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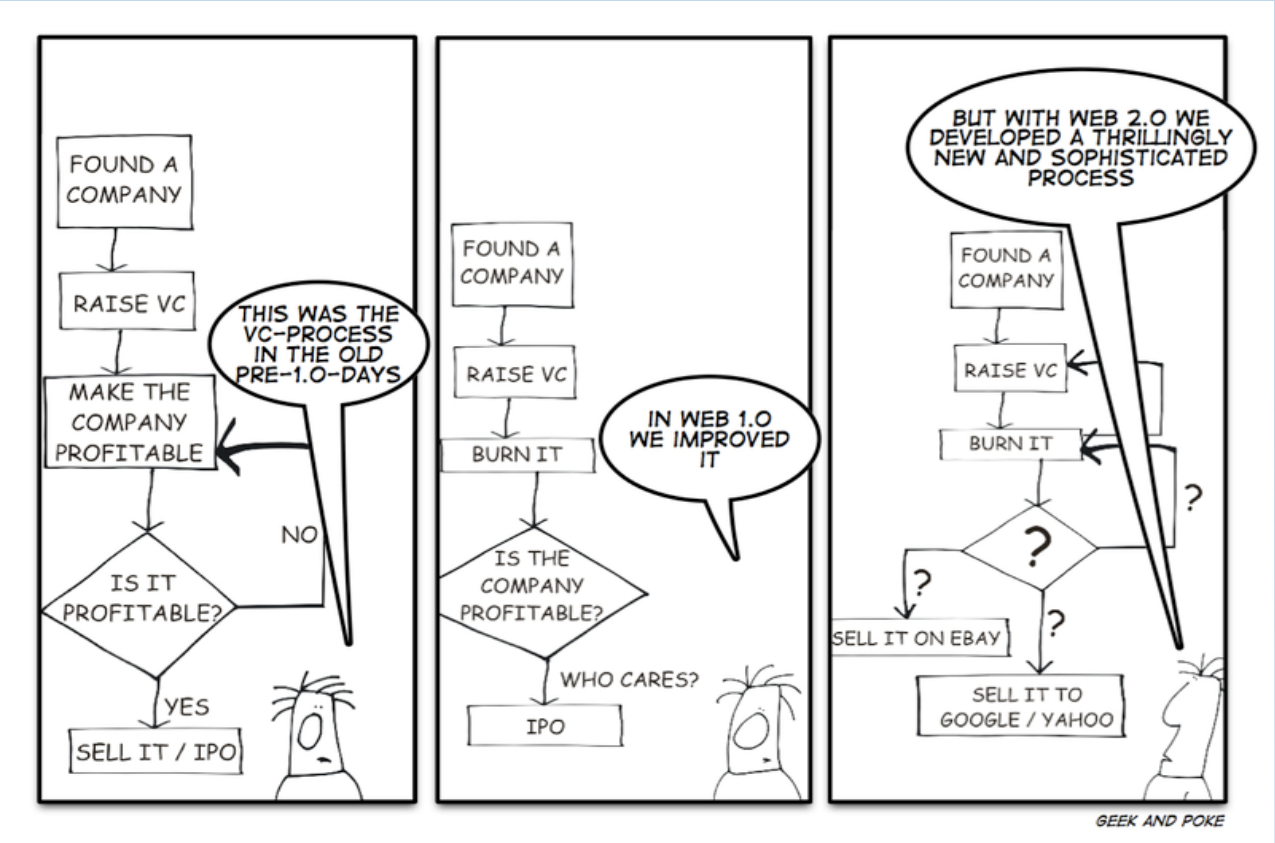
AMS



Business Process Modelling

- BPM Fundamentals

What is a Process ?

One man draws out the wire, another straights it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head: to make the head requires two or three distinct operations: to put it on is a particular business, to whiten the pins is another... and the important business of making a pin is, in this manner, divided into about eighteen distinct operations, which in some manufactories are all performed by distinct hands, though in others the same man will sometime perform two or three of them.

(Adam Smith, 1776)

What is a Process ?

Materials

Information

Resources

- People
- Energy
- Equipment
- Infrastructures
- Methods

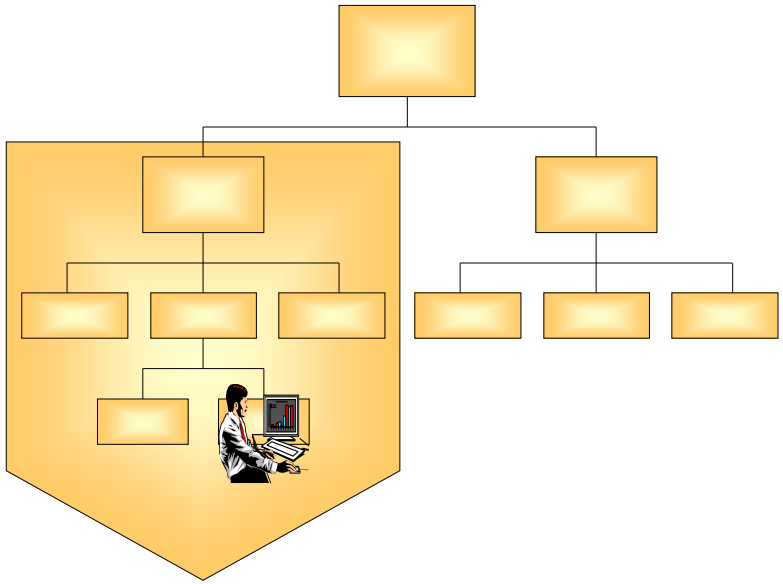
Products

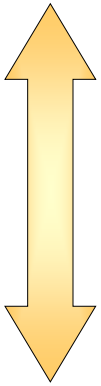
Services

Information

The Function-Oriented Organization

Function Oriented





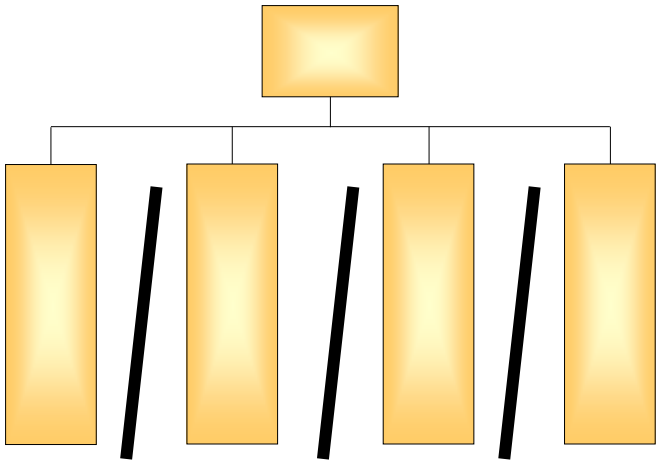
Functional Optimization

Organization Global Optimization

Doesn’t show how the value is aggregated
Functions are more important than customers
Responsibilities are lost between interfaces

The Function-Oriented Organization

- A horizontal flow of work, combined with a vertical organization results in several gaps and overlaps and empowers sub optimization, putting a negative influence on the organization efficiency
- The “island effect” decreases performance
  - optimizing the functions generates sub optimization of the “all”
  - nobody manages the “blanks spaces”

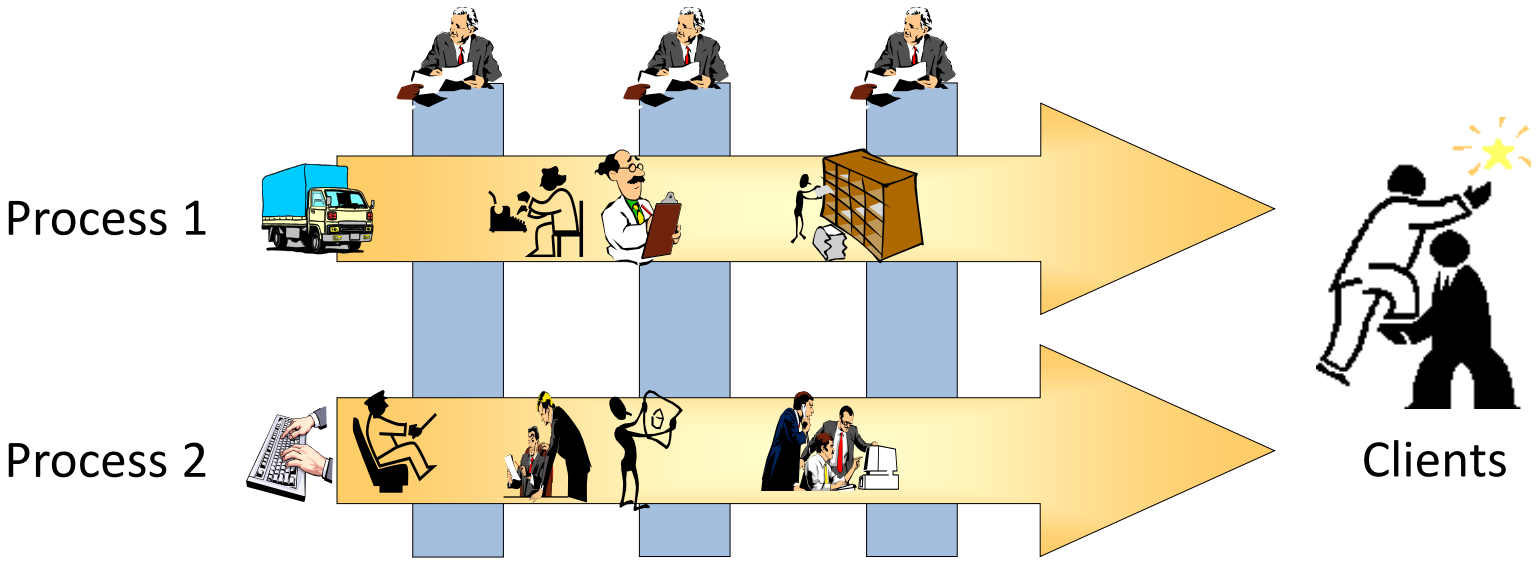


Blank spaces

Function Oriented

The Process-Oriented Organization

Horizontal management by processes cross functions of the organization to focus on products and customers.



Takeaways

1. All work performed within an organization is part of a process.
2. All products and services of an organization are the result of a process.
3. A process is realized by a cooperation of people (actors) and resources.
4. Process-oriented management focus on product and clients and not of functions or units.

ISO 9001…

"A result is reached efficiently when activities and resources are managed as a process" (ISO 9000)

- Section 1: Scope
- Section 2: Normative Reference
- Section 3: Terms and definitions
- Section 4: Quality Management System
- Section 5: Management Responsibility
- Section 6: Resource Management
- Section 7: Product Realization
- Section 8: Measurement, analysis and improvement

some examples of “types of processes”

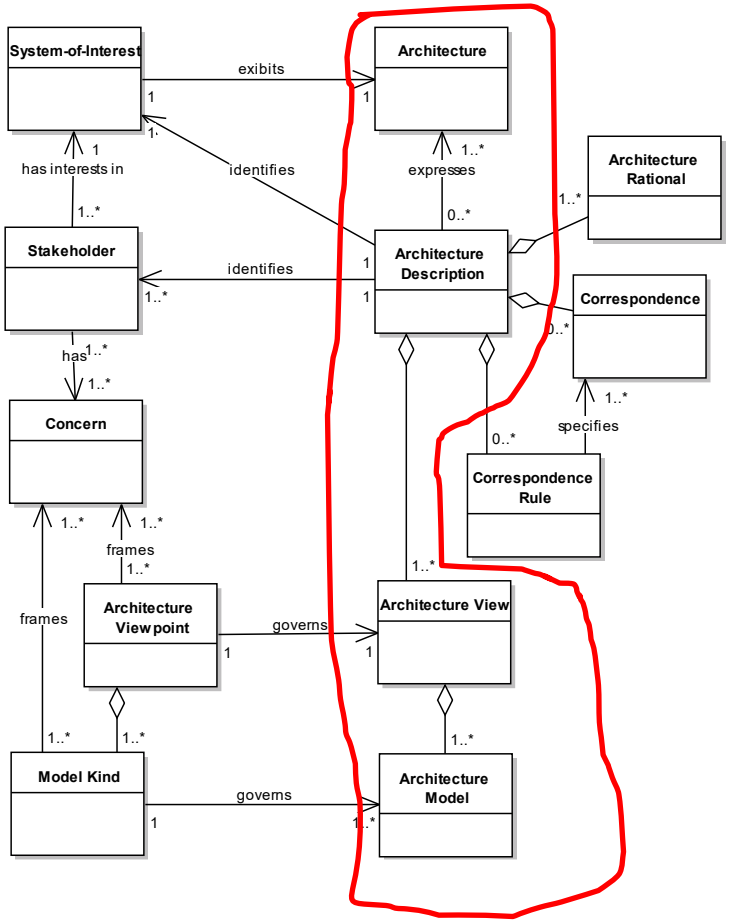
- **Management Processes**
  - Govern the operation of a system (e.g. organization).
  - Examples: Organizational Governance, Strategic Management, Strategic Planning.
- **Operational Processes (aka Primary Processes)**
  - Specify the core business and support the organization's value chain.
  - Provide value.
  - Examples: Purchasing, Sales, Logistics, Marketing
- **Support Processes**
  - Support the other processes
  - Do not provide (direct) value.
  - Examples: Accounting, HR Management
- **“Business Processes”**
  - ...see slides “BPMN - Business Process Management...

