

On Agile Design in Software Engineering and beyond

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Who am I?

- Name: Kuldar Taveter
- Position: Professor, Chair of Software Engineering
- Education:
 - Dip.Eng., TUT, 1988
 - M.Sc., TUT, 1995
 - Ph.D., TUT, 2004
- Work experience:
 - 1985-1989: Institute of Cybernetics
 - 1989-1993: Private companies
 - 1993-1998: Department of Informatics of TUT
 - 1997-2005: Technical Research Centre of Finland
 - 2005-2008: The University of Melbourne, Australia
 - 2008- : Department of Informatics of TUT
 - Jan-Aug 2011: University of South Carolina, USA
- Research areas: Agent-oriented software engineering, engineering of sociotechnical systems, multiagent systems, intelligent systems, ambient intelligence, agent-based simulation

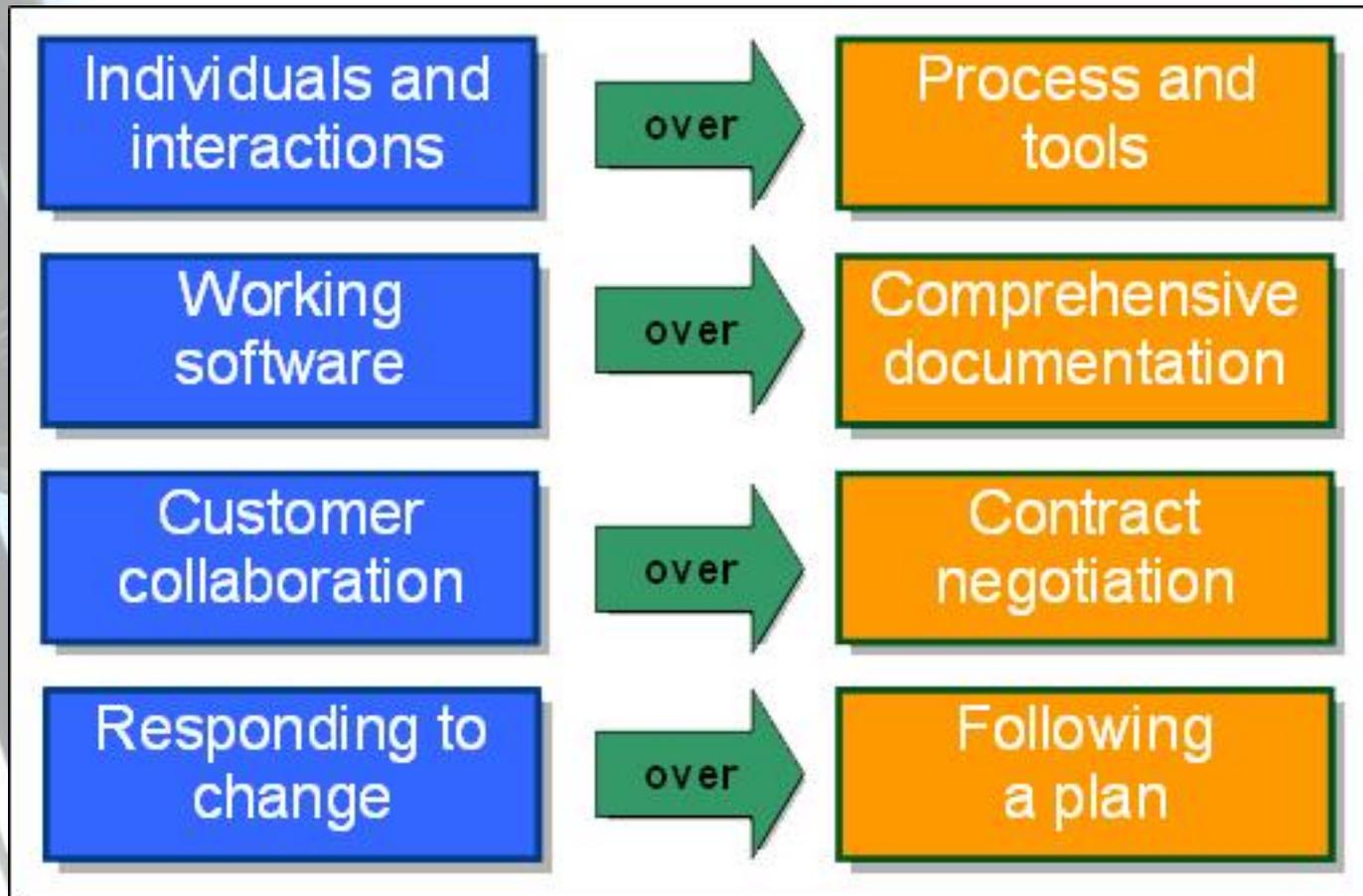
What is design?

- A specification of an **artifact**, manifested by an **agent**, intended to accomplish **goals**, in a particular **environment**, using a set of **components**, satisfying a set of **requirements**, subject to **constraints**

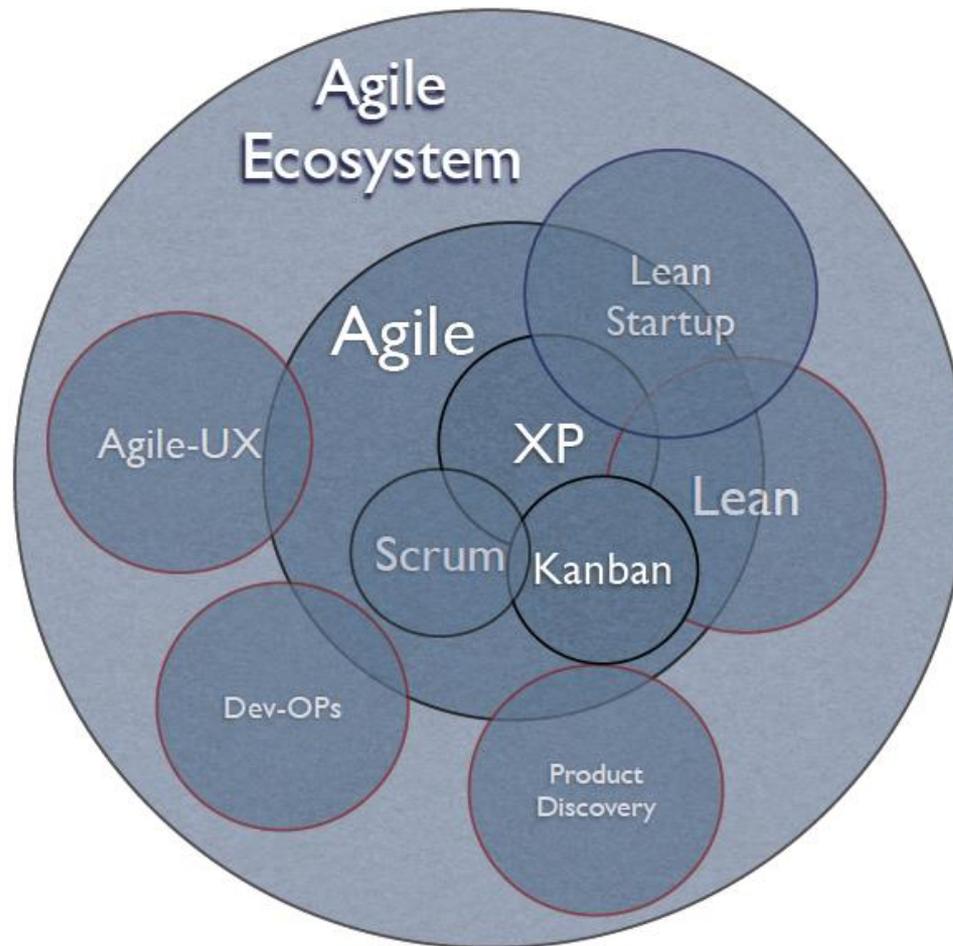
What is the artifact?

