Information Quality and Large Scale Project Budget Tracking

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Abstract: The acceptance of the "E-Russia" project by the government of the Russian Federation presents a significant challenge to existing management structures. Particularly apparent is the need to be able to optimize the financial aspects of a project of this magnitude. Large project budget monitoring and control, including effective warnings regarding impending trends and deviations, is an imposing task. In normal circumstances this is done retrospectively and with minimal predictive capability. By implementing appropriate analytical techniques along with determinations of non-linear instability in existing trends, dramatic improvement in project control can be attained. Additionally, appropriate models exist that enable the availability of public funding sources to be more accurately analyzed and projected. The risk factors in both the expense and funding components are more readily visible and early corrective measures may be applied to mitigate these risks. These techniques offer the potential to more readily assess the relevance and impact of the data normally collected and yields pertinent information that exposes a much more accurate view of the project from a management and financial perspective.

EXTENDED ABSTRACT

The government of the Russian Federation has proposed and accepted the principle objectives of the project "E-Russia." This project intends to significantly expand the scope and reach of computer communications throughout the federation and foster the development of three key objectives:

- Enhance educational opportunities
- Promote business development
- Provide individuals with access to information

The acceptance of this project has been subject to considerable discussion and controversy. Some of the pertinent criticism has centered on the need to develop improved auditing and management of projects of this size and scope. While information quality now approaches ISACA (Information Systems Audit and Control Association) standards in many areas, the accumulated experience and judgment within government and industry to effectively manage and cope with the implications of a project of this size may be somewhat lacking. This paper is part of a series of steps intended to foster increased awareness of strategic management of information and its quality pertinent to large scale IT projects.

For "E-Russia" as with all large scale projects there are several elements of methodology that are essential to the organization and management of the project. First, the 'Maturity Model'

establishes the criteria for determination of the successful completion of the key phases of the project. Next, the identification of 'Critical Success Factors' will establish foundational risk avoidance and essential actions required for full realization of the objectives. High quality information is one of the foundational Critical Success Factors. The final component is the identification of key goals and the financial monitoring and control commensurate with efficient attainment of the project objectives.

The monitoring and control of all budgets – from the small family through large State institutions – can be described via similar mathematical models. This is analogous to the ability to describe motion from the microscopic to galactic sizes, via the fundamental equations of mechanics. In actual experience the exactness realized in celestial mechanics is neither practical nor attainable in predictive financial analysis. This paper illustrates fundamental aspects of information requirements, mathematical models and attainable predictive scenarios that may be expected to assist in tracking and controlling the budgets of large-scale projects.

In Russia, project and budget tracking is multifaceted. Much of the effort required is political. Additionally there is considerable technical and procedural work. Finally, there is the analysis of past financial performance and prediction of the future performance. Historically, much of the analysis and predictive work that has been done in the past, in both Russia and the west, has utilized simple linear models (straight line) to ascertain past and future performance.

In principal, the task of accumulating project costs appears to be a simple and straightforward process. Payment data are verified and classified, ancillary charges appended and the data on source documents are transformed from paper to electronic form. It will be necessary to put control barriers in place to ensure an absolute minimum of data entry errors. Typically the resultant information is presented in a tabular form with appropriate totals and the process is regarded as complete. It is only after significant difficulties are experienced that a credible analysis is performed on the departures from expectations and rarely is any predictive effort attempted.

Drawing on the work that has been done in macroeconomics [P.Samuelson and W. Nordhouse, 1995], there are techniques and indicators that are useful for management of projects of this type. A significant aspect of success in this area is the optimization and strategic allocation of resources between the capital costs and the research and development expenses associated with the project: these activities demand data of the highest quality. Formalization and accuracy in this allocation has been demonstrated to be a key component of successful completion of large-scale development projects. In the instances where the roles of significant components is either ignored or merely approximated can result in negative consequences and even the failure of the project as a whole.

A thorough understanding of the econometric work of Samuelson, et al, [P.Samuelson and W. Nordhouse, 1995] and the utilization of standard mathematical techniques, enable a much more accurate evaluation of the present and future status of budgetary performance. This will allow the non-linear aspects of a complex project to be better seen and timely adjustments made before damaging effects get out of control.

By utilizing the econometric model, termed the "Multiplier-Accelerator Model" developed by Nobel laureate Paul Samuelson, [R Shone ,1997], the dynamic nature of project costing can be evaluated. The judicious use of this model, combined with appropriate design parameters of the project itself, will enable careful monitoring of cost performance.

The development of this model involves accurate definition as well as determination of the following components: capital expenditures related to implementation of the project, research and development expenses including continuing expenses to refine auditing and measurement expenses and finally, administrative and management expenses.

The mathematical model proposed in the paper fits the characteristics of the established econometric work of Samuelson, et al. The utility of this model allows several dynamic conditions of project performance to be identified.

First, as development and implementation is progressing in a satisfactory manner the dynamics of project milestones and the total cost of the project is not fluctuating in an unstable manner and subsequent accomplishments can confidently be projected to remain within acceptable ranges. Mathematically this indicates that the model is in a stable state without oscillating costs of requisite tasks.

Second, the model will allow the identification of situations where each step towards completion requires increasing amounts of time, money, information, and resources. This often observed condition is a predictor of runaway costs that can frequently result in either unsatisfactory attainment of project function or project failure due to unsustainable cost of attainment. Early identification of this condition will often enable proper project redefinition and control to eliminate the risks associated with event.

The final output of the model is the identification of the condition where relatively simple circumstances produce wildly fluctuating costs per unit of task completion. This particular instance is often difficult to comprehend, since the general attitude to relatively simple systems is the production of simple, not complex behavior. Yet recent advances in mathematics and econometrics has enables the identification and understanding of this intrinsic 'chaotic' behavior. Identification of the limits of the time domain of this condition will allow judicious decisions regarding corrective actions necessary to mediate the risks of this situation.

With proper input and analysis of the functional and budgetary aspects of large-scale projects, early identification of trouble indicators, such as poor quality data over appropriate time frames, project management and costs can be dramatically improved and enhanced.

References

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