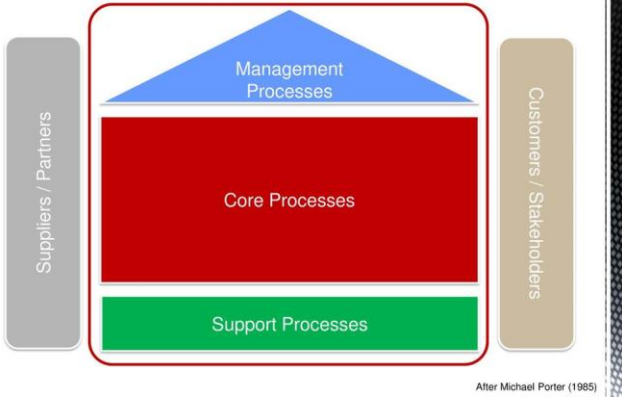


business process	<p>A chain of events, activities and decisions involving a number of actors and objects, triggered by a need and leading to an outcome that is of value to a customer.</p> <p>Examples: • Order-to-Cash • Procure-to-Pay (aka Purchase-to-Pay) • Application-to-Approval • Fault-to-Resolution</p>
Process performance	<p>If you had to choose between two services, you would typically choose the one that is:</p> <ul style="list-style-type: none"> • Faster • Cheaper • Better <p>Three dimensions of process performance</p> <ul style="list-style-type: none"> • Time • Cost • Quality
Business Process Management (BPM)	<p>Body of principles, methods and tools to design, analyze, execute and monitor business processes, with the aim of improving their performance.</p>
The BPM lifecycle	
Process identification steps	
Process Architecture	<div> <div> <p>1. Designation step</p> <ul style="list-style-type: none"> • Enumerate main processes • Determine process scope </div> <div> <p>Example: process architecture Wholesaler</p> </div> </div>
Prioritized Process Portfolio	<p>2. Prioritization step (aka Process selection) Prioritize processes based on:</p> <ul style="list-style-type: none"> • Importance • Health • Feasibility
Importance	<p>Which processes have greatest impact on the organization's strategic objectives?</p>
Health (or Dysfunction)	<p>Which processes are in deepest trouble?</p>
Feasibility	<p>Which processes are most susceptible to successful process management?</p>

Process identification	<p>What?</p> <ol style="list-style-type: none"> 1. Identify an organization's business processes 2. Prioritize their management based on certain criteria <p>Why?</p> <ol style="list-style-type: none"> 1. Understand the organization 2. Maximize value of BPM projects
<p>Porter: Types of processes</p>  <p>Porter: Types of processes</p> <p>Suppliers / Partners</p> <p>Management Processes</p> <p>Core Processes</p> <p>Support Processes</p> <p>Customers / Stakeholders</p> <p><small>After Michael Porter (1985)</small></p>	
Core processes	<ul style="list-style-type: none"> • Sales (lead-to-quote, quote-to-order, order-to-cash) • Purchase-to-Pay (direct procurement, e.g. supplies replenishment)
Support processes	<ul style="list-style-type: none"> • Purchase-to-pay (indirect procurement, e.g. parts replenishment, operational resources replenishment...) • HR (policies update, recruitment, induction, probation...)
Management processes	<ul style="list-style-type: none"> • Suppliers management (suppliers planning, suppliers acquisition...) • Logistics management (logistics planning, logistics controlling...)
Process scoping	<p>Processes are interdependent → insights into interrelations required</p> <ul style="list-style-type: none"> • Specialization: general – special product/service • Horizontal: upstream – downstream processes and their value chains • Vertical: main processes – sub-processes
Value chain modeling	<ul style="list-style-type: none"> • Chain of processes an organization performs to deliver value to customers and stakeholders • More generally, a mechanism to group high-level business processes according to an order relation (can be applied to core, support and management processes)
Typical artifacts for vertical scoping	
Value chains	<p>Chains of processes. Stay at a high level. Rule of thumb: 3-7 processes</p> <ul style="list-style-type: none"> • Procure-to-service, Risk management
(Root/Main) Processes	<p>Build up value chains and affect each other. They are abstract</p> <ul style="list-style-type: none"> • Lead-to-quote, Quote-to-order, Order-to-cash
Sub processes	<p>Build up processes. They are detailed, involve multiple activities and can be layered on different levels of abstraction (i.e. sub-subprocesses)</p> <ul style="list-style-type: none"> • Order shipment, invoicing
Process tasks	<p>Build up processes and sub-processes. They are atomic and performed by human beings, IT systems or equipment</p> <ul style="list-style-type: none"> • Approve invoice

