GCC-NLM Professional Development Collection

By:
Sujata Krishna

GCC-NLM Professional Development Collection

By:
Sujata Krishna

Online:
< http://cnx.org/content/col11412/1.4/ >

C O N N E X I O N S

Rice University, Houston, Texas

Collection structure revised: March 2, 2012
PDF generated: March 26, 2012
For copyright and attribution information for the modules contained in this collection, see p. 166.

Table of Contents

Chapter 1

1. GCC-NLM Professional Development Repository[1]

Gulf Coast Consortia NLM Professional Development (GCC-NLMPD) Curriculum for Biomedical Informatics Graduates

Main Idea	Specific Topics	Credit
LEADERSHIP		
Developing a Lab	Leading [2] - Offers guidelines for leading an effective research team, including a look at the role of lab directors. Includes tips on developing a vision or mission statement, directing and motivating people, and managing projects.	Rice ADVANCE
	Staffing a Lab [3] - This online book provides useful information and advice for staffing your research lab, and is available for free download. Sections include advice on hiring postdocs and technicians and choosing the best postdoctoral position.	Burroughs Wellcome

continued on next page

[1] This content is available online at <http://cnx.org/content/m37008/1.87/>.

	Interviewer Skills [4] - This workshop provides basic techniques and evaluation procedures used to screen for the best candidates	NIH video (1 hr)
	Designing Space [5] - Advice on construction of a new lab, and tips on storing and disposing of chemicals according to local rules and regulations.	Science Magazine Online
Management skills for Research	Setting Up Your First Lab [6] - Tips regarding the overall vision as well as potential personnel, equipment, and/or budget issues. Also gives a brief look into the daily life of an assistant professor and tips on gaining visibility. Setting Up Your Lab Video (1 hr) [7] (Video Transcript) [8]	Rebekah Drezek & GCC-NLMPD - Brendan Lee
	Compliance [9] – A downloadable PDF version of the Guidelines for the Conduct of Research in the Intramural Research Program at NIH.	NIH
	Animal [10] - The primary reference for use and care of laboratory animals in research, and is intended to assist investigators in fulfilling their obligation to plan and conduct animal experiments in accord with the highest scientific, humane, and ethical principles.	Institute of Laboratory Animal Resources, Commission on Life Sciences (National Research Council)

continued on next page

	Human subjects [11] - Provides a definition of human subjects research, as well as a brief overview of what educational activities do and do not constitute such research.	Research Administration, UC Irvine
	HiPAA [12] - links to the main page for HiPAA information at HiPAA.org. Includes information regarding the law, the DHHS, identifiers, transactions, and more. Also provides additional resources.	HiPAA.org
	IRB [13] - Provides information on which activities require IRB Review.	Research Administration, UC Irvine
	FDA [14] - links to the main page for the Food and Drug Administration, under the US Department of Health and Human Services (HHS). Includes information for scientists, researchers, and the general public.	FDA
	Running meetings [15]- Gives advice on how to run fun and effective lab meetings. Includes tips on preparation and activities before, during, and after the meeting.	AntLeader Leadership Series, UC Irvine
	Motivating Others[16] - focuses on the best way to motivate those around you to become happier, more efficient workers. Includes a chart of proficiency levels; how not to 'overdo it' in your motivation; essential questions you should ask yourself regarding motivation and improving efficiency; good interview questions to ask to evaluate the motivation level of prospective employees; and tips for learning on the job. A list of recommended reading is also included for further study.	Microsoft Education

continued on next page

	Employee Feedback [17] - suggestions about giving effective feedback to employees and coworkers. Also includes a list of recommended books to increase leadership and interpersonal skills.	New York Univ. HR
	Listening skills[18] - Advises on the role of the empathetic listener in helping others to see past any negative and/or stressful emotions, coining the phrase "listening first aid." Includes free downloads of a 1 hr long seminar on listening skills (.mp3)	Gregorio Billikopf,UC-Davis
	Communicating in teams[19] - Focuses on team building, collaboration, and communication and is directed towards project managers. Includes tips on building a collaborative team, ideas for mobilizing the team via team building and social events, concepts such as Management By Walking About (MBWA), and advice for verbal and non-verbal communication with team members.	Simon Wallace
	Change communications [20]- This link provides ten key things to keep in mind when planning, announcing, implementing, and communicating a change initiative.	Sarah Fenson, Inc.
Management skills for Industry	Writing effective emails [21] - A concise summary of guidelines for writing professional emails.	NIH
	Internal correspondence [22] - Gives pointers as to how best to use internal communication at work to create a company culture and common goal.	Bacal and Associates

continued on next page

	What not to say by email [23] - States 10 brief points to not put in an email.	Roger Matus
Mentoring Skills	Being a mentor[24] - How to improve your mentoring skills and explores issues that affect the research mentoring relationship. Includes free training materials and pre-made or custom curricula. (Mentor Relations Video - 1hr)[25] (Mentor-Mentee Expectations Video - 1 hr)[26]	Chris Pfund + Gayle Slaughter + Carrie Cameron
	Mentor-BioMedical Graduate Compact [27] - downloadable compacts for mentor-graduate relationships. These compacts include summaries of one's role and commitments as a graduate student, postdoc, or mentor.	AAMC
	Mentor-Postdoc Compact[28] - downloadable compacts for mentor-postdoc relationships. These compacts include summaries of one's role and commitments as a graduate student, postdoc, or mentor.	AAMC
	Conflict Management [29] - Free download of the book Party-Directed Mediation: Helping Others Resolve Differences (2nd Edition) as a PDF file. This book includes ideas for improving management of deep-seated interpersonal conflict through sound, research-based ideas.	Gregorio Billikopf, Univ. of California-Davis

continued on next page

STRATEGY		
Grant Writing	Obtaining Funding: Introduction [30] - An overview of grant writing, this page includes tips on how to write a successful proposal, be a competitive applicant, and obtain funding. Also includes general outline of review criteria for NIH and common grant requirements. Grant Writing: K99/R00 and R01[31] - Slides from a workshop by this title. Talks about the mandatory and optional/supplemental form and how to obtain them, requirements for R01, overview and requirements of the Pathway to Independence (K99/R00) awards. Video (2.5 hrs) [32] Video Transcript [33]	GCC-NLMPD - Phyllis McBride
	Small Grants R03 and Specific Aims [34] - A video (1.25 hrs) of the R03 grant application, followed by reviewing 1-page Specific Aims	GCC-NLMPD Phyllis McBride
	NLM Career Awards in Biomedical Informatics[35] - Slides from the NIH-NLM webinar by this title.	NIH
	(Video) [36] - A video of a 2 hr workshop on Introduction to Grant Writing	GCC-NLMPD - Phyllis McBride
	Tips [37] - A general advice page on obtaining grant funding, including tips for successful proposal writing and funding agencies to consider.	Rice ADVANCE

continued on next page

	NIH-Grants [38] - Includes general tips for applying for an NIH grant, specialty programs/awards for early-career scientists, and web resources.	Rice ADVANCE
	Sample R01 Applications [39] - Four samples of exemplary R01 applications with the research strategy	NIH
	Grant reviews[40] - Video (.mp4 file) on the grant review process.	NIH Video (2hr 25 min)
	Dealing with Development & Donors [41] - A webpage with FAQs on donor development.	Mal Warwick Associates
	Research Administration Terminology [42] - Provides a glossary of research administration terms, many of which include relevant links for further study.	RCR Administrators
Networking	Professional Societies [43] - The value of joining Professional Societies is discussed briefly. A list of some important Professional Societies in various fields associated with the broad area of Biomedical Informatics is presented.	GCC-NLMPD - Sujata Krishna
	Networking at Conferences and Meetings [44] - Advice on designing a network-friendly conference, including tips for reminding attendees of the "networking basics."	Ed Bernacki
	Social Fluency[45] - Includes an introduction to social fluency, and tips on preparing for a network event and building your network over time.	GCC-NLMPD - Beth O'Sullivan

continued on next page

	List of Contacts [46] - A concise overview for generating a list of networking contacts.	NIH materials
	Implicit Association[47], Professional Etiquette [48] - Presents a method, called the Implicit Association Test (IAT), that demonstrates conscious-unconscious divergences much more convincingly than has been possible with previous methods. Includes free implicit association tests as part of on-going research.	NIH Materials
DECISION MAKING		
Career Pathways	Planning Your Career: Satisfaction and Success[49] - The workshop provides insight into planning a job search, finding jobs, and using internet and community resources. Topics include self-assessment, transferable skills, networking, defining success, personal needs, work/life balance, and defining short-term and long-term goals.	NIH video (2 hrs)
	Advice on how to choose a career[50] - Succinct general advice on how to choose your life's work	Steve Jobs
	Informational Interviews and Job Shadowing[51] - Advice on what to ask at an informational interview	Nature Scitable
	Plotting Your Career in Biomedical Informatics[52] - Deals with terminology in the field and what to think about when deciding your career in this field.	GCC-NLMPD Ted Shortliffe

continued on next page

	Short- & Long-term planning[53] - Provides advice for those seeking a job after undergraduate education, as well as on short-term and long-term career planning.	Quintessential Careers
	Career Pathways in Biomedical Informatics (Video Vignettes)[54] - consists of five video vignettes that offer a peek into the career paths of some individuals in the Biomedical Informatics area, including an assistant professor, a technical writer, and PhD and MD researchers working in a clinical lab setting.	GCC_NLMPD - Sujata Krishna + Gale Wiley
	Obtaining and Negotiating a Position in Industry [55] - Advises on the best way to negotiate a position in industry. Topics include what to look for in a job offer as well as understanding the new team environment.	NIH video (1.5 hr)
	A Fitting Postdoctoral Position[56]- An brief article about issues to consider when choosing a post-doctoral position. See comments on the article, as they are valuable advice.	Inside Higher Ed
	An Academic Career[57]- Summary of a keynote presentation regarding careers in academia. Includes suggested reading, advantages of working in academia, and common fears when deciding such a career path.	Rice ADVANCE

continued on next page

	Dossier for Faculty Applications[58] - Advises on what you need in your dossier, teaching and research personal statements etc.	Stanford University
	Obtaining a Faculty Position in HE [59] - Includes tips on the application itself, research and teaching statements, and how to make your application stand out.	Rice ADVANCE
	Negotiating a Faculty Position in HE [60] - Introduces the reader to things to consider when negotiating a start-up package in the science and engineering fields, including research lab equipment/space and teaching assignments. Sample Cover Letters for a Faculty Position [61]	GCC_NLMPD
	Tenure & promotion criteria[62] (Video - 1 hr) [63] - Gives advice regarding the university promotion and tenure process to graduate students and post-docs who aspire to academic faculty positions. Includes tips on dossier preparation and how to best market your research, teaching, and service experience.	Rice ADVANCE
Ethics	Plagiarism [64] -Includes a module to help students and professionals identify and prevent plagiarism and other questionable writing practices, and to develop an awareness of ethical writing. Includes sections on plagiarism, self-plagiarism, and the lesser crimes of writing.	Office of Research Integrity, HHS

continued on next page

	Research misconduct[65] - This 26 page PDF involves a Virtual Experience Interactive Learning Simulation (VEILS) program, in which participants will assume one of four playable roles: a graduate student, a postdoctoral student, a principal investigator, or a research integrity officer. In each segment, the character has to make decisions about how to handle possible research misconduct.	Office of Research Integrity, HHS
	Respond to Research Wrongdoing[66] - A user-friendly guide to how to respond to research wrongdoing.	American Association for the Advancement of Science
	Responsible Research [67] - On the subject of dual use research, including public health and national security concerns.	NIH video (2 hr 28 min)
	Animal–based research[68] - This page from the APA outlines the goals of the Committee on Animal Research and Ethics (CARE). Also includes related resources, annual reports, and contact information.	American Psychological Association
	Medical Ethics [69] - Ethical challenges at the intersection of clinical research and clinical practice.	NIH video(1 hr)
	Exploitation [70] - Focuses on the ethical and regulatory aspects of clinical research, including research protocols, informed consent, and controversial issues relating to human subject research.	NIH video (2 hr 28 min)

continued on next page

	Professionalism in Medicine [71] - Focuses on using two traditions of open ocean navigation to increase moral development and professionalism in medicine.	NIH video(1 hr)
INNOVATION		
Innovation	From Academia to Your Own Start-Up [72] (Video Transcript) [73] - An example of an academic who successfully starts-up his own Biotech company	GCC_NLMPD - Glauco Souza
	On Innovation [74] - 19 min video by Charles Leadbeater on innovation, patents and copyrights and open-source, shared innovation.	TED
Research Ideas	Creativity and Paradigms [75] A talk about 5 spokes in the creative wheel: Challenge, Autonomy, Purpose, Mastery and Tools.	GCC_NLMPD - Tom Kraft
	Creativity [76] - Focuses on the best way to instill creativity in yourself and those around you. Includes a chart of proficiency levels; how not to 'overdo it' in your creativity; essential questions you should ask yourself regarding creativity and improving efficiency; good interview questions to ask to evaluate the creativity level of prospective employees; and tips for learning on the job. A list of recommended reading is also included for further study.	Microsoft Education

continued on next page

Scientific Curiosity	Bringing an idea to the market (video 1hr) [77] – patents, licensing and income issues are discussed and a timeframe suggested.	GCC-NLMPD - Larry Hope
	Utility Model [78] - A brief summary of the function of a utility model, including what it can protect, how it can be invalidated, and the difference between a utility model and a patent.	Forssen and Salomaa Oy
	Technology transfer issues [79] - This website gives the policy and procedures at Stanford university. It may be studied as an example of how technology transfer is dealt with at a university.	Stanford University Website
EXECUTION		
Writing skills	Dissertation [80]- Concrete tips in a starter-kit on how to get a Dissertation Writing Group together and how to keep it going	University of Wisconsin
	Writing a Paper for Nature [81] (video transcript) [82] From the perspective of two professors who have published several articles together in the journal Nature or Science, they reveal how to adjust ones writing style to such a journal. Includes detailed comments on student abstracts.	GCC_NLMPD Shaulsky and Kuspa
	Scientific Papers [83], Abstracts[84]- This link provides step-by-step help for writing a research paper. This in-depth video covers each of the components of a strong abstract, including title, intro, thesis, materials and methods, results, summary, and conclusion.	SACNAS

continued on next page

	Writing a Scientific Paper [85], How To Submit a Paper to a Journal[86]- This link provides tips for how best to present your research results for publication and how to submit the paper.	Science and Development Network
	Writing as a Team [87] - A summary of the tips for team work and team writing.	GCC-NLMPD - Beth O'Sullivan
	Use of new media [88] – While few Universities have a formal policy on the use of new media this link provides some insight into the issue.	University of Minnesota
Communication skills	Communication strategy [89] - Helps you think about your goals and motivations in choosing how best to communicate.	AHRQ
	Elevator Talks[90] Five Minute Presentations[91]	GCC_NLMPD Tom Kraft
	Technical Presentations[92]	Rice ADVANCE
	Citing from Twitter[93]	The Atlantic
	Designing a Presentation[94]	NIH Training video (2.24 hr.min)
	Presenting seminars[95] - This link provides instructions on how to capture and hold your audience's attention, what should be included on your slides, how much text, and which font and illustration should be used on your presentation.	NIH video(1 hr)

continued on next page

	Poster presentation skills[96] - This presentation focuses on selecting and organizing data, what to include and what not to include, the key components of a successful poster, lay-out and font selection, and poster presentation.Poster Design video (1 hr)[97]	NIH Video (1 hr)+ GCC Workshop video
	Dealing with the Media - Your Work in the Headlines[98] - This link provides information on why you should agree to an interview, what could go wrong in an interview, and how to prepare for good media interactions.	Elisabeth Pain
	Public speaking about your research[99] - Tips on public speaking	Dewey Decimal Classification
	Chairing a Conference Session[100] Introducing speakers, managing time, managing questions	Nature Scitable
	Panel Discussions [101] Preparing a panel, moderating the discussion	Nature Scitable
	Team presentation skills [102] - Brief but informative list originally published in the January 1998 issue of Presentations magazine gives 10 team presentation tips from the pros.	Jon Hanke
	Teaching [103]– University Teaching and Learning Center offers a handbook for teaching, tip and advice on what works	Stanford University
Networking Skills	CV and resume [104] - This workshop highlights the critical elements and structure of both CVs and resumes. These important job documents serve as the foundation for all job searches, and knowing how to create them based on the employment sector and published position description is essential.	NIH

continued on next page

	Formal Letters, [105] - A brief introduction to writing formal letters such as cover letters, focusing on their content and tone	Nature Scitable
	Cover Letters, [106] - Focuses on cover letter and resume construction targeted towards industry jobs.	NIH
	Thank You Letter [107] - How to write a thank you note after a job interview, and how to accept or decline an offer in writing.	Nature Scitable
	Interview Preparation [108] - Invaluable for anyone preparing for an employment interview in academia or industry. Includes sample lists of questions asked by employers, behavior-based questions, questions asked for academic positions, and questions you can ask your interviewer. Also includes a basic list of interviews do's and don't's.	NIH Materials- video (65 min)
	Interviewing Skills[109] - Summarizes a panel discussion on how to stand out during the faculty candidate interview process. Includes advice on preparing for the interview, preparing your questions, and what to do after the interview is over. Interviewing Skills video (1.5 hrs)[110]	GCC-NLMPD - Gayle Slaughter (video)

continued on next page

	(video)[111] - focuses on hot to give an outstanding, memorable job talk for a variety of audiences. Learn important elements to be included in any job talk, tips on giving a successful academic "chalk talk," how to structure your talk for your specific audience, and more!	NIH Video(2 hr)
	Behavioral Interviews [112] - This webpage describes behavioral interviews and where they are used. Links to sample questions.	Quintessential Careers
	Interview for Industry [113] - Summarizes a panel discussion on how to maximize the impact of your faculty candidate interview seminar. Includes advice on what to know before your visit, how to handle yourself during the visit and departmental talk, and how to tackle hard questions.	Rice ADVANCE, NIH video (1hr:47 min)
	Interview Seminar[114] (video)[115] - The video provides strategies on how to maximize the impact of your interview seminar.	Rice ADVANCE, NIH Video (2 hrs)
	Evaluating Positions and Negotiating a Job Offer[116] - This video provides networking skills, particularly position evaluation and job offer negotiation.	NIH
	Elevator Talk [117] - Links to a YouTube channel of business proposal 'elevator pitches' - approximately one minute long speeches – given by students competing in the 2011 Rice Business Plan Competition.	Rice University

continued on next page

Time Management	Prioritizing, Making Timelines [118] - provides a brief overview of time management, including advice on clarifying your goals, delegating successfully, and managing procrastination and stress. Also included is a link to Randy Pausch's talk on time management. Time Management video (1hr) [119] - Based on David Allen's 'Getting Things Done'	GCC-NLMPD- Sujata Krishna GCC_NLMPD- Marie Wehrung
	Setting Goals [120] - This video provides information on how to set goals to maximize productivity and to effectively manage time.	NIH video (1hr, 40 min)
Collaboration	Collaboration and Team Science [121] - Pertinent questions regarding your readiness to participate in and/or lead a successful research team. The project seeks to discover a set of best practices for collaborations among NIH scientists and researchers and offers a free Team Science Field Guide.	NIH: Bennett, Gadlin and Levine-Finley
	Conflict Resolution [122] - This webpage provides information on common conflict and steps for conflict resolution. Conflict Resolution video(2 hrs) [123]. Video Transcript[124]	University of Wisconsin + GCC_NLMPD- Mikki Hebl.

Table 1.1

[2] http://cnx.org/content/m33896/latest/
[3] http://www.scribd.com/doc/2544488/Staffing-the-Lab-Perspectives-from-Both-Sides-of-the-Bench
[4] http://videocast.nih.gov/Summary.asp?File=12484
[5] http://sciencecareers.sciencemag.org/career_development/previous_issues/articles/1680/toolkit_designing_your_laboratory/
[6] http://cnx.org/content/m37012/latest/
[7] http://bit.ly/jje7OG
[8] http://cnx.org/content/m41611/latest/
[9] http://sourcebook.od.nih.gov/ethic-conduct/Conduct%20Research%206-11-07.pdf
[10] http://www.nap.edu/openbook.php?record_id=5140
[11] http://www.research.uci.edu/ora/hrpp/definition.htm#Definition
[12] http://www.hhs.gov/ocr/privacy/
[13] http://www.research.uci.edu/ora/hrpp/definition.htm
[14] http://www.fda.gov/default.htm
[15] http://spac.ucdavis.edu/forms/leadership_tips/running_fun_and_effective_meetings.pdf
[16] http://www.microsoft.com/education/competencies/comp_motivatingothers.mspx
[17] http://www.managementhelp.org/commskls/feedback/basc_gde.htm
[18] http://www.cnr.berkeley.edu/ucce50/ag-labor/7article/article40.htm
[19] http://www.epmbook.com/team.htm
[20] http://www.inc.com/articles/2000/06/19312.html
[21] https://www.training.nih.gov/writing_professional_e-mail
[22] http://performance-appraisals.org/Bacalsappraisalarticles/articles/comstrat.htm
[23] http://www.deathbyemail.com/2008/12/10-things-never-to-put-in-email.html
[24] http://www.researchmentortraining.org
[25] http://wmdp.rice.edu/NaturalScience/KeckCenter/Sem/KeckSem-11Feb11/KeckSem-11Feb11.mp4
[26] http://bit.ly/uWdbAi
[27] https://www.aamc.org/initiatives/gradcompact/
[28] https://www.aamc.org/initiatives/49784/postdoccompact/
[29] http://www.cnr.berkeley.edu/ucce50/ag-labor/7conflict/
[30] http://cnx.org/content/m37150/latest/
[31] http://cnx.org/content/m38302/latest/
[32] http://bit.ly/kWEpTB
[33] http://cnx.org/content/m41666/latest/
[34] http://bit.ly/zMoFAq
[35] http://www.nlm.nih.gov/ep/NLM_EP-Webinar9_22_11.pdf
[36] http://bit.ly/etaEf3
[37] http://cnx.org/content/m37014/latest/
[38] http://cnx.org/content/m19394/latest/
[39] http://www.niaid.nih.gov/researchfunding/grant/pages/appsamples.aspx
[40] http://videocast.nih.gov/podcast/oite/oite062910/oite062910.mp4
[41] http://www.malwarwick.com/mals-corner/askmal/donordevelopment.html
[42] http://ori.dhhs.gov/education/products/rcradmin/glossary.shtml
[43] http://cnx.org/content/m37088/latest/
[44] http://www.successfulmeetings.com/Event-Planning/Conferences/Articles/How-to-Design-a-Networking-Friendly-Conference/
[45] http://cnx.org/content/m37016/latest/
[46] https://www.training.nih.gov/generating_networking_contacts
[47] http://implicit.harvard.edu/implicit/demo/
[48] http://videocast.nih.gov/ram/oite032509.ram
[49] http://videocast.nih.gov/summary.asp?Live=10055
[50] http://www.bbc.co.uk/news/world-us-canada-15197932
[51] http://cnx.org/content/m37008/latest/www.nature.com/scitable/topicpage/panel-discussions-13909630
[52] http://bit.ly/iuCCzf
[53] http://www.quintcareers.com/career_plan.html
[54] http://cnx.org/content/m37011/latest/
[55] http://videocast.nih.gov/summary.asp?Live=8661
[56] http://www.insidehighered.com/advice/2011/06/01/essay_on_picking_a_postdoc_position#Comments
[57] http://cnx.org/content/m36864/latest/
[58] http://cnx.org/content/m36874/latest/
[59] http://studentaffairs.stanford.edu/sites/default/files/cdc/files/DossierPreparation_05-06.pdf
[60] http://cnx.org/content/m19388/latest/
[61] http://cnx.org/content/m43411/latest/

[62] http://cnx.org/content/m38087/latest/
[63] http://bit.ly/hOGhiQ
[64] http://ori.hhs.gov/education/products/plagiarism/
[65] http://ori.hhs.gov/TheLab/TheLabGuide.pdf
[66] http://www.koocher.com/images/RRW_7-17-10.pdf
[67] http://videocast.nih.gov/summary.asp?Live=9435
[68] http://www.apa.org/science/leadership/care/index.aspx
[69] http://videocast.nih.gov/summary.asp?Live=9410
[70] http://videocast.nih.gov/summary.asp?Live=9628
[71] http://videocast.nih.gov/summary.asp?Live=9412
[72] http://bit.ly/vG3EI0
[73] http://cnx.org/content/m43325/latest/
[74] http://www.ted.com/talks/charles_leadbeater_on_innovation.html
[75] http://bit.ly/x9t8U6
[76] http://www.microsoft.com/education/competencies/comp_creativity.mspx
[77] http://bit.ly/iHKuWI
[78] http://www.fspat.com/utility_model.html
[79] http://rph.stanford.edu/5-1.html
[80] http://www.grad.wisc.edu/education/gspd/dwgstarterkit.pdf
[81] http://bit.ly/vtUUDJ
[82] http://cnx.org/content/m43326/latest/
[83] http://www.ruf.rice.edu/~bioslabs/tools/report/reportform.html
[84] http://sacnas.org/content/writing-effective-abstract
[85] http://www.scidev.net/en/practical-guides/how-do-i-write-a-scientific-paper-.html
[86] http://www.scidev.net/en/practical-guides/how-do-i-submit-a-paper-to-a-scientific-journal-.html
[87] http://www.cs.pomona.edu/~markk/cs121.s07/supp/teams.html
[88] http://www.oit.umn.edu/tech-brief/social-media/index.htm
[89] http://bit.ly/f0zP3C
[90] http://bit.ly/xNv2Dq
[91] http://bit.ly/rY1dkz
[92] http://cnx.org/content/m36873/latest/
[93] http://bit.ly/x5Ck0S
[94] http://videocast.nih.gov/launch.asp?16513
[95] http://videocast.nih.gov/launch.asp?16513
[96] http://videocast.nih.gov/summary.asp?Live=9360
[97] http://bit.ly/mmVztI
[98] http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2008_09_12/caredit.a0800134
[99] http://www.aresearchguide.com/3tips.html
[100] http://www.nature.com/scitable/topicpage/chairing-sessions-13908566
[101] http://www.nature.com/scitable/topicpage/panel-discussions-13909630
[102] http://www.ou.edu/class/bc2813/PresentationTips/10TipsFromThePros.htm
[103] http://ctl.stanford.edu/further-ctl-resources.html
[104] http://videocast.nih.gov/summary.asp?Live=10113
[105] http://www.nature.com/scitable/topicpage/thank-you-letter-13989101
[106] http://videocast.nih.gov/Summary.asp?File=14776
[107] http://www.nature.com/scitable/topicpage/formal-letters-13988017
[108] https://www.training.nih.gov/assets/Interviewing_Handout.pdf
[109] http://cnx.org/content/m36869/latest/
[110] http://bit.ly/lBHGno
[111] http://videocast.nih.gov/Summary.asp?File=14792
[112] http://www.quintcareers.com/behavioral_interviewing.html
[113] http://videocast.nih.gov/Summary.asp?File=14806
[114] http://cnx.org/content/m36865/latest/
[115] http://videocast.nih.gov/Summary.asp?File=14583
[116] http://videocast.nih.gov/podcast/oite/oite011410/oite011410.mp4
[117] http://www.youtube.com/user/jonesgraduateschool#g/c/01D470865EA983AC
[118] http://cnx.org/content/m37116/latest/
[119] http://bit.ly/lWf2SC
[120] http://videocast.nih.gov/podcast/oite/oite120908/oite120908.mp4
[121] https://ccrod.cancer.gov/confluence/display/NIHOMBUD/Home
[122] http://www.ohrd.wisc.edu/onlinetraining/resolution/index.asp

Acknowledgement
The project described was supported by Award Number T15LM007093 from the National Library of Medicine. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Library of Medicine or the National Institutes of Health.

[123] http://bit.ly/ma4Jhu
[124] http://cnx.org/content/m41551/latest/

Chapter 2

2. Setting Up Your First Lab[1]

NOTE: " * Adapted from Dr R. Drezek's Keck Seminar (2006) "*Establishing a New Interdisciplinary Biomedical Research Lab*[2] " "

This document is for those who want to be a University Professor. Here you will find advice on when and how to start thinking about building your own lab.

Take stock of where you are in your career progression at present and where you wish to be in one, five and ten years. Plan accordingly. Discuss these plans with your current mentors and colleagues. This provides a reality check and someone may show you something you had not thought of.

Here is a flavor of what you are in for as an Assistant Professor.

2.1 A Typical Day as an Assistant Professor

(Published with permission.)

A Typical Day of Dr Drezek, as an Assistant Professor	
8:30-10:15	Meeting at MDACC on OR ovary study. Our protocol was approved. (Yay!). Did we mention it has to be absolutely pitch dark?
	Try to get back to Rice on time for Nanobio training review. Hope it is not raining (irritates my Segway...)
	continued on next page

[1] This content is available online at <http://cnx.org/content/m37012/1.2/>.
[2] http://edtech.rice.edu/cms/?option=com_iwebcast&task=webcast&action=details&event=622

10:15-10:30	Nanobio student #1 review (I am co-supervisor on joint project)
10:30-10.45	Nanobio student #2 review (I am co-supervisor on joint project)
10.45=11.00	Meeting with postdoc #1 on paper revisions due last week.
11:00-11:30	Meeting with student project team #1 for BIOE 572
11:30-12:00	Meeting with grad student #1 on fl project.
12:00-12:30	Meeting with grad student #2 on job search.
12:30-1:00	Meeting with grad student #3 on protocol for R21 (Did I mention I have a R21 due today? By 5:00.)
1:00-1:30	Forage office for food.
1:30-2:00	Meeting with student having HW trouble in BIOE 572
2:00-2:30	Meeting with student project team #2 for BIOE 572
2:30-3:00	Meeting with grad student #4 on paper submission
3:00-4:00	Weekly teleconference on RO1 #1. Curse each other (as always) for choosing mouse model for colon cancer. Learn more than you ever care to know about strategies for colonoscopy in mice.
3:45-4:00	Leave teleconference early to hook up computer for this seminar
4:00-5:00	Give seminar.
5:00-6:00	Teleconference to discuss competing renewal of RO1 #2.

Table 2.1

2.2 Life as an Assistant Professor

You might think your biggest problem will be getting funded. Nope. Your biggest problem will be **time**, if you are successful.

Fall 2002 (Year 1)	**Fall 2005 (Year 4)**
1 graduate student/0 postdocs	10 graduate students/2 postdocs
No grants	Funding from NIH, NSF, and private foundations
~1000 sq ft lab/office space	~1800 sq ft lab/office space
Never had taught a class	Taught 6 classes
Did most of research myself	Mostly manage others
Being a professor feels like a big stretch...	Being a professor feels relatively OK...

Table 2.2: Changes with Time for an Assistant Professor

2.3 Planning Your Lab

This section covers: The vision, Personnel Issues, Equipment Issues and Budget Issues.

The Vision:

- Put together a plan for *your* research program – separate from your PhD or postdoc advisor – the year before applying for jobs, i.e. in the last stages of your training. Outline the material and personnel needs for this vision. You will need this to negotiate your faculty position.
- Decide how much of your lab will focus on techniques known to you and how much effort will be devoted to learning new techniques. Do new techniques involve a robust piece of equipment you can buy or do you need time on a shared facility.? For example, Confocal microscopy, Real-time PCR etc. may be core facilities you want to buy time on. Consider costs, feasibility and timelines.
- If you are going to handle animals, human samples or radiation get approval and licenses ahead of time.
- Collaborating with others on a campus can begin to get you useful data while you own lab is still being set up. If the Department has new techniques of interest and faculty who are open to sharing/mentoring you are in a strong position.
- Your 'vision' will help determine where you seek a faculty position.
- Consider the way Science Research is structured at your University – how funding opportunities affect the short-term and long-term success.
- Prioritize what your first students will work on – make sure it is different enough from your last lab that people will know it is yours.
- Productivity – In most research circles productivity is measured in papers and grants.
- Not all your time will go into directly productive activity. You will need some time to set-up and train your lab.
- Introduce yourself early to the department's finance and purchasing officer.
- There is no ready manual for how to set up and build your own lab for the first time

Personnel Issues:

- 4 types of personnel may be in your lab – postdoc, grad student, undergrad and technician. Technician may be productive straight away, graduate student after a couple of courses, and post-docs somewhere in between. Postdocs have a vested interest in productivity. Carefully match research tasks to appropriate personnel. Failure to do so will waste time and cause discontentment.
- Expectations & Objectives – You need to set these out clearly for each person in your lab.
- Productivity does not scale linearly with numbers of students/postdocs
- While it is tempting to grow as fast as possible, resist this – better to grow gradually

- Plan to have a steady flux of students in/out of your lab and avoid a major phase transition 5 years in
- Have a plan for what size group is right for you – don't let your grants completely dictate this (it can be easier to obtain grants than to manage them.)
- Be very, very picky about who is in your group! Go for quality rather than quantity.
- You will need to invest time in training new personnel or setting up new techniques. Plan carefully and optimize use of your time.
- Get to know your HR to familiarize yourself with local hiring practices. HR will help you determine the salary range for the level of personnel you hire. See if you can hire people with a 'trial period' within which either side can withdraw with no negative consequences.

Equipment Issues:

- Find out what your school has available
- Don't make assumptions – Rice didn't have a good confocal microscope when I arrived and I had never thought to ask...
- Play the vendors off each other (Fisher/VWR etc.)...
- Can save a lot of money buying used equipment - check out Rob Raphael's E-bay lab at Rice University.
- Contact the Health and Safety Officer for lab safety requirements
- VWR has an online lab planner[3] and checklist[4] .

Budget Issues:

- Draw up a budget before you begin. It must include consumables, small equipment etc. and have room for contingency.
- Budgets are usually discussed as part of Negotiating Your Faculty Position. Else, speak to your Department Chair.
- Lab Space – Can customized alterations be made to the lab space to suit you? Check with buildings people to ensure compliance issues and provision of outlets, ventilation, gas lines, internet access etc.
- Try to have your start up $s loosely defined – a pile of $s you can use for anything, so you can move start up equipment $ to people $. And shift more equipment and less people $s to your grants (when possible)
- This way if you move schools during your career, in most cases, you can keep your stuff.
- Retooling and repeated training of lab personnel will be necessary over time.
- Ask your chair to 'carry over' a bit of money you save in a flexible account that you can use to seed new work, pay a student, purchase something you forgot earlier or to fix something.
- Keep an organized file of your orders. It will make reordering consumables much easier.
- Create a procedures and protocols book and standard data template. Require all workers in the lab to follow the same procedure.

2.4 Gain Visibility as an Assistant Professor

- Get your own students to conferences early on – helps advertise to your field your switch to PI
- Loyalty does *not* mean not considering the possibility of being somewhere else – being in demand can help your own, your department, and your institution's prominence (Proceed with caution!)
- Speak at meetings
- Publish
- Write reviews.
- The more your name is out there the better your networking opportunities and grant success, also greater likelihood of attracting good staff.

2.5 Protect Your Time Relentlessly

- Be really careful about service – tempting to do too much too soon
- Actively limit teaching preparation time
- You absolutely can't say no enough...
- It is OK to say no to review requests, panels, talks...
- Know which things don't deserve your best effort – save it for what really matters
- Know which things don't deserve *any* effort
- Pre-tenure years pass very, very quickly...

[3] http://www.vwrsp.com/labplanner
[4] https://www.vwrsp.com/new_lab/page.cgi?tmpl=index

-
- Timeline for your Lab:

Last year of Post-doc	Offer of Faculty Position	Year 1	Year 4
Plan the lab and estimate a budget	Negotiate for lab monies based on your budget	Take on only as many students as you can handle. Results will not flow until lab is set up and students are trained.Apply for grants aimed at new faculty.	Plan to have as many students and post-docs as you can mentor.By this stage you want to be on large grants e.g.NSF, NIH

Table 2.3

Further Advice

- Seek advice from young Faculty while you are still a post-doc. Ask them how they settled in. What was difficult for them?
- Plan early, be creative and don't be afraid to take risks.

Help for Setting Up Specific Labs

- Setting Up a PCR Laboratory[5]
- Setting Up a Capillary HPLC Lab[6]

2.6 References

1. Drezek, Rebekah (2006) *Establishing a New Interdisciplinary Biomedical Research Lab*[7] *: The First Three (And a Half) Years.* Keck Seminar.
2. Andrade, Fancisco (2008), *Starting a New Lab*[8] , APS Mentoring Forum.
3. (2010) *VWR Lab Planning Guide*[9] .
4. Mifflin, T.E (2003). *Setting up a PCR Laboratory*[10] , Chapter 1, PCR Primer, Cold Spring Harbor Laboratory Press.
5. Mohan-Ram, Ved (2000) *The Art of Laboratory Feng Shui*[11] , Sciencecareers.sciencemag.org

Additional Bibliography:

Bonnetta L., (2006), *Making the Right Moves*[12] , Howard Hughes Medical Institute and Burroughs Wellcome Fund.

Barker K., (2002) *At the Bench*, Cold Spring Harbor Laboratory Press.

Barker K., (2010) *At the Helm*, Cold Spring Harbor Laboratory Press.

Goodrich, J.A. (2007) *Binding and Kinetics for Molecular Biologists*, Cold Spring Harbor Laboratory Press.

Glass D.J., (2006), *Experimental Design for Biologists*, Cold Spring Harbor Laboratory Press.

Cohen C.M & S.L. (2005) *Lab Dynamics*, Cold Spring Harbor Laboratory Press.

[5] http://www.biosupplynet.com/pdf/01_PCR_Primer_p.5_14.pdf
[6] http://www.ionsource.com/tutorial/capillary/caporder.htm
[7] http://edtech.rice.edu/cms/?option=com_iwebcast&task=webcast&action=details&event=622
[8] http://www.the-aps.org/careers/careers1/mentor/startingalab.htm
[9] https://www.vwrsp.com/lab_setup/pdf/lab_planning_guide.pdf
[10] http://www.biosupplynet.com/pdf/01_PCR_Primer_p.5_14.pdf
[11] http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2000_04_14/noDOI.3922973750920805208
[12] http://www.hhmi.org/resources/labmanagement/moves.html

Adams D.S. (2003), *Lab Math*, Cold Spring Harbor Laboratory Press.

Roskams, J. and Rodgers L., (2002), *Lab Ref.* , Cold Spring Harbor Laboratory Press.

Mellick, A. S. and Rodgers, L., (2006), *Lab Ref*, Volume 2, Cold Spring Harbor Laboratory Press.

Samett J.M.(ed.) (2004) *An Illustrated Chinese-English Guide for Biomedical Scientists*, Cold Spring Harbor Laboratory Press.

CSH Protocols[13] , , Cold Spring Harbor Laboratory Press.

(2005) Laboratory Research Notebook, Cold Spring Harbor Laboratory Press.

(2007) *Safety Sense: A Laboratory Guide*, 2nd Edition, Cold Spring Harbor Laboratory Press.

[13] http://cshprotocols.cshlp.org/cgi/content/abstract/2007/7/pdb.top14

Chapter 3

3. Transcript of the video 'Setting Up a Lab'[1]

3.1 Setting Up Your Lab Video Transcription:

http://edtech.rice.edu/www/?option=com_iwebcast&task=webcast&action=details&event=2511[2]

Professor Brendan Lee, M.D., Ph. D, Baylor College of Medicine

So my name is Brendan Lee and I'm of the faculty and scientist at Baylor College of Medicine, the Department of Molecular Human Genetics. And just to tell you a little bit about myself: so I do, I have two sort of areas in terms of research. I work on skeletal development and genetics of development. I also work on biochemical genetics, in more areas of metabolism. And I also do clinical research, longitudinal studies and interventional studies. So I kind of have 3 different domains, so I go from very basic to very research. This is a talk that I usually give once a year to the Baylor Post doc association, they have a seminar series focused on career development and things like that. So this talk is focused on some of the issues of how you would think about setting up your laboratory and process, and sort of the philosophy of setting up the laboratory, and some of the things to look for.

Let me have a couple of disclaimers. The first disclaimer is that this is purely my view of the world. And so, as you can imagine, you can completely disagree and that's perfectly fine. But I think that, you know, it may be helpful to you in the sense that I come at it from various disciplines, which is potentially, you know, one mechanism to see common themes among whether you do clinical research or basic research. As well as, I run a very large group. So I have, there are any one time 30-35 people in my group, and I train individuals, again, from all different walks of life, reflecting the difference in my research program. I have, you know, about equal amounts of predoctoral students, graduate students from Baylor, as well as medical students, as well as Ph.D postdoctoral fellows, as well as clinical postdoctoral fellows, and there's always a couple of junior faculty. So again, from my perspective, since I'm exposed to sort of, a wide variety of individuals, I mentor and I have to think about when I integrate a lab, you can view that as what it may, whether it may be worthwhile or helpful to you.

This is completely informal, at least when I give this talk. So please interrupt. If you see something you disagree with or agree with, you know, just interrupt. I don't have a lot of slides because, as I said, this is sort of an open-ended kind of discussion, and I'm not showing any secret, scientific data.

Alrighty. One second here.

Alright. Okay, so I think it's important to, just like you approach any problem in life, or science, you should have sort of a philosophy, and how you plan on tackling those issues as a scientist. So I want to talk to you about sort of some of the philosophical basis of when you set up your laboratory, how you could potentially think about going about

[1] This content is available online at <http://cnx.org/content/m41611/1.1/>.

[2] http://edtech.rice.edu/www/?option=com_iwebcast&task=webcast&action=details&event=2511

thinking about how you would set up a laboratory. So one of the things that I've always felt is that we should think of a lab really like a small business, you know. I think all of us want to work in a positive work environment, and a lot of times we get very attached to individuals that we work with. That's logical. I mean, if you're a postdoc or grad student, or what have you, you're there working hard for many hours of the day. And there often may be situations where you almost think of your lab as your family. You probably spend more time with the people in your lab, sometimes, perhaps, than your family. And so that's logical. But, at least from my perspective, I think it's important to really distinguish those issues and especially if you ultimately become the P.I, the principal investigator of the group. And I would recommend to really approach it from the perspective of a small business. And there are many reasons for this, and we'll go through it.

One thing I didn't do: how many of you are postdocs here and how many are grad students? Postdocs? And grad students? Okay, so shat's okay, I just want to, and that's relevant to me because you guys are all hopefully on the verge of going into this next step, so that's great.

One of the advantages of approaching things from a business model, and I was not a business major. I was a chemistry major, I want to say. But there are many things in the world of business that can teach us a lot of things, especially in this current funding environment. And academic environment. I think there are advantages in the sense that you approach your, your, sort of scientific venue and um, your domain from a business perspective, where you really set up much like a strategic plan would do in business, what is the mission, objective, and strategies to get there. And more importantly, you need to set up a true timeline to get there, because there are key timelines in all of your lives. Now, we think of science when we go into a lab and, you know, we have a great idea, and you want to discover something wonderful, and that's still why we do science. But the bottom line is, in this current day and age, it's you know, because of all the things that I don't need to get into: funding, academic requirements, etc, that's not how it works. You have to deliver something, and if you don't deliver something, well, you're next step, may or may not be there.

So it is important to have sort of a grounded foundation from the perspective of what is your mission, what are the objectives in this mission, and what are the strategies to get to this objective, much like you would do in a business plan, okay?

So that's number one. I think much like in small business, you need to think about leadership. How, and obviously when you start up your lab, it's not so, you might ask - it's going to be me and a postdoc or a grad student, or me and a technician. What do I even need to think about at this point? Well I would argue that if you are successful, obviously you could fall flat on your face and not get very far, but if you're successful, the habits that you establish early on will make it easier for you when you undergo an expansion and it's much harder to go back and change things. And there's a reason to this. I mean, think about all the tubes that you've generated, and all the samples you've generated during your Ph.D. And you think about all the stuff you generated during your

postdoc, if you actually had to go back and inventory everything and get it organized, you can imagine how complicated that would be and how much time that would take. So again, I think it's important, and this is good that they have sessions like this, that you really put some of these key point sin plan as you start out, even if you're going to start small. So leadership, thinking about how is it that you will lead this group, what type of model do you actually believe in in terms of leadership, and we'll get into some of those issues, okay.

Before even you set up your laboratory, when you start interviewing for jobs, okay, you guys do a session on negotiating a package and things like that? Okay, good. So even as you are in the process of negotiating faculty positions, think about things like space and capital, organized, when you set up your lab, you know, what are your space requirements, what are your capital equipment requirements, what are your infrastructure requirements? And that feeds into your small business, but you can't really do that small business if you don't really have a plan in terms of your mission, objective, and your strategy for getting there. So think clearly about space and capital, you have to address philosophy of staffing and hiring. How will you actually determine should you hire that postdoc or this postdoc or you know, that technician vs the other technician. So what are the things that you will think about, what are the qualities that you're going to look for, and you know, we'll get into that a little bit.

Training. So this is also very important. When you think about setting up a lab, you're not going to be doing everything yourself. Or if you do, that would be a very inefficient way to do the difficult types of finds that are advocated for you today, multidisciplinary science. So you need to think about, well, what are the mechanisms for training individuals in your lab because you may have a certain expertise and you can train that person to do that, but well, it may be that when you do your experiment or your strategy for achieving your first objective, it may require 3 or 4 different technologies. Also that's important in thinking wherever you go, are the people in place and a mechanism for you to get them their appropriate training so that you can actually get the experiment done that you need to get done?

And then, embedded in all this, and I'm a big believer in this, in terms of processes and standard operating procedures, I think it's always a good idea, see we're all scientist so we all know how to follow recipes and procedures, right? And we always change the procedures, because as we do them, we learn, and we get a new way of doing this and doing that, and you think you've got the best way of making the next best box, but it's very important that standard operating procedures are set up in a small business, just in the same way you should set it up in your lab. You would be surprised that I need to tell you guys. But since you guys are all postdocs, how many times the same mistake gets made over and over again in the lab, alright. And part of that is education. So certainly, my tolerance of a graduate student making the same mistake over and over again is different from a postdoctoral fellow, and you should think the same way, because making mistakes and is of the educational process, but it's extremely inefficient. And there's a balance in terms of ultimately, if you need to get to a certain point. You need to get a

certain paper out, or get to a certain grant deadline. One way to avoid this is not to make the same mistake over and over again, and believe it or not, as complex as science is, there's no such thing as a mistake that has never been made before. And so having a mechanism to incorporate that into your standard operating procedure is really, really important. I think critical when you have a lot to set up. And again, we can talk about how to do that.

Okay, so having said that, that the lab is a small business. Ultimately, it's still a community and just like small business, maybe. So I think that it's, it's important not to, while you may or may not espout what I say about this, it's not to forget about the other side of still maintaining a positive work environment, as principal investigator, so that individuals want to work there. Because obviously, as you guys know, you're not in this to make money, okay, or are you. If you are then you're making a big mistake, right? So you know, one rule I tell all my students and trainees, and that's because I was a grad student and a postdoc, it's really important that when you wake up in the morning that you are happy and excited going where you're going at least 51% of the time. So as long as you make that 51% rule, then you've got the right environment. I mean, we know science. There are many days when you go home completely miserable because you do the experiment, and it just doesn't work and you have no idea. And if you weren't miserable made by that, then you're not in the right job, the right situation, right? You're not passionate about what you're doing. But the point is, the majority of the time, you still have to be really positive and happy about going where you're going.

So, that's important in terms of, at least, my perspective when you start thinking about your lab environment. Any comments? Okay.

So, this question, well, then, you know, should a lab be a family, right? How many people here go out and socialize with their principal investigator? Okay. With other members, other postdocs in the lab? Okay. Grad students in the lab? Okay. So you know, that's great and that's completely fine, but as I said, if, as you work hard and interact a lot and you spend a lot of time with each other, there is a point where you know, that, you almost feel like this is a, the community becomes almost a family. And you know, it's interesting when you think about that. How many of you are part of families? Everyone's got a family, right, I assume. You are biologically alive and going around. How many of you have actually normal families? Right? My view is, and as a clinician I see lots of families including my own, and I don't think there's such a thing, you know, as a family that's not dysfunctional, partly. And so, I think that in thinking about this issue, you know, I'm somewhat facetious when I say it, but it's true. Because when you think have family structure, all sorts of things start factoring into those interactions. And you need to understand how that may or may not impact on you know, the productivity of your small business or your group. And it's something to keep

in mind, and then there is no perfect medium because I this is modified by your own personality. But, it's important, I think, when you go in, to sort of think, well what are the boundaries that I would like to set in running my small business? I, for example, fall more on the side of running it more like a business, and you know, it's not that we don't have a lot of interactions within the group

and so forth, but I try my best to sort of keep it within sort of the work environment for lots of reasons. And this become relevant where, when you know, you have a person who works for you in your lab who may be your best friend, but they're just a crappy technician – what are you going to do when it comes to hiring and firing? Can you fire your sister or your brother? Some people do, but you can imagine how it gets complicated on that level, so I think it's important to keep that in mind when you think about setting up the lab.

