

Implementing Process Modeling from Scratch: Untying the Gordian Knot

Best Practices Planning

Abstract

This white paper describes concepts and techniques for unraveling business complexity to arrive at trusted and well-managed process models. Various aids to process analysis and modeling are examined, including the role of a repository to improve organization and governance of the model information.

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Executive summary

The complexity of operational processes can be a significant obstacle to any effort to improve those processes through modeling and analysis. Three principles can be applied to sort through the complexity and arrive at models that can help you better understand your business. These principles include:

- “Divide and conquer” by segmenting the complexity into small "chunks" representing essential functions that can be related back to the whole enterprise
- Classical systems analysis that identifies the responsibility boundaries, interfaces (work requests), controllers (workers), and data objects (work products) that are affected by business processes
- Indexing and organizing the information captured in the models

Start with business maps that identify the key functional areas of the business, followed by business use cases that describe business activities that flow through the functional areas. Various analytical techniques can then be applied to aid in process discovery and capture. Analysts can rely on common, well-understood archetype models to help them gain an understanding of the data that underlies business processes.

The model repository needs to be organized incrementally as your models mature and your understanding of the business grows. Effective governance procedures need to be established to ensure that users can trust the information they find there. Technology can help by providing a tight integration between the repository and your business process management tool.

Introduction

This white paper includes the following sections:

- The challenge – Unraveling business complexity
- Determining where to start
- Business process frameworks
- Analytical techniques
- Business archetype models
- Establishing a repository

This information will help you understand some tried and true concepts and techniques for unraveling business complexity to arrive at trusted and well-managed process models. Various aids to process analysis and modeling are examined, including the role of a repository to improve organization and governance of the model information.

Audience

This white paper is intended for business analysts and managers of process improvement initiatives in both IT and line-of-business roles.

The challenge – Unraveling business complexity

Starting a new business process modeling effort can be overwhelming. By the time most organizations are mature enough to recognize the need to understand and capture their operational processes, the processes have become convoluted, redundant, and overly complicated. So, where to begin unraveling this tangle? This white paper describes how you can assemble a set of analytical tools and apply them to the creation of a useful and maintainable repository for business process models.

The first step in initiating an enterprise-wide business process modeling and engineering effort begins with the acknowledgement that businesses are complex systems^[1]. This is not as obvious as it seems! Many business modeling sponsors believe that the business already understands the bulk of its operations and that it is a simple matter to capture that information. However, once the process begins, it becomes apparent that many processes are performed differently by different individuals. Moreover, some of these processes

are redundant or even unnecessary, as is the case in many document management processes. As we'll discuss in this paper, the ability to recognize that the modeling effort is fundamentally one of understanding a complex system helps to level-set the expectations and properly fund the effort.

Given that a business represents a complex system, the following three fundamental principles can be applied during the capture and management of business processes:

- The first principle is the time-tested divide and conquer approach; business can often be structurally divided by function, with many of these functions repeated from business to business. Divide and conquer dramatically simplifies the overall effort by segmenting the complexity into small "chunks" that can then be related back to the whole enterprise.
- The second principle is based on classical systems analysis: the identification of responsibility boundaries, interfaces (work requests), controllers (workers), and data objects (work products). This principle further divides the problem space by identifying the workers, work requests, and work products that the business process affects.
- The final applicable principle is what I call library science 101, or indexing and organizing the captured information. In this last point, the intent is to allow not only capture of individual processes but reconstruction of the full business viewpoint in a way that allows maintenance of and access to the underlying information by anyone familiar with the indexing scheme.

Determining where to start

Following the divide and conquer approach, start modeling with a business map. A predefined business process framework (such as the APQC Process Classification Framework shown in Figure 1) can help you get started. Given that most businesses have a similar core set of necessary business functions (such as accounting, marketing, sales, and human resource management), this is a good place to begin the business map.