Process Architecture

A recall on “architecture”

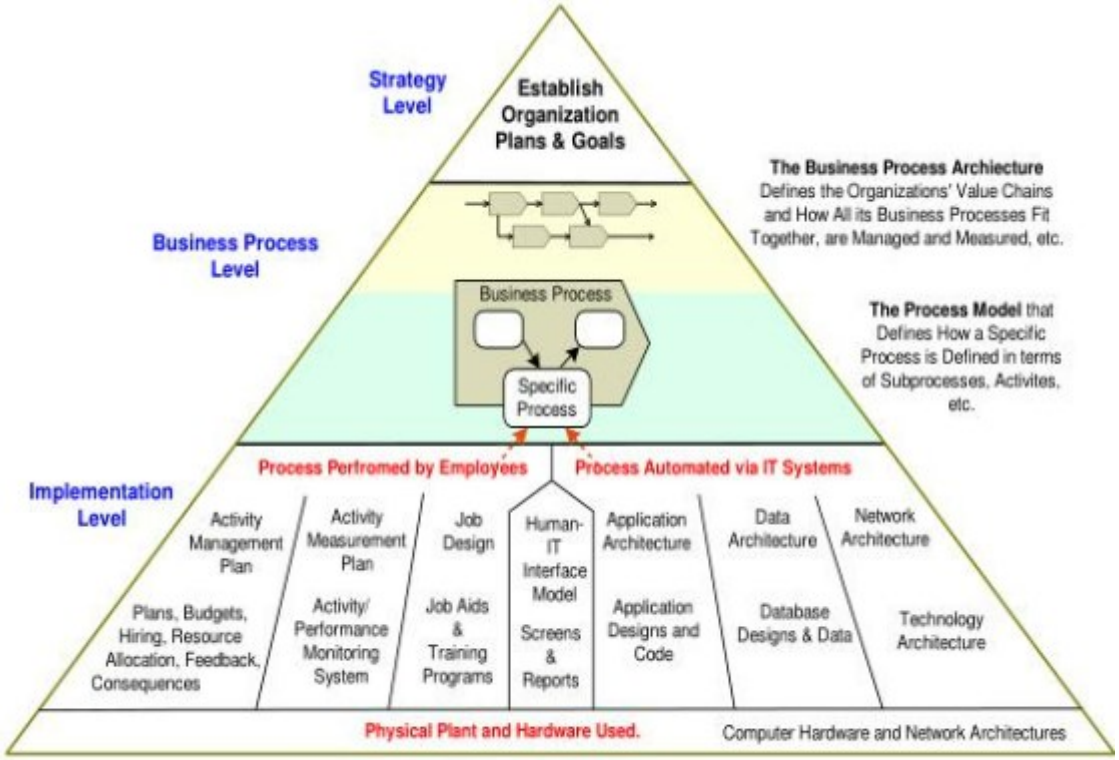
An architecture is a formal description of a system that defines the structure and properties of its components, their relationships and behaviour, as well as the principles needed for their analysis, design and evolution.

NOTE: Recalling that systems do really do not “have” an “architecture” but what is correct is to understand that “a system exhibits an architecture, which is an expression of an architecture representation”, it is common to see the term “architecture” simply used for what should, in rigor, be referred as “architecture representation” or “architecture view” or even “architecture model”…



When a set of processes share a common context and address related concerns, they can be understood as a "system", then we also can conceptualize a "Process Architecture" for them…

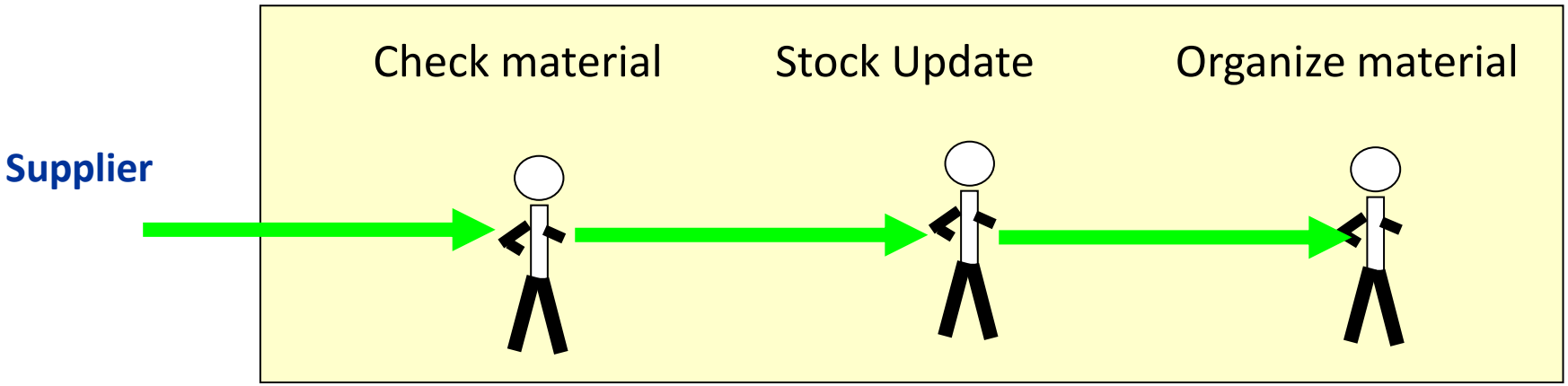
- Formal specification of processes:
  - Definition of the structure of each processes
  - Properties of each process
  - Relations between activities (i.e. collaborative behaviour).
  - Definition of (design) principles (e.g. composition, depth).



Source: Paul Harmon, BP Trends

Example

- **Activities Location:** The Warehouse
- **Actor**: Warehouse Officer
- **Activities :**
  - Check material
  - Stock Update
  - Organize material



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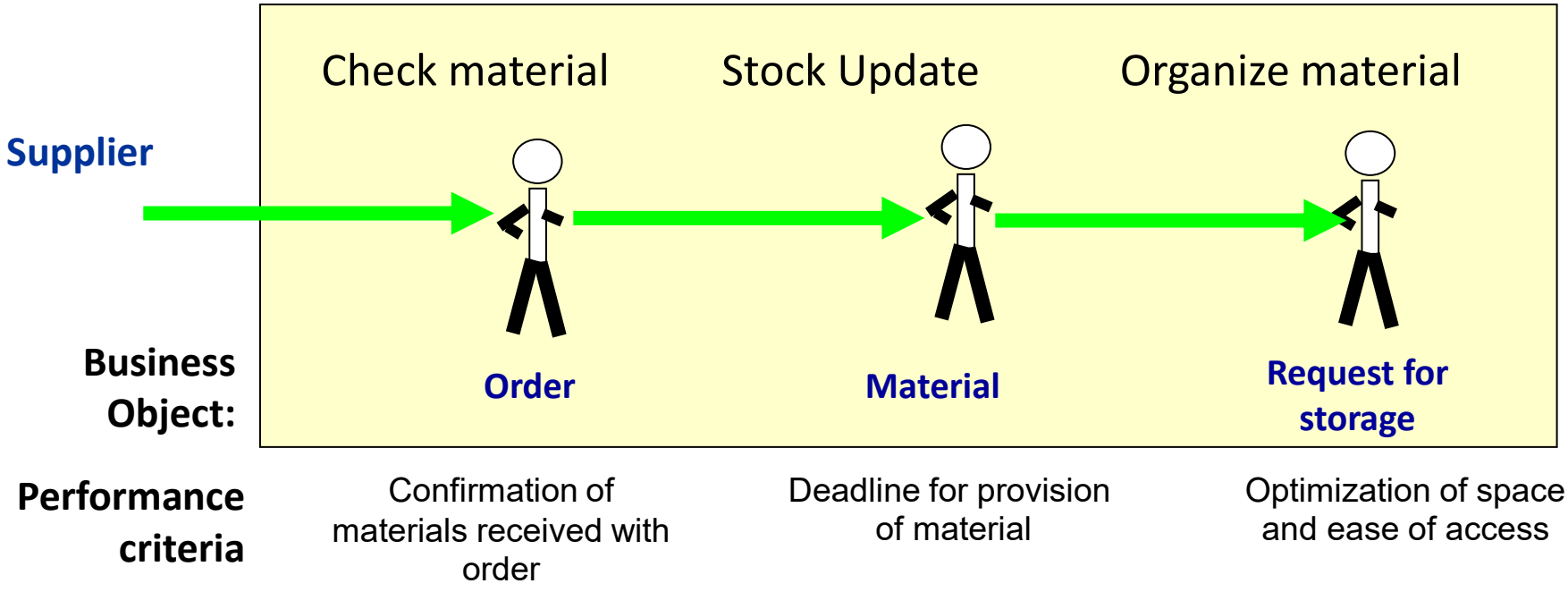
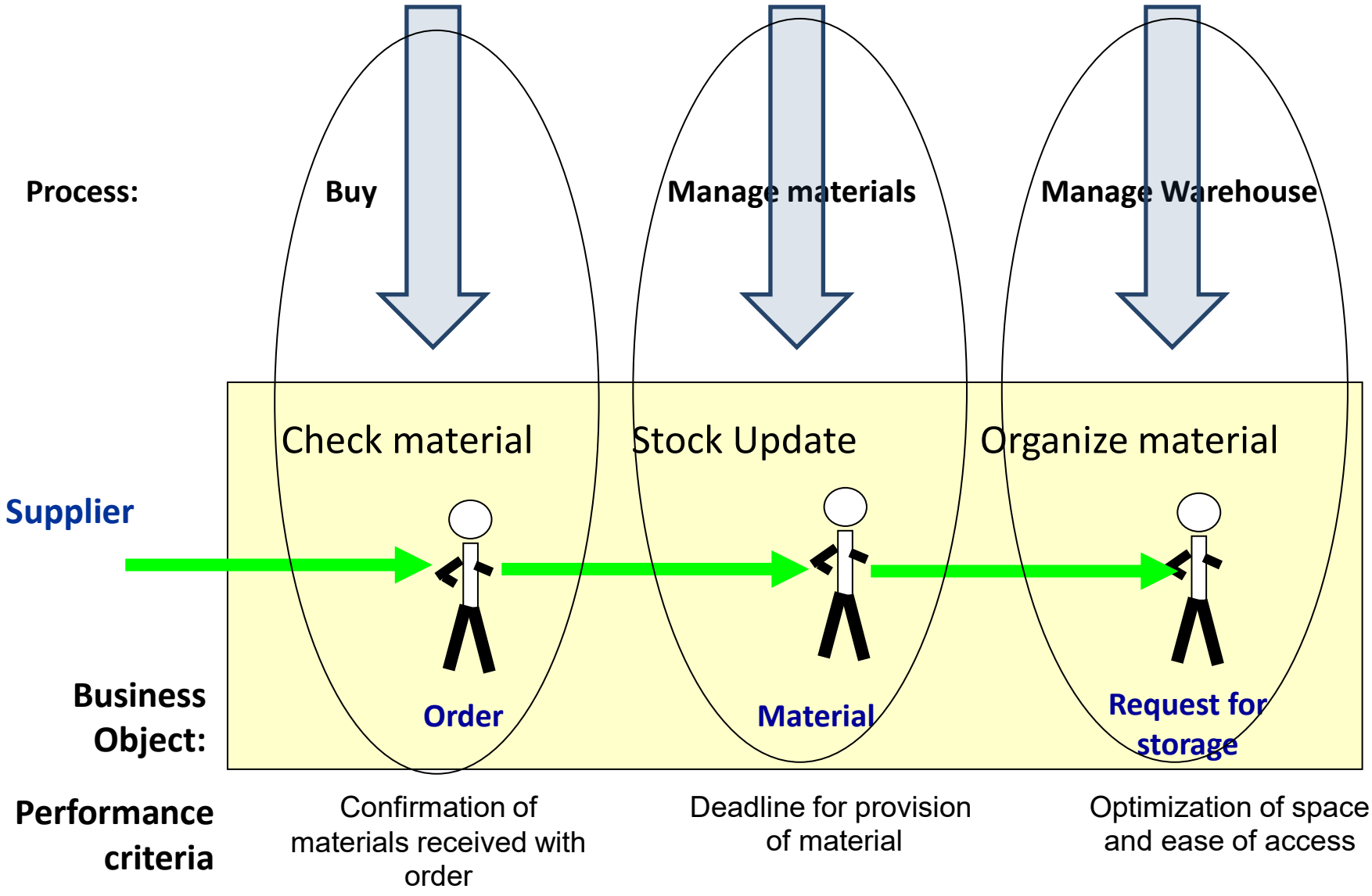
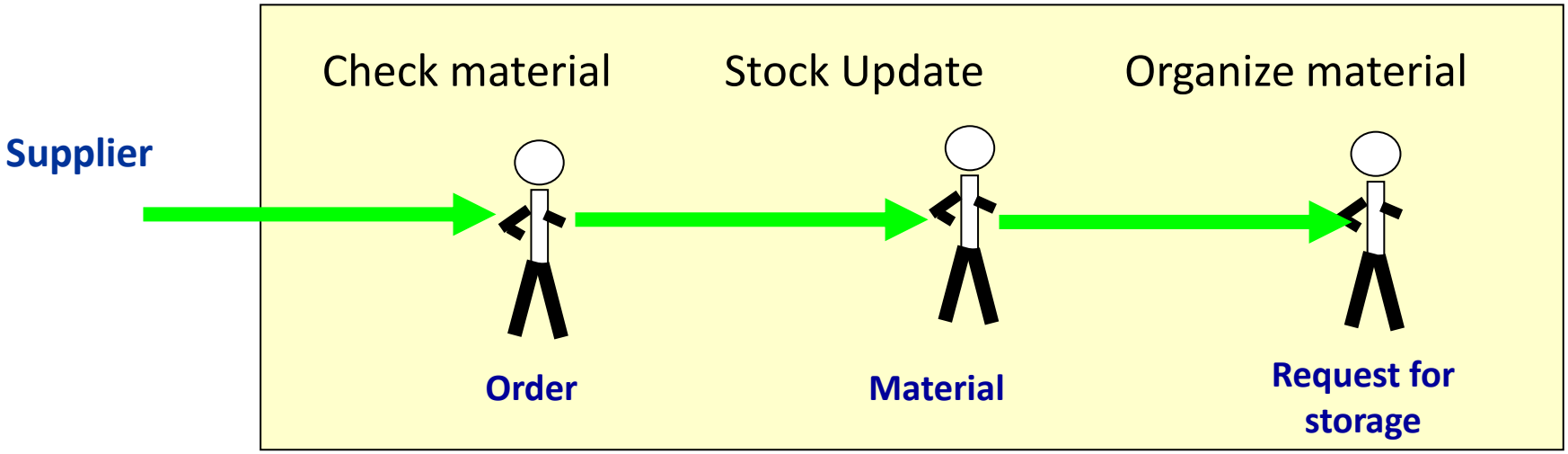


