Quantellia Case Study: Global Network Transformation Program

DECISION ENGINEERING FOR ENTERPRISE PROGRAM MANAGEMENT

Executive Summary

Many large organizations are reaping hundreds of millions in dollars in benefits from transforming their communications and computing infrastructures to using modern IP and cloud-based services. While the result of such transformation projects is often a substantial reduction in operational expenditure, the transformation process itself is highly complex and carries risk of substantial delay and unnecessary costs that arise from missed deadlines and rework. Until now, project and program management software tools have not been capable of analyzing this degree of complexity, nor helping to ensure that such projects remain on track and on budget.

This case study describes the key challenges encountered in an enterprise-wide program tasked with transforming the global communications infrastructure at one of Europe's largest financial institutions. It tells the story of how deploying Quantellia's Decision Engineering for Program Management (DEEPM™) solution provided program managers with the tools they needed to transform over ten thousand separate locations, filling serious gaps that were present in the project management systems on which the team had been relying. DEEPM™ includes a flexible rules engine, time-based simulation of complex business rules, and incorporates information from outside the usual project planning scope, including operating metrics and financials, supply chain information, and contract data.

DEEPM™ provides the following benefits:

- Accelerates transformation cost benefits by detecting and mitigating upcoming problems with a transformation plan well before they occur, using a simulation-based forward business rule engine.
- Decreases schedule delays through improving team collaboration and analysis with an automated visual what-if analysis for the program team, allowing them to experiment with changes to the program plan to remove these problems.
- Mitigates the cost and schedule impact of "in-flight" changes: changes to the business that happen during transformation and which require a re-plan. Replanning time can be reduced in some cases from many months to just a few minutes.
- Analyzes and optimizes a transformation plan to provide maximum financial benefit: by transforming centers that yield the greatest operations cost savings as early as possible, while still satisfying the specific business rules and overall constraints of the program.
- Reduces project costs through ensuring that all project stakeholders—including subcontractors—are incented towards providing maximum financial benefit to the project.
- Reduces project/program management personnel costs through automation.

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Background

Some of the most extensive and complex communications infrastructure in the world is used by large organizations that operate regionally or globally. Their geographical extent gives them the ability to take advantage of regional cost benefits, deploy expertise globally, and to reap a range of other globalization-related benefits. Realizing these benefits, however, depends on the efficient sharing and exchange of information throughout the organization, an end that most large enterprises achieve by linking the many locations at which they do business together via a sophisticated communications network.

In many if not most cases, these networks have grown organically over the past two decades as the needs of the organization have evolved, and as more capable and cost-effective technologies have become available. Typically, there has, until recently, been little effort to coordinate and homogenize these communications services, nor to ensure that opportunities made available by technology advances are systematically exploited. The result: network architectures that are out of date, supply chains that are overly complex, and services that offer limited functionality and reliability and yet are very expensive to operate. **Consequently, in most large organizations, some of the lowest-hanging fruit for corporate operating expense savings lies in the unrealized efficiency gains attainable by an overhaul of their communications services.** Such opportunities are being realized by enterprise-scale network transformation programs that are aimed at lowering operational expense, consolidating supply chain vendors, improving quality, and enabling advanced features.

This case study is based on such a program, carried out between 2009 and 2013 by one of the largest European-based financial institutions. The group operates globally with over 10,000 distinct business locations and employs over 180,000 staff. Prior to the transformation, the communications services that linked these locations together were a patchwork quilt of over 300 distinct service agreements involving a large number of vendors, some operating globally, some locally. Each geographical region managed its own network infrastructure, which ranged from public switched telephone network (PSTN) circuits, old integrated services digital network (ISDN) lines, to state-of-the art IP-based services, along with everything in between.

Many of these services were provided under contracts that were established when technology costs were much higher than today and whose tariff rates had not been adjusted to take advantage of the dramatic cost reductions in telecommunications afforded by modern equipment and services, along with a more competitive global telecoms market. There was considerable duplication of services, where multiple contracts from multiple suppliers were providing the same service to the same locations. It was very clear that very significant savings could be obtained by modernizing the infrastructure, unifying the network architecture, consolidating the suppliers to one or two, and outsourcing operation of the network to a third party.

