PMWorldToday

Published in PM World Today - July 2008 (Vol. X, Issue VII)

PM WORLD TODAY – STUDENT PAPER – JULY 2008

Selling a PMO to Management as a Centralised Repository of Project Expertise

By Barry RODGERS
ESC Lille Graduate School of Management

Editor's note: This paper was recently awarded 1st prize in the Student Papers competition at Happy Projects '08. the annual international project management conference in Vienna, Austria during 29-30 May 2008 organized by ROLAND GAREAIS CONSULTING and PROJEKTMANAGEMENT GROUP at the Vienna University of Economics and Business Administration. The paper is reprinted here with permission of the author and PROJECTMANAGEMENT GROUP.

ABSTRACT

It can be difficult in organisations to sell the value of implementing a project management office (PMO) to senior management. The benefits of a PMO must be quantifiable in order to prove its value to the organisation and the organisation goals, and to avoid the misconception that the PMO is just another unnecessary and costly layer of bureaucracy. A PMO, in it's functions as a repository of project historical data, as a support tool to project managers and as a neutral arbiter setting common standards, can be shown to have a positive effect by aiding accurate project cost estimation and thus cost / benefit. In the example of an I.T. company choosing between several mutually exclusive development projects for investment, the value of the PMO input can be identified by comparing the same projects presented to the management team for selection as based on PMO input and standards and as based on project team standalone figures. The company that fully utilises a PMO in this way can expect to realise a real quantifiable value to their business by choosing the right projects based on accurate analysis using common standards and criteria.

Key words: project management, cost estimation, PMO

INTRODUCTION

Initial software estimates shape the project for the rest of its life (Sengupta, Kishore et al, 2008). The estimation process determines the projected cost of a project which, when coupled with the projected benefits, allow organisations to make informed decisions on whether to start or continue a project. Therefore, to ensure organisational business success, not only must the project be a success, it must be the right project to being with.

This paper investigates how an organisation may continuously improve its estimation process by utilising a PMO (Project/Program/Portfolio Management Office), thus ensuring better project value through a more accurate costing process and derived cost/benefit analysis. It is based on the assumption that prior experience is an important input in estimation, and that organisations wishing to grow and improve must mandate prior project experience as an input into new projects (Nicolson, L., December 2006).

Through a literature review, the common functions of a PMO-structure in organisations are identified. The retention of prior project experience emerges as a commonly held belief to be an important function of a PMO- collecting, storing and sharing the collective organisational project experience in order to learn and develop. This leads to a hypothesis on the value a PMO brings to a software development company by managing organisational project experience to aid accurate cost estimation, leading to better project selection and helping to ensure the "right projects" are being done.

As projects are selected on the basis of their costs versus their benefits, so too must the idea of a PMO be presented as having quantifiable value that out-way the costs involved. We see that the PMO can be "sold" in the business environment as being of real value due to its inputs to cost estimation.

PMO VALUE AND FUNCTIONS

What is a PMO? *Project* Management Office, *Program* Management Office, *Portfolio* Management Office- a PMO is a structure within an organisation that functions to support and improve the management of projects within that organisation (Viswanathan, V. Kasi), and/or it's objective is to ensure all projects best achieve the goals of the organisation (Miranda, E., 2003) or, put simply, it's the core of project management in an organisation (Nicolson, L., 2005).

While discussing the value of outsourcing PMO functions, Laurence Nicholson defines four archetypes for a PMO: *Scorekeeper*: passive, supportive, monitor and report; *Facilitator*: source of best practices, seeking to improve; *Scrum Half*: interventionist, controller, accountable for projects; and *Perfectionist*: centre of excellence, a driver, influential (Nicholson L., 2005). These correspond somewhat to the five progressive, successive stages of PMO capability and development in an organisation as outlined in: *Stages 1 & 2*: oversight and reporting, first for single projects then programmes; *Stage 3*: helping project management become a core competency in the organisation and optimizing individual performance; *Stage 4*: "big brother" ensuring the business interests are being addressed in the project environment and *Stage 5*: the centre of excellence, a separate business unit managed by a direct report to the CEO (Hill, Gerard M., 2004). Further to this, the PMO as an auditor is also a common theme. In "Blueprint for a Project Management Office", during the project life cycle two processes are mentioned as being within the domain of the PMO: Project Audit and Tollgate Reviews. An audit is described as an "*in depth evaluation of the true and fair state of [the] project*" by an external actor to the project. Tollgate reviews are defined as decision points – is the project still valid, is it making progress, and is it resourced effectively to ensure success? (Mirando, E., 2003).

