



**POLITECNICO
DI TORINO**

Information Systems Notes

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This file represents an initial and not checked
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If you note any mistake or if you have comments,
please feel free to contact us.

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Contents

1	Introduction	5
1.1	Definitions	5
1.1.1	Organization	5
1.1.2	Business Process	5
1.1.3	Business Functions	5
1.1.4	Application and Application Portfolio	5
1.1.5	Information System	6
1.2	Views	8
1.2.1	Evolutional	8
1.2.2	IT Model	8
1.2.3	Functional Model	9
1.2.4	Organizational Model	9
2	High level models	11
2.1	Control Loop model	11
2.2	Anthony's model	11
2.2.1	Organizational View	11
2.2.2	Business Function View	12
2.3	T model	14
2.3.1	Management	14
2.3.2	Support	15
2.4	Primary - Business Domain	15
2.4.1	Manufacturing	15
2.4.2	Production industries	17
2.4.3	Telecom operators	17
2.4.4	Utilities	17
2.4.5	Bank and Insurance	18
2.4.6	Retail	18
3	Business Process Modeling Notation	19
3.0.1	Functional Perspective	19
3.0.2	Organizational Perspective	20
3.0.3	Data Perspective	21

4	Business rules	23
4.1	Definition	23
4.1.1	Business Rule	23
4.1.2	Business Logic	23
4.1.3	Policy	23
4.2	Business Rule	24
4.2.1	Declarative Rules and BRMS - Drools and Camunda .	25
5	Management Information System	26
5.1	Measurement	26
5.2	KPI	27
5.3	Management accounting	29
5.4	CSF	30
5.5	Balanced scorecards	32
6	Strategy	34
6.1	Porter Generic Strategies	34
6.2	Actors in competition	35
6.3	Business model canvas	37
7	Enterprise Resource Planning	43
7.1	ERP model	43
7.2	ERP Approach	44
7.3	Gap Analysis	45
8	Customer Relationship Management	46
8.1	CRM Paradigm	46
8.2	Service chains	46
8.3	CRM System	47
9	Organization	49
9.1	Characteristics - Organization variables	49
9.1.1	Size	50
9.1.2	Goal and strategy	50
9.1.3	Culture	50
9.1.4	Environment	50
9.1.5	Formalization	50
9.1.6	Organizational pattern, types and structures	52
9.1.7	Hierarchy	53
9.1.8	Structure	54
9.2	PM (Project Management) Process	56
9.2.1	Definitions	56
9.2.2	TCO	58
9.2.3	Size	58

9.2.4	Productivity	59
9.2.5	FP Function Points	59
9.2.6	Estimation of cost and effort	60
10	IS in Organizations	62
10.1	IT Area	62
10.1.1	Position in Organizational Structure	62
10.1.2	Roles	64
10.1.3	Processes	64
10.2	COBIT version 5	64
10.2.1	Processes: Governance and Management	65
10.2.2	Governance	65
10.2.3	Management	65
10.2.4	Cobit 5 key elements	66
10.3	ITIL v3	70
10.3.1	Process	71
10.3.2	Role	71
10.3.3	Functions	71
10.3.4	Resources and capabilities	72
10.3.5	ITIL Process	72
11	IT Governance	76
11.1	Corporate strategy and IT strategy	76
11.1.1	IS strategic Plan	77
11.1.2	IS Plan	77
11.2	Alignment	77
11.3	IT costs	78
11.4	IT value	79
11.4.1	Transaction Theory	79
11.4.2	Internal coordination costs (Agency Theory, Decision Theory)	81
11.4.3	Operation cost	83
11.4.4	Outsourcing	83
12	Marketing	87
12.1	Introduction	87
12.2	Digital marketing	88
12.2.1	Strategy	88
12.2.2	Web Site	89
12.2.3	SEO	91
12.3	Nomesia Presentation	91
12.3.1	How to build a site	92
12.3.2	Advertising and Search engine marketing	92
12.3.3	SEO	92

12.3.4 Social Marketing	93
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Chapter 1

Introduction

1.1 Definitions

1.1.1 Organization

Group of people intentionally organized to accomplish and overall common goal. The organization include and manage resources (people, machine and building) and implements business processes to achieve the goals. Organizations that work for profit are also called Enterprises or Companies. The organization is divided in organization unit (division, office, department).

1.1.2 Business Process

Set of activities executed in some parallel or sequential order by an organization to deliver service or product with defined input and outputs. An activity is a time spent by one or more people to do a task (activity is simpler and shorter than a process).

1.1.3 Business Functions

Group of people in an organization performing similar activities. Major business functions are manufacturing, sales and marketing, finance, accounting, human resources.

1.1.4 Application and Application Portfolio

An application is a software program to support an activity or a process. The portfolio is the set of application used by an organization. Legacy application are the applications running in a company in the last 10-20 years.

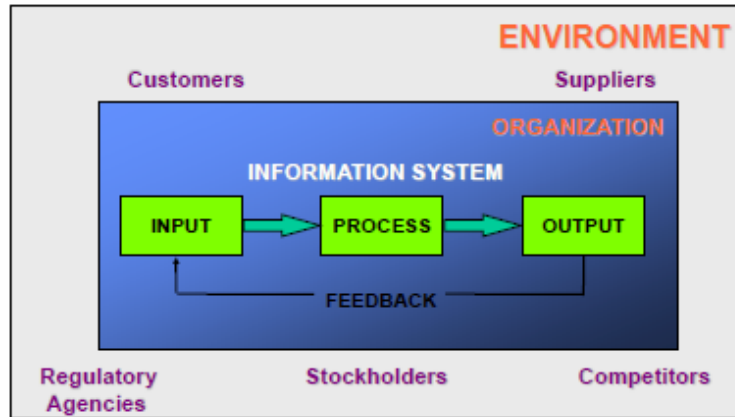


Figure 1.1: The Control Loop Model

1.1.5 Information System

Is the system to store and process information used by organization, including paper, people, computers and software. The computer based information system (CBIS) is the computer based system to store and process information. It is a subset of the overall IS. In organizations, lots of information and processes are, at least partially, on paper and in people mind only. Considering only the CBIS is a mistake, must be also considered the people.

A more precise definition: The interrelated component working together to collect, process, store and disseminate information to support the decision making, coordination, control, analysis and visualization in an organization.

From our view, I.S. is essentially made of several applications that read and write on several databases, that contains master data and transactional data. This means that there can be data integration problems.

The figure shows the high level model of an IS. The input is the capture or collection of raw data from inside or outside the organization. The output is the distribution of the processed information to the people who will use it or to the activities for which it will be used. Processing converts, manipulates, and analyzes the raw input into a form that is more meaningful to humans. Feedback is the output that is returned to the appropriate members of the organization to help them evaluate or correct input.

In a process analysis, there are many things to be done. The process should be modeled as a flow diagram in which the actors do some activities and share information on what was done. The items should be modeled: the information, the actors, the business rules and the activities with their sequence.

Consider the example in 1.2 in which a company wants to buy new raw material for production.

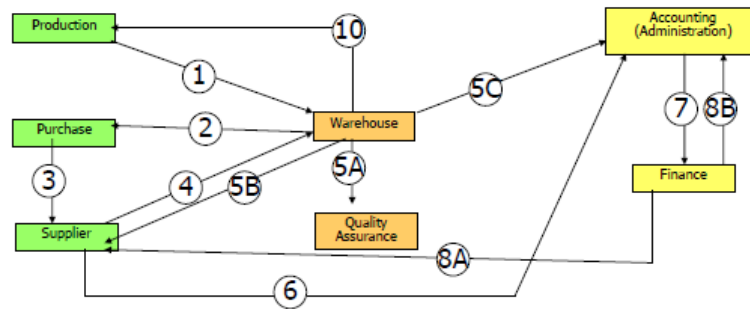


Figure 1.2: Example of process

1. Production asks Warehouse for raw materials
2. Warehouse has not the RM and forwards a request to the Purchase office
3. Purchase office negotiates with the chosen supplier, price, quantity, and delivery; issues the order and sends a copy to the accounting department
4. The Supplier delivers the materials to the warehouse together with the relative delivery note
5. 5A. Warehouse checks the received materials and sends a report to Quality Assurance concerning the compliance with the order specifications.
6. Warehouse returns possibly defective goods to Supplier.
7. Accounting receives copies of the delivery notes and the amount of returned materials
8. Supplier sends invoice to Accounting
9. Accounting checks the invoice (compare with order and delivery note) and ask Finance to proceed with payment.
10. 8A. Finance execute payment to supplier
11. Finance informs Accounting of the payment
12. The warehouse sends the materials to Production that can start operations.

The goal of the information system is to transmit information (eventually in real time), document (past and present) and monitoring (giving summary data for managers). The more people are involved, the more the I.S. is required and the more time it takes to be done.

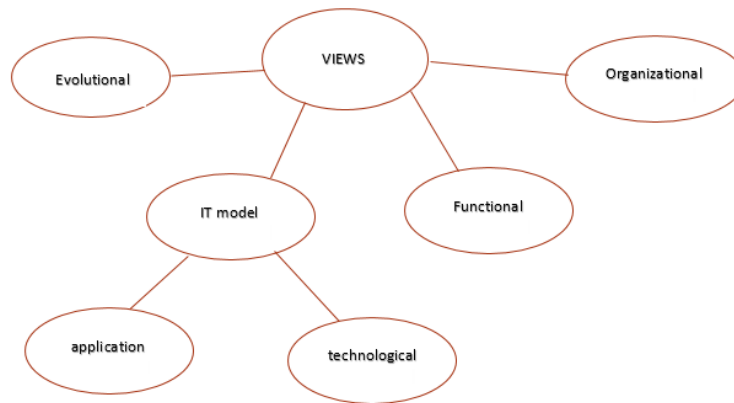
1.1.5.1 Information system's key points

- How to design an Information System?
- How to select the technologies that support it?
- What is the right amount of investment?

- Is it better to have a single integrated system or several applications developed ad-hoc for unique needs?
- Is it better to buy software and services from outside or develop them within the organization?

1.2 Views

There are more view points in the analysis and design of I.S.s.



1.2.1 Evolutional

The Evolutional view point is the view that issues with technology changes. The technological choices are mainly made in the frame the company rises considering the fashionable trends, the economy and the efficacy and ease of use. The bigger issues of evolutionary model are with time, because typically there are hundreds of applications in a company, that should be updated, upgraded or substituted. A problem that rises using different application is also the integration of data and applications (a big issue) and the legacy software (that is often unchangeable but it is very costly and risky to substitute).

1.2.2 IT Model

The IT model is composed by two main models: application model, that describes the software architecture, and technological model, that describes the hardware architecture.

The application model is the view of I.S as a software in application level. It comes typically with three layers: presentation (GUI), business rules (algorithms), data.

The technological model is the view of I.S as hardware systems and their connections. It is usually implemented as a client server architecture. The

choice can be using two tiers (data and application server) or three tiers (data server, application server, presentation server) for the server.

1.2.3 Functional Model

The functional model represents what the IS should do, abstracting from how it can be done (IT Model). It represents the processes (activities, functions), the data and the interaction between the two. There are two types of functional model, the ones with high-level of description (CRASO) or with detailed description (BPMN, Activity diagrams, class diagrams).

The CRASO (Customer Request Activity organisation Output) is the simple high-level model that shows activities, actors doing them and material/immaterial object treated by activities. A more detailed model is the BPMN that is like a swimming pool, in which each lane represents a company unit and the activity are in each one.

1.2.4 Organizational Model

Organizational model represents IS as a service offered to organizational level (and group) of organization. The model is often given by Organizational chart (macro level and micro level), Linear Responsibility Chart (LRC) and Swim lane (BPMN).

The macro organizational chart represents all the organizational unit, starting from president to the unit of lower importance. The micro organizational model represents the subdivision of a unit, describing also the roles of each one.

The linear responsibility chart represent process and the organization structure and external actor involved in it (also describing if it is client of the service or it is the service provider).

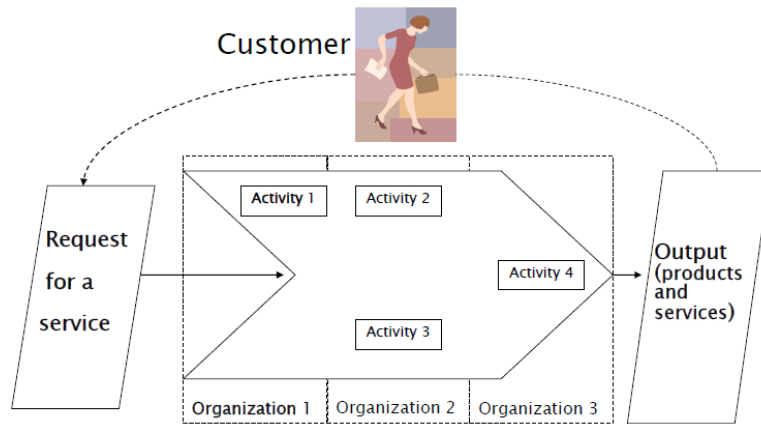


Figure 1.3: The CRASO model

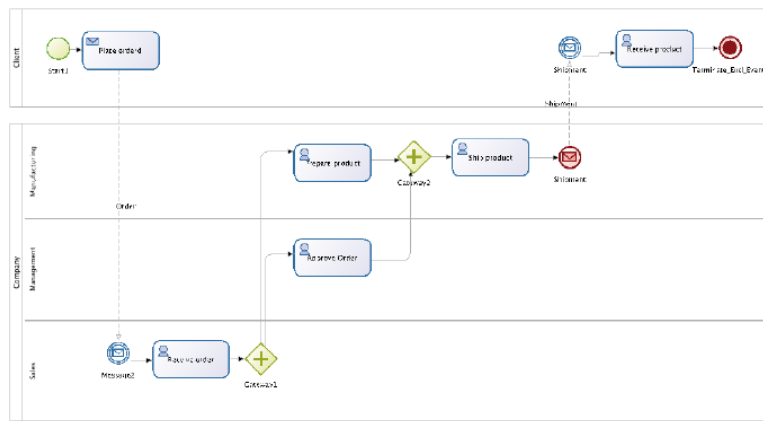


Figure 1.4: The BPMN model

Processes (samples)	Organization's Structures							External Actors	
	Purchase	Design	Production	Sales	Admin.	Human Resources	Information Systems	Supplier	Customer
Management Report	C	C	C	C	P	C	C		
Production									
Customer Order Processing			P	P					C
Procurement	P		P					P	

Figure 1.5: The LRC model

Chapter 2

High level models

Represents a main source of theory and practice of information systems methods and methodologies used to classify processes and support analysis and search of IT applications to support processes.

2.1 Control Loop model

It's a simplistic view model based on CRASO. It focus on the context and the environment. The organization is influenced by five actors: customers, suppliers, regulatory agency, stockholders and competitors. The model change as a consequence of output that is used periodically as a feedback for future activities, that means it provide a self evolution of the model after each loop.

2.2 Anthony's model

Provide a pyramid model that can be analyze both vertical (by hierarchical-organization levels) and horizontal (by different business functions).

2.2.1 Organizational View

The vertical representation is divided into four levels:

- strategic level: senior managers, base on complex analysis of large data set, extract and retrieve useful informations in order to do prevention and prediction for future decisions (investments, planning, management, innovation, changes ...). Analysis are typical on customers profile, products and performance. Business Intelligence and Data Ware House are the main components of the data analysis.
- management level: middle managers organize and schedule operations. It's a connector layer between the strategic decision and the lower levels. It supports control loop providing corrective actions.

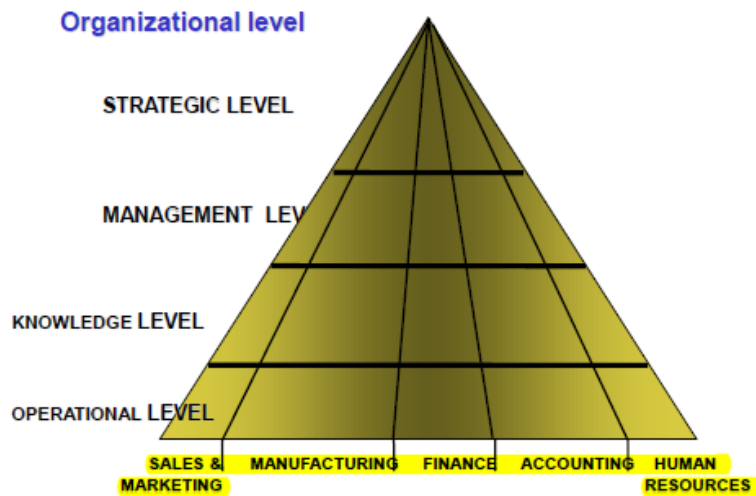


Figure 2.1: The Anthony's pyramid

- knowledge level: it's a level where is necessary the knowledge of environment and data is stored and collected by data workers. Data collected at this level will be used by the highest level. At this level the design can be investigated and changed.
- operational level: it's the lowest level, it involves all the activities necessary to produce the final product (operational managers work in this level).

In a business company the importance of an information system is direct function of information intensity of process and information intensity of product. Each type of business organization need a different type of Information System based on their different level of complexity and quantity of informations related to their main activity. Ex. a bank will focus its systems more on the strategical level and on the information intensity of process, otherwise a Tobacco Industry will focus more on the operational level and on the information intensity of product. In this schema a very important role is played by the budget that is the amount of money that the high levels distribute to low levels in order to reach goals.

