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Agile Requirements (engineering)

Au lapin agile

"At the agile rabbit"

Pablo Picasso,1905.
Oil on canvas.

Emmanuel Joyeaux
joyeaux@draeger.com

20 years Agile

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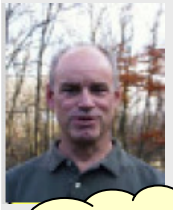
The goal is to increase adaptability and flexibility of SW projects.



1986
Scrum

Scrum
presented at
OOPSLA

CrystalClear

Agile
Manifesto

ReConf' 10
Agile RE

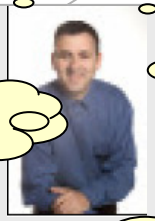
Certified
scrum master

Agile day
at JAX

1990 1995 1996 1997 1999 2000 2001 2003 2005 2006 2007 2009 2010

DSDM

FDD



XP
C3 project

XP
C3 cancel

Scrum at
Microsoft

50 "Agile"
books

1st DSDM
publication

1st FDD
publication

Standish group
"Agile Requirements"

Overview

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- Agile requirements process
- Formal methodology
- User involvement
- Experienced project manager
- Skilled staff

2003 CHAOS TOP 10

User Involvement
Executive Support
Experienced Project Manager
Clear Business Objectives
Minimized Scope
Agile Requirements Process
Standard Infrastructure
Formal Methodology
Reliable Estimates
Skilled Staff

The Standish group CHAOS report 2003

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Agile requirement process SCRUM

Agile manifesto

- **Individuals and interactions**
  over processes and tools
- **Working software**
  over comprehensive documentation
- **Customer collaboration**
  over contract negotiation
- **Responding to change**
  over following a plan

Agile Manifesto 2001

Iterative Requirements Engineering

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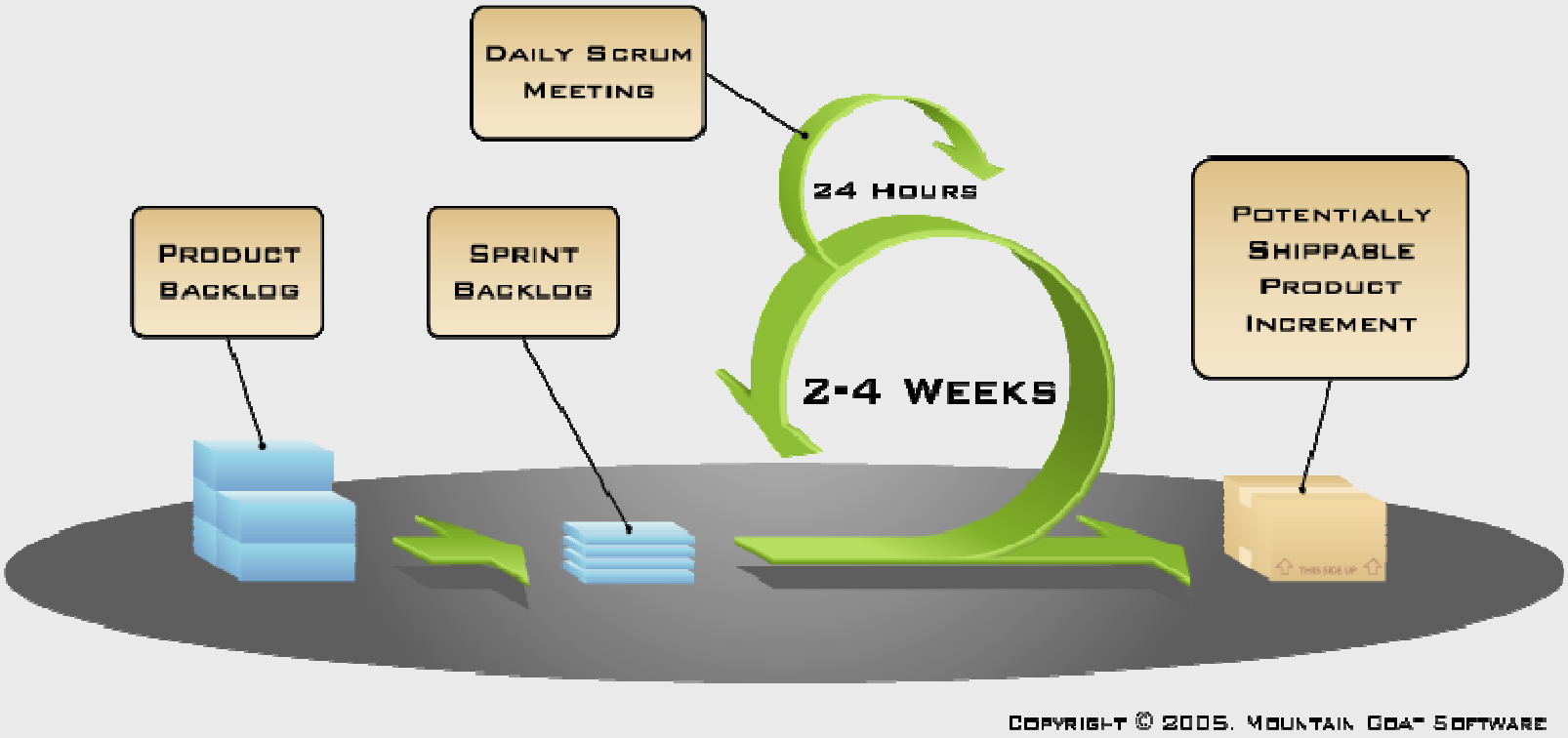

Agile Requirements Engineering is mainly driven by iterations in sprints. Activities are constantly repeated until the project is closed.

SCRUM information model

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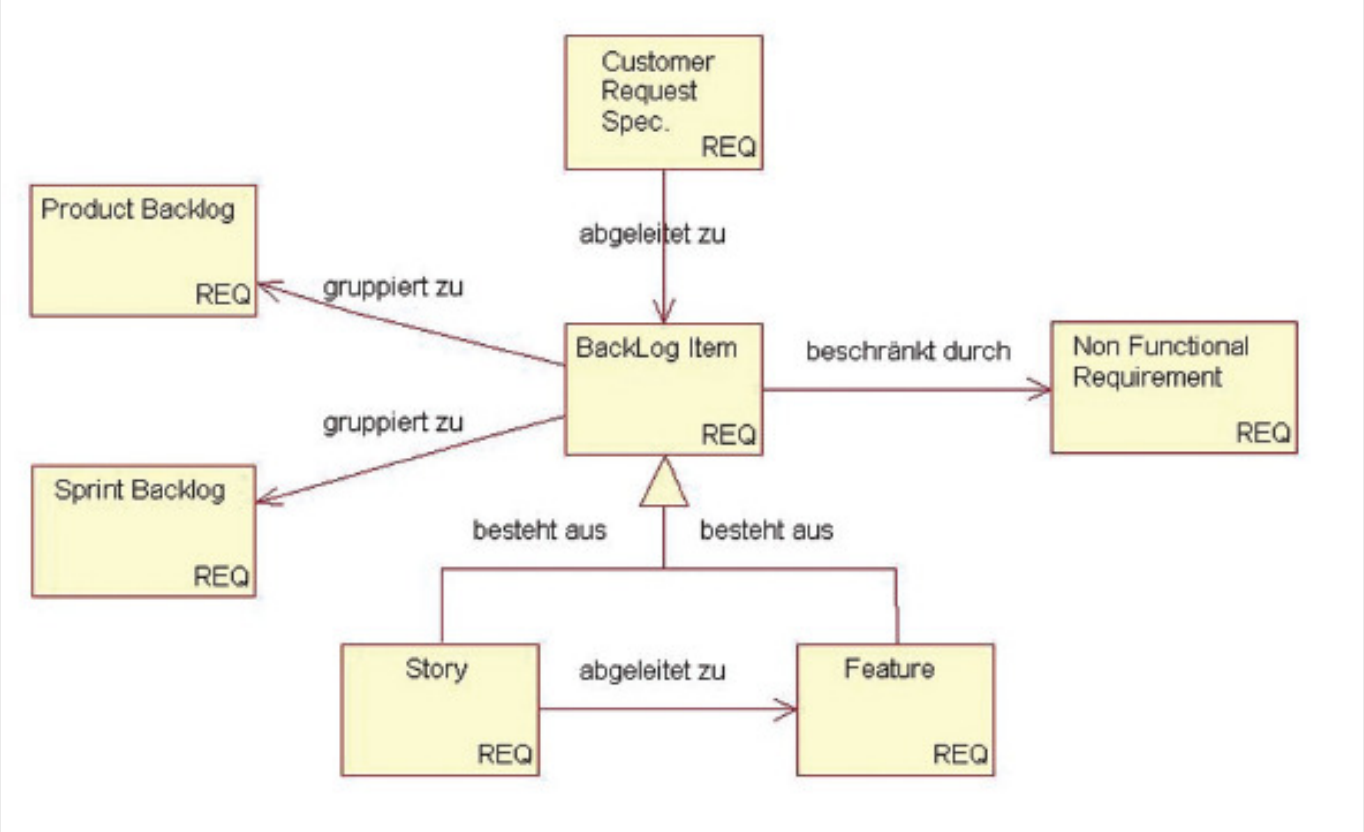

