

# AGILE PROJECT MANAGEMENT — AGILISM VERSUS TRADITIONAL APPROACHES

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## ABSTRACT

For decades now, corporations have been changing from a hierarchical approach to project management to being more collaborative as knowledge work has grown in importance. In the center of increased globalization is the need for project managers to have flexibility in a project system in order to be able to adjust constantly to emerging challenges and opportunities.

The need to distribute responsibility and initiative in support of adaptation to change is familiar territory to "agile" approaches to projects. In this paper, Agile Project Management will be examined from its historical practices and applicability of this style of project management to more traditional approaches to project management. Agile Project Management has proven to be a useful tool for today's knowledge worker and the project managers in the new economy which is characterized by more complex and uncertain project situations. This paper presents fundamental information about the agile methodology to encourage its implementation by professionals.

**Keywords:** Project Management, Agile Strategies, Patterns of Organization, Software Project Management, Traditional Management Approaches

## OVERVIEW

In the February 2007 issue of *Harvard Business Review* the myth of the flawless executive is dethroned in favor of the "incomplete leader" who no longer is oriented toward "command and control" but is instead focused on distributing responsibility and initiative throughout the organization [4]. For decades now, corporations have been changing from a hierarchical approach to being more collaborative as knowledge work has grown in importance. A September 2005 article in the *Project Management Journal* expresses similar sentiments for the management of projects as the authors question the "veracity of tight centralized management", "rationalist" discourse, and a "command and control" approach to project management [23]. Instead, the authors recommend allowing for flexibility of local response in order to be able to constantly adjust to emerging problems in the project system.

This need to distribute responsibility and initiative in support of adaptation to change is familiar territory to "agile" approaches to projects. In this paper, Agile Project Management will be examined from its historical practices, and the applicability of this style of project management. Agile Project Management is proving to be a useful tool to today's knowledge worker and the project managers in the new economy. As Zwicker [35] asserts, Lockheed Martin was looking for a way to improve its development of software products and found the agile methodology in the process. A comparison of Agile Project Management to traditional approaches will be presented.

## NEW PROJECT MANAGEMENT THEORIES

In recent years there has been particular interest in defining, or redefining, a theory of project management that can be used in the new economy which is characterized by more complex and uncertain project situations. Koskela and Howell [25] argue in a 2002 paper that the underlying theory of project management is obsolete. The theory underlying the PMBOK (Project Management Body of Knowledge) guide by the Project Management Institute (PMI) [30] is determined to be based upon the transformation view of production and three theories of management: management-as-planning, the dispatching model for execution, and the thermostat model for control. Koskela and Howell [25] question this theory's sufficiency in practice, especially in managing uncertainty and change. A new theory is not proposed but new ingredients are suggested: (1) a focus on Flow and Value generation in addition to transformation; and (2) inclusion of management-as-organizing for planning, the language/action perspective for execution, and the scientific experimentation model for control. In a subsequent paper Koskela and Howell [26] demonstrate that Scrum, an agile project management approach, is a comprehensive project management method with an underlying theoretical foundation that includes flow and value generation emphases (but not transformation), management-as-organizing, the language/action perspective, and the scientific experimentation model. They conclude by arguing for a "paradigmatic transformation of the discipline of project management".

Williams [33] presents research that shows that conventional methods of project management (including PMBOK) can be inappropriate and potentially disadvantageous for projects that are structurally complex, uncertain, and heavily time-limited. Instead, newer project management methods, such as "agile" or "lean" show promise for projects with these characteristics.

Other research has demonstrated the value of management models (such as administering, organizing, sense giving, team building, and engineering), even if these models don't represent best practices [17]. Models provide a common language and framework creating a shared reality which enables communication both within and between projects. Agile Project Management finds its common language originating in the Agile Manifesto [8] and Declaration of Interdependence [6]. The manifesto and declaration will be examined in a subsequent paper by the authors as the roots and sources of "agile" ideas and principles.