2.2.2 Business Function View

The functional taxonomy provide four macro-aggregates:

- sales and marketing: sales includes activities like contacting customers, selling products and taking order; marketing is related to identifying customers, determining their real needs, advertising and promoting products and services. Examples are operational (selling products,

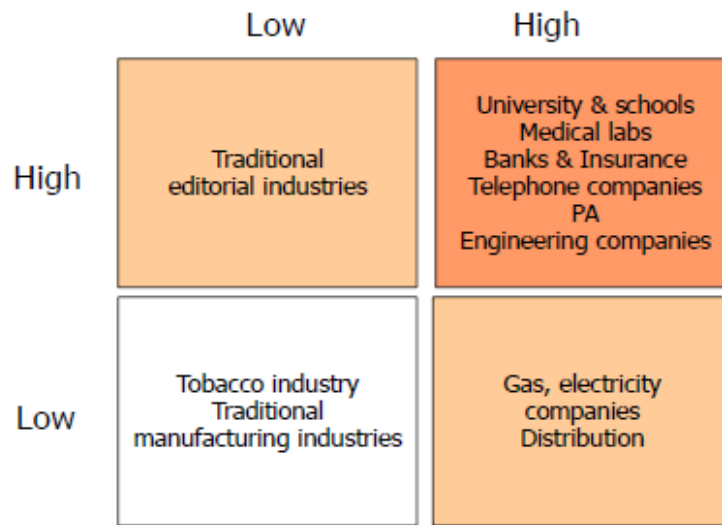


Figure 2.2: Relevance of IS

order processing), knowledge (market analysis), management (determine the price for product or service), strategic (prepare 5-year sales forecast).

- manufacturing and production: it involves operations like planning, development, establishment of productions goals, acquisition and storage of production materials, scheduling equipment, materials and facilities, integrate and control the production flow. Examples are operational (machine control), knowledge (computer-aided design), management (production planning), strategic (facilities location).
- finance and accounting: finance means managing the financial assets in order to maximize the return while accounting concerns maintaining and managing the firm's financial record and receipts to account the flow of funds in a firm. Examples are operational (account receivable), knowledge (portfolio analysis), management (budgeting), strategic (profit planning).
- human resources: attracting, developing and maintaining workforce. The support system should support identifying potential employees, maintaining the complete record of them, creating program to develop employee skills. Examples are operational (training and development), knowledge (design career path), management (compensation analysis monitoring wages and benefit), strategic (HR planning, long term labor needs).

2.3 T model

T-model represent three core processes: two horizontals are support and management and are quite equals in every domain, while the vertical is the primary and depends on the domain.

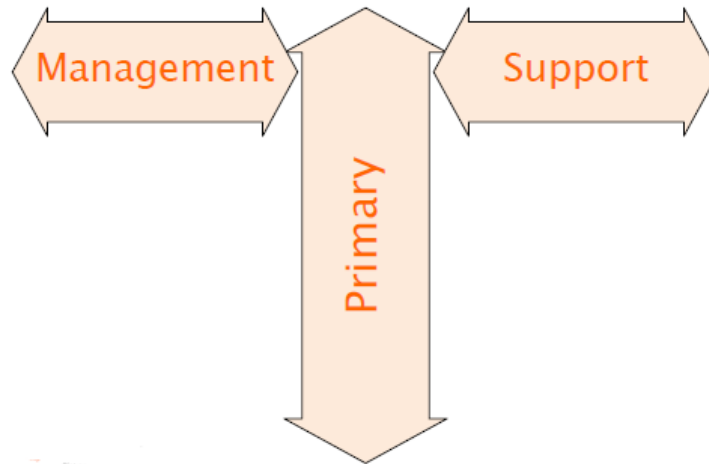


Figure 2.3: The T-Model

- Management: strategic planning, control and business intelligence. The goal is to lead the organization.
- Primary: production and provisioning of products and services. The goal is to serve the customers.
- Support: accounting, resources management and business support. The goal is to provide services to the organization and comply with law obligations.

2.3.1 Management

Managerial processes consist in both management level and strategic level of the Anthony's model. The IT has progressively automated these processes with tools as decision support and data analysis. IT gives the capability to collect and elaborate data from the production in real time. This data can be aggregated to monitor the processes and check the results with the goals defined. In this way, managers can take corrective measures that improve the production efficiency. The decision can be classified into:

- structured, follows an algorithm and can be automatized (e.g. stock resupply);

- semi structured, output is defined and the decision can be described as a rule (e.g. budget planning);
- unstructured, no algorithms at all, the decision is subjective (for example hiring a manager).

2.3.2 Support

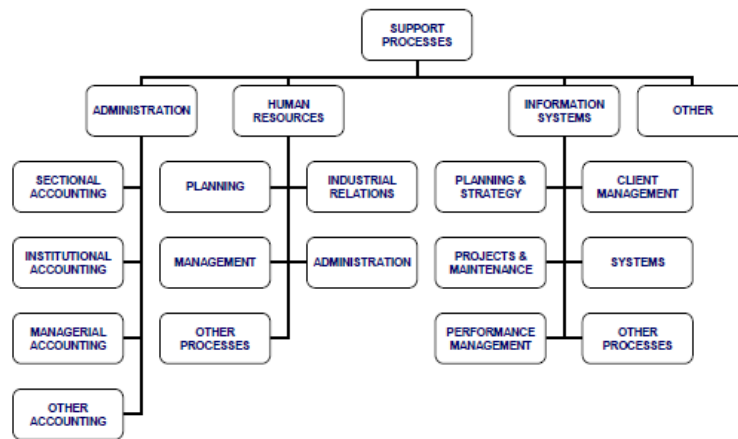


Figure 2.4: The categorization of support processes

2.4 Primary - Business Domain

2.4.1 Manufacturing

There are many models to represent the manufacturing domain. One of the most common is the value chain that represents the company as a sequence of processes to deliver a product. The value of the product is given by the sum of the value added at each step. It is important to remark that the value is different from the price, that often is bound to company history. This model report quite all the processes involved in the T-model. There are HR processes, Technology (what technology adapt to product) and procurement (that is where to buy a raw material for my product? It is a process bound to the suppliers). In blue, there are the main activities, the ones which provides value to the product: they are in chain: the inbound logistic (buy materials, stock it) is the first, followed by the operations, where the final product is made; when the product is ready, it must be delivered and then, we need outbound logistic, that must deliver the products to the shops, where they're sold. So, the next is the marketing and sale activities, where the product must be sold. In the end, the service process is the one given to the user when have bought the product, for example warranty.

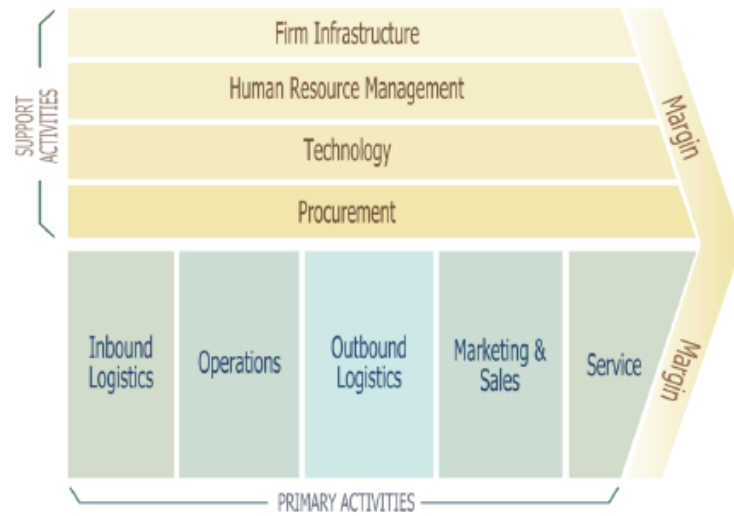


Figure 2.5: The value chain of primary processes

Application portfolio is another model to be considered (note that is not the one discussed in the definitions). This consider the list of processes that are needed for supporting manufacturing, a detailed view on the primary processes of the T-model. There are two types of sub-processes:

- planning, consider the strategic analysis and the planning (yearly, monthly, weekly); It is parallel to execution and consist in doing things in advance so when they are needed are already there. It also considers if stop or not the production of a product. Planning has different scale: the smaller the period the more real is the things to do.
- Execution, have other three lower detailed processes: order, material and physical flow. The physical flow that monitor large date volume in real time to keep the production as fast as possible Material flow defines, stores and process the orders to suppliers. It also should monitor the material level to order new one when too low. Material tracing is one of the common problems in a big company, it is very hard to know where a piece is stored when you have thousands model of products. The order flow defines, stores and processes the orders from customers also interacting with them. Also, a company must keep the track of the components used and the data relative to them. Without those information, it is impossible to realize the final product, there must be the product (what are the component of a product) and the process (how the product must be made) data that can be very large (GBs of data).

SCOR (Supply Chain Operation Reference) is a try to define what are the processes in manufacturing. SCOR is an effort by non-profit organi-

zation made by 750 members. This was done to make a standard in the processes and bind to each one a software function. Most of the functions are supported by existing software, but who produces it? A software vendor, whose interest is to sell its product. Often software for manufacturing is sold in segmentation (SAP), where a software is divided in many functions and only the ones needed are delivered. Changing the software vendor is hard, often software solutions are not portable with other companies so the problem is to integrate them. Give a standard should help in this way, to make software that is portable and can operate with other company-software.

2.4.2 Production industries

There are two high-level primary processes: production and maintenance of plant. Also in this domain can be used the value chain model but all the steps are easier. The inbound logistics buy and stock the raw materials, operations concern plant supervision, process control and machinery maintenance, outbound logistic concerns distribution and sale.

The issues in this domain are the maintenance of facility (you should be very careful if stocking oil or coke), the safety on the production places and the coordination of multi-plan productions.

2.4.3 Telecom operators

Telecom and bank are service company. Typically, are large company that provide calls service and internet access. The main operations are:

- Network: plan, design, maintaining (that is the most difficult, quite never seen from externals);
- Service: service (internet access, call service, ...) design, activation and delivery;
- Workforce: plan execute jobs, procure, store spare parts, manage technical docs.

Marketing and sales is an important part, often this type of company have a lot of concurrency and the customers can easily grow or decrease. This companies continuous push to invent and serve new services. Strictly follow the customers to accomplish them needs. Retail must follow the customers, especially in this domain!

2.4.4 Utilities

Suppliers of gas, electricity, water are company not so open to competition. This is a hard domain due to the difficult to extend the network (often old and to change it must be done a lot of tasks). In the internet, the last mile

is common, the network is repeated. Can you do this for electrical network? NO. For this domain, the infrastructure is one and cannot be subject to competition. (State entity that owns the network and rent it to the private company in competition).

Three layers of these companies. Production of resources, trading of those and n Operation is the customer center, producing and selling bills, in the network means maintaining and monitoring.

Network is one, service is one and there is a limited innovation. Renewable energy redesigned the service, changes completely the way of distributing energy. Solar energy is distributed, wind is distributed so the service should adapt. The network was something hierarchical, from big cables in city to little switch in houses. Network is new with solar production, there is no more centralized (smart grid) network, that is much more distributed and intelligent.

2.4.5 Bank and Insurance

As said for telecoms, the service is only one and can be:

- Banks: account management, investment management, lending (mortgages, loans);
- Insurance: vehicles, life, pension plan, health plans.

Nowadays the service is storing a number into a database, there is not a gold caves for you. The key point of operation is keeping up and running all the database into a computers (servers). Backup must be done, data must be backup and recovered.

2.4.6 Retail

We are talking of large retail as Ikea, Decathlon, Amazon and similar. Logistic problem came first, products must be distributed and must be identified (what product resell?). These are often physical market, so another problem is to have the product that should be on the shelf (not too much, not too little).

There are company with hundreds (thousands) of stores, the distribution of goods is much more difficult that in manufacturing. Typically, the logistic is given to external company that should integrate the IS with the one of the company.

Inventing and choosing the right product is another problem (knowledge problem). Thinking about Ikea, they design all the product sold, so they should design it very well (also a manufacturing problem).

Chapter 3

Business Process Modeling Notation

The BPMN is used to model existing process, design new process and execute process engine. This course refers to Camunda Modeler , available on <https://camunda.org/download/modeler/>, a free tool used to create the process model during labs.

3.0.1 Functional Perspective

Each process begin with a start event and terminate with an end event, it can have also intermediary events (an event has no duration). Events can be triggered by messages, errors, timer, compensation or rule. During the life time of the process there can be executed different task (activities with duration). Events and task are connected by flow (an arrow that represent a temporal constraint between tasks/events). The process should contain also constraints on the flow execution, in order to represent this constraints gateway are expected.

3.0.1.1 Start Events

Start events can have an associated trigger (condition that describes when it happens), the none has no trigger and the multiple has more than one.

3.0.1.2 Intermediate Events

If an intermediate event is attached to boundary of activity it interrupts the activity.

3.0.1.3 End Events

End events indicate the end of process, the none is used to end subprocesses.

3.0.1.4 Task (Activities)

Activities that are performed in the process by humans or computers that have a duration. Tasks can be used also to contain a subprocess (a subprocess can be defined initially as a general activity and then expanded in order to define the details).

3.0.1.5 Sequence Flow

Denotes temporal precedence between activities.

3.0.1.6 Gateways

Gateways control the flow of the process, each one split and merge it. Each time a split condition is satisfied on the split-gateway is generated a token that follows the path and then is waited by the join-gateway. There are different types of gateways:

- Exclusive Data-Based (drawn with or without X), the flow after the split takes only one flow based on the state of data (XOR).
- Exclusive Event-Based (drawn with a black star), the flow after the split takes only one flow based on the first event that happens (XOR).
- Inclusive, the flow can take one, two or more flows (OR). The join-gate waits only for the flows that are executed (which generate a token in the split-gate condition).
- Parallel, there is not an evaluation of condition and the flow continues on all the possible existing paths from the gate. Notice that in order to execute the activity after the join-gate all the parallel flows must be executed (each flow generates a token on the split-gateway).

3.0.2 Organizational Perspective

Organizational elements:

- Pool, contains a single complete process, flow cannot cross pools, processes in different pools communicate with messages. Normally each pool is defined for an independent organizational entity that has internal actors/departments/offices that can communicate internally with a standard communication method (flow across lanes of the same pool granted). Pools are used also to define external actors that interact with the main process (the pool is viewed like a black box with no details, only the messages required to interact with the main pool are defined). Two pools do not share the common system and for this reason need messages/events to communicate.

- Swimlane, is a subpart of a pool and defines "who does what". Swimlanes inside the same pool don't need a message mechanism to communicate, the process' flow can pass from a lane to another.
- Group, it's used to enclose a grouping of graphical elements. It does not affect the sequence flow.
- Text Annotation, attach notes to a model entity with explanations for clarity.
- Message Flow, show messages between pools or between activities in different pools.

3.0.3 Data Perspective

3.0.3.1 Information Artifacts

Data objects can be represented as volatile data, required or produced by activities. They represent input and output of a process activity. Data can be represented also as data store (persisted) that have a duration and a life beyond the process. This two type of artifact can be associated to the element of flow with a directed/undirected association.

3.0.3.2 Special Behavior Elements

- Message and Message Flows, used to transfer actions or data from one pool or process to another and correlate related process. The communication's participants must be in separate Pools.
- Signals, used to send data to multiple activities simultaneously. Signals are broadcast communications between participant or another process. They have no specific target or recipient. All processes and participants can see the signal and it's up to each of them to decide whether or not to react.
- Timers, used to launch periodic activities or to ensure that an activity happens within a specific deadline.
- Errors, the Error Intermediate Event is used to handle the occurrence of an error that needs the interrupting of an activity, it can only be used when attached to the boundary of an activity thus it can only be used to catch an error, the Error End Event is used to throw an error. Generally when an error occurs all work will stop for that process.
- Exception, used to define behavior when the system encounters a technical error.

- Compensation, event that cancels an activity already terminated in the past, triggering suitable compensation activities
- Repeating, used to repeat behavior, such as multiple launches of the same task. Using activity attributes it's possible to set the maximum number of loops for both while and until loops. After the activity has reached the loop maximum it will stop even if the loop condition is true.
- Multi Instance Activity, it's an activity that should be performed many times with different data sets. The value of the loop condition determines the number of times that activity is performed (in parallel using horizontal lines or in sequence using vertical lines).

Chapter 4

Business rules

4.1 Definition

4.1.1 Business Rule

A business rule (BR) is something to be respected to do some operation. An example could be: "a student must have passed the exam to enroll to final exam". A business rule is a statement that constraint some aspect of the business and can only be true or false. It can apply to processes, people and IS. Each business have rules that can be more or less:

- Formalized (Not formalized are typically only in the head of top managers; this happens often in small companies)
- Automated (Can be executed by some program, so they are those that can be written in code)

4.1.2 Business Logic

Business logic is made of business rule encoded in computer language (in a three tiers architecture¹¹ it is implemented typically in the application layer).

4.1.3 Policy

Policy is a general direction that is implemented through several business rules. For example the policy "Only valid missions are allowed for PoliTo employees" is made up of several business rules, for example "The mission is accepted only if the available budget is higher than the presumed cost" and "the daily expenses for meals cannot be higher than 80 euros".

4.2 Business Rule

A BR should be:

- Declarative, the statement of a policy, not how the policy is enforced
- Precise, the rule must have only one interpretation.
- Atomic, a business rule marks one statement, not many.
- Consistent, a business rule must be internally and externally (to other rules) consistent.
- Expressible, a business rule must be able to be stated in natural language.
- Distinct, business rules mustn't be redundant.
- Business-oriented - everyone should be understand it, not only by computer people.

