BPM for CMMI

The aim of this paper is to match BPM (see annex A for some BPM basics) and the process improvement approach used in the CMMI-SVC v1.2 [1].

The summary is the following:

1. understanding of BPM discipline is very beneficial for improving your CMMI processes
2. staring from “defined processes” (capability level 3) it is necessary to use BPM suite software
3. moving to higher levels requires the serious thinking about architecting of a BPM system to support your CMMI processes

Process Institutionalization from CMMI-SVC v1.2

Institutionalization is an important concept in process improvement. When mentioned in the generic goal and generic practice descriptions, institutionalization implies that the process is ingrained in the way the work is performed and there is commitment and consistency to performing the process.

An institutionalized process is more likely to be retained during times of stress. When the requirements and objectives for the process change, however, the implementation of the process may also need to change to ensure that it remains effective. The generic practices describe activities that address these aspects of institutionalization. The degree of institutionalization is embodied in the generic goals and expressed in the names of the processes associated with each set of goals.

CMMI-SVC v1.2 process types with a BPM interpretation

Performed Process (capability level 1)

A *performed process* is a process that accomplishes the work necessary to produce work products.

The generic goal to be fulfilled:

- The specific goals of the process area are satisfied.

BPM interpretation: Process templates are defined as black-box (inputs, governance, outputs, resources) with some information about some BPM artefacts such as roles (who) and business objects (what) involved. Relationships between those artefacts are not fully explicit. The outcome of a process instance is unpredictable (because it strongly depends on how people are doing the work).

Managed Process (capability level 2)

A *managed process* is a *performed process* that is planned and executed in accordance with policy; employs skilled people who have adequate resources to produce controlled outputs; involves relevant stakeholders; is monitored, controlled, and reviewed; and is evaluated for adherence to its process description. The process may be instantiated by a project, group, or organizational function.

A critical distinction between a *performed process* and a *managed process* is the extent to which the process is managed. A managed process is planned and the performance of the process is managed against the plan. Corrective actions are taken when the actual results and performance deviate significantly from the plan. A *managed process* achieves the objectives of the plan and is institutionalized for consistent performance.

The following generic goals to be fulfilled:

- Establish and maintain an organizational policy for planning and performing the process.
- Establish and maintain the plan for performing the process.
- Provide adequate resources for performing the process, developing the work products, and providing the services of the process.
- Assign responsibility and authority for performing the process, developing the work products, and providing the services of the process.
- Train the people performing or supporting the process as needed.
- Place designated work products of the process under appropriate levels of control.
- Identify and involve the relevant stakeholders of the process as planned.
- Monitor and control the process against the plan for performing the process and take appropriate corrective action.
- Objectively evaluate adherence of the process against its process description, standards, and procedures, and address noncompliance.
- Review the activities, status, and results of the process with higher level management and resolve issues.

BPM interpretation: Process templates are defined explicitly but not in detail yet – just macro-activities. Also such a definition is based on some locally (opposite to the whole enterprise) agreed conventions. Typically, it is known who (roles) is producing what (business objects), how (macro-activities) and when (some coordination). Although this is actually a skeleton of the process template, it is sufficient to plan process instances and to have some KPIs for managing of this instance against the plan.

The enacting of process instances may be carried out either manually or with the help of some tools (e.g. project management software). Handling of some artefacts, e.g. project documents, performance data and resource allocation, maybe patricianly automated. As each macro-activity involves a significant amount of human interpretation then the outcomes from process instances are roughly repeatable.

Defined Process (capability level 3)

A *defined process* is a *managed process* that is tailored from the organization's set of standard processes according to the organization's tailoring guidelines; has a maintained process description; and contributes work products, measures, and other process improvement information to the organizational process assets.

A critical distinction between a *managed process* and a *defined process* is the scope of application of the process descriptions, standards, and procedures. For a *managed process*, the process descriptions, standards, and procedures are applicable to a particular project, group, or organizational function. As a result, the managed processes of two projects in one organization may be different.

Another critical distinction is that a *defined process* is described in more detail and is performed more rigorously than a *managed process*. This distinction means that improvement information is easier to understand, analyze, and use. Finally, management of the defined process is based on the additional insight provided by an understanding of the interrelationships of the process activities and detailed measures of the process, its work products, and its services.

The following generic goals to be fulfilled:

- Establish and maintain the description of a defined process.
- Collect work products, measures, measurement results, and improvement information derived from planning and performing the process to support the future use and improvement of the organization's processes and process assets.

BPM interpretation: Process templates are defined in accordance with enterprise-wide agreed standards. Also process templates are defined explicitly at the granularity of well-defined small activities. Typically, it is known who (roles) is producing what (business objects), how (activities), why (rules) and when (exact coordination). This is actually a normal executable process template which intermixes human and automatic activities. The latter are rather comprehensive and can be common between different business domains.

Each project can tailor an appropriate standard process template to needs of this project (this is some kind of ad-hoc static optimisation, of course, with some reasonable limits). As process instance human participants (roles) perform mainly the added-value work (as well-defined small activities) and not the process administration per se, then the outcome of process instances becomes rather repeatable. Well-defined small activities are simpler to control thus making the management of a process instance more active.

