Revealing the Obvious? A retrospective artefact analysis for an Ambient Assisted-Living project

Itzel Morales-Ramirez, Matthieu Vergne, Mirko Morandini, Luca Sabatucci, Anna Perini, Angelo Susi

EmpiRE – 09/25/2012

FBK, Trento, Italy

ICT School, Trento, Italy

Outline

- Context
- Problem
- Study Design & Process
- Results & Threats to Validity
- Conclusion

Context

- Domain: Complex software systems
  - Complex set of requirements
  - Ex: Socio-Technical System (STS)
- Focus: Requirements elicitation & analysis
  - New system
  - System evolution

What is the problem?

- We have:
  - Information sources
  - Requirements elicitation/modeling techniques
  - Guidelines to use them
- But:
  - Are guidelines followed? Effective?
  - → Practice poorly documented
- What would be great?
  - Identify which requirements come from:
    - which source/technique

What is a Retrospective Study?

Dingsøyr, 2005 [1]

*"By a postmortem, we mean a **collective learning** activity which can be organised for projects either when they **end a phase or are terminated**. The main motivation is to reflect on what happened in the project in order to **improve future practise** [...]*

*This type of processes has also been referred to as '**project retrospectives**'."*

Easterbrook & Aranda, 2006 [2]: *retrospective*

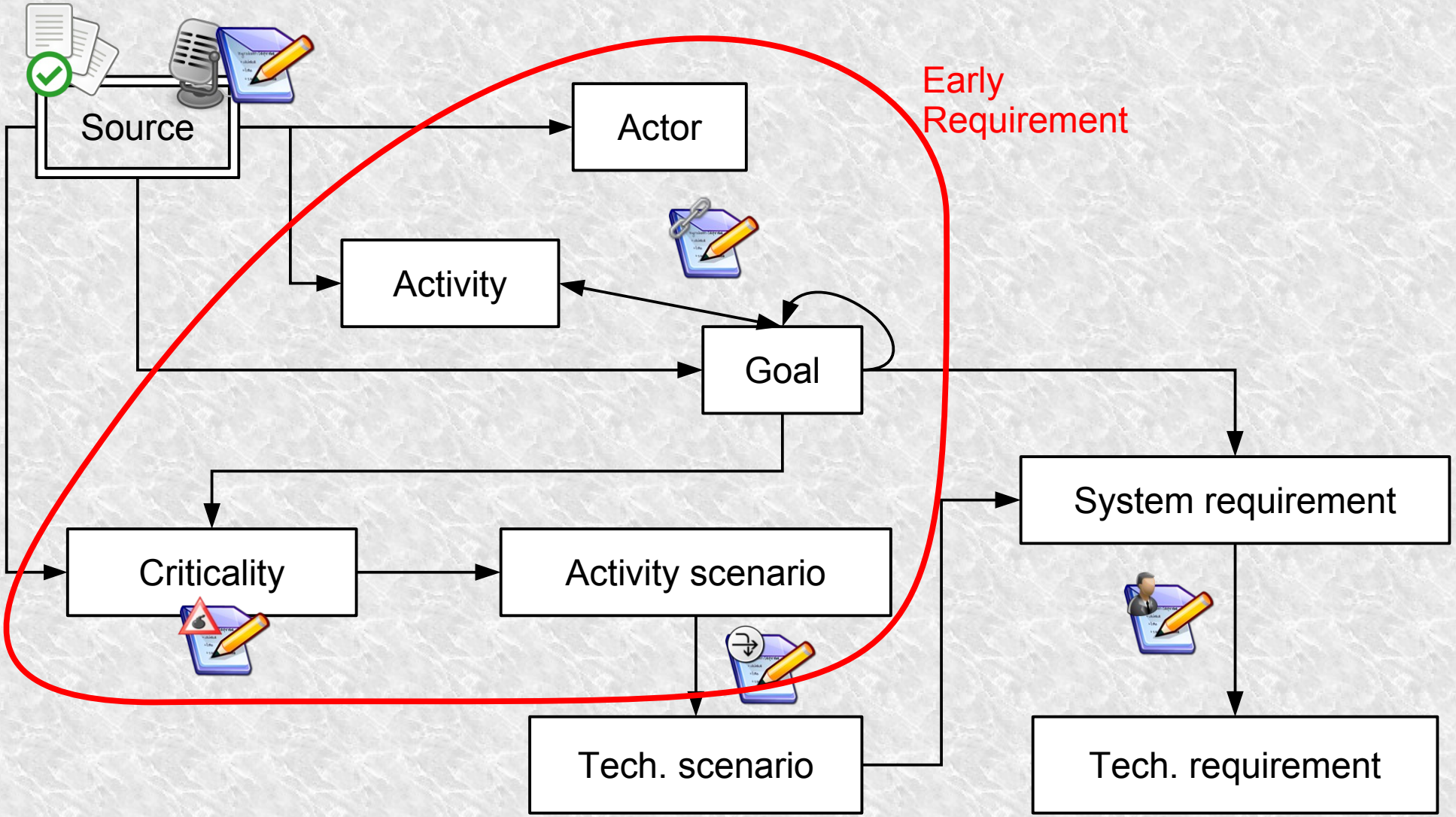
Why a Retrospective Study?

