# POLITECNICO DI TORINO

# **Stage Engineering of Telecommunication**



Informative systems for the management of the prevention of the health and the safety of workers and for the environmental quality of enterprise

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### Introduction

Our aim was to analyze the possibility to configure and use an intelligent network to generate an information system facing corporate users.

We have chosen our main object the management of health and safety of workers and the environmental quality of the production processes.

We felt that this issue is sufficiently cross-disciplinary and is of interest to all types of companies.

We hypothesized that the network to simulate companies to a defined territory (district, province) or businesses to a defined market sector or even to the establishments of an industrial group or of a holding company.

We also hypothesized that the need of the companies was to start a HSE management, without previous experience.

We have also assumed that all companies were connected to a DSL network of medium capacity and they had an average endowment ICT, with workstations on the network.

We imagined the minimum level of expertise and equipment to be able to understand the project even small and micro companies.

However, we have assumed a complex and complete scenario, which is able to respond to the needs of a large company.

In order to standardize the functions of the network and the information system that is conveyed, we used an information system and the HSE management existing calibrated properly for any industry and company size.

The company Digitalis Srl, with which we have developed this research, has provided us with the management system that produced the "System Environment" and his experience of testing in different scenarios of businesses.

"System Environment" seemed appropriate to identify the necessary information capabilities to the company and the applicable management method.

There seemed to be possible to hypothesize the over-enterprise capabilities of the information system, without have cleared and defined the dynamics of the internal functions to individual companies.

For this reason we have chosen to equip all companies with the same method and management system, and this "System Environment" aided.

Another motivation was the flexibility of use in contexts of different sizes and the existence of different language versions, which helped us to share more specific aspects and secondary

from the multilateral and the founding of the method and the functions of a proper and effective management.

In the initial phase, we tried to reconstruct both through search engines and through the analysis of specialized websites, offering information and services existing in HSE.

We have realized the great diversity of information greatly dispersed and contradictory to mix between documentation of good utility and reliability and trivial documentation and even instrumental information to a commercial offer.

The set information is found to slightly organisable and usable, and above all more able to generate uncertainty and doubts in the user and not to give adequate aid and technical support in concrete situations.

In the development of the research, we have therefore tried to follow the principle that information should be available when needed and in the most useful form.

Most of the investigations was expressed with the graphic slides, in order to follow the real dynamics between all involved.

### Goals

Design a system for integrated management of HSE in company

Design its organizational and information processes

Design its need of support

Design its need for knowledge

First the goals of the research are focused on the dynamics of the corporate functions involved in HSE management, processes and organization that are induced on the supply and demand information that is active within the company.

In particular, we analyzed the management systems (formal or informal) that already exist in every company, meeting the needs of organization and planning of production, commercial and administrative management, the accounting relationship with employees and with customers and suppliers.

We sought to draw a real integration of different management systems, identifying the common centers and operational interactions.

To this end, the configuration of the "System Environment" has helped us in making parallel and related processes that today are now separated.

All points of the various management systems can be identified and merged with the HSE management system: the individual settlements, working premises of which they are composed, the work steps that connect in production cycles, machinery and equipment, workers and their professional competence, materials and resources that are used, suppliers, products, waste and emissions that arise from individual processes.

Across the joint enterprise is both the source and destination of procedures from time to time regarding technical capabilities, administrative and health prevention and environmental protection.

We then tried to draw the top two levels of the network, directed by the company outside and from the outside to the company:

#### - The first level of functions:

- mainly of support, to be able to integrate the outside skills that are deficient in the company and to facilitate the necessary training processes;
- with administrative and supervisory purposes with preventive intervention and simplification of procedures;

## - The second level of functions:

- o of documentation and of second level education (Data Banks, e-learning etc.)
- o of communication between companies and specialized operational centers (Reach, Waste Exchange etc.)

The result has been the need to draw a complex network at multiple levels, with tools that are easy and intuitive orientation, to be able to select the question and to proportion the information or service related.

# Working hypothesis

The main working hypothesis is to be able to set up an information system coordinated between the business organization, a system of public and private, and a database system; the hypothesis examines the ability to activate in order driven the demand and supply information.

The second hypothesis is the possibility of integrating management systems through appropriate functions of the corporate network, making the sharing of data at all levels of the company and the interactivity by groups of workers ..

The third hypothesis is that the consistency of the functions at different levels of the network allows you to practice a linearity between the functions of learning management (through the HSE management system company), training generalist by support functions and specialized training through e-learning of the 3rd level of the network.

