



## AGILE ARCHITECTURE REVIEWS: THE “OUNCE OF PREVENTION” FOR HIGH-STAKES, HIGH-COST, ENTERPRISE APPLICATION AND INTEGRATION INITIATIVES

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### OVERVIEW

Gaining or defending competitive positioning drives some companies to continually embark on high-stakes enterprise application and integration initiatives. Many of which do not come to fruition as originally envisioned, or do so at great financial and human cost.

CIOs and senior leaders often bring us in as objective and independent outsiders to troubleshoot, offer candid advice, and determine if projects can be put back on track. Most often, we discover that lack of appropriate attention to and investments in the underlying architecture is one of the leading causes for the problem. The problem is compounded when large project teams are working on a weak foundation – choices that equate to pounds of cure are made, when just ounces of prevention early on and throughout the project would have staved off issues that cause a project to become problematic.

It is our point-of-view that planned and periodic architecture reviews – what we call agile architecture reviews – keep projects healthy and on track, much like periodic physicals stave off the potential for serious illness. In this article, we describe what we mean by “agile architecture reviews,” and the philosophies behind X by 2’s approach to agile reviews. We show how agile reviews bring tangible value to IT organizations, and discuss their implications in terms of time and effort.

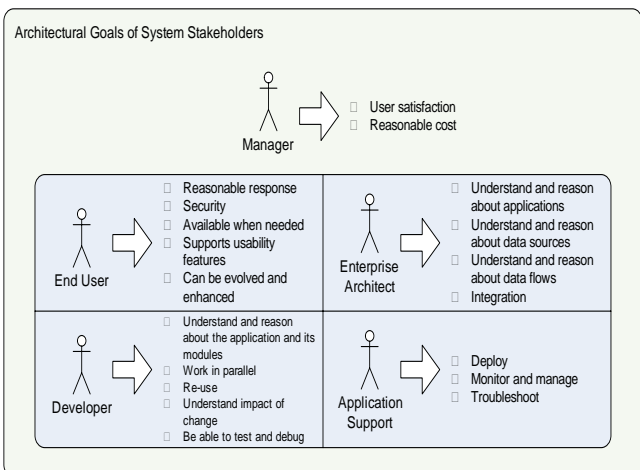
### DEFINING AND DECOMPOSING ARCHITECTURE

Software architecture is, essentially, a description of the system when decomposed into its elements, the relationship between the elements, and the properties of the elements that are visible from outside the elements.

Modern software systems are decomposed for a variety of reasons. First, we cannot appropriately deal with complexity unless we break it down into

its parts. Once we decompose the whole into its elements, we vastly improve our ability to reason about complex systems. We also do it because we want to work in parallel, reuse software, distribute computing across many computers, and understand the impact of changes. Decomposition also facilitates troubleshooting, as we are able to eliminate elements that are not relevant to the problem and drill down to elements of concern or those that appear suspicious – much like the physician who rules out particular conditions in order to reach a clear diagnosis.

Decomposition helps us determine which elements and relationships to study and depict based on project goals and priorities, which in turn depend on the stakeholders involved. Architectural goals frequently conflict, and trade-offs are required to reasonably achieve the goals. The mission, then, of enterprise and solution architects is to find the trade-offs and build solutions that fulfill stakeholders’ goals at acceptable levels.



The appropriate decomposition of elements, the definition of how elements will interact with each other – especially in the context of the prioritized goals of the various stakeholders – and continued evaluation is what we referred to earlier as the necessary attention and investment in architecture.

## MEASURING ARCHITECTURE

One of the ways to measure architecture is to wait until the solution has been built and experienced for a period of time by the key stakeholders. It is not unusual, in this approach, to discover that the solution does not scale well, is unreliable, difficult to change, and costly to maintain and extend. Unfortunately, it is also costly to make changes and corrections after the solution has been built.

Naturally, predicting how stakeholders' goals will be met before the solution implementation even begins is attractive. Every architectural mistake caught or improvement made in the early stages saves tremendous effort and cost down the line. A rule of thumb in software architecture suggests that a one-dollar investment in architectural activities before the implementation saves as much as one hundred dollars in development and maintenance activities. But the question is, how does one look at the architecture blueprint and measure its goodness before the solution becomes reality?

