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Improving the Practice of Process Improvement

Laura Black

The Paradox of Process

- Process-focused improvement efforts promise big payoffs. (e.g. Easton and Jarrell 1998)
  - **Total Quality Management**
    Business Process Reengineering
- But process-oriented efforts often fail.
  - **Failed implementation (e.g. Ernst and Young 1991, White 1996)**
  - **Short-lived successes (e.g. Kaplan 1990)**

The Paradox of Process

- Product development is a particularly challenging process.
  - › **Long delays between decisions and consequences**
  - › **Content provided by many functions**
- Doing product development well promises a particularly high payoff.
  - › **Tools seldom used (e.g. Cooper, Edgett, and Kleinschmidt 1997)**

Why can’t we collaborate?

projects

duration: initiation to launch

engineer-hours to complete

customer base

volumes

percent first-time buyers

Engineering

Marketing

Challenges in Cross-functional Collaboration

- The knowledge we need is
  - **Local (Wenger 1998)**
  - **Embedded (Polanyi 1966)**
  - **Invested (Taylor 1993)**
- We have trouble representing to each other what's at stake for us
  - **Longer development cycles, higher costs, fewer efficiencies**

Why can't we keep up?

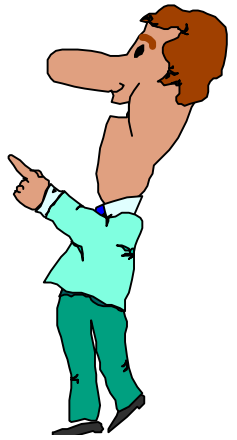
MKT: No design changes--just make it black!

ENG: It's a process problem. We've never painted parts that get so hot.

MKT: It's the right thing to do!

ENG: We'll have to pull people off the early phase of Secret Project.

MKT: Secret Project is the right thing to do, too. It must be ready next year.



ENG: We'll work extra hard. We'll pull off this lob-in and Secret Project, too.

Engineering

Marketing

Challenges of Dynamic Complexity

- Short-term actions and outcomes are more
  - **Salient (Kahneman et al. 1982)**
  - **Certain (Einhorn and Hogarth 1985)**
  - **Tangible (Repenning and Sterman 2000)**
- The longer the delays, the worse grows our decision-making.
  - **We blame the people, not the system--and make the problems worse. (Repenning and Sterman 2000)**

Process Challenges

- A *process* by definition
  - **Involves multiple practices**
  - **Is dynamic**
- Product development is particularly vulnerable to two failure modes:
  - **Break-downs in cross-functional collaboration**
  - **Inability to manage dynamic complexity**

Boundary Objects Help with Collaboration

- A robust boundary object...

  ***concretely* shows**
  ***differences* and *dependencies* and**
  is *transformable* by all involved

- Kinds of boundary objects:
  - **Repositories**
  - **Objects / drawings**
  - **Maps / models**
  - **Methods**

Formal Models Help with Dynamic Complexity

- System view shows it's the process, not just the people. (Repenning and Sterman 2000)
- A model can depict interactions between physical and behavioral aspects of work.
- Simulation through time portrays trade-offs between short-term and long-term strategies.

Each Without the Other May Not Work

- Typical boundary objects can't always
  - **Represent the dynamic complexity at stake**
  - **Represent a *process* as it is and as it can be**
- Formal modeling efforts often
  - **Fail to involve the people who can act**
  - **Fail to be concrete**
  - **Fail to be transformable / iterative**

Proposed: Use Formal Model as a Boundary Object

- Formal model is more explicit than description with words.
  - **The process of building a model aids consistency and draws out unspoken assumptions.**
- Simulation through time emphasizes dynamic nature of relationships / process.
  - **Simulation model is *designed* to be transformable.**

Proposed: Use Formal Model as a Boundary Object

- Process-oriented efforts may *require* formal models as boundary objects
  - **Rapid process prototyping**
    - ⇨Easy to transform
    - ⇨Easy to see trade-offs over long time horizon
  - **Low-cost iterative experiments-- a "wind tunnel" for organizational process experimentation**

As a Boundary Object a Model Can Become More Effective

- Involve people from across practices
  - **Use concrete model variables**
  - **Show how the work of one group affects the work of other groups**
- Model in front of the group
  - **Simulate early and often**

Learning More About Boundary Objects

- Using formal models as boundary objects
  - **Provides consistent empirical opportunities**
  - **Increases the population of boundary objects for study**
  - **Carries boundary objects into process design as well as product design**
- Using system dynamics models explores
  - **What levels of detail are appropriate to talking about process**
  - **Range of cross-practice collaboration**

Research Underway

- Combining **formal modeling** techniques with a theory of **boundary objects**, we'll contribute to the theory and practice of creating and sustaining robust processes.

- We're seeking to articulate a **sociology of effective use** of formal models.