

Use Entity Modeling for Simplified Application Development When Automating Business Processes

Providing Speed and Ease of Use to Developers and Business Analysts

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Entity Modeling: Coming Your Way in BPM Suites

Over the past decade, BPM suites have made huge strides in automation by applying a simple concept – separating business and process rules from application code. With this approach, BPM software has streamlined and accelerated the deployment of business processes, providing a significant improvement over the traditional ways developers embed process and business rules in code. BPM software has cut development time while also empowering business analysts to update and modify process models that execute in the process engine. For these reasons, the business case for implementing BPM suites is compelling.¹

And yet, for all the technology advances, impressive case studies, and high-impact ROI that BPM suites have delivered, user and IT expectations continue to climb. Businesses and government agencies still seek that elusive BPM holy grail: process design, automation, and execution without any programming or reliance on developers. In its most evolved state, the dream includes the ability to easily modify, maintain, and enhance process applications, as well as the ability to experiment with process designs for greater agility. In reality, such a perfected “programmer-less” product does not exist. But still, expectations continue to increase.

- **Invariably, the business wants greater software functionality over time, and BPM software is no exception.** Business people yearn for more flexibility (using case management) that supports different styles of work; support for the full diversity of roles in the organization and across the value chain; a way to meet relentless management expectations for greater agility; deeper integration with structured and unstructured information; and a range of patterns that address rising customer expectations. And they expect to get these added capabilities while minimizing (or even eliminating) coding efforts through the use of industry frameworks, process templates, and repositories of industry best practices and process models.
- **At the same time, technologists seek and expect a steady rate of advances, too.** Their expectations include true subject-matter engagement (using entity modeling), simplified relationship modeling, and easily iterated processes that reduce development time and effort, while also accelerating the integration of corporate data and applications. Plus, they fully expect frequent rollouts of better tools and connectors for integrating applications, processes, and information in the cloud, on premises, and in hybrid environments. This includes deploying BPM software components (discover, design, build, execute, monitor, and improve) across these environments.

All these expectations, and more, continue to fuel the high interest in low-code software, which opens the door for an important BPM software capability – namely, entity modeling.

Let's face it: the BPMS market has not grown as quickly as expected,² partly because of the shortage of process design skills and IT departments' reluctance to embrace something they don't know,

Entity-relationship modeling: The basics

“The entity-relationship model adopts the more natural view that the real world consists of entities and relationships. An entity is a ‘thing’ that can be distinctly identified. A specific person, company, or event are examples of entities. A relationship is an association among entities. For instance, ‘father-son’ is a relationship between two ‘person’ entities.”

Source: Dr. Peter Chen, MIT, Association for Computing

but mainly because building the desired applications (i.e., automated processes) is still too hard when compared against rising expectations.³

Software vendors have made many attempts to meet these expectations, and, over time, have collectively changed and significantly enhanced the BPM software market. For example, one key reason why BPM software vendors created case management solutions was to make it easier for developers and business analysts to automate business processes. Adaptive case management products give developers and analysts the tools to tackle the hardest processes of all – dynamic, unpredictable, information-intensive, and collaborative processes. Reducing deployment time has also catalyzed the development of industry best practices and frameworks, accelerators, and BPM-powered business applications, such as CRM and customer service.

All of these relatively recent advances have helped to meet the buyer's rising expectations. But most organizations find that it still takes too long to design and deploy processes, and that, for example, close attention to data integration has been sorely lacking in comparison to other areas of focus. The



constant push for faster and easier process design and development that builds on top of advances like case management, integration with analytics and MDM, and better support for social/collaboration will lead to further improvements. In turn, this will make it easier for business and IT alike to deploy adaptive, dynamic, and information-intensive business processes. And a key part of that new equation will be the addition of and greater use of entity-relationship modeling.

Entity Modeling Solves the Challenge of Integrating Processes with Data

Entity modeling solves a significant and costly problem that BPM developers often face: how to manage and integrate the data associated with processes. Entity modeling helps the project team tackle data integration by:

- adopting a more natural view of the real world, consisting of entities and relationships
- providing a high degree of data independence
- creating the basis for a unified view of data

A simple example helps illustrate why entity modeling is a superior approach for designing processes in BPM software. Just imagine that you are at the checkout in a store. You're buying 50 of the same item on sale. The checkout clerk starts scanning each item individually, for a total of 50 separate scans. You ask the clerk instead to scan one item to get the unit price, enter the quantity, and let the cash register calculate the total cost.

Traditional process design integrates data and processes similar to how the clerk scanned all 50 items – repetitively. Entity-relationship modeling is more like the suggested solution, entering the item once. With entity modeling, developers don't have to link the data variables with the process model each time the process model or process fragments need

Three primary ERM elements

Entities are “nouns” in the real world, defined by properties or attributes.

Examples are customer, product, shipment, and retailer.

Attributes identify entities in an entity set, and they map from entity or relationship sets into a value set. Employee number, policy number, and customer ID are examples of attributes.