There are three ways to implement a BR:

- Manually
- Automated in computer program (E.g. Java, JS or SQL application)
- Written in declarative form and executed by a rule engine

The rule engine is a program able to execute and apply the business rules. Process engine defines processes and rule are applied on those processes. In Camunda, a business rule can be declared as Business rule task. In the process execution, the rule task request is sent to rule engine that answer with true or false, but the decision is taken apart, by it. Defining business rules in declarative way gives advantages:

- Force formal definition of rules
- Separation of concerns between process and business rules (independent evolutions over time, localizations of rules in a single repository, business people can write/checks BRs)
- Easy to manage

4.2.1 Declarative Rules and BRMS - Drools and Camunda

BR Management system (BRMS) is a tool useful for simplify the rule management. It is a software system that can be used to define, deploy, execute and monitor business rules. The Business Rules Engine is the part of the BRMS in charge of executing the business rules.

Some BRMS are available but we'll focus on Drools. In it a rule have two parts: condition and action. When the condition is verified the action is executed. This was called AI a long time ago because it simulates the behavior of human brain in logic thinking. Conditions are made by different patterns which are typically composed with "and". Example of pattern is "Person(age == 100)" that matches all the person with age equal to 100. The language to define it is Java-like.

Business Rules can be also defined in Camunda. In it, they are called Camunda BPM Business Rules and are executed synchronously by a Business Rule Task. Also custom external rule engine can be used writing the relative Java Code as in normal service task. The decision are written in Decision Tables that are tables made of rows representing the rules. In the first column there is the input, in the second the rule and the third represent the output. While defining Business Rule Task in Camunda you have to specify three elements:

- decisionRef, the input variable for the table
- mapDecisionResult, the mapper to use for the table to search
- resultVariable, the variable in which the output result taken from the table is stored

Chapter 5

Management Information System

An information system to help the management process should give information on the goodness of processes. Management and Strategic level IS should support managers in monitoring and controlling the organization using few, reliable indicators. But how to define these indicators? Indicators, which should be high-level, are made by many measures that should be detailed, objective and repeatable. For example an indicator can be the brand recognition made of percentage of population aware of the brand and the number of announces in press.

5.1 Measurement

Measurement is the process of empirical objective assignment of numbers to entities, in order to characterize a specific attribute thereof. A measure is then an attribute of an entity. Typical entities in organization are resources (human or not), activity (design, production), product or service. The most common measures are relative to:

- Duration: how much the service take to be delivered? It can be applied for physical product or for services.
- Cost: how much a product or service cost to the organization?
- Quality: how the service is delivered? The product are all good or there are many product with defects? The delivery is good or the customer receives it damaged?

Anyway, there are many measures that can be classified in:

- direct measures (e.g. length, duration, number of defects, effort) and indirect (e.g. programmer productivity - LOC/months, module defect density - defects in the module/size);

- for assessment or for prediction (those requires a prediction system-mathematical model, procedures to define parameters, procedures to interpreting results);
- internal (can be measured purely in terms of the entity itself - e.g. LOC) or external (can only be measured with respect to how the entity relates to its environment - e.g. reliability or maintainability of source code);

Measure can be map to represent empirical relation into numerical relation (no new relation are created). For example, we can say that Joe is taller than Fred only if $H(\text{Joe}) > H(\text{Fred})$, where $H(x)$ equals to the height of x .

The process of measuring is made by many steps:

- Propose indicators (from literature, experience, staff in company) and verify it. To verify a indicator we can consider simplicity, understandability, cost (cost and delay to process, to collect raw data), coverage (how much the measure cover the indicator), frequency (how often the measure changes), objectivity (how much is not ambiguous);
- Implement collecting data, storing data in DB, compute measures and present it;
- Use them day by day and always try to improve them.

There are many approaches to define indicators, in the next sections we will see some of them.

5.2 KPI

Key Process Indicator (KPI) is process perspective, low-level indicator. Often they are confused with SLA (Service Level Agreement) that refers to a contract between the consumer and the company about a service that should be given according to some measures (often probabilistic measures are used).

A KPI indicator is defined by a Descriptor that made of:

- Name
- Type (General, Service, Efficiency, Quality)
- Definition (mathematical definition + description)
- Segmentation (data to which indicator is associated and therefore data the indicator can be aggregated on)

There are four types of KPI:

- General KPI, the measures are relative to input/output volume and human/not human resources:
 - input volume, the requests number
 - output volume, number of product delivered
 - human resources
 - not human resources (plants, machines, facilities)
 - inventory, the number or component stored in some magazine
 - other resources
- Service KPI, the main measures used are relative to time:
 - Response time, the time that the company needs to satisfy an order.
 - Lead time, the time that the client spend in queue.
 - On time, the punctuality of the delivery.
 - Perfect orders, the number of order in time and perfect.
 - Flexibility, the measure of how many changes can be made to a service by the customer.
- Efficiency KPI, the measures consider the cost of the service:
 - Cost per Unit, the total cost per volume. Often input and output volume are considered.
 - Productivity, volume per resource. For example, how many customers can serve an employee in a day.
 - Utilization, used resources per available resources. If a resource is not used, it is useless and it can be removed.
- Quality KPI, the measures considers the production:
 - Conformity, defined service per product description, non conform items per total items; items could be input requests, intermediate output, final output (defects, complaints).
 - Reliability, probability that a product satisfies its function after some time. The main measures are MTTF (mean time to failure), MTTR (mean time to repair) and the most important for customer MTBF (mean time between failure - the sum of the previous).
 - Customer satisfaction, depends by a lot of things and can be collected with surveys; they get a lot of information, not only specific to a product, but must be done rarely due the cost of doing them.

The KPI Process consist of defining and proposing different indicators, then implementing the mathematical definitions and, after verifying it, using them day by day. The verification step must control some aspects like cost, comprehension, meaningfulness, frequency and structure. Dimensions (or segmentation) are very important cause from them can be build different indicators with different meaning. For example it can be considered sales per hour/day/month (time window) or cost/defects per design/production (activity in process).

5.3 Management accounting

Accounting focuses on cost, revenues, cash flow, investment and capital. There are two types of accounting, the financial accounting (public data standard to law) and management accounting that are private and sensible data useful for the company's managers.

Management account should take in consideration cost accounting, that is the budget and actual cost of operation, processes, departments and products in order to analyze the variances and profitability. The cost are of two types: direct and indirect. The direct cost are those directly traceable to a product/service sold to a customer. The indirect are all the others. Costs can be also divided in fixed or variable. Fixed does not depend on number of units produced and the variable depends on them.

Suppose to administrate a car manufacturing company we have:

- fixed costs: infrastructure (buildings, long term contract personnel, machinery);
- variable costs: raw materials and parts, energy, short term contract personnel;
- direct costs: car components, effort to manufacture;
- indirect costs: machines to manufacture car, effort to design.

There are two way to allocate indirect costs: proportional to the number of element manufactured and activity based costing. The activity based costing is a technique introduced to overcome problems in proportional and so we'll focus only this. It requires to collect precisely (activity per activity) how costs are split. First, you should know how many did you spent for a product (both indirect and direct costs); Then, you allocate cost for each activity and resource in function of actual consumption of the product they realize. A company, in this way, can know the actual cost of each product or service, identifying profitable ones and defining selling costs.

Let's consider again the car manufacturing example. The company should know how many did it spent for design model A. You know that

design center costs 50M per year and the company produces 3M of cars of model A and 2M of model B.

- For the proportional the design cost is $50M/(3+2)M = 10$ Euro per car.
- For the activity based costing it is different, first you have to compute how much effort you spend for modeling the models (suppose 75% for model B and 25% for model A). Then you can evaluate the cost as $(0.25*50)M/3M$ that is 4 euro/car.

In conclusion the activity based costing is applicable from indirect (taxes, administration, security) to direct costs (traceable to product or service), allocates the cost of each activity/resource to product and services in function of actual consumption, aims at knowing the true cost of product/service, identifies profitable ones and defines selling cost.

5.4 CSF

Critical Success Factor (CSF) is a support for strategic level. The concept behind this indicator is that only 4 or 5 areas in a company are responsible for the success or the failure, so a CSF is a critical factor or activity required for ensuring the success of a company or an organization. The idea behind CSF is quite easy: in any organization certain factors will be critical to the success of that organization, in the sense that, if objectives associated with the factors are not achieved, the organization will fail, perhaps catastrophically so. It is important to underline that CSF's are not targets (e.g. acquire 25% of the market) or objectives (e.g. be the market leader) but they are critical aspects for the company (e.g. Offer high quality product).

By identifying your Critical Success Factors, you can create a common point of reference to help you direct and measure the success of your business or project. As a common point of reference, CSFs help everyone in the team to know exactly what's most important. And this helps people perform their own work in the right context and so pull together towards the same overall aims.

CSF can be defined at different level, following the company structure: corporation, function (production, design, research, etc.) and role (managers, administrators). Following a car manufacturing example:

- Corporation
 - Brand Recognition, image (think of Ferrari image and Fiat image differences)
 - Dealer network (would you buy a car online or only at car dealer?)
 - Equipment of cars

- Reliability of cars
- After sales service (warranty, call center service, etc.)
- Function (manufacturing)
 - Production costs
 - Quality of product
 - Environment issues (ex. job security)
 - Relationship with trade unions
- Manager (quality manager)
 - Reputation w.r.t. other functions
 - Skills of technicians
 - Process certification
 - Technology for monitoring quality

CSF can be grouped:

- from business domain or industry, this is often the most important and it is the same for all company in a certain business (e.g. skill of personnel for consulting company, brand identity);
- from competitive factors within business domain or strategic, factors that distinguish company from others (e.g. Tesla is a company of electric super-car);
- from environmental factors, constraints from outside such as norm, rules and standards (e.g. euroX pollution norm for cars);
- from contingency factors, temporary constraint due by unpredictable events (e.g. recover brand reputation after failures)

To summarize, the CSF does not represent a quantitative indicator but it is a critical activity or factor that can make the difference between success and failure. The CSF can be useful anyway to define targets, objectives and KPIs for the company (E.g. the CSF "customer satisfaction" can be bound with a target "83% of satisfied users"; the CSF "teaching quality" for a University can be bound to a Quality KPI "% of graduated with job within 1 year").

5.5 Balanced scorecards

The balanced scorecard (BSC) is a strategy performance management tool, a semi-standard structured report, supported by design methods and automation tools, that can be used by managers to keep track of the execution of activities by the staff within their control and to monitor the consequences arising from these actions. We can say that BSC is a tool to monitor the implementation of the company's strategy.

Using only the financial perspective to evaluate the company performance is very limited. For example, if you have an objective to decrease operating expenses by 5%, you may set a goal to limit customer support calls to five minutes or less – this is designed to increase efficiency and directly cut cost. However, customer satisfaction may decline as a result, which would lead to lost customers, lost revenue, and so on. This means that this well-meaning financial objective actually damaged the company's overall performance.

The balanced scorecards take into account 4 perspective and tries to balance them.

- Finance is important to monitor the cash flow. If company goes run out of money it's a mess, but you cannot run a company only for money. In this perspective has to be considered the cash flow, the ROI (Return on Investment, the investment return as a percentage of gain), financial result, return on capital invested and return on equity (the stock value change).
- Customer balance the finance perspective. If you not consider customer, you will no make money because you do not sell your product. Here you should consider customer satisfaction, market share, quality and service.
- Internal perspective is what is close to the company. About how the company works, business function, application portfolio, process for utility and so on. Here the things to be considered are number of activities (measure of complexity), opportunities success rate, accident ratios, manufacturing indicators.
- Innovation and Learning, it is the first time we see this. Innovation and learning perspective is a new perspective that we rare consider. It is not easy to evaluate quantitative but is very important to take in consideration. Nowadays, company that do not innovate dies because it is not competitive in the market. The indicators to be considered are investment rate into innovation, illness rate of employee and employee turnover (indicate how much employee are happy), internal promotion rate and gender ratios.

Often it is realized as a dashboard where the CEO and the managers have a view, respectively, on the company and in business function.

Chapter 6

Strategy

Strategy definition is the key for a company and is developed, obviously, from the strategic level. What strategy means? Strategy is "definition of goals of company and of action plans to achieve them" (def. by Chandler) or "definition of action plans to achieve the goals" (def. by Ansoff). What comes out from these definitions is that there are two aspects in company strategy definition, the goals and the actions to accomplish it. Michael Porter, a strategy expert and professor at Harvard Business School, emphasizes the need for strategy to define and communicate an organization's unique position, and says that it should determine how organizational resources, skills, and competencies should be combined to create competitive advantage.

The technology must be always considered in developing a strategy because nowadays the innovation comes very fast and if your company is not able to adapt to those changes it'll probably close. (See for example the strategy of Kodak and Fuji, where Fuji survives reacting to changes while Kodak slowly dies with its old strategy). There are many factors to be considered while developing the strategy, both internal in the company and external to it, but for sure nowadays technology is one of the most important factors.

6.1 Porter Generic Strategies

Michael Porter in 1985 in his book, "Competitive Advantage: Creating and Sustaining Superior Performance." identifies three generic strategies that can be applied quite to any domain:

- **Cost Leadership** or no frills and is about minimizing the cost to the organization of delivering products and services. You therefore need to be confident that you can achieve and maintain the number one position before choosing the Cost Leadership route. Companies that are successful in achieving Cost Leadership usually have: access to the capital needed to invest in technology that will bring costs down; very

efficient logistics; a low-cost base (labor, materials, facilities), and a way of sustainably cutting costs below those of other competitors.

- Differentiation consists in creating uniquely desirable products and services. How you do this depends on the exact nature of your industry and of the products and services themselves, but will typically involve features, functionality, durability, support, and also brand image that your customers value. To make a success of a Differentiation strategy, organizations need: good research, development and innovation; the ability to deliver high-quality products or services; effective sales and marketing, so that the market understands the benefits offered by the differentiated offerings.
- Focus, offering a specialized service in a niche market. Because they serve customers in their market uniquely well, they tend to build strong brand loyalty amongst their customers. This makes their particular market segment less attractive to competitors. Porter divided it into two parts: Cost Focus and Differentiation Focus. Cost Focus means emphasizing cost-minimization within a focused market, and Differentiation Focus means pursuing strategic differentiation within a focused market. But whether you use Cost Focus or Differentiation Focus, the key to making a success of a generic Focus strategy is to ensure that you are adding something extra as a result of serving only that market niche. It's simply not enough to focus on only one market segment because your organization is too small to serve a broader market (if you do, you risk competing against better-resourced broad market companies' offerings).

6.2 Actors in competition

The tool was created again by Michael Porter, to analyze an industry's attractiveness and likely profitability. Since its publication in 1979, it has become one of the most popular and highly regarded business strategy tools. Porter recognized that organizations likely keep a close watch on their rivals, but he encouraged them to look beyond the actions of their competitors and examine what other factors could impact the business environment. He identified five forces that make up the competitive environment, and which can erode your profitability. These are:

- Competitive Rivalry. This looks at the number and strength of your competitors. How many rivals do you have? Who are they, and how does the quality of their products and services compare with yours? Where rivalry is intense, companies can attract customers with aggressive price cuts and high-impact marketing campaigns. Also, in

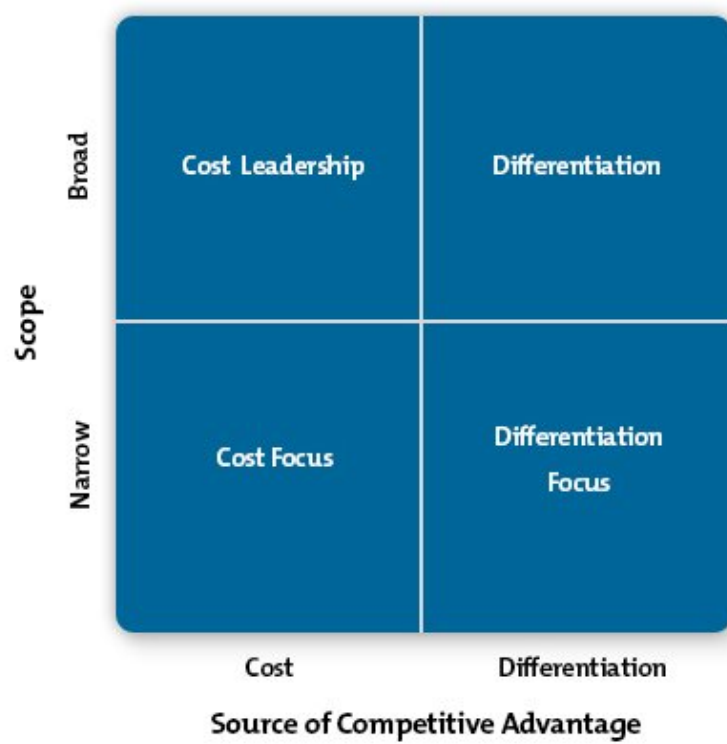


Figure 6.1: Generic Strategies by Porter

markets with lots of rivals, your suppliers and buyers can go elsewhere if they feel that they're not getting a good deal from you. On the other hand, where competitive rivalry is minimal, and no one else is doing what you do, then you'll likely have tremendous strength and healthy profits.

- **Supplier Power.** This is determined by how easy it is for your suppliers to increase their prices. How many potential suppliers do you have? How unique is the product or service that they provide, and how expensive would it be to switch from one supplier to another? The more you have to choose from, the easier it will be to switch to a cheaper alternative. But the fewer suppliers there are, and the more you need their help, the stronger their position and their ability to charge you more. That can impact your profit. Think about Intel in the CPU market, they have the power, there are no real alternatives.
- **Buyer Power.** Here, you ask yourself how easy it is for buyers to drive your prices down. How many buyers are there, and how big are their orders? How much would it cost them to switch from your products and services to those of a rival? Are your buyers strong enough to dictate terms to you? When you deal with only a few savvy customers, they have more power, but your power increases if you have many customers.
- **Threat of Substitution.** This refers to the likelihood of your customers finding a different way of doing what you do. For example, if you supply a unique software product that automates an important process, people may substitute it by doing the process manually or by outsourcing it. A substitution that is easy and cheap to make can weaken your position and threaten your profitability.
- **Threat of New Entry.** Your position can be affected by people's ability to enter your market. So, think about how easily this could be done. How easy is it to get a foothold in your industry or market? How much would it cost, and how tightly is your sector regulated? If it takes little money and effort to enter your market and compete effectively, or if you have little protection for your key technologies, then rivals can quickly enter your market and weaken your position. If you have strong and durable barriers to entry, then you can preserve a favorable position and take fair advantage of it.

