Business modeling practices: Using the IBM Rational Unified Process, IBM WebSphere Business Integration Modeler, and IBM Rational Rose/XDE

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from The Rational Edge: This article discusses various contexts for business modeling efforts and provides an overview of the technologies IBM offers to support business transition through three phases of e-business adoption: Function, Integration, and On Demand computing.

As organizations are moving to become more agile and On Demand, the need to take an engineering approach to connecting business and IT is increasing.

If you are interested in understanding why business modeling might be useful and would like an overview of the IBM solutions for business modeling, please keep reading. Ideally, you already have a basic understanding of the concepts of business modeling as defined by the Rational Unified Process. Several introductory articles on business modeling concepts can be found in The Rational Edge archives.

The purpose of this paper is to explore contexts for business modeling efforts and to provide an overview of the technologies IBM offers to support this. As I proceed, I will refer to various IBM software products that offer capabilities relative to the discussion at hand.

The essential concepts

These are business engineering, business modeling, and business process management. The Rational Unified Process discusses business modeling using UML modeling tools such as Rose/XDE and how it supports business engineering. The WBI Modeler in combination with the rest of the tools that constitute the IBM WebSphere Business Integration tool set support business process management. Let's review these concepts in order.

Business engineering

Business engineering is a set of techniques a company uses to design its business according to specific goals. Business engineering techniques can be used for business reengineering, business improvement, and business creation.

Business reengineering. This form of business engineering yields changes based on a comprehensive view of your existing business and a thorough evaluation of how and why it functions as it does. You question all existing business processes and try to find new ways of reconstructing them to achieve radical improvements. Other names for this are business process reengineering (BPR) and process innovation.

Business improvement. This form of business engineering yields local changes that do not span the entire business. It involves trimming costs and lead times and focuses on monitoring service and quality.

Business creation. This form of business engineering is used when the goal is to create a new business process, a new line of business, or a new organization.
Business modeling

Business modeling encompasses all modeling techniques you can use to visually model a business. These are an essential subset of the techniques you may use to perform business engineering.

Business process management (BPM)

Business process management is the concept of continuously defining, analyzing, and improving a business process.

Objectives of a business modeling effort

In a business world that is increasingly competitive, companies frequently find that their organization structures and processes are not allowing them to adapt to change quickly enough. Many of these companies have decided to adopt modern business practices and IT technology that supports them—a change that affects many aspects of an organization. The following challenges are common:

- Business processes are not visible to people working in the organization. If there is no common baseline to start from, it is difficult to discuss what to change.
- Different parts of an organization use different variants of the same process. This lack of alignment in practices and terminology causes confusion and makes it difficult to assess what should be changed.
- Technology has become essential to how business is run. Both the business management and IT management teams see the need to collaborate more than they traditionally have. Companies that didn't used to think of their products and offerings as software now find that software is how the products are represented. For example, much of the financial and banking industry has been changed over the past five to ten years through online representations of essential service offerings.

Business modeling, which refers to the techniques for visualizing and reasoning about processes and structures in the organization, is therefore becoming more important. Currently, there are no obvious standards for business modeling notation; there are, however, efforts underway to align several common practices. Standardization initiatives are driven by BPMI (Business Process Management Initiative, www.bpmi.org) in collaboration with the OMG (Object Management Group, www.omg.org). For more background on standards, see Appendix C.

So, let’s imagine that you undertake business modeling under the simplest scenario, in which you only want to understand or align business processes. As depicted in Figure 1, you would do this by visualizing the processes and then make improvements based on business requirements understood through executing the processes. You will see varying levels of formality in the modeling efforts, all depending on the audience and focus of the effort. Some practitioners use white boards and PowerPoint only, while others may use visual modeling tools such as Rose/XDE to do more formal UML modeling.

