iStar Showcase ‘11

Exploring the Goals of your Systems and Businesses

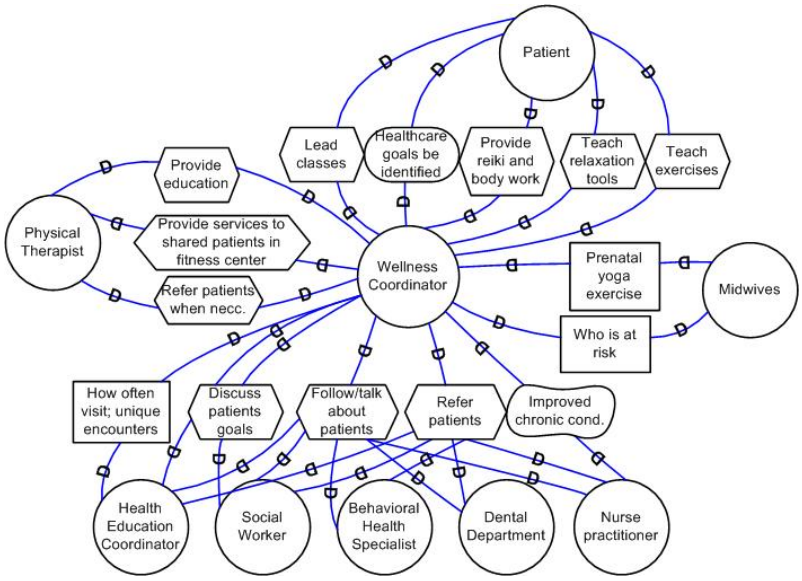
Practical experiences with i* modeling

June 21st, 2011, 13.00-17.00
City University London, Northampton Square, London EC1V0HB

Co-sponsored by
The British Computer Society Requirements Engineering Specialist Group
and City University London

Proceedings

Including Posters and Presentation Slides



An Example i* SD Model for a Wellness Coordinator in a Nurse-Managed Healthcare Center

Showcase Organizers

Neil Maiden, City University London, UK
Eric Yu, University of Toronto, Canada
Xavier Franch, Universidad Politècnica de Catalunya, Spain
John Mylopoulos , University of Trento, Italy

Proceedings Editor: Jennifer Horkoff

Program

Welcome by organizers - 2 minutes

Opening remarks - 10 minutes
● Ian Alexander - ScenarioPlus, UK; Chair, BCS RESG

An Overview of i* modeling - 20 minutes + 10 minutes Q&A
● Eric Yu, University of Toronto

Sample projects - long presentations - 15 minutes each + 5 minutes Q&A

Using i Modelling as a Bridge between Air Traffic Management Operational Concepts and Agent-Based Simulation Analysis*
○ **James Lockerbie** (City University London), David Bush (NATS, UK), Neil Maiden (City University London), Henk Blom (National Aerospace Laboratory (NLR), The Netherlands), Mariken Everdij (National Aerospace Laboratory (NLR), The Netherlands)

Evaluating the Impact of Evolving Requirements in HIV/AIDS monitoring systems in the UK
○ **Jorgen Engmann** (Health Protection Agency/UCL), Neil Maiden (City University London), James Lockerbie (City University London)

Agile Software Practices - Pre-adoption Analysis Using Strategic Modeling and Empirical Knowledge
○ Hesam Chiniforooshan (University of Toronto), Eric Yu (University of Toronto), **Maria Carmela Annosi** (Ericsson Research Italy)

Break - 20 minutes

Sample projects - short presentations - 3 minutes each + 1 minute Q&A

Civil and mechanical engineering

Modelling Requirements for an Integrated Management System for Civil Construction
○ Fernanda Alencar (Dep. Eletrônica e Sistemas), **Jaelson Castro** (Centro de Informática), José Roberto R de Menezes (Dep. Engenharia Civil,
○ Universidade Federal de Pernambuco, Brazil), José Jeferson R Silva3, Emanuel Santos (Centro de Informática)

Managing Requirements Knowledge - a Case Ctudy on Control Systems
○ **Dominik Schmitz** (RWTH Aachen University), Matthias Jarke (RWTH Aachen University and Fraunhofer FIT), Hans W. Nissen (Cologne University of Applied Sciences), Thomas Rose (Fraunhofer FIT)

Business and innovation

Designing the Trentino Innovation Network: Applying Tropos to TasLab
○ **Fabiano Dalpiaz** (University of Trento, Italy), Paolo Giorgini (University of Trento, Italy), Valentina Ferrari (Informatica Trentina, Italy), Stefano Tinella (Informatica Trentina, Italy)

Analyzing Requirements for Online Presence
○ S. M. Easterbrook (Department of Computer Science), E. Yu (Faculty of Information, University of Toronto), J. Aranda (Department of Computer Science, University of Victoria), **J. Horkoff** (Department of Computer Science, Faculty of Information, University of Toronto, CA), M. Strohmaier (Knowledge Management Institute, Faculty of Computer Science at Graz University of Technology), Y. Fan (Department of Computer Science), M. Leica (Department of Computer Science), and R. A. Qadir (Faculty of Information, University of Toronto)

Using URN and Key Performance Indicators for Performance Management in Small and Medium Enterprises
○ Alireza Pourshahid (IBM Canada and SITE, University of Ottawa), Daniel Amyot (SITE, University of Ottawa), Greg Richards (Telfer School of Management, University of Ottawa), Heather Meek (Boomerang Kids)

Healthcare

Proactive Adverse Event Management in Healthcare
○ Saeed Ahmadi Behnam and Daniel Amyot (University of Ottawa), Alan J. Forster (The Ottawa Hospital)

Collaborative social modeling for designing a patient wellness tracking system in a Nurse-Managed Health Care Center
○ Y. An (iSchool at Drexel), P. Gerrity (College of Nursing and Health Professions), P. W. Dalrymple (Institute for Healthcare Informatics, iSchool at Drexel, Drexel University, Philadelphia USA), **J. Horkoff** (Department of Computer Science, Faculty of Information, University of Toronto, CA), M. Rogers (iSchool at Drexel), E. Yu (Faculty of Information, University of Toronto, CA)

Bridging User Privacy Goals and the Privacy Features of Personal Health Records Systems
○ Reza Samavi (University of Toronto, Canada), Thodoros Topaloglu (Rouge Valley Health System, Ontario, Canada)

Software and system development

Architecting hybrid systems: the Etapatelecom and Cuenca Airport cases
○ Juan Pablo Carvallo (Universidad del Pacífico, Cuenca, Ecuador), **Xavier Franch** (Universidad Politècnica de Catalunya, Barcelona, Spain)

Modeling Requirements with i in the Development of a Data Warehouse for a University*
○ Paul Hernández (Lucentia Research Group Universidad de Alicante, Spain), Alicia Castro (Universidad de La Frontera, Chile), Jose-Norberto Mazón (Lucentia Research Group Universidad de Alicante, Spain), **Juan Trujillo** (Lucentia Research Group Universidad

de Alicante,Spain), Carlos Cares (Universidad de La Frontera, Chile)

Understanding Stakeholders' Viewpoints in Enterprise SOA
○ **Daniel Gross**, Eric Yu (University of Toronto), Sharon Volk (The Pheonix Insurance, Tel Aviv, Israel), Sharon Al-Al (The Pheonix Insurance, Tel Aviv, Israel)

Compliance and Assurance

Regulatory Compliance of Requirements of Health Care Information Systems - Experience with Nomos
○ Alberto Siena (University of Trento), G. Armellin (GPI srl), G. Mameli (FBK-irst, Trento, Italy), John Mylopoulos (University of Trento),) **Anna Perini** (FBK-irst, Trento, Italy), Angelo Susi (FBK-irst, Trento, Italy)

Assurance Requirements for Public Serivces
○ **André Rifaut**, Eric Dubois, Sylvain Kubicki, Sophie Ramel (Public Research Centre Henri Tudor, Luxembourg)

Security and Trust

Modelling Trust and Security Requirements: the Air Traffic Management Experience
○ **Elda Paja** (University of Trento, Italy), Fabiano Dalpiaz (University of Trento, Italy), Paolo Giorgini (University of Trento, Italy), Stéphane Paul (Thales Research and Technology, France), Per Håkon Meland (SINTEF, Norway)

Using Secure Tropos to Develop a Pre-Employment Screening System
○ **Shareeful Islam** (School of Computing, IT and Engineering, University of East London), Haralambos Mouratidis (School of Computing, IT and Engineering, University of East London), Miao Kang (PowerchexLtd)

*Modeling and Analysis of White-Box Security Patterns in i**
○ **Golnaz Elahi** (University of Toronto), Eric Yu (University of Toronto), Yuan Xiang Gu (Irdeto Canada)

Methodology for Evolving Security Requirements
Thein Than Tun, **Yijun Yu**, Bashar Nuseibeh (The Open University, UK)

General Q&A - 10 minutes

Poster session - 45 minutes

Additional Material

Posters

Using i Modelling as a Bridge between Air Traffic Management Operational Concepts and Agent-Based Simulation Analysis*

○ **James Lockerbie** (City University London), David Bush (NATS, UK), Neil Maiden (City University London), Henk Blom (National Aerospace Laboratory (NLR), The Netherlands), Mariken Everdij (National Aerospace Laboratory (NLR), The Netherlands)

Evaluating the Impact of Evolving Requirements in HIV/AIDS monitoring systems in the UK

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Agile Software Practices - Pre-adoption Analysis Using Strategic Modeling and Empirical Knowledge

○ Hesam Chiniforooshan (University of Toronto), Eric Yu (University of Toronto), **Maria Carmela Annosi** (Ericsson Research Italy)

Slides

Regulatory Compliance of Requirements of Health Care Information Systems

A. Siena[1], G. Armellin[2], G. Mameli[3], J. Mylopoulos[1], A. Perini[3], A. Susi[3]

[1] University of Trento, [2] GPI Spa, Trento, Italy, [3] FBK-Irst, Trento, Italy

Assurance Requirements of Business Services

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Further Information on the i* Framework and its Use in Industry

i* strategic actors relationships modeling – an overview

Eric Yu
University of Toronto
Toronto, Canada

Outline

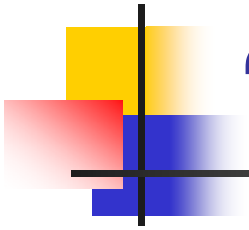
1 – What's different about strategic actors?

2 – ***i**** modeling concepts

3 – Reasoning with ***i**** models

4 – ***i**** tools

5 – The ***i**** community, ***i**** wiki, ***i**** guide



“Early” Requirements Engineering

- Concerned about ...
  - Understanding the socio-technical context
  - Avoid solving the wrong problem
  - Changing needs
  - Changing regulations
  - ...

Editor: **Neil Maiden**
City University London
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GORE, SORE, or What?

Ian Alexander

"AH, THE NEW VENDING MACHINE," said Sam, the sales manager. "Obviously, it needs to let the user put in coins, and push one button to get lemonade and another to get chocolate."

"It'll have to give change," said Sarah, the systems engineer. "Our machines always do, which means we have to check the coins with a standard Rogers and Smithson coin counter subsystem. What about credit and debit cards?"

"Why do we need a button for each item?" asked Henry, the human-machine interface engineer. "We could just have a Plexiglas tray for each item, so you directly pull out the one you like."

"All of that would make it large and to satisfy its users. Perhaps there's something wrong with trying to define requirements so directly—perhaps a combination of methods can do better than any one method on its own.

My Mousetrap Is Best

Competing schools of thought advocate different approaches to solve this requirements engineering (RE) puzzle:

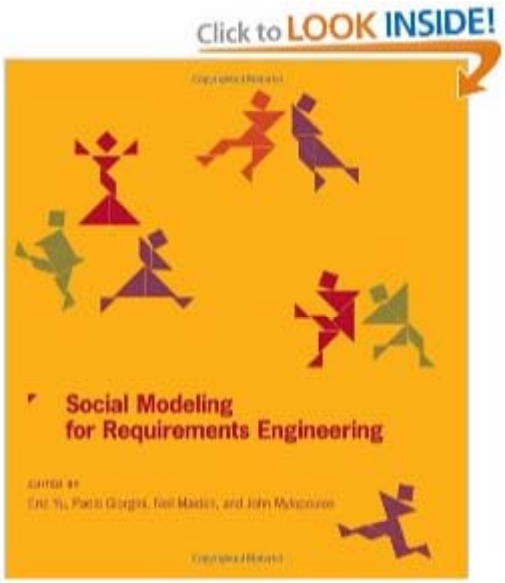
- stakeholder-oriented RE, or SORE (notably, the soft systems methodology);
- goal-oriented RE, or GORE (i*, KAOS, and so on);
- scenario-oriented RE, or ScORE (use cases, user stories, and so on);

Sample application settings

- Air traffic control
- Food safety
- Hospital wards
- Public health
- Social service organizations
- Business processes
- Software processes (e.g., agile)
- Software architecture
- Agent-oriented software methodology
- Security, Privacy, Trust, Compliance
- ...

i* variants and standardization

- ITU-T recommendation Z.151 (2008)
  User Requirements Notation (URN)
  - Goal Requirements Language (GRL)
  - http://www.itu.int/rec/T-REC-Z.151/en



MIT Press 2011. 742pp.

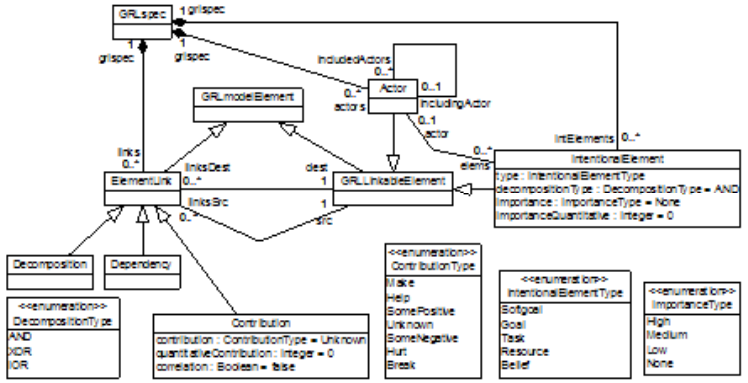


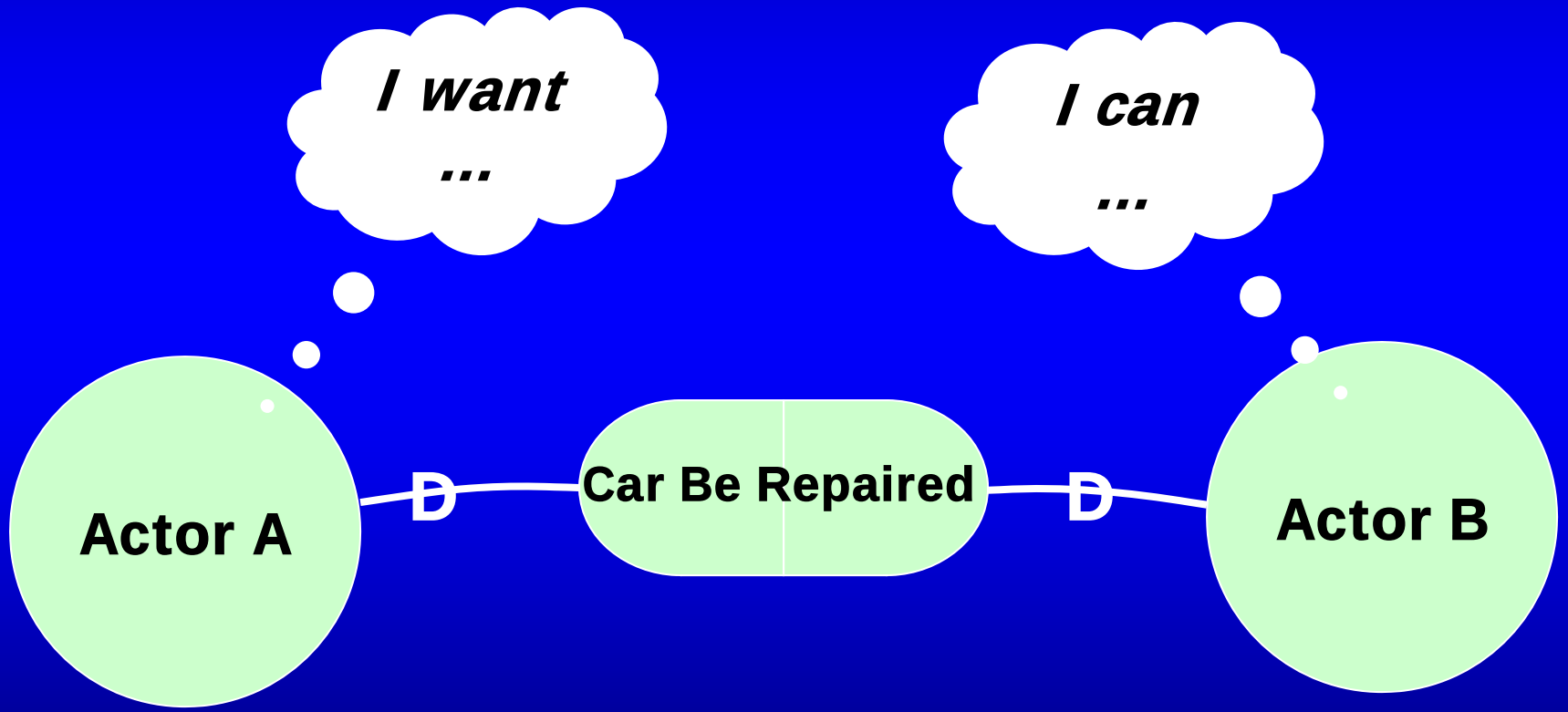
Figure 3/Z.151 GRL specification concepts

*i** basic concepts

Fundamental questions for each strategic actor

- What do I want?
- How can I achieve what I want?
- Who do I depend on to achieve what I want?

Strategic Dependency Relationship



Modelling Strategic Actor Relationships and Rationales

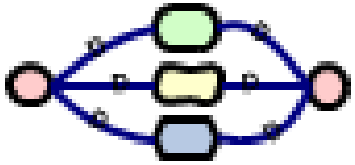
- the i* modelling framework

- **Strategic Actors**
  - have goals, beliefs, abilities, commitments
  - are semi-autonomous
    - freedom of action, constrained by relationships with others
    - not fully knowable or controllable
    - has knowledge to guide action, but only partially explicit
  - depend on each other
    - for goals to be achieved, tasks to be performed, resources to be furnished

10

Two levels of strategic actors modeling

- **Strategic Dependency (SD)** model:
  To analyze relationships among actors with strategic intent
  - includes humans and machines



SD model

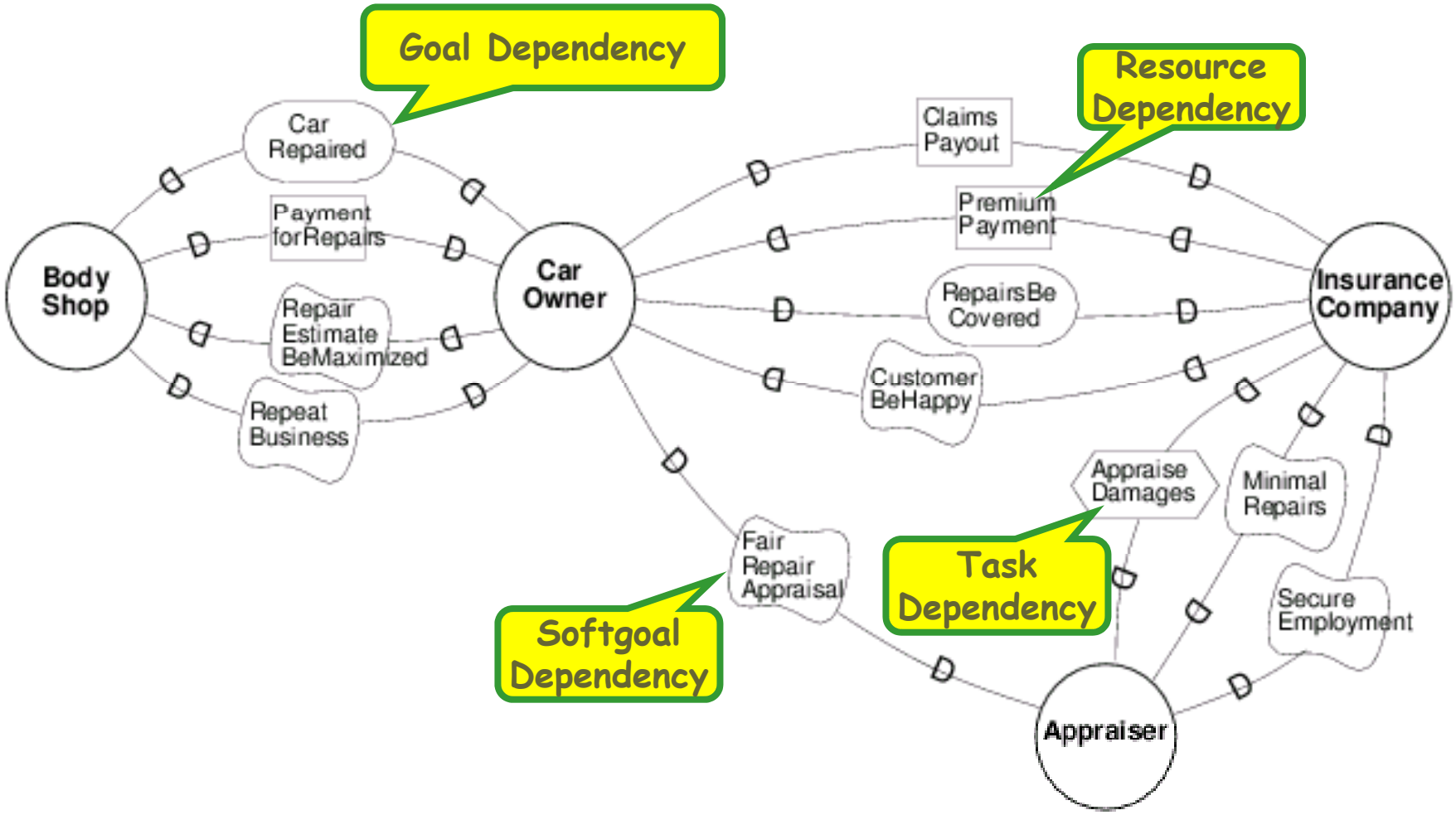
- **Strategic Rationale (SR)** model:
  To decompose the intentionality of each actor
  - Means-ends analysis

SR model

- What *i** does not aim to do
  - Execution level analysis
  - Temporal dimension

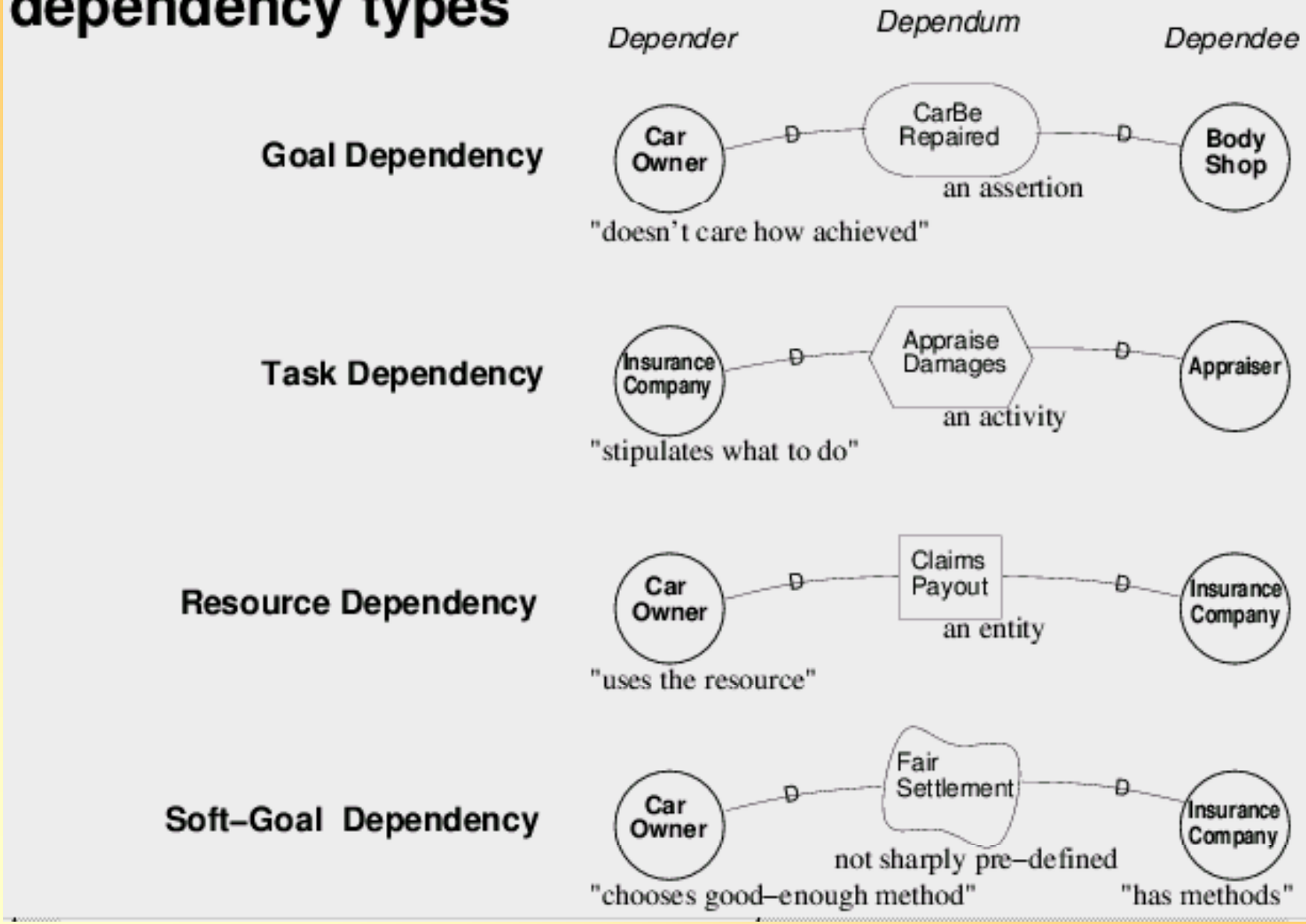
The Strategic Dependency Model

automobile insurance – example 1



Strategic Dependency Model

dependency types



The Strategic Dependency Model

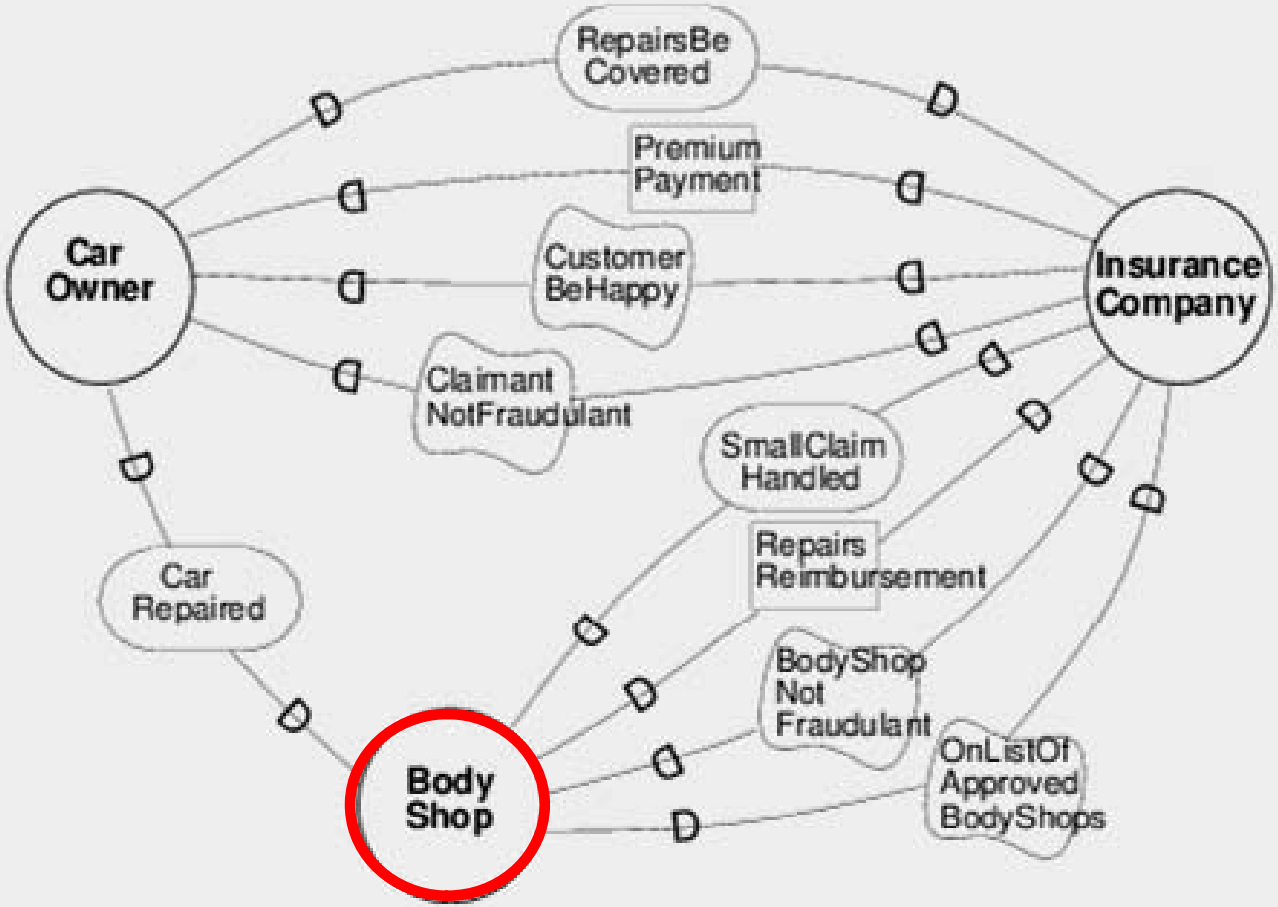
auto insurance – example 2
"Let the Insurance Agent handle it."

examples taken from: Hammer & Champy 1993 – Reengineering the Corporation, pp. 137–143.

14

The Strategic Dependency Model

auto insurance – example 3
"Let the Body Shop handle it."



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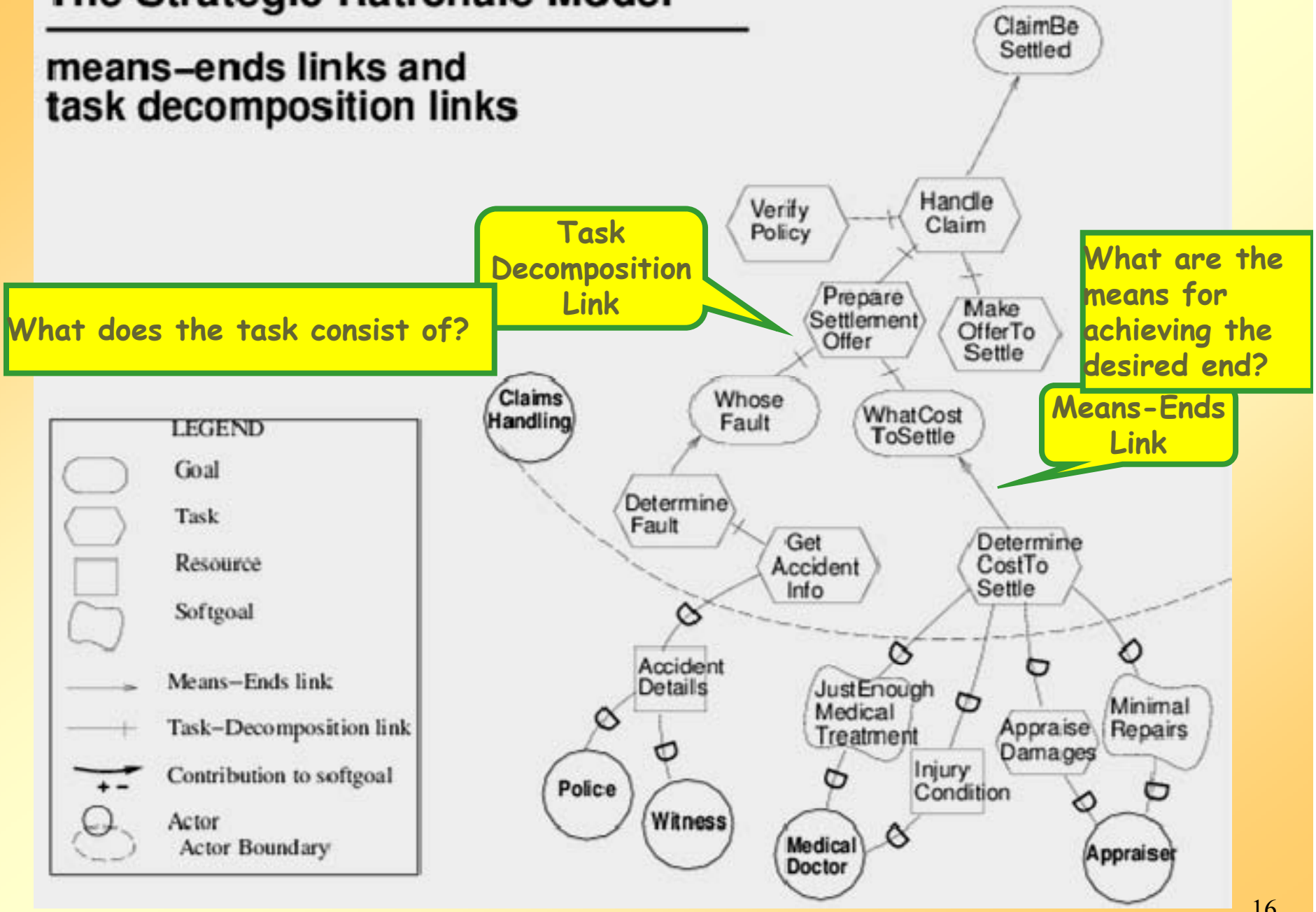
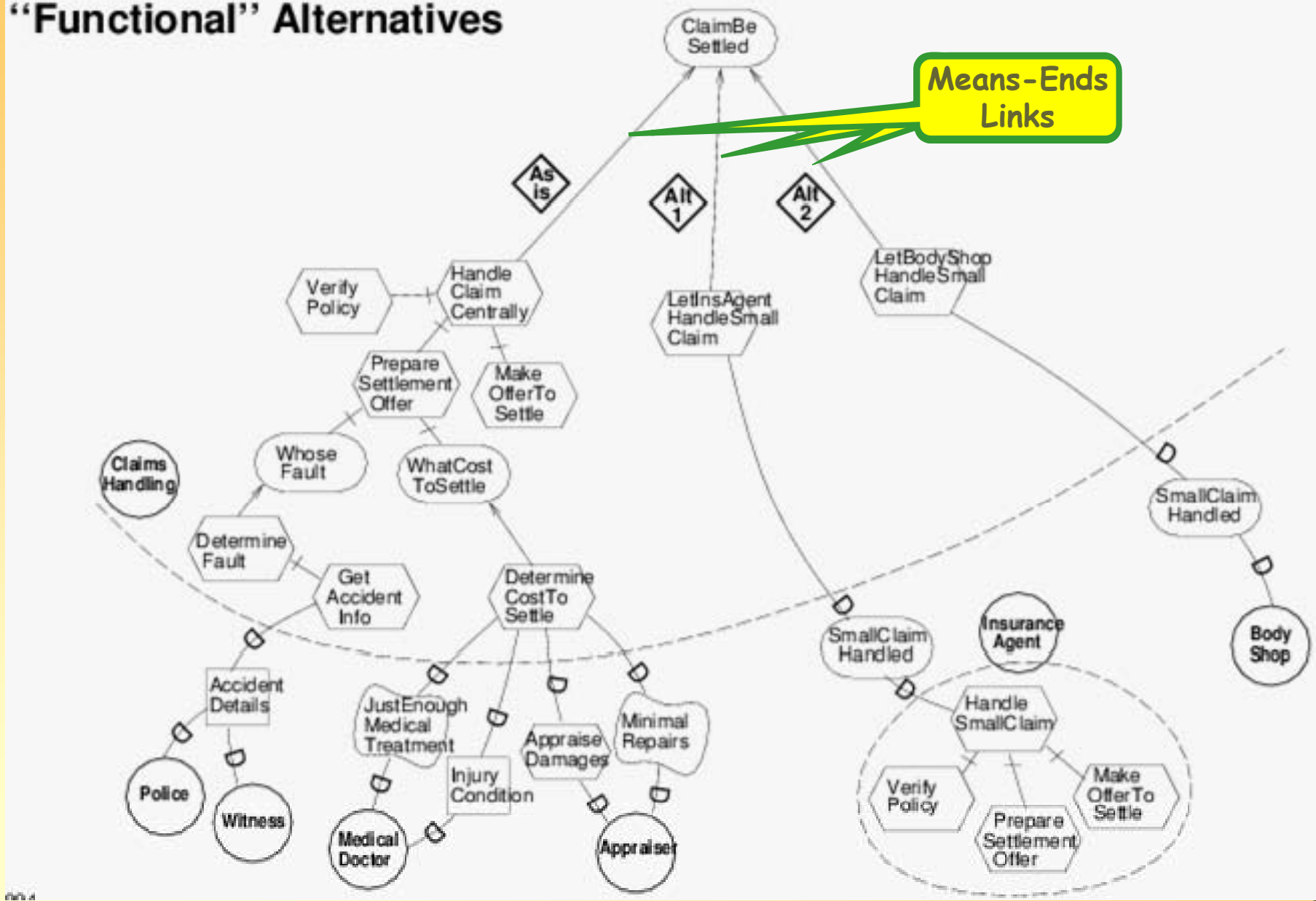
The Strategic Rationale Model