Relationships are associations between entities (like marriage and father/son) and “verbs” like the act of purchasing, evaluating, pricing, hiring, repairing, etc.

data, nor do they have to link the data multiple times for each new process that consumes the data.

With entity modeling, developers create entity-relationship diagrams to graphically link business processes with data:

“An entity-relationship diagram (ERD) is a graphical representation of an information system that shows the relationship between people, objects, places, concepts, or events within that system. *An ERD is a data modeling technique that can help define business processes.*”²⁴

Entity modeling is a significant advance over the traditional ways that BPM software developers integrate data and process because:

- **Traditional BPMN process modelers used to build process flows that execute during run time, are time-consuming.** For the process model to work, the entire data payload (e.g., variables) must be structured into the new process by developers, who



must declare all variables associated with the new process. The traditional modeling approach uses named value pairs on processes so that each process owns its own variables. This extra activity is required even if the variables have already been declared by existing business processes or process fragments; the declaration occurs every time a new business process uses the data.

- **With entity modeling, the variables in one process can be reused in other processes without requiring the variables to be declared again.** This is possible because the process models share access to the same data, eliminating the need for named value pairs. Instead, the data dimension is resolved by entity structures created through entity modeling. This approach provides greater business value because it costs less to develop, takes less time, and creates more flexibility by enabling multiple processes to use a single case.

The good news is that teams are not forced to choose between entity modeling and traditional process modeling because:

- **Combining entity modeling with process modeling is not only possible, but also offers distinct advantages over the typical process designer in BPM software, which may leave the data perspective out.** By combining the two approaches, developers can not only build processes in less time because of substantially reduced integration

efforts, but they can also turn the traditional process design and development approach on its head. How? By embracing a paradigm shift in how they approach process design and execution.

- **With traditional process modeling, business analysts depict the “as-is” and “to-be” using process flow diagrams, modeling tools, and BPMN, a modeling notation standard.** It’s now routine practice to start by creating the process diagram first and then integrating information variables after that. But what about when the business processes being redesigned are so information-saturated that data integration is of paramount importance? And what about situations where the process models are so unpredictable as to be nearly unique for each process instance? In those scenarios (and there are many such high-value case management processes across all industries), beginning with the information artifacts that support one or more processes can be a more logical way to approach the problem than by starting with process flows and process fragments that are, by their very nature, fluid to begin with. Entity modeling is tailor-made for such dynamic, information-intensive processes.

Coding introduces testing processes, change-control processes, deployment controls, and a complete software development change-control methodology. *If the business analyst can draw pictures and arrows really fast, but it then takes the*

When evaluating products, the question to ask of vendors is, “OK, fine, you can draw a process, but what about the data? How is the data integrated? How much coding is required?”



organization six months to undergo a development change-control process, the business hasn't accomplished the promise of BPM software.

Without entity modeling, data integration is point to point and can quickly become spaghetti code. Entity modeling provides a robust data structure that enables developers and business analysts to think more holistically about designing the entire business process.

This often brings up a question about the role of BPMN in entity modeling. Although BPMN is prevalent as a process-modeling notation standard, it doesn't solve the data dimension for integrating data and processes with either approach (traditional process modeling or entity modeling.) With a traditional process modeler, using BPMN for data integration still requires the developer to declare a data field, then declare another data field, then declare another data field, and so on. The traditional modeling approach becomes very complex when compared to using the entity model to virtualize the data, but BPMN is neutral with either approach.

Entity Modeling is Particularly Well Suited for Case Management BPM

Case management is an elegant solution for an age old problem: how to automate processes that are not repetitive but are instead unpredictable, sometimes even taking a different path for each instance of work.⁵ Dynamic case management solutions are typically used to support decision-intensive work performed by highly trained knowledge workers; the processes are highly dynamic or adaptive, collaborative and data

intensive – including large amounts of unstructured content, analytics output, and collaboration/social threads. Classic examples of case management processes include product recalls, field investigations, new account opening, patient diagnosis, telecoms line provisioning, concierge services for high-net-worth customers, security incident reporting, and fraud investigations.

Case management is the most complex type of BPM software because of its highly adaptive nature, which may require recombining process fragments in different patterns for each process instance. In dynamic processes, many unknown or unanticipated actions may occur; often, developers and business analysts cannot figure out in advance how the process will unfold. In addition, knowledge workers using case management solutions rely heavily on artifacts that support decision-making within the process, whether they are real-time analytics dashboards, rich media, or large text files.

Information management within case processing is where entity-relationship modeling truly shines, cutting down significantly on the development effort to integrate information with the process. ERM provides a data structure for the case that allows all processes and process fragments to access the same data structure. The shared-entity model frees the developer from having to declare all the structured and unstructured data related to all the processes, sub-processes, and process fragments at the beginning of the modeling effort. In contrast, traditional process modeling requires business analysts and developers to anticipate and map the process (and its permutations) in advance.

