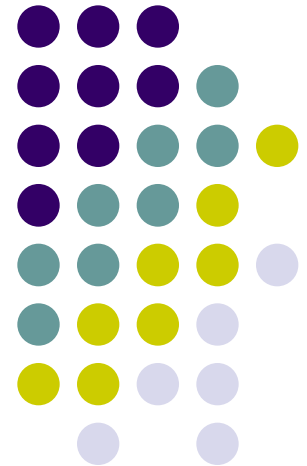


# Product Development Process Standardization in Multi-Project Organizations

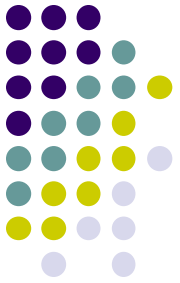
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Sid Rupani  
PhD Candidate  
Engineering Systems Division, MIT

*Advisor: Warren Seering*



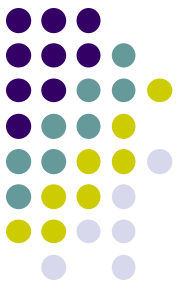
# The initial question





# Agenda

- Definitions and Motivation
- Research Questions
- Research Framework
- Research Design and Methods
- Initial Research and Findings
- Plan going forward



# Product Development Process

- “A *product development process* is the sequence of steps or activities which an enterprise employs to conceive, design, and commercialize a product”

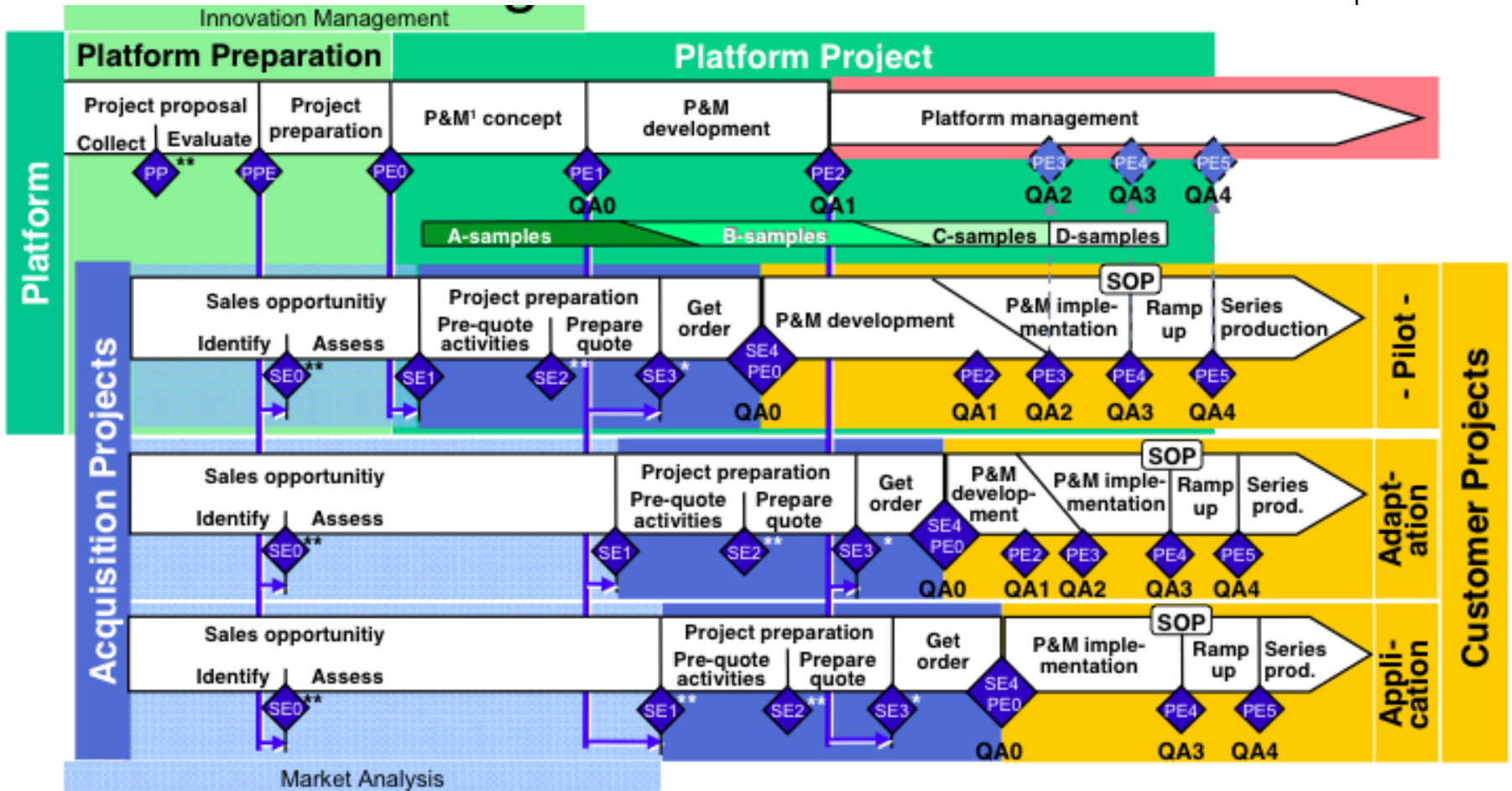
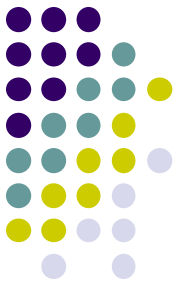
*Ulrich and Eppinger, 2000*