means–ends links and task decomposition links



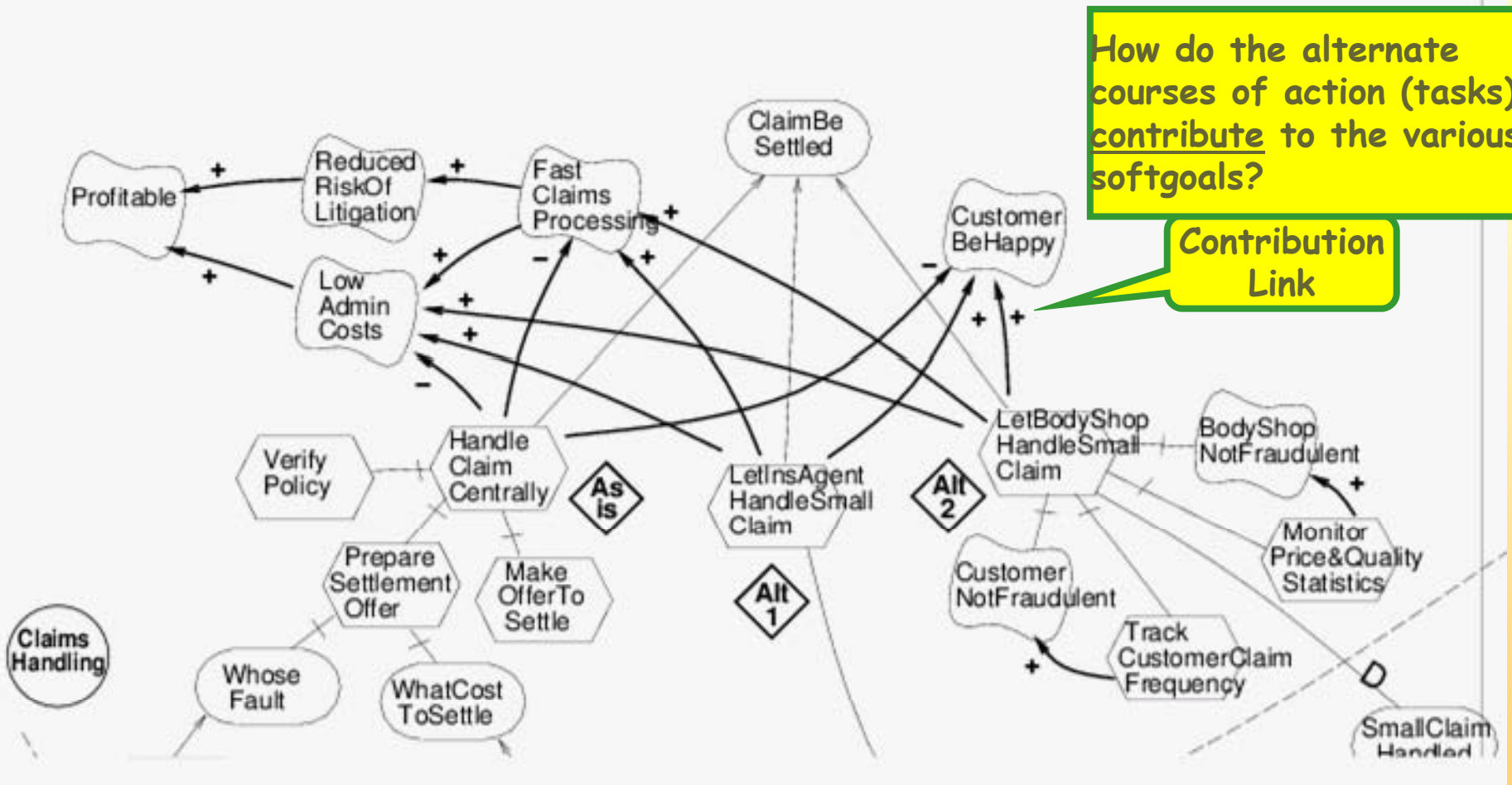
The Strategic Rationale Model

"Functional" Alternatives

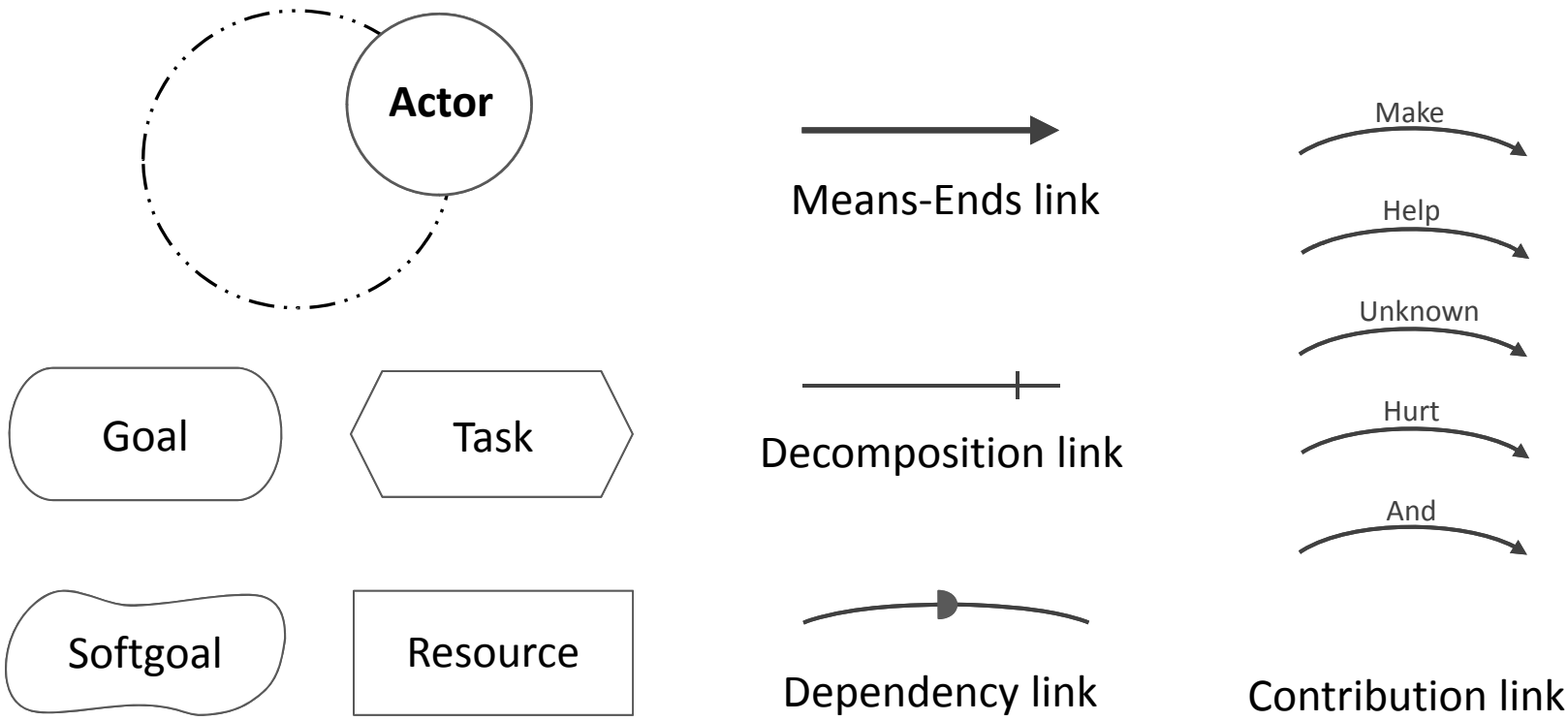


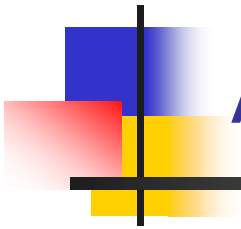
The Strategic Rationale Model

"Non-Functional" Rationales



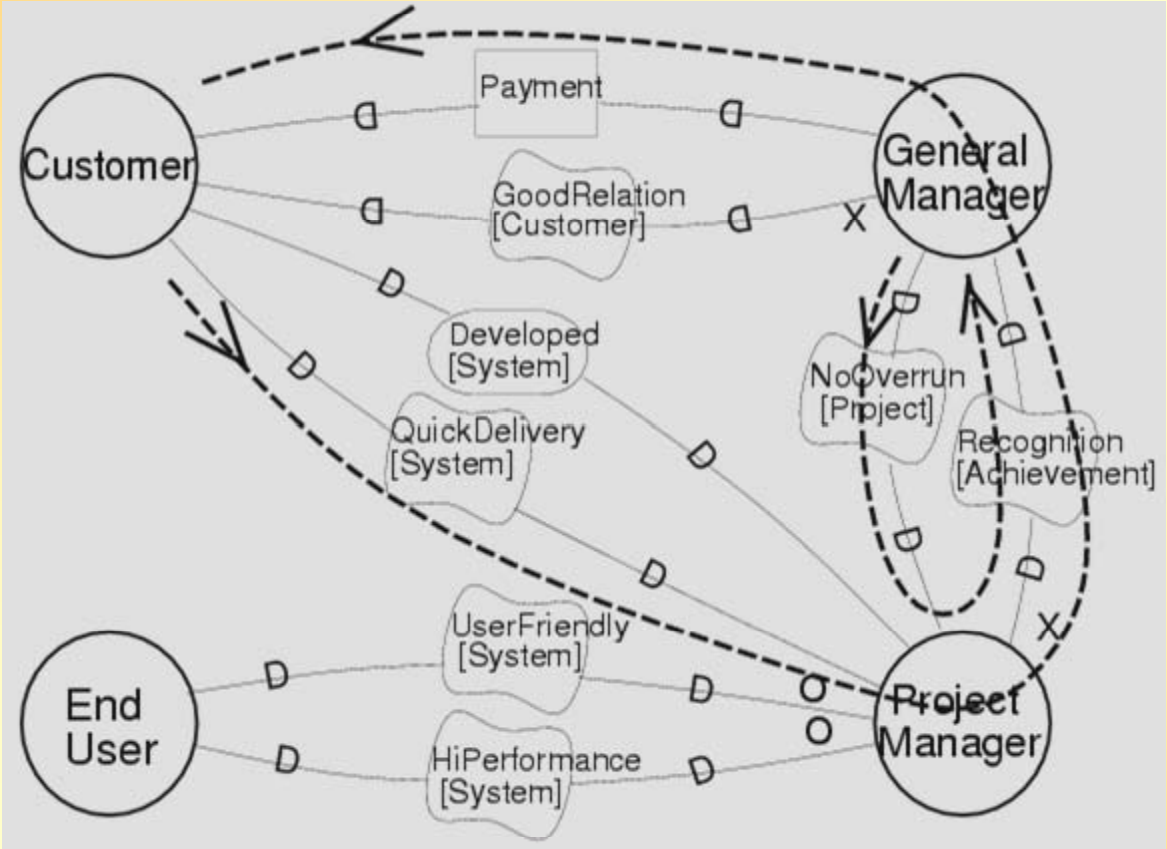
i* main concepts





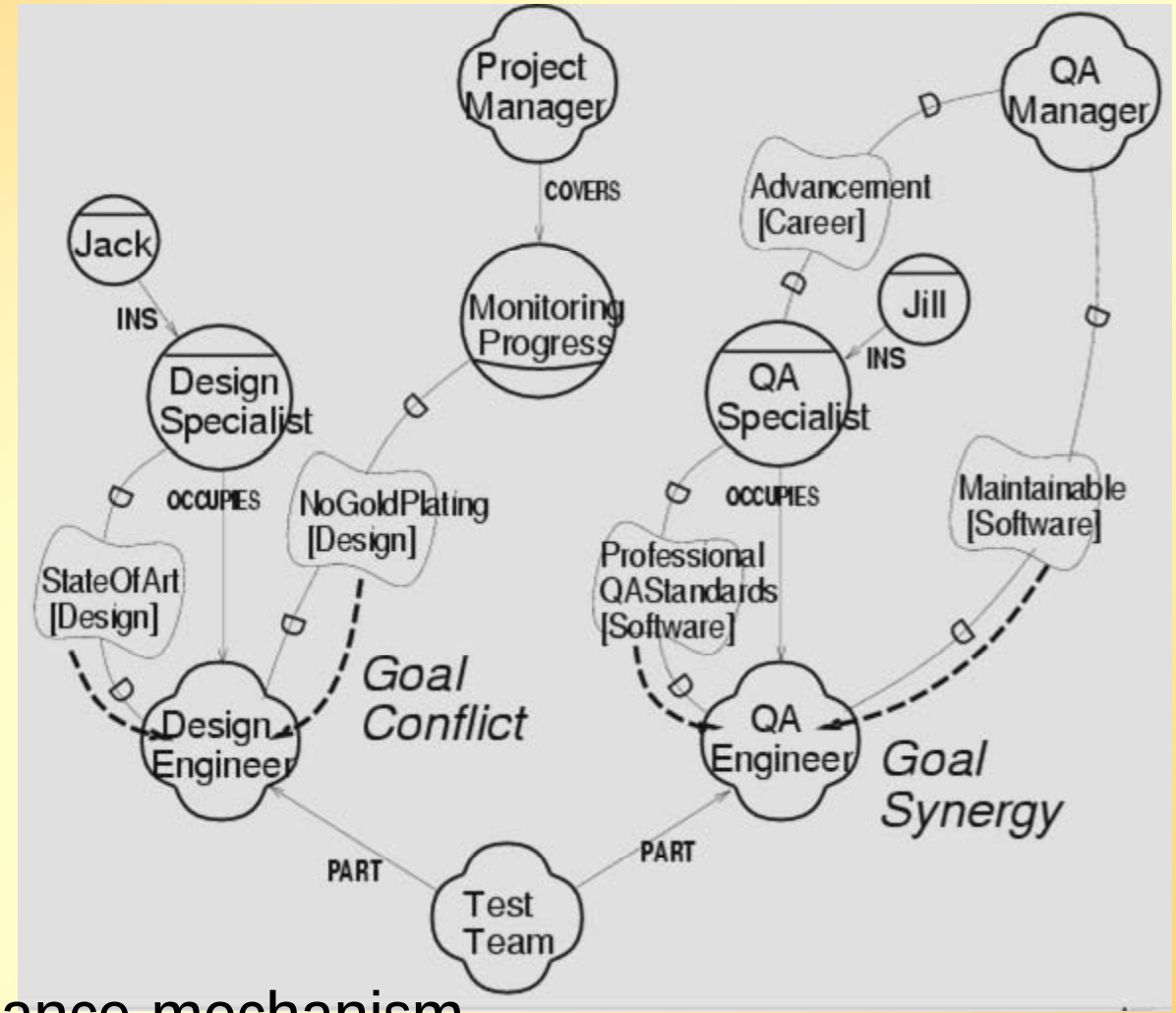
Analyzing the models

Analyzing vulnerabilities



- Example of enforcement mechanism
  - Reciprocal dependency
- Loop analysis

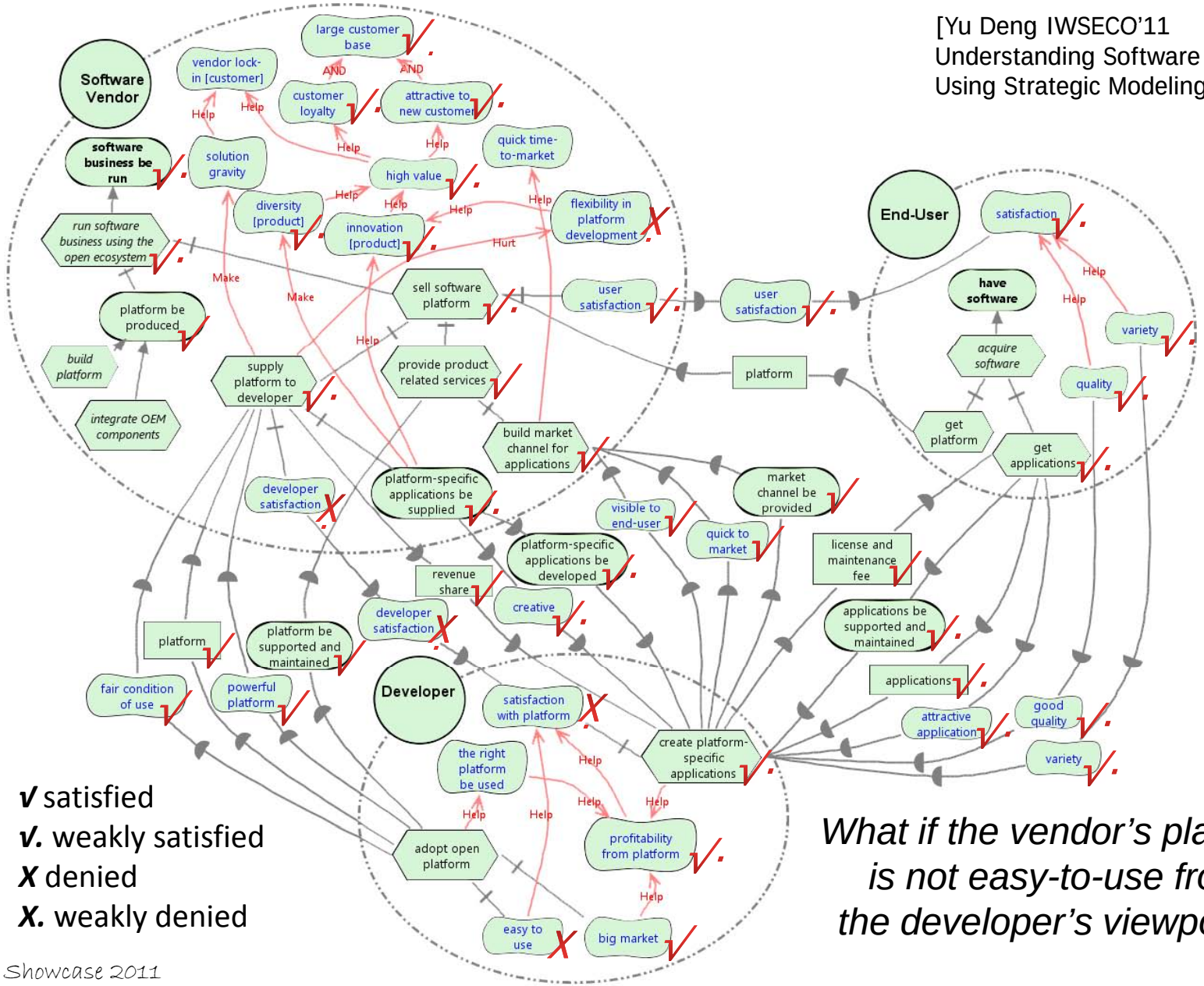
Analyzing vulnerabilities



- Example of assurance mechanism
  - Goal synergy or conflict
- Node analysis

Are Actors' Strategic Goals Met?

[Yu Deng IWSECO'11
Understanding Software Ecosystems
Using Strategic Modeling]



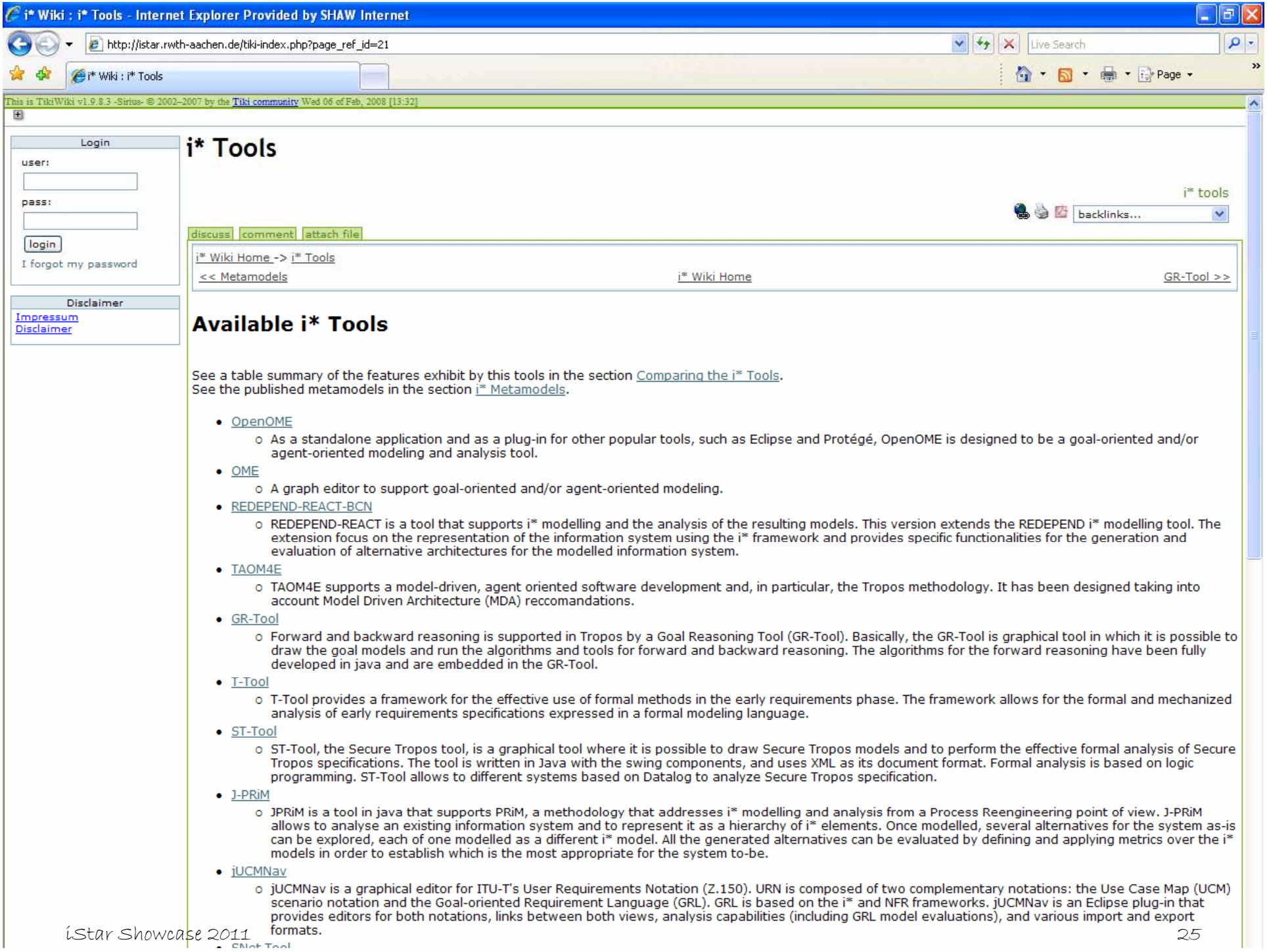
✓ satisfied
✓. weakly satisfied
✗ denied
✗. weakly denied

What if the vendor's platform is not easy-to-use from the developer's viewpoint?

Tools

- Canada (U Toronto)
  - OME, OpenOME
- Canada (U Ottawa)
  - jUCMnav for URN
- England & Spain
  - REDEPEND- REACT
- Italy
  - TAOM4E , GR Tool, T Tool , ST Tool
- Spain
  - GR-Tool , J-PRiM
- Germany
  - Snet Tool
- Brazil
  - Istar Tool, xGOOD, GOOSE
- Belgium
  - DesCARTES

See listing on i* wiki


i* Wiki : i* Tools - Internet Explorer Provided by SHAW Internet
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Live Search
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Page
This is TikiWiki v1.9.8.3 -Sirius- © 2002–2007 by the Tiki community Wed 06 of Feb, 2008 [13:32]
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pass:
login
I forgot my password
Disclaimer
Impressum
Disclaimer
i* Tools
i* tools
backlinks...
discuss
comment
attach file
i* Wiki Home -> i* Tools
<< Metamodels
i* Wiki Home
GR-Tool >>
Available i* Tools
See a table summary of the features exhibit by this tools in the section Comparing the i* Tools.
See the published metamodels in the section i* Metamodels.
OpenOME
As a standalone application and as a plug-in for other popular tools, such as Eclipse and Protégé, OpenOME is designed to be a goal-oriented and/or agent-oriented modeling and analysis tool.
OME
A graph editor to support goal-oriented and/or agent-oriented modeling.
REDEPEND-REACT-BCN
REDEPEND-REACT is a tool that supports i* modelling and the analysis of the resulting models. This version extends the REDEPEND i* modelling tool. The extension focus on the representation of the information system using the i* framework and provides specific functionalities for the generation and evaluation of alternative architectures for the modelled information system.
TAOM4E
TAOM4E supports a model-driven, agent oriented software development and, in particular, the Tropos methodology. It has been designed taking into account Model Driven Architecture (MDA) reccomandations.
GR-Tool
Forward and backward reasoning is supported in Tropos by a Goal Reasoning Tool (GR-Tool). Basically, the GR-Tool is graphical tool in which it is possible to draw the goal models and run the algorithms and tools for forward and backward reasoning. The algorithms for the forward reasoning have been fully developed in java and are embedded in the GR-Tool.
T-Tool
T-Tool provides a framework for the effective use of formal methods in the early requirements phase. The framework allows for the formal and mechanized analysis of early requirements specifications expressed in a formal modeling language.
ST-Tool
ST-Tool, the Secure Tropos tool, is a graphical tool where it is possible to draw Secure Tropos models and to perform the effective formal analysis of Secure Tropos specifications. The tool is written in Java with the swing components, and uses XML as its document format. Formal analysis is based on logic programming. ST-Tool allows to different systems based on Datalog to analyze Secure Tropos specification.
J-PRiM
JPRiM is a tool in java that supports PRiM, a methodology that addresses i* modelling and analysis from a Process Reengineering point of view. J-PRiM allows to analyse an existing information system and to represent it as a hierarchy of i* elements. Once modelled, several alternatives for the system as-is can be explored, each of one modelled as a different i* model. All the generated alternatives can be evaluated by defining and applying metrics over the i* models in order to establish which is the most appropriate for the system to-be.
jUCMNav
jUCMNav is a graphical editor for ITU-T's User Requirements Notation (Z.150). URN is composed of two complementary notations: the Use Case Map (UCM) scenario notation and the Goal-oriented Requirement Language (GRL). GRL is based on the i* and NFR frameworks. jUCMNav is an Eclipse plug-in that provides editors for both notations, links between both views, analysis capabilities (including GRL model evaluations), and various import and export formats.

http://istar.rwth-aachen.de/tiki-index.php?page=4.1.1.5+Do+not+include+an+Actor+within+another+Actor

i* Wiki : 4.1.1.5 Do not include an Actor within anothe...

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iStarGuide
i* Wiki Home
4.6.5.1.5.3 Contribu...
4.6.5.1.4.1 Give ini...
4.6.5.1.3.1 Formulat...
4.6.5.1.2 In order t...
4.6.5.1.1 To achieve...
4.5.1.1 Use the spec...
4.4.2 Don't ext...
4.4.1 Split a large ...

Main Menu
What's New
i* Wiki Home
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- Events
- i* Quick Guide
- i* Guide
- Publications
- i* Tools
- Who is Who
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4.1.1.5 Do not include an Actor within another Actor

i* Usage Guidelines

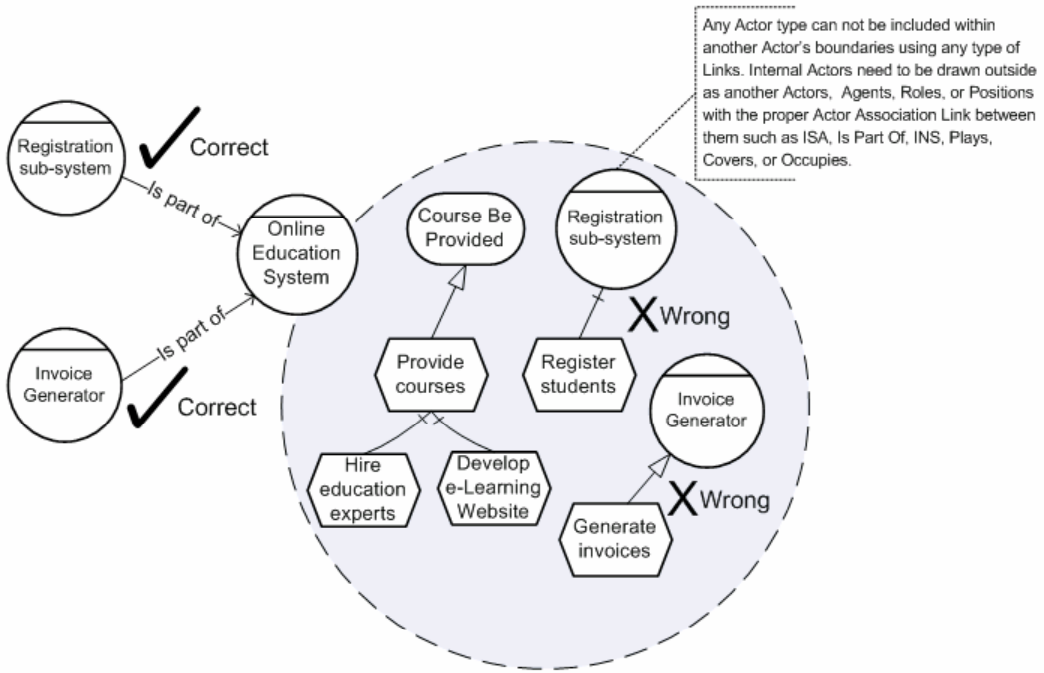
i* Guide > Guidelines > Level > Beginner
i* Guide > Guidelines > Type > Concept

edit remove rename lock perms history undo export discuss comment attach file

This Guideline Wiki Page displays the guideline as per the i* Style of the University of Toronto. Use Comment tab above to read or write comments about this guideline. Scroll down to see variations of this guideline for other i* modeling styles.

4.1.1.5 Guideline (Beginner,Concept) Do not include an Actor within another Actor.

Discussion: Actors are active and autonomous entities that should be modeled separately. "Sub-system" in the illustration can be modeled as actors that have Dependency Links with the main system and/or other actors. They can also be modeled with Association Links such as "is-part-of" and "ISA", to the higher-level system.



Return to iStarGuide document

References

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- i* wiki http://istar.rwth-aachen.de
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CITY UNIVERSITY LONDON

Using *i** Modelling as a Bridge between Air Traffic Management Operational Concepts and Agent-Based Simulation Analysis

James Lockerbie[1], David Bush[2], Neil Maiden[1], Henk Blom[3], Mariken Everdij[3]

1 CITY UNIVERSITY LONDON

2 NATS

3 NLR

CITY UNIVERSITY LONDON

Introduction

- Problem
  - Domain
  - Requirements
- Solution
  - i* Modeling
  - Challenges
  - Lessons learned
- Future activities

CITY UNIVERSITY LONDON

The Domain Problem

Air traffic increases

- Double in 20 years
- National boundaries and airspaces limit capacity

Single European Sky

- SESAR operational concept
- Trajectories agreed before flight and conformed to by aircraft
- Revised rules for aircraft separation

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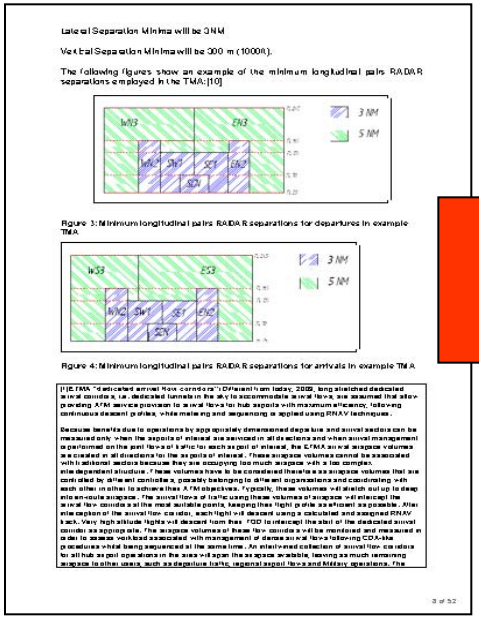
The Requirements Problem



Lateral Separation Minima will be 3 NM.

Vertical Separation Minima will be 300 m (1000ft).

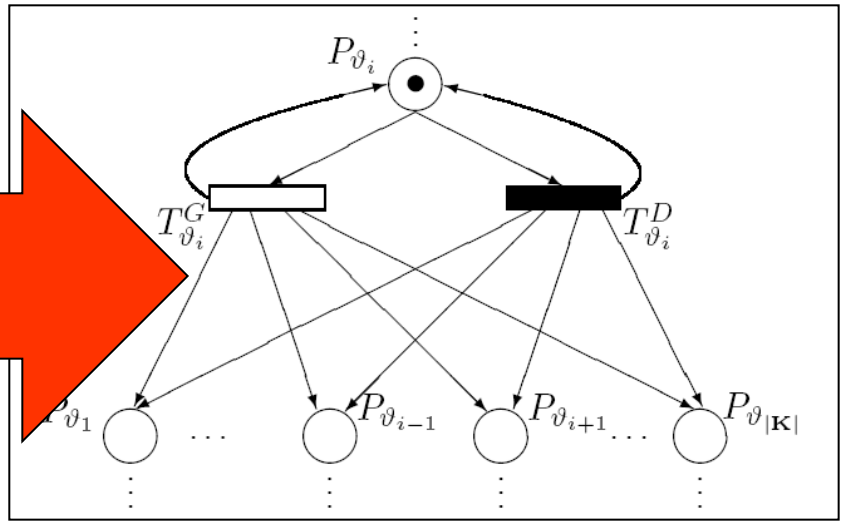
The following figures show an example of the minimum longitudinal pairs RADAR separations employed in the TMA:[10]

Figure 3: Minimum longitudinal pairs RADAR separations for departures in example TMA

Figure 4: Minimum longitudinal pairs RADAR separations for arrivals in example TMA

[1] ETMA "dedicated arrival flow corridors") Of relevance here today, 2002, long stretched dedicated arrival corridors, i.e. dedicated tunnels in the sky to accommodate arrival flows, are assumed that allow providing ATM service provision to arrival flows for hub airports with maximum efficiency, following continuous descent profiles, while metering and sequencing is applied using RNAV techniques.

Because benefits due to operations by appropriately dimensioned departure and arrival sectors can be measured only when the airports of interest are serviced in all directions and when arrival management is performed on the joint flows of traffic for each airport of interest, the ETMA arrival airspace volumes associated in all directions for the airports of interest. These airspace volumes cannot be associated with sectoral sectors because they are occupying too much airspace with a too complex, inter-dependent situation. These volumes have to be considered therefore as airspace volumes that are controlled by different controllers, possibly belonging to different organizations and coordinating with each other in order to achieve the ATM objectives. Typically, these volumes will stretch out up to deep enroute-route airspace. The arrival flows of traffic using these volumes of airspace will intercept the arrival flow corridors at the most suitable points, keeping their flight profile as efficient as possible. After interception of the arrival flow corridor, each flight will descent using a calculated and assigned RNAV track. Very high altitude flights will descent from their FOD to intercept the start of the dedicated arrival corridor as appropriate. The airspace volumes of these flow corridors will be mentioned and measured in order to assess workload associated with management of dense arrival flows following CDA-like procedures while being sequenced at the same time. An interlinked collection of arrival flow corridors for all hub airport operations in the area will span the airspace possible, leaving as much remaining airspace to other users, such as departure traffic, regional airport flows and Military operations. The



Concept of operations

- Text &pictures describing people, processes and technologies to be used
- INFORMAL – prone to omission and contradiction

Petri nets for simulation-based safety analysis of critical scenarios

- Includes equipment & human performance, environmental factors e.g. weather
- FORMAL – requires well defined terms constructs and relations

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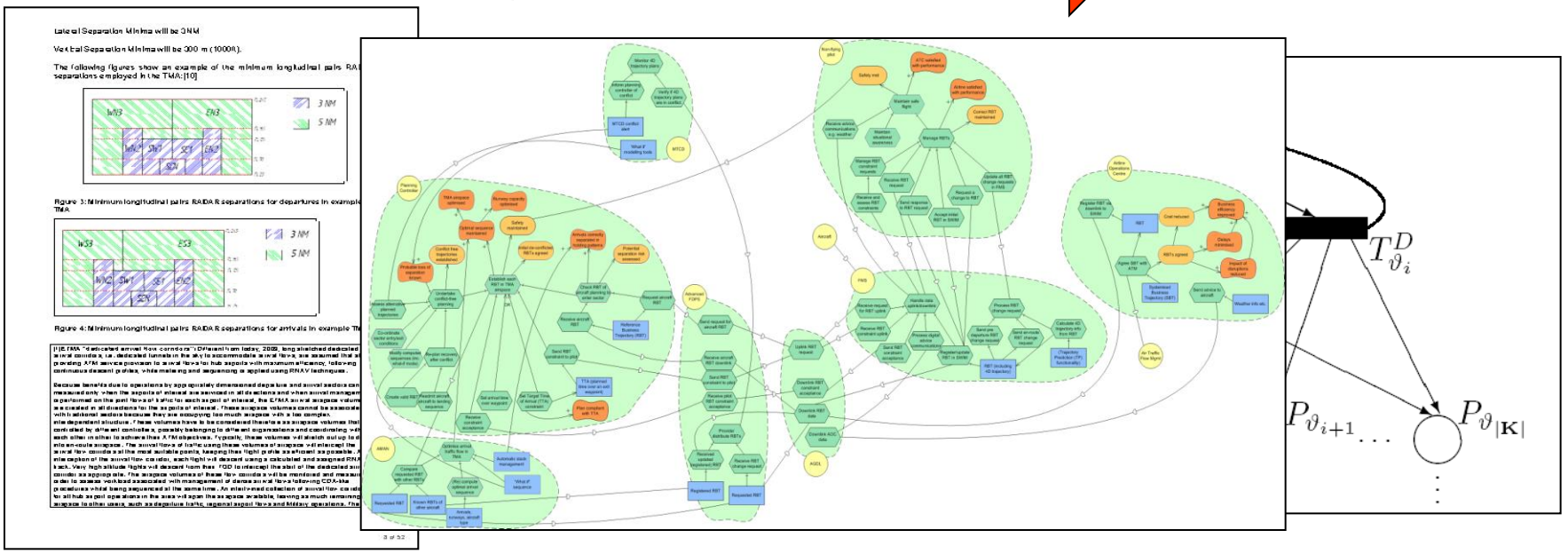
Our Solution: *i** Models to Bridge the Gap

Model concept of operation in *i** to identify safety critical scenarios



Present results of safety critical scenarios through *i** to operational experts

Operational Experts

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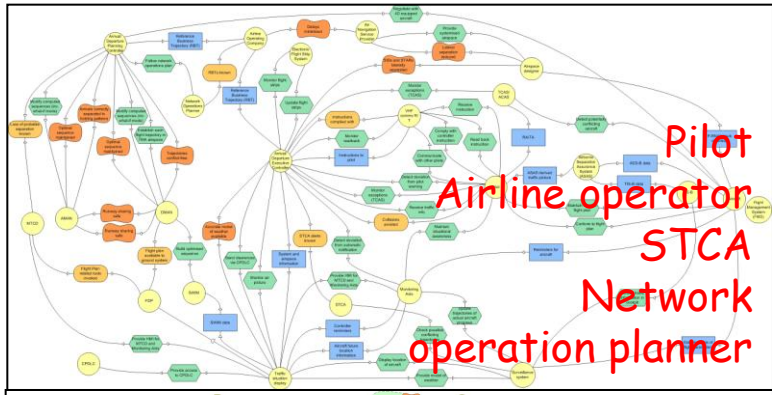
Producing the i* Models

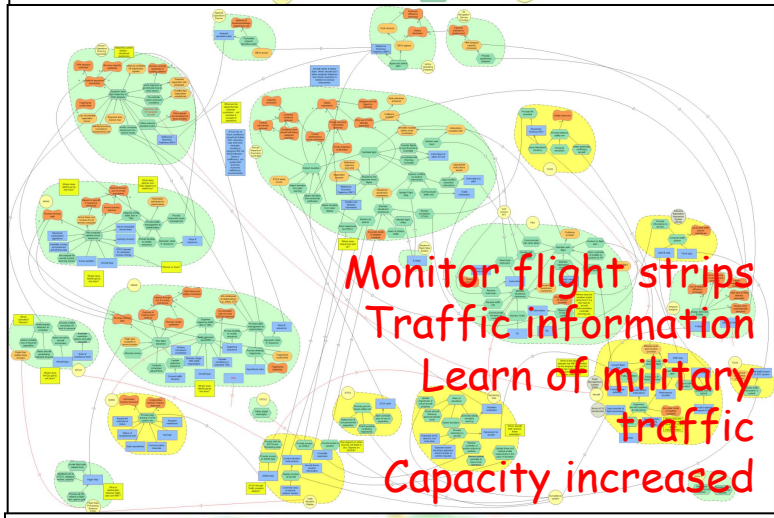
Exploited previous experience

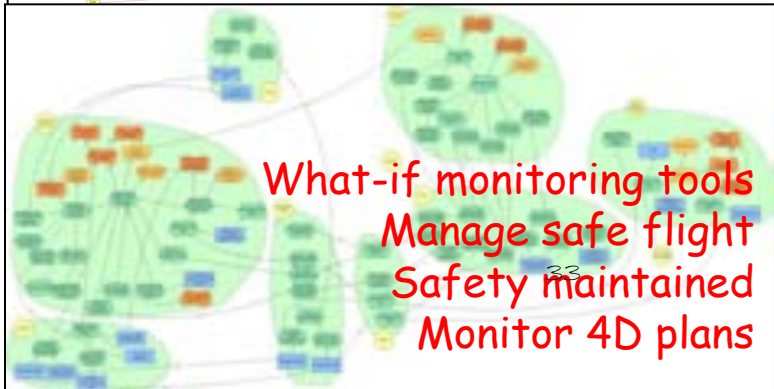
- Direct from concept of operation document because no access to stakeholders
- Reused model elements such as *cognitive behaviour for ATCOs* [Maiden et al. 07]
- Aligned class-level actors and instance-level agents such as *aircraft* and *weather*

Outcome

- One Strategic Dependency and two Strategic Rationale models in REDEPEND







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Airline company

Planning controller

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Modeling Challenges Faced

Important omissions identified

- Strategic planning and collaborative decision making elements
- Coordination dependencies between ATCOs and actors
- Information dependencies between systems
- Missing and incomplete goals and goal ownership