6.3 Business model canvas

Business model canvas (BMC) is a tool to express the business model that includes all essential strategic decision in an organization. It was developed

in 2010 from Osterwalder and Pigneur. BMC can be divided in 3 parts: customer, at the right, that should define the customer clusters that will be served, product in the middle and supplier to the left. The bottom parts consider financial aspects: the cost at the left and the revenues at right.

- Value Proposition: the reason why a customer should buy your product and not another. It have to answer to "what are the customer problems that it solves?", "what value are we delivering to customers?". The main reason are newness, performance, customization, getting the job done (outsourcing), price (low-cost product/service), status (brand identity, consider Apple or Ferrari), design, cost reduction, risk reduction, accessibility, usability.
- Customer segments: the group of customers the organization is aiming to serve. It is very important to determine who are your customers, what they do and what they want. This is the key point for marketing and also to define what channel and relation you must have with them. Segments could be:
 - mass market (e.g. consumer electronics, car),
 - niche market (e.g. luxury mobile phone, luxury cars, electric cars),
 - Segmented (e.g. offer both luxury car and normal car),
 - Diversified (e.g. Amazon offers both books and cloud services),
 - Multi-sided (e.g. commercial tv that have audience and advertisers; Google is another example).
- Channels: How the organization reaches the customer segments. A company should choose the best channels to increase awareness, explain value proposition, purchase the product, deliver the product, provide after-sale service. There are many type of channels that are resumed in the following image.
- Customer relationship involves the way you interact with customers. The goals are customer acquisition, customer retention and upselling. There are many ways to do that:
 - personal assistance (face to face, email, call center)
 - dedicated personal assistance (e.g. upscale financial services)
 - self service
 - automated service (as self service but customized on customer)
 - user community (to share knowledge and support customers)
 - co-creation (e.g. YouTube, Amazon book reviews by customers)

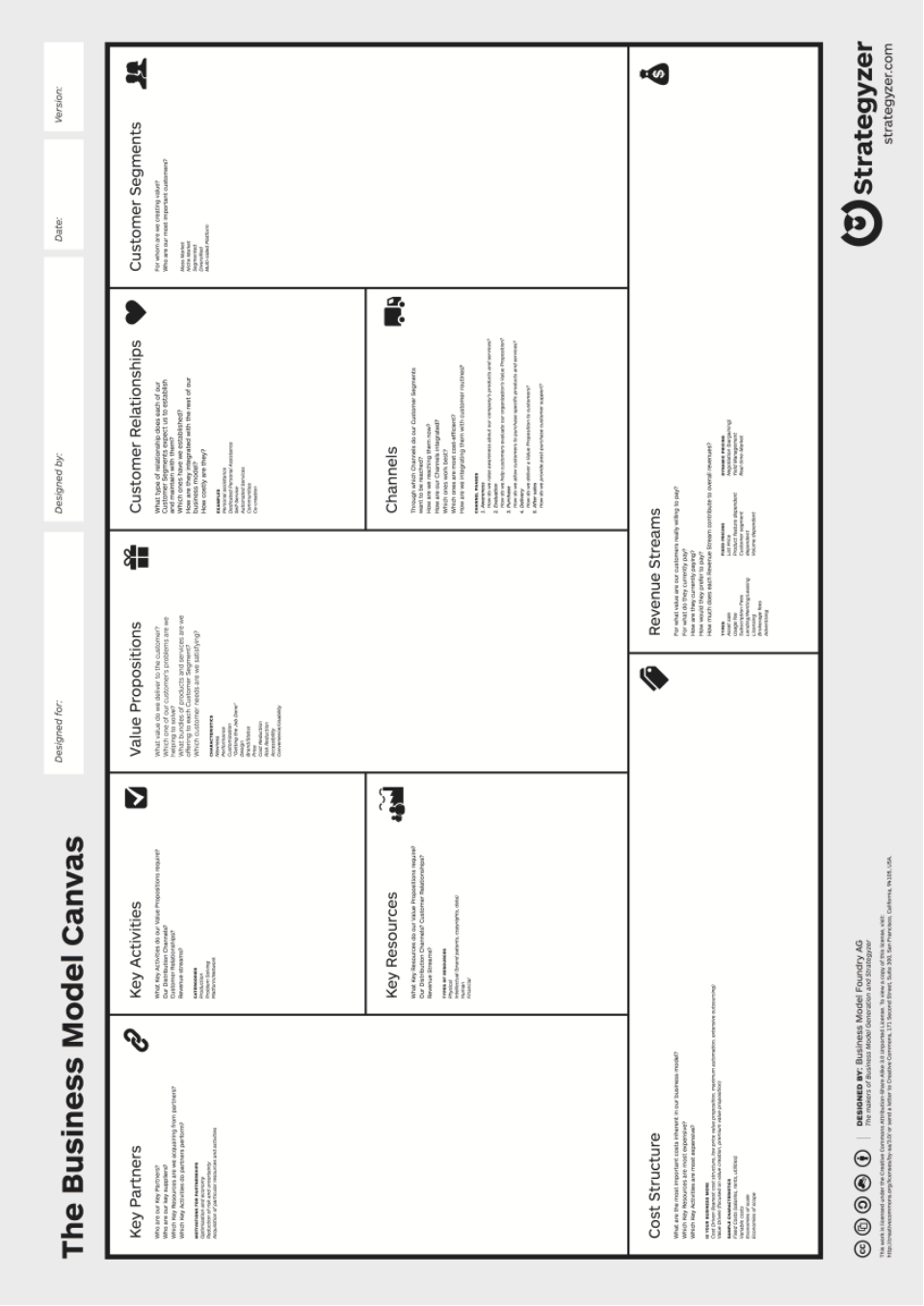


Figure 6.2: The Business Model Canvas

own	direct	Sales force
		Web
partner	indirect	Own stores
		Partner stores
		Wholesaler

- Key resources can be divided into:
 - physical (e.g. facilities, building, vehicles, stores, point of sales, platforms, networks)
 - intellectual (e.g. brands, patents, trademarks, customer data)
 - human (e.g. workers, researchers, designers, sales force)
 - financial (e.g. cash, credit lines, stock options)
- Key activities can be identified as the activities to perform to produce, to customer relationship, for the channels and the revenue stream. There are three main categories: design/production, problem solving, platform management.
- Key partnerships involves the relationships with other organizations like alliance between non competitors, coopetition (alliance between competitors), joint ventures for new business, buyer supplier relationships, outsourcing relationships. The goal of key partnerships are
 - optimization and economy (economy of scale, for example buyer/supplier relationship)
 - reduction of risk (e.g. coopetition to design innovative product)
 - acquisition of resources or activities (usage of platform, e.g. android with App developer, or usage of distribution network)
- Revenue streams defines how much and how your customer segments pay for the product. There are many types of revenue structure:
 - asset sale (one time payment for product),
 - usage fee (proportional to use, e.g. telecom company),
 - subscription fee (for amount of time, e.g. monthly payment),
 - renting/lending/leasing (exclusive use per a defined amount of time),
 - licensing (copyright, right to use a copy),

- brokerage fees (intermediation service between two or more parties),
- advertising.

Pricing mechanism should be divided into fixed pricing (based on static variable) or dynamic pricing (changes according market conditions).

- Cost structure can be value driven (e.g. high personalized and quality service) or cost driven (e.g. low cost product/service, for example Ryanair). The cost structures must consider fixed and variable costs, economy on scale (maximize utilization of resources to produce one product or service - increase volume of production), economy on scope (maximize utilization of resources to produce many products/services - increase set of products/services).

There are three main BM patterns: unbundling, long tail and multi-sided.

Unbundling is often used when a company have three type of business: product innovation, customer relationship management and infrastructure management. Often keep it together is not effective so it is better to split it into three company or business unit and analyze it individually. So, from a single BMC we get three BMC, one for each function. Often the customer relationship is a core business that have economy on scope. Often the infrastructure management is outsourced to external company and have an economy of scale. The innovation is often done by small companies from which the biggest one buy the license to use their product.

Long tail is an upgrade of traditional BM. The traditional model aims to sell large quantity of few items. The long tail approach instead aims to sell small quantity of many items. Nowadays the long tail is more profitable (for example, consider Amazon vs the book stores). The long tail is made possible by the advancement in technologies that today is offered.

Multi-sided is a platform that brings together distinct but interdependent group of customers (sides). An example is Google where we have three sides: the user of the search engines (free service), the advertisers (fee service) and the content providers (fee share). The value of the platform depends on the size of the sides. To launch such a model requires a lot of effort and in fact is not trivial but, when it grows, it tends to gain the monopoly of the market (see Google, Amazon, AirBnB, Uber, gaming console, commercial TV and many others).

There are some variant of multi-sided model.

The free variant have one side that is free and subsidized by the other sides. "The demand you get at the price of zero is many times higher than the demand you get at a very low price" from Kartik Hosanagar wrap best the advantages offered by this approach.

Freemium variant offers a basic service for free but a premium service for fee. The premium service fee pay for the free service (conversion rate is usually low, around 10%). It works only if to serve the free user the cost is low.

Bait and Hook is another variant that offers upfront a free service that later becomes fees. For example the free handset offered by mobile network operators.

Chapter 7

Enterprise Resource Planning

ERP is the integrated management of core business processes, often in real-time and mediated by software and technology. It made up of a suite of integrated applications that an organization can use to collect, store, manage and interpret data from these many business activities. ERP provides a continuously updated view of core business processes using common databases maintained by a DBMS. It track different type of resources as raw materials, production capacity, cash, orders, purchase orders and payroll. Data can be shared across various departments (manufacturing, purchasing, sales, accounting ...), the flow of information between all business functions is facilitated and manages connections to outside stakeholders. ERP software is organized in different levels:

- suite (set of application sharing one o more database in order to support a set of business processes);
- module (software application that supports a specific business process);
- function (supports simple operation/activity).

7.1 ERP model

ERP model is based on data sharing, modularity and prescriptivity. In the legacy system data are replicated, there are dedicated interfaces which synchronize it but these mechanism increase cost and delays, providing also a limited integration. Data sharing is based on a database system that is automatic synchronized, applications and modules share same data with same model (horizontal integrity of data) and data are aggregated from the operational to the management level (vertical integrity). Modularity

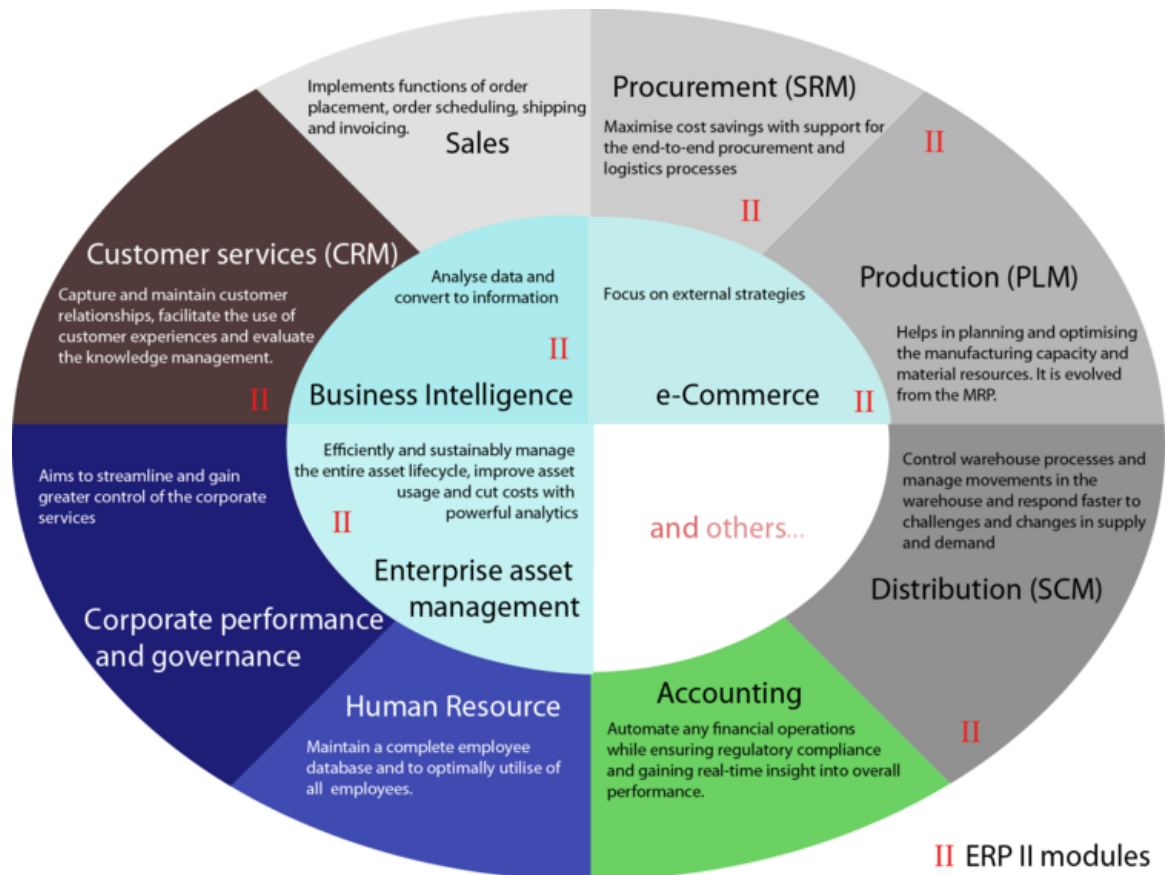


Figure 7.1: ERP modules

allow a smoother transition and extensibility, modules are offered from the same vendor and are easier to integrate. Prescriptivity means that modules contains a business logic (Ex.1 a supplier order can be accepted only of related order has been issued, Ex.2 a supply can be ordered only if authorized role needs it). The software is made from an ERP company and if you choose to buy it, you buy the entire process and not only the application. So the procedures of your activity could change. In the past the software was built from scratch, now big companies sell you the software and also the modifications of the standard procedure.

7.2 ERP Approach

The traditional approach involves two main activities, the first one is to understand the business process, the second one is to develop the software to supporting it. ERP approach is different cause the business process is adapted to the integrated system provided by ERP. The software can be

parameterized and customized.

7.3 Gap Analysis

Gap analysis

Activity	Current	ERP	Process Actions	Software Actions
Receive materials	Only recording, no control vs. order	Control on order: entering materials must have been ordered	Adapt process to ERP prescription	–
Quality Control	Driven by predefined rules	Result recording (no rules within system)	–	Adaptation of ERP software
Storage	IS drives selection of warehouse location	Only recording of completed storage	–	Adaptation of ERP software
Retrieve from storage	IS suggest location where to retrieve	Only recording of completed retrieval	–	Adaptation of ERP software
Inventory change	Change values in db (overwrite)	Values are corrected through correction transactions	Adapt process to ERP prescription	

Figure 7.2: ERP Gap Analysis

The GAP Analysis is a procedure to take a snapshot of current activities of a company for then choose the best application that shapes with the company's needing. The transition to ERP in a company cost in terms of license and personalization, induce delays and change the business process.

Chapter 8

Customer Relationship Management

CRM is an integrated and structured process which interact with customers in order to fetch new ones and maintain a public relationship with the existing ones. The main goals are: build a robust relationship, increase satisfaction and increase the value of company for them and viceversa. This is based on the idea that not all customers are equal and for this reason the marketing must be adaptive on different profiles (marketing one-to-one increase the value of customer otherwise mass marketing consider all as the same person). The customer in this way becomes the core aspect of the commercial strategy, the company: make access to product/service as easy as possible, produce customized offers, provides complete access to pre/post sales and collects complaints and suggestions (feedback approach).

8.1 CRM Paradigm

- Multichannel: customers accesses company through any channel;
- Uniqueness of data and service: the access is consistent through all the proposed channels;
- End to end service chain: contact with customers (front end) or service provision, delivery and administration (back end).

8.2 Service chains

There are 3 levels of service chains, but it can be more or less complex of this representation:

- Reservations: the possibility to buy the product/service before a certain date with for example on-line payments, all informations are

stored in a database;

- Product Sale: access to promotions and sales, sometimes based on the fidelity mechanism (customers that buy often or that have a lot of points on a fidelity customer card);
- Customer care: involves all telephone and on-line services by which the customers can contact an operator that will resolve issues or give information.

It's important to notice that CRM was improved in the last years with the technological evolution of services and communication channels. This has increased the continuity of contact and nowadays modern companies are able to be nearer to the customers in order to satisfy their needs. Not all business domains have same need for CRM, that depends on intensity of relationship with customer, size of customer pool, loyalty of customer and multichannel or not.

