



What can Early Aspects do for Software Product Lines?

Awais Rashid



10. And a river went out of Eden to water the garden; and from thence it was parted, and became into four heads.
11. The name of the first is Pison: that is it which compasseth the whole land of Havilah, where there is gold;
12. And the gold of that land is good: there is bdellium and the onyx stone.
13. And the name of the second river is Gihon: the same is it that compasseth the whole land of Ethiopia.
14. And the name of the third river is Hiddekel: that is it which goeth toward the east of Assyria. And the fourth river is Euphrates.

Genesis 2:10-14

Where was the Garden of Eden?



- In Taurus Mountains in Anatolia, Turkey?
- Near Tabriz in North West Iran?
- Ethiopia?
- Java?
- Seychelles?
- Jackson County, Missouri?
- Bristol, Florida?
- ...



What is an Aspect?







Approx. 80% of requirements specifications are in natural language

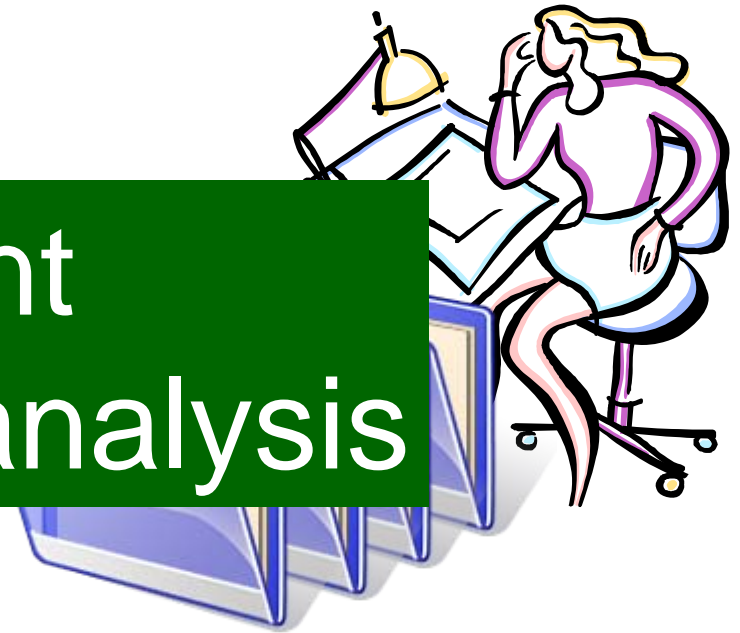




What does a requirements engineer do?

Reconcile multiple views of
concern
technical
capitalis
Identify variations on a theme
in case of product line
engineering

Inter-document dependency analysis



...



Early Aspects can support
crosscutting analysis of product
dependencies and interactions
across heterogeneous
documents in software product
line requirements



Is state-of-the-art up to it?

Semantics-based Composition



Concern Security

R₁: Users must enrol with the system

Subject Degree Relationship

Object

<Concern name="Security">

<Requirement id="1">

<Subject> Users </Subject>

<Degree type="Modal" semantics="Modal" level="high"> must </Degree>

<Relationship type="Move" semantics="Group">enrol </Relationship>

with the

<Object> system </Object>

</Requirement>

</Concern>

From Chitchyan et al. AOSD 2007

Semantic Queries



Query:

Select the requirements where **user enrolls** or a **system** is **enrolled** to.

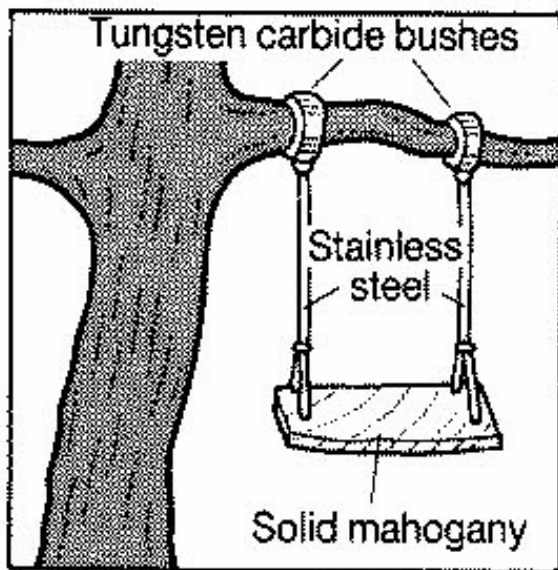
RDL Query

all requirements where (**Subject="users"** and **Relationship="enrol"**) or (**Object="system"** and **Relationship="enrol"**)