It is important to note that some level of flexibility should be anticipated to achieve that such a tailoring can be carried out without causing any negative effects and without serious efforts. For example, artefacts should be easy versioned and models should be easy to understand. The book [2] is dedicated for those issues.

Quantitatively Managed Process (capability level 4)

A *quantitatively managed process* is a *defined process* that is controlled using statistical and other quantitative techniques. The product quality, service quality, and process-performance attributes are measurable and controlled throughout the project.

The following generic goals to be fulfilled:

- Establish and maintain quantitative objectives for the process, which address quality and process performance, based on customer needs and business objectives.
- Stabilize the performance of one or more sub-processes to determine the ability of the process to achieve the established quantitative quality and process-performance objectives.

BPM interpretation: A normal executable process template is modelled to take into account the needs for proactive control of process instances. For example, the process template contains several check-points at which the performance of a particular process instance is measured to take an informed decision about the further execution of this process instance (see 7.8 from [2]). In some sense, a process instance interacts with the process execution

engine. So, a process instance is systematically optimised without changing its process template.

Optimizing Process (capability level 5)

An *optimizing process* is a *quantitatively managed process* that is changed and adapted to meet relevant current and projected business objectives. An optimizing process focuses on continually improving process performance through both incremental and innovative technological improvements. Process improvements are selected based on a quantitative understanding of their expected contribution to achieving the organization's process improvement objectives versus the cost and impact to the organization.

A critical distinction between a *quantitatively managed process* and an *optimizing process* is that the optimizing process is continuously improved by addressing common causes of process variation. A quantitatively managed process is concerned with addressing special causes of process variation and providing statistical predictability of the results. Although the process may produce predictable results, the results may be insufficient to achieve the organization's process improvement objectives.

The following generic goals to be fulfilled:

- Ensure continuous improvement of the process in fulfilling the relevant business objectives of the organization.
- Identify and correct the root causes of defects and other problems in the process.

BPM interpretation: A process template is optimised on the base of performance analysis of many process instances and some enterprise-wide information which is external relatively to this process template (e.g. a need to speed up all processes within the enterprise). This is a static systematic optimisation. Maybe some techniques for dynamic modifications of a process template are considered.

BPM discipline functionality in different CMMI-SVC v1.2 process types

The following table shows what BPM discipline functionality is involved in each process types. The level of involvement is indicated as "implicit" (informal), "explicit" (formal) and in between (marked as "I/E").

BPM functionality vs process types	Performed process	Managed process	Defined process	Quantitatively measured process	Optimising process
Optimise	Implicit	Implicit	Implicit	I/E	Explicit
Measure	Implicit	Implicit	I/E	Explicit	Explicit
Control	Implicit	I/E	I/E	Explicit	Explicit
Execute	Implicit	I/E	Explicit	Explicit	Explicit
Automate	Implicit	I/E	Explicit	Explicit	Explicit

Model	I/E (black box)	Explicit (locally and roughly)	Explicit (globally and detailed)	Explicit	Explicit

So, staring from “defined processes” it is necessary to use BPM suite software. Moving higher requires serious thinking about architecting of a BPM system to support CMMI processes.

Annex A

There are three concepts of BPM:

[**the theory**] BPM as a management disciple (*BPM discipline*) which allows you to model, automate, execute, control, measure and optimise the flow of business activities that span the enterprise’s systems, employees, customers and partners within and beyond the enterprise boundaries.

[**the tools**] BPM as a software (*BPM suite*).

[**the practice**] BPM as a portfolio of the business processes of an enterprise, and the practices and tools for governing the design, execution and evolution of this portfolio (*BPM system*).

The BPM discipline uses the following types of business artefact (see www.samarin.biz/terminology):

- events
- processes
- rules
- activities
- roles
- objects (data structures)
- objects (documents)
- audit trails
- key performance indicators
- services

The evolution of some artefacts and the relationships between them is necessary to accommodate typical changes in enterprise policies, enterprise priorities, compliance, technology, laws, etc. So, to be agile and responsive in business, it must be easy to modify all artefacts and their relationships without causing any negative effects (e.g. unexpected delays and undesired consequences) in any part of the BPM system.

I think that the four main architectural principles are necessary to achieve a high level of flexibility:

1. All artefacts must be versionable throughout their lifecycle.
2. All artefacts must evolve to become digital, externalised, virtual and components of clouds.
3. All relationships between artefacts must be modelled explicitly.

4. All models must be made to be executable.

More relationships are explicit and executable –> more knowledge about functioning of the enterprise -> more predictable results -> more rational decisions -> more comprehensive optimisation.

The best example of explicit and executable relationships between business artefacts is process -- who (role) is doing what (objects and activities), when (coordination of activities), why (rules), how (activities) and with which results (KPIs).

Bibliography

[1] CMMI-SVC v1.2, http://www.sei.cmu.edu/library/abstracts/reports/09tr001.cfm

[2] “Improving enterprise business process management systems” www.samarin.biz/book