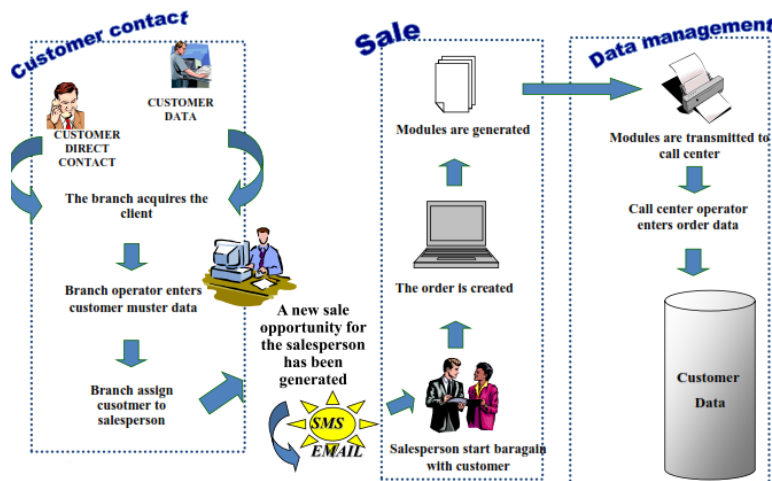


Figure 8.1: CRM Sale Chain

8.3 CRM System

CRM tools cover: commercial logistic, support for multichannel interaction, sales and analysis of customers. CRM modules can support customer during the life-cycle of product or service (front end) like salesperson, call center and Internet or can support marketing process like back end (ERP), campaigns, marketing and analysis. A brief description of main modules:

- Sales Force Automation Channel: consist of planning, controlling and interacting with customer (prospects, sales, offers, offers templates...);

- Internet Channel: information is available as catalogs of product on-line, the web-site suggest products, sales based on sale history and cookies.
- Call Center: CTI (Computer Telephone Integration) with IVR (Interactive Voice Response) or ACD (Automatic Call Distribution). Main functions : information on company and products, status of purchases or other transactions, complaints, history of interaction with customer.
- Customer Care: provide a legacy system and a service that protect customers and help them to satisfy their needs.
- Analytics: data from warehouse give useful information and functions like segmentation indexes, data mining, prediction ...
- Campaign Management: consist of selecting the list of customers, designing the campaign (base on Business Intelligence result) and transfer data from analytic CRM to operational IS.
- Database and Data Warehouse: information is usually organized into a Database System that collect data of customers. There could be also a Data warehouse system used to store customers anonymous profiles in order to make deep analysis and perform Business Intelligence.

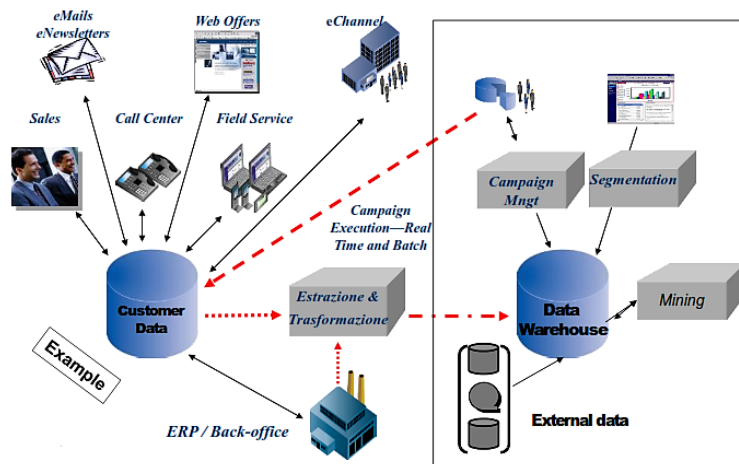


Figure 8.2: CRM Architecture

Chapter 9

Organization

An organization is group of people intentionally organized to accomplish an overall, common goal or set of goals and has stability in time. More formal: Social entity (because it is led by people), guided by objectives, designed to perform structured and coordinated activities, interacting with the environment.

- Goal
- Made of parts, concurring (or not) to achieve the goal(s)
- Life-cycle (birth, life, death) Person: 70 years average life Organizations: around 10yrs average life (Catholic church, Chinese dynasties: 1000 yrs)
- Tradition, culture, habits: automatic responses to issues but causes resistance to change
- Resistance to change
- Adaptation and evolution: necessary to survive

9.1 Characteristics - Organization variables

All characteristics of an organization can be seen as organizational variables (or parts of organization to be defined/changed) in organization design. Organizations always change (and have to be changed) to react to changes around and inside them.

- Size
- Goal and strategy
- Culture

- Environment
- Technology
- Structural: organizational chart, yet discussed
- Dimension: size in staff, org units, geo sites
- Formalization/specialization/hierarchy
- Organizational types
- Organizational structures

9.1.1 Size

Size depends on number of employees (permanent/temporary, Full time/Part time/Close collaborators), turn over, number of sites.

9.1.2 Goal and strategy

Goals may be coercive (prison), utilitarian (Business – For clients / stakeholders / public), normative goal (University, religious groups).

9.1.3 Culture

Written or unwritten assumptions about goals and products, common way of thinking inside the company. Typically comes from the top. Examples are accepting or not all clients, working more is better or bad, engineering (we decide the product, complicated) vs marketing (customers decide the product). Unwritten rules in an University may be dressing codes, access (sex, race, religion), behavior codes. Culture is both unifying factor and restraint on change (especially on IT) .

Change management is the discipline that studies issues and techniques for supporting changes in organizations.

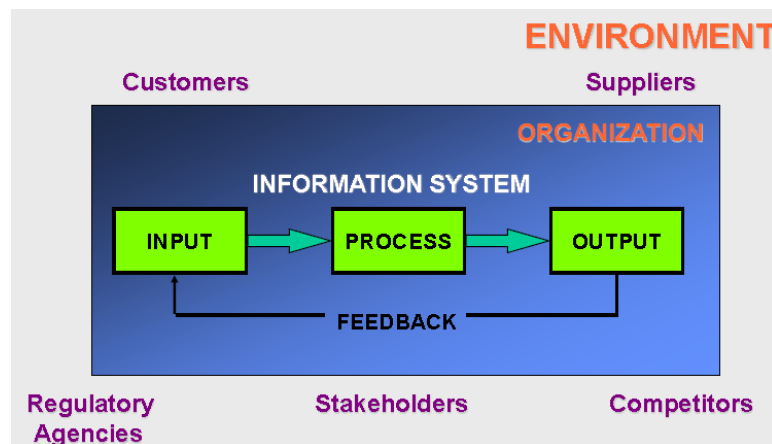
In summary, people who cover different roles, have different points of views, objectives, interests; for these reasons there are struggles, competition, conflicts which have to be recognized and solved.

9.1.4 Environment

Environment is the set of country, legal system and rules.

9.1.5 Formalization

Formalization, specialization and hierarchy are related, and depends also on culture.



9.1.5.1 Formalization and SOP

SOP is Standard Operating Procedures (algorithm). It is a procedure of some business process of the company, which is described in detail, so that it can be automated. Formalization makes the organizations efficient, in doing the same product/service, but also no resilient to change. Taking into account the level of description of procedure to follow, the higher the formalization, the lower the capability to decide is. In a 'Bureaucracy' there is no capability to decide at lower levels and no flexibility.

We can divide the levels of description of an activity in:

- Full formalization = algorithm
- No formalization = loose description

where more formalization means efficiency but less flexibility in responding to exceptions, while less formalization means flexibility but unpredictable behavior.

9.1.5.2 Centralization

Centralization is about where to allocate decision power the hierarchical levels.

Example: Bank Activity: mortgage allocation – decide amount given Levels:

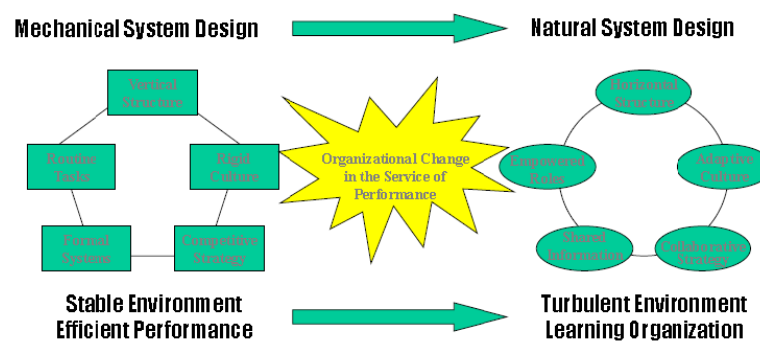
- Main branch (Director, Financial services director) – centralized, more homogeneous, slower
- Agency (100) (Director, Employees (1000) – open dossier (sop)) – decentralized, risk of fraud

9.1.5.3 Specialization

Level of detail of activities and level of specialization of employees. Specific activities are assigned to specialized roles (employees) in the organization. Specialization implies more formalization so that efficiency, no flexibility and no resilience to change.

9.1.6 Organizational pattern, types and structures

9.1.6.1 Organization design approach - organizational pattern



Source: Adapted from David K. Hurst, *Crisis and Renewal: Meeting the Challenge of Organizational Change* (Boston, Mass.: Harvard Business School)

Systems may be divided in:

- Mechanical System: bureaucracy, rigid culture, vertical, hierarchical, centralized decisions, very efficient but inflexible, good only if the environment is quite stable. Routine tasks, people need few information.
- Natural system: adaptive culture, capability to learn, collaboration instead of competitions, information shared, decisions also at lower level, less levels, more horizontal. Learning organization, more suitable for turbulent environment.

Organizational types are:

- Entrepreneurial: Startup business, opposite of bureaucracy, no formalization, interoperability
- Machine bureaucracy: Mid-sized manufacturing firm
- 'Divisionalized' bureaucracy
- Professional bureaucracy: Law firms (legal cases), hospitals (patients) each 'client' is different but there are common activities. Professional skills means are able to treat differently each case.
- Adhocracy: Consulting firm, building team ad hoc, on purpose for a specific case.

9.1.6.2 Organizational structures

We can represent it as a tree, vertical level are hierarchical level.

- Node: organizational unit, as group of people or other organizational units. It is also called, Function, Unit, Business unit, Branch, Office, Direction, Area.
- Link: formal dependency, used for control, communication, coordination channel.

Organizational structure is depicted in organization chart and must be completed by mechanisms to support Communication and Coordination.

Organizations may have vertical or horizontal structure. A company with 1000 people can be split in 3 levels with 333 people in lowest unit or 10 levels with 10 people in lowest unit. Given the same size, lower depth means faster reaction, higher load on upper levels or more delegation. An example of vertical organization is the Army: general, major, colonel, captain An example of horizontal organization is the Catholic church: Pope, Bishop, Priest.

Links are divided into:

- Vertical links: to control - the node on the top controls the node on the bottom, in terms of allocating work and controlling the result at the end. Employees at lower level must perform activities coherent with goals set at higher level. Managers at higher level must know activities and results of lower level.
- Horizontal links: to communicate. Employees in different units must share information and coordinate themselves

9.1.7 Hierarchy

Given level i in the structure it has:

- Capability / possibility to decide
- Capability to access information
- Capability to control level $i+1$, eg allocating work and control results

Vertical links

- Command chain: problem that cant be solved at level x is reported at level $x-1$
- Rules/procedures: Standard way of solving problem/performing activity

- Plans: eg budget, way of delegate work to a lower level node
- Vertical IS: to define and diffuse reports and internal memos, kpis and other measures

Horizontal links: where to find information, these roles know it

- IS: Knowledge base of personnel, data base of product information
- Direct contact: Liaison person, which is in charge to take contact with other unit or Temporary collocation of employees from different units
- Full time integrator role e.g. Project manager, product manager, brand manager
- Task force: Temporary group of employees from different units
- Team: Same as task force, but permanent

Project manager role, 4 business functions (finance, engineering, marketing, purchasing departments)

Option 1: the project manager coordinate separately the work of the 4 departments

Option 2: team up to 4 people of the 4 departments and the team leader to coordinate them

The IS is the cheaper but less effective. Team opposite.

Back to mechanical/natural: mechanical-vertical, natural-horizontal.

9.1.8 Structure

9.1.8.1 Functional

As in Anthony's pyramid employees grouped according to similar functions, skills.

- **STRENGTHS:** Allows economies of scale within functional departments, enables in-depth knowledge and skill development, more specialization, enables organization to accomplish functional goals, no focus on products, it is best with only one or a few products, ideal for small companies <1000 people.
- **WEAKNESSES:** It has slow response time to environmental changes, because the product is not the focus, may cause decisions to pile on top, hierarchy overload, more hierarchical. It leads to poor horizontal coordination among departments, may results in less innovation and involves restricted view of organizational goals not having enough in mind customer and products.

9.1.8.2 Divisional

Employees grouped by product (e.g. car division, truck division) and functions are repeated in each division

- **STRENGTHS:** It is suitable for fast change in unstable environment, leads to client satisfaction because product responsibility and contact points are clear: it focus on products. It involves high coordination across functions, allows units to adapt to differences in products, regions, clients, it is best in large organizations/companies with several products and decentralizes decision-making.
- **WEAKNESSES:** It eliminates economies of scale in functional departments, in-depth competence and technical specialization. It leads to poor coordination across product lines (set of product that are similar). It makes integration and standardization across product lines difficult, it is like to have different and independent companies and risks to do the same things two times.

9.1.8.3 Comparison between Functional and Divisional

Considering the concept of economy of scale with fixed and variable costs, the more you produce the less is fixed costs on each product, while with divisional fixed costs are doubled. As regard product development, with the functional structure people who design the engine are specialized and don't care much about the product, there is a more generic focus, while in divisional they have more the product in mind but they are less in number, so less specialized. In the end it is better to have more people so that they may be specialized and there is economy of scale. As regard HR, accounting, infrastructure, it make no sense to divide them. Considering the T model these are horizontal activities together with the IS, so that they are not specific for a certain context. For all these reason, we have Hybrids.

9.1.8.4 Other structures

Other less used structures are:

- **Geographic:** Functions are repeated per geographical area, e.g. for banks. Intesa Sanpaolo: "Direzioni Centrali" does horizontal activities, so it is hybrid (functional, divisional and geographical).
- **Matrix/multi-focused:** grouping by more than one criterion, a certain person belongs to more than one group and has more bosses, e.g. mix of functional and divisional so that people do both for the same activities. Complex.
- **Process/horizontal:** Employees grouped by process, people also belong to an entity that overlooks the processes.

9.2 PM (Project Management) Process

From the point of view of project management, a project can be a new project or maintenance.

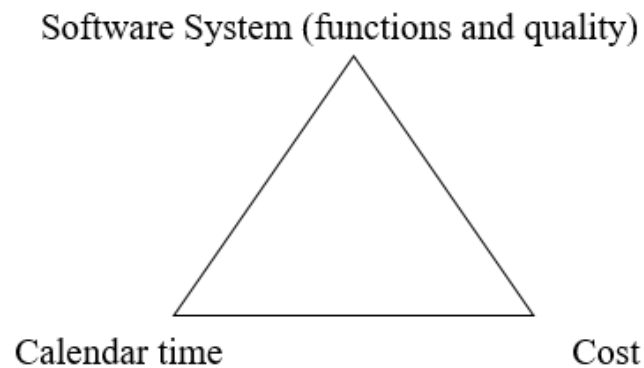
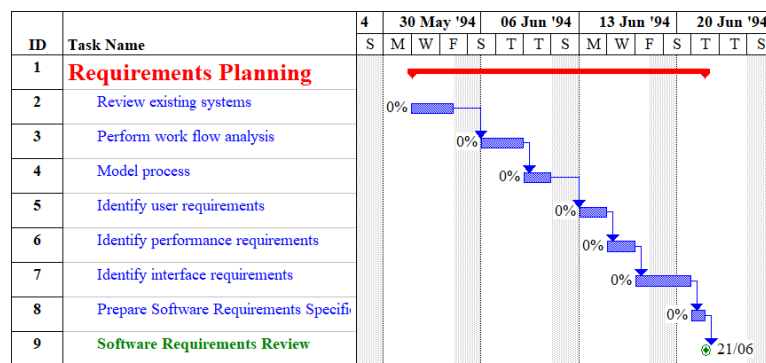
- INCEPTION: Planning proportional to the duration of the project (may not end up in the development of the project) - BEFORE
 - Estimation of money and time required. The estimation of time is mapped nearly one to one to the estimation of money. Here you need functional requirements.
 - Scheduling
 - Commercial proposal
- OFFICIAL PROJECTSTART: Development - DURING
 - Tracking = count time and money spent
 - Re-planning based on estimation and tracking, adaptation of the previous plan
 - Proposal signed
- RELEASE - AFTER
 - Post mortem = learning phase to try to understand what has worked and what no, to avoid same errors in the future

Management activities are planning (defining activities and products, scheduling activities and deliveries on calendar, deciding organizational structure, allocating resources, estimating cost / effort), tracking and managing risks.

9.2.1 Definitions

- Project: collaborative effort to achieve a goal, with defined limits of time / money
- Program: management of several related projects
- Resource: person and tool
- Activities (in bpmn is more general): time passed by resource to perform defined, coherent task
- Phase: set of activities
- Milestone: key event/condition in the project, 'if-then-else' to decide sequent activities

- Deliverable: product that goes to the customer or to the next phase and is attached to a certain milestone passed and a payment.
- WBS (Work Breakdown Structure) is a hierarchical decomposition of activities in subactivities with no temporal relationships. Also cobit is a list of activities but there are many document like it.
- Gantt chart shows time from two point of view - duration of an activities and temporal relationship between activities (precedence graph). From this, you can compute cost given the cost per unit of time (hour/day) and resources (in terms of number and qualifications): at that point, you have the plan.



Software System (functions and quality), Calendar time, Cost: you can choose 2 of them. Effort is time taken by staff to complete a task and depends on calendar time and on people employed. It is measured in person hours. Effort in hour is similar from different companies, while person year depends on the contract. Calendar Time and Effort are linked and depends on how many people work in parallel.