Process, process, process. I'm a bit believer in process. You know, that goes beyond standard operating procedure. So I'm not talking about making a virus, or making a piece of DNA or making a transgenic mouse, that's standard operating procedure. But I believe that the everyday simple stuff of how a lab works should be governed by process, process, process. And people sometimes think, that's really anal retentive or obsession compulsive, and there's always a borderline because, you know, what can be useful in one setting, can be pathological in another setting. But I think that again, from the perspective from when you have diverse environments, diverse individuals, diverse cultures, because again, in science especially, we have very diverse cultures, you don't want individuals personalizing their habits. You know, how something as simple as a bench should be cleaned up, or how we keep track of different things in the lab. You'd be surprised how little things like that can turn into big things when you have cultural differences, and it's not because. Because you might think the person next to you is extremely sloppy, and frankly, for them, that's their, sort of, social norm, right? And so how do you get around those issues? Because from their perspective, there's nothing wrong. And truly, it's not that they're a bad person or their pathological, cause that's their context, right? All of science and medicine is context dependent, and so are we. We're all context dependent. So the way you avoid those issues is to have process that govern each of those things that's document. So I think that's important to keep in mind, okay.

Another point to think about is the needs of the lab vs. the needs of the individuals. So you know, it's sort of a balance again, that you need to think about. You have to prepare a grant, you have to get certain things done so you can get papers out. That's the need of you and the greater lab, right? Because you represent the small business. At the same time, a grad student needs to get their training done, get their thesis written. Postdoc needs to, you know get, a first author publication and a story they can tell when they go to the next step, you guys to look for a job. That may or may not be consonant with what the lab needs. Maybe the lab needs a high, high priority experiment that needs to be done, and everyone needs to work on it, because ultimately that's detracting from what you need to do. So this is important in terms of, I think addressing this from the perspective of setting up a lab, and the philosophy of setting up a lab. You should make sure this is clear when you're changing the balance from one side to the other. And you know, sometimes individuals may or may not be sensitive to why you're asking a change in resource. And so for instance, in a small business, if you have to move resources from one area to the other, sometimes it just gets done and that has to do with, sort of the leadership issue that we'll get into later. But I think it's important for you guys to, when you run a large lab, to make sure that people understand why and what's the rational in doing something like that.

Okay, so. Let's talk about our business and this is important as you guys start engaging in looking for a job and setting up your lab. And if you look enough, you'll have different choices in terms of where to do this. So where is my business? The major division in America, of course, and many places, but primarily here in our country, is whether you set it up in a public or private institution. You do it at Baylor and Rice, which is private/profit. Or you would at UT, which is public. And there are distinct major differences between those two institutions or institutional models, and I've been part of both in my life, so I've been at Baylor for a long time now, but I grew up in the public setting. And that impacts dramatically how you run your lab, and how you do your business. So one issue that should ultimately factor in, I think, as the major issue in deciding between these two, and this is relevant to your scientific career, is the scientific environment and infrastructure. That's the overall, I think the most important criteria because whether

you'll be successful in achieving your mission will depend on the intellectual and the physical capital of your environment, and so, irrespective of whether it's a public or private institution, that's what you need to look at as your number one priority in setting up a lab. Now, having said that, that's going to be different depending on what you do which can be limited somewhat by what your area of research is. Now that may seem obvious what you need also keep in mind what's your long term goal. Long term, for us, means, 5 years from now, right? Short term, is sort of like a year to three. And if you notice, all the startup packages that you – how many people here have started looking for a job and negotiating a package. So if you notice, most start up packages, again, I am coming from sort of the view of biomedical research, so it may be different if you're a physicist so that's another disclaimer. I know nothing about physics labs and so forth, so it's really from the biomedical perspective. But, for the biomedical world, notice every package is 3 years. You know, they'll cover your salary for 3 years, or they'll provide startup and so forth. So that's sort of you timeframe for achieving, you know, clear objectives that you have. And you should look at your scientific infrastructure and understand whether that institution can help you achieve what you need to achieve in that timeframe. And then potentially, which is the hard part because you can't predict where your research will go, beyond that , 5-6 year time frame, which is your next time frame. Now, so, I would say that, that, is the overall driver. And in fact, I would argue that money is always important, but it's not always how much money you have in hand. Because, you can have all the money in the world, but if you don't have the intellectual capital and infrastructure close by to actually get what you need done quickly. Not saying you can't get it done eventually, but quickly, you've failed your business, because people forget there's a true clock that starts ticking. And it's not just your tenure clock, right? Certainly, that starts when you take a tenured track position, but the other clock is in fact, getting your first grant, getting the paper that shows that you can actually deliver as an independent investigator to study section, and that's very important. And the major, major determinant of that is environment.

So I'm a geneticist. So I'm a big believer in gene environment interactions. The environment will drive that. Now, as you get more successful, as you become more senior, then it's you who drive it. You become the driver of the environment, but when you are a new assistant professor, you do not drive anything. The environment is what

will enable whether you succeed or not. So the number one point in picking where you do your business is this. I would always recommend, when I have my trainees and the people in the faculty position, they'll come to me and say, "You know, Brendan, here's I got 2 offers and I'm trying to decide between the two of these. And these guys are offering me double the amount of money and all this stuff, you know." And obviously, these decisions are complex, but if scientifically, forget the amount of money, the place that can help you do what you want to do and your mission is here, I would always recommend you take that offer. So that's, if it's, obviously, it would be great if that's the one offering twice the amount of money. But in reality, you know that doesn't always work. I really would urge you to consider that in terms of where you take your business.

Okay then, so obviously you go beyond, what are the other issues that you need to think about in setting up your lab. Hard money vs. soft money, that can be very different. Obviously, hard money means that there's a constant amount of money that comes from somebody that's set and often times, state institutions will have that more than certainly private institutions, and that's important because, you know, as opposed to the initial investment over three years that you get, what's after that? Salary coverage, you know, that's always an issue in terms of where you set up your lab, and that's the motto, the motto there is tremendous. To ensure coverage for 3 years, to if you're at Harvard, after that you better raise everything yourself or it's gone to 50-75%. And that factors in, obviously, into your situation. Incentives for funding. This is more relevant, I think, after you get your first grant, but it's always relevant to think about, well, you know, where do I, what happens if I am successful and I get my first grant? Is there an incentive? Is the whole process incentivized? They will give you resources back as you become more and more successful. Things would consider about setting up your lab.

Access to graduate students and support. You would be surprised how dramatically different institutions are in terms of how they support graduate education. From a place where every graduate student is essentially to you free as an investigator to a situation, to where you might have to pay salary beyond the first year, to

a place where you have to pay salary and tuition. I understand Rice charges for tuition. So you know, that's important because every ten or 20,000 dollars, obviously, that you have to put into personnel, you have to take from somewhere else because it's a fixed pot in terms of your business. So this is important to really understand this issue.

I mean, obviously, when it comes to teaching and clinical responsibilities, that's going to vary depending on what you do and where you do that, and that's again important. Administrative responsibilities, eventually. I would say that ultimately, in all these things which are logical things to think about where you set up your business or your laboratory, the bottom line still one two and three, would be a supportive work environment.

And I tell you why. Hard money, salary, incentives for funding, how graduate students are paid, how much time you need to teach or see patients, whether you have to be the assistant director of a graduate program, all this stuff, how is that delineated to you? What do you expect in return to understand that you have to return? You get a letter,

right? You get a letter of offer that's going to delineate these things to you, correct? You know how much it's worth? It's worth the paper it's written on, that's the other lesson I tell all my trainees. Because anytime that letter, you can ask for all the detail you want written there, but the minute the environment and the economy or anything changes, the dean changes or the chair changes, that letter is basically meaningless. I think that's scary sometimes, but that's the truth. That letter is not some legal contract in the sense that, yes, you can certainly sue them if they don't do what they're going to say, but how many of you really think that you would do that? Because if you do that, you basically perform academic suicide. You'll never have another position of any stature of an institution of the same magnitude. That's the bottom line in practical terms. So if you're chairman, and that's scientific mentality, I tell you that, we're going to give you x number of dollars for three years, and start your package, but we just had an economy crash and the funding to the school, the department cut in half, and now we're scrambling to even pay the remaining salaries for different people, and they come and say this to you. And we have to, you know, cut back on what we provided. What can you say? Right? You could threaten to sue and leave. And some people do do that. But, in reality, if you're goal is to do you research and build your career, you know, there unfortunately there aren't as many courses as we'd like to think. So ultimately, the key comes down to, you know, is this the environment where you think you can be successful when make that decision? Go ahead.

(inaudible question... what about the .. like associated with an institution but not in any employee relationship)

You mean the institution itself? You mean set yourself up as such. In that situation, you're a business. Unless you file a full 3b or c or whatever it is that's a nonprofit, you are ultimately your own business. I think that that's perfectly fine, but that's not the academic model. You're now moving into a true business model because you would be responsible then from regular on down. So I have to say, that's not my area of expertise, so I probably wouldn't want to.

(inaudible question)

People setting up their own businesses? Oh absolutely, there are lots of people who certainly do that. And the issue is, and this is a digression, in this model, the academic model, the institution gives you the resources and the infrastructure, the minute you start going out on your own to start your own sort of business, your own laboratory, that you've got to really set the capital. So then you deal with the whole idea of venture capital and investment and absolutely. But that would be certainly, another model, but that's a real business as opposed to my philosophical business. And that you don't want me to talk about since I did not get any degrees in business, okay?

So anyways, getting back to what I was saying, it's important. So really, I think the most important 2 characteristics for where you set up your business is the resources and

infrastructure for you to get your mission done, you know, the intellectual capital, and probably, do you trust that this environment is stable for the next 2 or 3 years, that nothing disastrous, like what I just talked about could happen. I mean, it can happen anywhere, it happened here certainly, as well as around the country with the economic crash. But, I think those two are the important things. I mean, all these other stuff, it matters, of course, and you go out and get your letter to cover everything, but this is why I really

believe that where you, you know, decide ultimately, needs to be a place where you think you'll be valued and where you'll actually get your work done. Okay.

Mission Objective strategies, I'm going to go very quickly over this because this is a standardized type of business terminology applied to science, but it is important to think about it this way. One of the things that is the most effective for me when I was a fellow at Baylor, I was a clinical fellow, I met with my assistant, the vice-chair of the department, and we sat down and kind of made a business plans. Over five years, what is it that I want to achieve scientifically and how would I, what's the deliverable on that? Both from a paper perspective as well as from, you know, a funding a grant perspective. How many of you have done that? And actually mapped out, forget 5 years, even 3 years? That, okay. Well, that's good. If everything went well, what would be the scientific project that would come to flourish, and how would that translate into a publication of what type of impact, and how would that fit and help me get a grant or fellowship? And to actually think ahead, that's actually very helpful. I'm not saying that that's going to happen because obviously, it's science, it can change in a week, that's why we love science, right? You can go in, you can discover something, and boom! You're on a different path, and that's why we love doing what we're doing, but it's still important that you have this plan.

So what is the long term question? So this is part of the single most important issue when you guys set up your lab and think about what you do. Do not be wed to technology, because technology is here today and gone literally in two hours now, okay? Technology is sexy, it also can make you very unique very quickly and give you a niche to sell yourself on, and that's fine, but long term, do not be wed to technology, be wed to a question. What is the long term question that you want to solve? And when you start telling your story and setting up your lab, that's what people want to hear.

What are the deliverables to answer your question? And how do I achieve my deliverables? Well, that's where the technology would come in, and that's where you might go to an institution because at that moment, they've got all the technology that you need to get this done quickly. And, as we know, it only pays to be first. And getting there second or third, you know, you might do it even better, I've had many students do, generate data which I felt was by an order of magnitude the best data out there, but, because they were fourth, the impact of that paper, you know, was ten-fold or even 20 fold less. And that's especially true today when there's such clear metrics like impact factors on something, whether you like it or not, that's how the game is played.

So it's very important, again, I stress on this issue, what's the home? What's the setting? What's the place where I can get it done most efficiently, the quickest? Okay.

Let's talk about leadership. Here are various models of leadership: democracy, dictatorship, meritocracy, and oligopoly. So, who's a dictator here? Raise your hand. Okay, nobody's going to raise their hand. Dictatorship is the most effective form of government, okay? You can move resources around quickly, you can make decisions quickly, you can solve, and you can solve conflicts quickly. It is the most effective form of government. The problem with dictatorship is that you're a malevolent dictator or you're a bad dictator you burn really quickly also. So, you know, while dictatorships are very effective forms of government, you have to be really careful because you have to be a really, really good dictator, ie. the benign dictator. So, you know, I don't know who you are and what you are, but you need to think about that, but it is the most efficient form of government. Democracy, is, you know, a great form of government, I believe in democracy, but I would never run my lab based on democracy, okay? I think there's a balance because democracy involves, you know, things like, in California where you have two-thirds of the majority have to get a state budget, that's not efficient. If you do that in your business model, you're not going to get anywhere. But there are a lot of positives to democracy because you do, you know, engender a lot of buy in from everyone. The problem with dictatorship is you don't have buy in because doesn't realize that they don't have a say in things, so it's a balance. My, and I'll tell you what is sort of my general view at the end of the day is. Meritocracy, of course, well, the person who's pulling the wagon, who's the best student, the best postdoc, we're going to listen to them or a subgroup of them in terms of an oligarchy. You know, I don't think there's an easy question about how you model the leadership in your lab. Obviously, if it's just you and a postdoc it's not so relevant, but as you grow bigger and this is important and you need to think about it. And as you encounter problems and obstacles, this is important in how you engage this process. And I've always

felt that you have to be flexible. There are time that you need to be a dictator, and there are times where it's just better to have a vote. And I, I can't give you the specific, you know, the guidelines of when that is, because you've got to sort of learn that yourself, but at least from my perspective, what I've found is that different forms of government of leadership are appropriate for different situations in context. And, um, I think that having a mix is the best, sort of approach, when you deal with this. Comments? Okay.

Okay. And ultimately, how you change and when you implement these, depends on these two things: The balance of the leadership approach changes based on the mission, the size, and the environment. If you have a group of thirty, right? Some decisions you get feedback and then you have to make the decision. Other decisions it's probably better to have a complete vote and let everyone sort of buy-in and that's, that may be more important in that context versus when it's you and one technician, but again, I think it's important to think about some of these things because you'll find it useful when you deal with things like staffing, hiring, and inquiring.

Participation and creative input. So it is important to keep in mind that if you engender participation, you're going to have better creative input into any specific problem, you know, people aren't going to want to input their opinions and think about something really hard if they feel, well, at the end of the day, what their input is completely meaningless, you know? I'll give you an example about this. I serve on multiple review panels, I've reviewed 4 or 5 of the different institutes, I've done tenure reviews of the intramural program, and there's an amount of cynicism that when we fly over to NIH and we do this review, and we generate this beautiful report, and we realize that in a lot of the situations, that report gets stuck in a drawer. And other times, that's not the case. And it does engender how hard you work on something, you know. If I approach a review where I know the institute director is going to really use what we say and act on it, well you know, you really would go an extra mile in thinking about something as opposed to, well you know, they're going to listen what we have to say, they'll go through the motions, and then it goes in the drawer, you're not going to be as committed to using your brain power. So there was a balance. While again, dictatorship is very efficient, it may not engender the most, active, part in creative input, so keep that in mind.

This is a model of leadership. I'm not going to go through this, but there is a balance in this chart when you think about supportive vs. directive behavior. The balance between delegating, coaching, directing, and supporting, and you know, where you fall on this is sort of your own personal perspective, but you should kind of think about this and be flexible, that would be my best, recommendation because in dealing with any situation or any person, you may need to be in different places.

Space and capital. More space vs. less space. Correlation of interaction in space. So this is always important when you're setting up, right? Do you have the biggest space, the number of benches, and so on and so forth. So for most of my assistant professor career and beginning of my associate professor career, as I was expanding, it was a major space problem at Baylor. I mean, this was in the late90s and the early part of this last decade 2000, it was a space problem. And you know, if you were a grad student in my lab, you wouldn't get a desk til like after your first year. And post docs, if they were lucky, would get one in like the first 2 or 3 or 4 months. Usually, they had to sort of share until a certain point. Now, I'm in like this massive amounts of space. I would argue that I don't think productivity correlated all that much with the amount of space that I have. Certainly the comfort level did, but I'm not sure that productivity or creativity correlated all that much. That's just my own personal observation. In fact, when we moved into the massive amount of space in the new building, I was concerned that it was too much space because a lot of times as students and postdocs doing experiments, you learn things not formally, but informally, and you know, it's sort of like I was a resident or a clinical fellow in the hospital, you hear more about a patient just because an other person was talking about that patient next to you and you're all trying to fight the same computer. And you learn enormous amount that way. So I would not underestimate that. So that while this is certainly reasonable, I view it as one of those things where there is a law of diminishing returns and at some point, if you're really too crunched for space, it does impact, affect productivity. But in general, but I'm so sure of that is a major determinant.

New space vs. old space, well obviously, we all want new space, right? Just kidding. Equipment. Ownership vs. core. So this is very interesting. When we set up our lab, we want to be as independent and technologically capable as possible, right? We want to have that piece, this piece, that piece, and so

forth. Bottom line is, if we've got to actually learn how to use every piece of equipment and every piece of equipment is different, and more importantly, you have to maintain every piece of equipment. You guys know how much service contracts are, right? It's usually 10% of the cost of the equipment. It's amazing. It's always the case. It doesn't matter what it is. If it's a million dollar piece of equipment, the service contract is $100,000, must be the 4th law of thermodynamics for business capital operations, but this is important because you might end up maintaining something, and we all get into this, it's kind of like our shiny new car, we want to drive the shiny new car, but in reality, are you really going to be using it so much more that it's really worth your investment?

So this issue of core, well cores are great because you know, you don't have to worry about it. Your turn to service, and so on and so forth, but cores are quite different. There are cores that actually work well, and there are cores that actually don't work well at all. And this is where, again, when you look to set up your business, this is what I mean by, by, resource and capital. It's not just that people tell you, "Oh yeah, we have a core for that and we have a core for this, and we have a core for that," that's insufficient. That's kind of like my telling you, you don't have to do that experiment, trust me, it works really well. This is where you really need to dig deep and really understand that technology structure that you need, does it work? Are the people that staff it interactive and actually help you? How, what the cost of doing it, those are important issues, because every institution will tell you when you visit them, they got all the cores you need, but that's a far cry from really having an infrastructure that's both cost effective is actually accessible. And the best way to know that is, you know, look at the papers that use that core and publish with that core, if you see a zillion papers from an institution all with that person's core on them, then, that gives you some confidence that it's actually being used, it's an accessible quality. So it's something to keep in mind.

Ultimately, people vs. technology. The bottom line is, I would take the right person over ten million dollars' worth of technology. That's just my personal perspective, but I would say that, intellectual capital is way more important than personal technological capital. Okay.

Let's talk about staffing. You know, there's a balance of technical postdoc graduates vs undergraduates in terms of a balance of staffing. Again, it's not obviously an issue when you're starting up a lab, but I've often felt that you don't want to be skewed in any one direction, you know. And the reason is that, I think each of these groups of individuals, provide a very, very important contribution to the environment. And I don't think we have time because of just the nature to go into the detail with this, but I personally never felt that I wanted a lab which is all postdocs. And there are some large labs, which are all postdocs cause grad students make a lot of mistakes as part of their educational process.

But, again, what a postdoc needs is different what a graduate needs. They contribute different things to the environment. What do you offer in exchange so that those individuals that want to come work for you? So this is very critical because how do you attract good people, ultimately, to work in your lab? Well, as I said, if you run a really good lab in terms of environment, some of these things I talk about, you won't have a problem. It gets around. You guys already know who all the crazy P.I.s are in this building, I'm sure, if you're from Rice, alright? Same at Baylor, same at MD Anderson and UT. So, it's really important that, and this is part of the reason why I think you're sitting here. Because if you set up a good lab with good processes, and you have a good reputation, the recruitment will work by itself. I've always felt that was the case, and that was true even as a junior, you know, investigator.

So what do you expect, obviously , in exchange in what you offer in terms of your work environment? Obviously, commitment, you know, and this is important. Whenever you hire someone, I think it's really important to let them know, well, how long assuming the relationship works well, I can commit to have support for you. That doesn't mean at the end of that time, it's over, you just never know. I mean, especially as you start your lab, you've got three years of funding support. If you don't get a grant, how do you know you're going to support someone? So I think it's important to be upfront about that. You know, you need to sell your mission. Ultimately, they're going to want to work for you because they believe in what you want to do. It's not the experiment, it's really the mission. If you say that "my goal is to cure AIDs", well, that's really more compelling than "I want you to do 1,000 PCRs a week." And that's again, you know, relevant. People, and individuals, whether they grad students, postdocs, or technicians, we all know we have a lot of grunt work to do. Fellows, positions, I've spent an hour at TCH trying to work on

the medical records, where in the old days would take them 15 minutes, I was cursing left and right, but it's stuff we all have to do. Is it ultimately for a mission that you believe in? So don't forget that in terms of when you build your group and you talk, and you talk individually.

The balance of work, citizenship, leadership, and training. So, you know, I think it's critical that when you hire someone, irrespective of what you feel like you need them to do, and it may be 1,000 PCRs, you still have to provide all these other things that you want to be happy in. There are very few people that want to come in and basically, you know, do the same thing over and over and over and over and over and over again. There may be exceptions, but in general, irrespective of what the level of training is, they have to have stimulation, because otherwise, they'll not be a very, you know, interested part of the lab or worker. And the bottom line is, when you start your lab, you need the person, the first person you hire, to be working 150 or 120% or 200% in terms of effort if you're going to be successful. Because if you hire someone who's sort of, their goal in life is to punch that clock from 8 to 5, I can tell you that if that's the one person you can hire with the money you have in your start up package when you set up this lab, you know, you've just decreased your chance at being successful. So you need to think about that. You know, in terms of who is it that you want to hire. It may be someone's who is shorter term. It may be someone who's only committed to you for two years cause they may be doing something afterwards, but you know that for those 2 years, they're going to be

busting their, you know, to get what's done because of their own agenda or what they need to do well. That may be a worthwhile exchange as opposed to necessarily hiring the person who you know will stay with you, but you know, is not that all that motivated long term, so keep that in mind.

Hiring retention and termination. Okay. So interview. This is where it's important to sort of make your own decisions somewhat subservient. So if, if, if you have to hire. Anyone here hire a technician for their group recently? Or have you ever interviewed or interviewed grad students? Okay. Well, our sort of back, sort of, initial thought is that I'm going to hire someone is, I'm going to interview them, and talk to them, and then hire this person if I think they're a good person. Well, what makes you think that you're qualified to make that decision? That you can actually judge who is the best person for a specific situation? Or because you're a dictator, obviously. Well, this is one situation where even when I started my lab I depended on the people around me. Even if you don't have a large group. Now it doesn't matter because I have 20 people that I can run through and pick anybody. But use their coat, your colleagues around you. It's very important because there's just a lot more experience. And I would argue that in my situation now, my hire tomorrow, way less impact than the first hire I made in my career. So when you guys make your first hire, that hire will be the most important hire in your career, not when you're a full professor. Because when you're a full professor with a large lab, if you hire someone who doesn't work out, well, it's not going to change your career all that much. But if you're an assistant professor starting out with your three year package, one bad hire can change your life. So, are you just going to interview that person yourself and make that decision? When I make important decisions, I include my wife, my chair, and everyone else I can find. And that's important that you do that, especially at this point in your life. So many better than few. So if you're in an environment where people don't want to spend that time for you, that already tells you something about your environment. So, keep that in mind when you look to where you set up your business. References, strengths and weaknesses, would you hire this given my needs? References are always important, but don't read the letter. I've written a billion reference letters in my life, I've never written a bad reference letter. That's why people ask me to write reference letters. So, it's important to talk to the person and ask them straight, you know, "what is the weakness of this person?" and then you need to appreciate that everyone has a weakness. Don't be turned off if someone has a weakness. You need to follow up, and again, this is your most important hire, so do not underestimate this process, okay? I would say that the two things that are most important in whether you'll be successful when you set up your lab for assistant professor: First, is pick the right business environment. And the second is, first person and second person that you hire, although it's true every time. So don't skimp on this. Don't depend on HR to call their references. You should call each person and really ask them, you know, what is it, this is what I need, would you hire this person, okay?

Okay, retention strategies. You know, this gets at what I said before, what you offer. I think, when you

have someone who is good, you don't want them to leave, especially if you've worked and trained them to do something. And the way you want, keep people to not leave your group is, as I said, a positive work environment, training, stimulation,

authorship, you know. There's a lot of philosophies about authorship. Sometimes, people feel like technicians don't need to be authors on papers and so on and so forth. I've gone the other direction. I believe that, you know, that's not the case. Something you need to decide about, you know, about this issue, but it's important to have real mechanisms in your mind in how you keep someone who's good at what they're doing, working for you. Because again, most people are not doing necessarily because you're paying them a billion dollars, if you are, let me apply for a job, okay? Alright.

Termination. So, this always, may happen. I mean, where you have to terminate someone. How many of you have fired someone here? So, several things about this process. You're not educated on how to do this, also in any of this. I don't think, it's amazing how little education most people get for this process. And there are certain rules that are human resource related. I'm not going to go into it, you can get it from Human Resources. But I think there are certain, you know, reasonable things that you should follow how you would want to be fired if you had to be fired. How many people here have been fired? But let's say you were fired. Think about how you would want to deal with that issue. So number one, think of it as a no-fault divorce, okay. Any divorce, now I can tell you because I've observed many divorces, the most recent one between Baylor and Methodist, once you get into a blaming game, only bad things happen, okay? Everyone's seen the War of the Roses, that movie, with Kathy Turner and what's the other guy? That's a long time ago, maybe not. No one's seen War of the Roses? Alright, one person, two people. These are the old people here, just kidding, just kidding. So, the point is, it doesn't matter what the reason for termination is. I mean, sure, it was something criminal. Obviously, there are exceptions. But short of something criminal, I think that even if it's a personality issue, even if it's a competence issue, unless that person is actually willfully doing something, to harm the business, that's the exception, and that situation, you have to get someone, escort them out, and lock the doors, and short of that, I would say, in most situations, that's not the case, unless we've all failed in getting to that point. It's important not to place blame on things. It's a situation where it just didn't work out for whatever reason. And I think that's the approach you need to take. It's not that you're a bad person or you're a complete failure at what you do technically, or that you're just not a good enough citizen, there are lots of things why a person may not be the best they can be or you want them to be in a certain context. And I think that's important to say, "Look, this didn't work out, but you know, you clearly have a lot to offer, but it's just not in this environment. You're not placed right." Obviously, that's what I would suggest. Also, I think it's good to have a reasonable timeframe. I've always said you give two weeks to your enemies. No one in my career has ever given me two weeks. Because if it's gotten to that point, it means that you weren't communicating, not knowing that's going on, so I think that, and when, this is part of expectations, when you hire someone, you should tell them, sort of how you believe relationships should go. In other words, kind of like living together and getting married. Before you get married, hopefully, you know what you're getting into. And hiring your first technician or postdoc, it's kind of like getting married to some degree, but even more important because you've got to make it work, and it's over in a short time. I would argue that, you know, you need to have this sort of ongoing conversation so that you're such in a situation that even if it doesn't work out, it's not a surprise to you. You should never have

to terminate someone, that's a surprise to them or to you. If that's the case, you've screwed up royally, okay?

Okay, training and SOP. I've always believed that collaboration are a great tool in getting technology and we all collaborate. The question, though, is you have to ask yourself, is this a technology that you're going to be doing sort of more extendedly, for an extended period. If that's the case, this is one situation where you send someone there and you bring the SOP back into the lab, that's very relevant.

Formal coursework, local national symposiums, scientific meetings, standard operating procedure, these are all kind of standard stuff. But again, I think that these are the kind of things where you should have in your mind of, in any specific technology, how do I, you know, bring a technology that I need into the lab, or should you? As opposed to doing it for collaboration or for a single work. Okay.

Documentation is very important. So far, we haven't talked about how you do all these things. So I'm a big believer in documentation, not just because I'm a physician. A centralized source of information is critical for your SOPs, for your processes, for everything you do. So, I think that, every lab, doesn't mean, matter the size, needs to have access to a lab server. How many people have a lab server in here? Good. Common resources. This is how you prevent from making the same mistakes over and over again. And what's important is you need to update it. So as things change in the lab, you really need to have a process to go back and change them. Otherwise, you're going to be like what most labs have, binders and binders filled with billions of pieces of paper that have scribbles all over them, and you'd be surprised how, you know, as people come into the lab, it becomes a complete mess. And that's when mistakes happen over and over again. How many people have seen the Lady Gaga laidback project from which, which is from my department? Which my lab placed second probably to that one in our retreat, but I mean, there are some real points to that in terms of when you do that, when a grad student comes in and you're trying to pick up a project. You have no idea where anything is. Everyone's seen that video, right? Who has not seen that video? Okay, you need to google "Lab project with Lady Gaga." (http://www.youtube.com/watch?v=Fl4L4M8m4d0[3]) But the point is, this is how you prevent that. A lab server in centralized processes and protocols. Management software, you don't, you know, I've tried to do management software with different things over the years, and I think that it's tough because people learn the software and they're so complicated and people have certain things that they kind of just want to do. And I think, that's probably not as important til you get to be a really, really large lab. But again, that's up to you. Same with animal management software. We've tried a million different things, and the bottom line is everyone does a different thing and breathes for a different way, and I think the most important issue is training on how to keep records and how to read. That's more important than having a centralized warehouse. So making people show that they're trained that way is more important.

So this is important, I think, in terms of really getting a timeline in place. So once you set up your lab, you've got to have, sort of, the key experiments that you need to get done so that you can predict when you're going to have your first or second publication, because when it comes to funding, ultimately. When you get hired as an assistant professor, you could have had the most spectacular postdoctoral fellowship, you know, with high impact publications left and right, I can tell you as one who has hired many assistant professors and lead many search committees, that hiring an assistant professor is like flipping a coin, okay? And the reason is, gene environment interactions. It's very hard to dissect the success or lack thereof, it's both ways, of a postdoctoral fellowship from the issues around the environment. And we often look at the CV and publications, and certainly, you've got a spectacular CV, you're going to get more offers, and that's the way it is. But I would hold that, that is insufficient to predict if someone will be a successful assistant professor, and you know be productive and get tons of grants and so forth. And part of that is what I just said about in terms of how does the environment modify the postdoctoral fellow and when they become a person that's in charge of doing all these things. One way, I think, is to really have, this issue of I need to go to my next meeting, and I'm like really far away. We'll be ending in two minutes. Have this sort of timeline planned out to try to sort of at least you've got a plan going forward, and really have it in place in terms of even when you apply for your first grant, whether it's an H grant of otherwise. What is it that you need to have done prior to that? Because this is how you can drive your resources towards it. And this is especially relevant.

I spent 6 hours in a room over at the Marriot with Tony Scarfer(?) who is the head of CSR, he's the person who runs the Center of Scientific Review at NIH and he was showed like 85 slides. This is crazy. The bottom is, funding longevity of NIH investigators, it's it's it's slowing trending down, which means that is how long you keep a grant once you have a grant. This is important, you know, many people think that it's a badge of honor that you get this grant, and you can have it for 25 years and sign up for search. I would argue that the most important research is done in the first cycle. And you should not be stuck that I'm going to have this question that I'm going to answer, and I'm going to answer it for the next 20 years of my life. If a direction is not working, and the impact is not there, don't pursue it. Go on to the next. It's better to change, than to just kind of stubbornly stick through it, at least through the perspective of NIH funding,

[3] http://www.youtube.com/watch?v=Fl4L4M8m4d0

and that's going to be the growing trend. What you'll see that there will be fewer and fewer renewals. It's going to be a project that's going to be funded, and it's got its course and you move on to the next thing. This is important because many of you are early stage investigators, and they have different definitions for a new investigator vs. early stage investigator. You guys have gone through this with funding and applying for grants? Yes? No? Maybe not? Okay. This is important, you know, you need to understand this because as a new investigator, and as an early state investigator, you have certain legs up when you get reviewed. Now, why am I telling you this? Because you're only young once. If you blow this, then, that's it, and it also varies from institute to institute. So again, I'm taking a biomedical perspective, so I apologize to those who are Chem or funded by other mechanisms. But the bottom line is, every institute will fund new investigators at a different payline, and it's quite dramatically different. So this is the kind of stuff that's important that when you do your strategy, that you're going into the

optimal institute which will give you the most chance for your funding, alright? What good are you, not you, but what good is it if you go in as an early stage investigator and the payline for an early stage investigator is 2% above the regular investigators and the regular investigators are 7% and you're getting paid at 9%, versus the other institute where it may be 16% and that makes all the difference of whether you'll be successful in that first time around.

(Something I've heard is that a postdoc cannot apply as a PI for grant money?)

That's not true. I've just gotten a postdoc that got a full score on his R03.

(That's why I'm asking because I was told that couldn't be done)

So that's not true at all. You have to, you cannot be a postdoc and get an R grant at the time of award, okay, so that's certainly true. So if you get funded, you can't get a postdoc and funded with a R01 or R03 or R20, that's true, okay? Now, at the time you apply, that's different. As long as there's commitment from the institution. So I'll give you an example. So you're a postdoc and you were just awarded a, not awarded, but you're moving to an institution Y and you're going to be an assistant professor there. And you want to be put in a grant, but you're still a postdoc. As long as that institution is willing to, because, you don't apply for a grant, keep this in mind. The institution applies for the grant, you're the principal investigator. So ultimately, it's the institution that puts this in, this is why, you don't send anything in. It all goes through the institution and it gets uploaded by the institution assigning official. So the bottom line, as long as the institution will allow you to apply for the grant, and that may require a letter or a commitment from the institution's perspective and so forth, is that clear? Okay.

So, again, this is important. This is a whole different talk just focused on the grant reviews, and you know, you said you have a, you have a seminar on writing grants, right? My recommendation is make sure it covers more than writing grants, cause there's a whole environment. It's kind of like gene-environment interactions. There's the part of preparing the best grant, and there's the strategy of actually getting the grant. And the strategy of getting the grant may have absolutely nothing to have to do with writing the grant. It has to do with the mechanism of how, who, which institute, where you go in terms of review in the right study section, things like that, and that's very important. Okay.

I have this slide up here just to address one thing, which is in this current day and age, and I've shared two different study sections, the SRA, who was actually my first time chair, is now one of the division heads who actually train CSR. And this is why this is evolving. The idea is that they focus on impact, right? You guys have heard of the new scoring criteria. The bottom line is it's not whether its perfect design of the experiment, it's not whether you know, the materials are there, all those things are required. But really, the point is the overdriving issue of whether a grant should get funded. This is

important when you're setting up your laboratory and you're determining your own personal mission is: what is the impact of that mission if you actually do what you say you're going to do, okay? Is it important? Now, it's a very hard thing to evolve, to really judge, so the way I like to explain it to people is, if you've got your mission and you've got your question, does it matter to your boyfriend of girlfriend? If they think that's important too, alright, then you can explain it in such a way that they think 'wow, this is really important, you know' then it's probably the right thing. Because, the person who's going to review your grants ultimately, your work, whether it's publications or grants, it comes impact, not necessarily will the person be in this field with you. Frankly, you don't want it to be. Cause they're probably your competitors.

But this is really important in terms of the change in how to review.

Okay, I'm going to end right now. This is the resource that HHMI have put together. Any of you guys know this resource? It's useful. You can download it for free on the web, you can probably distribute it, it's not perfect, but it's a useful starting place. Don't read it like the Bible. You have to modify it for what you're doing, and hopefully you can take into account some of the things I said, but that is a good starting material in terms of thinking about, you know, negotiating your package as well as starting you lab. Okay?

Chapter 4

4. Career Pathways in Biomedical Informatics[1]

A Set of Career Pathways showing:

- Ching Lau,M.D., Ph.D working in a clinical and lab setting
- Jorge Herskovic, M.D., Ph. D. working as an Assistant Professor in Bioinformatics
- Ricardo Flores, M.D. working in a clinical and lab setting
- Hong Zhou, Ph. D. working as Faculty at UCLA
- Kimberly Mankiewicz, Ph. D. working as a Technical Writer
- For Links to other careers scroll to the end of this module

Ching Lau, M.D., Ph. D.

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/8tSBu4gE5TA?fs=1&hl=en_US&rel=0>

Figure 4.1: Ching Lau, M.D., Ph.D. Associate Professor, Baylor College of Medicine.

Jorge Herskovic, M.D., Ph. D.

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/eRJ2MgBDYIo?fs=1&hl=en_US&rel=0>

Figure 4.2: Jorge Herskovic, Ph.D. Assistant Professor in Biomedical informatics at University of Texas, Health Science Center, Houston.

[1] This content is available online at <http://cnx.org/content/m37011/1.11/>.

Ricardo Flores, M.D.

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/VGRLAwAroIw?fs=1&hl=en_US&rel=0>

Figure 4.3: Ricardo Flores, M.D., Baylor College of Medicine.

Hong Zhou, Ph. D.

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/RBL8wNeP3eg?fs=1&hl=en_US&rel=0>

Figure 4.4: Hong Zhou Ph.D., UCLA.

Kimberly Mankiewicz, Ph. D.

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/ZMhruz_2hCw?fs=1&hl=en_US>

Figure 4.5: Kimberly Manckiewicz Ph.D., Technical Writer, UT-Health

Anonymous Comments:

- Feb 2011: This young woman definitely offers a lot of useful advice for those that are interested in this field of study. It is good that she speaks in terms that are general enough for a graduate student to find the necessary and proper path to lead them to the right avenues. She is very informative.

4.1 Links to Other Possible Career Paths

- Bench to Briefs[2] (Law)
- Regulatory Affiars [3] (Law)
- Science Writers[4]
- Science Education and Outreach [5] (45-min NIH video)
- Science Policy Careers[6] (45-min NIH video)
- Technology Transfer Careers[7] (45-min NIH video)
- Forensic Science Careers[8] (116-min NIH video)
- Public Health Careers [9] (73 min NIH video)

[2] http://www.nature.com/naturejobs/2006/060803/full/nj7102-596a.html
[3] http://videocast.nih.gov/summary.asp?Live=9796
[4] http://www.nasw.org/faq-new-and-aspiring-science-writers
[5] http://videocast.nih.gov/summary.asp?Live=9795
[6] http://videocast.nih.gov/summary.asp?Live=9982
[7] http://videocast.nih.gov/summary.asp?Live=9984
[8] http://videocast.nih.gov/summary.asp?Live=9819
[9] http://videocast.nih.gov/Summary.asp?File=15369

- Science Jobs with the US Government [10]

[10] http://www.makingthedifference.org/federalcareers/biologicalsciences.shtml

Chapter 5

5. Social Fluency[1]

A Glimpse into the workshop is presented here in 3 parts. To view the entire workshop please scroll down and view the full workshop presented below in 5 parts.

Introduction to Social Fluency

This media object is a Flash object. Please view or download it at
<http://www.youtube-nocookie.com/v/6mbvhW8-ODI?fs=1&hl=en_US>

Figure 5.1: Beth O'Sullivan, Lecturer, Jones School of Management, Rice University.

The Hand Shake

This media object is a Flash object. Please view or download it at
<http://www.youtube-nocookie.com/v/zJLu_5fv6W0?fs=1&hl=en_US>

Figure 5.2: Beth O'Sullivan, Senior Lecturer, Jones Graduate School of Business, Rice University.

Practicing Social Fluency

This media object is a Flash object. Please view or download it at
<http://www.youtube-nocookie.com/v/w5aKQo3bXHs?fs=1&hl=en_US>

Figure 5.3: Beth O'Sullivan, Senior Lecturer, Jones Graduate School of Business, Rice University.

Presented here is the Full Social Fluency Workshop broken into 5 parts:

[1] This content is available online at <http://cnx.org/content/m37016/1.4/>.

Part 1: Preparing for a Networking Event

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/cG524pm9mqk?fs=1&hl=en_US>

Figure 5.4: Beth O'Sullivan, Senior Lecturer, Jones Graduate School of Business, Rice University.

Part 2

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/OIuPkA4ngZw?fs=1&hl=en_US>

Figure 5.5: Beth O'Sullivan, Senior Lecturer, Jones Graduate School of Business, Rice University.

Part 3

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/U7fyEzq6Ij4?fs=1&hl=en_US>

Figure 5.6: Beth O'Sullivan, Senior Lecturer, Jones Graduate School of Business, Rice University.

Part 4

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/hJqy1mTum9A?fs=1&hl=en_US>

Figure 5.7: Beth O'Sullivan, Senior Lecturer, Jones Graduate School of Business, Rice University.

Part 5: Building Your Network Over Time

This media object is a Flash object. Please view or download it at
<http://www.youtube.com/v/gP2aLevC2Rg?fs=1&hl=en_US>

Figure 5.8: Beth O'Sullivan, Senior Lecturer, Jones Graduate School of Business, Rice University.

Chapter 6

6. Professional Associations in Biomedical Informatics[1]

NOTE:

> *"I cannot emphasize enough the importance of being a member of a professional society. In fact, I found my first senior scientist position via the American Chemical Society's jobs website."*
>
> *- Stacey Kalovidouris, Institute of Biosciences & Bioengineering, Rice University.*

Once a definitive career path has been determined, coming to understand what that entails often leads to the idea of joining a professional society.

There are several advantages to joining a Professional Society or Association in your particular field. While there are many benefits to joining, here are some of the main ones:

- Networking Opportunities – To establish and maintain Professional Relationships, to affiliate with a reputed group.
- Journal – A society is usually associated with one or more journals to which you receive reduced or free subscription. Journals disseminate current advancements in the profession.
- Conference – A society's annual meeting is often a major conference in the field. Members may get registration discounts.
- Listserv for members
- Professional Development
- Finding employment via the society's job board and network
- To impact the profession.

6.1 Some Factors to Consider

- Cost of membership
- Unwarranted emails
- Unwanted solicitation
- Location constraints for events
- Presence/absence of a local chapter

[1] This content is available online at <http://cnx.org/content/m37088/1.1/>.

6.2 Societies in the broad Biomedical Informatics area:

(Not a comprehensive list)

6.3

1	BioChemistry	American Soc. Biochem. & Mol. Bio.[74] (ASBMB)
2	Chemistry & nano*	American Chemical Society[75] (ACS)
3	Peptide Chemistry	American Peptide Society[76] (APS)
4	Protein science	Protein Society[77]
5	Microscopy	Microscopy Soc. of America[78] (MSA)
6	Crystallography	Am. Crystallographic Association[79] (ACA)
7	Pharmacology	Am. Soc. For Pharma. & Experimental Therapeutics[80] (ASPET)
8	Biothermodynamics	The Gibbs Society[81]
9	General Biology	Fed. of Am. Soc. for Experimental Biology[82] (FASEB)
10	Microbiology	Am. Soc. For Microbiology[83] (ASM)
11	Microbiology	Am. Soc. For Virology[84] (ASV)
12	Cognitive Science (Decision Making/ Problem Solving)	Cognitive Science Society[85]
13	Experimental Psychology	Psychonomic Society[86]
14	Neuroscience	Soc. For Neuroscience[87] (SFN)
15	Vision Research	Assoc. for Research in Vision & Ophthalmology[88] (ARVO)

continued on next page

16	Physics	American Physical Society[89] (APS)
17	BioPhysics	Biophysical Society[90] (BS)
18	Biomedical Informatics	American Medical Informatics Association[91] (AMIA)
19	Information Processing	International Federation for Information Processing[92] (IFIP)
20	Technical Communications	Society for Technical Communication[93] (STC)
21	Human Computer Interaction	Computer-Human Interaction[94] (CHI)
22	Internet Technologies	International Association of Internet Professionals[95] (IAIP)
23	Computer Science	Assoc. for Computing Machinery[96] (ACM)
24	Computational Biology	International Society for Computational Biology[97] (ISCB)
25	Material Measurement	Material Measurement Laboratory[98] (NIST)
26	Math/Computation	Soc. for Industrial & Applied Math[99] (SIAM)
27	Engineering	Institution of Engineering and Technology[100] (IET)
28	Systems Engineering	International Council on Systems Engineering[101] (INCOSE)
29	Standards Engineering	Standards Engineering Society[102] (SES)
30	Electrical/Electronics Engineering	Institute of Electrical and Electronics Engineers[103] (IEEE)

continued on next page

31	Robotics	International Federation of Robotics[104] (IFR)
32	Photonics	Soc. of Photo-Optical Instrumentation Engineers[105] (SPIE)
33	Marine Engineering	Institute of Marine Engineering, Science and Technology[106] (IMarEST)
34	Chemical Engineering	Institution of Chemical Engineers[107] (IChemE)
35	Biomedical Engineering	Biomedical Engineering Society[108] (BMES)
36	BioEngineering/CS	Am. Inst. For Medical and Biological Engineering[109] (AIMBE)

Table 6.1

[74] http://www.asbmb.org/
[75] http://portal.acs.org/portal/acs/corg/content
[76] http://www.americanpeptidesociety.org/
[77] http://www.proteinsociety.org/
[78] http://www.microscopy.org/
[79] http://www.amercrystalassn.org/
[80] http://www.aspet.org/
[81] http://mljohnson.pharm.virginia.edu/gibbs-society/gibbs-home.html
[82] http://www.faseb.org/
[83] http://www.asm.org/
[84] http://www.asv.org/
[85] http://cognitivesciencesociety.org/index.html
[86] http://www.psychonomic.org/
[87] http://www.sfn.org/
[88] http://www.arvo.org/eweb/StartPage.aspx?Site=arvo2
[89] http://www.aps.org/
[90] http://www.biophysics.org/
[91] https://www.amia.org/
[92] http://www.ifip.org/homeintro.html
[93] http://www.stc.org/
[94] http://www.sigchi.org/
[95] http://internetprofessionals.org/
[96] http://www.acm.org/
[97] http://www.iscb.org/
[98] http://www.cstl.nist.gov/div831/
[99] http://www.siam.org/
[100] http://www.theiet.org/
[101] http://www.incose.org/
[102] http://www.ses-standards.org/
[103] http://www.ieee.org/index.html
[104] http://www.ifr.org/
[105] http://spie.org/%5D
[106] http://www.imarest.org/
[107] http://www.icheme.org/
[108] http://www.bmes.org/aws/BMES/pt/sp/home_page
[109] http://www.aimbe.org/

Chapter 7

7. Derived copy of Understanding the Promotion and Tenure Process[1]

7.1 Goals

- Institution
  - Tenure is a life-long commitment by the university to you
  - Successful faculty – innovators, leaders, producers
  - Research objectives in line with institutional directions
- You
  - Faculty position that meets your own research and career objectives
  - Member of functional, innovative and forward-looking department and institution
  - Security offered by tenure

7.2 What can I do now?

Think about your steps all along the way

- Consistently evaluate your own progress
  - Goals
  - Mechanisms to get there
  - Ways to learn from others and engage them
- Keep data on all your activities
- Ask for feedback
  - Grant writing
  - Papers
  - Teaching
  - Research program organization and development

This process is the accumulation of years of effort! **THINK AHEAD!!**

[1] This content is available online at <http://cnx.org/content/m38087/1.1/>.

7.3 Understand the general process

- Learn about the promotion and tenure process at your institution Different institutions require you to go up for Tenure within different time periods, usually around 6-7 years. There is often an annual or mid-term review of your progress to assist you in where you are and what you should be focusing your efforts on to strengthen your dossier.
  - Ask about the process at every stage if you have questions
- Request a copy of the policy
  - Be sure when you are interviewing that the policy is consistent with your personal goals
- Understand the balance of teaching, research, and service that the institution AND the department will expect
- Understand the audience(s) for the materials

7.4 The Dossier

- Summary of your independent career at institution
- Information on all aspects of your career
  - Research summary (publications, grants, citations, H-factor [2] , awards)
  - Teaching summary (courses, evaluations, awards)
  - Service summary (activities, awards)
- Inside reviews/letters
- Outside letters****
  - Writers identified by department
  - Also usually writers identified by individual

7.5 Dossier Components

- Summary of career
  - Education
  - Honors
  - Teaching/advising/mentoring
  - Citations
  - H-factor
  - Grants
  - Publications
  - Research/teaching summary written by candidate
- Outside letters

7.6 What happens after dossier is prepared?

1. Department review
   - Tenured faculty generally involved in decision to recommend or deny tenure
   - Department chair writes letter
     - Some schools have subcommittee

[2] http://en.wikipedia.org/wiki/H-index

2. School review
    - Often school-level committee reviews and makes recommendation to dean
    - Dean makes recommendation
3. Promotion/Tenure Committee (Provost)
    - Makes recommendation to President
4. President sometimes makes final decision

Multiple levels of review — no one person makes the decision! **Many** voices are part of the process.

