

# White Paper

## BPMN Process Model

Descriptive, Analytic and Executable

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Max Tay is an independent BPM consultant with the OMG Certified Expert in BPM (Business Advanced) certification. He specializes in various areas of business process management, including business process architecture, process improvement, decision management, risk and compliance management and process automation using BPMS.

He has extensive experience from working with both public and private organizations providing consultation on the application and optimization of business processes to achieve strategic goals.

His other knowledge areas include application of Balanced ScoreCard in BPM, Business Motivation Modeling, Operating Modeling and Lean Six Sigma.

**It is often said that BPMN 2.0 is becoming too complicated compared to 1.0 and 1.2, especially for business users and process modelers in general. The comprehensive notation set in BPMN 2.0, in fact, is the basis of one of its key benefits in comparison to its predecessors – the ability of the business process models to be executed on the process engines. Taking the appropriate method, BPMN 2.0 serves both as a practitioner's notation for process design and modeling, and process execution on process engine. The purpose of this paper is to explore the three levels method – descriptive, analytics and executable – in the process modeling to suit the business users, the business process practitioners and lastly the process engineers running the process model on a process engine.**

The notation in BPMN 2.0 includes a multitude of elements that allow not only representation of business process, but also the possibility of having a fully executable process model. However, having too many types of elements may clutter the process model so much that it is complicated and hard for a business to understand.

Adapting the three levels of modeling methods – descriptive, analytic (operational) and executable – and including incremental details at each level provides an effective approach for the different stakeholders of a business process model.

*Note: The three levels are not the same as the levels used in decomposing business processes (functions) in a Business Process Architecture. That is a topic for another paper.*

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This paper also presumes that the process model is intended for process improvement and also process automation via a process engine. The process engine provides human workflow management, system service orchestration and process matrices monitoring and reporting.

## Descriptive Process Model

A descriptive process model defines the scope of the end-to-end business process at the strategic level that managers can easily understand. It also depicts the expected outcome of the business process.

The model serves to:

- Clarify the scope of the end-to-end process
- Identify resources and assign responsibilities
- Identify KPIs of the business process
- Review the process to determine improvement and/or automation.

The key audiences of such models are the executive and/or senior managers who have an interest in improving and managing the end-to-end process. Hence it must be easy to understand, even for people with no experience in BPMN.

*Note: Restrict the notation set used. Suggest to only use these elements: pool, lane, abstract task, sub-process, start event (none), intermediate event (none), end event (none), data, data input, data output and message.*

Although the model is to depict the end-to-end business process, it must be kept simple; only including standard procedure and regular responsibilities. Work out the end-to-end process with a maximum of