9.2.2 TCO

For the vendor cost is about personnel, software and hardware. For the user it is the TCO (Total Cost of Ownership) divided in at least three phases:

- Before acquisition: Costs to define requirements and select the product (Market analysis, feasibility studies, requirement definition, vendor / product evaluation, contract negotiation)
- Acquisition: acquisition cost (one time fee, yearly fee, usage fee)
- After acquisition:
 - deployment costs (Install in all users machines, Training for users, Learning curve)
 - operation costs: Servers, network
 - maintenance costs
- Dismissal: uninstall, backup data, data conversion.

The longer the time frame, the less important the acquisition cost (if it is an initial fixed cost). $\text{Price (acquisition cost for user)} = \text{Cost (cost for vendor)} + \text{margin}$.

9.2.3 Size

- Of source code
 - LOC (Lines of Code)
- Of documents
 - Number of pages
 - Number of words, characters, figures, tables
- Of test
 - N test cases
- Of entire project
 - Function points (see later)
 - LOC (lines of code)

9.2.4 Productivity

Output/effort. What is output in software?

- $\text{Size/effort} = \text{LOC} / \text{effort}$
 - Inherits problems of LOC (what to count, what to include)
 - The lower level the language, the more productive the programmer must be
 - The more verbose the programmer, the higher the productivity
- $\text{Functionality/effort} = \text{FP/effort}$
- $\text{Object Points} / \text{effort}$

Both LOC and FP are measures of size and can be computed before a project start (estimated size) and after it ends (actual size).

9.2.5 FP Function Points

It is an alternative to LOC (Lines of Codes) to compute the effort required by an activity, especially for IS.

Function Points is linked to the amount of functionality, independent from the programming language. Is a number. They are just function with the logic behind: similar to functional requirement and conceptual diagram

1. Define boundary
2. Define entries, data managed by the application, relational databases.

$$\text{fp} = A*EI + B*EO + C*EQ + D*EIF + E*ILF$$

where:

- • EI = number of Input Item
- • EO = output item
- • EQ = Inquiry
- • EQ = Inquiry
- • ILF = Internal Logical File

The Master file contains points for EI (only input), EQ (both input and output) and EO (External Output). EIF is a piece of data not stored internally but is a proxy class, taken by outside.

1. Classify each component of product (EI, EO, EQ, ILF, EIF) as simple, average, or complex. Assign appropriate number of function points. The sum of the weights quantifies the size of information processing and is referred to as the Unadjusted Function points (UFP).

Component	Level of Complexity		
	Simple	Average	Complex
Input item	3	4	6
Output item	4	5	7
Inquiry	3	4	6
Master file	7	10	15
Interface	5	7	10

2. Calculate the Compute technical complexity factor (TCF)
3. $FP = UFP * TCF$.

For any product, size in “function points” is given by: $FP = 4 * EI + 5 * EO + 4 * EQ + 10 * ILF + 7 * EIF$

FP also to estimate and compute the cost of maintenance, somehow proportional to the value of the object.

Advantages: Independent of technology and programmer, standardized.

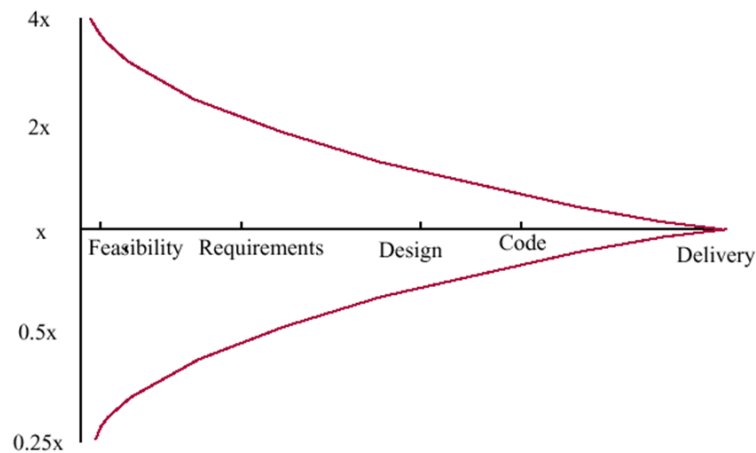
Disadvantages FP takes long time, done only by certified persons, so very expensive and transaction system oriented (no real time, no embedded systems).

	FP	LOCs
Depend on programming language	N	Y
Depend on programmer	N	Y
easy to compute	N, must be done by trained person	Y, tool based (after end of project)
Applicable to all systems	N, transaction oriented	Y

9.2.6 Estimation of cost and effort

Marketing define functions needed and Engineering do estimation. It is based on analogies with similar projects. People with experience are needed.

Estimation will not 100% exact: as the development process progresses then the estimate becomes more accurate. Estimation techniques:



- Based on judgment
 - Decomposition (if no experts): by activity (WBS) or by products (PBS)
 - Expert judgment
- Based on data from the company
 - By analogy, case based: given a set of projects and their attributes, you find projects 'near' to the new project and use that projects to estimate effort.
 - Regression models: given the data base of past projects (eg linear regression)
- Based on data, from outside the company
 - Function points
 - Object points

Techniques not suggested:

- Parkinson's Law: project costs whatever resources are available but system is usually unfinished
- Pricing to win: project costs whatever the customer has to spend on it, but costs don't accurately reflect the work required so that the customer will not get what he wants.

Chapter 10

IS in Organizations

In organization there are three main process families: Support, Managerial and Primary. The IT area is located in the support (horizontal) process family (if the company is not a software house). In fact, the IT area is the organizational entity that support IT services to an organization.

10.1 IT Area

There are three aspects to consider of IT area: position in organizational structure, roles and processes.

10.1.1 Position in Organizational Structure

IT area can have three position:

- As line function if it is a primary area. Medium large organizations typically define IT as a line function.
- As staff function if it is a secondary area or service to line function;
- As sub line function if it is a service for another area

Another fact to be considered is the Centralization of IT area. If the IT is decentralized (for example, if is a sub-line function of many areas) there may be incoherences between the technologies and data formats used. Also, economy of scale will not be applicable because every IT office have to buy its own furniture (computer, printer and other stuffs). The best choice is to make the IT area as a centralized service, it offers standardization (of career path, of architectural choices and tools), data sharing and economy of scale. However, a centralized IT area is less specialized and react slowly to request from other Business Functions.

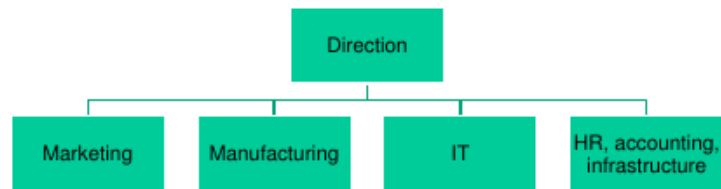


Figure 10.1: IT as line function

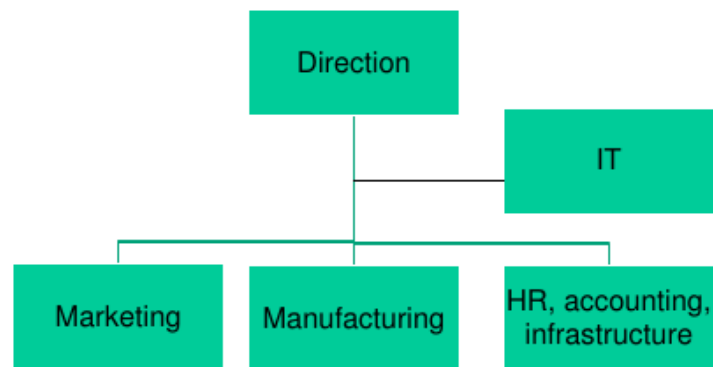


Figure 10.2: IT as staff function

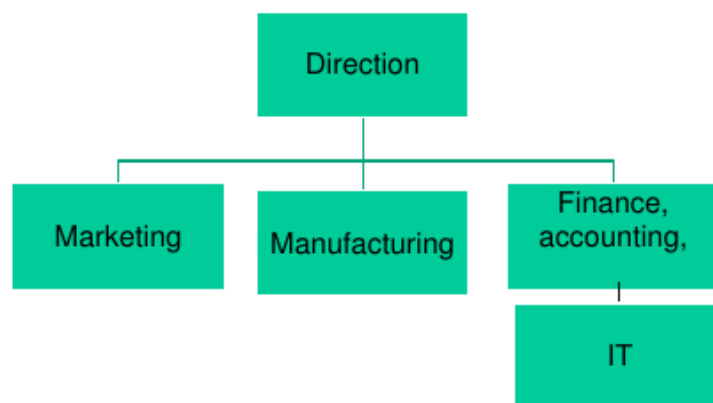


Figure 10.3: IT as sub-line function

10.1.2 Roles

There are many roles:

- CIO (Chief Information Officer): is the top level manager of IT area. Usually it allocates budget and plan the activities according with the CEO.
- CTO (Chief Technology Officer): is the responsible of technology scouting and technology choices
- Analyst
- Software architect
- Programmer
- Tester
- DB administrator
- System administrator
- Web administrator

10.1.3 Processes

To enumerate the processes of IT area was introduced the COBIT model. See the next section.

10.2 COBIT version 5

COBIT (Control Objectives for Information and Related Technology) is a reference document that contains ways of implementing IT in a not software company regarding IT governance, IT process and risk management, which suggests ways to do things, in order to align Business and IT strategy. COBIT reference model defines processes, resources, goals and measures within the IT group. Cobit 5 key elements are:

- Domain Processes Activities
- Principles
- Enablers
- Lifecycle approach
- Process Capability Model

10.2.1 Processes: Governance and Management

Domains = group of processes.

- Governance
- Management (day by day practice)
 - Plan
 - Build
 - Run
 - Monitor

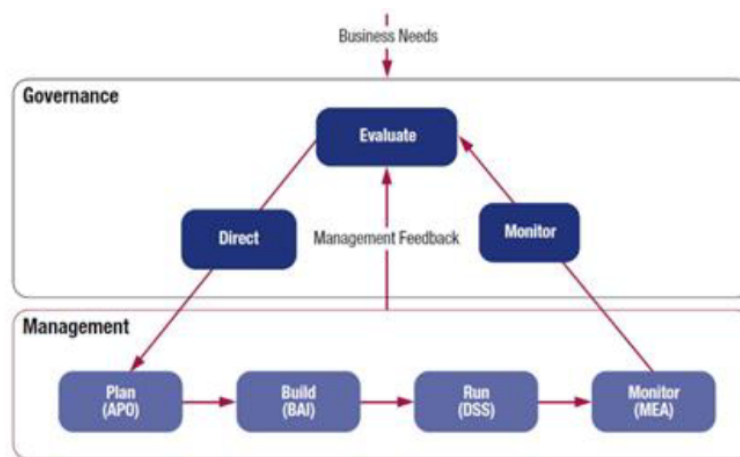


Figure 10.4: Governance and Management in IT

Each process further decomposed in activities and practices.

10.2.2 Governance

Governance is to take decisions, give goals, strategy, for both the company and the IT division.

10.2.3 Management

Management receives decisions and implements strategy. In the management control loop, managers have measures and indicators from the operational process; the work is done day by day and check if what done today is ok with the goals. In case not, define corrective actions.

- Build and run : operation level

- Monitor: collect numbers and measures and check if are consistent with the plan

Comparison between the control loop and the model of *Software engineering process*:

PLAN: definition of the direction

MONITOR: that the direction is followed

BUILD: Development

RUN: Operation + Maintenance

10.2.4 Cobit 5 key elements

10.2.4.1 Domains, processes, activities

Domains - (set of) Processes - (set of) Activities - (set of) Practices

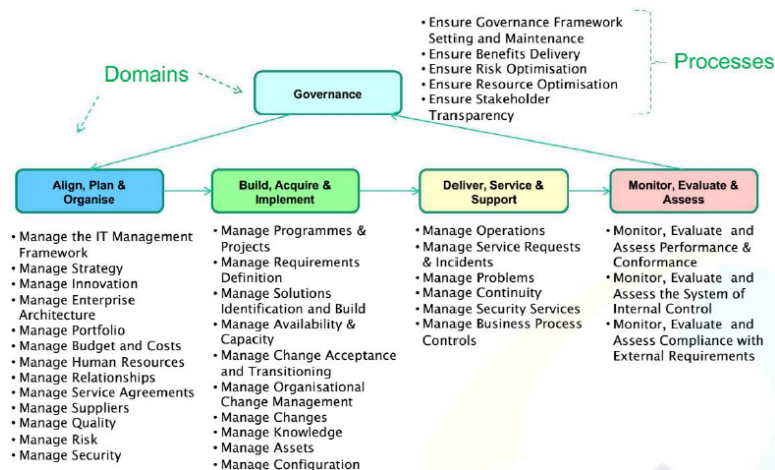


Figure 10.5: Domains

10.2.4.1.1 Domain APO: Align Plan Organize

It has to manage:

- Budget and cost. CIO (manager of the IT Office) is mostly in charge for this: he receives a budget for the next period (typical one year), to cover all costs.
- Supplier, which are other companies that deliver something: we have to interact with them and do contractual definition of the exchange service agreement.

- Enterprise Architecture (close to portfolio), which is the high-level design of IT architecture in the company: the company may not have any idea of the architecture of software it is running.

10.2.4.1.2 Domain BAI: Build Acquire Implement

This domain is involved in both maintenance and development. The real main activity is not development but decide and buy software package or services from an external company. In both case there is a program= many related projects. For one project: define requirements, identify solutions and build. It is composed by horizontal / support activities (04-10 not specific for 1 project, horizontal), such as: BAI06 Manage organizational change management: if there is a big change, at level of Business Process, there is also people resistance. Make people accept changes by training and communication. BAI07 Manage changes: from development to deployment of a new version of an application, many changes may be put together in a monthly release. BAI08 Manage knowledge: DB and people (5 and 7 of Enablers model) BAI09 Manage assets: machine, operating systems

10.2.4.1.3 Domain DSS: Deliver Service and Support

It is the domain where most of the money (50-60%) goes. It has to manage:

- Operations: keeping machines up. Hardware, operating system and the application must be up.
- Service request and incidents: what is not working, help desk (first level, may be solved in few step).
- Problems: in case of real problems (different levels of gravity), the help desk opens a ticket/ service request, which is then take in account by someone that after then solves the problems
- Security: monitoring flow of network, strange activities, work of CPU to avoid DoS attacks.
- Continuity: back up and recovering all data
- Business process control: mostly IT level. If you are an employee of the bank, the help desk must be able to offer support not only at IT level but also at business level. It is control at business process level, not just IT. Collection of numbers to compute KPI and then control them.

10.2.4.1.4 Domain MEA: Monitor Evaluate and Assess

It has to Monitor Evaluate and Assess:

- performance and conformance,
- the system of internal control,
- compliance with external requirements.

10.2.4.1.5 Domain Governance

Governance is to take decisions, give goals, strategy, for both the company and the IT division, in a way that IT goals are aligned and consistent with goals of the company. It is done by CEO and CIO. Flow of goals: Strategy Enterprise Goals implies IT Goals. Three high level goals are:

- Ensure Benefits Delivery: application Portfolio, IT services that support business Process. As computer people the benefits are IT services themselves.
- Ensure Risk optimization: define what can go wrong, probability and impact, recovery plan.
- Ensure Resource optimization: minimum amount of resources to deliver the maximum amount of benefits (applications, IT services, etc.). Resources are linked to budget: low is better. (Enablers 5, 6, 7).

10.2.4.1.6 Practice

A domain is a set of processes. A process is a set of activities. An activity is a set of practices.

For each practice there is a RACI chart with in the activities and the list of roles involved.

- **R** Responsible: one person or more who does the work to achieve the task.
- **A** Accountable: the person who is accountable for the correctness and completion of the task. ONE person. R reports to A and A approves work.
- **C** Consulted: people who provide information – Many persons, 2 way communication (e.g. R & C)
- **I** Informed: people kept informed of progress, receive results, read reports – Many persons, 1 way communication.

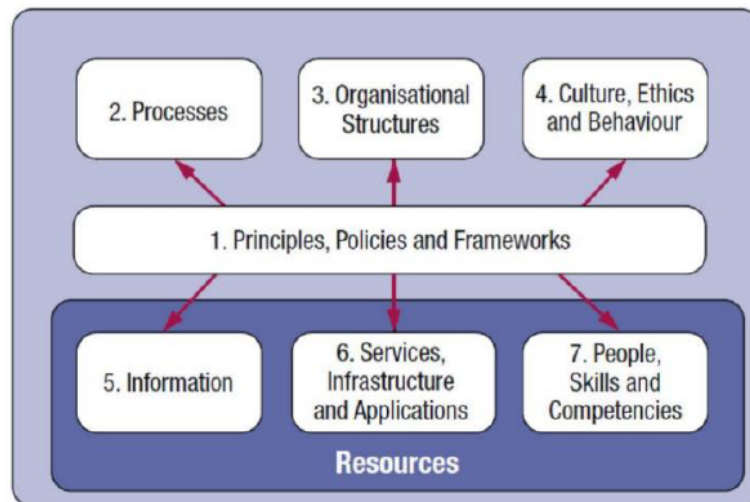
For each practice there are also:

- Document with Input and output, which are checkpoints: if you don't have Input you can't start and if you don't have Output you haven't finished.
- Measures per IT goals: a document propose the number of measures for each goal. E.g. 01 Alignment of IT and business strategy.

10.2.4.2 Principles

- Meeting Stakeholder needs
- Covering the Enterprise end to end
- Applying a single integrated framework
- Enabling Holistic Approach
- Separating Governance from management

10.2.4.3 Enablers



10.2.4.4 Process capability model

It gives a grade to an IT department of a company from 0 to 5, comparing what is happening in the department and what the COBIT document states.