A more complex scenario involves business modeling in combination with build process monitoring capability. As shown in Figure 2, as processes are executed, data is collected and performance is analyzed in order to generate business requirements for process change. This is the strength of the IBM WebSphere Business Integration tool set, and the capability it provides is referred to as business process management (as defined above). The current notation used for business modeling and process monitoring is inherited from the Holosfx products that IBM acquired a few years ago. The WBI Modeler also makes it easy to record costs and timing of tasks, which are required to do simulation of a workflow.
An even more sophisticated variation combines business modeling and process monitoring with application reconfiguration capability (automatic reconfiguration of an application based on changes in the business model). Business requirements for change may require changes in the functionality of existing software applications (IS solutions). In this case, as shown in Figure 3, the software requirements will lead to changes in the parameters by which the applications are run. Again, this type of reconfiguring is supported by the WebSphere Business Integration tool set.

Figure 2: Using performance analysis to refine business requirements for the business modeling effort.
Finally, you may do business modeling in combination with application development. If business requirements demand new functionality in your applications, or if the business is going through an automation effort, business modeling could be input to an application development effort in order to generate software requirements. This is the strength of the IBM Rational Software Development Platform. The business modeling notation used for this comprehensive process and toolset is based on the standard UML.
Figure 4: When application development is added to your fundamental business processes, businesses are able to tailor IT systems to directly address known business requirements.

Now, let's look at the big picture, as shown in Figure 5. The IBM Software Development Platform combines business modeling with other capabilities to monitor, reconfigure, and/or build application support for the business processes.
**Why do you want to do this?**

In order to remain competitive, clients we work with are going through three basic stages of e-business adoption, depicted in Figure 6: Function, Integration, and On Demand.

**Function.** The first stage, typically, is to build processes and IT support for domains or functions in the business. This is where most organizations are today. The understanding of the business process as well as the supporting applications tend to be specific to the functions or domains. For example, international corporations often rely on country-based expense-reporting procedures and supporting applications. The disadvantage is that there is some overlap in features and also perhaps difficulties in communicating information across national borders.

**Integration.** The second stage is to integrate domain-specific IT systems to eliminate overlap and to align processes and information structures across the organization. This should result in fewer applications to maintain and easier communication across borders or traditional business boundaries. However, as this is implemented, businesses tend to find more overhead in adapting to the needs of the functions or domains, and the organization is perceived as more bureaucratic. For example, adding or modifying an expense-reporting system to meet changes in local laws and regulations for overtime work might all of a sudden become rather complicated and costly as it now affects an application the whole organization uses.
**On Demand.** The third stage is to create something that combines the best of both worlds, with a focus on the marketplace in certain niches, but with the ability to integrate business-led processes and IT capabilities horizontally across the enterprise for efficiency and for speed of response and resiliency. Very few businesses have achieved this. No one would even attempt this unless they had to in order to remain competitive. But increasingly, organizations are striving to reach this stage in order to survive. This is what IBM's On Demand vision is all about.

The demands on business modeling are different in each of the three stages described above; business engineering becomes increasingly important as you go through the stages. Understanding business processes and business architectures is essential in order to deliver the appropriate technology; therefore, business modeling is critical to the IBM On Demand strategy.

![Figure 6: The three stages of e-business adoption.](image)

**Tools for moving through the stages of e-business adoption**

Currently, two IBM product sets exist to support business modeling. These product sets are related, although they have different purposes:

- The IBM Business Performance Management Framework, including the WBI Modeler for business modeling using a workflow-based proprietary notation. WBI Modeler can import and export UML models. It can also export model information to the WMQ Workflow tool.
- The IBM Software Development Platform. Includes an approach to business modeling using UML and Rational visual modeling tools (Rose/XDE and the Rational Unified Process). As the name indicates, this set of tools is targeted to the software developer audience; though the business modeling portion of the solution is aimed both for business developers as well as system analysts and architects.

