Research Roadmaps - A Critical Part of your Plan for Research Success

Lesia L. Crumpton-Young, PhD
Director, The Center for Advancing Faculty Excellence (CAFÉ)

Retired Professor of Industrial Engineering
Former NSF Program Director
Former Associate Provost at Texas A&M University
Former Department Head at the University of Central Florida
Former Associate Dean of Engineering at Mississippi State University
CEO, PowerfulEducation Technologies

US Presidential Award Recipient for Excellence in Mentoring Faculty & Students
Most Common Strengths

*developed by NSF DUE Program Officers in 2008

Strengths Cited in More Than 20% of the Panel Summaries

- Evaluation plan
- Build on prior work or products
- Large impact
- Dissemination, contribution to KB
- Potential for involving W&M
- Collaboration details
- PI's strong
- Important, timely, or responsive
Most Common Weaknesses

*developed by NSF DUE Program Officers in 2008

Weaknesses Cited in More Than 20 % of the Panel Summaries

- Collaboration details
- Large impact
- Innovative or novel
- Build on prior work or products
- Potential for involving W&M
- Dissemination & contribution to KB
- Activities doable & related to outcomes
- Evaluation plan
- Sufficient detail and clear plans

Percent

0 10 20 30 40 50 60
What makes a proposal Competitive?

- Likely high impact
- New and original ideas
- Succinct, focused project plan
- Knowledge of subject area of published, relevant work
- Experience in essential methodology
- Clarity concerning future direction
- Sound scientific rationale
- Realistic amount of work
- Sufficient Detail
- Critical Approach/sound plan of implementation
The World of Research

How do I get there from here?
Successful Research Efforts

- Develop Research Program Areas
- Develop A Research Roadmap
- Identify Funding Agencies
  - Plan for approaching Agencies
  - Identify Deadlines for submission
  - Determine Formats needed for submission
- Develop Research Infrastructure
  - Personnel, Students, Equipment, Surveys, Test Subjects, etc
- Develop Publication Plan
- Develop Presentation Plan
Research Program

- National Need/Compelling Area
- Research Project Ideas
- Research Funding Sources
- Research Proposals
- Research Environment
- Research Publications & Presentations
- Research Societies, Agencies, etc

Human Performance Dynamics
The World of Research

The Strategic Journey
What is a Research Roadmap?

- Research Plan
- Critical Path
- Blueprint
- Timeline
Why is a Research Roadmap Needed?

- To Effectively Manage Resources
  - Talent, Time, Energy, etc.
- To Provide Daily Guidance
- To ensure that your long term goals are met
- To provide enhanced productivity
  - (i.e. Efficiency)
- To provide “peace of mind”
Primary Components of the Roadmap

- Compelling Problem/Area of National Need
- Research Vision
  - (SMART criteria)
- Research Areas of Priority
  - (SWOT analysis)
- Research Objectives to be pursued
  - (Important questions to be answered)
- Significance of Research Objectives
  - (What is the Value Added)
Developing a Research Roadmap

<table>
<thead>
<tr>
<th>Need</th>
<th>Vision</th>
<th>Area</th>
<th>Objective</th>
<th>Significance</th>
<th>Method</th>
<th>Timeline</th>
<th>Funding</th>
<th>Publish</th>
<th>Priority</th>
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Developing A Research Roadmap

- Vision
- Research Areas
- Objectives
- Significance
- Method
- Timeline
- Publication Plan
- Funding
Step 1: What National Area of Need/Compelling Area of Research Are You Interested in Working On???
Primary Components of the Roadmap

- Compelling Problem/Area of National Need
- Research Vision
  - (SMART criteria)
- Research Areas of Priority
  - (SWOT analysis)
- Research Objectives to be pursued
  - (Important questions to be answered)
- Significance of Research Objectives
  - (What is the Value Added)
Considerations for Compelling Research Ideas, Projects, Programs, Proposals

Benefit to Societal Advancement

Benefit to Human Health and Welfare

Benefit to US Competitiveness, Environment, Economy

Benefit to the Professional Discipline

Benefit to the Research Knowledge Base
Grand Challenges

Make solar energy economical

Manage the nitrogen cycle

Provide energy from fusion
Grand Challenges

Provide access to clean water

Advance health informatics

Restore and Improve Urban Infrastructure
Grand Challenges

Engineer better medicines

Reverse-engineer the brain

Prevent nuclear terror
Grand Challenges

Secure cyberspace

Enhance virtual reality

Advance personalized learning

Engineer the tools of scientific discovery

http://www.engineeringchallenges.org/
Step 2: Identify your Research Vision
Primary Components of the Roadmap