SCRUM describes several artifacts which are directly related to requirements

Product backlog

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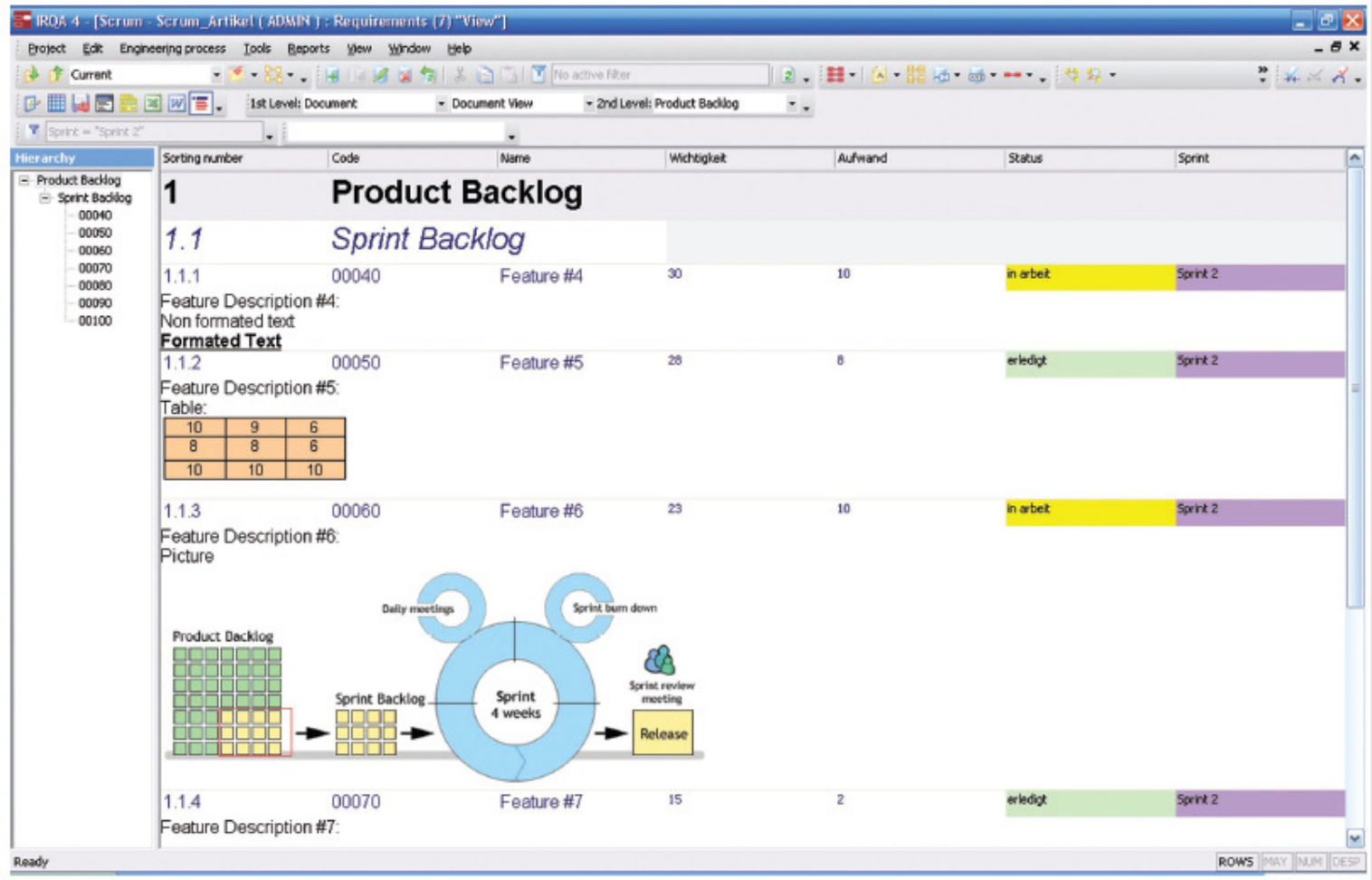

„Product backlog“ is much like a “traditional specification“ with („sprints“) increment plan attributes

Sprint backlog

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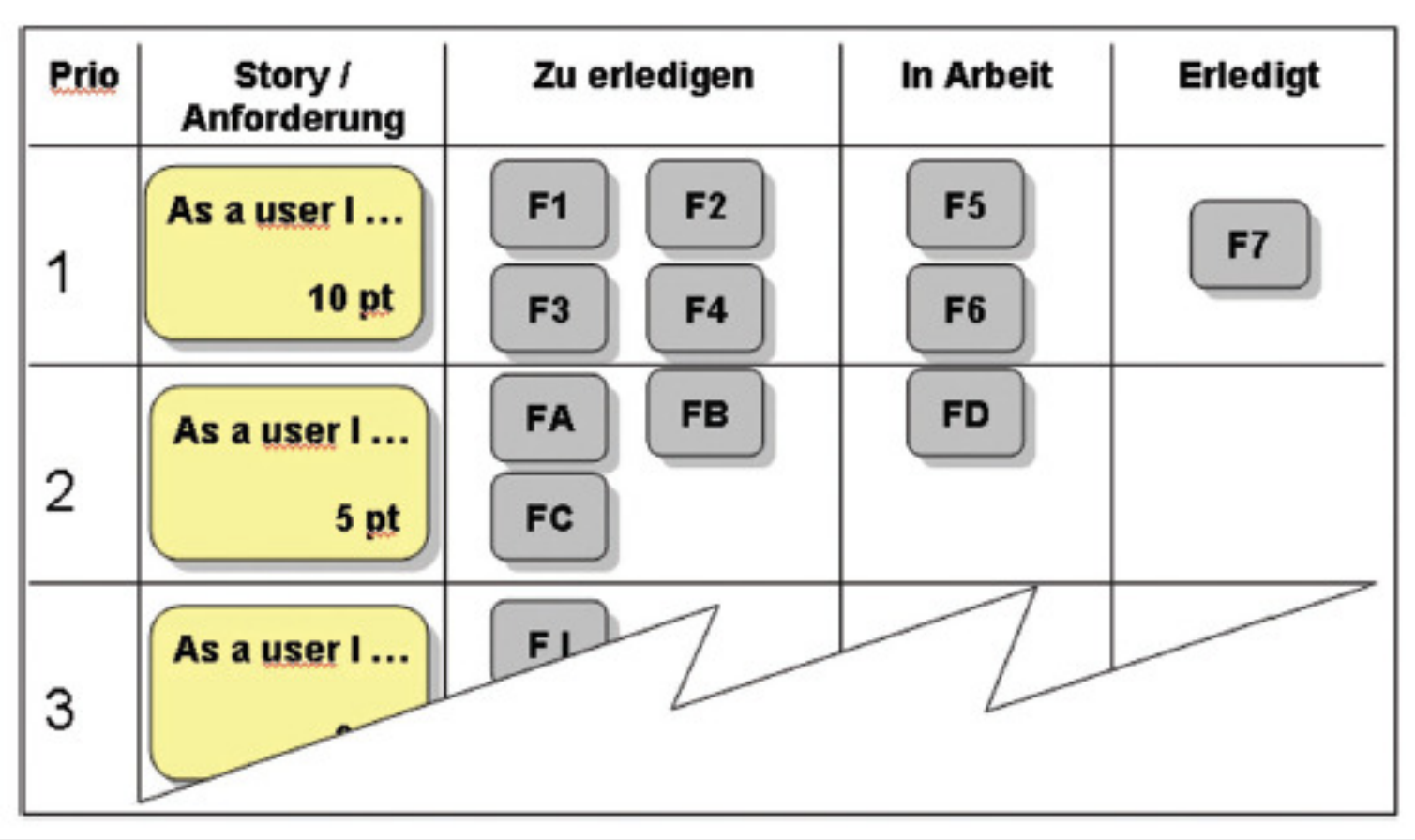

„Sprint backlog“ is much like a „traditional specification” combined with implementation tracking

Requirement management for change management

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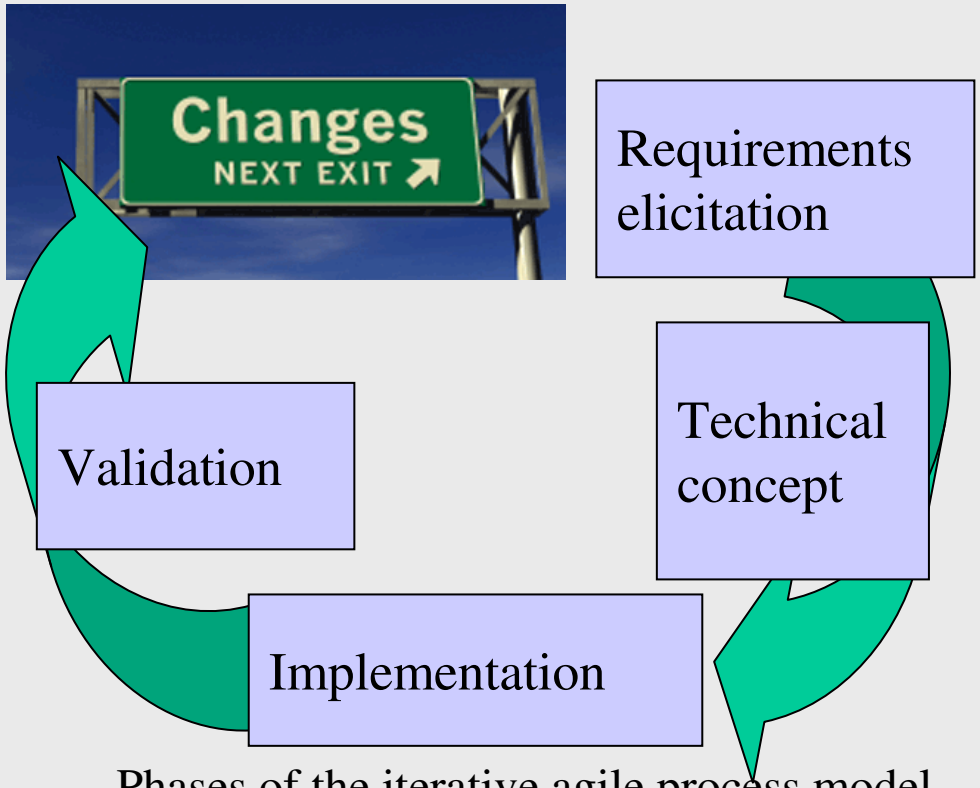
Agile managed requirements enable your project for change :

The agile workflow for each sprint covers the complete V-model including validation.