We can map the Scorekeeper or Stages 1 & 2 of a PMO to a model called "**Repository**": the PMO is a knowledge management or re-use database, an archive of past information from previous projects, methodologies, processes and standards (Viswantathan, V. Kasi). Facilitator or Stage 3 comes under the heading of "**Mentor**": A trainer within the organisation, documenting best practices and monitoring performance, the PMO coaches and mentors the organisations project managers (Viswanathan, V. Kasi). Acting as a **standards authority**, the PMO controls the methodologies used and defining the standards (templates, processes), and ensures the best practices are used consistently in the organisation (Nicholson, L., 2005). The **auditor** function as described seems to map well to the Scrum Half / Stage 4. The need for the **alignment of projects with business needs** is also a

frequently discussed topic, (Brittingham, Jean; Dinsmore, Paul C et al, 2006; Mirando, E., 2003; Johnson, Asley, 2007; Jainendrukumar, TD, 2008).

In fact the repository, mentor and standards authority models are frequently grouped together in PMO literature and appear to be the most common held view of a PMO. The PMO has an overall view of all projects and is best placed to mandate, co-ordinate, gather and distribute an organisations collective knowledge of effective project management.

Tools, techniques, processes, methodologies and data: all proven, tried and tested, stored and available for others to learn from. However, Michael Thiry maintains that PMOs should be people focussed and people driven, empowering project managers rather than drowning them in controls (Thiry, Micheal, 2006). So, this knowledge, experience and maturity, is it really organisational or is the main repository within an organisation its people assets?

PROJECT EXPERIENCE & EXPERTISE: PERSONAL OR ORGANISATIONAL

The Experience Trap (Sengupta, Kishore et al, 2008) is the documentation of a research project on experience-based learning for complex projects involving several-hundred project managers. The authors' main finding was that experience will have little bearing on a project manager's ability to manage complex projects. People build up a *"stock of knowledge called a mental model"* through experience of decisions made and their effects. However, this mental model does not work in a complex environment. The managers in the research study reacted to complications by ignoring them or trying to apply experience from a simple environment that did not fit the new complex situation.

In order to fix this and enable project managers to learn in complex environments, several practical steps are proposed, most of which seem to outline the *repository* and *mentor* functions of the PMO. *Cognitive Feedback* describes the usage of project data to produce models showing cause-and-effect relationships in projects, with experience showing that results are more effective when data from several projects is combined in the model. These models can be extended to become the basis for decision support systems and project simulation games in the company, allowing project managers to clearly see the probable future effects of their current decisions (in the company context) when in training and in real-world project management. The authors conclude that organisations would gain better value from their training budgets in this way by ensuring senior managers were learning (*"meaningfully improving their mental models"),* and being more successful in complex environments that the traditional model of spending on junior, entry level staff members who could be left to "*to fend for themselves".*

IT Project Portfolio Management (Bonham, Stephen, 2004) also argues for the creation of a "Knowledge Management (KM)" system in organisations. I.T. Specialists cannot rely alone on their own prior experience as in other industries due to the rapidly changing and advancing nature of information technology. In a seeming contradiction, the large difference and variance between projects is taken as the reason why project experience, project lesson learned, project post-mortems should all be fed into the organisation KM system. If all projects are so different, then of what use is data from prior projects? *The Experience Trap,* in its recommendations, advises that data going into a KM-type system should be "scrubbed" first – ensuring that data entered is not skewed as a result of atypical or unusual project circumstances. Stephen Bonham states that the organisations realise the value of the KM system when they also use it for storing processes – e.g. templates or cost-

estimation spreadsheets that, were proven to have been especially accurate. Specifically lessons-learned reports and cost estimation reports are effective tools from previously successfully executed projects in risk mitigation for new projects.