- The entity (or class of entities) being designed. Note: this entity is not necessarily a physical object.
- Classes of artifacts:
 - **physical artifacts**, both simple, such as boomerangs (single-component), and composite, such as houses (made of many types of components)
 - **processes**, such as business workflows
 - **symbolic systems**, such as programming languages
 - **symbolic scripts**, such as essays, graphic models, animations, and software
 - **laws, rules and policies**, such as a criminal code
 - **human activity systems**, such as software design projects, committees and operas

The Manifesto for Agile Software Development



Landscape of agile methodologies

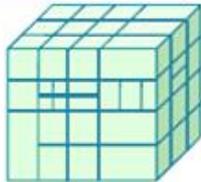


Artifacts in agile methodologies

- Lean Startup: *validated learning* vs. working software
- Lean UX: *delivered value* vs. working software

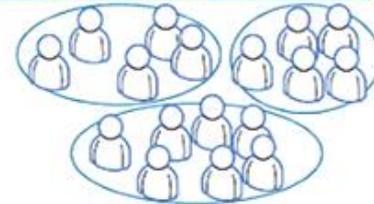
Scrum in nutshell

Split your product

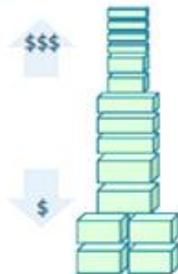


~~Large group spending a long time building a big thing~~
Small team spending a little time building small thing
... but integrating regularly to see the whole

Split your organization



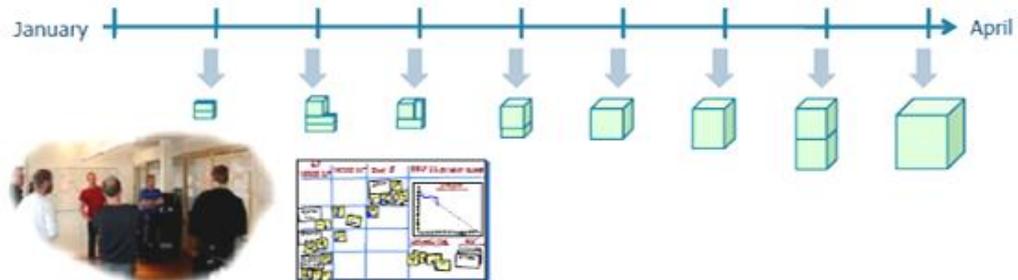
Optimize business value



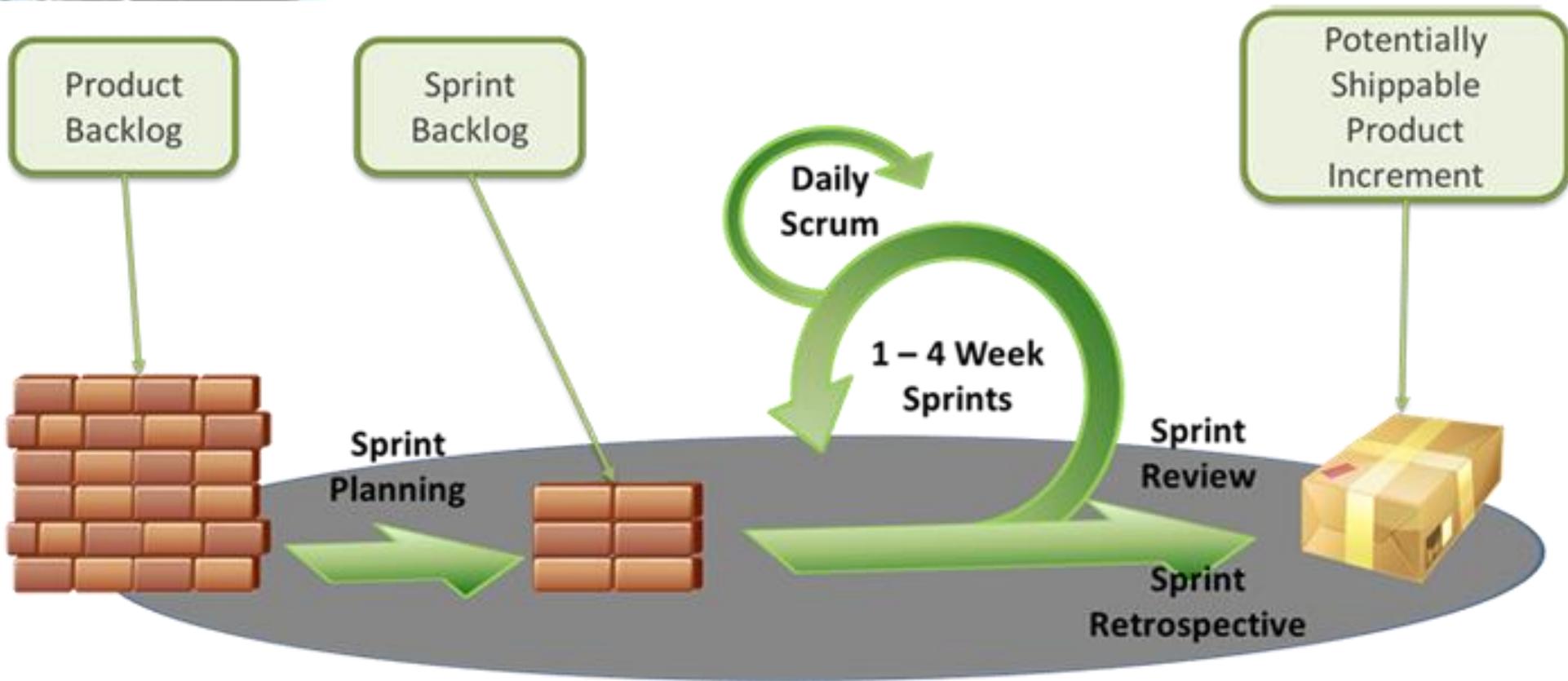
Optimize process



Split time



Iterations of Scrum



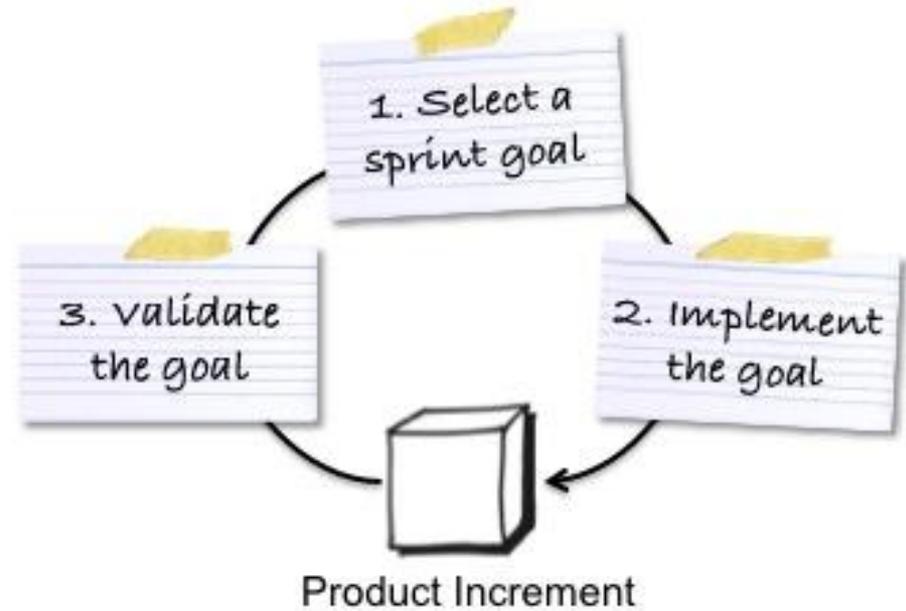
User stories

- **As a user playing some role, I must be able to perform some activities [in order to achieve some goal]**

