

Implementing Best Practices and Tools for Project Portfolio Management

A Business Process Deployment Case Study with Hewlett-Packard

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 PROXI advises large enterprises on how to optimally invest their time, people, and financial resources in the R&D assets that will maximize business performance and actively implement strategies. Previously, Jeff spent two years as a management consultant with PRTM. While working for Motorola Semiconductor, Jeff gained nine years of product development, design engineering, and business development experience. Jeff has a B.S. and M.S. in Electrical Engineering and an M.B.A.

Introduction: The industry dynamics under which Hewlett-Packard’s Imaging & Printing Group created and dominated the thermal inkjet printer market were shifting rapidly in the late 1990s. Early innovation by HP drove explosive demand and a relatively forgiving business environment. HP could do no wrong in the late 1980s through the mid 1990s. Intense competition, primarily from Canon, Epson, and Brother in Japan, and to a lesser extent with Lexmark in the US, started to erode some of HP’s commanding market share. This share redistribution had significantly reshaped the industry structure by the mid-to-late 1990s.

Other industry and market externalities were coming into the landscape as well. A corporate merger with Compaq, the shift towards outsourcing manufacturing operations, and the rise of ODM services for some development programs drove HP’s staff to focus on process improvements and core value creation in their R&D and product development environment. To this end, HP chartered the Product Generation and Productivity Lab with the responsibility to improve both product development and portfolio management processes for their inkjet printer business.

In November of 2002, Dan Lundberg had completed extensive research on new product portfolio management methodologies and on available software tools to support this critical business process. In addition, he had just presented a report to the executive team of HP’s consumer inkjet printing business, based on the best practices catalogued in the widely-known reference, Portfolio Management for New Products (Robert Cooper, Scott Edgett, and Elko Kleinschmidt, Perseus Publishing, ©2001).

An HP R&D manager, aware of Dan’s research, introduced Dan to PROXI Management Decisions. After several presentations, software demonstrations, and a successful process prototyping engagement, Project Executive™ from PROXI was selected as the robust portfolio management solution to be deployed at HP. The following case study highlights the business environment, managerial process needs, PROXI’s solution approach, process implementation challenges, change management benefits, and continuous improvement opportunities encountered within HP’s inkjet printer operations.

Organizational Background: HP's inkjet business includes many product lines, such as consumer desktop printers, photo printers, large-format printers, multi-function office machines, consumable ink cartridge supplies, and paper media. For the purpose of this case study, we will focus on a single business unit that develops printer hardware for several of the above-mentioned product lines. Before presenting the change management work performed at HP, it is useful to summarize the nature of this business unit's product portfolio, people structures, development and decision processes, and existing tools that comprised the "as-is" environment.

Portfolio Characteristics

- The product development portfolio typically has over 50 core products and platform projects that support a rolling five-year product roadmap. Products are the revenue-generating end products that are sold through various sales channels. Core products have derivatives that are typically localized product versions for overseas markets or optimized variants for specific applications.
- Platforms are the architectures from which specific product definitions will be based. Platforms are often shared across business units supporting different product lines. Within a given product line, each product depends on a platform development program investment. Products can also have investment dependencies on predecessor products. The majority of R&D costs are associated with platform development programs, but platforms produce no direct revenue. The products that depend on a given platform monetize the value from the platform's investment costs.
- Although this business unit is only responsible for producing a portfolio of printer products and platforms, the business model for computer printers is a "razor and blades" model. That is, there is a one-time revenue event when a printer is purchased, but there is a significant annuity stream of revenue and profits from sales of consumable supplies (e.g. ink cartridges and paper media). It is no secret that the economics associated with ink supplies and laser toner cartridges is the major source of profits for the computer printer industry. The implications are that the system-level value creation must be accounted for by each printer hardware business unit, in order to make good portfolio management decisions for the greater HP Imaging & Printing enterprise.

Who's Who?

- The Portfolio Management Team (PMT) is a cross-functional team of the division General Manager and a subset of his Directors from R&D, Engineering, Marketing, and Finance. This committee oversees all product development programs. They had been meeting twice per week for two hours each session to review development programs. Programs were reviewed individually and only a fraction of the 16 hours per month was devoted to considering the aggregate portfolio.
- The Vintage Chart Development Team is also cross-functional, with one or more representatives from each of Marketing, Finance, R&D, and the Process/Tools group of the Product Generation & Productivity Lab. The primary responsibility of this team was to produce and present a recommended plan of record to the PMT, on a quarterly basis. A review and approval of this plan of record (i.e. the Vintage Chart) was scheduled as a regular agenda item for one the PMT meeting sessions each quarter.