Finally we worked on the assumption that to implement the project it is not necessary to create new infrastructure data transmission but only to complete connections ADSL and computerization within the companies.

The verification of these hypotheses was conducted through the following analytic insights and their consistency with the results

#### Materials and method

## The structure of the stage

Digitalis S.r.I., the facility where I did my internship, is a small company that developed the "Sistema Ambiente", a computerized system for the management of the prevention of health and safety at work and environmental compatibility of companies (see contents).

The system was developed based on models of participation and intervention tested prior to computerization and later was tested in operational environments of each sector (manufacturing, services, administrative) acquiring as considerable flexibility and ability to adhere to organizational and more different structures.

In a second phase, starting from the legislative consistency at European level, the system was designed to operate multilingual, allowing data sharing between users who use different languages on the same server.

In this phase the compliance was tested of the system in different national contexts, possible appearance because the system is based on risk analysis and the characteristics of the process and the organization of work and not on the dependence of specific rules from time to time maybe are valid in different contexts or periods of time. Indeed, the use of the system and its proactive method, based on its own analysis, facilitates the verification of compliance with specific rules and planning controls.

In a third phase, the system is tested in environments outside Europe (Latin America, Africa and China) deriving the confirmation of full compliance management system.

Over time, the structure of Digitalis S.r.l. structure has become a "network" by partnering with other small companies engaged in the material with which it operates "at a distance".

#### The material

I had access to the "Sistema Ambiente" and a number of examples of application and use.

I used documents illustrating the characteristics of the risks to which I have referred.

Many of internship time were devoted to investigations regarding the matter and the business issues.

#### The method

After the first phase of documentation, I proceeded to make an analysis from my point of view of network design.

I proceeded to divide the functions in the operational phase which is necessary for a complete management within the company, then:

- what the company figures are involved
- what the information currently available to each one is
- what the roles that each exercise are and what influence they have on the global management
- what the relationships between the various parties are
- what the organization which has responsibility for managing HSE is
- what the new information to enter the circuit company information are
- what the new relationships that management requires HSE are
- what the different management systems are and what the interrelationships between them are with the HSE management
- what the functions of recording, planning and processing of data are
- how suppliers and users of data can operate
- what the information that the company can not have and can get outside are
- what the information that the company must provide to the outside is

I depicted this analysis by using the graphic slides in which I tried to highlight the predictable dynamics.

I finally looked at the instruments of the transfer of the available data to the company both internally and in liaison with external parties.

# Symbols and abbreviations

**HR** Human Resources - It is the business function that develops the administrative functions that concern the workers

**HSE** Health Safety Environment, the control system of the risks to health and safety of workers and the environment.

**Prevention Office** Technical service turned to control of the risks for the health and safety and to execution of the Prevention Plan

**PR**: Prevention Responsible, figure technique that instructs the CEO to perform risk analysis and organize the Prevention Plan.

SA abbreviations of "Sistema Ambiente"

**Work doctor** Specialized doctor in the knowledge of the illnesses that can be provoked by the job

**Work phase** Phase of the operational flow of the firm in which different duties interfere wkth a specific work organization and with homogeneous characteristics of risk

**Worker's group** the group of workers that operates in a work phase that shares the work organization and the risks

**Worker's group representative** The group of workers elects a representative that helps the group to verify the risks for the health and the safety and that it examines the problems with the PR and with the CEO

# Company network analysis

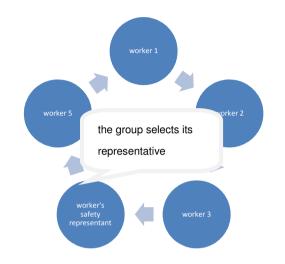
### **Premise**

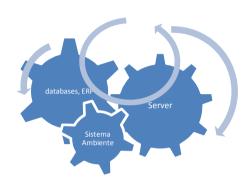
To think about the information system aimed at improving the company. First of all, I have done an analysis of what is happening and must occur in the management of an establishment company, following the method described previously.

The examination performed on the current state. I made it clear that the wide availability of information today on the network is not intended to uniquely and consistently to the needs that arise in business contingencies: it is, as I said, of information and dispersed often without any validation.

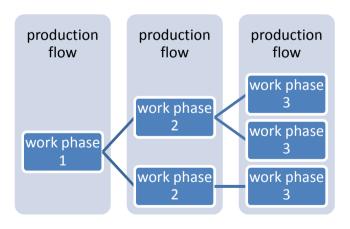
I chose to configure as a starting point the information system the real dynamics of business management to understand: first of all, what are the information needs. And when how they originate.