Keeping it **quick** makes the project flexible for changes : each „delivery point“ opens the project for a scope change.



Phases of the iterative agile process model

Agile requirement management

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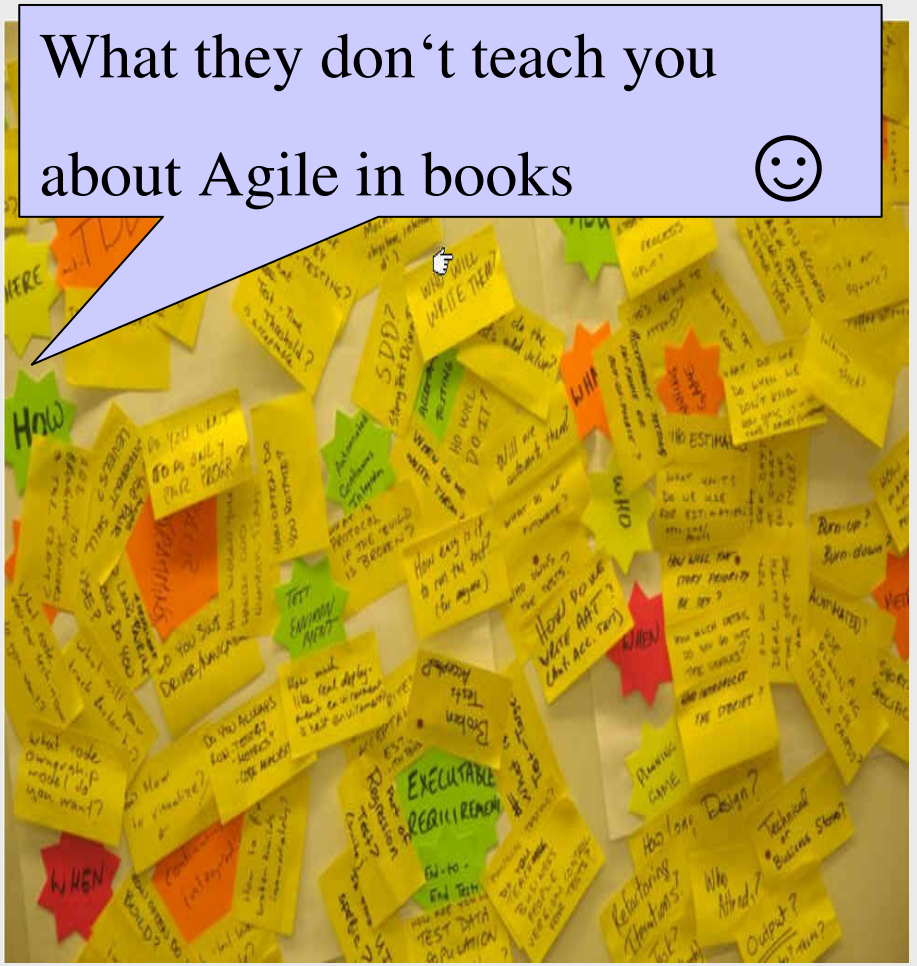
Requirements are essential also in Agile projects :

- **Good requirements, understandable by all project members and stakeholders.**
- **Rich requirements documentation : Priority , actual implementation state (burndown)**
- **Coarse requirements of the beginning shall be refined later.**



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Formal methodology

Are the used Requirement Engineering Methods….
Agile enough?

Requirement Methods in Agile

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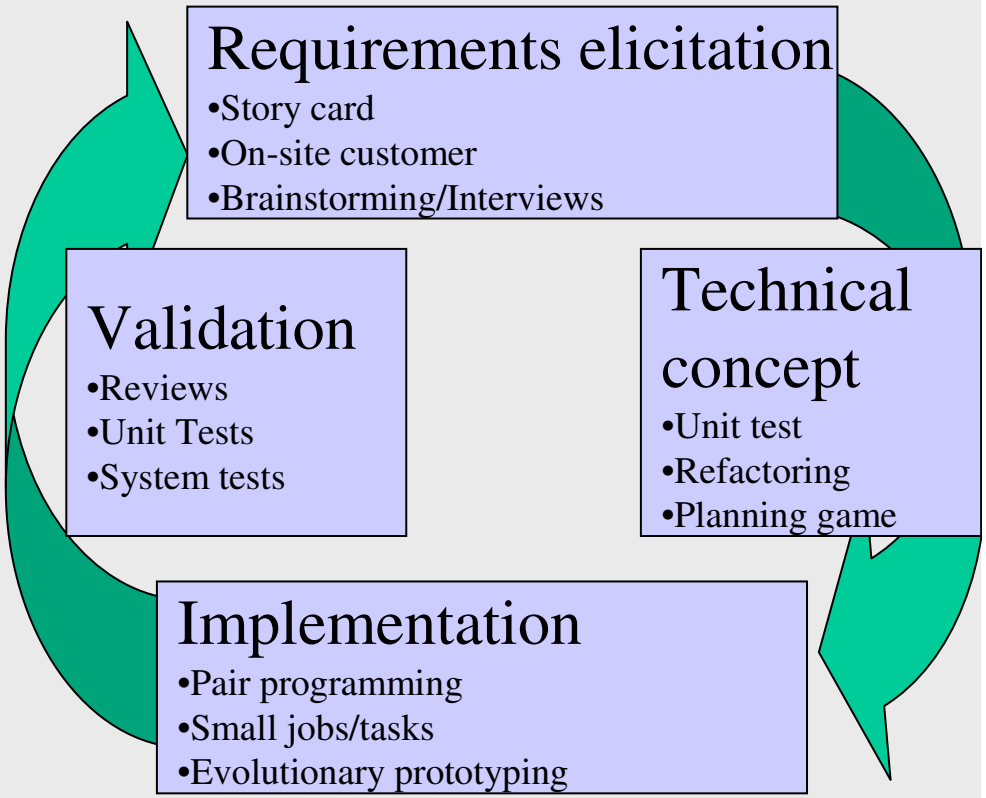
Agile uses several methods related to requirements engineering :

- **Interviews**
- **Brainstorming**
- **Product Backlog**
- **Sprint backlog**
- **Evolutionary prototyping**
- **Story cards**
- **Story cards breakdown**
- **Unit Tests**
- **Acceptance tests**
- **On-Site customer**
- **Use Cases**



Methods in the iterative agile process model

Source : „Agile requirement Engineering, Christian Fonden, Feb 2008.

Assessment criteria for agility

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Methods used in agile context should be lightweight, adequate to be used repeatedly in each sprint : results of previous sprint should be reusable in next sprint.

Each method can be assessed in its effectiveness according to several criteria :

- Lightweight
  - **Amount of documentation/Agility**
  - **Amount of work for reporting**
  - **Amount of work from participants / needed training+knowledge**
  - **Amount of work for customers / needed training+knowledge**
  - **Tool support**
- Repetition in every sprint
  - **Adequate for iterations**
  - **Validation capability**
  - **Traceability**

Inspired from : „Agile requirement Engineering, Christian Fonden, Feb 2008.

Being a good interviewer takes work!

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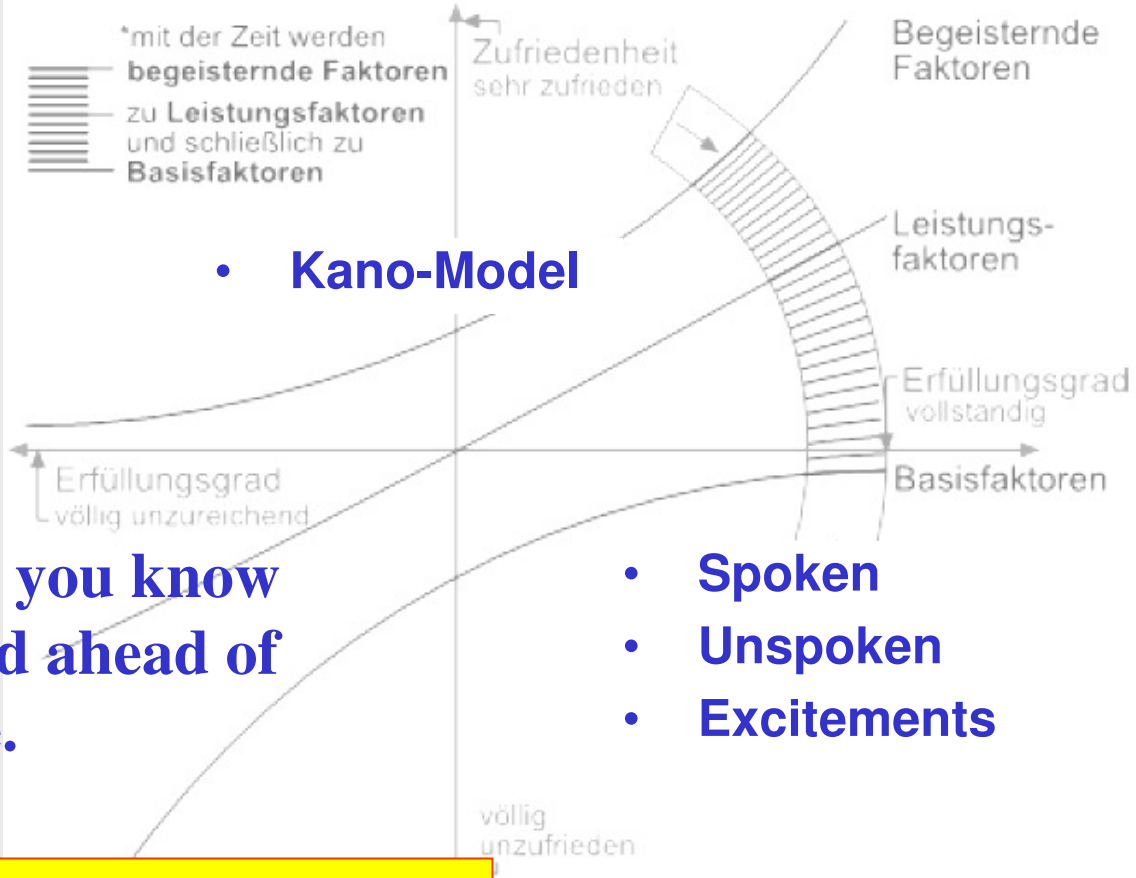
Acquire good verbal and written communication skills.