7.7 General process

- Understand the timing of preparing the dossier, what you should submit and when
    - Think carefully about names for Outside Letters
- Understand the process completely
- Don't wait until the last minute to prepare your materials
    - Think about your research/teaching summary
    - Ensure that your papers are submitted in a timely way
- Ask QUESTIONS if you do not understand

7.8 Outside letters

- Highly influential in decision process
- May have opportunity to suggest names
    - Develop relationships - create a network
    - **MARKET yourself!**
- Post-decision: Ask about possibility for feedback from the letters (can be useful)

Anticipate whom you would want to write letters and get to know those individuals

7.9 Factors considered

- Research
- Teaching
- Service

These factors combine to reach a decision, BUT the specific combination varies widely across institutions

7.10 Research

Publications

- Used to assess your productivity
    - Numbers vary widely among disciplines
    - Type of publications expected also vary widely
    - Different expectations at different promotion points
- Used to assess the quality of work produced

    - Citations, H-factor, Impact on the field
- Demonstrate your contributions
- Provide evidence of your unique contributions, particularly in collaborative/cross-disciplinary activities

    - How many? How much of your time?
    - Why did this matter? What did you and your discipline contribute?

Grants

- Important national review of work
- Demonstrate ability to secure funding for research

Presentations

- Invitations reflect status in the field

Visibility/Engagement/Focus

- Present at multiple conferences
- Engage the leaders at those conferences
- Invite leaders to your institution via department events
- Reflect on level of focus in work and, if broad, engage multiple communities

7.11 Teaching

- Effectiveness
    - Often evaluated by students
    - Ask assigned or selected mentor to provide review
- Innovation
    - Think about ways to do it better/more effectively
    - Engage students
- Range/breadth
    - Assignments may be focused or broad
    - Be prepared to teach beyond your comfort zone
- Enthusiasm
    - Convey why you love what you do
    - Occasionally volunteer for something extra
- Develop a portfolio of your teaching
    - Syllabi
    - Handouts, other notes on courses developed
    - Problem sets
    - Other written materials
    - Computer-based materials, notes on courseware
    - Copies of software developed for courses
    - Examinations
    - Copies of graded papers where there is a significant writing component
    - Evaluation by a colleague
    - Student evaluations

7.12 Service

- Department
  - Help your department accomplish the faculty's goals University
- University
  - Engage in the broad community, but wisely — most P/T committees are broad
- National Organizations
  - Choose wisely for visibility with minimum time
- Civic/K12/Outreach Opportunities
  - Choose wisely, but make a difference

7.13 Keep your CV up to date

- Include students mentored at all levels (primary and secondary mentoring)
  - Undergraduates
  - Graduate Students
  - Post-doctoral Associates
- Include advising responsibilities at all levels
- Refereed publications
  - Some institutions request an evaluation of % effort on each
  - Citations — check your "h-factor"
- Abstracts / Conference Proceedings / Presentations
  - Seminars/Workshops/Panels/etc.
  - Posters
  - Invited talks at meetings
- Service within university, in community, at (inter)national level

7.14 P/T versus Performance Reviews

Ask your institution about frequency and nature of performance reviews

- Can be very helpful in guiding activities
- Opportunity for mid-term feedback
- Provide an internal view of accomplishments
  - Some may have external letters
  - Dossier can be similar to promotion dossier

7.15 Are there answers to my questions?

- How many publications do I need?
- How much grant funding?
- How many graduate students? Postdocs?
- How many committees? Which ones?
- How good must my teaching be? Does it matter?
- How do I know if I'm doing enough?

There are no "right" answers to these questions, because the process is a composite of all of these and varies from place to place:

FIND OUT WHAT YOU CAN ABOUT YOUR INSTITUTION - ASK QUESTIONS!!!

FAQs:

- If I am denied tenure will I get feedback? This varies from institution to institution. Usually a negative decision is it. There is no second chance, but it is best to ask.
- Can I request that some people not write my letters? Yes, often you can name up to three people who should not be approached, but be careful about this.
- Is the Research and Teaching Summary just a formality? A well-written summary should tie in your previous work with current and point to the direction where you are headed. It should tell a clear story. Write this as you go along and revise it every few years. Do not write this just when your dossier is coming up for review.
- Is it better to have more publications on your own or with collaborators? You really want a balance. Your publications should show what you can do. If you are collaborating with another junior faculty who may also come up for review you want it to be very clear who did what in the publications.
- Is it better to take a non-tenure track position at a prestigious place or a tenure track at a not-so prestigious place? It depends. You need to study the specifics very carefully. But you do not want to spend too long in a non-tenure position. Talk to your mentors.
- What is a typical timeline for tenure? It varies from institution to institution, but typically 7-8 years is normal. 6th year the decision process starts, 7th year the decision is made, and if it is negative you have the 8th year to look around for another position. Some places you come up for tenure between associate and full professor, but mostly is it form assistant to associate professor. A mid-term review is often around the 3rd year. You want to leverage the information you get to improve and strengthen your portfolio. If the mid-term review does not happen till year 5 it is too late, one cannot then set the dossier right.
- What is the likelihood of success? The Department really wants you to succeed. They invest a lot in you when they hire you, so they really want you to succeed.

Chapter 8

8. Obtaining Funding[1]

NOTE: * Collated from work by Semahat Demir (NSF), Lydia Kavraki (Rice), Rob Raphael (Rice), and Joan Strassmann (Rice), and Jane Grande Allen (Rice).

8.1 Introduction

Funding is important for obtaining tenure in an institution of Higher Education in the United States. You need to be prepared to address the funding issue in the long run. So, how can you prepare for a grant? You need more than a great idea.

- Ask important, big questions
  - Do not redo your Ph.D. or postdoc work
  - Find a substantially new project if your proposal is rejected twice.
  - Read deeply and broadly (at least 5 articles a day).
  - Be creative.
  - Do not be afraid to do something really different.
  - Talk to lots of people about research.
- Have several projects at once
  - Keeps you excited.
  - When one project faces problems, another could be blooming.
  - Increases funding opportunities.
  - Synergy in thinking about different things can suggest novel pathways.
  - Increases your visibility.
- Write clear, well-researched proposals
  - The proposal must be impeccable, no typos, clear headers, clear flow from hypotheses to methods.
  - Follow the format of the agency exactly.
  - Include preliminary data and figures.
  - Get sample funded proposals by asking people for them, preferably those not too close to your research.
  - Have several people read your proposal.
  - Leave enough time, at least 3 months for several drafts and for feedback.
- Collaborate

[1] This content is available online at <http://cnx.org/content/m37014/1.3/>.

  - New ideas often come from collaboration.
  - Techniques and approaches can be shared.
  - This is the ONLY way to succeed without turning into a workaholic.
  - Teamwork is fun!
  - Find collaborators from a broader pool than is initially comfortable, and bridge the gaps with frequent meetings.
  - Same-stage collaborators are often best.

- Keep Publishing
  - The search for funding can be discouraging, be prepared to fail.
  - Keep trying, but don't forget to keep publishing anyway.
  - Write up your research quickly.
  - Write a mini-review, review, perspective etc. at least every 2 years.

- Obtain Funding Information
  - NSF and NIH are not the only sources of funding.
  - Learn about those grants requiring nominations, and get them.
  - Ask as many people as possible about how to find funding opportunities: faculty mentor, graduate/postdoc mentor, department chair, colleagues, Office of Sponsored Research, Foundation Relations Office.
  - Get on e-mailing lists for funding announcements – e.g. NIH, NSF, Listservs appropriate for your field, Multi-disciplinary grants' mailing lists etc.
  - If there is a funding opportunity that you are interested in, ask the Deans' office to find out who else at your institution has been funded by this agency. Talk to this person, get a copy of their funded award, get any inside information that you can.
  - Be a detective! Find out which agencies have funded your colleagues and persons in comparable positions at other schools. Some people have this information on their websites or CV.
  - It is a good idea to contact the funding agency to see how your idea aligns with their funding priorities. Have a short abstract ready with your tentative specific aims BEFORE you contact them.
  - Send versions of the same project to multiple funding agencies, but tailor the scope of project as appropriate.
  - Send versions of the same project to multiple funding agencies, but tailor the scope of project as appropriate.
  - Apply for any and all internal/local funding opportunities you can find. Take these applications seriously and don't put them together at the last minute. This is a great way to get preliminary data and a preliminary draft of your next major proposal.
  - Apply for any and all internal/local funding opportunities you can find. Take these applications seriously and don't put them together at the last minute. This is a great way to get preliminary data and a preliminary draft of your next major proposal.
  - Make a spreadsheet of opportunities and deadlines.
  - APPLY. You won't get the grants you don't apply for. NIH and NSF review panels are impressed by young investigators with multiple pending grants – it shows that the applicant is seriously aggressive about securing funding.
  - Take advantage of your research office in learning about private funding.

8.2 The Logistics

- Identify a funding agency and learn everything you can about this agency (the web and your colleagues are good sources)

- Understand the mechanism for submitting a proposal from your institution
- Develop a time frame for writing and proofreading the proposal
- A proposal needs a budget and appropriate signatures.

8.3 Tips for Successful Proposal Writing

- Determine if your project is relevant to the program
- Get in touch with the Program Director
- The Program Director is part of:
  Review Panels
  Award/decline recommendation
  Post management of the awards (progress report)
- Follow the instructions posted by the agency Format, sections, project plan
  Agency's Review Criteria (NSF Merit Review Criteria)
  Priority Areas for the agency

- Respond to a solicitation
  Deadlines (pre-proposal, letter of intent, full proposal)
  Additional review criteria and requirements
- Read "successful" proposals of your colleagues
- Have your proposal reviewed by collaborators or colleagues before submitting
- Do not wait to submit on the day of the deadline

8.4 Writing Great Grants: A Three Step Recipe

1. Choose a significant problem
   * Bonus points if not much work has been done on the problem
   * More bonus points if you have done the important work
2. Leave no doubt that you can accomplish your aims
   * Established track record of publications
   * Clear and convincing preliminary data
3. Write a clear, easy to read proposal

8.5 Big Hurdles and Pitfalls

Some potential pitfalls you may encounter are:

- Laboratory techniques not yet working
- Students not yet trained/busy with classes
- Teaching and other responsibilities
- Proposing to do too much
- Not making clear the points and connections that are obvious to you

8.6 Do and Don't

- Do not necessarily assume the person who reviews your grant will be an expert in your area or know why your research is novel
- Get grants done in advance and have colleagues read them.
- Stay Abreast of what different institutes consider "Young Investigator Status"

- The response to a revised NIH grant is very important.
  Never appear to be angry or emotional. Just stick to the science. If a reviewer got something wrong (which often happens), just lay out the facts.
  This is hard because you have put so much effort into the grant it's easy to take comments personally Criticisms are of the science, not of you!

8.7 Funding Agencies To Consider (not a comprehensive list)

Listed here are some points about the two main funding agencies: NIH and the NSF. However, there are many other funding agencies, other than the two main ones.

1. NIH (www.nih.gov)
   * R03 "small grant" mechanism. Review panels can be a tad easier on these applications.
   * R21 for exploratory/developmental research. Less preliminary data needed.
   * R01 – primary investigator-initiated mechanism. Substantial preliminary data needed.
   * Director's New Innovator Awards and Pioneer Awards

2. NSF (www.nsf.gov) * apply for both CAREER and regular research grants (not with the same project)
   * if you get NSF funding, apply for any and all supplements!

3. Military-related funding
4. DOD Congr. Directed Medical Research Programs
5. DOE
6. DARPA (http://www.darpa.mil/BAA/)
7. Army Research Lab (http://www.arl.army.mil/)
8. ONR (http://www.onr.navy.mil/02/BAA/)
9. Air Force (http://www.wpafb.af.mil/)
10. Welch Foundation (http://www.welch1.org/)
11. Oak Ridge Associated Universities Powe Junior Faculty Enhancement Award
    http://www.orau.org/consortium/programs/powe/powe-awards.htm
12. Human Frontier Science Program (www.hfsp.org)
    * Early Career and non-EC grants, also travel fellowships
13. HHMI (www.hhmi.org)
    * Early Career and non-EC professorships/research awards
    * Fund the person, not the project
    * Learn more from Foundation Relations Office
    * Calls for applicants not every year
14. Packard Foundation
    http://www.packard.org/
15. Sloan Foundation (http://www.sloan.org/programs/scitech_fellowships.shtml)
16. Dreyfus Foundation (http://www.dreyfus.org/)
    * Teacher-Scholar Awards
    * New Faculty and Faculty start-up awards
    * Internal competition first
17. Pew Scholar (http://www.futurehealth.ucsf.edu/pewscholar.html)
    * Nominated by university
18. Searle Scholar (http://www.searlescholars.net/)
    * Nominated by university
19. Beckman Foundation (http://www.beckman-foundation.com/byi.html)
    * Very short application (4 pages)

20. Coulter Foundation (http://www.whcf.org/)
    * Heavy, heavy focus on commercialization development
21. Keck Foundation (http://www.wmkeck.org/programs/scholars.html)
    * Nominated by university
22. Partnership for Cures
    http://www.4cures.org/
    * formerly Culpeper Biomedical Pilot Initiative
23. Burroughs Wellcome Award (http://www.bwfund.org/)
    * variety of biomedical funding priorities
    * variety of eligible career stages
24. Field-specific agencies
    * Ask around to find out what is appropriate for your field
    * Apply to field-specific agencies in addition to NIH/NSF
    * For example:
    * American Heart Association – local and regional (can submit "same" project to both)
    * March of Dimes
    * American Federation for Aging Research
    * National Heart Foundation
    * Mizutani Foundation for Glycoscience
    * Children's Heart Foundation
    * Alternatives Research and Development Foundation
    * Pfizer
    * International Society for Heart and Lung Transplantation
25. CRISP – Database of funded projects
    * http://crisp.cit.nih.gov/
26. NIH Review Criteria
    * http://www.csr.nih.gov/guidelines/r01.htm
27. Article: How to get NIH funding
    * http://nextwave.sciencemag.org/cgi/content/full/2000/10/12/1
28. NSF - www.nsf.gov
    CAREER program
    * http://www.nsf.gov/home/crssprgm/career/start.htm
    Engineering Division
    * http://www.nsf.gov/home/eng/
29. Private Foundations
    • Office of Naval Research (ONR) and other federal programs
    • NIDRR - The National Institute on Disability and Rehabilitation Research
    http://www.ed.gov/fund/grant/apply/nidrr/index.html
30. Miscellaneous Funding links
    o GrantsNet - http://www.grantsnet.org/
    o Grant writing
    + http://www.research.umich.edu/proposals/PWG/pwgcontents.html
    + Google search for articles
    + Book – Research Proposals: A Guide to Success (Ogden and Goldberg)
31. Industry
    * SBIR mechanism (NSF, NIH)
    * Direct Funding from Companies

8.8 The National Science Foundation (NSF)

Overview
* Founded in 1950
    * An independent federal agency
    * Responsible for advancing science and engineering
    * Makes merit-based grants and cooperative agreements

- Individual Researchers and groups
- Colleges, Universities
- Other Institutions - public, private, state, local and federal

o 9,800 new awards (success rates are different for different programs)
o success rates are different for different programs

Funding Opportunities at NSF
* Individual Programs
o Research, education, center programs
    * Priority Areas (Investment Areas for FY)
o Cross-Programs and Cross-Directorates
    * Cross Disciplinary Areas
o Cross-Programs and Cross-Directorates
    * Interagency Programs
o NSF, and other government agencies

Award (Grant) Types
* Individual Investigator Initiated Awards
* Individual Investigator Initiated Awards
* CAREER Awards
* Center Awards
* SBIR/STTR awards
* SGER awards
* Supplements
* Workshops, conferences

NSF Disciplines and Structure
1. Biological Sciences (BIO)
    2. Computer and Information Sciences and Engineering (CISE)
    3. Education and Human Resources (EHR)
    4. Engineering (ENG)
* Biomedical Engineering Program
    5. Geosciences (GEO)
    8. Polar Programs
    9. Office of Cyberinfrastructure
    10. Office of International Science and Engineering
    11. Office of Integrative Affairs

NSF Merit Review Criteria
Criteria include:

- What is the intellectual merit and quality of the proposed activity?
- What are the broader impacts of the proposed activity?
- What is the intellectual merit of the proposed activity?

Potential Considerations
* How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields?

* How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.)

* To what extent does the proposed activity suggest and explore creative and original concepts?

* How well conceived and organized is the proposed activity?

* Is there sufficient access to resources?

* What are the broader impacts of the proposed activity?

* How well does the activity advance discovery and understanding while promoting teaching, training and learning?

* How well does the activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)?

* To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships?

* Will the results be disseminated broadly to enhance scientific and technological understanding?

* What may be the benefits of the proposed activity to society?

8.9 Applying for an NIH Grant

What is a new investigator?

- Never had an R01 or equivalent grant from NIH
- For some programs, must be within 10 years of latest degree

Special programs for early-career scientists

- Kirschstein-NRSA Individual Fellowships (F32)
- Career Development Awards (K)
- NIH Director's New Innovator Award (DP2)
- NIH Research Supplements to Promote Diversity

Kirschstein-NRSA Individual Fellowships (F32)

- Individual postdoctoral research training support
- Must be US citizen, non-citizen national, or US permanent resident at time of award
- Provides stipend and institutional allowance for up to 3 years
- Research supervised by faculty mentor
- http://grants1.nih.gov/training/F_files_nrsa.htm

Selected Career Development Awards
* K01 - Mentored Research Scientist Development Award: To provide support and "protected time" (3-5 years) for an intensive, supervised career development experience in the biomedical, behavioral, or clinical sciences leading to research independence

* K02 - Independent Scientist Award: To provide support for newly independent scientists who can demonstrate the need for a period of intensive research focus as a means of enhancing their research careers

* K08 - Mentored Clinical Scientist Development Award: To provide support and "protected time" to individuals with a clinical doctoral degree for an intensive, supervised research career development experience in the fields of biomedical and behavioral research, including translational research

* K25 – Mentored Quantitative Research Development Award: To attract to NIH-relevant research those investigators whose quantitative science and engineering research has thus far not been focused primarily on questions of health and disease

* K99/R00 - Pathway to Independence Award (see next section): To provide an opportunity for promising postdoctoral scientists to receive both mentored and independent research support from the same award

http://grants.nih.gov/training/careerdevelopmentawards.htm

Pathway to Independence Award (K99/R00)

* Designed to facilitate a timely transition from a mentored postdoctoral research position to a stable independent research position at an earlier stage than the norm
* Up to 5 years of support consisting of 2 phases
  * Phase I provides 1-2 years of mentored support for highly promising, postdoctoral research scientists
  * Phase II provides up to 3 years of independent support contingent on securing an independent research position

NIH Director's New Innovator Award (DP2)

* To stimulate highly innovative research
  * One application receipt period per year
  * 10-page application
  * Awards provide up to $1.5 million in direct costs for 5 year project period

NIH Research Supplements to Promote Diversity

NIH Research Supplements to Promote Diversity

* For individuals from under-represented groups or disadvantaged background
* Provides supplements to R01 and other grant mechanisms to support individuals at various career stages from high school through investigator

http://grants.nih.gov/grants/guide/pa-files/PA-08-190.html

But remember...

The R01 is still the major source of support for early-career investigators and is the "gold-standard."

* NIH has set a target for the number of awards to new investigators
* NIH Enhancing Peer Review Report (2008) also recommends

o Establishing an Early Stage Investigator (ESI) designation
o Clustering the reviews of ESI applications

Web resources – Read and ask questions

* NIH Grants Web Site: http://grants.nih.gov/grants/oer.htm – contains many documents explaining grant processes, mechanisms, special programs, tips for writing applications
* Web Site for New Investigators: http://grants.nih.gov/grants/new_investigators/index.htm
* CRISP: http://crisp.cit.nih.gov/ - lets you search abstracts of funded grants
* NIH Guide to Grants and Contracts: http://grants1.nih.gov/grants/guide/index.html – announces special programs and initiatives
* Guidelines for Reviewers: http://cms.csr.nih.gov/ResourcesforApplicants/PolicyProcedureReview+Guidelines/Guidelin - lets you see what reviewers are looking for (note links for review of applications from new investigators and for specific grant mechanisms)

And don't forget...

* Contact NIH program officers – identify from NIH home page http://www.nih.gov/
* Talk to your institution's sponsored research office
* Consult your former advisers and current senior colleagues

8.10 References

- Demir, S., Kavraki, L., Raphael, R., and Strassman, J. (2006, October). How to Obtain Funding: NSF Advance Workshop at Rice University. [http://www.advance.rice.edu/negotiatingtheidealfacultyposition/agenda.html].
- Kinney, K., Wilson, P. and Neptune, R. (2004, October). EFWO Negotiating the Ideal Faculty Position Workshop Agenda: How to Find Funding. [http://www.engr.utexas.edu/efwo/workshop2004.cfm].

- Thackrey, D. University of Michigan's Proposal Writer's Guide. [http://www.research.umich.edu/proposals/pwg/pwgcomplete.html].
- Rice ADVANCE. (2010, February 22). NIH Research Funding for Early Career Investigators. Retrieved from the Connexions Web site: http://cnx.org/content/m19394/1.2/
- Cates, S. (2007, July 30). How to Obtain Funding. Retrieved from the Connexions Web site. http://cnx.org/content/m14808/1.4/
- Rice ADVANCE. "Best" Practices for Finding Funding [Connexions Web site]. February 22, 2010. Available at: http://cnx.org/content/m19391/1.2/.
- NSF grant writing article: http://nextwave.sciencemag.org/cgi/content/full/2000/07/06/8

Chapter 9

9. Grant Writing: Getting Started[1]

9.1 Grant Writing: Getting Started

A Workshop delivered by **Phyllis McBride, Ph.D.** on February 18th, 2011 to graduates of the NLM Bioinformatics Program at the Gulf Coast Consortia.

Follow a logical, organized, consistent process

- Understand the current grant environment
- Refine your idea
- Select your collaborators
- Search for potential funding opportunities
- Learn about the agency mission

Where do I begin? Part 2

- Begin an iterative thinking and writing process
  - Draft your specific aims or project summary
  - Discuss your idea with your colleagues
  - Revise draft of specific aims or project summary
  - Discuss your idea with your program manager
  - Reflect on your program manager's comments
  - Revise draft of specific aims or project summary
- *Only then* should you begin to draft the proposal

What is the current grant environment?

9.2 How do we get funded when money is tight?

- More than one federal funding agency may support the type of research you conduct
- Most federal agencies support more than one type of funding mechanism
- Many of the federal funding agencies that will be of interest to you have implemented processes to help new investigators

How do I find federal funding?

Search Grants.gov (http://www.grants.gov/[2])

[1] This content is available online at <http://cnx.org/content/m37150/1.2/>.

[2] http://www.grants.gov/

- One-stop shopping
- Only the 26 federal grant-making agencies post funding opportunities to this site
- Provides e-mail alert service and RSS feed

Is other funding available?

Search a wide range of funding sources

- Internal funding at your institution
- Professional organizations
- Private and corporate foundations
    - Philanthropy News Digest RFP Bulletin(http://foundationcenter.org/pnd/rfp/[3])
    - Institute of International Education (IIE) (http://www.iie.org/en[4])

What types of funding are available?

Different types of funding are available to you at different phases of your career

- Pre-doctoral fellowships
- Post-doctoral fellowships
-
- Career development and young investigator awards for new and junior scientists and clinicians

How do I find the right opportunity?

- Articulate the topic, purpose, and scopeof your proposed research project
- Remain open-minded as you search
- Search for funding opportunities regularly

What makes a proposal successful?

- Superb idea
- Strong fit between your idea and agency's mission
- Thoughtful and meticulous grantsmanship
- Ample work time

9.3 What else makes a proposal successful?

The Idea

- Must go beyond your dissertation research
- Must be superb!
- Must be new, fresh, and innovative
- Must be significant
- Must fill a gap in what is known about the topic
- Must move your field of research forward

The fit between idea and mission

- Learn everything you can about the agency
    -
    - Mission, strategic plan, and investment priorities
    - Organizational structure and culture

[3] http://foundationcenter.org/pnd/rfp/
[4] http://www.iie.org/en

    - Recently funded awards
- Obtain information from a variety of sources
    - Read agency web site
    - Talk with colleagues and program manager
    - Volunteer to serve on a review panel

9.4 The Grantsmanship

Insert paragraph text here.

- Read the instructions!
- Read all the instructions!
- Read all the instructions again!
- The large print giveth, and the small print taketh away....

What are basic components of a typical proposal?

- Title
- Abstract
- Specific aims
- Research strategy
- Preliminary studies
- Significance
- Innovation
- Approach
- References
- Project schedule
- Data sharing plan
- Post-doc mentoring plan
-
- Biographical sketch
- Resources
- Budget
- Budget justification

Why is the specific aims section so important?

- Must provide a conceptual overview of the entire project
- Must outline the overall project goal, specific aims, outcomes
- Must be clearly written
- Must generate enthusiasm for the project
- Must be able to stand alone
- Why?
- The specific aims section is quite often the only part of the proposal that all reviewers will have an opportunity to read!

Workshop exercise

- For your proposed research project
    - Articulate the overall goal
    - Identify 2 to 4 specific aims
    - Indicate what the expected outcome of those specific aims will be

- Review the drafts
    - Is each aim independent, or, is any aim dependent on the completion of another aim?

How can I enhance competitiveness?

"We will use the previously designed data collection instrument, described in Section B.3.1 on page 16, and the statistical analysis, similar to that which is in the Methods Section of the reprint attached as Appendix VI, to measure the extent to which our healthcare assessments approaches will be reflective of the community standards described in Section B.2.1 on page 5."

– From Morrison and Russell, *Grant Application Writer's Workbook*

Think about your reviewers

- Tell your reviewers a story
    - "No matter what the genre, all writing is storytelling." (Steven Taylor Goldsberry)
- Remember that not everyone will understand your study section will understand your idea as fully as you do

How can I ensure that reviewers can easily find what they're looking for?

- Follow the agency's formatting requirements
    - Observe page limitations
    - Observe margin requirements
    - Observe font and point size requirements
- Develop a visually appealing page design
    - Incorporate headings and subheadings
    - Incorporate ample white space
    - Include graphics
        - Refer to graphics in the text
        - Provide a figure or table number, title, and caption
        - Label axes and data points and provide a legend, as needed
        - Make graphics large enough to be useful

9.5 Appraise the quality of your proposal

- Conduct – and seek – an honest appraisal of your proposal's quality and readiness to go forward
- Is everything in place? That is, does your team have:
- A top-notch idea?
- The right mix of expertise and experience?
- The resources needed to carry out the project?
- The institutional support to sustain the project?
- The time to prepare a truly competitive proposal?
- The clarity of writing to engage and interest reviewers?

9.6 Make a Go or No Go Decision

- If the proposal lacks required components it is a no go.
- If the proposal is complete it is time to go ahead.

How can I ensure that reviewers understand my proposed research?

- Include all required sections

- Place the sections in the required order
- Use parallel structure from one section to the next
-
- Incorporate logical paragraph breaks
- Open paragraphs with clear topic sentences
- Discuss important items first
- Use declarative sentences
- Avoid the use of jargon
- Define potentially unfamiliar terms
- Spell out acronyms and abbreviations
- Employ appropriate style and usage
- Use correct grammar, punctuation, and spelling
- Vet, edit, proofread, and spell check the application

How can I foster positive reviews?

- Read and follow all of the instructions
- Present a top notch, new fresh, innovative, and significant idea
- Delineate a focused and rational research strategy and approach
- Identify expected outcomes and future directions
- Propose a reasonable amount of work for the award period
- Demonstrate sufficient knowledge of the literature
- Provide appropriate quantity of preliminary data
- Develop independent, stand-alone aims and objectives
- Delineate a focused research strategy and approach
- Demonstrate expected outcomes and future directions
- Provide a reasonable budget
- Protect the safety of laboratory workers and/or animals
- Include a thoughtful schedule of work, and include key milestones
- Include a budget.

Adapted from David Morrison and Stephen Russell, *Write Winning Grants*

9.7 How else can I foster positive reviews?

If applicable, prepare and include plans:

- To provide instruction in the responsible conduct of research
- To protect the safety of laboratory workers
- To protect human and animal subjects
- To share data
- To share model organisms
- To mentor post-doctoral fellows

9.8 How long does it take to write a proposal?

- Create a proposal preparation timeline
- Allow a minimum of 3 months to prepare an individual investigator proposal
- Allow ample time to complete all tasks
- Preparing to write
- Writing and revising

- Uploading, reviewing, routing, and processing
- Requesting that your institution submit your application
- Allow extra time to accommodate Murphy's Law

How are proposals reviewed?

- Realize that the review process varies from one agency – and even one program – to the next
- Identify your targeted program's review process
  - Merit review (by individuals and/or by a panel)
  - Administrative review
  - Often have to wait 6 to 9 months for a review
- Understand that the review process is lengthy
  - Often wait 6 to 9 months for reviews

What are the review criteria?

Realize that criteria vary from one agency – and even one program – to the next

- Identify the review criteria for your targeted agency, program, solicitation
- Understand how the agency defines each of the review criteria
- Determine how the agency weights each of the review criteria (if applicable)

What are the review criteria for NIH?

- Investigator(s)
  -
  - Education, training, expertise, relevant experience, track record
- Environment
  - Access to and suitability of facilities, support of institution
- Significance
  - Importance of project to the field
- Approach
  - Feasibility of methods
- Innovation
  - Originality of research
- Budget
  - Not a review criterion, but reviewers will check to see if it is reasonable.

NIH Pathway to Independence (K99/R00)

Purpose

- To facilitate a timely transition from a mentored postdoctoral research position to a stable independent research position with independent NIH or other independent research support at an earlier stage than is currently the norm

NIH K99/R00 parent announcement

Project period and project costs are divided into two distinct phases

- Phase 1: Mentored support (2 years)
  - Total cost per year should not exceed $90,000

  - Must commit 75% full-time professional effort (9 months)
  - May spend 25% time teaching, doing clinical work, etc. (3 months)
- Phase 2: Independent scientist (3 years)
  - Total cost per year should not exceed $249,000
  - Must commit 75% full-time professional effort (9 months)
  -
  - May spend 25% time teaching, doing clinical work, etc. (3 months)

- Eligibility
  - Must have research or clinical doctorate
  - Cannot yet have more than 5 years of post-doctoral research training
  - Cannot yet have a tenure-track assistant professor position (or equivalent)
- Mentor
  - Should be full-time faculty at sponsor institution
  - Must have funded research related to selected research topic

NIH K99/R00 proposal components

- SF 424 (R&R)
  - SF 424 (R&R) Cover Sheet
  - SF 424 (R&R) Project/Performance Site Locations
  - SF 424 (R&R) Other Project Information
  - SF 424 (R&R) Senior/Key Person
  - SF424 (R&R) Detailed Budget
- PHS 398
  - PHS 398 Cover Letter (optional)
  - PHS 398 Cover Page Supplement
  - PHS 398 Career Development Award Supplemental Form
  - PHS 398 Checklist

Career Development Award Supplemental Form

- Candidate Information
  - Candidate's Background
  -
  - Career Goals and Objectives
  - Career Development/Training Activities During Award Period
  - Training in the Responsible Conduct of Research
- Research Plan
  - Specific Aims
  - Research Strategy

NIH K99/R00 Additional Materials
Additional Materials

- Statements of Support
- Environment and Institutional Commitment to the Candidate
- Budget for Entire Proposed Period of Support
- Letters of Reference

- Appendix Materials
- Resource Sharing Plan
- Biographical Sketch

NIH Research Project Grant (R01)
Purpose

- To support a discrete, specified, circumscribed project to be performed by the named investigator(s) in areas representing the specific interests and competencies of the investigator(s)

NIH R01 parent announcement

- Project period
  - Up to 5 years
- Project costs
  -
  - Appropriate to the project; up to $250,000 per year
- Eligibility
  - Individuals with the skills, knowledge, and resources necessary to carry out the proposed research

NIH R01 proposal components

- SF 424 R&R
  - R&R Cover Sheet
  - R&R Project/Performance Site Locations
  - R&R Other Project Information
  - R&R Senior/Key Person
- PHS 398
  - PHS 398 Cover Letter (optional)
  - PHS 398 Cover Page Supplement
  - PHS 398 Modular Budget
  - PHS 398 Research Plan (12-page limit)
    - Protection of Human Subjects (doesn't count against 12-page limit)
  - PHS 398 Checklist

NIH R01 Research Plan

- Specific Aims (1-page limit)
- Research Strategy (12-page limit*)

* *Includes tables, graphs, figures, diagrams, charts*

- Preliminary Studies
- Significance
- Innovation
- Approach

-
- Protection of Human Subjects
- Biographical Sketch (4-page limit)

What if my proposal isn't funded?

- "Never give in, never give in, never, never, never, never – in nothing, great or small, large or petty – never give in except to convictions or honor and good sense."

– Winston Churchill

Good luck on your proposals!

If you have questions or would like additional information, please feel free to contact me.

Phyllis McBride, Ph.D.
Director, Office of Proposal Development
Rice University
713-348-4436
pmcbride@rice.edu[5]

Acknowledgements

The GCC Professional Development Project
is supported by a grant to the
NLM Training Program in
Biomedical Informatics and Computational Biology
from the
National Library of Medicine
Grant #3T15LM007093-19S1

[5] pmcbride@rice.edu

Chapter 10

10. Grant Writing: K99 R00 and R01[1]

Grant Writing: K99/R00 and R01

Phyllis McBride, Ph.D.
NLM Professional Development
May 10, 2011
AGENDA

- Walk through the web:
  - How to find the R01 parent announcement
  - How to find the R01 application package
- Discuss the R01 Research Project Grant
- Take a break
- Discuss the NIH Pathway to Independence Award
- Discuss strategies for success
- Q&A

WHERE DO I BEGIN?

Where do I begin? Part 1

- Establish a logical, organized, consistent process
- Develop a good idea, then refine it into a great idea
- Search for potential funding opportunities
- Learn about the agency mission
  - Ensure that your project aligns with agency's mission
  - Begin an iterative thinking and writing process
  - Discuss your idea with your colleagues
  - Discuss your idea with your program manager!

Begin early!

Allow time to become familiar with forms and proposal requirements

- PHS 398 – Proposal proper
  - Downloaded from NIH
- SF424 (R&R) – Administrative information
  - Downloaded from Grants.gov

[1] This content is available online at <http://cnx.org/content/m38302/1.1/>.

- Career Development Award Supplemental Form
  - Downloaded from Grants.gov

Research Project Grant
NIH R01 Parent Application
Research Project Grant (R01)

- Stands as the original funding mechanism for NIH
- Award suggests research independence
- PurposeSupports a discrete, specified, circumscribed project related to the stated program interests of one or more NIH institutes or centers
  - 27 Institutes and Centers
    - (http://www.nih.gov/icd/[2])
  - Each Institute and Center has a specific research agenda
    - Often focuses on particular diseases or body systems

NIH Institutes and Centers
Research Project Grant (R01)
Key Features

- Unsolicited application
  - Investigator drives the research
- Eligibility
  - Individuals with skills, knowledge, and resources necessary to carry out the proposed research; does not require US citizenship
- Budget
  - Costs appropriate for the project; allows direct costs of $250,000 per year or less
- Project duration
  - Up to five (5) years
- Grant cycle
  - Three opportunities to apply each year

NIH Standard Due Dates – Competing Applications
Application Package (R01)
Mandatory Documents (R01)

- SF424 R&R Cover Component
- SF424 R&R Project/Performance Site Location(s)
- SF424 R&R Other Project Information
- SF424 R&R Senior/Key Person Profile
- PHS398 Cover Page Supplement
- PHS398 Research Strategy
- PHS398 Checklist

"Optional" Documents (R01)

- PHS398 Cover Letter
- PHS398 Modular Budget

[2] http://www.nih.gov/icd/

- PHS398 Budget
- R&R Sub-award Budget Attachment(s) Form

Research Strategy (R01)

- Introduction
- Specific Aims
- Research Strategy
  - Significance
  - Innovation
  - Approach

Introduction (R01)

Required only for resubmission and renewal applications]

Specific Aims (R01)

- Limited to one (1) page
- Considered the most important page in the entire application because it may be the only page that reviewers who are not assigned to evaluate your proposal may read
  - Must be able to stand alone
  - Must be clearly written
  - Must generate enthusiasm for the project
- 1st paragraph:
  - Introduce the project
  - Educate the reviewer
  - Identify the gap in the knowledge and why it creates a problem
- 2nd paragraph:
  - State your overall goal for the project
  - Explain your rationale
  - Present your central hypothesis (if possible)
- 3rd paragraph:
  - Describe your qualifications, research environment
- 4th paragraph:
  -
  - Delineate your specific aims in bullet form
    - To test a stated hypothesis
    - To create a novel design
    - To solve a specific problem
    - To challenge an existing paradigm or clinical practice
    - To address a critical barrier to progress in the field
    - To develop new technology
- 5th paragraph:
  - Highlight the project's innovation, significance, and impact (i.e., short- and long-term benefits)

Research Strategy (R01)

- Limited to 12 pages
- Considered the heart of the proposal
- Comprises three required subsections:

  - Significance (1-2 pages)
  - Innovation (2-2½ pages)
  - Approach (4-6 pages)
- Also includes Preliminary Studies (3 pages)

Research Strategy – Organization (R01)
Research Strategy – Significance (R01)

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields
- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved

Research Strategy – Innovation (R01)

- Explain how the application challenges and seeks to shift current research or clinical practice paradigms
- Describe any novel theoretical concepts, approaches, or methodologies, instrumentation, or interventions to be developed or used, and any advantage over existing methodologies, instrumentation, or interventions
- Explain any refinements, improvements, or new applications or theoretical concepts, approaches, or methodologies, instrumentation, or interventions

Research Strategy – Approach (R01)

- Most important part of the Research Strategy
- Describe the overall strategy, methodology, and analyses to be used to accomplish each specific aim
- Explain how the data will be collected, analyzed, and interpreted, as well as any resource sharing plans, as appropriate
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high-risk aspects of the proposed work
- Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised

Research Strategy – Prelim Studies (R01)

- Select the best way to present preliminary studies
  - Include within one of the three main sections, i.e., significance, innovation, or approach
  - Include as a separate section
- Provide an account of only those preliminary studies relevant to the proposed project
- Determine how much preliminary data to include
- Present the results in a logical order
- Cite your own publications, if possible
- State explicitly how the results relate to the proposed project

PATHWAY TO INDEPENDENCE
K99/R00 Parent Announcement
Pathway to Independence Award (Parent K99/R00)
NIH Pathway to Independence (K99/R00)

- Purpose
  - To facilitate a timely transition from a mentored postdoctoral research position to a stable independent research position with independent NIH or other independent research support at an earlier stage than is currently the norm
- Project period and project costs are divided into two distinct phases
  - Phase 1: Mentored support (2 years)
    - Total cost per year should not exceed $90,000
    - Must commit 75% full-time professional effort (9 months)
    - May spend 25% time teaching, doing clinical work, etc. (3 months)
  - Phase 2: Independent scientist (3 years)
    - Total cost per year should not exceed $249,000
    - Must commit 75% full-time professional effort (9 months)
    - May spend 25% time teaching, doing clinical work, etc. (3 months)
- Eligibility
  - Must have research or clinical doctorate
  -
  - Cannot yet have more than 5 years of post-doctoral research training
  - Cannot yet have a tenure-track assistant professor position (or equivalent)
  - US citizenship or permanent residency is not required
- Mentor
  - Should be full-time faculty at sponsor institution
  - Must have funded research related to selected research topic

Mandatory Documents (K99/R00)

- SF 424 (R&R)
  - SF 424 (R&R) Cover Component
  - SF 424 (R&R) Project/Performance Site Locations
  - SF 424 (R&R) Other Project Information
  - SF 424 (R&R) Senior/Key Person
  - SF 424 (R&R) Detailed Budget
- PHS 398
  - PHS 398 Cover Letter
  - PHS 398 Cover Page Supplement
  - PHS 398 Checklist
  - PHS 398 Career Development Award Supplemental Form

Career Development Award Supplemental Form (K99/R00)

- Candidate Information (Total of 12 pages)

-
  - Candidate's Background
  - Career Goals and Objectives
  - Career Development/Training Activities During Award Period
  - Research Strategy
- Training in the Responsible Conduct of Research (1 page)
- Mentoring Plan (6 pages)
- Statements of Support from Mentors, etc. (6 pages)

- Environment and Institutional Commitment to Candidate (1 page)

- Research Plan
  - Specific Aims
  - Research Strategy
    - Significance
    - Innovation
    - Approach
    - Also include Preliminary Studies
  - Inclusion Enrollment Report
    - If conducting clinical research
  - Progress Report Publications List
    - For renewal applications only
- Human Subject Sections
  -
  - Protection of Human Subjects
  - Inclusion of Women and Minorities
  - Targeted/Planned Enrollment
  - Inclusion of Children
- Other Research Plan Sections
  - Vertebrate Animals
  - Select Agent Research
  - Consortium/Contractual Arrangements
  - Resource Sharing Plans
    - Data Sharing Plan
    - Sharing Model Organisms
    - Genome-Wide Association Studies
- AppendixMay include the following in the Appendix:
  - Manuscripts and/or abstracts accepted for publication but not yet published
  - Manuscripts and/or abstracts published, but a free, online, publicly available journal link is not available
  - Patents directly relevant to the project
  - Surveys, questionnaires, and other data collection instruments; clinical protocols and informed consent documents

Strategies for Success

General Tips

#1 Strategy for Success

Read the instructions and then read the instructions again!

The large print giveth and the small print taketh away....

Strategies for Success

- Discuss your research idea with your mentor, colleagues, and program manager
- Request your reference letters early, and talk to your references about what needs to be included in them
- Be realistic
  - Make sure your specific aims can be accomplished within the proposed time

    - Make sure – and explicitly state – that you have the appropriate resources to conduct the research (equipment, lab space)

- Identify yourself as a new investigator
- Organize your application in the required format
- Convey the value of the research in plain language – clear, succinct, and professional
- Be comprehensible to both scientists and the public
- Ensure that your application is complete
- Have zero tolerance for typos and other errors
-
- Relay the potential impact of the research on health
- Think like a reviewer
    - How would you rate your application?
    - Shore up any weak spots before submission

Acknowledgements

The GCC Professional Development Project
is supported by a grant to the
NLM Training Program in
Biomedical Informatics and Computational Biology
from the
National Library of Medicine
Grant #3T15LM007093-19S1

Chapter 11

11. Time Management[1]

Time Management
Sujata Krishna
In this module you will learn to:

1. Clarify your goals and steps to attainment of the goal
2. Delegate
3. Deal with issues that take up your time
4. Manage procrastination & Stress

11.1 Clarify your goals and steps to attainment of the goal

Ask yourself:

- Why am I doing this?
- What is my goal – over the next 10 years? Over 1 year? Is this your goal or someone elses?
- What do you need to do to succeed? Write this down and make a timeline for attainment. Break it down into small steps that are attainable.
- Make your goal something you can assess - how will you know you attained it?
- Define the resources you need - people, equipment, time etc.
- Identify the potential obstacles in attaining your goal

Failure to plan leads to failure. Plan out your day (in detail), week, semester, year and long term (somewhat more vaguely). You can change these, but you must have a plan.
Splitting Your Work Time
You Should aim to spend:

- 80% of your time doing your work towards your goal
- 10% of your time on Professional Development
- 10% of your time on publicizing your work - i.e. writing papers, giving talks, professional networking etc.

Place each task in a Covey's 4 quadrant to-do list:

	Urgent	Non-urgent
Important	1	2
Unimportant	3	4

[1]This content is available online at <http://cnx.org/content/m37116/1.5/>.

Table 11.1

Tackle #1 first, then 2, 3, and 4 in that order.

11.2 Delegate

Delegate everything you can to someone else who can do it well. Give them the resources to do it & trust them.

11.3 Deal with issues that take up your time

Several issues often take up your valuable time, such as:

- Disordered paperwork – can't find what you are looking for
- Emails, paper requests
- Missed appointments or unpreparedness for meetings
- Tired, unable to concentrate
- People requesting help, volunteering etc.
- Telephone calls where you are on hold

What can you do about it?

- File paperwork away. Focus on one issue at a time.

- Emails: Deal With it Once: if it is a short task, do it now and be done with it
- Learn to say 'No' firmly, but politely. Use 'I'll do it if no one else steps forward.'
- Communicate clearly and follow a conversation up by an email stating the outcomes.
- Never commit immediately. Always ask for time to consider.
- Calls – use the speaker phone so your hands are free.

11.4 Manage Procrastination & Stress

- Stress often results from poor time management.
- Good time management leads to success.
- If a task has no deadline, make one up.
- Don't aim for perfection, aim to be good.
- Last minute, rushed jobs cost you. Best to not leave it to the end.

11.5 Tools for Time Management

- 1. Time Management Quiz [2] - Use this to discover how good your time management skills are and where you can benefit form improvement.
- 2. Rescue Time [3] is a program that runs in the background on your computer and tracks how much time you spending doing different things. There is a free lite version that lets you see, for example, how much time you spend emailing, or on Facebook etc. A paod subscription enables you to set up time limits on different types of activities.
- 3. LeechBlock [4] will block various sites after time allotments you've given it have been used up. This can help you manage your time.

[2] http://www.ucc.vt.edu/lynch/tmquiz.htm
[3] http://www.rescuetime.com/plans
[4] https://addons.mozilla.org/en-us/firefox/addon/leechblock/

11.6 References & Further Reading

1. Randy Pausch's Talk on Time Management[5] , University of Virginia, Nov. 2007.
2. The Seven Habits of Highly Effective People, Stephen Covey, Free Press, 1990 ISBN 0671663984

[5] http://www.youtube.com/watch?v=oTugjssqOT0&feature=relmfu

Chapter 12

12. Transcript of the video on ' Conflict Resolution'[1]

Conflict Resolution Video Transcription

http://edtech.rice.edu/www/?option=com_iwebcast&task=webcast&action=details&event=2512[2]

Instructor (Sujata Krishna):

Now I want to introduce the overall program under which this workshop is being held.

You're all welcome to the Gulf Coast Consortia, where this is the NLM professional development. We're forming a course and this is one element of the course. So we've had several workshops and there are several more to come in May and some in June, so keep your eyes open.

The course is actually for biomedical informatics graduate students, but we have left it open in this pilot here to any graduate students.

And the GCC serves 6 institutions, Rice is one of them. U of H, Baylor, MD Anderson, UTMB and U of H. So you may find people here from different institutions, please get to know each other. That's one thing that we really encourage you to do, to network here.

And now I would like to introduce the topic. We're going to talk about conflict resolution. And we have a second hour, after Mikki speaks, which is open to all of you. You can ask questions for personal or professional development. So this will be anything, from "how do I get a job?", "am I suited to this?", whatever. And if she's not willing to take it, she'll say so, I guess. So please, please use that.

She's a professor of management and psychology. She has a background as an applied psychologist. So she is eminently capable of talking on this topic. And another thing you should know about her is she's big on running. She's done several marathons. I think she's done 52. So great, another marathon session here.

Mikki Hebl:

So welcome, everyone.

So I'm pleased to be here. Just to give you a little bit more about me. I am from the great state of Wisconsin. I also spent time in Massachusetts and New Hampshire and California and Texas, okay, so I feel like I've been around. I was trained in Social Psychology. My social psychology, for those of you who don't know, is the study of the way people think about, influence, and interact with others. So it's really the social

psychology is the study of our daily lives. I got hired in an I/O Industrial Organization program, which was really fitting with my interest because I/O psychology is the psychology of the workplace. So if you think of social psychology as the psychology of daily social interactions. It's easy to take that and look at it in the workplace.

There are courses on conflict resolution within I/O psychology, within social psychology. So I was thinking about what to teach you, and how to broach this subject, and I thought 'man, there's so much to teach.' So

[1] This content is available online at <http://cnx.org/content/m41551/1.1/>.

[2] http://edtech.rice.edu/www/?option=com_iwebcast&task=webcast&action=details&event=2512

I just put a few overheads up there as guiding points of things I'd like to cover. We can get more specific. Please interrupt me if you have questions.

And what I would say a lot about the stuff that I'm going to talk about is what I always tell my graduate students, which is the answer to "How do you? What do you? When should I? Should I?" is "It depends." Okay? See? A+ in the course.

It depends, okay? It depends. So for conflict resolution, it also depends. It depends on so many things.