- “Processes can be regarded and treated as systems that should be engineered purposefully and intelligently, facilitated by useful models.”

*Browning, Fricke, and Negele, 2006*

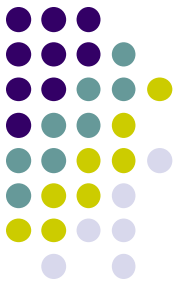


# Product Development Process - Example



Robert Bosch GmbH, Control Systems

# The issue



“Companies made up of many different business units will face an important question as they make the shift to a process enterprise:

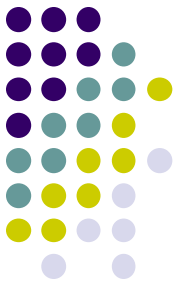
Should all units do things the same way, or should they be allowed to tailor the process to their own needs?

In a process enterprise the key structural issue is...**process standardization versus process diversity.**

**There’s no one right answer.”**

*Hammer and Stanton, 1999*

# Benefits of Standardization



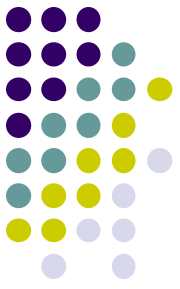
- Process standardization enables true concurrent engineering and provides a structure for synchronizing cross-functional processes that enables unmatched vehicle development speed...
- standard development processes are the only conceivable way to run a multi-project development factory and gauge the performance and progress of any individual program.”

*Morgan and Liker, Toyota Product Development System, 2006*

- The standardization increased the relevance of knowledge acquired in one part of the establishment for another and the documentation served as a conduit for knowledge to flow from one part of the organization to the other.

*Adler and Cole (1993), Argote (1999)*

# However...



- Projects are different!

PD projects differ in factors like scale, complexity, technology uncertainty, schedule, environments, goals, domain, available resources, and project team capability.

*MacCormack and Vergnanti, 2003; Dvir, Shenhar, and Alkaber, 2003; Cockburn, 2000; Glass, 2000; Lindvall and Rus, 2000.*

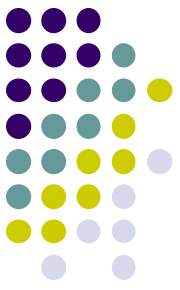
- A ‘one-size-fits-all’ approach is difficult to work in product development.

*MacCormack and Vergnanti, 2003; Glass, 2000; Lindvall and Rus, 2000.*

- “...process diversity offers one big advantage: it allows different kinds of [projects] to be managed in different ways”

*Hammer and Stanton, 1999*





# The standardization extreme

- “...many organizations’ standard processes tend to be detached from the way work is actually done. Many of those doing so-called ‘real work’ may see the standard process as irrelevant, too generic to be helpful”

*Browning, Fricke, and Negele, 2006*

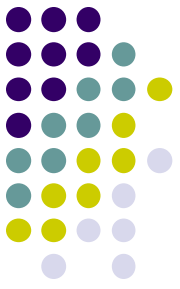
- Standard process is often bureaucratic and cumbersome, lacks buy-in from employees, and project teams often circumvent the process or only pay lip-service to it.