If you look at a more complete picture of support for helping clients migrate through the stages of e-business adoption, you'll see three main components:

- A middleware platform that forms the basis for all applications. In this platform you may see an enterprise application server such as WebSphere Application Server, and possibly also a workflow engine such as WebSphere Foundation Server for monitoring of business process execution.
- A set of application development tools—requirements management tools such as Rational RequisitePro, visual modeling tools such as Rational Rose/XDE, and construction tools such as WSAD.
- A set of business modeling tools such as WBI Modeler or Rose/XDE possibly combined with workflow orchestration tools such as WebSphere MQ Workflow.
Business and AD Tools

Business-Level Tools
- Business Performance Monitoring
- Business Process Modeling

Requirements Analysis
- Software Architecture

Workflow Orchestration

Design and Construction

Middleware Platform
- Workflow Execution Engine
- Portal Server
- Enterprise Application Server

Figure 7: The tools for e-business adoption. The strengths of the IBM Business Performance Management Framework lie in the left side of the picture, while the IBM Software Development Platform is focused on the right side.

Impact of process characteristics
Another dimension to consider is the characteristics of the business processes being described. The IBM Business Performance Management Framework products lend themselves to modeling and managing processes that are repeatable in nature. In these types of processes, known as transactional processes, the same sequence of steps, with minor variations, is repeated every time the process is executed. This is typical for production processes and order handling processes, for example.
Figure 8: An example of a transactional process, in which the same sequence of steps gets repeated every time the process is executed.

But there are also processes that are much less predictable in nature. For example, in a software development process, it is very difficult to define predictable sequences of activities. Activity and workflow diagrams used in UML-based modeling can never be prescriptive, only illustrative; the same is true of workflow diagrams in RUP. Modeling these processes needs to be focused on the results achieved along the way, what responsibilities need to be carried out, and not a prescriptive sequence of activities. We call these processes non-transactional; the strength of the UML (among other things) is that it supports class diagrams and interaction diagrams in addition to activity/workflow diagrams.
Figure 9: A UML activity diagram example.

The IBM technology for business process management (IBM Business Performance Management Framework software) is, as mentioned before, most effective for transactional types of business processes. Monitoring and management of more unpredictable processes require an expanded set of business notation and monitoring techniques like those offered as part of the IBM Rational Rose/XDE/UML approach. IBM Rational monitoring technology (the IBM Rational Project Console) focuses project management attention on the status of the deliverables of the process and achievement of milestones, rather than on what steps of the process may have been conducted.

For clients working in scenarios where both the IBM Business Performance Management Framework offering and the IBM Rational RUP/Rose/XDE offering are needed, IBM offers integrations between WBI Modeler and IBM Rational RUP/Rose/XDE. Note that these two approaches have differences in their styles of notation; Appendix A provides a table that translates key concepts used in WBI Modeler and IBM Rational RUP/Rose/XDE, respectively. The notations are overlapping, but offer different strengths as indicated above.

Process for business modeling

The business modeling discipline in RUP
Of the scenarios for business modeling outlined earlier in the "Objectives of a business modeling effort" section, any given organization may find itself engaging several. A "common way of working" tends in real life to mean a common framework for how to do business modeling, with variations depending on the usage scenario. In order to be able to harvest and reuse experiences, it is critical that the terminology, approach, and notation you use are standardized. As you gather experiences from business modeling efforts, you may gather a set of adaptations of the framework to typical usage scenarios. Those adaptations should be based on experiences in your organization. For example, the business modeling discipline in the Rational Unified Process (RUP) outlines the workflow shown in Figure 10.
Figure 10: RUP workflow diagram.
This graphic can serve as a framework for all usage scenarios of business modeling, although the emphasis of the steps will be different in each scenario. The original workflow from RUP has here been extended with a workflow detail "Analysis of Model" to further emphasize how models can be explored to analyze expected behavior. RUP offers some guidelines on how to do this, however the addition of the WBI Modeler and its guidelines broadens this guidance.

Let's consider a subset of the workflow details shown in Figure 10 that are relevant to modeling (for complete details of the business modeling workflow, you should refer to RUP itself).