So I study social interactions and you can ask, say you're interested in "Should I confront the conflict?" Well, it depends. It depends because we want to look at the situation that you're in: How much power do you have? Will it hurt? Could it potentially hurt you? We want to look at the situation in which the person you are having the conflict with is in: Is this person a superordinate to you? Is this person controlling your destiny? What are the personalities characteristics of this individual? Does this person have sort of a "my way or the highway" because it doesn't matter how good you are at conflict resolution if this person is "this is the way," you're really going to be wasting your time, and possibly hurting your time by digging deeper. Okay?

And then you can think about the situation itself. So you have: you, you have the other person, and you have the situation. And some situations are ripe for solving. If we come to an impasse, and we cannot move, we've got to talk. We've got to get around the conflict, but there are some conflicts that really are best just kind of left alone. Watched, and left alone. You feel it's there. The other person feels it's there, but sometimes to bring it out into the open is possibly the worst thing to do. Okay? So it really does depend. And also, I can't give you a situation where say, in this situation with this person or that person, this is the best thing to do. Because it may be the best thing today, but tomorrow it may be the worst thing, okay? So even within person, there ... it depends. It depends. What's going to come out of your mouth when you confront that, okay? Is it okay to be articulate? Is it as articulate today as it was yesterday? Are you going to say exactly what you said to me when we practice it? And what, did so and so take his or her medicine today? Is it going to be well received? So to some of this, to a large extent, some of the things I tell you is going to be "it depends."

Now, I want to tell you that when I was a graduate student. Actually, that's not true. When I was an assistant, a visiting assistant professor at Dartmouth College. So I got my Ph.D. at Dartmouth College, and then I stayed there one additional year. So I was a visiting assistant professor. And just like Rice has this opportunity to be a resident in the dorms, I had the opportunity to be a resident in the dorms. So I lived in the dorms with the students for one year. And in order to do this, I had to take a lot of different training classes, because if you live in the dorms, you're going to be experience a lot of crises, conflicts, illegal stuff, okay? And you're somewhere between a blind parent, you're not supposed to be parenting them, to a very responsible police officer. You are supposed to prevent deaths, okay?

So, I dealt with a lot of issues. And one of the things, that I would say is probably the most meaningful conflict related training that I got, or even better than exposure to a lot of the readings, was I went to mediation training. And it was only a 3-day course, and they have courses in mediation training that are many, many hours. You have to do a certain number of hours, and then you can call yourself a mediator. And if you are a mediator, I think you can get licensed, and you can practice this. And what I will say is those 3 days have helped me with my own personal relationships, with trying to solve conflicts, and I just recently did this in our department between faculty members, and it helps just solving and listening to other peoples' problems. So I would like to tell you a little about that today. And I would say, if there is ever was a chance that you get to take mediation training, do it. It is not a waste of time, okay? It's just.

Yes, go ahead.

(inaudiable question)

There's not among this course, but if you look in my guess, my guess is if you look in Houston at mediation training, you would be able to find it. It's offered. I had a guy who was selling me my condo 5 years ago, and he said that he was a mediator on the side, and many people who are lawyers get mediation training. It is, it's a job in of itself, but there is such a thing as just getting mediator training, so that you can help in crises. So I just google "mediation training in Houston" and you should be able to see it. And again, it was provided at Dartmouth, so it may be provided at University of Houston. I don't think it's provided, to my

knowledge, at Rice. But I would look at the other schools. And I know at Dartmouth, if you got 90 hours, you were certified, or something like that. That goes back on my memory to a while ago, okay?

(inaudible question)

There's not mediation training, but there may be something on conflict resolution. I don't know if there is. Do any of you know? Certainly, there are in many business schools. So you could again, if this is of interest to you, but I think they take more of a conflict resolution between stake holders; whereas, this is, this translates. I mean if

you're going to see, I put how to try to resolve a conflict between you and another individual. How to do it with your advisor, and how to do it with your department head, those sorts of things. And what you see is the same strings run through. But I'm just telling you: please, look for it because it is not a waste of time. I've used it in my marriage, I've used it in friendships, and I definitely used it to get people together to talk about the issues and try to be transparent and try to be get beyond it, okay? Yes.

as you grow older, it difficult to change habits, yourself and the way you think. And I wondering if by taking mediation training, this lecture, or similar lectures at Rice. How easy is it to assimilate yourself and modify your behavior?

That's a great question; and everyone heard that, right? And can you, do you hear that on the tape too? So, we social psychologists, and psychologists in general, and personality, and we study this. Do people change behaviors? Do heavy people lose weight? Do people who are smokers stop smoking? Do who are mean, are they always mean? And the answer is that a lot of behaviors, habits, personality dispositions become more and more fixed, and they say that Todd Heatherton and his colleague, Roy Bowmeister, wrote a book about 'do personalities change', and their answer was no, not after 32. So you have until 32 to get it right, and then you're screwed. And I don't think that's quite right. I think his point is that it is very difficult to change behaviors. It is very difficult. Do people do it? Absolutely, because they follow this book up with micro-narrative approaches of how people are successful. How there are Jareds out there, like the Subway eater who lost all his weight. How people do stop smoking, how people do change dramatically. They were butt-heads, and they're really nice people. They're philanthropist, or whatever. But it is hard; it's hard for people to change.

With mediation training, I don't know that you have to change your personality or to something that severe, I think it's a way of following steps so that you hear the other person. And the steps of mediation make it so that you have to follow these steps and once you follow these steps, it's not really about changing your personality. It's about suspending your anger and suspending your beliefs to listen and articulate what the other person says and have them listen and articulate what you say so that you can find out if there is some common ground and usually there is. Usually what is the problem with conflict is that people lose the ability to argue over the objective truth and facts, and they start going to name-calling, insults, and defenses. And so they lose the ability to solve "is this room white? Or is it off-white?" Okay? Instead of "I told you! And you always say that I'm wrong, and I'm not wrong, and look at it! It looks just .." and so people begin to argue about things that aren't the topic of the conflict. And so mediation training is often about getting rid of all of those trait level things and just focusing in on this one particular incident and setting some ground rules so that it's less likely to invoke all of that extra stuff that we have, our personalities and things that aren't likely to budge. Does that make sense? And we'll take more about that, as well. And please feel free to interrupt me.

So, let's move on. So, anyways. So I'm going to talk about conflict resolution and then I'm just going to have open forum for professional issues, discussions. I teach "Professional Issues". I've taught it about 7 or 8 times, I taught it to both at both of you, 2 of the students, and I need to teach it to two more of the students here. So no telling, this is a preview. And I love this stuff, and I feel very free to talk about all sorts of things, and I'll give you some references at the end that I think are particularly good spots that you should know about because the references and resources are out there, and the web has never been a more helpful source of advice, okay?

So conflict, here we go.

Conflict: to come into collision or disagreement; be contradictory, at variance, in opposition, clash. The account of one eye-witness conflicted with that of the other. My class conflicts with my going to the concert.

To fight or contend; do battle. A fight, battle or struggle; especially a prolonged struggle. Strife; controversy; quarrel. Conflicts between parties, discord of action, feeling or effect. Antagonism or opposition, as of interest or principles. A conflict of ideas.

So you hear this and when I was reviewing this, and you might be doing this too, you might say, "Ah... isn't academics one big conflict? Isn't the whole purpose of academics, to sort of say, 'no.. it's not's quite what they said, it's actually this' or 'so and so 1999 was wrong, it's this' and then so and so 1999 write back and say 'people! 2011 was completely wrong!' so this is about, we keep each other business because of conflict. So to some extent, in academia, and in the workplace and in general, creativity comes out of conflict, new ways of thinking comes out of conflict. Conflict isn't always seen as such a bad thing. And there are also not only subcultural differences, but there are cultural differences in how we feel about conflict as well. But I would say, that when we think about conflict, what we think about are some of the negatives, so we think about voices being raised, we think about people pointing their fingers, okay? "You did this to me!" okay? "You!" and of course, we are always reminded that four fingers are pointing back at us, okay? People insult each other so we move from, "you know, you didn't clean up the dishes" to "you know what? You never help. You're just lazy. You're lazy." Okay? So we quickly move into insulting each other and away from the topic. We get defensiveness. "I know what you're going to say, but let me just tell you why you're wrong." Relinquishing positions, so often times, in a conflict, if we have to give up, if we have to relinquish our position, we're seen as weak, okay? So we're seen as "you know what? This is how I feel and this is what I want and this is it. Okay? It's a zero-sum game, I want it all, you get none." And if we relinquish at all, it sometimes feels in our society, like we have failed. Like we haven't gotten what we wanted.

The subjectivity of it. So when we see conflict, again, what happens, is we often lose the ability to be just completely objective and know the facts and learn the facts. What we want to do is look at the facts with experimenter bias. We want to say, "Well... you could say I'm right in that situation if you ..." okay? So you make it so that you're coming out ahead. People use emotion over logic. My colleague studies the way people

approach situations. Do you approach situations with cognizance or do you approach them with emotions? So if somebody insults you, "You know what? I really don't like your glasses." Okay? Do you say, "Oh... you know, maybe these glasses aren't the best." Or do you go, "Well, I don't like your nose." Okay?

You know? And we have different ways of reacting, and those are not state level. They are trait level. Okay? And that's what he shows. There's sort of, there's a way that we are more likely to react in this sort of emotional "whoa blah blah blah" or a cognitive.

There are situations in which all of us tend to be more cognitive, and situations in which all of us tend to be more emotional. We lose sight of the facts and we use 'you' statements that personalize the issue. So instead of, "you know, I would have liked the dishes to have been done," its "you never do the dishes, you lazy son of a gun." Okay?

So is conflict good? Some of it is good, it's often part of the growing experience. And it's good because we have dissonance. If you know about cognitive dissonance, it often feels uncomfortable to have that conflict, so it propels us into action, and that's a good thing. So conflict, if we come away from this talk thinking conflict is really bad, this is not true. Conflict is a part of our society, it is a part of your life, and it probably will always be a part of your life. So the best thing we can do is think about how we can frame conflict and move it from a necessarily bad thing into something that's good and be sure that we have the tools that when we want to get out of conflict, we can get out of it. So some of it is bad. Conflict, when it is very extreme can be the precursor to major stress and depression, inability to perform well, preoccupation with situations or with other people.

And I see I've lost one slide. And maybe I just erased it, but I was going to say was there is a quote by, maybe I lost it, let's just see if it's here. I must have erased it, but anyways. It basically says that in academics, we work with conflict; our subject matter is conflict and there is a quote by Duey(?). Do I have it on here? I don't have it on here. But basically, Duey(?) is a psychologist who basically says conflict is good, it breeds thought, and it breeds us into action. So just to say conflict is sometimes good, it's sometimes bad in extreme.

I'd like to have you focus on Chinese symbol on the bottom left. So is anyone in this room, does anyone

in the room know how to read that symbol? No? Yes? What is it? What is it?

It's conflict. Tang tu?

(inaudible students)

Okay. And so, this is, tell me, you get to tell me because I looked this up, and it means "danger" or "chance," okay. Okay, which one is the danger one? The whole?

(Student: yeah, it means trouble)

So what I read on the internet, also, but I don't speak Chinese, is also that there is opportunity within it too? *(Student: No, second word has meaning of opportunity)*

But together this makes conflict.

(Student: The Chinese word... this is danger)

So this is a bit different with the other one. So we have to stick with this one.

So this is the one I was going for, and what I've learned is that this signal, this symbol for conflict means both "opportunity." It's defined as "opportunity" and "danger" together. Is that true? The second one. You say it's the opposite. Well, whatever it is, what I learned was that the Chinese symbol for conflict involves both "opportunity" and "danger" and I think, if we stick with that, maybe I didn't get my symbols right, if we stick with that, I think that's a really good way of thinking. That's a good way of thinking about conflict. Okay?

And so Lazourous (?) developed and researched a model to helping individuals react to conflict. And this has continued to be a pronounced theory in psychology. Jim Blaskovitz(?) and his researchers at Santa Barbara, CA do research on this as well. And they look at what happens when people view something as a threat vs. a challenge. And if they view it as a threat, people tend to use wishful thinking, avoidance, and even hostility and aggression as a coping strategy.

So if you view something as a threat, you want to stay away from it, you remove yourself from it. If you view it as a challenge, then you're more likely to find solutions and thoughtful action as a result of this perception. So I view it as a challenge, I'm going to move toward it, I'm going to try to overcome it, I'm going to try to see something good in it. And again, I think when we have a confrontation, one of the things that I would like you to leave with, is the idea that you can view it as something that's a threat or you can view it as this is something in my life that is creating cognitive dissonance that I have to solve, that I have to move beyond, and I should move toward it, okay? So Chinese character for conflict is pictured here, and it means danger and chance. So if you not only see the threat and danger in the conflict, what challenge or chance do you see?

And I'd like all of you to just choose a conflict in your life. Okay, whatever that conflict is. Maybe it's a conflict within yourself. Maybe it's a conflict with another person, maybe it's a longseeded conflict, whatever that conflict is, and raise your hand once you have that conflict. I won't make you tell me about it, but I just want to know that we're all thinking of a conflict.

I want you to think in your mind of a conflict that you have, right now, with another person. Sometimes people have conflicts within their own self, "Oh I want to do this" "No I really, really want to do this" "I should to this..." "I should work on my dissertation, No I should not", I know, I'm mind reading over you. She channeled her thoughts to me and they reached me, okay? But some of you might have a person that you really just are having frustrations with. Maybe it's an advisor, maybe it's somebody else. And once you have that conflict, just raise your hand. If you don't raise your hand, I'm going to give you an extra conflict of mine. Do you have a conflict too?

No? Well, I do. Do you have a conflict? No, behind you. Okay, okay, that's fine.

So we all have a conflict, and I want you to just think about that conflict right now, and tell me, do you have negative feelings about it? Okay, is it unresolved? Okay, so are there ways that you could look at it as a positive thing? Can you remove the negative things and say, "This could propel me into action, maybe I really need to do something about it." Now, some of the "propel into action" will become clear because you simply continues to be with you. If you can say "uh... I have this conflict, and you know what? It's just dull, it doesn't bother me that much, it's just sort of a nuisance, I can let it rest." But if I can say to you, 'do you have a conflict?', and right away, "OH YEAH! I GOT MINE" and it's welling up inside of you, then maybe that's one you want to think about and really use in this thing. And I want to have you do this

exercise of having that conflict and thinking about the conflict, because at the end, I'd like to propel you into action with the skills to possibility to overcome it.

If you get fired, you're a graduate student or a post-doc, I am not held accountable. Okay? So I have no additional funding to take you on in my lab. She says, "No I, no you don't." We'll at least help you work through some of it, alright? Okay.

I teach this in my graduate class, here's this orange. So two people were arguing over an orange and both felt they should have it, a third person deciding to settle the argument cut the orange in half, and gave half to each of the two people. However, neither were happy. The first person needed orange juice, the second person needed the zest from the orange peel. To me, this illustrates the first, most important step in conflict resolution, and that is: We need to understand, and listen to each other, okay? Both of these individuals who wanted the orange could have had 100% what they wanted if they had just talked about what they wanted, listened to each other, and resolved it, okay? Now, do all conflicts result in this possibility? No. In some possibilities, you're going to get half an orange, and that's it. And then you're going to have the cake, or you're going to

have less orange juice – a little bit of water, okay? But, there are situations in which people can really come to a 100% satisfaction with each other, and you want to think about what does it mean to resolve conflict.

Does it mean that one person gets 100, the other person gets 0? Does it mean that everyone gets 50% so that you're never really happy? And again, that's something you want to talk about when you think about other alternatives, when you think about all the options that you can do. So, one of the main takeaway points is, you need to accurately identify the problem and when you do this, it usually involves listening. You have to identify, what is the problem that you have, what is the problem that other people see, you got to take in information, okay? If this is a really big conflict, it helps not only for you to address what you see as the problem, what you see the other person sees as the problem, and what 3rd party sees. So you're collecting lots of data, right? We're all researchers. So you collect lots of data because a lot of times when you collect data from your friends, they might say, "Listen, Micky, I really, I think you're really reasonable in general, but on this situation, I don't think you're quite right, and here's why" and it's much easier for you to listen to a friend and to lose a face with your friend, than it is if you're being unreasonable in the confrontation and dispute. So it's good to collect information, "Here's the scenario. What do you think about the scenario? Ask somebody trusted." And the thing is, there's a lot of pressure when you're asking this trusted friend for them to say, "Oh, I think exactly what you think, okay?" So you say, "No, I need your advice, I really need you to give me feedback here." So again, collecting information and making sure you identify the situation properly. Know what's going on. Be a fact finder. It's really important.

So here's my last, my second, I had this written down so I'm hoping that this is correct, okay?. But this accurately identifying the problem, and this is the verb "to listen." Does that look like "to listen" to you? And it involves ears, eyes, undivided attention, and heart. Yeah, well, they wrote it for me, so I just get to say it. But again, these metaphors, I think, are really, really important, okay? So when you are fully identifying the problem, when you're fully doing conflict resolution, you want to include this. You want to include, the ears, the eyes, the undivided attention. In undivided attention, there's no room for "Yeah, but; but me.., but you always, but but but" and one of the things you find with conflict, is right away people go into defensive mode.

So there are several different ways to resolve conflicts: Withdrawing, or simply avoiding, "I'm going to ignore that person. There's soothing or placating, "I'll do whatever I need to just to get thru this situation." There's compromising, "okay, I'm willing to give up want I have to give up." There's forcing, "I'm going to force" or "I'm going to be forced to do it," okay? There's collaborating, there's working together and just trying to get through it again as fast as possible. And there's confronting or problem solving. And again, it very much depends, a situation, can be resolved in all of these ways. I bet most of us have used all of these ways; they're certainly ways where we just say, "I'm not going to deal with this one." And I think that you want to pick your battles, and you especially want to be sensitive to the fact that I'm talking to a group of people who, and

this is perhaps not the happiest statement to make, but to some extent, you don't have a lot of power

in the situation that you're in. Post-docs, you have more power than graduate students, but you don't have an assistant professor position. Assistant professor positions are not, they involve less power than having a tenured position. So on top of this conflict resolution and conflict styles, there's a lot of power differentials. And that's sometimes what makes up the basis of conflict, or why conflict is so difficult to resolve because the chips are much higher for one side of person. Okay, if we talk about something like publications, where I am in the publication. Well, if I'm the faculty member and you're the graduate student or the post-doc, I get to make the decisions, and you are, you don't have a lot of recourse. I mean, there is some recourse, I'd like to tell you about that, it's a hole, there's a lot of power issues that come into play if you argue too much if your advisor, or with your post-doc advisor. So I think that's an important thing to understand as well, which is power differentials are often underlying, or exacerbating conflict.

Okay, so let's go ahead and go through some of these things. Let's go through the process of what you do.

The first thing, you want to do, and we're going to go through this. This is between two people, and we're going to go through this with different types of a people and what a mediator does. So first let's say, you're now thinking of that issue, that person that you're in conflict with. And you want to solve it yourself. So the first thing you want to do, is just stop, don't think about it. Just cool off, go away from the situation. So you've just been with this person, let's call it your advisor. Can I ask for a show of hands of who thought of their advisor, or is that like? You guys aren't allowed to ... Their advisor is mean, just so you know, okay. So we're not going to have honest, we're just not going to know. Let's think of that conflict you have, okay? And let's think. I want you to imagine these scenarios.

So the first thing, you've just come out of their office, or you've come out of an interaction. That's not the time to go back in and say, "This is it, I'm resolving it." First thing to do, is to cool down. Second thing, is to talk and listen to each other. So in order to do this, you've got to do somethings, you've got to find a neutral spot. If you have no power going back to the professor's office or the boss's office is not an equal playing field for you. You're going into his/her turf, and you'd really like to be an equal. So you say, "Hey, could we met in wherever.. some room. Can we meet for a coffee? Can we go talk about this somewhere?" and you're going to talk and listen to each other.

Now there's specific rules for talking and listening, and I'll just preview these a little bit. There are a little hard to do when you are, when you don't have a third person. Because very quickly, it gets into a problems of defensiveness and ground rules. But essentially, what you want to do is you really want to listen to the other person. Let the other person try to set some ground rules, and say "I'm here because I have a conflict with the way that you do X, and I would like to, perhaps, have you explain to me why you do it, and for me to listen to that, and then I will explain to you the issue that I have or I would be

happy to tell you how something is making me feel, and then perhaps, you could explain and try to tell me so that I can come to an understanding." Nothing in that language has been accusatory of someone trying to hurt me, okay? Nothing in that language has been accusatory of me trying to be bitter back to this person. So the goal is to identify the situation and to hear people out.

(inaudible question)

Right, right, and that's why I say it's between two people, and it's for certain situations. Because we're going to come to a situation, where it's often best to have a third person. And if you, so, what do you do if you want to this on your own? The best person, is to let them know ahead of time, I think have this with an advisor too. This is just a generic people. Maybe we can wait for a second; but what I do, is what I say, in this situation, I send an e-mail ahead of time and I just say, "I was wondering if we could meet in a neutral area to talk about blank, and you give a preview." But again, not in a negative, self-destructive or other-person-destructive way. "I'm trying to come to an understanding about the decision, and I was hoping we can reflect on that, so we can come to some understanding." And that person still may not be aware of what the situation, okay?

(.. why is he asking me to? I don't even want to talk to him.)

Right, if you feel that way, what I would not do, is I would not get into anything over e-mail. Maybe the best thing to do, is let's erase that, and you go to them directly, and say 'at some point in time, can we talk about this?" E-mail can be the worst thing, okay? Because you might write something innocuous and it's

totally innocuous, so you might write something funny, but now their guard is up. So they're saying every little misspelling, as you "you meant to misspell that, it corrected you, but you meant it." I think what I'm trying to get at, is you want to give them time to at least to know that you want to talk about something in a neutral spot, without giving it away, without telling them right there and then. Perhaps it's a good time for them there, and at that point, you can do it. So I'm not suggesting you send out something that they're going to slap down, and say "no." I'm suggesting that you somehow get a place where it's not their office, where it's not your domain, but it's a neutral domain where you can talk, okay?

(inaudible question... first step you are a post doc, proposal)

"Let's go to coffee. Can we go to get a coffee?"

(and now the other person is not ready to discuss. Just trying to solve the conflict and you both get in the way. How do you ?)

So what you have to do is to be fair to the other person to, and the way that you do that is you might say, "there are somethings that I wanted to talk to you about, and I wanted to hear your reaction to them and give you my sort of feelings on this as well, but in order to do that, I want to be able to tell you and have you think about them, and maybe we can pick this up again later," okay? So that you should allow them sometime to process it too. Because if you just come there, they have no idea, they didn't think there was any conflict, and you've already gotten to the conflict resolution, you're not giving them enough time to overcome it. So it may be that, you have to, and remember, this is why you choose your battles carefully. This is a big issue, because sometimes if it's just a little issue, people are so defensive that it becomes even greater. It's like "oh, that's the worst thing to do. Now so and so's mad and I only meant that I was a little teeny upset," okay. So you're not doing these with things that, like, what's appropriate? I don't know. I don't know what conflicts you were thinking about. So let's say you had 3 papers you thought were going to come out with your authorship on it, and you're not on any of the three. That would be a problem. That's an impasse, that's something where you have to do something. This isn't something like, 'Geez, my advisor isn't giving me the time on the machine that I thought I should get. He or she is only giving me 6 hours instead of 8." Maybe that is a big issue. You'll know it when it is a big issue. Some of you have the big issues, and those are impassables, those are ones you need to solve. And again, this is very difficult to do because you are leading it. It might be a better situation if it's a really big one, to bring in the mediator. And the mediator can go to the other person, and inform the other person, and that person comes to you and informs the person, and that person gets people together, okay? So some of this is possible to do on your own, and not possible to do on your own. And you just want to think through these steps. How will it go? But yeah, clearly, if that person doesn't have any clue, you're going to need a time where you can introduce it. And you're going to need a time where they can go away and think about it, and then you're going to need to come back, okay? And remember, they are probably going to get defensive, so it's really important how you lay it out in the beginning. You don't want to be like, "you did this, you did that, you did this, you did that," what you want to do is phrase in terms of "I".

"I feel", "it is my experience", "I am having a difficult time", "I'm experiencing this", rather than "you" because "you" is pointing fingers and it may just be your interpretation. And one of the things you find from mediation is that. And spouses are notorious with this. They are so good at reading the behaviors and the subtle paraverbal behaviors that they'll look at each other. Let's say Enrika is my spouse right now, they go, "What?! I didn't do anything" and Enrika says, "Jesus, it was just a look, I didn't, wasn't even, I was looking at the wall behind you. I wasn't even looking at you." Like we set each other off, just by looking at each other. Do we do that, married couple? We have a married couple here.

We might be calling upon them, okay? Yeah, and I mean you're ready on the 6^{th} you did that, you are, you do do do, when none of that was inferred, okay? And so you need to make sure that when you do this, you're talking about "I". You are owning everything. They may not know mean to be mean to you, they may have a reason for what they're doing, and you can't say, "you, you made me look like a fool, you gave me too much

work." You can say, "I feel like you gave me too much work." But you're not inside their head, and you don't know why they did it. And you don't know why they did it and even when you're married, even when you think, for sure you did. Because you got the two years of proof, or the 17 years of proof, okay? And

that's, and truly, that is one of the biggest reason for people fighting. They'll fight over, again, the color of the walls. "No, it's not! You always do that! You always disagree with, you always say ..." and all of a sudden it's not about the color of the walls, it's about the habits of fighting. And so that's what you really want to get away from. You want to get away from the generalizations to what the issue is about, okay?

Yeah, go ahead, no no, go ahead. I want all the questions.

(The conflict has already taken place, now you are finished with stuff and put off, and now it's time, you feel like it's time to, you know, approach the person. Now you... possibility that the person will say, 'I don't want to talk about it' so I think that this is just a hypothetical, not fully hypothetical, but let's say that so that you can correct me if this is how you should do it. So, now next time to prove the person to talk, and you're approaching it with 'I' statement and it's your turn. You want to decide whether this is really the time whether you should approach it or not, because you don't want to be, you know, because that's only one opportunity that you get. Every time you approach, you are delaying, so how do you see that the other person is ready or not?)

I think if the person says, "no" to you "I don't want to talk about it," then I think it's probably you do not feel resolved about it. It's possibility time, and again, I think the answer is "it depends." But you want to think about how big is the issue. You want to weigh the cost and benefits of letting it go. Like, you want to think about the position that you're in, you want to think about is this something I need resolved? I have to, these are 3 publications, and I need to be on them. I need to have this resolved. Or is this, the implications of what you said, make me think that you are racist, and I don't know if I can work with you anymore. Well, it turns out lots of people are racist, we might just have to let that one go. So again, it depends on the content and how important, or maybe I'm wrong. Maybe you can say, "geez, the 3 publications, don't matter at all, and it really bothers me to have to work with someone who is racist." It's sort of like, how much dissonance or conflict you feel needs to be resolved. But to me, when you say, when that person says to you, "No, I'm closed for business," I think that's when it is potentially time to involve a third person and get a mediator. If it's important, that's right. Because, otherwise, you're just going to get; that person is not ready; that person is not cooled off. That person is not welcoming, and it's hard to make someone be neutral, when they're not approaching the conversation. You can't force it on them, they got to be ready. And that's part of it. The ground rules are just so critical. It's so critical you go to a neutral spot, and that both parties are willing to be there. If you don't do that, it's so hard to do it. And then you got to involve somebody else. Okay.

So you brainstorm solutions. So this is, I like to think about this whole thing with somebody, like you have a friend, you have a partner, you have somebody that you love,

"hey, we love each other, let's try to solve this on your own." This is somebody in your lab, so these are good opportunities to do it yourself, sort of. So you can think of solutions, so "hey maybe we can do this, or maybe we can do that." And you are invested in that person, and that person is invested in you. And you choose the idea that you both like, and you make a plan, and you go for it.

Now I'm not trying to say that this is easy work. It's still very difficult. But let's move on. This is something you try with your own, with a relatively, just sort of the framework that you use, okay?

Embedded in these frameworks, are sort of an SOS. So the SOS – steps of resolving conflict are Story, Options, and Solutions. So each person tells his or her side of the story, including using a "I" message to say how he, to say how each feels. Okay. So this comes to mediation, which we'll talk about in a second. But mediation, and this S, this first S is really about saying, I've forgotten your name, Sujas? So, Sujas and I have worked on a project together and Sujas has dropped the ball on it. I've done the work, and Sujas has not. I'm the protagonist in this story. But actually it turns out that Sujas worked on another project before and he carried all the weight, so he was like "I'm not carrying the weight for Micky this time." So he was kind of mad at me and he was, like, suspending his work because he didn't want to get sucked in and get no credit again. So, the story goes like this: somebody says to us, or we say to each other, "Okay, Sujas, we're going to talk about this, and I'm going to tell my story, and I want to hear your story. So I say, "Sujas, this is the deal" and I'm just going to shoot ahead to mediation. Because in mediation, what is going to happen is, Sujas is going to have to tell me what he heard me say. So, and I really, if I really wanted to pick on you two, I could really do this, and I could bring out some stuff, but I'm not going to do that, because I don't

want to make it worse. And I want you to try and go home, figure out sometimes. Sometimes, this actually like makes people mad. Because it's very hard to do. And all you have to do is go home with your partner and try it. So Sujas, the first thing is I'm going to tell you how I feel, and you're going to have to tell me what you heard me say, and what you have to do. It's easy to, well it's not always easy to listen, it's very difficult to repeat it back as you heard me say it, without also bringing in your own, okay?

"So Sujas, I worked on this project entirely, it was my feeling that you weren't there, and I experienced this sort of, um, what I perceived a negative attitude from you when I tried to get help, it didn't seem like you were there. I felt like I was doing it all by myself, and I was wondering if you could explain that to me." Okay, so now we're going to stop and you're going to say what you heard me say, and it's going to be relatively easy for you to do because this really didn't happen, so you can't really come up with defenses. But go ahead and try you're best if you can.

And you would say, "what I hear you're saying is..." Okay? This is called the parroting the part of this relationship.

"What I hear you're saying is you're upset about how... (inaudible)"

No, no, first what you're going to say is, "Micky, what I hear you saying is that you felt..."

"Micky, what I hear you saying is that you felt that I'm not doing work (inaudible)"

That's correct, except when you said that, you actually made me look a little bit bad, so what I would, so I'm going to correct you, okay? And you're not going to judge, you're not going to go, "Yeah, but..." You're going to say is "Okay, so what I hear you say."

Now will you tell me, what your experience was?

(I feel that I worked on another project a lot, and you didn't work as much as I did).

Yes, that's good. So what I hear you saying, is that you felt that I didn't work very much on the earlier project, and so I, you, what I hear you saying is that this was your attempt to get away from not having to do all of the work on the second one.

Now, if you go through with that exercise. That was difficult for us to do now. Now bring in emotions with it and bring on the fact that you are pissed off, and you're processing this with a lot of emotions and it becomes really difficult. If you can do that, first of all what happens is you start to see, "Okay, this person really is taking time out to try to listen to me and to meet with the minds. We are trying to resolve this situation."

Okay, so the next step is, alright, now how can we get beyond that?

So, I hear what you're saying, I now understand that that is why you're doing it, I can try to explain my situation, but sometimes, but just getting out "Oh, I get it, and he's right. I didn't do very much work on that other project. It makes sense to me. I want to apologize to you for not doing very much work on that thing, and I will try to do make up for it on this. I might need your help on the writeup a little bit because the terminology surrounding blah blah blah is a little difficult, but I am willing to take that. Would that be fair?" And so, what we're trying to do is really make sure. And you know, it is not kumbayah, let's sit around and hold hands. It works, it really, really does work. And you often go home, and try it with your conflict with the spouse. Yeah?

(I hear what you're saying, but .. inaudible)

So let's go through this. Because we have a slide just like that. So options as people suggest, people suggest possible solutions, so solutions we both agree, okay?

(Inaudible solutions)

It's the biggest marital strategy that people use. It's what mediators teach in couple therapy, but what happens is, it's very difficult for us to do it first without getting trained. So that's when couples go to counseling, the counselor is a mediator, and the counselor, if the counselor is good, tries to enable people to do it themselves. I think I could do it better than you could because I've had mediation training and I've tried to use it on my husband a whole lot, okay?

I think you won't be as good, so you might go into this and get, "oh my god, this situation has gotten totally out of hand. What's that lady's phone number? I'm going to call her and prank call her, okay?" But what I think what will work is having a mediator like, so this is a big issue between you and your advisor. This is an advisor you really want to keep, but this issue that is really unfair, have a mediator come in. Yes.

(inaudible)

Oh you know, again, it depends on how serious it is and how much. Sometimes we just want to wait and watch. We just say that, "Oh that neighbor just annoys me. They keep stealing my garbage bin, and I keep telling them 'no, don't steal my garbage bin, it's mine."' You know it's conflict because every morning I come out, and they got my garbage bin.

Well, you know what? You might not want to confront them. Just go buy another garbage bin for $5. Now, if they keep taking that one, okay, "Mr. You're my garbage bag stealer." I'm not going to go "Hey, you're my garbage bag stealer." I'm going to go, "You know? I was wondering if I could talk to you for a few minutes about the garbage situation." And he'll be all "grrr" and you just say, at that point in time, "maybe I can come back later at another point, I just wanted to converse with you about it. Would it be okay if I stopped over", okay? At that point in time, you can kick in some of those things, and you do find that they truly do work, especially if you get people. It's hard to be the mediator and one of the person's in the conflict. So until you have ability to really understand it. I'm certain, certainly, when I'm really in the conflict, it's difficult for me too. But when you're the mediator, it makes total sense. You can see it because as the mediator, you, I would like to move to that, if we could. Because I think when you're the mediator, you can see it so clearly. You can say, "Yeah, he's really pissed at her, cause he did all the work on the first one, and she's like all mad and stuff, but where was she on the first one?" So you say, "Okay, I get it. You know what? I'm the outside person."

And they say, "Okay, I see it very clearly, I see how this came out." And we have so and so substantiating it, and here's what's going to happen, in the future, you two have to continue working together, and you know what? It's in your best interest to work together, so here are the 3 solutions you can have:

One, we can go back and we can take your name off of this paper. Two, we can take his name off of your paper. Or three, we can carry on and say it's a wash. And from now on, we will do these things together. I mean, the end is, when you're not in it, and you're not heated in the moment, the outcomes are endless, it's so objective and so easy to see the different possibilities. But when you're in it and trying to do it too, it's difficult. So I'm telling you, next time when I give this talk, I'll start with the other stuff first.

We've talked about advisors, what happens if they just. I'm going to move ahead a little bit, so just stay with me. So some lessons, those who resolve conflicts attack the problem, not the person. So one of the ground rules of mediation, there will be no name-calling. If there is name-calling, there is apologies. If somebody apologizes and they truly apologize, "I'm sorry" that's not the opportunity to say, "Ah! See I won! They said they're sorry." Saying sorry is one of the hardest things in the world. It's the hardest thing in the world, and when somebody says they're sorry to you, and they're really, truly sorry, the best thing you can do is have an open heart. That is really the best thing you can do, and that's one of the keys to mediation. I made a mistake. I truly made a mistake, and I am very sorry for that, okay?

That's all you can do. Sometimes you can go back and erase it, other times you can't. And so you have to say you're sorry, and you have to let them stand. That's all you've got. So to be gracious and accept that is just one of the rules, it's a rule. Accusing the person accelerates or widens the conflict and provokes self defense. Attacking the problem leads to resolving the conflict and conflict resolution is a process.

This is what, I think your question was really good because it often does, if it's a big thing, it often does involve revisiting the situation. It's not like "Okay, we met, and now we're happy and going to go about business." It involve saying 'How we doing? How are we, are we getting on?" And you don't always say "How we doing?" after the big crisis, and you're watching and saying, "Are things better now?" And again, that happens when you're in a relationship. It happens when you're in a friendship and you've had a big argument, and it's a real big argument, you kind of get back with that person, and you say, "Gosh, are things going to be the same? Are they going to be different? Are they forever changed?" So it's the same when you have a big conflict, as well. Yes?

(inaudible question – you realize that it's probably better, that just you know, put in an apology, and other person and you depend on other person and that other person will respond well)

Okay, so I'm in an argument with you and I apologize and you go, "see? I was right!" Then I think, you continue to carry on, we're getting into a situation when we need a mediator because a mediator does not allow somebody to say, "I'm sorry." "Uh! See I was right." It's not, it's just not helpful mediation. At the

end of helpful mediation, you again come to a conclusion about this is what I hear, this is what I heard, now are we okay with this? What does this mean to you? What does this mean to you? And the

ground rules are going to be no name-calling. And they're going to be, you have to be honest, you have to say what's on your mind. If you're going to come to this, and I'm going to waste my time to be with you to mediate this, then you need to be talking to each other, and you need to be frank with me. And we found all these other people to substantiate your claims, so going into it, I have a really good idea how you feel about all this stuff. So if I hear you start, just sort of kowtowing, "mmhmm, fine fine" and "oh yeah, exactly what you said," I'm going to know because I've done my work as a mediator. Okay. So there's no single best, 'this is it' depends on.

So we're getting into conflicts with advisors, and this is clearly something that many of you might face. And Enrika asked a question, "well, what happens if the conflict involves something with an advisor and the advisor says 'well, this is just the way you do it"' and certainly, I would like to say that a lot of people conflict with the most with advisors: authorship, that's the big one because those are sort of the golden chips, right? I mean, that's why you're doing a post-doc, cause often times you're getting experience, publications. In graduate school, you're getting your Ph.D., you're trying to jump through the hoops, so it's often "Am I ready to do this? Help me with this. Help me with that. And am I getting publication credit?" There's conflicts about working styles, amount of work that you're doing, the priorities that you're setting, documenting "well, you told me to do this, and now you're changing it", okay? All I had to do is think about all the things I do wrong. Not enough, use of, and late for meetings. Not knowing expectations. If you don't get to meet with your advisor, you often don't know the expectations, or you try to do something and you just, you didn't do it like the advisor wants it, and they say "well..." and so they're weren't clear expectations set.

If you're a graduate student, and now I switch the coins, I switch the sides a little bit, or a post-doc, and you're grading other people. The grade changes, I just thought it was funny. I was writing this talk, phone rings, and it's right here "hello?" "Yes, I'm calling you and I was wanting to talk to you about my grade, can I come to your office hours?" And I say, "Well, you can come to my office hours, is it something I can clear up on the phone? Perhaps we can talk?" And she said, "Yes, that would be great. I have an 89.03, and I was wondering if there was anything I can do to get extra credit." So this is the curse of the B+.

Now, so there's a lot of the grade arguments and the changes and things like that. When we go into that, attitude, personality, and then harassment. There can be some real serious things as well, and not that other things aren't. These are legal repercussions. So going back again to Enricka's comment. There are several different strategies that people have when they work with students, okay? What if your student has this sort of 'it's my way or the highway', 'you do what I say or you leave', um, they can be punishing. They could say to you, 'if you're going to complain about this, I'll give you more work', or 'I'll stop you from progressing'. They can placate, 'oh yeah, I hear what you say, I'll give that some consideration' but they never do anything. They can be defensive, 'don't you think I know what's best for you?', um, 'you know, when I was a graduate student, you should have seen what I had to do' and 'this is only fair.' The power differential is

something to consider and the potential embarrassment that you have in going to your advisor and perhaps crying in front of your advisor, and then you have to go back. And you might feel bad about that. I think all of my students have cried in front of me and I've cried in front of them.

So, this slide I wanted to get to about your question, okay? Because undoubtedly, we all do have or had or will have different advisors and different superior styles and they think, you know, there are some real things to think about when you're dealing with power differentials and you still, you need to address the issue with somebody who does know how to work to you. And they think the first thing you want to do is you want to always show respect. So you go to this person, you know there's probably no way this is going to change, I really feel like I should get authorship, and I'm not going to get it, but I feel like it's important that I go and do this for my own personal stake. Like, maybe I won't get authorship, but if this is a big enough issue to me, then I feel like I need to address it. So the first thing you want to do is make sure that you have respect for that individual, okay?

Respect is important in any of the domains, whether they're the subordinates, whether they're the same – coworkers, but, it's also important because this is your superior and we know that respect towards superiors

is something that we learn early on. You're subordinate and you may not know the situation from the other side, so these are things that might be reasons to things to think about, okay? Somebody once told me when I was a graduate student, 'well, graduate students always overestimate how much, in fact, everybody overestimates how much they participate in the project.' There's something called 'effort reports' that we have to do when we go up for tenure or for promotion, and we have to say, 'here's a paper, and on this paper, 27% of it was my idea', which I think is funny, because how do you get 27%? But let's just say you could do 10, 30, 50, 100%. And if you take those and add them up, I'm quite sure, and add them up with the other people who are participating, I'm quite sure that would get estimates over 100%, okay? Just as when you ask men or women how much of the housework they do, it reaches over 100%, okay? And they say, you know, come on, let's be real, here. So people think that they do more than they actually do. So then there's the issue, there's a perception thing. Some of it is, you may not know, and I think that it's important to know: when you're an undergraduate, do you remember ever thinking, 'my gosh, I worked so hard but I'll never work this hard again'? And then you became a graduate student and you thought, 'oh, lord, that was easy', okay? And then you become an untenured professor going up for tenure and you go, 'this is SO much work', okay? And then you become promoted in full, and they put you on P&T committee and they ask you to be department chair and they ask you to do all these other things, and you're like, 'I can't even do it anymore. I can't even' so you have these undergraduates who are working with you who think, "Well, I put ALL of my free time into this' and you like 'you don't even know' okay? So there is this whole thing to 'you really don't know' how much of the effort you did, you don't have this whole idea about when was it formed out, how much of this was done before I came into it, how much gets it revised, and sometimes you do. Sometimes you do, but be aware that this other person holds all sorts of information about the topic that you don't hold, and you're trying to fact find. So you're trying to say, 'just make it clear

to me how this comes out because I'm trying to understand this.' So again, it may not be that you're going to come out with that A- like the woman wanted this morning, but I do feel in the end she understood that I'm a person of integrity. That I raise, I gave everyone 2 extra points on their final grade and that if I raised hers .97, I would have to raise everyone's .97 because that would be a fair thing to do. Then there would be somebody in the class that then was that .818 away from it, and could I really deny them the .818 away from it? And if I gave them the .818, there would be somebody else that would be .06 away from it from that increase, and the world goes on and go, and therefore, they're going to have to be forever stigmatized with the curse of the B+, okay? And by the way, I've had the B+ too, and thank you very much. You know, but I let her talk, and I talked with her about it, and at the end, she said 'thank you, that's very fair' and I said 'well, my office hours if you want to come in and talk about it more, you can'. And she seemed to be, the subject seemed to be talked out.

The appointment, again the appointment thing, the preview and discuss, the anticipate potential reactions from a powerholder, okay? Can you get fired? I mean, can you, what is the organization culture like at this place? Like, what happens if you do argue against the person? What are the cultural implications? What are the potential costs and benefits to doing this? Will the person, can the person yell at me? Will the person make me cry? Will it be worse than I think? And you don't know the answers to many of these, but you can at least think about them, especially when the stakes may be high, okay?

Don't burn bridges if you have, leave feeling worse. You may not have done it correctly, or you find out that the person you are working with is really not a good person. And that's one of the things you find out. And then you've got an even bigger conflict. You've got a conflict called 'I work for a person that's not a very good person and what do I want to do?' And at that point, if the person does something very egregious, like doesn't give you credit, isn't developing you as a person, isn't doing the ethical things that they are supposed to be doing as a trainer, then may be time to think about, 'okay, I need to remove myself,' what are my options? My options at that point in time are to really go to a mediator, to make a formal complaint, to remove myself from the situation and work with another person, okay?

So alternatives to confronting an advisor about conflict or particularly, or if it's egregious, find an ally in your department. This may be another post-doc, it may be a senior graduate student, it may be a trusted advisor, another trusted professor in the department. Or you can go to the area head, a lot of times there's the graduate student representative for post-docs. It may be other post-docs, or it may be that the

department had this wel, head. The dean, at Rice University, and I imagine at most of these other places, there's the Director of Equal Employment Opportunity Program, okay? So you can go visit that person. And there's Human Resources, and people can document 'I have something egregious about this person and I would like to make a, I would like to file a grievance.' And the reason it's really important, and I'm not trying to get you all to go and file grievances, but I am getting you all to try to file grievances if it's an egregious act, okay? Because when we have people who are tenured and who are there with safety

and security, grievances can help remove them if enough grievances are collected. That is the one thing that can help remove truly unethical people and people who are doing bad things, but we need proof of that. So if somebody is doing something very egregious, there is a way to help.

I think I'll save this. I was going to say that handling student conflicts are the same and I have a wonderful TA this semester who got an e-mail from a student about the 8 points that she was cheated on, or she felt she wasn't graded correctly on, and she wrote a point by point comparison, maybe I'll just give you a couple of the highlights. Maybe that's what I'll do. Maybe if I can find them. I hope I've brought them. Oh, darn. Okay, I didn't bring them. I'll just tell you: The person had obviously gotten into a situation where she felt like she was on a roll. She was going to let us know about each infraction of each of the 8 points and how they were misgraded. Now, the nice thing is it wasn't really directed at me cause I don't do the grading. But it was directed at the TAs and they didn't really like it very much. And so, it was kind of mean spirited, and at the end, it said something like, you know, 'and how are we supposed to mind read?' and there were just, you can see the insults, she had gone from objectivity, to let me throw this in for extra spirit, this is a game. And Amy wrote back, I mean, I was just so impressed because what I have learned to do is to just say at this point, 'just come to my office, I would rather explain this than write it out in a two hour email.' But Amy took the time to write it out, and she said, and it was just so beautifully crafted, it basically said, "Here are the responses, and now I would like to give you a little professional advice. I would like you to read this message that you wrote to me in about a week from now and imagine how you would feel if you were a graduate advise, if you were a TA who was doing this for 20 hours a week and this were your job, how would you feel if this message came to you? And the reason I ask this is, is that you might want to know in the future that these sorts of things can be seen as very hostile and while I am taking this time to develop you and to help you understand this, not all people would do this," okay? And it was so nicely articulated. It was about four screens, and the person wrote back and said a few more things, but seemed to come to an understanding and apologized and Amy wrote back again and said, "I'm glad to help you developmentally.' It was the message we all know we should write if we have enough time, but it's the message that most of us don't take time to write, and it was very much in keeping with the, 'I'm going to be a mediator, I am not going to react to this message, I am going to tell this person', and at the end, the person had something like 'you know, I feel like I was really graded unfairly on all of these things' and Amy reminded the student that there's also the effect that you are probably, just as there were some items you were graded more difficultly, there were some items you were probably leniently graded, you know? And it was just such a beautiful consider these options, too.

That's the time we should all take. We don't have that time, we're in a very fast paced thing, so I think sometimes the keys to conflict in reducing the conflict is just to slow down, cool off, and do not engage in e-mail warfare, okay? Because e-mail warfare is a permanent record, okay? You're putting things in paper, it gets very, very close to harassment, discrimination, negativity, unprofessionalism, anything you want to like add in there as well, and you've got it permanently. So don't engage, if you want to engage

in e-mail, then write the e-mail, send it to yourself and read it a few days later, ask somebody else to read it, make sure that somebody else is somebody who doesn't have a hot head, okay.

Here's the mediation process. First step, both sides agree to solve the conflict. We come back to your comment, I've forgotten your name. Persia, we come back to your question. What if person B doesn't want to meet? We can't solve the conflict. The mediator has to say, 'Are both of you willing to meet'? This has to be something where people want to meet to resolve it. So we've agreed to get together, Sam and Jisoo are going to get together, and they've taken a cooling off period. They are ready to come to me, I am the mediator.

Second step, and this is again, what you learn in mediation training. It is wonderful. So Katie and Ben,

you learn this, take this home. And I don't want to be your mediator, though. Okay. So these are the ground rules, so we're going to meet, Jisoo and Sam, we're going to meet in the BCR because we don't have any business here, this is a neutral place so we'll come to this classroom, we'll grab some coffees, we'll feel relaxed, we'll just sit and we'll talk. Alright, here are the ground rules: One, we're going to treat each other with respect, no blaming, no put downs, we don't call each other insults, and I'm the referee. So if I say, 'zzzz, you called him a name," you have to apologize 'I'm sorry, Sam.' You attack the problem, not the person. You wait for your turn to speak, there's no interrupting. And you work together for a fair solution, and you tell the truth, okay? Parroting should be in there well, as well. You learn parroting skills, so parroting is, you're going to say exactly what you experienced then Sam is going to come back and say, "what I heard you say" and in your parroting, and you're telling about the problems, you're owning it. You're saying "I... I...I... I felt as if... it is my perception that ... I experienced..." not "You're a bum, you're a blah blah blah blah blah", okay? That's the referee blows the whistle on those sort of things. So, we'll tell you the reason this works is that when you parrot, when you say "Ah, I get it" a lot of times what happens is you perceived the person was upset over X, they weren't even upset over X. They were upset over Y, and Y is easily addressed, okay? So again, it's like a ping pong match in high speed. And we're going to take a cross slice sometimes, and that's not really understanding the whole game. So what the mediator wants to do is stop and say, "Where is the exact point of conflict here? What's the breakdown? What is the exact problem? Okay, Jisoo do you see what Sam is upset about? Sam, do you understand why Jisoo is upset with you? Okay, that's the thing. Is there anything else? Yes, there's a third thing." And those three things together are all the same issue, and so now we have out what the issue is. It's this repeated Jisoo is going into Sam's space and taking things from Sam. That is what we have to. The notes for that class in social psychology, okay.

