



New Faculty Orientation: Research

**Maja Mataric'
Vice Dean for Research**

About the Presenter



- Undergrad University of Kansas, PhD MIT 1994
- Asst. Prof of CS at Brandeis '94-' 97
- Joined USC in 1997 as an assistant professor
- Assistant (1st kid '98) → associate ('01) (2nd kid ' 02) → full (' 06) (3rd kid '09)
- Center director (RASC), Viterbi WiSE Chair, Academic Senate President, Vice Dean for Res.
- Provost' s Strategic Planning Committee, Mentoring Steering Committee, Trustee Academic Affairs Committee, Senate Executive Board, University Committee on Appointments, Promotions and Tenure
- Research: intelligent robotics, from robot teams to socially assistive robots for rehabilitation, training, and education
- Funding: NSF, NASA, NIH, DoD, DoE, DoEd, foundations, industry gifts
- **Academia is a great place to continually invent yourself, but do so wisely**

Goal & Methods



<https://viterbischool.usc.edu/researchandinnovation/>

- Goal: Facilitating and Enhancing Research Excellence
- Methods:
 - Programs for junior faculty
 - Active dissemination of opportunities (gist & web)
 - Leveraging Office for Research opportunities
 - Collaborating with other USC schools & units
 - Help with center and other large-scale proposals
 - VICI fund for incubating centers
 - Visioning exercises and strategic initiatives
 - Awards Office
 - Viterbi Research Committee



Junior Faculty Programs

- At least one mentor for pre-tenure faculty
 - mentoring lunches, meetings
- Funding for travel to meet with sponsors
 - if not already in startup package
- Internal review program for NSF Career proposals
- “Best practice” advice for early career/young investigator program
- Viterbi support for YIP proposals, especially broader impact
 - E.g., reduced indirect costs
- Directed dissemination of YIP funding opportunities
- Personalized advice from the DC Research Office

University & Viterbi Research



- USC is a Research I university
- USC has consistently risen in national research volume rankings:
 - In total research expenditures (>\$500M): around 10th among private and around 25th among all (ahead of Yale & Harvard)
 - In federal expenditures (>\$200M): 10th among private and 19th among all (ahead of Yale)
 - Viterbi is the 2nd largest contributor (after Keck/Medicine)
- Viterbi's research expenditures are about 1/3 of USC's; this includes all engineering-affiliated centers and faculty and all types of research funding (federal, corporate, and private)
- The funding portfolio is distributed over various sources

Interdisciplinary Research



- USC spotlights societally relevant research; such research is inherently interdisciplinary (read USC vision doc)
- Interdisciplinarity is a major strength of USC
- Take advantage of our varied strengths in the numerous schools: Keck, Annenberg, Dornsife, Dentistry/Kinesiology, Gero, Cinematic Arts...
- BUT: pre-tenure interdisciplinary research has risks:
 - Must show a major contribution in at least one field, cannot straddle and be OK “overall” or “on average”
 - Promotion letters needed from recognized major figures in the field
- If you are defining a new area, make sure it is recognized and considered a contribution; give talks far and wide, and publish in recognized established journals with good impact factors

USC Office of Research



<https://research.usc.edu>

- Under Vice President Randolph Hall (formerly of Viterbi)
 - reports to the Provost
- Purpose: help faculty in the process of research:
 - University-level strategy, initiatives, partnerships
 - Training courses via the Center for Excellence in Research (CER)
 - Support for shared equipment cores
 - Cost-share on center proposals
 - Internal funding programs
 - Funding information dissemination
 - Management of institutionally limited funding opportunities
 - Oversight of USC Stevens
 - Washington DC branch

Washington DC Branch of USC Office of Research



<https://research.usc.edu/about/vp/dc/>

- Steve Moldin, Executive Director, most experience with NIH
- Jim Murday, DoD expertise, especially nano & energy
- Al Olson, intelligence community & other services
- Internal NSF experience from several NSF staff and rotators
- Multiple consultants in DC
- Facilitate large grants, meetings with DC funders, workshops in DC and locally, visits by funders...
- First contact: Vice Dean Maja Mataric' (mataric@usc.edu)
 - Connection to the Vice President
 - Connection to the DC Office and Steve Moldin

Center for Excellence in Research (CER)



<https://research.usc.edu/about/vp/cer/>

- A Senate-Provost initiative that originated in the University Research Committee by M. Matarić
- The USC Office of Research supports and houses the program and offers a menu of information and training workshops about obtaining funding from various federal agencies, industry, foundations, etc.

