

Exigen Business-Process and Workflow Simulation

Overview

To meet the challenges of the global economy, enterprises around the world are developing new business processes and modifying existing ones. This poses a multitude of questions. Managers need to know whether a new or modified business process will perform as expected, what human and non-human resources are required for top performance, what the cost and time factors will be, where bottlenecks may develop, etc. That's where **business-process simulation** comes in. Simulation as defined here means "running" a graphical model of a business process to view its behavior. Simulation can be used to generate performance statistics on a business process and variations of it to arrive at the best possible alternative.

Simulation plays a vital role in both the development and implementation of the Exigen solution:

- 1) For each of the vertical industries (telecommunications, etc.) to which the Exigen solution is applied, Exigen develops a "best practices model." Each model is obtained by consolidating the business-process models of successful companies in that industry. Simulation is used to test the resulting model with the goal of minimizing the time and resources needed to process business transactions.
- 2) During strategy sessions with a new customer, Exigen experts build and simulate the customer's business-process model. This allows for the comparison of the customer model and the best practices model with the goal of developing the most effective solution for the customer.
- 3) Finally, when the Exigen solution is nearing readiness for deployment, simulation is carried out in the customer's environment to test and debug the solution using actual work items and processing devices.

In the first two steps, Exigen's GRADE Modeler and Simulator are used, while the third step deploys Exigen's VisiFLOW Workflow Simulator.

By using simulation in key phases of the development and implementation process, Exigen ensures that its customer-specific solutions meet the following standards:

- q Top performance (optimized cost/benefit ratio)
- q Validation (processes work as planned)
- q Error free (processes have been tested/debugged in the customer's environment).

Simulation in the Exigen Solution Life Cycle

The figure on the following page shows how simulation is implemented within the Exigen solution's life cycle. Tasks in which simulation plays a role are marked with a bold frame (and those using GRADE with the "Grady" icon).

Starting from the top, the first two instances of simulation occur when the customer model and the best practices model are simulated. Their performance is measured and compared. In most cases, the customer's processes can be optimized by incorporating elements from the best practices model.

The next simulation occurs when the customer's model has been modified in accordance with recommendations and is simulated again to measure performance. The gradual improvement of the model may take several iterations.

Once the optimal customer model is obtained, the business process to be implemented also may need several iterations of test runs and validation.