So the third step, is mediating with a win-win guideline. So this is again, cooling it off. It's each person using "I" messages. It's stating the problem as the other see it. It's seeing how they're responsible for the problem, okay? So after we have gone through the "I I I' and the parroting, then I come back as the mediator and I say, "Sam, can you understand why that might be upsetting?" "Yeah, but ...." "No, no, Sam can you

understand what Jisoo has said might be upsetting?" So I'm trying to clarify that experience and then understanding, "yes, okay." Now explain, and what we're going to is again, merge a more clarification. It sounds like work, it is work. You don't want a mediate for something little. You want to mediate for big things. And it works. It really does. Brainstorm solutions together and agree on a solution that satisfied both people, "Okay, Sam, I now want you to say that you understand Jisoo and you want to thank him for his time, okay? And Jisoo, I'd like you to do the same." Now, this is so effective that there's mediation training. This is so effective that people are professional mediators. This really works. What if it doesn't work? Mediation also works for organizations, right? This is like we mediate the dispute, we come in and we do collective bargaining or we do something where there is a mediator. If mediators don't work, then they can call in arbitrators, and the arbitrator, right?, is the person who says, "I don't even need to take any information between the two of them, all I'm going to do is I'm going to listen to Jisoo, I'm going to listen to Sam, I'm going to get all of your opinions, and I'm going to decide", okay? And that's what you can do at the end. You can't really do that with your graduate advisor, okay? He's out of here, okay? She can stay. But you can do that with companies, and just to let you know, that's how arbitrators and mediators differentiate, okay?

(question, but arbitrater is like I don't care)

Yes. They come to a conflict resolution. Yup, that's it. The arbitrator decides without the parties. The mediator wants the people in the parties to come together and decide, but the mediators is there to facilitate by removing all of the hostilities at both levels, and making sure the people play within the ground rules.

(question, how do you choose a mediator?)

Carefully. You know, it's kind of like how do you choose a therapist? I mean, there are some natural mediators, okay? So let's say it's something in your department, then you can go to the department head. But the department head, if you're a graduate student, and you're problem is with a faculty member, you know, the graduate student represents, the person representing the graduate student tends to see things from the graduate student side. The department heads tend to see their clients as the faculty members, so

you know, you really want, I mean, if it's an important question, you know. And I think what you want to do is find somebody who you think will be fair to both, and that may be going and talking to a faculty member who you respect and having them present the situation to the department head because you want the outcome to be significant, you know. You want something to happen. But it's a really important, you know, you're question is, right? Cause you're going to get different, you want it to be somebody who's fair, who can suspend, and by the way, there are real trained mediators that you can hire as well. And for organizations, they cost way too much to come in and do something like this, but usually people can play the role. And there are local mediators, and I'm not, I know one in California, but I don't know how you find the local ones as well for smaller issues. There was a question, Yes.

(Question: So my question is, so where's the accountability on a both side solution? So you brainstorm all these ideas and both of you have to agree to do these things, who's holding these people to be accountable for actually following through?)

So that also, I hate to say it, but it depends, okay? So some mediators will have people say, "okay, let's just write up something, it's not a formal document, but it's like an informal document, where we'll both sign these, this is what I can take away to say, and it's going to up to you two to honor these, okay?" And most of it is honored, or you'll meet back in mediation. Cause there's nothing so, one thing you don't want to do is make people more aware of "Oh my god, now Jisoo is really being like a hawk, is anything on my desk moved? I put a piece of hair there to see if came near and borrowed it, you know." You don't want it to be more of a hawk situation. You want it to be something where the two people agree, and that agreement stands. But usually, there's an investment. People are not comfortable when they come to mediation; they're not comfortable coming. It does not feel good. And so the end is something that they, that they have accurately and honestly like said, this would be a good outcome, and I forgot to say that when we talk about outcomes, we say, "Jisoo, is that a good outcome for you? Sam, is that a good outcome for you? Are you, can you carry that out? Okay?" So again, it's sort of a lot of word of mouth, although, you can do an informal document as well. Now when mediators are professional and come in, they actually can write it down too, so there can be formal accountability. But the process, I must tell you, you believe in the process. The process does work.

Other questions?

Okay, so we don't have any heads, do we? Department heads? So these are just getting people to understand from the department. Yes?

(I think like that is one of my, one of the reasons that I wanted to come here was, as a, as a manger, as a supervisor of graduate students. It's kind of, the situation is not there yet, but at some point, we may, this is, maybe this is for my interest if graduate students learn this. But at some point, we can remember and I have students.)

Well, yes. Let's talk about it now. This is perfect, okay? So what I just told you extends, okay? So for managing conflict as a head, we're going to go back to the orange, okay? You have to understand the problem before solving, before responding. So now you are the mediator, you're the head, and this is part of your job, and you can either get professionally trained on mediation experience or you can do it in the 'do it yourself' sort of away. And again, what's it's going to be like, is the mediation training. So you want to understand, you want to gather information. What you want to do is not, and this becomes especially difficult when you're the head, when just two months ago, or two days ago, you were best friends with one of the persons in the conflict. You know, you want to take conflict sides, you know you want to take Person B's side because you and

Person B are buddies, okay? You know, you don't want to take Person A's side because you'll offend Person B, and this is where you really have to suspend that subjectivity. You know that this worker is usually always in the lab working, and this one time she screwed up, but usually she's always good, and how can you have this meeting and have to come down on her? But the deal is, you really have to identify what the problem is, okay? You have to identify what's going on. What's the person's thing with words? What's the emotion in the situation? What are the sources of information that can help me understand? So as a, so two of my research assistants are having an argument, two faculty members are having an argument, the first, and they want to talk about it and they want to come to some resolution. Or maybe they don't want to,

but I can say to them, would you like to talk about it? And if both of them say yes, "we would like to meet, this is what happened in our department", I said 'yes, let's meet' and so, what I did is collect information beforehand. You want to understand what does this person think, what's going on in this situation, what's this person's experience, how does everybody else feel about this, what do I think is the right thing is not entirely relevant, okay?

What's relevant, what's really relevant, is what is the outcome that we can make together? What are the different outcomes and what are the best outcomes for everybody? For the whole situation? And so, there's strategies, again, if you're going to call this meeting to order, sometimes, its' best to just wait, to wait and watch, sometimes it's to affirm positives so you can say, 'I know that you are struggling with blank, and i just wanted to tell you that I think you're doing a great job,' so that there are some positives there too, so it's not just a focus on those negatives. And you can use the policies in place to form your decisions as well, okay? So according to this policy, we can't really do that, or what this, your behavior may be, so instead of having that mediation meeting, you may be able to correct one of them with a policy. Because the stakes can be high when you get people together to meet, because you want to make sure it's an "it depends, yes, this is a scenario where it does make sense." I mean, you just don't want to be calling people together all the time over something that is not, you don't want to be calling people together for something that is trivial, because otherwise, you're going to be dealing with things every day. I don't know if you all have read the book, if you haven't you should, it's by Richard Rousseau, and it's called *Straight Man*, and it is a book about academia. And Richard Rousseau is not an academician, but I think it should get an honorary academician degree because he talks about all the ridiculousness about the fact that academia is funny. It's a comedy.

Oh my god, is that there! Are you reading it right now? And do you love it?

(inaudible)

Okay, and it is an absolute pleasure to read. Isn't it a pleasure? Okay. And you know, it's basically all the ridiculousness of academia and the triple trivialities and how in academia, the trivialities are so large because the stakes are so low. We don't get paid a lot, we don't have a ton of power, our power's all department focused, and so I think it's a really good understanding, of you know, you don't want to make these trivial situations

into mediation, this is the tool and you can use that tool in a lot of different domains but when you're really talking about mediation, it's usually a large conflict where people are really not, somebody's not doing well, okay?

(inaudible – actually, I've seen many times, that most of the times I've seen the advisors try not to interfere if there is a conflict among the people in the lab)

They leave it to the head. Do they leave it to you to figure it out? Or do they just say, "ah, you guys figure it out."

(I think there's the tendency of supervisors to let people sort it out on your own. Sometimes it's okay, and sometimes it's not. Brought up to his attention, report it as a supervisor, now you want to ... you want your lab to be famous as a good environment. So one of the things I feel like a good supervisor should do himself is... if there's a conflict among his people, and maybe calling one of those people and mediate them. But he is not).

You know, is it right? It may not be right for me, it may be right for you. I think it's about, I think what you're talking about, is you'd like to create an organization climate, a laboratory climate where people get along. And one of the tools may be to identify the people make the place. So if the people are happy, and they're getting along well, you've got a great place. And some of the tools of mediation may work very well, I think there's also, so so, yes, you can use some of those tools, I think you can also want to avoid the potential of micromanaging. Oh, they're getting involved in that situation and it really wasn't a problem. Somebody called me a name, but I knew they were just joking. And if the advisor or that lab manager says, "listen, we need to talk about that name' when it wasn't, it was momentarily insulting to me, they called me a 'liberal whatever'. Then, "well, I kind of am," but you know, if somebody like now, gets us together and says, "well, you're a liberal" and that really hurt my feelings. So if they said that to you, you know, so I think you want to play that balance delicately. And take into account what you're trying to build, what

the culture is like now, what the climate is like now, if it needs to change, if it does need to change, then I think these can be tools, or maybe just an open forum for how would y'all like the column to change? What would you like it to be like? And what can we do to get it there? So it's sort of like inviting everyone in, but not singling people out, or 'you did this, you did that, I think that was a problem.' I think mediation, if you're going to be a mediator, it often happens. You can say to the people, 'if you have problems, I am here, no matter how big or how small," but again, sometimes, the wait and watch is a good strategy because you don't want to be that micromanager, so you want to kind of wait to be invited as the mediator role. Does that make sense?

Decisions should be made, okay so this is this is, now. Again, it depends. So now I'm going to read this, so I'm going to over it three times. Decisions should be made for the whole group, not individuals. So let's say that you got somebody in your lab who is just

like ridiculously loud or insulting or there are situations where individuals behaviors are problematic and you want to make decisions for the whole of the group. So if somebody is out of line, maybe it's a situation a good time to think about mediating or doing something that was resolves things. Always listen respectfully and I think that I don't listen well enough. I think sometimes that I talk too much and too quickly and don't always hear everything I need to. And I think a lot of us do that. We live in a very fast paced society, where it's like, "okay!" and my husband, he's a talker. He grew up as one of eleven children, and I always say, "give up the conch!" You know the conch is this reference to this book. And whoever has the conch, the shell, gets to talk. *Lord of the Flies*. I'm like "what's the book?" But yeah, *Lord of the Flies*. I'm like 'give up the conch, honey!" Well, in his like household, they never gave up the conch, because they never get the conch. So once they got the conch, they hold onto it, and they "blahblahblahblah" and they, so I'm like 'oh my god, do I akjaskldjklasjf' and I have to listen, and sometimes I'm like 'okay, I try to say to myself, be a better listener." Be a listener, don't try to judge people immediately when they come into their office of, "I know what this person is going to say, here's your solution." Like really listen to what they're saying, and practice parroting. Say, "So, what I think you're saying is that you're worried about this, is that correct? Okay?" And then you have carefully identified what the problem is. Um, leading by punishment is never a good strategy. Unified purposes are good. Again, thinking about the whole group. Harmony occurs when everybody participates, so again, these are, these are not just clichés, but these are sort of clichés about conflict resolution. And minority voices need to be heard. They just must be heard. Okay.

I think we're almost at the end. I can't believe how long that took us. Is conflict good? I return to this slide. Some of it is good, it's often part of the growing experience, it feels uncomfortable and propels us to action. So remember, some of this is very good, but some of it is bad, it's a precursor to major stress and depression and inability to perform well, and preoccupation with the situation or person. And what I'll end with is a quote from Albert Einstein: "Peace cannot be kept by force, it can only be achieved by understanding." So it's really about what are we trying to do in conflict? Well, we're trying to argue our point over another person's point. We're trying to advocate something. We're upset by something. So ultimately, what we want is two people understanding each other so we can free up the misunderstanding and try to choose an optimal solution, okay?

With that in, I will stop. I'm super happy to answer questions about conflict resolution, or to do anything additional, if you'd like. Okay?

Yes?

(A friend talked to me about a book, it came out of some Harvard study about conflict resolution and it's a book called *Getting to Yes*, I haven't read the book so I really don't know much. But one of the ideas he took away about was this concept that of identifying interests rather than positions. So you have two people coming in and they each come in

with positions they want, they've already anticipated the other side, so they're staking out their positions and they're going to defend them. Whereas the mediator needs to find out, have them articulate what their interests are. What do they actually care about? Not the positions they have to defend, it may be in the example of the orange once, one of the interest had interest in orange juice, and the other interest was they wanted to make zest. But they're position is that they wanted to occupy the orange. But actually, the problem was, but as long as they were focused on their position, they weren't going to get anywyere.)

Yeah, I think that's a great point. It also reminds me something else that I didn't mention about conflict resolution, which is a little bit similar, which is one of the ways to resolve conflicts for the social psychology graduates. By social psychology, I mean upperclass. Okay? We know it's superordinate goals. Okay, so moving people to agreeing, "okay, we want something and we want it together and this breaks down the disharmony." So reminding people, "look, what we all want is to get a good education, we all are here because we want to get lots of pubs, you two are arguing over who's first author and who's second author, but let's keep in mind the more you both work, the more pubs there are both of us." Okay, so if you can get people to understand, again, and it's kind of like understanding their interest. It's like if you can remind them what the bigger goals are and how actually you two are unified so it's not harmonious to be separate because together you can work twice as hard, or you can get as much as, here's our goals that are together, then it's also a unifier, you know, rather than segregist.

Yes.

(How do any of – inaudible –)

Yeah, well, I think that, I mean, I could put status in and squish it with ego and I don't think that status always means big ego, but I think it's hard to. There are some personality differences that makes ego come out more, right? Sort of stubborn, disagreeableness is harder to deal with. And then, I think status is sort of like that. "I'm a professor. Who do you think you are? You're just a graduate student." You know? And again, I think if you choose your mediator carefully, if you choose somebody who is going to say, "Well, I'm a mediator, and I'm a professor too, and come on, you know, let's hear." So I think if you have a mediator who is below rank of the highest ranking person, you're potentially getting into problems. That's where you really want somebody, that's why I said when you pick a mediator, you probably wouldn't pick another graduate student, right? You pick a faculty member who is respected by the other person so that the ego is left at the door. And that's part of the ground rules too. You know, you can't pull rank on people. You can't. We can't pull rank here. We're coming to talk about this incident, and if rank is part of that incident, then it's invited in, but if it's not, then we need to check it at the door.

(inaudible question)

Well, so this is where one has an ego, and one. I mean, you know. Ideally, you have the referee and this is what the mediator is like, I mean, when you're articulating the, so you think about spots where egos may show up. They may show up in parroting, "I'm not going to give that person everything," you know. And that's where the mediator says, "Oh, they also said blank, and they also said blank," and the ego person may say, "yeah, yeah, that too." The mediator says, "No, actually, you need to say that. Actually, I need to hear you articulate that. No, actually, that's not quite what they said. Um, what they said, can you repeat this?" And then you say again to that individual, "Is that everything? Did they articulate exactly what you're feeling?" And if they didn't, they'll say, "No, actually, this is what I said," okay? And so and so, "Oh, that's close enough —" "It's not your turn actually." So the mediator is in control and can, if successful, can put a stop to that very easily, to some extent.

Yes.

(inaudible question—Why are conflicts repeated with certain people?)

I think if they're minor and they're repeated, they get to a level, it's like a nerve, right? The nerve is an action potential and when stimulated enough, it – what does it do?—excites. It was there! It was there! Thank you, RT Briggs, 1987. So it excites. If it gets to a certain point, it does become a big issue, and then I think it's time to approach it. And again, some of these, you may not need a mediator. If it's a little issue, let's say you wait for your advisor all the time, and she's always late. I'm just going to give that example, okay? And it's annoying you because it feels disrespectful. And at the same time, it's like you don't really know what to do because you don't want to, like, have that person, I mean, that's not a big enough issue where you would call in a mediator, okay? It's something you feel the person would be responsible, responsive to, I think that's a situation where you can say, "May I just have a few moments of your time to say something that has been bothering me just a little bit? And I thought telling you, we might be able to solve it. Alright? I might be able to understand you situation." And when you do it yourself, the only thing you have to do, is you really have to hold yourself accountable to listening and being open, and that's, that sounds a lot easier than it is. We all have biases when we think we're the protagonist of all

of our stories, and we don't see our errors and the things we do wrong. We see all the justfications for why we do those things. So if you're going to approach someone and say, "Hey, you know, you're, it's bothering me a little bit because every time we come a meeting, you're exactly 25 minutes late, okay? And I feel like I'm not that important to you, and that's what I feel, so I was hoping that we could figure out a system so maybe I wouldn't have to wait." And so then, you get into a situation where maybe they say maybe, "Well, I'm sorry you feel that way..." and you have to filter out, it's really important for you to filter out and not take the fish bait of "Oh, that really feels like an insult, oh, you're really, really getting close to bothering me." Somebody says to you, "Well, you know what, I'm really sorry I had these other things." Or whatever it is. You have to be a responsible party being the mediator too to say, "Oh, okay, I say understand why you're coming late. That

makes sense." Or you have to offer some of the suggestions, and let that person process the information as well. In a fair and neutral way, okay?

(*parts inaudible* usually, when you get to that situation there are .... Do you deal with everything? Knowing that if you don't deal with everything)

I think what you try to do, is you try to pick, this is a really important question, okay? You do not want to pick 16 issues and bring them up, okay? And you don't want to pick one issue and bring it up, okay? You want to pick the general category and stay away from specifics. If you say to a person, 'It really made me angry' is that good? "It really made angry that you were home late for dinner last Tuesday night, okay?" You have given up all of your power of saying, "It makes me angry when you don't show up on time for the things that we agree on" because you've let that person out by picking one example and getting into specifics instead of the general way that you're feeling. So if you're really upset, and what you're upset about is you feel like you're not being appreciated. And I could, you want stay sort of broad at that point and say, "I can give you examples if you want, but what I really want to articulate is there are ways that I am not feeling appreciated. And these are the things I feel that would, could improve the situation." What happens if you just focus on 'last Tuesday night,' Person X comes back and says, "Well, my car broke down" and then Person X sees it that all the things that the situation prevented them from being, so they're excused. So it feels like a laundry list of things coming at them, and they're there to defend and shoot down each of the ones coming at them, okay? Whereas if you give them the big picture of, 'there are times' and again, it's like, 'I want you to know the ground rules. I want you to know, first of all, that I love you very much and I'm telling you this because I would very much like to feel better. There are times where you make me feel unappreciated, I just said it wrong. I feel unappreciated by you at times. It is my feeling that sometimes it seems like I'm come out of situations feeling bad and feeling like..." and again, it's you claiming your feelings, okay? And then they may say, "Could you give me examples?" And then I would, again, still keep them, I wouldn't go into specifics, but I would say things like, 'sometimes when we set a time, I feel like I have to wait extra long. Sometimes when I ask you to do things, they don't always get done. Sometimes" and, but the other thing, is you need to let them go when you tell them. It's not like "Well, I've articulate them and now the score boards up." So you really do need to articulate in your statement of your issues those things and be free of them. They're not an "okay, now I'm keeping score." Okay, does that make sense? Okay.

(inaudible question)

Well, so, there's a couple different things. One is, what if you tell this person that you want to meet with them, they didn't know there was a conflict, they're sort of like flabbergasted, you want to be able to come back and say, can we talk about this more? And, you know, sometimes there's a wealth of why people get upset. They're people who get upset because it's such a cultural norm of "I don't want to upset people." People often get upset when they know you're upset with them. And so there's this defensive,

"Well, you think you're mad at me. And now I'm mad at you." And you go back and forth, and you go, "because of X and two years ago and you did that to me," and "Oh my god!" and so it's a really bad thing. So that's why again, we're all the protagonists. "What! They're mad at me? How dare you!" And they think you need to be aware of some of this processing, so you don't fall prey to it, and that you're understanding that people, it takes a while for people to take responsibility for their actions, and to not be defensive and take it all in. It's like, I think especially in situations where you're telling people, "this is

what I feel you've done to me to upset me" just to remember it may take a couple times because you have probably done things to upset, you know, what people almost everyone does that kind of bug you, and the horrible thing is you probably do things that bug most people too. At least one or two, okay? I mean, that's just human life, right? And so there you're probably going to have a situation where you need to come back, and they're going to say, "Well, these were somethings that bothered me." And you go, "Oh my god! Well, now I'm being given this information", and then hopefully you can work through it, okay?

You know, and I always will say, what I will say and maybe this is a good concluding thought is, "I don't think you can ever really, I think one of the reasons that relationships are so meaningful, the longer you're in them, is I feel like once you've seen the negative sides of people, once you've seen the conflict, you don't really understand and appreciate people before you see those. You're relationship gets deepened so much by seeing, 'okay, I've made this person mad, now I understand how they resolve conflict, okay, this is what we have done together, oh we've worked through this, I know this person was mad at me, and this is' I mean, it's such a rich part relationships and it's such a part of, it's a necessary part because it leads to growth, it leads to redirection of people. It leads, you know, to better projects, it leads to people saying, 'okay, I'm ready to graduate, I'm ready to be on my own because I can start to take on things that you're giving me' and argue back my independent reason for asserting them. It tells people what in the relationship is the most important things to work on, so again, I think that conflict is necessary, and I think it could be a really good thing, so long as we approach it as a challenge vs. a threat.

Yes.

(inaudible, and one of the examples that you mentioned earlier. At one point, you said not to give the examples at all, just give a general example.)

Well, I think. I always say to my husband, "could you give me some examples?" I just always do that, because I need to know am I totally understanding him correctly. So I think you don't want to be like, "I'm not going to tell you," you know, people need to like know, but I'm just saying you don't want to, what I'm saying about the specific examples is if you start with specific examples, people often have a reason for why they weren't they're best at a particular point in time, that one instance, so, and the question was, what if they're a whole bunch of little things? Do I bring all 16 of them up? So I would say, don't bring all 16 of them up, bring up the latent factor. Sorry, that's. I. Yeah. Bring up the theme. Bring up the theme. What do all of these things mean as a whole,

okay? What they mean is 'you're being rude to me', or 'you're taking things from me and not returning them' or 'you're taking liberties that you're acting unprofessionally towards me,' 'you're not respecting me' or, and you know what I just did? You all should be saying "YOUUUUU," okay? You're already learning!

So it is my feeling, I feel as though, and the reason is you don't know what I'm doing. You can only say, "it feels as though," "I perceive," "what I'm experiencing is," so it's not "you, you, you." But I think that's where you want to get those themes across. And if people say, "well, give me some examples." You can say, "Well, let me just tell you three, and I don't want to get into them because this is not, this is not, the point is not to have you defend each of them, the point is to let you understand what my experience is. My experience is that, I expected you to be home on time this particular time, I expected you to return my things, I was really disappointed. It felt as if I wasn't respected at this point in time..." and you can list some of those examples and listing those examples, pick the ones that are most irritating to you so that you've gotten them out, okay? So, in other words, if you've let out 3 of them, but you still have 13, let out the 3 that are most responsive so it feels redundant to list the other 10, okay?

(Inaudible question: now many times, let's say.... And you want to talk to person, maybe it's not a good time, maybe you. So let's say that you... what is the... what is really better at that point. Sometimes I feel like it's better, okay, as soon as the conflict happens, and now you're in this state where you're not giving me any communication. The communication has been blocked)

Yeah, and yeah, when is the ideal time? I agree.

(If you let it go, then you have established controversy.)

And that's in the writings too. You want to cool off, I think about a cooling off period of, when you get an e-mail, and you go, "UGHHHHH...jasldkfjl;aksf" okay? That is not what you want to do. You need to cool off. So you need to wait, you need to think about it 24 hours, you need to think about it 48, you need

to gather your thoughts, you need to go, 'I am a human processor. I am protecting my own needs' and you need to chill out. And once you chill out, then you need to approach the situation. The longer you let it boil, the worse it often gets. And, so, so, yeah.

(more from the other person's perspective. You may have cooled down, but the other person may or may not. Let's say they have not cooled down, so now you're waiting)

Well, you can say to them, you can say to them, "I was hoping we could talk sometime. I would really like to talk about the issue that we had, and you may not be ready right now, but I would love to do it when you're ready, so if you could let me know if you're interested or when you might be ready, I'm here waiting." And that gives them the

power. People don't want to feel powerless, and that's part of this whole thing, you're coming together and the mediator is putting you on equal footing, and saying, "okay, Enricka's opinions are not important than Katie's. They both come, they have a playing field that's equal, I need to hear both of them, and I need to hear the real point of the issue, okay? You want that. That's what you want to do."

(Are there any signs or cues that you should be picking up on?)

If the person is not ready to meet with you, you cannot force them to meet or you call in, at that point in time, if that person doesn't want to talk, I think that's when you call in a mediator, and you say, can you, cause the person may not want talk with you because there may be other issues. Maybe they feel threatened by you. Maybe they feel like they don't have any power. Maybe they feel like they can't be honest. Maybe they feel like there's too many repercussions. Like you're not inside that person, and you don't know why they're not talking. Maybe if there's a mediator. If you say to somebody, "I'm really concerned about my conflict with so and so, it's a really big conflict it's really weighing on my heavily. I was wondering if you could mediate this or if you could put this person, find out, give me some advice on what I should do, and that may not end in a mediation. It may end in somebody coming back to you and saying, 'you know what? I think this is something that's just going to be unresolved for a while because they cannot mediate. They don't want to talk and you can't force people into mediation." Unless it's organizations.

(So one thing is happens between graduate students and they're PIs. There is an organization, which in different organizations has different ways, and they can do different things, and it's often, they're poorly... because they're often constructed for the benefit for the advisors. Precisely, when they're needed for the students.. but they are there in principal and they can be put into practice. So they counts as allies for both parties.)

They do, they do. And I bring this up again because the graduate students are often in a position of just having low status, and just being at the beck and call at their thesis committee members who are professor's allies. So it's like, where do you go? And that's where I think every, most departments have somebody who you know, I can go to that professor. I can shut the door and I can tell them in a trusted way. You know, you hear that down the line, you know who that is. And that's the person you go to. You hope they're on your committee. You hope your committee is comprised of people like that, but if they're not, you find that advocate. And if there is no such advocate, then you go outside your department.

Is that it? Okay? I never got to the rest of the stuff, maybe I can visit you guys again next year.

SujataKrishna*: Please do.* I'm very happy. You're welcome!

Chapter 13

13. Transcript of video 'From Academia to Your Own Start-Up'[1]

Glauco Souza, PhD & Sujata Krishna, PhD (Instructor)

Thank you for being here, as you know, this session is about going from academia to your own start-up. Which begs the question, how many people here are hoping, wanting, or be really glad to at some point to have their own business? One two three four five. That's great.

So could we have reasons why you are excited to, why does this attract you?

Well, I've spent so many years developing this technology, it'd be a shame if it just sat on a shelf in a lab. I should at least try to turn it in.

So you're at the point where you have some product that you can see.

Yeah, I mean, I would feel bad if I spent all of these years developing this software and it just sits on a shelf on a sports control server in the lab and it's never turned into a commercial product when I feel that there's a lot of commercial appeal to it. And I feel that I have to at least try it, even if I fail, you know, I have to at least give it a shot.

That's great. Was there a hand on this side? Somebody who wants to be an entrepreneur? You don't need to have your product, we can all be at very different stages and that's fine. Yeah?

Some of the, the pace of academia can be slow and the obstacles to actually making progress or sometimes, it's a different tempo in your life, and a different pace that things can have so, so just that. So in some ways, if you want to make your technology available to others you can do that through academia, you can do that through open source, whatever, and make something useful, but time-scale and resources available to do that are very different. So, it's very exciting to not be constrained by any formal guidelines.

Anybody else? We saw some hands that went up, I'm sure that there was on this side. Please.

I'm also like in the software development, so, so, I have a husband that's in the field, so that's something we talk about starting a company, even a consulting company that we can begin with would be something that offers flexible time schedule and also I'm excited about the getting involved with the business aspect of owning your own business, but I don't know that's why I'm here.

Okay, so you like to flexibility and you like the idea of getting rich, is that right?

Most people would agree with me.

I don't see anything wrong with it, that's great. We're just trying to find different reasons that attract people to become entrepreneurs, right? And some of us might not realize that at some point that the draw might have the right opportunity where you're sitting someday like he is, you can see a product, you can see a market, and it's begging you to go out there and become an entrepreneur, and you may find something in that position, right? So maybe there are ways to become an accidental entrepreneur.

And the last reason why this is really important is to know what it takes to become somebody who has their own start-up, it's really appreciate somebody who comes across this, to understand what it is he

[1] This content is available online at <http://cnx.org/content/m43325/1.2/>.

does, how many different aspects does he have to think about in his day, in his year. It really matters to understand that. So those are the reasons for going into it.

You were asked to do an exercise, now this is for the NLM trainees. Some people here are not NLM trainees, just bear with me, but I do ask to do an exercise, to do a flow chart, in what it takes to make a business, several of you submitted your work, and thank you for that. Our speaker's looked at them and he's going to comment on three of them today. Those who did not, I want to say that there is a log kept for your participation in all of these sections, and that goes into your progress reviews so bear that in mind for whatever it's worth. We really like you to come, you're learning things here, but if you like it here or not. So these are long-term things.

I would hope that in the process of making the flow charts you would have come across thoughts, questions, maybe you were uncertain about some things. Which one comes first or it seems like all these things have to be done at the same time, or I really don't love how long it takes to get a patent or a license so whatever your impressions are, this is the time to get them answered by Glauco as best you can. As he speaks, I'm sure you'll realize that his time is very precious, you'll see how many different things he's doing, and we're very fortunate to have him here. Please make use of this class. So I urge you to ask him questions, whatever you may have.

At this point, I would like to go ahead and introduce Glauco. Glauco started up a company called 9o3D Biosciences here. His background is PhD in Chemistry, Physical Chemistry from George Washington University in 2003. Glauco, correct me if I'm wrong anywhere. And then he went out and worked in industry for a while, came back, he worked at M D Anderson as an Odyssey Scholar. And it was while he was an Odyssey Scholar that he got

two patents and he got the idea going for this company. And he became that accidental entrepreneur that we were talking about. He saw something that he could take out there and make more of, and that's during, which started only 3 years ago. And it's up for a good start, let's learn from him. Thank you, Glauco.

If you guys have questions, stop me. I'm going to sort of fly through the technology, so just raise your hand and we can discuss anything that if you want to. My talk is going to go, first I'm going to give a brief genesis about how the company about and then sort of you know, in a nutshell, summarize my experience in putting the company together, the different aspects that I didn't know that I had to put together. And I'm going to throw in how we did our technology of our parts of our business plan, part of our business strategy, and I hope to get some discussion.

So, we are a spin off as Sujata mentioned, a spinoff from MD Anderson and Rice. And the genesis of the company is a bit serendipitous, because it's not like I had this clear 'alright, we're going to design this product, and we're going to have a company.' Myself and Tom Killian, the physics professor, we play water polo together, so we'd always go out, have some beers, and Bob, who's a bioengineer professor would come along too and we always talking about science, different ideas, and we came up with this product. Didn't actually this product, this project, and I guess, Dave Lee, the President of the Company, his background is business and he always come to haves beer with us, and I think he got sick and tired of us that one day we'll have a company that he basically said, 'alright, why don't we try? Let's see how it goes.' And it's interesting because we realized, 'okay, let's try, so how do we start?' so the genesis of all this is start it with something that's been presented here before, Tom Craft. He's director at HTC and I think that Tom Craft the professor had an IBB seminar here and he sat in and I think he was the only one. But he had lots of questions to Tom and so he's like, 'maybe we should go to HTC and talk to them and see what they think if this is an idea' I think he was really hoping that Tom Craft would tell us, 'You guys have no business in having a company, just go back to lab and do your work.' So we went to HTC and we had an overnight, Tom and I, e-mailed back and forth our executive summary, we sat down with him and Deborah Mainsfield, you guys may know her, and we got out of there, they were like, 'okay, you guys should start a company.' We just sat in the parking lot and it was like 'oh no, what do we do next?' and they helped us, but, so, it's a, there's several factors that have to be there in timing that is critical.

So, I listed as "The Ten 'Must-haves"' for a start up. Actually, I changed today, I forgot today was 11/11/11 so we have 11, an extra at the end, since everybody keeps talking about it. So, first thing, and it

may be you need an idea that works and that's not always the case. And he gives them in 3D, we levitate cells to generate a 3D environment to culture cells, and in biotechnology, this is not as much true for a software company. The IP, the patents,

is linked to developed idea. If you don't have a patent, or you cannot patent your idea, it's very difficult to evaluate that because anybody else can do it after you have your company, so and we have, world wide patent license from Rice University because I was told, I was discovered at MD Anderson, Tom and Rob were at Rice, so whenever we went to that, the university owns the patent. So when you decide to have a company, we have to license Rice through the process of Rice which is tricky, so and we have company owned, yes?

(Going through the patents and whatnot, so with some things, ideas or whatever, I mean, you may not have, coming from others directions, you may not have originally had the idea that you did in lab and so, at what point, do you think that it's a good idea to be just patenting work as it comes out of the lab just for the potential of that vs. do you think that is it better to have more of a business plan with the technology before you're going out there and patenting things that are developed in lab?)

That's, you, when you start a company you learn a lot about licensing packets and academia has completely the wrong idea what a patent is and this is from my experience. From inventors, it's not a paper. An invention patent is very different from authors in a paper has nothing to do with a patent first. If you think about disclosing anything of your ideas that is patentable, you automatically lose most of your international protection, so yes, to answer your question, yes, if you have an idea that has commercial value, you have to file at least a provisional patent before telling anybody. So, yeah, now you have to protect your idea. Now, universities are very conservative because it's expensive and I think early on they have patented a lot of technologies and it becomes very expensive if it doesn't get commercialized, they never get their return on investment, so, yeah, but you do have to patent.

So, if it's your idea, you have to have an idea, and you have to solve a really problem. So sometimes in science, we all think our ideas are great, and maybe they are, but they're not really solving a real problem, so in our case, if we're doing life science research, tissue engineering, cancer research, regenerative medicine, stem-cell, you need to culture cells, and people know how to do that you take your cells put it in a petri dish, they go to the bottom, and they grow. And that's what is called 2D-mation, cell culturing, this is sort of like this, very much like this. But there's a paradigm shift in cell biology now where we understand that to grow cells, and if you want them to look like how they grow in the body, they need cell-cell interaction, and cell-cell interaction and for you to have cell-cell interaction, you need a 3D environment and this cell-cell interaction defines the biology of the tissue so it's very important. And I'll show you some data later on just to show you that 2D and 3D can give completely different results as far as growth. So, this is our problem, it always helps to have NIH, which gives lots of money, to validate your problem, that definitely helps. Even if it's to educate investors, I'll touch on that.

And, this is our idea, this is how we provide a solution to the problem. We have nanoparticle assembly that we can tag cells, so we can imagine a cell in a deck of cells with nanoparticles, and we apply a magnetic field and the cells line up, and that's what we have here. This is a magnet and this is ——- which are cells together, and this fairly large, this is over a millimeter here in diameter, and this 3D is what's cultured for 48 hours, which is very fast. And glioblastoma is the most aggressive type of all brain cancers. So, in here, just to demonstrate that these cells are levitating, we have a magnet, we have the ferroid levitating, we take the magnet out, it drops to the bottom. You put the magnet back on, it levitates, so you have an invisible scaffold where the cells can just grow in 3 dimensions. So this is just a scanning electron microscope, for those who are interested in the science, scanning electron microscopy image of two spheroids. We started these cultures with the same number of cells, same magnetic field, the only difference between these two samples is that this one grew for 8 days so the cells just multiplied and as you can see, the bigger structure. And this, again, is over a millimeter in diameter.

So, if you have an idea, you solved a problem, it does help if the problem is big enough and it's usually if you have to be there, it helps. So, you definitely, in technology, a market share, having a billion dollars always helps and this is the markets that we are serving with our technology, life science, which is a smaller market, we're going to toxicity and drug testing already, which is the billion size market, and of course,

tissue engineers is the long term goal. And you have back extra patents and licensing, all this when you go license, again, you're in the university, you have a patent, if you want to make a company, you're going to have to deal with the university licensing to you, and that's the first thing they'll ask, because that defines what use of their patent, where you can sell it to, the product, so it is what defines milestones, royalties, how much of the company they're going to have, so you have to understand that pretty well.

So, of course, if it's a big problem, you're not alone, and have to understand and be aware of the competitive landscape. In the case of our system, it's the first competitor is 2D culture, and there are lots of problems, but is the mostly used method. There's thousands of publications and that's, we'll never replace 2D cell culture, actually, our system starts from a 2D culture, so, and of course, there are existing 3D models with a lot of such limitations, usually, they're very, they use animal proteins as a gel, and that's really, it makes it very difficult to do any type of translation or work if you're using animal proteins as part of your 3D cell culture environment. It's hard to set up, and then the protein can be costly, and a lot of times it's not very compatitible with the protocols in the lab. And again, you have to understand the competition. And 'as good as' is not good enough. You may have good enough idea, but it works just like the product next door, it's not enough. You have to be

better, and you have to be able to point out and quantify not only for investors but also for when you go to a, sell a product.

In the case of 3D, we, our benchmark is to do cell culture, which is the most we use, we are very simple, so the only difference between us and 2D cell culture is that you have to add the nanoparticles to decorate the cells and you have to apply the magnet to levitate the cells, so this is what we call 'razor, razor blade model,' which is we have our razor, which is the magnet razor, which is reusable, but we always have to buy the nanoshuttle (the nanoparticles), so that's our razor blade. And we also have a lot of razorblades now.

(Inaudible question)

We have, the system is the broad patent which is Rice and MD Anderson that involves microlevitation, cell culture magnetification, so the nanoshuttle that we use, is company patented. And we have different aspects, different formulations, we only sell one, but we patent a broad number of formulations. We have dehydro, we prove that technology, so we patent that too. When we use our ray of magnets going to 2496, who else, we have some new tools to manipulate and it's all company owned different patterns.

(drives and levitates cell, we recall...)

Yes, so, again, you have to be able to quantify some of this types of advantages that you have over your competition, so one thing that is very compelling to us, we can make 3D cell cultures very fast, much faster than the other tools. Because we can focus the cells with a magnetic view, so we can promote as soon as you levitate the cells, you promote cell-cell interaction, and you can form a 3D culture overnight. So, to see here, this is human umbilical fetal cells, these are levitated cells because this picture you can see individual cells coming together, you can see the cells start interacting as they come into contact, and this is only an hour. And we go 4 hours later, and you can already see tubular structures forming, which is very fast. And another key aspect of our technology, that other technologies cannot do, is co-culture. We can bring different cell types together, and here is a good example. In here, it's a 3D assembly of the green glioblastoma, most aggressive type of brain cancer, the red are brain astrocites but they are modified red protein. So we can culture them separately and bring them together, and you can see the green cells crawling up basically around the red, which are the normal brain cells. So, if you're developing a cancer drug, the red drug, and you can stop this process or modify get rid of this process, it's very important, so, the ability to manipulate two cell types is key.

So these are the short list of cells that we have tried. The list is longer than this and we have done stem-cells, primary cells, different organs, so, one thing that I always say that I've

thought when I was in industry, if you have an idea, it's much easier, you can fit it in a box. You know, I'm a physical chemist, so people have a lot of ideas when there's a laser, it takes half of a room, and then they have a great idea that they can't pack into a box and make some progress. It's, you cannot put that into a box. It's a little different for software. Software, I guess, it has to be downloadable, but it's different. Put it in a box, is a good measure for the idea that you have, and these are a box, a very simple. We have the magnet drive and we have a hole on top of the magnet so the light goes through, so it's very easy to

visualize. We have a nanoshuttle solution, and this is a picture of a levitating culture. So we have our 6-well, which is basically a plate, with magnets on top, and these are human primary fibroblast culture where we you just vary the number of cells to see how you can manipulate the culture.

So, if you can fit it in the box, now you need a business strategy. I'm putting this as a 6, but it's everything sort of happens together. It's very hard to separate. So the business strategy, which both it can drives your licensing negotiation because they're going to ask a lot of questions and the path we decide for near term goal is to do cell culture for life science, which if you are in the biotech area, it's very tough. You go talk to investors, it's or venture capitalist, they hate life science because it's academia. It's very slow, it's very hard to forecast anything, and but that's the easiest way for us to get to market because we need the hands of scientists and you need to go to university. The midterm goal is discovery and the long term is regenerative matter. Or you have milestones that have to follow and we have met a few already, we had 'angel and atf.' Do you guys know what angel is? Angel is usually the first people that invest in your business; it's what they call 'family, friends, or angels' so they are first investors that you get, and an angel should never expect return. They should hope for return, but they should not expect return because it's very risky. That's why it's family, friends, and if you have a startup, you may know your friend very well that you're getting your money from because they may not get it back.

So, you have to, it's tricky, so the idea that you have, your startup, your own boss, that's not true because sort of, in my mind, as soon as you take money here, you're not your own boss anymore. You have to, you know, you have to think about this guy. And we got emerging technology fund, we get our second paycheck emerging technology fund, we get a SPIF phase 2, I'll touch that in a second. And these are the sale projections that we're working pretty hard to reach them.

So, yes?

(Inaudible question)

Yeah, it's projections. You're going to have to do it, it's tough, but you're going to have to do it. You're going to look at competitors but these are our projections. And this will change.

(this is what you chose, this is what we think we can do).

This is why we have to choose, and atf. And they'll ask the questions, 'how do you come up with these numbers?' and then we'll. We did, we just, we are scientists in the lab, we talked to friends see how many of certain reagent they use in the lab, the spend this much money, so if they use 25%, you allocate to us, you have 15,000 scientists in the medical center, and it just extrapolate those numbers and you got to hope for the best. So, that's hard though.

(Inaudible question).

We're here. We're getting there. It's pretty small, the projections we have here, but we are starting to see a nonlinear line, and that's what we want. And that's, that I'll touch on the next slide. It's always lifetime on a startup is very relative. You need to have the vision, especially in a science because you're getting grants and, but, you have to raise money to go back to investors to help to, you know, improve sales, to grow, and it's it's a bit of roller coaster, definitely. I have friends that have young kids and they just alright, I'm going to build my startup, I tell them they are crazy, but they did and a lot of them are successful, but you got to be really careful because it's, and I'll touch a little bit a little later on my experience.

So you need money, of course, and the best type of money is grants. So if you think you want to get out of academia to stop writing grants, you're going to write more grants. So, and we got phase 1 and a phase 2, we got a grant from National Science Foundation, and the grant we got it for was to come up with tissue model, 3D tissue model for toxicology tests of airborne agents. Why are airborne agents? It's very hard, in a lung, you have the air liquid interface, and it's very hard to grow cells at the air liquid interface, so we can levitate these cells to bear air liquid interface, you can flow the gases and test for the toxicity and animal models are very poor representation of human lung, so you have to use, it's ideal, the ideal case would be for you to use human cells, you have to go in vitro, so, and that's are the very different cell types that we culture with our system for the grant.

So the amount of funds raised, this real, we raised quite a bit of money, it's I don't know, we raised almost 2 million dollars in grants, ETF, and seed funding. We're looking for 500 to a million dollars, and of course, you always think of exit opportunities. Do you guys know what exit is? It's how you make your

money at the end. Yes. So, yes, but that the, you have to understand, especially when you're an inventor, you get attached to the invention and you have ownership and you, but you have to sort of detach yourself and really understand

when the right deal comes, you may have to take it, and let it go. Because there's two types of companies that is you know, fast-growth start up, which is our case, or what they call, life-style companies. Life-style when you, you know, have a pizza shop and you're going to be the owner for the rest of your life. That's not the case and if you want to venture capital, more aggressive type of investment, you do not want to be a life-style company. You got to be very clear that when the right exit opportunity comes to you, you're ready to let it go. So, which is tricky. We had a, it's a tough place to be. It's emerging technology front from state of taxes. Seed funding is angels and grants, as well. So and grants, there you cannot depend on grant money for everything. It's very specific.

(You can return the etf?)

They expect, they take ownership of the company, basically. So we have, it's an interesting process. You get, we got a million dollars, so basically, we have access to a million dollars, we have taken 750 so far, and we have to raise, if you take more than 500,000 you have to raise 500,000 from private investors, which you've set a valuation to the company at that point. And you have 36 months to do so. So we have 4 years to do that. So, 5 years, to do that. So when you do that, no, 3 years to do that. Yeah yeah, sorry. So, maybe it's 4 years, no it's 3 years. And, when that investment comes, the value of the company becomes equivalent to the amount of money they invested, they take that percentage of the company, instead of taxes. But the nice thing is, they give us a long, 3-4 years to raise money to move company forward to increase the value so you are not as diluted, so they don't. They give us, the first 250,000, absolutely. They came at the 250,000 where we didn't even have sales. We didn't have value for the company, so, they could, you know, if they wanted to, take everything, so we have that minor time to, and they want jobs, where we have to create jobs. Yes?

(How much of what your developing is really in the public domain? How do you balance that? Is there any expectation of that?)

Not as, as for us, a small business, a reason to research.

(Inaudible question ...)

Yes, DOD have this. All of them have ASPR. These grants, as far as, these grants are divided phase 1, phase 2, and phase 3, so phase 1 is very fast because we got 200,000 for 6 months. So, you have to you know, have to work, it's pretty intense. If you want to get to your milestone, so you can get phase 2, which is bigger money for two years. So, and even when you get phase 2, it's milestone. You have your milestones you have to make them for them to give you my money. They don't give 500,000 right off the bat.

(I mean, is there...?)

We're creating jobs, we're developing technology.

(Is there any expectation that you're going to whatever, sort of, proprietary)

It's all company owned.

(technology, that you're developing, no one can have access to it?)

(Well, you develop model system for the SDIR, so is that available to other researchers that want to test toxicology?)

Only if they buy from us.

So you guys actually own not just the platform and a lot of you developed it between the models, since the process itself is proprietary.

It's patented, yes.

So did you have to patent it first before you could apply for that kind of?

It's very tricky, if you're going to put any data in your proposal, that has intellectual property value, they will encourage you to file a list of provisional. Do not put data in there that is not. I had to file data reported in phase 2 and for data in the phase 2 application, there were new ideas there, I had to rush file the provisional before I sent that in. because then it is in the public domain, so you really have to, they are a couple of key findings that we had to file provisional. And filing patents is very expensive. You learn on, because when we have to deal with attorneys, it's expensive.

Yeah, even on the license, because when you license technology, your company is going to pay for all the patents, even what is already spent. If the university already paid for a part of your patent, and we keep getting these bills sometimes, like, but which is painful to actually license, because at least when it's our patent we have some control of that, but when it's not, it's complicated.

Exactly, yeah.

So, regarding grants, you have to keep expanding IP because that not only will get the extension, not only will give you better protection and better talking points to investors, in many ways, you extend the life of your patent, because if you are improving the technology when one patent expires, you still have the other applications that downstream that will protect your rights. So, this is some of the tools that we have been developing and myself insist. So it's pretty neat.

We have a 3D wound-healing model for you guys who are scientists. We can make this 3D sheets of cells overnight, which is faster than what is out there, and here we are using human embryonic kidney cells, and we can puncture a hole on this tissue and put a magnet on the bottom. Hold the tissue and puncture a hole, and there's no 3D wound-healing model available. There's no commercially available, so this is the first one and we did file a patent for this, so in what we did basically to prove that for proof of principle and to show that this works, we puncture the wound and we exposed the cells to ibuprofen, Advil. Advil, I don't know if you know, is nephrotoxic, like pregnant women, marathon runners, they cannot, they should not take Advil because it gives you kidney failure. So and this is published. So we made these little holes, and then we saw the cells filling in. You know, this is a big piece of tissue. And you can see, you don't have to be a scientist to see 48 hours the holes closed. With a high concentration of advil, it doesn't close. It actually gets bigger. And we can measure rates of how fast the holes close and we can translate that in, what they call, dose dependent curve. But the interesting fact of this data is that the x intercept here, which is where nothing changed, is, is the same very close to the concentration in ibuprofen, so we're basically measuring, in vitro, how toxic ibuprofen is, and it's pretty neat. And it's one of the things that is the new buzzword, 'labor free.' You don't have to be labor yourself to get these results.