**Describe current business.** The key benefits of this step are an understanding of current business context, a first insight into business needs, and a definition of the scope of the modeling effort. An example of diagrams that could be produced (via Rose/XDE) are context diagrams (a variant of class diagrams), as shown in Figure 11.

![Figure 11: Example of a simple context diagram.](image)

In some cases, you might find the business modeling effort is only relevant for a part of the business, in which case a more detailed context diagram might be produced, as shown in Figure 12.

![Figure 12: Example of a more complex context diagram.](image)

**Identify business processes.** The key benefit of this step is an understanding of what process areas require change compared to current processes. This is facilitated by producing overview diagrams that show high-level processes as business use cases and business actors. What you build here (and what you may continue in the "Refine business process definitions" workflow) is what RUP refers to as the business use case model. An example of this model, created using Rose/XDE, is shown in Figure 13.
Refine business process definitions. The benefit of this step is a more detailed definition of the business processes, but one that is still understandable to someone outside the organization. This is about describing from an external viewpoint what the processes are, without including internal details such as information structures or what roles are involved. Typically, this is done via text documents, although some also illustrate the business process flows with simple activity diagrams.

Design business process realizations. The benefit of this step is a description of how roles collaborate to perform the process, and what information objects are used, managed, or produced. This is where you get into the details of the process and start building what RUP refers to as the business analysis model. Common output from this step is one or more activity/workflow diagrams using either WBI Modeler or Rose/XDE, depending on your context. For example, if the process is highly transactional, and is a candidate for being implemented in a workflow engine, you'd choose WBI Modeler. An example of this output is shown in Figure 14.
Figure 14: Example of a business process realization modeled with WBI Modeler. 
Click to enlarge.

The same activity/workflow diagram in Rose/XDE using UML would appear as shown in Figure 15.
Figure 15: The same activity/workflow depicted in Figure 14, rendered here using Rose/XDE and UML.

Another diagram type used more for technical audiences is the sequence diagram, which can be created via Rose/XDE as shown in Figure 16.
Figure 16: Designed for technical readers, the sequence diagram offers a step-by-step view of the business process being modeled.

So far, we have only focused on the dynamics of the process. It may also be useful to look at static structures among classes using class diagrams. For example, a view of participating objects in a business use case or process is shown in Figure 17.
Refine roles and responsibilities. Unless you need to simulate your workflows, you would typically not spend a lot of time on detailed descriptions of the classes in the business analysis model. Instead, you might (for example) investigate state changes to explore lifecycles of key business entities (Rose/XDE), as shown in the statechart diagram in Figure 19.
Figure 19: Example of a statechart (state transition) diagram drawn in Rose/XDE.

If you are building your model in WBI Modeler and plan to do simulation, you will need to capture details around cost and schedules for resources. Figure 20 shows an example of how business workers/roles are defined in WBI Modeler.
Figure 20: WBI Modeler helps you capture details around cost and schedules for resources. This portion of the user interface shows how business workers/roles are defined.

Analysis of models. The Rational Unified Process does not currently put a lot of emphasis on analysis or simulation of the models. There is some content that describes activity-based costing, which WBI Modeler tool supports a variant of. Assuming you have captured details of resource cost and activity duration, as described in the previous step, WBI Modeler allows you to generate various charts to analyze the execution of a workflow scenario. Figure 21 shows a sample chart with cost per activity for an instance of a workflow (scenario).
Figure 21: WBI Modeler allows you to generate various charts to analyze the execution of a workflow scenario. Here is a sample chart with cost per activity for an instance of a workflow (scenario).

Another variant of analysis is to simulate the progress of the process. Figure 22 shows a process "snapshot" created for visual reference within the WBI Modeler tool. The higher numbers of little red boxes next to the activities/tasks indicate higher workload at each task, at the point in time the snapshot was taken.