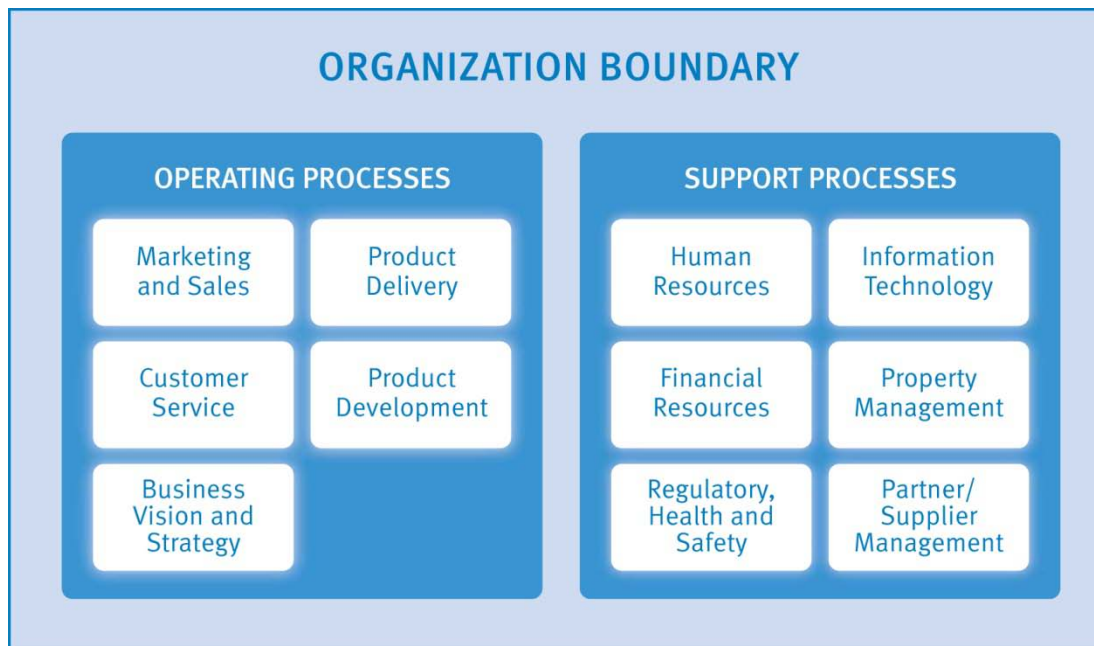


Figure 1. Example business functional map (based on the APQC Process Classification Framework)

With the business map in hand, you can start identifying specific business activities that flow through the functional areas. These business use cases are flow-based descriptions of a particular goal-oriented business behavior (see Figure 2).

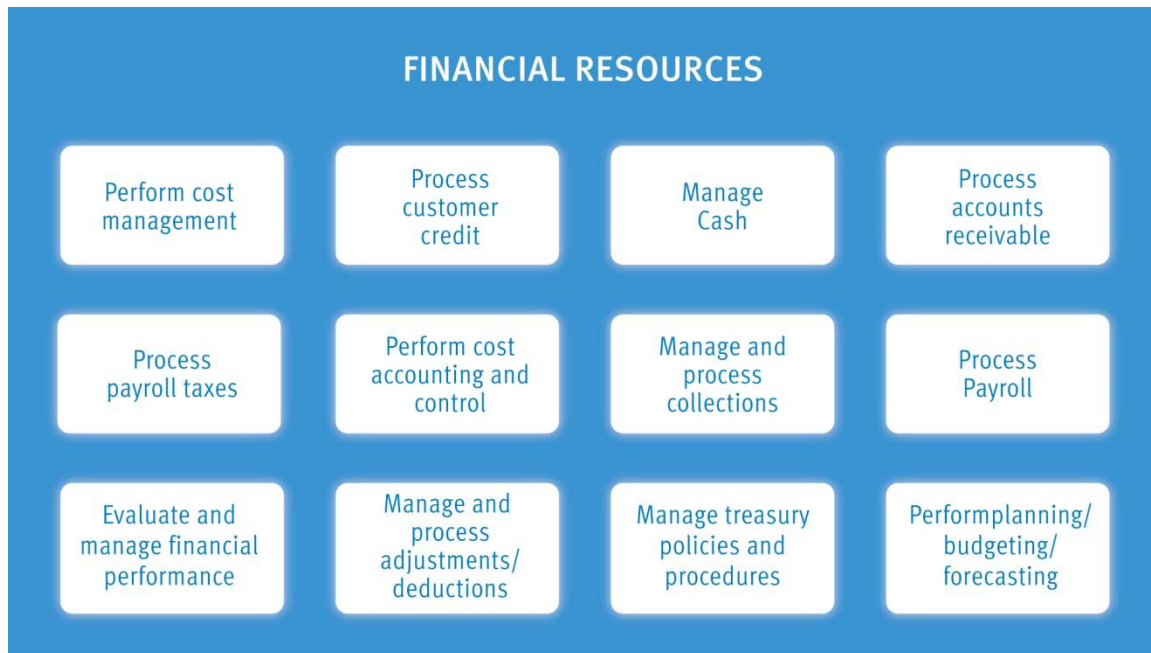


Figure 2. A sampling of business use cases for the financial resources business area

The combination of the structural business functional map and the behavior business use case set defines the business architecture for more detailed elaboration. This mapping also provides the basis for the model repository structure.