Know what a good requirement looks like!



- **Kano-Model**

Never assume you know the user's need ahead of time.

- **Spoken**
- **Unspoken**
- **Excitements**

Understand how the requirement will be tested.

Don't expect everyone to be good at this.
Train, train,train.

Pursue the underlying user need.

Interview good and bads

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- **Amount of work from participants / needed training+knowledge**

Preparation is medium (topic list, question catalogue), but being a good interviewer needs training --

- **Amount of work for customers / needed training+knowledge**

No preparation, no knowledge needed ++

- **Adequate for iterations**

Can be repeated in each sprint, with different topics ++

- **Tool support**

None --

Source : „Agile requirement Engineering, Christian Fonden, Feb 2008.

Interview goods and bads

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- **Amount of documentation/Agility**

Interviewer writes as much as he feels necessary ++

- **Validation capability**

No way to say if interview is complete, no commitment to repeatable --

- **Amount of work for reporting**

Report consists of the protocol written during the interview ++

- **Traceability**

Difficult to track the contents of the interview, backward (why does he say that) and forward (impact of what he says). --

Source : „Agile requirement Engineering, Christian Fonden, Feb 2008.

Methods agility overview

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	Docu-menta-tion	Valida-ble	Report	Trace-ability	Partici-pants work	Customer work	Iterations	Tool support
Interview	+	-	+	-	-	+	+	-
Brainstorming	+	0	+	-	0	+	+	+
Product backlog	-	+	+	+	+	0	0	+
Sprint backlog	-	+	+	+	+	0	+	+
Evolutionary prototyping	+	+	-	0	+	+	+	+
Story Cards	+	+	0	+	+	-	+	+
Story cards breakdown	+	+	0	0	-	-	+	-
Unit tests	-	+	-	+	-	0	+	+
Acceptance tests	+	-	-	-	+	0	+	+
On-Site customer	+	-	+	-	+	-	0	0
Use Cases	-	+	-	+	-	+	+	+

Source : „Agile requirement Engineering, Christian Fonden, Feb 2008.

Overall assessment results

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Method	++	0	--	Overall
Story cards breakdown	3	2	3	0
On-Site customer	3	2	3	0
Unit tests	4	1	3	1
Acceptance test	4	1	3	1
Interview	5	0	3	2
Use cases	5	0	3	2
Brainstorming	5	2	1	4
Product backlog	5	2	1	4
Sprint backlog	6	1	1	5
Evolutionary prototyping	6	1	1	5
Story cards	6	1	1	5

Source : „Agile requirement Engineering, Christian Fonden, Feb 2008.

- ✓ No silver bullet
- ✓ "good old" specifications –backlogs- are still part of the most efficient methods

Agile requirement management methods

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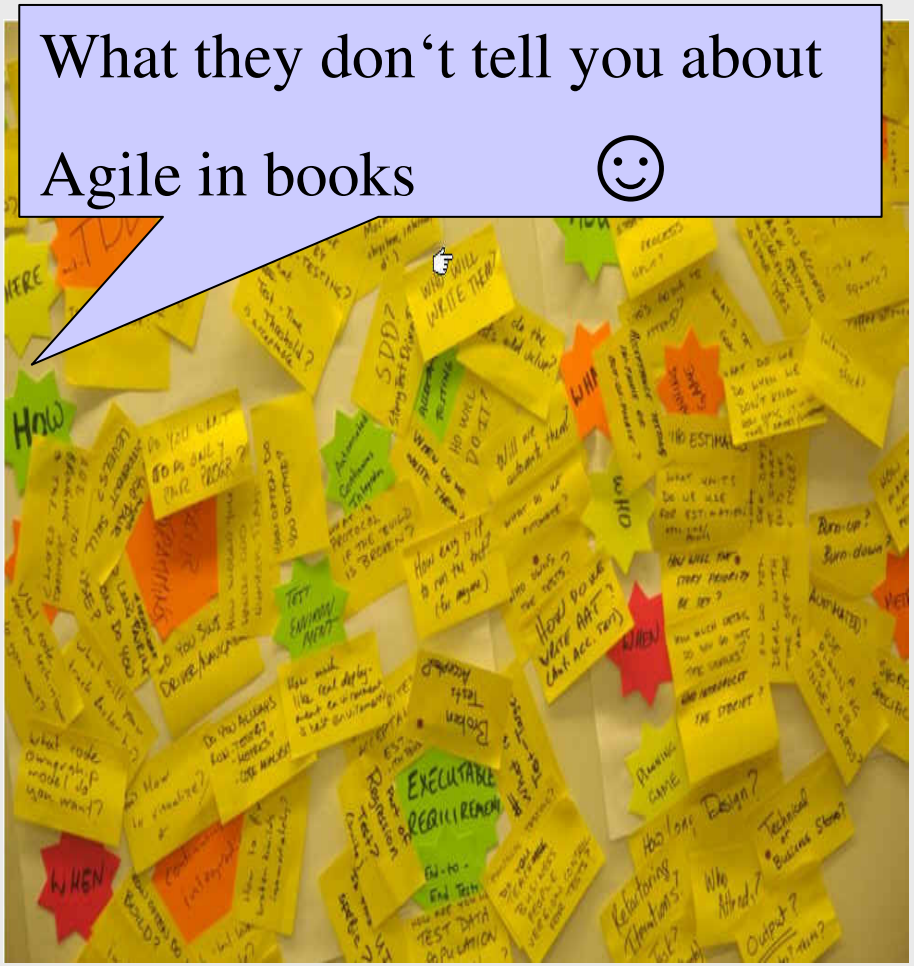
- **Agile requirement process uses several formal requirement engineering methods.**
- All methods used have their **own limitations and risks**
- **There is no "silver bullet", all methods are needed together.**
- **All the Team must be trained in these methods. This includes "Customer on-Site"**



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User Involvement

The *first sprint* is about making an opening in the customer‘s belly.

The *customer on-site* will *review* if the opening is completely *burn down* before we determine what to do in the *second sprint* with *story cards*.

Dangerous statement : no more requirements

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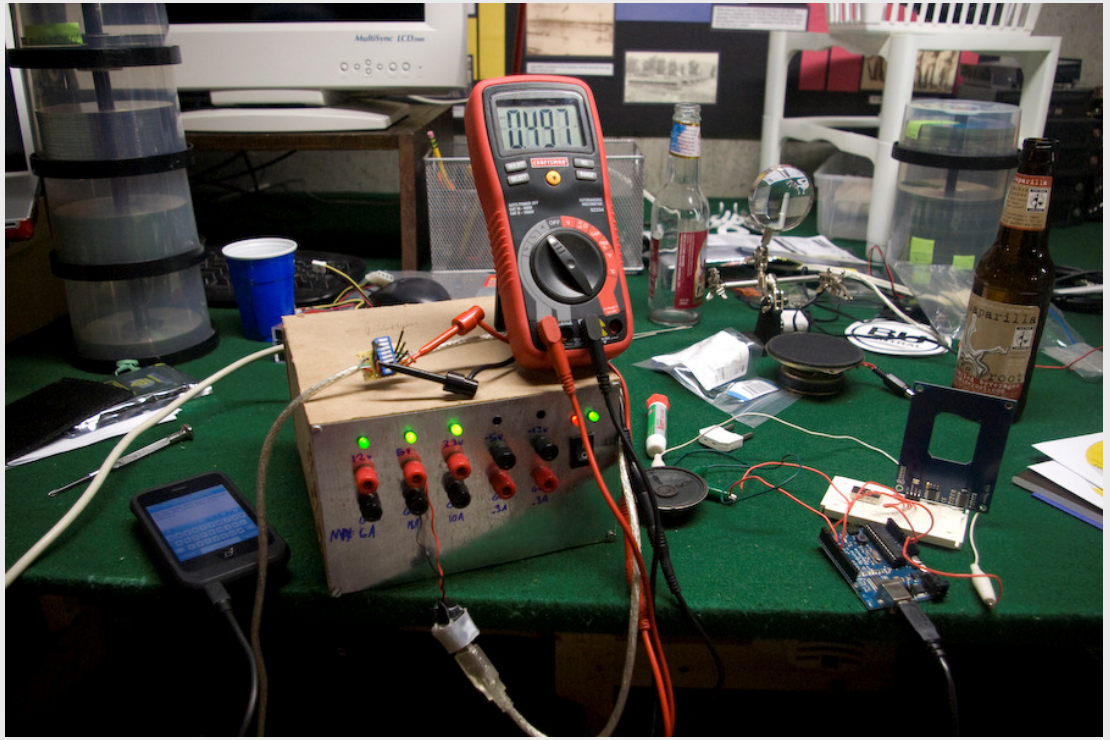
Dangerous statement :

Involve actively the stakeholder in the project suppresses the need for requirements elicitation