Process Highlights

- Various processes are employed for forecasting project schedules, market demand for both printers and consumable supplies, pro-forma financials for new products, human resource requirements, and expenditures for development programs. A great deal of effort and institutionalized expertise is behind each of these forecasting processes. However, the resulting information had limited utility, as it was stored in many disparate, disconnected data repositories. The interactions between the time, people, and money forecasts were not integrated in a way that could be used to visualize portfolio scenarios or to answer "what if" questions for planning analysis. Such data partitioning severely limited the usability of the rich information available for decision making.
- A multi-tiered objectives-setting process ultimately produced the portfolio requirements that, in turn, drove the plan of record determination process. A forum of the division's functional managers, the division-level General Manager, and the group-level General Manager would determine the high-level customer objectives. Program Managers and product development core teams would evaluate these high-level objectives and translate them into the design objectives to be achieved in their development programs.
- Like most product development organizations, HP has a structured Product Life Cycle (PLC) development process (generically referred to as a stage-gate or phase-gate process). Each phase of the process has specific requirements that must be met, in order to successfully pass the associated senior management gate review and enter the next phase of the process. Human resource commitments are made in the early stages of the process, with the bulk of the resources committed at the end of the Investigation-to-Lab phase.

As-is Tools and Frameworks

- Various tools and information frameworks were used to organize information for both planning visualization and decision-making purposes. These tools or presentation formats were all applications of MS Excel and MS PowerPoint. The most formalized of these tools were the Vintage Chart (plan of record), a "bottoms-up" program requirements forecasting template, and a complex financial modeling/forecasting spreadsheet.
- The Vintage Chart was the primary output of the portfolio planning process. It generally covered a five-year product roadmap that resulted from a rolling three year development horizon. At the time of starting the portfolio management process improvement initiative with PROXI, the Vintage Chart had recently migrated from an interview-based MS Powerpoint document to a data-driven MS Excel chart.
- There was no analysis capability nor "what if" scenario evaluation capability, other than manually manipulating a variety of spreadsheets and slides produced under the auspices of the finance, marketing, engineering, and program management communities. Such large amounts of "data churning" severely limited the number of scenarios that could practically be evaluated at the portfolio level. This ultimately limited the quality of the resulting quarterly plans of record. In addition to the low productivity structurally imposed by these tools, disparate tools under the governance of separate organizations inevitably are fraught with conflicting assumptions and data for the same exact programs of interest.

Unmet Business Needs: The immediate charter for the process improvement team was to “make it easier to update the Plan of Record (POR)”. The problem, as described to the members of the PGP, was that the current tools were manual in nature. In fact, the POR was an intricate MS PowerPoint slide in which virtually every aspect of size, location, color, and text surrounding each object had special meaning. This slide was supported by a complex financial spreadsheet that was driven by several key product features and market assumptions.

Initial Challenge

- The result was that many hours of detailed manual effort were required to incorporate a new idea into the portfolio and prepare it for presentation. The initial efficiency improvement sought was a reduction in time and effort necessary to prepare an alternative plan for discussion. The PowerPoint slide was the focus of attention, because it was so labor intensive, but the underlying financial tables were where the valuable work was being done.

Process Control Challenge

- The actual process for considering an alternative to the POR required the Marketing or R&D member of the portfolio management team to discuss a product option (new products or features needed to offer competitive performance at a given price point and within a certain market timeframe) with peers in their area and then to “shop” them around to key members of the PMT to determine market acceptability, technical feasibility, and economics. Most of this took place through hallway conversations and resulted in “the” portfolio plan, with only one or two questions being brought to the PMT for discussion. It wasn’t supposed to operate this way, but this approach had evolved partly because of the time and energy necessary to “flesh out” any alternatives.
- The hallway conversations became a very important, though unofficial, aspect of how a subset of the PMT considered the POR. Most of the options and alternatives discussed were never committed to paper because of the overhead involved. When the PMT met, one or two versions of the POR were brought in for discussion. Those involved in the hallway conversations assumed the time for discussion was over and it was now time to review and choose. Those not included in the hallway conversations, came with an entirely different expectation. From their perspective, the discussion was just about to begin in earnest. They wanted to see all of the options on the table, not just the few unofficial survivors. There was an unspoken feeling that the hallway conversation approach had eroded the analytical rigor of the process and that good alternatives were being overlooked. The current process was frustrating to all parties involved.

Social Data Challenge

- Hard data, soft data, private data, contingent data; the plan of record had it all. When the members of the PGP team first looked into the situation, several key elements of data management surfaced. Most significantly, data was privately held and the holders of the data considered it to be “theirs”. They weren’t the data stewards on behalf of the PMT, rather they were the data owners sharing their information with the PMT. Moving their data repository from a privately held one to a publicly accessible one would present significant social change management challenges.
- These social challenges were complicated by a real technical challenge. The data needed by the PMT was only part of each owner’s much larger and intricately woven private data store needed for their other Marketing, Finance, or R&D processes.

Even if the data could be extracted to a publicly accessible place, it would only be a copy. The master data would continue to reside locally and would continue to change frequently. Providing data access and maintaining data currency were significant issues.

- The most difficult aspect of data collection was the amount of “cerebral data” (information that only existed in someone’s head) that had crept into the process. Much of the richness of the plan of record analysis was contained within the hallway conversations. Here options often appeared, were discussed, and were discarded without ever reaching a documented state. Yet, the fact that they were even considered was an important part of the POR evolution. The cerebral data could best be envisioned in scenario form, “if this feature set were built into this platform, positioned at this price point, and surrounded by these other products, it would achieve this level of market success”. In other words, when discussing the potential success of a product, “it depends” was a very real question. Though based on the privately held data, this cerebral data could not be reliably reproduced outside of the hallway conversations.