Business process frameworks

As Figure 1 shows, several business framework models have been produced to assist organizations in the capture and modeling of their business processes. One of those groups is the American Productivity and Quality Center^[2]. The APQC, in collaboration with a number of representatives from various industry segments, has created a collection of business process frameworks. These frameworks currently cover the business processes for the aerospace and defense, automotive, banking, broadcasting, consumer products, education, electric utilities, petroleum downstream, petroleum upstream, pharmaceutical, and telecommunications industries.

Of course, every organization will have its own particular “spin” on these core process areas, but having a basis from which to start greatly simplifies the overall effort and reduces the problem space to one of tailoring and adjusting existing model elements to match. Moreover, by studying these frameworks, it is possible to discover areas in the organization that are not following best practices and are thus good candidates for re-engineering.

In addition to the models that the APQC provides, the TM Forum makes frameworks available on the enhanced telecommunications operations map (eTOM), the IT Infrastructure Library (ITIL)^[3], and the Capability Maturity Model Integrated (CMMI) from the Carnegie Mellon Software Engineering Institute. All of these frameworks offer a structural hierarchy of business processes that allows for organization of model contents, but the eTOM model also provides an interesting twist whereby the vertical groupings are structural and the horizontal groupings are behavioral (see Figure 3). By cross-indexing each business process as part of both a structural hierarchy (that is, a repository index) and a business process flow, this strategy shows the necessary linkages between behavior and structure.

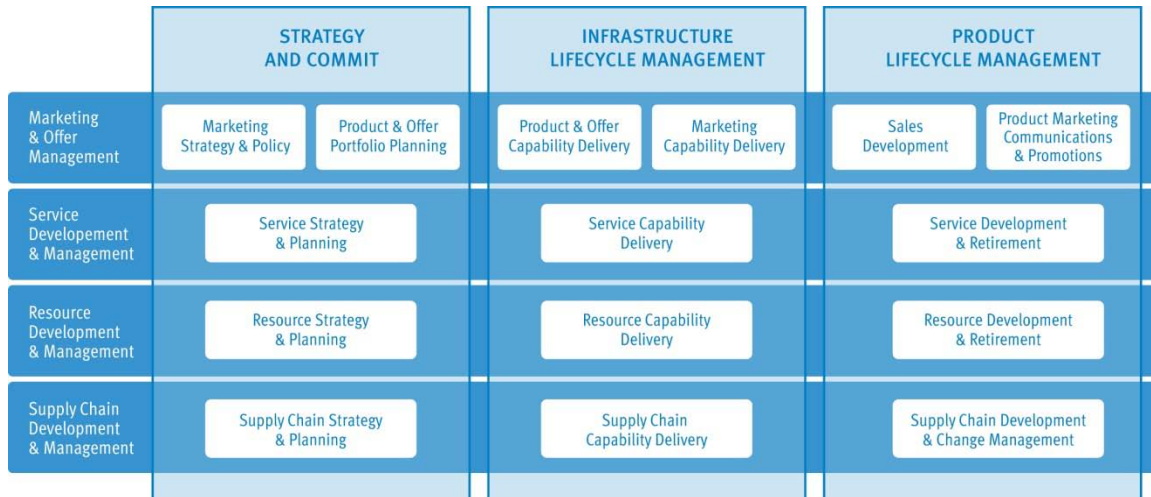


Figure 3. The eTOM operations layer^[4]

Analytical techniques

Once you have established a working roadmap for the business, the next step is to begin process discovery and capture. Even using a pre-existing framework leaves a significant level of complexity in the business interactions and behaviors. Analyst teams can spend a significant amount of their time in deciding where to begin modeling. Any and all of the approaches listed in Table 1 will result in useful model information.

Table 1. Analytical techniques

Analytical technique	Description/approach	Example
Top-down	Begin with the highest-level business process area, and proceed to more detailed levels following the business framework (if a framework is used).	Accounting, Revenue Assurance, Cash Receipts
Middle-out	Using the business use case map, select a business process to detail; follow dependencies to other processes, and then expand the level of detail (such as business objects, flows, and dependencies). Assign each process to a specific functional area.	Inventory Management, Inventory Object/Flow Descriptions, Assignment to Supplier Management
Bottom-up	Begin with a low-level description of business process flows and work toward more abstract levels of the organization.	Bank Deposits, Cash Receipt Management, Revenue Assurance, Accounting
Inside-out	Determine all contact points with external entities, and begin with the internal management processes before exploring the external relationship.	Purchasing, Supplier Agreement Management, External Vendor
Outside-in	Determine all external partners, vendors, and suppliers; identify the touch-points with the organization (including data descriptions).	Partners Identification, Contract Management, Legal

The decision about which approach to use depends entirely on the nature of the organization and the availability of resources. For example, if you only have access to managers, begin with the top-down approach. If line workers are available, then use a bottom-up methodology. If the organization is heavily influenced by external partners or vendors, use the inside-out approach.