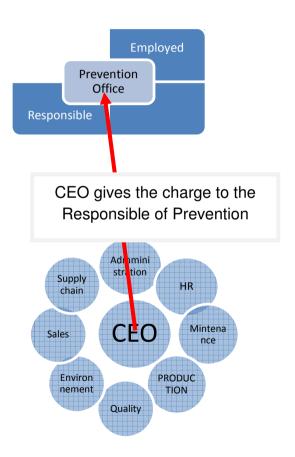
Prevention organization and Risk analysis

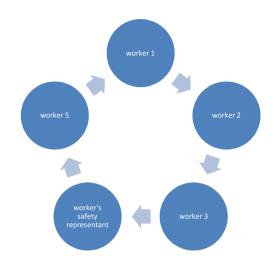




head of group work phase responsable





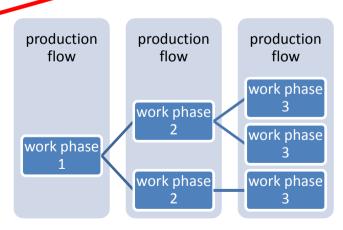


databases, ERP Server Sistema Ambiente

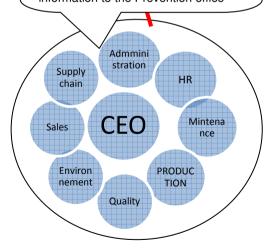
Prevention Office
Employed

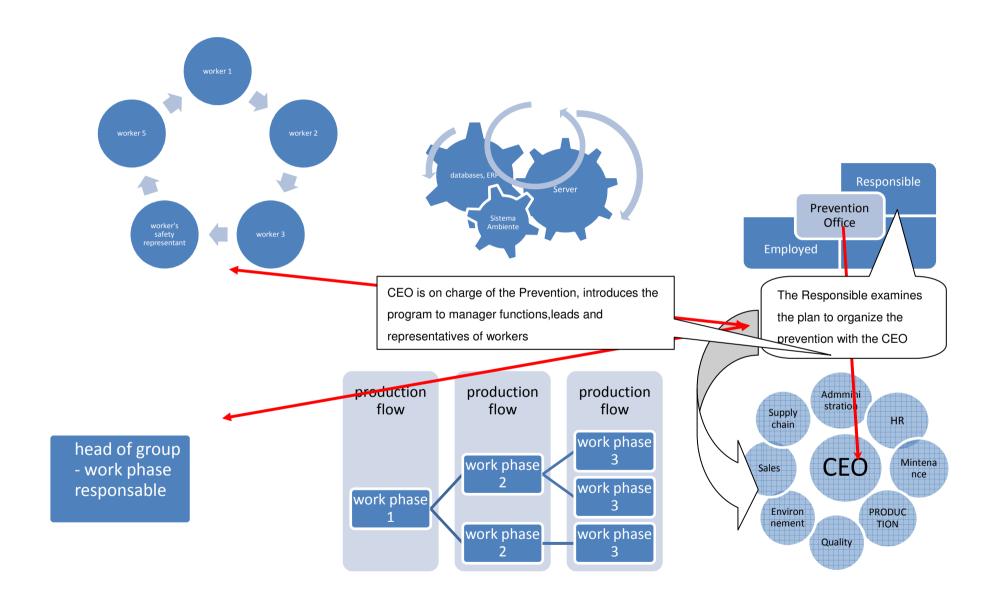
The work phases is responsible of furnishing the technical and organizational information to the Prevention office