Modern software architecture blueprints are generally expressed informally, and in many environments do not even readily exist. Because they are usually captured as views and documents describing architectural requirements and decisions and their rationale, and due to the informal structure of the output, we cannot simply feed it into a computer and receive a score. It is up to experienced professionals to study and measure the "goodness" of the output.

If we do not want to wait until the quality of architecture is tested via the real-life experience of the system – and if we do not want to risk the additional time and expense inherent in restructuring the project after-the-fact – we have to perform regular architecture reviews throughout the life of the project.

## ARCHITECTURE REVIEW

An architecture review is the process of systematically evaluating software architecture against architectural requirements and the goals and priorities of stakeholders. For maximum value, architecture reviews must be regular, independent, and performed by those outside the project.

- **Regular-** Reviews are similar to preventive medical care – we never know when a health problem will develop, but we can prevent serious illness with regular check-ups that allow physicians to prescribe healthy changes in our lifestyles and behaviors. Architecture is also very dynamic – it changes constantly as teams gain deeper insight into their problem domain and requirements and become more adept with the technologies they utilize. As architecture changes, mistakes can happen, and opportunities can be missed.
- **Outsiders-** Architecture reviews need to be unemotional. Mandates require financial audits be done by outsiders. Doctors do not provide care to family members. Members of the project team cannot be objective about their own work. It is also very important to be able to look at the problem afresh because we lose the ability to challenge our own work after a while. Outside parties also bring broader perspectives simply by virtue of their exposure to the successes and failures of others.
- **Independent-** Independence of the reviewers eliminates the risks of hidden agendas, and fosters incentive for an honest account of the architecture under review. Any conflict of interest or affiliation with any particular product or technology can lead to distortions that may prove quite costly down the line. The only incentive that the reviewer should have is to provide value to the organization by delivering the unvarnished truth and helping with improvements.

## FACING THE CHALLENGES OF ARCHITECTURE REVIEWS

While regular and independent reviews are the most effective and practical way to measure architecture, such reviews do present three challenges:

- **Time of Key Resources.** Architecture reviews always involve the most critical resources in the organization – the people whose time is at a premium. The only practical way for review teams to rapidly learn the architecture of very complex systems is through extensive communication with the key resources. Documents and artifacts play a role in reviews, but cannot replace the value of direct communication.
- **Scope is Hard to Define.** "Trouble" areas of architecture where reviews can bring the highest impact are almost never known in advance and are discovered in the course of the review itself. Someone once said, "the most important thing is to find the most important thing," which reflects the difficult nature of

architecture reviews. When the reviews are planned, no one is certain how many or which specific areas of the architecture will require in-depth analysis.

- **Striking the Right Tone.** Architecture and development organizations take pride in their work. Involving them in the review – providing explanation and direction rather than just criticism – is critical to the overall success.

As outside architects we have experienced each of these challenges, leading us to develop an approach for rapid and effective architecture reviews, which we call **Agile Architecture Reviews**.

## THE AGILE APPROACH

Because “agile” is a somewhat elastic word in the world of Enterprise IT, we must first define it in context. The core values of the “agile” movement emphasize high-caliber people over the detailed processes guiding them; working product over excessively descriptive documentation; rich collaboration over complicated contracts, and responding to change over rigidly following a plan.

The family of agile approaches and methodologies does not question the value of planning, robust processes, and documentation. However, if we look back at the challenges we described earlier, it is clear that reviews must be rapid, flexible, and iterative, placing emphasis on what is most important for the success of initiatives – involvement of the right people, and the ability to adapt and eliminate waste – in other words, an “agile” approach.

## BREADTH-FIRST ITERATION

Our agile architecture reviews begin with a three-step process:

1. Business priorities, or the issues our clients experience, can drive the **broad boundaries** set for the architecture review. These boundaries can name applications and modules that need review as well as specific architectural aspects that are of interest.
2. Once the boundaries are set, we perform a **breadth-first iteration** employing our review framework to ensure that all relevant aspects of the architecture are reviewed. We time-box the time we spend on activities and elements, focusing instead on covering the breadth of the architecture.

