PHILIPS

A People Oriented Approach to Product Line Scoping

Eelco Rommes
Philips Research
The Netherlands

The Herrenchiemsee is a small island in the German lake Chiemsee, which would not be interesting if not for the palace that King Ludwig II has built on it in the second half of the 19th century. Ludwig was a great admirer of the French kings of the 17th century, especially of Louis XIV, the Sun King. In their honor, he let this palace be a copy of the palace of Versailles. Building this palace was a large endeavor, which led to some unfortunate technicalities.

For one, the palace was never finished. The palace of Versailles consists of three large parts, Ludwig only managed to build the middle part of it on Herrenchiemsee before the end of his reign, and that part was not finished. Because of this, the palace was never used as it was intended to be used: as a place where Ludwig could receive and entertain guests: it would have been most impolite to receive guests in an unfinished palace. Nevertheless, the palace cost 400 million euros (today's currency) and Ludwig had plans for three more castles to be build.

This is an intriguing project for anyone interested in the planning of large, complex projects. What went wrong? For one, Ludwig's financial planning was probably not as advanced as it should have been. But why? I have not done any research in this area, but my guess would be that this was a classic stakeholders problem.

Looking at the project, we can easily find many stakeholders who were involved: Ludwig himself of course and his guests (his 'customers' so to speak), the architects, many constructors, artists painting the numerous frescos, the craftsmen who built the furniture, chandeliers,

What's the problem?

Scoping: what is in & what is out.

- Product portfolio
  – Defines products and their requirements.
- Domain scope
  – Bounds the domains that are relevant for reuse.
- Asset scope
  – Which assets should be part of the reuse infrastructure.

Keywords: return on investment, effort reduction, time-to-market, economic benefits,…

Product line scoping is the problem of determining what is inside and what is outside of a product line effort.

Schmid identifies three levels of scope [Sch00]:

The product portfolio defines the various products that are part of the product line, and their requirements.

The domain scope bounds the domains that are relevant for reuse and what should be part of them.

The asset scope identifies which assets should be part of the reuse infrastructure.

Traditionally, scoping is seen as an economical problem.

Scoping's Stakeholders

The scoping process has many stakeholders:

- Management
- Product managers
- Sales
- Customers

- Users
- System architects
- Developers
- Suppliers

The scoping process has numerous stakeholders, each playing a certain role with respect to the product line. Although the actual list of stakeholders is largely project specific, here we list some of the more common stakeholder roles to hint at the complexity of the problem.

Management: investments in the pl platform should correlate to business strategies, marketing strategies and the company's organization.

Product management: the product portfolio, product features and time-to-market are all important aspects of marketing and they are all effected by the scoping effort.

Sales persons: the product portfolio, product features and time-to-market influence market position and sales options.

Customers: the scoping effort determines what products and features are available when, and, to some extent their price.

Users: scoping determines the products and features available.

System architects: the scope of a product line influences its architecture as well as that of the separate products in the product line, by determining what functionality will be provided by the reuse infrastructure.

Developers: developing for reuse requires different skills and processes than developing for a single application.

Suppliers: the asset scope determines which components will be reusable and which product specific.

3

No Two Stakeholders Are Alike
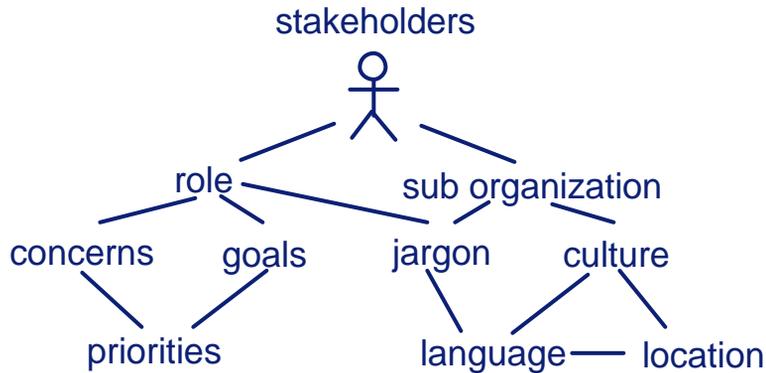
Stakeholders are people, and people are different. Stakeholders are different in many ways. This diagram serves to illustrate this diversity.

Each role (product manager, developer, application expert, etc.) yields certain responsibilities, and therefore certain concerns, goals and priorities. Moreover, each role has its own specific language in the form of jargon: management speak, the architect's UML, etc.