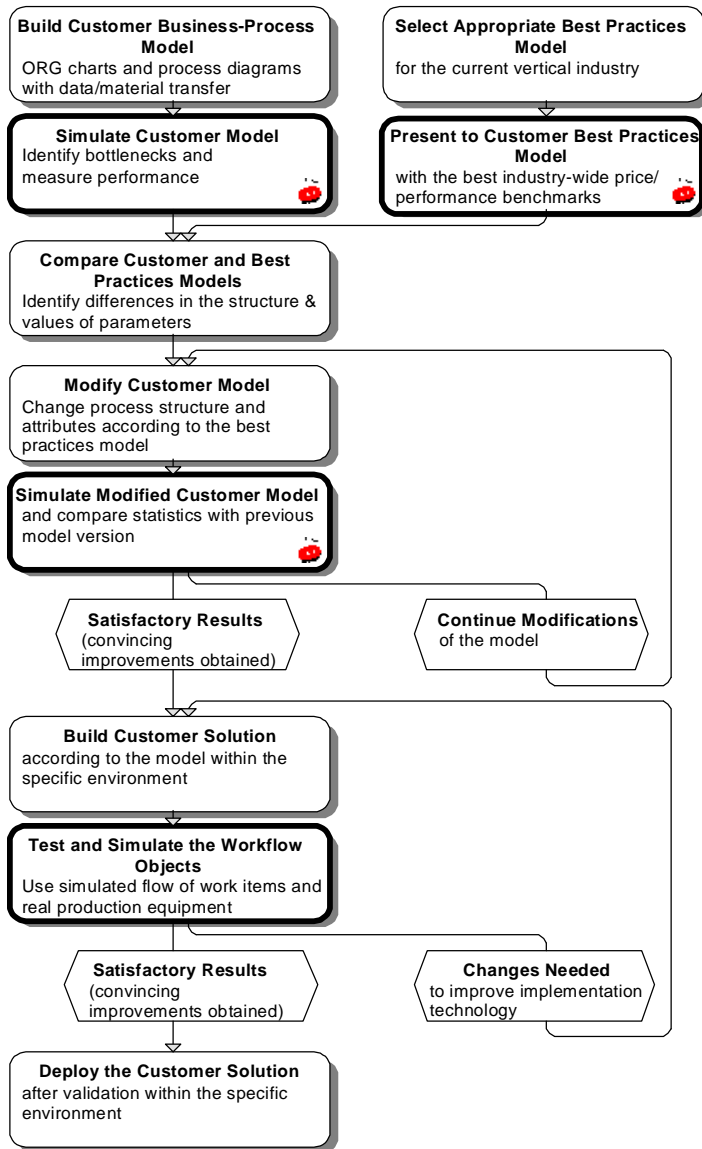


Figure 1: Role of simulation in the Exigen solution life cycle

Building Business-Process Models for Animation and Simulation

Both the best practices models and the customer-specific models are built using the comprehensive modeling tool GRADE (Graphical Re-Engineering Analysis and Design Environment). This tool is described in general terms in a separate white paper. Here, we will focus on the specifics of using GRADE to model/simulate business processes.

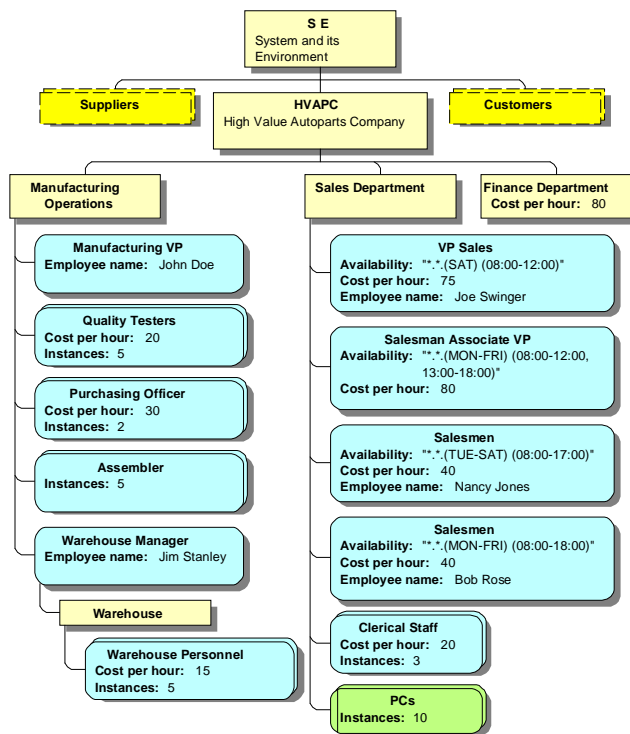
GRADE offers a graphical modeling environment in which all aspects of the business process can be integrated into a **single** model:

- q Structure is reflected in organization/resource structure (ORG) diagrams
- q Processes are described in business process (BP) diagrams

- q Data structures, document structures, etc., are reflected in data definition (DD) and entity-relationship (ER) diagrams.

The GRADE tool was designed for building "industrial strength" simulation models and has proved its worth in large-scale projects worldwide. Among its advantages are the following:

- q Capability to **model extremely complex systems** with thousands of elements
- q **No scripting required** for simulation attributes; a friendly GUI-type interface supports building of graphical simulation models
- q Each model has a global **data dictionary**, a sophisticated "table of contents" that contains all names used and helps keep the model consistent.



As can be seen in the example at left, the GRADE **ORG diagram** is an extended version of the traditional organizational chart. It can contain the following elements:

- q Organizational units (yellow rectangles), representing companies, departments, branches, groups, divisions, etc.
- q Positions (light blue, rounded rectangles), representing a job or role within a company or a specific employee
- q Resources (green, rounded rectangles), representing non-human assets such as equipment or premises.