Project stakeholders

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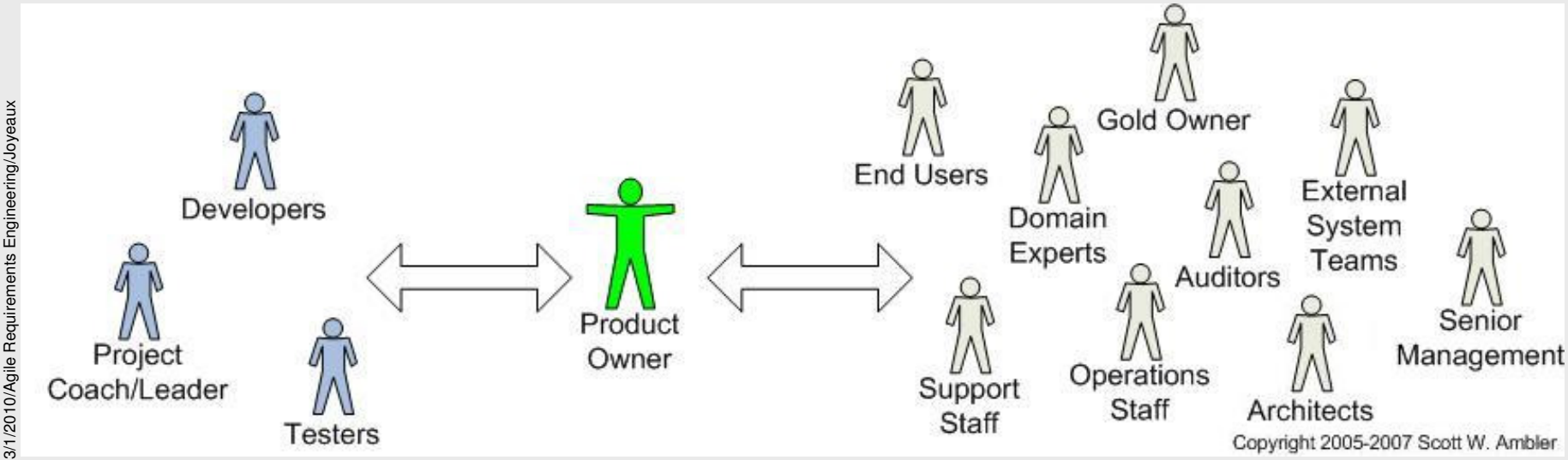
Involve actively the stakeholder in the project suppresses the need for requirements elicitation…

…But…

- **Also Agile project have lots of stakeholders**
- **Stakeholders include not only beneficiaries but also negative and representative stakeholders**



Example Stakeholder analysis
Influences on a Video Game's Product Manager

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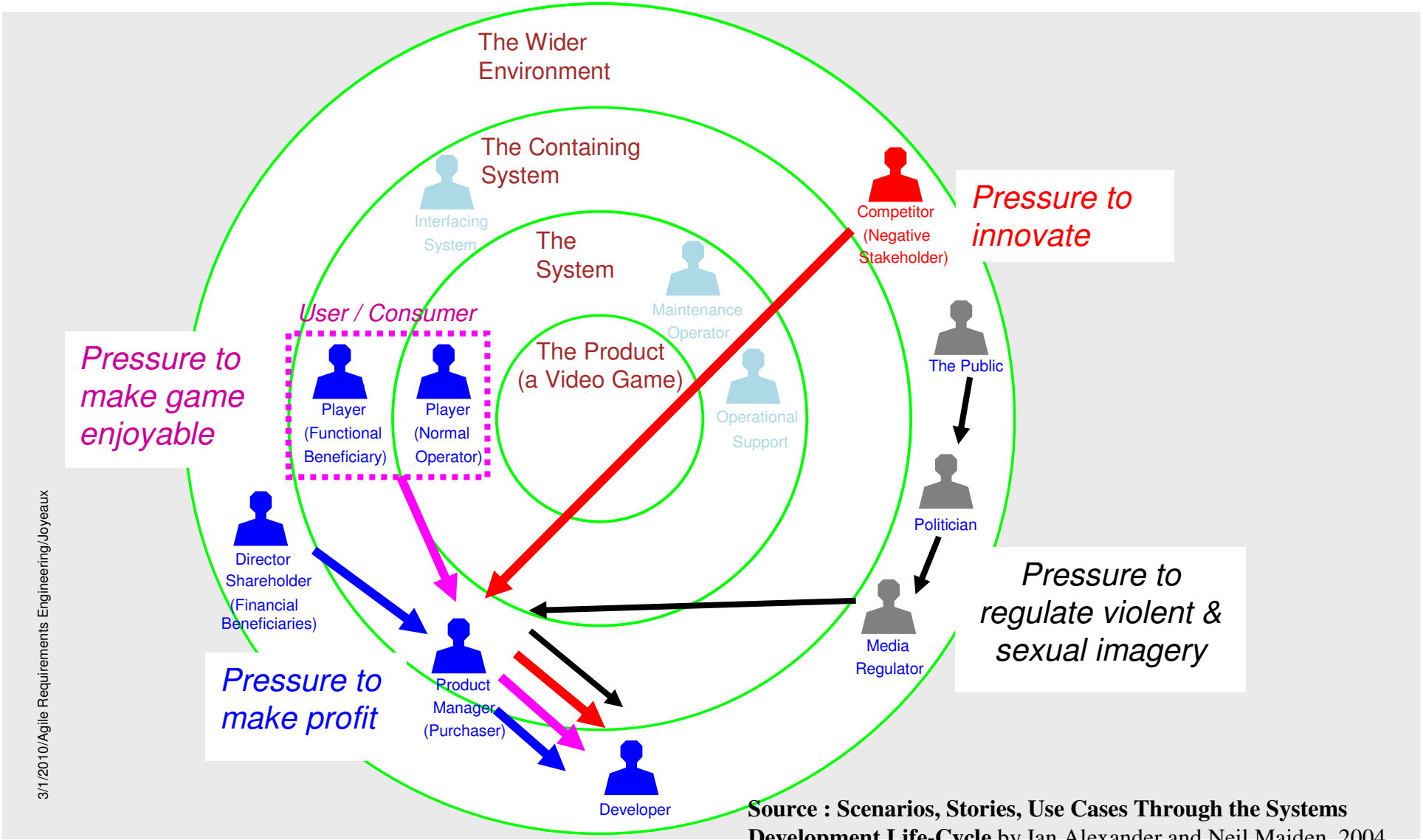

3/1/2010/Agile Requirements Engineering/Joyeaux

Source : Scenarios, Stories, Use Cases Through the Systems Development Life-Cycle by Ian Alexander and Neil Maiden, 2004

Consequences of “no requirements”

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Involve actively the stakeholder in the project suppresses the need for requirements elicitation…

Implement the requirements, do not document them…

…But…

No elicitation = no requirements

No requirements = no product backlog and no sprint backlog

- **How to identify and mitigate contradictory interests from different stakeholders ?**
- **On which basis shall rely the planning game ?**
- **On which basis shall the prioritization happen ?**

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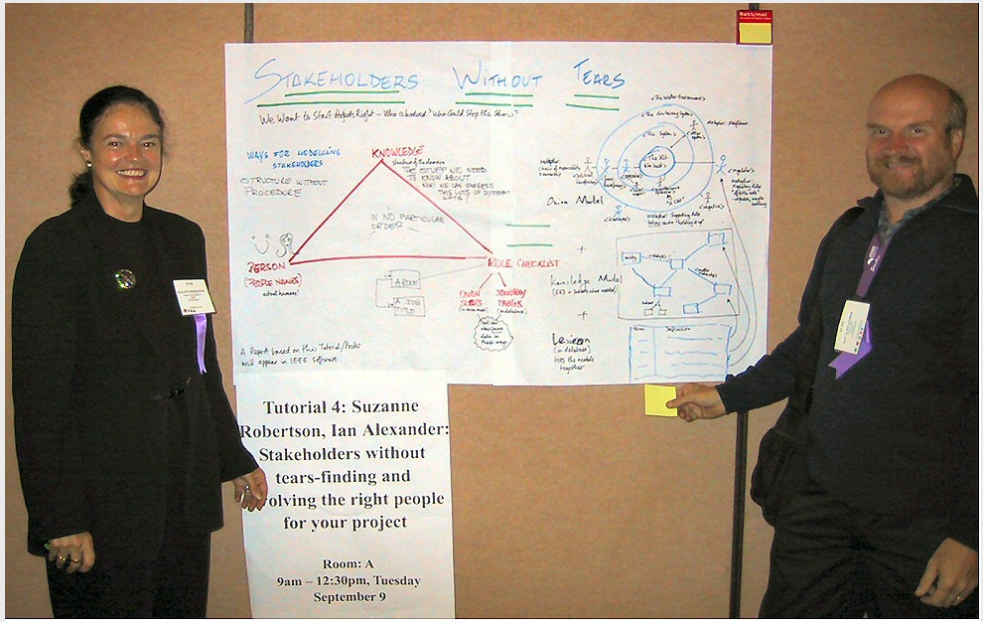
Suzanne Robertson and Ian Alexander

analyzed „stakeholder problems“ in over 12 project situated in 8 countries and involving 541 participants.



Ian Alexander is author of *Scenarios, Stories, Use Cases Through the Systems Development Life-Cycle* and co-author of *Writing Better Requirements*
Suzanne Robertson is a principal of The Atlantic Systems Guild and co-author of *Managing the Requirements Process* and *Complete Systems Analysis*

Stakeholder without tears

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What people mean when they say, "We have a problem with our stakeholders."

