

Exam

- Monday, July 26, 2010, 10-12
- 90 Minutes
- Same room: 01.11.018
- Please be about 10 minutes early!

- Open book
- We try to be quick and give you access to your exams about a week later.
- Please check the web site for the exact date and time!

Software Quality **Management**

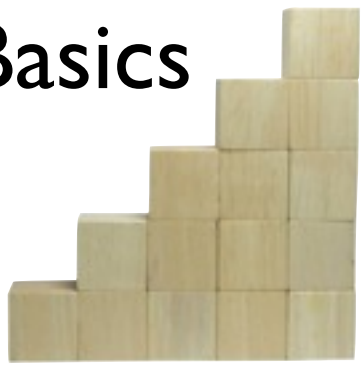
Dr. Stefan Wagner
Technische Universität München

Garching
23 July 2010

**Quality management
methods**

Quality planning

Basics



Product



Quality

Metrics and



Measurement

Process
Quality



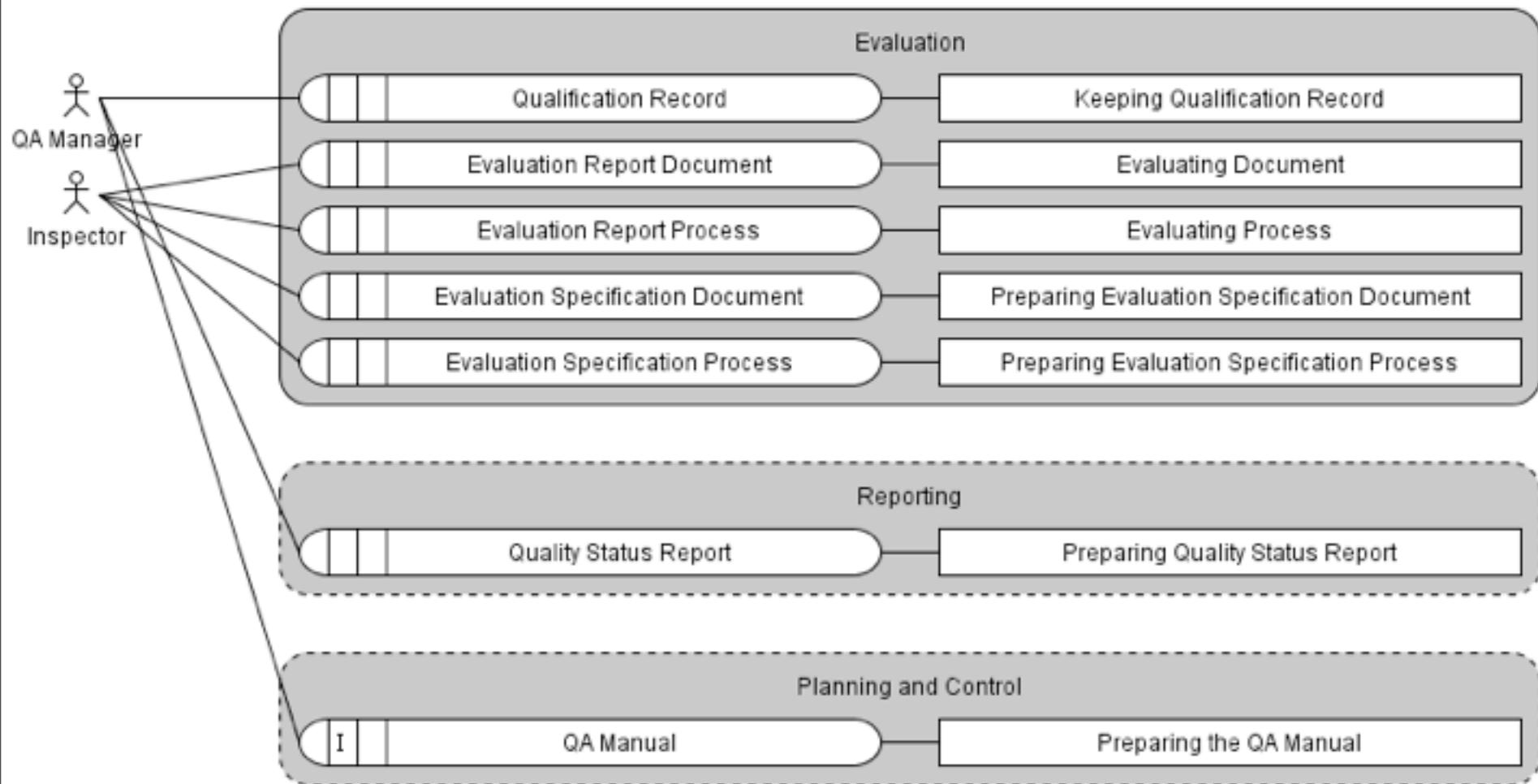
Management

**Certifi-
cation**



Quality management in process models

V-Modell XT



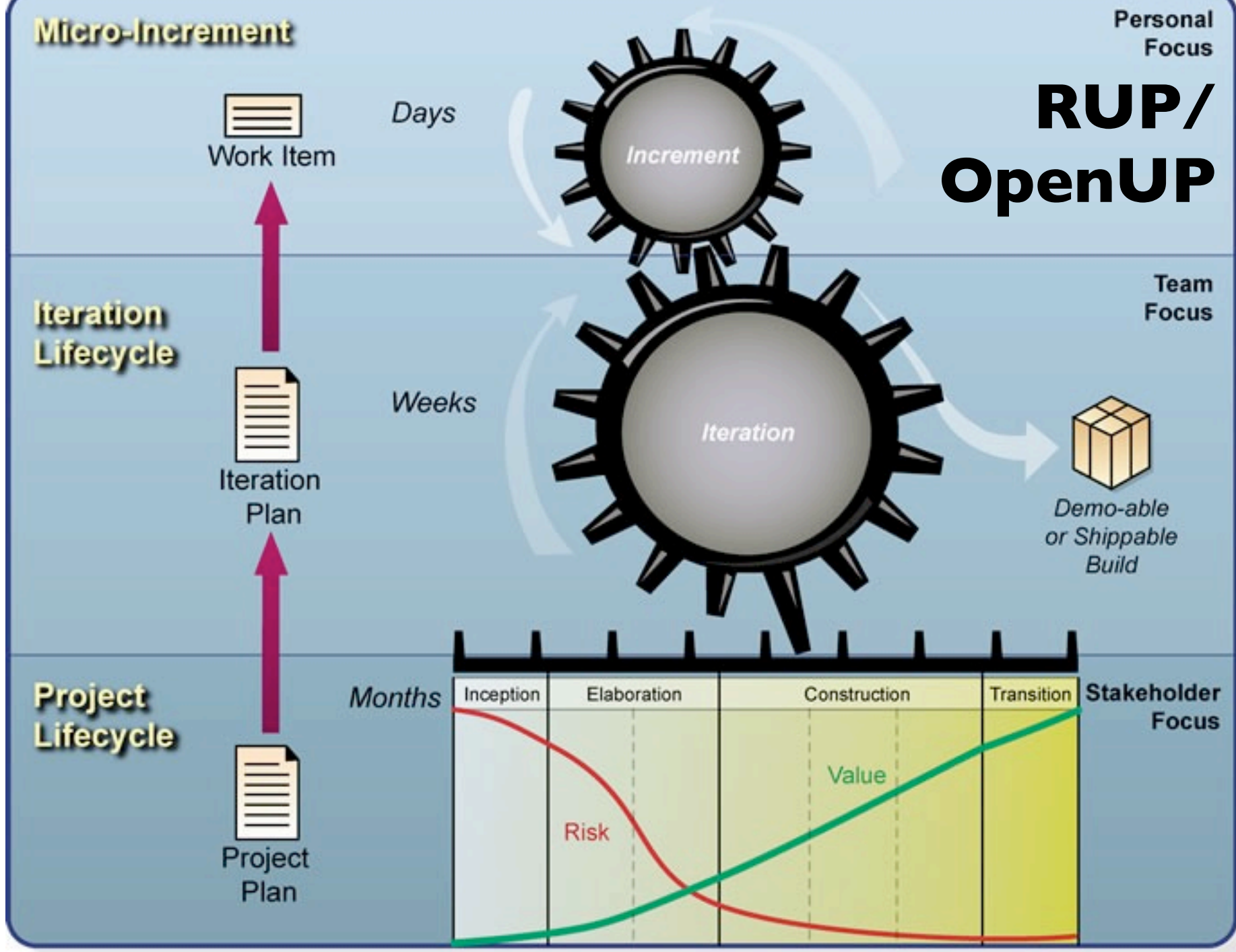
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The QA Manual is a central artefact in the quality assurance of the V-Modell XT. It specifies quality targets, products and process zu be evaluated, plans, and measures. There is a QA manager, who is responsible for it.