Figure 22: WBI Modeler allows you to simulate the progress of the process. Click to enlarge.
Reuseable model frameworks

IBM's business consulting services team is currently addressing the business engineering needs of our clients by developing an approach we call Component Business Modeling (CBM). Today's interconnected firms face a business environment that is challenging on multiple levels; organizational structures and strategic alliances constantly shift in response to rapid-fire marketplace changes. The idea is to speed the transformation of an organization by providing frameworks for agile or On Demand businesses. Currently, CBM is primarily available for our customers in the financial industry.

But in a general sense, some CBM principles and techniques, such as the definition of a Business System, are available in RUP today.

Integration vs. development projects

An additional set of factors to consider in business modeling have to do with the general purpose of the project; that is, whether you are attempting to integrate process and applications, or to develop or automate processes. Consider the following:

- In traditional application development, the effort needs to include architectural specifications (interfaces, mechanisms, components) as well as low-level constructs such as classes and methods. UML offers full support for this activity.
- The components of an integration solution are somewhat different: adapters, business objects, diagrams representing individual steps of processing, etc., are the key constructs. The work on an integration project is usually concentrated on tying together existing people, processes, and applications (perhaps with some satellite development to support integration at the end points).

Therefore, if you intend detailed business modeling work to result in development work, the choice of implementation technology has a significant impact on the format (and potentially the total content) of the modeling work produced.

At a high level, one can consider the IBM Business Performance Management Framework (using WBI Modeler) approach to be well-suited to modeling transactional processes for integration projects and the IBM Software Development Platform (using Rose/XDE and UML) approach to be well-suited to modeling processes that will result in new system functionality or architectures. The two sets of tools can be used together (e.g., Rose/XDE for modeling business requirements and business analysis models, WBI for transactional business processes).

Conclusion

Business modeling is a key to moving to an On Demand enterprise. IBM is focusing on business modeling to drive:

- Process monitoring
- Process integration
- Process creation
- Process automation

Currently, IBM Software Group offers two complementary product groups for conducting business modeling:

- IBM WebSphere Business Integration (WBI) Modeler, which ties into IBM products for process orchestration and monitoring. WBI Modeler supports a subset of the modeling activities defined in the RUP business modeling discipline—mainly visualization of business use case realizations. WBI Modeler also offers simulation capability, which allows you to analyze the models.
- IBM Rational Rose/XDE, which supports full-scale UML business modeling and ties in to the IBM Software Development Platform and all modeling activities defined in the RUP business modeling discipline.

Depending on your business modeling context, you may choose either or a combination of these modeling approaches.

References

- BPMI (Business Process Management Initiative) - [www.bpmi.org](http://www.bpmi.org)
- OMG (Object Management Group) - [www.omg.org](http://www.omg.org)

CBM (Component Business Modeling)—IBM Executive Brief

The Rational Unified Process 2003

## Acknowledgements

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## Appendix A: Translation of Rational / WebSphere concepts

Translation of key concepts in RUP/Rose/XDE to WBI Modeler. For definitions, please refer to the WBI Modeler user guide and to the Rational Unified Process:

<table>
<thead>
<tr>
<th>RUP/Rose/XDE Concept</th>
<th>WBI Modeler Concept</th>
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<tbody>
<tr>
<td>Business Use Case</td>
<td>-</td>
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<tr>
<td>Activity Graph (diagram)</td>
<td>Process</td>
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<tr>
<td>Business Actor</td>
<td>External Entity</td>
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<tr>
<td>Business Goal</td>
<td>-</td>
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<tr>
<td>Activity</td>
<td>Task</td>
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<tr>
<td>Business Entity</td>
<td>Phi</td>
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<tr>
<td>Business Worker</td>
<td>Role</td>
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<tr>
<td>Package</td>
<td>Organization Unit</td>
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<tr>
<td>Business System</td>
<td>Organization Unit can be used</td>
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<tr>
<td>Business Event</td>
<td>-</td>
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<tr>
<td>Business Rule</td>
<td>-</td>
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<tr>
<td>Class diagram</td>
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<td>Collaboration diagram</td>
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<td>Sequence diagram</td>
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## Appendix B: IBM products for business modeling