Example


Process:
Buy
Manage materials
Manage Warehouse
Check material
Stock Update
Organize material
Supplier
Business Object:
Order
Material
Request for storage
Performance criteria
Confirmation of materials received with order
Deadline for provision of material
Optimization of space and ease of access

Process Architecture

- Who is interested in "green process"?
- How to identify the benefits of automatize the activity "check material“?



People "know what they do" but may not actually know in which Business Process they are actually performing work!

Process Architecture References…

A (classic shape of a) generic reference framework for processes

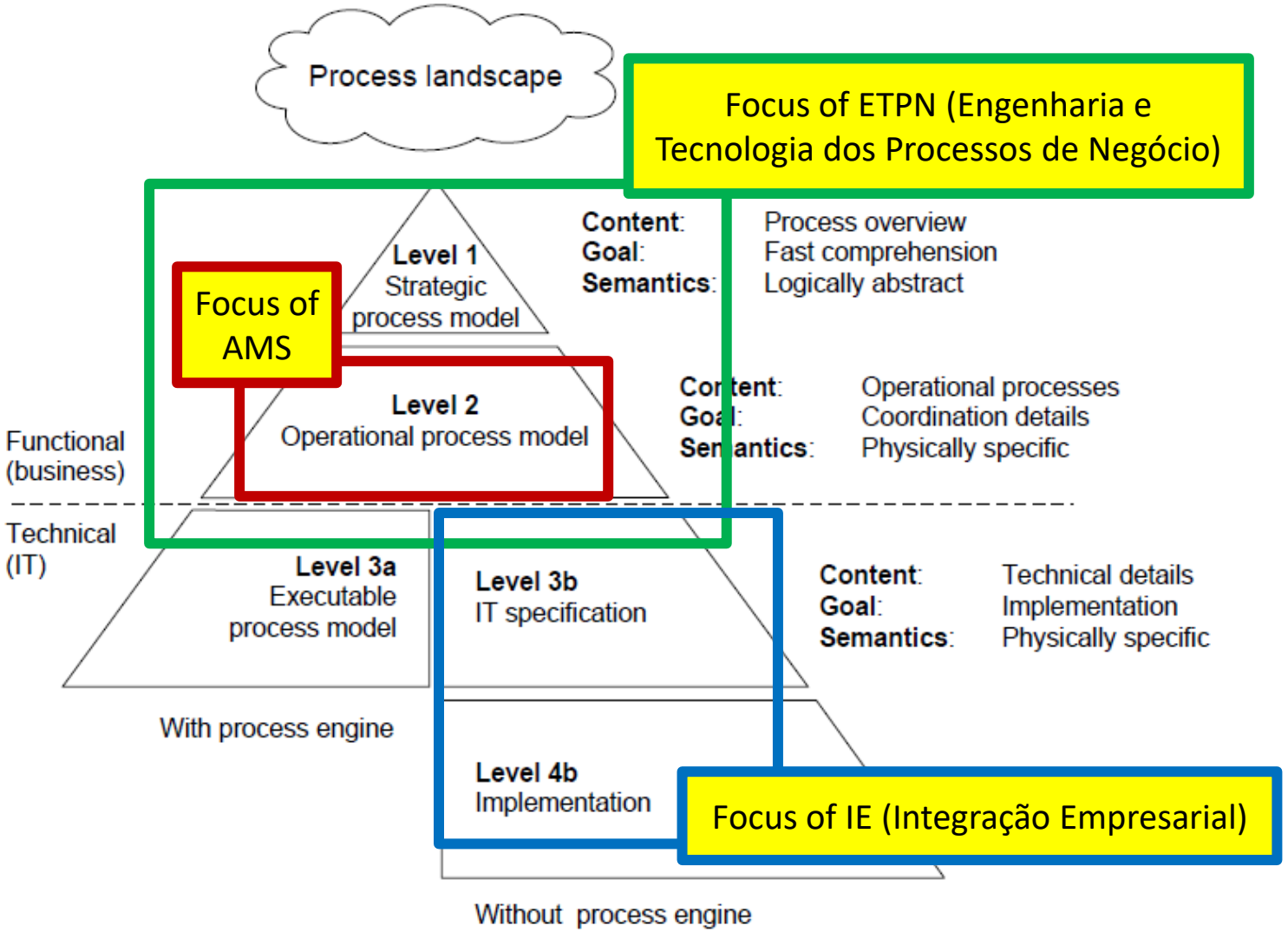
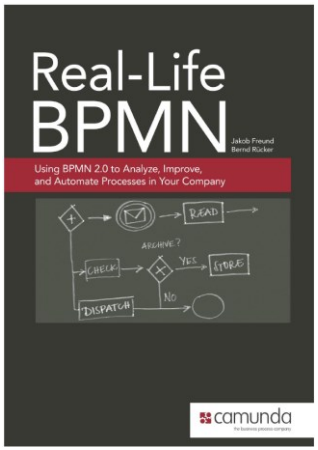
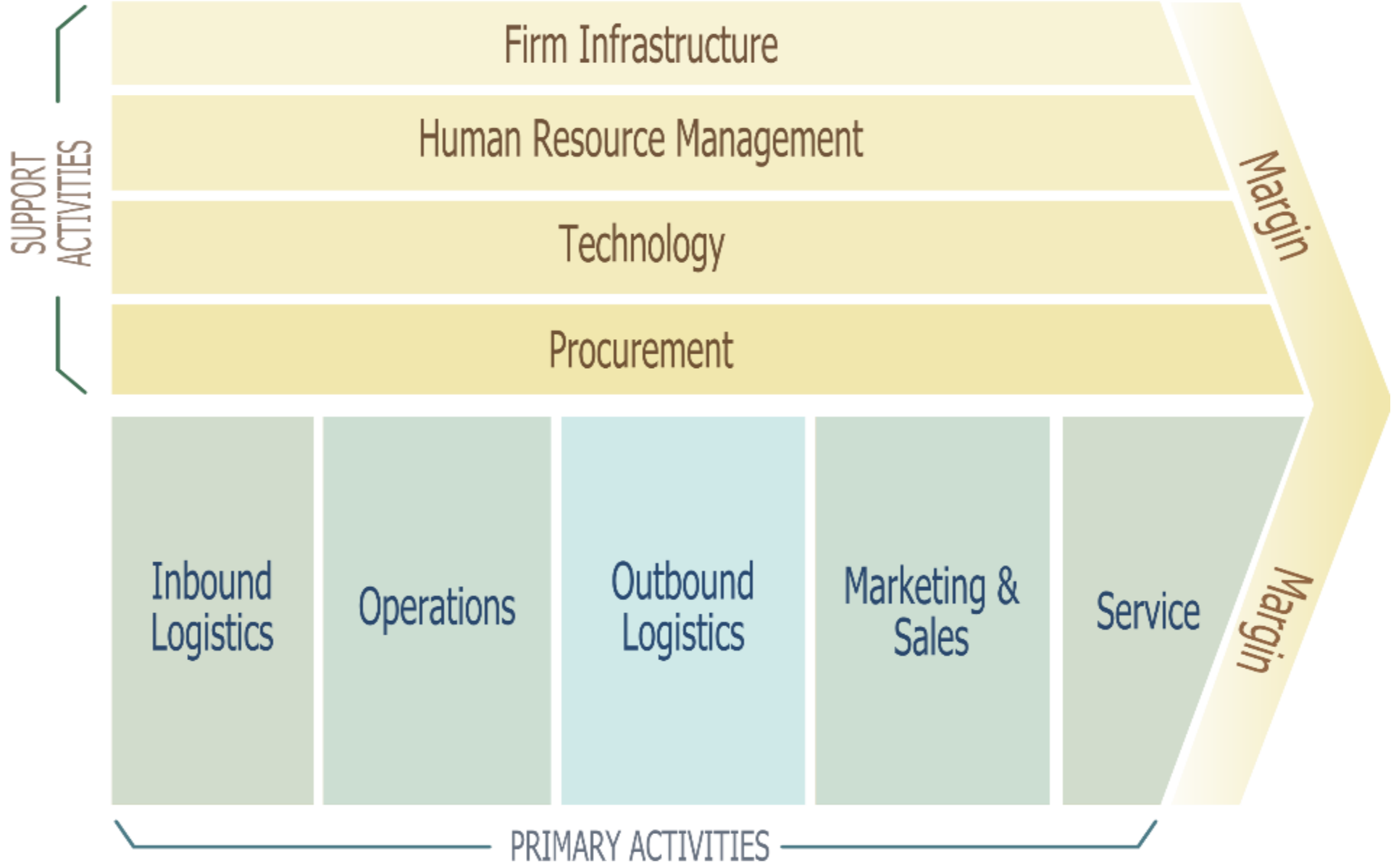