	Lack of commitment	Lack of skills by stake-holders	Bad stakeholder discovery	Stake-holder interest and involvement	Lack of communication between stakeholder and project	Total
Germany Nov 2001	18	40	14	3	7	82
Australia Nov 2001	11	5	0	2		18
…..	….	….	….	….	….	….
USA April 2002	26	27	4	5	6	68
Italy May 2002	3	4	3	4		14
Finland May 2002	40	45	8	10	4	107
Total	186	208	72	48	27	541
Percentage of total	34%	38%	13%	9%	5%	100%

Source : Stakeholders without tears, Suzanne Robertson & Ian Alexander

Stakeholder without tears

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Total	186	208	72	48	27	54 1
Percentage of total	34%	38%	13%	9%	5%	10 0%

Agile methodologies like "On-site customer" and "acceptance tests"… improve these topics

Source : Stakeholders without tears, Suzanne Robertson & Ian Alexander

Stakeholder without tears

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But the real challenges are here

Source : Stakeholders without tears, Suzanne Robertson & Ian Alexander

Agile requirement management

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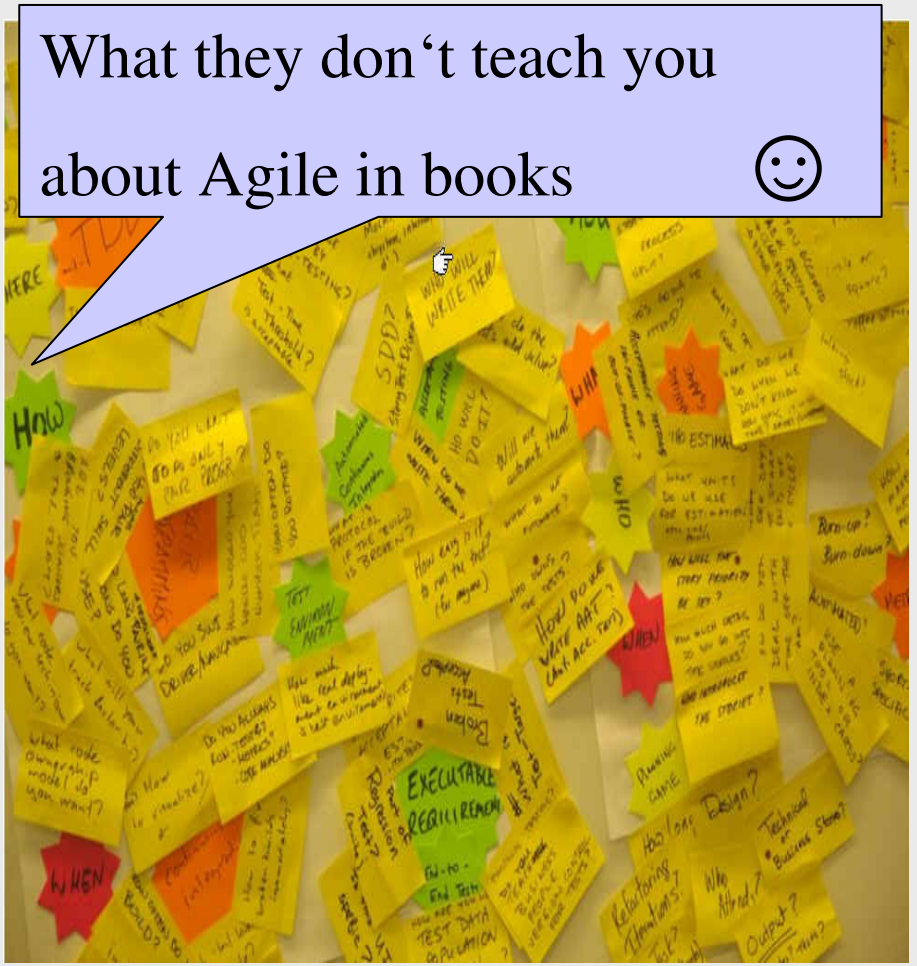
- **Agile process brings only slight improvement to stakeholder involvement.**
- **Commitment of stakeholder still needs Requirements, even though this is not “Agile”**
- **Agile process reinforce the lack of skill by stakeholder.**



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Experience and Skills

"There is simply no substitute for knowing what you're doing."
Jeff Case (co-inventor of SNMP)

Prioritizing requirements

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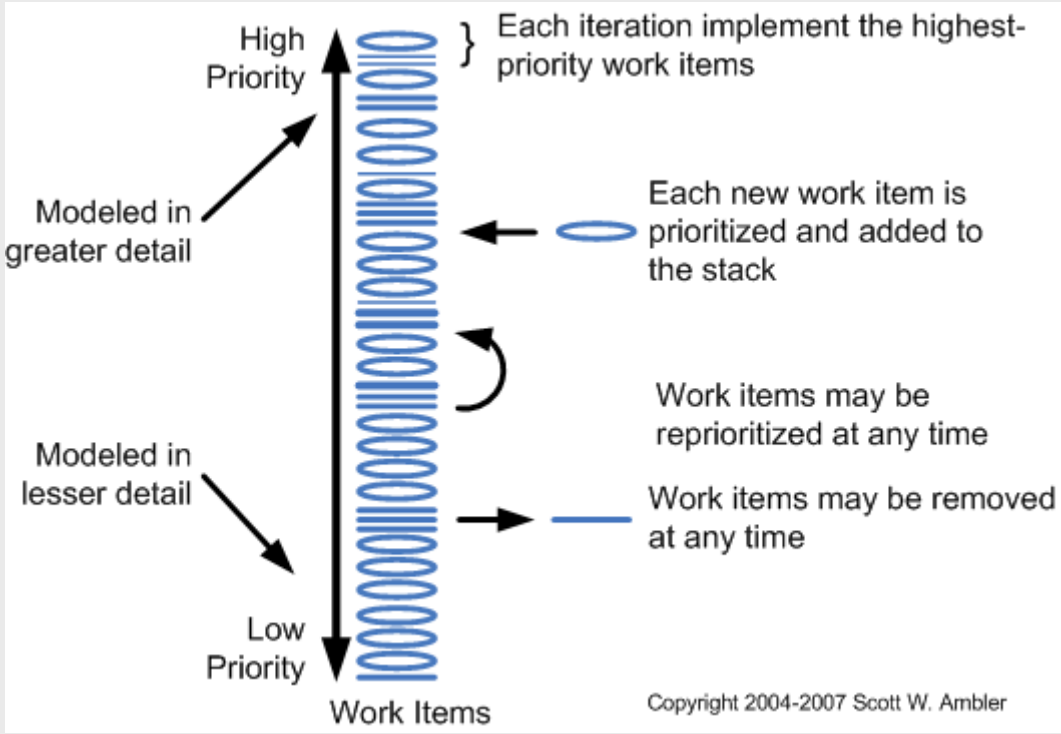
Scrum suggests that the team commits to a finite quantity of requirement they can implement during the time box given by the sprint (usually 2-4 weeks).

To facilitate this, the requirements shall be prioritized.

Each new sprint provides a chance for a new prioritization.



MosCow : Prioritize your requirements

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One mechanism is to use a number system, but this is flawed as it results in all elements being number one.
A more successful method is to prioritize requirements by using words that have meaning :

MoSCoW stands for:
M - MUST have this, Essential.
S - SHOULD have this, Desirable.
C - COULD have this, Possibly useful.
W - WON'T have this time but would like in the future, Luxury.

The importance of this method is that when prioritizing, the words mean something and can be used to discuss what is important.

MosCow is a method popularized by the Dynamic Systems Development Method (DSDM) community

Story cards and use cases

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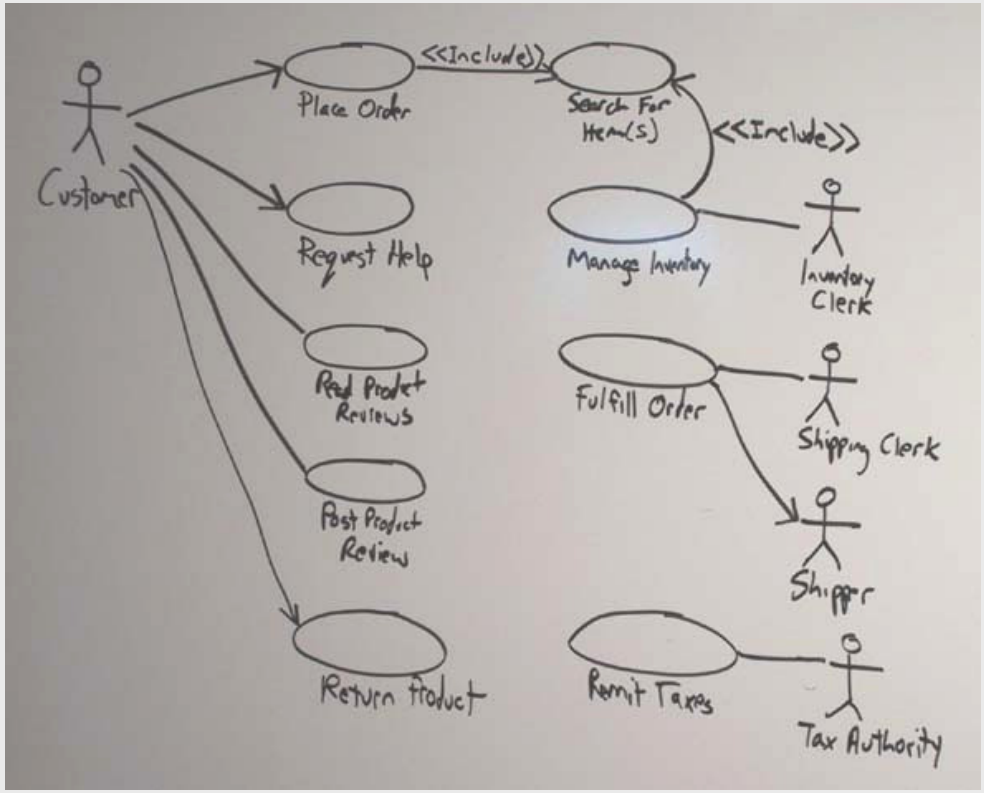

