The future of Systems Engineering and Integration Self Documenting System

WHITE PAPER

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BACKGROUND

Too often many Systems Engineering or Information Systems projects fail due to poor project management. The causes of the project failures are repeated in subsequent projects without learning from previous project failures. “Depending on which consultancy you ask and what they're ultimately trying to sell you, the failure rate for technology projects is anywhere from 37% to 75%. " (Information Week 2013) According to Oracle there are six culprits to project failure, unengaged stakeholders, poor risk management, vague project scope definition, delayed critical project communication, lack of enforcement of methodologies used and unsuccessful automated tools to provide continuous process feedback. (Oracle 2011)

The research also points out these areas are common throughout most IT projects. Therefore, it would be beneficial if IT projects could share is the lessons learned from other projects to improve future project performance. This could minimize the potential for project failure and improve project efficiencies. For example, a project team with the objective to implement a grants management system for the Department of Health and Human Services’ (HHS) National Institute of Health (NIH) could learn from a project team that has implement a grants management system for HHS’ Food and Drug Administration (FDA). However, in reality because of the limitations in the applications used to manage projects and the silos created between the project teams and government bureaucracy, project teams do not have access to real time or useful indexed data to learn from the past performance of other projects. As a result, a proactive approach to project management cannot be achieved to mitigate actual and/or anticipated risks. What if there was a way to change this reality? The emergence of sharing information and learning from others as an individual with the use of Atlassian Confluence, GitHub, Microsoft SharePoint, Facebook, and other information sharing platforms has changed the trajectory of maintaining silos.

THE USERS

Generation Xers (Gen Xers) and millennials are common users of collaboration applications. Gen Xers have discovered the use of online tools to make their personal life decisions easier and faster. This use of online decision-making tools, unbeknownst to this generation, incorporates business intelligence with the use of predictive analytics to assist in decision-making. To the common user the tools are known as search engines or specifically by their industry name, Expedia, Carfax, etc. What if a similar application was created to evaluate and improve the future performance of IT projects? In addition, what if this application could be used to improve the future performance of Construction Projects or Education programs? This innovation roadmap will address the source of an innovation idea, whether it appears to be feasible, its value proposition, high level features and how it can be distributed into the marketplace.

RESEARCH

Our exposure to various Federal Government IT projects revealed that projects succeeded and failed due to the lack of communication and effective implementation of project processes. 20 to 150 people usually support these projects. As a result of this experience we have done some irregular passive scanning to address this issue. This includes staying informed through conversations with the past and present co-workers, reading the latest news on government spending through the General Accounting Office (GAO), scanning the external environment for new technologies and analyzing the demographics of IT Projects. There was no structure to the conversations or an agenda created. Experiencing the same issues on various IT projects triggered scanning for improvements to this issue to identify an innovation opportunity. The issues we experienced through failed or delayed IT project sparked the irregular scanning of IT projects. Many Federal Government IT projects are required to use the Capability Maturity Model Integration (CMMI) Development Standards to implement a project. These standards were designed to improve the systems engineering development process. However, quit often the maturity model is not always implemented effectively for IT projects. Currently, the project teams are implementing this methodology by using costly or outdated applications and methods. These methods include:

Storing information in repositories that are outdated or overly complicated to use, which leads to the inability to use historical documentation for accurate forecasting and project insight. The use of and management of massive amounts of documents and spreadsheets with minimal or unmanageable traceability.

Knowledge workers, i.e. Leadership, Program/Project Managers, Business Analyst, System Engineers, Test Engineers, Technical Writers, Help Desk analysts, etc., who spend a lot of time searching for information on their projects. “According to IDC [International Data Corporation], the time employees waste searching for information can cost up to $12,000 per employee per year!” ((Kofax, 2012))

“Many well-intentioned but undertrained process groups have misunderstood the CMMI and implemented overly burdensome or ineffective processes in their organizations. Ensuring the key players in process improvement receive CMMI training will help prevent costly missteps in process implementation. Learning from the experiences of other organizations is generally helpful but must always be taken in context.” (CMMI 2009)

If the CMMI development process were implemented effectively, then 37% to 75% of IT projects would not continue to be delayed or fail. In the case were CMMI is used across the Federal Government, this delay and failure cost the tax payers millions of dollars a year. The assumption can be made that an ineffective CMMI process is implemented.