Any of the elements may be single or multiple (indicated by a double frame). An element also may be marked as external to the organization (by a dashed frame). In addition to its name, each element may have attributes, e.g., competencies (skills, etc.), availability (time interval when the element is available), cost per hour and efficiency level.

Figure 2: Sample ORG diagram

example of a BP diagram; in Figure 3, on the next page, the major elements of BP diagrams are labeled.

GRADE **business-process diagrams** resemble flowcharts and are based on the fundamental concepts of **tasks** and **events**. Figure 1 is an

Tasks, represented by rounded, blue rectangles, correspond to activities performed in a business system and can be assigned such attributes as duration and triggering conditions.

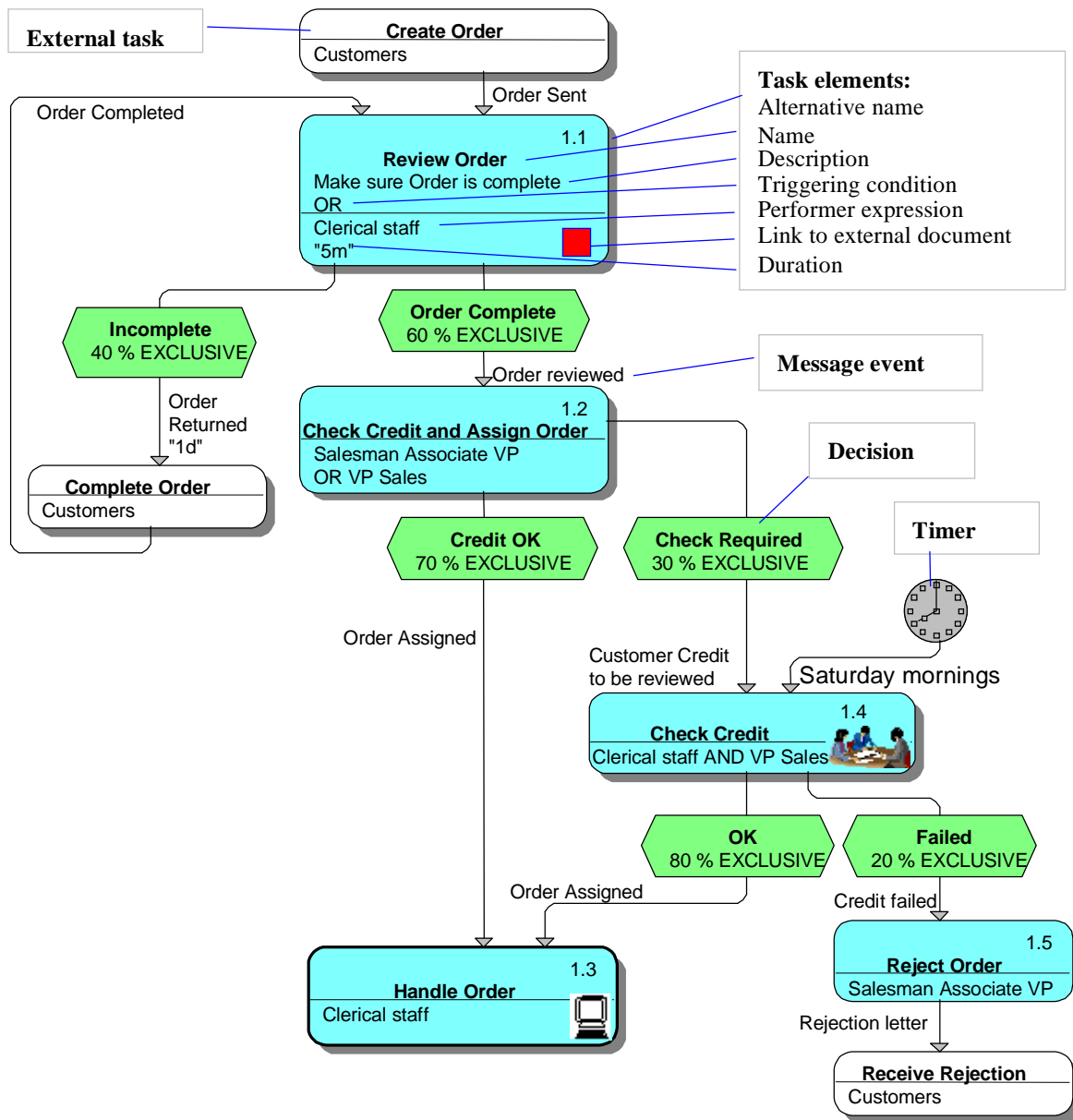


Figure 3: Sample BP diagram

Events link and/or initiate tasks. Message events correspond to objects (e.g., an invoice) produced by one task and transmitted to another. Material events represent the flow of materials. Control flows simply express the fact that one task is completed and the next may start. Timer events take place at specific moments or are generated at intervals by a timer.

Results of Business-Process Simulation

When all required task properties have been specified, model simulation may start. **Animation** reveals the model “in action.” You can visually follow the business process, as tasks and events are highlighted in sequence on your screen. The animation shows how many instances of a task have been started, where backups are forming, etc.

For a more precise evaluation of model behavior, **statistics** can be generated. The simulator is preprogrammed to generate typical performance statistics; the user simply switches this option on. These default statistics include

totals, averages, maximums, and minimums, which can be generated in table or chart form, and which cover the following aspects of business processes:

- Cost and duration
- Length of message queues and the time messages spend in a queue
- Performer utilization levels and idle times
- The time a task waits for a performer, etc.

With GRADE, you can easily gather non-standard statistics as well by specifying corresponding user-defined attributes, e.g., to calculate the average cost of materials when installing a phone line for a residential customer.

The gathered statistics may be reviewed in a special statistics/trace browser, using Excel-like tables and charts, or be exported to Excel for post-processing. To facilitate "what-if" analysis, results of several simulation sessions can be saved and compared.