Pandora’s Box

- The PMT is a group, but the group is composed of individuals. The group had a problem to be solved, but the individuals each had their own idea of what the solution would do for them. There was a problem statement to be solved, but without active support from all the individuals, the solution wouldn’t stick. To build support from the individuals, their individual agendas needed to be addressed within the context of the general problem statement.
- Two of the biggest issues were workload and visual appeal. For every option put on the table, Marketing and Finance needed to respond to the cerebral scenario. The hallway conversations were highly efficient for them. The idea of writing up every option appeared as a Herculean undertaking. Any process that added workload would be met with resistance. As owners of the current, highly visual, plan of record, Marketing wanted to see similar, visually evolved, representations of the analytical results. If the process couldn’t depict the results sufficiently, they’d have to manually render the POR anyway. Visualization was a key component of the decision making process. Stepping too far back from what people were used to seeing would cause resistance.
- Finance already had the huge data collection workload of tracking project investments (people and money). Since the solutions for portfolio management being considered appeared to rely on data similar to what they were already collecting for other purposes, Finance saw this as an opportunity to provide a more integrated budgetary solution.
- Managers and engineers throughout R&D had ideas they wanted to explore. They needed an efficient way to inject an idea into the portfolio and test its impact. They saw this as an opportunity to enhance their personal review process before exposing the idea to the broader audience. The hallway conversations worked for the few, but most didn’t have access to that process. Any new solution must have some way to support ad hoc investigations.
- Product enhancement ideas were myriad, and trade-offs were difficult, as most were in response to conflicting individual interests. The flexibility of the PROXI team was a big factor in the eventual selection of a solution provider.

Project Executive™

Client Case Study

Allocate your time, people, and money to the optimal portfolio of product development projects

PROXI Approach: The business process of project portfolio management is getting increasing amounts of attention by a breadth of operating companies, enterprise software vendors, management consultancies, and academics. While enterprise solutions have evolved for more deterministic processes (e.g. enterprise resource planning, supply-chain management, and product life-cycle management), this domain does not lend itself to a standard set of modeling inputs, functionalities, features, process metrics, nor reporting outputs.

That being said, the underlying decision process is fairly universal. Organizations need to determine how to best invest their time, people, and money resources. Depending on the type of business, there may be other constrained resource pools, such as manufacturing and test capacities, server bandwidth, network storage, etc. However, the primary resources of most firms are time, people, and money. The financial modeling, analytical functionality, and user-interface of Project Executive™ are oriented around the ubiquitous objective of allocating an organization's limited resources to the set of project investments that maximize its business performance and that are aligned with its strategy.

Although all customer engagements have their own unique process implementation and change management characteristics, there are common elements that comprise each solution deployment. A "standard" deployment starts out with configuring the Project Executive™ database and determining the proper Operational Model. Over time, customers can use the Company Setup screen to easily make any changes to the initial Operational Model (see Figure 1. below). This includes defining such parameters and model entities as:

Database Settings:

- Forecast time resolutions (e.g. Monthly, Quarterly, Annual)
- Financial and production units (e.g. K\$/M\$/B\$, KUnits/MUnits)
- Valuation method discount rates
- Other environmental options

Operational Model:

- Department/Functional Areas
- Job Classes/Skill Sets
- Development Phases/Milestones
- Project Income/Expense line items
- Qualitative/Strategic project Custom Fields

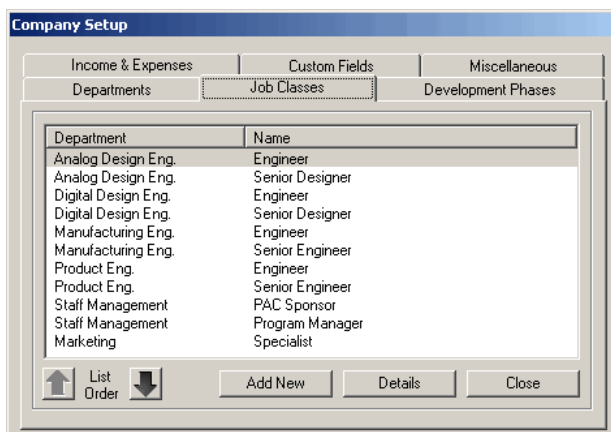


Figure 1. Company Setup screen with example Job Classes

Next, we evaluate the quality and completeness of an organization's readily existing project and organizational resource data. We have limited the required data inputs to the basic information that almost all organizations forecast for their project business cases and resource capacities. While various qualitative/strategic inputs are also accommodated, such time-series information as the following are representative of the types of inputs to our methodology:

- Average selling prices, cost of goods sold, and sales volumes
- Period-based operating expenses and development costs
- HR requirements by department and job classification
- Program schedule in terms of start date, phase durations, and/or product life-cycle milestones (illustrated below in Figure 2.)