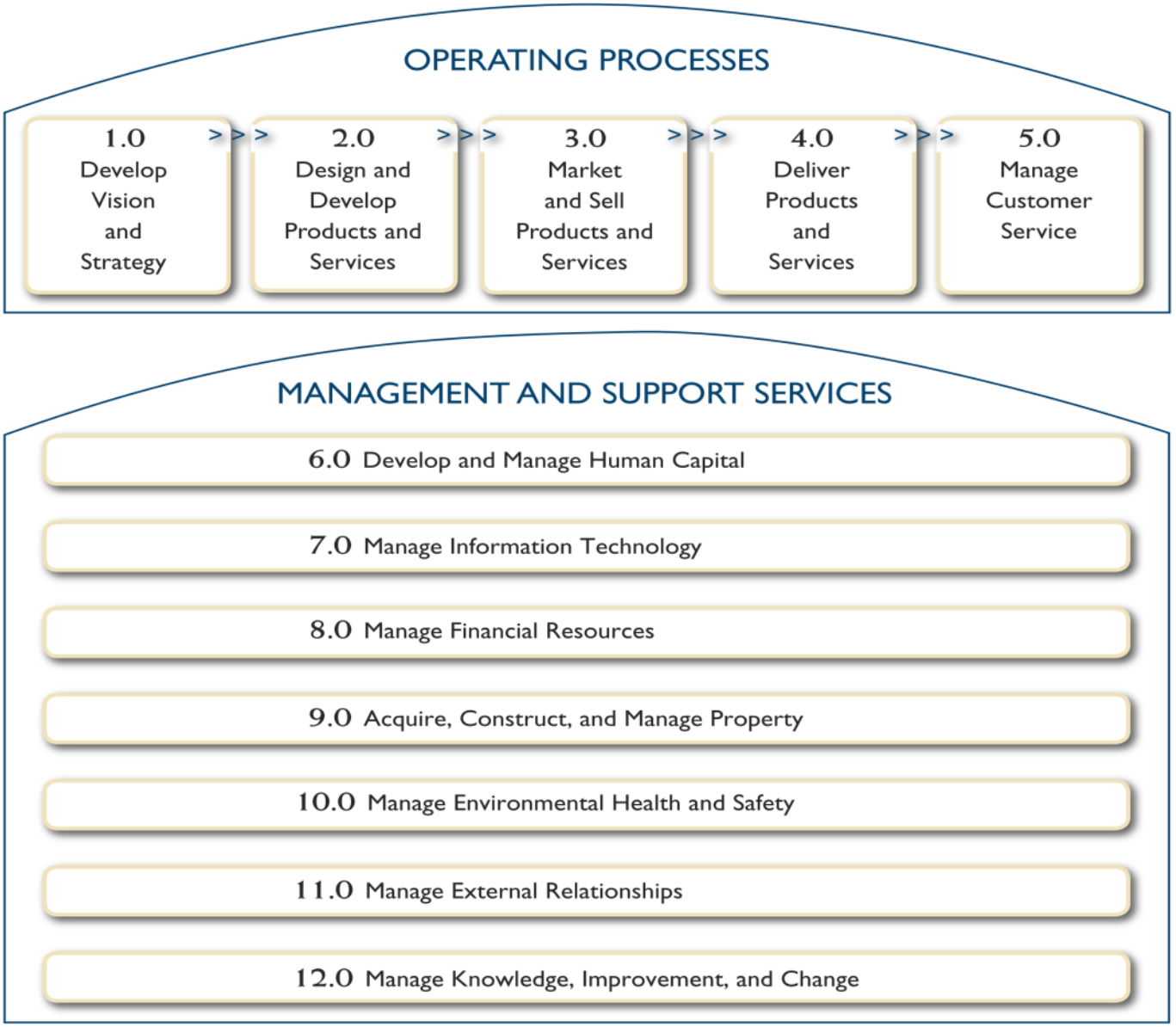
FIGURE 1.5 camunda BPMN framework (caBPMN)



Value Chain (Porter, 1985)



Process Classification Framework

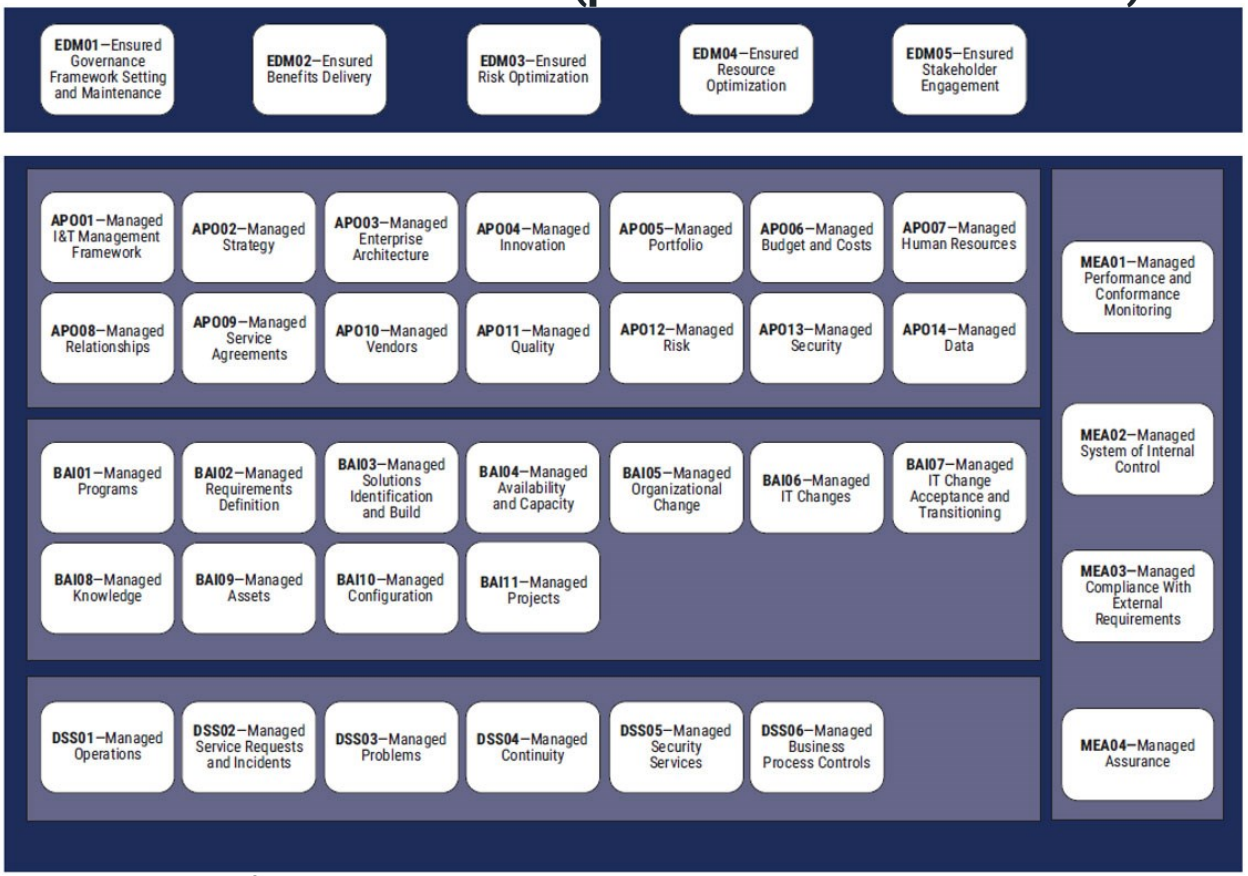


Process Classification Framework

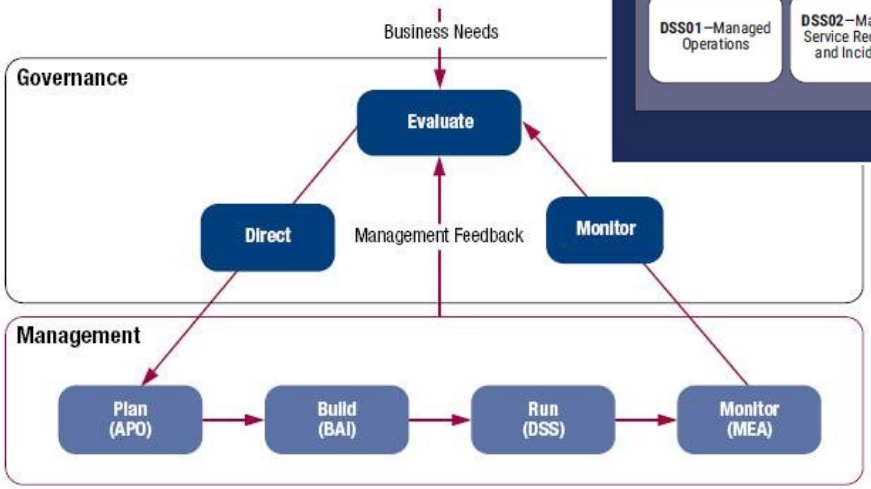
- 4.2 Procure materials and services
  - 4.2.1 Develop sourcing strategies
    - 4.2.1.1 Develop procurement plan
    - 4.2.1.2 Clarify purchasing requirements
    - 4.2.1.3 Match needs to supply capabilities
    - 4.2.1.4 Analyze company's spend profile
    - 4.2.1.5 Seek opportunities to improve efficie and value
    - 4.2.1.6 Collaborate with suppliers to identif sourcing opportunities
  - 4.2.2 Select suppliers and develop/maintain contract
    - 4.2.2.1 Identify suppliers
    - 4.2.2.2 Certify and validate suppliers
    - 4.2.2.3 Negotiate contracts
    - 4.2.2.4 Manage contracts
  - 4.2.3 Order materials and services
    - 4.2.3.1 Process/Review requisitions
    - 4.2.3.2 Approve requisitions
    - 4.2.3.3 Solicit/Track vendor quotes
    - 4.2.3.4 Create/Distribute purchase orders
    - 4.2.3.5 Expedite orders and satisfy inquiries
    - 4.2.3.6 Record receipt of goods
    - 4.2.3.7 Research/Resolve exceptions
- 7.4 Manage enterprise information
  - 7.4.1 Develop information and content management strategies
    - 7.4.1.1 Understand information and content management needs and the role of IT services for executing the business strategy
    - 7.4.1.2 Assess the information and content management implications of new technologies
    - 7.4.1.3 Identify and prioritize information and content management actions
  - 7.4.2 Define the enterprise information architecture
    - 7.4.2.1 Define information elements, composite structure, logical relationships and constraints, taxonomy, and derivation rules
    - 7.4.2.2 Define information access requirements
    - 7.4.2.3 Establish data custodianship
    - 7.4.2.4 Manage changes to content data architecture requirements
  - 7.4.3 Manage information resources
    - 7.4.3.1 Define the enterprise information/data policies and standards
    - 7.4.3.2 Develop and implement data and content administration

Control Objectives for Information and related Technology (COBIT)
https://www.isaca.org/resources/cobit