## AGILE PROJECT MANAGEMENT APPROACHES

### Agile Project Management Practices

One way to examine approaches to agile project management is to investigate practices of agile project management. One set of practices [22] includes the following:

- Assume Simplicity
- Embrace Change
- Enable and Focus on the Next Effort
- Incrementally Change
- Maximize Value
- Manage with a Purpose, Question Actions
- Project Manager must manage the project and process boundaries
- Rapid Feedback to All Stakeholders
- Quality Deliverables
- Create Documentation Based on Value

Glen Alleman [3] describes agile as a “thought process” with the following practices:

1. Think small incremental deliverables
2. Get the customer to have some skin in the game
3. Never have breakage — have continuous QA at every point through assurance process
4. State up front requirements are fluid — build the processes around fluid requirements.

### Patterns for Organization and Project Management

Patterns are another approach to understand the use of agile based practices in project management. The origins of patterns are typically attributed to the architect Christopher Alexander who used patterns for the construction of towns, neighborhoods, and buildings. Patterns provide solutions to problems in context or more precisely patterns are “a recurring structural configuration that solves a problem in context, contributing to the wholeness of some whole, or system that reflects some aesthetic or cultural value.” [13]

Coplien and Harrison [13] demonstrate that values drive structure from which process emerges. They believe that an organization’s structure is a much better indicator of effectiveness than process and structure is most effective when oriented on “product” instead of “process”. Good communication, as a foundation to structure, requires an emphasis and value on both the human element and an understanding of roles and communication. Coplien and Harrison [13] believe that effective organizations will demonstrate patterns that can be used by other organizations to be effective. A series of approximately 93 patterns are given related to: (1) project management, (2) piecemeal growth, (3) organizational style, and (4) people and code. The particular relevance of patterns to agile project management are: (1) their roots in agile principles and, perhaps even more importantly, (2) as a description of an approach which is in harmony with the agile idea of not supplying hard and fast rules which claim to work in all situations. Instead, patterns are a special kind of rule that “works together with other patterns to create emergent structure and behavior” [13] which makes for effective organizations.

Khazanchi and Zigurs [24] see patterns “as a way of understanding and dealing with complexity”, with particular application toward the management of virtual projects. In a 2005 PMI publication, Khazanchi and Zigurs [24] argue for three theoretical elements to define patterns: (1) communication, (2) coordination, and (3) control. They believe that patterns can be created for these three elements that include processes, best practices, factors, tools and techniques.

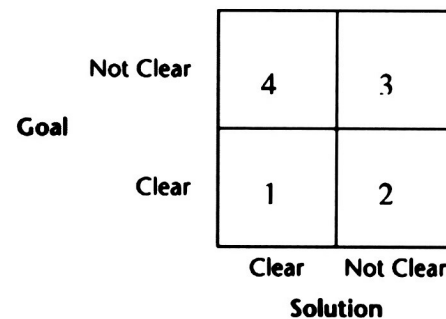
### Theoretical Approaches

A variety of books have been written in the agile project

management domain that are based on different theoretical foundations: Theory of Constraints [5], Critical Chain [27], Lean Production [29], Complex Adaptive Systems [7, 21], Chaos Theory [15] and Cooperative Game Theory [11]. Even though the theories appear to be diverse, at their core, they all are in harmony with the agile principles found in the Agile Manifesto [8] and Declaration of Interdependence [6]. Wysocki [34] summarizes some of these approaches in his book on effective software project management. Even though this book is oriented towards software, the principles extend beyond software, and the models used are effective ways to understand agile project management.

### Agile Project Management Strategies

From an agile project management classification perspective, the Iterative, Adaptive, and Extreme strategies defined by Wysocki [34] fall under the agile project management umbrella. The Linear and Incremental strategies are traditional project management approaches. These approaches will be briefly reviewed to help differentiate them from the agile approaches. In addition, Wysocki [34] has identified an approach which identifies project characteristics in a quadrant and then matches those to different project management strategies. Project characteristics are classified based on a certainty to uncertainty continuum for the project goal (ends) and project solutions (means). After identifying the quadrant (see Figure 1 below) that a project is in, specific, situational project strategies can be selected to match project management strategy with problem type. If there is doubt about the quadrant a project belongs to, the less risky strategy is to err on the side of choosing a higher numbered quadrant. However, depending on how the project evolves, it may be advisable to adjust the management of the project to the strategies of a lower quadrant if the project characteristics change. The authors will examine these quadrant characteristics in a subsequent paper.