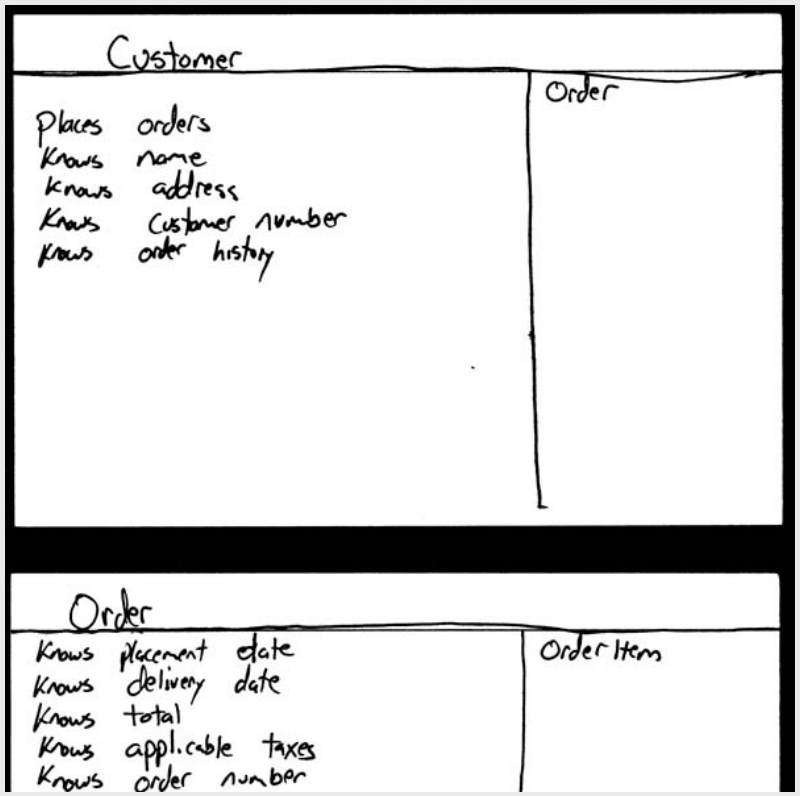

Story cards and Use cases are one of the central methods for requirements elicitation.

Some agile people even propose having use cases *instead* of requirements.

Use cases are usually worked out in workshop with flipcharts and pens.

Use case diagrams
Example : Car Control System Specification

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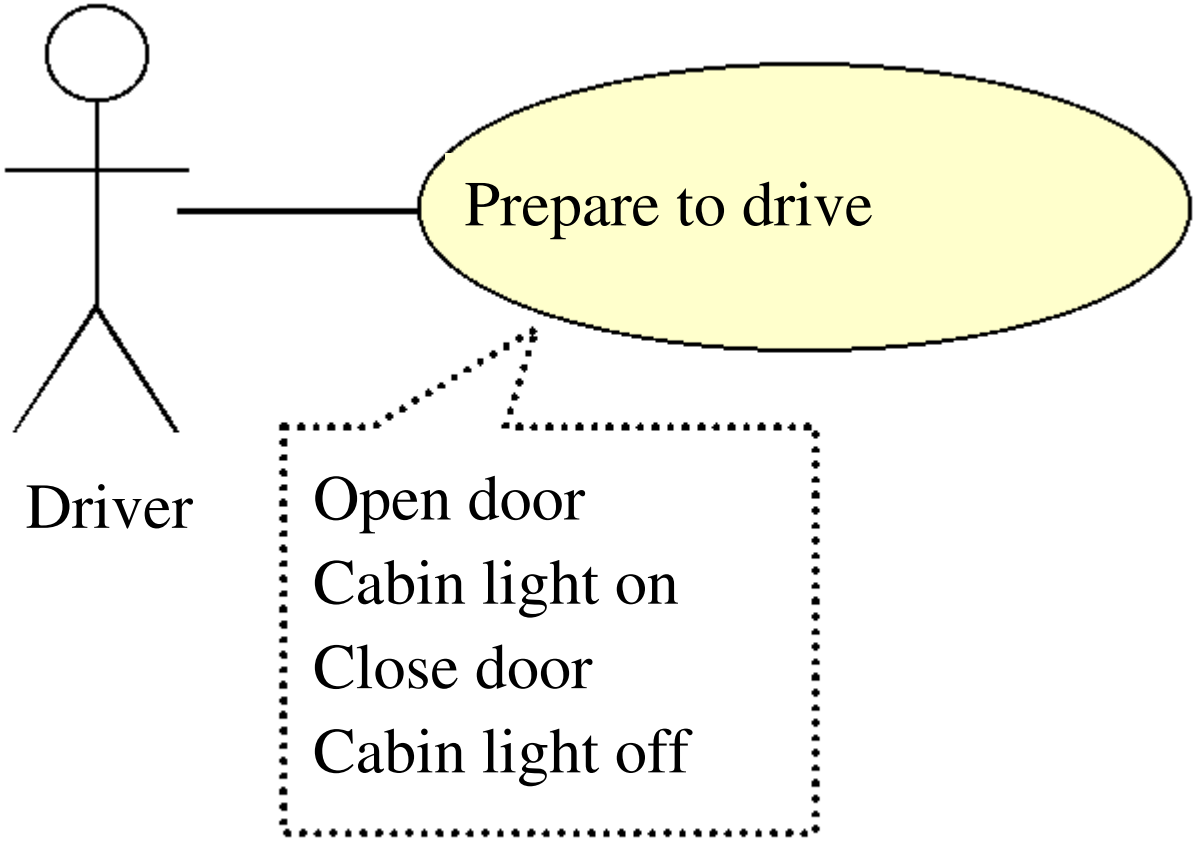

A Use Case Diagram is only a Summary

Use case Scenarios
Example : Car Control System Specification

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2.1.2.1 Primary Scenario

a) The Driver opens a door, causing the Door Control Unit to switch cabin lighting on.

b) The cabin lights continue to shine while any of the car doors is open.

c) The Door Control Unit lights the Entry/Exit Lamp for each door while it is open.

d) The Door Control Unit switches cabin lights off 30 seconds after last door is closed.

2.1.2.2 Alternative Paths

a-i) A Frontseat or Rearseat Passenger opens their door.

d-i) The Door Control Unit switches off the cabin lights as soon as the ignition is activated.

2.1.2.3 Exceptions

b1) No door opened/closed for 10 minutes: Door Control Unit switches cabin lights off.

c1) Battery Tension fallen below 10V: The Door Control Unit does not light any Entry/Exit Lamp, until the Battery Tension is again above 10.5V.

Use Cases vs. Requirements

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- Use cases tend to be descriptive rather than analytic, and they are not ideal for capturing **design constraints** (such as legacy interfaces) or for **required qualities such as security, reliability, performance** and so on.
- They are valuable for **discovering requirements**, for guiding design, and for acceptance testing.
- The needs governing large projects are complex, and require a range of information structures including
  - **stakeholder and goal models,**
  - **business rules,**
  - **algorithms and behaviors (closed loop control, prediction calculations..)**
  - **interface definitions (protocols, data structures, hardware connections),**
  - **commercial and physical constraints (like cost, size, weight, climate…),**

  which can not be framed as use cases.

Use cases, stories, scenarios *help* find the requirements, they do not replace them !

Dangerous statement : no Impact analysis

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it is much easier and cheaper to simply ask people to estimate the change than to have an impact analysis. …

…But…

Whom to ask if the project is closed and people gone ?

What is the price of the *consequences* of an insufficient impact analysis ?

Ariane 5 – maiden flight

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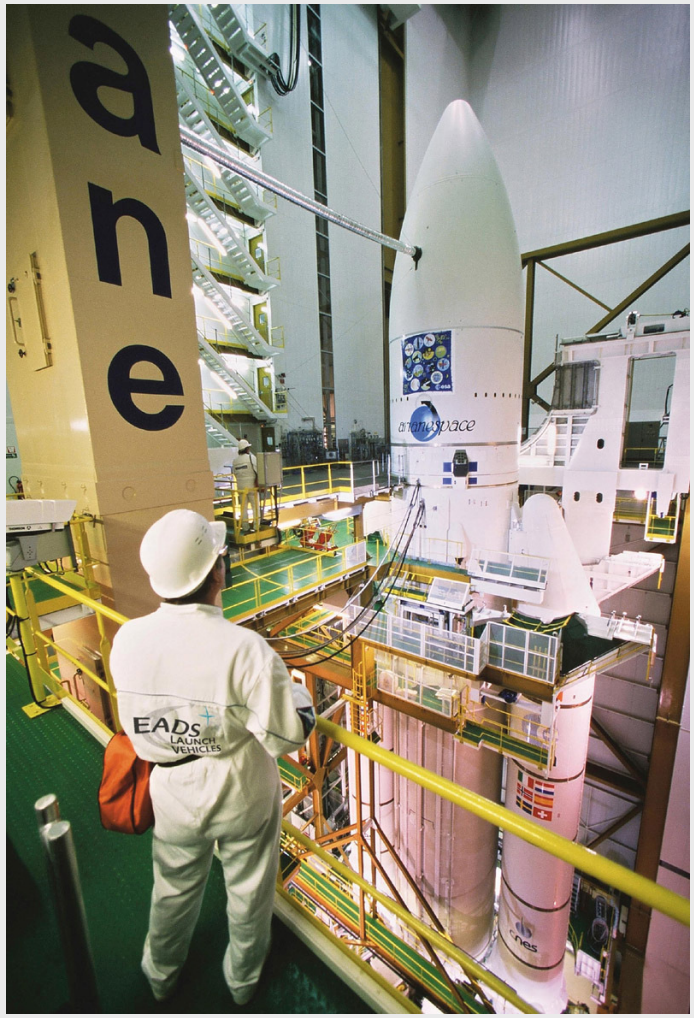
June 4th 1996, Kourou / Fr. Guyana, ESA

Maiden flight of the new European rocket
Development costs in 10 years: € 6000 million
Happening:

- **30 seconds after lift-off, Ariane 5 was 3700m high and reached a horizontal speed of 32768.0 (internal unit). This value was five times higher than Ariane 4.**
- **The error log was sent to the main computer, which tried to interpret it as flight trajectory data. The main computer performed nonsensical correction of the supposed wrong flight trajectory (20 degrees and more).**
- **The rocket was on the verge to break apart, and blew itself up (32 sec).**



Ariane 5 - root causes for the accident

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Causes:

- The involved part of the SW should have been active only before and during start. The flight trajectory should have come under control of the earth station after start, for Ariane 4 : 50 seconds after start.
- Even though the Ariane 5 had a complete different behavior, impact analysis has been “shortened” because the “flight SW is only running a short time and therefore risks are low”

- Complete tests of the navigation and main computer have not been done, because the same software had already been tested in Ariane 4.
- Only 3 out of 7 variables were checked for overflow ; Objective evidence had been provided that the left 4 variables would contain values that were small enough.
  This evidence was not valid for Ariane 5, but was not retraced.