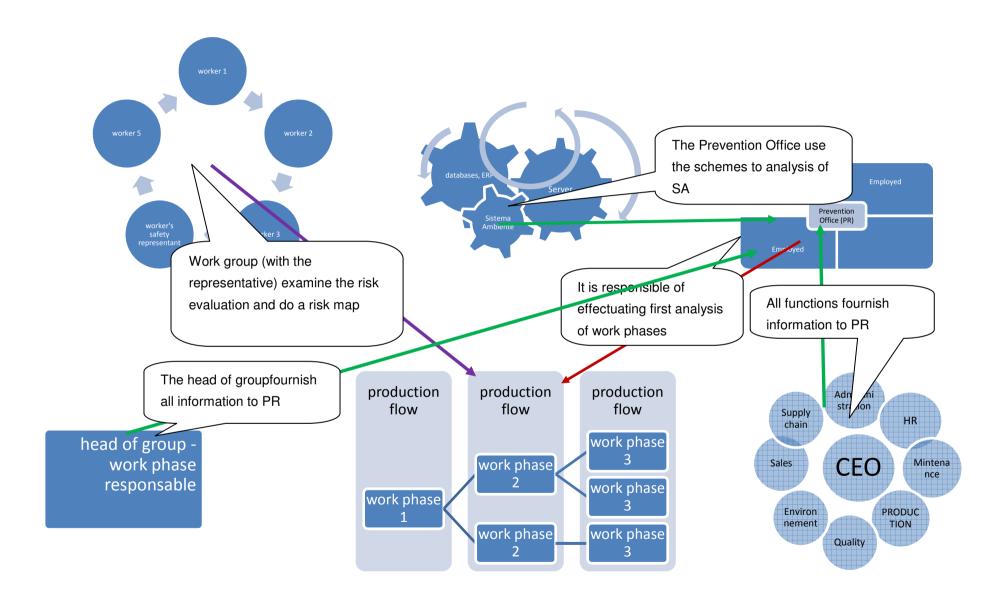
> hea of group work phase responsable

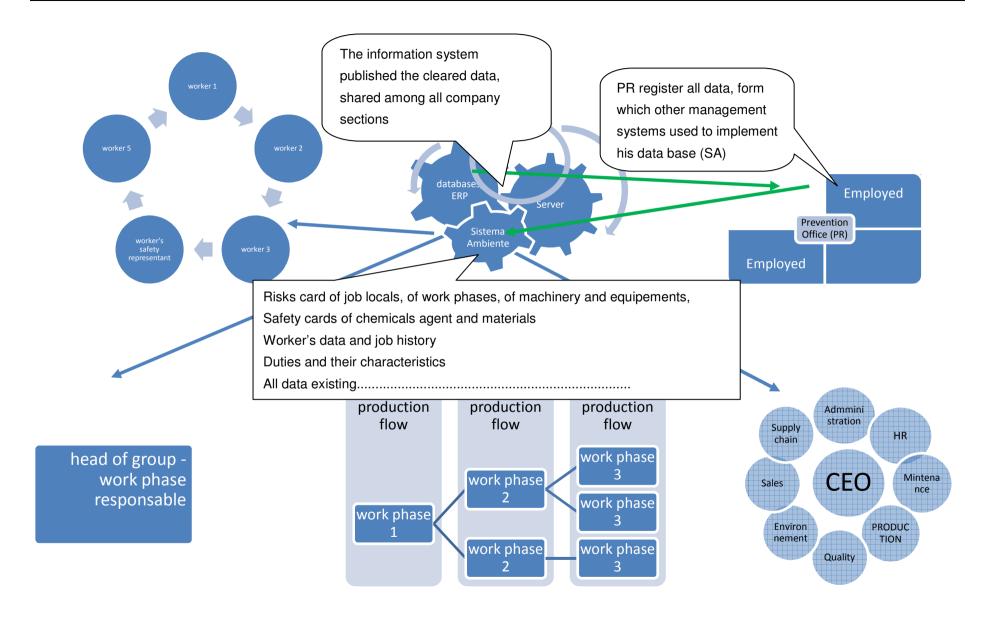


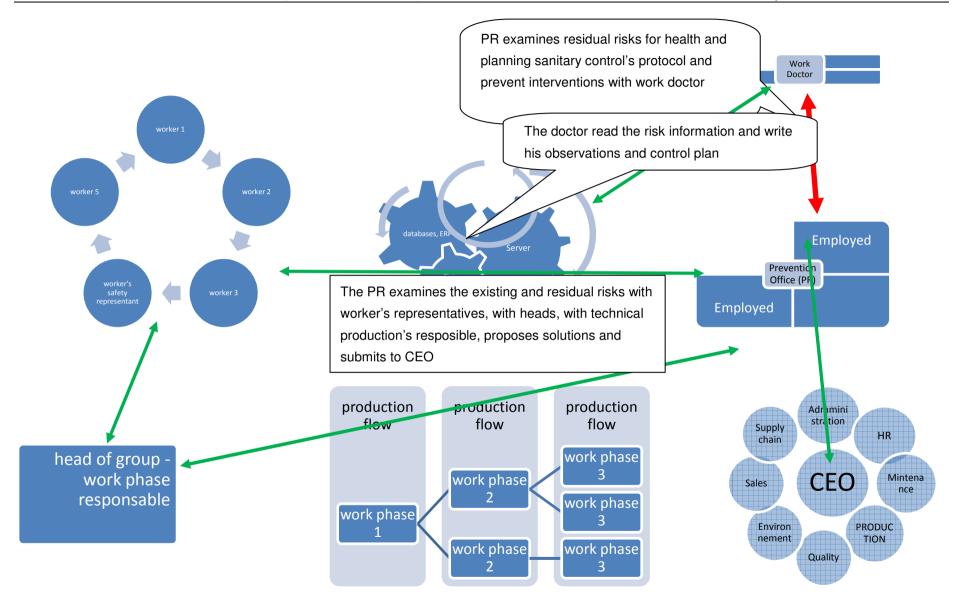
the company's function is furnishing the technical and organizational information to the Prevention office