**FIGURE 1: Project Characteristics Quadrants by Goal and Solution Uncertainty — Adapted from [34]**

### Linear Strategy

A Linear strategy is a traditional strategy that consists of dependent, sequential phases that are executed with no feedback loops. The project solution is not released until the final phase. This strategy fits Quadrant 1 projects because of the following characteristics of this strategy: (1) Clearly defined goal, solution, and requirements; (2) Few scope change requests; (3) Routine and repetitive projects; (4) Use of established templates.

The strengths of the Linear strategy include: (1) The entire project is scheduled; (2) Resource requirements are known; (3) The most skilled resources are not required; (4) Team members

can be distributed. The weaknesses of the Linear strategy are: (1) Plan and schedule do not accommodate change very well; (2) Costs can be higher; (3) Time to complete can be longer, especially if change occurs; (4) Requires detailed plans; (5) Must follow a defined set of processes; (6) Is not focused on customer value as much as delivering against the plan.

### **Incremental Strategy**

An Incremental strategy is identical to a Linear strategy except that each phase of the project releases a partial solution. The characteristics of this strategy are identical to the Linear strategy except that business value must be delivered prior to the final phase. Therefore, this strategy is also well suited to Quadrant 1 projects.

The strengths of the Incremental strategy include: (1) Business Value is produced earlier in the project life cycle; (2) Change requests can be accommodated between increments and discovered through incremental solutions; (3) Stronger focus on customer value than the Linear approach. Some weaknesses of the Incremental strategy include: (1) Heavy documentation; (2) Difficulty defining function/feature dependencies; (3) More customer involvement is required compared to the Linear approach.

### **Iterative Strategy**

An Iterative strategy consists of a number of repeated phases that include a feedback loop after a group of phases is completed. The last phase of a group may include a partial solution if the customer desires. The Iterative strategy is a learn-by-doing strategy that uses intermediate solutions as a pathway to discover the details of the complete solution.

The strengths of the Iterative strategy include: (1) Customer can review current solution for suggested improvements; (2) Scope change can be accommodated between iterations; (3) Adapts to changing business conditions. Weaknesses of this strategy include: (1) Requirement for a more active customer than Quadrant 1 projects; (2) The final solution cannot be specified to the customer at the outset of the project. An example agile project management method is Scrum [32].

### **Adaptive Strategy**

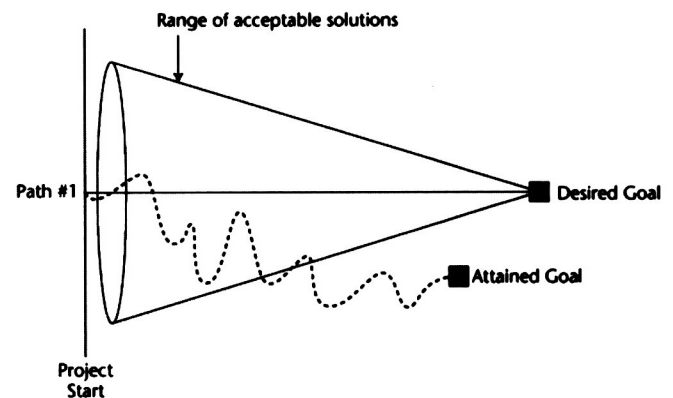
An Adaptive strategy is similar to an Iterative strategy except that with an Adaptive strategy each iteration's feedback adjusts the next iteration so that a solution will be converged upon. An iteration can release a partial solution at the discretion of the customer. The Adaptive strategy is a quadrant 2 and quadrant 3 strategy because it is best suited to projects whose solution is only partially known. To remove the uncertainty, the solution is arrived at via a continuous change process from iteration to iteration. The success of the Adaptive strategy is therefore highly dependent on the ability to accommodate frequent change and adjust accordingly. Therefore, planning is done primarily in a just-in-time manner.