*Cooper, 2005*

- GM example: “the more they attempt to define the process of product development, the less the organization is able to carry out that process properly.”

*Sobek, Liker, and Ward, 1998*

# Standardization and Innovation

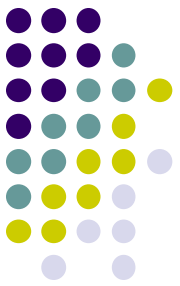


- Routinization creates a risk: when organizations are guided by old knowledge, they do not create new knowledge.

*Brunner, Staats, Tushman 2009*

- In a 20-year longitudinal study of patenting activity and ISO 9000 quality program certifications in the paint and photography industries, we found that **increased routinization associated with process management** activities increases the salience of short term measures and triggers selection effects that lead to increases in exploitative technological innovation, **at the expense of exploratory innovation.**

*Benner and Tushman, 2002, 2003*



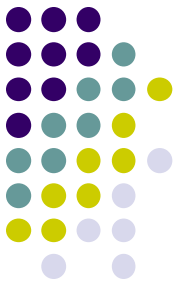
# Overarching Question

- “The need to achieve organizationwide convergence of development processes often **conflicts** with the need to execute projects that vary widely in nature, scope, duration, or sophistication.”

*Ramaswamy, 2001*

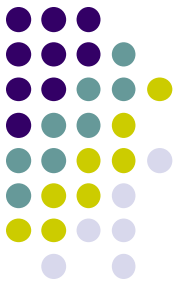
- *Tradeoff* between process Standardization and Diversity

For a given organization, what is the right level of standardization across product development processes?



# Research Questions

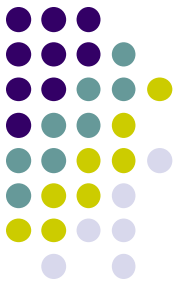
1. How do product development processes for different projects in an organization differ?
2. What factors drive these differences?
3. How do differences (diversity) or commonalities (standardization) between processes impact performance on project-level and organization level outcomes?



# Research Approach

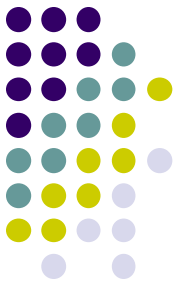
- Theory-building from case studies
- Working with 4 companies
- Studying archival process data, project information, performance outcomes (where available)
- Interviewing project managers, process managers, engineers, business-unit managers

