The Proven Value of Solution Architecture: Six Sigma for Projects
by Paul Teeuwen and Raymond Slot

Much has been argued about the value of architecture, but actual proof is generally lacking. As for solution architecture, recent quantitative research has confirmed that this approach not only helps reduce throughput time and budget for IT projects but also leads to a reduction of variance in time and budget, indicating that bringing solution architecture to a project can be viewed as a quality improvement process in line with Six Sigma thinking. In this Executive Update, we’ll examine a recent research project to illustrate the benefits of a solution architecture.

THE RESEARCH

A large systems integration company analyzed 49 software development projects for customers. The project size was from €50,000-2.5 million (US $61,000-$3,027,000). The average project size was €700,000 (US $847,340). The research defined 10 independent variables, as follows:

1. Involvement of a solution architect in the technical calculation of the project
2. The level of certification of the solution architect, as proxy for the experience of the architect
3. The match between the level of certification of the solution architect and the size of the project, based on the assumption that more complex projects need more experienced architects
4. Specific experience of the solution architect in the business field of the project
5. Quality of the solution architecture
6. Quality of the domain architecture
7. Quality of the enterprise architecture (EA)
8. Quality of the architecture governance process
9. Presence of a controlling architect during the execution of the project
10. Compliance testing between architecture and project during execution

For each independent variable, the project leader and/or the solution architect determined a score of high, medium, or low.

In addition, eight dependent variables were defined:

I. Usage of architecture is correlated with the expected value of the actual project budget (as percentage of the planned budget)
II. Usage of architecture is correlated with the variance of the actual project budget (as percentage of the planned budget)
III. Usage of architecture is correlated with the expected value of customer satisfaction
IV. Usage of architecture is correlated with the expected value of the percentage delivered
V. Usage of architecture is correlated with the expected value of the functional fit
VI. Usage of architecture is correlated with the expected value of the technical fit

For dependent variables, the project leader and/or the solution architect determined a score of high, medium, or low. After that, correlations were determined (see Table 1).

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Table 1 shows that having a solution architecture is the most powerful driver of value. It has a positive effect on five of the eight dependent variables. Enterprise and domain architectures also have an influence, though somewhat weaker.

We believe that the dependent and independent variables of the study are related in certain ways, as depicted by the cause-and-effect map in Figure 1.

One of the more significant facts of the mechanism is that enterprise and domain architectures do not have a direct influence on improving time and budget of the project. The effect works through having a solution architecture. Theoretically, it is possible to have a good solution architecture without enterprise and domain architectures, but in practice that will not happen.

Table 1 — Correlations for Dependent Variables

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Figure 1 — Cause-and-effect map illustrating relationships between study’s dependent and independent variables.
Architecture governance has a direct influence on the budget, because the project cannot deviate too much from a prescribed course. Architecture governance defends against scope creep in projects. For the same reason, it also has a weaker influence on the percentage of the project delivered. Architecture governance also helps establish EA practice.

It is important to note that if an EA group produces only enterprise and domain architectures, that approach will have very little effect. These are the famous ivory-tower EA groups of the past. We now can understand why they have not shown any favorable results. To be useful, enterprise and domain architectures must make their way into projects via the project start architecture (PSA) to the solution architecture.

EXPECTED RELATIONSHIPS WERE NOT FOUND

In the study, a number of relationships were not found. This includes certification of architects, which had no influence on any dependent variable. We attribute this to the fact that many excellent architects are not yet certified, so this may change in the future.

Whether there is a controlling architect during the project was not found to have an influence. Our interpretation is that this is part of the architecture governance process and that architecture compliance is achieved in different ways. In addition, the best way to control the design and build process likely depends on the maturity of the architecture and process in delivering software.

None of the dependent variables had an influence on the percentage functional fit (see VII in Table 1). Our interpretation here is that this is so much the responsibility of the business that having an IT architecture is not the deciding factor. Perhaps having a business process architecture would have had an influence, but that was not part of the research.

THE VALUE OF SOLUTION ARCHITECTURE

Solution architecture has a strong influence on the duration of the project. It also reduces the variance in the budget. In the research, we did not see a strong influence on the budget itself, but in line with Six Sigma thinking, reducing the standard deviation (sigma) is a good thing. We do see the strong influence on customer satisfaction and percentage delivered as a second-order effect, through the reduced duration of the project. While it is speculation, one might argue that for customer satisfaction, duration is more important than budget. An IT project is generally part of the total business project where all other kinds of actions are to be executed. If the project is overbudget, it is annoying. If it is late, all other actions must wait, jeopardizing time to market.