- See if practices follow guidelines
- See if techniques are effective
  - Where requirements come from?
  - Which sources? Techniques?
- Documentation about practice, not theory

Project Studied – ACube

- Assisted-living residence for elderly people suffering Alzheimer's disease
- Duration: 3 years (2008-20011) – RE phase: 6 months
- STS (medical constraints, unobtrusive monitoring, staff management, etc.)
- Several elicitation techniques used:
  - Interviews & questionnaires
  - Goal modeling
  - Scenarios
  - ...

ACube Process & Traces



Research Questions

RQ1: How did the different **information sources** contribute to the **identification and modelling** of the diverse artefact captured in **early-requirements** documentation?

RQ2: In which ways did the information sources, the early-requirements artefacts and scenarios contribute to the **elicitation of system requirements**?

RQ3: Does the **requirements elicitation process**, as reconstructed from the empirical analysis of the available documentation, comply with the **theoretical process** envisaged for the project?

Study - RQ1

- Identify patterns in ER artefacts traceability links

#id	Activity	...	Sources
a26	Assisted Washing		DOC03RSA DOC05RSA CartaServizi
a27	Medical check up		CartaServizi

Entities description

Traceability links

Study - RQ2

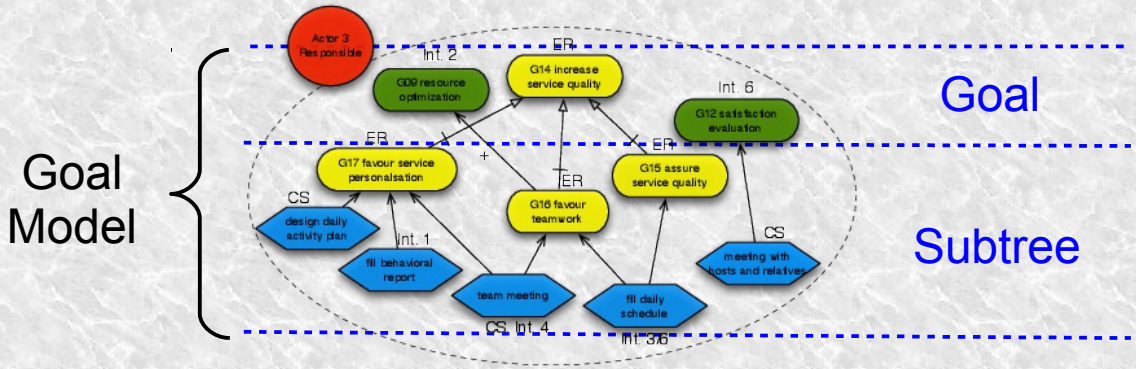
- Identify patterns in full paths traceability links

