An Introduction to Global Product Line Requirements Engineering

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Abstract

Empirical studies have shown that the use of a product line approach to software development can result in shorter time to market and improved productivity. Outsourcing and distributed development has added a new dimension to product management, exacerbating problems associated with transitioning from marketing studies to product definition to analysis and design. Communication problems can arise when requirements for products are captured on a regional or international basis. This half day tutorial provides an introduction to global product line requirements engineering from the perspective of project and product management. Topics covered include geographically distributed product lines including organizational and technical issues of globalization, distributed requirements elicitation, feature modeling, the role of the product line manager, and the use of meta-models to define global/distributed processes.

1. Introduction

Significant savings have been reported when transitioning from traditional single product organizations to product line organizations [1] [2]. However, typical product lines reported on in the literature usually reflect single site development [3].

When a product line is global in nature, processes, tools and organizational structure change [4]. This tutorial focuses on the creation of product lines in a global economy. The tutorial team exercises reflect actual published and unpublished case studies.

2. Product Line Taxonomy

Product lines, unlike individual products, have feature variation. Not all features will be in all products in the product line. Sales and marketing organizations need to clearly communicate not only the features of the products being developed, but how they vary from product to product and region to region. Release planning is also complicated by feature dependencies, e.g. feature “B” cannot be in a product release unless feature “A” is also in the release, and by geographically distributed product management functions.

3. Requirements Management

Requirements management processes are more complex when considering product lines vs. managing change for individual products. Impact analysis requires traceability, and traces can be difficult to maintain in a product line environment. The technique of using a meta-model as an aid to defining deliverables and processes is introduced.

4. Requirements Elicitation

Product line elicitation techniques, including traditional text requirement specifications and UML modeling concepts are discussed in the tutorial. The relationship between a feature model and traditional use case model is described, and best practices for requirements development are presented.

5. Organizational Issues

Product line requirements engineering requires significant organizational changes. For example, the role of the product manager may change, and/or the role of product line manager may be introduced. Certain types of sales/marketing pressure may be applied to introduce unique or baroque features to meet individual stakeholder needs. Techniques for effectively managing product lines in a globally distributed environment will be discussed.

6. Tutorial Organization
The tutorial is structured so that student understanding is reinforced with a team exercise for each major topic. The exercises reflect actual scenarios where the team can compare their recommendations or findings against the strategy actually used. The exercises include:

- Product Line Taxonomy and meta-model
- Feature Modeling and Feature Variation
- Organizational Issues and Globalization

7. Presenter

Brian Berenbach is the program manager for requirements engineering at Siemens Corporate Technology. He has been working in the field of requirements engineering for over 15 years, first as a consultant, and then as a senior member of the technical staff at Siemens Corporate Research in Princeton. Recently at Siemens his program has been involved with product and product line definitions for such diverse products as medical systems, baggage handling, mail sorting, automated warehouses, and embedded automotive systems.

8. Level

This tutorial is primarily for professionals who are interested in learning about the product line approach to distributed software development, including roles, organizational structures and formal approaches to product line requirements definition.

9. Attendee background

No prior knowledge of requirements engineering processes or software development is required. Any business or software professional will be able to follow the material and understand the concepts.

10. References