Inconsistencies identified

- Between entity names, e.g. *RBTs* and *flight plans*

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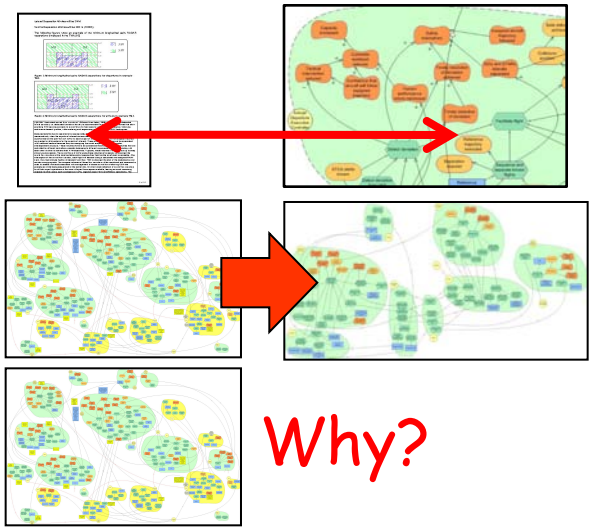
Lessons Learned

For requirements practices

1. Video conferencing was effective
2. *i** modelling takes time, so keep it strategic
3. Trace *i** elements to documents
4. Reuse models if fit for purpose
5. Challenge goal ownership
6. Use resources as hooks for instance-level simulation



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What We Found; Where Next……

Conclusions

- *i** effectively highlighted problems in concept of operation – but other models could have
- Gives an idea of critical scenarios – areas of communication, the human part
- Looks like an effective tool for presenting scenarios

Future new processes and tool features

- Capabilities to mark up models with potential problems to identify critical scenarios
- Capabilities to present back to operational experts

Evaluating the impact of Evolving Requirements on System Wide Goals

Using i* methodology integrated with Satisfaction Arguments to evaluate the impact of changing requirements in HIV/AIDS monitoring systems in the UK

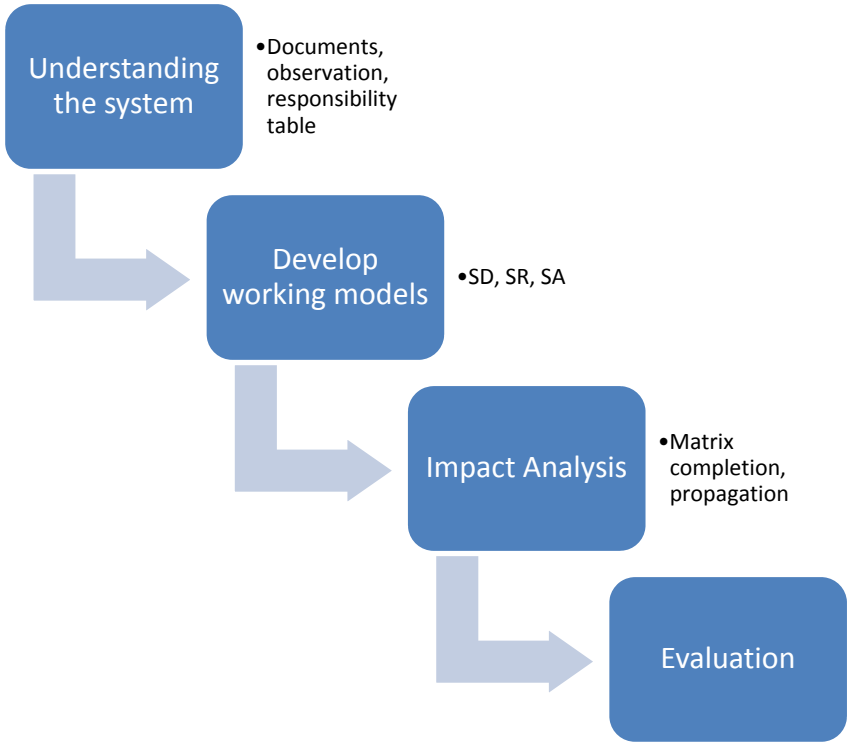
Jorgen Engmann[1], Neil Maiden[2], James Lockerbie[2]
[1]Health Protection Agency/UCL
[2]City University London

The domain problem

- Health Protection Agency, Centre for Infections, HIV/AIDS Reporting Section (HARS)
- System set up in 1982 to record cases of HIV infection
- Incremental upgrades over time to accommodate emerging aspects of HIV epidemiology and new technology - using Change Request (CR) procedure
- CR effective BUT
  - Over time, resulted in a base system with several integrated peripheral applications
  - CR's became more complicated in nature
  - Hard to assess impact of CR on entire system
  - Time consuming

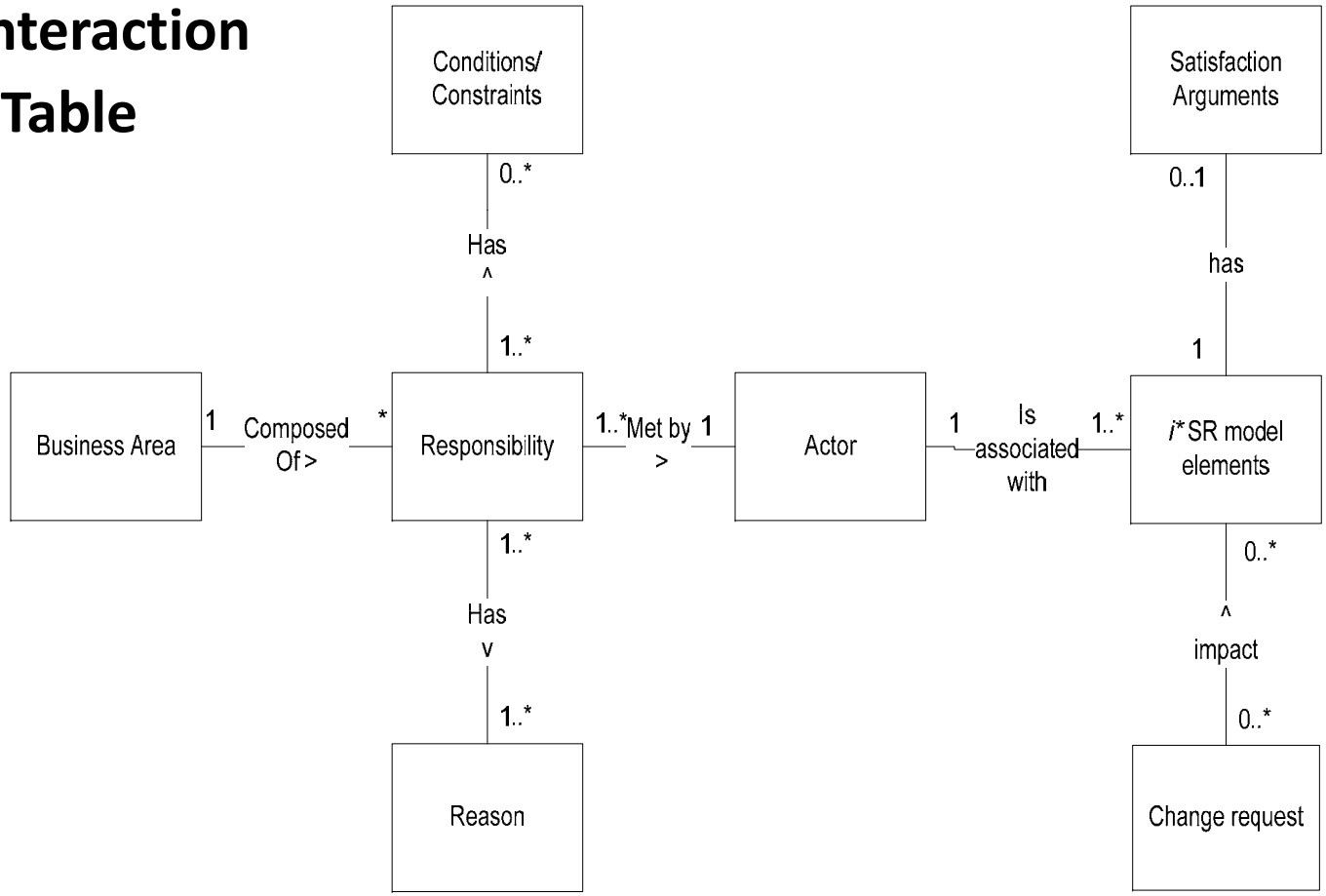
The proposed solution

- i* SD to show context and dependencies
- SR model to show detail on how goals are achieved
- Satisfaction arguments to document domain assumptions

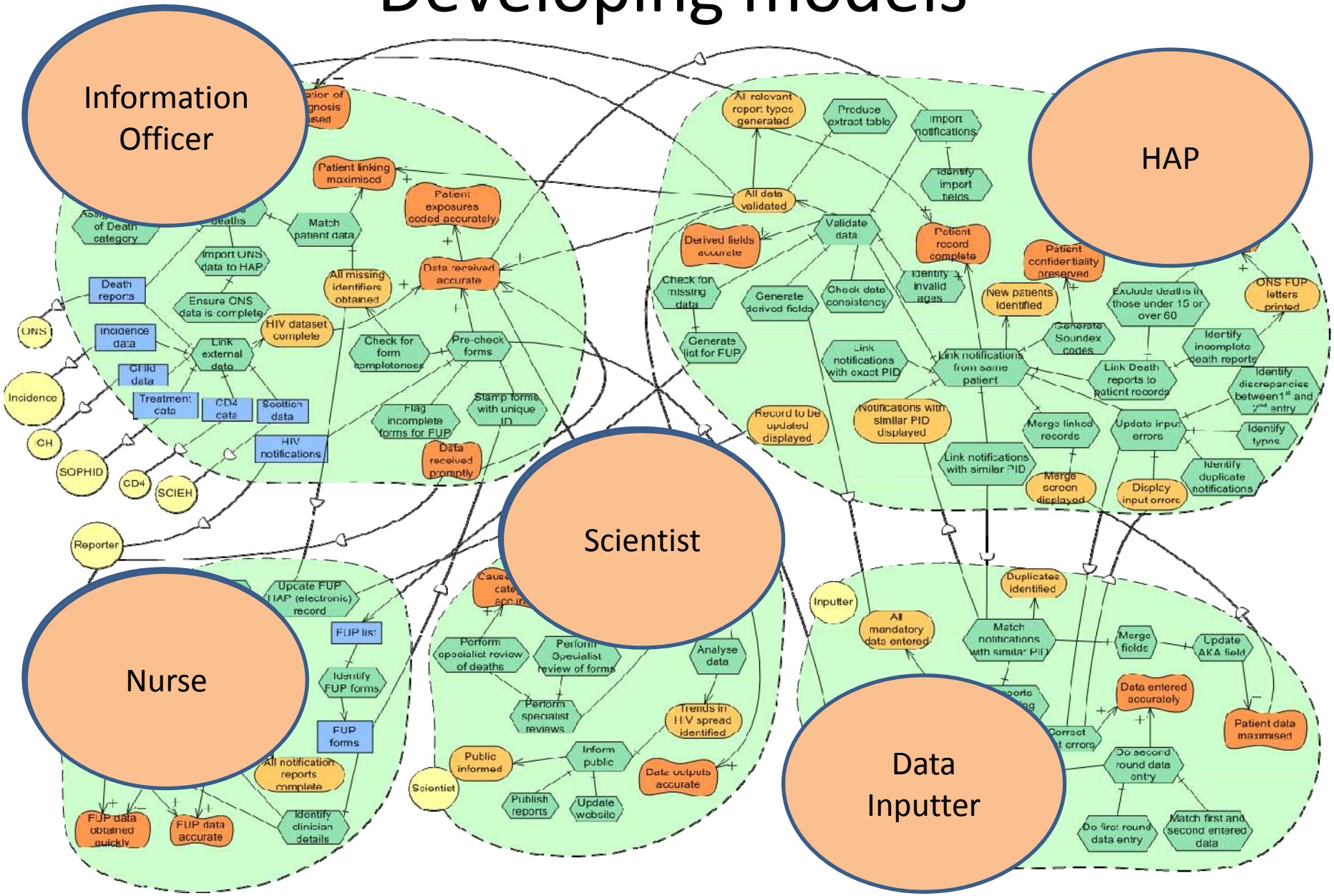


Understanding the system

- **Documents:** procedures and responsibilities of staff
- **HAPv3 requirements:** data flow diagrams
- **Observation/interaction**
- **Responsibility Table**
  - Actor
  - Responsibility
  - Conditions
  - Reasons



Developing models

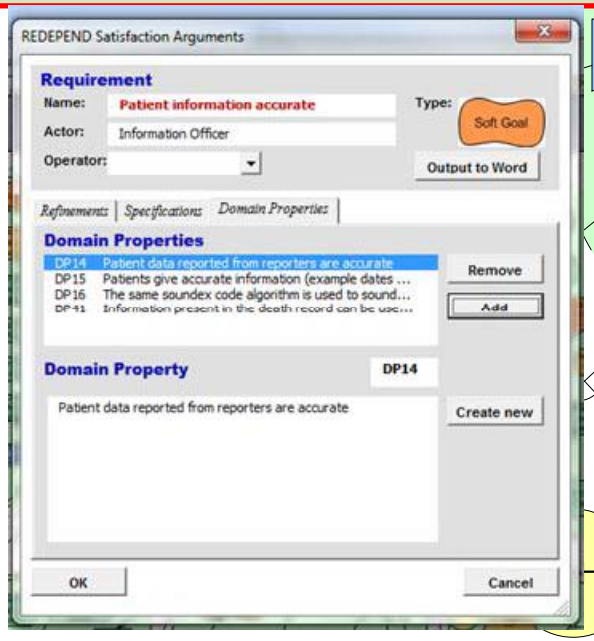


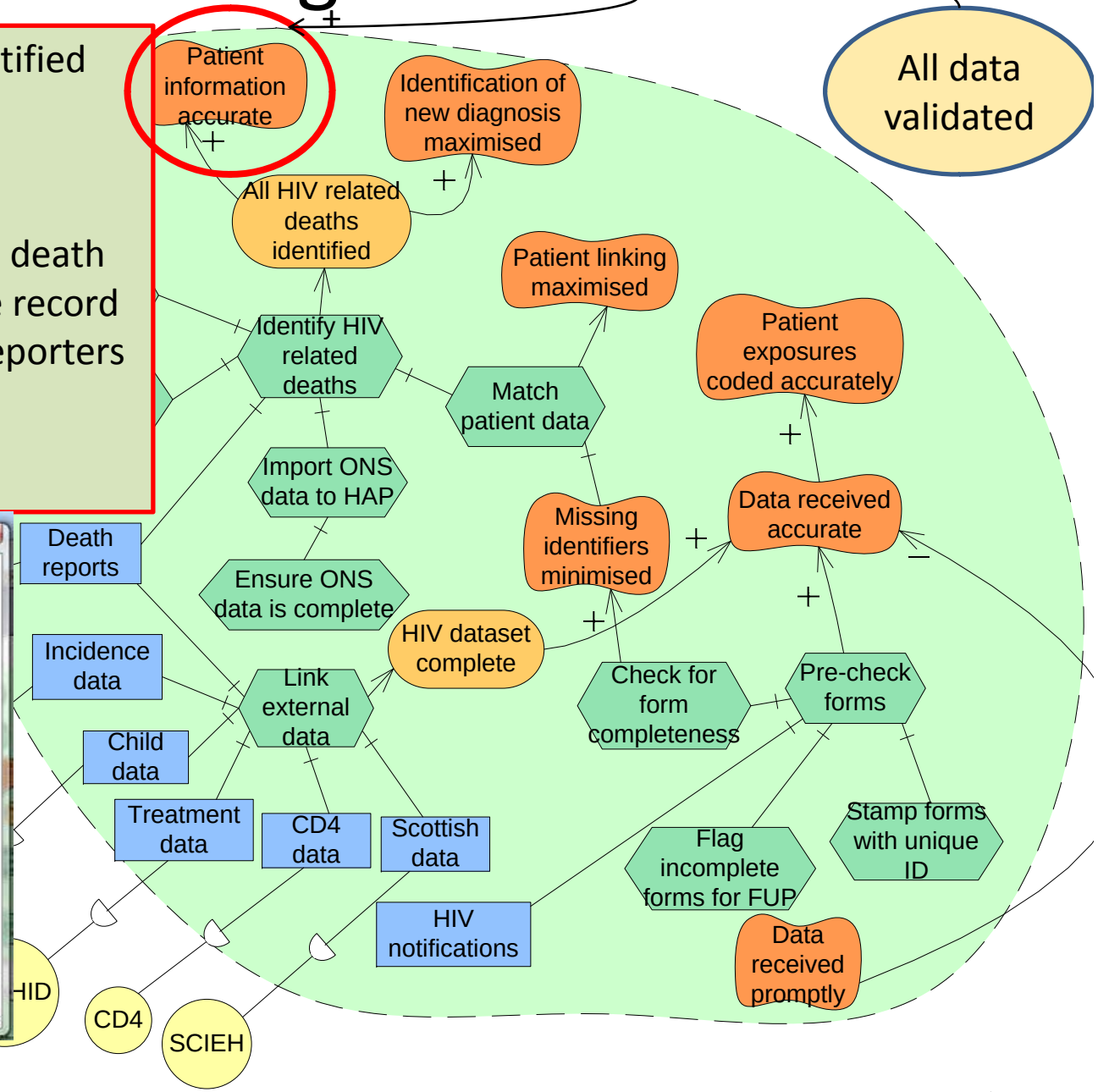
Satisfaction Arguments

R: -All HIV related deaths identified

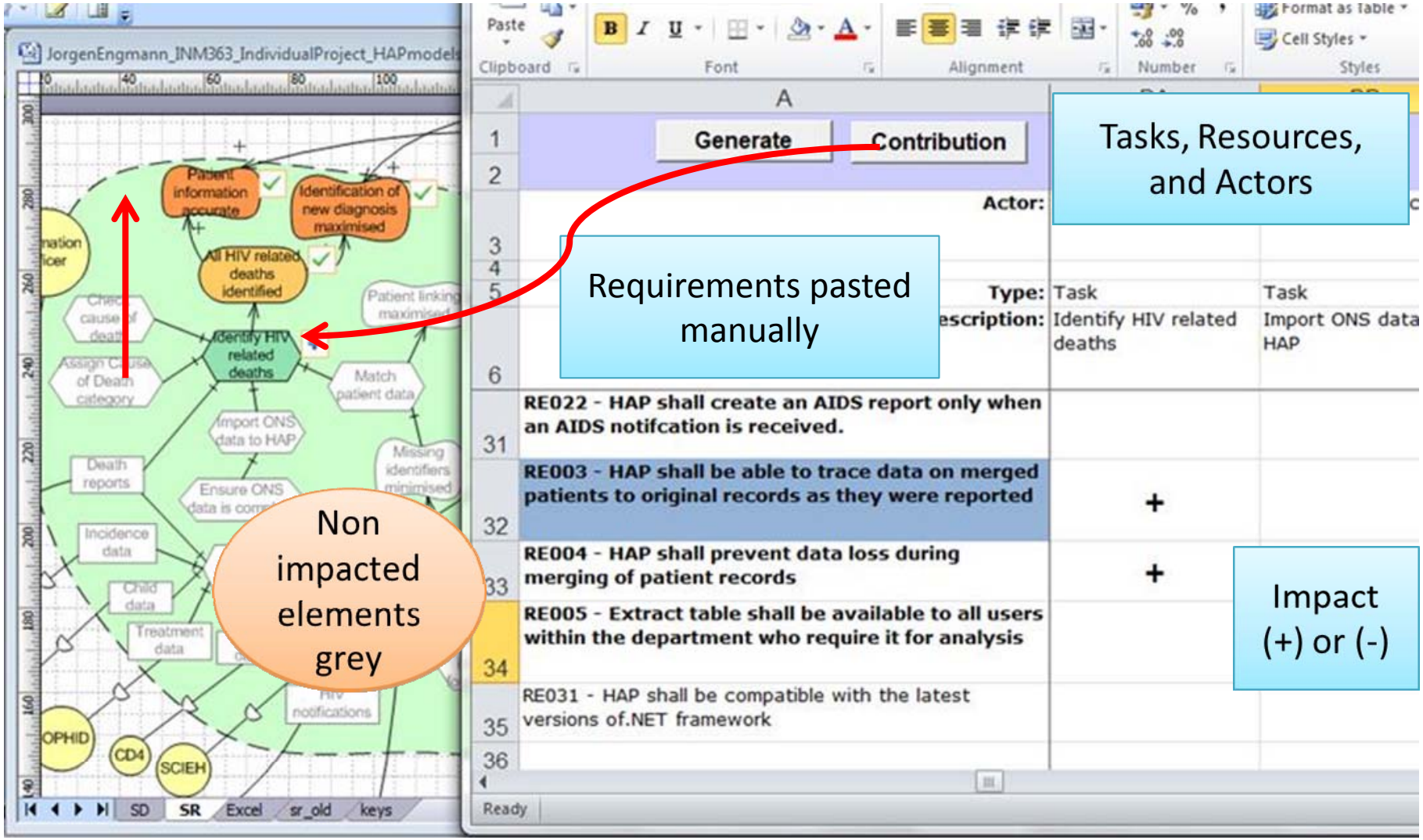
S: -[HAP]All data validated

D: -Information present in the death record can be used to validate record
-Patient data reported from reporters are accurate





Impact Analysis



Evaluation/lessons/reflections

- **"Big picture"** enhanced with domain assumptions - a good **communication** tool
- Modelling takes **time** but will evolve with system becoming a reference tool
- Matrix completion **easy** (excel)
  - Encouraged CR **requirements analysis/validation**
  - could be **subjective** →record rationale.
- Some requirements **alleviate** the need to do task, **depend on task** or **depend on other requirements** → model validation/improvement

Conclusion

- It is possible to produce i* models of a legacy system by reverse engineering its implementation to requirements
- Combinatorial approach of methods provides a richer representation of requirements
- REDEPEND facilitates both modelling and impact analysis

Agile Practices – Pre-adoption Analysis
Using Strategic Modeling and Empirical Knowledge

Hesam Chiniforooshan
Eric Yu

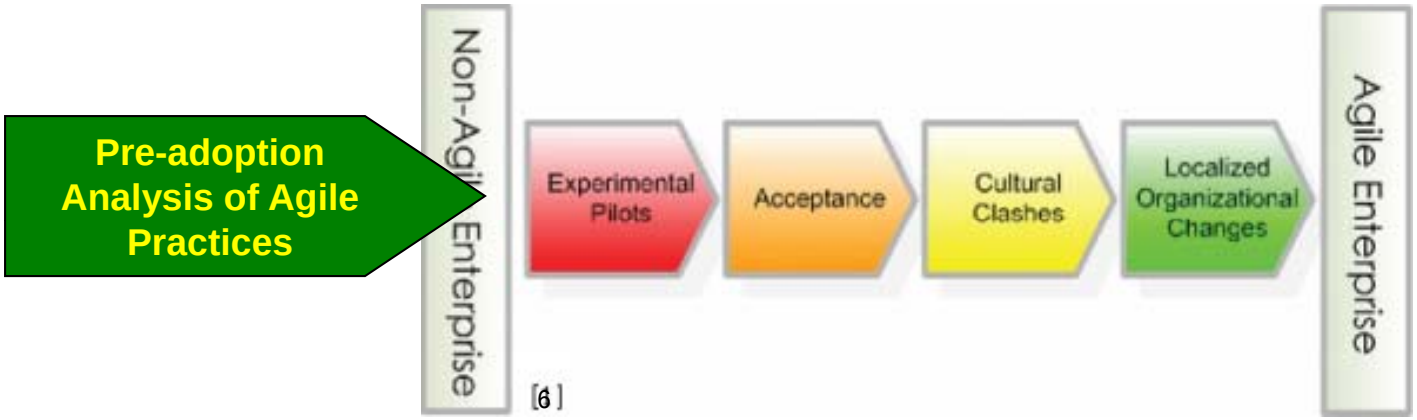
University of Toronto

Maria Carmela Annosi

ERICSSON

Introduction
Transitioning to Agile

Main Approach in Agile Adoption –



- Systematic Frameworks
  - Agile Measurement and Adoption Framework (Sidky et al., 2007)
  - Agile Adoption and Improvement Model (AAIM) (Qumer & Henderson-Sellers, 2008)
  - Experience-based framework for adopting agile practices (Krasteva et al., 2010)
  - Adopting Agile in Distributed Development Context (Sureshchandra & Shriniv., 2008)

- Problem Statement
  - How to identify potential conflicts of the process and organization ASAP?

2

Motivating Industrial Experience

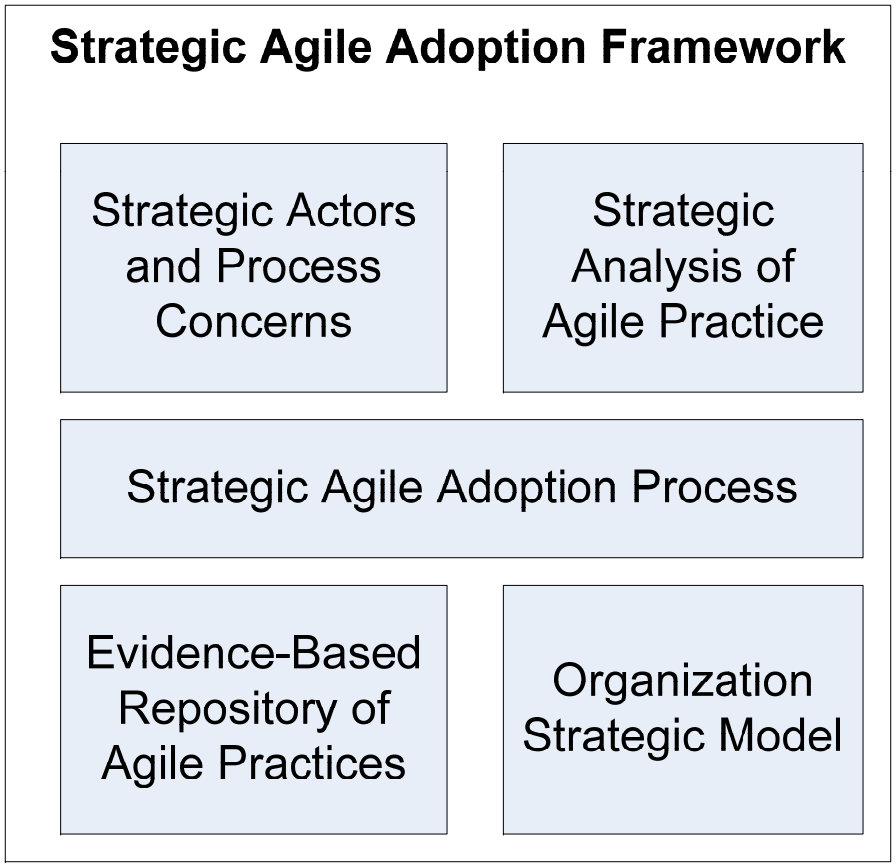
- An R&D unit in Ericsson, Italy
  - 20 developers, testers, and middle-managers
  - Intended to move to Agile, by adopting Scrum practices
    - Scrum Team Structure
    - Daily Scrum Meeting
    - Sprint Planning
    - Short Release

- Primary Concerns in transitioning to:
  - Can the advertised promises of new process be attained?
  - Can the proposed agile practices solve our process concerns?
  - What are the potential conflicts of the new process with the organization?

3

Background
Strategic Agile Adoption Framework (SAAF)

Detecting strategic conflicts of a process and an organization, prior to the actual enactment of the process



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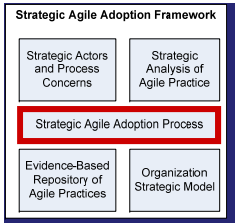
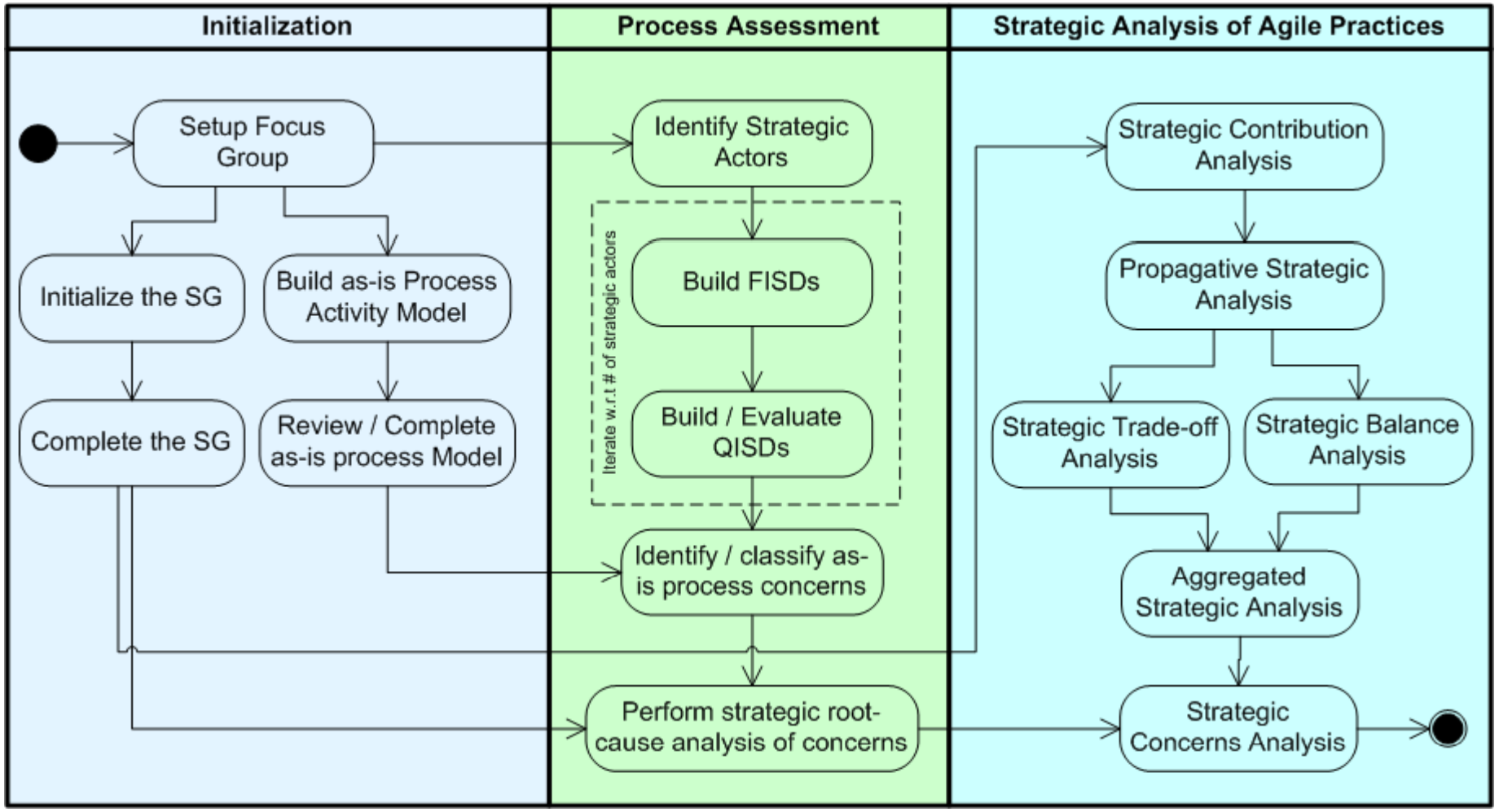


Background
Strategic Agile Adoption Framework (SAAF)



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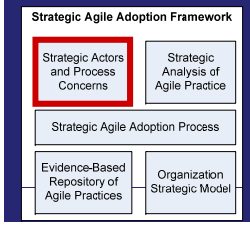
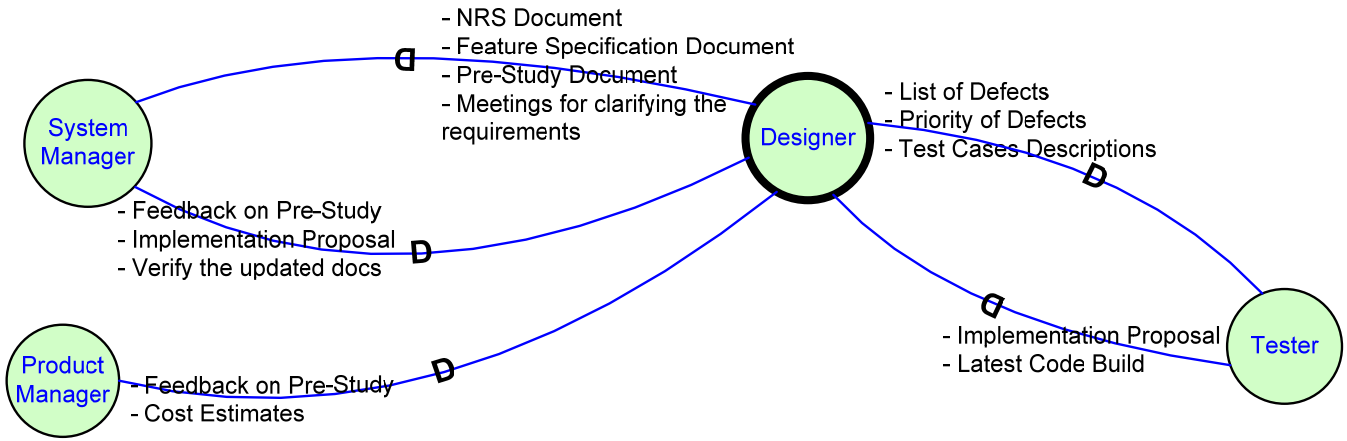
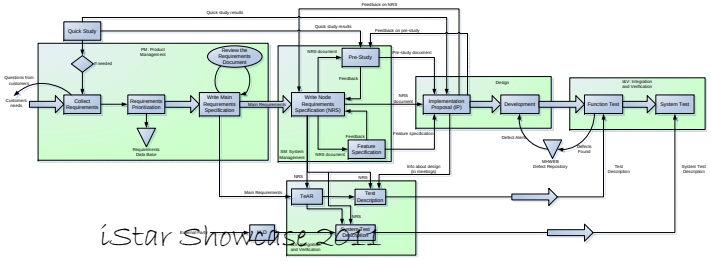


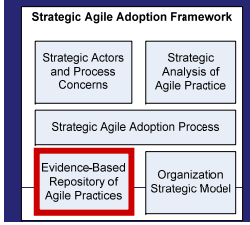
Strategic Actor and Process Concerns

Application of *i** SD in Process Assessment

- First round of interviews (*January, 2010*)
  - Initial Understanding of ADRS (roles, responsibilities,…)
  - Development of initial models
    - Itemized Strategic Dependency Diagrams
    - Process Flow Diagram







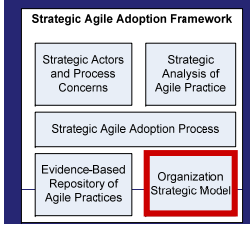
Evidence-Based Repository of Agile Practices

Taking a Goal Oriented Viewpoint in Systematic Review of Empirical Studies

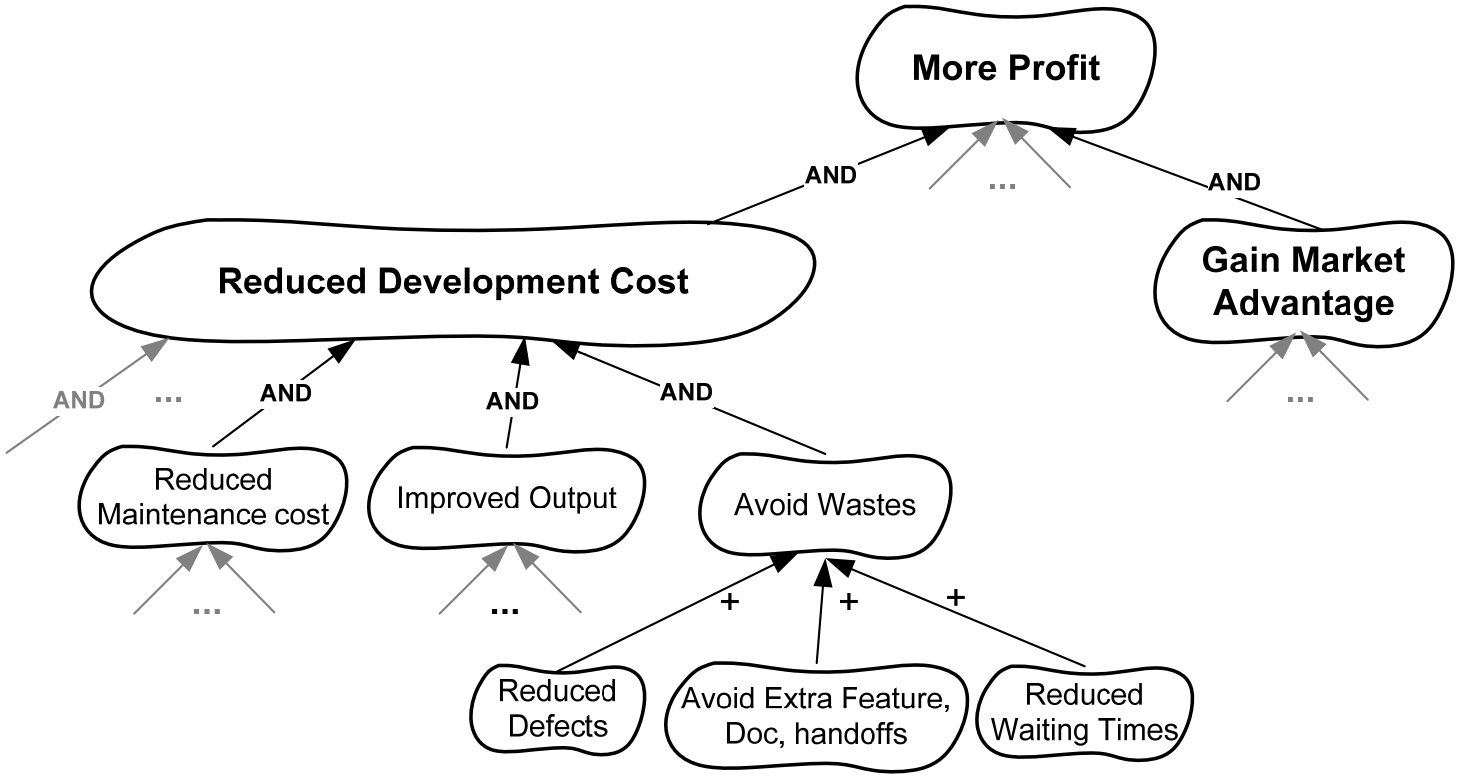
www.ProcessExperience.org

Major Objective	Minor Objective	Contribution Type from Fragment	Study	Situation
Effective Communication	Improved awareness (of what others are doing)	++	[S1]	In General
		-	[S1]	Large projects, extensive number of meetings
	Real-time knowledge transfer	+	[S8]	In General
		-	[S2, S12]	Distributed Development: use of email and wiki pages
	Enhanced Communication with business people	++	[S3, S8]	Existence of multi-level Scrum in case of many scrum teams

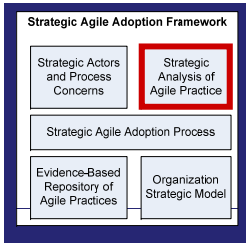
Daily Scrum Meetings – Objectives Dataset



Organizational Strategic Model



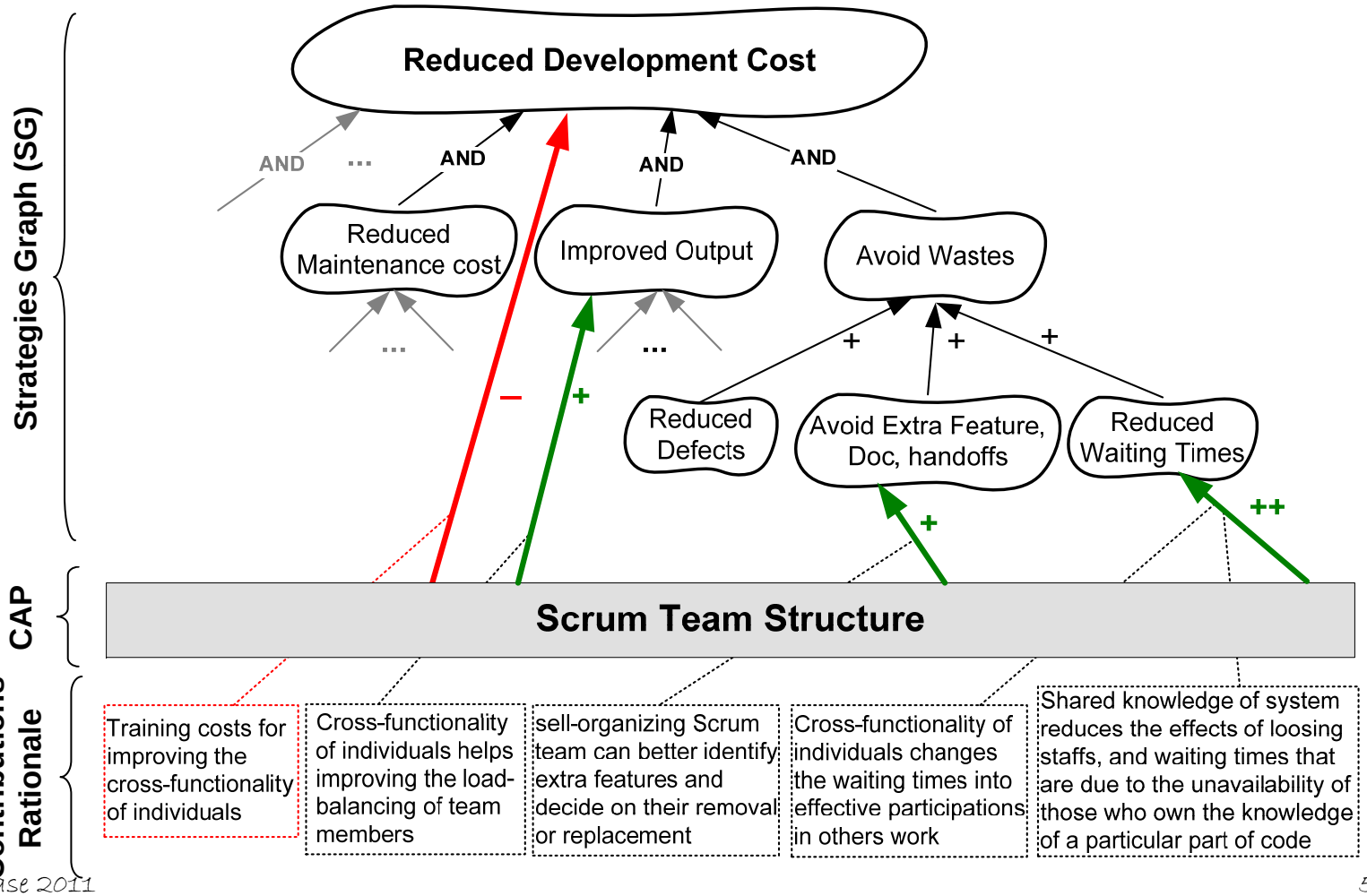
- Further Elements:
  - BSC Perspectives:
    - Financial, Customer, Internal Process, Learning & Growth
  - Quantitative Measures
  - Influencing Organizational Initiatives

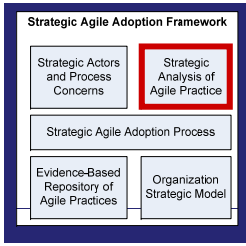


Strategic Analysis of Agile Practices

Application of Goal Oriented Techniques in Software Process Analysis

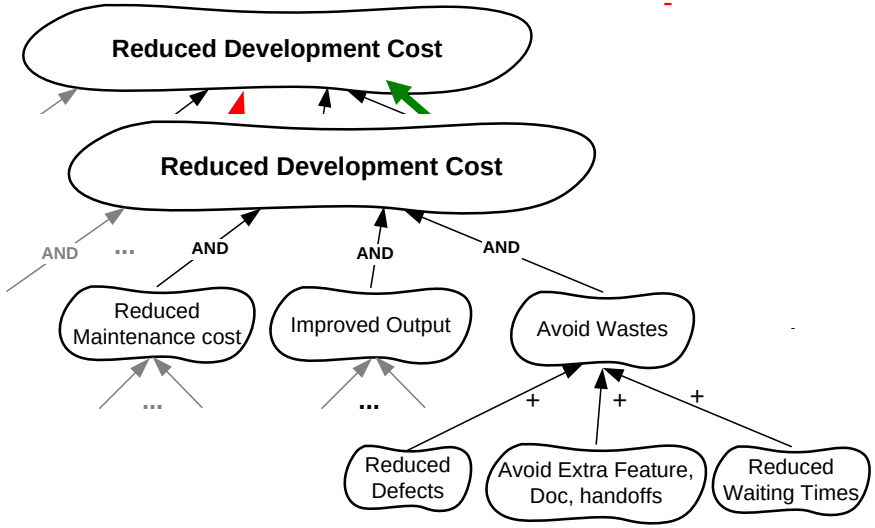
1. Strategic Contribution Analysis





Strategic Analysis of Agile Practices

Application of GO Techniques in Software Process Analysis



1. Strategic Contribution Analysis
2. Propagative Strategic Analysis
3. Aggregated Strategic Analysis
4. Strategic Trade-off Analysis
   - ✓ Practice Level / Process Level
5. **Strategic Balance Analysis**
   - ✓ **Balance Improvement**
   - ✓ **Balance Preservation**
   - ✓ **Balance Preservation Across Categories**
   - ✓ **Homogeneous Contributions Across Categories**

Conclusion

- Modeling
  - *i** models can be customized for application in various domains
  - Goal models can facilitate participation of organization members in SPI initiatives
  - The analysis process of Strategies Graph can turn to a generic decision making framework
  - Modeling of organizational strategic objectives, is a key to their shared understanding by all members
- Process
  - Earlier detection of the process / organization conflicts can save organizational resources
  - Agile processes can be customized wrt organizational strategic objectives

Thanks

References:

[1] www.ProcessExperience.Org

[2] H.Chiniforooshan, E.Yu, M.C.Annosi. "Towards the Strategic Analysis of Agile Practices", Forum of 23nd International Conference on Advanced Information Systems Engineering (CAiSE Forum), 2011, London, UK.