“ Traditional mapping of variables to the process map is extremely demanding and time-consuming. Entity modeling significantly lowers the development effort and provides an elegant solution for highly dynamic processes. ”



For example, imagine the case is a manila folder that many individuals and processes access. Say customer service puts an item in the case, and then someone from sales puts another item in the manila folder. Then, underwriting takes items out of the manila folder, later adds more items to the case, and updates existing information. No one knows exactly when individuals will add an item or access an artifact, and there is no specific sequencing for the work items. Plus, there's no single or specific process using the manila folder – it all depends on what happens with the specific work and workers involved at any given time. Instead, different roles involved with the case use different processes or process fragments to interact with it. These different processes access items of information in the manila folder using the shared data structure that entity modeling provides. This allows business people to track all the information related to the case relevant to their process.

Entity Modeling Is Key for BPM-Powered Business Applications

As five key trends converge – the enterprise content management (ECM) market matures, analytics becomes more prevalent across the organization, big data drives new and existing processes, collaboration and social threads become more prevalent, and BPM software supports flexibility through case management – a new opportunity for BPM-powered, business-ready applications is evolving.⁶ This market is still emerging and goes by many names, but is sometimes referred to as *smart process apps* or *enterprise information management* (EIM).

Although BPM-powered software solutions are not 100% out of the box, these information- and

process-intensive applications fill in the gaps between the cross-functional processes tackled by large enterprise suites, such as CRM, ERP, SCM, and HRM, and departmental solutions cobbled together using unintegrated desktop software and manual efforts. They are typically industry-specific. Examples of these new applications include customer onboarding, product planning, investigations, and incident reporting. The big breakthroughs in these applications are (1) greater access and integration between unstructured information – like documents, images, rich media – and structured data from analytics, and (2) the use of case management BPM to power these flexible, adaptable applications.

From a developer's perspective, these next-generation applications require properties, relationships, information modeling, and entities. By using entities, developers aren't required to make Web Services calls, or use XPath to navigate messages. The addition of properties, relationships, and entities provides the skeleton framework for developers to add the UI, behaviors, and building blocks (such as a form, a list, presentation layouts, and action bars). Each of these entities could have deep functionality built in, such as personalization, localization, and scalability. While the need for programming is still there, entity modeling makes the process easier, reduces the amount of communication between developer and the subject-matter expert, and reduces the amount of programming required. And by creating a domain-specific language, changes are at a higher level and are quicker and easier to make. While this is not the same thing as low-code, there's overlap between ERM and low-code in the shared objective to simplify development.



Where to Go from Here

Organizations seeking to automate processes using BPM software, while also applying the most effective approach for business analysts and developers, should take the following steps:

- **Look at how much the BPM software vendor has embraced developer productivity as a key goal** by using approaches such as entity modeling and low-code software. Go beyond the process-map diagram to determine how data is integrated with multiple processes.
- **Determine how well the BPM product integrates processes with unstructured information** like forms, documents, images, faxes, video, and other types of information. Also look at what is required to integrate processes with analytics dashboards.
- **Focus on how to automate the hardest processes in your organization when evaluating BPM tools**, even if you are not starting with those processes. The hardest processes to automate using BPM software are highly changeable, unpredictable, and information-intensive.
- **Look for products that span the gamut of systems and people involvement**, from end-to-end orchestration with very little people involvement; routine, repetitive processes that support people and orchestration; and dynamic case management processes. Avoid painting yourself in a corner by choosing products that offer only one type of BPM solution (unless the organization truly needs a very constrained software product for a specific type of process).



Notes

1. For more on the advantages of using BPM suites, see “Tackle Complex Processes with Dynamic BPM Suites and Business-Ready Apps,” <http://www.digitalclaritygroup.com/tackle-complex-processes-bpm/>.
2. According to Market Reports Hub, the BPM software market will grow from \$4.71 billion in 2014 to \$10.73 billion by 2019, with a compound annual growth rate (CAGR) of 17.9%. While about \$10 billion by 2019 is not a big slice of the IT market, it is respectable. However, Market Reports Hub’s BPM software forecast also includes a percentage of revenue from content and document management.
3. See two blog posts and comments for a more detailed discussion of the factors holding back growth in the BPM software market, “The Future of Business Process Management (BPM) Software,” <http://www.digitalclaritygroup.com/the-future-of-business-process-management-bpm-software/> and “Why Is the BPM Market So Small?” <http://bpm.com/bpm-today/in-the-forum/why-is-the-bpm-market-so-small>.
4. For a more in-depth definition of entity-relationship modeling, see “Business Applications in the Age of BPM,” by Scott Francis, <http://searchcrm.techtarget.com/definition/entity-relationship-diagram>.
5. See “What is the Difference between Case Management and BPM?” ebizQ, http://www.ebizq.net/blogs/ebizq_forum/2010/06/what-is-the-difference-between-case-management-and-bpm.php.
6. For more insight on these emerging applications, see “Tackle Complex Processes with Dynamic BPM Suites and Business-Ready Apps,” <http://www.digitalclaritygroup.com/tackle-complex-processes-bpm/>.



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