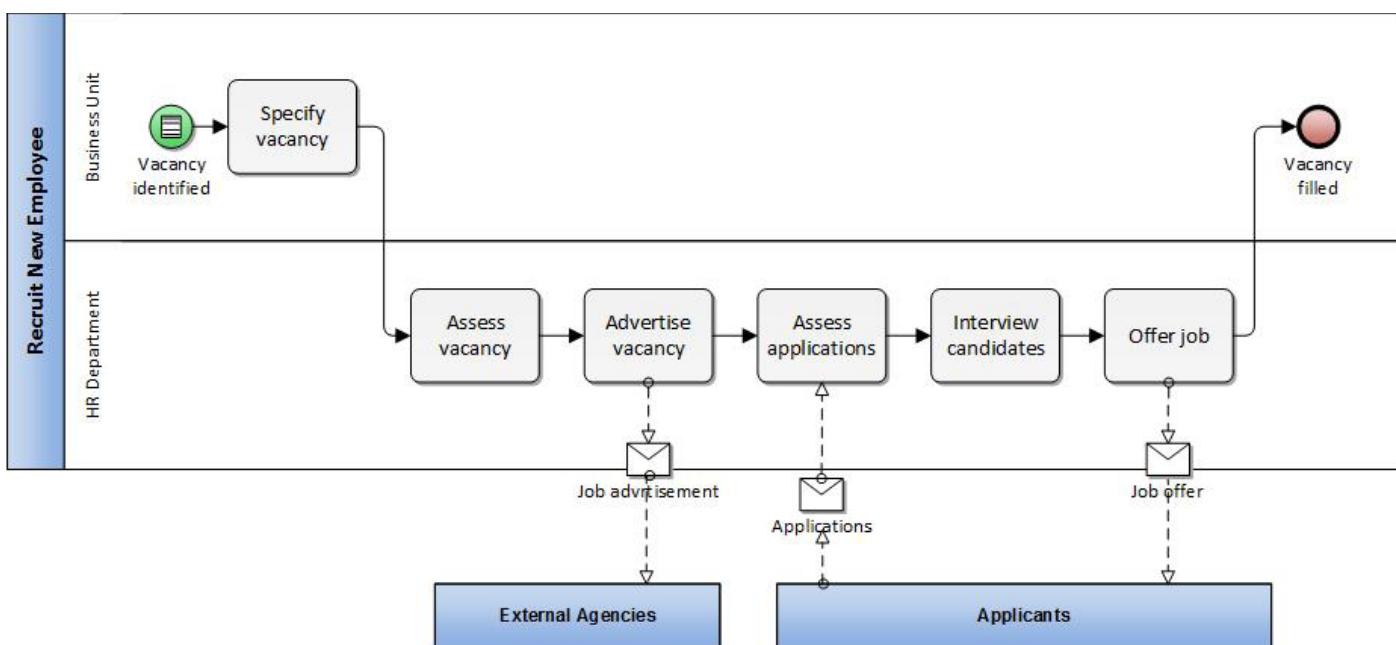


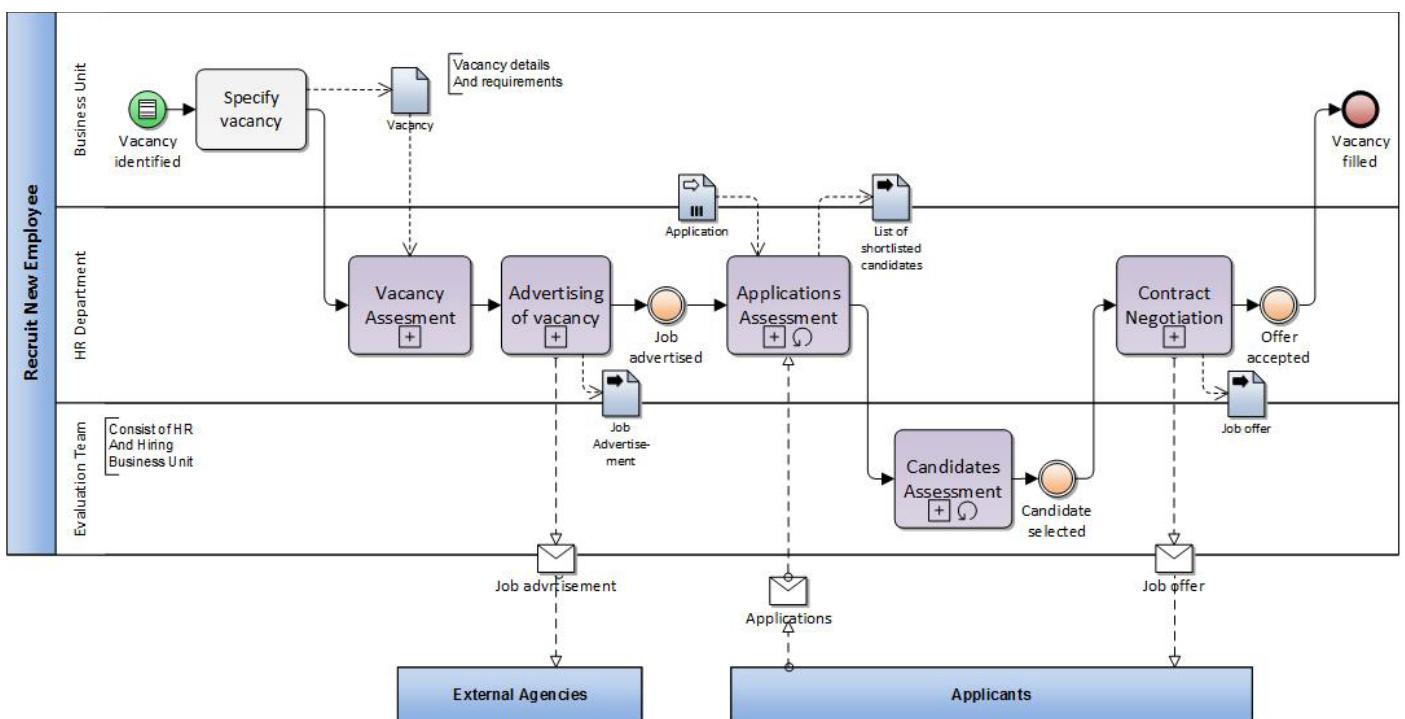
Figure 1: Level 1 – Recruit New Employee process (draft)