- Compelling Problem/Area of National Need
- **Research Vision**
  - (SMART criteria)
- Research Areas of Priority
  - (SWOT analysis)
- Research Objectives to be pursued
  - (Important questions to be answered)
- Significance of Research Objectives
  - (What is the Value Added)
SMART Criteria

- S – Specific
- M – Measureable
- A – Ambitious/Achievable
- R – Relevant (Responds to a NEED)
- T – Time Defined
The major societal problems that I am most interested in solving include:
Society would be a better place if the following were created:
My knowledge and expertise would be best applied to the following areas of study:
My knowledge and expertise would be best applied to solving the following problems:
Society would be a better place if the following solutions were implemented:
US Competitiveness Would Increase If the following were created or done:
My discipline would significantly benefit from the following creations:
My discipline would significantly benefit from the following solutions being developed:
The Grand Challenges that I am most interested in helping to address in our country are:
The ENVIRONMENT Would Increase BE BETTER If the following were created or done:
Step 3: Identify your Research Priority
Areas to Pursue
Primary Components of the Roadmap

- Compelling Problem/Area of National Need
- Research Vision
  - (SMART criteria)
- **Research Areas of Priority**
  - (SWOT analysis)
- Research Objectives to be pursued
  - (Important questions to be answered)
- Significance of Research Objectives
  - (What is the Value Added)
**SWOT Analysis - Research Domain**

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• **Strengths:** what are the advances/advantages of your current research or literature in the field.
• **Weaknesses:** what are the mistakes made or fruitless efforts of your current research or literature in the field.
• **Opportunities:** what are the new theories to be tried/what existing theories haven’t been tried, etc.
• **Threats:** what circumstances/situations/hurdles exist that could inhibit the achievement of the research goals.
Step 4: Identify the Research Objectives to Pursue
Primary Components of the Roadmap

- Research Objectives to be pursued
  - (Important questions to be answered)
  - What are you trying to accomplish

- Significance of Research Objectives
  - (What is the Value Added)
  - What will be the outcomes
To formulate Objectives

3 Basic Types of Research

- #1 Descriptive Research Study
  - Typically provides general information about a certain factor
  - Ex. How many Americans buy Foreign vehicles?
  - Ex. Percentage of African-Americans young females that voted in the last presidential election
To formulate Objectives

3 Basic Types of Research

- #2 Experimental Research Study
  
  Typically analyzes the effect of or the relationship of multiple variables
  
  - Ex. What is the impact of playing games on the fatigue level of humans
  
  - Ex. What is the affect of typing on the development of Carpal Tunnel Syndrome
To formulate Objectives

3 Basic Types of Research

– #3 Evaluative Research Study

Typically provides an evaluation or assessment of a certain product, process, or phenomenon

– Ex. How difficult is it to operate a cell phone?
– Ex. What are the customer complaints associated with the Disney Fast Pass System?
Step 5: Plan the Research
Methodology to be used
Primary Components of the Roadmap

- Research Methodology
  - (how will this be done?)
- Research Timeline
  - (how long will this take?)
- Research Funding Plan
  - (Do I need some money for this research?)
    - (Who will pay for this?)
    - (How much will it cost?)
Write a Research Plan to Answer Key Questions

What has been done previously by others in this research area?
Why is your approach promising?
Why is the research goal and objectives to be pursued important?
What evidence supports that this is a good research idea to pursue?

How will the research study be conducted?
What research methods will be used?
What research variables will be tested?
What research equipment will be used?
What testing samples will be used?
Write a Research Plan to Answer Key Questions

What experimental design will be used?
What participant group will be used?
What control group or baseline testing measures will be used?
What data collection instruments will be used?
What data collection techniques will be used?
What data collection protocol will be used?
What data analysis techniques and approaches will be used?
What statistical analysis techniques will be used?
What timeline will be used for the research work?
What management strategy will be used to oversee this research?
What major milestones will be met in the research and when will they be met?
Primary Components of A Research Roadmap

• Publication Plan
  – (What aspect is publishable?)
  – (Where will I publish this work?)
Various Types of Publications

- Conference Proceedings Publications
- Journal Publications
- (Content consideration –
  - literature reviews,
  - discussion of conceptual ideas,
  - description of designs, theories, policies, practices, etc
  - Project outcomes
  - Experimental results
Additional Points to Ponder
Strategy for Success

Chase The Fat Rabbits
Strategy for Success

Decide if you Should RUSH-IT OR FLUSH-IT
DEVELOP YOUR POWER PARTNERS

- Collaborators
- Mentors
- Advocates for your Work
- Expert Reviewers
- Administrators
TURN the CRITIC OFF
INVEST IN LOW COST SUPPORT
Productive People Think and DO Things Differently

THANK YOU