

Documenting Agile Project Knowledge: A Review of Knowledge Capture for Agile Practices

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Abstract— In the current agile project management environment of fast-paced, iterative changes, capturing appropriate project knowledge without affecting the light, iterative method is critical. The goal is matching light, streamlined documentation approaches to agile practice while avoiding excessive documentation. This intent includes knowledge capture specifically designed for a specific audience. This research addresses these audience requirements with modern project documentation tools. Organizations considering documentation practice changes should also consider change management and implementation planning. While there is no generic toolkit that meets the needs of every organization, the intent is to provide best practice methodologies and an approach to determine organizational needs.

Keywords - Knowledge Capture, Knowledge Management, Agile Project Management, Project Documentation.

1. INTRODUCTION

Methodologies for software development projects have changed dramatically in the last fifteen years, represented by a drive toward lighter, more agile approaches. According to Highsmith, Cockburn, and Boehm [10] agile software development, a common title for these lighter approaches, is a group of methodologies that use adaptable, product-centric techniques for software development projects. Iterative design models with continual sponsor interaction also characterize the agile process. These attributes allow for rapid adaptation in the development process to meet evolving user requirements.

Cohen, Lindvall and Costa [7] describe one of the primary characteristics of the agile development method as a reduction in intermediate documentation inherent in traditional development methods. Documentation consumes significant project resources and a reduction frees project resources for other efforts. Project Management methodologies defined as traditional are often heavily reliant on defined processes that utilize extensive documentation. In contrast, the changing atmosphere of agile project management allows for a lighter, agile approach that is less dependent on traditional process documentation allowing for flexibility and speed.

Rapid changes in agile development methodologies have produced new requirements for recording project knowledge. According to Highsmith, Cockburn, and Boehm [10] agile software development methodologies emphasize the final product rather than the extensive project documentation previously associated with traditional projects. Despite this emphasis, organizational

requirements and project benefits still provide conditions for some form of knowledge capture and dissemination according to Nemani [14]. Potter and Sakry [17] contend that appropriate documentation provides benefit for current project efforts as well as future benefits of knowledge transfer and organizational learning. While an agile methodology places emphasis on the product, knowledge capture can be part of that final package.

2. RESEARCH QUESTIONS

This research addresses several questions related to knowledge capture requirements for agile structured projects and will provide the framework for this research.

- 2.1 Can agile project practitioners record agile project knowledge without negatively affecting project method, timeline and goals?
- 2.2 To provide maximum benefit for ongoing support and further development, what knowledge should documenters record?
- 2.3 How can agile project participants record project knowledge to benefit an organization's project management methodology?
- 2.4 What is the best method for recording this project knowledge to minimize required documentation resources?
- 2.5 What project knowledge is project specific?
- 2.6 What project knowledge has limited value for ongoing initiatives?
- 2.7 Which methodologies of knowledge capture are best suited to a project structure that values collaboration and individual direction?

3. RESEARCH SCOPE AND APPROACH

The research for this project will include evaluations of the separate bodies of available knowledge on project management documentation and agile project methodologies. The research will also include an evaluation of current and emerging concepts on knowledge capture to determine methodologies suited to agile development projects. These aims will strive to correlate the two available bodies of research and draw conclusions about best practices for agile project knowledge capture. The research will also include new and developing methodologies for knowledge capture and collaboration.

A related topic covered by this research is minimum documentation requirements for agile projects. One of the stated goals of the agile methodology is a reduction in documentation when compared with traditional project

management methodologies. To support the light, flexible nature of the agile method, this research contains an exploration of critical and core documents versus avoidable documentation. This research addresses the concept of minimum required for documentation selection, and it addresses minimum requirements for the content of the actual documents that practitioners use.

4. LITERATURE REVIEW

Dybå and Dingsøyr [9] note that agile project management practices are evolving methodologies that represent a departure from traditional project management practices. Because of the rapid changes in agile methods and changing approaches to projects management, there is an imperative for research to help understand the value of and the requirements for the use of these new methodologies. Current research primarily offers a general view of agile methodologies and deals with the introduction and implementation of agile methods. There is an opportunity for more finite research into organizational practice to support agile methods and the optimization of agile techniques. The focus of this research is agile project knowledge capture including the use of documented knowledge to support project efforts and organizational learning.