eight activities (can be task or sub-process) and only show a single path through the model.

*Figure 1* on the previous page shows a draft of an example for “recruit new employee” process.

*Note: Although simple, ensure the correctness of syntax. Breaking the syntax is a bad idea as it introduces confusion. Remember, it is the standard that helps in the long run. If necessary, the semantics may be inconsistent at this level.*

Apart from senior management, there will be other audiences including process participants, process analysts, and process engineers. These stakeholders would expect more details, but avoid jumping into the details at this level. After several iterations, an agreed end-to-end process model will be reached (see *Figure 2* below).



**Figure 2: Level 1 – Recruit New Employee process (final)**

In the example, the final model includes the following details:

- The key responsibilities for each activity;
- Data (global, input, output) in the process;
- Messages with external parties; and
- Intermediate events showing significant business events of the process.

It is also vital at this level to define the Key Performance Indicators (KPIs) for the process and the business. The agreed KPIs are needed for the analysis at the next level. Examples for the KPIs for this process:

- Percentage of vacancy filled quarterly
- Ratio of internal versus external fulfilment
- Recruitment cycle time

Key Performance Indicators (KPIs) can be created as Objects in leading process modeling tools such as iServer. Objects can be connected to processes using relationships allowing monitoring and analysis.

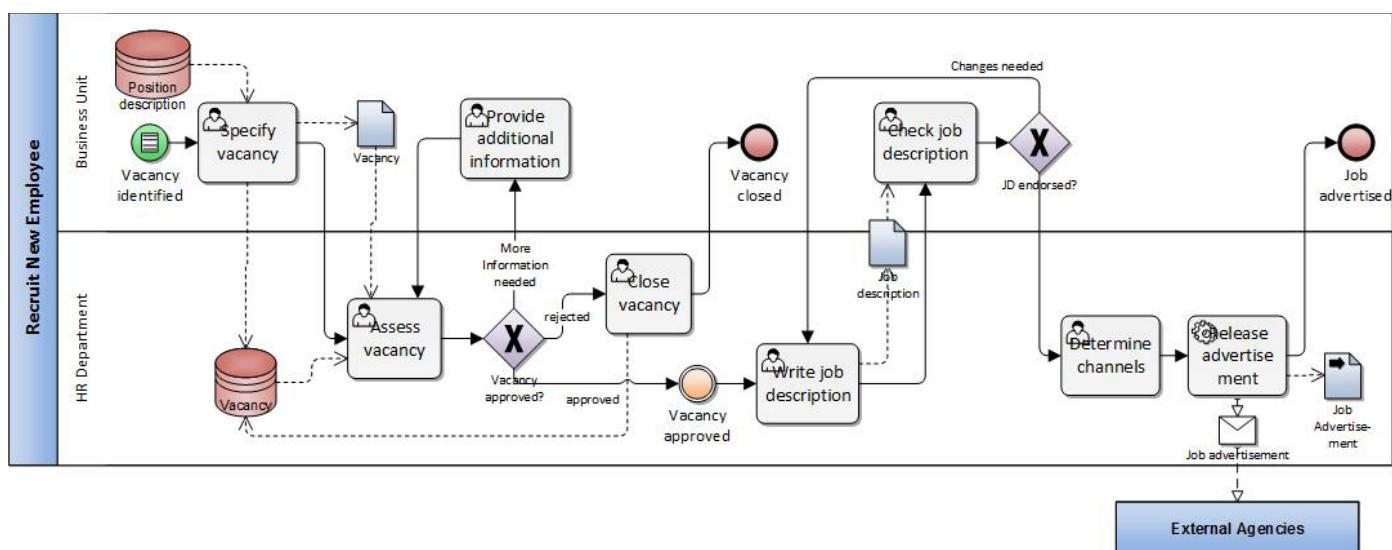
- Cost of recruitment
- Ratio of interview against application received