The strengths of the Adaptive strategy include: (1) Does not waste time on non-value-added work; and (2) Provides maximum business value within the given time and cost constraints. The weaknesses of this strategy include: (1) Must have meaningful customer involvement throughout the project; (2) Cannot identify exactly what will be delivered at the end of the project.

Example agile project management methods are Adaptive Project Framework [34] and Adaptive Software Development [21].

### **Extreme Strategy**

An Extreme strategy is similar to an Adaptive strategy except that instead of adjusting with each iteration to converge upon a solution, the goal of the project must also be discovered and converged upon. The lack of goal clarity is the main difference between the Adaptive and Extreme strategies. The Adaptive strategy requires a clear goal and the Extreme strategy does not. Research and development, or similar projects would fall in this Quadrant 3 oriented strategy. This type of project goal uncertainty is also referred to as "chaos" as "often the project ends up with final results that are completely different from the project's original intent" [16]. Figure 2 graphically represents a search for a goal through an extreme, quadrant 3 project.



**FIGURE 2: Goal Searching in Extreme Projects [34]**

The strengths of the Extreme strategy include: (1) Allows for keeping options open as late as possible; (2) Offers an early look at a number of partial solutions. The weaknesses of this strategy include: (1) May be looking for solutions in all the wrong places; (2) No guarantee that any business value will result from the project. Example agile project management methods are INSPIRE [34] and Flexible (DeCarlo's [15] eXterme Project Management).

### **Summary of Strategies**

Wysocki [34] provides a somewhat simplified, high level view of these strategies in terms of both construction and project management to highlight the iterative cycle differences and also the way the project management phases interrelate with these cycles.

In Figure 3, Wysocki's [34] five strategies are compared from a scope, design, build, test, and deploy perspective. Although the differences are simplified in the figure, the main differences are based upon which phases are reiterated per cycle. In an extreme strategy, even the project scope is readjusted based upon feedback from the project iterations.

Another way to examine the differences in the strategies is by comparing project management phases to the development or construction phases. The iteration differences between the strategies can be seen, in particular, in the way that planning, monitoring and control operate differently (Figure 4). By comparing the traditional Linear and Incremental strategies to

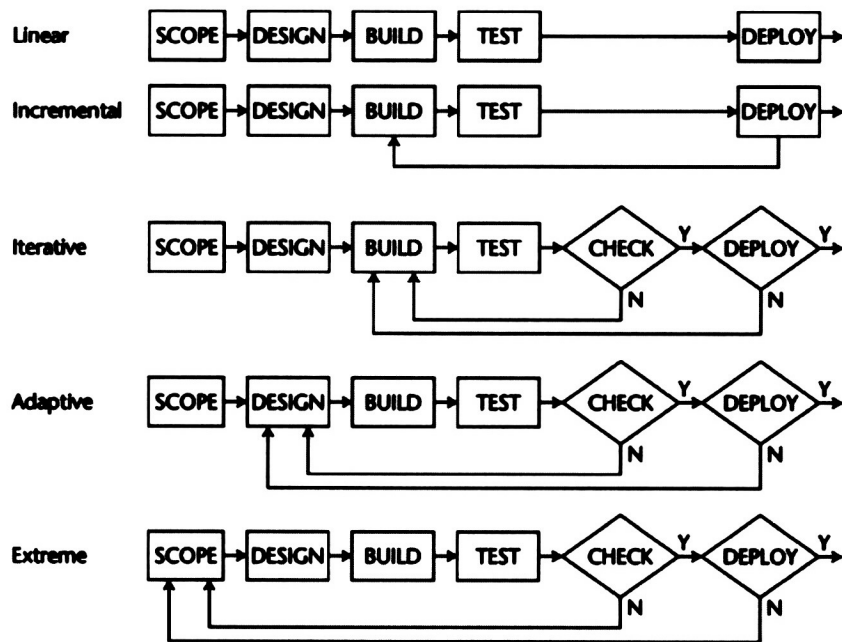


FIGURE 3: Project Management Strategies Based on Complexity and Uncertainty [34]

the Iterative, Adaptive, and Extreme strategies, the differences between agile project management approaches and the traditional approach can be more easily seen. Of particular note, the planning efforts with the agile approaches are done more often and in an iterative manner.