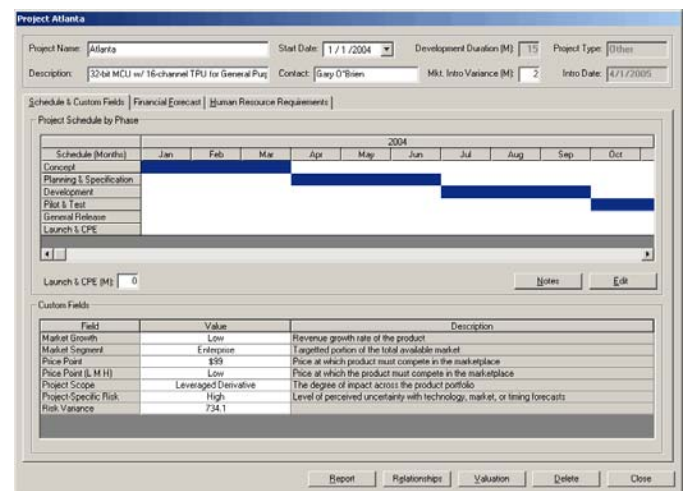


Figure 2. Schedule tab of the Project business case screen

After working with the customer to forecast and collect any data deficiencies, we populate the Project Executive™ database for the client. Loading the database, during this first portfolio management cycle, helps to "bootstrap" the user training and accelerate the business process implementation. The rigorous modeling and user-interface validations incorporated in Project Executive™ force a thorough "scrubbing" of the raw input data. With a customer's real project portfolio and resource constraints entered in our system analysis environment, we then conduct portfolio analysis skills training that is far more effective and meaningful than that using mocked-up sample data.

By this point in the process deployment, any modeling revisions and/or incremental analysis/reporting functionalities are inevitably identified. Depending on the scope of development modifications desired, client-specific enhancements may be done within the original deployment schedule or may be conducted as a separate post-deployment engagement.

Finally, with the database fully populated with "clean" data and the process owner group trained on the system's portfolio analysis capabilities, we work with the in-house portfolio analysts to prepare one or more baseline portfolio scenarios as a "strawman" recommendation to the organization's senior management team. The advance preparation and real-time analysis capabilities of the system are then leveraged to evaluate any number of "what-if" scenarios and to visualize the impact of such things as schedule changes, headcount increases, budget cuts, alternative strategies, etc.

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Allocate your time, people, and money to the optimal portfolio of product development projects

The final output is a robust portfolio plan that:

- Is documented and defensible
- Was determined in a consensual fashion by middle and senior management
- Identifies the set of projects that maximizes business performance, subject to resource constraints and strategic intents
- Achieves planned resource capacity utilizations
- Identifies any “bottlenecks” associated with a given scenario

Such resource deficits can now be addressed via future hiring plans, shifting of cross-trained personnel, cross-divisional borrowing of staff, and discretionary budget requests. The resulting plan is much more effective in getting the necessary incremental resources, as it not only determines what is needed when, but also identifies where the additional resources will be invested and what additional business performance can be achieved.

Project Executive™: The flexibility to custom-configure the process embedded in Project Executive™ and the ability to rapidly incorporate incremental functionalities enables a high-value decision-support solution for most operating environments. Nominally speaking, 80-90% of the required functionality is common for any organization’s business environment, while the other 10-20% is manifest through built-in configuration options and minor-to-moderate incremental development efforts. The following will illustrate this approach by first outlining the starting solution demonstrated to HP and then by describing several highlights of the final process and tool solution implemented.

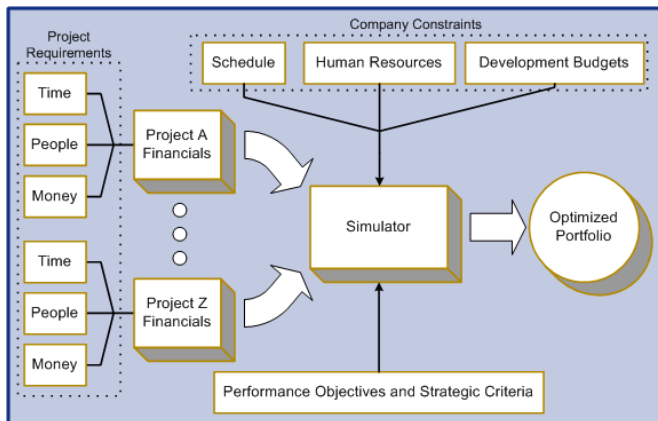


Figure 3. Portfolio Analysis Problem Formulation Diagram

Starting Solution

The underlying analytics that HP leverages in its Project Executive™ process and system solution are depicted in **Figure 3.** above. This figure schematically illustrates how a real company’s objectives, strategies, and resource supply-demand situation can be formulated as a structured, solvable problem for portfolio analysis and planning. A project is an activity that consumes time, people, and money. Project requirements represent the demand side of the “equation”. An organization’s capacity constraints on time, people and money dictate the supply side of the “equation”.

The business case for each project (both in-process programs and new candidate projects) incorporates pro-forma financial forecasts, human and capital resource investment requirements, a program schedule, qualitative characteristics of each project, and relationships to other portfolio projects. Projects that result in products that are sold commercially are referred to as Revenue-Generating Projects (RGP), while those that do not have associated sales-life financials are referred to as Cost-Center Investments (CCI). Both types of project investments must be considered, including their inter-project relationships. A common example of a project relationship is an end product’s RGP depending on a co-investment in an architectural platform, process technology, or intellectual property development that is a CCI.