A program to achieve those aims was instigated in 2009, an implementation vendor with appropriate skills and global presence was selected, a program governance group was convened within the company, and work began.

Establishing the Business Case

A key activity in the planning phase of the project was to clearly understand and articulate the objectives of the program along with how these were to be achieved. The primary goal was to transform the global network to a single architecture based on a unified communications (UC) architecture on which multiple advanced services could be delivered. This would replace the existing infrastructure for ATMs, branches, small and large offices, and call centers. Savings would be obtained by decommissioning significant capital assets (PABXs and other major equipment) and recovering the expense of operating these, along with lower per-service tariffs for each existing service replaced with the UC solution. Considerable savings would also be realized from decommissioning large, costly trunk lines that provided aggregation and transport between outlying locations and major data centers.

Initial Formulation of ROI Recognition

The initial formulation of the Return on Investment that would be credited to the program was based on determining a baseline annual operating cost for the legacy network. Cost accounting figures from 2008 were used to establish the baseline annual operational expenditure (Opex). ROI attributable to the program would be recognized by comparing the network operation costs at the completion of the transformation to the 2008 baseline.

It was immediately recognized that a direct comparison of post-transformation Opex numbers to the 2008 baseline would not yield a like-for-like comparison, and therefore would be misleading. The reason for this was that, as well as transforming its communications technology, the company was also undergoing a process of major organizational change. Business units were being divested, offices were consolidating, and, consequently, the requirements that the transformed network would need to fulfill were very different from those of the network it was replacing. To account for this, a complex "growth" formula was devised which added or subtracted ROI credit depending on the number of services supplied before and after the transformation, and on the number of full-time-equivalent (FTE) employees serviced pre- and post-transformation.

Using the above formulation, the transformation program governance board committed to achieving a specific ROI target by the end of the program.

Reformulation of ROI Recognition

As the program commenced, the management group faced several unforeseen challenges which will be described in more detail below. As a consequence of this and the resulting failure to successfully complete site transformations on schedule, the planned reductions in operating expense were not being achieved and it was recognized that the company was losing significant business benefit as a result. However, since the ROI targets had only been specified relative to the end of the program, there was no way to effectively quantify mid-program ROI performance and, therefore, no way to adequately measure the extent to which the program was under- or over-performing, and no way to specify the changes in performance required to achieve the desired Opex reduction trajectory.

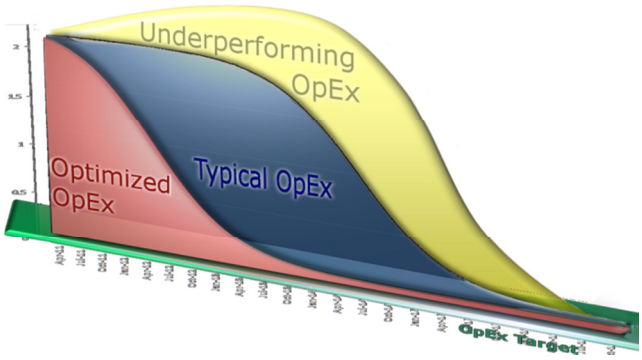

Figure 1. Different OpEx trajectories in a transformation program aimed at reducing operating expenses.

To illustrate this, the graph shown at left plots three alternatives for the change in operating expense over time as a program progresses. In all three scenarios shown, the Opex begins at the same level as the program commences and ends at a lower level at the completion of the program, again the same for each of the cases shown. Based on the original formulation of ROI which considered only the start and end values of the Opex, the three scenarios shown would be indistinguishable. And yet, the three have radically different financial consequences for the company. In the "Optimized Opex" case, cost reductions are achieved early in the program, while in the "Typical Opex" case, reductions are not achieved until much later. The consequence is that the net expense of operating the network over the lifetime of the program (which corresponds to the area under the curve) in the "Typical" case is much greater than in the "Optimized" case. Even worse is the "Underperforming Opex" scenario where the program activities actually force Opex to increase for a period, before reductions finally bring expenses down to the targeted value.