Requirements

Sources

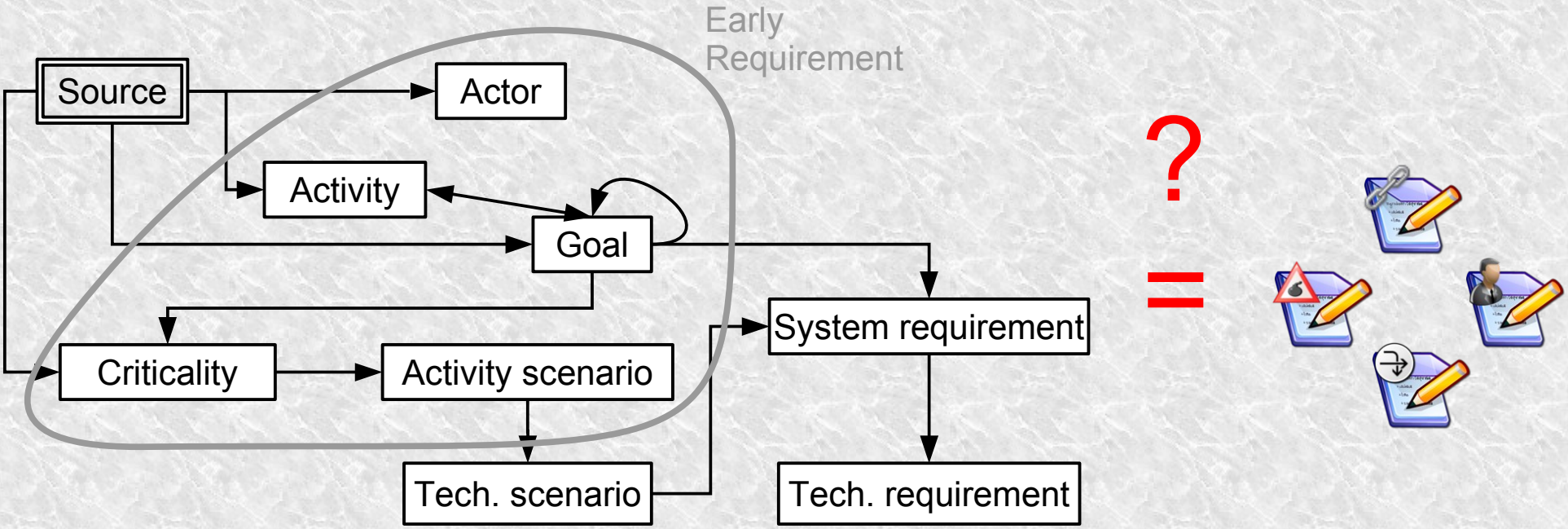
Paths

Reqs / Docs	Goal										Subtree										Scenarios									
	01	02	03	04	05	06	07	08	CS	ER	01	02	03	04	05	06	07	08	CS	ER	01	02	03	04	05	06	07	08	CS	ER
R021	X										X		X	X	X	X					X	X	X							
R022																					X									
R023	X										X	X	X	X	X	X	X	X	X			X	X							
R024										X											X		X				X			
R025	X										X		X	X	X	X					X	X	X							
R026	X									X	X	X	X		X		X	X	X		X		X				X			
R027	X									X	X	X	X		X		X	X	X		X		X			X	X	X		
R028																					X		X			X		X		