VisiFLOW Workflow Simulator

Exigen's VisiFLOW Workflow Simulator is used to test and validate the workflow application in the real production environment directly from the VisiFLOW workflow editor. "Workflow application" refers to a business-process application, e.g., for handling a particular type of order. During simulation, the workflow designer/tester can log into multiple queues as any system user. The simulator uses live data and processes jobs as if multiple users were working.

The Bottom Line

As this paper has shown, simulation plays a vitally important role in optimizing business processes and ensuring their smooth and efficient operations. Deployment of the GRADE Simulator and the VisiFLOW Workflow Simulator for these purposes offers significant advantages:

- q Modeling and simulation take place in an intuitive, **graphical environment**. The completed models are understandable without special training.
- q The GRADE Simulator enables **animation** to make the business process "come alive." The viewer can check the sequence of tasks and spot bottlenecks.
- q The GRADE Simulator enables the generation of **statistics** on various process alternatives; these results can be represented as **tables** or **charts**, or exported to spreadsheet or other formats for more detailed analysis. This provides the facts and figures needed for intelligent analysis of the "as is" and various "to be" models to arrive at the optimal solution.
- q Both simulation tools make use of **point-and-click** and **drag-and-drop mechanisms**, which increase productivity during model building, simulation and optimization.
- q The tools have built-in **syntax prompters** and **analyzers** to ensure the completeness and consistency of models.
- q Assuming that Exigen experts are teamed up with a business area expert from the customer's side, model building and simulation can be **completed quickly** (time frame: a few hours to a few days). This helps ensure Exigen solution deployment within 90 to 120 days.
- q The VisiFLOW Workflow Simulator enables the fast and effective **testing of the real flow of work items** directly in the design and editing environment to prevent errors before they can occur.

Together, the Exigen simulation mechanisms provide a **double insurance policy** for your investment: by providing the facts and figures you need to arrive at the optimal business-process solution, and by enabling efficient testing and debugging of that solution to ensure problem-free deployment.