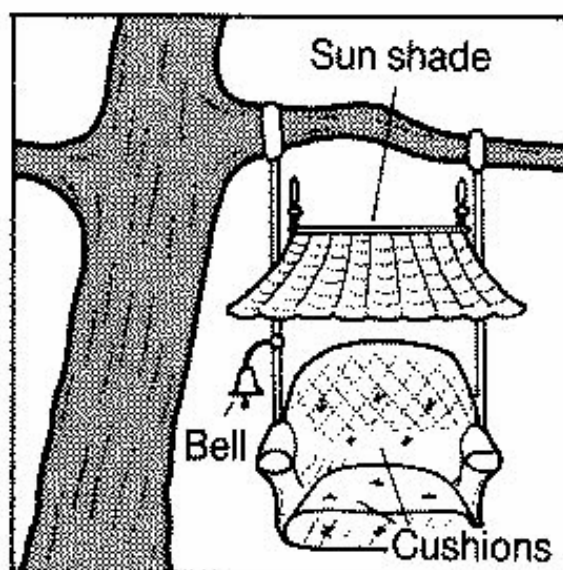
Also used in Queries for matching:
Synonyms: register, sign up, join...
Lemmas: enrol, enrolled, enrolling..



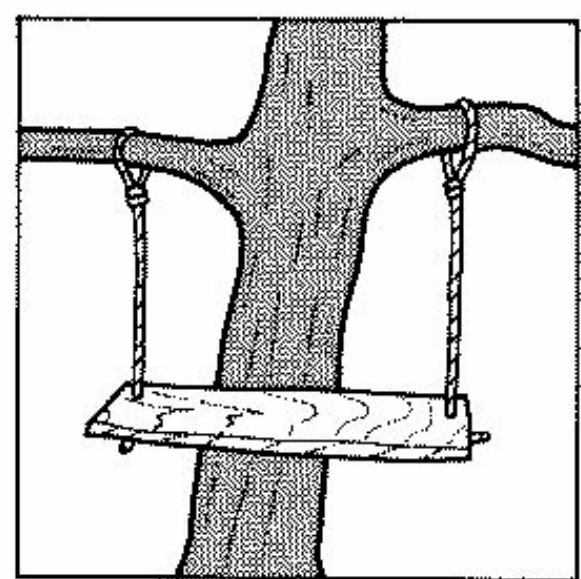
It is all about bridging
multiple sub-domains!