# Examples of Project level Process Data

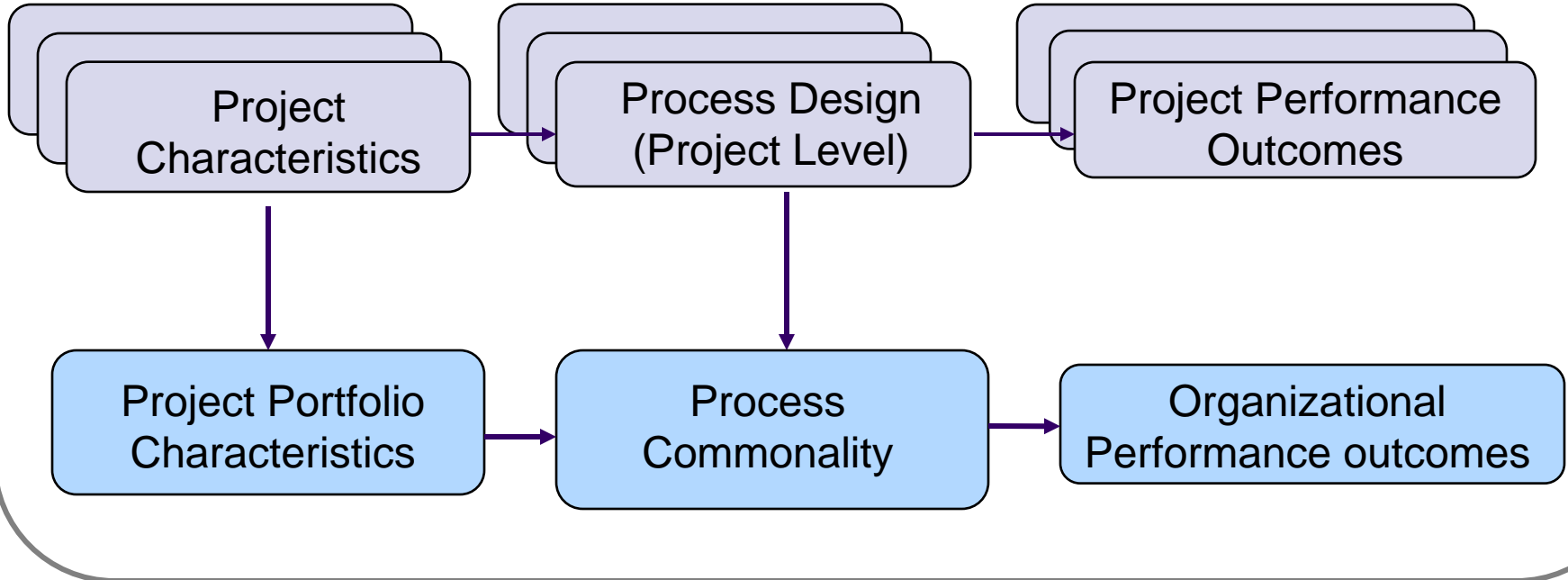


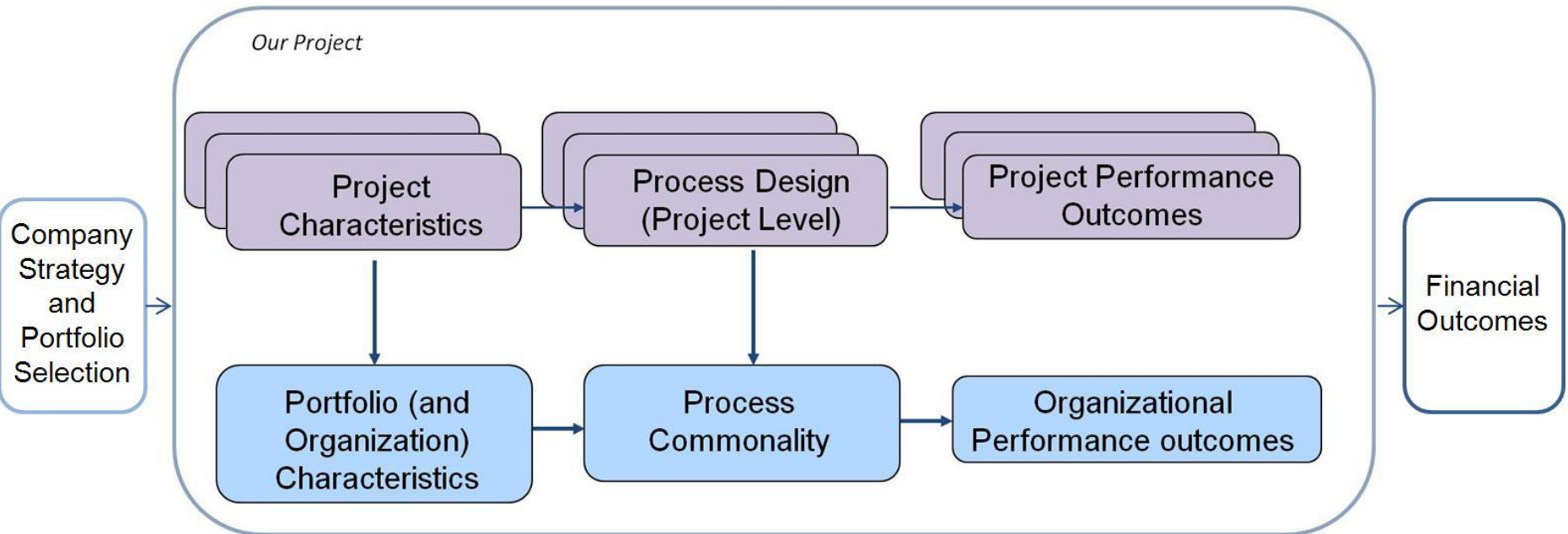
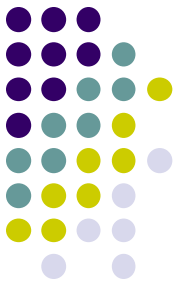
- “Engineering Plan”
- Gate Reviews
- Process Customization Declarations (PCD) and Rationales for Deviation (RfD)
- Project Information Repositories and Checklists
- Several “Process Views”
  - Different views contain overlapping but different information
  - Integrate and Triangulate information

