Mapping out a Research Agenda

Barbara G. Ryder
Rutgers University
ryder@cs.rutgers.edu
http://www.cs.rutgers.edu/~ryder
http://prolangs.rutgers.edu/

Why do research?

• To satisfy intellectual curiosity
• To better understand things
• To be at the forefront of an exciting, technical field
• To always be learning new things
• Because that’s what professors do!
Helpful Personal Qualities in Pursuing Research

• Creativity
• Curiosity
• Independence of thought
• Good communication skills
• Perseverance
• Self-discipline
• Interaction skills

Choosing a Research Problem

• Problem should be important
• Problem should hold your personal interest
• Problem should have depth, in terms of aspects possibly available for investigation
• Problem might come from questioning existing literature
Choosing a Research Problem

- Problem may be amenable to some technique you already have devised
- Problem may lead you into new technology
- Problem may be in 'hot' area
  - Pros and cons

How to proceed?

- Set aside **uninterruptible** blocks of 'research thinking time' in your weekly schedule
- Familiarize yourself with previous work from the literature
- Critically examine previous approaches, questioning generality, practicality, validation
How to proceed?

• Frame long-term questions to be answered
• Use short-term objectives to subdivide research into manageable pieces
  - Divide work into investigations that ‘fit’ into a coherent whole
  - Make progress one paper at a time

How to proceed?

• Know what it means to ‘solve a problem’ or validate a technique
• Write papers and give talks about your work
  - Intuition, intuition, intuition
  - Exercise: do an in-the-elevator summary
• Develop a personal style
  - One at a time vs juggling several projects
How to proceed?

- Allow your graduate students to suggest explorations
- Re-examine your research achievements at regular intervals, to ensure progress towards answering long-term questions

SE Research

- What practical problems are you addressing?
- How will you validate your approach?
- How can you 'keep up' with this broad area of CS&E?
  - Attend conferences and network
  - Pick favorite journals and other research groups and periodically visit their websites
Specific Techniques

• Establish a reading group with your students

• Summarize attended conferences to others, to discuss key research issues encountered
  - 2-3 sentence summaries of each presentation

• Keep a research notebook where you can jot down ideas for later consideration
  - Go back and look at your entries!

Specific Techniques

• Teach a graduate seminar in your area of interest
  - Teaching is a learning experience

• Attend workshops, especially those with work-in-progress presentations

• Participate in grant evaluation panels and program committees
Specific Techniques

• Leverage your efforts with graduate students
• Use senior faculty mentor(s)
  - e.g., Obtain examples of funded proposals

Possible Pitfalls

• Switch of research areas during junior faculty years
  - Requires large time investment up front
• Controversial/risky research areas
• Obtaining negative results
• Interdisciplinary work
Collaboration

• **Con:** Need for junior faculty to establish a personal research identity
• **Con:** May be time-consuming
• **Pro:** Projects can be more complex and more realistic
• **Pro:** Allows groups to tap into personal strengths of participants

Biggest Challenge

How to develop a coherent research agenda with limited time to do so, while juggling the responsibilities of a junior faculty?