- Satisfaction of BU with selection process

## Analytic or Operational Process Model

The analytic model, as its name suggests, is for analysis of the process either via simulation or other process improvement methods adapted from Lean Six Sigma. This is where the defined KPIs come into the picture. We will skip the analysis in this paper and look at another usage of the model at this level – the operational process model. An operational process model is used to show what is happening at the level of the participants. It could be a day-to-day guideline of the process from the view of the respective participants.

Before we continue, recall that there are different types of stakeholders, and each is only interested in their own viewpoint. First, the process analyst who is concerned with the whole end-to-end integration of the process between human tasks and system tasks. He/she is also concerned with the improvement of the process either through process optimization or process automation. On the other hand, a process participant is only interested in the activities of the process that concern him/her directly. The process engineer at this level is concerned about what the process engine has to achieve.

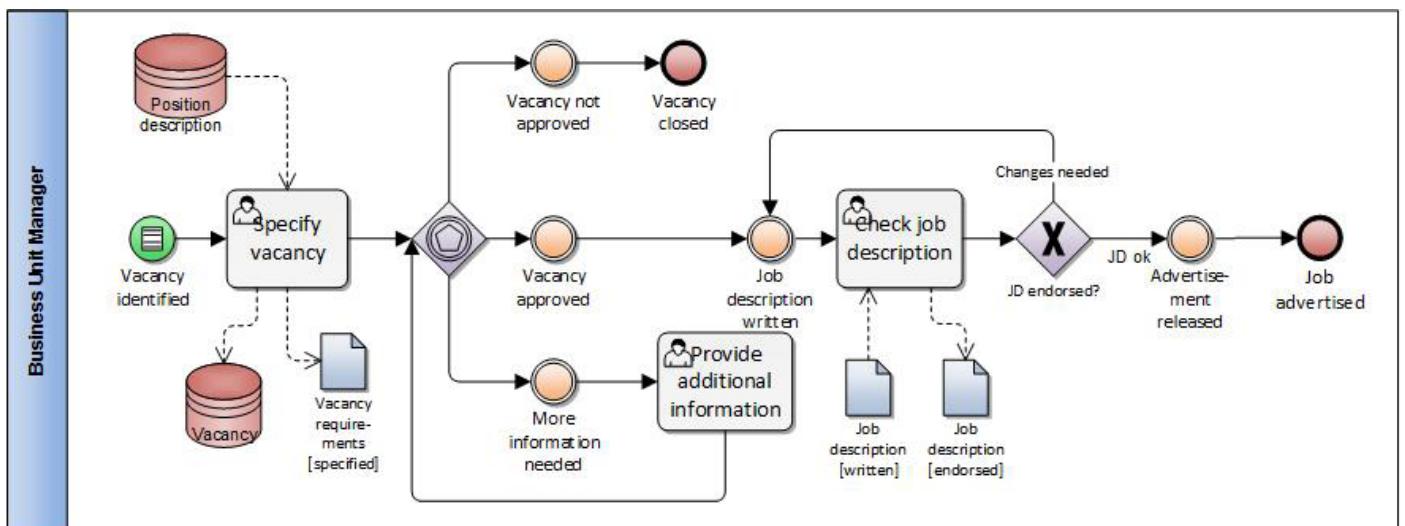
*Figure 3* shows the first part of the recruitment process from the initiating event to the “job advertised” intermediate event. The sub-processes are expanded to task level and types of tasks are also identified, particularly user tasks. Data store elements are introduced to show potential system integration. Alternate business paths, if any, are also included in the operational model. The key audiences for this view are the process analyst (who designed the model) and the process engineer.