0 – Incomplete Process

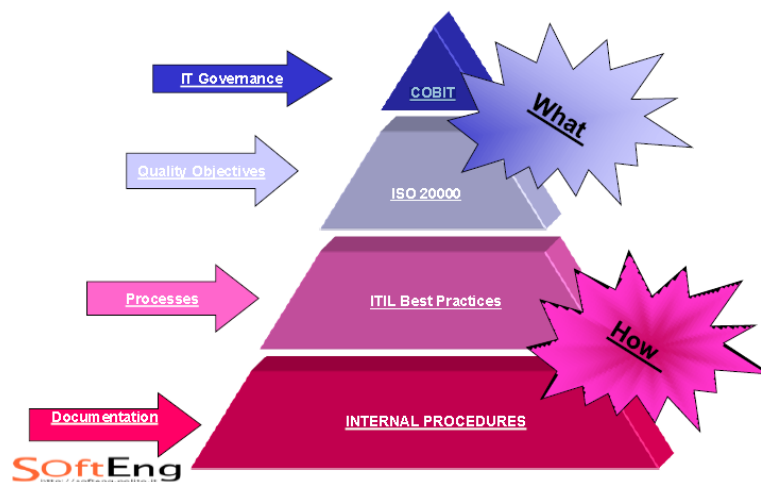
1 – Performed Process: processes done but not described, so that there are no measures and no possibility to improve them.

2 – Managed Process: some measures described.

- 3 – Established Process: all measures completely described.
- 4 – Predictable Process: all measures described and collected.
- 5 – Optimizing Process: matches "Innovation and learning" in BSC, top goals are adaptation and improvement, flexibility, capability to change embedded in the organization.

10.3 ITIL v3

ITIL (Information Technology infrastructure library) is a reference model to be used by company and it is considered best practice for an IT office. It can be used to manage IT services both developed internally to an organization or externally (outsourcing). IT is about delivering services.



Both COBIT and ITIL are model for organizing the IT group. ITIL is similar to COBIT (not one to one correspondence), but there is more known and the concept to divide people in groups. Key concept in ITIL are:

ITIL	COBIT
Service Strategy	Governance
Service Strategy	Plan
Service design Service transition	Build Acquire Implement
Service operation	Deploy Deliver Support
Continual service improvement	Monitor Evaluate

- Processes (services, it's the same concept)
- Roles (like Service Owner)
- Functions

10.3.1 Process

Process: set of activities to achieve a goal.

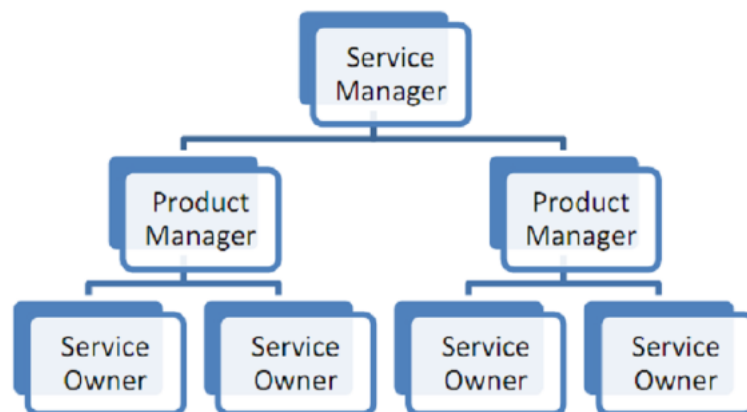
Service: an application used to implement business processes, a mean of delivering value to customers. Services are at different level.

Service management: people and infrastructure to deliver services.

Customer can be internal to the company or external.

10.3.2 Role

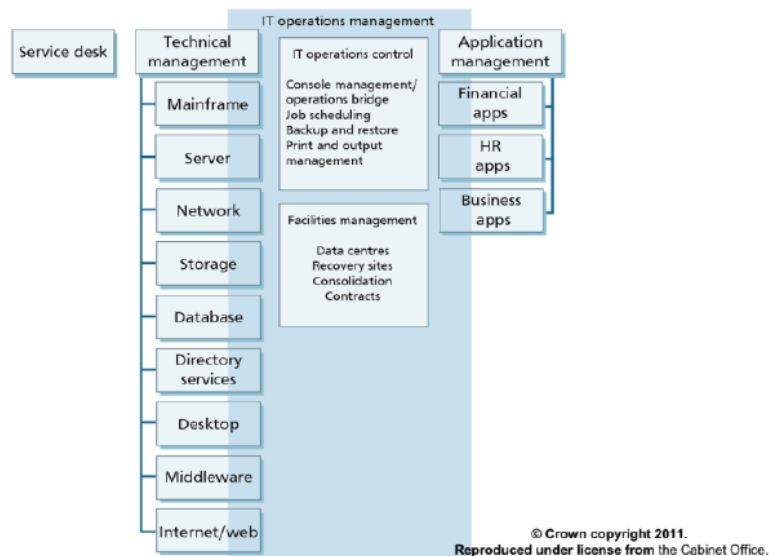
- Service owner: the responsible of a service, accountable for design, performance, improvement, management of a *service*
- Process owner: accountable for design, performance, improvement, management of a *process*
- Service manager: accountable of *all* services
- Product manager: accountable for a *set* of services



10.3.3 Functions

The new concept here is the function:

- Service desk: service people who are contact point between users - external and internal to company - and IT office. Often it is a call center to ask for support. It manages any communication to IT service provider(s), manages incidents, service requests, change requests and owns incident management process.
- Technical management: (infrastructure level - technical roles inside the group are listed, every one has a specific skill). It must ensure



that service provider has right set of skills and resources to deliver IT services, so that procures, manages, develops skills required, resources required.

- Application management: (application level). It must manage applications, end to end and procures, manages, develops required skills and resources.
- IT operation management: it is about all the operation regarding facilities and monitoring the software. It must manage day by day (IT) infrastructure and facilities (power, heating/cooling ...).

10.3.4 Resources and capabilities

All IT office is about getting the right resources and capabilities.

- Resource: tangible asset (capital, information, people, applications)
- Capability: intangible asset (knowledge, organization, processes)

10.3.5 ITIL Process

In ITIL there are 5 groups of processes:

- Service Strategy
- Service Design
- Service Transition

- Service Operation
- Continual Service Improvement

10.3.5.1 Service Strategy

It is about thinking and implementing new services, and for each service, features, ways of accessing it, pricing it, SLAs and contact point must be specified.

- Strategy management
- Service portfolio management: update portfolio of services, decide services to be produced / retired
- Financial management of IT services: secure funding, balance cost and value, compute cost of services
- Demand management: understand future service demand, endure capability to satisfy demand (see service capacity management)
- Business relationship management: establish relationship with customer, identify customer (service) needs

Here there is the list of services in deployment and that are being retired. Define the cost for each service, knowing the entire cost. Understand future, analyze trends. Capacity management is about now: here instead we try to figure it out the future and to define requirements.

10.3.5.2 Service Design

In software engineering it is thinking and implementing a new service.

It is about:

- Service catalogue management: the service catalogue is a list of operational services, subset of application portfolio. Service catalogue contains only applications that are running (available services), while application portfolio contains also the application under development. It provides, for each service Features, Way of accessing it, Pricing, SLAs, Contact point.
- SLA management: create, monitor, and review SLAs. SLA may depend on OLA (operational level agreement), so that SLA will require internally some OLA, which are lower level services.
- Capacity management: ensure services are delivered within defined response times with defined loads.

- Availability management: define and monitor availability (MTTF, MTTR, etc.)
- IT Security management: confidentiality, integrity, authenticity, non-repudiation.
- Supplier Management: negotiate cost/delivery with suppliers, ensure that suppliers satisfy agreements
- IT service continuity management: risk analysis and Business Impact Analysis, recovery of IT services in case of disasters, define Business Continuity Plan (BCP)

This works before and in parallel with service operation.

10.3.5.3 Service Transition

It is about managing changes. Goals are implement changes to existing services and deploy new services. In COBIT Operation and Transition are together, while in ITIL operation is about finding defects and the transition is the deployment part from the change to operation. Change means adding (remove or modify) functionalities to services. It can be normal (every tot) or emergency change (released as soon as possible). The change request is a formal request of change issued by a customer or internal user received by service desk and handled via change management process. It is typically called ticket. The release is a set of changes implemented/released together; it may happen every night or in the weekend.

In the Change management process there are specific roles:

- Change manager: for normal changes
- Emergency Change advisory board: for emergency changes (high priority high severity)
- Change advisory board: for large, higher impact changes

Each change must be authorized, tested and validated. Evaluation is about quality control.

10.3.5.4 Service Operation

It is about keep everything up and running. The goal is to provide services within planned parameters and restore services when needed. Three concepts are:

- Incident: interruption or degradation of a service
- Problem: cause of incident(s)

- Event: change of state in infrastructure or else that has impact on delivery of service, it is condition to monitor (e.g. number of machines, status of services), that can cause incidents if not managed correctly.

The main activities are:

- Incident management process: the incident must be detected, logged, classified, given a priority. A diagnosis must be done. After that there is escalation, to analyze at which level the problem is. Then resolution and recovery and finally closure.
- Problem management process: systematically analyze incidents and related causes, to prevent new incidents (also in long terms data-mining on the database of incidents to find similar patterns). Reactive problem management: fix problems as reaction to incident Proactive problem management: anticipate future incidents.
- Event management process: monitor and handle events (no action: log event-, warning, exception: perform corrective action)
- Service request fulfillment: support users in non-incident situations.
- Access management: provide access to services implementing a given policy. Systematic management of all account and access. The access policy is not defined here.

10.3.5.5 Continual Service Improvement

Monitor in COBIT. The goal is alignment and improvement (functionality, SLAs) of services. It defines and collects KPIs, CSF, measures. Define what should and can be measured, gather process and analyze data, plan and implement changes and investigate and diagnose.

Chapter 11

IT Governance

The IT processes defined in COBIT (Plan and Organize) are all relative to decisions in IT in the company: define strategic IT plan, define information technology, define IT processes, define IT organization and manage investment. The IT governance is about these decision. It is important to remark that we are considering company that are not software houses, IT is not the main process.

The corporate governance is the set of processes by which all companies are directed and controlled. The IT governance depends on the corporate governance, that must decide what is the importance of IT in company and how much budget allocate to IT.

IT governance is a subset of corporate governance that deals with IT system and service. The IT area must support the organization strategy and so IT Governance must know very well what is that (the key point is that IT governance must be **aligned** with the corporate strategy). The IT governance (limited by the constraint given by corporate governance) decides if buy or make software, what contractor to use and what technology.

11.1 Corporate strategy and IT strategy

The strategic plan is the key result of the corporate governance. It is the set of objecting and means of achieving them for the next 3/5 years. IT strategy is part or at least must support the overall strategy. The IT strategy is defined through the IS strategic plan and the IS plan. The IS strategic plan is defined to support the corporate strategic plan and defines how IS supports the strategy and the roadmap for developing IS in the company (considering the budget). Also this document is long term and consider a time horizon of 3/5 years. It is very important to align the IS strategic plan with the organization strategic plan. The IS plan have a smaller horizon (typically 1 year) and is derived by the IS strategic plan.

11.1.1 IS strategic Plan

The IS strategic plan defines:

- Current situation - Architecture, applications(Application Portfolio), systems (HW, OS, DB...), personnel and organization (include make/buy and vendor choices)
- The new situation - Architecture, applications, systems, personnel, organization and the new projects to be made.
- The overall IS budget (defined by the company strategy)

11.1.2 IS Plan

The IS plan defines:

- Budget
- Projects - defined by schedule and budget for each project

The projects are often defined taking the IT strategic plan and selecting the projects that can be made according to the budget and the time. The budget must consider the fixed prices, the costs of keeping the things up (staff, infrastructure, licenses, services).

11.2 Alignment

As said many times, the alignment between the corporate and IT area is mandatory to provide value in the company. An example of good alignment is the Benetton that decided to use data of sales to provide customers always the product they want on the shelf. There are two type of alignment: Explicit and Implicit. The explicit alignment is the situation considered before, where the governance defines the IS objective and critical functions that will support the Business functions. In the implicit alignment the CEO assigns to the business functions the objectives and then, each of them negotiate the IT needs directly with IT area. This requires that the charge is out of IS costs (there is an internal market and an evolution in outsourcing is possible). Aspects to be considered in IT alignment are:

- Business strategy
 - Scope
 - Distinctive competencies
 - Business governance
- Organization infrastructure and process

- Organization structure
 - Processes
 - Skills
- IT strategy
 - Technology scope
 - Systemic competencies
 - IT Governance
- IT infrastructure and process
 - Architecture
 - Processes
 - Skills

11.3 IT costs

One of the goal of IT governance consists in offering value to the company. The benefit should be evaluated and measured (yes, we are always speaking of money) and must be evaluated the costs as well (that are the only thing the CEO sees about IT area). Computing the cost is easier than computing the value. The costs can be: the IT area cost or the cost for a single IT project. IT area cost is the global cost of IT for the organization. It is composed by fixed costs (personnel, facilities, hardware, software) and variable costs (service from other companies, rental of hardware and software). IT project cost is specific for a project and it is often computed as TCO (total cost of ownership). This requires to consider all costs (direct and indirect, external and internal) in every phase:

- construction or selection (make vs buy) - requirement definition, design, coding, testing or requirement definition, vendor/product identification, contract definition
- deployment - install product, training users, data entry/reformat
- operation and maintenance - day by day support, changes in software
- dismissal - uninstall and dispose product.

Computing TCO is difficult, especially for indirect (hidden) costs, and for time span considered (years).

11.4 IT value

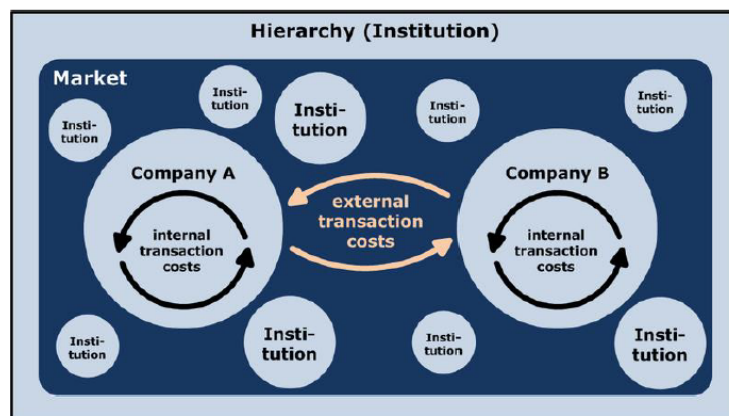
To compute the value that IT area offers we must use three economic theory of organization: Transaction cost theory, internal coordination cost, operation cost. The value of IT area is the saving that it made on those three costs.

11.4.1 Transaction Theory

This starts from those assumptions:

- actors take decisions rationally to maximize utility and profit
- all actors have all information

The consequence is that is the market that defines the best price of a product because it is a perfect place where doing transaction. So, the firm have to chose if it is better to produce internally or to buy from external companies and it is only matter of costs. The company have to choose if making an



internal transaction (IT area make the product) or buy from another company with an external transaction. The difference is that the market is not controlled and the price is defined by itself. Often the market offers better products at lower costs (due to economy of scale). Develop the same product internally means to know how to do it, is expensive because it is a special purpose product. However, market has drawbacks, in fact, it requires to make a contract between the buyer and the seller that describes the product (that is very difficult sometimes, think about designing a new car) and the money with legal obligation (used for negotiation first and for litigation later). So the market have hidden costs, related to the operation (searching the vendor/product, transportation, inventory holding, communication with supplier) and to the contract (writing and enforcing it). Those are not easy to compute, especially those regarding the contract. The contract has to

be complete and it has to contain description of service or product, delivery conditions and guaranty conditions with legal value. The service/product and all possible exceptions are hard to describe completely and it is often the cause of choosing to develop it internally. An incomplete description, in fact, caused by difficulty of description or information asymmetry, may allow opportunistic behavior of one or more parts (and often increases costs). So, the general rule is to use external transaction only when the product is very simple to describe and you know clearly what you want to buy. When you develop the product inside the company, often you don't describe it and you don't do any contract. Often firms use hierarchy to make an internal transaction. This is more efficient but it is often more expensive and you must have the know how (quality of the product can be affected).

11.4.1.1 Market transaction and firm size

The size of the company may change if the transaction type changes. It is possible to make:

- vertical disintegration, when the company bought on market a product/service that before was developed internally
- vertical integration, vice-versa.

It is important to remark the importance of the know-how in this operations. In disintegration, you are losing the know-how about the product. In integration you must have (or you must acquire) the know-how or you'll never be able to make an integration. The actual trend on company is to reduce the size of the company and buy medium size companies, becoming a network company.

11.4.1.2 Effects of IT on transaction costs

We can divide the effects for

- External transaction costs:
 - Lower cost for search, evaluation, selection (Internet is the market place)
 - Lower cost for communication (Internet)
- Internal transaction costs: lower costs for coordination and communication (many tools for communication are available, e.g. Slack, GSuite).

11.4.2 Internal coordination costs (Agency Theory, Decision Theory)

11.4.2.1 Agency Theory

Assumption of transaction theory is that firm is a monolithic entity aiming at one goal. Unlikely, due to non-rational behavior of firms and conflicting behavior of individuals in them that assumption is always false. Thus, Agency theory has a radically different assumption: analyses friction and disturbances that can happen inside an organization. Theory says that in organization there are principals (owner, shareholders) and agents (employees and manager). The firm is based on a web of contracts between principal and agents (explicit or implicit contract - if explicit very general). The problem of the transaction theory assumption is that it not consider that agents have own interests and goals, and they try to maximize individual utility – not only the firm's utility. Those contrast between goals of agents and principal (organization) causes agency costs (that have to be reduced as much as possible or company is destined to die). Agency costs fall in three categories:

1. Monitoring: control of agent by principal (time lost by principal, it's a cost)
2. Bonding: time spent by agents to report to owner (instead of working)
3. Residual loss: lost profits by principal due suboptimal behavior of agents.