Organisational Knowledge Management systems, such as a PMO in its *repository* function, have been proven to provide real value to the organisations that implement, maintain and support them. Executives from one software provider using this model for the last 3 years have a general consensus that their project management processes have improved – backed-up by the fact that their number of "problem-projects have decreased by over 50% during this time (Sengupta, Kishore et al, 2008, Pg. 100). Another example given is that of Royal Dutch/Shell who estimate for annual cost of $5 million the company estimates an annual return of over $200 million (Bonham, Stephen, 2004, Pg. 189).

HYPOTHESIS: *PMO VALUE IN SOFTWARE COST ESTIMATING*

The paper assumption (that prior experience is an important input to estimation) along with the identified functions of the PMO in the realm of managing project experience allow the following hypothesis to be proposed:

> *Organisations that utilise a PMO to manage their collective project experience can be assured that their cost estimation process is both accurate and continuously improving.*

A literature review is used to validate the hypothesis, focusing on the author's industry of software development and specifically the initial cost forecasting for projects being put forward to a company project selection board.

SOFTWARE COST ESTIMATION

The AACEI in Skills and Knowledge of Cost Engineering (Amos, Scott J., 2007), cite several purposes for cost estimation ("the predictive process used to quantify, cost and price the resources required by the scope of an investment option, activity, or project"). The cost estimate is of vital important to the project and it's sponsors in determining it's viability and feasibility and by helping evaluate different project. Estimates are classified into five levels, depending on the scope definition and the estimate end-usage. Two different methodologies for estimation are given: **conceptual** and **deterministic**. Conceptual estimation seems to fit into the notion of the PMO repository holding the data needed to perform a historical cost analysis of similar projects in order to determine a cost forecast. Deterministic estimation is a more detailed pricing method, working on a higher estimate class than an initial forecast (classes 3 to 1).

Capacity Factor Method

$$\$_B = \$_A(\text{Capacity}_B / \text{Capacity}_A)^e$$

Calculating the cost of project B, given the cost of similar project A and the "capacities" of both projects.

Figure 1: Sample AACEI Conceptual Estimation Technique

AACEI also talk about the uncertainty that surrounds estimation, and the contingency that must be built into an estimate to take account of the "confidence levels, risk issues…". Estimates are rarely a single point value, bur rather a range with contingency being used to cover variations in the cost caused by errors in the cost quantification.

Dan Galorath in his paper on *Effective Software Sizing* (Galorath, D., 2007) refers to the difficulty project managers have in accurately estimating the size of a project and in quantifying the risks and uncertainties related to their estimates. He sees software sizing as a direct relation to cost: the amount of code needed to satisfy requirements drives the project cost, with a common reason for incorrect estimates being "*Data from previous projects…. not used as input into a sizing estimate because it is believed the differences are too great"*. He uses five estimation techniques (described below) to size a development project, deriving the final estimate from clusters of similar values from the estimation techniques (again with estimates not being defined as one point value, but a range with the "least", "most" and "likely" estimates):

1. **Expert Judgement**:

A subject matter or cost estimation expert give their best guess, based on their previous experience on similar tasks and their understanding of the scope of the project at hand.

2. **Delphi Analysis**:

A group or panel of subject matter or cost estimation experts give their best guesses, again based on their experiences and current (at the time of estimation) understanding of the project. Estimates can be submitted singly and anonymously to be compiled into one average estimate, or the process can be iterative and group based, with the experts brainstorming and discussing their way to a consensus estimate.

3. **Analogy**:

An extension of expert judgement, this is a systemic form of using prior experience to arrive at a cost estimate. Common, or analogous, features or situations are identified between the current project and previously completed projects for which the data has been retained. The cost estimate then is a combination of the previous costs multiplied by an index (to determine the current value of an old estimate) and an estimation (by some other means) of the new or unique features of the project.