It became clear that, in order to manage the program and guide it towards the "Optimized" curve and away from the "Underperforming" curve, a more granular specification of the ROI target was required. The single end-point ROI specification was augmented with monthly, quarterly, and annual Opex reduction targets and performance measures were updated accordingly.

Challenges

From the outset, the size and complexity of the transformation program presented the implementation and management teams with a number of challenges. Transformation sites were categorized in terms of their size, ranging from ATM terminals at one extreme to major office complexes housing thousands of staff at the other. A distinct "count down" plan was prepared for each category listing the sequence of tasks that had to be performed within specified time windows prior to the transformation "cut-over" date (the "count down" date at which the new network would be fully operational). When applied to each of the sites that were to be transformed, a global program plan was produced.

After initially using state-of-the-art program management software to manage this plan, it became apparent that the complexity of the plan and the rate of change that was occurring were too great for such tools to be effective. **Inevitably, it took longer to update the tool than the time window within which program decisions had to be made so, early within the implementation phase of the program, the tool was abandoned in favor of a set of spreadsheets.** Given the complexity and sheer magnitude of the program, while spreadsheets were adequate to *store* the information gathered about the progress of transformation activities, they were wholly inadequate as a means of *presenting* the data in a format that provided managers with the key information they required and in a form that they

intuitively understood, and could use to make informed decisions to maximize the business benefit of the transformation program.

Schedule Complexity

There were many rules and constraints with which the transformation plan needed to comply, making it extremely complex and very "brittle"; the smallest change to any plan element would cause changes to ripple through the rest of the plan, inevitably violating one of the constraints or rules. These violations were very difficult to detect as they required carrying out inferences along long causal chains (A affects B which affects C, then D… and so on until a rule violation occurs at Q). For example, decommissioning a service supplied under a contract with a "minimum usage" clause without considering the other services still on that contract, could trigger penalty charges, which in turn would negatively impact Opex. On average, simple sites had a dozen or so rules and constraints governing their transformation, while complex sites had up to hundreds. Given that there were on the order of ten thousand sites in total, the task of manually producing and validating a viable plan that conformed to all of the rules and constraints rapidly became intractable. This manifested itself early in the program with fewer than 50% of attempted site transformations succeeding, almost always because a rule or constraint had not been met in time, and the management team had no visibility of this until the transformation failure had already occurred.

Transformation failures only served to compound the planning difficulties because a failed site had to be rescheduled. Since with each passing day, the time remaining until the program's completion date was getting shorter, the large amount of unplanned rework had the effect of increasing the number of sites that needed to be transformed as the available time decreased. This in turn increased the complexity of the scheduling task and with it, both the time taken to produce schedules and the likelihood that further failures would occur. Clearly, this was a situation which, if sustained, would not be likely to lead to a successful outcome for the program.

Interaction with Factors External to the Program

One often-overlooked feature of large enterprise programs is that, generally, the impact of tasks and resources that belong to the project is not limited only to other tasks and resources within the project, but also affects a wide range of factors in the day-to-day operating business. In fact, influences propagate in both directions: decisions made in the program often affect mainstream business operations, and vice-versa. However, the ability to effectively manage across the program/business operations divide is limited by the somewhat disconnected silo within which most program/project management (PPM) tools model a program or project. **Generally, PPM tools provide program management offices with** a **sophisticated model of project tasks and milestones organized according to a work breakdown structure, along with schedules, resources, task completion dependencies, and other project-related factors. However, they offer little ability to model how project activities affect, or are affected by, the mainstream business.**

To illustrate the consequences this can have, consider the following example from the network infrastructure transformation program. Effective decision making in this program required an accurate model of how the cost structures associated with operating the network changed as elements of the

network were transformed. Poor decisions that did not take this into account ran the risk of greatly inflating operating costs through indirect mechanisms that were not easily detectable using the PPM solutions initially deployed.