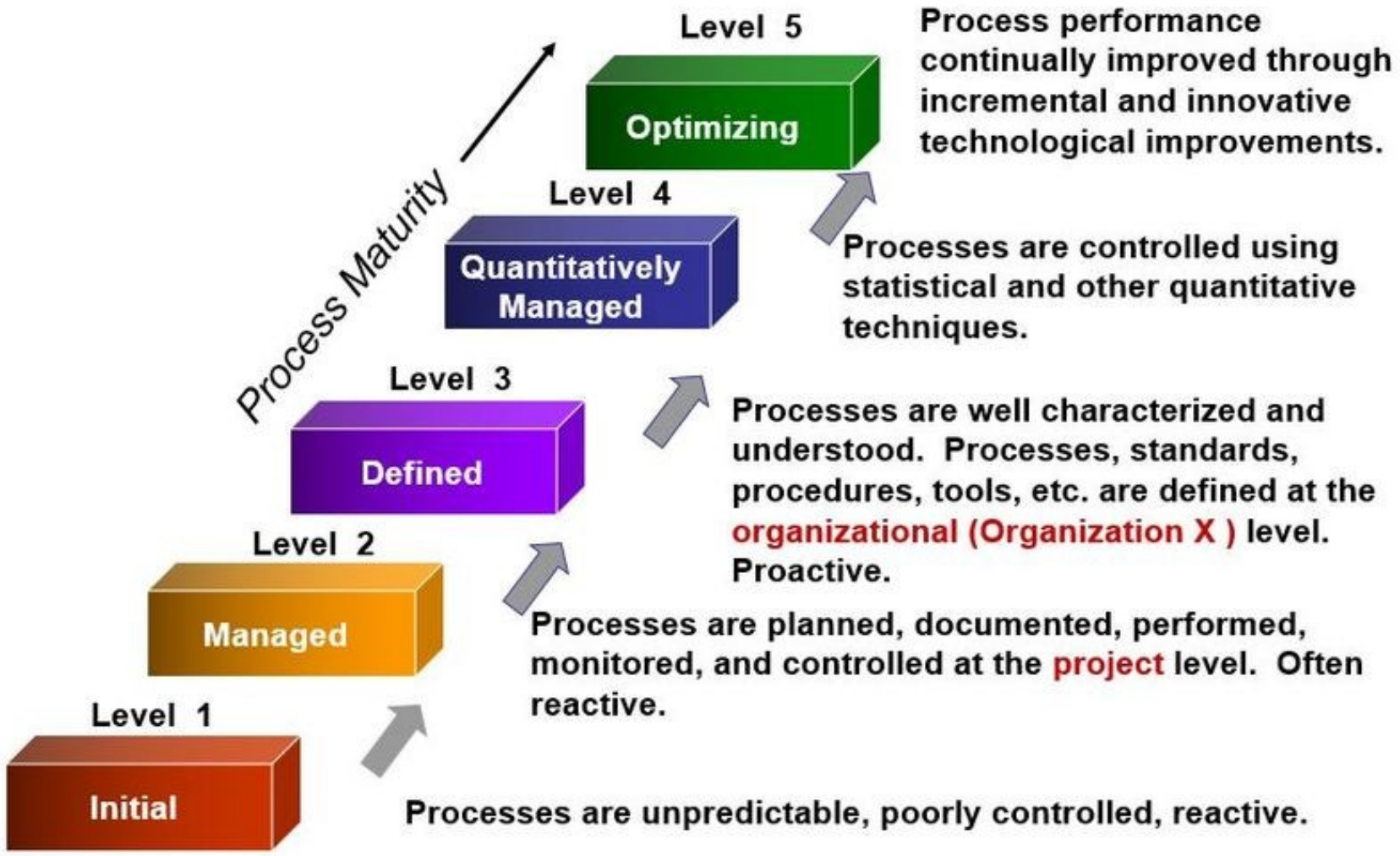
COBIT 2019 Core Model (process reference model)



COBIT is a framework to support IT professionals and enterprise leaders fulfil their IT Governance responsibilities while delivering value to the business.



Process Capability and Maturity



https://herdingcats.typepad.com/my_weblog/2015/03/five-estimating-pathologies-and-their-corrective-actions.html

ISO/IEC 15504

SPICE (Software Process Improvement and Capability Determination)

ISO/IEC 15504 is the reference model for the maturity models, consisting of capability levels, so that it can be found an overall determination of the **organisation's capabilities for delivering IT based products** (software, systems, services). For each process, it defines a capability level according this scale:

0	Incomplete process	The process is not implemented or fails to achieve its purpose ;
1	Performed process (Informed)	The process is implemented and achieves its purpose
2	Managed process (Planned and monitored)	The process is managed and results are specified, controlled and maintained.
3	Established process (Well defined)	A standard process is defined and used throughout the organization
4	Predictable process (Quantitatively managed)	The process is executed consistently within defined limits
5	Optimizing process (Continuous improvement)	The process is continuously improved to meet relevant current and projected business goals

The capability of the processes is measured using 9 process attributes:

- 1.1 Process Performance
- 2.1 Performance Management
- 2.2 Work Product Management
- 3.1 Process Definition
- 3.2 Process Deployment
- 4.1 Process Measurement
- 4.2 Process Control
- 5.1 Process Innovation
- 5.2 Process Optimization

Each process attribute is assessed on a relative rating scale, based upon evidence collected:

- Not achieved (0 - 15%)
- Partially achieved (>15% - 50%)
- Largely achieved (>50%- 85%)
- Fully achieved (>85% - 100%).

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A discussion on

“BPM - Business Process Management”

On “BPMN” and “Business Process”

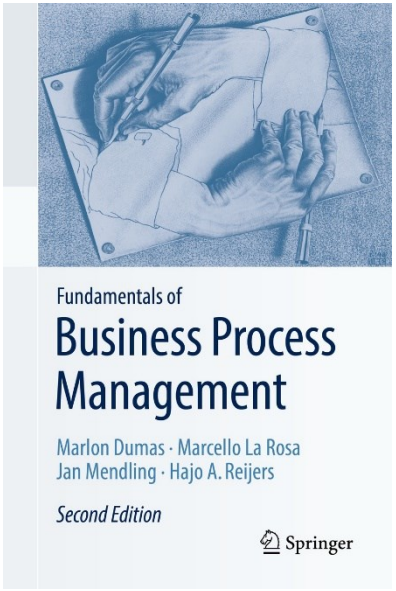
The acronym BPMN stands for “Business Process Modeling Language”.

The reason for that name is historical, when the language was developed to model “socio-technical processes in business organizations”, which required its own semantics, different from the until then classic techniques and languages for modelling of “industrial processes”.

Meanwhile more sophisticated perceptions of “processes in business organizations” has emerged, which, depending of the reference, can classify those processes according to multiple views, such as “support processes”, “compliance processes”, “management processes”, ... and even “business processes”. Besides the fact that usually all those processes can be modelled making use of the BPMN language, it means that, according to this present state of the art, not all the “BPMN models” should be about “business process”.

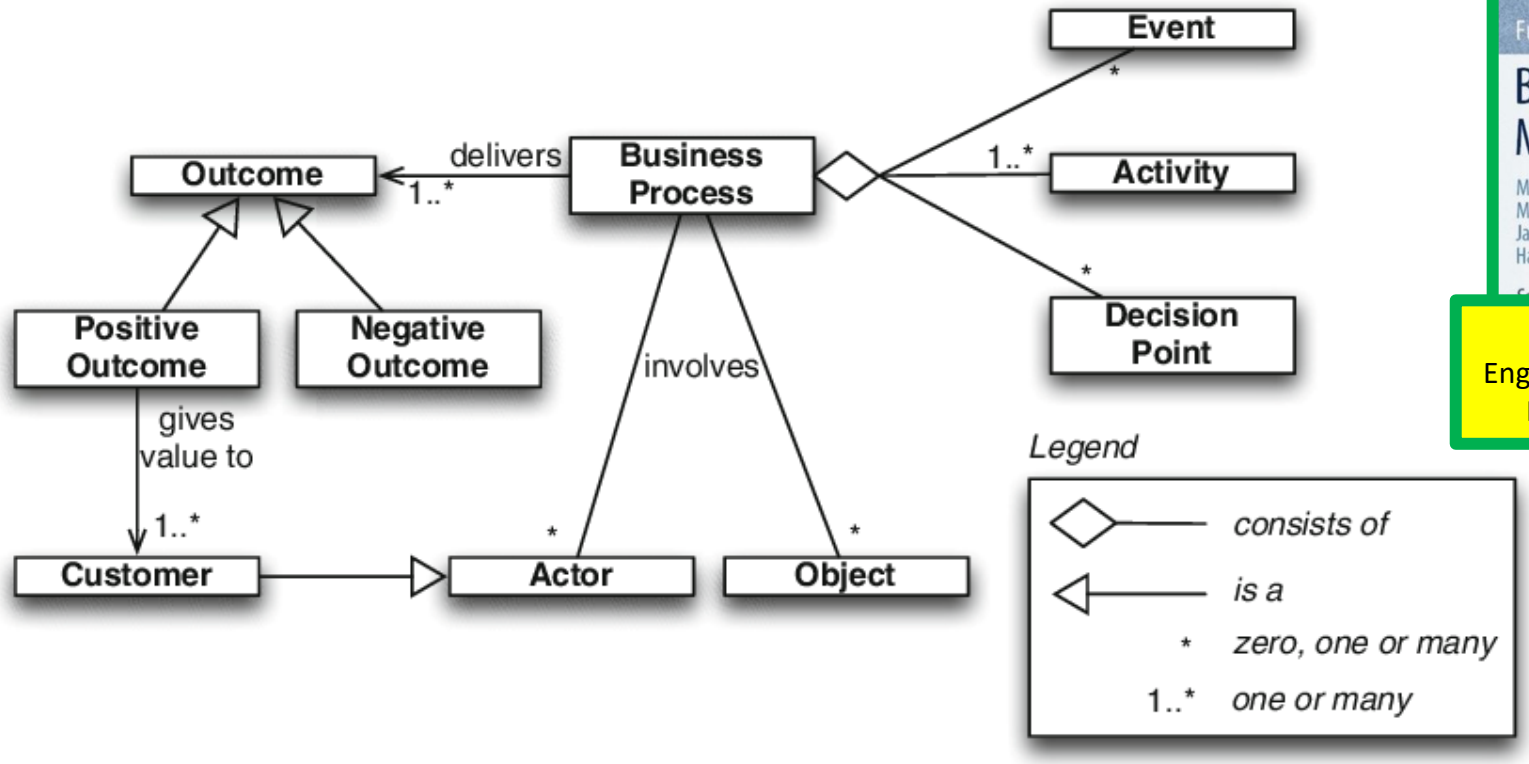
That is deeply discussed in the MSc, in the UC of ETPN (Business Processes Engineering and Technology), where are adopted the concepts of the book “Business Process Management”. In that context, a process only is “business process” if its outcome has a direct value for a costumer, meaning all the other processes in the organization should not be named “business processes”.

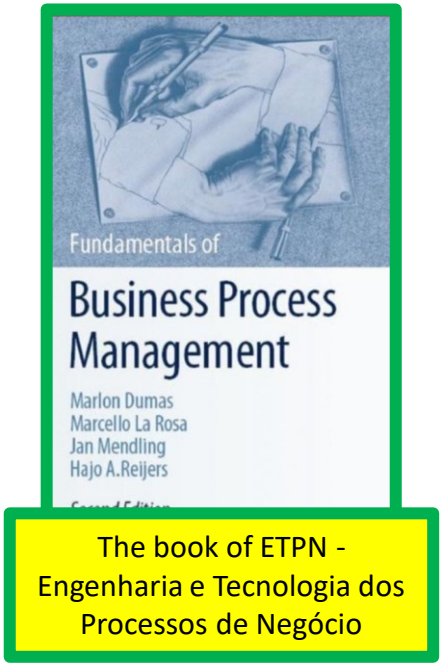
In this course we will ignore all that, as our focus will be simply to learn and exercise the BPMN language! However, consider taking the course ETPN to learn more about this interesting subject ;-)



What is really then a “Business Process” ?