All artefacts, called work products, can be evaluated, which needs to be specified in the QA manual.

The qualification record is for keeping information about qualifications, i.e., certifications, by external authorities like TÜV.

In the QA manual, it is also specified how often the quality status report is compiled. It contains the evaluations of artefacts and detected quality problems.



RUP emphasises that both, product and process quality, are important. It contains some ideas of TQM, for example, everyone is responsible for quality. It is not merely a responsibility of testers.

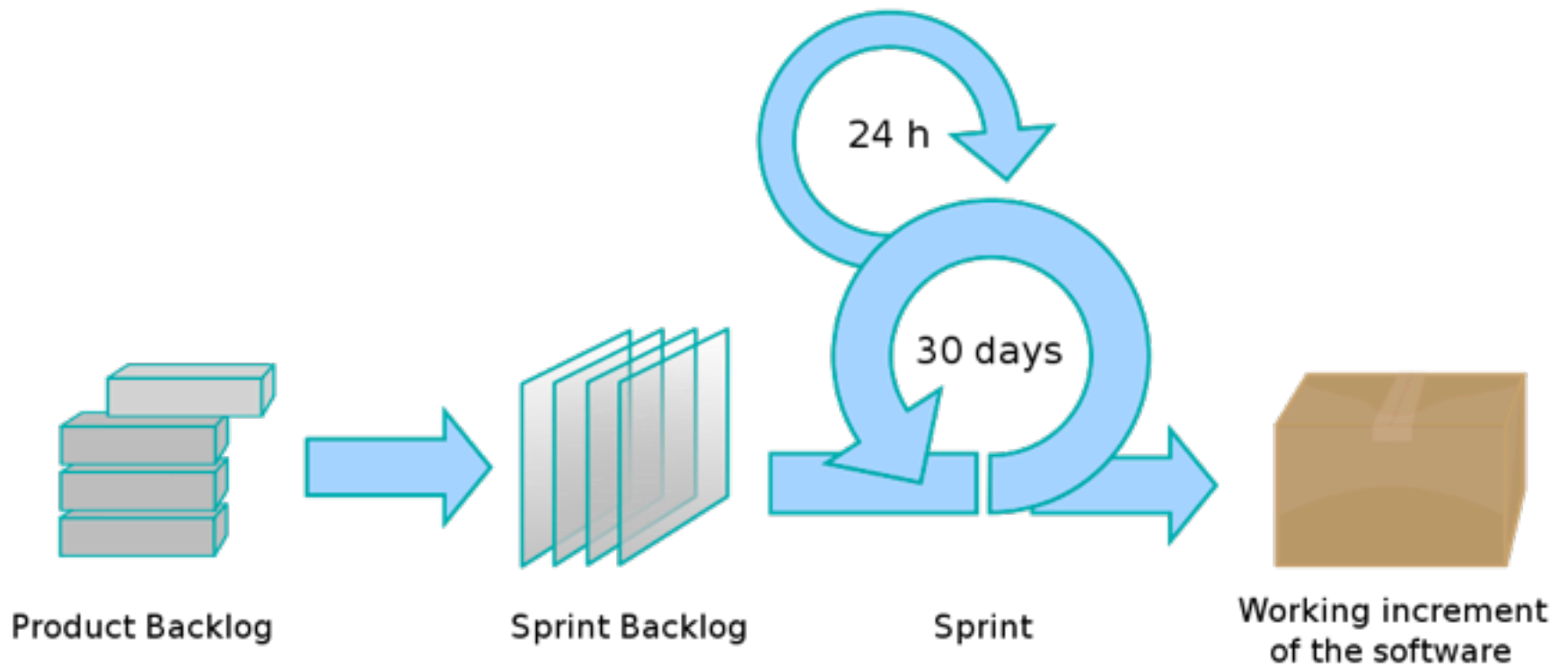
The main part that deals with product quality is the test discipline: There is a test designer, who writes test plans, test models, and test cases.