Consider, by way of illustration, the cost of providing a particular legacy service prior to transformation. This service contributed to overall operating cost via a direct component (the charge for the service), and an indirect, or "allocated" cost (the share of costs allocated to that service for its use of aggregate resources. This includes trunk lines, NOC operations, etc.). As legacy services were decommissioned, their direct costs could generally be counted as savings immediately, but the indirect costs could only be removed when all services they supported were either decommissioned or switched to other infrastructure. As a result, a tactical decision to delay the transformation of a small site, whose direct costs make no discernible difference to overall operating expense, may still have disastrous consequences for Opex overall if the delay forces a major trunk asset (that would otherwise have been decommissioned) to remain in service for an extended period.

If the operational implications of a decision are not made visible to the management team, a seemingly minor decision to the value of a few thousand dollars can nevertheless have a program ROI impact measured in the millions.

Underperformance against Business Case

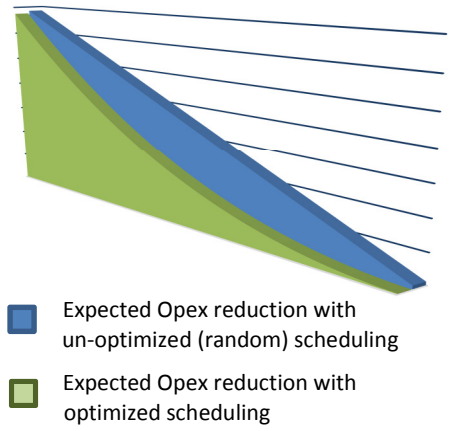

Figure 3. Comparison of Opex trajectory for plan optimized for Opex reduction with un-optimized plan.

previous section, *Interaction with Factors External to the Program*). In addition, in an environment with many rules and constraints, creating even a *single* valid schedule without intelligent automation is an almost intractable tasktask (see *Schedule Complexity*). Searching for scheduling solutions that optimize business-related metrics while meeting all of the rules and constraintsand offers tremendous potential benefit to programs. However, it is typically

To maximize business benefit to the company, the transformation schedule should be organized such that the activities yielding the biggest cost reductions are completed as early as possible in the program. However, this is often difficult to ascertain, partly because the true cost effects of various activities are sometimes hidden (see the

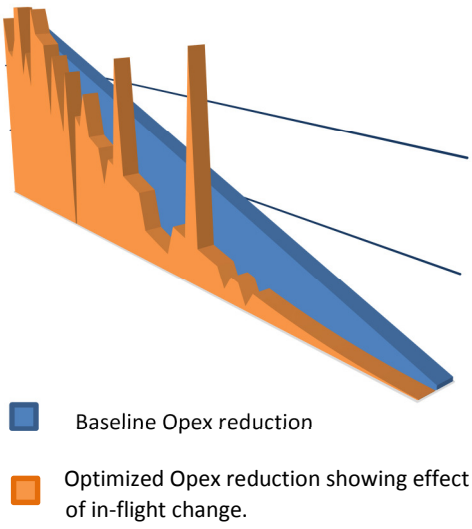

Figure 2. Effect of in-flight change on optimized Opex reduction.

beyond the capabilities of most of the PPM functions available to program managers.

In-flight Change

Even under the best of circumstances, the challenges facing managers of large, complex transformation programs are formidable. When the client organization is itself transforming in parallel with the network technology transformation, program managers are faced with the added difficulty of having to hit a moving target. This has been likened to trying to change an engine on a jet airplane while it is in flight.

When the requirements of the client organization change, as they did frequently in the program we are reviewing, the program management office must assess the impact of the change on the existing plan. Activities, resources, and milestones may be added, removed, or modified – for example, a previously acquired business may be spun off during the transformation program. The sites that were originally part of the transformation schedule will now no longer require transformation and can be deleted from the plan.