Example of Product Backlog

As a	I want to	So that (I can)	Business Value	Estimate
HR Manager	Publish new vacancies	Find candidates	80	20
Job Hunter	Apply for a job	Quickly apply for a job	80	40
HR Manager	Triage applicants	Politely eliminate unpromising candidates	50	8
Googlebot	effectively find and index all postings	Ensure that internet searchers can find job postings on this site	50	13
System Admin	quickly recognize and analyze system	ensure rapid resolution of technical problems	30	20

Sprint goal



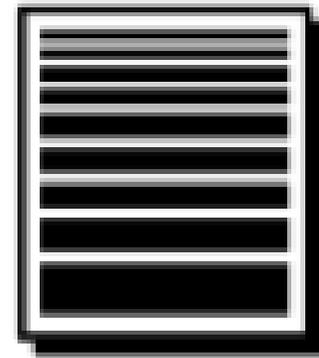
Example of Sprint Backlog

User Story	Tasks	Day 1	Day 2	Day 3	Day 4	Day 5	...
As a member, I can read profiles of other members so that I can find someone to date.	Code the ...	8	4	8	0		
	Design the ...	16	12	10	4		
	Meet with Mary about ...	8	16	16	11		
	Design the UI	12	6	0	0		
	Automate tests ...	4	4	1	0		
	Code the other ...	8	8	8	8		
As a member, I can update my billing information.	Update security tests	6	6	4	0		
	Design a solution to ...	12	6	0	0		
	Write test plan	8	8	4	0		
	Automate tests ...	12	12	10	6		
	Code the ...	8	8	8	4		

How to create Product Backlog?



Vision

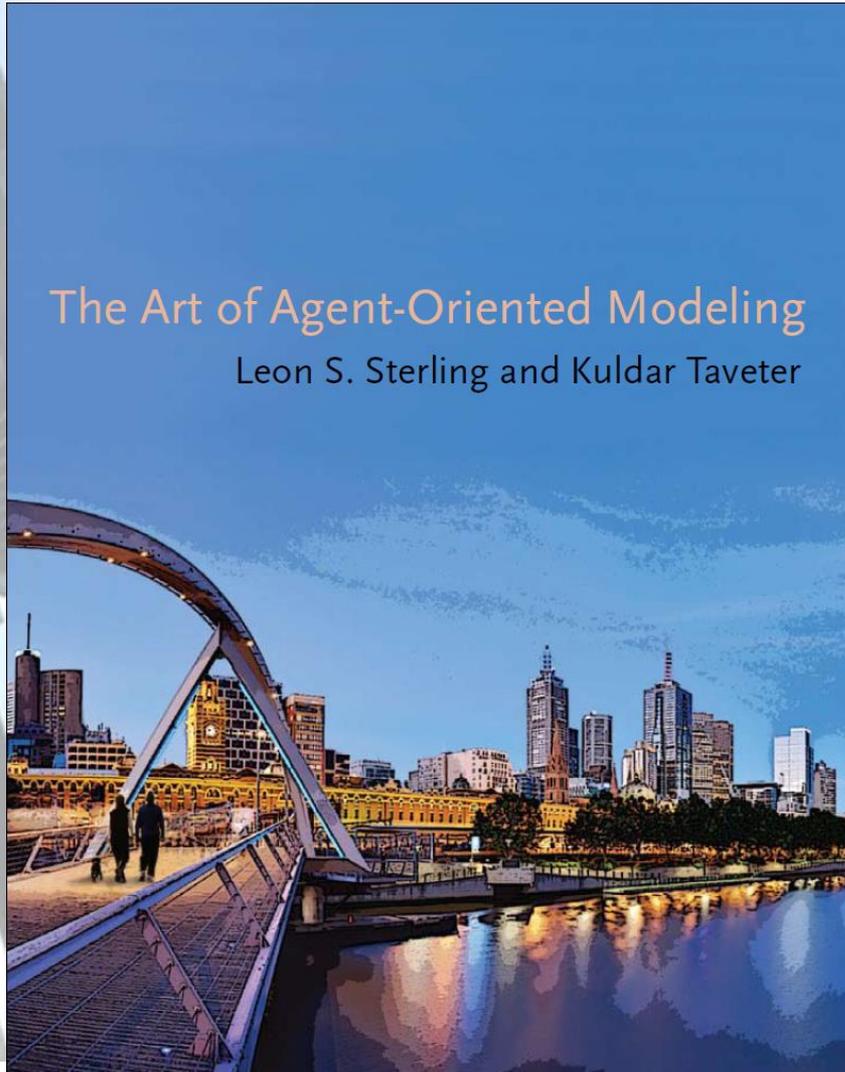


Product
Backlog

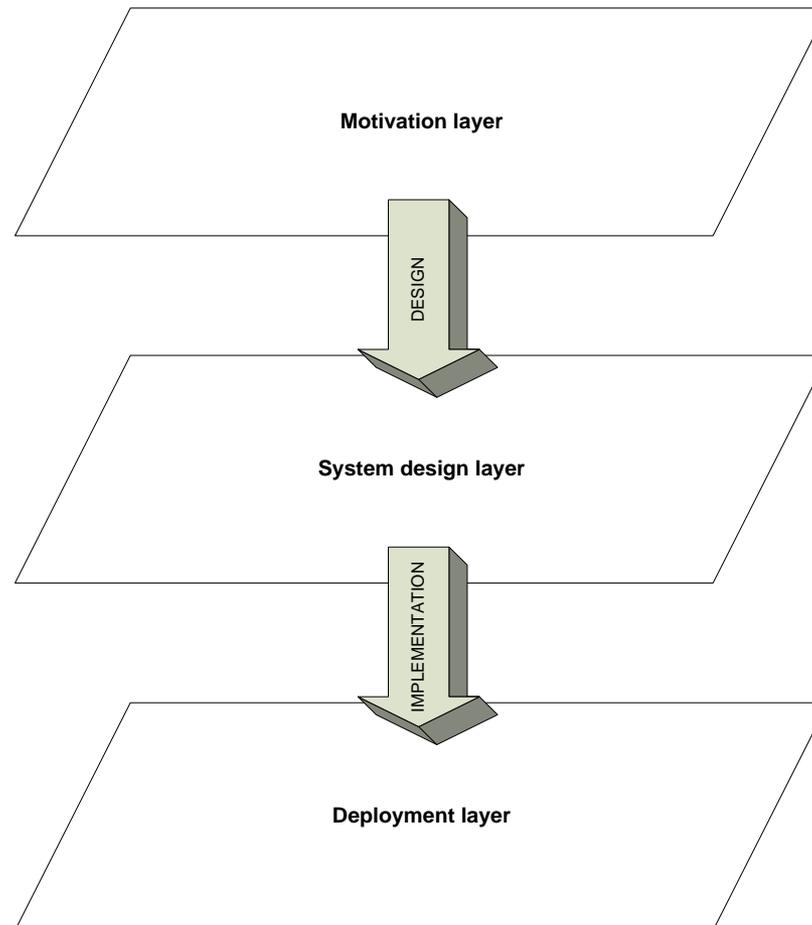
How to manage Product Backlog?