RUP has the principle that testing is done early and concurrent.

Furthermore, the project manager creates project and iteration plans that include risk lists. The tests focus on risks.

Graphic from http://epf.eclipse.org/wikis/openup/publish.openup.base/guidances/supportingmaterials/introduction_to_openup_EFA29EF3.html?nodeId=365555c7

Scrum



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It can be compared to the PDCA cycle.

An emphasised best practice is to continuously verify quality of products and processes.

Product quality is assured in each sprint with common techniques such as testing or reviews. There is usually one sprint, which is more focussed on QA regularly.

For process quality, there are Scrum review meetings after each sprint. There it is asked what worked well and what didn't.

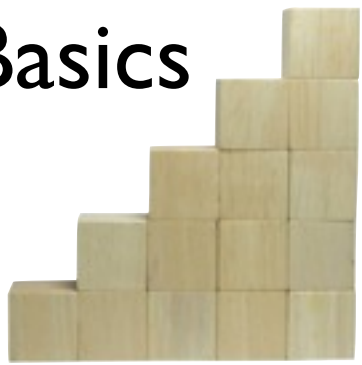
What are concrete actions to improve?

Compare also to Lean Development, especially respect for the people!

http://en.wikipedia.org/wiki/File:Scrum_process.svg

Quality management in process models

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**Certifi-
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ISO 9000

IEC 61508

CMMI

SPICE

ISO 26262



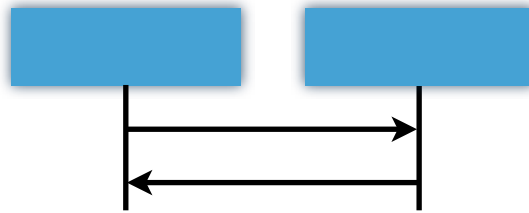
Certification of software is nowadays mostly about certifying that you used an appropriate process.

Certifiers check mainly the documentation you produce.