Reference model	<p>Is used as a template to design the process architecture</p> <p>Examples:</p> <ul style="list-style-type: none"> • Information Technology Infrastructure Library (ITIL) • Supply Chain Operations Reference Model (SCOR) • Process Classification Framework (PCF) • Control Objectives for Information Technology (COBIT) • Value Reference Model (VRM) • Voluntary Interindustry Commerce Solutions (VICS) • eTOM Business Process Framework • Performance Framework
Process Analysis Techniques	<ol style="list-style-type: none"> 1. <u>Qualitative analysis</u> <ul style="list-style-type: none"> • Value-Added & Waste Analysis • Root-Cause Analysis • Pareto Analysis • Issue Register 2. <u>Quantitative Analysis</u> <ul style="list-style-type: none"> • Flow analysis • Queuing analysis • Simulation
Value-added analysis (Maximize)	<ol style="list-style-type: none"> 1. Decorticate the process into steps <ul style="list-style-type: none"> • Steps performed before a task • The task itself, possibly decomposed into smaller steps • Steps performed after a task, in preparation for the next task 2. Classify each step <ul style="list-style-type: none"> • Value-adding (VA) • Business value-adding (BVA) • Non-value-adding (NVA) <hr/> <p>Produce value or satisfaction to the customer</p> <hr/> <p>Examples</p> <ul style="list-style-type: none"> • <u>Order-to-cash process</u>: Confirm delivery date, Deliver products • <u>University admission process</u>: Assess application, Notify admission outcome
Business value-adding activities (Minimize)	<p>Necessary or useful for the business to operate</p> <p>Example</p> <ul style="list-style-type: none"> • <u>Order-to-cash process</u>: Check purchase order, Check customer's credit worthiness, Issue invoice, Collect payment, Collect customer feedback • <u>University admission process</u>: Verify completeness of application, Check validity of degrees, Check validity of language test results
Non-value-adding activities (Remove)	<p>Everything else besides VA and BVA. Activities the customer would be unwilling to pay for Includes</p> <ol style="list-style-type: none"> 1. Handovers, context switches 2. Waiting times, delays 3. Rework or defect correction <hr/> <p>Examples</p> <ul style="list-style-type: none"> • <u>Order-to-cash process</u>: Forward PO to warehouse, Re-send confirmation, Receive rejected products • <u>University admission process</u>: Forward applications to committee, Receive admission results from committee

<u>Seven sources of waste</u>	
Move	• Transportation • Motion
Hold	• Inventory • Waiting
Over-do	• Defects • Over-Processing • Over-Production
Transportation	<p>Send or receive materials or documents (incl. electronic) taken as input or output by the process activities</p> <p>Example</p> <ul style="list-style-type: none"> University admission process: to apply for admission at a university, students fill in an online form. When a student submits the online form, a PDF document is generated. The student is requested to download it, sign it, and send it by post together with the required documents: <ol style="list-style-type: none"> 1. Certified copies of degree and academic transcripts 2. Results of language test 3. CV <p>When the documents arrive at the admissions office, an officer checks their completeness. If a document is missing, an e-mail is sent to the student. The student has to send the missing documents by e-mail or post depending on document type.</p>
Motion	<ul style="list-style-type: none"> • Motion of resources internally within the process • Common in manufacturing processes, less common in service processes <p>Examples</p> <ul style="list-style-type: none"> • <u>Application-to-approval process</u>: a process worker moves around the organization to collect signatures
Inventory	<ul style="list-style-type: none"> • Materials inventory • Work-in-process (WIP) <p>Example</p> <ul style="list-style-type: none"> • <u>University admission process</u> : About 3000 applications are handled concurrently • <u>Vehicle inspection process</u>: when a vehicle does not pass the first inspection, it is sent back for adjustments and left in a pending status. At a given point in time, about 100 vehicles are in the “pending” status across all inspection stations
Waiting	<ul style="list-style-type: none"> • Task waiting for materials or input data • Task waiting for a resource • Resource waiting for work (resource idleness) <p>Examples</p> <ul style="list-style-type: none"> • <u>Application-to-Approval process</u>: Request waiting for approver • <u>University admission process</u>: Incomplete application waiting for additional documents; batch of applications waiting for committee to meet • <u>Vehicle inspection process</u>: A technician at a base of the inspection station waiting for the next vehicle
Defects	<ul style="list-style-type: none"> • Correcting or compensating for a defect or error • Rework loops <p>Examples</p> <ul style="list-style-type: none"> • <u>Travel approval process</u>: Request sent back to requestor for revision • <u>University admission process</u>: Application sent back to applicant for modification; request needs to be re-assessed later due to incomplete information • <u>Vehicle inspection process</u>: A vehicle needs to come back to a station due to an omission