**Figure 3: Level 2 – Recruitment process (part) – Process Analyst / Process Engineer Viewpoint**

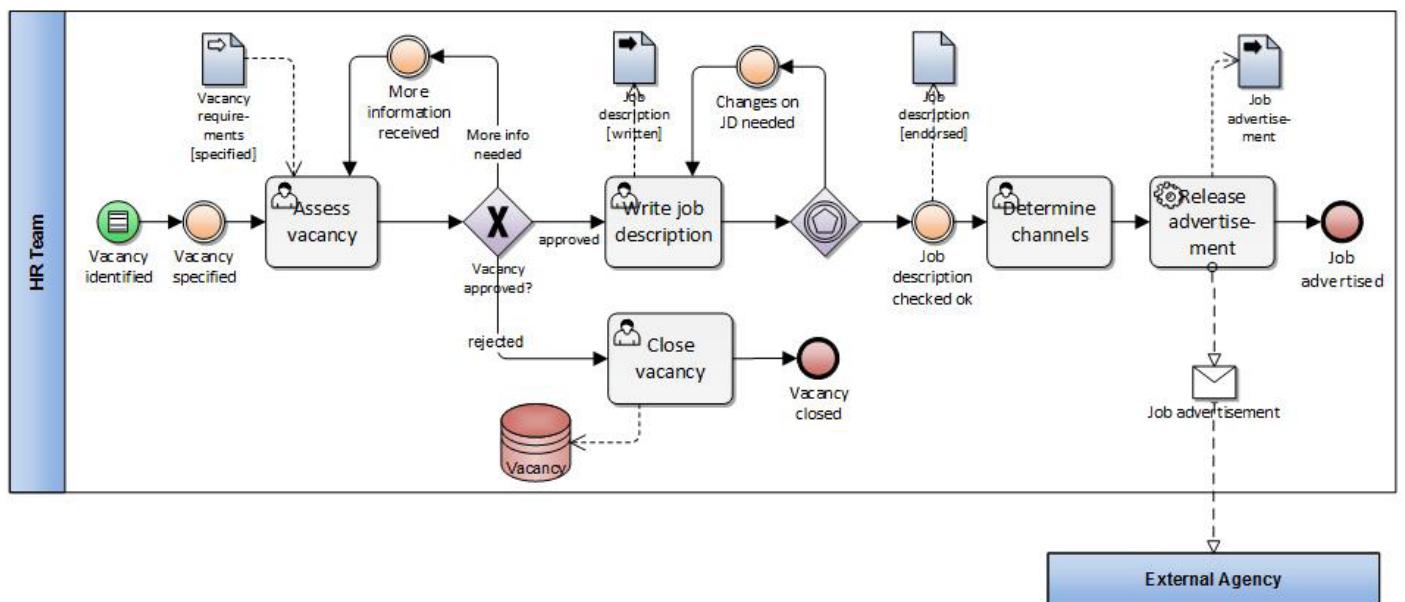
*Note: It is critical to ensure the correctness of syntax and consistency of semantics in the model.*

As for the subject matter experts (SMEs) representing the hiring Business Unit and HR team, looking at their piece of the puzzle would make more sense, as that is what happens in real life. It is therefore worthwhile to show these SMEs their view of the world (see *Figure 4* and *5*).