Given the financial performance objectives and portfolio-wide strategies of the organization (specified in the appropriate value creation metrics and strategic fields of interest), subject to the resource capacity constraints of the organization, a range of optimal portfolio scenarios can be identified, visualized, and compared. The analysis is not a “one-shot” type of calculation, but rather a comprehensive set of portfolio scenarios across many objectives and over ranges of resource investment. Furthermore, all of the “levers” for evaluating “what if” inquiries in a real-time fashion are available. Quickly visualizing the impact of changing project start dates, cutting budgets, adding headcount, etc. facilitates well-informed managerial dialogue and decision making. Ultimately, a plan of record that balances business performance, planned resource utilization, resource deficits (bottlenecks), and organizational strategy is determined.

While the above modeling and analysis features apply universally, real operations and product development environments are idiosyncratic. As a result of institutionalized accounting models, industry dynamics, corporate structure, organizational behaviors, and related business processes or learned practices, neither a standard set of functionality nor rigid modeling is conducive to this decision-making domain. Hence, a value-added business process solution for project portfolio management must be able to incorporate both custom modeling revisions and additions to any existing analytical models.

Two additional phenomenon drive the need to have a flexible platform on which to build customer-specific implementations of Project Executive™. First, there is the “onion effect”. After providing the capabilities to deal with the many outer layers of this complex domain, customers request additional functionality to further enhance this business process solution. Secondly, given the pervasive nature of this domain in a typical operation, there are various related processes and applications to which Project Executive™ can be leveraged. The implications are that our approach offers value far beyond the starting solution that we bring to each customer deployment. In getting back to the HP case particulars, the following sections will highlight the custom modeling and incremental features developed in conjunction with HP.

Custom Modeling

There are three areas where business-specific modeling and functionality was developed to better support the HP environment. Although the details of this customization are strictly proprietary, it is easy to recognize the importance of the factors outlined below. Some additional information about this customization is provided in the **Process Implementation** section. For now, it is sufficient to mention that two of these areas relate to the consumable supplies component of printer businesses, while the third relates to the structure and diversity of HP’s sales channels:

- Inkjet and laser toner cartridge economics
- Supplies’ annuity modeling and financial valuation
- Sales channel revenue sharing

Allocate your time, people, and money to the optimal portfolio of product development projects

Incremental Functionality

The collaborative development effort experienced with HP is representative of most customers. However, being more process-rich and less systems-laden than other deployment environments, HP provided greater ability than usual to implement innovative functionality. The following chart in **Figure 4**, highlights both HP-inspired and PROXI-initiated features. Some of these were done within our deployment engagement, while others were done following the learnings attained in our collaboration. Examples of incremental functionality originating from each respective party are detailed below (features circled in red).

| | HP - Required/Suggested | PROXI - Initiated |
|------------------------|---|--|
| Post-Deployment | <ul style="list-style-type: none"> Multi-tab Project Reports in Excel Continuous-range Custom Fields Stacked-Area Charts Scatter Diagram Charts Project List Reports for Lab Rollups | <ul style="list-style-type: none"> Line Plot Charts MS Excel Reporting/Exporting Chart Zoom, Scroll, Return Grid Cut, Copy, Paste, Undo Company Setup List Order |
| Pre-Deployment | <ul style="list-style-type: none"> Discrete Custom Fields Database snapshot archiving Pens and Price Points Modeling Supplies P&L Drivers Model Revenue Converters Modeling Project Cloning & Scaling | <ul style="list-style-type: none"> Bubble Charts Bar Charts Custom Constraints (Strategic/Qualitative) Solution Compare Scenarios Revenue/COGS Unit or Totals-based |

Figure 4. Pre and Post-deployment system development with HP

Project Cloning & Scaling

Leveraging historical projects for forecasting new project business cases or creating alternative project variants from existing project business cases is quite powerful for generating a rich set of investment options (see **Figure 5**, below). Furthermore, creating new projects from well-characterized project templates is an efficient means of profiling new investment opportunities.

We developed a set of functionalities that collectively were named in honor of the HP marketing manager that drove the desired requirements. The "Amy" feature provided the ability to make an exact copy (other than a unique project name) of any existing project or project template that had already been forecasted in our system. This copy could then be easily modified to represent a new investment project with similar cost-benefit dynamics or to define a mutually-exclusive, alternative case for a variant of the original project.

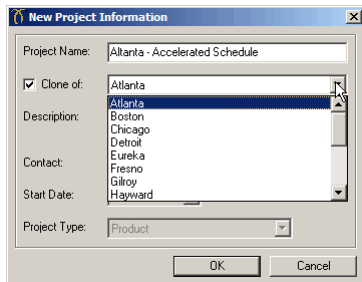


Figure 5. Creating a Project Clone from an existing project

The key "levers" to transform copies of projects into new business cases are the ability to shift project milestone dates and phase durations and the facility to use financial scalars to rapidly modify already-entered project data (shown on the right side of the abbreviated screen shot below in **Figure 6**.—note: sample data in these views are not HP-related).