For example, in a retail shop in which there are an owner (principal) and 3 vendors (agents):

- Monitoring: controls done by the principals to check what agents do (instead of doing other work)
- Bonding: reporting, by agent to principal, on activities done, so that the principal can control (monitor)
- Residual loss: customer asks for discount, vendor says no, customer does not buy OR owner would have granted discount, and completed the sale (choices/goals of agent and principal are not aligned).

11.4.2.2 Effects of IT on agency costs

The effect of IS/IT on agency costs is to ease the collection of information from lower levels that:

- reduces bonding and monitoring costs

- reduces the intermediate management levels (reduces depth of hierarchy, one single manager can control much more people)
- reduces specialization needs of lower levels
- increases decision power of lower levels

The problem of Residual loss remain.

11.4.2.3 Decision Theory

The key point about taking a decision is having the information to do that. Information is the key to support decisions and make it optimal. There are two problem regarding informations: (1) often information are imprecise, unavailable or delayed to the higher level (the ones taking decisions), (2) capacity of information management by individuals is limited. An interesting concept about decision is "Bounded Rationality" by Simons. It states that the decision cannot be optimal because all information cannot be always available. Simons said that humans have a limit in collecting, storing and processing the information. So all the decisions are taken inside the boundaries given by this constraint. However, we are in the "big data era", where there are thousands of data available and so, we should have a limitless boundary. Wrong, we have not because we have not enough processing power to handle all the information. This is called Analysis paralysis. Decision can be categorized in two ways:

- Structured vs Unstructured - if the decision is taken on well-defined parameter it is structured;
- Planned vs Unplanned - unplanned when occurs a disaster that must be repaired.

Decision are taken at many levels of organization. So, must be clear to whom giving the decision power; this is an important decision because it must be done to minimize internal coordination cost. Also, it is important that the one taking the decision is aligned with the goal of the company (see agency cost). There are decision cost when the decisions are taken where information is not produced:

- Communication, documentation (miscommunication): cost of collection and transmission of data to higher levels;
- Opportunity cost: delays in availability of information at higher levels and lost opportunities;
- Suboptimal decisions: because of delays / imprecision.

11.4.2.4 Effects of IT on decision costs

The Effect of IS/IT on decision cost is that it has a positive effect on quantity and quality of information, availability of powerful tools to support decision process (model building, what if analysis, browsing and exploration of data). It has instead a negative effect on quantity of information (information overload).

11.4.2.5 Internal coordination costs

The internal coordination costs are the sum of the cost of agency costs (monitoring, bonding, residual loss) and decision costs (communication and documentation costs, opportunity costs, suboptimal decisions). It is very important to allocate decision power in order to minimize the Internal coordination costs (ICC).

11.4.3 Operation cost

Those are the costs to produce product or service: they can be fixed or variable.

- Economy of scale: Unit cost is equal to Fixed cost / number of units produced. Important for large manufacturing companies.
- Informational economy of scale: Fixed cost / number of services offered. Favors service companies with larger customer base.
- Economy of scope: Fixed costs / number of products sold. See for example Procter and Gamble (having Pampers and many other sub-brands).
- Demand side economy of scale / Network effect / Network externalities: value of service increases with number of users (Ex. Telephone network, Social networks).

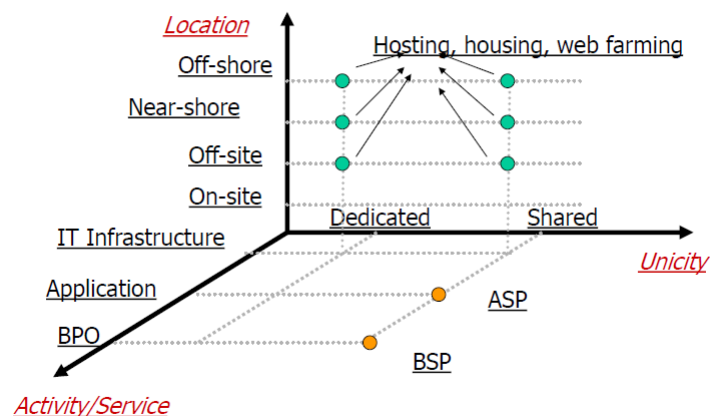
About those costs IT cannot do a lot.

11.4.4 Outsourcing

In terms of transaction theory, outsourcing means changing from internal transaction to an external one. Outsourcing may include vertical disintegration (transferring resources outside the organization). The opposite of outsourcing is in-sourcing: changing from external transaction to an internal one. In-sourcing may include vertical integration. IT outsourcing is a strategic decision. The decision must be taken considering: cost, quality and service (KPIs, SLAs), strategic effects (is IT a core activity), the know how that can be lost, protection of data (if we outsource we are not directly

owning our data, that can be leaked). The main trend in the last 20 years is to use Software as a Service (SaaS). It is a software licensing and delivery model in which software is licensed on a subscription basis and is centrally hosted. It is sometimes referred to as "on-demand software".

11.4.4.1 Axes



- Location (important for privacy and law system): On-site, Off-site, Near-shore (Italy, Europe), Off-shore (US, China, very far places)
- Activity/service: IT Infrastructure (IaaS, PaaS - if you does not store sensible data, anything can be outsourced), Application (SaaS or development of custom applications), BPO (all the IT process is externalized)
- Unicity: Dedicated (made for you, customized) or shared, made for many customers (general e.g. google docs)

Important concept for IT infrastructure outsourcing are:

- Hosting: hardware is property of outsourcer in site of outsourcer (they pay for all, company pays a fee)
- Housing: hardware is property of organization in site of outsourcer (they pay fixed cost, company pays hardware and a fee).

The recent trend for IT outsourcing is Cloud Service that offers IaaS, PaaS and SaaS (from cloud we can get application - Google Doc, Google Maps), platform or even the infrastructure). They are bought from external vendor

as a service. Outsourcing can apply to resources (Application, infrastructure) and process domains BAI and DSS of COBIT. The other two domains of COBIT (APO and MEA) are in charge of deciding/monitoring outsourcing.

11.4.4.2 Outsourcing decision

Before defining the steps of outsourcing decision, it is important to examine the service to be outsourced.

- Is it a strategic service or not? A strategic activity can be outsourced anyway, but better do it internally.
- It can be packaged and done outside? Is it easy to define? A commodity activity may or may not be outsourced, if too complicated and not well formalized.
- Can be done outside at lower cost, better quality and shorter delay?

It is also important to define who (checking they are available and skilled) will select the vendor and write the contract (planning the outsourcing) and who will monitor outsourced activity (monitor outsourcing). When you take the decision of outsourcing you also should consider those risks:

- Changes in organization and Its strategy, maybe losing know how (vertical disintegration)
- Changes in service or vendor
- Changes in technology or environment

11.4.4.2.1 The outsourcing process

There are mainly 4 steps in outsourcing decision, 3 about planning and 1 about monitoring:

1. (PLANNING) Define activity or service (with requirements and SLAs): the general rule is that "if you really could write the whole job down on paper, then someone else can do it" (F.Levy).
2. (PLANNING) Find and evaluate vendors: as regards vendors you should evaluate their history, products history and users. Avoid to have only one vendor and be careful to evaluate the persistence of the vendor. This activity is often long and not proportional with respect to the cost of transaction.
3. (PLANNING) Contract writing is the most delicate activity. You have to define the legal part with the technical annex (product description) and the SLAs (also the KPIs are useful). The key points are:

- As said in (1), the harder to describe activity and define SLAs, the better to insource the activity;
- Consider how to change/suspend contract without penalties in case of changes in service description, technology or context;
- Consider the duration of the contract, the higher the risk, the shorter the contract;
- Consider what happens if the service will be insourced again (property of data, procedure, hardware, assets and most important people and know how);

The contract costs are made of contract writing and contract enforcing: there is a tradeoff about them, the highest the first, the lowest the former and vice-versa. Those costs are often very high and difficult to evaluate (often they are implicit); Another cost is the litigation cost that must be considered when you and the vendor disagree about something. This is impossible to predict and it is often an high cost.

4. (MONITOR) Contract enforcement / monitoring (SLAs with vendor).

It is important to understand well what is a **SLA**: place where exception are remarked (for example, if your ISP must provide you 5Mbps and a day you have 2Mbps then SLA is not respected). SLA must be capable to control the relationship defining all the possible exception but often SLAs is not right the first time they are written. Improve always the SLA is often not possible when the contract is written. Contract and SLA can be re-negotiated, but negotiation is hard (if you ask more then they ask more money, if they ask more you don't have high flexibility to negotiate and you should accept or you have to consider switching cost). The better approach is to check SLA at regular time and check and solve in friendly way the issue. To summarize, the CSF in outsourcing are:

- Do not overlook the hidden cost
- IT skills remain needed for monitor and plan
- Continuous control of contract, interaction with vendor, partnership
- Continuous analysis of risk and changes

Chapter 12

Marketing

12.1 Introduction

Definition in '60: Activity of a company to conceive a product/service and sell it to a customer, for a profit Definition today is broader, not only for companies (cfr politics): Activity of an organization to satisfy the needs of other individuals / organizations offering products / services or promoting ideas/values

- Marketing in initial state was product oriented. There was little competition and the companies were oriented to manufacture, this was the leader function of the company.
- Later, start to raise more competition, there were many possible products and companies Want the customers to buy their, and so, companies have to make advertising a key activity.
- The final stage is using the market to sell the product you have, convincing people that it is the best on the market. Then, companies collect information on the customers and understand what should be the next product or service. Following the customers to understand what they want e what they want to buy to develop product. Marketing became a key activity for the company and it was integrated in every company functions. Nowadays, it is the marketing that decide the next product to be developed and design it.

Summing up, nowadays marketing became the core functionality of the company. In the first steps of marketing, the engineering function were the core function, but now, the marketing (and customers) are the core of the development process.

Three activities today:

- Communication and advertising: not only for products but also for the brand (e.g. sponsor for sports event). Branding: build a reputation for the brand.
- Analysis: collect and analyze information on market (about customers, sales, competitors).
- Design new products considering the collected data (not by engineers but by marketing people).

Digital marketing grows due to the capability of collecting and processing data. Since some years, the innovation provided companies new way to keep and process big set of data with the so called "Big data" techniques.

Channels in marketing also change a lot: from traditional media (journals, TV, radio, word of mouth, fliers) to digital media (social media as Facebook, web, email, IM) powered by the radical changes in new technologies (smartphone, internet, social media). Nowadays, that everybody is on-line, digital marketing is the rule due to its ability to collect, measure and analyze who sees and interact with our ads. It is more powerful because it is faster, it requires less entry barriers and there is more data available.

12.2 Digital marketing

In digital marketing there are two main thing to take into account.

1. first point is strategy: identify strategy for company and for the ads; as the other functions, also marketing depends on the company strategy.
2. Tools are the medium to use in marketing; they are:
 - Web Site
 - SEO
 - Email, newsletters
 - Social Networks
 - Affiliate Marketing

12.2.1 Strategy

Strategy uses the 4 P's.

- Place - Internet: Web Site (how to appear top on search engine), IM, Social. Moreover, you should know how to integrate with the traditional channels.
- Price is transparent for you and for competitors.

- Product that must provide a value and must be consistent with what is promised.
- Promotion, right integrated mix of web site, SEO, email, IM, social network.

Also, the strategy must define what tools to use and how, the goal of marketing for each tool and for the strategy. The strategy depends on product, customers and competitors.

12.2.2 Web Site

The basic conceptual tool is Digital Marketing Funnel (DM Funnel). Less pool of users from top to bottom.

Figure 12.1: The Digital Marketing Funnel



- Exposure - Be aware of existence of website; tell people that your web site is there.
- Discovery - Visit website; They visit your web site. (You know nothing about them, only IP address).
- Consideration - Leaving information; they became prospect, they have not bought nothing but can became customers (Visitor tells you the data about himself, email, name, etc).
- Conversion - buy something; make the visitor customers of your web site.
- Customer relationship - buy something again; Customer can ask question, complains, satisfaction, reviews and so on.
- Retention

Attach to the funnel there are measures.

Discovery	hits per day
Prospects	numbers of hits per day per IP, numbers of new emails left, numbers of new accounts, numbers of inquiries receives
Customers	numbers of sales
Retain customers	numbers of sales per customers per period

You want to increase the ration between number of sales and hits. The funnel should be most cylinder as it can: Who hits also became prospect, who became prospect buy and who buy will buy again. The conversion rate is the measure of the the number of user that proceed between each step. Conversion rate equals one when all hits became prospect, that become buy and so on.

Web site is a value (also the domain name is) and is completely under control of organization. The goal of the website must be defined and it depends from the strategy. In any case, it must provide usability and accessibility (to people and browser, it is important to follow W3C recommendations). General recommendations are:

- Define keyword around which to create the website
- Choose a valuable domain name (easy to remember)
- Choose if housing or hosting your website
- Define general structure
- Give a graphic format
- Use a valuable home page, no 'click to enter' button, no long animation/presentation
- Content should be easy to grasp, using inverted pyramid principle (content of the web site must be done with inverted pyramid principle as it is done in journalism - put most important information on top).

Usability recommendations are:

- Never use PDF files, the search engine is not able to see it and user have to open another application to read it
- Use as few as possible scannable content (dynamic content) that is bad for SEO and user with old devices
- Never use pages not resizeable
- Never use not meaningful title page. Title is important, it is an important keyword for the search engine. No word such welcome, articles and so.

- Never add advertisings on the page. It gives cleaner pages and better user experience
- Never violate the design convention.
- Never open new browser windows

12.2.3 SEO

Search Engine (e.g. Google) uses spiders to scan all internet pages to discover, for each page, the keywords attached. Then it indexes the pages and when you make the request for some searches, it returns SERP (Search Engine Result Page) that can be: Organic (list of website containing keywords ranked with an algorithm) or Sponsored (list of paid ads related to keywords).

The algorithm for organic result depends on:

- How many links refer it
- Number of click
- Importance of website

If you want to be up you must realize your web site with right keywords. You have to focus the website on your keyword and it has to be the most popular one. Key points to get at the top: follow the guidelines given by search engine (Text is scanned, dynamic content is not). Carefully consider the keywords the web site is based on. Defining the keyword is not a well defined process, you should try using different keywords and see the results.

- Too wide means huge competition
- Too narrow means less matches
- Concatenating two or more words could be the best option

Remember that the search engine indexes per page, not per web site, so each page should be optimized (using different keyword for each page).

12.3 Nomesia Presentation

Web marketing agency and Google marketing Internet is going from desktops to mobiles. Time spent on internet is divided in:

- Half on searching
- A quarter on social
- A quarter on email

This give us a concept, the main share is on search engine that are still driving most of our attention on internet. There are 2.5 bn users of Google and 100bn queries every month. In digital marketing we can measure things. For example, if we want to know a query on our intention, they give us that we make it:

- More complex queries ("What" was used in the past, "How" is the most used now, "Why" is growing and will be the next most used. The simpler is "What", the complex is "why", it requires intelligence to answer).
- More conversational, more like talking to our friends
- More at the moment

12.3.1 How to build a site

When you build a site you must know the content and you must get this content useful for SEO, ADV and social. Indexing is tech name for Searching. What goes on internet have two customers: visitors that get on your site and the spiders. Spider is the program that analyzes the web site and collect information. They read all websites in the world. Structure and content on page have a impact on indexing by the SEO. So they must be made based on the opportunity to intercept the traffic of the target Analytics oversees the control and optimization of results.

Keyword map is expensive, need a table full of lines and you must develop your website according to your goal.

12.3.2 Advertising and Search engine marketing

Website can be represented as a flower. The site is the stem, the content is kernel of the flower, petals are Advertising, Social and SEO. The user is like a butterfly that must be attracted by the petals to get into the flower. So, petals of the flower are very important. SEM means to buy advertising from SE. You can pay Google for a space in the search page for specific queries. With this you will intercept the target audience that will visit your page. Another thing that you can buy is a pop up or a set of screen in other website and show there your ads. Advertising must be aligned with your content.

12.3.3 SEO

SEO is both on page and off page. On page is keyword research, web structure, W3C validation, meta / title tag, image/video optimization, site map creation. Off page is directory submission, social bookmarking, blog submission, PR submission, article submission, and so on.

SEO goes through indexing WS. On page optimization goes to content and meta texts (spider reads it). Guest posting: Posting an article on another web site that redirects to your site.

12.3.4 Social Marketing

We have to choices to make new contact: going to another party or host a party. Community marketing is hosting the party at your house, and you must be kind with all guests and prepare all for them at best. Influencer marketing means go to friend home. You uses a social profile of a well known friend to sponsor yourself. Community marketing is very hard to keep up. When there are a lot of people complaining on you, it is better to go at friend's home.

Influencer pyramid for influencer marketing:

- Web star (1 000 000 fans)
- Blogger / Youtuber (100 000 fans)
- Smart Influencer (1000 fans, a normal person)

The first gives the effect that VIP are emulated by the mass, so if they uses a product, all want to use the same. The second are considered experts in some matter, they have high reputation and will be listened if advices something. In the third you have trust, you are listened by your friends.

The first is most expensive (30.000 Euros). You can talk with blogger and you tubers, ask for a price (300 to 800) and pay for having your article in them. For the others there is IT platform (VOICR.it) in which reward you with CPC (cost per click). From 10 to 60 cents of Euro. (The best of us can make 50 Euro per month).

You tube is in the half between advertising and social. It is interesting for advertising because it is quite inexpensive and it is growing. YT is the destination of passions and those are often connected to brands.