Potter and Sakry [17] define project documentation as, “a method of concisely capturing and sharing critical project concepts.” A couple of the key words in this definition, concise and critical, are important considerations for agile projects. A significant concern for agile project participants is when and how to document appropriate project knowledge according to Nemani [15]. There are several questions posed in current literature on project documentation and specifically agile project documentation related to this definition. What knowledge is actually critical to a project? What documentation is nice to have and what is a poor use of resources to create and maintain? One of the goals of this research is to define the best use of knowledge capture resources. This goal includes a determination of unnecessary work. Another goal relates to the amount of knowledge to capture in specific project documents.

Current Agile Documentation Conceptions

Parnas [16] describes the software development setting for agile practice. Parnas contends that agile is another solution for software development issues that will not solve the underlying problems on its own. Instead, a more comprehensive look at the specific documentation employed by software developers should be conducted. Parnas argues that understanding the communication gaps that exist and the documentation that is missing the mark will address the underlying issues. While this information provides an excellent counter-point for strict agile practice, it also provides an imperative to understand the contribution that appropriate project documentation can provide in an agile setting. This suggests that the limited documentation strategy of agile methodologies does not preclude a need to examine the actual need for project documentation and the methodologies used to produce it.

Agile Project Documentation Attributes

Cohen, Lindvall, and Costa [7] explain that agile development methods are light and traditional documentation can be seen as cumbersome and a deviation from the method. Agile projects often move quickly from one project iteration to another and rely on the project participants as the keepers of project and system knowledge. Agile Project Managers should consider the use of project team members for knowledge capture and documentation efforts when defining best practice and appropriate documentation tools.

Ambler and Lines [2] call on research results to show that comprehensive documentation for a project does not actually increase the likelihood of success for a project effort, but rather indicates a lower success rate. This seems to be counter-intuitive but the authors outline how excessive documentation can obscure important information. This can detract from actual project task work affecting the project timeline. Agile project participants should note that excessive documentation should not weigh down the speed and agility of the agile method.

Agile Project Documentation Value

An important concept that relates back to the original Manifesto for Agile Project Development drafted by Becker and Ghedini [3] relates to priority. A key point in the manifesto is “working software over comprehensive documentation.” The idea being that the goals of an agile project are in the product not in the documentation, unless it supports the product and its development. This concept means that project documentation should have specific value for the project and the software developed by Rüping [20]. If a specific documentation effort does not directly support the development efforts of the project, then avoid it. Potter and Sakry [17] point out project participants should consider the purpose of specific documentation to assign value. Before creating additional documentation, practitioners should specifically consider the use for the information. Without determining who will use the information and for what purpose, it is difficult to determine the contribution to the project effort as a whole.

Ambler and Lines [2] also clarify that the value of documentation should meet specific requirements for Return on Investment (ROI). If the use of specific knowledge capture methods or tools proves to be more expensive from a resource perspective than the value that they provide for the project and organization, users should avoid them unless there is a specific requirement. When considering the costs of documentation, organizations should also address the Total Cost of Ownership (TCO).

Agile Project Communication Requirements

When considering the concept of documentation for agile projects, Ambler and Lines [2] outline a concept that project participants should emphasize communication, not just documentation. Organizations should also use this theme when evaluating documentation tools for a project. The suggestion is avoid documentation that does not convey a message that will be of value to project participants or stakeholders, or as organizational knowledge for future project participants.

In fact, Kong, Kendall and Kendall [11] conducted case study research that revealed industry sentiment that agile methods improve project communication. This feedback contradicts the concept that additional documentation increases project communication. Cervone [6] points out that it often best to employ direct communication over additional project documentation. This does not mean that there should be no project documentation. Instead, project participants should consider efficiency when determining the best method for project communication needs. At times, documentation fills the need, but other situations require communication via direct project participant interaction for efficiency. This concept supports the minimalist philosophy for agile project documentation.

Project Management Documentation Best Practices

There are ample literature resources that provide insight into the value of Project Management methodologies including the project documentation. According to research results provided by Besner and Hobbs [4] there are specific documentation tools that have significant value for projects. Tools that focus on organizational learning and memory received the highest ratings from the research participants. Beyond specific documentation types that offer the most benefit, appropriate methods for document creation and use can enhance project benefits.