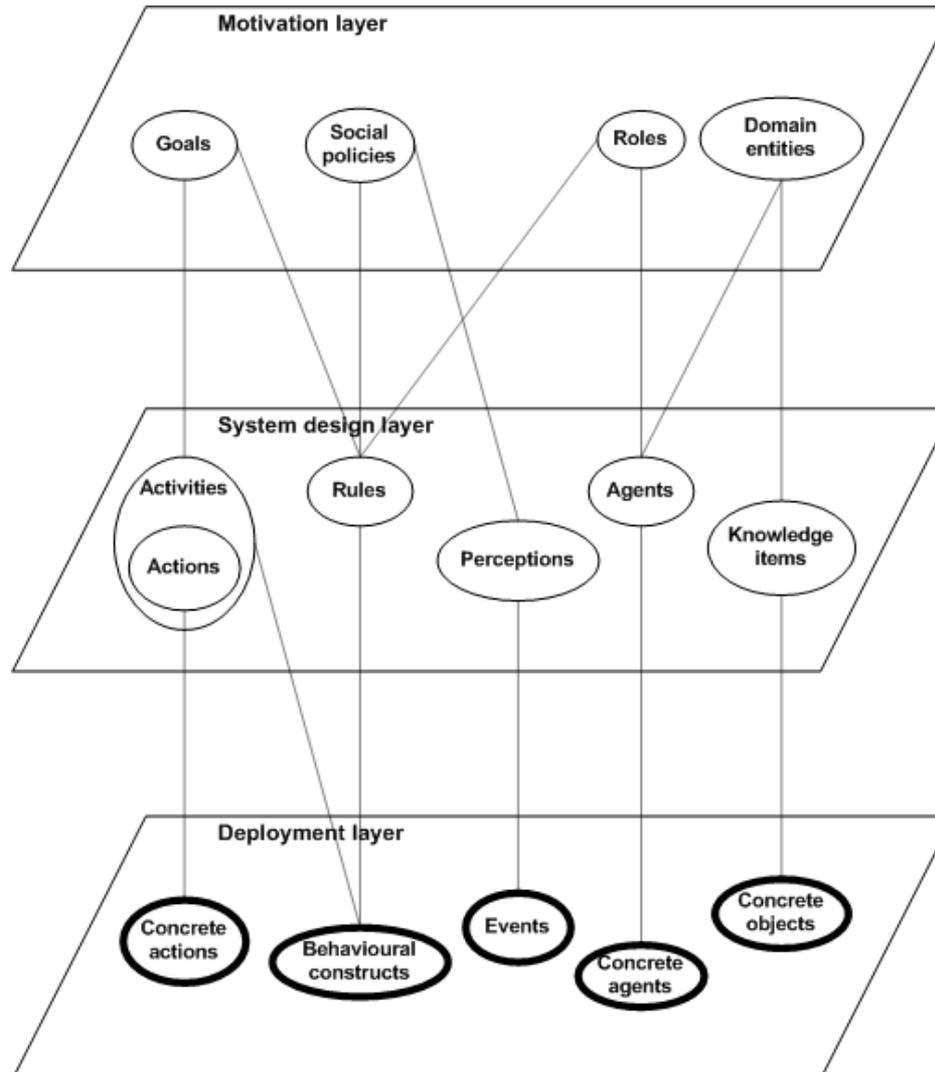
Agent-oriented modeling (MIT Press, 2009)



Conceptual space for design



Conceptual space populated with concepts



Three perspectives required

- Interaction
- Knowledge
- Behaviour

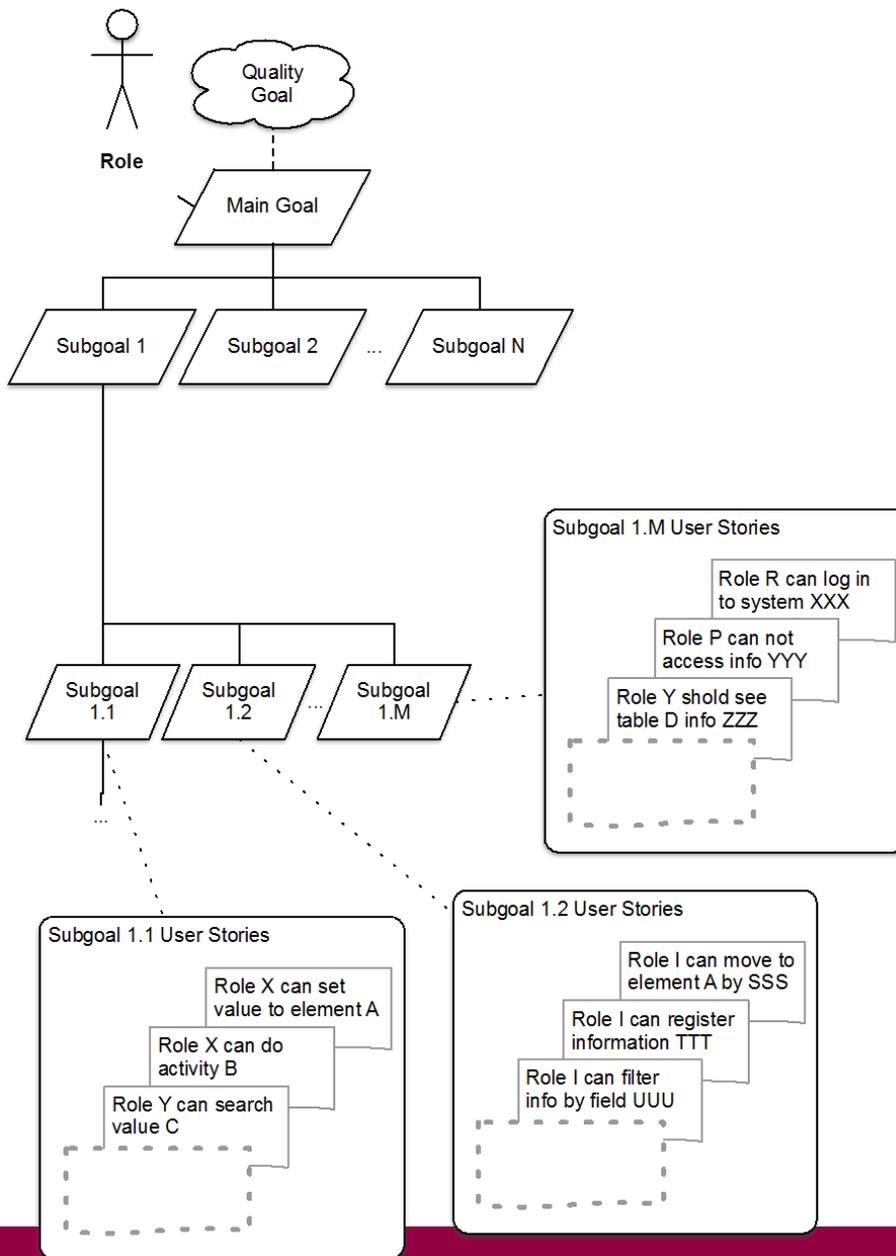
The Viewpoint Framework

	Viewpoint aspect		
Abstraction layer	Interaction	Knowledge	Behavior
Analysis	Role models and organization model	Domain model	Goal models
Design	Agent models, acquaintance model, and interaction models	Knowledge model	Scenarios and agent behaviour models
Prototyping	Interaction prototyping	Knowledge prototyping	Behavior prototyping

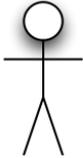
Agile Agent-Oriented Modeling (Kuldar Taveter, Tanel Tenso)

- Problem domain (product backlog) is presented as a goal model
- A goal model connects functional requirements, quality requirements, and roles
- A goal model is constantly updated within iterations of an agile design process

Agile AOM (AAOM)

