Balancing Agility and Discipline: Evaluating and Integrating Agile and Plan-Driven Methods

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ABSTRACT

Rapid change and increasing software criticality drive successful development and acquisition organizations to balance the agility and discipline of their key processes. The emergence of agile methods in the software community is raising the expectations of customers and management, but the methods have shortfalls and their compatibility with traditional plan-driven methods such as those represented by CMMI, ISO-15288, and UK-DefStan-00-55 is largely unexplored.

This tutorial pragmatically examines the aspects of agile and plan-driven methods and provides an approach to balancing through examples and case studies

Categories and Subject Descriptors

D.2 [**Software Engineering**]: Management

1. INTRODUCTION

Agile development methodologies (such as XP, Scrum, and ASD) promise higher customer satisfaction, lower defect rates, faster development times and a solution to rapidly changing requirements. Plan-driven approaches (such as Cleanroom, PSP, or CMM-based methods) promise predictability, stability, and high assurance. However, both approaches have situation-dependent shortcomings that, if left unaddressed, can lead to project failure.

2.This tutorial pragmatically examines the aspects of agile and plan-driven methods through examples and case studies. We characterize "home grounds" where the approaches are most likely to succeed, identifying five critical dimensions that describe the agile/plan-driven spectrum. We present a risk-based method for developing balanced strategies that take advantage of the strengths and mitigate the weaknesses of both agile and plan-driven approaches, and that fit the objectives, constraints, and priorities of a particular project or organization. Step-by-step walkthroughs of several example projects show how the method is applied. Finally, we involve participants in an exercise involving hands-on evaluation of their current organizational balance of agility and discipline, identification of likely directions of change, and development of strategies for balancing their agility and discipline to meet future objectives and challenges.

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2. DISCIPLINE, AGILITY AND PERPLEXITY

Discipline is the foundation for any successful endeavor. Athletes train, musicians practice, craftsmen perfect techniques, and engineers apply processes. Without these basic skills there may be an occasional success using natural talent, but professional consistency and long term prospects are limited. The strength and comfort which come from discipline support the endeavor when things are difficult, when the body or mind is under the weather, or when something new or unexpected arises and a response is required. Discipline creates well-organized memories, history, and experience.

Agility is the counterpart of discipline. Where discipline ingrains and strengthens, agility releases and invents. It allows the athlete to make the unexpected play, musicians to improvise and ornament, craftsmen to evolve their style, and engineers to adjust to changing technology and needs. Agility applies memory and history to adjust to new environments, react and adapt, take advantage of unexpected opportunities, and update the experience base for the future.

Every successful venture in a changing world requires both agility and discipline. This is as true in business and software development as it is in sports and art. In his bestseller Good to Great [3], Jim Collins presents a two dimensional scale that describes the characteristics of successful businesses. One dimension is a culture of discipline and the other, an ethic of entrepreneurship. In our context, we equate entrepreneurship with agility. If one has strong discipline without agility, the result is inflexible hierarchy and stagnation. Agility without discipline leads to the heady, unencumbered enthusiasm of a start-up company–before it has to turn a profit. Great companies, and great software projects, have both in measures appropriate to their goals and environment.

3.Agile and plan-driven development approaches have generally been seen as opposing viewpoints, and the rhetoric on both sides still remains essentially confrontational. The claims and counter-claims, misrepresentations and salesmanship create a sense of perplexity in those of us who simply want to successfully complete our projects and please our customers.

3. A DAY IN THE LIFE OF TWO PROJECTS

In this module of the course, we allow the participants to sit in during a typical day with two development teams: one using Extreme Programming and the other SEI's PSP/TSP. We then compare and contrast their activities.

4. TWO CASE STUDIES

Having seen how the "pure" methods are applied, we examine two cases where creative project managers mix the approaches – one from an agile base and the other a plan-driven base – to form successful hybrid approaches.

5. FIVE CRITICAL DIMENSIONS

In this module we compare the methods in four areas: Application, management, technical and personnel to identify their strengths, weaknesses and the home grounds where they naturally fit and are most likely to succeed.

Based on the comparisons, we identify 5 critical dimensions (size, criticality, dynamism, personnel, and culture) that can be used to graphically describe an organization or a project in terms of its agile and plan-driven characteristics.

6. BALANCING AGILITY AND DISCIPLINE

Our method, summarized in Table 1, uses risk analysis and a unified process framework to tailor risk-based processes into an overall development strategy. The method relies heavily on the ability of key development team members to understand their environment and organizational capabilities, and to identify and collaborate with the project stakeholders.

Risk analysis is used to define and address a set of defined risks we see as specifically associated with agile and plan-driven methods. The process framework is based on the Risk-based Spiral Model Anchor Points developed by Boehm [2]. These anchor points are essentially an integrated set of decision criteria for stakeholder commitment at specific points in the development process.

Table 1. Summary of risk-based method

Step 1.	Rate the project's environmental, agile, and plan-driven risks. If uncertain about ratings, buy information via prototyping, data collection, and analysis.
Step 2a.	If agility risks dominate plan-driven risks, go Risk-based Plan-driven.
Step 2b.	If plan-driven risks dominate agility risks, go Risk-based Agile.
Step 3.	If parts of the application satisfy 2a and others 2b, architect the application to encapsulate the agile parts. Go Risk-based Agile in the agile parts, and Risk-based Plan-driven elsewhere.
Step 4.	Establish an overall project strategy by integrating individual risk mitigation plans
Step 5.	Monitor progress and risks/opportunities, readjust balance and process as appropriate.

7. USING THE APPROACH ON YOUR WORK

In this module, each participant uses the five critical dimensions to characterize their environment and then applies our risk-based approach to develop a balanced development strategy.

8. REFERENCES

[1] Boehm B. and R. Turner, *Balancing Agility and Discipline: A Guide for the Perplexed*, Addison Wesley, Boston, 2004.

[2] B. Boehm, "Anchoring the Software Process," IEEE Software, July 1996, pp. 73-82.

[3] Collins, J., *Good To Great*, Harper Collins, New York, 2001.