Study - RQ3

- RQ3: Compare theoretical & reconstructed processes

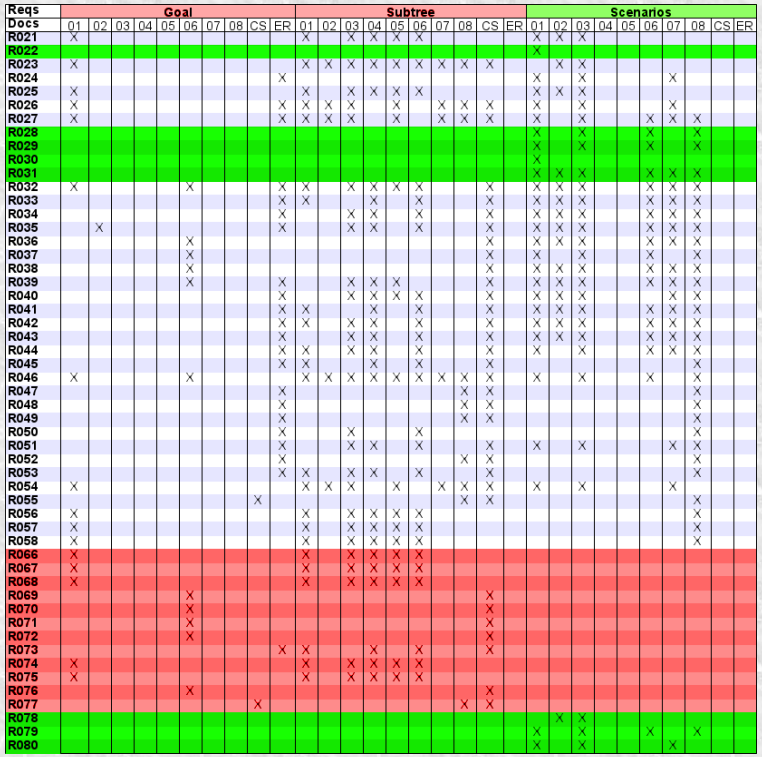


Results - RQ1

- RQ1: How did the different **information sources** contribute to the **identification and modelling** of the diverse artefact captured in **early-requirements** documentation?
  - GM elements ← interviews 
    - Activities ← organizational document 

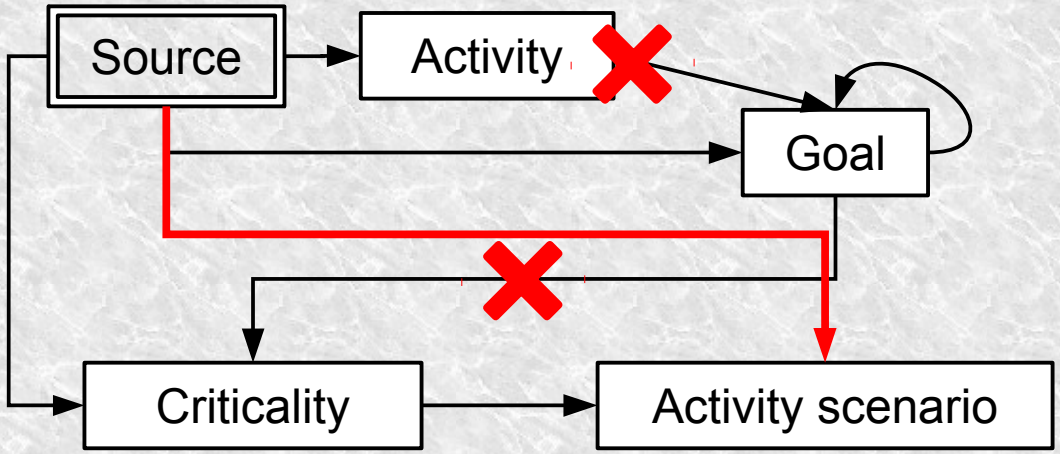
Results - RQ2

- RQ2: In which ways did the information sources, the early-requirements artefacts and scenarios contribute to the **elicitation of system requirements**?
  - GM and scenarios complementarity
  - 23% only GM
  - 15% only scenarios
  - 62% shared



Results - RQ3

- RQ3: Does the **requirements elicitation process**, as reconstructed from the empirical analysis of the available documentation, comply with the **theoretical process** envisaged for the project?
  - Globally compliant
  - Activity scenarios ← interviews
  - Bottom-up evidence



Threats to Validity

- Construct validity (measures correctness)
  - Sources-techniques-requirements relationships → Compare RE techniques I/O
  - Links interpretation → Traces directly related to the studied elements
  - Links validity → Partial check with IR tool (Lucene)
- Internal validity (relationships reliability)
  - 2 ACube analysts feedback → compared to data
- External validity (generalizability)
  - Single case → Representative STS

Conclusion

- Were the results obvious?
  - Yes, theoretical process and traces were close
  - But some unexpected differences revealed
- Did we learn anything to improve?
  - Evidences about GO and scenario-based methods complementarity
  - Version history missing → could help to understand RE process iterations
- Did we find anything to investigate further?
  - Potential revised guidelines exploiting unexpected combination findings
  - More retrospective studies on different projects (sources & techniques)

Thanks for your attention.

Questions?

References

[1] Dingsøyr, Torgeir. « Postmortem reviews: purpose and approaches in software engineering ». Information and Software Technology 47, n°. 5 (mars 2005): 293-303.

[2] Easterbrook, S., and J. Aranda. “Case Studies for Software Engineers.” ICSE’06 (2006). http://www.cs.utoronto.ca/~sme/case-studies/case_study_tutorial_slides.pdf.