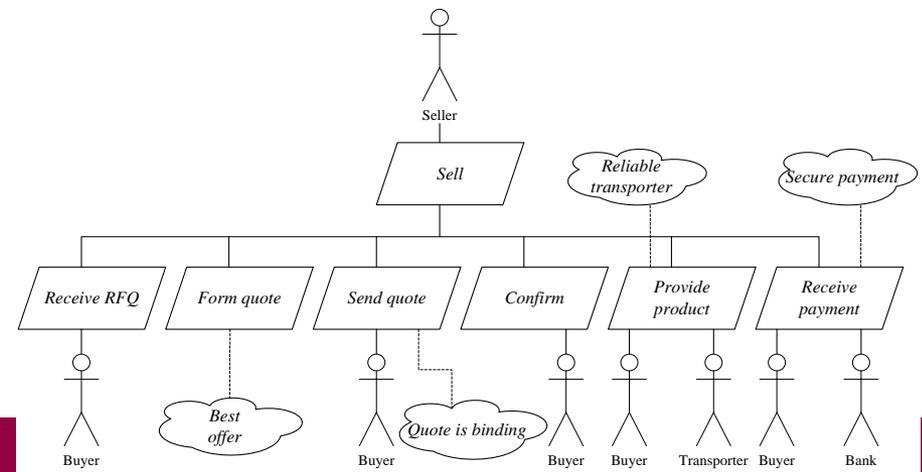
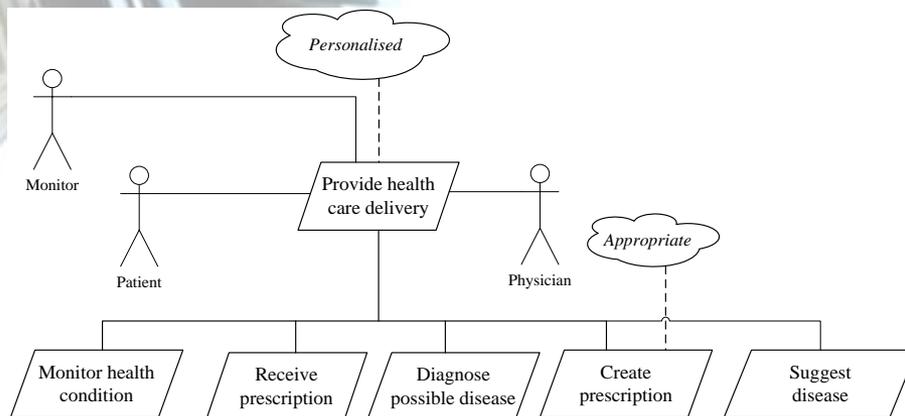


Notation

Symbol	Meaning
	Goal
	Quality goal
	Role
	Relationship between goals
	Relationship between goals and quality goals

Examples of user stories

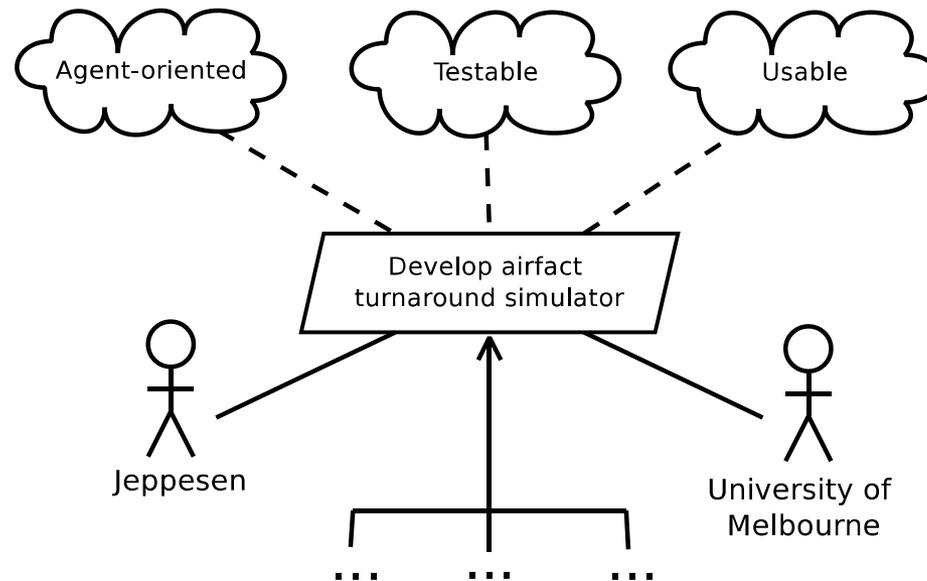
- As a user playing some **role**, I must be able to **do something** in order to **achieve some goal**
- Example 1: As a *Receptionist* I want to *Register patient* to *Monitor health condition*
- Example 2: As a *Seller* I want to *Ship order* to *Provide product*



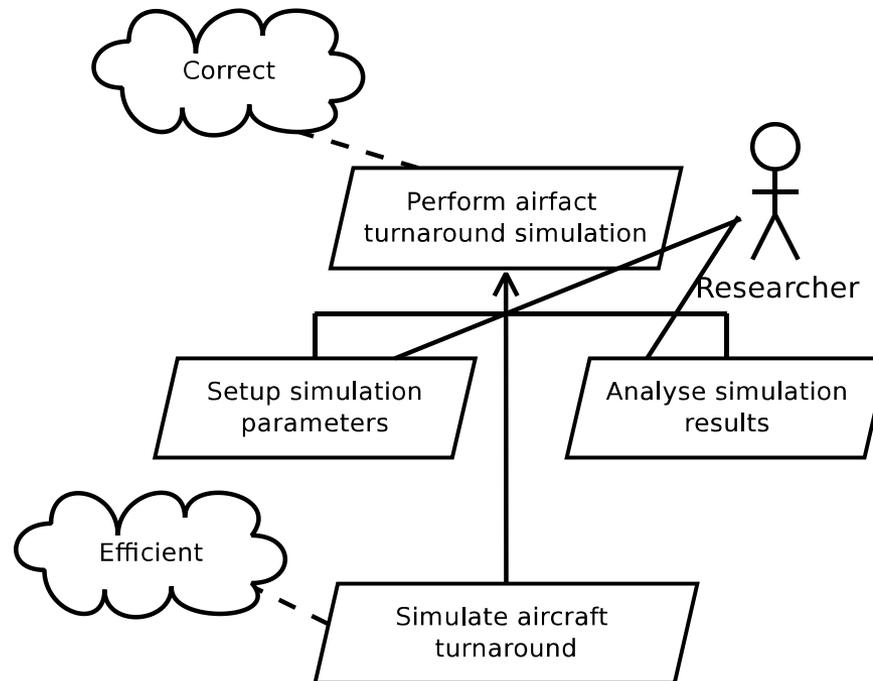
Examples

- Aircraft turnaround simulation
- Simulation of crisis management (EU FP7 project)
- Asperger's Game
- Issue Management
- Healthcare

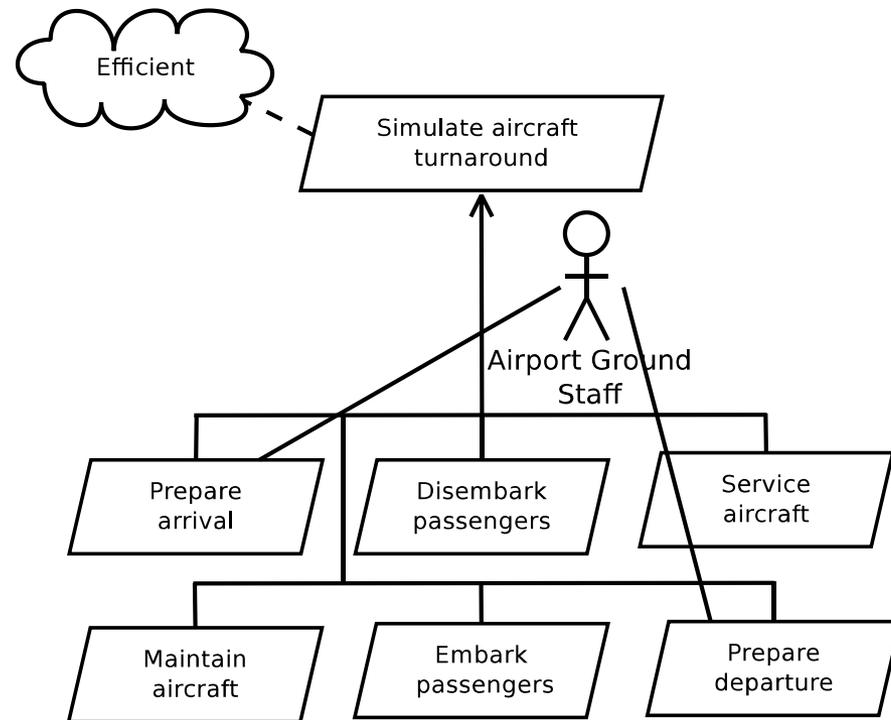
A goal model for the project of aircraft turnaround simulation