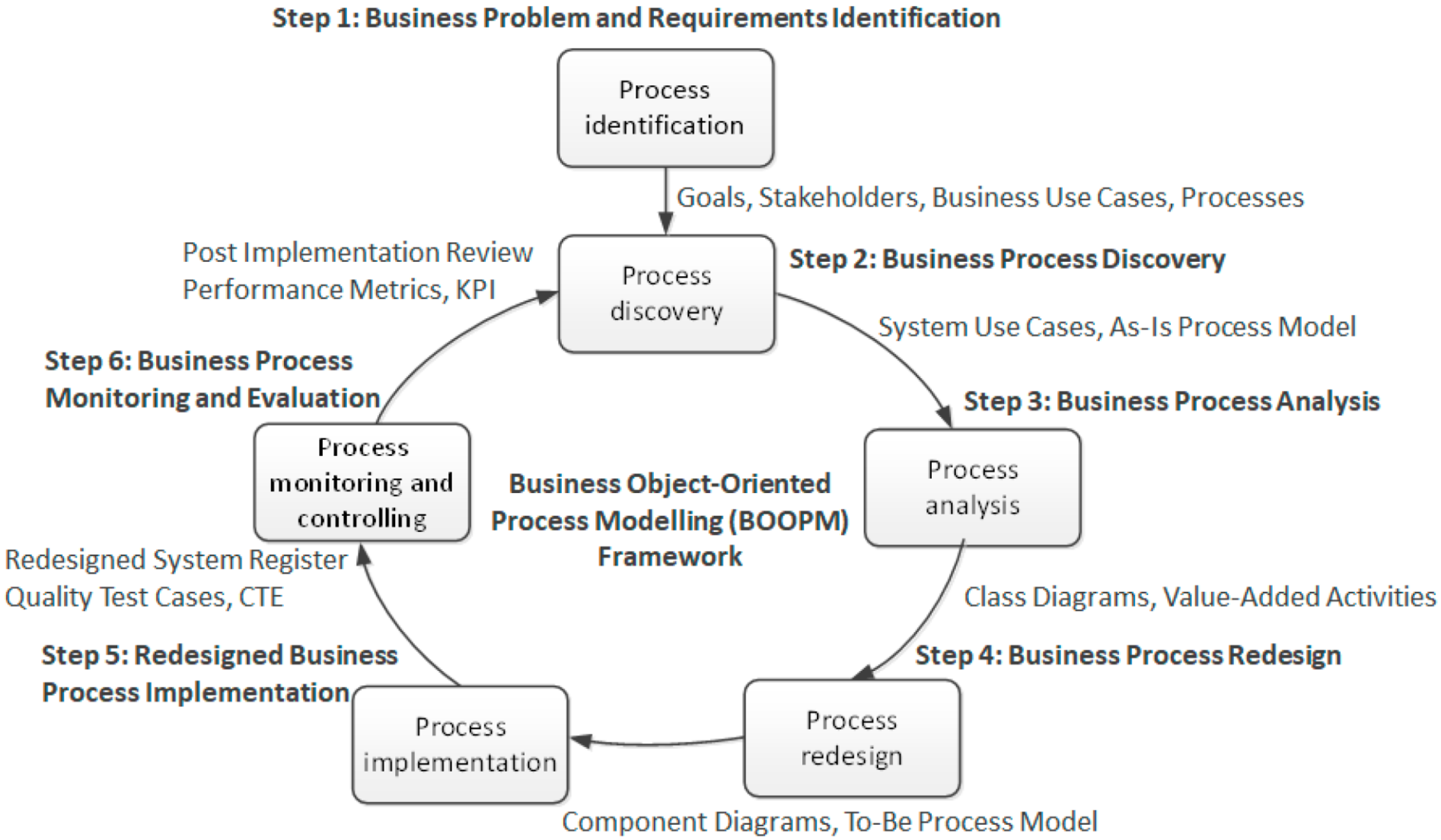
- Set of interrelated activities that transform inputs into outputs in order to produce a service or product **to a specific customer**.
- The focus is always on the final product!!!





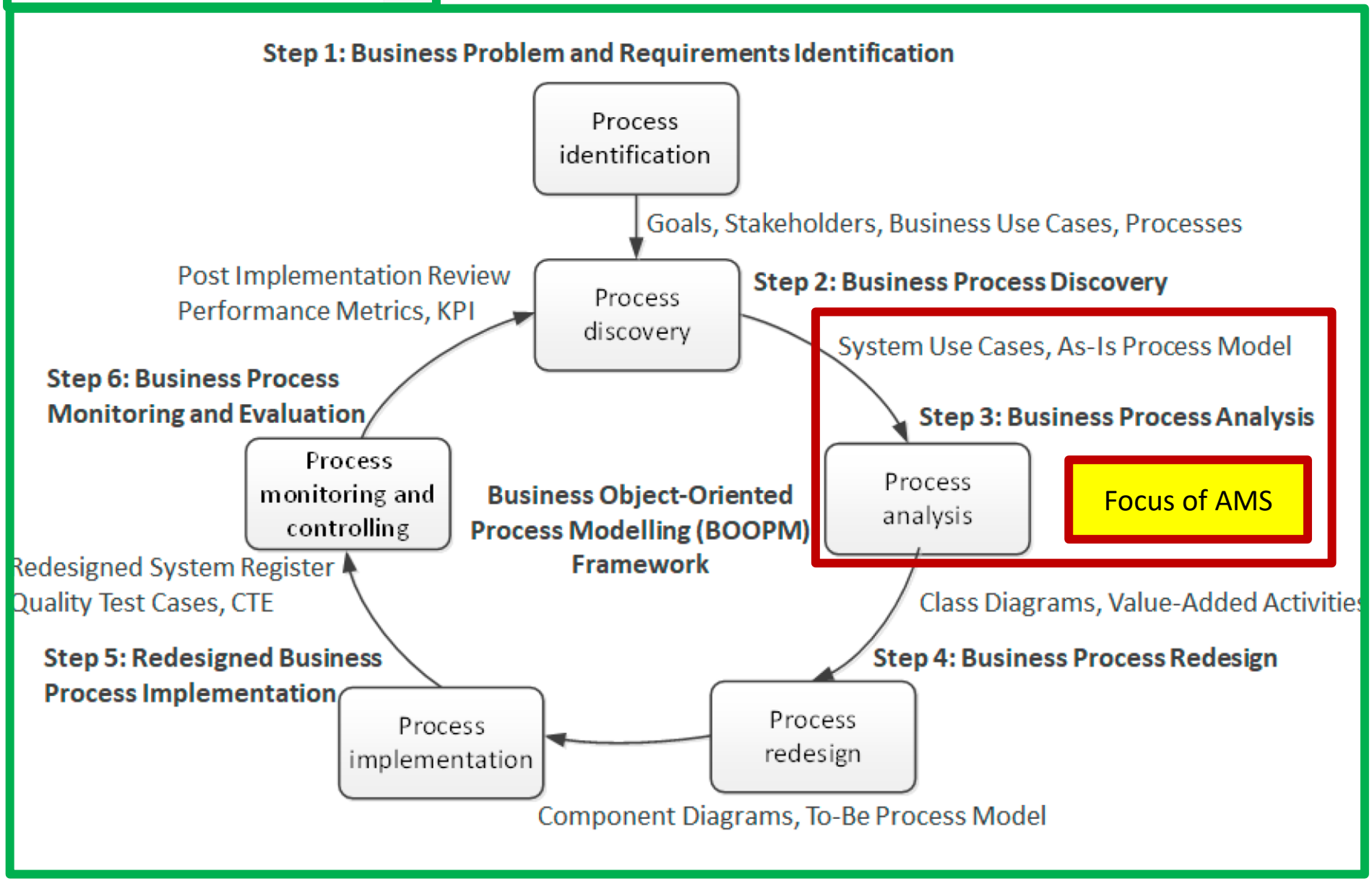
The book of ETPN - Engenharia e Tecnologia dos Processos de Negócio

A (classic) reference framework for the BPM lifecycle



Process Innovation and Improvement Using Business Object-Oriented Process Modelling (BOOPM) Framework
https://www.mdpi.com/2571-5577/2/3/23/htm

AMS addresses only a small part of the BPM concern, whose wide picture is provided at ETPN!



Process Innovation and Improvement Using Business Object-Oriented Process Modelling (BOOPM) Framework
https://www.mdpi.com/2571-5577/2/3/23/htm

On “Process” versus “Business Process”

Process:

- “A set of interrelated and cooperative activities that transform inputs into outputs”. (ISO 9000)

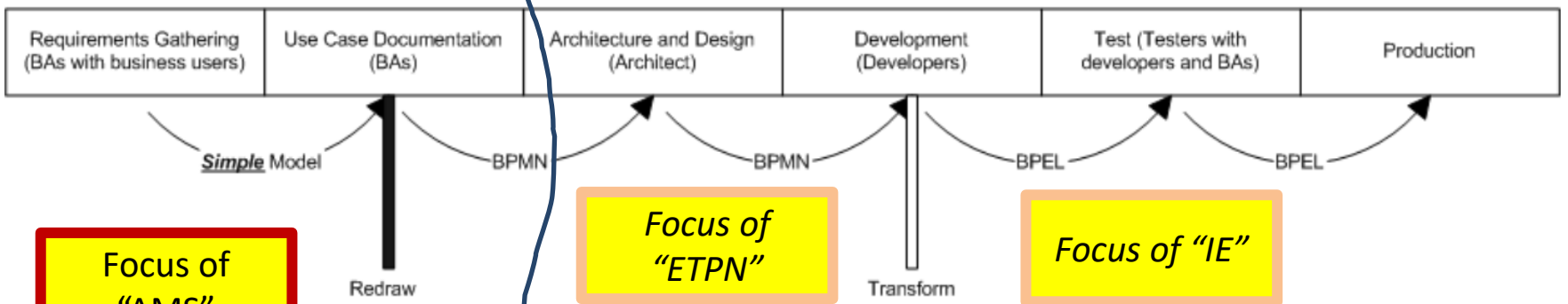
Business Process:

- “A collection of activities that takes one or more kinds of input and creates an output that is of value to the customer.” (Hammer & Champy 1993)

NOTE: This is a definition of “process” that might be “just that”, or also might be of a “business process”, but we cannot assure it without a confirmation of if “the recipient” is a “business customer”:

- “As set of linked activities that take an input and transform it to create an output. Ideally, the transformation that occurs in the process should add value to the input and create an output that is more useful and effective to the recipient either upstream or downstream.” (Johanson 1993)

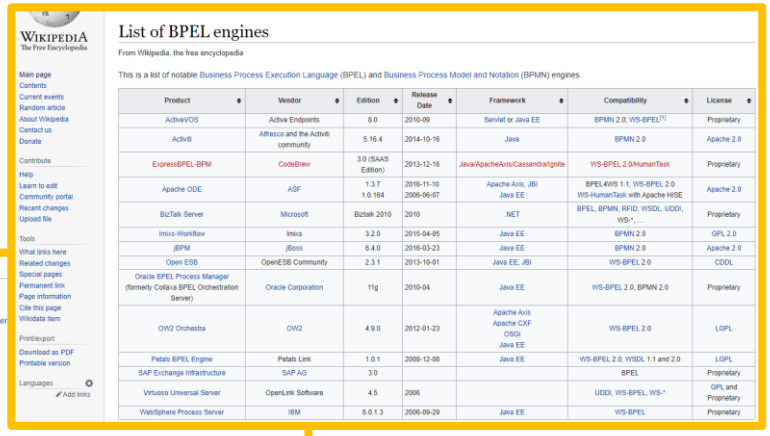
BA = “Business Analyst”



Focus of “AMS”

Focus of “ETPN”

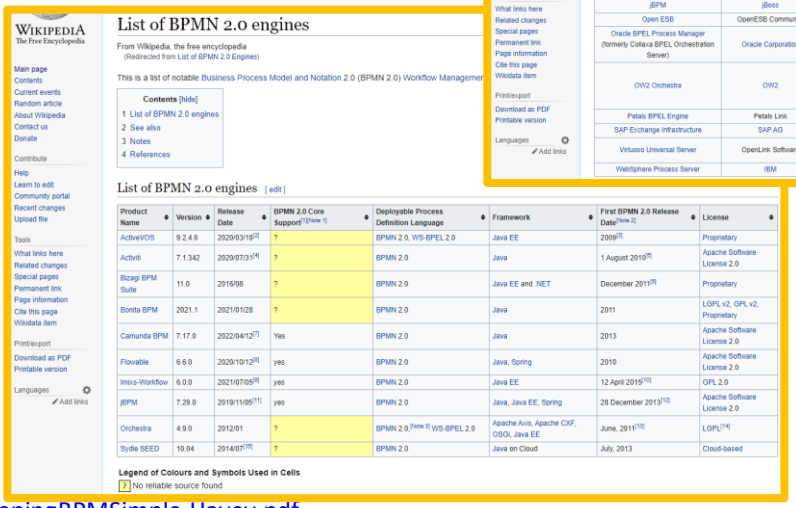
Focus of “IE”


List of BPEL engines

From Wikipedia, the free encyclopedia

This is a list of notable Business Process Execution Language (BPEL) and Business Process Model and Notation (BPMN) engines.