So we also have, what we call the magnetic pen, which is basically a little tool to pick up tissue. Cause remember now, tissue now is magnetized, because the magnet nanoparticles and basically we have a cephalon cap and a magnet on the side, and we have via senior design project from bioengineering team designing a real pen for us, which is basically going to work for this, you put a magnet on, you take the magnet off the cephalon tip, you put a magnet on, you can pick up this piece of fibroblast tissue, you take the magnet out, you can drop it. So from a insulated tissue, and remember, from a business point of view, this will be the equivalent of a pipette tip, so people are going to use it, throw it out, and need to buy more. So, it's okay, we like that.

So we can also put the, make layered tissue, which is very hard, which is part of co-culture, and here is an example. This whole section here is piece of 3D culture of endothelial cells and the bottom is fibroblast, so we can pick it up, and stack them up and you can basically make a tissue. We have put 4 cell types together now.

(Say if you were to patent the pen)

We've patented the pen.

(So before that, could someone come and say, 'okay, cool, I'm going to use an electromagnet' which is not the same magnet, same principle in theory, but it's in a sense absolutely different, could they then patent that? Or is your patent cover and since the idea of electromagnet, even though)

The very first, how this project started, was electromagnet. Yeah, that's how it started. On a small scale, yes, the problem is, you cannot generate type of forces that you need to hold a tissue with an electromagnet and there's a lot of different issues like heating. An electromagnet heats, and there's ways to get around, but we patent that too. Yeah.

So, this is another pretty neat tool, I think, for detecting cell viability. And again, it's labor free, and viability is just how healthy the tissue is. Because when we levitate these cells, we are promoting cell-cell interaction, so, when you put the cells together, they start interacting and forming tissue and it's fast, so if you add a drug that either disrupts the cells surface or kills cells, you break this interaction. Right? So, what we saw, we have do what they call prebreast cancer cell line, and this is what they call precancer cell

line, so we levitated culture, brining cells together and an hour later, we had the drug. And here is different cultures under different concentrations of ————–, which is a chemotherapy agent. You can see, you don't have to be a scientist, there's a huge difference between the two cultures. And the difference is the control that has no drug allows the cells to form 3D structure and as you increase the concentration, it just doesn't form. And we have, we have a basic topology algorithm that we use, it's not ours, it's opensource that you can analyze the structure of this assemblies and we can convert that to viability. Where everything is dead is 0% viability, then they're healthy it's 100% viability, which is very similar to how people do cell viability today, which people are usually using color or size, so, the interesting thing of these results is the NCF10, which is the pre-cancer should be more resistant to the chemotherapy, otherwise, this wouldn't be chemotherapy. The point of chemotherapy is that the cancer cells are more sensitive to the drug, right? Because you'll kill everything. And that's what the literature, it's not our data. Actually, I didn't show that there is data shows that this is what is expected. But the interesting is, that the NCF10 and the precancer is more resistant to the MDA and 2D systems give the opposite result. And we about the same toxicity to the people have, so we have an image analysis to, gain labor free, you can do whatever you want at the end of your experiment. And also, these kind of assays, it's what people call too 'four dimension' because you can take data over time without killing your culture, so you can take a data point and you can see the progression, and you can see after 168 hours, there's a clear divide here. And this is actually, happens as

kidney cells with ibuprofen, so we are replicating the results of our other assays. So when we think, we would patent this too, so now.

(The algorithm?)

No, it's freeware actually. So, imageJ has factor dimension analysis, which is good, because it makes it easier. So now we are coming up with 24 with launch of a 24 well system that works really well and the 96 well. So the high throughput improvements to the patent, it's only, company-owned, so, which puts us, extends the life, because in reality, 10 years from now, may even use this even. They're not going to use, if they original, so when the patent expires for the, we have 3 more years of patent life on these.

(When was your original patent?)

It was 3 years ago, the provisional. So, at least, these we filed last years. So, again, best marketing tool in biotechnology, in our area or our technology is publication. We had Nature Nanotech last year, which, you know, all the different media channels published, talked about, and we had companies like Genentech come approach us to buy the system. They're actually testing our high throughput now. So again, if you're in science, even if you start your own company, you're going to have to publish, and it pays off though. And again, never miss the opportunity of marketing your technology. I'm not sure how many of you here do cell culture, but you know, could 3D enhance your work? You never know. It works. And you know, again, you should consider all the benefits of our system. So, these are valuable propositions. Rapid formation of the 3D structure would provide an in vivo like environment and it's easy to handle. I have a lab with CC11 11 11 always look for talent. And we are looking for interns in science and business, so if anybody wants to work with us, you vision with us, we always have lots of interns, and I think they have a really good experience. And we have hired lots of people that came as strategy interns in the sciences.

We start to wrap up. I would say, not so much words of wisdom, make sure that your idea works if it's in a box. This is important, get your PI advisor on board. It's tricky, and sometimes you have a great idea that you're mentioning, I don't know if your postdoc/grad student, but that works well, you think you have a product. I worked in an investment for my case. I did my Ph.D. and I worked in industry at the same time, so I always joke, I would never want my own company because I know how painful it is to deal with everything. But, when the opportunity came, we came up with the technology, I figure I could sell it, so, but, it's key for you to have advice. Sometimes your advisor, they don't want to have a company, so you're going to need him to get through to license. Or maybe, they'll want to have a company, but it's not the same idea that you have because they need you, because in reality,

you're the one that really knows how it works. And you don't want to burn bridges. So get your advisor on board.

Licensing is not easy. We thought it was going to be like this, 3 months and it was, I wouldn't say a mistake was part of the learning, because it took a year for us to license this. And if you don't have a license,

you cannot raise money and we didn't get paid for a year, so it's very hard not to get paid for a year. This is actually it's this one here. You got to put your skin in game. In my case, it was, I didn't get paid for a year. So, and, investors want to see that. You, it counts. They will turn the ETF, the emerging technology fund, they would just say, how are you getting paid? I will say, I haven't been paid, I haven't seen a paycheck for 10 months, and they'll say 'oh, okay' because they know you're not stupid, you know, and if you're going to take the chance, they know that, you know, you believe in what you're going to do, and they're going to need that. So it's very important. It's not easy though.

Yes, long hours and founders do get paid less. So, if you're going to hire a CEO for your company, he's going to make more than you. You usually make about 30% less of the people at the same level because the payoff for you is at the end. You need to find good advisors, it's key, like Tom Kraft(?) and you do have to listen to them. Because investors know, they talk to each other, and if you're hard to deal with, they're not, because they'll have to deal with, because you're attached to the funding.

Of course, we all, you know, smart, and have Ph.Ds, MDs, MBAs, but no, you do not know everything, especially if you haven't done your own company yet. You have to, you don't. Yes, you're going to have to do everything. A through Z. there is no from designing brochure, designing logo, doing these things in the lab, everything.

Attorneys are very expensive. And you'll need a good one, for sure. The license process really paid off for us, we had a really good attorney. We lucked out because he did it pro bono for us, because he liked our idea. He liked the team. We pitched our idea to him, he was like, 'oh yeah, I like that' so we put it as part of my business development and he got a really good deal because the quality of our license will also define the kind of deal you get for investors. And he did get us a good deal, and as soon as we got our first check, we got our first bill from him. It was not fun, when we saw that he cost $650 an hour. But, we took it because we didn't have to pay in the beginning because he was taking the chance and like, 'alright, fine.' And it did payoff. We changed firms now, he's a little cheaper now. So, it's not easy but it's worth it. Yeah. It is the team, that may have been someone we know, that's Tom that he took us abroad came.

These are the flow charts that we had. And it's, you guys are on the right track, so I'm just pointing out a couple of things that I would have done differently that I didn't know either.

In the case here, you have the licensing all the way on the bottom of the process, and this just has to go to the top because if you don't have a license, you don't have a product, you cannot raise money. Period. That's one thing we did, we did not take money from anybody until we got the license, or until we were pretty sure.

We did, we did, our own money, yeah. And we had research to file the patent and all that. But as a company, we had.

Yes.

The patent, for us, of course, but that's at the university. You're not in the company yet, so whatever happens at the university assigned all your IP to them, so they own it, it doesn't matter. So now you want to start a company, so, then you have to license because otherwise, the company themselves don't have . The first patents a new one. And yes.

(I've never seem a document with my employer... I know it's the way it works, but the institution takes a big chunk too.)

Yeah, it's all signed.

So, in here, again, this one is kind of one of my flow charts, I'm not sure anybody knows where it starts, but, I do like that too. But the key point here is, the patent and the license, bringing up your point. Patent and license are different, are two separate things. So you do need to patent, that's the first step. And when you become an entity, a company, comes the license. So, that's it's where you're going to determine royalties and how much the university is going to take from your company. Like Rice has 2.5% of us, which is good. That's a good thing because investors like to see a big institution as part of your company. It's not a 2.5, yeah. We got it through license.

So, those are the things that you have to negotiate.

Yes, there are milestones for, we have the license for the life, we have milestones that we have to meet, so we don't meet, we can lose the license, but for the life of the patent, yeah. So, we have I think it's, a lot

of things that we have to do. And salary is negotiable. As you go, you may have to change a few things. So even though it's a painful process, you have at the end of this process, you have to end up with a good relationship with the IT office, because you may have to come back to them and say, 'okay, these people are going to invest in our company, but they don't like milestone A and C' so usually, they're going to say, 'fine, okay, you'll get it Monday with the change' but, you know, you have to have a line of communication because they're going to, if you make a milestone, you just didn't bring

money. Or the ETF money didn't come in, then you don't have your money, but you know it's coming, you don't have the cash to pay the first second third milestone, you have to talk to them, 'okay, ETF money is coming, can you just hold on the payment?'

Yeah, exclusive or a lot. So, and again, the patent and the license will shape the business strategy and vice-a-versa. The next one, it's very small here. I think you guys may have a copy, maybe. And I like the way you think, you see the process, people say, 'oh yes, you're going to have a company and be rich' and you know, sometimes, I just want to make sure I have enough money to pay everybody.

If you guys have any questions, if you are thinking about licensing a technology or starting a company, just let me know, shoot me an e-mail, and you can come by and see our space. We are just down the road on a UT incubator, a very small company integrator. A function, and we work pretty hard. We're 3 blocks down. We're at Pressler and. There's the tall UT building, we're on the 21st floor. They have the incubators for companies.

(How many have you hired? As you've grown, I don't know how many principals investigator, whatever you had, and I'm sure who you had to start with, and as you get bigger, you need people, how do you?)

I'm scared of death of hiring. Because we're so small, if you get the wrong person, it can be so disruptive. Actually, we have money to hire now, but our milestones are so short and I have no time to train or take the chance of getting somebody who's going to take my time and it's not going to work, so, I just take more, it's, we have our first scientist, we had, it was options. We offered options of the company, and also when you offer options you have to be careful because there's a lot of paperwork that you have to understand and get ready. But it's part of having your first company too. There's a couple of things that you learn as you go, but, options, usually, we get in turns, we get the interns in, they work well, we convert them into scientists, and that's usually how we do it.

(Options?)

Yeah, we have grant money and the ETF money and it's for that.

(How is it without income?)

I think that much, we didn't have cable. I have a very nice landlord that's kind of things you learn. There are nice people there. I had to call her and say, 'here, I may have to move out because I can't pay rent.' And I was a postdoc before, so it's not like and so, she was like, 'alright, fine, don't pay rent. Whenever you're ready to start paying rent, we'll just add up.'

She was fine. I was a good tenant, I did very little. She was a guardian angel. Somebody bumped into my car and I got a 2,000 check that I didn't have to fix, so I don't even fix my car because that reminds me of the hard times. Because I was in the middle of the licensing negotiations, that you know, that roller coaster, somebody ran into my door, I saw who ran into my door, it was their fault, and I was just, that's all I need now. In turned out, it was perfect. I had $2000 there, the car was functioning, the door closed. And I'm like, "it's fine! Hit the other side!"

She doesn't. She was just nice. I paid it off, as soon as I got paid. The founders, we put money in, and since I'm the one we had to quit my job, so I got help, and I wasn't married, so, that helped. No kids. Yeah, as I said, I couldn't have done it if I had kids and a family. If I was married, I'm sure my wife would have divorced me regardless.

But yeah, no, and we thought we were going to get licensed much faster, but it just didn't happen. And even for the grants, they say you don't need a license for a grant. But yes, you do need a license. And one thing I'll ask , people say, 'oh, you don't need a business plan' SDR this is a good lesson for you guys that are science. We sent in our phase 1 and we got a laundry list from the program director with a long list of questions, which we thought, we knew it was good news, because they didn't reject. We really needed that, but they basically asked for a business plan and they gave us three days to respond. That's all. And they

asked for licensing, for IP portfolio, all of that. And you had three days. So if we didn't have it organized and ready, which we had, so, we sent it to him, and he said 'well done, you guys get it.' But if we didn't have, we would have been very painful, you do need that. Don't listen to them who say you don't need it. it has to be, because you have to have only one page for the case. NSF you have 6. They come back with, you have to basically write another proposal, same thing for phase 2. But phase 2 we're even more prepared because we have the questions.

(Basically you need your license before you do anything.)

Just about.

(So that's kind of risky. You're risking all things. You don't know where it's going, but you have to.)

You always need a license. It's important to have a license. For example, you have a product like ours, and they have 7% royalty, you're not going to get an investor. It'll come to that. And you'll need an attorney, I didn't know that. So you need to have a license, it's very important, the terms of the license. What would happen, you're going to have to go back and change the terms and it takes time, it's very painful. So licensing, yes, it's the key part.

That's why you need your advisor on your side because he's the communication, the point of communication. I had, Rice negotiated our license, so we got a founder from here, was negotiating license.

(Why Rice instead of MD Anderson?)

It's technology that's nanorelated. It's a device so it made sense for Rice to take lead. MD Anderson, yeah, same thing, that's why it took so long for us too. Because you're in the process of the institutional negotiations. So once they had the, on the disagreement, they said, 'alright, Rice makes all the decisions' which was fine, but MD Anderson is more on the drug related aspect.

Great, let's thank Glauco for a wonderful talk.

If you have any questions, just let me know, shoot me an e-mail. And that's what it said. The entrepreneur community, you get pretty close. You always ask people, people always talk, you're looking for lab space, you're looking for employees, you went through ETF, you're going through it, it's pretty close knit. Yeah.

(Your previous relationship with MD Anderson and UT, is that how you got your incubator space?)

So actually it was an interesting story too because we needed that space because that was central, and they had all this equipment that we need that we couldn't have. And we kept bugging them to talk to us, and we know that we were way bottom of the list. And we got ETF. Like the next day we got ETF we were having coffee with the vice-president office. And it's like, those guys, they like to recycle the money, which is fine. Because you know, it's the UT institution working at it, so it's good for them. So it's actually good if they get money. So the ETF is what was critical, it had nothing to do with the other side, emerging technologies fund.

(Ownership, taking proportional to, does it hurt that every time you take and give away ownership, your exit dollar sign has to go up higher.)

Yeah, it's tricky, you don't want to dilute, you cannot be caught up in the ETF. The ETF money is good money regardless because there are a couple of aspects that it's not really just a, the ETF process is a very stringent process because you have 4, Tom, the physics professor he said he never worked so hard on a grant, a proposal, as he did, for a million dollars, as he did for ETF. Because it's 4 rounds of grilling, and so, once you get ETF, it's easier to talk to investors because you kind of validates that you went through a feeder

process. So even though your, and it's up to you to grow your company as much as you can to get to a valuation you're not that diluted at it as much when they're money's at it, so yeah, but you have to.

(So value is better at 10% of a billion dollar company than 50% of a million dollar company.)

Yes.

(So when you were a, you were a postdoc, you were working in industry)

I was a PhD.

(Sorry, you were a PhD working in industry, and then you did a postdoc.)

Yeah, that's when I came.

(Is that when you had this idea? And so when you had this idea of, so when my postdoc is done, I'm going to go start this company? And that's why you're not getting a paycheck. What I'm sort of wondering

here is, so what if you were on faculty at Rice? Or at Anderson? Would that change? How would you get commission on this? Would you be willing?)

That's a good question. It would be a different company. From the angle of starting a company, if you really want to, you need somebody to lead and jump in. So my Odyssey scholarship was ending and the end of that year, I was already preparing faculty applications, etc. so when I came up with the idea, it worked, and I had experience from the industry, I was confident that I could put this in a box and I could sell it. There was value there so, again, this is an important factor too: if I'm attached to MD Anderson they're going to pay for it. Any idea that I have there, is theirs. So I'm going to have to like several licenses, that's why as I was like, alright, you had to get out of the university, be your only entity so whatever you invent is yours. So, it's important to, you know, detach yourself from the university early enough if you're trying to prove your IP. That was one of the reasons, and there's a lot of others that you know, you could write a book.

(That's why there's only one company that writes patents at Anderson, because each subsequent one you would have broken at UT.)

(So, you're getting bought out this year?)

Depends if we do. Yeah, sure, I would do a lot of things differently. Yeah, so, and that's the thing, all my ideas are on the side, so it's tricky too. The investors, we all own it.

(Do you still have some reserve that you can start a second company with?)

Yeah, so, you know, there's mixed ideas related to doing cell culturing in 3-D. I'm sure I could talk to them, and.

Cell-culture time. Yeah.

Okay, I want to talk to you about next time. So he raised a point about publications. That's going to be one of our next ones, how to write for nature. So there is an exercise. You need to submit an abstract, a very, very good example of an abstract. So you just need to follow it, submit it before the 1st of December and have a couple of submissions. So this is for trainees. So if you do no take your spaces, someone else will. So go ahead and make your submission.

You do not need an idea that's going into Nature. It's just the style of Nature. This is a hypothetical exercise for the style of writing.

Chapter 14

15. Transcript of the video 'Grant Writing K99 R00 and R01[1]

14.1 Grant Writing K99R00 and R01 Video Transcription

Phyllis McBride, Ph.D., Director of Proposal Development, Office of Research, Rice University

14.1.1 Part 1: Introduction & Obtaining R01 Materials Online

Welcome everyone, thank you for coming to the NLM professional development workshops. We have a fantastic person here to talk about professional development. This is Dr. Phyllis McBride. And she is the Director of Proposal Development here at Rice. She has also worked and developed proposals at the CH2 Andell(?) and EDS. She is a Ph.D. in English and we're very lucky to have her here today.

Thank you. Can everyone hear all right? We were having some problems with the sound a little bit earlier. First of all, I'm really glad that you're here today. And I just want to say right up front, that anyone who takes time out of a schedule as a busy as I know all of your schedules are, is doing yourself a really service. You're going to be learning some information, I hope, that will help make you much more competitive when you're beginning to apply for grants. Either in, as assisting with, let's say, one of your advisors or a mentor in your lab, or whether you're ultimately applying for those grants for yourself. There are so many people that always kind of amazes me who have never had any introduction to grant writing, whatsoever. And yet, when they graduate, they're suddenly tossed into a situation where they have to go out and secure grant funds. So anything that you can do like this is going to give you a little bit of a head start for above everybody else. So that's always a good thing to know.

What I wanted to do is just give you a little bit of an idea of what we're talking about today. The first thing I'm going to do is just give you a very quick walkthrough the web because one of the things that is probably the hardest about applying for a grant is actually finding the funding opportunity and finding the area on grants.gov where you would upload that opportunity. And so I'm going to let you have some idea of how to navigate that. We will then talk about the NIH research project grant, which is also known as the R01, take a short break, and then come back and discuss the NIH Pathway to Independence Award, which is also called the K99 or R00. And R00 is what I should say. And we'll conclude by going over some strategies and tips for success, things that you can do in any proposal, whether it's an R01 research project grant, or a Pathways to Independence Proposal that can help make you have a much better chance of success. And we'll end with questions, so if you have questions along the way, please feel free to jump in and let me know, and we'll answer them as we go. If you have questions that you would prefer ask at the end of the presentation, just jot those down, and we'll be sure to leave ample time for that. Any questions so far? Okay.

Oops. Oh. Is it going to go? Okay.

[1] This content is available online at <http://cnx.org/content/m41666/1.1/>.

The first thing that, I think, the critical question to ask yourself is: Where do you begin? I think probably many of you have heard your colleagues talking about writing a grant proposal and many of them are not smiling when they're talking about it, and they look rather distressed and they are. And so what I

wanted to do is try to offer you a plan of attack for how you can go about this process. The first thing that you want to do is establish some kind of logical process for the application process itself. And this is going to be slightly different for each person, some people are very linear and they want to work through it exactly in certain order, some people prefer to jump around from section to section while they're working on the proposal. There will be times when you are working on a team proposal, where you'll be sort of dividing and conquering and having some people work on one section while others are working on another, and whichever approach you're using, you want to make sure that you're consistent with it. As you become more and more comfortable working on grants, if you follow that same process from grant to grant, what you'll find is that, fairly quickly, you won't be having to think so much about just the logistics of how do I find the funding opportunity and how do I fill out all of these forms and upload everything. You'll actually be able to think about your research. What a concept! So always a good thing to do.

The key thing that you want to do, also, is define a really good idea. And in today's competitive grant market, one of the things that you've got to do is make sure that your idea goes beyond good and that it's actually great. Just a truly superb idea because you have to keep in mind everyone is looking for funds, we're short on funds, especially at the federal level, and that's where everybody looks because that's where the big money is. So what often times happens if you have reviewers who are evaluating proposals, not just trying to make decisions between which is the excellent proposal vs the good proposal. They're making decisions between we have all of these excellent proposals, and which of those are we going to be selecting? So one of the things that you'll want to do is really talk about your ideas and so, right, you're able to refine them as much as possible.

Once you have your idea, and I would say only have you have your idea, you would then begin looking for funding opportunities. And the reason I say this order is the most appropriate is that it ensures that your research agenda drives the funding opportunities that you're looking for. A lot of times people will hear about a funding opportunity that offers millions of dollars and they try to force or squeeze their proposal, their research to fit that so that they can go after that pot of money. But what often times happen, is that reviewers see that you're trying to force that, and they just don't buy it. And so it's often times much wiser to go ahead and stay true to your research idea and just constantly look for funding opportunities, and then when you see the right one for your research, you'll know that you've got a good fit, and you'll have a much better chance at success.

After you've found the funding opportunity and you know what agency you're going to be applying to. For most of you, it'll be NIH, probably some of you will apply to NSF or DoD since DoD has a lot of medical research programs also, you'll want to learn as much about that agency as you can. And you can do this, of course, by getting on the agency's webpage and reading about the agency as a whole. Reading about the specific institute or center, if you're applying to NIH, that you're targeting, and also look at information on the specific program that you're targeting. The other thing that you can do to find out about the mission is simply talk to your colleagues. Talk to some sincere colleagues who you know have been funded at a particular agency, because they can give you some insights that aren't going to be on the webpages, sort of insider tips, if you will. And also talk to your colleagues and find out what kinds of luck have they had at applying to agencies. It's really nice if people are willing to share, if not, an actual copy of the review comments that they've gotten back after submitting their proposal, if they at least sort of tell you, well 'this is the thing they dinged me on', or 'this they really liked.' That's really a way to help one another.

And then, finally, the next that you want to do is just begin an iterative process of talking about your idea with your colleagues, refining it, talking about it with some more colleagues, refining it, and when you feel like you've got a pretty good idea of what it is you really want to do, at that point, it's the time to go ahead and talk with the program manager at the agency that you're applying to. People always hesitate to do this, and I can't emphasize enough the importance of talking with your program manager. We're actually paying them with our tax dollars. They work for us, okay, so and they're also really eager to be able to help you because they are people who care enough about the discipline that they're working in to volunteer to

be a program manager usually for about a three-year term. That's a significant commitment. They want to know what is happening on the ground, so to speak, in the various disciplines related to their own, and so, giving them a chance to hear about your ideas, and offer some suggestions on how you could improve the idea, or how you could best present the idea, is really, extraordinarily helpful. It's also nice because if you talk to your program manager and they say, you know what, 'that's a great idea, but it's not right for our particular program or agency,' they can then refer to you to the appropriate program or agency, and that saves you a whole lot of time and heartache because you're not preparing an application that's not going nowhere.

(inaudible question)

Absolutely. Absolutely. And there will be times when you might submit an application that really, you know, everything is becoming interdisciplinary so the lines between institutes at NIH are starting to blur a little bit, so there might be instances where two different institutes within NIH would co-sponsor your grant. If you find that after talking to a program manager they say, "well, we really like it, but it's not a perfect fit, you should talk with this institute," and if they give you that same response, try to get both of them on the phone and say, "hey, is there any way, you both seem interested, but it doesn't seem like a perfect fit, is there any way that you would be interested in sponsoring half of the project, of whatever percentage of the project they feel comfortable with."

(inaudible question)

Actually, what will happen is when you submit your grant application, it won't be submitted directly to an institute, it will be submitted to the Center for Scientific Review, and the people at the Scientific Review will look at your application, especially your 'Specific Aims' section and you're 'Approach' section, I'm sorry your 'Significance' section and they will then make decisions based on their experience which institute your application should go to, and which particular study section your application should go to. If you want to try to have a little bit more control over that process you can do that by simply, you can include a cover letter with your proposal and you can indicate "I am interested in having this application reviewed by Study Section X" and you can give them the name of that Study section. What's great about NIH is that they publish not only all the names of the study sections, but the rosters for all of the study sections, so you can actually go online, click on the study section that you think is appropriate for your research, and what you might see is that all of that people in that study section are really working on a slightly different idea, so what you may have to do is keep looking, and you may find a study section that by title doesn't seem like it would be the best one for your research, but based on the people who are on the panel and the kind of research they do, you realize that that would be the best place. And again, that's also something that you can talk to your program manager about. Most people will, I think, have made the recommendation that if it's your first time to apply, you should just let the Center for Scientific Review do their job and shuttle your proposal to the right study section, after you have had success with a particular proposal and you kind of have a better idea of how the whole process

works, at that point, you might want to go ahead and start indicating the particular section you wanted to go to as well.

Okay, the other thing that I can't emphasize enough and we all know this, and we never do it, is to start early. As early as possible, and I say this because there are so many, the reason, all of your colleagues look distressed when they're working on proposals is that there is a slew of forms and documents that have to be filled out and put together and uploaded before you can even get your proposal in to be reviewed. Bless you! And so allergy season, and so, what I wanted to do is kind of walk you through a little bit of some of these publications. PHS398 is the forms that you would use for the proposal proper, so for your specific aims, your research strategy, those kinds of sections. Those are downloaded from NIH. There is another set of forms that are primarily administrative in content, which are called the SF424, Standard Form 424. And in those you download from grants.gov. In addition, if you're working on a career development award, such as the Pathway to Independence, you would need to download that particular supplemental form grants.gov as well.

So, the question now is how to get to, to some of these forms. So if you're looking for, if you're just trying to find a funding opportunity, or a program announcement as they're called at NIH, other agencies

will call these "program solicitations" "requests for proposals", "request for application", at some agencies, you'll hear them call "BAAs" or "Broad agency announcements". Essentially, those are all terms that are referring to the instructions for your proposal. And, or for the actual solicitation itself. And as I've said, those are sometimes very difficult to find. So if you're looking for just the funding opportunity, for let's say, the major research project grant, you would start at the NIH webpage, click on 'grants and funding' and then when you see this funding heading under that, you will see that there is something called "unsolicited applications." I don't know, can everyone see that okay? Unsolicited applications, that is the same term that's used that the alternate term is 'parent announcements' and what this means, it's a great thing for all of you because some agencies will put out requests for proposals and they'll say, "and this is what you have to conduct research on," and you're limited by that. NIH and other agencies, you have the opportunity to come up with your own idea and submit it to the agency that you think is most appropriate for funding your project and you do this without them asking you to, they don't have to put out a special request for proposal. All they do is just say, 'hey, if you've got an idea, create a proposal and submit it to us." The reason there is an announcement at all is actually because of an administrative part of the standard form 424, so it's kind of like one form begets another form begets another form. And so there is a parent announcement for a variety of different awards. The R mechanisms are for research, if you look at the R01, you'll see that you can click on and get the announcement. I also wanted to show you there's training announcements, career development announcements, those of you who are interested in the K99/R00, you can come down and get that announcement right here as well.

So you would just simply, when you see R01, slide over, click on the announcement number, and you're going to actually get a copy of the proposal solicitation, and this is usually about a 15-25 page document, it gives you every kind of information you could possibly want and then some about the proposal that you would need to write to respond to this particular funding mechanism and we'll talk about that a little bit more as well in a little bit.

If you are, if you have found your solicitation, let's say you've decided you have a great idea, you're going to submit an unsolicited application by using the R01 funding mechanism. Now what you want to do is find out okay, how do I actually, once I've created this application, how do I apply? And you apply through grants.gov. So you go to the homepage for grants.gov, and you click on 'apply for grants.' The

first step is simply downloading the grant application package and what you would do at this point is put in the funding opportunity number, which you will be able to get off the funding opportunity that I just showed you a picture of. In this case, it's PA for Program Announcement, 10 and 067. So you enter that and it gives you a list of 2 things. The one of two different forms. The one that you want is on top because as you can see it's used for submissions that have due dates after January 25th of 2010. You click on download and then you can continue. Before I go on, there is a spot right in here where you can sign up for alerts, if there are any changes in the particular funding mechanism. The chances that there are going to be changes to a parent announcement are pretty slim, though it does happen. However, if you're applying to a specific request for proposals or a request for applications, in those instances, it would be really wise to put your e-mail address in here, and what they'll do is any time there's an update to that solicitation, they'll e-mail you and let you know so that you don't get a big surprise when you're submitting and find out, they've added this section to the proposal, and I didn't even know they were going to do that, so that's a nice thing to do. You can download the application instructions and download the application package... supposedly you can. It's working.

So this is what the application would really look like. The one thing that they do that's really helpful in this whole mass of forms that they have you fill out is that on some forms they actually prefill the forms for you, which is really nice, so in this instance, this is the program solicitation for the research grant, the research project grant, the R01, they've actually filled that information in for you. They've put the opportunity number in for you. They've given you the names of the forms that you'll be using. The opportunity open date is the date that this particular parent announcement became available, when it first hit the streets so to speak. The close date usually refers to a date that you can no longer submit an application under that; however, in this instance, that's not the case so don't worry about that too much. If it said expiration date, then you'll realize you would know that you can't submit to it anymore. But the

close date is slightly different. It gives you all of the contact information for the agency, which is nice if you have questions. It's right there. And the other thing that's really nice about this document is that they fill in which other forms and documents that you have to create for this particular proposal. So in this instance, you need the SF424 for the research and related, that's what the R stands for. The project performance and site locations, other project information, senior key person profile, a cover page supplement, the actual research plan which is the heart of your proposal, and a checklist. Then they have a section called optional documents and one of the things is optional, is for instance, a cover letter. If you want to have a cover letter, you can. If you don't want to, it's not a big deal. I would say if you have the opportunity to include one, do, because it's a chance for you to highlight just a few things about your proposal and also a chance to help make that your proposal gets sent the appropriate study sections. So you want to use key words in this letter that you really are reflective of your research.

Now, the other things that they have in here, they're putting them as optional documents, and the reason that they're actually required. If you're submitting a proposal, you have to submit a budget. The reason this is listed in optional is because you can submit one of two different kinds of budgets. If you're requesting less than $250,000 a year, you would use the modular budget. It's the easiest budget in the world. You just simply request the number of modules, and they come in $25,000, each one is worth $25,000, you just incorporate the number of modules that you need for year 1, year 2, year 3, 4, 5, and so forth. If on the other hand, you're really going to go for it, and you're going to request more than $250,000 per year. In that instance, you would need to get permission from your program manager to proceed. If you they give you permission, what you would have to do is provide a line item detailed budget so if they're going to give out really huge chunks of money, they want to make they know exactly how it's going to be spent, so you would use one or the other. And the final document that's listed here is the sub-award budget attachment. There will be sometimes that because of the nature of the

research you're doing, you'll realize that you need to have someone on your project team, even if you're applying for a R01, which people think as an individual investigator proposal so that they provide the expertise that you don't have. It may be that you're working on a larger type proposal that's for a center, and in that instance, you would have a number of different people who would be collaborating with you. And many of them, if they're from other institutions, would need, they would need to submit their budgets. And when you get your own budget and all of the subcontractor budgets, you can then put together a, come up with a final dollar amount for your proposal. This gives you just a few instructions and this is just a one-page document that's all that you have right there. So that's how you can locate some of these documents.

(inaudible question)

Yes, we're about to look at them. There's a whole little stack, and this is just for a single proposal.

14.1.2 Part 2: R01 Research Grant

So for the research project grant, the R01, actually, let's see, we'll talk a little about the R01 first. This is actually what we had seen earlier. This is actually the public health service PHS398 funding opportunity that you get, that you can download from the NIH webpage. You can also download these from the grants.gov webpage as well. And this is going to give you, as I said, just about every piece of information that you could possibly need or want for your application.

The research project grant is overall, is I think, a very interesting one. It's sort of the original of all of the grants that NIH offered. It's considered one of their standard funding mechanisms. It's the grant that is awarded the most often at NIH and it has a very simple purpose and that is simply to provide funding and support for a very particular well-defined project. So it's essentially, if you have a large research project that might be made up of a number of different experiments and so forth, this would be the kind of funding mechanism that you would want to use to request support. One of the things that you'll find is that for some funding mechanisms like the R01, virtually every institute and center within NIH will participate and that again, leaves this very open for you to be able to come up with your idea and submit it to whichever institute you think is most appropriate. However, you need to be aware that each institute and center does have a specific research agenda. Some of them focus on a particular disease. Some on a certain body system,

so this is just a list starting, if you can look over in the top right corner, you'll see quick links. It's got acronyms for all of the NIH institutes and centers as you can see there's quite a few of them. And you can click on any one of those to go to the institute or center that you're interested in learning more about. The office of the director actually does fund some research, though probably not as much as the other institutes. And they just go through in alphabetical order to list the institutes and centers. The first one listed is the National Cancer Institute. They provide a very quick summary, and then you can click if you want to get a further description of what it is that they do, and what they fund. So when you're trying to learn a little bit about the agency's mission, this would be the perfect place to go to get that information.

The key features of the research project grant is that first of all, it is an unsolicited application, so you're the one that gets to drive the research, you don't have to try to make your research fit someone else's research agenda. The eligibility is wide open, basically, they just say, if you have the skills, knowledge, and resources necessary to carry out the proposed research, you can be a principal investigator for an R01 proposal. One thing that I really want to point out also, is that the R01 does not require US citizenship and so I know that with some agencies it's a real struggle to be able to find funding opportunities that you can apply for if you're not a US citizen, so it's nice to know that there are some

out there that you can apply for with no problems. The budget for an R01, you can request essentially, what they say, is request the amount of money that you need. Don't try to under, sort of, come up with a low-ball estimate thinking that it will help you, because it won't. Don't try to pad the budget because the people who are reviewing it are also researchers, they'll know if you're padding the budget.

You just want to ask for what you need, and what that means is that you really have to think through your project and every aspect of your project, well before you put the budget together so you're sure you can request the appropriate amount. You can have direct costs of $250,000 per year or less. How many of you know what direct costs are vs. indirect costs? A few of you? Direct costs are costs that can be tied directly to your work on a particular project. So, these would be things like your salary, that for the time you spend working on the project. It could be travel that's associated with the project. It might be any kind of materials and supplies or equipment that you purchase for the project. Those are things that all have a specific price tag on them so you can add those up, and say 'okay, we know we're at $250,000 or less." Indirect costs, and so you know that every year, let's say you were able to hit that magic number of $250,000, and people try to get it as close to that as they can, they don't want to lose anything, then once you're able to do that, you'll put that into your modular, your modular budget. For indirect costs, and you would get that $250,000 every year. Indirect costs would be given to you on top of what you get for direct costs. Indirect costs are the things that are not directly tied to your project. These are things like, another term for it is 'facilities and administrative costs' or 'overhead' if you're in business. So these are things like electricity, it's really hard to figure out how much electricity you're using when you work on your project, or water, or computer resources or the library, and those kinds of things. All of those are indirect costs. And the universities and institutions all negotiate with the federal government to come up with an indirect cost rate for their particular institution. Basically, it's a very complicated formula that allows them to determine what the university is having to spend in order to keep research going at that institution. And that would be the indirect costs, so these are great proposals for you to be able to win because you're getting all the direct costs and your institution is getting the indirect costs as well. Some institutions will share the indirect costs, sometimes it goes strictly, let's say, to the office of research, sometimes it might go part of it might go to the Dean's office, sometimes another part of it might go to your department. Some department chairs are very kind and they pass that money on to you so that you have some additional funds that are unrestricted, you can use for your projects. So if you see that there's just something you didn't think of when you were putting the proposal together that you really need, that would be a source of funds for you to be able to get that and so that's really nice, a nice thing to have, if they'll do that. And that's something you might always try negotiating with your department chair or your dean, in fact. Some departments in colleges are more flexible than others.

The project can be up to 5 years in duration. I will tell that with the budget being what it is right now, most people are not getting 5 years of funding. They're getting 4 years of funding. So what you can do is submit a project that's designed for 5 years of support, just be prepared in the back of your mind for NIH

to come back and say, 'we really like your project, but we can only give you 4 years of support." And that point, you would work with your office of sponsored research to negotiate a change in the scope of work, because obviously you don't want to cram 5 years' worth of research into a 4 year project period. You would want to drop some of the work off that project. Make sense?

Okay, and then the other thing that's especially nice about the R01 application is the grant cycle. There are many agencies and funding opportunities out there where you get one shot at applying every year. With NIH or almost all of their grants, you get 3 opportunities to apply. So they have 3 grant cycles. As you can see those last 3 columns, cycles 1, 2, and 3, the deadlines are spread throughout the year. So

let's say that you are working frantically on a proposal and you're going to try to hit the February 5th deadline and you realize it's just not going to happen no matter what you do. Then what you can do is say, "well, I didn't make it for that one, but I could still make the June 5th deadline, so I'm going to continue working intensely on this proposal." And that way, when the June 5th deadline rolls around, I will not only have a complete proposal, but I will have a proposal that has been vetted or has been reviewed very, very thoroughly. So that you have the best possible proposal to submit at that point. What you'll find, there's an actual page on the NIH website that gives you a list of all the standard due dates for all of the different types of proposals so the funding, every funding mechanism, has what's called an 'activity code.' As you see in that left hand column, the activity code will, if you just want to skim through this list and find the ones that you're looking for. So if you're looking to submit a brand new R01 application, you would see that the deadlines are Feb 5th, June 5th, and October 5th, that very top line. If, however, you've already submitted a R01, and it's about to come to an end, and you want to get it renewed for another 5 years, you would not submit your proposal on those same dates. If you drop down to the third row, where it says 'renewal, resubmission, and revisions", in that instance, the proposals would go in on Mar 5th, July 5th, and November 5th. As you're skimming through this list, be really, really careful about whether you're getting the dates for new proposals or for renewals, resubmissions, and revisions.

(inaudible question)

What the general rule is, and I don't know the specifically about the T32s, but generally what happens is, you can submit one application and then you get one, if you're not funded, you can submit one revised application and that's it. It used to be that you could submit an application and then you had 2 more chances and I think what they've decided is that most people who are going to be funded were going to be funded on either the first or second application that they submitted. But if they were submitting a third one, generally speaking, for whatever reason, that project wasn't going to be funded. It might be that there was some kind of experimental flaw with the project, it might be that it just did not generate enough enthusiasm for the reviewers, but if you go ahead and submit a third application, of course, that's just more time that you're spending on it. And reviewers would rather see you start over with either a new application completely or a new topic all together. And so in a sense, even though it kind of hurts not to have that extra chance, they're saving you a lot of time. Yes?

(inaudible question)

A revision would be if you have submitted an application and you have made, you've realized there are some errors in it or something that you need to correct, you can submit it as a revision document. So it's more, as the name implies, really allowing you to go in and make some corrections. But typically, those are going to be pretty rare. What you're going to see mostly is the new, the renewals and the resubmissions. And they information for the K awards is up there as well. The codes, yeah, typically these codes will give you an idea of what kind activity each funding mechanism supports. The R series supports research. The K series supports career awards, why they used a K and not a C, I don't know. And so there's a whole set of those.

Once you've actually decided, okay, I'm going to apply for a R01 application, I've got my idea, I've figured out which institute I want to target, I've now gone to grants.gov and I have downloaded the application package, and again, this is what it will look like. It will have everything, all of the administrative information filled in for you, and on the left, it will give you a list of the mandatory documents as well as the optional documents that you'll need.

Now there's a lot of other forms that are attached to this and those, that's what I want to go over now.

So if you pull out the packet that has a copy of the SF424 form on it, I'm not going to go into this in detail because all of our eyes will glaze over, including my own. But there's a few things that I do want to point out along the way. So as I said, and right up front, you'll see that it gives you the name of the funding opportunity that you're applying for. If you pull up an application and it doesn't have the correct name, go back in and try that again because you want to make sure that you've got the right application, or the right program targeted. You don't want your application to be going into the wrong, the wrong program. There is a list of mandatory and optional documents. These little arrows that you see right here are a way that you can indicate when you're done with one section of the proposal, you move it over to the complete section and it's just a way for you to very easily track at a glance, where you're at in the proposal process. You will also have what's called a cover component. That's the second sheet. This is primarily, again, more administrative information. What will happen is that, if you see the grayed in fields on the screen, these are bright yellow, you can't miss it. And those are required fields. And some will be required for some funding mechanisms. There might be different required fields for other mechanisms, which is why you want to make sure you've downloaded the right one, so you give them all the information that they want. This is actually a two-page form. The cover is, and this is just simply filling in the information. One thing that's really nice is that, I think, all of you will have an office of sponsored research or sponsor research projects at your institution, and there should be people there who would, will be very familiar with these forms, and who can either answer any questions that you have about them, or can even help you fill some of them out, depending on how your organization is set up. Sometimes they'll do all of them except just a couple for you, and they'll have you do the ones that only you could answer.

Another thing that you have to do is provide information on the project site. For your project, most of you, your project site is going to be your home institution because that's where your lab is going to be, that's where your human subjects, let's say are going to be. In some instances though, you might be partnering with another institution, and in that instance, you would provide the information for not only your institution, but if you go to the bottom of the page, you'll see 'additional locations' and you would write the locations for any other institution that might participating in this research and state where they're located as well.

Other project information is collecting the kinds of information that it's, it's really critical to make sure is in place. These are very important things like human subjects research, vertebrate animals, proprietary or privileged information. If your project impacts the environment, if you're going to be working in a location that's a historic site that might be disturbed in some way, if you're working outside the United States, essentially, this is just a way to sort of flag these items for your reviewers and for the administrations at NIH so that they'll be able to make sure you've included everything in your application package.

This is also the part of the application where you upload a number of different documents that you create and save Microsoft Word or whatever word processing package that you use. So one, the projects summary, this is just a one-page document, the project narrative, the bibliography and references cited, facilities and other resources, equipment and any other attachments. And as I've said, these will be slightly different for different funding mechanisms.

You will also have to fill out a page about your senior personnel. And you will be the most senior of all if you're the principal investigator, so your name will go at the very top of the form. And then you will

continue to fill out information for each other member of your proposal team. And this will give you the opportunity after you've added the information for one person, if they do you need to add information for another, and if you click yes, it brings up another set of blank fields for you to enter that information in. This is the kind of thing that if you, it's the end of the day, and you feel a little brain dead, but you want to get something else done, these are some good things to work on. They have to be done, they're kind of time-consuming, but they don't require great intellectual effort on your part, so they're nice things to work on in those instances.

For every person that you have on your project team, you're going to need to upload a biographical sketch for that person. NIH has a special form for biographical sketches, which is on the next page and it's limited to 4 pages. You also need to upload a list of all of their grant support that they have received over the last 3 years. The reason you're adding that is, primarily so that your reviewers can make sure there's

no scientific overlap between two of your projects. Yes?

(inaudible question)

It's actually, it is part, on your biographical sketch, you can list your grant support going back further than 3 years, so if you have a relevant project that you finished 4 years ago, but you really want them to know that you worked on that project, you can list it in your biographical sketch. On the current/pending support form though, you would omit it because it wouldn't be recent enough. Yeah, that's a very good question.

So, you would fill out this current/pending support form. And again, there's a special form for that and as you can see at the bottom of the page, you just click the attachment button and you would upload a .pdf document.

The biographical sketch, as I said, is limited to 4 pages. There are, the first page I have given you provides the instructions for the biographical sketch. The following pages provide an actual sample so you can see what one looks like. One of the things that I wanted to point out is that they have added a new component to the biographical sketch, and that's the personal statement. So if you already have a NIH biographical sketch put together, go back and take a look at it and make sure that you have that section added in. And if you don't go ahead and insert that now so you don't forget because they will be looking for that now.

The other thing that I think is very nice that you can do in the personal statement, is if there is some reason that your productivity has slowed down for some reason, you have an opportunity here to explain why. So if you had family obligations, an ill parent or child, what have you, you can put that information in here. I really like the way, that on this sample, they've done this. It's the last few sentences. They kept it short and sweet and simply said, "during 2005-2006, my career was disrupted due to family obligations." That's it. That's all they said. You don't want to belabor the point. You just want to sum it up and move on and she immediately says, "however, upon returning to the field, I immediately resumed my research projects and collaborations and successfully competed for NIH support." So you don't want to emphasize times that you're research has slowed down for whatever reason. Yes?

(inaudible question)

Okay, the next, a few pages back you will see what's called the "other support form." And as you can see, this is a list of grant support that this particular person has had. There's then a cover page supplement. There are more cover pages that you have to fill out; it's really kind of crazy. And then you'll come to probably the most important of all, and this is the "PHS398 Research Plan Component." And if you look on the left hand column of this page, you'll see that there are, is, an entire list of documents or forms that you need to fill out and then simply upload to grants.gov. The key ones of course, are for the research plan section. The real heart of your proposal.

There is a checklist that comes after that, another cover letter component, and then the budget. And the budget that I've included here is the sample of the modular budget. This is the one you would use if you're applying for $250,000 or less per year and believe me, it's worth being able to go with the modular budget. It will make your life, much much easier. So that's what we've got just for our forms. Yes?

(Question)

Yes, you will submit a budget justification. And you want budget justification to be a true justification. You want to explain the rationale for why you have put a specific person on your project, what's the expertise that they bring that you don't have that you need, why do you need a certain set of materials, why do you need to make a certain trip, you want to really provide a true rationale for that because when funds are tight, the more persuasively you can word your justification, the more likely that the reviewers will be to let you keep that item on your budget so you definitely want to justify as much as possible.

Okay. We kind of gave a quick overview of the R01. I want to go into in a little bit more depth at this point, and the reason I'm looking at the R01 is because it is the original grant funding mechanism for NIH and all of their other funding mechanisms, in one way or another, build on the R01, so if you get comfortable with the R01, you're going to be able to take that knowledge and apply that any of the other funding mechanisms that you might apply to at some point.

So again, that list of mandatory documents, which we've just gone over, I've highlighted research strategy, because I do want to talk about that in more depth. These are the optional documents that really aren't

necessarily optional. And then you get into the research strategy. The research plan used to be limited to 25 pages. And some people just loved this because they can go into tremendous detail when they were writing their applications. Reviewers on the other hand, because frustrated with it, because they're very busy people, they have limited amount of time to be able to review all of these applications, they're doing that on a volunteer effort on top of their own research and teaching and service activities, and one of the other things that NIH reviewers were beginning to notice is that the research plans were becoming bogged down with experimental details rather than telling an overall story of what the research you're doing is going to allow us to do in the future if it is successful. What will be the ultimate impact? Will your research be a critical step in being able to identify something that will ultimately lead to the cure or treatment of a disease? Is it a component of an intervention? Those are the kinds of things that they're more interested in, the overall significance, and also the impact of your proposal. And so what they've done is they have radically shortened the length of the research plan from 25 pages to 12. And what a lot of people have tried to do is take their old 25 page applications and then just cut them down to 12 pages. I would strongly recommend against that approach because what happens is you end up cutting and pasting a lot and a lot of the information is lost in the process. And the flow the proposal becomes a little bit rough, and so things that it would have been easy to

follow in your 25 page research plan, are suddenly not as clear in your 12 page research plan. So I would recommend that you just start from scratch. Open up a new word document on your computer and start with a brand new application. I think then, when you have those page limitations in mind, as you write, you sort of edit yourself in terms, 'oh, I can't spend too much on this section because I know I still have all these other sections I have to allow room for also.'