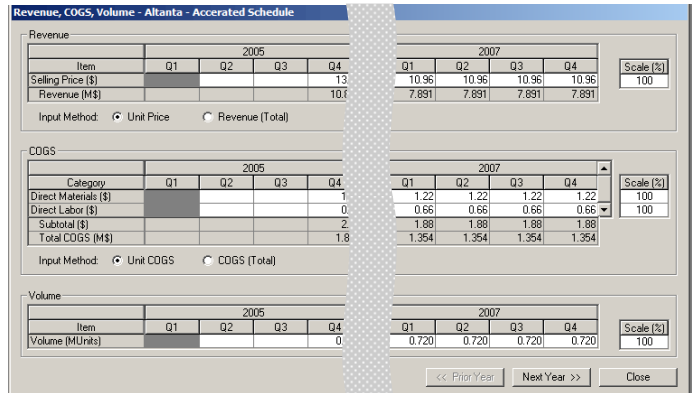


Figure 6. Using Scale Factors to modify financials of a cloned project (collapsed view of Revenue, COGS, Volume screen)

Solution Comparing

Even with relatively small numbers of projects, a convenient means to compare alternative portfolio solutions is needed. Process practitioners need a rapid way to visualize project inventory and portfolio metrics differences, as they investigate incrementally "larger" portfolio plans (something we call Marginal Solutions) and test alternative strategies. A comparison between a 9th Marginal Solution without any Strategic Constraints versus a 7th Marginal Solution with a strategic bias towards allocating resources to projects supporting the Enterprise market segment is shown below by the abbreviated screen in **Figure 7**. The leftmost panel is populated with one solution, while the middle panel is loaded with a second solution. The rightmost panel shows the differences, in terms of Projects Dropped, Projects Added, and changes in the financial and resource utilization metrics.

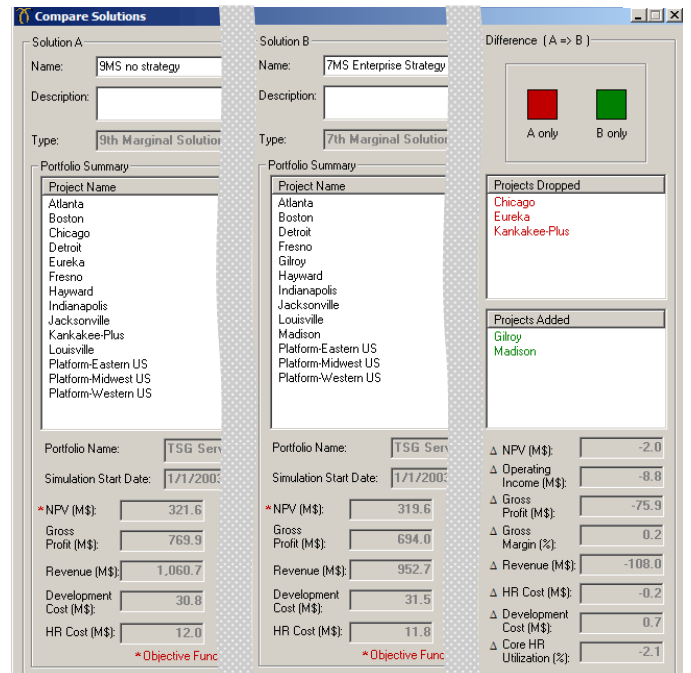


Figure 7. Comparing two alternative portfolio scenarios (collapsed view of Compare Solutions screen)

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Process Implementation: Project Executive™ is a highly configurable, rapidly customizable system. It is not a “canned” packaged software application with a fixed model around which to “bend” client environments. Thus, we take the opportunity to thoroughly understand a client’s idiosyncratic operational needs, to make any necessary model revisions, and to develop any incremental functionality that would enhance the resulting business process embedded in our system. As such, the anatomy of this HP initiative was divided into three distinct segments: requirements definition, operational model configuration and custom functionality prototyping, and system deployment and training.

Requirements Definition

Several on-site visits, prior to kicking off the initiative, allowed us to work with the necessary functional managers from the Product and Platform R&D Labs, Finance, Marketing, and the Product Generation & Productivity Lab, to determine the additional complexities of their portfolio environment that should be incorporated into the portfolio analysis process. The major modeling additions related to the nature of HP’s total system value that comes from a “razor and blades” model. That is, the business model for a printer project investment must not be considered in isolation of the annuity stream of revenues and profits that are contributed from the consumable supplies that HP produces for its printers. The important contribution of the supplies to the total system value creation requires HP to spend a great deal of effort to model and to forecast the economics associated with their ink and laser toner cartridges. We proposed to enhance our project forecasting and financial valuation models to incorporate this critical aspect of HP’s business environment. Additional incremental features that came out of the Requirements Definition phase were developed in the subsequent Prototype and Deployment phase projects (see **Figure 4**).

Prototype Phase Project

As a reminder, it is useful to summarize some of the jargon previously introduced in the **Organizational Background** section. The terms “Plan of Record” and “Vintage Chart” were used somewhat synonymously to refer to several formats for the rolling 5-6 year product and platform roadmap. The cross-functional core team tasked with implementing the portfolio management process was dubbed the Vintage Chart Develop Team, while the senior management team responsible for approving the final Plan of Record was called the Portfolio Management Team. The Vintage Chart Development Team consisted of one R&D Lab manager, one Marketing manager, two Finance managers, and two process-improvement managers. The Portfolio Management Team was the business unit’s Vice President General Manager and the functional-area directors comprising the division staff.