At first glance, it seems intuitive that removing such work from the schedule surely simplifies the program. But in a complex program, such first impressions can be dangerously deceiving. First, simply leaving the sites on the legacy network leaves the program vulnerable to the indirect cost trap described above within *Interaction with Factors External to the Program*. In addition, removing the sites from the program may remove a disproportionately large contribution to the program's ROI, especially if the sites were particularly expensive to operate. On top of this, any change to requirements originating from outside the program will initiate a re-planning process within the program, incurring all the difficulties described in the section, *Schedule Complexity*.

In dynamic environments, change impact analysis has the potential to cripple the smooth execution of a technology transformation program. Sites which are subject to change generally cannot be transformed until the analysis is complete, stopping work on those sites and again causing the kind of planning upsets already reviewed from several perspectives. **To cope with change, programs need management tools that provide them with the ability to re-plan quickly and with assurance. As with other challenges previously reviewed, in large-scale programs, this is not tractable as a manual process and requires intelligent automation.**

Misalignment of Vendor Incentives

A final factor program managers must consider to assure successful transformation is that the incentive arrangements they negotiate with implementation vendors are aligned with outcomes that return maximum business benefit to the company. As an example of how this can go awry, consider an arrangement with a vendor where they are paid a bonus for exceeding a given number of successful site transformations by a particular date. From the vendor's perspective, this encourages a strategy where the maximum effort is put into sites that are quick and easy to transform (for example, the ATMs). However, these sites generally return the *least* cost savings back to the company; in effect, the incentives rewarded the vendor for *minimizing* the benefit returned to the company.

To remove as much risk as possible from achieving ROI targets, program managers must clearly understand the effects that a given set of incentive arrangements will have on vendor behavior and the effect that this in turn will have on the program's business case. Incentives should always be structured so that the vendor is most rewarded when they provide the greatest benefit to their customer.

Program Management Office Effectiveness and Efficiency

A common theme that has emerged from all of the above considerations is that large programs are very complex and the number of factors that need to be taken into account in order to successfully manage them make this task unfeasible for manual processing. Standard PPM tools, while offering a rich set of features for task, schedule, and resource management, do not generally provide the functions required to mitigate the risks introduced by program complexity, to model the effect program decisions have on business financials, or to rapidly evaluate possible planning changes and validate those against the complete set of business rules, both within the project and crossing over to the operational business. In the absence of such tools, program management offices (PMOs) often employ large staffs to maintain schedules, analyze changes, and attempt to mitigate future risk. Yet, as discussed, no matter how well-staffed a PMO is, the challenge the staff faces is ultimately intractable without automation. Consequently, the effectiveness of the PMO is diminished and with it, the likelihood of successful program outcomes.

To conclude this section, the table below shows the typical impact of many of the factors described above on operational expense (Opex) and program budget.

Factor	Opex Impact* ($M)	Program Budget Impact ($M)
Planning Violations	1.6	8.8
Change Impact Analysis	1.3	0.9
Opex Scheduling Optimization	12.9	-
Incentive Alignment	13	-
Automation	-	1.5
TOTAL	**28.8**	**11.2**

*Difference between operating expenses based on 100% transformation success rate and actual operating expenses over 3 years assuming $200M Opex reduction available in program.

Impact of the DEEPM™ Solution

Quantellia's Decision Engineering for Enterprise Program Management (DEEPM™) solution successfully addressed the challenges described in the previous section. It was deployed after the program had been in its implementation phase for approximately one year and was instrumental in improving program

outcomes from a position where ROI targets were in severe jeopardy, to a point approximately one year later where annual targets were exceeded. The mechanism by which this was achieved was the upgrading of the tools available to PMO staff to include DEEPM features, namely:

- A relational database that provided a master repository for all project planning items.
- Interfaces to enterprise data sources to support rule evaluation taking both project and business factors into account.
- A flexible decision modeler capable of representing the interactions between program and line-of-business factors, and performing rule and constraint validations that take both program and business-related factors into account, including complex financial outcomes.
- Automation of program planning assurance tasks.
- What-if analysis for analyzing planning alternatives and validating these against all rules and constraints.