[3] H.Chiniforooshan, E.Yu, M.C.Annosi. "Itemized Strategic Dependency: a Variant of the *i** SD Model to Facilitate Knowledge Elicitation", 4th International *i** Workshop, Tunisia, 2010.

[4] H.Chiniforooshan, E.Yu. "A Repository of Agile Method Fragments", International Conference of Software Process (ICSP), Germany, 2010.

[5] H.Chiniforooshan, E.Yu, M.C.Annosi. "Strategically Balanced Process Adoption", International Conference on Software and Systems Process (ICSSP), USA, 2011.

[6] Szalvay, V., Mar, K., & James, M. (2008). Agile Transformation Strategy,Danube Technologies, Inc.

Modelling Requirements for an Integrated Management System for Civil Construction

Fernanda Alencar[1], Jaelson Castro[2], José R R Menezes[3], José J R Silva[3], Emanuel Santos[2]

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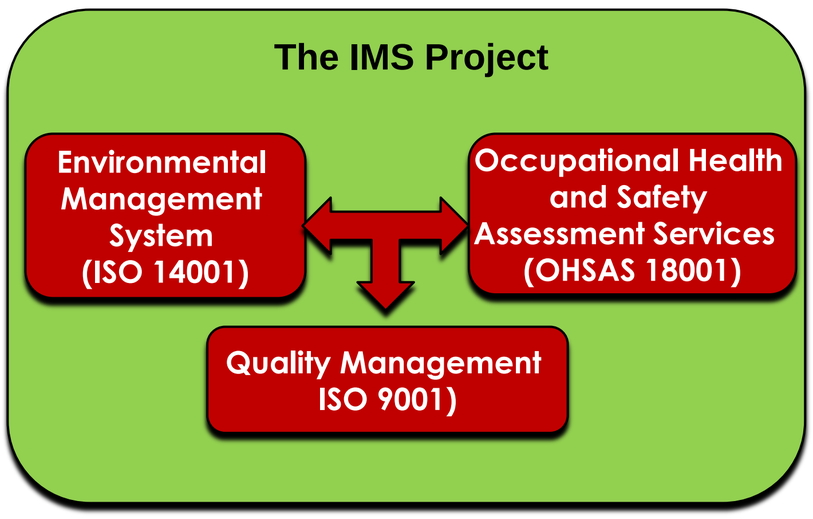
Introduction



Motivation

- Environmental Management System (ISO 14001)
- Occupational Health and Safety Assessment Services (OHSAS 18001)
- Quality Management (ISO 9001)

Proposal

- The "Integrated Management System for Civil Construction – IMS" project
  - Compute the results of the internal inspection
  - Detect non-conformities to the standards
  - Reduce small errors related to incorrect filling of auditing forms

Partners

- Civil Engineering Industry, academic and Brazilian government

Objective

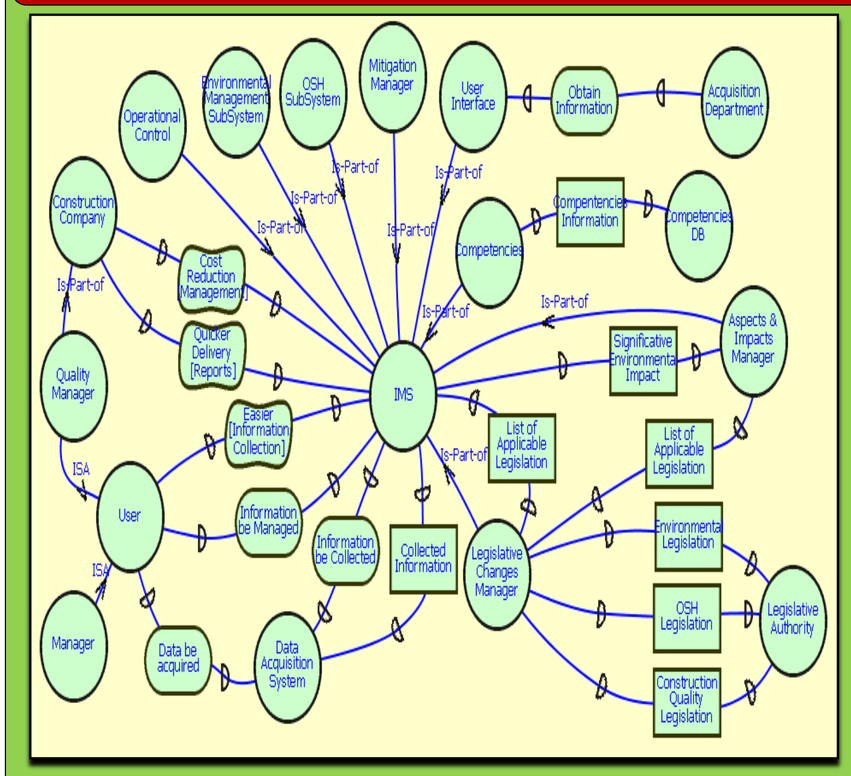
- The development of the Integrated Management System (IMS), in order to support for integrated management of civil construction organizations aiming at their sustainability

The Approach

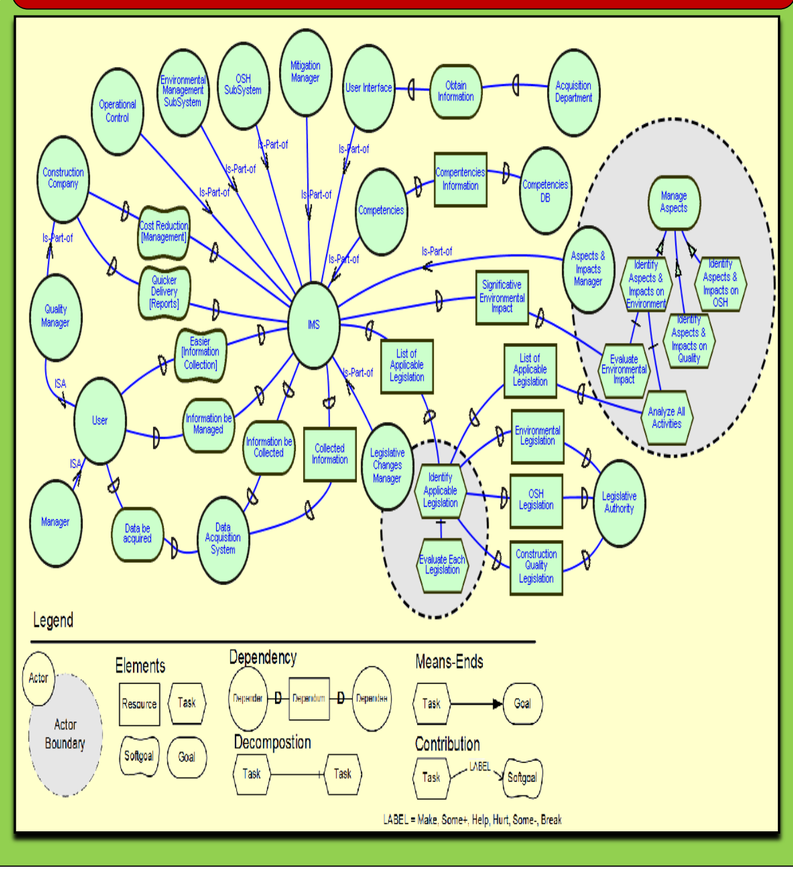
Elicit stakeholders needs (Imeetings) → Consider current Information Systems → i* (iStar) Crash course * → Construct i* Models → Validate i* models → Propose initial architecture of the IMS

The Proposal

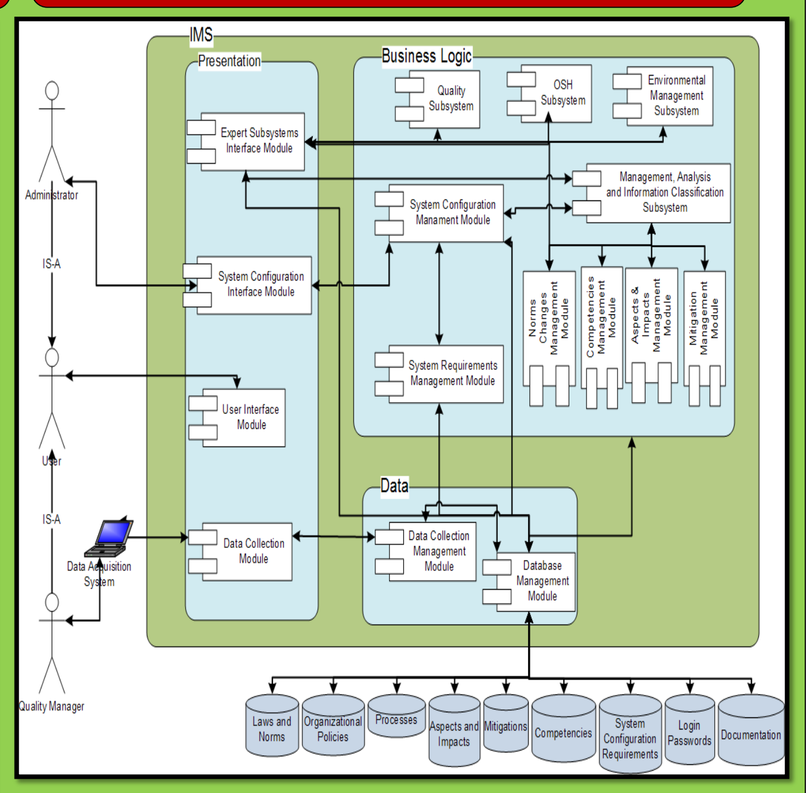
1a. The Strategic Dependency Model of the IMS



1b. The Strategic Rationale Model of the IMS



2. Initial architecture of the IMS



Lessons Learned

- Elicitation with i*
  - Excellent mechanism for elicitation of stakeholders needs, intentions and desires
  - Help to keep focus during discussions with our partners
- Reasoning with i*
- Civil engineers exposed to i*
  - Requirements Engineering is not common in civil construction
  - High learning curve
  - Dealing with complexity and scalability

Conclusions and Future Works

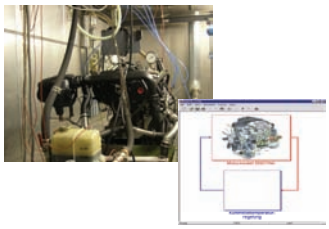
- Conceptual model of integrated management system in place, with certification in two construction companies.
- Seven (07) construction companies have benefited directly from the activities of this project, participating in courses and seminars
- Fifty (50) companies had direct access to project results
- Future works
  - Complete the IMS development
  - Validate IMS
  - Further case studies

Managing Requirements Knowledge – A Case Study on Control Systems

Dominik Schmitz[1], Matthias Jarke[1,2], Hans W. Nissen[3], Thomas Rose[2]
[1] RWTH Aachen University, [2] Fraunhofer FIT, [3] Cologne University of Applied Sciences

1 Problems

Innovations in Control System Engineering



Innovations in cars nowadays are mainly driven by software, but control systems and software engineering currently do not interact
⇒ methodological complementarity is hindered

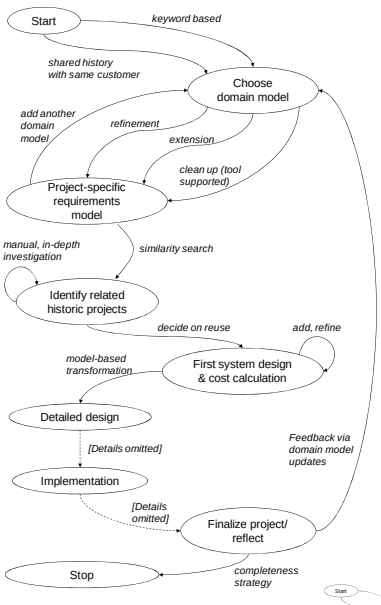
Application domain: combustion engine controller

Specific Characteristics of Small- and Medium-Sized Enterprises (SMEs)

- Dominate in individual control systems engineering
- *Profound knowledge* in a particular, narrow field as the core asset of the enterprise
- *High frequency of innovations* – knowledge, experiences evolve quickly
- *Focus on specific customer issues* with very individual problems and solutions ⇒ no opportunities for planned product families

Need for an integrated approach to manage requirements knowledge

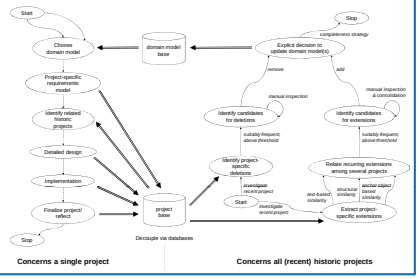
2 Solution



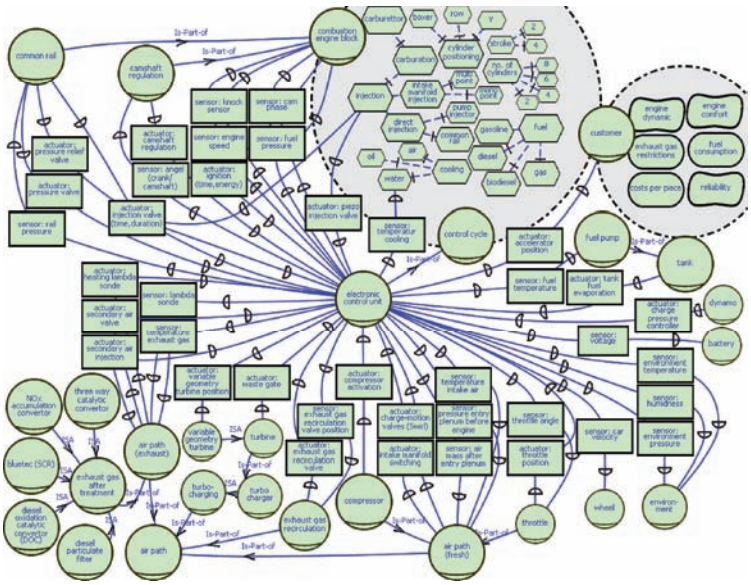
- *Model-based* capture of requirements with *i**
- *Domain models* to represent particular knowledge/experiences
- A *situational method engineering* approach to support the development process
- A *similarity search* for projects at the level of requirements
- Continuous *model-based development*, esp. model transformation
- Support for *evolving domain knowledge*

Technologies

- *i** for modeling
- Telos/ConceptBase for model management
- Eclipse platform
- Java-based

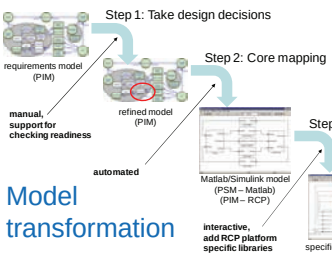


3 Application Details

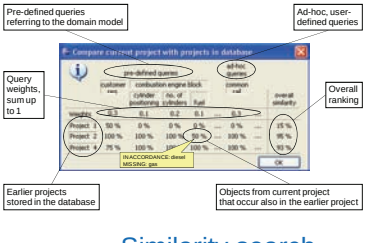


Domain models

- Common starting point
- Accelerate modeling
- Tailoring/update possible



Model transformation



Similarity search

& new anchor object-based similarity measure

Evolution (over t)

Project Partners and Industry Involvement

iStar Showcase 2011

Designing the Trentino Innovation Network: Applying Tropos to TasLab

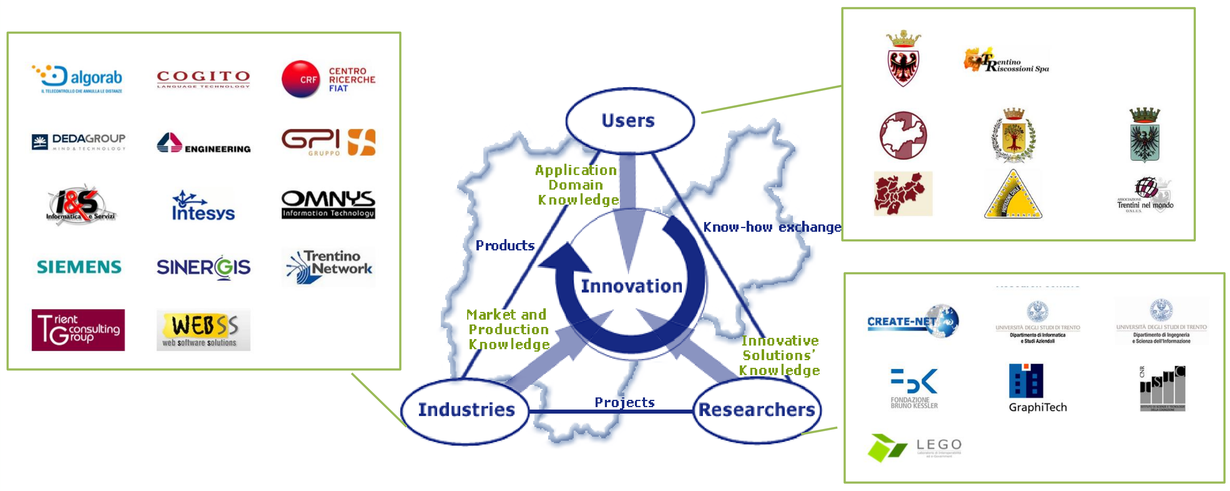
UNIVERSITY OF TRENTO - Italy
Information Engineering and Computer Science Department

Fabiano Dalpiaz, Paolo Giorgini – University of Trento, Italy
Valentina Ferrari, Stefano Tinella – Informatica Trentina, Italy

Informatica Trentina SpA

Context: the TasLab initiative

- ***TasLab*** **(*T*rentino *as* a *Lab*)**
  - **An innovation network for the ICT sector**
  - **Trentino Province, Italy**
  - **Focus on innovation for the public administration**
- **Why such initiative?**
  - **Trentino is a research-intensive territory (+1000 researchers in the ICT area, population ½ million)**
  - **Autonomous governance allows for experimenting innovation in the public sector**
  - **Implementation facilities for research: +700 SME in the ICT sector**
  - **Innovative Lead User: local public administration**
- **The TasLab cornerstone: the Innovation tripole**
  - **The synergy between research, industry, and users creates innovation**



- **Towards TasLab: a set of coordinated initiatives**
  - **We consider a project concerning the organizational design of the TasLab innovation network[1]**

The Alignment Problem

- **The project included several concurrent activities**
  - ***Top-down*****: interviews to elicit stakeholders's needs and constraints from the TasLab vision**

Province of Trento (PAT)
R1. TasLab shall innovate ICT services via industry-research cooperation
R2. …

Researchers
R1. TasLab has to be a legal entity
R2. Researchers involved in strategic decisions
R3. …

Industries
R1. Companies shall play a more important role in ICT innovation
R2. …

…

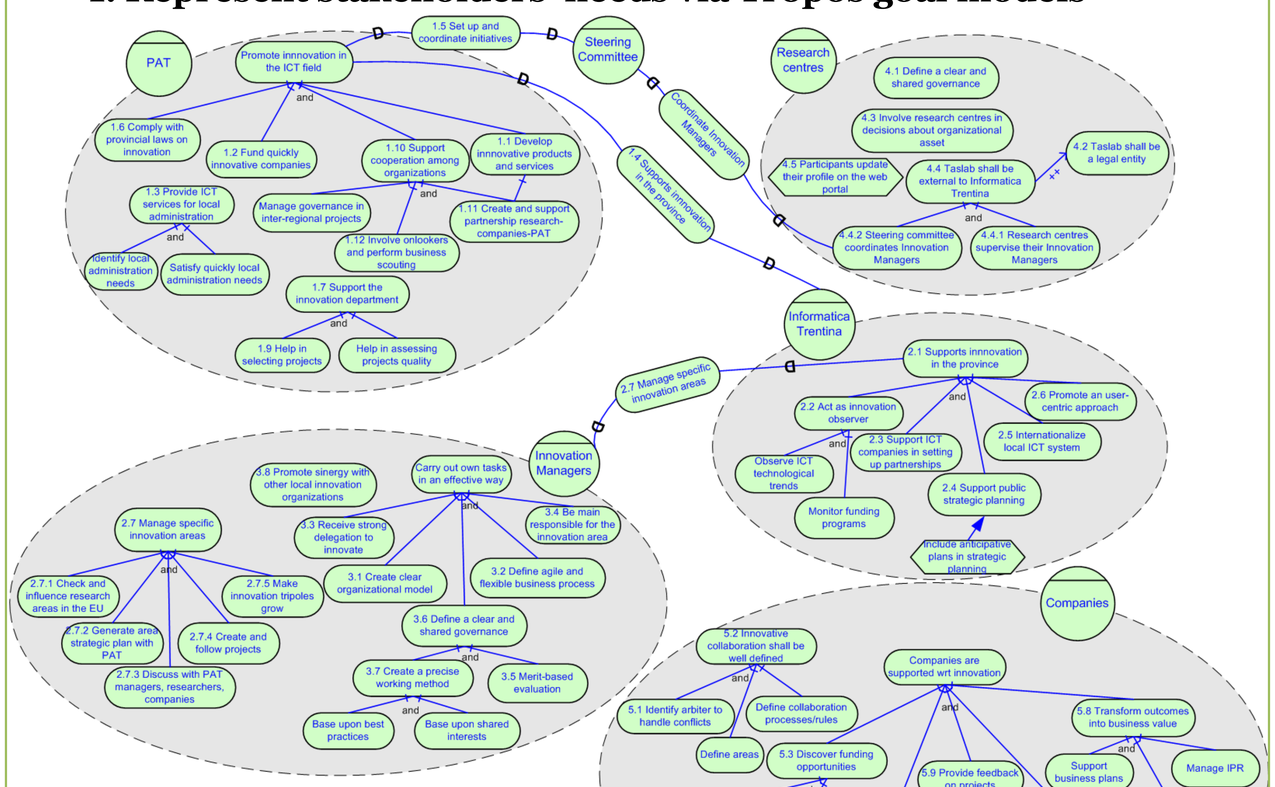
  - ***Bottom-up*****: organizational design of the innovation network**
    - **Services to offer to participants (e.g. scouting, funding, dissemination, …)**
    - **Business processes to support these services**
- **A problem of alignment!**
  - **Are the needs and constraints supported by organizational design?**
  - **Are there services/processes stakeholders do not need?**

Our Approach

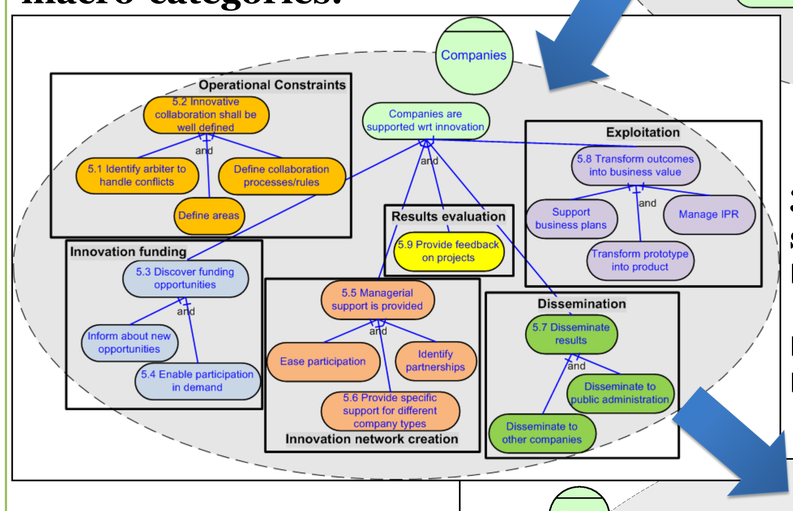
- **We conducted a top-down analysis**
  1. **Analyse the interviews and the vision documents**
  2. **Use Tropos to model stakeholders' needs**
  3. **Cluster goals according to macro-categories (TasLab services are grouped in these categories)**
  4. **Introduce TasLab actor as system-to-be and assign it leaf goals from other actors**
  5. **Link goals to services via means-end relation**
  6. **Check alignment (do services support stakeholders' needs?)**
  7. **Provide recommendations to organizational designers**
- **Spiral approach to iteratively refine the analysis**
  - **Due to the evolution of needs and organizational design**

From goals to services

1. Represent stakeholders' needs via Tropos goal models



2. Cluster goals according to macro-categories:

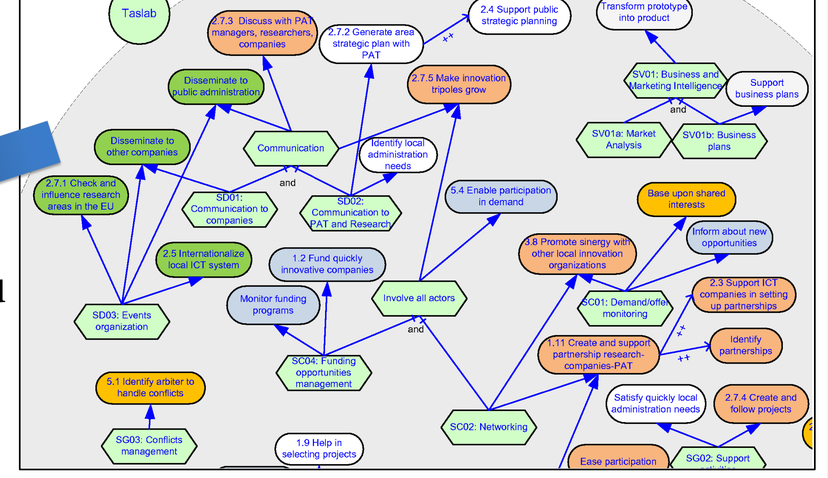


3. Link goals to TasLab services

- **Introduce TasLab as system-to-be**
- **Services are tasks**
- **Link via means-end relation**

4. Check alignment

- **Most goals supported by services**
- **Some goals will be supported by adopting best practices**
- **A few goals not supported**
  - **e.g. feedback on project proposals and completed projects**



Benefits

- ✓ **Effective communication to people with different profiles**
  - ❑ **Managers**
  - ❑ **Researchers**
  - ❑ **System analysts**
  - ❑ **Developers**
- ✓ **Social dependencies useful to relate the interests of multiple stakeholders**
- ✓ **Loose coupling between language and methodology allowed mapping stakeholders' goals to organizational design**

Lessons Learned

- × **Users understand a subset of the language concepts**
- × **Input data heterogeneity makes modelling hard**
  - ❑ **Different levels of abstraction (strategic vs. operational)**
  - ❑ **Different vocabularies**
- × **Some requirements types are not supported**
  - ❑ **e.g. Needs vs. constraints**
- × **Actor-based modularity is not enough**
  - ❑ **Category-based modularity**

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[1]Project "Knowledge and know-how transfer among research centers and enterprises, including also the mobility of researchers and technicians", the operation implemented has been selected under an operational programme co-financed by the ESF, Operative Programme 2007-2013 of the Autonomous Province of Trento (act n. 1637 (30.06.2008))

Trentino as a Lab
iStar Showcase 2011

European Union
European Social Fund
Investing in jobs and skills

Analyzing Requirements for Online Presence

Kids Help Phone Canada & University of Toronto

S. M. Easterbrook[1], E. Yu[2], J. Aranda[3], J. Horkoff[4], M. Strohmaier[5], Y. Fan[6], M. Leica[7], and R. A. Qadir[8]
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[3]Department of Computer Science, University of Victoria; [5]Knowledge Management Institute, Faculty of Computer Science at Graz University of Technology.
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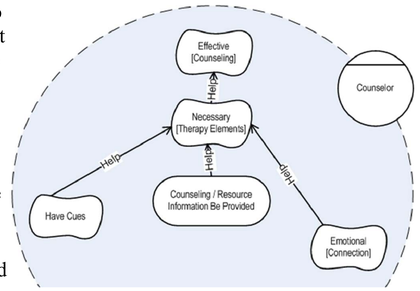
Setting: Kids Help Phone Canada

- Kids Help Phone is a not-for-profit organization that has provided phone counseling for Canadian youth since 1989.
- Began transitioning to **online counseling** in 2002.
  - **Pros:** online counseling can reach more kids, provide comforting distance.
  - **Cons:** online counseling loses voice cues, raises concerns for confidentiality, protection from predators, public scrutiny over advice, and liability for misinterpreted guidance.
- **Challenge:** How can the organization explore and evaluate options for online counseling, balancing the conflicting concerns and the needs of multiple parties?

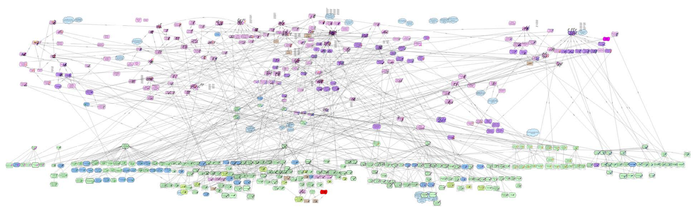
Stage 1: Organization Understanding

- i* models were created to describe aspects of the organization.
- Qualitative evaluation used to analyze and compare different technology options for online counseling.
- Model snippets presented to organization (see right)
- Results:
  - Better understanding of the organization.
  - Analysis brought to light several issues and provoked interesting discussions.



Stage 2: Efficiency of Existing Systems

- Existing online counseling system had difficulties handling volume of enquiries.
- Large i* model created to represent current online counseling system.



- Evaluation used to analyze changes and additions to current system.
- Results:
  - Options were validated by converting models to tabular form , example:

Feature: Optional Private Threads

Motivations	Concerns
• Allow kid to choose whether threads are public or private • Be able to reply privately to kid • Reduce amount of editing in second tier • Confidential service	• Kids won't see private responses to other kids • Might annoy kids by making their posts private • Kids won't learn from each other in private posts

- Created prioritized requirements specification.

Multi-Year Collaborative Research Project

- Collaborative research project between Bell University Labs at the University of Toronto and Kids Help Phone was launched in 2004 and completed in 2008.
  Objective: Perform a strategic analysis of the information needs of Kids Help Phone, in light of their increased use of an dependence on technology to facilitate and support their counseling process.
- Evolving research goals resulted in three major project stages:
  - Stage 1: Organization Understanding,
  - Stage 2: Efficiency of Existing Online Systems, and
  - Stage 3: Knowledge Management.

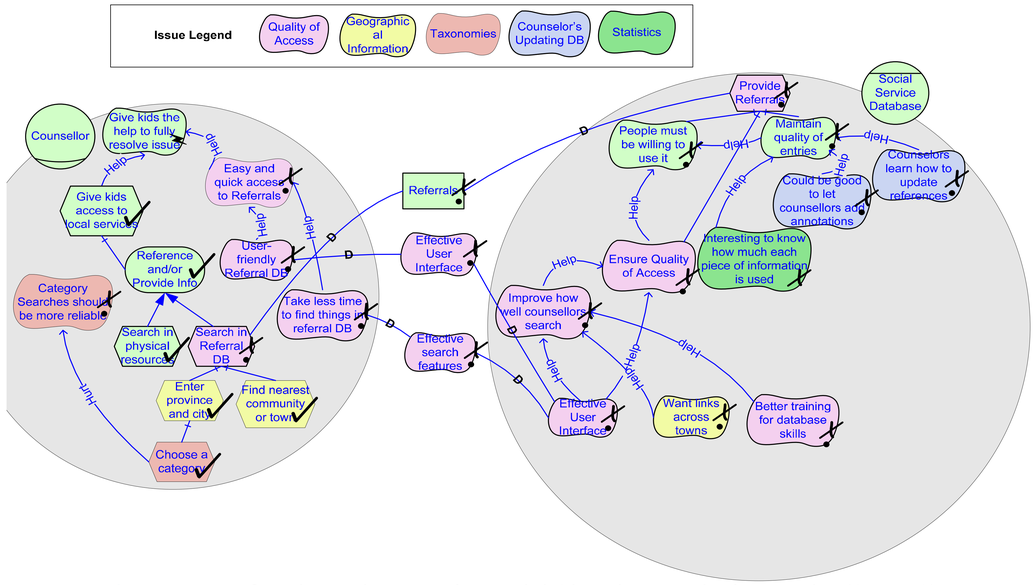


Figure 1: Referral Database As-is Model Showing Analysis Results (Stage 3)

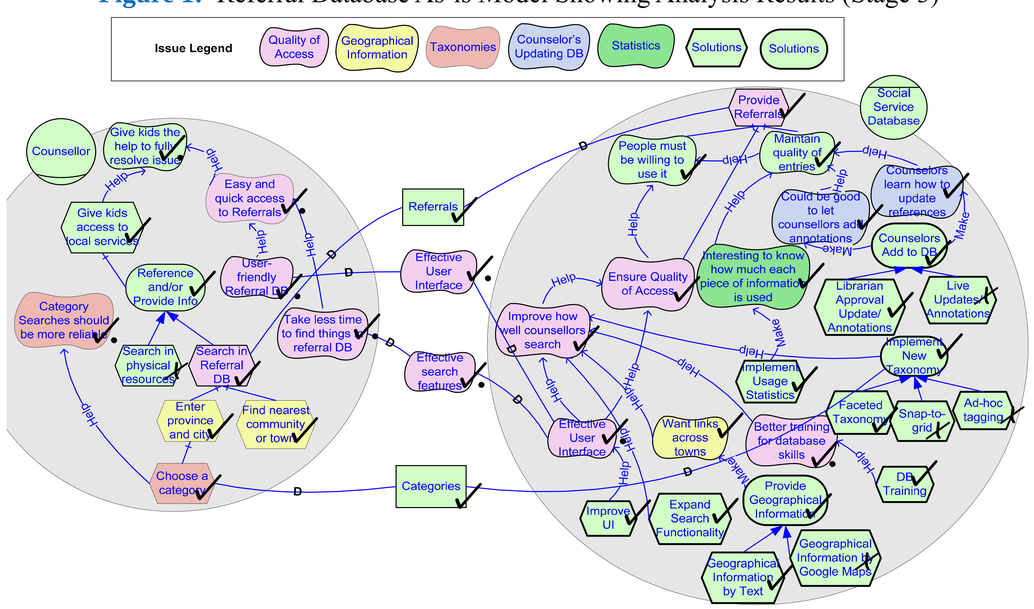


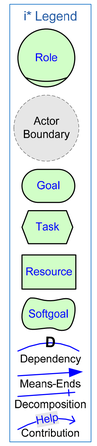
Figure 2: Referral Database To-Be Model Showing Analysis Results (Stage 3)

Use of i* Modeling

- Applied i* modeling as a means of explicitly considering organization actors, roles, goals and dependencies.
  - Aimed to understand how the organizations goals were currently being met (as-is), and how they could be met in the future (to-be).
- Applied the i* Framework as described by Yu (1997).
  - Used all types of i* syntax (actors, goals, softgoals, tasks, resources, contributions, decompositions, dependencies).
  - Made extensive use of qualitative forward i* analysis described by Horkoff & Yu (2010).