Internal Funding Opportunities: University Level



<https://research.usc.edu/for-investigators/funding/usc/>

- Zumberge: small w/ mentor (\$10K, year-round) and large interdisciplinary (\$85K, annual), competitive
- Collaborative Research Fund (\$30K/year, up to 3 yrs)
- Core Instrumentation (\$300K), as-needed cost-share (up to \$200K), also technician funds
- WiSE: undergrad (\$5K/semester), grad top-off, faculty support (up to \$50K every 4 yrs), travel (\$2500/year)
- Initiatives:
 - Clinical and Translational Health Science (\$50K-\$80K/year)
 - Ming Hsieh Institute for nanoscience for cancer
 - Many others, see next slide and web page

Internal Funding Opportunities



<https://research.usc.edu/for-investigators/funding/usc>

Collaboration Fund; Core Instrumentation Fund; Donald E. & Delia Baxter Foundation Faculty Fellows Program; Eli and Edythe Broad Innovation Award; METRANS Transportation Center; Ming Hsieh Institute for Research for Engineering-Medicine for Cancer; Mousetrap Fund; Pfizer's Center for Therapeutic Innovation (CTI); Rose Hills Foundation Innovator Grant Program; Rose Hills Foundation Science and Engineering Fellowships; Saban Research Institute Cores; Southern California Clinical and Translational Science Institute (SC CTSI); Southern California Environmental Health Sciences Center; Southern California Research Center for ALPD & Cirrhosis; Technology Advancement Grants (TAGs); USC Alzheimer Disease Research Center; Undergraduate Research Associates Program; Viterbi Research Innovation Fund; Women in Science and Engineering (WiSE); Zumberge Faculty and Research Innovation Fund

Viterbi Internal Center Incubator (VICI)



- [Arid Climate and Water Research Center \(AWARE\)](#)
- [Center for Artificial Intelligence in Society \(CAIS\)](#)
- [Center for Cyber-Physical Systems and the Internet of Things \(CCI\)](#)
- [Center for Human-Applied Reasoning and the Internet of Things \(CHARIOT\)](#)
- [Center for Peptide and Protein Engineering \(CPPE\)](#)
- [Center of Machine Learning \(MaSCle\)](#)
- [Robotics and Autonomous Systems Center \(RASC\)](#)
- [SleepHub](#)
- [Vertex Center](#)

Viterbi Internal Center Incubator (VICI)



- CIEBOrg: Center for Integrated Electronics and Biological Organisms
- Biomimicry for Synthesis of Smart Textiles
- Center for Intelligent Environments, Technology and Society (CENTIENTS)
- Center for Machine and Process Intelligence
- Healthcare and Medical Engineering (HealME) Center

Contracts & Grants Administration



- **Central:** Dept. of Contracts and Grants (DCG), run by Jeri Muniz, under the VP for Research Randolph Hall; *submits ALL proposals*
 - Compliance with federal and other funding submission regulations
- **School-level:** Viterbi Business Office (VBO), *approves proposals before proceeding to DCG & submission; oversees school-level compliance for pre- and post-award.* Viterbi contact to DCG: Nichole Phillips, Director of Viterbi Research Administration
- **Local/department-level:** Your dept. business manager will assign a research administrator, *who prepares proposals and submits to VBO*
 - *These are services **BUT please:***
 - *Be mindful of people involved and timing expectations*
 - *Read the memos*
 - *Report problems to Nichole Phillips*

Overhead



- Overhead = indirect cost, facilities and administration
- Pays for operating expenses of the university & school
- Overhead rate is 65%, determined by USC not Viterbi
- On par with comparable universities
- Of that 65%, ~12 pts (19%) goes to the Central USC Facilities Fund; there is also an overall participation tax (6%)
- Research is not really a revenue source
- Things that do not incur overhead:
 - Equipment (> \$5,000)
 - Tuition
 - Participant support costs
 - Subawards/contracts (only the first \$25k of subs are subject to overhead)
 - Agency-mandated no overhead programs (see cost-share)

Cost-Share



- Cost-Share = Viterbi's subsidy for a specific effort/proposal; a cost to the school
- Indirect costs can be cost-shared under appropriate conditions; this is an income loss for the school
- Some universities don't give it (e.g., MIT, Stanford)
- Some federal grant programs and some foundations require it
- All cost-share requests must be submitted through the Viterbi online cost-share system at least 14 business days prior to the proposal submission deadline (at least a month for centers and/or other collaborative proposals with multiple schools involved)
- <https://viterbibusinessaffairs.usc.edu/research-administration/cost-sharing>