Rubin and Rubin [19] indicated that minimal documentation could create knowledge silos and mean additional resource risk for the project. Part of the impetus for this research is to provide knowledge capture tools to allow for the dissemination of project information and the ability to avoid knowledge silos for better knowledge sharing within an organization. While a project may progress quickly with resources focused solely on project tasks, the inherent risk of relying too heavily on the expertise of a few participants may not be acceptable. By establishing methods for capturing knowledge created during a project, organizations may effectively mitigate this risk.

Another important tool given high priority in Besner and Hobbs [4] research is risk management and risk mitigation documentation and tracking. Project size is another consideration for the type and amount of documentation used to support project efforts according to McGovern [12]. Limited documentation is acceptable for small efforts completed in a short time with limited resources required. Longer efforts including team members that are not exclusively co-located and requiring more organizational resources should have more formal documentation practices, according to the author. Other benefits of appropriate documentation include the preservation of knowledge, communication of project expectations and requirements, and empowerment of project managers to obtain and direct project resources according to Robinson [18]. Documents produced during a well-run project naturally convey the message of project planning, status, and goals.

Streamlined Documentation Methods

Canzoneri and Van Tiem [5] indicate that streamlined documentation enhances the project management of software development efforts. The concept of simplified,

streamlined documentation correlates well with the light, flexible approach of agile development projects. This research will explore the proposed benefits of pairing a streamlined approach to knowledge capture with flexible, agile software development methods.

Minocha and Thomas [13] described the current knowledge capture and collaboration tools, like a Wiki Environment are beneficial for agile project documentation. These tools offer historical functionality to observe changes throughout the course of a project. They also offer project communication tools for recording various project statuses, changes and version control. By both recording updated information and making it available to other project participants in a format that tracks changes, project team members can collaborate on the development of a system while capturing knowledge simultaneously.

5. DISCUSSION AND SOLUTION MODEL

An important concept to consider when defining a solution for documentation practices for agile projects is Knowledge Management. According to Alavi and Leidner [1] knowledge is essentially the information held by individuals and Knowledge Management is the practice of extracting, recording and disseminating that knowledge for the benefit of the organization. This definition of knowledge is important because it directly relates to the purpose for documentation during projects. The capture of agile development project and system knowledge is potentially valuable to organizations. By recording agile-driven project documentation including lessons learned and previous successful strategies the agile methodologies can continue to evolve to suit the specific organizational needs. This derived knowledge can also promote improved agile project management practices generally. To derive these potential benefits, project participants should use specific criteria for agile project documentation to provide a framework for appropriate knowledge recording and dissemination practices.

Using the concepts of minimum required and maximum return for project resource efforts, organizations can determine the appropriateness of specific practices. The process outlined is one where participants record only project information that provides more value than cost, do not affect the work that the project members are completing, and record as the project progresses rather than after specific phase completion. The goal of agile project documentation should be to add specific value to an effort without creating unneeded overhead or resource requirements.

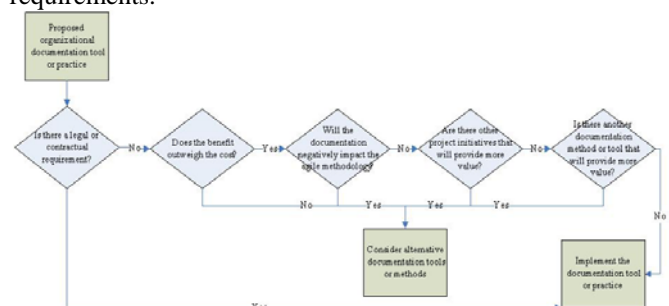


Figure 1 Solution Model Description

Organizations can use a decision flow (see Figure 1) to determine whether to implement a documentation type or tool. Each of the decision points along the path offers an opportunity to evaluate proposed practices to ensure that they provide value and support agile project management practices. These decision points offer opportunities to avoid or remove documents or practices that utilize project and organizational resources inefficiently. Organizations can also employ another opportunity to filter documentation for value by using the method outlined below (see Figure 2). This second filtering flow allows for streamlined content. One of the concerns related to over-burdening the agile methodology is over-documentation. This can be in the form of additional documents that have little value for the project effort, or it can be too much content in each of the documents or tools as well. By addressing specific considerations like purpose, audience and use, practitioners can streamline the content of documentation to support agile efforts without overtaxing resources or providing convoluted communication.