Qualitative Evaluation Labels

Full Satisfaction ✓ ✓ ✓ ✗ ✗ Full Denial



Stage 3: Knowledge Management

- Used i* models to explore solutions which focused on the knowledge management needs of the organization.
- Created first draft of models on the fly.
- Focused on editing models based on clear scope.
- Example: (left) Referral Database as-is and to-be models showing the evaluation of potential technology solutions.
  - Colors used to assign intentions to organizational issue categories.
- Results:
  - Evaluated situational effectiveness of technologies for storing and distributing knowledge, including wikis and discussion forums.

Lessons Learned

- Initial stage models were too large and complex.
  - Tried to model everything.
- Later stages focused on clearly defined model scoping.
  - Each model focused on one specific issue.
  - Models were easier to understand, modify and evaluate.
- Modeling and analysis were helpful in understanding the organization and evaluating alternatives.
  - Demonstrated the ability of i* to aid in domain understanding, analysis, communication, and decision making.
  - i* modeling helped to describe opposing and complex viewpoints.
  - i* modeling and analysis helped to compare technology options.

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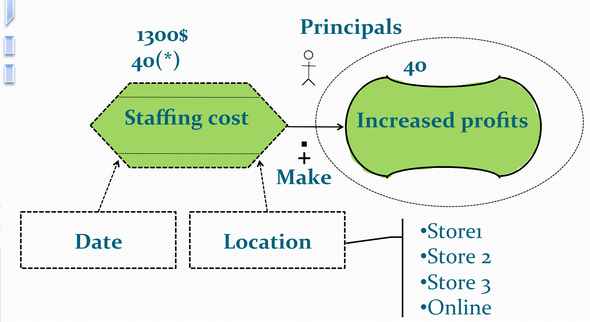
Using URN and Key Performance Indicators for Performance Management in SMEs

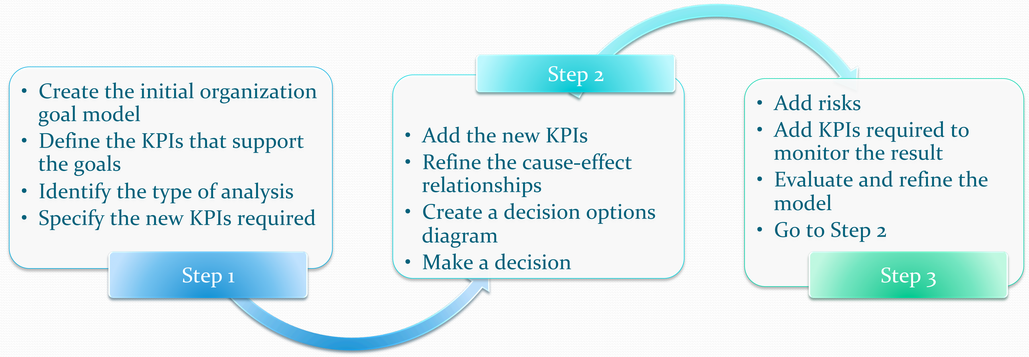
BI-BASED DECISION MAKING

- 50% of BI implementations fail to influence decision makers!
- Data views might not fit users' decision models
- BI data does not necessarily show the cause and effect relationships we need to make decisions
- Cognitive fit: decision makers tend to make better use of information that is displayed
- Current BI visualizations do not explicitly show the relationships between decision parameters

GRL AND KPI FOR DECISION MODELING



A FRAMEWORK FOR BI-BASED DECISION MAKING

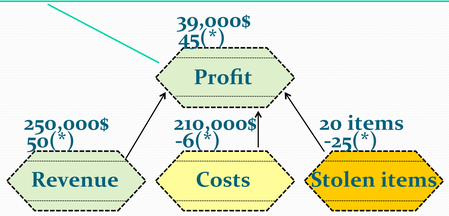


HOW DO WE IMPROVE DECISION MAKING?

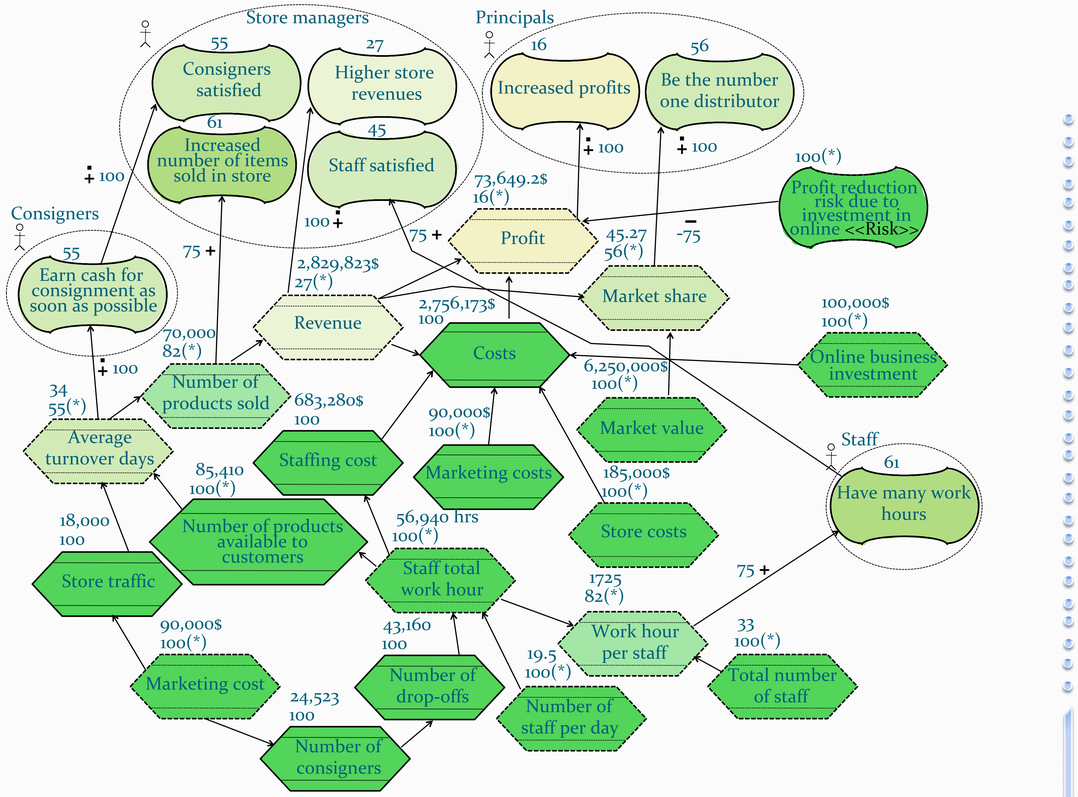
- Decision makers build models based on their goals
- Visual decision framework to improve cognitive fit
- Better display relationships between KPIs and goals
- Iterative framework to allow incremental improvement

FORMULA-BASED EVALUATION ALGORITHM

METADATA:
Formula = Revenue – Costs – Stolen * 50



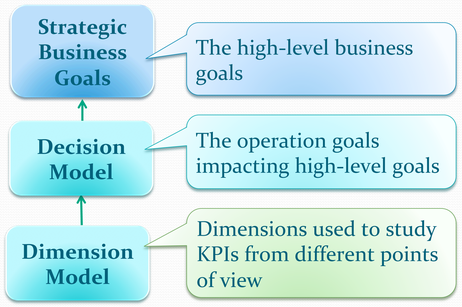
RETAIL BUSINESS THIRD ITERATION MODEL



LESSONS LEARNED

- Goal models with indicators are a good modeling representation for managers.
- Modeling helps with documentation of both known and uncertain aspects of business.
- When no historical data is available, use industry standards or "best guesses".
- We are still unsure of how much information we have to show in the model.
- The new formula-based propagation algorithm provides a great deal of flexibility.
- The algorithm has room for improvement (e.g., goals contribution KPI)
- Creating different versions of a model in different iterations can be painful.

HIERARCHY OF THE MODELS



Team: Alireza Pourshahid (SITE, uOttawa), Daniel Amyot (SITE, uOttawa), Greg Richards (Telfer School of Management, uOttawa), Heather Meek (Boomerang Kids)

uOttawa

Proactive Adverse Event Management in Healthcare

Using the Goal-oriented Business Process Family Framework

Saeed Ahmadi Behnam (uOttawa), Daniel Amyot (uOttawa), Alan J. Forster (uOttawa, The Ottawa Hospital)

Motivation

There is a need to capture, model and reuse both problems and solutions in the context of patient safety in the healthcare domain.

Challenges

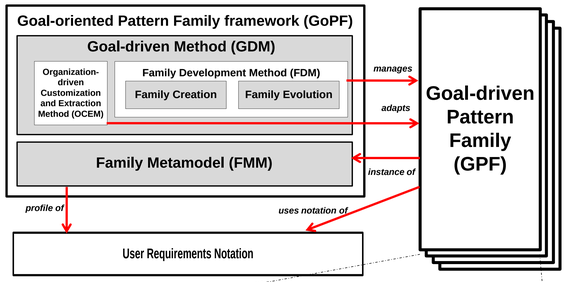
- Capturing the knowledge about problems & solutions is difficult
- Reusing the captured knowledge is also challenging

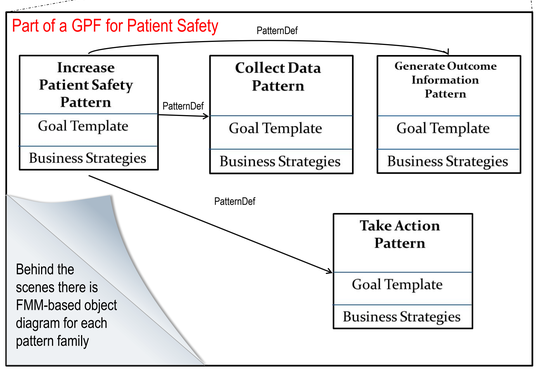
The Goal-oriented Pattern Family (GoPF) framework combines goal modeling with process modeling to address these challenges.

Goal-oriented Pattern Family Framework

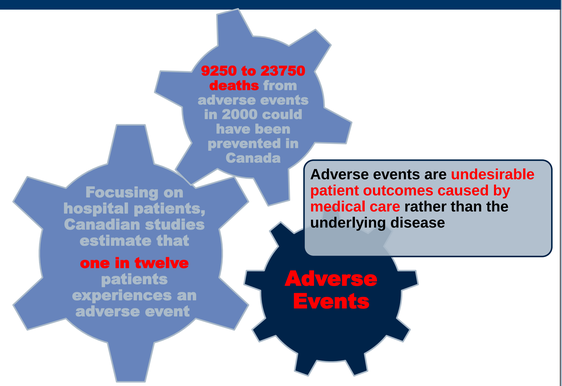
Objectives

- Facilitate capturing and maintaining domain-specific business knowledge as patterns
- Facilitate creating goal models and business process models for specific organizations

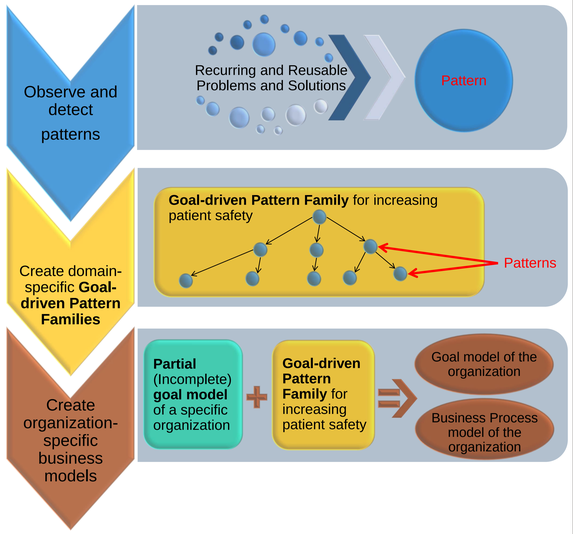




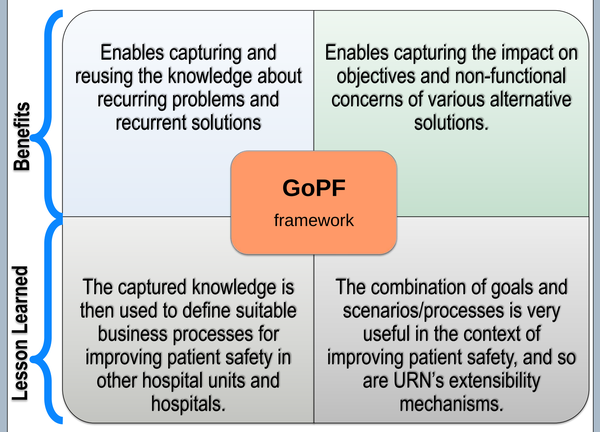
Importance of Proactive Adverse Event Management



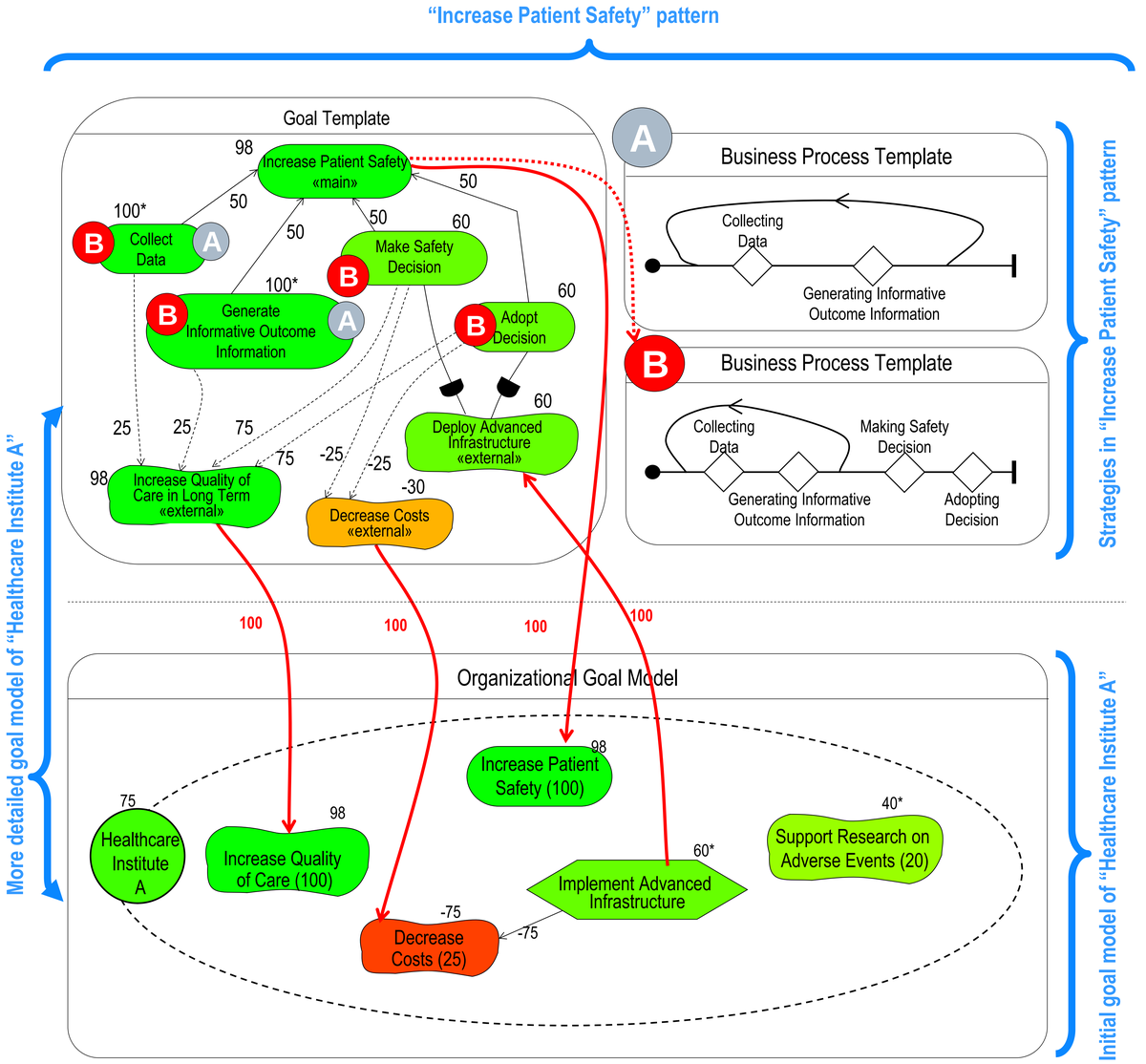
Using the GoPF Framework



Benefits and Lesson Learned

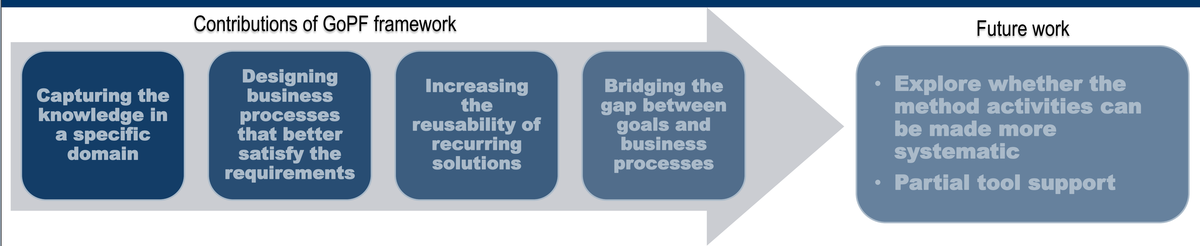


Creation and Application of a Pattern Family



With this approach, a hospital that does not yet systematically monitor adverse events (AE) can model a new prospective AE surveillance process based on the knowledge captured in other hospitals, and tailored to the goals and resources of this specific hospital!

Conclusion and Future Work



Collaborative Social Modeling for Designing a Patient Wellness Tracking System in a Nurse-Managed Health Care Center at Philadelphia

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Context: Nurse-Managed Health Care Center

- "The Center" is a nurse-managed community health services facility .
- Located in an area with a low-income and medically underserved population.
- Focuses on a transdisciplinary and holistic approach to chronic care.
- The Center's EMR (Electronic Medical Records) system contained patient information stored in fragmentary places.
- The as-is health information technology hindered efficient patient tracking and outcome evaluation.

Figure 1: Chronic Care Model

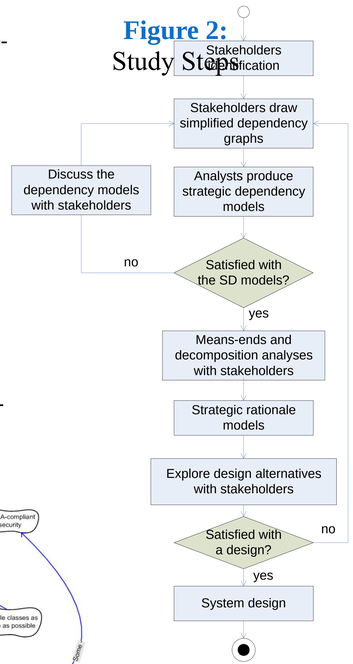
Objective: Create an electronic patient wellness tracking system to link the success of health education and chronic disease management to clinical data.

- The PWT is aimed at maintaining information about a wide variety of health and wellness services provided to patients with various illnesses including chronic diseases.

Study Steps

- First, the analysts held several group meetings with stakeholders, observed the staff's activities and workflows.
- Stakeholders and analysts collaboratively created simplified SD models focusing on one actor at a time (e.g. Fig. 3).
- Analysts expand simplified SD models to produce detailed SD models (e.g. Fig. 4)
- Detailed SD models verified with stakeholders
- Analysts expand SD models to produce SR models (e.g. Fig. 5).
- SR models verified and explored with stakeholders
- SR models manually converted to design (UML) models and detailed requirements (e.g. Fig. 6)
  - Some heuristics for conversion were applicable

Figure 2: Study Steps



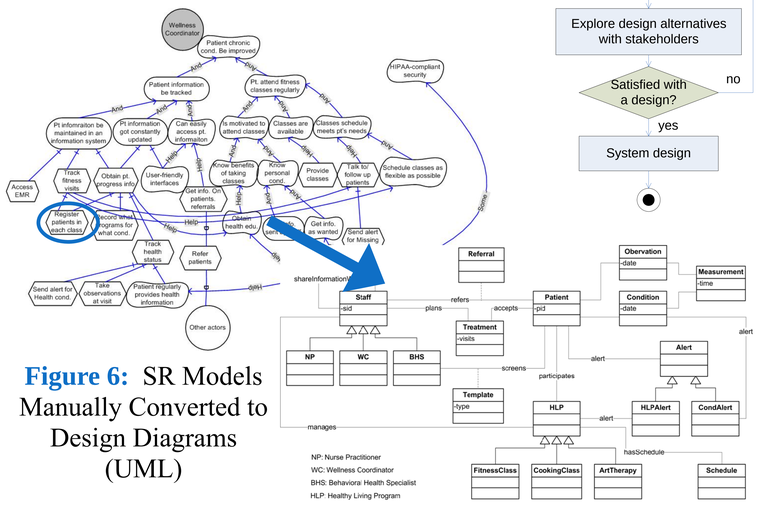


Figure 6: SR Models Manually Converted to Design Diagrams (UML)

Challenges

- **Deeply understanding and accurately capturing the information needs of the stakeholders is crucial to successfully designing and deploying the PWT system.**
- Current commercial health IT products and not designed for the **transdisciplinary model**.
- The transdisciplinary model for is a **complex healthcare process** involving a group of professionals in different disciplines.
- It is challenging for a **system analyst or designer without a healthcare background** to fully understand and design a system for workflow between different healthcare professionals.
- Much of the **information** processed by healthcare professionals is **tacit and hidden**, it is challenging to completely illicit the requirements.
- System analysts tend to use **technical diagrams** and models to represent requirements and some initial design, but **healthcare professionals do not easily grasp the semantics** of these diagrams.
- Medical and healthcare **terminology presents a tremendous barrier** for system analysts to capture requirements.
- **Communication** between healthcare professionals and system analysts is difficult, especially in the initial stages of design.
- It is challenging to **evaluate stakeholder opinions** on the results of design and development.

First attempt: Year-long series of focus group meetings with Center Staff made little progress in capturing the requirements for the PWT system.

Figure 3: Example Simplified SD Model for Nurse/Administration

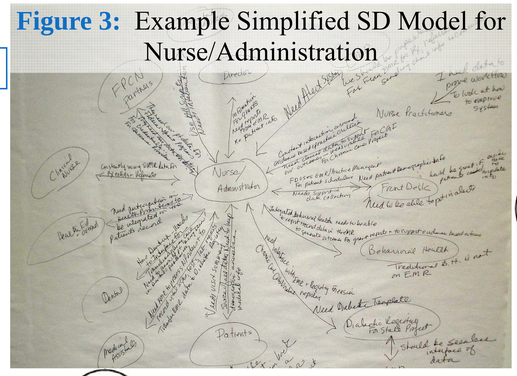


Figure 4: Example Focal SD Model for Wellness Coordinator

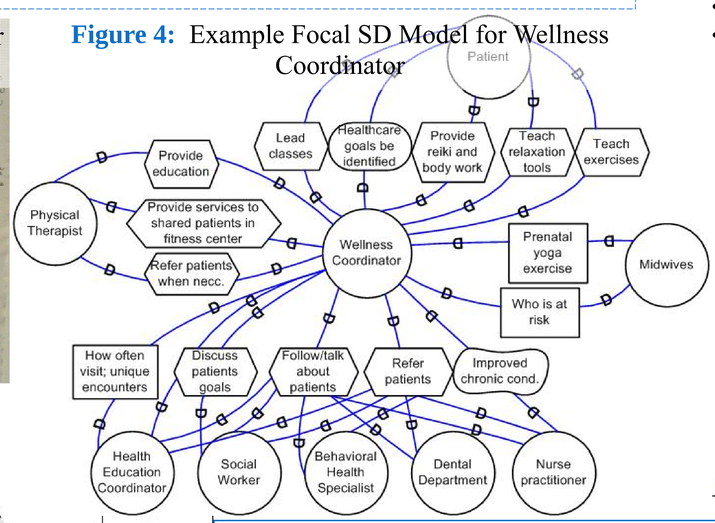
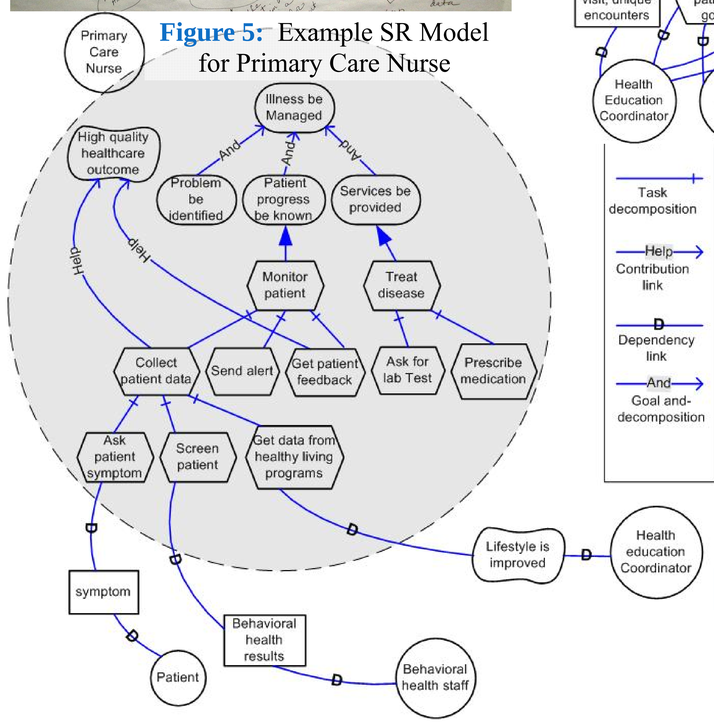


Figure 5: Example SR Model for Primary Care Nurse



Use of i* Modeling

- Almost all challenges were related to the early phase of requirements analysis.
- The i* Framework seemed promising as a means to address the challenges:
  - Aimed to help the system analysts deeply understand the domain and problems.
  - Aimed to elicit goals of stakeholders.
  - Encourages involvement of stakeholders in the requirements analysis process.
  - Helps the stakeholders to understand the limitations and potential of adopting technical solutions.
- Applied the i* Framework as described by Yu (1997).
  - Used all types of i* syntax (actors, goals, softgoals, tasks, resources, contributions, decompositions, dependencies).
  - Made minor modifications to simplify SD models.
  - Implicitly applied qualitative forward i* analysis (Horkoff & Yu 2010).

Benefits of i* Use

- The i* Framework with adaptations was an effective tool:
  - Facilitated communication between healthcare providers and system analysts.
  - Increased the involvement of stakeholders in the system design process.
  - Improve system analysts' understanding of critical issues of disease management.
  - Helped the stakeholders validate the captured requirements.
  - Fed into the process of eliciting detailed requirements and system design.

Lessons Learned

- Although application of i* was successful, using i* with domain stakeholder created some challenges:
  - Stakeholders had difficulty expressing requirements as intentional elements (goals, resources, tasks, and softgoals).
  - i* models were not sufficient for expressing workflow and sequences of activities.
  - The formal goal refinement process is too time consuming and technical-intensive for non-technical stakeholders.
  - There lacks a systematic and effective way for eliciting refined goals to generate SR models.
- Responses:
  - Use of simplified SD model for collaborative modeling .
  - Create focal SD models with clear actor focus.
  - Involve stakeholders only in the verification of complex SD and SR models.
    - Stakeholders were able to understand and verify SD and SR models created by analysts.
- Previous attempts at system analysis had asked only "what" questions, but had not delved into the "why"
- i* collaborative social modeling breaks down terminology and technical barriers between analysts and stakeholders.

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Jennifer Horkoff, Eric Yu, Arup Ghose. Interactive Goal Model Analysis Applied - Systematic Procedures versus Ad hoc Analysis, The Practise of Enterprise Modeling, 3rd IFIP WG8.1 (PoEM'10). Springer

Yuan An, Patricia Gerrity, Prudence W. Dalrymple, Jennifer Horkoff, Michelle Rogers iSchool, Eric Yu: Collaborative Social Modeling for Designing a Patient Wellness Tracking System in a Nurse-Managed Health Care Center. 4th International Conference on Design Science Research in Information Systems and Technology (DESRIST'09)

PRIVACY GOALS AND SETTINGS MEDIATOR MODEL FOR PHRs:
A Conceptual Modeling Approach

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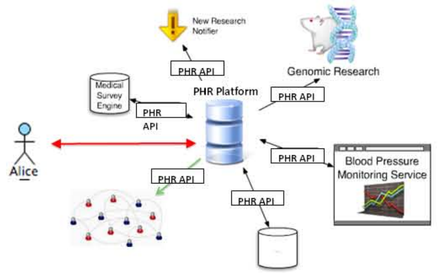
Problem

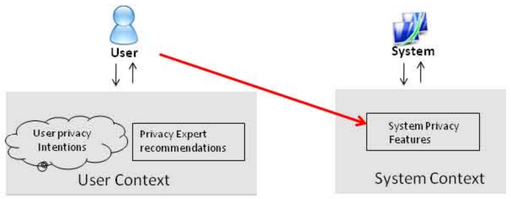
- **Personal Health Records** (PHR) become ever more complex and intertwined with human social life
- PHR platforms (e.g. Google Health, Microsoft Health Vault)
  - an integrated health data repository of an individual
  - an open platforms using APIs to augment multiple third party applications and services



PHRs Transformation to Communication Platforms

Self-Management of Privacy

Existing solutions
- Push the "I agree" button of a long legal privacy text in order to receive the service
- Go over a growing number of privacy features



- Problems with the existing solutions
  - A PHR user has to work in the System context for her privacy settings.
  - The user does not understands the consequences of his/her privacy settings choices.
  - Recommendations of the privacy experts left unnoticed.

Solution

Bridging the gap between the high-level users' privacy goals and the low–level system privacy features by i* multiple agents goal-oriented models as the **Privacy Goals and Settings Mediator Model (PGSM)**
•Captures privacy experts knowledge
•Improves the users' comprehensibility of the privacy configurations.

PGSM Model Through Scenario

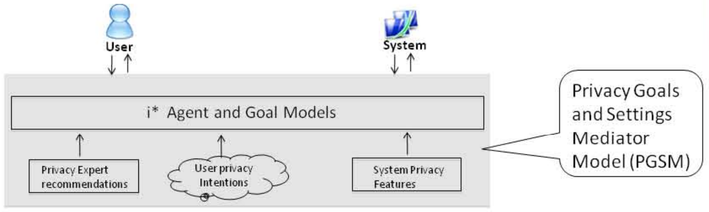
Breaking the Glass (HL7, 2011)
- Alice, a PHR consumer, has severe allergies to some antibiotics and she has indicated these allergies in her PHR.
- She wants to make sure that even in an emergency situation, the staffs in an emergency department are able to access her PHR data.
- Alice is concerned if her PHR data being misused.
- She is also concerned if her privacy setting prevents her form receiving quality treatment.

PHR User's Goals
Receive Emergency Treatment
Privacy is protected
Receive Quality Treatment

?

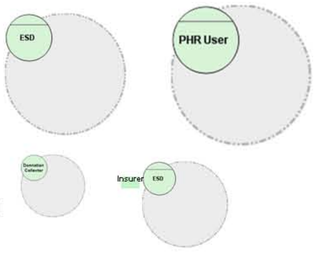
System Privacy Features
Explicit consent
Authenticated by PHR
Personal experience
Audit log for every access
HIPPA compliance

PGSM intends to fill this gap

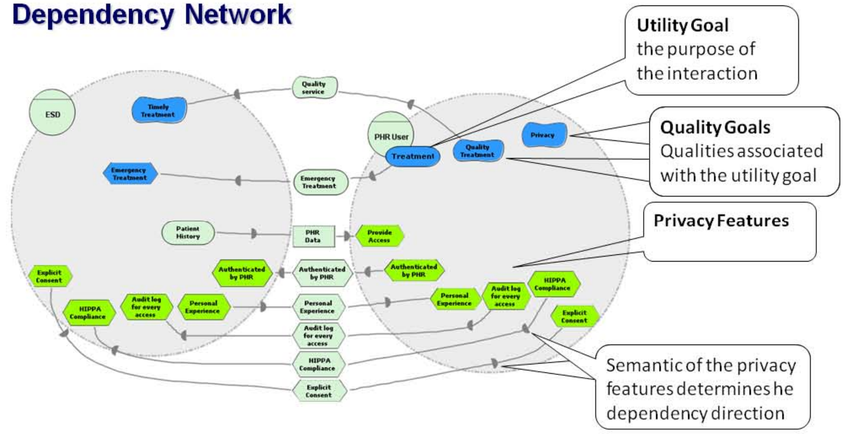


Actors

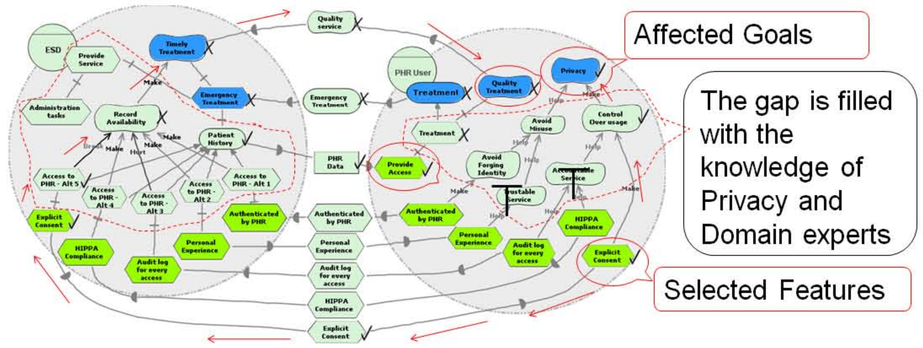
- The central elements in PGSM are actors
- Each actor has some goals want to achieve
- The achievement of User's Privacy goal is investigated combined with the user's other goals and goals of other agents and institutions involved in the interaction.



Dependency Network



Participants' Internal Rationale



These goal models link the privacy features offered by a service to the high-level user's goals. The goal-structure allows to reason how changes in a privacy feature, or lack of a privacy feature, may affect the user's goals. The achievement or violation of privacy is then determined by evaluating the degree of satisfaction of these goals.

Conclusions

- The gap between users' goals and system privacy features identified and filled with the PGSM model
- In the design-time the model captures the experts' privacy knowledge for a particular PHR information-sharing context.
- In the run-time, a user can interact with the model to make the consequences of selecting different privacy options visible in terms of their effects on her privacy goals.