Another useful approach to complex system analysis is to use classical techniques (see Figure 4). This approach leverages identification of system (also known as business) boundaries, interface points between members of the business and external parties, business workers, business data objects, and workflows. This form of modeling is useful for the next step of detailing the actual steps of the workflow and provides a useful way to indicate dependencies between various workflows.

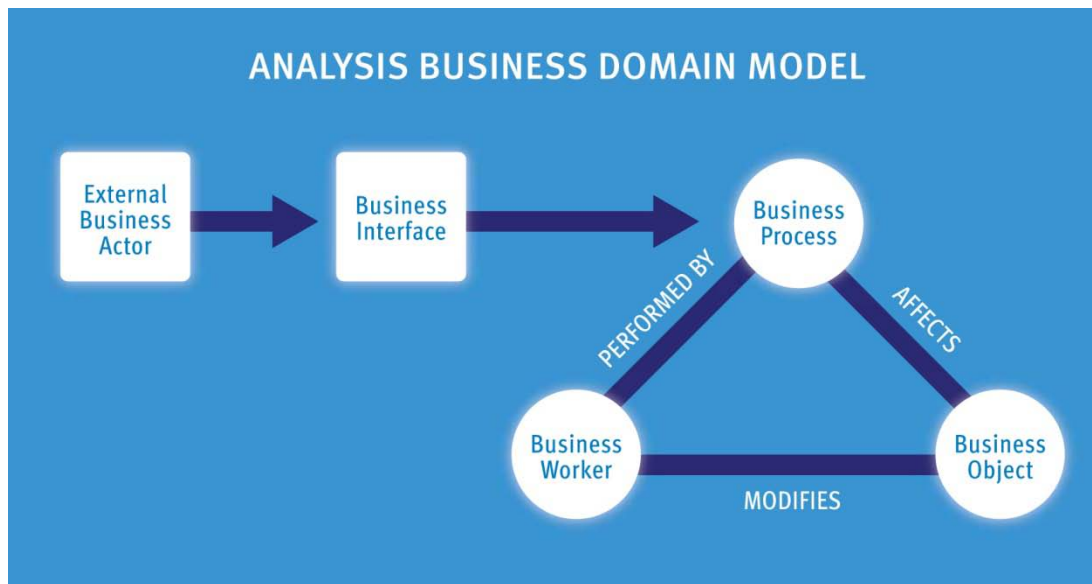


Figure 4. Business system analysis model

The actual information-gathering operation for business process elaboration is similar to any other analysis effort and focuses on interviews with business workers, review of existing documentation, and inspection of supporting software systems. When setting up for interviews, it is important to avoid "manager trap," where the only subject matter experts (SMEs) are from the management staff. It is imperative for the success of a modeling effort to speak directly to the people executing the business processes; only they will have the "tribal knowledge" necessary to create an accurate picture of how things really work. Management will tend to portray how they expect the process to work rather than actual behaviors. Similarly, set up interviews on a one-on-one basis to observe the business behaviors directly; that way, the "oh yeah, I forgot about that step" moments will be more likely to happen.

In review of existing documentation, the best practice is to work backward from current documents to less-recent documents; anything over two years old is unlikely to have accurate information (unless such documents are regularly updated, like training manuals or operating procedures). However, documentation may be the only materials initially available to the analyst team, and they can provide a good check against the business process map used to organize the analysis effort. Where possible, it is also a good idea to study software system test cases—teams create good cases from the actual business processes that the system supports.

Finally, for business processes that are supported by software systems (which is most of them these days), it is a good practice to spend time reviewing the functionality available to the business workers. Although you do not need to dig down to the "button click" level of detail, noting where and when in the manual process the computer system is used and the information passed back and forth will greatly aid in the accurate modeling of the business process.