4. **Database Comparison**:

DB Comparison is a form of analogy, but using IT systems to generate the estimates based on a retained database of input data. As such algorithmic models (e.g. COCOMO) can be applied to input data to quickly generate estimates.

5. **Functional Measurement**:

Golarath refers to functional measurement as a count of the use cases. Otherwise known as Function Point Analysis, from the external user view of the system the features or functions (inputs and outputs) are counted and their complexity rated to arrive at a cost estimate.

Extending his case study data, the following table can be constructed to show the distance between each estimate value and the final composite: supporting his claim that "*there is no single best method… no single best answer… multiple estimation methods be used to achieve an estimate with a high degree of confidence".*

Distance From the Composite Technique	Least	Likely	Most
Composite	**24,721**	**54,015**	**78,950**
Expert Judgment	15,279	-4,015	-18,950
Delphi Analysis	8,144	-295	-2,986
Analogy	20,599	5,435	0
Functional Measurement	0	-26,547	-45,988
Database Analysis	-1,571	18,335	36,720

Figure 2: Table extended from the data presented in Galorath's Case Study

A common theme in cost estimation literature is that an estimate is, by definition, approximate and thus uncertain. As such there are risks to the estimate, and as for all risks there is a probability of occurrence and a loss that comes as a result (Van Scoy, Roger L., September 1992). Following a risk analysis, a "contingency" is added to the cost estimate, to cover the impact of the risk. The size of the contingency depends on the probability of the risk, however the probability of a risk can be very difficult to estimate reliably with risk being described by many authors as subjective (Barki, Henri et al, Autumn 1993).

Risk Score:

Risk Score = Probability x Loss Value

Contingency:

SUM (Identified Risk Scores)

In reality the contingency can be subjectively reassessed depending on the risk profiles: the organisation may want to set aside the full loss value for high probability risks (JISC infoNet)

Figure 3: Risk Scoring & Contingency

FINDINGS

From the above, we can see the value of a repository PMO in holding the prior project data needed for cognitive sizing, especially the Analogy and Database Analysis techniques, with

the Standards Authority PMO responsible for mandating the post-project processes necessary to ensure the data is captured and recorded. The repository PMO could maintain qualification and experience records to aid the identification of the experts needed for the Expert Judgement and Delphi Analysis techniques. The disparity between the sizes shown in the Golarath helps highlight the value of the Standards Authority and Mentor PMOs in mandating a common methodology for all projects within the organisation. By mandating the estimation method(s) that must be used, the PMO helps management make better project selection decisions by knowing that project estimates presented were developed on a standard level (such as rules for counting logical lines of code (Golarath, D., 2007 and Boehm, Barry W. et al, 2000, Page 77.), or guidelines on measuring functional points, which most standards organisations now promote as the most effective means of measuring software metrics (Jones, Capers, Autumn 2005).

For an organisation to make an informed decision on project selection, the benefits must be compared to the costs involved, which are partly composed of the contingency calculated from the project risk analysis. "The Right Projects Done Right" couples the management of risk and benefit in one of the authors' "Seven Best Principles for Managing Benefits" (Dinsmore, Paul C., Cooke-Davies, Terence J., 2006). Organisational experience can be an input into the probabilistic determination of the risk and following the formulas shown here, should the data held in the PMO repository help produce a more accurate probability estimate of a risk (which is lower than what would have otherwise been calculated), the value can be realised in the lower contingency fund needing to be set-aside to cover this projects risk, and in the fact that a more accurate risk analysis can help the organisation make better decisions on which projects to invest in. As stated by Laurence Nicolson: "*Risk Management has been identified in best practice as being the single greatest indicator of project process maturity"* (Nicolson, L., December 2006).

