Architecting Social: Supporting the Exploration of Socio-Technical Dependencies through an Architectural Lens

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Team

* Collaborative effort
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Context

- Software engineering
- Complex
- Large-scale
- Inherently and deeply social
- Communication is key
Social and Technical: Side by Side

- **Technical artifacts:**
  - Requirements, design, source code, test cases, issues/bugs, frameworks

- **Social factors:**
  - Organizations, team structure, communication modes, location

If the social context is the environment within which the technical is produced, how does one affect the other?
Some Foundations

- Conway’s Law ("mirroring"):
  - Designs of systems tend to match the organizational and communication structures of those who build them
  - Quality of the interfaces are dependent on communication

- Socio-technical Congruence (STC)
  - High congruence tied to higher productivity and improved quality
Challenges in Finding Answers

- Post-hoc analysis
  - Calculation of congruence metrics and inferences about quality
  - Emphasis on low-level artifacts
  - Source code units becomes the primary view of the system

Too late for insights to be actionable

Less useful view early in development process
Awareness as the Foundation

**Architectural Diagram**

- Component A
- Component B
- Component C
- Component D
- Component E

**Source Explorer**

- proj_alpha
- pack_alpha
- pack_beta
- file_alpha.h
- file_beta.c
- ...
- ...

**Developer Social Network**

**File Network**

**Time Period**

- Last Week

**Project Activity**

- (a)
- (b)
- (c)
- (d)
- (e)
- (f)

**Details**

- proj_alpha
  - Component A (file_alpha.h, Developer 1)
  - Component B (file_beta.c, Developer 2) (*changed 3 hours ago*)
  - ...

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*Note: The diagram shows a network of components and dependencies, with details about file networks and social networks among developers.*
(Some) Use Cases

- Awareness of developer activity through the lens of architectural and task assignment knowledge
  - ...developer working on non-assigned components adding undocumented interface
- Better understanding of design decision influences and their relation to requirements
  - ...architectural additions to better fit team structure, possibly violating requirements
STML: Modeling Underpinnings

- Socio-Technical Modeling Language
- Addressing diversity and lack of standardization
- XML-based, strong typing, type-based extensibility
- Influences from xADL and using elements of the xADL toolset
- Promoting reusability and exchange
Interesting Questions

- Are socially-influenced designs supportive of requirements?
  - Do they erode up-front design decisions over time?
- What kinds of architectural styles “fit” best with organizational arrangements?
  - What about communication patterns?
- What is the right mode of intervention, and how do we know?
  - What is the easiest change to effect, and how to find the balance between social and technical?
Open Call

- Really interested your help!
- Reports of socio-technical observations
- Data-sets of past or ongoing projects
- Interest in using toolset
Final Thoughts

- Fascinating interplay between technical and social
- Working toward providing development-time support for awareness
  - Basis for investigating socio-technical interplay
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