## PHYSICAL SCIENCES AND ENGINEERING (2-11-10)

**What are the reasons that someone should come to und for research in the physical sciences or engineering?**

- SUNRISE
- Geothermal
- Energy and petroleum research
- Administration is NOT an impediment (compared to other Universities) they have a supportive administrative function
- Size of the U is good, adaptability and quickness a good thing (due to smaller size)
- Not as insular – silos are smaller, more cross work between departments
- Ad hoc collaboration happening at UND
- UND is nimble. Cross disciplines across colleges at UND and cross pollination
- Flatter hierarchy at UND
- Smaller size allows students greater access to teachers and faculty

**What assets, resources and capabilities help UND?**

- Energy development, clean water
- Well balanced portfolio of energy
- Because of size (smaller) makes more partnerships across university and outside the U
- Interdisciplinary work in nano sciences
- Produces high quality graduates
- Fundamental work (dark energy…) is strong across the campus
- EERC
- EPSCOR
- Computing capacity is fairly weak
- Computer science faculty is stretched thin (this is a gap)
- UND Research Foundation, CIBD, REAC – good support for translational work
- Reasonable IP policies
- Distance education is strong and allows ability to develop coursework
- Strong UAS capabilities (very unique)
- Many observational platforms for measuring the atmosphere (decent capacity but continued work needs to be done and more investment is always required)
- Ability to construction, build and test capabilities (engineering in particular)
- ND has clean environment is an advantage in scientific studies and accompanying expertise to conduct work

- Students say use of other capacity and access to other faculty is key and strong
- A lot of hands on experience for students and they run a lot of the research

**From the Faculty – what are the University's Niches?**

- Climate research
- Energy
- Aerospace
- Medical devices is an opportunity
- Particulate matter (across physical and life sciences)
- Multi scale modeling and experimentation and move it fluidly across faculty
- Dark energy
- High temperature and combustion capacity along with modeling
- Surface transportation weather identification and modification
- High-pressure capacity (larger scale) and high temp sample synthesis
- Unmanned aircraft including sensors, pilot instruction
- Nano particles
- Natural disasters (ie water/flooding)
- Air pollution control technologies
- Remote sensing capacity
- Green applications/technologies and understanding the environment
- Ag products to products and fuels, chemicals (energy uses)
- Chemical feedstocks
- Life support/space suits and systems
- Mobility of contaminants through solid surfaces
- Size of schools within UND bring a lot of different people together and allows flexibility and run a wide gamut
- Faculty student relationships are a real strength (through a lot of personal contact)
- Teaching and research are integrated! "student centered research"

**What would be surprise for people outside the University?**

- High temp and high pressure research and demonstration

**Specific outside collaboration?**

SUNRISE

**UND unique facilities**

- Imaging center
- ERL at Engineering

**Barriers & Limiting Factors**

- Need grant support (admin)
- Research space is at a premium
- Cutting edge computing (no linux box is an example) is limited
- Overabundance of paper work administratively
- Start up funding for research is limited
- Availability of tuition waivers for emerging departments
- Weather can be problem in attracting/recruiting faculty
- Need more work on updating facilities
- Twamley shuffle (from students perspective)
- Need more admin, secretarial
- Low representation of women in engineering makes it hard to recruit more women
- Availability of matching funds is problematic
- Grad school needs more money to deal with growing grad student population
- Awareness of funding options needs to be increased and put in central place
- More info about resources needs to be developed and aware

**Aspirations – what do you want to do and be in ten years?**

- Science education – need to promote science from graduates (this can be developed through increased research capabilities) – create a pro science state!
- A developed intrastate transportation option
- Increased lab space
- More involvement by students in determining what space is needed/wanted
- More research technicians to help faculty and students
- Energy/education research platform to include teaching and demonstration (campus wide)
- Convert buildings from "dumb" buildings to "smart" buildings

- Create advanced reward system for conducting research (to include adding faculty)
- Centralized communications and information systems (to include feedback from users)
- Optimize IT infrastructure
- A higher level of collaboration cross discipline (develop a forum to share info, ideas and opportunities)
- Involve policy side in collaborative projects (as well as technology side)
- Students in engineering coupled with entrepreneur group (good now, needs to be increased)
- Develop Zigma Zi (spelling?)
- More support for things researchers are not good at (ie accounting).
- Work on addressing water issues in state (would be good for the legislature as well) in a cross discipline approach
- In ten years don't want to have the same problems then as we do now (energy, fuel)
- Increased basic infrastructure
- Proper climate control
- Continued development of research in energy (emerging energy options such as wind, solar)
- Transforming transmission options for energy (radio frequency)
- Platform for demonstrating energy and education platform to include infrastructure (green technologies and ongoing research in building, HVAC...)
- Make research important within the state and have the legislature realize this and support
- Need to develop approach to make research important to populace to garner support (ie agriculture, water…) – get the message out
- Need to set priorities (fix old buildings or build new ones)
- Need to explain to "our bosses" (tax payers) what contribution the U is making to growing our state and communities – need to be proactive all the time in promoting needs and benefits
- Do research that benefits the industry of the state (ie lignite, agriculture…)
- Need more outreach to industry (need to be more aggressive)
- Specialized research agreements
- Need to continue to develop funding and research opps for students (to develop trained leaders)
- Increased internships, preference to ND trained students as employees
- Need research project that is very relevant to the state
- Create the "energy station" here as compared to "ag station" at NDSU