Coverage

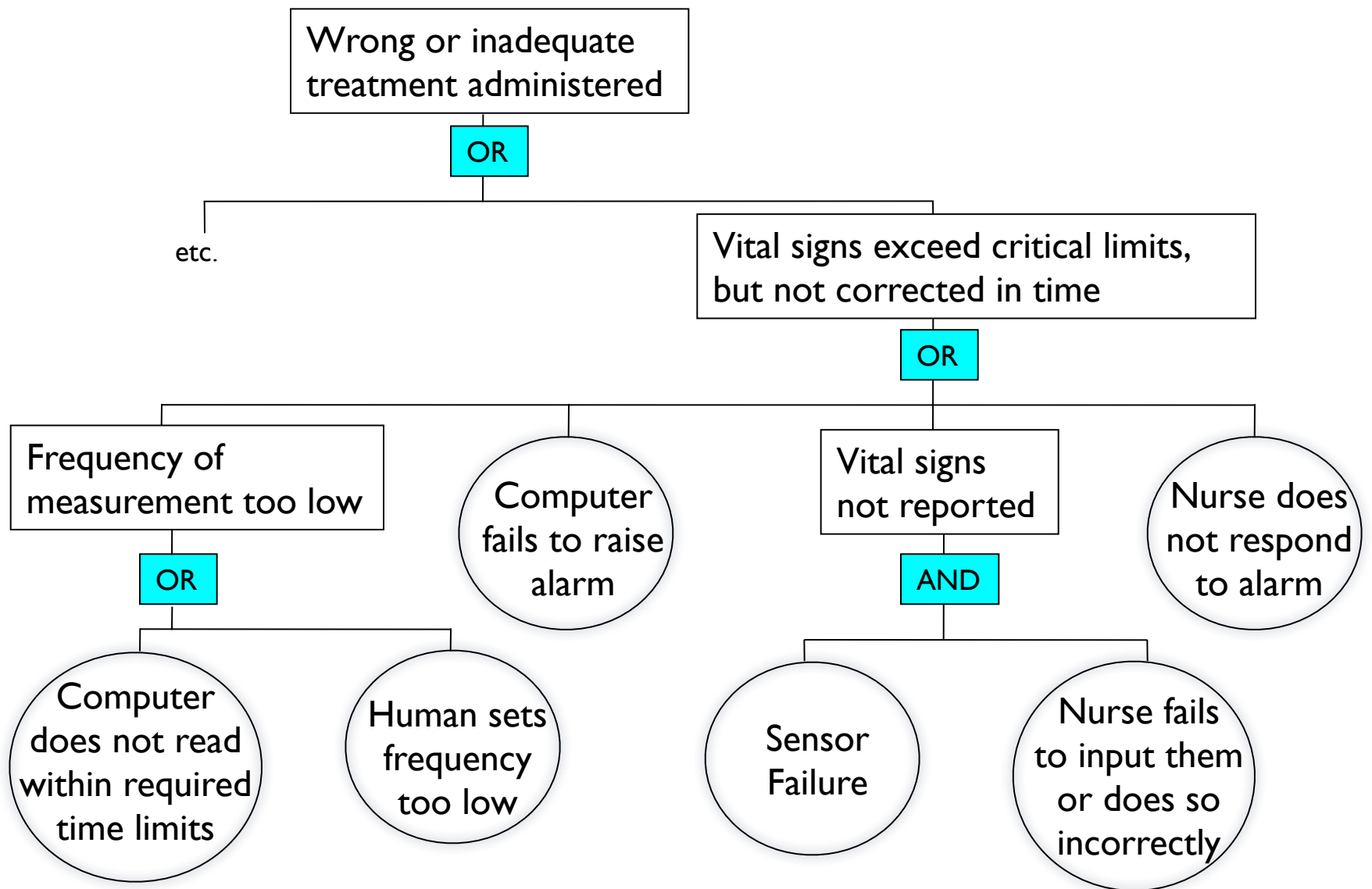
```
if (x > range)
  x = provide
  publisher.s
}
for (y = 0; y
  doSomeTh
  doSomethingElse(y);
}
```

Test suite



Test coverage is one large aspect that is emphasised in some standards. For example, some safety standards request at least MC/DC (modified condition/decision) coverage.

Fault tree analysis (FTA)



Leveson (1995)

Boolean model: failed, works

Goal: Identification of singular failures or combination of failures that lead to an unwanted top event

Apart from the top event, there are numerous base events, which describe failures of smaller units.

FMECA

Failure Modes and Effects Criticality Analysis						
Component	Failure Modes	Cause of Failure	Possible Effects	Prob.	Level	Possible Action to Reduce Failure Rate or Effects
Sensor	Read failure	- Wrongly mounted - Energy breakdown ...	Life signs are not reported	0.006	Critical	Install redundant sensor

Similar to FTA, but in form of a table

Steps:

Identification of all components and their failure modes

For each failure mode, determination of effects on other components and the system