The research strategy is made up of 3 specific sections. One is the introduction, one is the specific aims, and the third and most critical probably, is the research strategy. The research strategy itself is made up of another 3 components: the significance, the innovation, and the approach. Now the introduction is fortunately only used if you are resubmitting or submitting for a renewal application. If you're submitting a brand new R01 application, you do not have to include that component. If you are submitting a, if you're working with a resubmission or renewal application, you would have to have a introduction, and what you would do in that introduction is address the set of reviewers comments so that you can indicate to the agency, "yes, I heard what you have to say about my application, I've thought about it carefully, and I have revised my research program accordingly." The other thing that that's really nice for, if you are resubmitting your application, is that it allows you to sort of build an institutional memory for your proposal. Most times, if you submit a proposal to an agency and it's not funded, you'll resubmit, but you won't have to address previous review comments, and so it's sort of like you've done all of this work, and you might get, have that proposal declined again, where if they saw that you had answered all of those question, if you were right on the border, they would probably be more likely to go ahead and fund you. So those are some things to keep in mind.

The Specific Aims is limited to a single page. It used to be you could have this go on for even 2 pages, now it's strictly one page. It is considered by far the most, the single most important page in your entire proposal, and the reason for that is that it's the one page in your proposal that everyone on your NIH study section will have an opportunity to read. Keep in mind that your reviewers are all going to be assigned, they may have let's say 300 applications that come in for a R01, and there's no way that they can all look at 300 applications and provide any coherent evaluations for them. So what NIH does is divide and conquer, and they'll give 10-15 applications to one person, 10-15 more to someone else, and so forth. The primary reviewer for each application and the secondary reviewer for the application will read your application very, very carefully and they will provide, you hope, very good comments on it. The other people who are on that study section, and there maybe 20 other people on the study section have their own stack of 10 or 15 applications to review, so they're probably not going to take on more applications than what they already got. What they would be willing to do is read a one quick page, a one summary page of the application and that way, when they're sitting in their study section reviews and everyone's around a big table, and they're going through the proposals, through all of these proposals, if the primary and secondary reviewer advocate on behalf of, or not for a particular application's funding, they can have said, "well, you know, I haven't read

the whole proposal, but I have read that one pager, and based on it, I tend to agree with the reviewer that says we should fund rather than the one that says we should decline funding." So it's a critically important part of the proposal. A lot of times say that reviewers essentially look at this page and make the decision on whether to fund or not just from this one page, so no pressure or anything. So it is very important. When you're writing this, keep in mind that this needs to be a stand alone document because, again, they might not be able to read the rest of your proposal, it has to be very clearly written, and it also needs to generate some enthusiasm for your project. So you want to go beyond simply what your project is going to do and find some way to express some enthusiasm and energy when you're discussing your project. The best way to simply do this, of course, is to talk about the ultimate impact of your project and the benefits that it might have to a larger group of people.

There are a number of ways that you can write the Specific Aims section. Because this is such a critical section of the proposal, I've provided you with what could be considered a template for this section and it's just a basic 5 paragraph format.

In that very first paragraph, and this is a very economical approach that you take covers everything that they need to know but covers each item in about 1-2 sentences. So you have to be, I've worked with people before and they spend 6 weeks just on this one item. Now, they're working on other things while they're doing that, but they're just continually revising and revising this section. So paragraph 1, as you would expect, is an introductory paragraph. You want to introduce the project, educate the reviewer, tell them what do we know about this project so far or about this topic or research area so far and then explain what do we not know about this research area, what's the gap in the knowledge and why is that gap creating a problem.

In the second paragraph, you're going to show that you're going to actually address that problem. So you would state your overall goal for the project, explain your rationale, your reasoning for actually conducting the project, and you would then present a central hypothesis, if you can. Sometimes, the individual aims for your project will be so different that it would be very, very difficult to have a central hypothesis that really covers all 3 or 4 of your aims. If that's the case, you can simply include the hypothesis of each individual aim, when you're discussing those aims.

The third paragraph is your chance to say, "okay there's been a problem, I'm telling you that I have a solution for it, and now I'm going to tell you about qualifications and the research environment where I work so that you will be convinced that I'm the person for this job and also that I have everything that I need to actually complete this project." You've got the lab space, you have the equipment and instrumentation or access to it, you might have postdocs of graduate students who can assist you with research. Any of those things would be helpful to mention here.

Another thing that people, and I'll say a couple of things about each of these items, qualifications is a very difficult thing to write because you're walking a very fine line between being overly humble so that your reviewers end up not really getting a full sense of what you can do or sounding almost arrogant, which you don't want to do because obviously that's a turn off. So what I would recommend is that you write your qualifications section and give it to a friend and have them read through it and just tell them you need really frank comments in terms of do they feel like you're hitting the mark on what is needed here. I was working with some faculty members who were in a workshop once, and fortunately, one of the people in the workshop was very familiar with another person's work and when we were reading the qualifications sections for this person, it was very short, and this other person piped up and said, 'why haven't u talked about your you know x number of patens that you've gotten for this?" and he has just not mentioned them. That's a big thing to mention. So it's a way to make sure that you're getting everything in that really needs to be in.

And the research environment, you can really go beyond saying, just talking about your lab and equipment and instrumentation, and you can think of this in a much broader way. So think about the intellectual environment that you're working in. Are you at an institution where there are a number of people who are working in your area where you get to meet on a fairly regular basis or you can talk to quite often to find out, you know, get feedback on your ideas, and give them feedback on their ideas? Those are, is there are a consortium that you belong to? Is there a some kind of review group where you read each other's publications or grant proposals? Those are things that you can mention as well, if you

have a real rich, robust, intellectual environment. And I think anyone here within the Texas Medical Center is definitely going to have that. The research environment can also refer to your access to human subjects, so let's say if you are working on a proposal and you're wanting to have access to people who have a particular type of cancer because that's what you're going to be conducting your research on. This would obviously be an area, a city, where you would be able to find that population. Also, just the fact you live in the fourth largest city in the country is going to ensure that you're going to have a subject pool that will allow you to recruit the people that you need for your research, and in the numbers that you need. So those are things that you can mention as well. Yes?

(Question)

I understand what you're saying because there is so much that you're trying to include in the specific aims. Yes, there is. And I would really encourage you to try to include a discussion of your qualifications and research environment in both places. It maybe that all you can do in the Specific Aims section is provide a sentence, maybe two short sentences on that, but what you're trying to do is not simply rehash what's already in your biographical sketch or what's going to appear in your proposal proper. What you're trying to do is provide the context in which the reviewers can look at your particular skills. So, you know, if you just look at a list of publications that tells you one thing, but if someone comes in and tells you their general area of expertise that suddenly makes those publications make sense. So that's the type of thing that you would be including there. Basically, you're priming the reviewer to look for more information in your proposal and in the biographical sketch. And to look at it in the way that you want them to look at it.

Okay. The fourth and fifth paragraph of the Specific Aims, in the fourth paragraph what you will actually do is simply list your specific aims. I recommend you list them in numbered or bulleted form, and that you just have a simple sentence for each one of them. So, some of your aims might be that you're wanting to test a certain hypothesis, create a novel design, solve a specific problem, and so forth. Be sure when you're writing your specific aims that you focus really more on, I guess you can say the content of what it is you're going to do, rather than the method that you're going to do, to use. A lot of times people will say that they're going to compare two different things and that's their specific aim. And really, that's not an aim. That is a methodology. That's an approach for how they're going to solve a problem. So what you want to ask yourself is, 'okay, I'm going to compare these two items, but why am I comparing them? What's the information that I hope to glean from this?' And whatever that information is, whatever your response is, that is what your specific aim is, and then you can, of course, complete your aim by saying, "I will do this, by comparing these two groups, or these two data points, data sets, or what have you." Does that make sense? One other thing to be very careful of when you're writing specific aims is you want to make sure that every aim is independent. So in other words, what reviewers, when reviewers are going to give you millions of tax payer dollars, they want to make sure that you're going to be able to complete your projects successfully. And so one of the things that they'll look for is to make sure that every part of your project can be completed. If they see that you have to complete your first aim successfully before you can ever move on to your second aim, they're probably going to either decline funding or seriously take off points because what their concern would be is, well if you can't complete your first aim, the rest of your project just comes down like a house of cards. Everything sort of collapses in on itself. So what you want to do is make sure what you craft your aims in a way that, if you think of a bicycle wheel and think of your aim as the spokes on a wheel, they're all going to the same central point that you're trying to make in your research, but they're not dependent one on the other. So that's the probably most critical thing you want to think of.

And then the final paragraph, you can think of this as the payoff paragraph. This is your chance to emphasize to the reviewers what the innovation and the significance of your project are. Remember innovation and significance are two of NIH's review criteria. So you want to actually use the words "innovation" and "significance" in your specific aims and in your proposal. Don't just assume that you can describe the significance or innovation and reviewers will immediately recognize that it is such. Remember they're reading very quickly, often times very late at night, and so you really want to say "This project is innovative because..." and then describe the innovation. Or "This project is significant because..." and then explain the significance. I also mention impact because as you know, NIH has gone to a slightly different review formula and they have 5 review criteria, but then they also have this criteria called 'impact' and it's not a

specific review criteria. It's sort of the holistic view of your entire proposal. If, however, your significance and your approach sections are weak, then chances are going to be fairly high that your overall impact score will be somewhat lower as well. One of the best predictors for success and for high reviews is the approach section. So if you get really high marks on your approach section, especially if you've also got them on the significance section, then chances are good you're going to have a very high impact score as well.

(Question)

Exactly. And they, what NIH is trying to do is make a different, make a distinction between significance and impact. So significance is saying why a project is important. It's going to help advance your field or something like that. Impact is saying why your research, what specific effect your research is going to have both short term, and long term. So it's, significance is more of the short term view, and you can think of impact as the higher level long term view of your research. Does that make sense?

(Question)

Oh, because when your application is scored, they're going to look at the 5 review criteria. One is for innovation, one for significance, one for approach, one for qualifications, and one for research resources or research environment. And they will give you a score for each one of those review criteria. But then they will also give you what's called an impact score that's completely separate from those. So it's essentially them saying, "well, this is my overall impression of your proposal" so in other words, they're not going to add up the score you get on your 5 review criteria and say, "this equals your impact score." Those 5 things aren't directly tied to your impact score at all. Obviously, the higher they are, the better the reviewers felt the proposal was, so the impact score is likely going to be higher. But it's not a given. There could be times that you might have really addressed something in your proposal and it could be technically correct and everything, but for some reason reviewers just aren't enthusiastic about the proposal, it just doesn't grab them, and in that instance, you might have high scores for your review criteria, but an impact score that's somewhat lower. And those are the ones that are really hard to take, so.

(Question)

Right, it's going, it's kind of strange. The priority score is a formulation that includes your review criteria as well, think it also folds the impact score in. I'm not positive about that, I'd have to double check. And then, what will happen of course is that if your priority score is above a certain level, it might be every institution within NIH sets it a different way. Some institutions will say if your application has a priority score that's in the top 10% of applications received, you'll get funding. Or if it's in the top 40% of the applications that we receive, we will forward your application to the full study section review. And then

you'll get not only individual reviewer comments, but also a summary comment of exactly what was said in the room when they were reviewing your application. I'll have to look into that. If you

(Question)

Right, you have the score. And one of the things.

(I think the advisory panel has to say after... you'll have your score that your...And they'll publish their, other institutions don't publish their. It's been a little confusing)

(So all the people in your study section who don't have conflicts of interest will score it, and that will go into the priority score that impacts whether or not you receive the grant. The three people who sign your reviewer application will give you scores based on the significance and innovation and all of that stuff, okay.)

(I get my comments back, and I know what they gave me, but I don't know)

And I think, also, just to build on what you're saying. People have been asking, it used to be with the old scoring system; everybody had a pretty good idea of what kind of priority score would put you in the "fundable" range. Now that they've moved to the new scoring system, I think that there really just now starting to get a sense of that for each of the institutes. I don't know if that's sort of take on it or not, but right.

Right, right, so I think it's something that it's worth going into the NIH webpage. And you can eventually drill down to a portion of it where they give the award data, and they'll talk about how many applications they received, how many were funded, how many were declined and so forth. And you can start to get some of that average scores as well. And if you look at, you can look at that at an institute by institute basis. And that could allow you to start to get an idea of how close was your proposal to be funded. Sometimes it's

very, very close and they just run out of funds. I've worked with someone a while back and this was a while back and this was at Texas A&M and they had applied to UDSA and they were actually recommended, they got excellents all across their scores, they were recommended for funding, were to be funded, and they went down the line and they funded the first 3 people who were recommended for funding, and they just didn't have any more money. And this particular faculty member was the next one in line, and he should have been funded, but they just didn't have it. So what they told him was to reapply for the next grant cycle, which is what he did, and he was funded then. He was sort of top of the list and those kinds of things end up happening. I don't think as much with NIH as with some of the less well funded agencies like USDA, but there are those kinds of things that, where some of those top slots are taken if you want to put it that way. So

(Question)

Okay, so research strategy section as we mentioned is now limited to 12 pages. This is considered the heart of the proposal and people always have questions about how many pages should I devote to the three parts of the research strategy. This is a pretty good break down, significance I would give about 1-2 pages, innovation 2-2.5 pages, and your approach where you're really talking about the nitty gritty details of your experiments, that would be 4-6 pages. One of the, one big piece of information that's not included in one of the 3 sections is preliminary studies. You can now discuss preliminary studies in any number of ways. You can discuss it right up front and then move into the description of your proposed

research. You can discuss preliminary studies as they come up, so in your approach section when you discuss aim 1, if you have preliminary studies that support aim 1 you could mention them there, or you could hold off and discuss your preliminary studies at the end. What you have to do is just look at your particular proposal and select the one that you think is going to work the best for you. That would be best for your application. And I would give that about 3 pages.

If you're a new or junior investigator and you just don't have that many, let's say that in your preliminary studies you don't have a lot of publications yet, they're going to understand that, so don't feel like "I've seen my mentor's list of publications and it goes on for 50 pages and mine is 1 page and how are reviewers going to look at that?" They're going to be very aware of where you are in your career and they'll gauge your publication rate or publication numbers accordingly.

There's a couple of different ways that you can organize the research strategy. I personally prefer the approach on the left, to me, that's just more how I think where I would want to know right up front what the three aims are, and then for each aim, I would be interested in finding out the significance, the innovation, and the approach and then I would just repeat that exact same format for aim 2, aim 3, however many aims you have. There is another way to divide this up though, and that is to talk about it in terms of significance, innovation, and approach. And in that instance, you would say the significance for Aim 1, aim 2, aim 3. Then you would talk about the innovation for aim 1, aim 2, aim 3, and so forth. And again, this really depends on your particular proposal. It could be that you're working on something where the significance for all 3 aims really melds together well, and in that instance, discussing significance and innovation and approach separately might be the way to go. I think for most people, the approach on the left is probably going to be the optimal one.

We have, I want to give you a break here. I have some information here and this is very straight forward information on, that is straight from the R01 solicitation and so I think I'm just going to mention a couple of key points. On the significance, for instance, one of the things that you want to do is drive, oops, describe how the concepts, methods, technologies, treatments, services, or preventive interventions that drive this field, field your working in, that will be changed if your proposed aims are achieved. That is ultimately what significance comes down to. Innovation, is very similar. There's a lot of different bullet points that they have, but essentially, what you're doing is that you are, let's see which one is it, if you're describing any, I keep hitting the wrong button, sorry, a lot I guess, describing any novel theoretical concepts, approaches, methodologies, instrumentation, or interventions to be developed or used and any advantage over existing methodology, instrumentation, and interventions. I think when some people think about innovation, they think that they have to come up with an idea that's totally brand new that no one on the planet has ever thought of before, that's really not the case. What you may do is come up with an idea that has been floating

around for a long time, but maybe you have identified a new approach, a new methodology that can be used that's more efficient, or that's more accurate or that can be better utilized in data sets or what have you. That is still an innovation. It may not be the, sort of, game changing innovation that really changes how we think about a particular field, but it still is an innovation. So what you want to do when you're looking at your proposal is ask yourself, what is it that I'm doing that's different in some way than something that's already been done? And why is my way of doing this better in some, this regard. And you can do that for any of these items that's listed.

The approach section is probably the heart. Well, it is the heart of your research strategy, this is still remember, part of that 12 pages that you're writing and basically what you're trying to do here is, provide the details of all of the aims that you're going to be completing. This would mean some

experimental details as well. So key things to keep in mind: I've done it again would be to explain how the data would be collected, analyzed, interpreted, as well as any other resource sharing plans since NIH is a publicly funded agency, any of the data that you can collect ultimately needs to be made available to other researchers. This is to ultimately save the taxpayers money from having every person have to recreate or redo experiments.

One of the things that might be counter intuitive, but is very important is discussing potential problems. You might say, 'well Phyllis, why on earth would I want to point out the problems of my research project?" You want to do that because your reviewers are going to spot them anyway. And so if you, if you know that there's a particular part of your, let's say experiment, where things might work, but they might not work, you want to just address that right up front in your application. Acknowledge it to your reviewers and say, "I think this is going to work and here's why and here's your evidence", maybe some preliminary studies. But then you want to reassure your reviewers that if that approach doesn't work, you have alternative methods that you can use to get the same information. It might be slower or a little bit more cumbersome, but you can still get that information. And so those are some things that you would want to include as well.

If you are just starting on a brand new research project and you don't have preliminary studies, it's very important to go ahead and establish feasibility so that you reduce this sense of risk that your reviewers might see when they're reading through your proposal. And then, this is not part of the research strategy proper, well it is part of the research strategy, but it's not one of the three items that's specifically required to be there, you just want it to be there and that's preliminary studies. And there's a number of ways that you can present this. One of the things that I would strongly recommend, people always ask, 'well, how much preliminary data should I show?' If you have conducted some preliminary studies, and the studies have already been published, the results have been published, all you have to do is provide a quick summary of the results and provide a citation so that reviewers can go and actually read the entire article if they wanted to. If you have not, if you've conducted preliminary studies, but you have not yet published them, there is more of a burden on you to describe what those preliminary results were and in that instance, you would have to allow more space in your actual preliminary studies section. Whenever possible, if you do have citations that are related to the proposal that you're submitting, be sure and include those citations, because it goes just that much more toward your credibility as a researcher.

And then one thing that's especially important with preliminary studies, a lot of times it's clear, it's very clear in your minds how your preliminary studies related to your proposed research project. It may not be remotely clear to your reviewers, so you want to make an explicit statement of what part of your preliminary studies is actually linked to the proposed project. And sometimes it will be that, you're going to use the data from the preliminary studies in your proposed project. Sometimes you're going to be using a methodology that you developed in your preliminary studies on a completely different topic, but that methodology is going to be used again in your proposed study, so you want to make it explicitly clear how they're connected.

14.1.3 Part 3: K99 Pathway to Independence

Okay, we'll go ahead and get started.

Talking now about the K99/R00 parent announcement, which is for the Pathway to Independence. This is... How many of you are grad students? How many are post-docs? If you are a graduate student, it's not too early to start thinking about this kind of application. If you're a post-doc, this is something that

you very definitely want to think about because this particular program is only available to you up to 5 years out. So if you have more than 5 years into your postdoc, you wouldn't be eligible. But anytime up to that, you could. And so this is something, a fantastic award. It's very competitive, but if you get one, it not only provides good funding, but it helps to make you more competitive on the job market as well.

The reason it has this split number, the K obviously represents, refers to the training component, the fellowship component. And the R refers to the research component of the project. This is really a true melded two part proposal. This is what the actual parent announcement looks like. You would access this just the exact same way you would access the parent announcement for the R01 award that we talked about earlier.

The purpose of the Pathway to Independence Award is essentially to facilitate a very tiny transition from the postdoc stage to the Assistant Professor or Independent Scientist stage. I think some of you are probably familiar with the National Academies of Science Report that came out. They continue to update the numbers for it, but the age at which people are getting their first R01 award, which is considered the award that indicates you have independent status, that you're an independent researcher has been steadily climbing over the years. And so, the agencies, all the federal agencies have been trying to incorporate some tactics that would allow people to start getting those R01s at a much younger age because of course if you're, if it takes too long to get one, it hurts your chances for tenure and things like that, and so they really want to try to work with you. And that's why they have programs like this, it's also why now they give you an opportunity to check if you're a new investigator because that can sometimes help give you that extra little nudge that's needed to put you in the fundable range. So take advantage of all of these kinds of things, cause they are very, very helpful.

There are two phases to the Pathway to Independence Award. The first phase is the mentored phase. The mentor support phase. It lasts 2 years. And you can, during this phase, you have to name a, as you would expect, a mentor, typically, it would be a mentor at the institution where you are currently located. You can also have more than one mentor so if there is someone else that is just a fantastic scientist that you've always wanted to work with, or if you're hoping to go to a particular institution, you might try to see if you could get someone from another institution to be a mentor as well. But you want your primary mentor, in most cases, to be at your home institution, just for logistics purposes. The thing that's really nice about this is not only can you get up to $90,000 a year, but also, you get time. That's the big thing that this gives you. So instead of having to teach a lot of classes or run a lot of labs, you get 75% of your time guaranteed for research activities. Now the other 25% of the time, you might still be teaching or overseeing a lab, what have you, maybe some clinical work, but you don't have to. The only thing that's critical is that your institution guarantee that you will have 75% of your time devoted to pure research. And that really helps you get the publications that you need, that help indicate that you're an independent scientist, and that will help you when you're then out on the job market.

What will happen then, is after phase one. After you've had this two years of mentored support, you then, there is a possibility, though it's not guaranteed, that you would move onto to the independent scientist stage. Typically, here, you would be moving to another institution though you might be staying at the same institution, that is a possibility. In this instance, the amount of funds that you get goes up considerably, up to $249,000 a year. Again, you get 75% of your time devoted to research, 25% to other things. The reason this is so nice, and the reason these are so competitive is that, as a postdoc you get one of these, and you have your two years of mentored support, and during that time begin looking for a full time assistant professor position, if you're able to tell prospective employers, 'hey, I'm going to be bringing 3 years of support with me", 3 times $249,000 is a pretty good chunk of change, that's going to

make you a very attractive candidate. Not that many people arrive at their first job with funding already in hand, and if you can show that you can do that, that really does increase your chances for employment. Yes?

(Question – Well, the next thing, I only know this because my lab mate, they have to still give you the competitive package that every other institution gives to the people applying who don't get this grant...)

Right, right, so it's a very sweet deal.

(Question – So, for the mentor support; let's say as part of my proposal, I want to buy a piece of

equipment that's $100,000)

It has to be under $25,000, I think, if you want to keep it. Otherwise, the institution gets it. Right.

Yeah, it depends. There are some, usually, there's two different levels for equipment. It varies from agency to agency and application to application. I believe for this one it's $5,000, normally it's $1,000. Anything that costs - is it 5? I think it's 5,000 – anything over 5,000 is considered equipment so a lot of the times people try to put a new computer in the equipment budget section of their, their budget section, and really, you can get a computer for under $5,000 so that would actually go into your materials and supplies if you were going to purchase a computer. Now if for some reason, you had to purchase a really heavy duty computer, and I know of a faculty member who is an archaeologist, who had to do that, who had to survive sort of, the rough and tumble of a field experience. In that instance, his computer did cost over $5,000 and it was listed in the equipment category of the budget. So

(So, let's say that my equipment costs $75,000, now, total allowed cost is $90,000, let's say I buy my equipment now I move, can I take it?)

There is, probably, there is a chance. You can always ask. You can try to make that part of a negotiation, and generally speaking though when I get into equipment that that's expensive and requires that much maintenance and support from the institution, they're going to want to keep that equipment. Because usually for really expensive equipment, what they try to do is get more than one person to be able to use that particular instrument because it would simply be, it wouldn't be feasible to provide a $75,000 instrument for every single person who needed it. So you have to share the equipment. There is though, this does come when you're in the, actually in both stages, you have a budget for research expenses and I think it's up to $25,000 if I'm remembering correctly. And, that is for literature support, and I don't, I can't remember off the top of my head what it is, but the independent scientist phase, but you would have funds available to purchase equipment. If you're trying to purchase a very large or expensive piece of equipment, I would recommend that you actually look for equipment that you can bring because there are such things. For instance, with national science foundation, they have the major research instrumentation. NIH has the SEEPA grants, so there are ways that you can do that. Generally though, you don't apply for a piece of equipment on your own. You have an entire group of people who would use that equipment applying together and usually you want a very large group so that they realize that you're going to get the biggest bank for the buck out of the instrument.

(So these two steps ....)

This is actually one application that has two parts. Exactly. That's a very good question, you do have to, when you submit this application, you will submit one application, you will have your 2 years. It's not

guaranteed that you'll get the next 3 years, but it's a pretty sure thing if you've done the work and you've submitted reports and all that. So right before the independent scientist phase starts, you do submit some more information. It's not like you're creating a new proposal though. Essentially what you're doing is providing them with an update on what you have accomplished during the mentored support phase so that they realize that 'okay, this is a person who's going to make good use of this money and who's really going to be able to accomplish some things, and therefore, we want to go ahead and fund her for the remaining 3 years.' So it's a much simpler process to get the last 3 years of support than it is to start off.

If you get the mentor support, you're good. So.

To be eligible you have to have a research or a clinical doctorate and it has to be in hand at the time that the award would actually begin. You can't more than 5 years of postdoc research training. You can't have a tenure track assistant position or an equivalent research position. And US citizenship or permanent residency is not required, so this is open to everyone. One of the things that is very interesting about the Pathway to Independence Award is that the qualifications of your mentor are just as important as your own qualifications. This is when you're probably going to, if you have been working with someone who's got a big name in the field, that would probably be a great person to put down as a mentor. If, if that is someone that you really want to work with, and that's going to be a critical factor as well. And someone that you feel would really provide you with good training opportunities, so that you could expand your skills and then be even better ready for independent, to be an independent scientist.

(I was reading the program, and it said that one of the qualifications for the mentor is that he should

have a demonstrated record of ... if that is not true with our mentor, how would you?)

Exactly. I would, I would think about having, if I really wanted that person as my mentor, I would think of having that person as a secondary mentor and try to find someone who does have a very, someone who's more senior who has very well established record of having their students, and their students get positions as assistant professors.

(Can we choose that person as a co-mentor; the one that's more established as a co-mentor?)

Yes, you can.

(Then what kind of letter you would want from a co-mentor? What kind of paperwork?)

They would want to see, what you would want to see is have both of your co-mentors write letters of reference that explain specifically what their role will be as your mentor. So it may be that one co-mentor is going to really focus on helping you with your research and this is very over simplistic, and one is going to help you with the training portion of it, where you're learning some new skills. They would outline that in great detail in their letters, each one of them. And that way when your reviewers are reading through all your letters, they get sort of a complete package of I see that you're going to have a very well-rounded experience through this grant. Does that make sense? The other thing is that, and this is an important point, your mentor also has to have a good track record of success, they should have some grants funded, these grants need to be federal grants. If they have NIH grants funded that would be even better. It used to be a requirement that they have NIH funding, though it's not specifically stated in the program announcements anymore, I would definitely look for people who have NIH funding.

So you're probably looking at faculty members who are at the Associate to Full Professor range to be your mentor. If they're at the assistant professor rank, they probably haven't had time, frankly, to have mentored that many people or to have built that much of a track record for their grants. Questions?

(Question – What's the average after the submission closing to you hearing a decision? Is it a year? Or 3 years?)

Forever and ever. It takes a long time. And it varies from agency to agency and program to program. Usually it's at least 3 months minimum, probably more like 6 months. And I have seen some agencies that take 9 months. NIH has been getting much better, so I would say you would hear something within 3-6 months, and again, it would probably be closer to 3 because they're really trying to expedite their review process. That's why they've shortened so many of their reviews.

(So, I guess, it looks like these deadlines. So let's say you submit, you hear back 3 months later, it's probably too quick of a turn around time to hit the next deadline, right?)

It might, well, that's actually one of the things that their trying to do, is get reviews back to people fast enough and decisions back to people fast enough that if they want to immediately incorporate those recommendations from the reviewers and reapply, they'll be able to do that by the very next grant cycle. And that means that they would usually have to, have to get it back to you within 3 months. Since there's about 4 months between each grant cycle. One thing that you could do is plan for an earlier grant cycle than you anticipate or that you would really want and then if you receive funding, you can negotiate with them. Let's say you need to finish out a post doc or something, you can negotiate with them to move the start date for the project up. Or, if you had the good fortune of getting funded on the first attempt, you can go ahead and start the project if you're staying at the same institution, and they would just start paying the cost instead of it coming out of say your advisor's budget or something like that, if that makes sense.

(So, for the mentor, are they expected to write in their letters how many postdocs they have mentored?)

No, they don't have to do that, they don't have to say that explicitly, but I think they will actually include a biographical sketch in the proposal just like you will and it is generally going to be clear, just from their publication record and from their grant support whether or not they have mentored a number of students. If someone has a lot of grant support it's almost a given that they're going to have a lot of students working in their labs so that's one thing. It could that your mentor might say something to the effect of "I have mentored X amount of students over the years and this particular student is one of the top 3." They might make a statement like that, which suggests how many they've mentored, but it's not a requirement that they include that.

In the Pathway to Independence Award, as you'll see, all of these documents look very, very similar.

They are exactly the same kind of documents that you would need for the R01 project research grant, or research project grant except for the last very one on the list. And that is the "Career Development Award Supplement Form." This contains a, quite a bit of information, as you can see, this is what the form looks like, it's actually 2 pages, but the first page has you provide information, an introduction to the application, there's then a very large section that's focused on candidate information. And let me look, I can give you page numbers for this as well. So you have a total of 12 pages to discuss all of the

candidate information. In with that will be the candidate background, I have this written out so you can see it more clearly. The candidate's background, your career goals and objectives, the career development and training activities, so will you be attending formal classes? Will you be attending informal seminars? Will you be getting one-on-one training with someone? What kinds of training and development work will you be getting? And also your research strategy. You will work with your mentor on all of these sections, but especially on the Career Development and Training Activities, and the Research Strategy, because it's really going to be you talking with your mentor and saying, 'you know, I really want to get more expertise in this area,' and your mentor would then help establish a training program for you that helped you grow in that area. Similarly, if you're writing the Research Strategy, you want someone who's very senior, like your mentor would be, to review that research strategy or perhaps even help you write that Research Strategy so that it's as competitive as possible. What you're aiming for in your Research Strategy is to indicate to reviewers that you have what it takes to become an independent scientist, and that's why you would want to work with, ironically, why you would want to work with someone, a mentor, is to make sure that you've got your project set up so that once you're done not only with the mentored phase, but also the research scientist phase, you can truly branch out on your own and begin doing research without having to have input from a mentor or from other people. You will always have input from other people because that's just what's required when research is as complicated as it is now, and as interdisciplinary as it is. But in theory, you wouldn't have to have that.

You also, the training and responsible conduct of research is a very critical issue. I know that at Rice the program is through, it's the CITI program, C I T I, and there's a number of different modules that are available on this topic that people can take and it provides a score and once you pass you're good to go. So you would just describe what those modules would be, that's one page. The mentoring plan is written primarily by the mentor and it's 6 pages long, obviously there will be input. You would have statements of support from the mentors, this would be the letters, and so you would just want to make sure that all of the letters combined weren't over 6 pages so that you could fit all of those in. And then you also want to show how your institution is committed to you as a candidate. One of the key things that this means for the mentored phase of this award is that they will guarantee that you will have 75% of your time free to conduct research, that they're not going to try to drop classes on top of you or labs on top of you, things like that and still expect you to do all of this research. So you would get a letter of commitment, typically from your department chair. Yes?

(Question... and so you don't have offer from Assistant Professor yet, okay? So in a medical school setting, you'd be at the instructor level if you're... so in this 2 year gap that's when you would actually...)

Exactly, that's when you would start the interview process.

(So you would be very unlikely ... your responsibilities besides doing research.)

Probably, it just depends on whether or not, if you're clinical or research. There's sometimes a variant in that. I will mention, now that you've brought it up, the idea that the clinical research. One of the things that they point out in the solicitations, is that if you're going to do clinical work and you're applying for one of these, be sure, you should always contact your program manager, that be sure to do that if you're conducting clinical research, because it'll make sure, they'll make sure there's a few things that have to be set up in special ways, and they'll make sure that you have everything set up properly for your application, and they'll make sure that you'll still qualify for it.

(Yeah, I talked to... and she was actually very discouraging...)

It's primarily offered for people who are more in research Ph.Ds, who are more pure research rather than clinical research, but that's why you want to talk to the program manager because they might be able to let you know, 'okay, the project that you have, even though it's clinical, you're doing clinical research, it fits

in so beautifully with other things in our grant portfolio, that I would encourage you to apply for this.' On the other hand, they might be discouraging and say, 'you know what, this is probably not the best award for you.' Don't get that discourage you though, because NIH also has other career development awards that are designed specifically for people who are in clinical research. Others can't apply to them, it's just clinical, and they have those at all stages of career development so I would recommend that you look through some of those, and that you might have a better shot, it sounds like if this is the particular organization that you're going to be targeting, and they're being a little discouraging. I would probably say, go ahead and look for another funding application, but I would talk to them about it first because you never know and you want to have as many opportunities as you can.

(I have a question, how ... is it to have a prior institution)

Correct. In NSF you typically have to have either permanent residency or US citizenship. And that is going to be true on most of the awards that are for fellowships or for training opportunities because what the United States is trying to do is develop some of its own researchers who will stay here and really help build up our sciences because often times we're really lacking in the sciences. And so, in terms of having had a NIH, a NSF support before you apply for this NIH award, that's not necessary. At all. So you don't have to have any other kind of research.

(So that transition is not necessary, and it's not going raise ...)

Right, that will be something that's factored into the way they review the applications and a lot of it will depend on what people have made of the NSF fellowship. Some people are very productive and they've gotten a lot of publications from it, some people have sort of done the minimal and they really haven't gotten that much out of it. And if they haven't done that much, that might, having had it and not done, having done as much with it, might actually count more against them than if you had never had it at all and you had managed to still be productive so yes, you don't, you're not required to have any prior funding at all when you apply for this. Obviously, if you have, that's great and even if it's internal funding or from other agencies or private foundations or corporations, I would list it all, but you don't have to have a big federal award before you apply for this.

(I have a question. What's the difference like, how much do you differentiate between mentoring, career development and training activities and also statement of support from mentors?)

Okay, one is actually in the candidate information section. That is actually a section of the proposal itself. When you're getting into the mentoring plan, what you're going to do is, that's separate from this candidate information section so you're able to go into much more detail about exactly what's going to be included in the mentoring. You won't be able to talk about it too much in the candidate information plan because you're going to devote the majority of that plan to your research strategy.

(So statement of support from mentors)

Those are letters.

(So...)

Yes.

14.1.4 Part 4: K99 Continued and Tips for Success

(You're writing a proposal and you do not have..)

You want to try not to, so you want, one of the reasons you want to start early on this type of application is one, is because it's complex, and two, that you want to make sure that when you write your candidate information and your mentoring plan, you can write it in a way that it is somewhat, that it reinforces what's said in the letter and the letter reinforces it. But that, they're not worded identically. They might emphasize, they should support one another as you go through.

(So, the mentoring plan, do we write them?)

Really, on all of these, you're going to work with your mentor. There will be some sections that you alone will write, some sections that only your mentor will write, but really to be develop a good mentoring and research plan, you're going to have to work with your mentor to develop the kind of training that you want because you should have an input into that, and obviously, they should too. And same thing goes with the research, so you'll really be working really closely. That's one thing, it's actually kind of good through

this proposal, if for nothing else, is an experience in working collaboratively with other scientist because this really sort of fosters or even forces that kind of relationship. Yes?

(Question)

It could be, I would probably, if they offer 2 years, I would take the two years though, especially if I knew that I was going to get the 3 years following because you know, if they're going to provide that funding and your institution won't have to provide it, your institution is probably going to want you to try to take that. There will be, I'm sure, exceptions when you could make arrangements with the agency and with your institution to only take a year of it. Are you thinking because, are you in your last year as a post doc or?

(2 year post doc...)

Exactly, and I certainly understand why you would to be started at your next position, which is exactly what this is set up to do. This could be a situation though, where you would talk to a program manager and explain your situation and say, you know, would it be possible to do this, or would this require that I have a second year of the post-doc? I'm guessing that they'll going to either require or encourage you to take that second year because the whole point of the mentored phase is to get you new skills, and so if you suddenly said, well, I'm just going to get one year of that instead of 2 years of that, they may say, we're making a really big investment, and you're not getting as much out of it as you could if you had the full two years. That, that is my guess, but I'm not positive about that.

(Let's say that there's a proposal where you stated that... in your mentored phase.. would last for 2 years, but by the time you get the funding one year has already passed and now you have one year.)

You will actually very likely have aims that are focused on mentoring and training activities. And aims that are focused specifically on research activities. Because this is a proposal that requires that you do both, so the majority of your aims might be focused on research because that's ultimately what you're working for, but at least one of your aims will be focused on training.

(Let's say that we have accomplished our aims in total of 2 years.... Mentored funded by ... but a third year is not really used, but we have still accomplished everything that we had said in our grant that we would do in two years... can we ...)

And move onto the next phase? This is one of the reasons it's critically important that you work with your mentor to design your research strategy and your research program because you want to craft one that's going to carry you through the entire project period. And that skill, given in and of itself, is trying to come up with something that's not going to be more than 5 years ultimately, but also not too short that you're not getting the full benefit of the proposal, so I would say that's something that you want to work with your mentor, and do your best to try to get the full 5 years.

(Question – You would take a much longer time than ... you'll finish this before time or)

Exactly.

(More inaudible question)

Right, so don't look at this application as the in terms of they're just interested in the research project, they're not so interested in the career development. They're really interested in the career development portion of this, so you definitely want to spend as much time with it.

(Question – this year, research aims and how you split it out into sections)

What you will do is when you're writing your original proposal, remember this is really just one proposal, and it's, it just happens to be divided into two phases and it, and it, may be divided between more than one institution, so what you would do is in your original proposal, you would actually write specific aims that are for your research and for your career development. I would probably start with the aims for my research, make very clear what those are, and then I would probably include the aim for the career development so that I could come in and make a statement along the lines of 'these career development activities will thoroughly prepare me to conduct the research' and describe the effects.

(question)

What I would do is, there's actually in the program solicitation, all of these, whoops, we lost it, all of these individual sections in the program announcements for the Pathway to Independence Award. What will happen is when you go through the solicitation, you'll see that they will very clearly highlight what sections to include in the proposal, we want to include those, all of those sections and in the order that they're listed

and what I would want to do to make it clear that you've done that is to provide very clear headings and even subheadings, especially subheadings, I think because that helps focus people if they're reading through your application. So yes, it will be seen, but they should support one another as you're talking, so you shouldn't have to, when you're describing your career development stage, you shouldn't have to completely start over in describing what your research is that you've already discussed in the previous sections. So it would help eliminate some repetition, and it would also give you an

opportunity to reinforce some things. Maybe there's something in the career development stage, or in the research stage that involves career development so you don't want to really discuss it there, but you need to, you feel like you need to at least mention it and just discuss it in depth in the subsequent section

(Question)

Right, it's not, and think in terms of the career development as it's not a single feat, so career development can encompass formal classes that you might be taking. It could encompass going to specific conferences so that you can have a chance to interact, to network with other people in your field. It could be taking online courses, it could be working with a journal club, it could be working with a group of your peers who meet on a regular basis and maybe it's an affinity group where you're all interested in similar topics, so there's a lot of things that can be pulled into your career development plan, so what you can do is, and I say have at least one aim per career development, two different aims. There might be one that's focused on one aspect, major aspect of career development, and another one that focuses on others. So maybe one aim is focused on formal didactic training, and the second aim is focused on more informal training that's just as important. It's just less.

(Question) A setting for your trainee? Like, right, right, you do not have to design; the only place that you will have experiments will be in the research portion.

(Oh, that's what I meant.)

Sorry, yes, right. Right. And the mentored portion is more, it's more descriptive, so instead of saying you have a certain hypothesis you're going to test and a series of experiments, you're just going to basically delineate all of the different training opportunities that you would be participating in during that phase.

(Question)

Oh, oh, I see. No, you would actually go ahead and include all of your settings as if it were your project. That you would start with your mentor and then, certain, by the time you finish the two years with your mentor, you would be prepared to take on the remainder of that research in the next 3 years, either at the same institution, or at another institution. Exactly, it may be that because of judicial reasons, you want to try to set it up so that maybe one or two of your aims naturally finish at the end of two years simply because there are issues of intellectual opportunity and who owns the data that's been collected, so you want to make sure you have access to all of that data when you move to a different institution. So in that instance, or if there's certain equipment where you work now but you might not have in the next institution that you're at and so those are some things you would want to take into account, but primarily you can look at this for the long haul because that's really what it's meant to be. It's a strange, it's a strange program.

(I have a question along similar lines, so one of the most important factors for getting experience is to ...whereas, this thing is doing the opposite in some ways. So I guess, what is the appropriate way to find the separation, to find that independence in some way. Have you seen a good way for someone to tackle that?)

That's a very good point to make. There is a mentored phase and obviously your mentor is probably someone who you've worked with a lot. And so they have had a great influence on you and most likely. If you work with them on this proposal for the mentored phase, they will continue to have that influence, but what you want to demonstrate is, and I would make it very explicit statement that by the time I have completed this 2 year mentored phase, I will have all of the skills necessary to become an independent scientist. I would just flat out say it, so there's no doubt about it whatsoever. And what you will do, is emphasize that during that mentored phase, there's definitely a skill set that you want to get in terms of maybe conducting certain types of experiments or learning to use equipment that you haven't had an opportunity to use yet, those kinds of things that you would do dependent on a mentor for at this phase. You can say, well, once I've gone through this mentor phase, he or she, my mentor, is going to have taught me all of these things, and I'll be able to go off on my own. Does that make sense? So it's good, it's very artificial, to me it's a very

artificial distinction or boundary between a mentor and an independent scientist. There is a phase when you are compiling influence by your mentor, and there is a phase where you're clearly beginning to branch out on your own and begin to look at questions that aren't necessarily related to what your mentor was saying in his or her lab. At the same time, research is so interdisciplinary now that you're always going to working with people that may not be formal mentors, but they're still going to be providing you with new knowledge, new information, just as you will for them. So to me, it's kind of a fuzzy line, but I think that's the way that you would do it, is just show, these are the specific things that I need, if my ultimate goal is to this kind of research, and I have skills that get me to this point, I need to get the skills, the additional skills that move me to that next point, and I'll get those in these 2 years, and once I have that, I'll be able to branch out and begin my own sort of.

(Question – and I think reviewers on their own, looking at this 5 year plan, can tell whether this comes from a very well known person for a very long time, or if it's a student who's bringing new ideas or ... hopefully...)

Yes, yes, and I think that they will be able to do that. Because the people who are going to be reviewing are going to be fairly established themselves and so they will be able to see that. They'll also be looking at the publications list and grant support list and things like that for both you and your mentor or your mentors. And that will give them a good idea as well. One thing that you can do is that when you're planning the research portion of this project, think in terms of coming up with a project that is somewhat different from what your mentor is currently working on in the lab. Maybe it's something that's slightly related, so that they would still have the ability to mentor you, obviously, that you might want to think in terms of making it clear that you're about to go in a slightly different direction. It doesn't have to be opposite direction, they realize that people are going to be very, when you get to this stage, you're at a focused, more narrow area of research, but that's how I would do that.

So what I'll do is go ahead and move on just so we can summarize quickly and talk about strategies for success and these are strategies not just for success on the Pathway to Independence Award or the R01 Award. This is for any proposal at NIH, and frankly, for any proposal at any agency, foundation, or corporation. There are some things that you just need to do no matter what.

The first, is that you need to read instructions. And this sounds like a very basic thing to say, but it's amazing how many people don't read the instructions or they don't read them in full, maybe they read the portion that seems more interesting to them, say the portion that deals with the research, but maybe they sort of skim over the portions that deal with the budget or some other issues that they're not accustomed to working with. You really want to make sure that you have those instructions in front

of you, that you refer back to them often, remember that they provide an outline for your entire proposal. They also give you the review criteria for your proposal, so that you know that you're writing to. You can make sure that you have completed your proposal, you can kind of think like a reviewer and you can ask yourself, 'if I were a reviewer, how would I rate this proposal? Would I be able to find all of the ways that I've met the review criteria?' so those are some good ways to approach it.

The, one of the main things that you want to do is talk about your idea. So discuss your research idea with your mentor, colleagues, and program manager. I would, if you are going to have, well, you would if you're applying for the Pathway to independence, if you need reference letters, I would request those very early, they're actually submitted independently from your application, and so you want to make that you get people on that soon, and that they, so that you can track them, and make sure that they get uploaded when they should. You don't want someone to write a rushed reference letter for you for a proposal that is as competitive as this one is.

And then also be very realistic. One of the comments that people get, I think almost, I think that is very common on their first application especially, they'll get a review comment that's saying that they have been overly ambitious and that's in some ways not a bad thing, it means that you are a real go getter and that you have lots of ideas and lots of energy, and you're ready to go forth and conquer. And so that's great. What is not so great about it is, is that you have to remember that you have a limited amount of time, a limited amount of money, and other resources available to complete all of that work. And so, very likely, remember you don't have to do your entire career's research under a single grant. You're going to have plenty of other

opportunities to get grants, to continue to build on the research that you start, so the key thing is just to try to be realistic. And this is where having a mentor or colleague who's fairly senior take a look at your aims and make sure that they do appear to be doable within the timeframe.

You also want to explicitly state that you have all the resources that you need. If you are doing work on magnetic resonance, and your institution doesn't have an MRI machine, then you've got to indicate somehow to your reviewers that you will be able to get that work done, maybe you'll develop an agreement with a neighboring institution to use their MRI, what have you. But you want to explicitly reassure your reviewers that you have everything to be successful.

If you are a new investigator, you would definitely want to identify yourself as such, because again, that does give you a little bit of an extra edge when you're applying.

You want to organize your application in the required format. This sounds pretty basic, but it's amazing how many people decide to go off and create their own format for things. Make sure that you write in really clear, plain language. You're not trying to write down to your reviewers by any stretch of the imagination, but you do want to write clearly. A lot of times people will assume that their reviewers are going to have the same level of really deep knowledge of their topic as they have, and the reality is you're probably the expert on that topic or one of the few experts on that topic. And so you want to make sure that your reviewers will be able to truly understand what it is that you're trying to describe. You can do that in a number of different ways. I think, probably, the best, is just simply to make sure that your describing things in clear terms. Don't try to make things more complicated, sometimes I think, when people write, they almost try to make things sound complicated, and trust me, the research that all of you are doing is complicated enough, you don't need to try to make it sound complicated. If you can make it sound very accessible, your reviewers will love it. Because they'll be able to read through, and first of all, and understand what you're saying, which benefits you greatly. And secondly, if

they read through and understanding everything, in the back of their minds, they're thinking 'dang, I'm smart, I'm able to follow this, and it's not even in my immediate field' and that's always a good thing to have your reviewers feel this way. To have, a kind of, positive, I guess, a positive experience in reading your proposal. One of the things that I have heard said about proposals, the way that you know you have a really good proposal, is if at the end of reading it, you feel like you have learned something. So that might be one way to think of proposals when you're beginning to write is would somebody feel like they really learned something new or gained some new insight from reading this proposal?

You also want to make sure that your application is complete. This is one of the reasons that you want to start early and try to begin uploading everything early so that if you see that there is, you might suddenly discover that there is a form that needed to be filled out that you just didn't make it to. This would give you time, if you didn't have that, to go ahead and create it or fill out the form or what have you. Make sure that you have zero tolerance for typos. I know a lot of times people will say, oh it's the content that's important, it's not the superficial things like typos, but it is the superficial things like typos because what the typos tell you about the person's care that they might be taking with their data, so they'll be making inferences that you might not necessarily think about when their reading your proposal. So you want that proposal to be as clean as possible so that they realize or make an assumption that your data is equally high quality.

You want to, for NIH especially, relate the potential impact on research and how NIH's fundamental mission is to improve public health, whether it's through diagnosis, treatment, interventions, cures, what have you, you want to very clearly hit how what you're doing is going to help public health. It may be that it's going to be a step in a very long series of steps that are required to help public health, it may be that you're developing an intervention that would be immediately useful. Either way, you want to connect your research to improve public health.

And then also you want to think like a reviewer. And as I said earlier, when you've completed your application, read through it, ask yourself is what I have written clear? Have I told the story of the research? Is this written more as a narrative so that, we all love stories where people tell stories, it's what we do, and so, you want to ask yourself at the end of this, have I told a compelling story to my reviewers and have I supported it with good evidence along the way? And then, if you've done that, ask yourself, 'now, okay, if

I were to review my own application, how would I score it?' so go through and ask yourself 'what would I give myself for this significance criteria? How would I rate the approach criteria?' and so forth. And if you see that one of those scores tends to be, you might rate it a little bit lower, don't despair, this is good that you've identified it, and much better you've identified it than the reviewer. So you can go back and in and shore that part of your proposal up. You might need to get more feedback, for instance. And in that way, you can feel much more confident when you submit your application that you've got a truly excellent application because that is really the case.