3. Finally, we **present** the results of the first iteration of our agile reviews to the key stakeholders. In the course of the presentation and discussion, we make recommendations and jointly decide on the next iterations of the review, if they are needed.

## AGILE REVIEW FRAMEWORK

Our architecture reviews of existing applications and “in flight” initiatives are carried out using the following framework:

We begin by establishing and prioritizing the review goals. Goals may originate from negative experiences and the desire to improve the deficiencies, anticipated scenarios such as changes that should be accommodated, performance and scalability targets, availability expectations, or “universal” goals applied to broad categories of software systems – the general expectations of modern software.

Prioritizing goals is important since goals can conflict and tradeoffs may be necessary.

The next step is to gain a high-level understanding of the architecture in its current state, and capture the conceptual, logical, and physical architecture of the system. We drill down to relevant modules and sub-systems, creating architectural views that assist with analysis against established goals.

With the high-level understanding and views in hand, we evaluate the architecture’s “fitness” relative to established goals, using various techniques and tools to “extract” and evaluate architectural information.

Finally, we make recommendations to remedy “gaps” identified using patterns, best practices and our experience. Our recommendations also outline opportunities to leverage industry best practices, technologies and tools to advance and evolve the architecture.

## ARCHITECTURE REVIEW PHILOSOPHIES

- **Focus on the Right People.** People involved in the review process – the client project team and the review team – are extremely important to the success of the review. A review process is needed to ensure the comprehensive nature of the review, but at the end of the day it is the caliber and experience of the team performing the review that ensures its success.
- **An Iterative Process.** Reviews deal with many unknowns. Iterations help to identify and explore areas of the architecture that require in depth attention, and provide logical planning points for the next steps.

REVIEW DIMENSIONS	
Application	Structure of the application under consideration
Execution	Execution environment of the application, such as the operating system or the application server
Development	The development environment and process
Data	Application data sources and hosting technologies
Operations	Operational aspects such as monitoring and deployment
Network	All aspects of networking in the system
Security	Security aspects such as authentication, access control, and encryption
Integration	Existing integrations and the ability of the application to integrate with other enterprise systems

- **Rapid Delivery.** Reviews involve a majority of key project resources and so they must be completed quickly and focus on high value-add activities. For example, direct communication with key project stakeholders is a much more efficient way of gathering information than laborious studying of the artifacts, although a very selective review of documentation with focus on simple and high value-add artifacts is also important. Rapid review ensures that results are achieved quickly, costs and resource requirements are kept low, and most importantly, that architecture problems are discovered and corrected early.
- **Pragmatism and Open-Mindedness.** Our years in the industry and experience with architecture reviews have made it clear to us that nothing is ever perfect – there are many ways to achieve the desired results. What is crucial for the success of architecture reviews is to be able to look beyond simple “cook book” knowledge and get to the essence of why certain architecture solutions and strategies work and others don’t. It is about delivering value in the right context of the application under question.
- **Respect for the Project Team and Openness.** Our architects “have been there and done that.” We appreciate how difficult enterprise IT projects are and how much the history and evolution of enterprise environments limit the choices and ideal solutions. We conduct our reviews openly, and clearly express why

we ask certain questions or request specific information. We recognize and involve the team in the process, and respect the amount of hard work they put into making their projects a success.

## CONCLUSION

As companies embark on high-stakes enterprise application and integration initiatives, ultimate results are often in question. Appropriate investment in and attention to the underlying architecture, in the form of regular, independent reviews, provide the “ounces of prevention” necessary to stave off costly and time-consuming “pounds of cure” after project implementation.

Our agile architecture reviews keep projects healthy and on track, through an approach proven to provide honest feedback on the state of project architecture to the key stakeholders. They also outline a roadmap of possible improvements and actionable next steps for the project teams.

We deliver value by putting the right people to the task and by applying a proven agile approach to deliver results quickly and comprehensively. Our incentive is to deliver value to the clients who bring us in by providing the unvarnished perspective. Our practice shows there is no better foundation for long and productive relationships and no better ways for our clients and their initiatives to succeed.

### *About the Authors*

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