Based on that, determination of probability and severity of effects

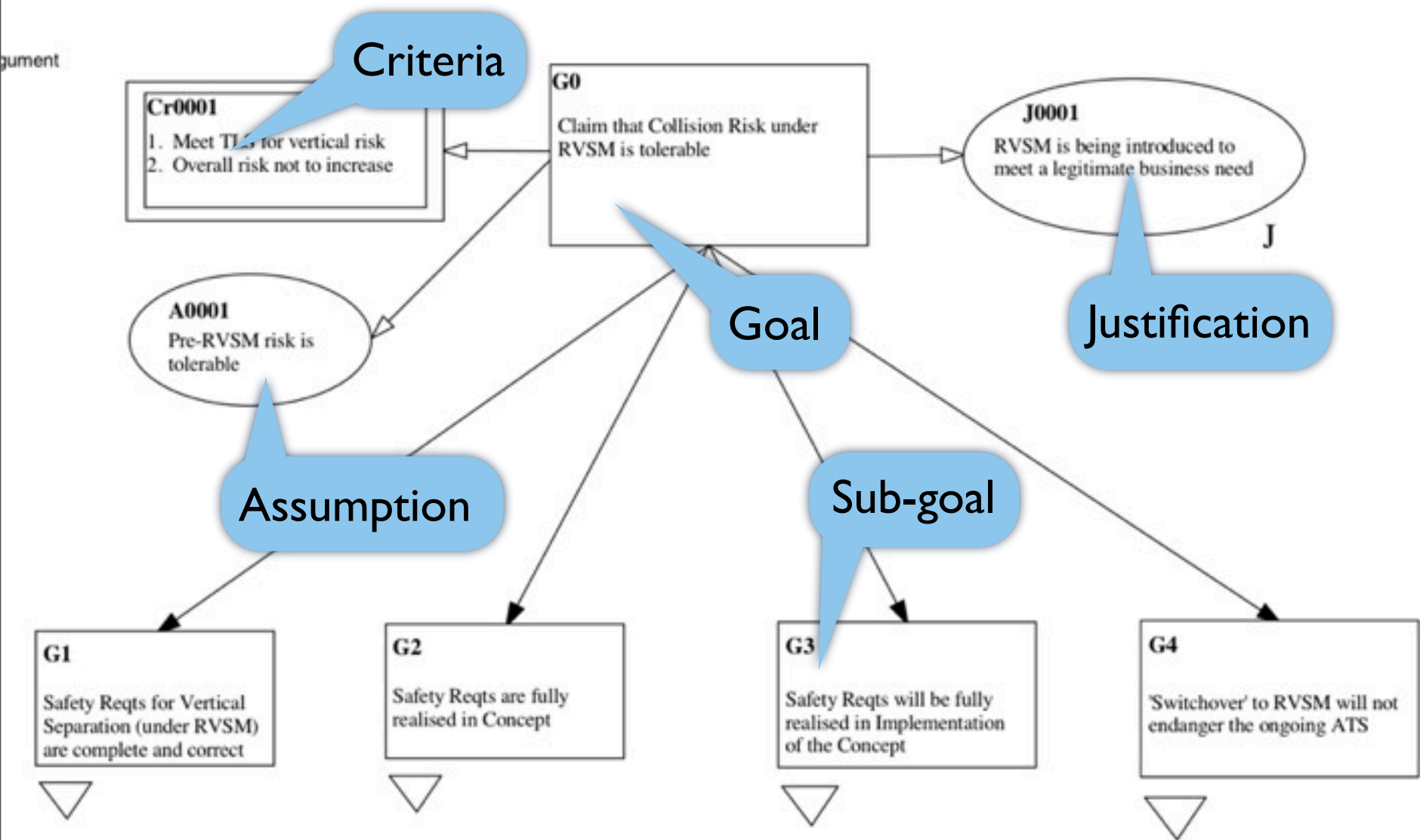
But is it really safe?