Product	Vendor	Edition	Release Date	Framework	Compatibility	License
ActiveVOS	Active Endpoints	8.0	2010-09	Servlet or Java EE	BPMN 2.0; WS-BPEL[1]	Proprietary
Activiti	Alfresco and the Activiti community	5.16.4	2014-10-16	Java	BPMN 2.0	Apache 2.0
ExpressBPEL-BPM	CodeBrew	3.0 (SAAS Edition)	2013-12-16	Java/ApacheAxis/Cassandra/Ignite	WS-BPEL 2.0/HumanTask	Proprietary
Apache ODE	ASF	1.3.7 1.0.164	2016-11-10 2006-06-07	Apache Axis, JBI Java EE	BPEL4WS 1.1, WS-BPEL 2.0 WS-HumanTask with Apache HISE	Apache 2.0
BizTalk Server	Microsoft	Biztalk 2010	2010	.NET	BPEL, BPMN, RFID, WSDL, UDDI, WS-*	Proprietary
Imixs-Workflow	Imixs	3.2.0	2015-04-05	Java EE	BPMN 2.0	GPL 2.0
jBPM	jBoss	6.4.0	2016-03-23	Java EE	BPMN 2.0	Apache 2.0
Open ESB	OpenESB Community	2.3.1	2013-10-01	Java EE, JBI	WS-BPEL 2.0	CDDL
Oracle BPEL Process Manager (formerly Collaxa BPEL Orchestration Server)	Oracle Corporation	11g	2010-04	Java EE	WS-BPEL 2.0, BPMN 2.0	Proprietary
OW2 Orchestra	OW2	4.9.0	2012-01-23	Apache Axis Apache CXF OSGi Java EE	WS-BPEL 2.0	LGPL
Petals BPEL Engine	Petals Link	1.0.1	2009-12-08	Java EE	WS-BPEL 2.0, WSDL 1.1 and 2.0	LGPL
SAP Exchange Infrastructure	SAP AG	3.0			BPEL	Proprietary
Virtuoso Universal Server	OpenLink Software	4.5	2006		UDDI, WS-BPEL, WS-*	GPL and Proprietary
WebSphere Process Server	IBM	6.0.1.3	2006-09-29	Java EE	WS-BPEL	Proprietary


List of BPMN 2.0 engines

From Wikipedia, the free encyclopedia
(Redirected from List of BPMN 2.0 Engines)

This is a list of notable Business Process Model and Notation 2.0 (BPMN 2.0) Workflow Managemer

Contents [hide]
1 List of BPMN 2.0 engines
2 See also
3 Notes
4 References

List of BPMN 2.0 engines [edit]

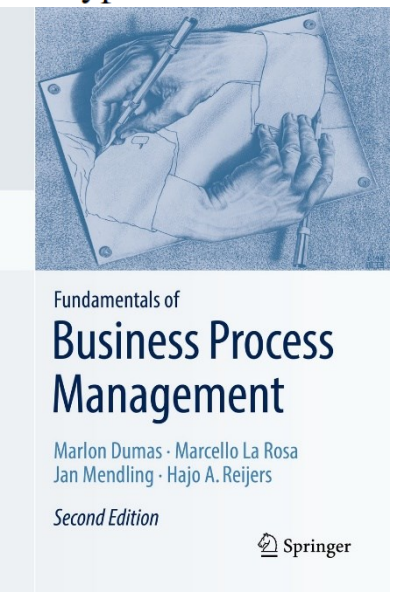
Product Name	Version	Release Date	BPMN 2.0 Core Support[1][Note 1]	Deployable Process Definition Language	Framework	First BPMN 2.0 Release Date[Note 2]	License
ActiveVOS	9.2.4.6	2020/03/18[2]	?	BPMN 2.0, WS-BPEL 2.0	Java EE	2009[3]	Proprietary
Activiti	7.1.342	2020/07/31[4]	?	BPMN 2.0	Java	1 August 2010[5]	Apache Software License 2.0
Bizagi BPM Suite	11.0	2016/08	?	BPMN 2.0	Java EE and .NET	December 2011[6]	Proprietary
Bonita BPM	2021.1	2021/01/28	?	BPMN 2.0	Java	2011	LGPL v2, GPL v2, Proprietary
Camunda BPM	7.17.0	2022/04/12[7]	Yes	BPMN 2.0	Java	2013	Apache Software License 2.0
Flowable	6.6.0	2020/10/12[8]	yes	BPMN 2.0	Java, Spring	2010	Apache Software License 2.0
Imixs-Workflow	6.0.0	2021/07/09[9]	yes	BPMN 2.0	Java EE	12 April 2015[10]	GPL 2.0
jBPM	7.29.0	2019/11/05[11]	yes	BPMN 2.0	Java, Java EE, Spring	28 December 2013[12]	Apache Software License 2.0
Orchestra	4.9.0	2012/01	?	BPMN 2.0[Note 3] WS-BPEL 2.0	Apache Axis, Apache CXF, OSGi, Java EE	June, 2011[13]	LGPL[14]
Sydle SEED	10.04	2014/07[15]	?	BPMN 2.0	Java on Cloud	July, 2013	Cloud-based

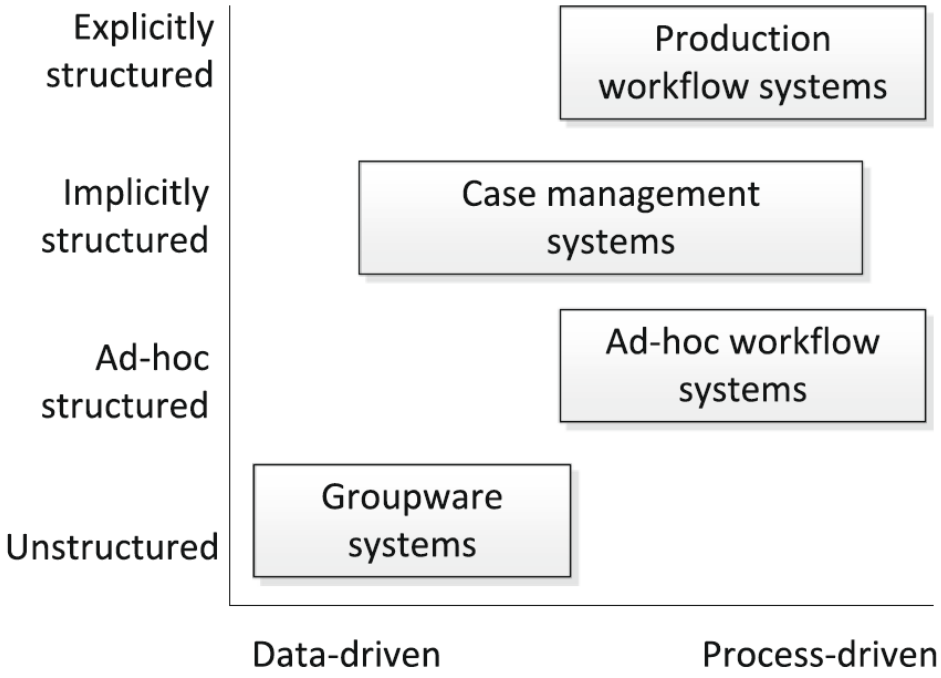
Legend of Colours and Symbols Used in Cells
? No reliable source found

From
http://www.bptrends.com/publicationfiles/01-06-ART-KeepingBPMSimple-Havey.pdf

On Process Automation...

Fig. 9.1 The spectrum of BPMS types





To learn more about process automation, consider the MSc course on “IE” (Enterprise Integration) !!!!

Business Process Management System versus Case Management Systems

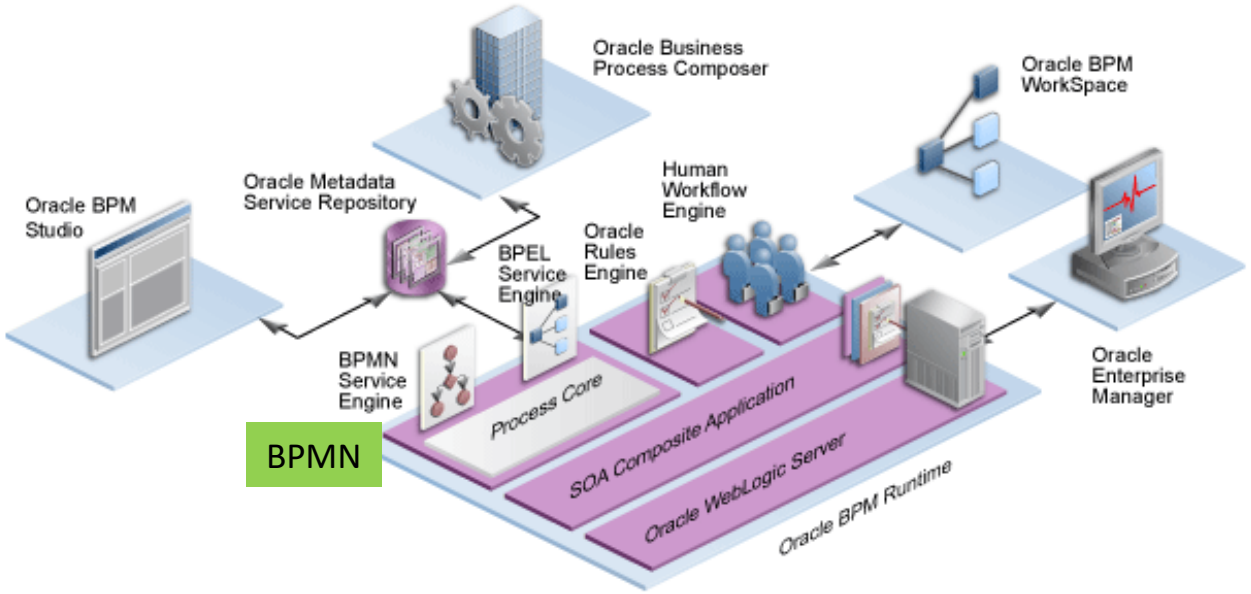
- **Business Process Management Systems (BPMS)**
  - supports the design, analysis, execution, and monitoring of business processes on the basis of explicit process models. The purpose of a BPMS is to coordinate an automated business process in such a way that all work is done at the right time by the right resource.

- **Case Management Systems (CMS)**
  - The idea behind a case management system (or adaptive case management system (ACM)) is to support processes that are neither tightly nor completely specified. Rather, implicit process models are used, which capture a conventional flow from which a user can deviate—unless this is explicitly prohibited. A case management system is usually fully aware of the precise details of the data belonging to a case (including customer data, financial or medical data). On the basis of such awareness, the system is able to inform end users about the status and history of a case, as well as the most obvious steps to continue with.

Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2013). *Fundamentals of business process management* (Vol. 1, p. 2). Heidelberg: Springer.