The first order of business was to individually explain the overall operational model used to formulate the portfolio analysis framework to each of the functional managers on the Vintage Chart Development Team. With a clear understanding of how their respective domains can be represented in the portfolio analysis and planning formulation, we then conducted interviews with each manager to get their view of how their operations should be modeled. Issues such as what granularity of job skill sets is meaningful for resource requirements and capacities forecasting, which development phases and milestones of the product lifecycle should be used for program schedules, what key line items should be included in the project-level income/expense statement, and what time resolutions are appropriate for forecasting and planning of project schedules, human resources supply-demand, development cost estimates, and pro-forma product financials.

Next, we had additional sessions with the primary Finance member of the Vintage Chart Development Team, to do in-depth reviews of the financial valuation model and metrics used to quantify the financial value creation at the project and portfolio levels. Besides designing the details of how the consumable supplies annuity stream for each printer program’s income statement would be implemented, the only other major model revision was to use a finer cash-flow time resolution to better reflect the relatively short sales horizons for consumer electronic products. For the purposes of the Prototype Phase engagement, we emulated the system-level valuation by creating separate projects containing the respective printer and supplies portions of the system-level financials and then pairing them in a mutually-dependent fashion (via the Project Relationships modeling capabilities). In contrast, for the follow-on Deployment Phase engagement, we built extensive functionality to generate the consumable supplies revenue and operating profit annuity streams “on the fly”. This portion of the system-level profit and loss forecast was then superimposed on the pro-forma printer financials, based on which ink cartridges would be paired with a given printer product.

After “boiling down” the operational model resulting from our individual manager interviews, we presented our recommended database configuration and Company Setup to the Vintage Chart Development Team as a group. With the overall portfolio model setup and validated, we then needed to determine the scope of projects that would be used for the duration of the Prototype Phase project. To simplify the amount of data collection and additional forecasting effort, the portfolio scope was limited to Revenue-Generating Projects—RGPs (i.e. end commercial products) and the platform development projects which are the Cost-Center Investments—CCIs on which the product programs depend.

Working primarily with the R&D Lab manager and two Finance managers (one responsible for budgets and human resource headcount and one responsible for product financial forecasts), we collected the readily available data for the projects of interest and identified the data gaps that needed to be obtained. Subsequently, all remaining data was requested from and submitted by the appropriate section and program managers.

Since we only provided minimal user training, during the brief prototype phase engagement, we entered all project business cases (Development Schedules, HR Requirements, pro-forma Financials, Development Costs, Custom Fields, and Project Relationships) and organizational resource capacities data ourselves. Once the entire portfolio data set was “scrubbed” for invalid data exceptions, we were able to move on to performing a sample portfolio analysis. This analysis was conducted with the Vintage Chart Development Team, so they could start to gain portfolio insights that would be invaluable to highlight in the forthcoming executive review.

Preparation for the executive review included establishing a baseline scenario as a portfolio recommendation, with several “choice points” to evaluate as alternative “what if” scenarios. These portfolio scenarios were contrasted, in terms of their impact on aggregate value creation, total investment costs, and resource utilization.

Deployment Phase Project

Up to and including the Prototype Phase, only product and platform programs were being considered as the candidate projects competing for human resource and development budget allocations. The business unit's headcount and budget must support more than just the requirements for named development programs. If the scope of project investments is limited to a subset of the total investment portfolio, then the HR Capacities and Development Budget must likewise be a commensurate amount of total organizational resources. In most organizations, the portion of headcount and budget available to work on development projects is not a fixed, known portion of total resources. Furthermore, there are additional cost-center investments that are difficult, if not impossible, to explicitly allocate to specific named programs. These "projects" may have large amounts of people and capital requirements that need to be rolled-up with the specific investment requirements for both in-process and new candidate development programs and then reconciled against the real, widely-known, total HR and Development Budget constraints.

At the outset of the Deployment Phase, the Finance organization requested that the scope of the portfolio be expanded beyond product and platform investment projects. Again, the motivation to include all operational activities, was so that the human resource capacities and development budgets used in the portfolio analysis would be the actual quarter-by-quarter business unit headcount and budget constraints. This required that all other resource-consuming activities be defined and have their associated forecasts for human resource and budget requirements included in the analysis. While this sounds like a tedious and difficult task it is actually quite simple to do with "dummy" projects that HP affectionately termed "blobs". These are somewhat amorphous investment projects, in that they support sets of related projects or even the entire portfolio. For example, an entire section of engineers developing common software printer drivers to be used across the product portfolio has a known amount of people and budget that will be used per quarter. These requirements can easily be forecasted in a blob project over the applicable development horizon. If the investment supports the entire portfolio, we simply "Force-in" the project to the portfolio solution (a means of reserving resources for these requirements of the portfolio). If only a subset of the portfolio projects depends on a blob, we use Project Relationships to form the appropriate dependencies between the products and/or platforms that depend on the blob.

There were two parallel tracks that were the "long straws" of the Deployment Phase effort. While our development team finalized and implemented the requirements for the HP-specific incremental functionalities, our consulting staff worked with the extended HP team to refresh forecasts for projects already created and entered into the Project Executive™ database during the Prototype Phase. In addition, all remaining product and platform project business cases (proposed and in-process) were forecasted, validated, and entered into the database. Finally, all blob investments needed to be defined, forecasted, and connected to the associated projects that depend on them (or forced in to support the entire portfolio).