Ambler and Lines [2] indicated that the project knowledge shared during the course of agile projects is purposefully fluid between individuals involved in the project. Project Managers should analyze documentation practices that were successful for previous projects that did not employ agile practices to determine applicability for agile projects. The capture of project knowledge during agile development projects should mimic the format of agile methodologies in their fluid, evolving nature. Project participants should record documentation as a project progresses instead at a specific point-in-time designated for discussing findings. Traditional development documentation strategies may not be well suited to adaptable agile methodologies.

Project Documentation Toolkit

Organizations can use knowledge capture methodologies that will not influence the agile structure of the project. Considering the adaptive and fluid structure of agile development projects, the methodologies to capture knowledge and disseminate it should also be flexible and evolve with the project. There are available tools including project management software, collaborative project wikis and development session recording tools that allow for this level of adaptability.

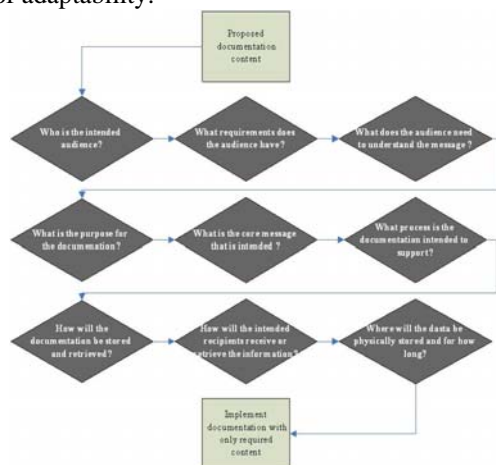


Figure 2 Documentation Strategies

Minocha and Thomas [13] explain how the adaptive, participant-driven qualities of a project collaborative knowledge base or wiki can provide value for a project with fluid, adaptable requirements. By considering the nature of agile projects and being sensitive to the agile stated goal of minimal documentation impact, project practitioners can employ these types of flexible tools to meet project needs.

Besner and Hobbs [4] contend that there are specific documentation types that have proven project management value. When selecting the documentation practices for an agile effort, organizations should consider documentation that has proven benefit from previous endeavours. This toolkit contains some specific examples that have broadly accepted value for project management practices. While there are likely other documentation types that are valuable to specific project endeavours, this section outlines some that have universally documented value.

A project plan is one of the documents identified as valuable tool for agile projects. The caveat behind the project plan concept is that it should be dynamic and evolve at the project progresses. Developing a comprehensive project plan at the beginning of an agile project does not fit with the nature of the agile practice, but a project plan for an agile effort should evolve as user requirements are clarified and a project phase progresses. Project participants responsible for documentation should address the project plan, like all of the documents considered for implementation, using the filtering process outlined in Figure 2 to ensure they create only valuable content.

Practitioners should also identify and record risks and issues for agile projects and organizations should use a dynamic risk and issue log that participants should update throughout the course of a project. A decision log is another tool that has documented value for project management universally. A decision log is a detailed record of project decisions and includes timing and responsible decision maker information. The value of this document is the authority provided for implementing agreed upon project direction. Organizations should use a decision log to record project decisions that influence current or future efforts including support and communication.

Another important consideration for agile project documentation is the author. Project participants should address the question of who will record project information as well. While there may be a specific project team role or project management assignment for documentation on traditional project, this may not be the best methodology for agile practice. It is best for project participants to record the fluid documentation collected throughout the course of a project. The formats discussed above, like collaborative project management tools, support this type of knowledge capture as project participants make use of the tools. Project team can then effectively use the tools for both project organization and knowledge capture.

Application and Implementation Strategies

Once leadership in an organization decides to make changes to documentation practices, they should consider the actual implementation strategies required for success. Understanding best practice is only a first step in realizing

the benefits of streamlined documentation for agile projects. They should consider organizational cultural factors that influence change generally and knowledge capture and documentation specifically. Project leadership should address project timing, change management within the organization, practice change team composition, and the requirements of the users affected by the changes.

Project Managers and sponsors should address organizational considerations when a methodology for documentation is chosen and implemented. Project decision makers should review proposed documentation best practices to ensure they meet internal needs and requirements. Several factors can influence the implementation of revised knowledge capture methodologies for organizations. Organizational leaders should consider current documentation practices, organizational culture and implementation timing when planning a documentation practices change.