**Figure 4: Level 2 – Recruitment process (part) – Hiring Business Unit Manager Viewpoint**

The model above (*Figure 4*) clearly depicts the viewpoint of the Business Unit Manager – showing the tasks and artefacts to be produced and expected outcomes (vacancy closed or job advertised). The model below (*Figure 5*) shows the viewpoint of the HR team.



**Figure 5: Level 2 – Recruitment process (part) – HR Team Viewpoint**

Having separate views of the same process for the different roles may require more work, but it will pay off; especially if the process crosses multiple business functions. The feedback from the SMEs would

represent their view from within their representative business functions which match to the viewpoint of the individual role.

Closing the gaps between the process analyst, process participants as SMEs and process engineers is the key to moving from the operational model to the executable model. It ensures that the logic between operational model and the executable model is the same; different views based on a single model also helps the business to understand any technical implications of the process (as inputs provided by the process engineer).

## Executable Process Model

The work of moving the process model from the operational level to the executable level lies mostly between the process analyst and the process engineer. On the process model itself, the model has to be refined to include system elements such as business rule task, script task and service task. In the example (Figure 6), only service task is used. From the model in Figure 3, service task is added to any activity that links to a data store showing the integration required between the process engine and other enterprise systems.

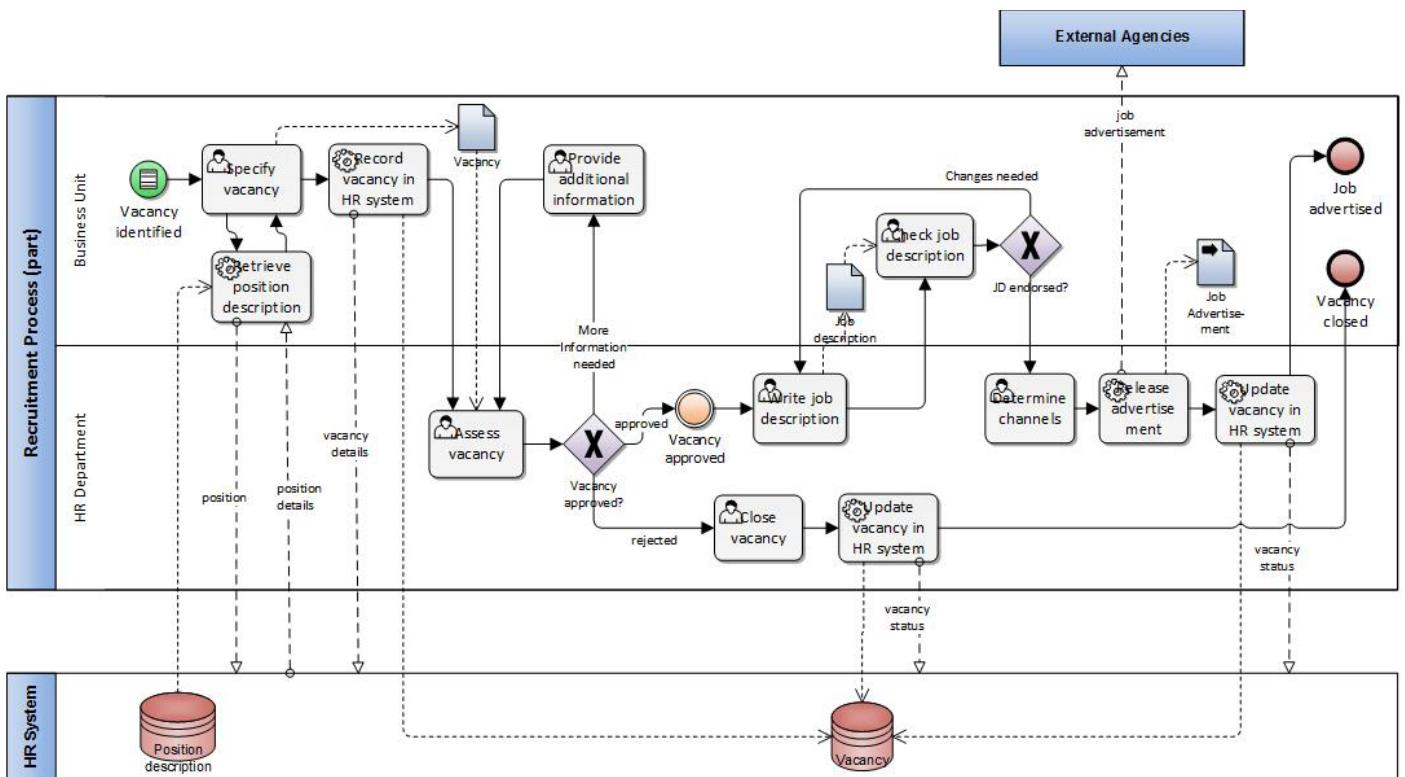


Figure 6: Recruitment process (part) – Executable

Apart from the system tasks that are shown on the diagram, there are other parameters that are defined for process execution but not shown on the process diagram.

*Note: The parameters required for process execution on a process engine are defined as part of the BPMN process model but not shown on the diagram.*

The table below shows the additional requirements of an executable process model that are not shown on the process diagram:

Definitions	Explanation	Process Element Link	External System
Process Data	These are data that are used or generated during the process runtime. In a BPMN diagram, they can be represented as data elements but for process execution, they must be further defined either in XML or object models. Data matching between parent process and sub-process, receiving messages must also be defined.	Pool for global data. Task for local data.  Represented by data objects on diagram.	Nil