With the portfolio data entered and "scrubbed", it was time to conduct formal system training for the Vintage Chart Development Team. The entire team participated in the first three training modules for Project Investment and Resource Modeling, Portfolio Optimization, and Portfolio Analysis, Charting, and Reporting. A fourth module was presented to the three members of the team that would act as "system administrators" (i.e. those with access permissions to create new user accounts and to change the Company Setup configuration to maintain the system over time).

Besides a tutorial on the functionality that the administrators have at their disposal, we also presented the overall portfolio management process flow that we developed and documented with HP, over the course of the Deployment Phase.

The "homestretch" activities included preparing several alternative portfolio scenarios, with one being the primary recommendation from the Vintage Chart Development Team to the senior management. Similar to the executive review of the Prototype Phase, several key choice points were utilized to drive the differentiated alternative portfolio scenarios.

We then deployed a completely functional beta version of our system on HP's file server and client PCs. Before concluding the Deployment Phase, our combined HP-PROXI team identified some additional requirements for optional system extensions, based on our on-the-ground learnings. Being in the unique position to "see the trees from outside the forest", we prepared and presented a thorough Findings & Recommendations report that contained 11 key points for continuous process improvement at HP. With proper attention to client confidentiality, some continuous improvement points for the HP process are discussed in the next section. We wrapped up, by sharing our plan for final testing of the HP release of our system, reviewing our licensing agreement, and determining some actions for follow-on support of the ongoing business process change management effort.

Continuous Improvement: Having the chance to become intimately familiar with HP's "as-is" people structures, business processes, forecasting behaviors, and decision-making toolset, it would be a lost opportunity to not offer some insightful observations and recommendations for the client's continuous improvement interests. Rather than list all of the recommendations submitted to HP, it is more instructive to focus on the issues commonly encountered across many clients.

Suggestions for Further Process Improvement at HP

1. The sustaining development requirements needed by a product development program, beyond its manufacturing release date, should be consistently forecasted across programs. Such discrepancies will tend to underestimate the resources needed to support new product introductions.
2. The set of job categories within functional areas are too specialized for project forecasting and portfolio decision purposes. Also, the skill sets defined across departments can be better aligned for similar job classifications. Otherwise, resource allocation can be easily over-constrained, and the common practice of cross-department "borrowed staffing" is hard to support.
3. Quarterly budget constraints can be modulated to mirror the seasonality of the business requirements, rather than being estimated at one fourth of the annual budget.
4. The proper multiyear development horizon and sales horizon durations should be refined over time, based on product and platform development cycle times, printer sales lives, and the term for the consumable supplies annuities.
5. Large "blob" investments should get broken down to finer "blobs" over time, to provide better transparency to the shared resource investments of the portfolio (we can refer to these as "lumps").
6. As the process matures, a more rich set of project alternatives should be forecasted at earlier and earlier lead times to the portfolio analysis and decision-making reviews.

Project Executive™

Client Case Study

Allocate your time, people, and money to the optimal portfolio of product development projects

Results-Retrospective: This was a valuable engagement for both HP & PROXI. The mutually derived enhancement ideas, based on HP's experience, have resulted in new features and improvements found in subsequent versions of Project Executive™, and recommendations from the PROXI team to improve the Portfolio Management process at HP have been incorporated as permanent process improvements found in today's process. Most recently, based on referrals from members of this HP team, the Portfolio Management expertise of the PROXI team has drawn attention from others within HP seeking to address their own portfolio management challenges.

From the beginning, the Project Executive™ system met the core analytical requirements of the PMT. Suggested enhancements to enable importing of data from privately managed data stores are planned, in order to overcome the largest concern (i.e. the time and energy necessary to keep the Project Executive™ database current) that this team has for using the application more efficiently.

Reflecting on the requests from individuals to get specific incremental features included in the deployment version of the software revealed a mixed blessing. On the one hand, these requests had definitely increased the scope of the engagement. On the other, they were widely accepted enhancements that were greatly appreciated by Finance and Marketing. Inclusion of "cloning and scaling" and customized consumable supplies annuity stream calculations have been critical in gaining support from these groups.

A major lesson learned from this engagement was recognizing the degree of social change required to address technical problems. The PROXI team had done an admirable job of addressing the technical issues: enhancing Project Executive™ to meet HP's unique requirements, mapping our current data flows, integrating essential data from the private stores, and training a core team to manage the analytical process. The struggle that continues is a social one. Ownership of privately held data stores continues to create silos of influence, and the behavioral changes necessary to integrate Project Executive™ into the informal hallway meetings remains an ongoing challenge.

Conclusion

Portfolio management is much more than a technical problem. The engagement model used by the PROXI team helped to clarify the process as well as provide a robust, effective tool. While a social challenge remains as a developmental area, much has been learned and improvements to the process have already been implemented. The analysis tool provides the necessary rigor and documentation for the decision-making process, while the consulting engagement provided an independent review of the existing portfolio management process—one that can become even more valuable over the long run.