### Summary of Agile Project Management Approaches

#### General comments

The principles of Agile Project Management begin with the underlying principles and values of the Agile Manifesto [8] and Declaration of Interdependence [6]. Of particular importance are the emphases on people and the desire to remain flexible and adaptable in the face of uncertainty and complexity. Agile project management approaches also emphasize a generative approach, where only what is needed (processes, tools, procedures, documentation, etc) is required to be used in the project. Plus, there is awareness with agile that different situations require different solutions or different methodologies or approaches. Cockburn [9] outlines four additional principles that could be considered when selecting an approach or methodology for project management: (1) A larger group needs a larger methodology; (2) A more critical system — one whose undetected defects will produce more damage — needs more publicly visible correctness (greater density) in its construction; (3) A relatively small increase in methodology size or density adds a relatively large amount to the project cost; and (4) The most effective form of communication (for transmitting ideas) is interactive and face-to-face. Plus, project priorities and delivery date, level of quality, and desired visibility into the process could also impact the approach chosen.

Finally, there must be a match between the project, culture, project team, customers, and the project strategy that is selected. This decision is not fixed, however, but the team and/or project manager should be willing to change the strategy as the project

characteristics change. There ought to be a continued emphasis on matching the level of processes, procedures, and documentation to the needs of the project.