Architecting Hybrid Systems: The Etapatelecom and Cuenca Airport Cases

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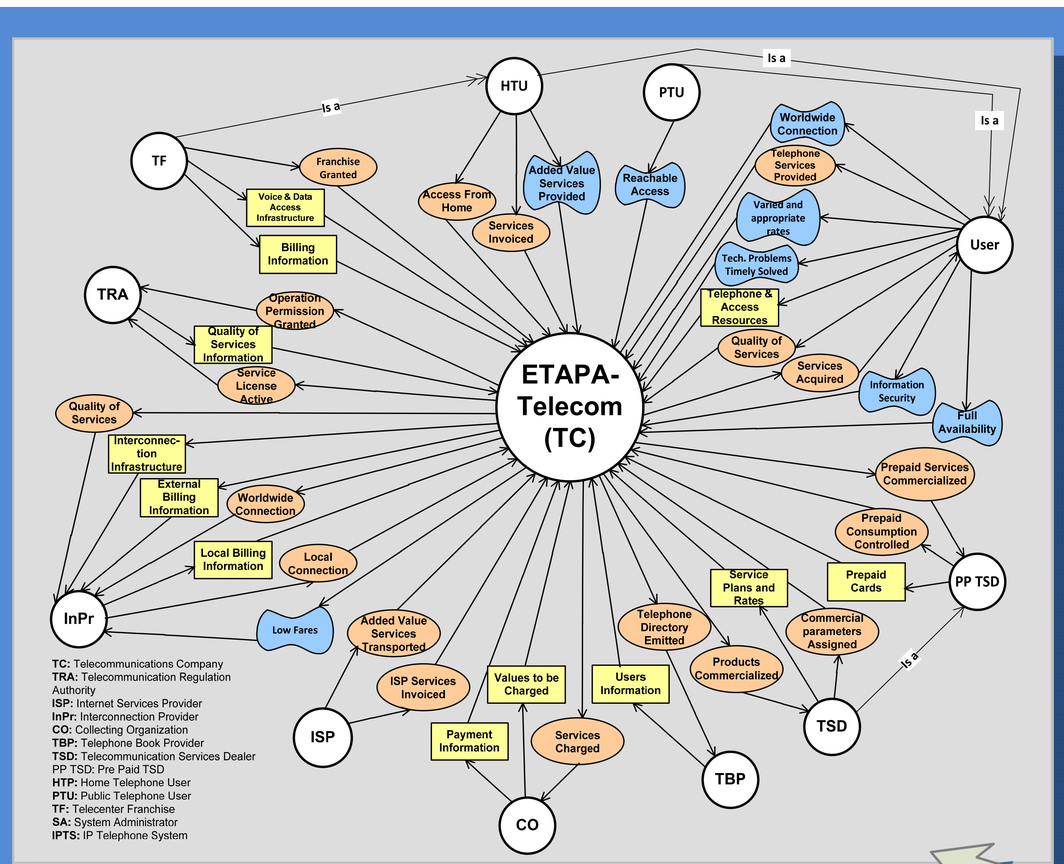
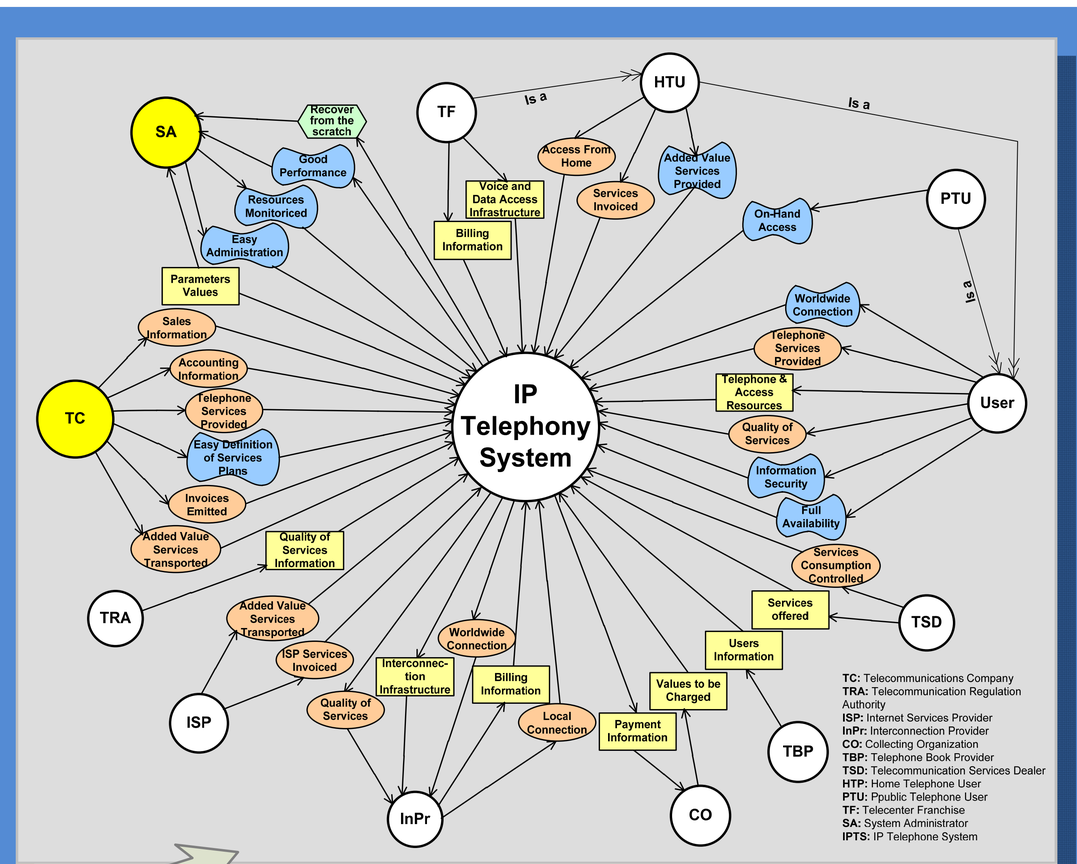


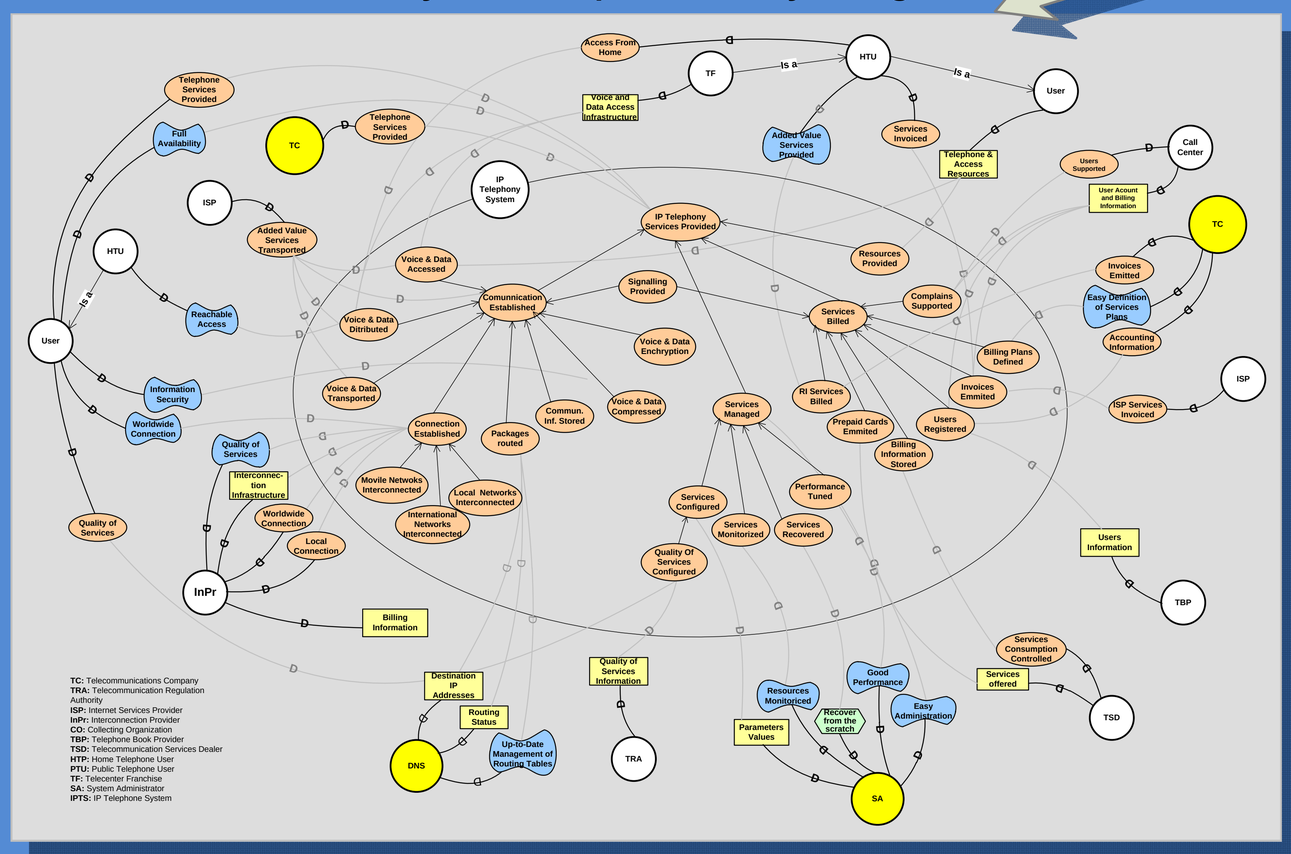
Activity 1: Modelling the organizational context



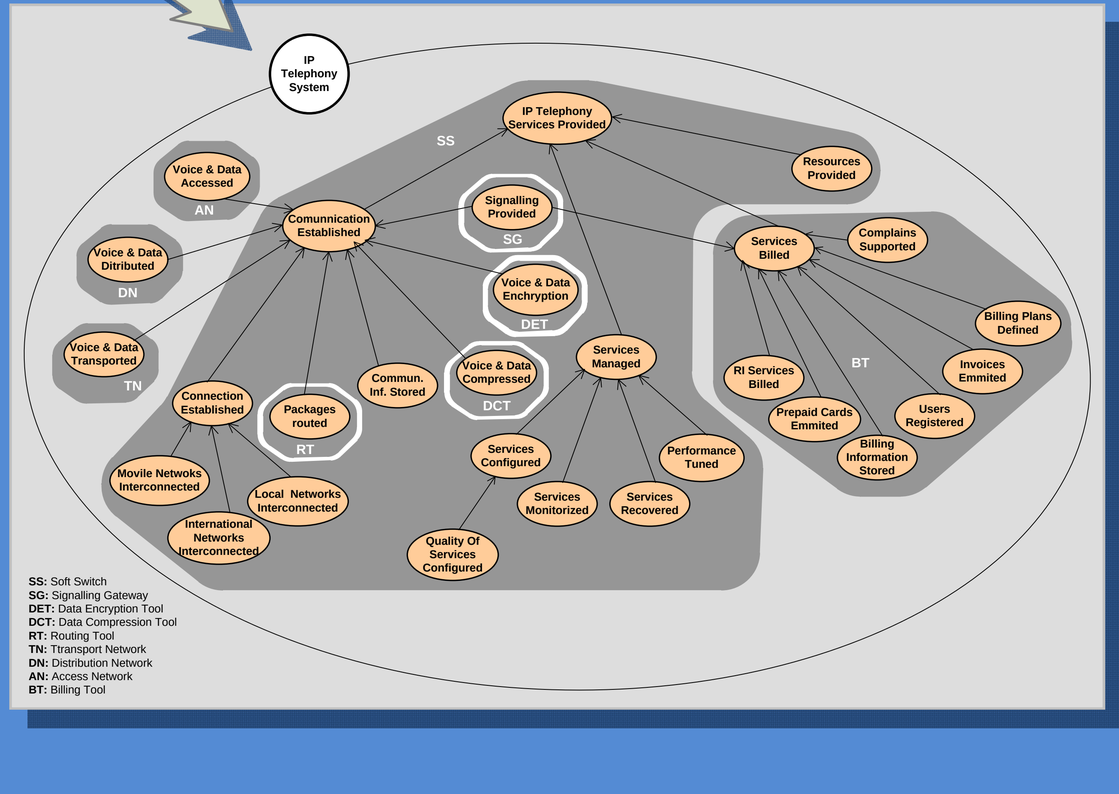
Activity 2: Modelling the environment of the system.

The DHARMA Method

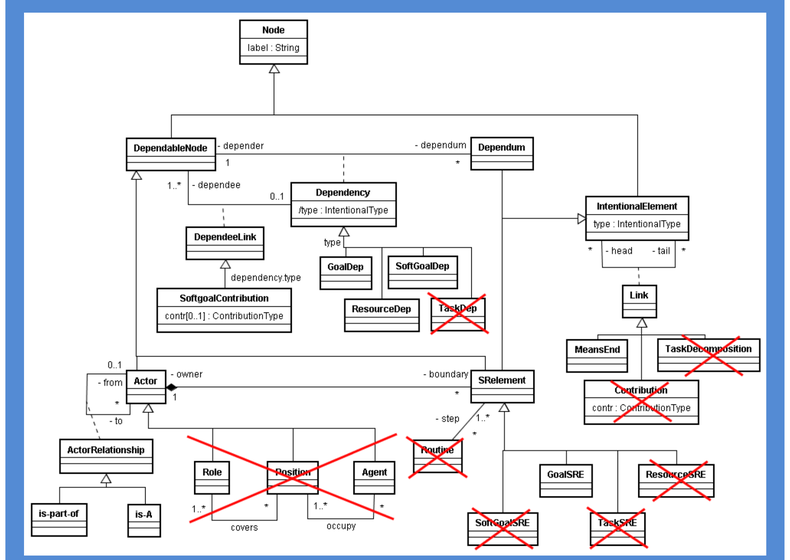
Activity 3: Decomposition of system goals.



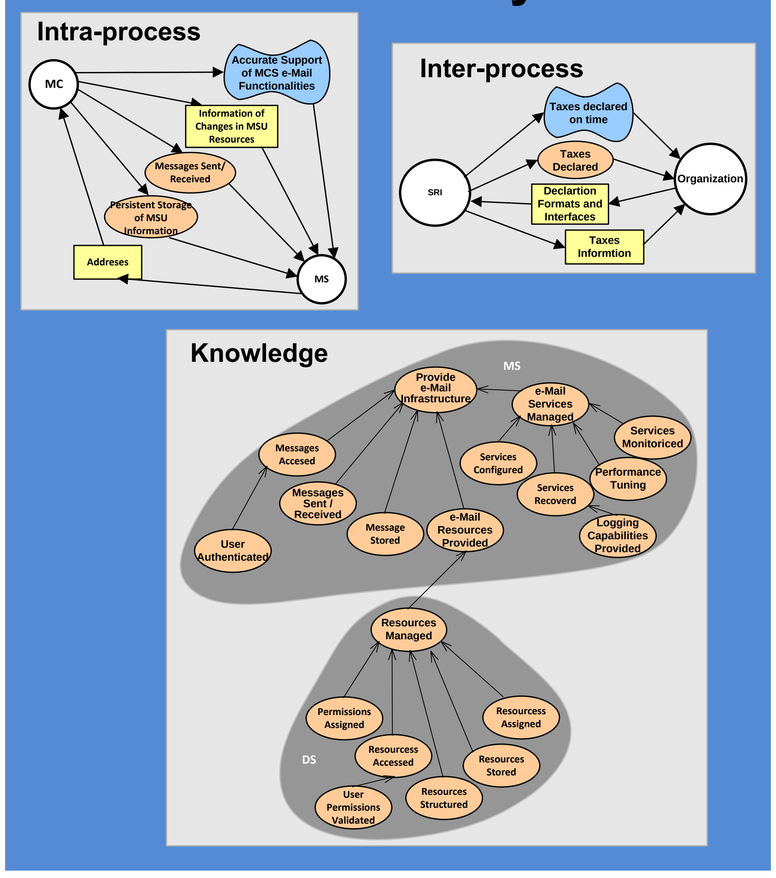
Activity 4: Identification of the system actors



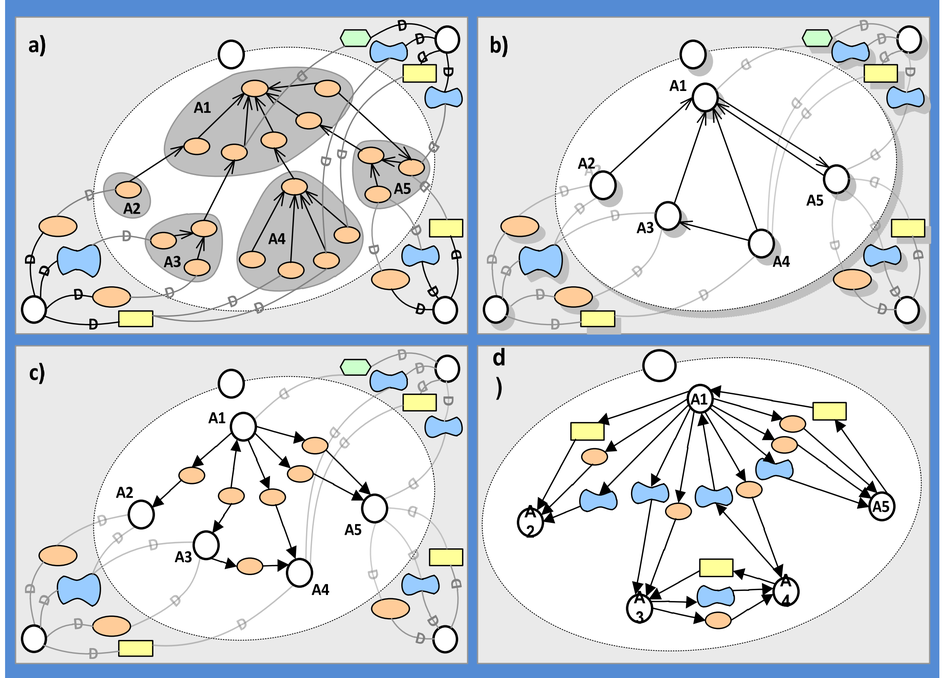
*i** Metamodel for the DHARMA Method



Reusability



Obtaining an Interoperability Model



Modeling requirements with i* in the development of a data warehouse for a university

The UNIVFRONTERA1-09I project

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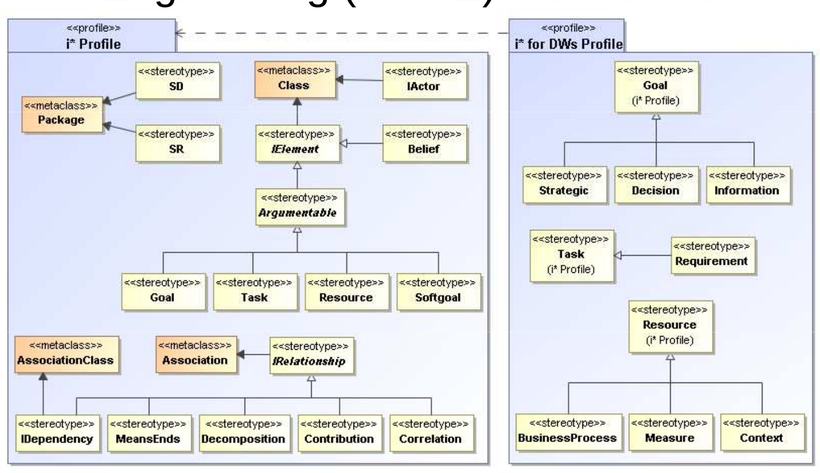
Summary of the UNIVFRONTERA1-09I project

Project name: DEVELOPMENT OF A DATA WAREHOUSE BY USING A MODEL-DRIVEN HYBRID METHOD AND THE LUCENTIA BI SUITE CASE TOOL **| Status:** in-progress with some results **| Organization:** Universidad de La Frontera (Chile) **| Nature of the business:** Higher education and research

Motivation

- **Requirement analysis for DWs** should be based on a Goal-Oriented Requirement Engineering (GORE) framework
  - -The DW aims at providing adequate information to support the decision making process, thus helping to **fulfill goals of an organization**
  - -Requirements for DWs are **difficult to specify from scratch**, since decision makers often only express general expectations about which goals the DW should support
  - -DW systems have **different kind of stakeholders** with different interrelated goals that must be modeled to easily obtain a conceptual model of the DW that satisfy them
- **Extension of i* framework for DW via the profiling mechanism of UML**
  - i* can be used in our MDA framework for the development of DW supported by **Lucentia BI Suite tool**



Using i* in UNIVFRONTERA1-09I project

1. Acquiring domain knowledge

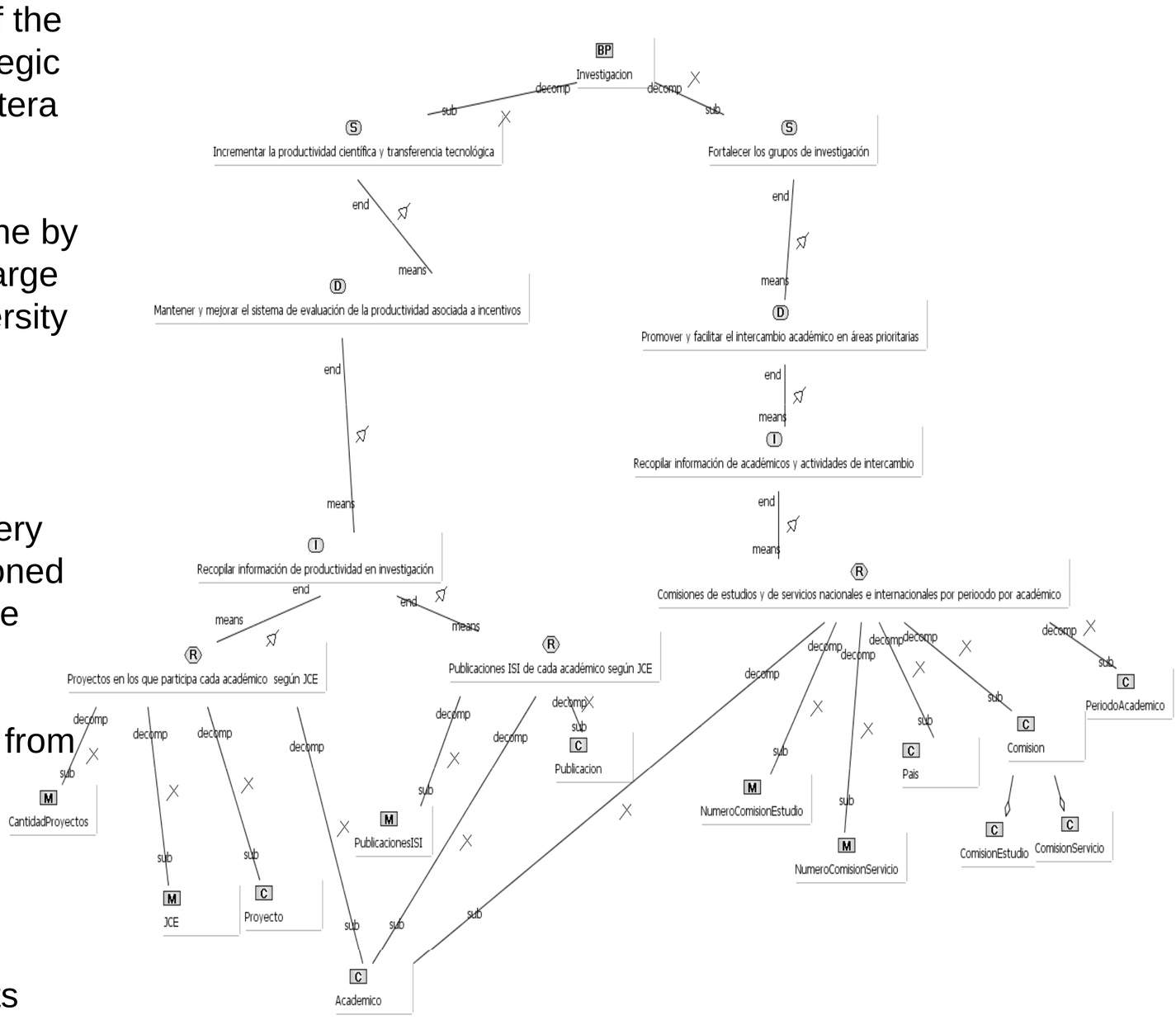
- In order to know the domain application of the project several documents about the strategic business plan of the University of La Frontera were read in detail

2. Interviews

- Several meetings and interviews were done by videoconference with the personnel in charge of the business strategic plan of the University of La Frontera
  - “Dirección de Análisis y Desarrollo Institucional de la Universidad de La Frontera.”
  - These meetings and interviews were very valuable for discussing the aforementioned documentation in order to determine the resulting i* diagrams.

3. Sample of i* model

- After the meetings, several strategic axes from the business plan were considered to be related to the data mart of personnel
  - Academic degrees
  - Research
  - Sustainability.
- From each of this axes we have created its corresponding i* diagram



Lessons learned

- Users feel that using i* for DWs is very useful for…
  - ... considering goals and responsibilities from the strategic plan in a structured way
  - …discovering new requirements in the operational databases
- Pitfalls
  - Too complex i* diagrams exponentially hinders understandability
    - Specially when there are many actors involved as in University of La Frontera

Understanding Stakeholder Viewpoints in Enterprise SOA

Using Agent- and Goal-Modeling to understand arguments in software architecture decision-making in organizations

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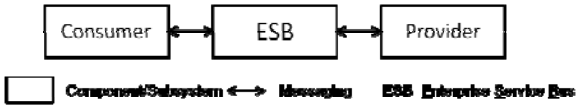
Sharon Volk, Sharon Al-Al
The Phoenix Insurance
Tel Aviv

A design question: How to send messages between a Consumer component and a Provider Component?

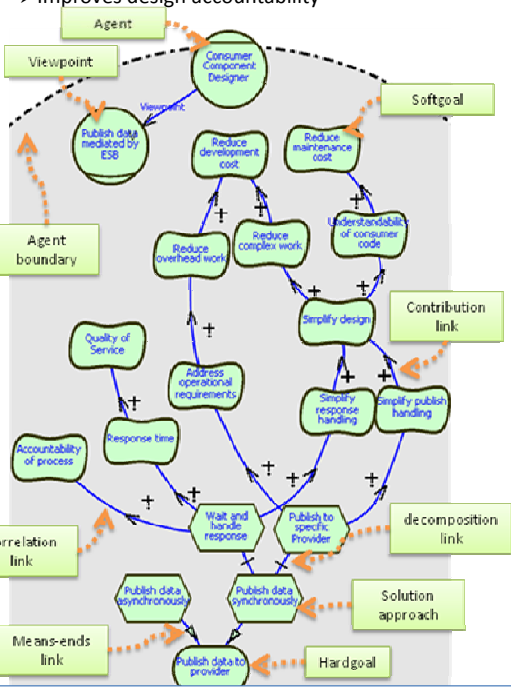


Consumer Component Designer

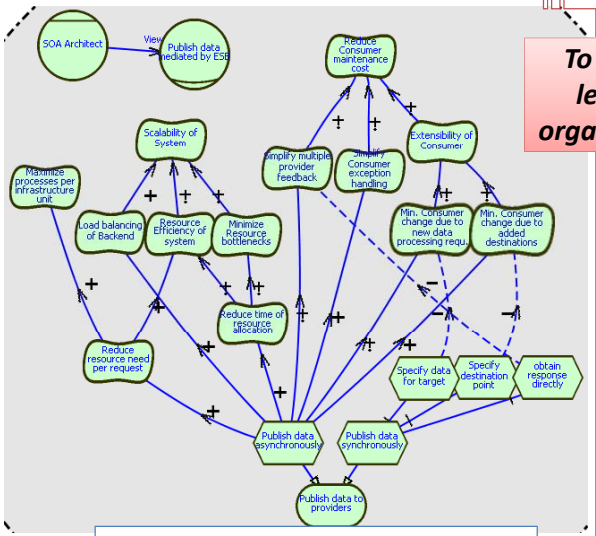
My design is better because it…
- Simplifies Consumer component
- Reduces maintenance cost
- Reduces development cost of consumer component
- Better response time
- Better quality perception of component user
- Improves design accountability

SOA Enterprise Architect

Use async messaging for
- Efficient use of infrastructure resources
- Improved Scalability
- Improved extensibility of new Providers
- Improved modifiability of new data processing needs
- Simpler Exception handling
- Simpler processing of multiple Provider feedback

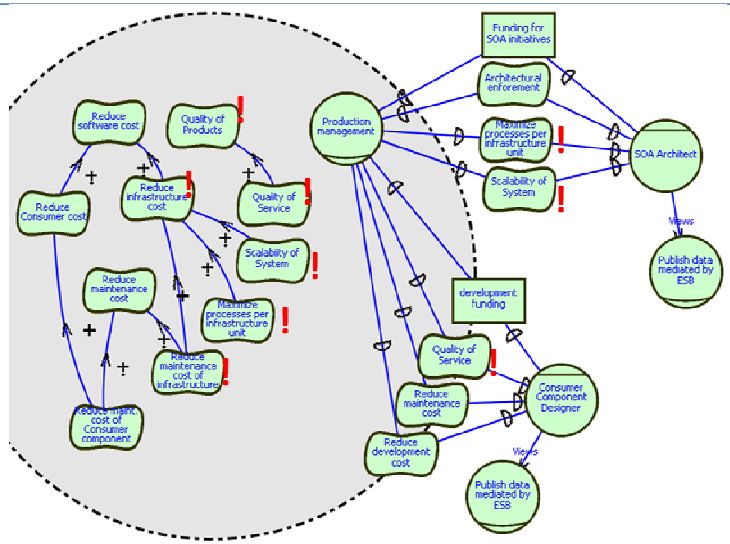


Consumer component reasoning viewpoint

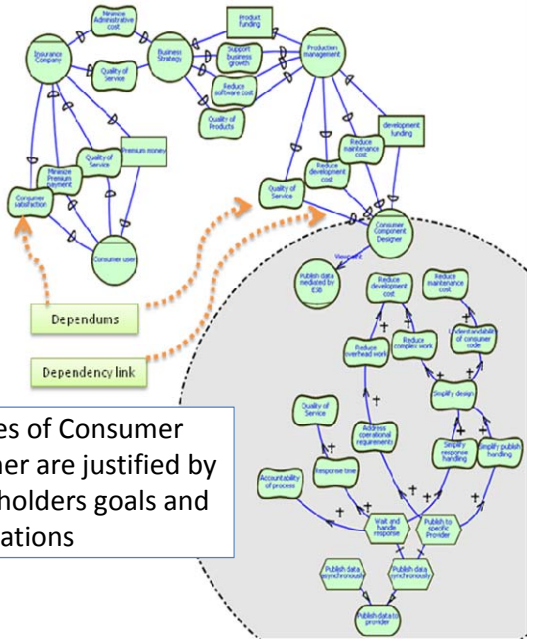


SOA architect reasoning viewpoint

To resolve conflict, let's uncover the organizational context



Prioritization from higher level goals helps resolve opposing viewpoints



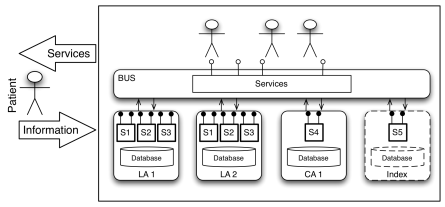
Design rationales of Consumer component designer are justified by higher level stakeholders goals and expectations

Placing designers' argumentation visually side-by-side

Organizational setting of argumentation

Regulatory Compliance of Requirements of Health Care Information Systems

A. Siena[1], G. Armellin[2], G. Mameli[3], J. Mylopoulos[1], A. Perini[3], A. Susi[3]



Operators (nurses, doctor, sensor-based devices): input data.
LA: Local Authorities
CA: Certificate Authorities

The Project

A.M.I.C.O. (Assistenza Multilivello Integrata e Cura Ovunque) – Industrial R&D project

- Aims at developing a distributed healthcare information system
- Private and public healthcare organizations collect/share data about patients, thus defining the Electronic Patient Record (ERP)
- ERP management brings issues of data integrity and protection of patients privacy rights
- The company has been requested to provide an evidence of law compliance of the system-to-be

Problem

- System requirements already gathered
- Compliance issues addressed internally by the company
- Objective: **Validate** system requirements w.r.t. a given law, or propose **integrations** to the **SRS** document

Roles & Team

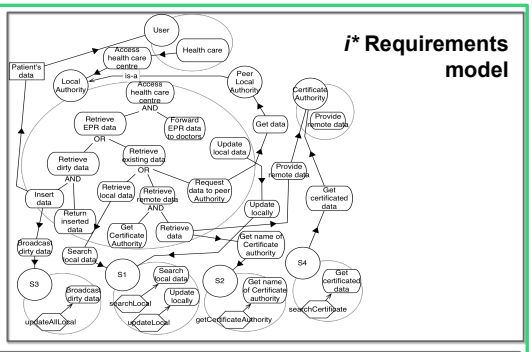
- The industrial partner (GPI) was responsible for building the EPR;
- We supported refining requirements analysis from the point of view of legal compliance (Italian Personal Data Protection Code D.Lgs. n. 196/2003)
- 8 people involved in law compliance analysis task: 1 coordinator, 3 analysts, 1 sw architect, 2 designers, 1 programmer

Approach: Model-based compliance

- definition of *law compliance* through **modeling** the relation between law and requirements
- notion of compliance splitted in two parts:
  - **Intentional** compliance
  - Compliance **Auditability**

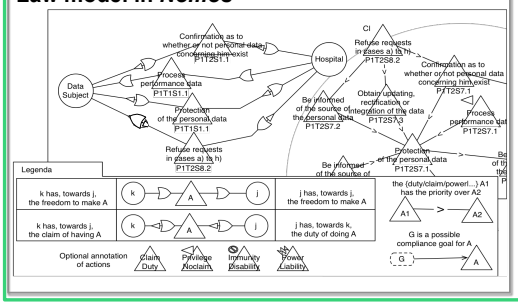
Steps

- Create models of the requirements (using *i**)
- Create models of the law (using an extension of i*: *Nòmos*)
- Contrast the model of requirements with that of law



***i** Requirements model*

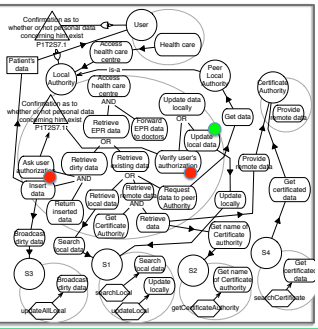
Law model in *Nòmos*



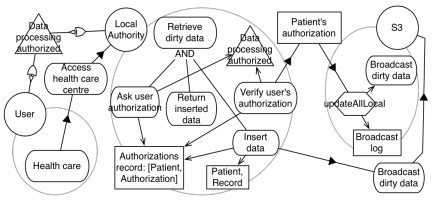
Resulting model

Design-time distribution of responsibilities such that, if every actor fulfils its goals, then actual compliance is ensured

- Existing strategic goals are checked w.r.t. their ability to fulfill specific prescriptions
  - "Realization" relation added to the model
  - Goals fulfilling prescriptions are compliance goals
- If no compliance goals are identified for a given prescription, new ones have to be modeled
  - Otherwise, compliance with that prescription is established



Output from Compliance Auditability



Findings: SRS additions

Requirements integration

Law article	Requirement	Audit
Art. 7.1	The Local Authority registers users' authorisations	
	The Local Authority writes the User's in the Authorisations base	✓
	The Local Authority inserts the data into the local DB	✓
Art. 7.2e	The Local Authority verifies the entrance of new peers	
	The Local Authority maintains the list of verified peers	✓
	S1 gets the list of verified peers from the Local Authority	
Art. 7.3a, 7.3b	The Local Authority writes data modifications to log	✓
Art. 9.4	The Local Authority identifies the patient by means of identity card	
	The Local Authority records patients' ID card number	✓
...	...	
Art. 157.1	The Local Authority produces a report with the collected data to the Garante	✓

Auditing requirements document

Auditability document	Reponsible	When used
Authorisations record	Local Authority	Request of user's authorisation Insertion of dirty data into the local DB ...
Database log	Local Authority	Insertion of dirty data ...
Broadcast log	S3	Broadcast of dirty data entries
Requests log	Local Authority	Requests of data modifications are received from the patient Changes are made in the local database
Peers list	Local Authority	Addition of a new peer to the list of known peers

Evaluation

- Compliance analysis: 15 person-day;
- Modeling: 7 person-day;
- 29 law articles; 10 of them mapped into NPs
- 12 new goals added
- 5 auditing resources identified
- 25 new requirements

+ Perceived advantages
  - Compliance choices made explicit;
  - Visual representation of compliance aspects
  - Decrease of ambiguity
- Scalability
  - Suitable for relatively small but high-impacting laws

References:

A. Siena, G. Armellin, G. Mameli, J.Mylopoulos, A. Perini, and A. Susi, "Auditable Compliance Requirements: an Experience Report from a Health Care Project," in Proc. of the 29th International Conference on Conceptual Modeling, ER'10, Vancouver, BC, Canada, November 2010

Alberto Siena, PHD Thesis. " Engineering Law-Compliant Requirements. The Nòmos Framework".

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[2] GPI Srl, Trento (I)
[3] FBK-Irst, Center of Information Technology, Trento (I)

Assurance Requirements of Business Services

{andre.rifaut, eric.dubois, sylvain.kubicki, sophie.ramel} @tudor.lu

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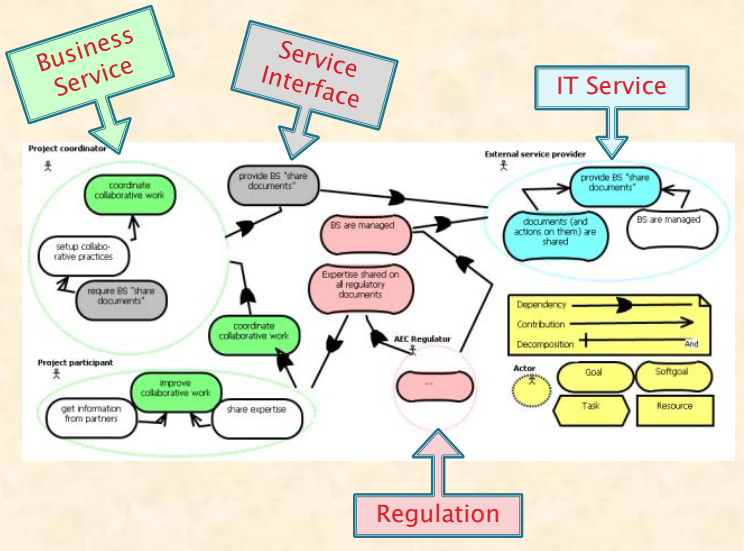
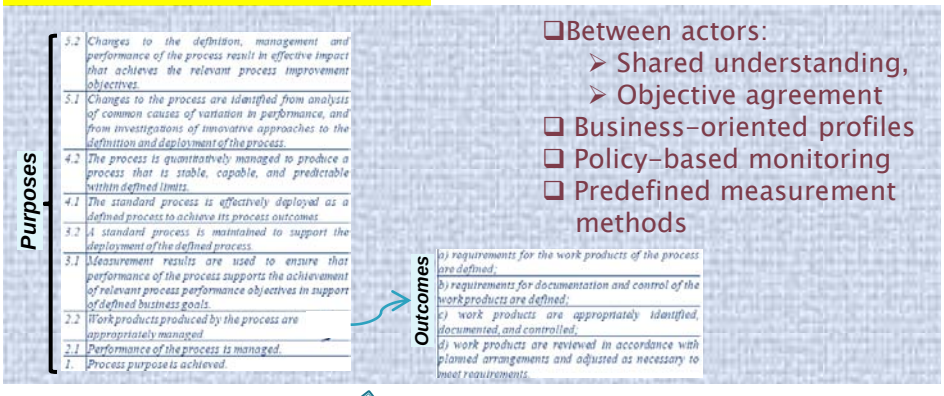
STEP 1: STRATEGGIC STAKEHOLDERS, VALUES AND REGULATIONS

- Select actors (business, regulators, IT providers)
- Define dependencies between actors
  - business value,
  - compliance "value",
  - business services.



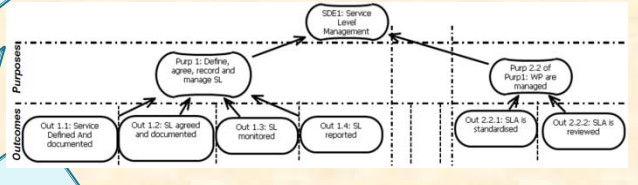
What are Measurement Frameworks ?