To deploy the solution, a decision model was authored in Quantellia's World Modeler™ software. This model represented a quantitative simulation of how the program was executed and also how it interacted with major factors of the operational business units that were relevant to the program. A summary of the DEEPM model components is shown below:

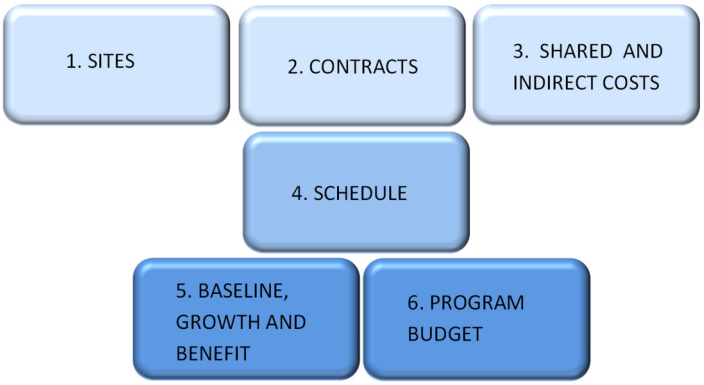

Figure 4. DEEPM Decision Model Categories

The decision model was then mapped to data sources using World Modeler's data binding interface. This not only enabled access to the various enterprise data sources, but provided automated extract-transform-load (ETL) capabilities for migrating spreadsheet-based data sources to a relational database.

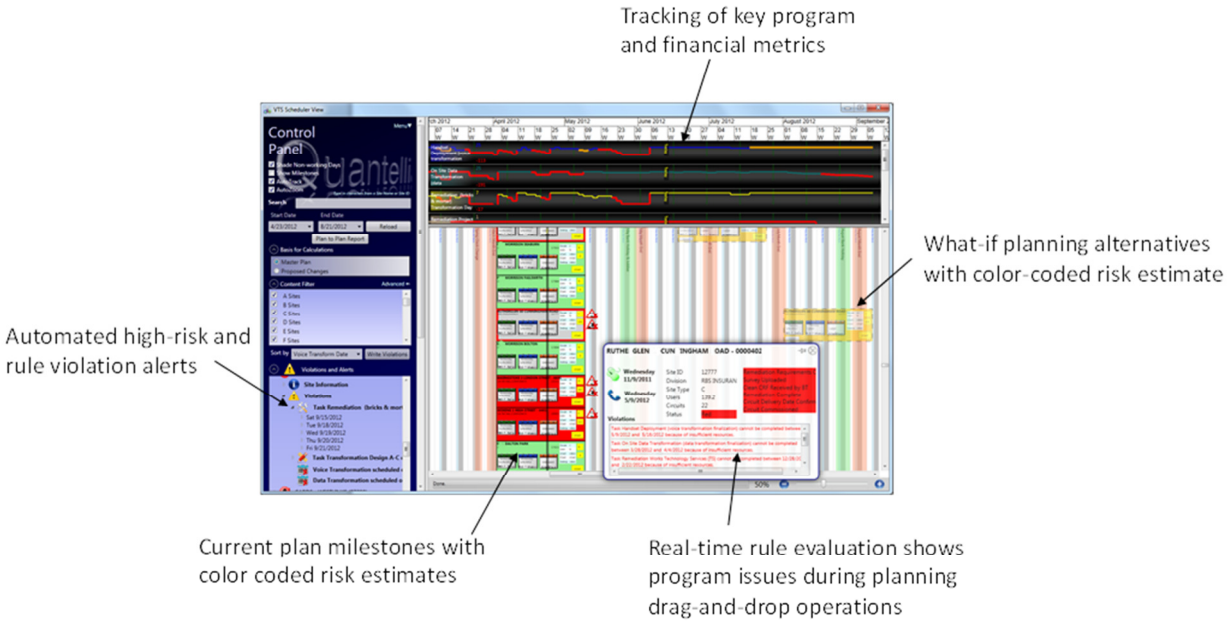

Figure 5. DEEPM User Interface

The DEEPM user interface, shown in Figure 5, provides PMO staff with a powerful, interactive, real-time environment that provides at-a-glance information about the status of program milestones, the risk associated with future milestones, and the details of any rule violations that put successful completion of tasks in jeopardy. Unlike traditional tools not based on decision models, DEEPM's "over-the horizon" simulator allows PMO staff to assess the impacts of planning decisions on future program activities and operational and financial outcomes, even if these activities have not yet been explicitly scheduled. This alerts program managers to future risks with sufficient advance warning to enable mitigating action to be planned and implemented.