## Facilities

- Lab equipment, tech support, buildings (including upgrades of existing and build new) **13**
- IT support and equipment (faculty and grad student specific)
- Equipment to attract and retain graduate students (including IT and infrastructure)
- Prioritize upgrades, maintenance on existing and new equipment – set up a maintenance fun/tech fee at the university level. **(19)**
- High speed computing centralized system adequately funded and supported (ie CRC) **5**
- Increased Internet connectivity (switches/fat pipes)
- Structural testing equipment for wind turbines **12**
- 3d scanner with corresponding 64 bit capability for geology
- Particulate measurement station

## Structures and Governance

- Firm commitment to development, protection and commercialization of technology
- Educate faculty for commitment to development, protection and commercialization of technology
- Reward faculty commitment to development, protection and commercialization of technology
- Have President appoint an ambassador for technology/innovation
- Review balance between research and education
- Administrative support for grant writing and administration
- Develop and/or enhance research collaborations between institutions through

## Program Development

- Identify UND as a premier institute for: Energy, Transportation fuels, batteries/fuel cells, off peak storage of power **(17 points)**
- Institute for materials including high temp. alloys, ceramics, carbon nanaofibers, specialized membranes
- Bring up platform for energy education/research
- Systematically identify and re-evaluate focus research areas
- Directed reinvestment of F&A into research growth areas (four points)

## Collaboration

- Re-engage EERC
- Learn from EERC – promotion of research
- Build mechanism to recognize and reward researchers involved in interdisciplinary research
- Allow more autonomy for researchers involved in collaborative research
- Existing and potential centers need to focus on better communication with faculty about opportunities for collaboration
- Ability to see what research projects applied for grants, not just those projects which received funding
- Searchable database of UND research projects/proposals (way to find out what is happening outside your department (9 points)
- Incentivize collaboration done mandate it
- More seed money for collaborative/interdisciplinary work
- More focus on inter-college collaboration, above and beyond interdepartmental projects.
- Support staff to help researchers make connections and work with private industry (translators)
- More aid in dealing with IP issues
- Blow up the promotional/tenure system – limiting factor to collaboration as currently structured (six points)
- Collaborative "matchmaker" – staff/office focused on building collaboration

## Faculty Development and Recruitment

- Seed money for mid-career faculty to do research (nine points)
- Institutional support for faculty leave and replacement staffing
- Increase increments for promotion salaries
- Improve starting salaries
- Improve institutional support for startup research (six points)
- Modernize research facilities (six points)
- Provide funds for equipment updating and maintenance
- Mechanism for adding faculty to capitalize on opportunities
- Reward faculty efforts for research proposal awards (10 points)
- Endowed research chairs to leverage ongoing resources
- More opportunities for collegial exchange eg. Faculty club
- Tie in with community and cultural events
- Support for development of faculty research proposals
- Streamline administrative process for proposal submission (single point of submission) (five points)
- Enhance Alice Clark mentoring program
- Add secretary to accounting staff

- Address moral problems in financial staff
- Leadership development program for future department chairs
- More flexibility in expenditures for equipment
- Research centers to encourage/facilitate info sharing and collaboration
- Change requirements for grad student (TOEFL) – barrier to recruiting intl. grad students (five points)
- Reduce time for processing of graduate student applications
- Simplify process for hiring post-docs (now same as for faculty)

**TOP Areas as "voted" on by faculty**

- Lab equipment, tech support, buildings (including upgrades of existing and build new) **13**
- Prioritize upgrades, maintenance on existing and new equipment – set up a maintenance fund/tech fee at the university level. **(19)**
- High speed computing centralized system adequately funded and supported (ie CRC) **5**
- Structural testing equipment for wind turbines **12**
- Identify UND as a premier institute for: Energy, Transportation fuels, batteries/fuel cells, off peak storage of power **(17 points)**
- Directed reinvestment of F&A into research growth areas (four points)
- Searchable database of UND research projects/proposals (way to find out what is happening outside your department **(9 points)**
- Blow up the promotional/tenure system – limiting factor to collaboration as currently structured **(six points)**
- Seed money for mid-career faculty to do research (nine points)
- Improve institutional support for startup research **(six points)**
- Modernize research facilities **(six points)**
- Reward faculty efforts for research proposal awards (10 points)
- Change requirements for grad student (TOEFL) – barrier to recruiting intl. grad students (five points)