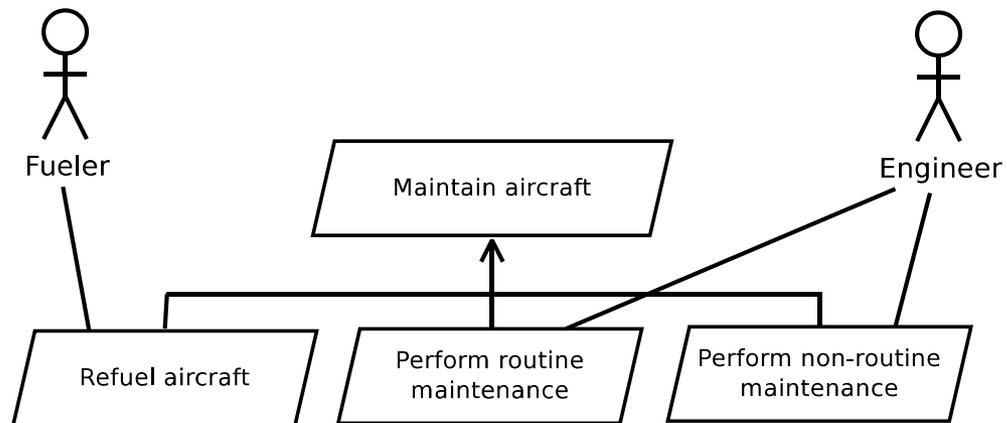
A goal model for the application of aircraft turnaround simulation



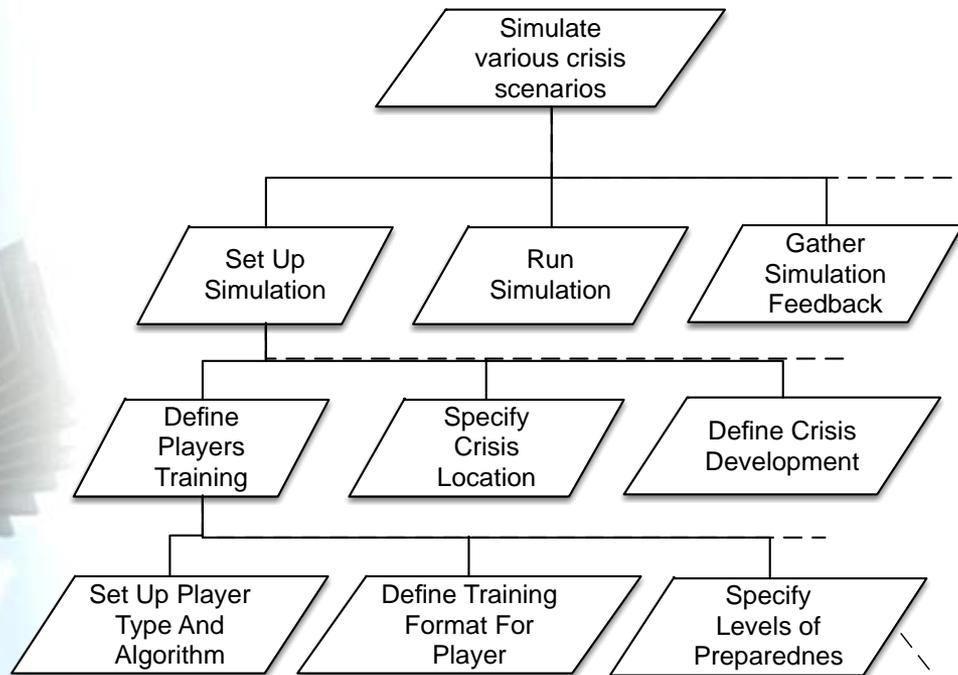
A goal model for the functionality of the application



Elaborated goal model



A goal model for the application of crisis management simulation

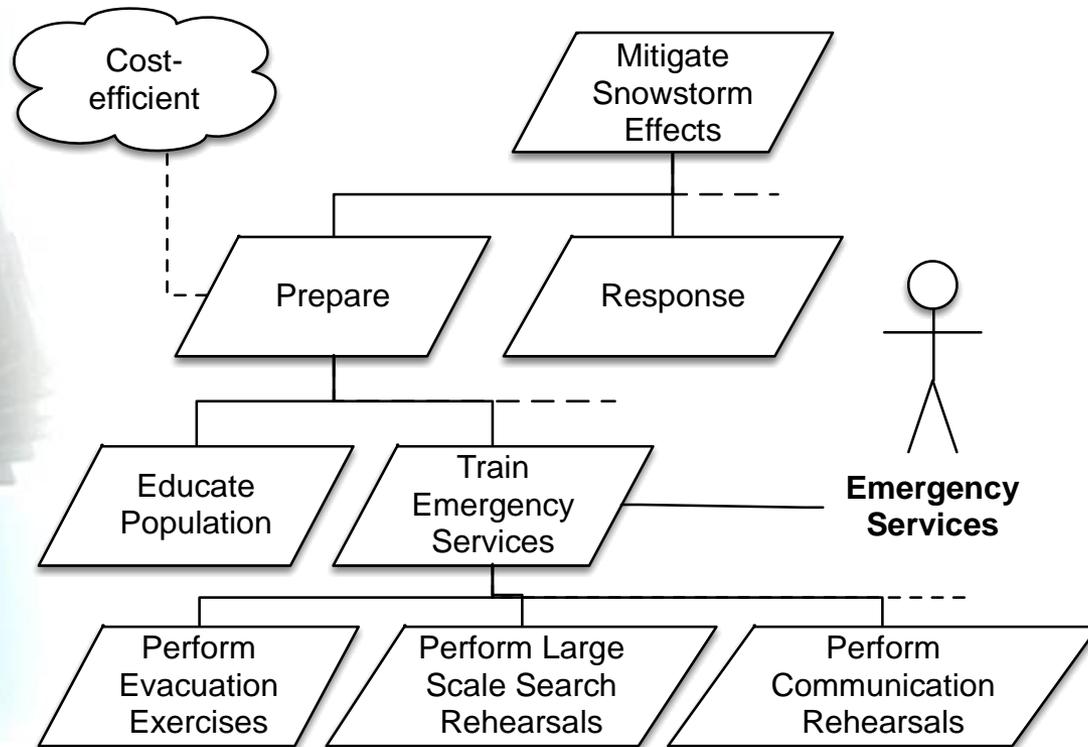


NOTE: for example these levels of preparedness will be used when running simulation to determine the response by players in crisis situation

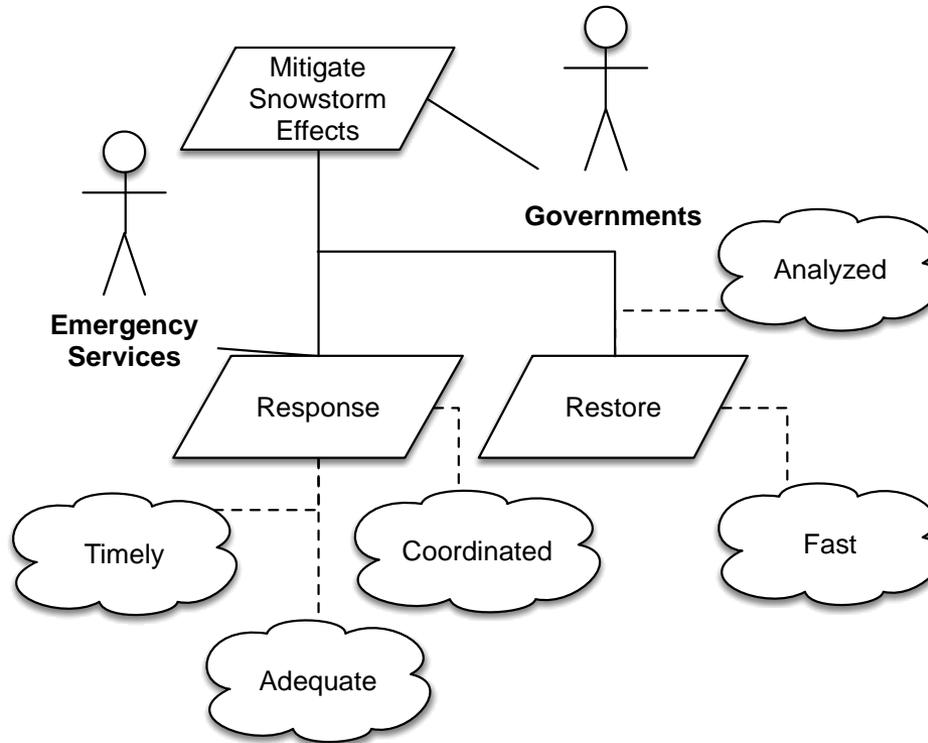
User stories for the sub-goal “Set Up Player Type and Algorithm”