Viterbi Dissemination of Opportunities



- Weekly Research Gist
 - Funding opportunities
 - Local meetings/workshops
 - Research-relevant university announcements
- Comprehensive research portal:
<https://viterbischool.usc.edu/researchandinnovation/>
- Funding opportunities
 - Faculty research topic database
 - Pre-award and post-award policies
 - University and Viterbi Initiatives
 - Research infrastructure cores
 - Research-relevant resources

Early Career & Young Investigator Awards



- Many agencies have early career awards: NSF, NIH, ONR, Army, Air Force, CDMRP, etc.
- Your odds of getting these are higher than for other types of grants
 - E.g., NSF CISE 20% funding rate for CAREER <10% for standard grants
- These are often considered prestigious (e.g., NSF CAREER, ONR Early Career) and lead toward higher-level honors & awards (NSF and other PECASE awards)
- These pave the way for future awards from the same agency
- These help you get tenure (some type of YIP award is basically expected for promotion in Viterbi)

NSF CAREER Awards



- Almost all of our assistant professors get these
- You can apply up to 3 times
- Plan strategically and be ready:
 - Contact the relevant agency program director to learn more and discuss your plans
 - Take the Provost's training course in May
 - Participate in the internal review program
 - Take broader impact very seriously (for all NSF grants, not just CAREER); it may decide if you get funded among the top candidates
- This advice applies to all other early career proposals as well

Broader Impacts



- NSF and some other agencies focus on broader impact & outreach
- A web page or a standard course not sufficient; instead, consider:
 - A well thought-out outreach program
 - K-12 teacher training & local school visits
 - Partnership with a public institution (e.g., California Science Center)
 - Many more good models, be creative
 - Example: NSF RET Program (supplements and sites) and GK-12 Program (BE-LA)
- Societally relevant research is a key tenet of the USC Vision
- Dr. Katie Mills from the Viterbi K-12 STEM Center help each faculty member individually design a broader impacts program for Career and other proposals



Research Centers

<https://viterbischool.usc.edu/research-centers/>

- Research centers of excellence are a means of facilitating high-impact usually interdisciplinary research
- Viterbi has many centers
- Participate, enhance your research, collaborate, leverage
- BUT: keep your research contribution clear and identifiable
- AND: don't get involved in a major service role before tenure (e.g., Education Director, Outreach Director, etc.)

New Research Initiatives Program



- Overseen by Mahta Moghaddam, collaboratively with Research Vice Dean
- Ideation, team-building, and implementation of new research initiatives
- Coordination between faculty research (including Viterbi research centers), industry partners, and Advancement activities
- Coordination of convergent research initiatives between USC Viterbi and other entities both on-campus and off-campus
- Targets of specific active pursuit:
 - NSF ERC, STC, and MRSEC proposals
 - MURIs
 - NIH centers
 - DoE EFRC, DoD centers, EPA SCPC
 - Corporate and Foundation relationships for basic and applied research

Facilitating Centers & Large Proposals



- Submit the request to Mahta Mogaddam
- Use the center proposal coordination process lead by Nichole Phillips
 - Graphics support
 - Grant writer/editor support
 - Short-term teaching release
- Initiate space request negotiation (Linda Rock)
- Streamlined cost-share procedures (on-line form)
- Interaction with the VP for Research via Vice Dean for Research to get support for interdisciplinary=multi-school proposals
- **Need to reach out early in order to provide support and contract with outside contractors such as graphic artist and/or writer/editor**

Viterbi Awards Office



- Role: to serve as a resource to Viterbi faculty and department chairs in nominating our Viterbi faculty for national and international awards, fellow and advisory committee opportunities
- Structure: two staff members (Kim & Kelly)
- Activity stats: ~ 90 nominations/year, ~30% success rate
- Point of contact:
 - Kim Matsunaga (kim.matsunaga@usc.edu)
 - If you feel ready to be nominated for an award, make sure to contact Kim or your department chair



Awards Notification Tool

- Purpose: notification, tracking, and recognition of faculty awards
- **Faculty** enter their own awards on myViterbi site. Dept. chairs screen and distribute.
- Types of awards to be reported: best paper awards, society awards, fellowship distinctions, and national and international awards.
- No grants and contracts, with the exception of Early Career Awards/Young Investigator Awards/Pioneer Awards which are also distinctions.