The DEEPM™ solution, once deployed, provided PMO staff with the ability to run any proposed program plan through the system and immediately see:

- A list of any milestones that were at risk because rules or constraints on which they depend are violated.
- The current risk status of each site and milestone, shown on a Gantt-chart-like display.
- What-if alternatives that comply with program constraints, available resourcing, etc.
- The Opex impact of any proposed planning changes.

This set of features helped the program managers meet and conquer the challenges they faced.

Schedule Complexity

DEEPM automated the evaluation of program business rules and constraints and interactions with business factors external to the program. This allowed PMO staff to quickly ensure that schedules did not include un-buildable plans and assured transformation activities could succeed as planned. Re-

planning was also greatly facilitated by the ability to immediately and interactively identify planning scenarios which did not violate program rules.

Interaction with Factors External to the Program

Since the DEEPM™ model included interactions with external factors, these were fully taken into account in planning decisions. Opex leakage due to unaccounted-for indirect costs was stopped by alerting PMO staff to situations where excessive concentration of indirect cost was occurring, indicating that a shared resource was not being efficiently transformed.

Underperformance against Business Case

The what-if capabilities of DEEPM™ enabled the efficient comparison of alternative schedules with the assurance that all necessary rules and constraints were being evaluated in the assessment of each alternative. The Baseline, Growth and Benefit model immediately calculated the ROI impact of each planning variation.

In-flight Change

Successful management of in-flight change required the ability to rapidly assess the impact of changes and the downstream effects of alternative responses to those changes. DEEPM allowed changes to be entered into program plan and their implications, both to the program and the operating business, to be instantly evaluated. Timeframes for making decisions to deal with in-flight changes were reduced from months to days, removing change response as a significant source of delay to the program.

Misalignment of Vendor Incentives

The close integration of program activities, operational impact, and financial outcomes allowed the modeling of vendor activity and the immediate effect this has on the ROI trajectory. Various alternative incentive schemes could be tested to determine their likely effect on business benefit to the company and the most effective solution chosen.

Program Management Office Effectiveness and Efficiency

DEEPM's extensive use of automation reduced human resource workload and increased the accuracy, reliability, and timeliness in the areas of planning assurance, change impact analysis, and ROI assurance. This not only improved program performance overall, but reduced the cost of operating the PMO itself.

Conclusion

The scale, pace, and complexity of enterprise transformation programs has increased to the point that today's best-of-breed management tools do not provide many of the functions program managers require to successfully deliver the outcomes to which they commit. There are too many factors to consider, both within and outside the program, and the time window within which program decisions must be made is often smaller than the time required to perform the supporting analysis using traditional tools. Add to this the fact that program managers are also often responsible for achieving financial outcomes, such as specific reductions in operational expense, and the challenges facing managers of large enterprise programs quickly become overwhelming.

This indicates the existence of a technology gap where information automation can be applied to make program managers more efficient provide a much greater level of assurance during the planning process, and ultimately to increase the value of the transformation effort, sometimes by many tens of millions of dollars. Such automation reduces human workload to a level that is tractable and puts managers back in control of the programs for which they are responsible.

Through deploying its Decision Engineering for Enterprise Program Management (DEEPM™) in a global network technology transformation program being undertaken by a large European financial institution, Quantellia has proven DEEPM's effectiveness in substantially reducing risk and costs.

Further Information

If you would like further information about Quantellia's range of products, including DEEPM™, please visit us at **www.quantellia.com**, email transformation@quantellia.com, or call +1 720 242-7825.