Build up evidence

Assurance cases

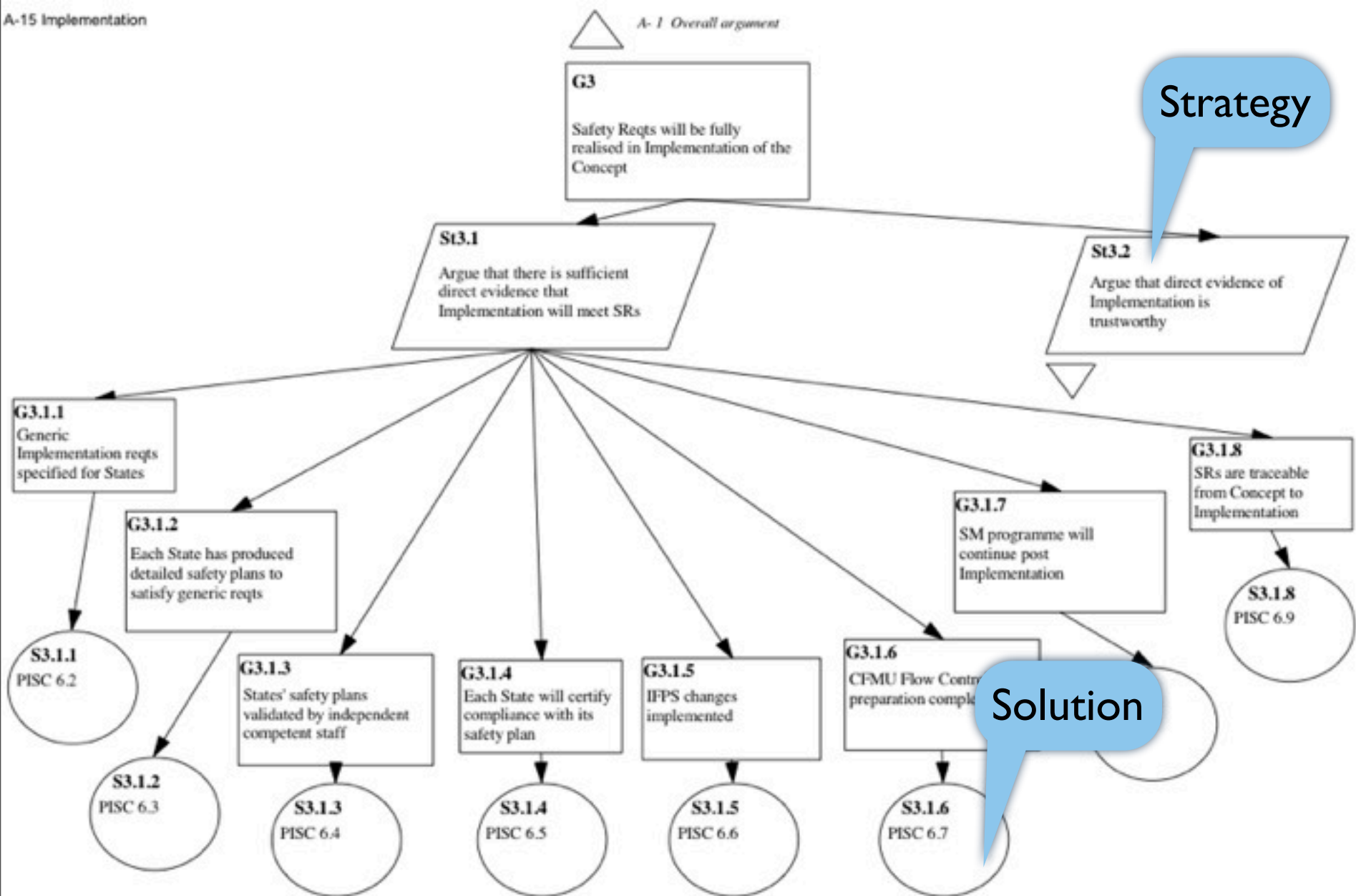


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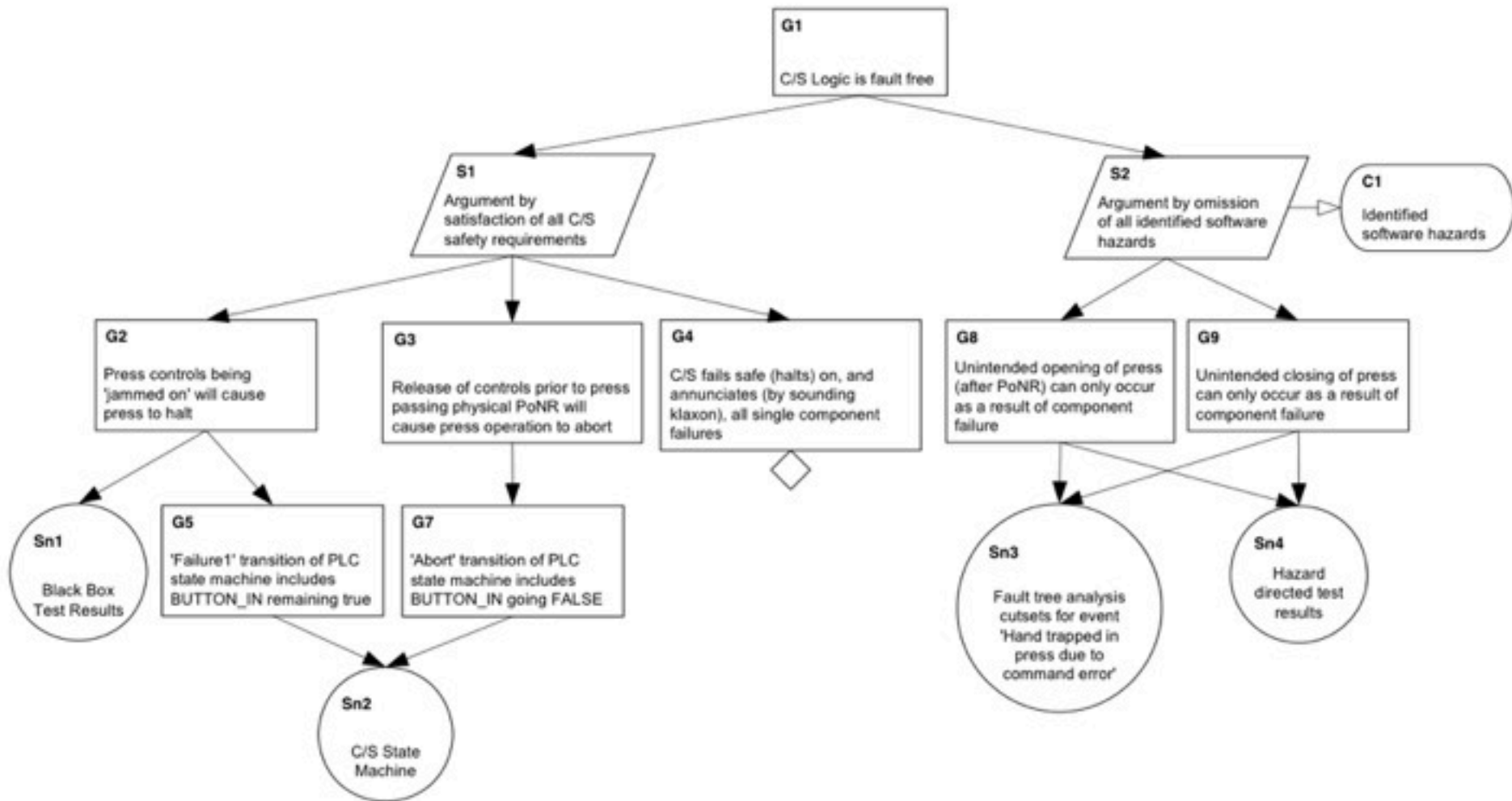
An example of an assurance case in GSN (goal structuring notation) from Eurocontrol.

RVSM = Reduced Vertical Separation Minima
ATS = Air Traffic Service

From: The EUR RVSM Pre-Implementation Safety Case



Software safety



Alexander, Kelly, Kurd, McDermid (2007)

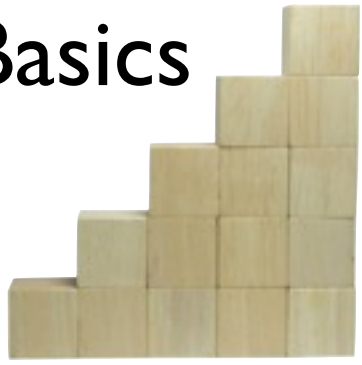
Usage

- Safety
- Security
- Dependability
- Any quality attribute

Group work (optional)

- 2 groups
- 1 whiteboard each
- 15 minutes
- Design (part of) a safety case for the control software of a X-ray radiology equipment.
- Top level goal: The radiology equipment is acceptably safe.
- Use only
 - goals,
 - contexts, and
 - solutions.

Basics



Product



Quality

Metrics and



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Management

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cation**



Your expectations...

What is the most important quality?

- * Something new about SQA and quality of GUI
- * Use it in projects, something real, practice
- * What is quality SW?
- * Basic knowledge
- * Measuring quality, metrics
- * Quality team
- * Connection to Software architecture
- * Expectation of customer w.r.t. quality
- * quality in every step of the SL
- * quality aspects for real
- * Bridge between theory and practice



What did you like?

What didn't you like?

Where would you like to see more depth?

What else can I make better next time?