Viterbi Core Infrastructure



<https://viterbischool.usc.edu/shared-research-infrastructure/>

- Shared core infrastructure with user fees:
 - Core Center of Excellence in Nanomaging (CNI, Andrea Hodge)
 - John O'Brien NanoFab Core & Cleanroom (Andrea Armani)
 - Center for Peptide and Protein Engineering (CPPE, Rich Roberts)
 - Center for Advanced Manufacturing (CAM, SK Gupta)
 - Quantum Computing Center
 - Machine Shop
- Programs:
 - Provost's Core Infrastructure Initiative
 - NSF Major Infrastructure Program (MRI)
 - DoD DURIP Program
- Disseminating infrastructure funding opportunities, cost-share
- Networking with existing centers & institutes to leverage resources

Corporate & Private Funding



- Corporate and Foundations Relations Office: Todd Logan
- Foundations: Jennifer Lidar
- Special RFPs with partnering companies (GE, Lockheed Martin)
- IP negotiations can be lengthy...



Industrial Partnerships

- Airbus Institute for Engineering Research (AIER)
- Center for Machine Learning (MASCLE)
- Center on Advanced Manufacturing (CAM)
- Cyber-Physical Systems and the Internet of Things (CCI)
- Michelson Center on Convergent Bioscience – Agilent Center of Excellence
- Pratt & Whitney Institute for Collaborative Engineering (PWICE)
- TCC Foundation Center for Reduced Emissions Using Plasma
- USC Center for Artificial Intelligence in Society (CAIS)
- USC-Lockheed Martin Quantum Computation Center
- CiSoft: Center funded by Chevron; possible model for other centers

Average Expectations: The Dean's Vision



- At least 3 GRAs funded per year
- Fellowships and TAs are in addition to that
- 25% GRAs not allowed on grant budgets
- One PhD graduated per year, one new PhD student taken on
- 5 years in the PhD program per student: 1 as TA, one as fellow, and 3+ as GRA (no fixed order)
- Each faculty member should submit at least 2 proposals per year as PI, the range goes to 30+
- Co-PI and other roles are extra and encouraged
- These are minimal numbers: do the calculation for how much it takes to sustain a pipeline of 3+ GRAs given funding rates (~10%) and plan proposal submissions accordingly

Pointers for Getting Research Funding



- The economy can always be in better shape; research support has been steady, no telling what will come next
- Basic advice:
 - Connect with program managers/administrators at federal agencies, go to visit, talk to them
 - Serve on review panels as much as possible
 - Read winning proposals and get people to read your proposals and give you honest feedback
 - Talk to research mentors about the content of your research and your research strategy
 - Get your students engaged early in research, writing papers, and helping with proposals
 - **It is necessary to be strategic and well prepared**

We Are Here to Help



- Mentoring programs (this is part of it)
- Tracking proposal submissions
- Tracking research involvement (co-PI, senior/key personnel, student supervision, etc.)
- Faculty forums with key visitors:
 - luminaries
 - representatives from funding agencies
- Weekly research gist
- Memos with important news
- Research portal
- Special programs for junior faculty, as well as PhD students and postdocs

Resources for Junior Faculty



- New faculty orientation
- Fall workshop on research administration (new!)
- NSF Career award internal review program (2 reviews per proposal by previous winners) with Broader Impacts help (Dr. Katie Mills)
- Cost-share on early career awards (except NSF and NIH, where it is not allowed)
- Travel funds for junior faculty
- Reduced teaching load
- Faculty mentoring program

Mentoring



- *Each of you should have a mentor with whom you have a productive relationship*
- All pre-tenure faculty have at least one, preferably two, assigned mentor(s); tell us if it's working
- HOWEVER: assigned mentors are not always ideal
- Tell us your preferred mentor, and we will work to set it up
- Vice Dean Timothy Pinkston will meet with each of you
- Use the following individuals as mentors: assigned mentor, dept. chair, vice deans, (more) senior colleagues you like
- Take the time to network and talk to people

Keep the Dialogue Going



- *Contact info:*
 - Email to me (mataric@usc.edu) AND assistant: Marjorie Brownbill: brownbil@usc.edu
For appointments contact Marjorie
 - Nichole Phillips: nicholep@usc.edu 213-740-3237
 - Amanda Reguengo: amandas@usc.edu 213-740-6064
- We move as fast as possible, but please leave enough time for addressing and iterating on issues
- We want you to succeed. Own the school, it's yours to shape and lead!