# Research Framework

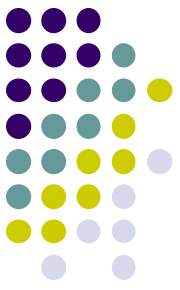


*Our Project*









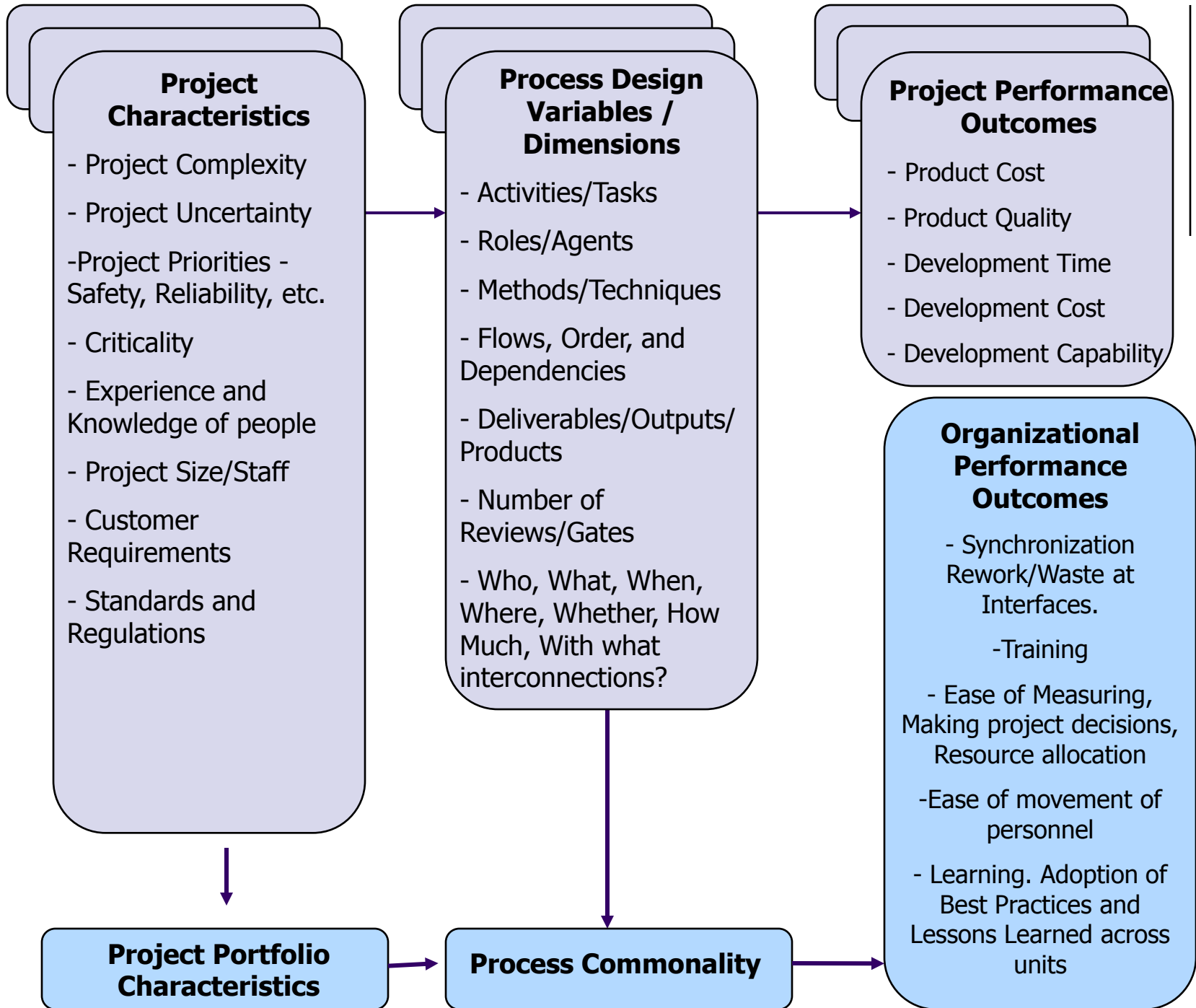
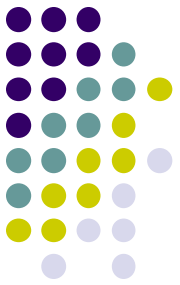
# Extending the Current Work