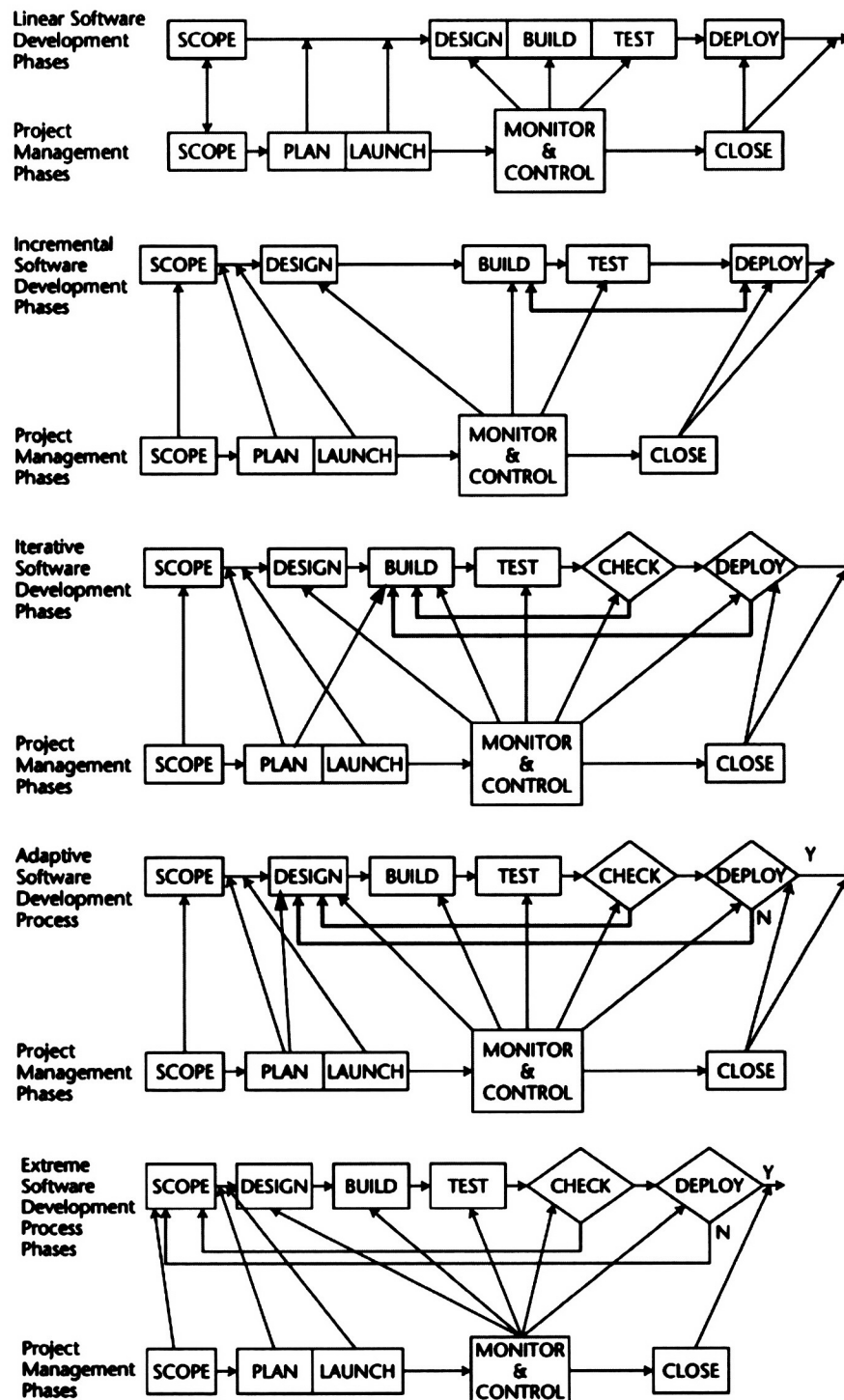
#### Applicability beyond Software

Even though the majority of the literature related to “Agile” ideas and “Agile Project Management” is still within the software development domain there are attempts to widen the scope of agile project management and make it applicable in other areas. One area that is receiving particular attention recently is construction. Conclusions in this area include: “There seems to be considerable potential for gains to be made from the adoption of APM in the pre-design and design phases of construction; iterative and incremental development can facilitate creative solutions, particularly to complex and uncertain requirements. However, the fractured and temporary nature of the actual construction organization is likely to impede the desirable continuation of these practices through to construction and support”. [28]

### AGILE AND TRADITIONAL PROJECT MANAGEMENT

#### Harmony with PMBOK

At the 2004 PMI Global Conference, Griffiths [19] described a way for agile methods to be used alongside traditional methods. His suggestion was to take as-is the PMBOK processes for Initiation and Closure, and then build on the Progressive Elaboration concepts for the Planning process. The Execution and Controlling processes, however, were handled quite differently and an agile approach is suggested. Sliger [31] finds a high level of compatibility between the PMBOK and agile practices. Highsmith’s [21] Agile Project Management framework is used by Sliger as the basis of comparison with the PMBOK.



**FIGURE 4: Project Management Strategies Based on Complexity and Uncertainty — Adapted from [34]**

When comparing different project strategies or approaches, Wysocki [34] also details differences between traditional and agile projects.

### Traditional Versus Agile Projects

Traditional projects are clearly defined with well documented and understood features, functions, and requirements. In contrast, agile projects discover the complete project requirements by doing the project in iterations and therefore reducing and eliminating uncertainty. Because of this, agile tends to be higher risk compared to traditional projects, but agile has the flexibility to more easily adjust to changes in project requirements.

### Traditional Versus Agile Project Managers

Traditional project managers manage their projects against the budget, schedule, and scope. Metrics and variance can be tracked against the planned baselines. The traditional project manager wants to reduce risk and preserve the constraints of time and money. In contrast, the agile project manager is focused instead on deliverables and business value and budget and timeline are secondary. The agile project manager is trained to deliver a product instead of adherence to a process like the traditional project manager.

### Traditional Versus Agile Teams

Traditional projects can more easily support distributed work teams of specialists and junior members because of the well-defined requirements and other documentation. Agile project teams require co-location of team members and staff in order to embrace change and rapidly produce increments. Projects being worked in multiple locations can have teams using agile methods in each location. The commitment level from agile project members must be greater than from traditional team members as they are called upon to take a greater role in their projects.

### **Case in Point**

There is much evidence in the literature of successful implementations of the agile methodology. One example is that of Lockheed Martin [35] which involved an effort to improve the delivery of systems to the client and finding the agile approach in the process of its investigation. Lockheed Martin managers chose agile practices in order to improve four areas that were consistently part of management's focus: managing changing requirements, increasing productivity, ensuring quality standards were met, and developing and delivering a product increment more often. In one departmental implementation of the agilism, a majority of those polled within the business area saw a greater than ten percent improvement in productivity, product quality, customer satisfaction and overall reduction of cost of development [35]. Given the large scale of Lockheed Martin and many industry systems, even the smallest improvement in any of these areas has a major positive impact to the bottom line.