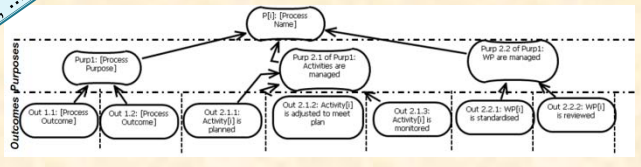
- Between actors:
  - Shared understanding,
  - Objective agreement
- Business-oriented profiles
- Policy-based monitoring
- Predefined measurement methods

STEP 2: SELECT FROM MEASUREMENT LIBRARY

Assurance[some process] = <performed; monitored; reviewed; controlled; defined; trained; KPI mngt; ...>



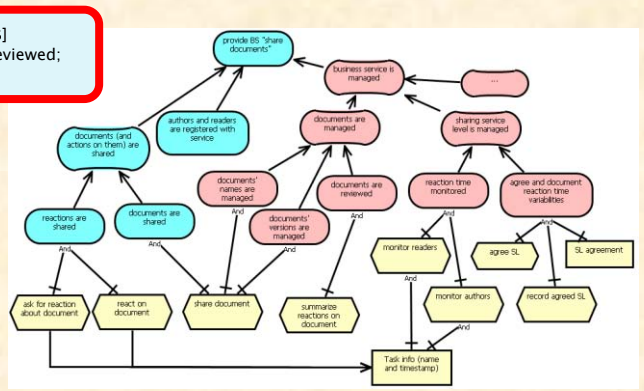
Assurance[some service] = <SL mngt; incident mngt; problems mngt; configuration mngt; financial mngt; ...>



STEP 3: INSTANTIATES MEASUREMENTS TO TARGET VALUES

Assurance[**Sharing of expertise**] = <performed; monitored; reviewed; controlled>

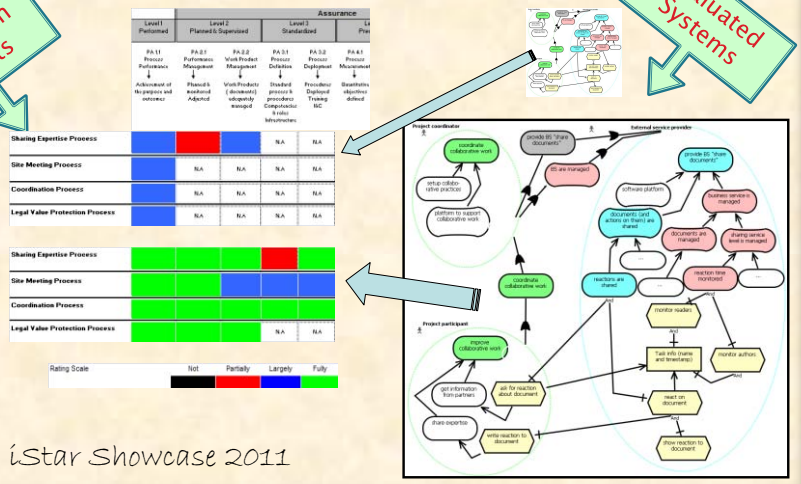
Assurance[**Sharing of docs**] = <performed; monitored; reviewed; controlled><SL mngt>



STEP 4: INSTANTIATES MEASUREMENTS TO TARGET VALUES

Evaluation Results

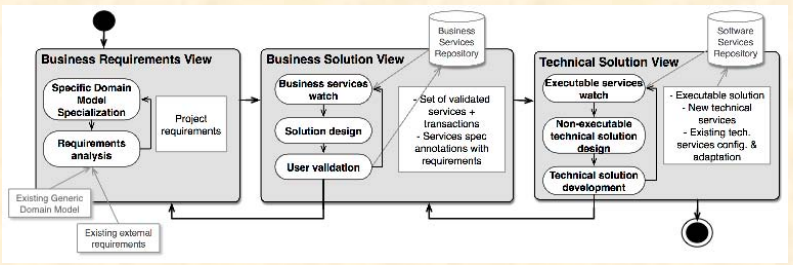
Evaluated Systems



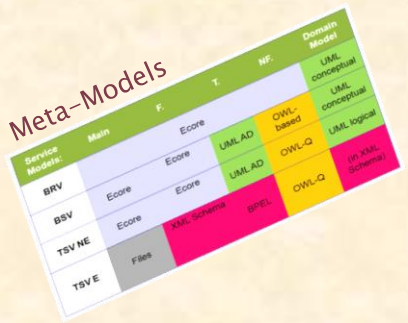
iStar Showcase 2011

STEP 5: REFINE WITH UML CASE TOOL AND EXECUTE

- Integration of 3 Eclipse© perspectives
  - Papyrus© for UML,
  - BPEL designer,
  - Protégé© for OWL-Q
  - EMF generated and self-defined (for Ecore MM)
- Repository
  - Model database for all kinds of models
  - Reuse module to be integrated in the editor



Meta-Models



Application used on building sites

Modelling Trust and Security Requirements: the Air Traffic Management Experience

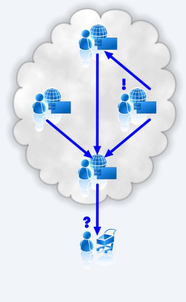
Elda Paja[1], Fabiano Dalpiaz[1], Paolo Giorgini[1], Stéphane Paul[2], Per Håkon Meland[3]

[1]Università degli studi di Trento, Italy [2]Thales Research and Technology, France [3]Sintef, Norway

The challenge

Context

- Our lives rely more and more on e-services (Internet)
- Software now handles the sensitive and high-value data on which people's businesses, privacy, livelihoods, and very lives depend



Problem statement

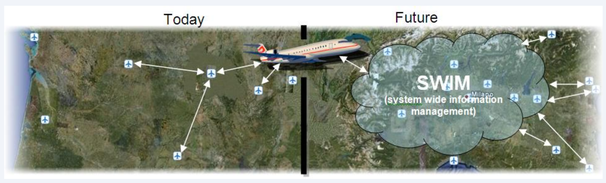
- Establish and maintain trustworthiness and a secure behaviour in a constantly changing service environment
- Address all stakeholders (i.e. service end-users, developers and suppliers)

Approach

- Provide **modelling solutions** for **security engineering** and trust management
- Help express security needs and derive security requirements for composite services on the Future Internet

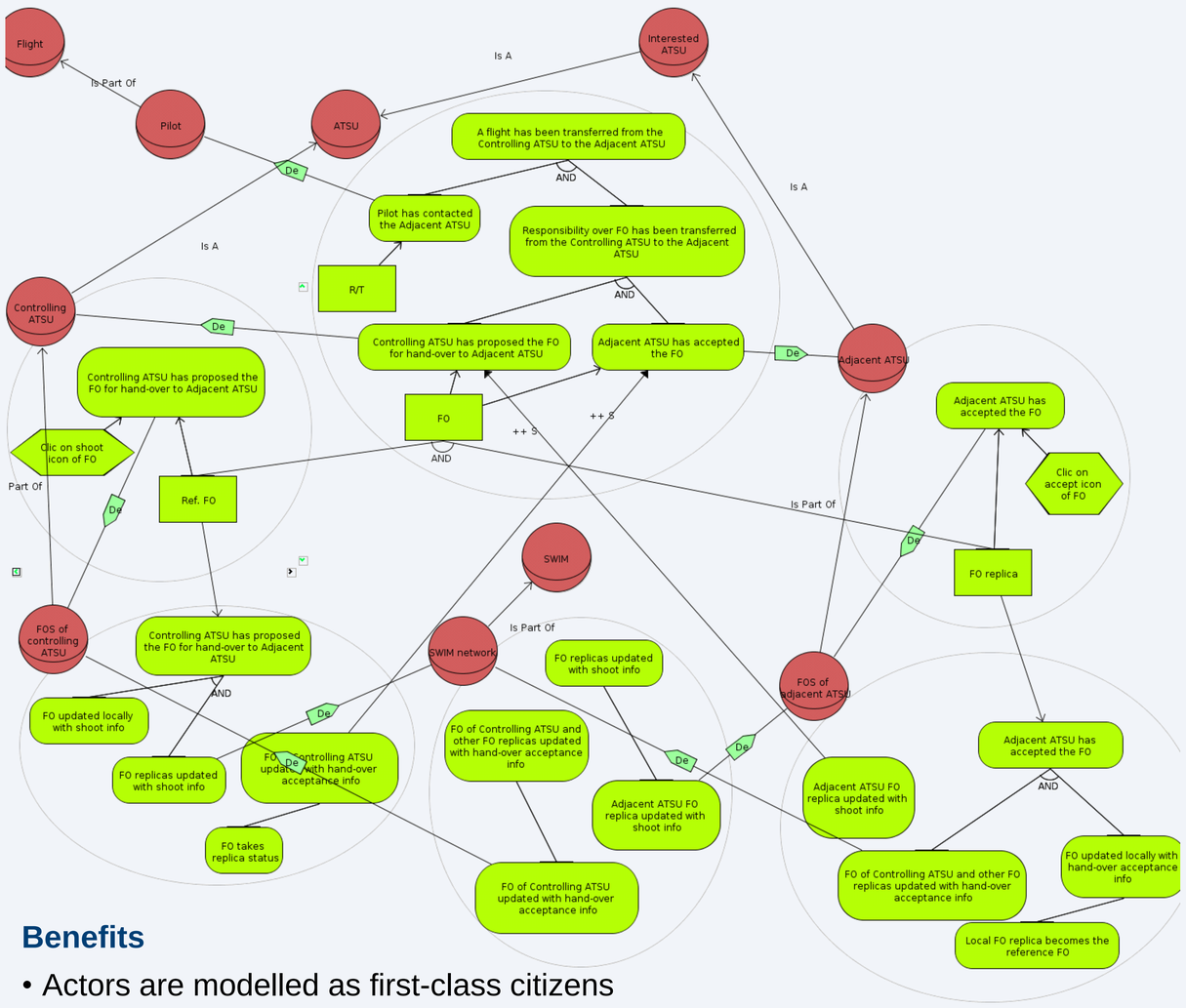
The case study

Introduction of SWIM in ATM



- Mission/safety critical context
- Complex environment (stakeholders, data, processes…)
- Point-to-point communication is scheduled to be replaced by system wide information management (SWIM)
- New threats and vulnerabilities appear with this open virtual information pool

The baseline: modelling with SI*



Benefits

- Actors are modelled as first-class citizens
- Suitable high-level of abstraction
- Adequate capture of the transfer of responsibilities (goal delegations)

But!

SI* comes with some **limitations** and causes confusion, especially to non-expert modellers…

Lessons learnt from SI* modelling

Items to be improved

- Clear semantics of language concepts
  - Modelling assets (incl. resources)
- Allow for expressing and capturing security needs
- Suitability for service-oriented architectures (SOA)
- Scalability

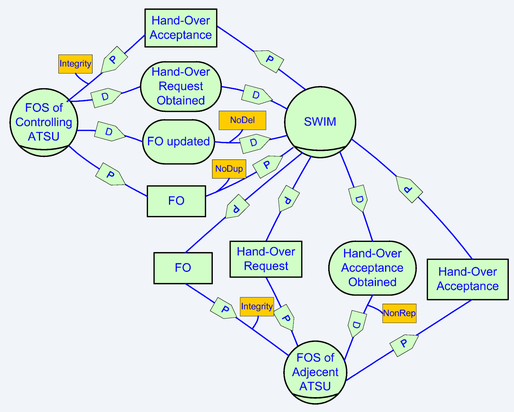
Aniketos innovations

- Introduce distinction between tangible and intangible resources
- Build on the notion of **social commitments** to formalise organizational interactions and high-level security needs
- Establish compromise between autonomy and responsibility driven engineering
- Multi-view modelling

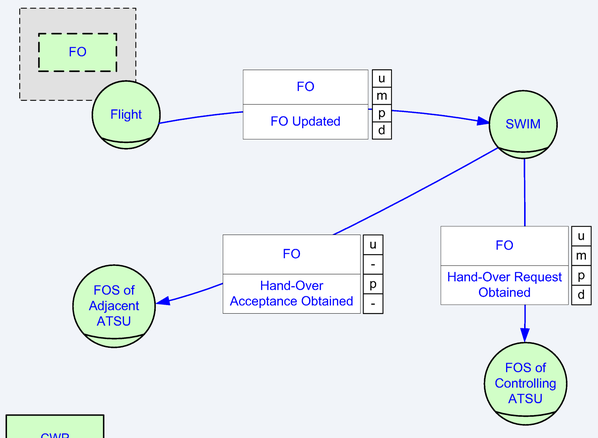
Initial results

Multi-view modelling

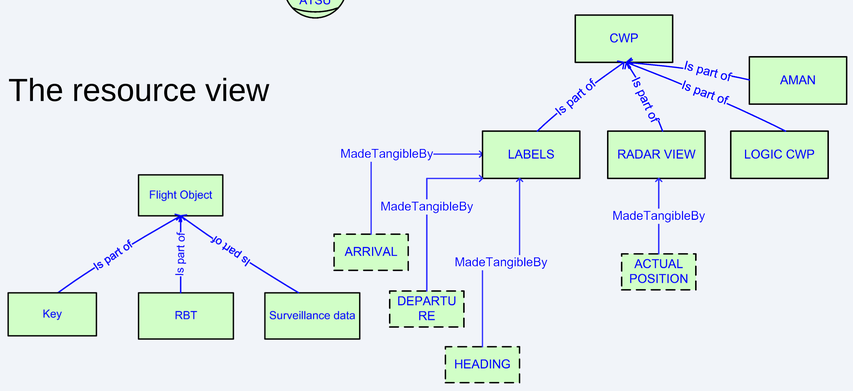
- The social view



- The authorisation view



- The resource view



Commitments Derivation

Social commitments

- Formalisation of interactions between actors
- Supports the specification of security and trust
- Contractual relation: ***C(Debtor, Creditor, Antecedent, Consequent)***

Debtor	Creditor	Security need specification
FOS of controlling ATSU	SWIM	Integrity (Hand-Over Acceptance)
SWIM	FOS of adjacent ATSU	No-Delegation (FO updated)
FOS of adjacent ATSU	SWIM	Integrity (FO), Non-Repudiation (Hand-Over Acceptance Obtained)

Ongoing work

- Modelling of security needs
- Formalization and reasoning on security properties
- Evaluation
- Obligation view
- Methodology
- Tool support

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant n 257930.

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Powerchex Ltd.

Using Secure Tropos to develop a pre-employment screening system

Context

•Powerchex Ltd is a pre-employment screening company that provides employment references and background checking specifically for financial institutions. The key business aim is to provide a fast and efficient service by reducing the screening turnaround time to 5 working days.
•Powerchex clients, which include some of the largest financial institutions in the UK and worldwide, send details of job applicants to Powerchex, which then perform a number of pre-employment screening services, ranging from full background checks to individual checks such as credit search, criminal record search, address verification and academic and professional qualification verification.
•The existing manual and semi-automatic system is:

- Labour intensive and prone to errors;
- not scalable, therefore lacking the capacity to deal with the volume of work required for the expansion of Powerchex;
- not secure enough to handle business data;
- Not conducive to staff retention.

The project, which run from 2009 to 2011, was funded under the Knowledge Transfer Partnership (KTP) programme.

Challenges

•Security is a major consideration within the financial institutions who deal with large amounts of sensitive and private data;
•Developers, who are not security specialists, usually need to develop software systems that require knowledge of security;
•Deal with security issues based on a specific system context with limited resources and high constraints;
•Distinguish among functional, security, and security-relevant requirements;
•Tracing security requirements into design artefacts and also understand what are the consequences of adopting specific design solutions for such requirements;
•Testing the security solution at design level.

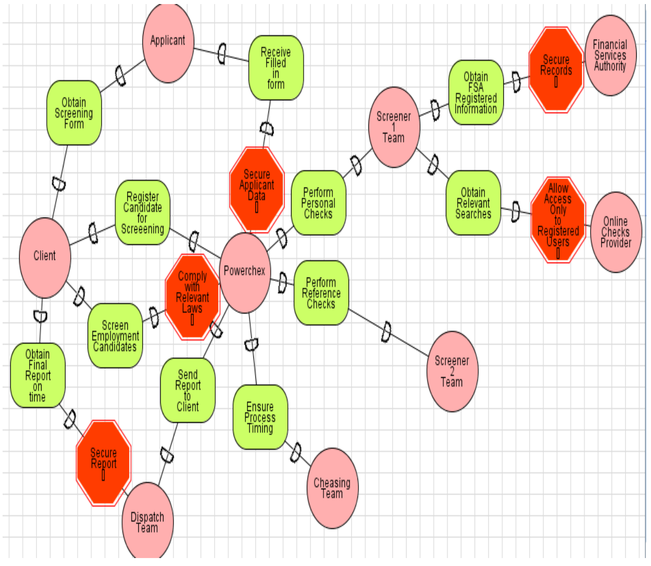
Secure Tropos

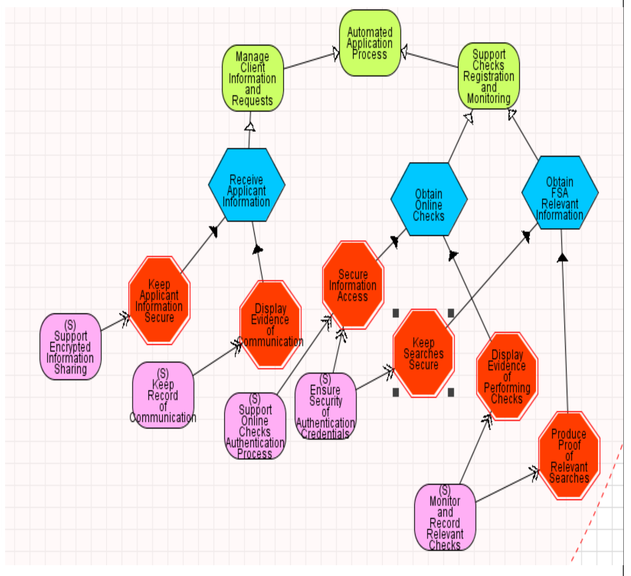
•Secure Tropos is based on the Tropos methodology, which adopts the i* modelling framework;
•Secure Tropos creates a development environment where security is taken into account from the early stages of the development proccess;
•The approach is based on concepts from requirements engineering (such as actor, goal, plan, and resource) and security engineering such as security constraint, vulnerability and threat;
•In the context of the methodology a security constraints is defined as a security condition imposed to an actor that restricts achievement of an actor's goals, execution of plans or availability of resources;
•To support the analysis and evaluation of the developed security solution, the Secure Tropos modeling language also supports the modeling of security attacks;
•The process supports the development of clear outputs in terms of models such as the Security Analysis Model, the Secure Components Specification Model and the Security Attack Model;
•The methodology is also supported by an automated tool. The tool, called SecTro is a platform independent analysis and modelling tool that supports the development and analysis of the methodology's models;
• The detailed about the tool can be obtained from (http://sectro.securetropos.org/)

Solution

•Secure by design in order to support the security of the system;
•**Security Analysis Model**

- Consider social dimension of security by analysing the environment in which the system will be operated;
- Model system actors along with the strategic and security needs so that security constraints can be identified;
- E.g. Client actor depends on Powerchex to Screen Employment Candidates. This goal dependency however introduces a security constraint for Powerchex to Comply with Relevant Privacy Law.



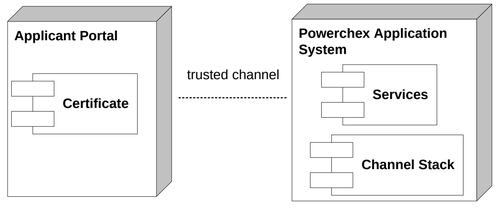


•**System Security Requirements Model**

- System itself is considered as an actor;
- Allow to capture and analyse the technical dimension of security
- Some constraints within the Powerchex context are: Keep Applicant Information Secure, Secure Information Access, Keep Searches Secure and Produce Proof of Relevant Searches.

•**Secure Components Specification Model**

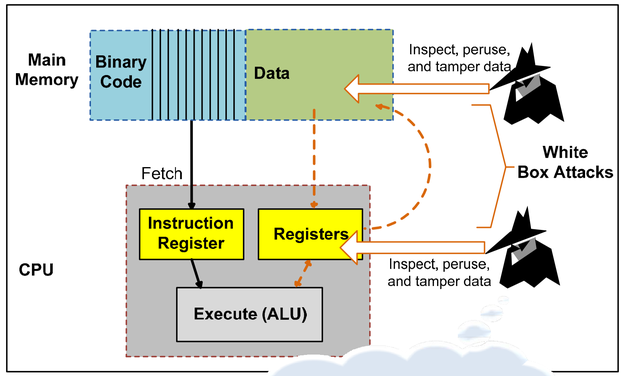
- to define the architecture of the system with respect to its security requirements.



Modeling and Analysis of White-Box Security Patterns in *i**

Golnaz Elahi[†], Eric Yu[†], Yuan Xiang Gu[‡], University of Toronto[†], Irdeto Canada [‡]

What is White-Box Security?



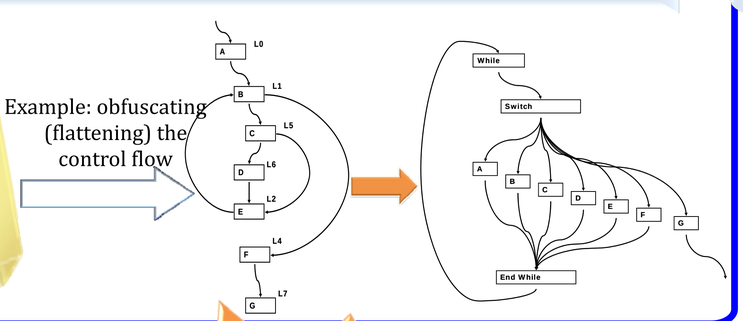
Produce a crack or installable program and distribute it

White-Box Security Pattern

White-Box security patterns helps applications protect themselves from attacks in untrusted environments.

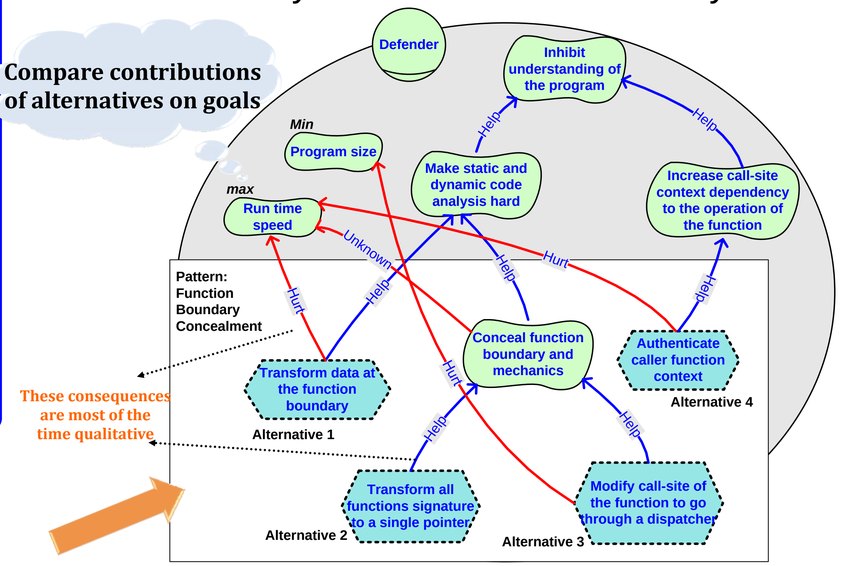
The main intent of security patterns: **Impede the hacker at every step of the hacking process**

Example: obfuscating (flattening) the control flow



Security Patterns Trade-offs Analysis

Compare contributions of alternatives on goals

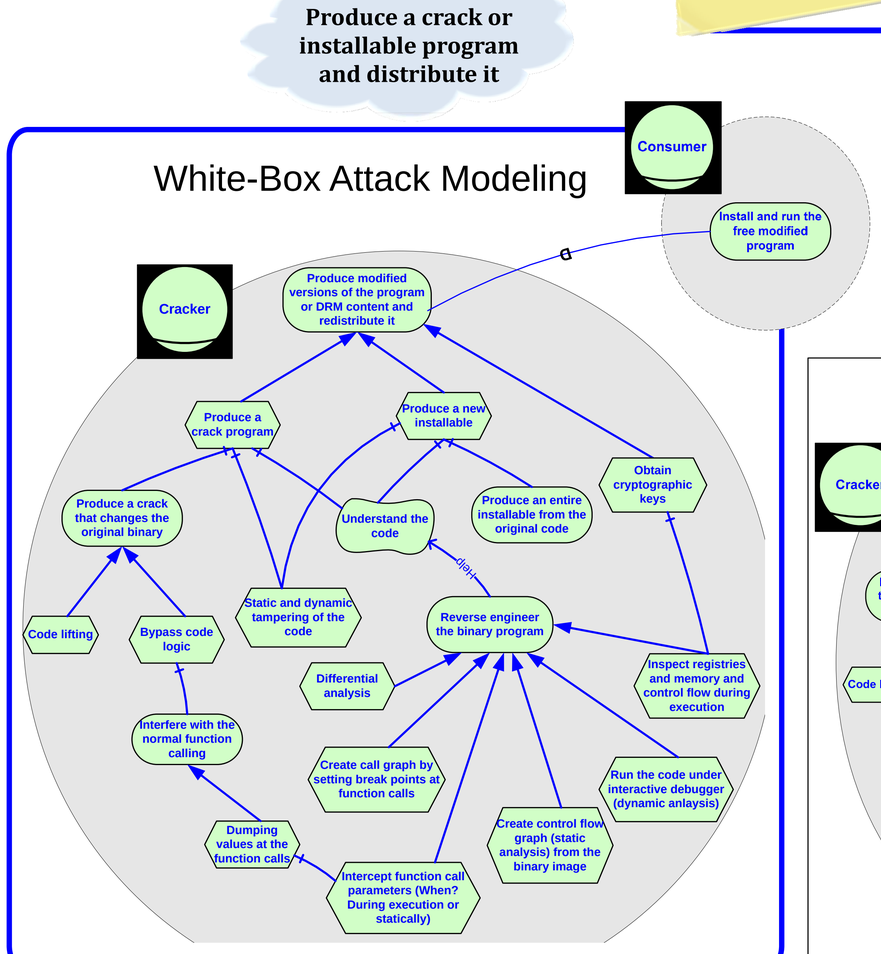


These consequences are most of the time qualitative

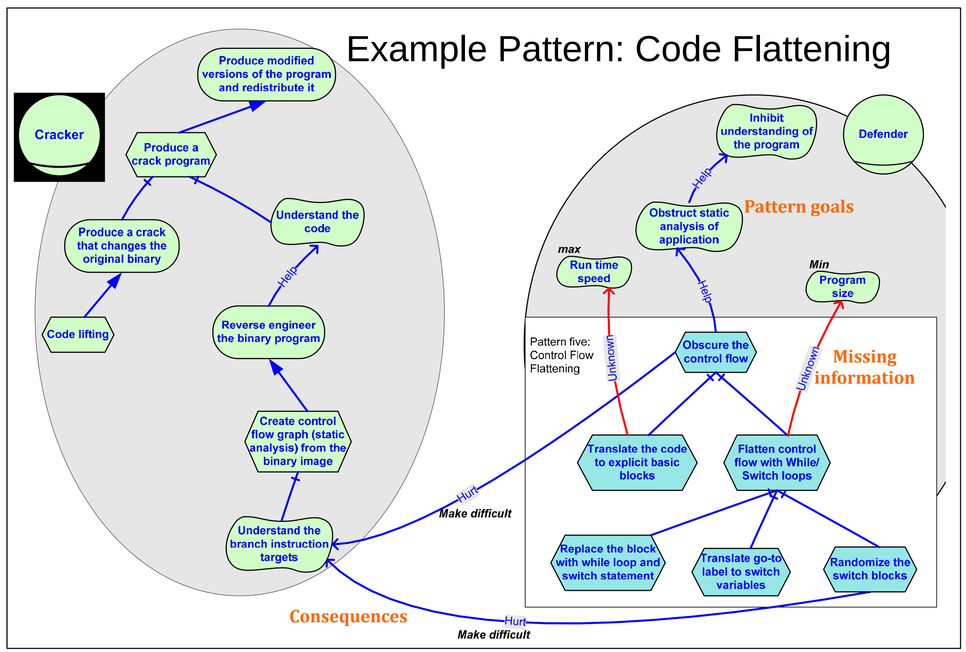
How *i models help in understanding, analyzing, and comparing security patterns?**

- Express the pattern goals
- Compare alternative patterns
- Analyze consequences of patterns
- Discover missing information

White-Box Attack Modeling



Example Pattern: Code Flattening



Decision Analysis

Alternative	Security (Maximize)	Run time speed (delay) (Minimize)	Binary size (Minimize)	Build time (Minimize)
No security countermeasure	Low	High (0.1 s)	100 M	Fast
Diversity	Medium	High (0.2 s)	130 M	Slow
Function boundary concealment	?	Medium High (0.5 s)	150 M	Medium
Control flow flattening	Medium	Medium High (0.75 s)	150 M	Medium
Control flow flattening	Medium High	Medium (2 s)	160 M	Medium

Incomplete information about contributions of the patterns

Some data is qualitative

Some data is quantitative and accurate

Eliciting value trade-offs of stakeholders through Even Swaps

secure CHANGE

www.securechange.eu

Methodology for Evolving Security Requirements

Thein Than Tun Yijun Yu Bashar Nuseibeh

The Open University

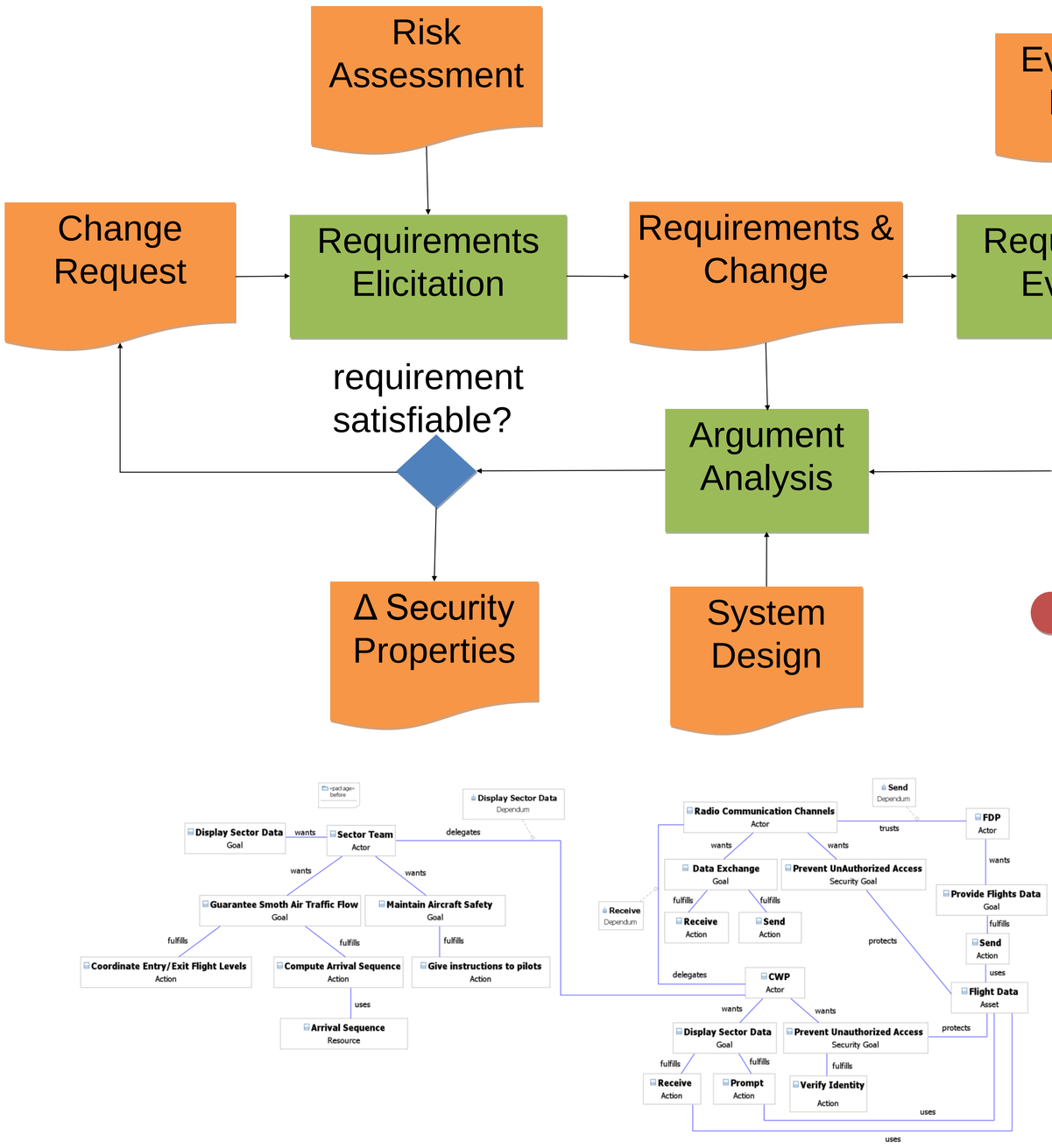
What

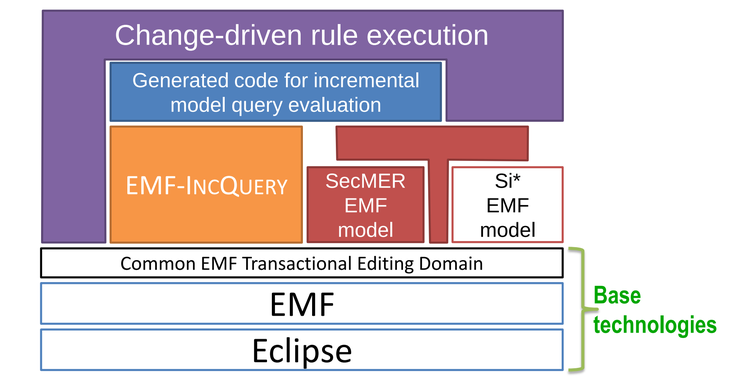
A requirements engineering method to ensure lifelong compliance of long-lived software systems to evolving security, privacy, and dependability requirements

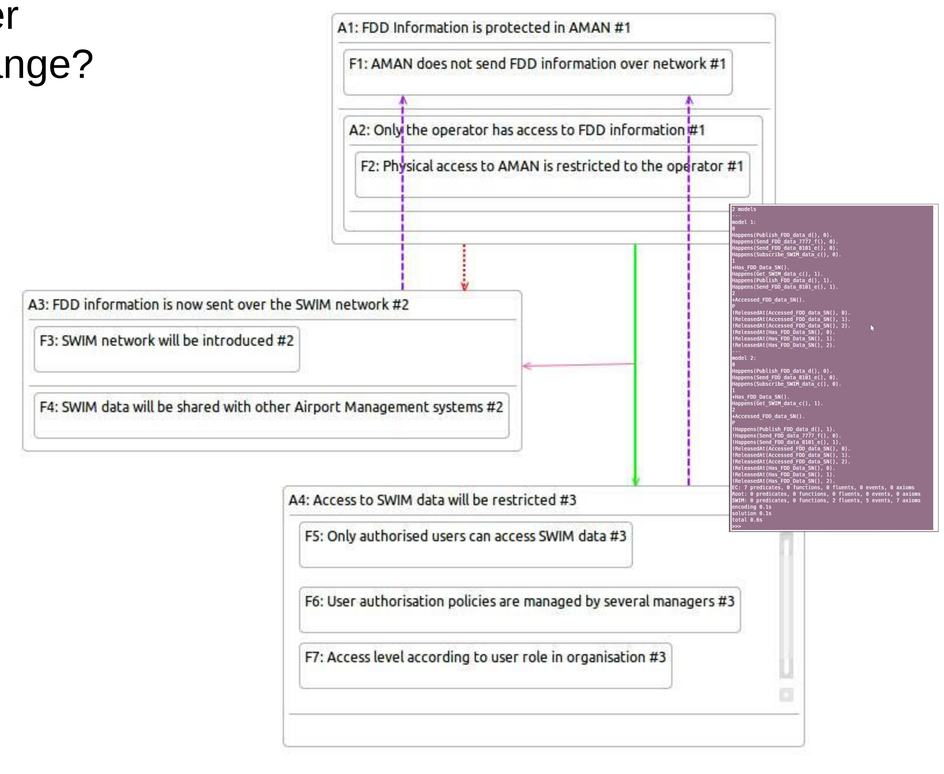
Why

Long-lived security-critical software-intensive systems need to respond to inevitable changes in their functionality and socio-technical context, while maintaining their security

How







Publications

1. Nuseibeh, B., C. B. Haley, and C. Foster, “Securing the Skies: In Requirements We Trust.”, IEEE Computer, 42(9), pp. 64-72, 2009.
2. Nhlabatsi, A., B. Nuseibeh, and Y. Yu, “Security Requirements Engineering for Evolving Software Systems: A Survey”, Journal of Secure Software Engineering, 1(1), pp. 54-73, 2009.
3. Tun, T. T., Y. Yu, C. B. Haley, and B. Nuseibeh, “Model-Based Argument Analysis for Evolving Security Requirements”, Conference on Secure Software Integration and Reliability Improvement, SSIRI 2010, IEEE Computer Society, pp. 88-97, 2010.

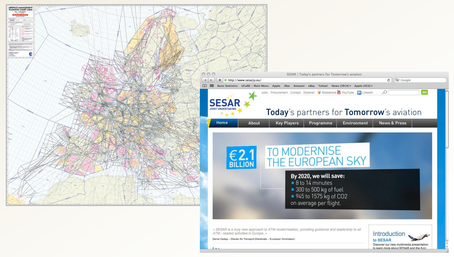
Using *i** Modelling as a Bridge between Air Traffic Management Operational Concepts and Agent-Based Simulation Analysis

James Lockerbie and Neil Maiden (Centre for HCI Design, City University London)

David Bush (NATS), Henk Blom (NLR) & Mariken Everdij (NLR)

1. Domain Problem

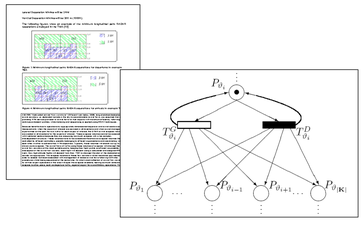
- **Air traffic predicted to double in 20 years**
- **National boundaries and airspaces limit capacity, so...**



- **Single European Sky**
- **SESAR operational concept**
  - — Trajectory-based rather than airspace based
  - — Trajectories agreed before flight and conformed to by aircraft
  - — Revised rules for aircraft separation

2. Requirements Problem

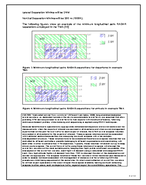
- **Concept of operations**
  - — INFORMAL : prone to omission and contradiction



- **Petri nets for simulation**
  - — FORMAL: requires well defined terms constructs and relations

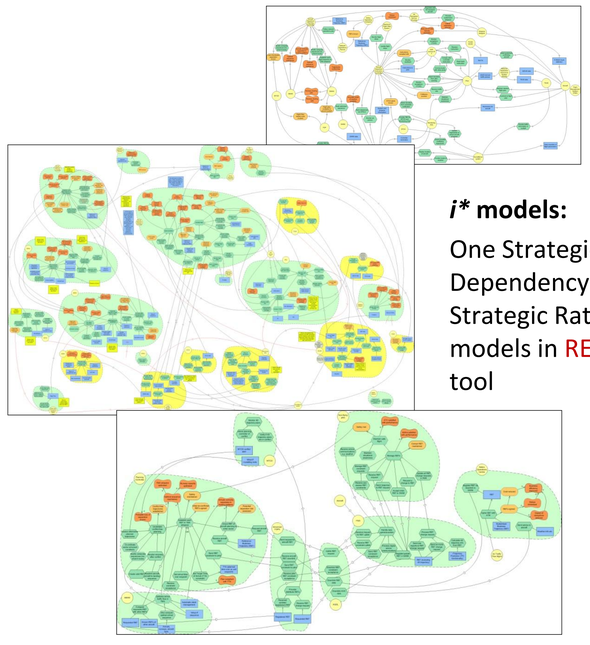
3. Solution: *i** models to bridge the gap

Model concept of operation in *i to identify safety critical scenarios**



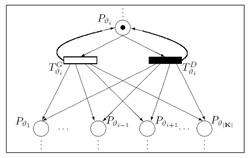
Concept of operations:

Text & pictures describing people, processes and technologies to be used



***i** models:**

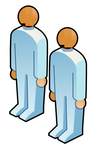
One Strategic Dependency and two Strategic Rationale models in REDEPEND tool



Petri nets for simulation-based safety analysis of critical scenarios:

Includes equipment & human performance, environmental factors e.g. Weather

Operational experts



Present results of safety critical scenarios through *i to operational experts**

4. Lessons Learned

- **Video conferencing was effective**

- ***i** modelling takes time, so keep it strategic**
- **Trace *i** elements to documents**
- **Reuse *i** models if fit for purpose**
- **Challenge goal ownership**
- **Use resources as hooks for instance-level simulation**

5. Conclusions and Future Work

- ***i** effectively highlighted problems in the concept of operation**
- **Gives an idea of critical scenarios – areas of communication, the human part**
- **Looks like an effective tool for presenting scenarios**
- **Future capabilities to mark up models with potential problems to identify critical scenarios**
- **Future Capabilities to present back to operational experts**

Contacts

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This research was in partnership with NATS NLR

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Evaluating the impact of Evolving Requirements on System Wide Goals

Using *i** methodology integrated with Satisfaction Arguments to evaluate the impact of changing requirements in HIV/AIDS monitoring systems in the UK

Jorgen Engmann[1], Neil Maiden[2], James Lockerbie[2]

[1]Health Protection Agency/University College London, [2]City University London

1. The domain problem

- A public health system was set up in 1982 to record and monitor cases of HIV infection and AIDS in the UK
- Emerging aspects of HIV epidemiology and technological advances over time led to incremental upgrades which were implemented using an in-house Change Request (CR) procedure
- CR effective BUT
  - Over time, resulted in a base system with several integrated peripheral applications
  - CR's grew more complicated in nature
  - Became difficult and time consuming to assess impact of CR on entire system

2. The proposed solution

A. i** SD to show system wide context, actors and dependencies

B. SR model to show detail on how goals are achieved

C. Satisfaction Arguments (SA) to enhance means-end links with domain properties that must be true for link to hold

D. Change Request impact analysis by mapping impact of change (+ or -) to SR model tasks and resources, then propagating impact through to goals and softgoals using REDEPEND

3. Results

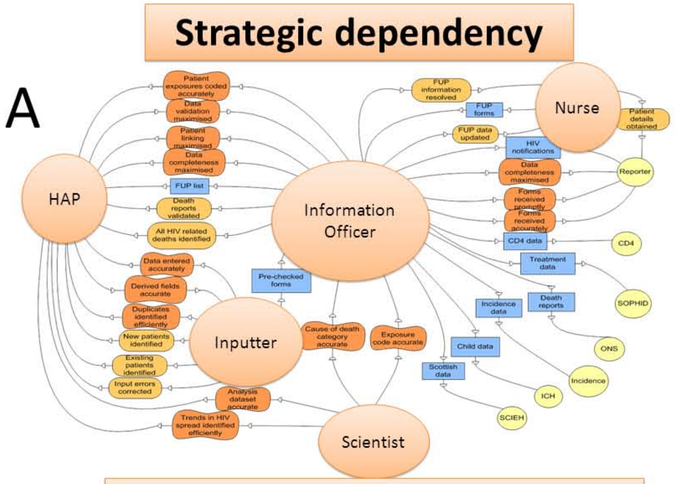
3.1 Understanding the system

Making use of various sources of information…

- **Staff protocols**: procedures and responsibilities of staff *[identifying Actors, Goals, Tasks and Dependencies]*
- **Systems documents:** Data flow diagrams and system requirements for HAPv3 *[Enhanced understanding of dependencies and Tasks]*
- **Observation/Interaction:** To develop awareness of domain properties and discover missing requirements
- **Responsibility table:**
  - Mapping **Responsibilities →*i* elements*** [soft goals, goals, tasks and resources]
  - **Conditions** required for responsibility → **SA**

3.2 Developing the models in REDEPEND

A



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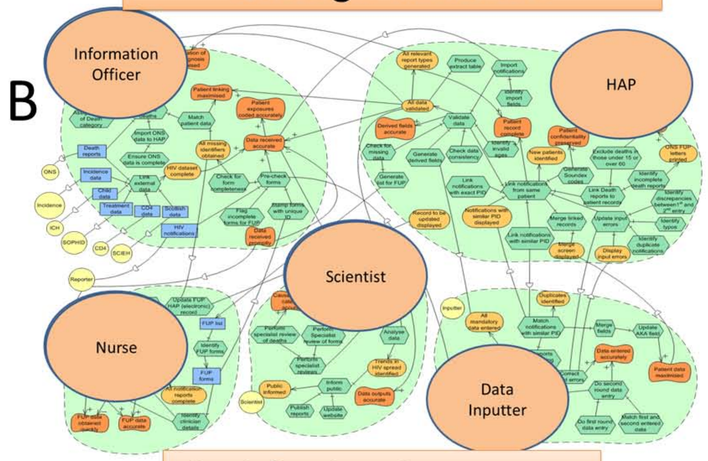