- As a Simulation Model Administrator, I want to define the “Snowstorm Training” type of training for a player of the “Emergency Service” type to set up player type and algorithm
- As a Simulation Model Administrator, I want to define other types of training for a player of the “Emergency Service” type to set up player type and algorithm. NOTE: training types are “Earthquake Training”, “Chemical Burn Training”, etc.

A goal model for the functionality of the application



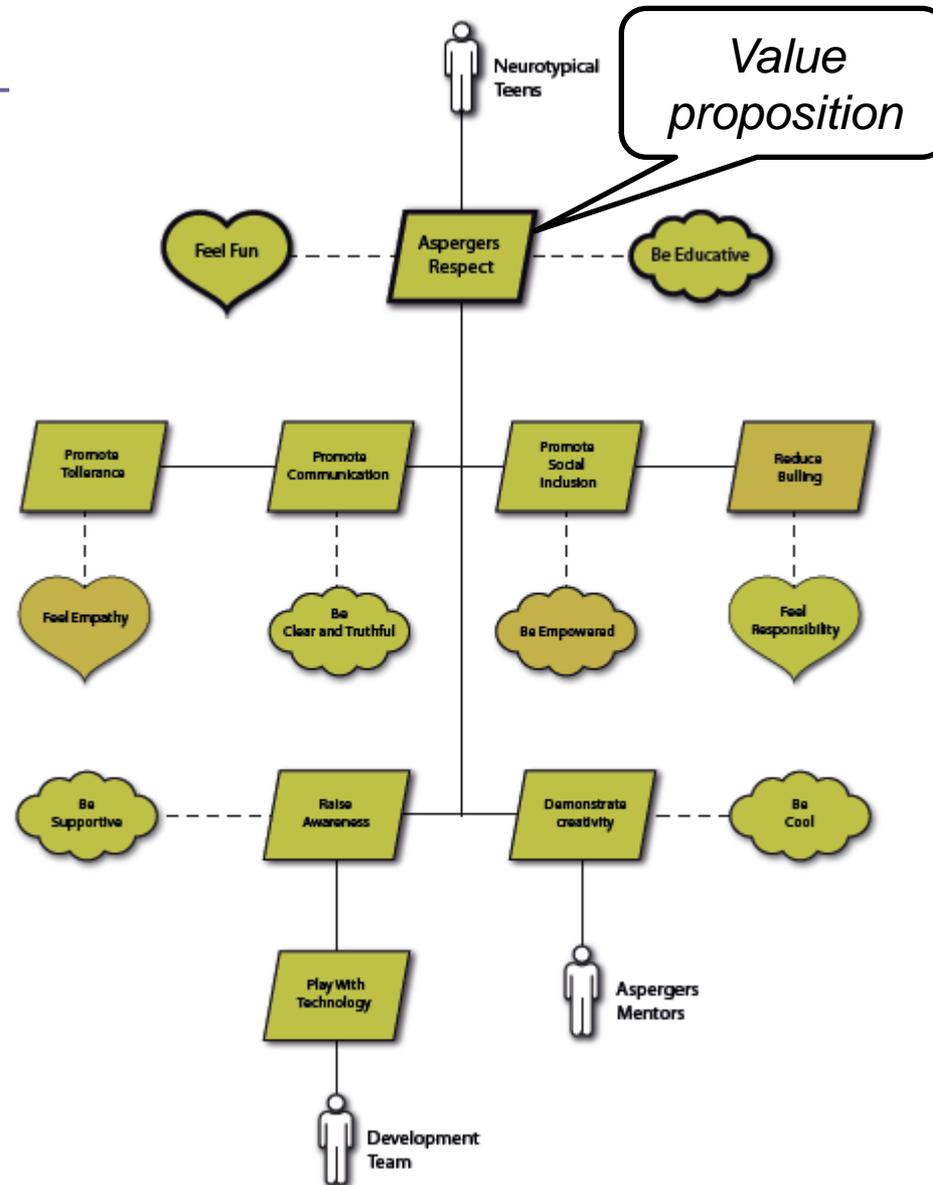
Elaborated goal model



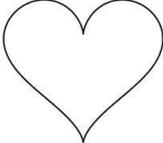
Agile design and project management with a modified goal and role model



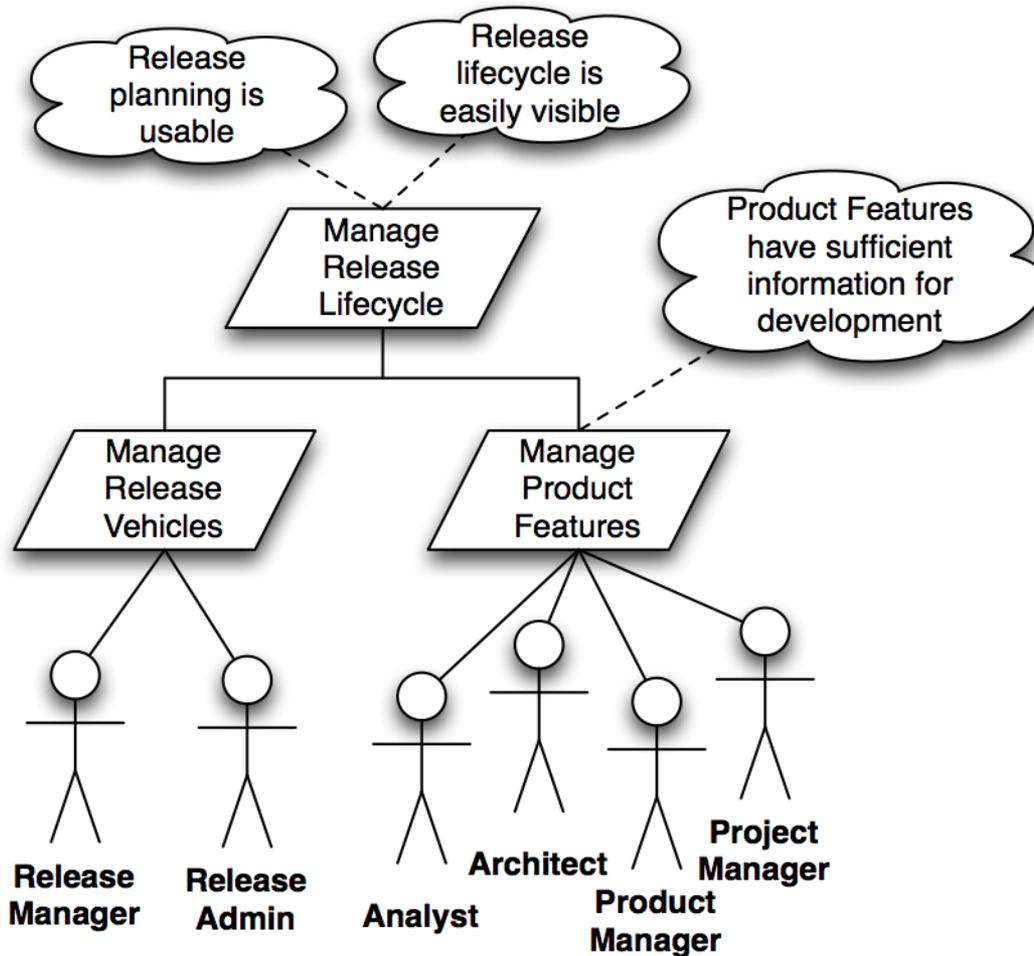
Goal model for Asperger's Game



Notation for goal models

Symbol	Meaning
	(Functional) Goal: To-Do goal
	Quality Goal: To-Be goal
	Quality Goal: To-Feel goal
	Role
	Relationship between goals
	Relationship between goals and quality goals