Costs of consequence and costs of prediction

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it is much easier and cheaper to simply ask people to estimate the change than to have an impact analysis. …

Damage:

€ 125 million for the start procedure,
€ 450 million Cluster-Satellites
€ 300 million for subsequent changes
Loss of earnings for 3 years

Methods used in agile are focused on flexibility and adaptation to today's knowledge.

Whenever prediction is needed, predictive methods are still needed.

Those methods are usually considered as "useless and costly documentation" in agile projects.

Usage of prediction methods shall consider the cost of the impact, not only on the cost of the method.

About method knowledge

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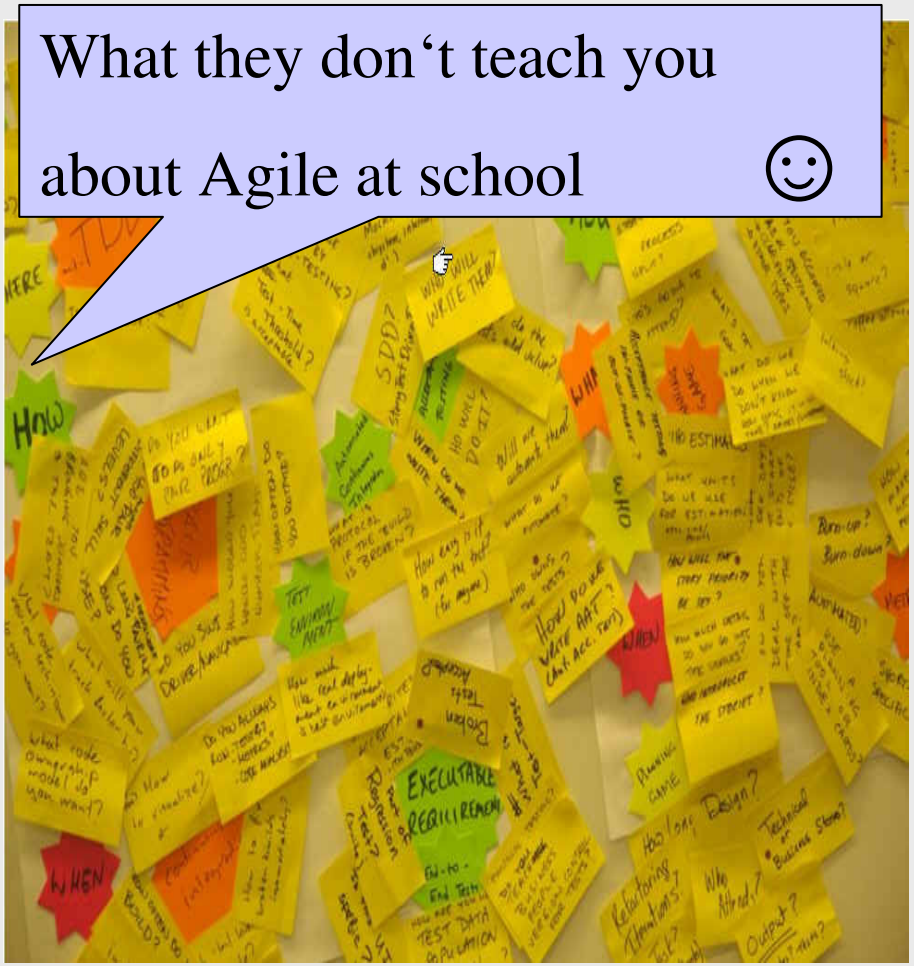
- Agile process emphasize **people and interaction** over process and tools*

  * Agile manifesto

- All project members needs the **skills** to know the strength and weaknesses of agile methods**. This includes stakeholders.**

- **Experienced** people who know how to overcome the limitations of agile methods are critical in project success



The golden middle way

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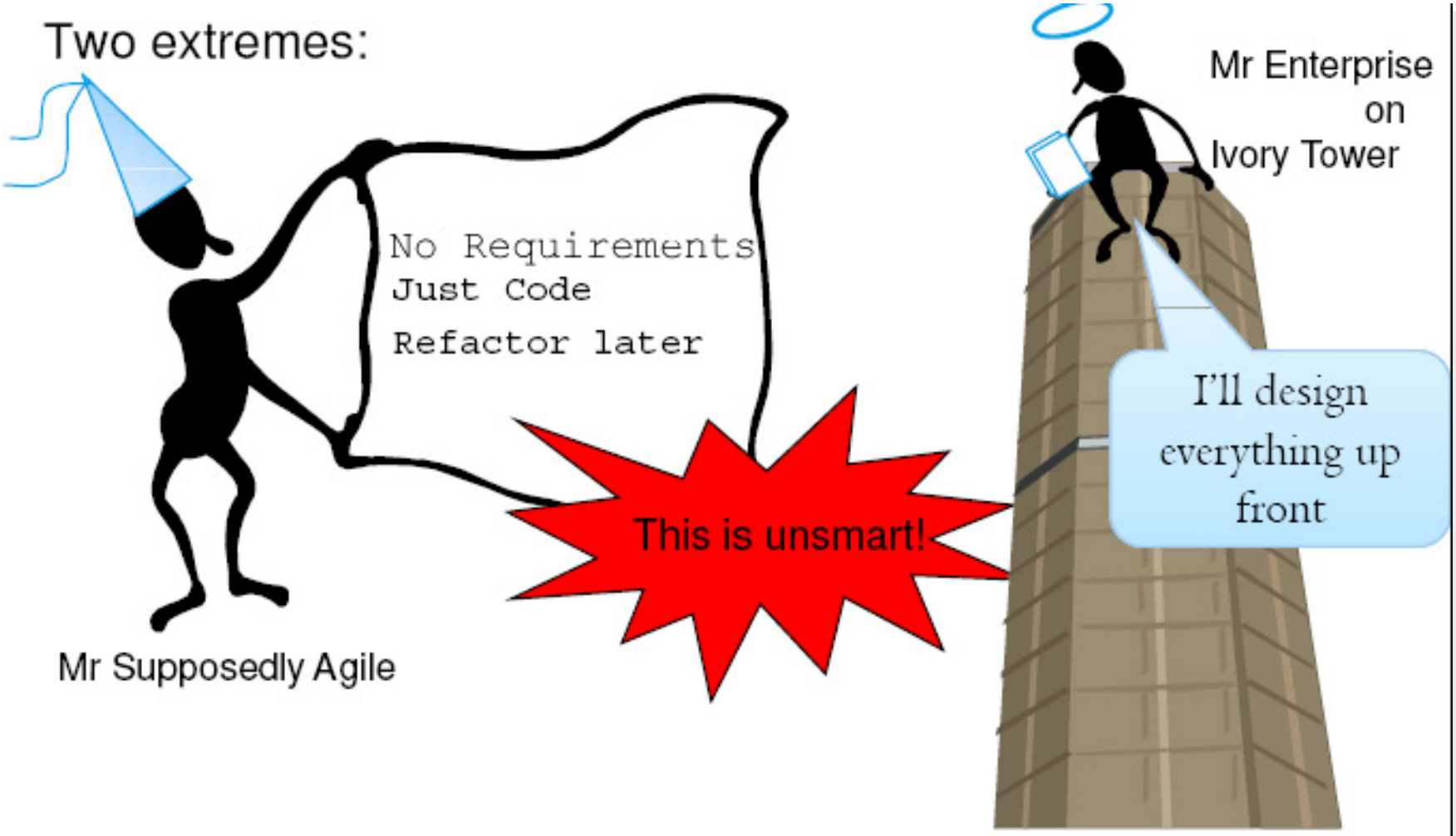

Source : Be Smart, what they don't teach you about Software at School by Ivar Jacobson, Keynote ReConf 2009

Conclusion

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- Agile requirements process
- User involvement
- Formal methodology
- Experience and Skills

You need ALL together.

2003 CHAOS TOP 10
User Involvement
Executive Support
Experienced Project Manager
Clear Business Objectives
Minimized Scope
Agile Requirements Process
Standard Infrastructure
Formal Methodology
Reliable Estimates
Skilled Staff

The Standish group CHAOS report 2003

➢**This is full blown requirement management, which requires skilled people and strong experience.**

Conclusion

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Things shall be done as simple as possible, but not simpler.

Einstein

Thank you for your attention.

Any questions?

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The Einstein-watch gives the time with only one needle – and only, when you want it to do so… (Wissenschaft-shop)