Generalizing by Similarity:
Lessons learnt from Industrial Case Studies

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Agenda

- Introduction

- Our Approach

- Projects Under Study

- Findings

- Conclusion

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Introduction 1/2

❑ Large IT vendors execute 1000's of projects in variety of business domains and environments.

❑ Reliable dependence on past experience
  ▪ Saves cost
  ▪ Saves effort

❑ Generalize from past projects
  ▪ Made using subjective and unjustifiable judgments

Goal: Reduce subjectivity in the process of similarity-based generalization by identifying systematic ways to judge similarity.

RQ 1: What value can a business expect from past academic case study research, when a business faces a new project that appears to be similar to the previously published cases.

RQ 2: How can someone (e.g. a researcher or a project manager) generalize from observed cases by using his/her knowledge about similarities and dissimilarities between past and future cases

❑ Similarity-based Generalization

- Reasoning by Analogy

- Existential not Universal

- *Weak* Generalization - required reasoned judgment

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❑ Reasoning by analogy infers a property of an unobserved case, that we call the ***target*** of generalization, from observed cases, that we will call the ***source(s)*** of the Generalization.

    ❑ Note similarities and dissimilarities between source and target

    ❑ concludes that because of the similarity between source and target, and despite the dissimilarities, the same association will occur in the target

    ❑ It requires a so-called prior association, which is a relation observed in the source

Example:

- ❑ 3 agile projects
- ❑ No customer onsite
- ❑ All other aspects followed Agile guidelines
- ❑ software development company performed the agile project for a small company

> Prior Association is:
> **The project is agile, performed by a software development company for a small company, and there is no customer representative on-site.**

WILD GUESS !!!!!!

For the Generalization to be valid:

❑ a reason for the similarity to be sufficient to generalize from source to target, and

❑ a reason for which the dissimilarities are not sufficient to block generalization from source to target.

❑ Our Focus - *ARCHITECTURAL SIMILARITY*

   ❑ Decompose the case into components and relationships – interactions between components produce phenomena we want to generalize

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To summarize, our similarity-based inference contains the following steps:

❑ Describe the past projects' architecture in terms of actors and their capabilities.

❑ Identify a mechanism created by this architecture and explain this mechanism in terms of that architecture.

❑ Assess if a target case will exhibit the same mechanisms, assess similarities and dissimilarities between the architectures of sources and target cases and explain why the similarities are sufficient to justify the generalization and the dissimilarities not sufficient to block the generalization.

Project Details

❑ 3 projects - Project Alpha, Project Beta, Project Gamma

❑ "Called" Agile (in reality mix of agile and structured practices)

Outsourcing Project	Project Alpha	Project Beta	Project Gamma
Type of engagement (Outsourcing arrangement)	Single external client	Collaborative external client	Inter-departmental project
Scope	Large	Large	Medium
Number of team members	Nearly 300	35-40 + Client Team of about 100	35-40 + client team of about 50
Contractual agreement regarding cost and duration	Fixed	Flexible	Flexible
Size in person/years	400	343	85
Modularity of Product Architecture	Low	Low	High

Findings (1/2)

Observation: **In each project the client and the vendor had complementary specialized knowledge that helped in aligning technology with business.**

Supporting Quotes/Examples:

Vendors' Domain knowledge "We have a person specifically responsible for the domain knowledge in the team-business analyst, they understand the domain. So there are business architects, technology architect. Business architect works closely with the domain people. And then we have enterprise architect, they understand both."

Clients' Domain Knowledge: "When we didn't know something we went and asked the domain owner from client side and it was just on the spot we clarified and they provided that knowledge."

Mechanism: **If knowledge and skills of client and vendor complement each other, chances of business and technology alignment are enhanced.**

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Observation: The understanding of 'risk' by client and vendor was project context specific.

Supporting Quotes/Examples:

Participants emphasized that risks as perceived by clients and risks as perceived by vendors are different. They pointed out that in a fixed price/fixed schedule project, additional effort (e.g. adding new project staff) pertains solely to the vendor. But the vendor would then have to spend (elsewhere) employable people at no extra cost. The vendor would try to minimize this, if an effort-intensive user story is deemed high priority. They explained that if a project is not fixed-price, it becomes a risk for the client and there would be intense deliberations as to whether the effort being proposed by the vendor is really justified.

Mechanism: **A fixed price contract creates risk for vendor whereas time-and-money contract creates a risk for the client while experimenting with new methods and techniques**.

Conclusion

❑ **Contribution 1:** we reflected on what value a business organization can expect from hosting case studies for a researcher.

Empirical material collected adds value in at least three ways:

(i)   Provides rich case descriptions which can serve generalization purposes should the company face a similar project context in which it is supposed to execute a new project with predictable chance of success;

(ii)   the cases allow for distilling a number of mechanisms that explain why past projects were successful in implementing certain software engineering practices;

(iii)   using knowledge about these mechanisms and knowledge about the new project, business decision makers can do their own evaluation about the extent to which it is realistic to expect success from implanting practices from past projects in the new context.

❑ **Contribution 2: we made a proposal for a systematic procedure for generalizing based on knowledge about context similarities pertaining to new and past projects**

Questions

- For further queries, please contact me @ preethu.rose@tcs.com