

APLE 2006 Summary

Introduction

The First International Workshop on Agile Product Line Engineering, 2006 (APLE 2006) brought together practitioners and researchers with a strong interest in the potential for integrating Agile Methods and Product Line Engineering Techniques. The one day workshop, co-located with the Software Product Line Conference, was held on August 21, 2006 in Baltimore, Maryland. The number of participants from industry and academia was approximately even; the participants from industry had experience in diverse application domains including banking, finance, medical devices, insurance, automotive, computer peripherals, etc. The morning sessions were used to present a collection of seven research, experience, and position papers. The afternoon sessions were used to identify possible topics for discussion, discuss two of the topics (all topics could not be covered due to time constraints), summarize the results of the discussion, and determine the interest in organizing the workshop again at SPLC in 2007.

The four topics identified by the participants included the issues and experiences in applying Agile Methods, Product Line Engineering techniques, and combinations of Agile and Product Line Engineering techniques used in industry; issues and success factors in defining an Agile Product Line Engineering technique; how to empirically assess new Agile Product Line Engineering techniques proposed; and how to share the results discovered between academia and industry in this community. A summary of the discussion from the first two topics is provided below.

Discussion

Topic 1. Agile Methods, Product Line Engineering techniques, and Combinations of Agile and Product Line Engineering Techniques Used in Industry

Several projects from industry were discussed which had used Agile Methods. The projects had varying degrees of success. In the less successful projects, technical and cultural issues were discussed as key sources of problems. For example, numerous changes occurred to the requirements near the end, the impact of the changes were not well understood, lack of technical expertise, lack of management expertise, and the difficulty in bridging the gaps between the business, management, and technical people. In one case, the result was unhappy customers and unhappy employees. However, in a successful case, which involved the iterative enhancement of

an existing product, using Agile Methods improved the quality, productivity, defect metrics, and avoided the need for intense overtime near delivery.

The level of involvement of the customer was identified as a key success factor in using Agile Method. The need to adapt the level on a per project basis was agreed upon, as for some projects, a release each month is good, others every quarter, and so on. Finding the right balance for each project is likely to take some time.

Projects from industry were discussed which had used Product Line Engineering Techniques. A number of significant issues were identified including the difficulty in: providing visible progress when developing the core assets; testing the core assets at the system level; managing variability both in space and over time; determining the value of new features with accurate scoping and cost analysis; and developing and maintaining the documentation and the code due to the heavy-weighted nature of the process. For example, one new product line required approximately 30 person years to develop the core assets; these were difficult to show to stakeholders and test before completion. The product line engineers see the need to reduce bureaucracy without sacrificing documentation quality. The distinction between product line systems engineering (hardware and software) and product line software engineering was also discussed; the systems engineering problems presents additional challenges such as managing hardware assets and the interactions with the software.

There was some experience among the participants in combining Agile Methods and Product Line Engineering Techniques successfully. Some important principles which contributed to the success included: focus on the customer (closer collaboration) and obtain customer feedback early and often; look for ways to eliminate waste (ask why things are being done?, what is the value of what we are doing?, etc.); avoid “analysis paralysis” by making the best decision you can based on what you know now; have management and technical support for the process from the top down (this involves training managers in their new, agile roles); recognize the training and skills required for agile approach may be higher or at least different than plan driven approach; and expect change and adapt from what you learn. Agility was introduced in several activities, including planning, requirements engineering, and code development (pair programming). Using the “just enough” approach, the plans and other documents developed were viewed as useful working documents. Pair programming was viewed as a useful training technique.

Open issues include determining whether it is more effective to apply agile methods in the application engineering, rather than domain engineering, activities and the role of automation (i.e., what should be automated?).

Topic 2. Issues and Success Factors in Defining an Agile Product Line Engineering Technique

The discussion on defining an Agile Product Line Engineering Technique emphasized the need to tailor the level, or degree, of agility introduced both overall and a finer level of granularity (e.g., a feature by feature basis). The book *Balancing Agility and Discipline* by Barry Boehm and Richard Turner proposes five axes to consider. The book is not specific to product line development, but focuses on plan driven approaches. In addition to the axes proposed in the book, the degree of agility can be considered by asking questions such as: how much variation in time are you anticipating/expecting (the more variation in time there is would lead us to a more agile approach) and how much do you need to focus on the current problem vs. investing in a longer term problem (the more focus there is on the current problem would lead us to a more agile approach)?

Outstanding issues include understanding the potential to introduce agile principles into the Product Line Engineering disciplines (application, domain engineering, management) and investigating the impact of technology (development platforms, tool support, etc.) on an Agile Software Product Line Technique. Two possible approaches to defining the process include starting with a Product Line Engineering Technique and introduce agility or starting with an Agile Method and introduce product line concepts. The approach may depend on many factors such as the business environment, culture/expertise in different methodologies, maturity/level of domain expertise, developing a new vs. legacy product, etc.

Conclusions

The potential benefits of combining Agile Methods and Software Product Line Engineering Techniques are enticing, however, there are numerous open research issues. Due to the strong interest in solving the issues, we plan to organize APLE 2007, co-located with SPLC 2007 in Kyoto, Japan.

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