The benefit of the PMO can be realised by quantitative research. Normally an event triggers the thought process within an organisation leading to the creation of a PMO (Nicholson, L 2005). As such, it should be possible to track the progress of an organisation that is implementing the process of using a PMO (in whichever of its forms) by comparing project results in the maturating organisation to the results from before the trigger event. In addition to the benefit of knowledge management case studies already quoted in the paper (from Sengupta, Kishore et al, 2008, Pg. 100 and Bonham, Stephen, 2004, Pg. 189), other quantitative research papers exist that have tracked many companies progress over a several years after implementing new project processes. A Gantry Group study shows most companies seeing a positive ROI of 6.5% 1 year after having implemented a project and portfolio management centre (Gantry Group, January 2008) and a 36-month case study of companies improving their software processes showed real value being realised on many fronts (software process improvements, as listed in the paper, included many possible PMO functions: e.g. mandating of formal inspections, better initial assessments), (Jones, Capers August 2005).

CONCLUSION

An analogy can be made between a PMO and a Greek temple: the PMO is built upon three pillars: Processes & Procedures, People & Organisation, Systems & Tools (Thiry, Michael 2006), and the PMO itself is the pillar on which successful project management is built on. And, furthermore, accurate cost estimation is the pillar the project is built upon.

In software cost estimation, the PMO works to ensure the project selection board is able to compare presented projects knowing they are based on a common framework and methodology and the PMO works to ensure the project manager is able to give true and accurate forecasts for their project (both currently known and possible costs), using not only their experience as an input but the experience of the organisation as a whole.

In order to avoid the misconception of the PMO as a costly, unnecessary layer of bureaucracy, its value must be quantifiable in a business sense. A support organisation like a PMO aides project management, and perhaps helps link the project-based organisation with the objectives of the business layer (who pay for the projects and the PMO). Projects are selected in the business based on their benefits, and so, implementing a PMO should be seen as a project in itself – the benefits (costs and risks) need to defined, visible and quantifiable in order to justify the project and operational expenditure. This paper cites several case studies where companies were tracked during or after their implementation of new project processes and it is obvious that value can be seen AND quantified in business terms.

While this paper talks of being able to sell the PMO to management in business terms, it should also be noted that this is not the only sales process regarding PMO value. On the other end of the scale, the users of the PMO- the project managers- also need to be sold on the value in their daily working lives of the various functions/archetypes/models of a PMO.

FURTHER WORK

This paper was based on a literature review and further quantitative research is recommended in the chosen business case (software cost estimation). The hypothesis presented would be better proven by following the progress of a software company moving towards a formalised process of recording and using prior experience during feasibility or estimation phases to track the success levels (time, cost and quality) of projects as the process matures within the organisation. Of specific interest in the world of software development would be to model and track projects that use the Agile methodology where the scope (and thus costs) are continuously refined during the project life-cycle to see how prior organisational experience can be mapped to the continuously evolving project environment.

REFERENCES & BIBLIOGRAPHY

- Amos, Scott J., 2007; *Skills & Knowledge of Cost Engineering*, AACE International, 5th Edition.
- Barki, Henri; Rivard, Suzanne; Talbot, Jean, Autumn 1993; *Toward An Assessment of Software Development Risk*; Journal of Management Information Systems Vol. 10, No. 2.
- Boehm, Barry W.; Abts, Chris; Brown, A. Windor; Chulani, Sunita; Clark, Bradford K.; Horowitz, Ellis; Madachy, Ray; Reifer, Donald; Steece, Bert, 2000; *Software Cost Estimation with Cocomo II;* Prentice Hall.
- Bonham, Stephen 2004; *IT Project Portfolio Management*; Artech House.
- Brittingham, Jean; *Aligning Project Delivery for Success in a Pogram Maangement Environment*; CH2M HILL.