Over-processing	<ul style="list-style-type: none"> • Tasks performed unnecessarily given the outcome of the process • Unnecessary perfectionism <hr/> <p>Examples</p> <ul style="list-style-type: none"> • Travel approval process: 10% of approvals are trivially rejected at the end of the process due to lack of budget • University admission process: Officers spend time verifying the authenticity of degrees, transcripts and language test results. In 1% of cases, these verifications uncover issues. Verified applications are sent to the admissions committee. The admission committee accepts 20% of the applications it receives • Vehicle inspection process: technicians take time to measure vehicle emissions with higher accuracy than required, only to find that the vehicle clearly does not fulfill the required emission levels
Over-production	<ul style="list-style-type: none"> • Unnecessary process instances are performed, producing outcomes that do not add value upon completion <hr/> <p>Examples</p> <ul style="list-style-type: none"> • Quote-to-cash process: In 50% of cases, issued quotes do not lead to an order • Travel approval process: In 5% of cases, travel requests are approved but the travel is cancelled • University admission process: About 3000 applications are submitted, but only 600 are considered eligible after assessment
Equipment rental process: wastes	
Transportation	<ul style="list-style-type: none"> • Site engineer sends request to clerk • Clerk forwards to works engineer • Works engineer sends back to clerk
Inventory	<ul style="list-style-type: none"> • Equipment kept longer than needed
Waiting	<ul style="list-style-type: none"> • Waiting for availability of works engineer to approve
Defect	<ul style="list-style-type: none"> • Selected equipment not available, alternative equipment sought • Incorrect equipment delivered and returned to supplier
Over-processing	<ul style="list-style-type: none"> • Clerk finds available equipment and rental request is rejected by works engineer • Rental requests being approved and then canceled by site engineer because no longer needed
Over-production	<ul style="list-style-type: none"> • Equipment being rented and not used at all by site engineer • Equipment returned by site engineer because is incorrect
Issue register	Purpose: to maintain, organize and prioritize perceived weaknesses of the process (issues)
Issue register structure	<p>Can take the form of a table with:</p> <ul style="list-style-type: none"> • Issue identifier • Short name • Description • Assumptions • Impact: Qualitative and Quantitative • Possible improvement actions <hr/> <p>Larger process improvement projects may require issue trackers</p>
Pareto chart	<ul style="list-style-type: none"> • Useful to prioritize a collection of issues • Bar chart where the height of the bar denotes the impact of each issue • Bars sorted by impact • Superposed curve of cumulative percentage impact

Categories of causes: Six Ms

1. Machine: factors stemming from technology used
 - Lack of suitable functionality in the supporting software applications
 - Poor User Interface (UI) design
 - Lack of integration between systems
2. Method: factors stemming from the way the process is designed, understood or performed
 - Unclear assignments of responsibilities • Unclear instructions
 - Insufficient training • Lack of timely communication
3. Material: factors stemming from input materials or data
 - Missing, incorrect or outdated data
4. Man: factors stemming from wrong assessments or incorrect performance of steps attributable to:
 - Lack of training and clear instructions
 - Lack of motivation • Too high demands towards process workers
5. Measurement: factors stemming from reliance on:
 - Inaccurate estimations • Miscalculations
6. Milieu: factors outside the scope of the process
 - Delays caused because of unresponsive external actors
 - Sudden increases of workload due to special circumstances

Time measures	<ul style="list-style-type: none"> • Processing time : Time taken by value-adding activities • Waiting time: Time taken by non-value-adding activities • Cycle time: Time between start and completion of a process instance (Processing time+ Waiting time= Cycle time) (Processing Time÷ Cycle Time = Cycle Time Efficiency)
Cost measures	<ul style="list-style-type: none"> • Processing cost :Cost of value adding activities • Cost of waste: Cost of non-value adding activities • Per Instance Cost: Cost of a process instance (Processing cost+ Cost of waste= Per Instance Cost)
Typical components of cost	
Material cost	•Cost of tangible or intangible resources used per process instance
Resource cost	•Cost of person-hours employed per process instance
Resource utilization	Time spent per resource on process work ÷ Time available per resource for process work = Resource utilization (Resource utilization = 60% → on average resources are idle 40% of their allocated time) (Typically, when resource utilization > 90% → Waiting time increases steeply)
Quality	<ol style="list-style-type: none"> 1. Product quality Defect rate 2. Delivery quality On-time delivery rate Cycle time variance 3. Customer satisfaction Customer feedback score

Process performance reference models	
Supply Chain Operations Reference Model (SCOR)	<ul style="list-style-type: none"> • Performance measures for supply chain management processes
American Productivity and Quality Council (APQC)	<ul style="list-style-type: none"> • Performance measures and benchmarks for processes in the Process Classification Framework (PCF)
IT Infrastructure Library (ITIL)	<ul style="list-style-type: none"> • Performance measures for IT service management processes
Flow analysis	Process model + Performance of each activity → Process performance