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Young Engineers at Work

By Anthony DeMarco

Wide-scale and widely-publicized project failures across the public and private sectors require project managers to gain and retain the knowledge necessary to avoid overruns in the future. Since schedule, cost, or risk overruns account for most failed projects, successful project managers need access to a full arsenal of background information and best practices examples to avoid unsuccessful projects and ensure the project comes to fruition within budget and on time. While younger engineers or those new to the engineering space are often viewed as lacking the experience, knowledge, and judgment of their elders to make the critical decisions to keep their projects on track, one group is taking the project management field by storm.

Only five years out of undergraduate school, this group of young engineers successfully ran a System-of-Systems "Review Your Training" cost exercise during a past International Society of Parametric Analysts-Society of Cost Estimating and Analysis (ISPA-SCEA) International Conference. Despite lacking the years of experience of their senior conference goers, this group was the only team to solve the cost exercise problem's complex hardware, software, and IT estimating challenges with a single, integrated solution. Their unique story follows.

Tackling the Perfect Storm: To Update or Modify?

The cost exercise problem presented to the ISPA-SCEA International Conference attendee engineers was in support of the state of Florida's decision to pursue an expanded state and Federally-linked system of emergency response command centers for natural disasters. The lead government agency used in the experiment was the Florida Division of Emergency Management with support from the Division State Fire Marshal and Federal Emergency Management Agency (FEMA) Region IV. The content providers were weather satellites, air and ground weather stations, and Federal, state, and local agencies including the water and power companies.

To tackle this problem, the team of young engineers conducted a cost/benefit analysis on behalf of the lead government agency to select two options:

- Option A – Modify the existing system by using the Federal government's Global Information Grid (GIG) for expanded delivery of essential information to users and data providers while performing minimum maintenance on existing infrastructure

- Option B – Perform a major upgrade on all existing systems to support an enhanced information flow while increasing rates of interconnectivity between users and data providers – including assured backup capability

The team analyzed both options by using PRICE Systems' TruePlanning© 2007 – a complete suite of integrated cost models and benchmarks, along with powerful, fast knowledge management to enable cost, schedule, and risk management estimation and analysis of product and IT system lifecycles. Using TruePlanning 2007 to model the software, hardware, and IT and networking equipment, they drilled into the software (using True S), the hardware (using True H), networking equipment (using True IT), and integration, test, system engineering, and project management costs at each level of the infrastructure (using True Systems).

The team harnessed the power of PRICE Systems' historical knowledgebase, which is built into the TruePlanning models to simplify the estimation by selecting custom-developed and Commercial-off-the-Shelf (COTS) software complexities; communication gear hardware weights and complexities; and IT equipment purchase prices, upgrade requirements, and lifecycles. Further, the young engineers consulted with PRICE Systems' subject matter experts to size the GIG core enterprise services by analogy using data from a previously-completed estimate with similar communication service requirements.

Harnessing the Perfect Storm: The Total Solution

Using TruePlanning 2007, which encapsulates PRICE Systems' 30 years of experience with thousands of projects, software expertise, and continuous independent research, the team of young engineers established the following:

- Option A – Modeled the system as described in the problem statement, as in the case of the traditional system upgrade, but with an additional system component to represent the custom development of the GIG's core enterprise services. Used True Systems to capture the GIG integration effort required from the state of Florida by isolating the appropriate activities at the highest TruePlanning project level and subtracting the GIG development costs, since Florida is using but not developing the communication services provided by the GIG

- Option B – Modeled the system as described in the problem statement in a straightforward way, by agency, using the information provided about licensed and custom developed software, communication hardware, and IT and network equipment requirements throughout the system infrastructure

With TruePlanning 2007, the team constructed the entire estimate for each option as an integrated whole, including system engineering, integration and testing, as well as project management costs. They did not have to spend any effort combining hardware, software, and IT estimates from disparate sources; nor did they have to identify potential overlapping of project management costs due to having multiple subsystem estimates. This simplification of the True Planning 2007 estimating process allowed the team of young engineers to focus on understanding the underlying issues involved in the available upgrade options, resulting in more straightforward and easily understood end results. Further, TruePlanning 2007 provided everything the team needed to make solid, well-rounded projections, and the suite's risk analysis capability proved critical for good decision making.

Calming the Perfect Storm: More than Beginner's Luck

When the team of young engineers presented their analysis to the ISPA-SCEA International Conference judging panel, the group received high praise for the team's research and understanding of the cost exercise's problem. The judges noted that not only had the team presented much more than a simple estimate for Option One and another cost for Option Two, but also they sought to truly understand the problem and extend the solution beyond just the cost dimension. Further, the panel appreciated the extended depth in the young engineers' analysis, which included cross references to General Service Administration (GSA) tables and online resources. The judges also positively noted that the risk report, charts, and graphics from TruePlanning 2007 served as pictures of the estimate story, dynamically responding to view any level of the system desired. Furthermore, unlike the other teams, the team managed to produce the prescribed cost breakout by work breakdown structure directly from one tool – TruePlanning 2007.

As a result, the team of young engineers, each of whom had less than five years of experience, produced a high-quality, credible, and valid estimate for a complex system problem. This was primarily thanks to a willingness to exert estimating data collection due diligence and a superior estimating tool. Imagine the possibilities this result presents for analysts with many years of experience.

PRICE Systems (www.pricesystems.com), a world leader in Cost Estimation and Program Affordability Management solutions, enables organizations in the aerospace & defense, banking, financial services, and insurance industries, as well as government agencies, to successfully select, control, and deliver large-scale, complex, and high-visibility projects. The company offers cost estimating, cost analysis, and knowledge capture tools, combined with expert consulting in cost estimating, project control methods, and best practices, to help customers better control costs and schedules throughout a project's lifecycle, ensuring program affordability. Established in 1975 with offices in the United States, Europe, and Asia-Pacific, PRICE Systems serves more than 250 customers worldwide. More than 10,000 project professionals have been trained in the company's cost estimating and analysis methodologies.

Anthony DeMarco
Author

Anthony DeMarco is President and Managing Member of PRICE Systems, Inc. For more than two decades, Mr. DeMarco has been a pioneer in cost forecasting and analysis technology. He has led PRICE both in its former incarnation as a division of Lockheed Martin and since its inception as a successful independent company in 1998. Among DeMarco's credits are the design and implementation of the first application-specific integrated circuit cost-estimating tool. He soon added enhancements that produced the first parametric electronic module estimating system, which is still an avionics industry standard. He holds a patent on the PRICE labor and materials cost estimating model and, for the PC market, he designed XPERT/H™, a desktop version of the PRICE Hardware Model. In 1997, DeMarco received the highest honor bestowed by the International Society of Parametric Analysts (ISPA), the Freiman Award. In 2001, he was appointed by then–NASA Administrator Daniel S. Goldin to serve on the International Space Station Management and Cost Evaluation Task Force (IMCE). DeMarco helped NASA to address cost growth on the program by assessing the quality of the ISS cost estimates as well as program assumptions and requirements and by identifying high-risk budget areas and potential risk mitigation strategies. Using PRICE modeling, DeMarco found that the program was underestimated by more than $20 billion. For information about PRICE Systems, visit www.pricesystems.com.