Global Software Engineering: The Future of Socio-technical Coordination

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Overview

- Desired future state
- Problems we need to solve
- Research challenges
  - Software architecture
  - Eliciting & communicating requirements
  - Environments and tools
  - Orchestrating global development

Where We Want to Be . . .

- Resource use independent of location
- Effective coordination planning
- Uniform understanding of requirements
- Measure architecture/organization “fit”
  - Have rich set of tactics to choose from
- Effectively manage change

Problems of Global Development

- **Key phenomenon:** coordination over distance
- **Fundamental problem:** coordination mechanisms disrupted in distributed projects
- Coordination mechanisms
  - Based on agreements or contracts
  - Based on communication
- Distance
  - Much less communication
  - Less effective communication

Research Challenges:

Software Architecture

- Software dependencies and task dependencies
- Measuring architecture/organization "fit"
  - Can ***this*** organization produce software that conforms with ***this*** architecture?
  - Analogous to "design for manufacturability"
- Tactics for improving "fit"
  - Adjust organization
  - Adjust architecture

Research Challenges:

Eliciting and Communicating Requirements

- Anticipating the need to support negotiation
  - Predicting the amount of requirements change
  - Identifying who is affected
- Media for requirements communication
  - What needs to be face-to-face?
  - What mix of voice, video, messaging, tool-mediated communication?
  - Use of formal or diagrammatic representations?

Research Challenges:

Environments and Tools

- Virtual co-location
  - Informal communication
  - Awareness
- Continuing to exploit project memory
- Enriching project memories
  - What other data belongs in the memory?
  - How to balance privacy issues with utility?
- Project history and collaborative tool infrastructure
  - Potentially huge amounts of data
  - Integration, interoperability

Research Challenges:

Orchestrating Global Development

- What practices are effective when? E.g.,
  - Up front investment in design, process, architecture
  - Focus on agility, flexibility, communication
- Interactions among practices, e.g.,
  - Can I reduce the need for a common development environment by investing more in architecture design?
  - Will a defined process reduce the need for communication?

Conclusion

- Deeper understanding of coordination in software engineering
  - What kinds of coordination are required?
  - What drives the need to coordinate?
  - How do we predict the needs to coordinate across a project?
- Deeper understanding of coordination mechanisms
  - For a given project: how much to invest in coordination?
  - What coordination mechanisms/tactics to invest in?
- Need better theories of coordination