Groups and Roles	Although the pool and lane of the diagram can be used to represent roles of participants, they are not binding in BPMN. The allocation is managed through membership (a combination of defined groups and roles) with possible other parameters (depending on the process engine). The structure of the groups, roles and other parameters must be defined and users allocated with the right memberships.	Pool, lane or individual task.	May be linked to external authentication and authorization system such as LDAP.
Business Rules	Normally defined as decision tables and implemented on BRMS / DMS which is called using a Business Rule task. On the process engine, the parameters, the conditions, and return values must be defined.	Business rules task	May be implemented on Business Rules Management System (BRMS) or Decision Management System (DMS).
User Interface	For each user task in the process model, screen or form must be defined and designed. Most out-of-the-box form designers of process engines are adequate for putting together a decent form. Depending on the process engine, it is also possible to define screen flow or page flow, i.e. having some logic flow of multiple pages of form for a single user task. In addition the form fields must be matched to the process data.	User task	Not required
Business KPIs	Though all process engines come with some features of capturing, monitoring and reporting on KPIs, there is no standard at the moment and they rely on the method implemented by the individual engine.	Mostly BPMN extension by process engine	Depend on process engine.
Scripts and Services	Scripts for script tasks and Web services or other types of integration service for service tasks must be developed. Again most process engines come with a handful of pre-built integration services ready to use by the process engineer.	Script task and Service task	Script task is internal to process engine.

Once these definitions, designs, and developments (if any) are completed, the process model is ready for execution. The executable process deployed on a process engine is commonly referred to as a ‘process based application’ or simply a ‘process application’.

## Conclusion

BPMN process models used with the right level of details can serve as a descriptive mode for senior managers, an operational model for process participants, an analytic model for process analysts and process execution model for process engineers. In short, make sure that the level of details is aligned with the view point of the audience.

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