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
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<tbody>
<tr>
<td>The IBM Rational Project Console</td>
<td>A metrics collection tool that dynamically creates a project Web site with a progress metrics dashboard based on data collected from the IBM Software Development Platform.</td>
</tr>
<tr>
<td>The IBM Software</td>
<td>A platform for automating software development consisting of a set of integrated components covering all</td>
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Appendix C: Notes on standards

OMG and UML

The Object Management Group (OMG) is responsible for the Unified Modeling Language (UML) and Meta-Object Facility (MOF) standards. These standards have traditionally been seen as relevant in the software development process and are heavily used and supported by the IBM Software Development Platform.

From the Introduction to OMG UML:
The OMG’s Unified Modeling Language™ (UML®) helps you specify, visualize, and document models of software systems, including their structure and design, in a way that meets all of these requirements. (You can use UML for business modeling and modeling of other non-software systems too.)

- The UML is a general-purpose modeling language although its roots are in modeling software systems and specifically Object-Oriented Programming. The language is based on a modeling architecture rooted in another language, MOF, which provides the language used to describe the UML itself. MOF is also important to IBM as it is the modeling language implemented by the Eclipse Modeling Framework (EMF), which is used extensively by our tools across all brands.

- Specifically, the UML 2.0 model is the metamodel for the future IBM Rational modeling products.

- The WBI Modeler implements its own metamodel, called BOM, that is based upon UML 2.0 and reuses substantial parts of the UML while adding extensions to support business process specification.

- BPMN and BPMI.org

- The Business Process Modeling Notation (BPMN) was developed by BPMI.org as a method for describing processes in a manner that could be easily translated to technology-specific standards such as BPEL.

From the BPMI.org Web site:
The Business Process Modeling Notation (BPMN) specification provides a graphical notation for expressing business processes in a Business Process Diagram (BPD). The BPMN specification also provides a binding between the notation's graphical elements and the constructs of block-structured process execution languages, including BPML and BPEL4WS. The first draft of BPMN was made available to the public on November 13, 2002.

- The next generation IBM WBI Modeler has taken into account the BPMN specification when the development team was working with customers and usability teams in the definition of the notation that the modeler implements. This notation borrows elements from the UML 2.0 notation, from BPMN and from existing IBM products such as the previous WBI Modeler 4.2.4.

BPEL or BPEL4WS

The WBI Server Foundation middleware includes, among other things, a Business Process Execution Language for Web Services (BPEL4WS or simply BPEL) runtime component. BPEL is thus the language used to technically specify the workflow that is to be
executed.

FDL and WebSphere MQ Workflow
FDL (FlowMark Definition Language) is the native file format describing workflows for the WebSphere MQ Workflow middleware. WBI Modeler generates FDL that can be imported into MQ Workflow. This is not a general standard proposed by a standardization body, but is mentioned since it may be referred to.

Architecting and managing business and information systems
It is probably too early to discuss standards for business architectures, but various frameworks have been put in place to help manage the business as a whole including its information systems.

A few examples:

- The Zachman Framework emerged in the early 1990s, focusing on how you build enterprise architectures to ensure information systems are more business focused.
- More recently, the Component Business Model efforts in IBM's Business Consulting Services organization, work to define standard frameworks for the on demand business.

About the author
Maria Ericsson is a principal consultant for IBM Rational's Strategic Services Organization (SSO). She started working in the field of software engineering and object technology in 1990 at Objectory AB, and co-authored Ivar Jacobson's book, *The Object Advantage: Business Process Re-engineering with Object Technology*. Since joining Rational in 1995, she has worked as a mentor and trainer in process, business modeling, and requirements management, and also spent three years as a member of the Rational Unified Process,® or RUP,® development team. As part of the SSO, she currently focuses on solution deployment strategies and serves on the IBM Rational field training team. A resident of Sweden, she is based in the Kista office.