Each sub organization has its own culture and the local jargon to go with it. Also, the location of this sub organization can determine language and influence culture.

Why All Stakeholders Should Scope

- Diversity is bliss.
  - Each stakeholder has his own view, concerns, and expertise to bring to the table.
- It can't be faked!
  - No single person has all the wisdom needed to balance the views, concerns and goals of all these different persons.
  - Commitment can't be ordered.

The diversity of stakeholders can be of great value to the scoping process. Such a diverse group of people is capable of looking at the problem from many different perspectives. With a smaller number of people, diversity is inherently less and so is the capacity to find fresh perspectives on the scoping problem. This may lead to a technician's scope: products that are fun to build but not too hard, but not fit for the market; a marketer's scope: the products might fit very well in the current market, but impossible to build, or not aligned with current business strategies is to explore new ones; etc.

Another advantage of involving people in the process of scoping, is that of early commitment. The way the process works strongly influences how much commitment, and done badly it can turn on you. Done well, people might feel responsible for the outcome of the process and perhaps even learn something about other people's worries and woes too.
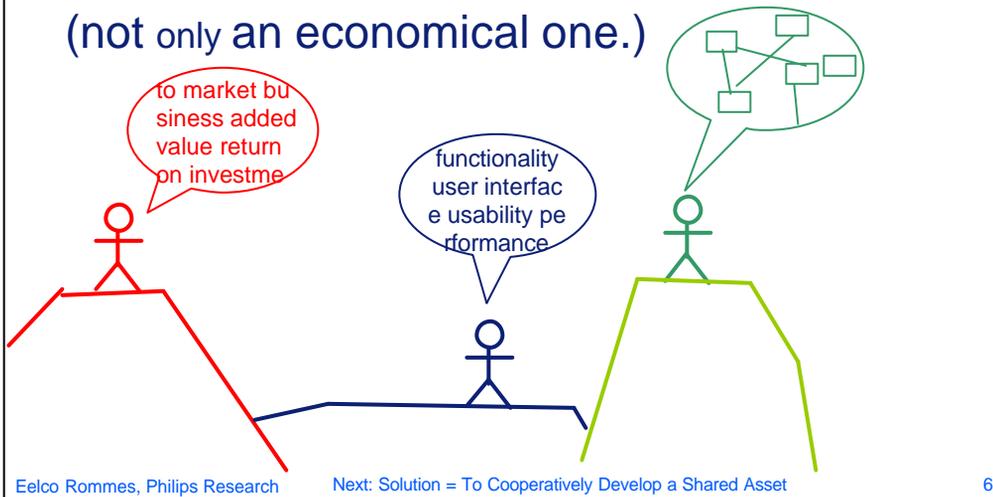
A sub-problem to the scoping problem, which is a social problem, and not an economical one:

The social problem of scoping is to get different people with different goals, concerns, priorities, culture, and using different jargons, to cooperatively define a scope.

Solution: Cooperate!

- Cooperatively develop a shared asset.

- New problem: what kind of asset?
  - It should *define scope* (products, domains, assets).
  - It should *be understandable to all* stakeholders (no management speak, marketing formulas or UML).

A solution to the social problem of scoping is to have the stakeholders develop a shared asset together. Ideally, this asset should define the product portfolio, domain scope and asset scope, while still being understandable for all stakeholders.

User Scenarios (1/3)

A user scenario is a short story describing an actor using an envisioned system to accomplish some goal.

…Dr. Hart prepares for the intervention using a workstation. He has access to all information concerning the patient and selects the diagnostic images for the procedure…

Eelco Rommes, Philips Research   8

User Scenarios (2/3)

User scenarios:

- Are written in natural language, using jargon only from the application domain.
- Describe typical use of systems within the scope (which may include –ilities).
- Are not use cases.

User scenarios bridge the language gap by using natural language, with only jargon from the application domain.

A set of user scenarios captures the relevant requirements of each product in the product portfolio by describing the typical use of these systems. A single scenario can deal with a single system, or a multitude of systems that are used together.

User Scenarios (3/3)

A Good User Scenario is:
- Accessible
- Attractive
- Challenging
- Frequent
- Specific

(Gerrit Muller, http://www.extra.research.philips.com/natlab/sysarch)

Eelco Rommes, Philips Research   Next: The Scenario Based Scoping Process   10

Gerrit Muller has written about 'stories', which are similar to our user scenarios [Mul03]. He defines five criterions for a good user scenario:

•Accessible

•Appealing

•Challenging

•Frequent

•Specific

Accessible: scenarios should make the problem communicable to all stakeholders. In our approach, the scenario is not only a means of communication, but is developed by all stakeholders. This makes the accessible criterion even more important.