Business archetype models

Analysis of business processes usually requires understanding the underlying business data that are created, manipulated, or modified during the execution of a particular process. Often, in an initial business process analysis, these business objects are not well defined in terms of their attributes or they are mixed together so as to make the business process more complex than is strictly necessary. A good example of this would be forms used to evaluate a loan application. You can think of the application as the business object, but it is really composed of several other more granular objects, such as a customer, a set of assets, and a credit history. If the modeler does not recognize these lower-level objects, problems will occur when it becomes clear that a customer in the loan evaluation is the same as the customer who later enters into a contract—a very different business process.

To aid the business analyst, a set of business object models is available for a variety of common business data concepts (see Figure 5). In an earlier article “[Getting It Together: Organizing: Your Business Process Repository](#)”^[5], in the [EMC® Documentum® xCP Community](#), I noted the value of business archetype models in the development of business object models and presented how these models can be used to discover and properly relate business concepts. For a model started from scratch, you can use these archetype frameworks almost directly to represent common business concepts such as Party (any entity who can enter into a legal contract), Address (a point of contact—geographic, telephonic, or electronic), an Order (a customer-initiated transaction for a product or service), or Product/Service (the subject of a transaction between Parties).

provides the development team with a well-defined object model and the operations that can be performed on those data, there is a much higher likelihood that the business process will be automated correctly.

Finally, a well-defined archetype model allows for the development of business simulations. A good simulation will account for all of the possible paths that the business process may follow (also known as business use cases). The business process areas illustrated in the archetype model (such as how a party may participate in a business transaction, billing, or marketing) allows for those processes to be linked through the information they are modifying, and explicitly shows where and how (if not necessarily when) the data will be modified. Many business process modeling tools provide for the ability to rapidly automate and test business process flows, in particular the tools that are part of process suites such as the [EMC Documentum xCelerated Composition Platform \(xCP\)](#).

Establishing a repository

Consider two key concepts when creating a modeling repository from scratch. The first is the organization of the repository. Even using a business process framework and a business archetype model to assist in predicting the overall structure of the business, it is likely that there will be subtle needs you must meet, such as the ability to assign a particular business process to more than one functional area when it is performed in such a way as to cross standard boundaries. It is therefore best to begin by designing the structure around what is well known about the business, such as standard financial procedures or human resource management. Areas such as Product and Service Strategy and Planning (to use the eTOM terminology from Figure 2 on page 6) tend to be less well defined and should be built out only once you have a solid understanding of the processes. In short, start simple and small and build out the full repository in stages. (For more information on creating, structuring, and maintaining a repository for business process models, see “[Controlling the Chaos: Understanding the Effects of Process Change](#)”^[7], in the [EMC Documentum xCP Community](#).)

The second key concept is to establish governance over the repository. You can do this by establishing an oversight committee (also known as the head librarian), training, and a periodic inventory review of repository materials. This is especially important when multiple users outside the core business process analysis group are responsible for contributions to the repository. Imagine the chaos if a library patron were allowed not only to retrieve materials from a shelf but to put anything they felt of value into the library any way they wanted: Signs reminding patrons not to re-shelve books are there for a reason. Training materials should include the modeling standards, a thorough coverage of the peer review process for materials to be entered into the library, and sufficient oversight to ensure that the rules are being followed. A poorly organized model repository is worse than useless—it is expensive and useless! Business process management tools that feature a tight integration with a content repository, such as [EMC Documentum xCP](#), enable this form of governance by providing automated administration tools to the Repository Manager.

Conclusion

Modeling a complex system is difficult, time-consuming, and expensive—certainly for business process modeling. However, even the most complex business can be understood by breaking the problem domain down to more reasonable functional areas, using pre-existing model frameworks, identifying business objects, working with a well-defined strategy (inside-out, top-down, and so on), and capturing the discovered information in a well-structured repository.

Alexander solved the problem of the Gordian Knot with a single sword stroke; for modern business process modeling, a bit more work is required, but starting the effort with a good strategy will go a long way toward solving the problem.

References

- [1] Gell-Mann, M., “What Is Complexity?” *Complexity* 1(1):16–19.
- [2] [American Productivity and Quality Center website](#).
- [3] [ITIL website](#).
- [4] The eTOM model. [TM Forum website](#).
- [5] Lieberman, Ben, “[Getting It Together: Organizing Your Business Process Repository](#),” [EMC Documentum xCP Community](#), January 2010. <https://community.emc.com/docs/DOC-5497>.
- [6] Arlow, Jim, and Ila Neudstadt, *Enterprise Patterns and MDA: Building Better Software with Archetype Patterns and UML* (New York: Addison Wesley, 2003).
- [7] Lieberman, Ben, “[Controlling the Chaos: Understanding the Effects of Process Change](#),” [EMC Documentum xCP Community](#), December 2009.

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