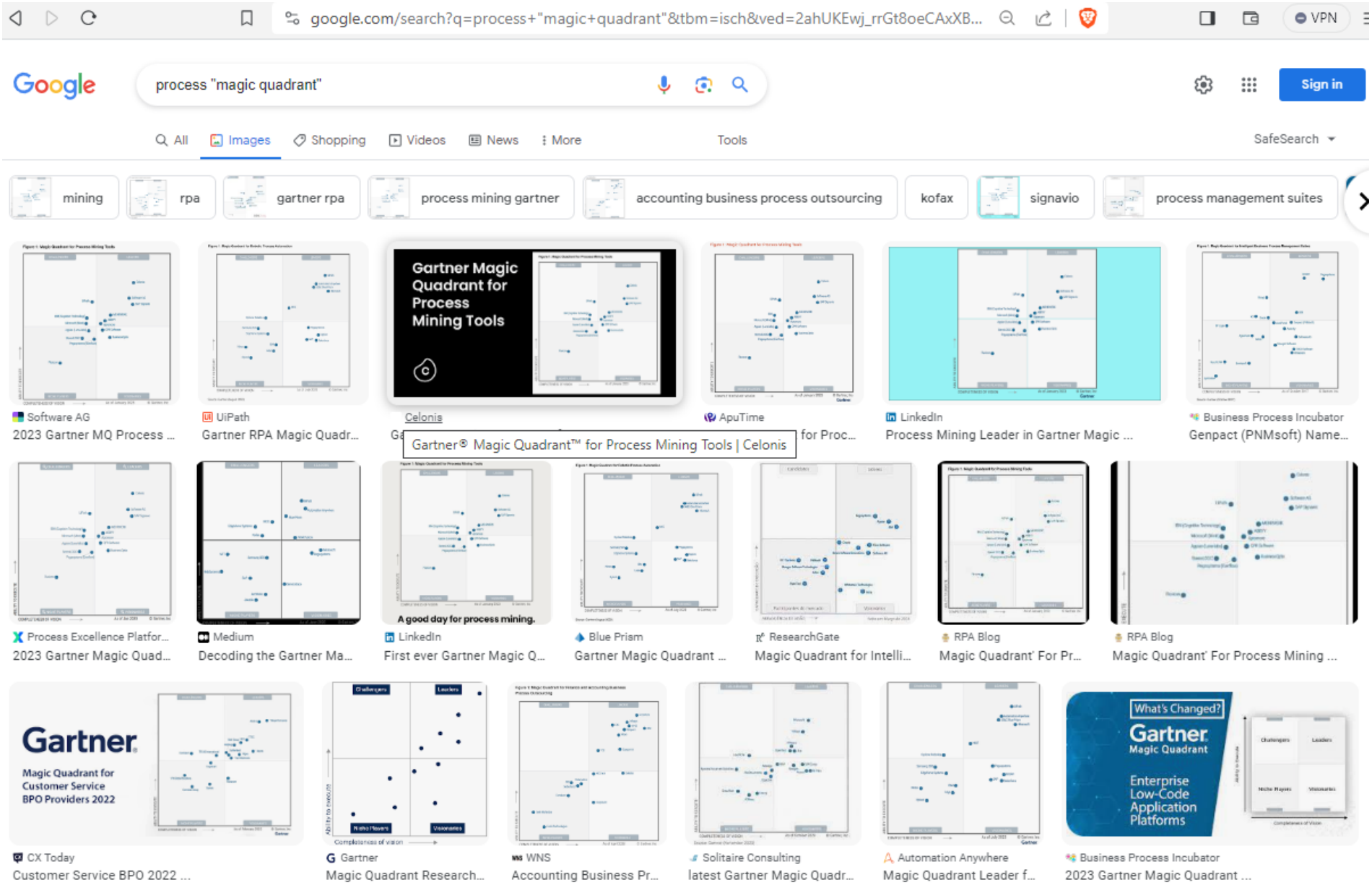
Process automation with Oracle BPM suite 12c

BPMN



http://www.oracle.com/us/assets/im08t0-bpm-suite-3-1592409.jpg
https://www.c2b2.co.uk/middleware-blog/new-features-and-changes-in-bpm-12c.php

There are a lot of techniques and tools for “process simulation”, “process mining”, “process orchestration”, “process ...you name it...”



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AMS

(Business) Process Modelling

BPMN (Business Process Model and Notation) Core

http://www.bpmn.org/

https://pubs.opengroup.org/architecture/archimate3-doc/apdxd.html#_Toc10045528

/ ArchiMate / Relationship to Other Standards, Specifications, and Guidance Documents / D.1 The TOGAF Framework

The ArchiMate language, as described in this standard, complements the TOGAF framework [4] in that it provides a vendor-independent set of concepts, including a graphical representation, that helps to create a consistent, integrated model "below the waterline", which can be depicted in the form of TOGAF views.

The structure of the ArchiMate core language closely corresponds with the three main architectures as addressed in the TOGAF ADM. The strategy, motivation, implementation, and migration elements approximately map onto the remainder of the ADM (although these elements may also be used in Phases B, C, and D). This is illustrated in Figure 116. This correspondence indicates a fairly easy mapping between TOGAF views and the ArchiMate viewpoints. A more detailed description of this correspondence is given in [6].

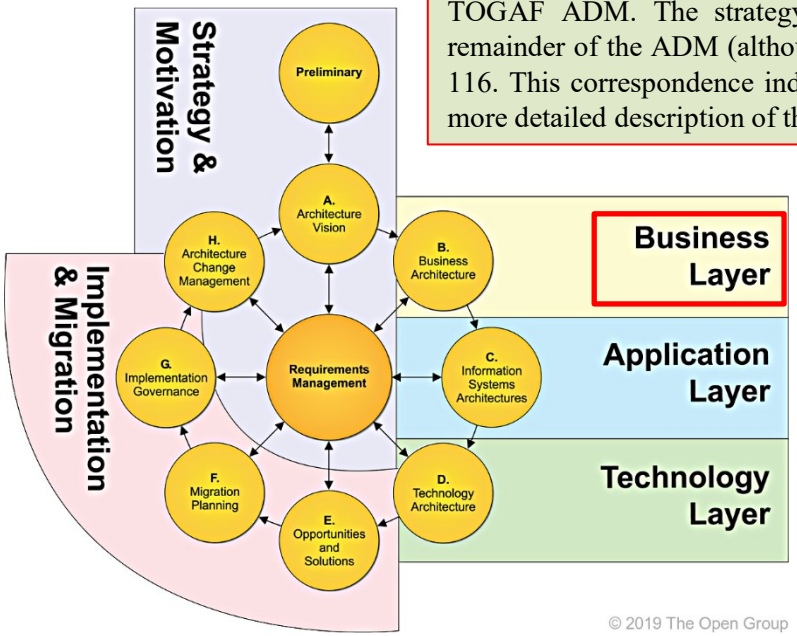

Figure 116: Correspondence Between the ArchiMate Language and the TOGAF ADM

Although some of the viewpoints that are defined in the TOGAF standard cannot easily be mapped onto ArchiMate viewpoints, the ArchiMate language and its analysis techniques support the concepts addressed in these viewpoints. While there is no one-to-one mapping between them, there is still a fair amount of correspondence between the ArchiMate viewpoints and the TOGAF viewpoints. Although corresponding viewpoints from the two standards do not necessarily have identical coverage, many viewpoints from both address largely the same issues. Moreover, the viewpoint mechanism described in Section 14.4 lends itself well to define TOGAF viewpoints using ArchiMate concepts.

It is important to reiterate that the ArchiMate standard is a modeling language and not a framework, and therefore the viewpoint definitions are more detailed and specify the stakeholders, concerns, level of detail, or abstraction level, and also the entity types involved in the viewpoints. In the TOGAF standard this is presented in a more general way, so sometimes there cannot be a one-to-one mapping between the entities and some interpretation or transformation will be required.

In conclusion, the TOGAF and ArchiMate standards can easily be used in conjunction:

- The two standards complement each other with respect to the definition of an architecture development process and the definition of an Enterprise Architecture modeling language
- The two standards overlap in their use of viewpoints, and the concept of an underlying common repository of architectural artifacts and models; i.e., they have a firm common foundation
- The combined use of the two standards can support a better communication with stakeholders

See [6] for a detailed explanation of how the TOGAF and ArchiMate standards can be used together.

https://pubs.opengroup.org/architecture/archimate3-doc/apdxd.html#_Toc10045528

/ ArchiMate
/ Relationship to Other Standards, Specifications, and Guidance Documents
/ D.3 BPMN

Both the ArchiMate language and BPMN [12] can be used for modeling business processes. Their aims are different, however. ArchiMate notation is typically used for high-level processes and their relations to the enterprise context, but is not intended for detailed workflow modeling, whereas BPMN supports detailed sub-process and task modeling down to the level of executable specifications, but lacks the broader enterprise context, for example, to model the application services that support a process or the goals and requirements it has to fulfill.

Both languages share the concepts of (business) process and event. In the ArchiMate notation there is a single business process element that may be decomposed in other processes that are related using flow and triggering relationships, possibly using junctions to represent more complex connections. BPMN has a more fine-grained set of elements, with various types of events, tasks, and gateways. Its metamodel also distinguishes explicitly between process and sub-process (although it lacks a graphical representation of a business process itself). The BPMN concept of participant (or pool) and the ArchiMate concepts of business role or business actor (or application component for automated processes) also correspond.

In a typical scenario, both languages can be used in conjunction. Mapping from ArchiMate notation down to BPMN is fairly straightforward. The other way around loses the detailed elements of BPMN. Moreover, there are structural differences between the languages that preclude a direct concept-to-concept mapping and may merit a pattern-based approach. A detailed description of such a mapping is beyond the scope of this standard.

The ArchiMate language has derived a number of concepts from UML [8]. For other concepts, straightforward correspondences can be defined.

In the Business Layer, the ArchiMate business process concept can be mapped onto UML activity diagrams, where more detailed specifications of such processes can be given (although BPMN would be the preferred language for detailed process and workflow modeling). The ArchiMate business actor and role concepts can both be mapped onto UML actors, although the latter can also be used for modeling automated actors. Business collaborations have been inspired by collaborations as defined in the UML standard [8], although the UML collaborations apply to components in the Application Layer.

In the Application Layer, the application component element corresponds to the UML component. This facilitates the direct linkage between higher-level Enterprise Architecture models described in ArchiMate notation and lower-level solution architecture and implementation models in UML in one continuous development chain. In a less direct manner, the ArchiMate application function concept can be mapped onto UML activity diagrams, and an application service to a use-case diagram. Application collaborations also correspond to UML collaborations.

Many of the elements of the ArchiMate Technology Layer correspond directly to UML. The node, artifact, device, system software, and path elements have a direct counterpart in UML (where system software is called execution environment).

In addition to these elements, many relationships in the ArchiMate language have close ties to UML as well. The ArchiMate association, composition, aggregation, specialization, and realization relationships have a direct counterpart in UML.

There are also some notable differences between the two languages. The ArchiMate serving relationship (formerly “used by”) is different from UML dependency. Although their notations are similar, their directions are different. UML dependency is often used to model, for example, function calls in software programs, but in ArchiMate notation, the direction of the serving relationship denotes the direction of service delivery, independent of whether this service is called by the user or offered pro-actively by the provider. At the architectural level at which the ArchiMate language is aimed, the run-time operational details of such call graphs are less important than the more stable and generic notion of service provision.

This also points to another important difference: UML does not have a separate service concept, since in its object-oriented paradigm the behavior expressed by a service is encapsulated within the interface offering that behavior (i.e., its operations). The ArchiMate language differentiates between interfaces and the services they provide to allow, for example, specifying that the same service is offered through multiple interfaces. Hence, an ArchiMate application interface does not equate directly with a UML interface.

Finally, UML has a predefined, fixed set of diagram types, whereas the ArchiMate viewpoint mechanism allows for the construction of custom, stakeholder-oriented views on an architecture.

See [16] for a more detailed explanation about how the UML language and the ArchiMate standard can be used together.

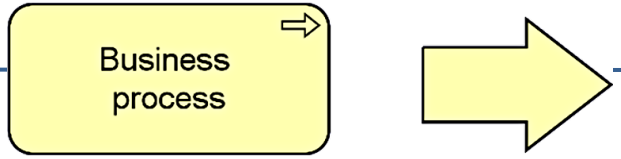

Figure 59: Business Process Notation

8.3.1 Business Process

A business process represents a sequence of business behaviors that achieves a specific result such as a defined set of products or business services.

A business process describes the internal behavior performed by a business role that is required to produce a set of products and services. For a consumer, the products and services are relevant and the required behavior is merely a black box, hence the designation “internal”.

A complex business process may be an aggregation of other, finer-grained processes. To each of these, finer-grained roles may be assigned.

There is a potential many-to-many relationship between business processes and business functions. Informally speaking, processes describe some kind of “flow” of activities, whereas functions group activities according to required skills, knowledge, resources, etc.

A business process may be triggered by, or trigger, any other business behavior element (e.g., business event, business process, business function, or business interaction). A business process may access business objects. A business process may realize one or more business services and may use (internal) business services or application services. A business role may be assigned to a business process to perform this process manually. An automated business process can be realized by an application process. The name of a business process should clearly indicate a predefined sequence of actions using a verb or verb-noun combination and may include the word “process”. Examples are “adjudicate claim”, “employee on-boarding”, “approval process”, or “financial reporting”.

In an ArchiMate model, the existence of business processes is depicted. High-level business, end-to-end processes, macro flows, and workflows can all be expressed with the same business process element in the ArchiMate language. It does not, however, list the flow of activities in detail. This is typically done during business process modeling, where a business process can be expanded using a business process design language; e.g., BPMN [12].