Are there any questions? I apologize for going so far over, but I think that we had really good questions along the way, and I'm glad that we have a lot of time to answer those. Are there any last minute questions?

If you have questions later, please feel free to e-mail me. I'm at Rice University, in the Office of Proposal Development, and I don't think, I can give you my e-mail address. And good luck on all of your research.

Chapter 15

16. Transcript of the video 'Writing a Paper for Nature'[1]

Professors Gad Shaulsky and Adam Kuspa on 'Writing a Paper for Nature'

Sujata Krishna, Ph.D.:

Hi everyone, welcome to the GCC-NLM Professional Development workshop. Several of you come every time during the NLM trainings and every time we meet, the extra space in the classroom will be open for different people to come and signup for the workshop. So some of you might be here for the first time and you're welcome. I'm Sujata, I'm the instructor.

Today we have with us two professors who are going to talk to you about writing for Nature, and they have a lot of experience with this as you will see a bit later on. Professor Adam Kuspa is the Vice-president of the Baylor College of Medicine, and he's also a professor in Biochemistry. Professor Shaulsky is also at Baylor College of Medicine, and he's a professor of genetics. He got his PhD in 1991 from (?) Institute of Israel and Professor Kuspa got his from Stanford in 1989. I think both of you met at, in California as postdocs, is that right? And on and off they have collaborated, so they have several of their publications together. They have individual labs and several of their papers are separate with their labs. Many of their papers in Nature have been, that I've seen, were between 2005 to 2009. They have ongoing publications in Science and other journals that are not talking about. So in 2010 they were both awarded the Michael DeBakey prize for research and excellence. So here we have 2 very experienced people who have published in Nature several times, who have chatted with the editors back and forth, so let's learn from their experience.

Please don't be shy to ask questions. This is a session about learning.

Thank you.

Okay, so when we were first asked to tell you how to write a paper for *Nature*. I think my first response was, 'well, I don't know how to do that." And it was kind of embarrassing to handle this. So I don't want you to leave here with the impression that I have all the answers. Maybe Adam knows a little bit more than I do, but we really don't have a recipe for publishing in heightened vector. So we share some of our experience with you, one thing that Sujata didn't mention – because we didn't tell her – is that Adam was an editor of *EukaryoticCell* for 10 years, just stepped down last year. So he also has a lot of experience looking at papers from an Editor's point of view so feel free to talk about that experience with him as well.

So all of you know took notes, this is the joke part of the presentation. And this is the more serious part of the presentation. Seriously, if you're in biology for fame, I assure you you're in the wrong business. So a lot of the motivation for publishing in high impact journals is fame, and that's the wrong motivation. You should be motivated by doing good science. When I first came to Baylor, Adam was already an established assistant professor and he was just getting tenure, I think the same year that arrived. And my chair took me to his office and kind of sat me down. I was fresh assistant professor, and I didn't know what was going on. And he said, 'if anybody in your lab is not working on something that's going to be published in *Science*

[1] This content is available online at <http://cnx.org/content/m43326/1.1/>.

or *Nature* in the next 6 months, why are you doing this at all?' Okay, so that's my chair and I tried to stick to it, but wasn't always successful.

So let's get a little bit more serious about why do people want to publish in nature? Because I guess this is something that you ask Sujata as a presentation, and it's pretty clear that the fame that comes with publishing in a high impact journal is going to help your career. There's no question about that. So first

of all, it's going to give you exposure to a very wide audience, and that's going to facilitate collaborations, and that's going to facilitate trainees who are then going to want to come to your lab, or if you're a trainee, it's going to facilitate the next job you're going to get; if you're a graduate student, it will put you in a better post doc position, etc. For us, I guess, it started some good collaborations. So, it's, don't get me wrong, it's not a bad thing to publish in high impact journals, but that's not the goal. It's the means to an end, rather than a goal.

So, I guess this is our credibility. So these are some papers that we have published in *Nature* and we put *Science* there as well. I hope you don't mind. So, we wanted to show you here in Red what are the topics we published on so you can see that it's not all on the same topic. The topics are actually pretty unrelated and the common theme is something that Adam and I found interesting, and something that I guess was groundbreaking and what else can we say? We really like those topics.

Just as soon as he tells you there's no formula in publishing in *Science* and *Nature*, we're going to tell you our formula. Yeah. Catalyze by preparing for this discussion, we actually did think about how you go about thinking about submitting a paper to Science or nature, and it turns out, we do change the way we operate. We think a project is sort of lies at a level of making it to a general high profile publication.

But in honesty, maybe one out of these 10 times we've published in Science and Nature journals, I think there was only one paper that you said, 'okay, this is something we're going to do for *Nature* that ended up being published by *Science*." It really was the first paper that we thought about as we were coming up with the idea, and you said, 'this is going to be a huge thing and that's going to be published in *nature*, and nature didn't want it. So we ended up sending it to *science*."

Okay, so our approach to publication. Our approach to doing science in the first place, is we work on things that we think are interesting. And it may sound trivial, but it's not. You have to have courage to work on what you believe is interesting. You'll hear from a lot of people, 'well, you need to work on the next hot topic,' or 'you need to work on something that is currently very popular,' or 'you know, look at what nature is publishing now, and that's what you need to be working on.' Well, that's, in my opinion, that's wrong. Because, if Nature has already published it, don't work on it if you want to publish in *Nature* because it's going to be old news. And if you're not completely convinced that this is what you want to do and this is really interesting to you, you're not going to do a good job. Once again, motivation is not where you are going to publish, it's what you are going to do in your life. It's going to be good science.

Okay, so, we always try to send our work to the best possible journal. Sometimes it takes a little bit more work because you have to reformat your paper and resend it to different journals, but we always try to think about what will be the best journal that we could get this particular piece of work published in and we send it there. We have a lot of rejections. But we also have a lot of success. Whenever we write a manuscript, we try to write it such that, I don't know all of your backgrounds, but if I try to talk to you about any one of those topics or if you try to read any one of those papers, I would hope that it would appeal to you. So we try to write papers such that any intelligent person would find it interesting, and a lot of the times, you'll see that the language we use is very simple. We don't try to make things too fancy or too complicated, and the idea is to have people or give people the ability to relate to what we're doing rather than ground them in jargon and in very, very specific terms that most people won't understand.

Having said that, I think that the last sentence here, the idea that integrity and completeness of the work comes first. We will not compromise our work just to make it, you know, publishable in a certain term. It may all sound trivial to you, it may sound like 'yes, of course, everybody knows that, we've taken ethics courses and things like that.' But it's really true that if you stick to those ideas, they'll serve you well. So don't pander, don't try to do what you think other people will like, just do what you like to do and you'll succeed, if you're good.

So, as Adam said, before Sujata asked us to talk to you, we really didn't have a strategy for, or we didn't

know that we had a strategy for publishing in high impact journals. Then we started thinking about it and talking about it, and we realized that we do have a strategy, we just didn't formulate it. So it helped us formulate it for you.

Okay, so we're selective about what we're going to submit, paradigm shifting. I think we both like to be radical and do things that other people didn't think about before and a lot of times it turns out to be a paradigm shift. Sometimes, it turns out to be something completely unpublishable, but I don't like doing what everyone else is doing. I know Adam for sure doesn't like that so if you do something that is off the mainstream, you're taking a risk because people may not understand what you're doing. But there's a huge benefit if you actually succeed. And then, something that is going to be easy to comprehend for the nonexperts, I think I covered that just a moment go. Now, having said that, not all of our papers are written this way and not all of our papers are paradigm shifting. We have a lot of papers where we just take the ball forward another yard and we characterize this gene and that gene and I think it's fair to say that when you have a project like that, we put less, maybe not less of a mental effort, but less legwork when it comes to making things really perfect. Is that a fair description of how we handle this?

Well, there's no doubt it. Also if you haven't gone through condensing a 50 page manuscript to a 5 page manuscript, you won't always know. It's a different kind of effort and language. Spending 40 hours more in work to get it down right.

So one of the things you end up doing, and we'll go over some of the abstracts that you sent to us, one of the things that people want is polish the title and the abstract. But as Adam said, when you start writing something, sometimes it comes out as a monster piece of manuscript, and the 3,000 words that you have for a small paper like that, or 1,000 words, it's very difficult to convey an idea. And we spend a lot of time on language and on deciding on what's important, and what's less important. What can go into the main text, what should go into the supplements, and, but I think the most important part is, what do we need to do to show unequivocally that our conclusions are supported? And I think that's the most difficult part and that's the part that takes most of the work on the part of the students and postdocs that actually do the work at the bench. And that's a lot of give and take between us and our trainees. The year or two that lead up to a paper like this. Then, the writing part takes about 2-3 weeks to write something. And then the, this idea of soliciting peer reviewers. I think that's something that you should definitely do when you start writing papers, and that applies to any paper. Do in house review and do it with, you know, ask someone who's a friendly reviewer, but who's going to be very, very critical of you. It's very difficult to accept criticism. One of the best critics for my papers is Adam, and he always rips them apart and rearranges them. And I try to do the same for him because it's useful, it's a good collaborative thing to do, but I always go to somebody else who's outside of my field and who would dedicate enough time to read the paper, look at it, and say, 'why do you think this is a paper that's going to nature?' and if I get that response, I know I didn't do a good job. I know I didn't explain it to the lay intelligent person. And we have to get a feel for those before we can actually write a paper that will be understood by a lot of people.

So let's get to the more detailed part. Short, catchy titles. No jargon, really. So I'm going to show you the evolution of 2 titles. One is from Adam's first *Science* paper with Bin Huang, and that's a paper that has a really interesting story. Do you want to tell the story?

Yeah, this is probably one of the papers that catalyzed the thought that we actually do have a process about deciding what we would submit as a paper. It's a manuscript that I submitted to *Genes and Development*. It was a 50 page manuscript. It had a title of something like this, and it was rejected without review. So the Center of Genes they didn't even want to read it. And my colleague over here, Gad, he said, 'you know, this is important piece of science.'

And so then Adam was an assistant professor at Baylor, and I was still a postdoc in San Diego and we were just communicating on the phone, and when he told me it was rejected from Genes and Development, I said, "That's just impossible."

So this is the days before electronic submission. So if you ever did a paper submission, they ask you to submit a self-addressed stamped envelope, and you made your own figure, and you pay a lot of money for them, so you generally wanted to get them back from the journal. So I was an eager, young, assistant professor so I fedexed the manuscript to the Center or Genes with a self-addressed fedex envelope inside.

And I got the manuscript back in 36 hours.

My interpretation from this is the guy on the loading dock read the title, put it in the envelope, sealed it up, and sent it back to me. I mean, literally, that's the impression that I got. But this guy over here convinced me that Science was important, took a while, and that led to this rewriting I spoke of taking this 50 page manuscript and turning it into 1500 words. It took me 6 weeks because that was the first time I was trying to submit to Science and Nature. But anyway, we got this intermediate title, and then the next mark, this was final title of the paper, you look at the top, the reason that the main editor at G&D rejected it, who shall remain nameless, we just don't publish things based on overexpressions. Too many artifacts. That was it. They didn't read it. And it was pretty jargony. Cyclic adenly kinase, and you don't even know what adenyl cyclase does. And so we boiled it down to the final title, which is the title in Science. The idea was that the most important signaling molecule in an organism could be done away with and you can get them to develop fairly normally by simply overexpressing the downstream target of that signal. It's a finding that's been born out of subsequent research. Well, anyways, *Science* ended up accepting it and speaking to the importance of publishing in these journals, I was reading the paper letter from Science that said that they accepted by submission and my chair walked up to me, could read from the sun shining from my window, the letter had Science, he knew what it meant, he grabbed it out of my hand before I finished reading the letter and walked back to his office. He said he needed to include it in my promotion package. True story. So Gad is the hero of short titles. And the next one is an example of a paper we're working on. I presented this to Gad.

So, a cool discovery we found that taking ? immune cells that can do extracelluar neutrophiliac traps in human immune system this was my title and I thought it was catchy (?). Pretty general, not a lot of jargon, and he tells you the story, right? I was driving to my yoga class when Adam told me that I almost fell asleep at the wheel. And in 5 minutes. You were driving? Yeah, we were both driving and talking about this on the phone. And we came up with this: so, social amoebic traffic bacteria by casting DNA nets. Maybe it doesn't tell you the whole story, but it has a rhythm to it. It's shorter, and it didn't get accepted to either nature or science. But the idea was that a long title that has a lot of information in it is something that's suitable for a journal that is specific to your field, because then the reader can take a

look at the title and they know from the title what the problem was, what you did, what your conclusions were, and that's great, for the 20 or 30 people who are in your field and really interested in this. And you're going to decide based on the title, whether or not they're going to read the paper or, you know, they'll just make a copy of it and use it for when they want to reference you or something like that. A short title like this or like that is more suitable for a broader audience. So it has to have some catchy phrases, something in it that anybody would say, 'ah! Is that really what they mean?' and you know, it's a lure. It's not going to convey everything that you've done, but it's going to attract them to read your paper. And that's something that serves a couple of purposes. One, is for the editors to become interested in what you've done because the editors like, all of us, are human, or most of them, and they will read the title first and maybe they'll look at the abstract as well if they're interested. And sometimes they'll leaf through the pictures and see if it's something that they want to send to reviewers, so in my opinion, a short, catchy title is something that serves you well, and it's done fairly well for us. We have papers with long titles that you've never heard about. That's the point.

Okay, so something that helped us: clear abstracts that follow the recommended format. So some of you have sent us abstracts and I want to thank you for doing that. I think that's pretty courageous to kind of put your stuff there and have it criticized so we'll try to be gentle, but constructive. With that, but what is it that you should have in your abstract? So the first couple of sentences, and every journal has it in their instructions, but really believe it. So the first couple of sentences tell you what field you are in, so not the problem that you're working on. Just the field, okay? So if you're working on learning and memory, say something like, 'cognitive ability is really important because blah blah blah.' Then the problem that you're working on comes second, like either the second or third sentence. So you're defining the problem and it's okay to define it as a hypothesis if you want. Then what is your experimental approach 'we have taken samples from so and so and did so and so.' Then you summarize your important results, and then finally you go back to the beginning, okay? 'so we worked on cognitive ability, our conclusions, the narrow part of

our conclusions that pertain to the part that we studied have an influence on this broad field in this such and such way' so this is a standard way of writing an abstract, but as soon as you realize that this is what journal editors want to see, and this is the format that most of us are used to, if you write in that format, you're communicating clearly to the reviewers and the readers. It's a good thing to do that.

One thing that I think is my personal preference and I kind of push Adam to do it too is to write in first person. 'We extracted samples from so and so.' Now I was taught in school to write, 'samples were extracted from this and that sample' because this is not personal. Because science should be something that anybody could repeat. And the fact that you did it or she did it, he did it, shouldn't matter, you should always get the same results, but it's difficult to read passive voice, 'samples were extracted from 13 hour cells, etc etc' something that's hard to relate to, especially in the abstract. If you want to do that in experimental methods it's probably okay.

Cover letter. So, if you've ever written a paper, you know that you have to submit it and send it in. They ask for a cover letter. One of the biggest mistakes that you can make is not write a cover letter or not write a clear cover letter that explains why you think that your paper should be published in high impact journals.

Now, your title and your abstract should stand on their own and explain everything that you've done, but there are some things that you can explain in your cover letter in just a few sentences that would tell the editor 'this is something really special, this is something really unique,' and I would say, if you're going to hype what you've done, the cover letter is where you should hype your science. Okay? So a lot

of the journals don't want you to put 'this is the first time anybody has seen something like that.' You're usually not allowed to put that in your abstract, but you should definitely put that in your cover letter. And, you know, you can't write in your abstract, 'well, this is going to revolutionize the field' because well, maybe it won't and this is going to exist forever in public record. Your letter to the editor is not something that's going to become public, okay? Be honest about what you're doing and why you think it's going important, but definitely put all the buzz words and all the hype in that letter because you have to appeal to the editor. You have to make sure that you pass the guy in the loading dock, that you know, it's just going to bounce back your paper. Get to the editor and have the editor be convinced that this is something that reviewers should read and that the broad readers of *Nature* or *Science* or one of these popular scientific magazines should publish.

A lot of those journals encourage you to do a pre-submission inquiry. A pre-submission inquiry, I think, you sell yourself short. The reason they tell you to do that is they don't want you to go through a lot of work to write your paper in *Nature* or *Science* format because they will reject – I didn't read the statistics recently, but I think they *Nature* rejects 80% of the submissions right off, (90), so 9 out of 10 papers that you write and send to *Nature* will be sent back without review. And that's writing a paper in this format is a lot of work. I find, we find, that it's useful to do that. Send them a complete manuscript, don't just send an abstract because abstract is the last thing you should be writing. I write the title first. Then I look at the pictures and write figure legends and experimental methods, then discussion, then introduction at the end. If you haven't written the paper, how can you write the abstract? The abstract is not going to convey everything that you want to put in the paper. So my strategy is I just write the paper, put it together, with a belief that it's going to be accepted and I think it's worth the effort. So even though they tell you to do a pre-submission inquiry, I don't do that. But you said to do what was our record? Well, 10, I'm sorry. I think there are rare cases when pre-submission inquiries are worth it. I mean, we had one case where we basically knew *Science* or *Nature* was going to take the paper and you were negotiating with them because one or the other, they basically told us at a meeting that they wanted it. So in that context, we contacted editors and sort of asked what they wanted to see in the paper. Because, I think, Gad hit the nail on the head. How do you convince them that your work is worthy of their journal if you haven't put it together basically 100% before you make your case?

It's difficult to imagine if you haven't done it. But the papers evolve on their own. So once you start writing the paper, it takes you in different directions, and it's not until you finish writing the paper and have a few people look at it that you know what it's going to look like. Then your abstract and your title are going to mean something. But at that point, you might as well send the whole paper with your submission.

The in-house review, I think we talked about. It's important to do that. A lot of times it's unpleasant. But, you know, it's like a little bit of medicine rather than a disease, so try to do that. Editors are people, and if they know you, it's harder for them to ignore you. And the same applies to reviewers in your field, so when you go out to meetings, don't hide and don't shy away. If you have a poster, try to get to the 3-4 most important people in your field. Take them to your poster, buy them a beer, talk to them about it. Try to get them interested in your science, try to get them to remember your name. If you can't do it on your own, try to do it through your P.I. who's present at the meeting. Sit next to them at lunch or at dinner, you can't put a price on how or how important it is to generate personal contacts with editors that you can then negotiate with, you can appeal to. If there's a dispute between, or a disagreement between the reviewers, either among the reviewers or between some of the reviewers and yourself and the paper is maybe on the cusp of being rejected, your relationship with the editor, who you know, and with the reviewers who are anonymous to you, but a lot of the times you know who your reviewers are,

these relationships are important. The same applies to your grant applications and all these things. So, when you go to meetings be out there and advertise yourself. It's an important thing to do. If you're ever asked to review a paper by a journal that you either submitted to, or going to submit to, or anywhere in your field, agree to review. Even if you're busy and I know a lot of you may think that this is an abstract thing because maybe most of you are maybe not reviewing papers yet, but it will come as you become an assistant professor and as you mature in the field, you'll be asked to review papers. And I think it's only in the past couple years that I started to turn down offers or requests for review because I'm interested, but I just don't have time. But make time because this is how you generate personal contacts with your potential editors.

I guess I make one additional point about relationships with editors and it gets back to this point of being very selective in what you decide to submit to them. These are folks, they generally stay in their job sometimes for decades. I've been dealing with the same immunology editor at *Science* for 8 years, same genomics editor at *Science* for 15 years. They write "News and views" and so forth about your work. So if you submit crappy manuscripts, you're going to get a reputation of, 'oh, here's another crappy manuscript from that lab at Baylor.' So that's another reason that you want to be highly selective. You want to be respectful with your relationship with the editor, and respectful of their time, and they know when they get something from you, they know that you really believe that you deserve to be in the journal.

Same applies to editorial board members, so when you apply, when you want to submit to a journal, look on the front page or the first page. Who are the editorial board members? Do you know them? Does your P.I. know them? Did anybody in your immediate surrounding do a postdoc with them? Or a Ph.D. with them? Can you get an in? See if you can them a copy of your manuscript, if you know them, and ask them, 'do you think this is a *Nature* paper? Do you think this is a *Science* paper? Do you think this is a PE&S paper?' You'd be surprised at how some of these people are happy to look at your papers, especially for trainees, less so for established people like ourselves. You know present yourself, I'm so and so, I work in a lab with so and so, who did a postdoc with you. And you know, I have this really great manuscript, that I think is worth publication, but I'm not quite sure, can you take a look at it? What have you got to lose? But if you get to know people at meetings, this is something that you can leverage upon them.

37:25

Repeat. So, the statistics are pretty harsh. Most of the submissions to the high impact journals get rejected without review. And if that's going to devastate you, sorry. It's going to happen. It's going to happen a lot. Just get used to it. What do you say? It's not personal. Adam says it's not personal, but I think it is personal. But you have to have a big enough ego to live with it. It is personal, they hated my science, all the expletives that you want to put there, but after all that just calm down and try to go to the next journal, and the next one. And with your next paper, you know, learn from this. What did I do wrong in the first one? Why didn't we get published? Try to go on.

So I think this is, the, kind of the formal part of the presentation. Are there general questions about this so far? We're going to get into the workshop aspects of this and getting into the abstracts and insulting some of you, because.

Did we forget to tell them to ask questions? We did. Ask questions anytime.

Kind of a general question about it. I guess it was in Science and Nature about not quite rejections, where they send back a 'yeah, we've loved to take your paper, but can you do the entire experiment over with this many tweaks?' It's going to take 3 more years.

Do what they tell you. So that's part of committing to a project, or a high profile journal. There was one of those kind of papers where this thing was going to go to *Science* or *Nature* and Gad's lab was going to do a whole another 9 months of work based on 2 or 3 three page single paged reviewers comments and it was adding maybe 10% to the manuscript. But he was so sure about the 90% that he was able to convince his graduate students to put in another 9 months of work, and it got in. So I'd say, if it goes that way for you, I would certainly say do that.

Now I don't know if 3 years is a reasonable thing to do, but this example that Adam is giving, I really didn't think added much to the paper, 10% is generous. But, it's what it took to get the paper published and it was important enough. I mean, we could have sent it to another journal and would have gotten published, and it wouldn't have generated the same collaborations and from postdocs and things like that that came out of it. So it was really worthwhile. And you know, it was a little bit something that we thought was, 'maybe we were just wrong and the reviewers were right and we should have done it.' It's just shut up, put your head down and do it. Yeah.

I've heard a recommendation that postdocs should publish every 6 months, and it should be on this timeline, and it's pretty high by quantity. So is quality of these types of manuscripts fall into the same output – so you say the balance –

If you know a postdoc that can write *Nature* paper every 6 months, I want him in my lab. I don't think it's realistic, but I would never, ever, compromise quality for quantity. That is one of the things that I put on first of these series of slides. You don't compromise integrity, and you don't compromise the quality of your work just to make sure that you get published in a journal. It borders on fraud, if that's what you want to call it. But you don't want to do it. Science is more important than publicity.

As far as time and quality and quantity, I can see something submitting to lower tier journals and the amount of work having to go into that journal is less, so it actually takes less time.

I feel it's being very field specific. So let me answer a question you didn't ask. So how is quantity vs. quality judged in search committees for faculty positions and on promotions committees? I've been on the Baylor promotions committee for 8 years and served on a couple dozen faculty search committees, and the people on those committees are pretty smart, and they can see the difference between somebody who works with diligence who has to put 3-6 papers worth of data into 1 paper, because that's the way those fields are. So that's the only thing you can do. So you generally have to put about 3-6 papers worth of data in 1 paper, and that's really, you know, slushed out in those discussions. So it's not really a publish more or vs. better, it's really fields or something. So you know, if you're working in cancer, or cell culture, you might be able to publish more rapidly. But if you're working on model organisms, sometimes you have to go a year or two between each publication. But people can see.

Has it ever happened that you get rejected and somehow you rewrote your paper and still tried the same journal?

The same journal? No, I don't think so.

So once you get rejected, you have to take it as an answer.

So there are several ways that journals will respond to you that may pertain to your question. A lot of times when they just reject you – I guess we should have brought a few rejection letters, but you'll get them – so, it says, 'you know, even though your paper was really nice blah blah blah, we have too many submissions and we can't accommodate everybody, but' then there's something about 'it doesn't mean in the future you shouldn't submit any papers to us.' That's a rejection letter, and in my opinion, it's irreversible. But, since I never tried that, I'm not sure.

A lot of the times you'll get, so if they didn't send it to reviewers, I don't think you can negotiate much. If they send it to reviewers and it came back with very, very negative reviews, you know, your first response is 'those ***', and you're next response should be 'okay, what did I do wrong? And how should I do it better?' If you can fix the problems, even though you get the rejection letter, you can try again.

I would just say there's another kind of rejection, that gets at the earlier question, which is, 'manuscripts

basically okay, but we don't think you proved your point, if you make 10 more knock out mice, you can resubmit your manuscript.' And then you have to make a judgment about, 'am I going to do that work?' And read between the lines about whether they like it or not. If you see the phrase, "we feel it's more appropriate for a specialized journal' that's pretty much death. But there is sometimes room for argument. But let me get back to my earlier answer, I've seen the same manuscript three different times, be submitted to three different journals, once where I was editor for the paper, and the other two times when I was a reviewer, so you really, it's you shouldn't really think about these thing as *Nature*, the editors of *Nature*, the *Nature* specific reviewers. It's really your field. You have to think more horizontal. The journals are really more just conduits. So you got to think about, if you don't respond to the reviewers when the reject your paper in a very meaningful way, and you sort of just put it into a different journal without modification, the papers probably going to go to the same reviewers, so I've seen the same paper, three times, unaltered, and it really upsets you because they didn't address the stuff that you brought up. I've actually gone as far as to return on the third submission, the third journal where I was the reviewer, I submitted the exact same review without stating it, but to give the point that 'look, you didn't change anything. I have the exact same opinion of your manuscript.' So it's really a learning experience when you get rejected to improve the science, so you should take every opportunity to change your manuscript accordingly.

I have a question preprints in this area of publishing. It's common in math and physics to put your article or your discovery or whatever up on archive, for example, and post it there before it's in a journal. I was wondering, again, just to get primary, to your publishing on that, any feeling on that any way or another?

In biology, it's an absolute no-no. So we've had, we have a newsletter that goes out to the all the (?) researchers in the world, and we submit titles and abstracts of papers that have been accepted for publication. *Nature* and *Science* have a policy that says that you cannot do that because you'll compromise copyright. And even though they accepted your paper, they may not publish it. I would say consult with the editors after your paper has been accepted. But if you send it out before it's been accepted, don't be surprised when you hear 'well, it's already out there, we can't publish it.' Have you encountered anything like that?

No, I haven't. I was just that, I'm in a crossover field and I work in computational, so there are people I work with who publish on archive, but because I cross over between clinical and biology and the math/physics end of it, I'm trying to get a feel for where things fit.

So yeah, I'm thinking in life sciences it's, as far as I know, it's against the copyright at least of these high impact journals.

Are there other questions?

General? If you come up with questions as we go on, so feel free. So what I would like to do is once again, thank the people who sent us abstracts. I know it's not easy to do that, and especially to get your abstract criticized. What we've tried to do, so Adam and I didn't talk about those abstracts, each one of us just gave our own opinion and you'll see that we have different styles.

Might I ask, how much time do we have left? So we probably have time for a good discussion.

So let's start with this one. Maybe the author should sit in a chair right here. You know, you have to say who you are.

So I want to start with mine, if you don't mind.

Yeah, why don't you do that?

So, Gad and I decided for no particular reason to edit these abstracts without seeing each other's, so it might be interesting. This was the abstracts, so read it for a second without my comments. So, the first thing was the title. And, by the way, I searched, I did a little bit of work on each one of those and we see that this is a paper that was published and the published abstract is down here, so I can show that to you later. So when I read it, I didn't understand what Q-reactivity was. So I was put off by that. So if that's something that's specific to the field, but try to pass it by 5 intelligent lay people. If they don't know what Q-reactivity is, don't put it in your title or the abstract. Same applies to 'blunted brain responses'. Is the brain blunted or is the response blunted, and I'm not sure what is a blunted response? I think I get the idea, but I think the general point here is, it's hard to define a term in the title. You can actually do it in the abstract, to define a specific term in the title.

So what I got from this abstract was, is that yours?, so, I thought that what this abstract says is that

people who can't enjoy things like visual stimuli or just plain things have a hard time quitting smoking, is that right? Okay, so I would say something like, you know, 'People who don't enjoy life, can't quit smoking.' Okay? It's a lay way, it's a simple way to relate to a broader audience, it's still, I think, honest and adheres to what you found, but now it communicates the same message to somebody who's reading *Nature* while they're waiting in line at a train station or at the dentist or something like that. Where they can just find *Nature* magazine. So if you made it too specific, you've lost a lot of lay audience, lay people.

What else did I see? You only used 170 words, they allow you 200-300 words. So usually, it's harder to trim things down, but use all the words that you can. Use, get close to their limit. So the first sentence, ' the ability to predict the long term success of drug cessation treatment continues to elude researchers' I think that's too specific already. So the first sentence that I would put in, would be something general about kicking an addiction, getting away from smoking, quitting smoking, something a lot more general,

and then the ability to predict is something that maybe people who treat addicts are interested in, but there are more addicts out there than there are people who treat them. And there are more people who know an addict than people who treat them, and these are the people that you want to relate to. Okay, so everybody knows somebody who smokes, and everybody knows how hard it is to quit smoking. Okay. If you can appeal to these people, you've brought a much broader audience than this. And then the, so the 'blunted brain responses' was hard to understand, the 'intrinsically pleasant stimuli' I thought those were pictures of nice things, but 'intrinsically pleasant stimuli' is a very specific term, or it's a more professional term, and it's definitely a good term to use in a narrower readership journal, but for most people, this is not something that they would relate to. And then they last thing was 'biomarkers.' I thought that there was a potential here to draw a much broader conclusion or at least to come up with a broader suggestion along the lines of people who can't enjoy simple things have to use drugs to please themselves. And if you're using that as a biomarker, you're once again, appealing to a very narrow field of people who try to define which treatment we should apply to which group of people, of addicts. So, just want to see if I, okay, so, I've made a few suggestions about, you know, are cigarette smokers aren't able to enjoy life, it's provocative, it's something 'what are they talking about? Let me read this.' It draws, I think, more attention. Or, something along the lines of this, then, this first sentence I would say, 'some addicts can never quit their drug habits, while others do.' So you've framed a problem. 'Smoking is an addiction' so you're narrowing it a little bit, and then you go on 'why some people can quit smoking and some people can't.' Then I would say that 'studies suggest that addicts and so on' and when you get to here, okay, this is where the formal format of *Nature* gets in. So here, we tested the relationship between the abilities of smokers to enjoy pleasant images and their chances of quitting smoking. I'm trying to say that in more simple terms, than smokers who wanted, so I'm describing what you've done, and what I'm saying here is to use something, some general term for brain activity, rather than the terms that you were using there, and then at the end, let's see. No, just to be honest, you found a correlation, you don't know if it's a causative thing. But I would say, 'this correlation suggests that people are capable of finding joy in other things may quit smoking or quit their addictions.' I don't know if that would made it into *Nature* or *Science*, but it's sort of a general idea of how I would handle that. Do you want to?

Sure, I think one of the points that Gad just made is, don't be afraid to avoid technically difficult terms in the abstract. I, you did, do technically demanding science; otherwise, the paper wouldn't be appearing in *Science* or *Nature* so you don't have to feel compelled to sort of be technically, scientifically precise in terms of describing what you did in the abstract. Now, I took another approach because I just edited the 5 abstracts because if you were a faculty or colleague coming to me and saying, 'hey, have at it' and I went about it mostly by removing words as you'll see and with just a few comments and change of tone. I think we've now learned, for certain, who's the catchy title author is because I didn't feel like I could do that in every case. And I had a different point for the title, which was, I definitely wanted to remove jargon, so beyond "Q-reactivity" meant nothing to me, I thought "blunted brain response" was general, I think people could have understood that even if they weren't a neuroscientist.

(59:36)

But what I wanted to see is, I wanted to see the author take a stand, give some directionality to what they found. If you notice without the word 'failure,' you don't really know if he's saying the measurement of

the response to an intrinsically pleasant stimuli predicts failure or success and the smoking aspect. So maybe failure is not the right word, but you get my point. Don't be afraid to take a stand in terms of providing definitive direction into what you're saying. Again, I didn't edit very much here because I thought it was fairly straightforward abstract. What I thought we could do here on the fields specific jargon is, just define it. I don't know what 'event related potentials' are actually measuring

so if you could just write that report on XX is something in lay terms that would allow an intelligent person to understand what event 'related potentials were'. I didn't feel this was a biomarker, I felt it was an indicator and I felt there was a way to stratify smokers for risk to drugs cessation failures so I really changed just a few words. And my final comment would be 'intrinsically pleasant stimuli,' beautiful term, but it's used three times. Or it was used three times, and one of the cool things you can do with these abstracts is, you know, the authors have, I mean, the readers have read the title. You don't have to repeat sort of concepts introduced in the title more than once, certainly, in the abstract. You view the title plus abstract as a unit, so I felt that there must be some way to say the words 'intrinsically pleasant stimuli' in a different way that might bring more meaning and reduce, sort of, the overall redundancy of the verbiage. That's what I have for that one.

Do you want me to go first on the next one?

Yeah, why don't you pick one?

Okay, so now we're going back to the... and just open it up.

Again, with this one, of this abstract, not my field, so I don't, it's that sort of human machine interface issues, very important topic of usability and health information technologies. And I think this kind of thing is very much in line with *Science* would be changes in healthcare. So it's very topical. Again, I didn't do much other than delete words. I'm not a big fan of colons in titles where you're sort of cueing in on a larger picture, colon, then you give them some specific details. Again, you'll see a trend in the way that I look at things. I think you need to sort of give them a punchy directional title stating exactly what you're showing so 'Usability Of Health Information Technology Platforms Predict Chronicle Performance.' It's a statement, you know. You may so it's not completely justified of what you did, but you're going to explain the tolerances around that sort of very direct statement in your abstract. And the rest of this we can just read for ourselves, you can see what I did very clearly. I felt there were about 3 or 4 sentences of introduction in the abstract, and I sort of want to cram them all together and give one contextual sentence and sometimes you can actually get into the topic of the paper within the sentence, so, if you read what I did, it's 'adoption of health information technology' I felt you do have to actually define the abbreviation there because you're going to use it more than once 'within high performing academic hospitals has improved blah blah blah.' So basically you have 2 or 3 introductory sentences and one shorter sentence; 'and the process of universal adoption throughout the healthcare system has not been smooth in part due to the unint..' again, I didn't do much editing, I just removed what I felt were, sort of, not particularly useful pieces of information. Really, basically, phrases that should be in the introductory paragraph after the abstract. And so, what else did I remove? Not much. Basically, I was pretty much okay with this. Any? I mean, I think that's pretty straightforward.

Yeah, I'm not sure if I remember what I did to it, so let's just take a quick look at it. Number 2, I don't see a number 2. It's behind.

Okay, so I don't mind columns, but I didn't like the term 'usability.' I think that people in computational biology or computational medicine understand what 'usability' means. I don't know what is 'usability.' I think it's probably a term that has a professional meaning at something that can be measured and manipulated and I felt alienated by that word. So, I would like to see something that would better explain why this is important to, you know, a lay person like myself in this field. I agree with Adam the first sentence, you know, to say the US Government put into a lot of money into something doesn't mean that it's a good thing, and I think there's a lot of examples of that, so I wouldn't lead with that.

And then, so I found the main findings, so you have main finding 1, you found a significance difference, etc. And main finding 2, we show the objective is reproducible. I that was fragmented, the fact that you put the main findings separately rather than put them together, I, I found to be distracting, so my point would be, this title was not attractive to a broad readership. The description of defining the split and I thought

that was distracting. And I also thought that the main findings, I disagree with Adam a little bit, I didn't think it was a justified, I didn't think that the main finding justified publication in a high profile journal, so maybe this could be the basis of something more profound, as it stands I thought this was something that would interest people who are thinking about purchasing software to run a big, you know, hospital database or something like that. And there are only a few people in the world who do that, and most of us who use healthcare or are exposed to healthcare in some way are really not that interested in the 'usability' of the system. So how can you make something like that more appealing to a broad audience? What is it that I should care about when it comes to how my hospital handles my personal medical files? And if you can relate to that, I think that would be a little bit more appealing to a broader audience.

Is that? Any questions on that?

Okay, I would guess, look, you're asking for maybe a focus on medical errors.

Yeah, I would say that if you could say something like, 'medical errors are fatal to patients and they're costly to society, to patients, to families, to hospitals, and things like that.' Let's try to find something that can help hospitals take care of us better, and that's the impetus of what you're trying to convey here, I think that would make it, you know, with the same set of results, but would make it more palatable to a broader audience. The whole part of this, I guess, is higher quality for lower price, that's what the government did with civilian dollars.

Maybe you should do one more abstract?

I kind of wanted this one. Okay, so, is the person who sent us this here? Okay.

Alright, I hope you can. So, I thought this was a fascinating finding but, it hid a lot of wrong points from my perspective, so I think it's going to be useful for the group to look at it. So the first thing, look at the title 'computational analysis reveals a timely significance of specific immune signaling networks involved in anti-F factor and factor-8 inhibitor antibody production.' So I guess it's something to do with hemophilia because the first sentence is about hemophilia and it's about blood clotting factors, which I have learned about a long time ago, and I knew very, very little about. And this title is supposed to attract me to read this. And it didn't because it was so, first of all, the title was too materials and methods like for me. So, it's scientifically very accurate, both the title and the abstract, and it's very, very well organized. But, it was too dry. I wasn't drawn to it, so I don't think I suggested an alternative and, you know, I don't think I can do a good job in suggesting an alternative but it would have something that would include 'hemophilia', okay, so maybe 'the blue blood' or something like that. 'Hemophiliacs were prevalent among, like say the European nobility and the kings and queens of Europe.' So maybe something catchy like that would appeal to wider audience. Then, I didn't see the first statement of general significance so you're saying that treatment of patients with congenital hemophilia is complicated by the patient is going to generate antibodies against the treatment. It didn't frame the problem for me. So, not everybody knows what hemophilia is and even those who know what hemophilia is may not connect it to the fact there are clotting factors in some of those can be introduced into the patient and so, I thought that was missing. I was pushed into the detailed abstract

too quickly. And the question that you're framing, so although 'several risk factors in green, would be associated inhibitor antibody development conflicts interplay of the inflammatory and immune responses lead to anti F and A antibodies secretion over the course initial F8 treatment remains unclear.' What's the question? So, I would say write the question after you write the answer so you say, 'here we show that the biological pathways trigger etc,' I would say write the question or the hypothesis such that it will be answered by the 'here we show that is recommended by the journal' that is the transition from the general problem to what you've done. Then, there is a lot of details here that I think should be kept for the materials and methods or for the figure legends, but not the abstract. The abstract should appeal to almost anybody who's intelligent and understands English. If I see, say, if I see things like you know 'aisle 5' and 'rands' and 'tma alpha' and things like that, if I'm not in the interlocking field, it doesn't mean much to me. I know 'aisle 5' is an interlocutor, or I think 'aisle 5' is an interlocutor, but I don't know the difference between aisle 1 and aisle 5, and maybe I should, but I honestly don't. So it didn't appeal to me, it didn't attract me to read the paper.

Then, so, in black, is what I wrote. I didn't think it was a compelling discovery or new concept in the field. What you wrote there, the computational analysis can supply insights, that's not new. We know

that computers that can help us do science, so the main topic here, or the main conclusion should be that biomedical discovery that you've made. That's the thing that you should emphasize, not tell us that computers can help us. We know that. And I honestly didn't understand what was the biological, or the biomedical breakthrough that would appeal to, you know, hundreds or thousands of people who are going to read this paper. So that's what I would look for in something that's going to be something in a really high profile publication. That's what I had.

I had a different take on this. Obviously, which one was this? Four? Was it four? I got rid of four. Okay, so you'll find it. Which one is it? What was the abstract on that?

So I thought this abstract was perfect for the style of abstracts. We've all read them online where you read just the abstract online and you get everything you need to know from the study. Perfect, and you don't even need to read the paper. There aren't any problems, how we did it, the computer program we used, the findings, the results, the implications, but it's important for my final comment, to remember that *Science* and *Nature* papers are almost like news articles. They're like news articles in the paper. I mean, they really, yes, they're scientific papers but most of the details are in the supplementary online material and they're 15,000 words, maybe 25,000 if you're lucky. And you are trying to attract a larger audience, so, again, as I've said in the other abstracts, take a stand in your title and I took from this abstract that what was done was modeling the dynamic behavior of cytokines. That's the big breakthrough, you just modeled how cytokine production changes over time, you can stratify patients and make predictions about how fast they're going to generate these antibodies, and that's really cool. So why not just say that in the title? 'modeling the dynamics of immune signaling outputs predict antifactor-8 antibody production.' You're sort of leaving why that's important for the first sentence of the abstract. You don't really know why antifactor-8 antibody production matters, but in the very first sentence at the end, this idea that the title works with the abstract, 'treatment of hemophilia A patients with clotting factor 8 is complicated by the development of antibodies directed against f8' and then you have the details and the statement that we don't know why this is, and then you notice I removed the materials and methods. 'We used this pathway and blah blah blah, we modeled' as soon as you say 'we modeled' it evokes some kind of computational procedure, some sort of algorithm, some sort of computer program, and some sort of dynamical output that you're acting on, so we model the dynamics of these cytokine pathways at work predict that biomarkers for antiF8 production. And I thought the rest was fine. So I think, just by removing the very, very specific materials and methods and trying to

more clearly state what the output of the entire project was, you know, new procedure predicts something important. And I would leave it for the editors of *Science* and N*ature* because this is not my field, as to whether that rises to the level of sort of New York Times news article. That's all I have to say.

We have 2 more abstracts, so. Yeah, I'll email these to you so you can send it back to them.

Maybe we can go over one more of detailed bit. There was one where, okay, why don't you do this?

Okay, so this is the same thing over and over again. Take a stand in the title about what you think it is you should, and you can't tell them how you did it. That's part of the story of what is nowadays network model is part of the story, it's about in the title. And what I think this point is the instruction of our metabolism is outdated by this, and does not. And the rest of it, is again, a really useful spread. So when the author gets back this thing you will just see that I didn't really change anything, I just got rid of phrases and one additional sort of explanatory sentence, and sort of taking the stand about what it is that you think you found. I combine the concept of the new age model being novel because a lot has used these two things, and a lot of. So basically, the word is the right thing; rearrange them a bit. So it's the same abstract that I wanted to give this week.

So, something with a very similar title or approach is published in *Nature* in March, so this is the abstract that we received. Is Christy here? And this is the *Nature* paper that was actually published, so did you?

I got a description from reading Nature examples. I am researching activation micro.. but I looked online at recent papers.

So you used that script. So, you did a little. But I wanted to bring your attention to some words that is used in their abstract and to some of hers that she used. So they're saying things in kind of active, decisive voice. They're saying that 'capsid signaling controls microphiliac activation (?)' there's a statement here.

You need to know what microphiliac(?) are and you need to understand neurosisity (?). I wouldn't write a title like that, but clearly, made it in a journal, so it's a good title for *Nature*. And as I said, I'm not an authority on this, so I'm just giving you a few suggestions, but there is an active kind of decisive voice when they're describing what they did. And they play a decisive role in pathogenesis and they regulate microphilia activation. So these are rules they are using. So here are some words that you are using 'understanding something' like in the process of understanding, we haven't understood it yet, so it's not decisive, it's. And 'novel statistical method' so you know there's a Nature method, it's I don't remember seeing a lot of papers in *Nature* or in *Science* that describe methods recently. So usually, they want you to maybe develop a new method of describing of what you found using that method and it's still did you biologically break it that you should make signal. And then you say, this is an improvement over previous methods, so it's incremental though. It's not a breakthrough. You know, it's just maybe tweak as opposed to what they're saying, it's controlled, and it's you know, very straight, precise, and a lot of things. And once again, allows us to understand it. I thought it was a good abstract but it didn't have this decisive, I know what I did, it's really important and here I'll explain to you why it's important. Because it's all I wanted. And the other thing is, you once again, you only used 168 of your 300 words you could use. So, you could beef it up a little bit.

We were asked not to write the full text.

Alright, questions? Suggestions? Comments? Good jokes?

If you're taking down something from 500 words to 300 words, how would you, I find that a very difficult thing.

It is very difficult, because you fall in love with 500 words and you can't, you can't imagine living without 200 of them.

I went from 1500 to 500 and now I have to do it again.

It's painful, that's all I can offer.

The other thing that Adam said, if you haven't published in Science or Nature, the editors will actually rewrite your titles of your abstracts for you. We haven't mentioned that, but it's fair to say that the 2,000 some Science paper that journal writers were not comfortable with the concept of this notion of this, so they forced us to write a new like that to. It turns out it is a system, that they want to be very careful, and they want to better things.

I'm sorry I don't have a quick answer. Other questions?

Alright, thank you very much for your patience.

Index of Keywords and Terms

Keywords are listed by the section with that keyword (page numbers are in parentheses). Keywords do not necessarily appear in the text of the page. They are merely associated with that section. *Ex.* apples, § 1.1 (1) **Terms** are referenced by the page they appear on. *Ex.* apples, 1

Attributions

Module: "Derived copy of Understanding the Promotion and Tenure Process"
Used here as: "7. Derived copy of Understanding the Promotion and Tenure Process"
By: Sujata Krishna
URL: http://cnx.org/content/m38087/1.1/
Pages: 53-58
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/
Based on: Understanding the Promotion and Tenure Process
By: Rice ADVANCE
URL: http://cnx.org/content/m19412/1.2/

Module: "3. Obtaining Funding"
Used here as: "8. Obtaining Funding"
By: Sujata Krishna
URL: http://cnx.org/content/m37014/1.3/
Pages: 59-67
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/

Module: "Grant Writing: Getting Started"
Used here as: "9. Grant Writing: Getting Started"
By: Sujata Krishna
URL: http://cnx.org/content/m37150/1.2/
Pages: 69-77
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/

Module: "Grant Writing K99/R00 and R01"
Used here as: "10. Grant Writing: K99 R00 and R01"
By: Sujata Krishna
URL: http://cnx.org/content/m38302/1.1/
Pages: 79-85
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/

Module: "Time Management"
Used here as: "11. Time Management"
By: Sujata Krishna
URL: http://cnx.org/content/m37116/1.5/
Pages: 87-89
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/

Module: "GCC-NLM Professional Development - Conflict Resolution Video Transcript"
Used here as: "12. Transcript of the video on ' Conflict Resolution'"
By: Sujata Krishna
URL: http://cnx.org/content/m41551/1.1/
Pages: 91-112
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/

Module: "Transcript of the video 'From Academia to Your Own Start Up'"
Used here as: "13. Transcript of video 'From Academia to Your Own Start-Up'"
By: Sujata Krishna
URL: http://cnx.org/content/m43325/1.2/
Pages: 113-124
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/

Module: "Transcript of the video Grant Writing K99R00 and R01"
Used here as: "15. Transcript of the video 'Grant Writing K99 R00 and R01"
By: Sujata Krishna
URL: http://cnx.org/content/m41666/1.1/
Pages: 125-149
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/

Module: "16. Transcript of the video 'Writing a Paper for Nature'"
By: Sujata Krishna
URL: http://cnx.org/content/m43326/1.1/
Pages: 151-163
Copyright: Sujata Krishna
License: http://creativecommons.org/licenses/by/3.0/

GCC-NLM Professional Development Collection
A collection of modules form the GCC-NLM Professional Development course developed by Sujata Krishna, PhD.

About Connexions
Since 1999, Connexions has been pioneering a global system where anyone can create course materials and make them fully accessible and easily reusable free of charge. We are a Web-based authoring, teaching and learning environment open to anyone interested in education, including students, teachers, professors and lifelong learners. We connect ideas and facilitate educational communities.

Connexions's modular, interactive courses are in use worldwide by universities, community colleges, K-12 schools, distance learners, and lifelong learners. Connexions materials are in many languages, including English, Spanish, Chinese, Japanese, Italian, Vietnamese, French, Portuguese, and Thai. Connexions is part of an exciting new information distribution system that allows for **Print on Demand Books**. Connexions has partnered with innovative on-demand publisher QOOP to accelerate the delivery of printed course materials and textbooks into classrooms worldwide at lower prices than traditional academic publishers.