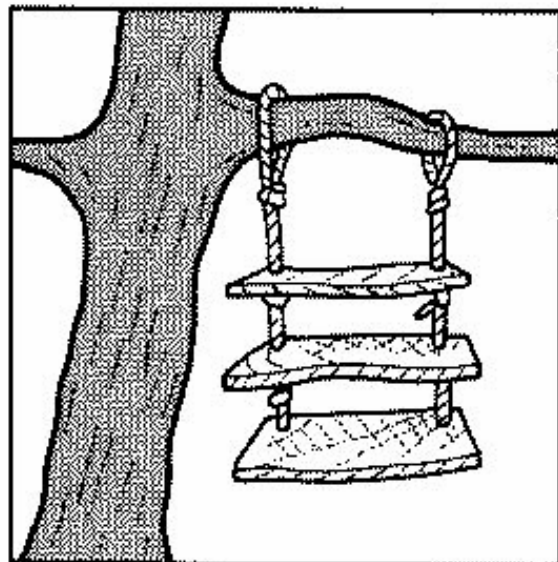
What Product Marketing specified



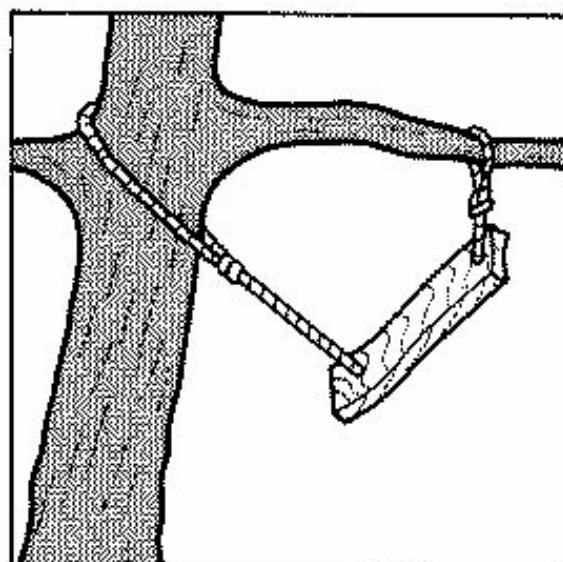
What the salesman promised



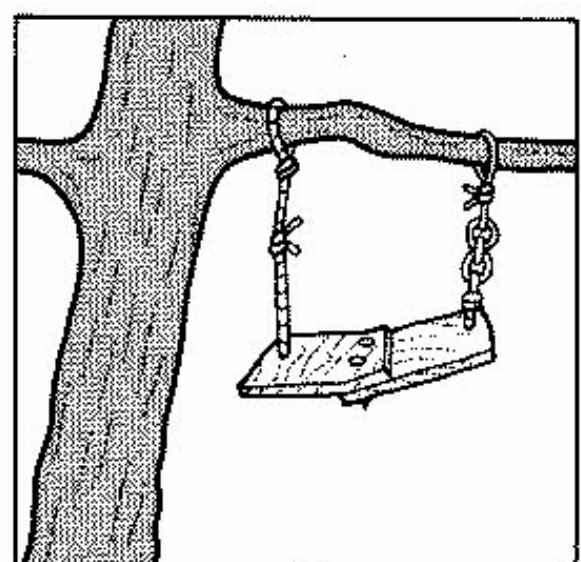
Design group's initial design



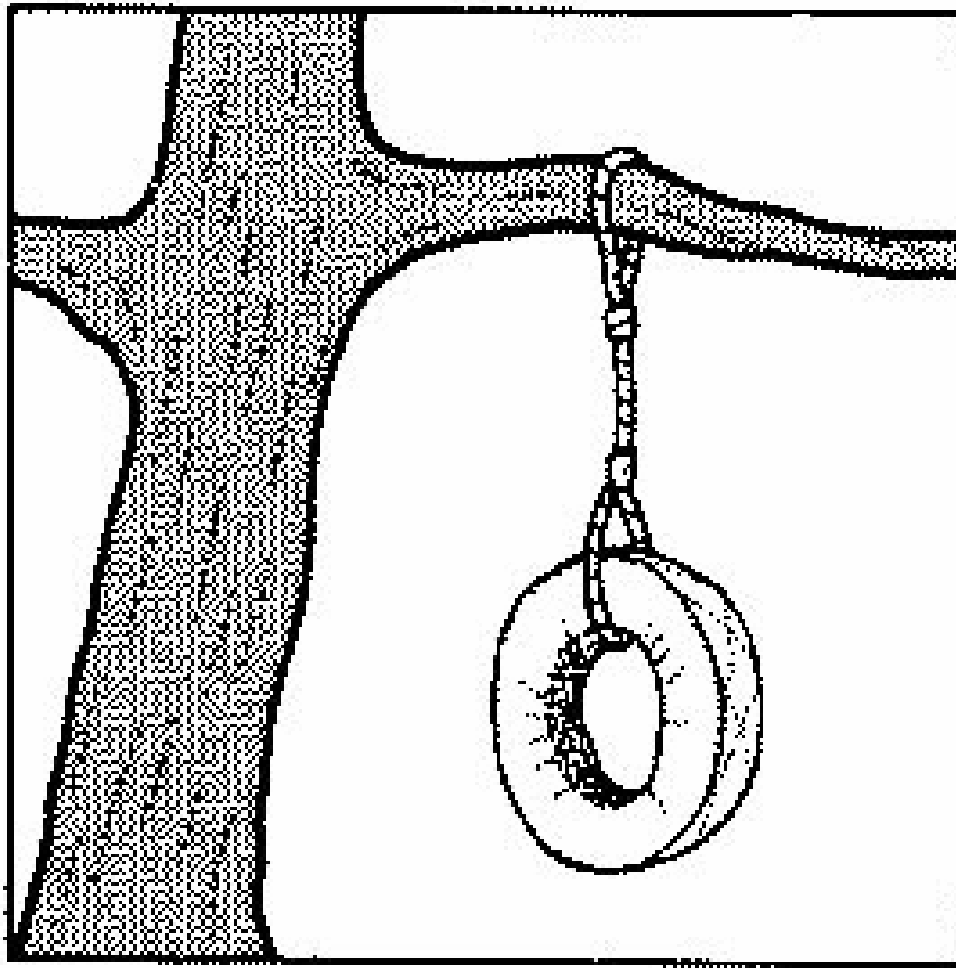
Corp. Product Architecture's modified design



Pre-release version



General release version



What the customer
actually wanted





“The first step towards the management of disease was replacement of demon theories and humours theories by the germ theory. That very step, the beginning of hope, in itself dashed all hopes of magical solutions. It told workers that progress would be made stepwise, at great effort, and that a persistent, unremitting care would have to be paid to a discipline of cleanliness. So it is with software engineering today.”

Fred Brookes, No Silver Bullet