Making a determination of best practice for knowledge capture and sharing via documentation is just the first step toward planning an actual methodology change. Project leadership should also review current documentation practices for the organization. This review may provide insight into knowledge utilization that project participants may not have considered initially. While an impetus for change may still exist, the current utilization is important to consider. Reviewing current practice can also help establish a baseline for change if organizational leadership plans a phased or gradual change.

The culture of an organization is also an important consideration. De Cesare, Lycett, Macredie, Patel & Paul [8] noted that successful agile practices are dependent on non-technical factors like organizational culture and structure. The specific considerations that may affect an implementation include change tolerance, established practice, competing priorities and leadership support. The cultural environment of an organization may structure the approach to changing documentation methodologies. Organizational structure is a factor in implementation planning as well. Organizations that have centralized documentation practice methods including Project Management Office (PMO) or Documentation Services departments have clearer ownership for transitional efforts than loosely organized organizations.

Another important consideration for a successful change to documentation practices is the composition of the project team involved. Organizational leaders should fill several critical roles with participants that are committed to the success of the transition. Project leaders should identify user champions that are aware of current practices and are adaptable to change. Change management is an important subject for an implementation team to address during the planning phase for a documentation practice change also. Change management should include formal communication planning including specifics and the reasoning behind the changes. User acceptance is important for a successful transition to new practices and change communication is one vehicle for ensuring this acceptance. This communication should include both the details surrounding agile project documentation changes and the background

providing the impetus for change. The actual users of documentation tool, templates and practices should understand how changes in practice and process improve efficiency and communication. Without clear value, users are less likely to adapt to new methods and organizations may not realize the potential efficiencies driving the change.

Organizational Benefits

By eliminating redundant or unnecessary documentation practices, Ambler and Lines [2] contend that organizations will observe increased project pace. One of the primary drivers for adopting agile practices is the potential increased pace of projects utilizing the methods. By pairing streamlined knowledge capture and documentation practices with the agile practice, organizations can take advantage of the benefits of a faster approach and develop the required knowledge base required for on-going support and development.

By implementing the practices outlined in this research, organizations may enhance the knowledge transfer between agile project participants and on-going system support professionals and development teams. Project cost is a concern that these streamlined practices address by optimizing this resource utilization. The purpose of this information is to enable organizations to obtain benefit from documentation without changing successful agile practices. A related goal of this research is to enhance the value of agile practice by offering best practices and methodologies for capturing and recording knowledge generated during agile projects. A balanced approach to agile documentation is the aim.

6. LIMITATIONS

The focus of this research is current and emerging agile project management practices. As agile practices continue to evolve and new tools and concepts become available, the recommendations provided by this research should be re-evaluated. While the methods outlined are determined to be best practices for the current development environment, they may not be applicable for future development methodologies.

The scope of this research is also limited to agile project management practice. While other project management initiatives could benefit from these streamlined documentation concepts, the solutions outlined pertain specifically to agile methods. Continued research could be performed to evaluate additional applications for the concepts and methods presented. While practitioners could potentially extrapolate the concepts to include other project management initiatives, readers should consider the specificity of the solutions outlined. Agile practices are the focus of this research and the specific practices suggested. Continued research could be performed to evaluate additional applications for the concepts and methods presented.

7. RECOMMENDATIONS FOR FUTURE RESEARCH

Future researchers should evaluate the benefits of various knowledge capture tools and methods to determine the success of the proposed solutions. While this research

provides extrapolations based on current circumstances and evaluated need, organizations should evaluate the actual success of the methods utilized for knowledge capture. This evaluation should include measurements of success based on criteria including knowledge value vs. documentation costs, project impacts and evaluations of the changes incorporated into the agile methodologies based on the recorded project knowledge. Organizations should tailor the suggestions provided based on the feedback provided by the actual performance of the methods utilized.

Additional application for the knowledge capture framework is another potential area of research. While this study is specifically concerned with agile software development, there are likely other knowledge capture and documentation applications for the concepts presented. The presented correlations may also have value in other project-driven fields. Streamlined documentation practices may provide value in various setting when tailored to meet specific use requirements.

8. CONCLUSION

The actual implementation of streamlined documentation practices for agile projects requires more than just analysis and determination of best practice. Part of the planning and preparation that should go into a practice transition includes the development of an implementation plan. This plan should include communication and change management considerations, organizational considerations, and a specific approach based on user requirements and competing priorities. The success of implementing knowledge capture and documentation practice changes is dependent on the approach used.

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