THE EXPERTISE OF THE SOLUTION ARCHITECT

A couple of relationships on the outer boundary of Figure 1 are of interest. The solution architect’s expertise in the project’s business field had an influence on the percentage delivered as well as some influence on the customer satisfaction. A solution architect’s experience in projects of the same size strongly influences customer satisfaction. We can explain this from the fact that more experienced architects are used for the bigger projects. These two facts indicate that the choice of solution architect is an important one in staffing the project. In the preproject phase, having a solution architect involved in the project’s technical calculation reduces the sigma in its budget.

AN OUTSIDE-IN PERSPECTIVE

If you take an outside-in perspective, you start with customer satisfaction and percentage delivered as the ultimate goals in the model. To work on those, you need to control the duration of the project, for which you need the solution architecture. The other driver is the skill of the solution architect, primarily in terms of the size of the project, which is secondary to the business knowledge about the project.

CLOSING THE LOOP

Ideally, cause-and-effect maps show a loop for positive feedback, so that an improvement cycle can get underway. We expect that if customer satisfaction increases, this will lead to more effort in architecture governance and start a virtuous cycle.

WHAT DOES THIS MEAN FOR THE EA MANAGER?

Having a solution architecture for every project is definitely a good thing. At lower maturity levels, it will be necessary that the enterprise architect gets involved in the actual project to make the more detailed solution
architecture on the basis of the enterprise architecture. Avoid architects that work only on enterprise and domain architectures, without getting into solution architecture.

On higher maturity levels, there will be separate solution architects. Appoint a solution architect who has experience with the size of the project, which takes precedence over specific business knowledge of the functional area of the project. Ideally, involve the solution architect in the technical calculation before the project initiation document to improve the reality of the project budget. Strengthening the architecture governance process gives a positive boost to your project.

ENDNOTES


2The research paper used negative wording. For clarity of reading, the corresponding positive statement is used in this Update.

3The lower percentage, the higher the probability that the dependent and independent variable correlate. The common standard of 0.05 was used as threshold value.

4The study researches the effect of the independent variables on the dependent variables, one by one, because there were too few projects in the survey to analyze multiple correlations. As an example, it is not possible to identify the combined effect of having an EA with a solution architecture and compare this to an EA without a solution architecture.

5The study did not investigate the effect of a PSA, but rather of a more detailed solution architecture. In a future Update, we will discuss how to get from a PSA to a solution architecture.

6The influence from budget to customer satisfaction was lacking in the sampled projects, probably because the budget is internal to the system integrator, so the customer does not notice, but the customer will notice a time delay.

ABOUT THE AUTHORS

Paul Teeuwen is an independent consultant based in the Netherlands. He focuses on advising large international clients about IT strategy and architecture. Mr. Teeuwen previously worked for Nolan, Norton & Co., the consulting firm of Cutter Fellow Richard L. Nolan. His thinking is based on the Nolan Stages Theory, which guides the sequence of IT improvement projects in a large firm. Clients have included a wide range of banks and government organizations, including ING, ABN AMRO, MasterCard, Philip Morris, and Netherlands Tax (IRS).

Before going into consulting, Mr. Teeuwen worked in the IT department of AT&T Network Systems (later merged into Alcatel-Lucent). He holds a special interest in applying the knowledge base of organizational change to IT and EA departments and was awarded the Netherlands NAF medal in 2009 for exceptional contribution to the enterprise architecture profession. Mr. Teeuwen is a member of the Program Committee of the Dutch Architecture Conference (LAC) as well as the Enterprise Architecture Conference organized by IRM UK (London). He is a regular speaker at conferences, including SIMposium. He can be reached at teeuwen@euronet.nl.

Dr. Raymond Slot is Professor of Enterprise Architecture at the Utrecht University of Applied Sciences (the Netherlands). He researches the business value of EA, EA quality, and tooling. Dr. Slot has extensive experience in creating and implementing business and IT enterprise architectures. He is one of the developers of the IAF architecture framework and a pioneer in enterprise security architectures. Dr. Slot is an enterprise architect and has advised senior management with M&As and business transformations. His interest is in combining the human and architectural aspects of business transformation. He can be reached at raymond.slot@hu.nl.