HISTORY

In the early 1900s the automotive industry was having a similar issue, experiencing failures in producing enough vehicles on time. The manual process of manufacturing cars was stagnating the quantity and the level of car production. Using interchangeable parts meant making the individual pieces of the car the same every time. That way any valve would fit any engine, any steering wheel would fit any chassis. This meant improving the machinery and cutting tools used to make the parts. But once the machines were adjusted, a low-skilled laborer could operate them, replacing the skilled craftsperson that formerly made the parts by hand. To improve the flow of the work, it needed to be arranged so that as one task was finished, another began, with minimum time spent in set-up. (PBS 1998)

This introduced the automotive assembly line, which created a repetitive manufacturing

process. “Repetitive manufacturing is a form of mass production that relies on making high numbers of identical units in a continuous flow. This type of manufacturing is suited for a number of applications and is used in factories all over the world. Many companies specialize in developing equipment and techniques designed for such production processes. “(Wisegeek 2014)

SAP, an industry leader in Repetitive Manufacturing states REM is commonly used when a production process meets the following criteria:

“The same or similar products are produced over a lengthy period of time.

The products produced are not manufactured in individually defined lots. Instead, a total quantity is produced over a certain period at a certain rate per part period.
The products produced always follow the same sequence through the machines and work centers in production. Routings tend to be simple and do not vary much.” (SAP 2013)

SAP is "a market leader in enterprise application software [that] help organizations of all sizes and industries combat the damaging effects of complexity, generate new opportunities for innovation and growth, and stay ahead of the competition." (SAP 2014) This company has taken REM and created an enterprise application to support the execution of REM. Coupled with a few of their analytical solutions, SAP has also created a proactive environment for managing the production cycles in manufacturing. Their Batch Traceability Analytics services follow the same steps as testing software or system application in IT project management.

In the process, discrete, and repetitive manufacturing industries, occasional oversights can result in finished products that are defective. The Batch Traceability and Analytics ES bundle enables businesses and plant personnel to analyze and find the root cause of the faulty materials in these products quickly and easily across the entire supply chain without logging into multiple enterprise and plant systems or modules that track the parameters and flow of materials and products. It also provides the capability to

trace batches by going beyond company IT boundaries. Once a defective or corrupted batch is discovered, business and plant personnel can recall the defective batch (if has been supplied to customers) and return any remaining raw materials to suppliers (if the supplier is the source of the defective material). (SAP 2010)

OUTCOME

The systems that SAP has put into place have increased communication across manufacturing projects by incorporating REM standards. This same idea can be used to manage IT projects to proactively resolve issues and find opportunities. This is the objective CMMI is attempting to achieve with IT projects. However, because of the dependency of a manual process to implement and execute CMMI, many times the CMMI process is not as effective.

The process of REM is not only an innovation opportunity that can be borrowed by IT projects, but the predictive technology used within SAPs solutions can be used as well. Especially since predictive analytics is a growing industry.

The industry is just beginning to tap into its growth potential, and during the next five years, increasingly powerful predictive analytics tools will unlock business insights, driving revenue at an average annual rate of 3.4% to $33.3 billion in 2019. These tools can automatically forecast trends in business statistics (e.g. per-store revenue) and consumer behavior when combined with existing data-mining technologies. As businesses in a wide variety of industries, including small and midsize companies, increasingly use IT infrastructure to record and store business data, the potential for these technologies will only continue to expand. (IBIS 2014)

Several organizations, such as Deliotte are on to the trend of predict analytics as it relates to project management. Their Predictive Project Analysis solution, not yet automated, is a start to the future of project management. Deliotte's "PPA capabilities allowed the team to assess project complexity and benchmark it against successful projects of similar complexity. This helped identify areas of potential risks and issues across 17 aspects of the project, including governance, risk, planning, and vendor management. (Deloitte 2012) Deloitte has not created an automated process for this methodology."

Based on this scanning and the analogy an innovation opportunity is recognized. There is an innovation opportunity to improve the way information is managed across IT Project by creating an application that uses a well-defined CMMI process to consolidate and index unstructured project information for the entire system development life cycle. This innovation opportunity creates an innovation idea to borrow SAP's implementation of an enterprise management system to manage every repeatable component with an IT project. The system would be a centralized location to store, share, manage and structure IT project information. The information would be structured to be repetitive and reusable within and across other projects.

According to Jim Vaughan in a CIO October 30, 2009 article, "The reduction of complexity will increase the accuracy of the data that is collected and what I have found is that you do not need to measure your project in excruciating detail. The more time you spend on creating these details the more "value" you are expending by requiring additional time to be spent on your measurements. This is the primary reason that many government project costs so much money. Government contracts require that data be kept at these very detailed levels." By removing the need to manage documents, which adds to the complexity of data collected, this reduces the cost to the Program Management Offices.

OUR INNOVATION

Our Episteme ™ solution is to offers a centralized repository to manage the reusable parts of an IT project, so team members can proactively share, collaborate, develop and analyze project information using an effective automated CMMI development methodology. This system will enable organizations to hire low-skilled workers to manage and implement IT projects, therefore reducing IT project costs throughout each phase of the value chain. In addition, this application will capture, store and retrieve regulations information for the purpose of application development. This will also allow the executive leaders to capture better-earned value for the systems developed. Final, this will also enable systems to become self-documenting for software development projects.

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