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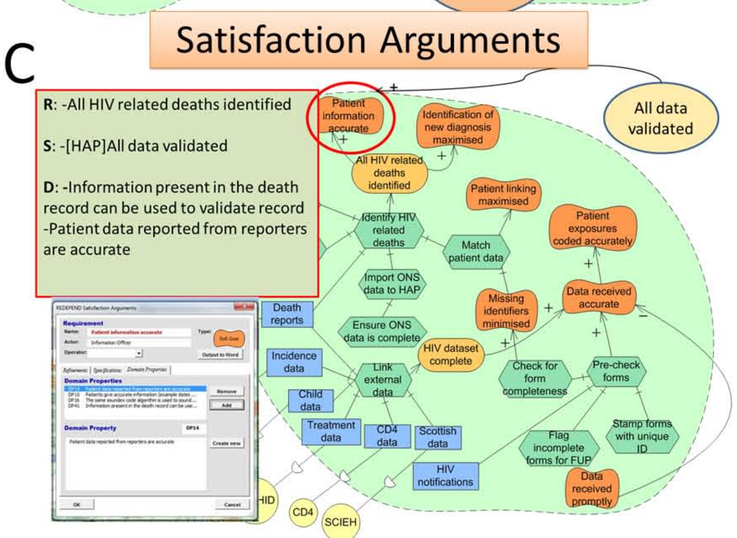

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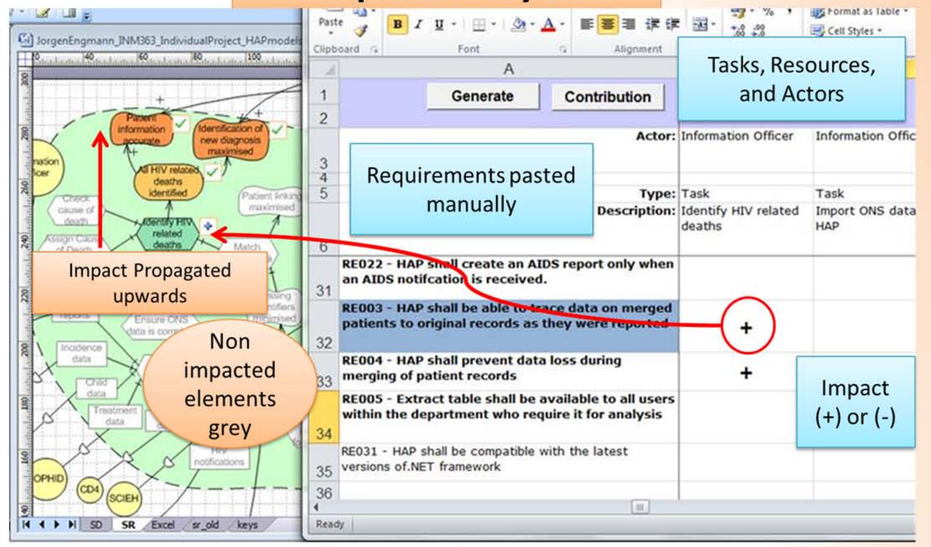

4. Evaluation\Lessons learned

- Models provide a **"Big picture"** enhanced with domain properties - a good **communication** tool
- Initial modelling takes **time** but will evolve with system becoming a **quick reference** tool
- Impact assignment simple (excel spread sheet generated by REDEPEND)
  - Encouraged CR **requirements analysis/validation,** but
  - could be **subjective** →record rationale.
- Some requirements **alleviate** the need to do task, **depend on task** or **depend on other new requirements** → model validation/improvement and SA specification

5. Conclusion

- It is feasible and useful to produce *i** models of a legacy system by reverse engineering its implementation to requirements
- Combinatorial approach of methods provides a richer representation of requirements
- REDEPEND facilitates both modelling and impact analysis enhancing and informing system and process redesign

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Strategic Analysis of Agile Practices:

Hesam Chiniforooshan[1], Maria Carmela Annosi[2], Eric Yu[1]

[1]University of Toronto,[2] Ericsson Software research

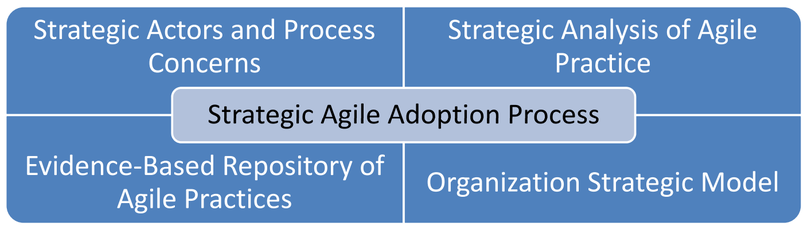
Current Approaches to Agile Adoption

1

- Trial of new process in a pilot project [5]
  - Radical Transformation to agile
  - The unpredicted risks of pilot experiments
- High risk of:
  - Selecting wrong practices
  - Missing the advantages of core agile values

Strategic Approach to Agile Adoption

2



Strategic Agile Adoption Framework (SAAF) [1]

- Highlighting the significance of
  - pre-adoption analysis in transitioning to a new process
  - Strategic goals and trade-offs
  - Participatory approaches in process improvement

Strategic Analysis Process

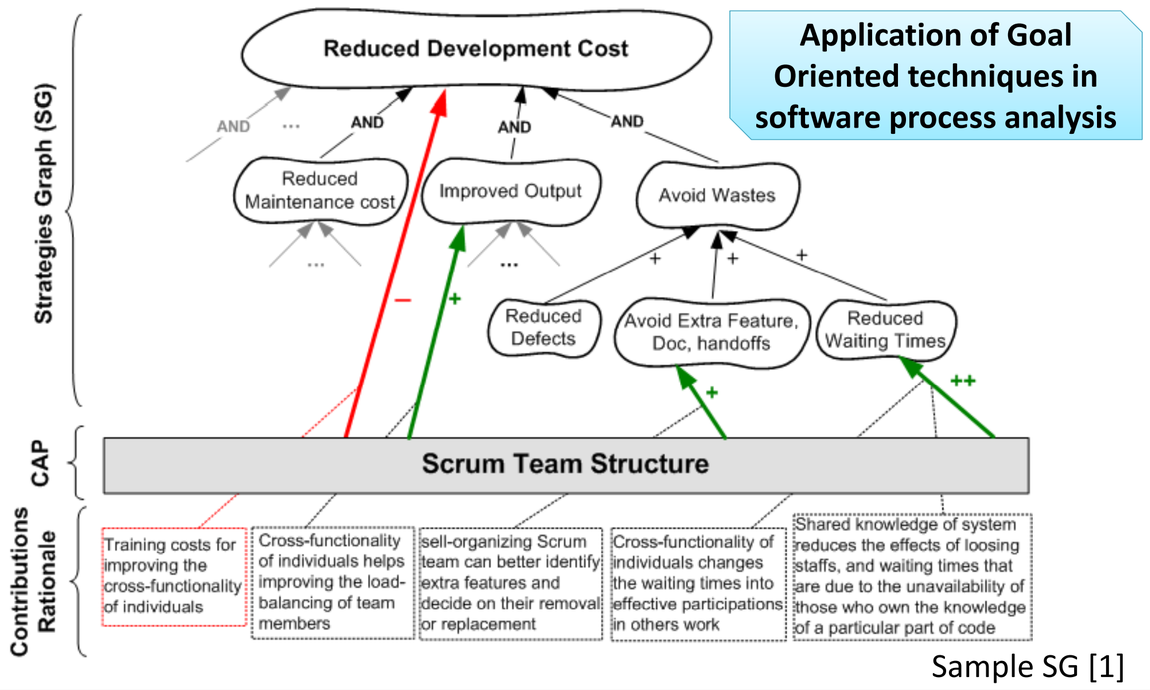
3

***Phase 1* Setting up Strategies Graph (SG) for the Organization :**

1 Initial Construction of the SG
2 Retrieving Strategic Knowledge of CAPs and updating SG
3 Acquiring feedback and updating SG

***Phase 2* Strategic Analysis of Candidate Agile Practices (CAPs):**

1 Strategic Contribution Analysis
2 Propagative Strategic Analysis
3 Strategic Trade-Off Analysis
4 Aggregated Strategic analysis
5 Strategic Balance Analysis
6 Strategic Concern Analysis



Sample SG [1]

Strategic Actor and Process Concerns

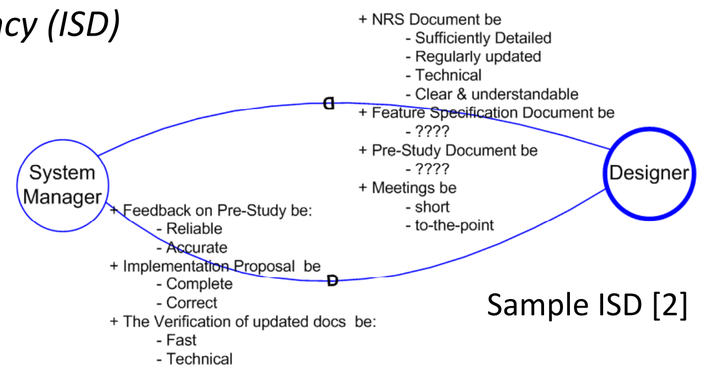
4

- Assessment of as-is process
- Identifying root-causes of the need for Agile
- *Extraction* of process concerns

  Itemized Strategic Dependency (ISD)

  - One model per actor

Application of *i Strategic Dependency models in software process assessment**



Sample ISD [2]

- *Analysis* of process concerns

  Strategic Analysis based on the organizational SG

Evidence Based Repository of Agile Practices

5

- Data Collection: Systematic Literature Review
- Available online at www.ProcessExperience.org

Major Objective	sub Objective	Cont. Value from Fragment	Study	Situation
Enhanced Communication		++	S1	
	Improved awareness - of what others are doing, better information passing	++	S1	
		-	S1	Large projects, as they may need extensive number of meetings
	Real-time knowledge transfer	+		
		-	S2, S12	Distributed Development: use of email and wiki pages for comm.
	Enhanced Communication with business people / project leader	++	S3, S8	Existence of multi-level Scrum in case of many scrum teams
	Better understanding of customer needs	+	S8	

A Subset of Objectives of "Daily Scrum Meeting" [3]

Objectives of Framework

6

- Earning a realistic perspective to Agile adoption [4]
  - * Does the Agile process works for our organization?
  - * Which promises of Agile are attainable in our organization context?
  - * What justifications to make on the proposed process?
- Improving the likelihood of success in Agile adoption
  - * Anticipating the risks of new process
  - * Minimizing the strategic conflicts of process and organization
- Establishing a strategic decision making paradigm
  - * Applicable on areas other than process adoption
  - * Strategic evaluation of organizational initiatives

Industrial Experience at Ericsson

7

- The framework is used in one of the R&D units of Ericsson
  - The company wanted to adopt an Agile process, in response to their as-is process concerns
- **Results of Pre-adoption process analysis:**
  - Establishment of a strategic decision making process
  - Root-Cause analysis of process concerns
  - Evaluation of to-be practices w.r.t organization strategies
  - Identifying the shortcomings of to-be agile process in addressing as-is process concerns
  - Tailoring candidate practices w.r.t organization context

References:

[1] H.Chiniforooshan, E.Yu, M.C.Annosi. "Towards the Strategic Analysis of Agile Practices", Forum of 23nd International Conference on Advanced Information Systems Engineering (CAiSE Forum), 2011, London, UK.

[2] H.Chiniforooshan, E.Yu, M.C.Annosi. "Itemized Strategic Dependency: a Variant of the *i** SD Model to Facilitate Knowledge Elicitation", 4th International *i** Workshop, Tunisia, 2010.

[3] H.Chiniforooshan, E.Yu. "A Repository of Agile Method Fragments", International Conference of Software Process (ICSP), Germany, 2010.

[4] H.Chiniforooshan, E.Yu, M.C.Annosi. "Strategically Balanced Process Adoption", International Conference on Software and Systems Process (ICSSP), USA, 2011.

[5] Szalvay, V., Mar, K., & James, M. (2008). Agile Transformation Strategy,Danube Technologies, Inc.

A. Siena[1], G. Armellin[2], G. Mameli[3], J. Mylopoulos[1], A. Perini[3], A. Susi[3]

Regulatory Compliance of Requirements of Health Care Information Systems

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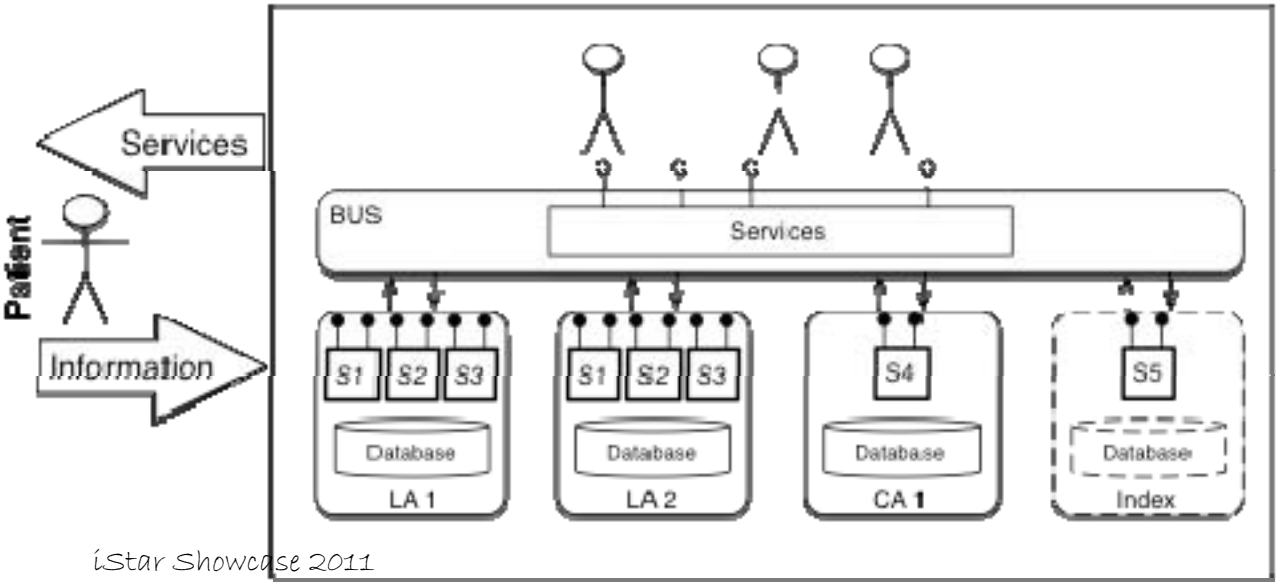
[2] GPI Spa, Trento, Italy
[3] FBK-Irst, Trento, Italy

The Project

- ***A.M.I.C.O.*** (Assistenza Multilivello Integrata e Cura Ovunque) – Industrial R&D project
  - Aims at developing a distributed healthcare information system
  - Private and public healthcare organizations collect/share data about patients, thus defining the Electronic Patient Record (ERP)
  - ERP management brings issues of data integrity and protection of patients privacy rights
  - The company has been requested to provide an evidence of law compliance of the system-to-be



Operators (nurses, doctor, sensor-based devices): input data
LA: Local Authorities
CA: Certificate Authorities

Problem

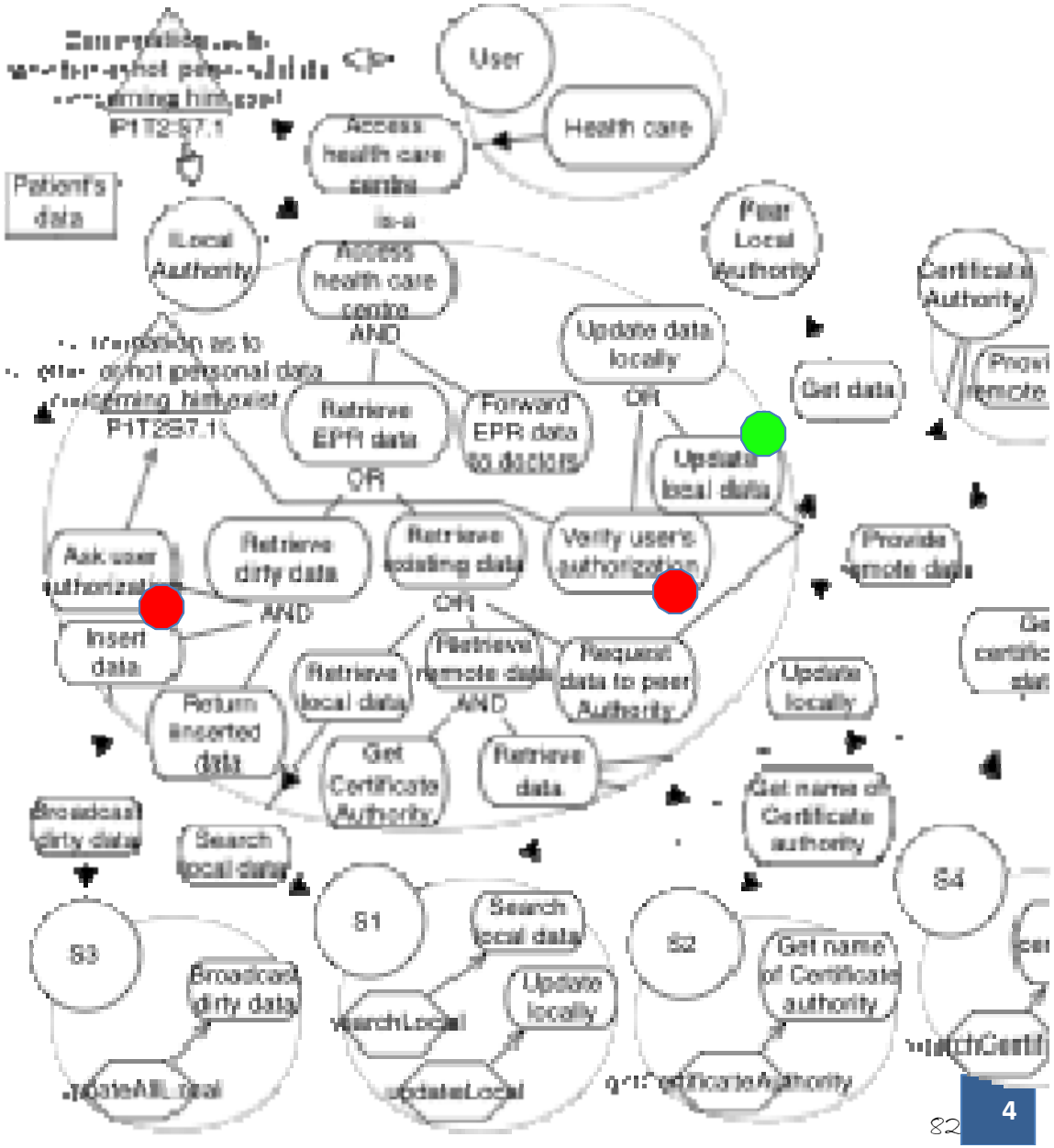
- System requirements already gathered
- Compliance issues addressed internally by the company
- Objective: **Validate** system requirements w.r.t. *Italian Personal Data Protection Code D.Lgs. n. 196/2003*, or propose **integrations** to the **SRS** document

Approach: Model-based compliance

- definition of *law compliance* through **modeling** the relation between law and requirements
- notion of compliance splitted in two parts:
  - **Intentional** compliance, i.e. none of the elements of the law is violated by these requirements
  - **Auditability**, i.e., compliance can be confirmed when the system is operating, on the basis of gathered data

Steps

- Create req. models (i*)
- Create models of the law (using an extension of i*: Nomos)
- Contrast the model of requirements with that of law
  - distribution of responsibilities such that, if every actor fulfils its goals, then actual compliance is ensured
  - distribution of auditing resources, such that at run-time processes can be monitored and produce data at support of compliance claims



Evaluation

- Compliance analysis: 15 person-day;
- Modeling: 7 person-day;
- 29 law articles; 10 of them mapped into NPs
- 12 new goals added
- 5 auditing resources identified
- 25 new requirements

+ Perceived advantages

- Compliance choices made explicit;
- Visual representation of compliance aspects
- Decrease of ambiguity

– Scalability

- Suitable for relatively small but high-impacting laws

THANK YOU

More details on the Poster!

Assurance Requirements of Business Services

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i-star ShowCase
London, June 21, 2011

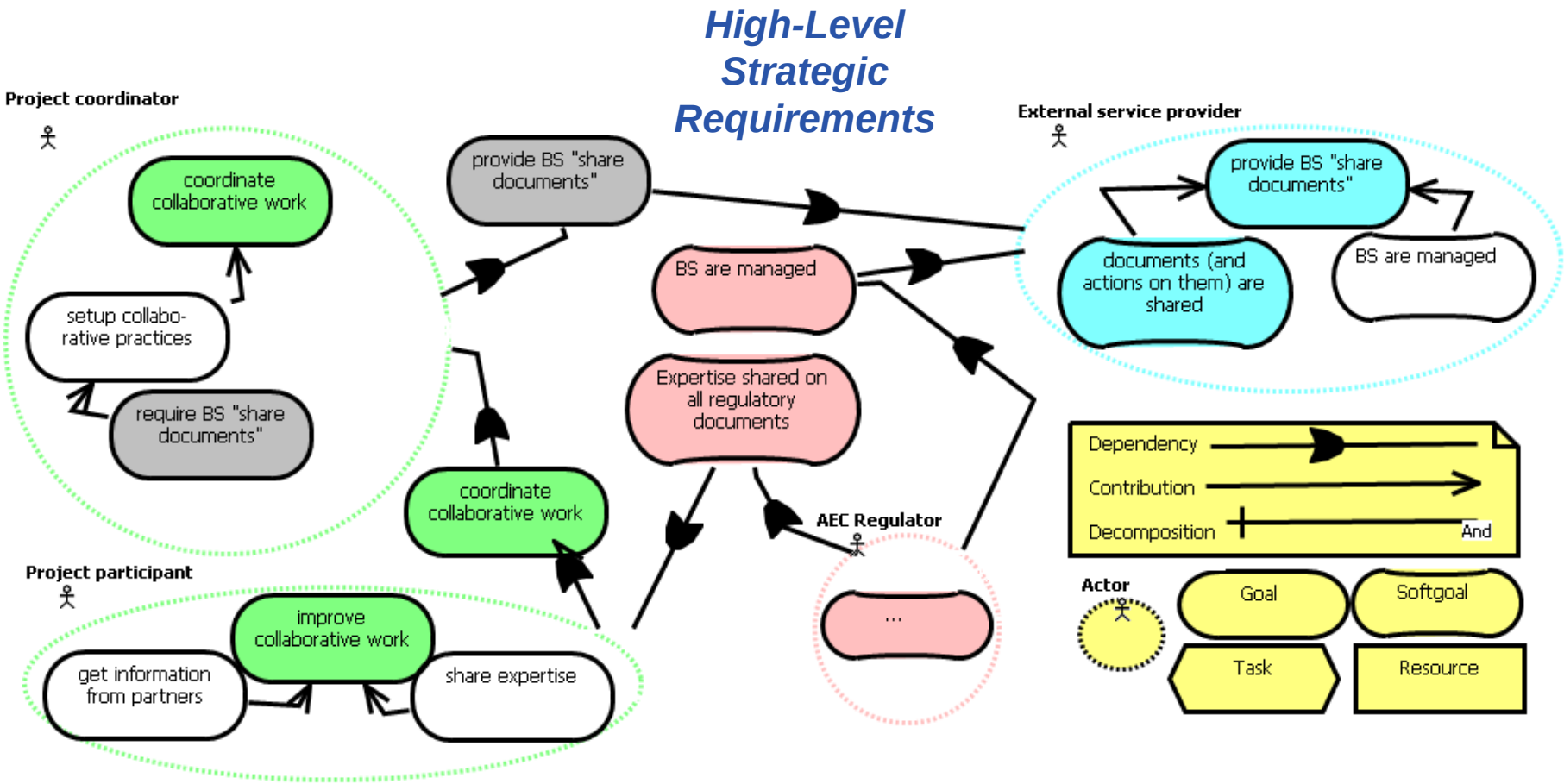
Des2co Project at CRP Henri Tudor

- CRP Henri Tudor Luxembourg: innovation for enterprises and public organisations. (Staff ≈ 450)
  - *Activities*: applied research; development of tools, methods, labels, standards, certifications; consulting; high-level training and qualification
- Dest2Co project:

Planning → Design → Construction → Use

  - Architecture, Engineering and Construction sector (AEC)
  - Highly-collaborative business domains
  - Need for projects' specific sets of services
  - Service-based innovation: envisioning future services for AEC
  - Method and toolset for the design of services

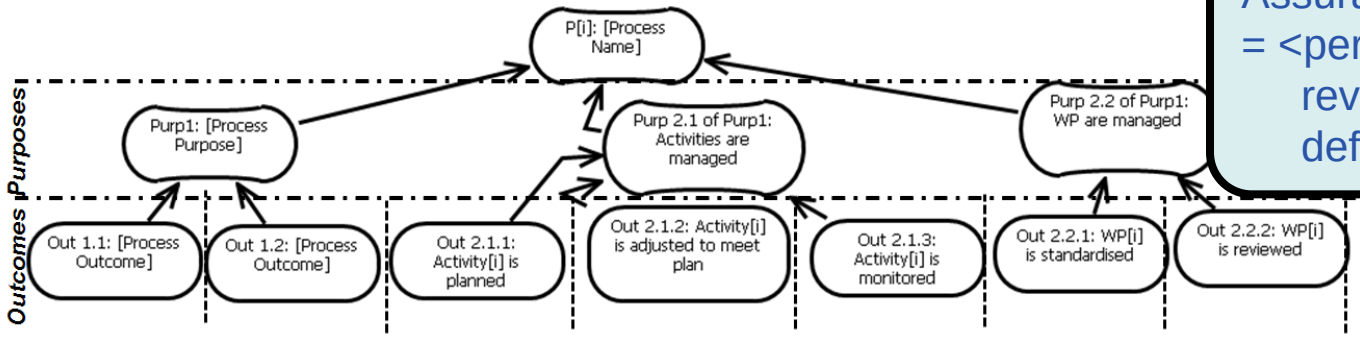
Step 1: strategic requirements



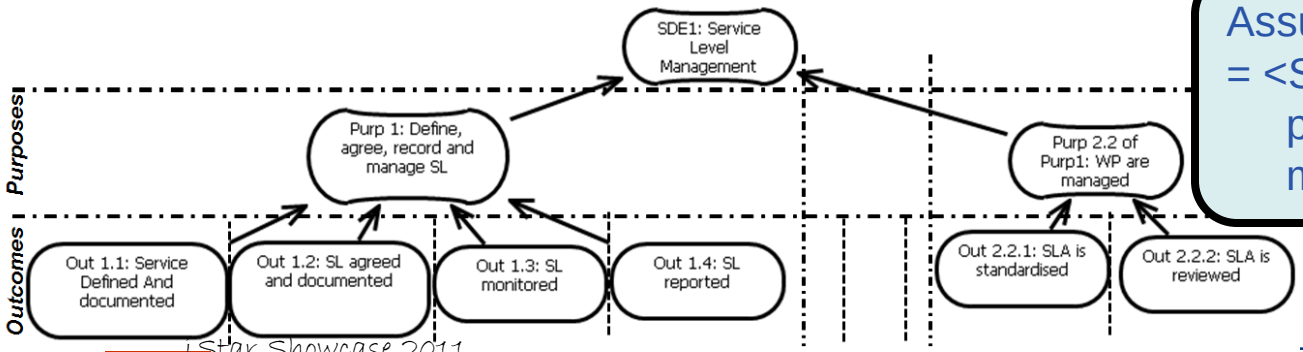
jUCMNav: http://lotos.csi.uottawa.ca/

Step 2: use measurement library

- Measurement Frameworks:
  - Shared Understanding, Objective Agreement, Measurability



Assurance[*some process*]
= <performed; monitored; reviewed; controlled; defined; trained; KPI mngt; ...>

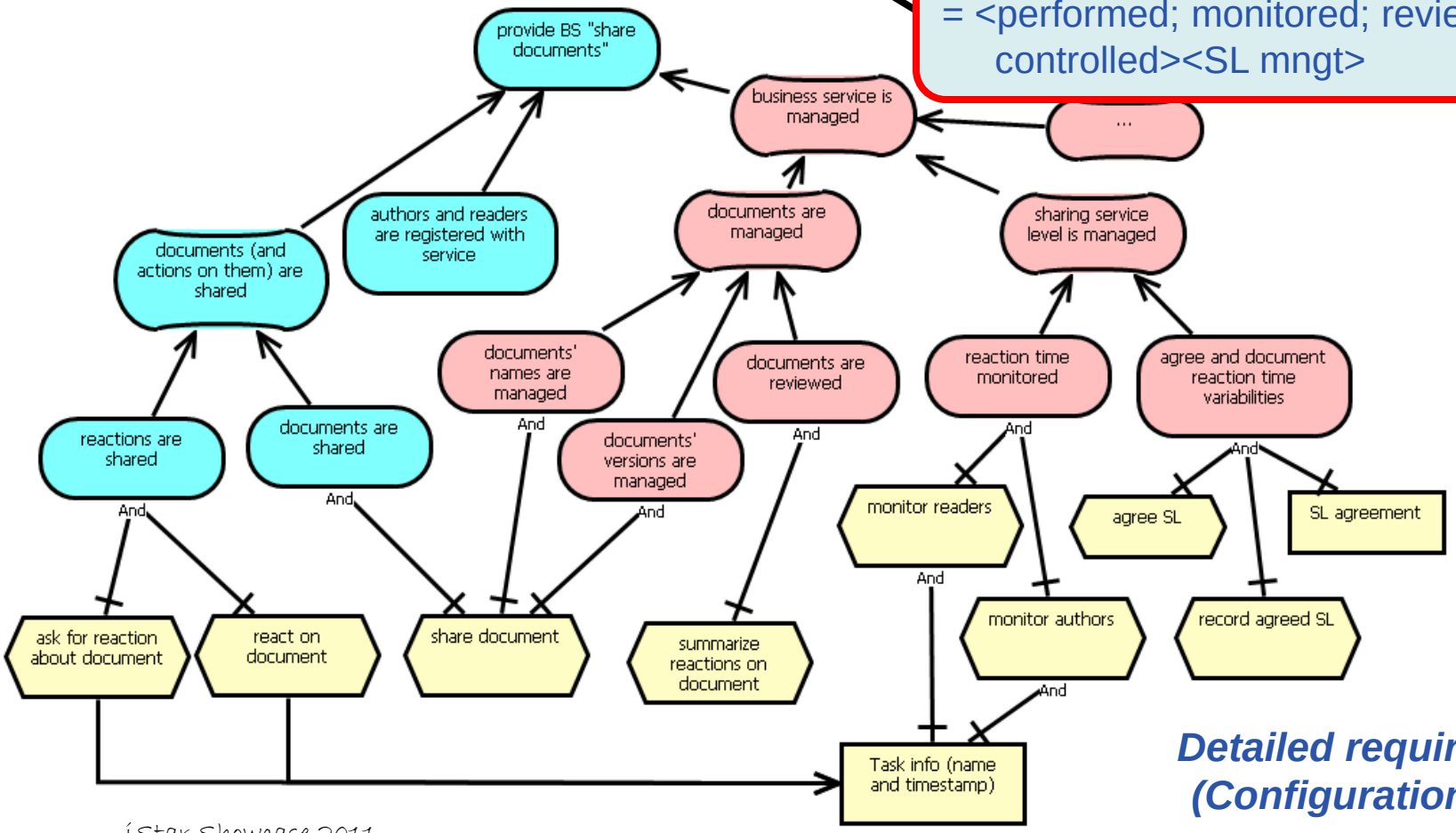


Assurance[*some service*]
= <SL mngt; incident mngt; problems mngt; configuration mngt; financial mngt; ...>

Step 3: instantiates measurements

Assurance[**Sharing of expertise**] = <performed; monitored; reviewed; controlled>

Assurance[**Sharing of docs**] = <performed; monitored; reviewed; controlled><SL mngt>



Measurement Requirements (Purposes and Outcomes)

Detailed requirements (Configuration / PIM)

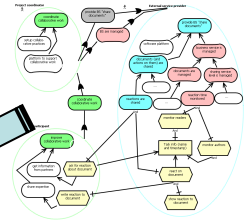
Step 4: assess, compare, evolve

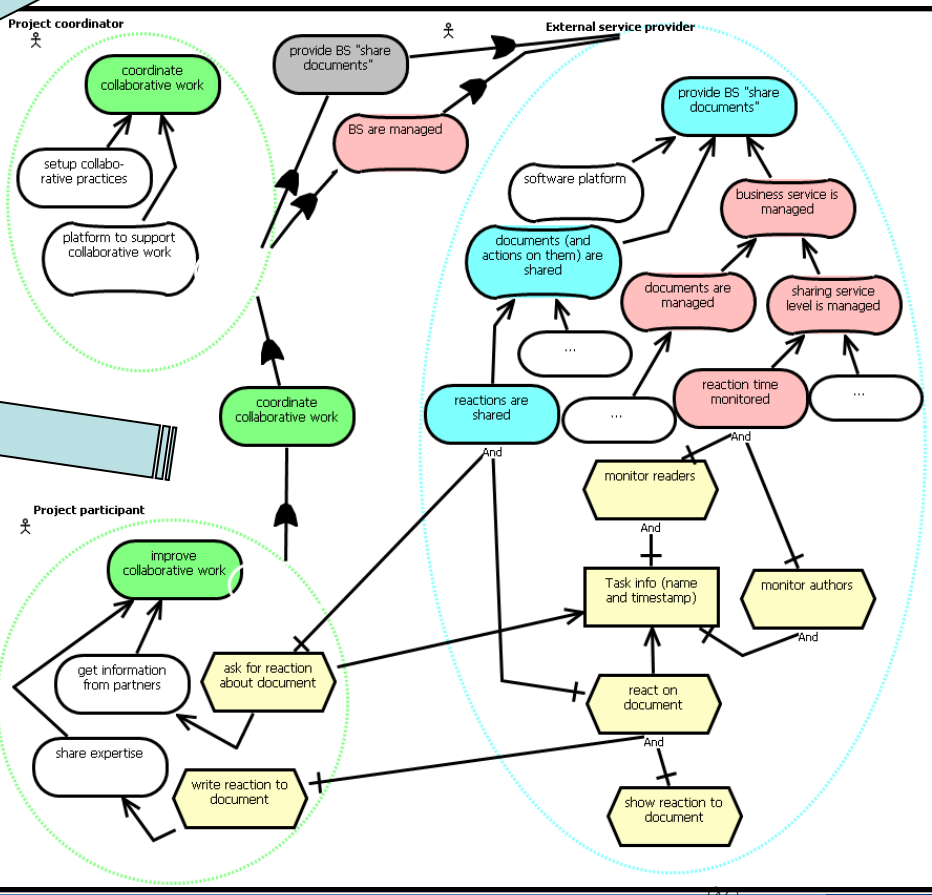
	Assurance				
	Level 1 Performed	Level 2 Planned & Supervised		Level 3 Standardized	
	PA 1.1 Process Performance	PA 2.1 Performance Management	PA 2.2 Work Product Management	PA 3.1 Process Definition	PA 3.2 Process Deployment	PA 4.1 Process Measurement
	↓	↓	↓	↓	↓	↓
	Achievement of the purpose and outcomes	Planned & monitored Adjusted	Work Products (documents) adequately managed	Standard process & procedures Competencies & roles Infrastructure	Procedures Deployed Training I&C	Quantitative objectives defined

Sharing Expertise Process				N.A	N.A
Site Meeting Process		N.A	N.A	N.A	N.A
Coordination Process		N.A	N.A	N.A	N.A
Legal Value Protection Process		N.A	N.A	N.A	N.A

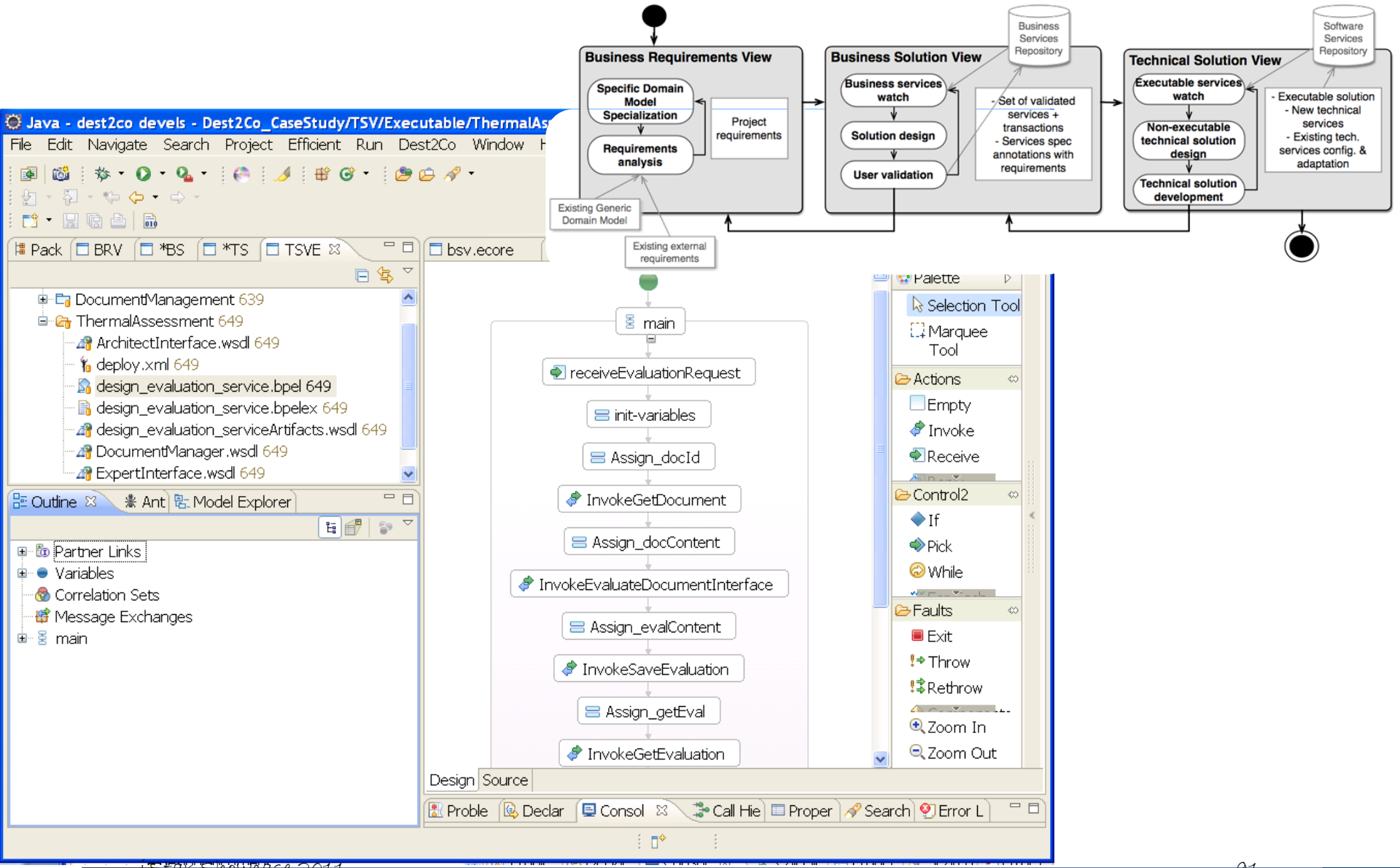
Sharing Expertise Process					
Site Meeting Process					
Coordination Process					
Legal Value Protection Process				N.A	N.A

Rating Scale	Not	Partially	Largely	Fully





Step 5: refine



Thanks for your attention

Assurance Requirements of Business Services

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London, June 21, 2011

For more information concerning the i* Framework and its use in industry, please see:

The i* Home Page:

http://www.cs.toronto.edu/km/istar/

The Collaborative i* Wiki

http://istar.rwth-aachen.de/tiki-index.php

istar modeling group on Linkedin

http://www.linkedin.com/groups/istar-modeling-3795855

i-star group on Citeulike

http://www.citeulike.org/groupfunc/14571/home