In recent years there has been a growing dissatisfaction with the term "agile" and corresponding "agile" practices. New terms are being introduced such as "pliant" and "non-linear" to replace "agile". At the core of this dissatisfaction is the concern that the term "agile" is being used primarily as a marketing device and that many prescribed "agile practices and processes" are being followed with blind adherence at the expense of being flexible and adaptable to the need for different practices and processes. Coplien [13] expresses fear that "we are lemmings" simply following the latest fad rather than being adaptable to finding the best practices for the projects. He also advocates a return to the Agile Manifesto and its roots as a means of bringing focus back on people and on being effective not simply being "agile" as an end in itself.

In addition to the concerns that "agile" has lost touch with its original meaning, there are other concerns and criticisms about agile and agile project management. Boehm sees risk of design mistakes that "cannot be easily detected by external reviewers due to the lack of documentation." [12] During the first eWorkshop on Agile Methods, there was concern that the reason agile worked was simply that agile approaches require more experienced people and therefore the capabilities of the team members are what project success should be attributed to rather than agile practices and principles [18]. Alleman [1] believes that managing projects with agility is no more than simply using process areas appropriately and with intelligence. Elsewhere Alleman [2] argues that Agile is "a delivery mechanism", a "style of performing processes", but not a discipline. Previously a stronger advocate of agile project management, Alleman [2] now has "had second thoughts about how much hype there is around Agile Project Management having observed failed projects that adopted agile project management techniques without first understanding the core principles of project management." Alleman [2] believes that a better starting point is to "pick your favorite project management processes — PMI, CH2M Hill, Prince2, DoD PMBOK, NASA Systems Engineering, Solomon's Performance Based Earned Value, or a variety of others" and then "apply agile principles to those process areas - that's agile project management."

## CONCLUSION

### **Summary**

Agile practices, including project management, grew out of a need to manage projects characterized by complexity and uncertainty with responsiveness and adaptability. When goals and solutions are unclear and there is high volatility, there is particular need for alternative approaches to managing projects. Becoming equipped with different approaches to project management will allow project managers to better match the characteristics of the project at hand. The effort to accommodate agile project management approaches and learn how to be flexible and adaptable may well be worth the investment for many project managers. This flexibility could be highly advantageous when faced with certain types of projects and project scenarios.

### **Importance of Matching Project to Project Management Approach**

The need to properly match the project management approach

to the project is crucial to project success. However, simply making a one-time decision to be "agile" may be insufficient for the organization, or perhaps even for the life of a particular project. Instead, there must be a willingness to change, adapt, and be aware of how best to manage a given project situation within a particular environment and culture.

### Hybrid Approach

While not directly focused on project management, the comments by Cunha and Gomes [14] on product development are equally valid: "the traditional engineering roots of management processes should be complemented with a more organic and adaptive view. In summary: order may not be as good as it seemed and the challenge may reside in the identification of the appropriate combination of structure and disorder." A hybrid approach to project management with both traditional and agile practices may be the most valid approach.

### Heart of Agile Practices

This paper has spent a great deal of time discussing a variety of processes and procedures which build on agile values and principles, but if the heart of agility is not maintained, then simply following an "agile" process is not being agile. Cockburn [10] describes it this way: "I keep telling people that agile is mostly an attitude, not a methodology or fixed set of practices." "Agility is a means to an end, not the end itself" [20]

As Lockheed Martin [35] experienced, when one is looking for ways to improve productivity, product quality, customer satisfaction and reduce production costs, it may be that one will discover the heart of agility at the center of the solution.

### Areas of Future Investigation

The literature on agile project management is still in its infancy, but much more research should be done into agile project management outside the scope of software development. Included in this research should be the development of project management patterns extensible into agile projects in general. There is also the possibility of producing a common theory of agile project management that could help project teams understand the underlying ideas of agile within the context of project management. Finally, additional work is already underway to bring agile ideas into the PMI's PMBOK. However, the success and likelihood of introducing agile ideas into the PMBOK is unknown.

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