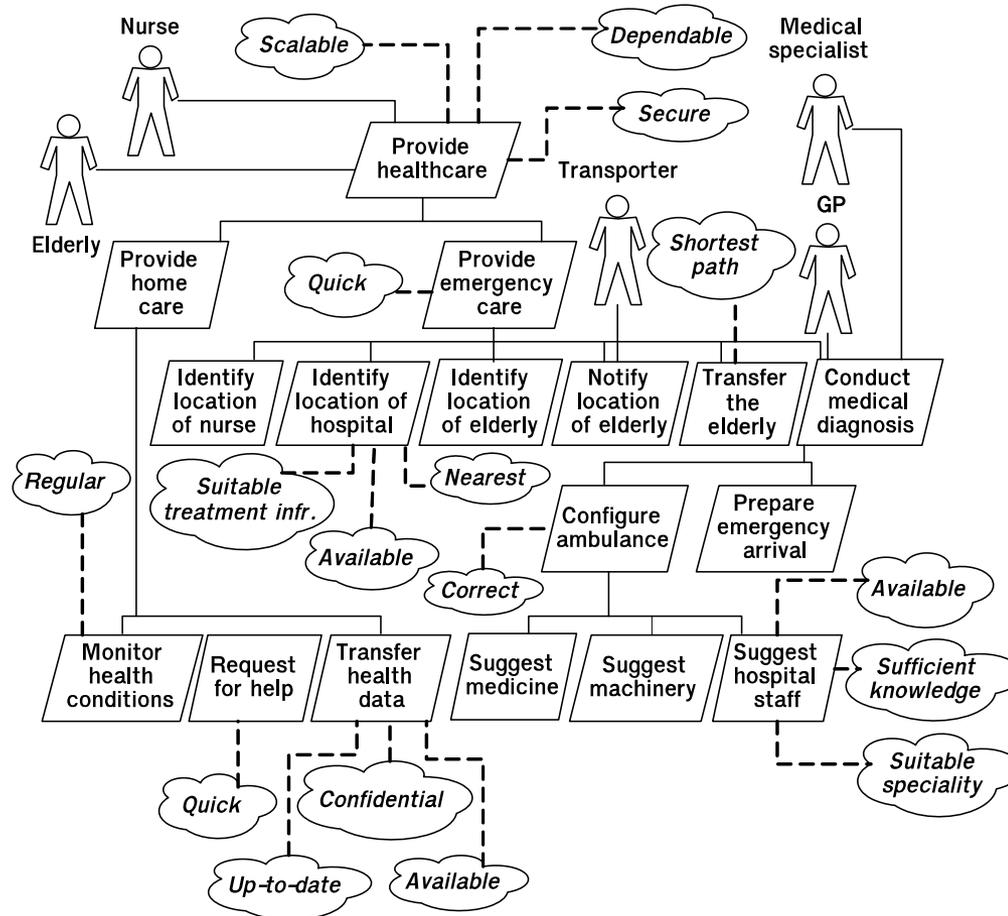
Goal model for the application of issue management



User stories for the sub-goal “Manage Release Vehicles”

- As a (human playing the role of) Release Admin, I must be able to add a new Release Vehicle to manage release vehicles;
- As a Release Admin, I must be able to change Release Vehicles to manage release vehicles;
- As a Release Manager, I must be able to see a list of Release Vehicles to manage release vehicles;
- As a Release Manager, I should not be able to edit a list of Release Vehicles to manage release vehicles;
- As a Release Manager or Release Admin, I should be able to sort a list of Release Vehicles into the ascending or descending order to manage release vehicles.

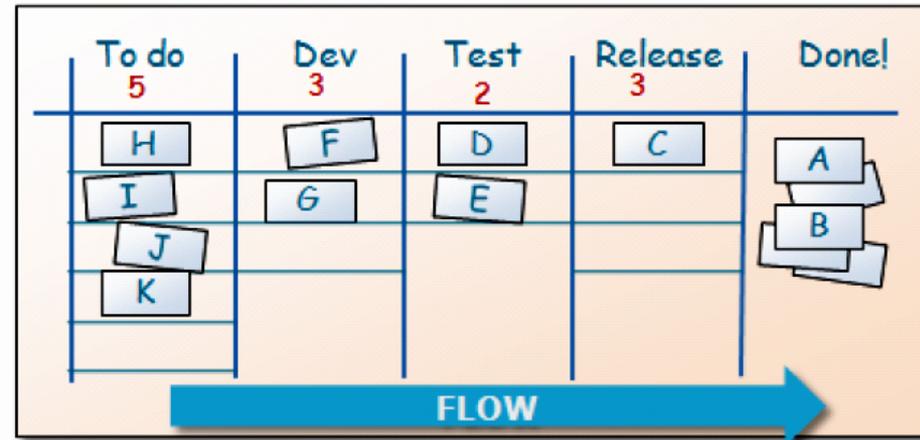
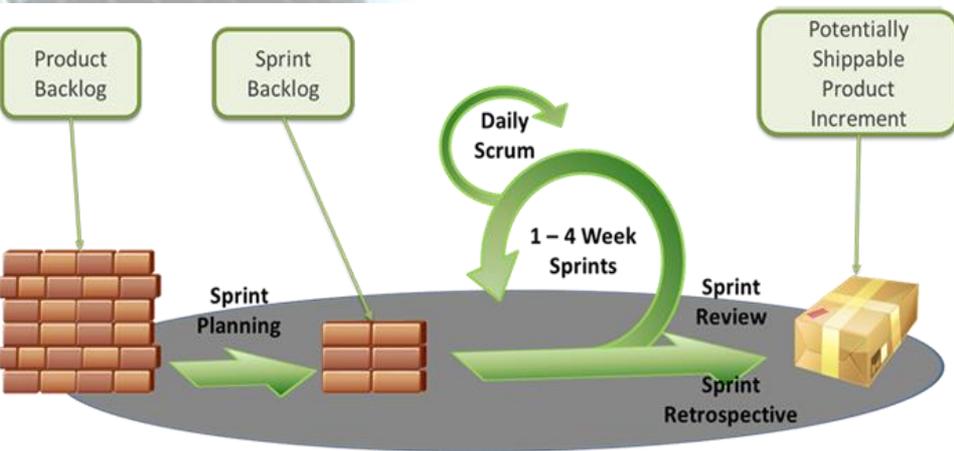
A goal model for the application of healthcare



Minimal Viable Product (MVP)

- A minimal viable product (MVP) is a chunk of functionality that delivers a subset of the customer's requirements, and that is capable of returning value to the customer when released as an independent entity
- Think of it this way: Gather up all the user stories that share the same goal in the goal hierarchy — that is your MVP!
- AAOM is used this way by LHV Bank in Estonia

Scrum vs. Kanban (1)



Conclusions

- Presentation and elaboration of problem domain is of critical value
- Analysis should be included in the iterative loop
- Sprint backlog has a goal
- User stories describe the implementation of (business) goals
- User stories are divided into tasks
- Business goal = Minimal Viable Product