- Majority of process design work is at the level of individual project  
*“Little research has been completed on the links between the operations at project level, the portfolios of projects at the organizational level, and central routine activities of the firm as a whole.”*

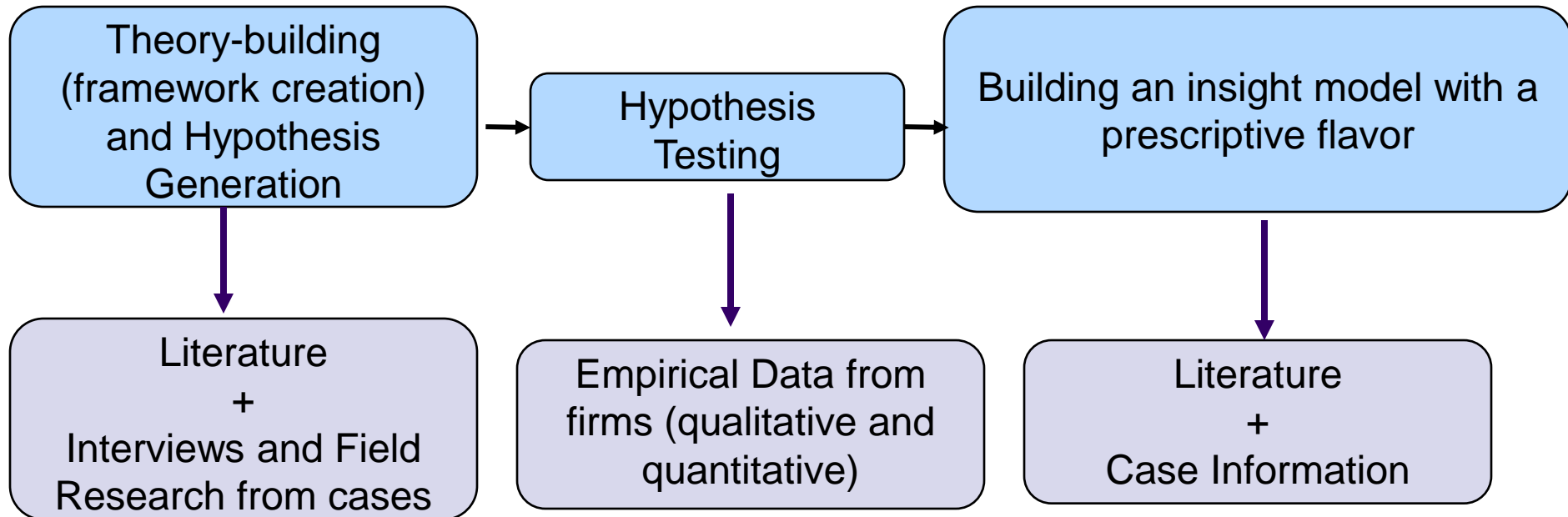
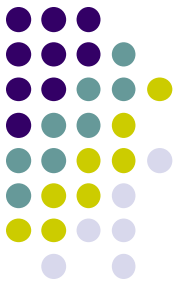
*Gann and Salter (2000), Engwall (2003)*

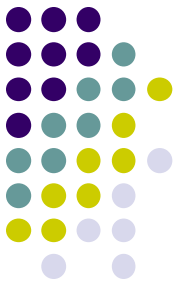
- Process standardization research treats process in undifferentiated manner  
*“On both sides of the question, complex causal mechanisms play out in diverse ways in diverse situations. This might imply that we should not be aspiring to general conclusions with respect to the overall question, but rather seeking to sort out the mechanisms and the contingencies.”*

*Winter (2009)*



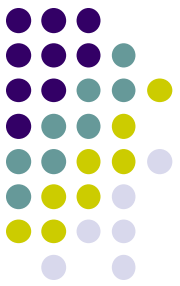
# Research Flow





# Plans going forward

- Test hypotheses generated from theory-building exercise
  - Measures of process commonality working with process documentation
  - Select and develop coding for projects and work with data to test project-process characteristic correlations. Combine with interview information
  - Process customization – project performance link
- Transforming conceptual model (from framework) into mathematical model



# Questions and Comments



Category	CTOL	STOVL	CV
Common	39.2%	29.9%	27.8%
Cousin	41.0%	37.5%	29.1%
Unique	19.8%	32.6%	43.1%

Source: <http://www.jsf.mil/>, accessed July 6, 2006