- Chavas, Jean-Paul, 2004; *Risk Analysis in Theory and Practic*e; Elsevier Science & Technology.
- Dinsmore, Paul C.; Cooke-Davies, Terence J., 2006; *The Right Projects Done Right;* Jossey-Bass.
- Gantry Group, January 2008; *ROI Benchmark Study Report: Hewlett Packard's Project and Portfolio Management Centre;* The Gantry Group LLC (www.gantrygroup.com).
- Galorath, Dan, April 2007; *Effective Software Sizing;* PM World Today Vol. 9, Issue 4.
- Hill, Gerard M., 2004; *Complete Project Management Office Handbook, The*; Auerbach.
- Jainendrukumar, TD, January 2008; *The Project/Program Management Office*; PM World Today Vol. 10, Issue 1.
- JISC infoNet; *Calculating Contingency*; www.jiscinfonet.ac.uk/InfoKits/risk-management/calculating-contingency
- Johnson, Ashley S., January 2007; *Project Management and Business Processes: A Look at strategy, structure, processes and projects*; PM World Today Vol. 4, Issue 1.
- Jones, Capers, August 2005; *The Schedules, Costs and Value of Software Process Improvements*; Software Productivity Research LLC (www.spr.com), Version 6.
- Martinelli, Russ; Waddell, Jim, 2007; *Program Management: A Framework for Collaboration;* Program Management Academy.
- Miranda, Eduardo, 2003; *Blueprint for a Project Management Office*.
- Nicolson, Laurence, December 2006; *Project Management Benchmarking for Measuring Capability within the Organisation*; PM World Today Vol. 8, Issue 12.
- Nicolson, Laurence, 2005; *The Value Proposition of Outsourcing PMO Activities within Project Driven Organisations; www.pmforum.org.*
- Sengupta, Kishore; Abdel-Hamid, Tarek K., February 2008; Van Wassenhove, Luk N.; *The Experience Trap*; Harvard Business Review, Vol. 86, Issue 2.
- Sienkiewicz, Kim, November 2004; *The PMO's Impact on Shareholder Value;* www.allpm.com/modules.php?op=modload&name=News&file=article&sid=1256
- Sulllivan, William G.; Wicks, Elin M.; Luxhoj, James T., 2006; *Engineering Economy;* Thirteenth Edition, Pearson Education.
- Thiry, Michael, 2006; *The IT PMO: What is it really managing?*; www.pmforum.org.
- Van Scoy, Roger L., September 1992; *Software Development Risk: Opportunity, Not Problem*; Technical Report of the Software Engineering Institute, Carnegie Mellon University.
- Viswanathan, V. Kasi; *PMO- The Value Proposition.*
- Wysocki, Robert, 2004; *Project Management Process Improvemen*t; Artech House.

This paper was awarded 1st prize in the Student Papers competition at Happy Projects '08. the annual international project management conference in Vienna, Austria during 29-30 May 2008 organized by ROLAND GAREAIS CONSULTING and PROJEKTMANAGEMENT GROUP at the Vienna University of Economics and Business Administration. For information about the conference, visit www.happyprojects.at. To see a report about the student paper awards at the conference, visit http://www.pmforum.org/blogs/news/2008/06/student-paper-award-winners-08.html.

The ESC Lille Graduate School of Management

The ESC Lille Graduate School of Management is a private, non profit business school. The “Ecole Supérieure de Commerce de Lille”, is a French "Grande Ecole", registered by the French Ministry of Higher Education and Research and accredited with Equis and PMI. Founded in 1892, ESC-Lille is one of the oldest Business Schools in France. For over 114 years it has broken new ground whilst maintaining its warm tradition. The school offers a wide range of management programmes and enjoys two state-of-the-art campuses in Lille and Paris. *Groupe ESC Lille, Paris Campus, Tour La Villette, 6 rue Emile Reynaud, 75019 PARIS, France.*

About the Author:

Barry Rodgers

Student Author

Barry Rodgers, a native of Ireland, currently lives and works in France, where he is also a student of project management at the ESC Lille Graduate School of Business. A graduate of the University of Dublin (Trinity College) in 2001 with a BA in Information & Communications Technology, he has mainly worked in travel technology since then both in Ireland and in France. Barry is a PRINCE2 Practitioner and member of the PMI (Project Management Institute) and AACE (Association for the Advancement of Cost Engineering) and may be contacted at barryrodgers@gmail.com.