Appealing: the product(s) described in the scenario should be important to the (potential) customers. Moreover, it should still be important when the envisioned product would be ready to ship. It is easy to fail on this one. To get it right, a lot of application domain knowledge is required, as well as a good insight in application trends, and business strategies. (E.g. who will our customers be when these products are on the market?)

Challenging: if the product(s) described in the scenario are easy to realize, you probably know everything about them already. Don't waste your time on scenarios, just build them and win the market.

Frequent: scenarios should describe how product(s) will be used

10

Scenario Based Scoping
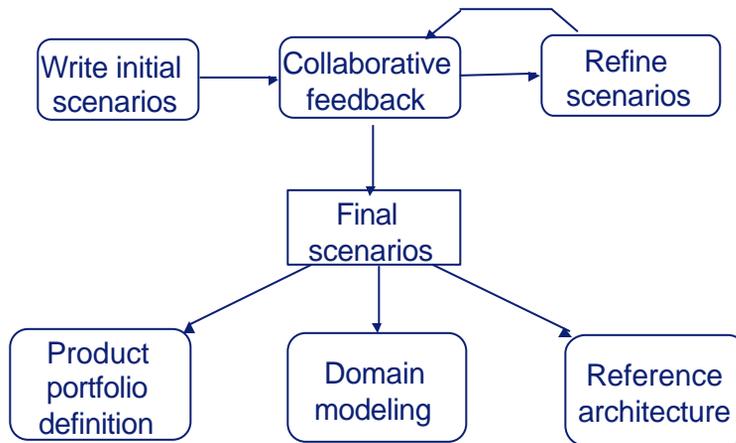
The initial scenarios can be written by a small group of initial writers, or collectively using a group process. Feedback should be given by all stakeholders involved, preferably in such a way that they can interact. During feedback sessions, each stakeholder uses his specific expertise and background to judge the scenarios on three questions:

1. Are the scenarios feasible?
2. Are they desirable?
3. Is the set of scenarios (over)complete?

The final set of scenarios forms a strong basis for more precise product portfolio definition, domain modeling and for developing a reference architecture for the product line.

Experiences

- We used the approach on several practical case studies concerning medical imaging systems product lines.
- Some reactions:
  - "We should do this more often, but we do not have the time."
  - "Nice to talk to these people instead of negotiating with them."
  - "We will do this more often, even though we do not have the time."

We applied the scenario based approach in a number of practical case studies on product lines for medical imaging systems. Overall, the reactions of involved stakeholders were positive. The reactions of stakeholders ranged from 'we should do this but we're too busy' to 'we're going to do this'. Some of them actually use (parts of) the method in industrial practice. People from different parts of the company get to talk to each other with a common goal in mind, instead of e.g. a negotiation process. On one product line, the approach is now being adopted for roadmapping.

Conclusions

- The success of scoping depends on the success of stakeholder cooperation.
- Stakeholders are very diverse, therefore…
- …stakeholders do not cooperate easily.
- Scenario based scoping attacks this problem by development of shared assets describing scope: user scenarios.

The success of a scoping effort depends on the success of stakeholder cooperation. Due to their diversity, it is hard for stakeholders to cooperate optimally.

This makes scoping primarily a *social problem*. We propose an approach to tackle this problem based on the development of shared assets: user scenarios. The scenarios describe product portfolio, and serve as a basis for domain and asset scoping.

We have applied the scenario based approach to scoping on several practical case studies on medical imaging product lines and product populations.

Thank you!

PHILIPS

Author contact data:

Eelco Rommes, Philips Research

WDC 2-015

Prof. Holstlaan 4

5656 AA Eindhoven – The Netherlands

eelco.rommes@philips.com

References (see the workshop paper for a full list of references):

[ARO03] Pierre America, Eelco Rommes, Henk Obbink, Multi-View Variation Modeling for Scenario Analysis. Accepted for PFE-5, Siena, Italy, November 2003.

[Mul03] Gerrit Muller, Story How To. Available online at http://www.extra.research.philips.com/natlab/sysarch/

[Sch00] Klaus Schmid, Scoping Software Product Lines – An Analysis of an Emerging Technology. In Patrick Donohoe (editor), *Software Product Lines – Experience and Research Directions*, Kluwer Academic Publishers, 2000