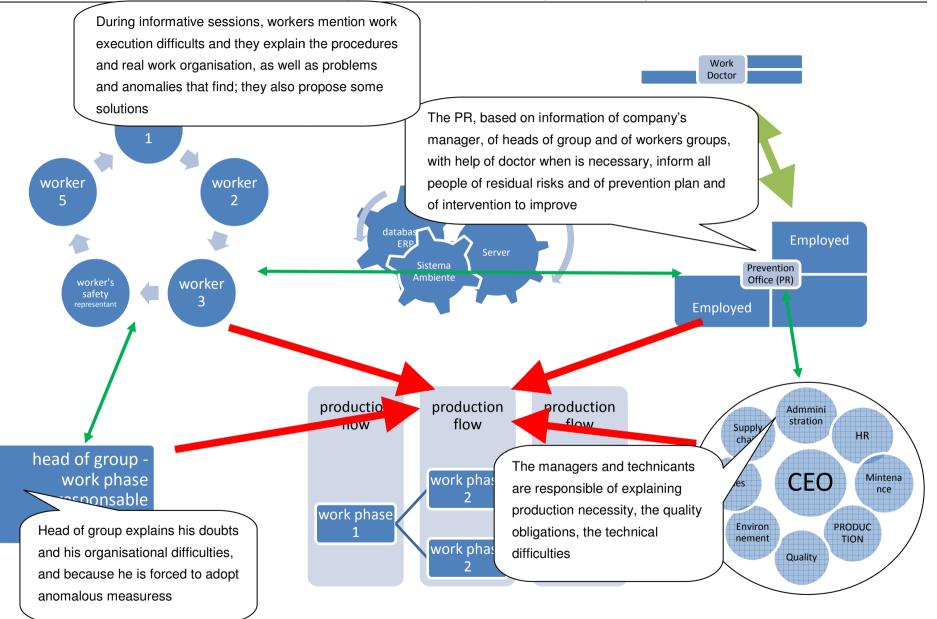


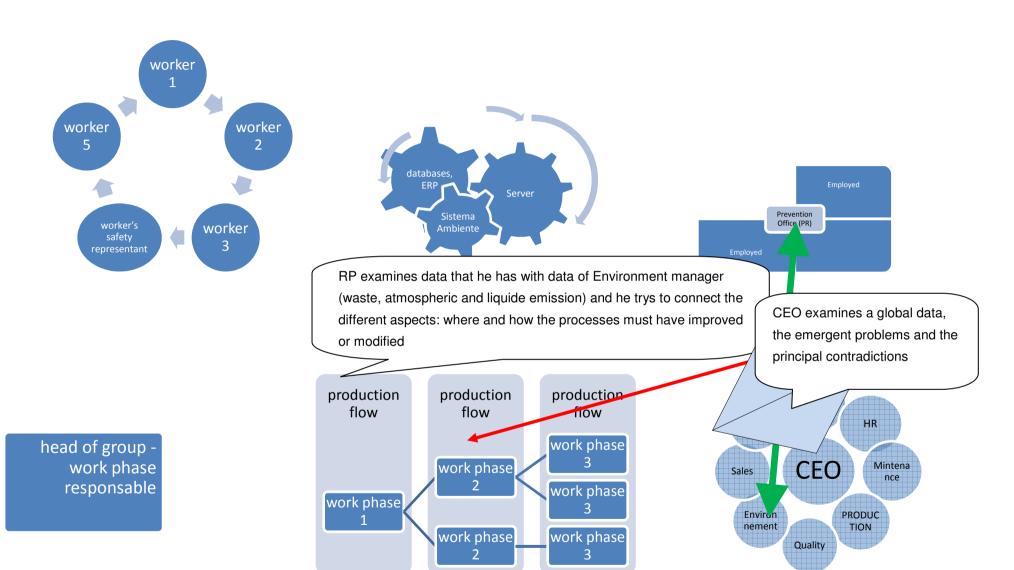


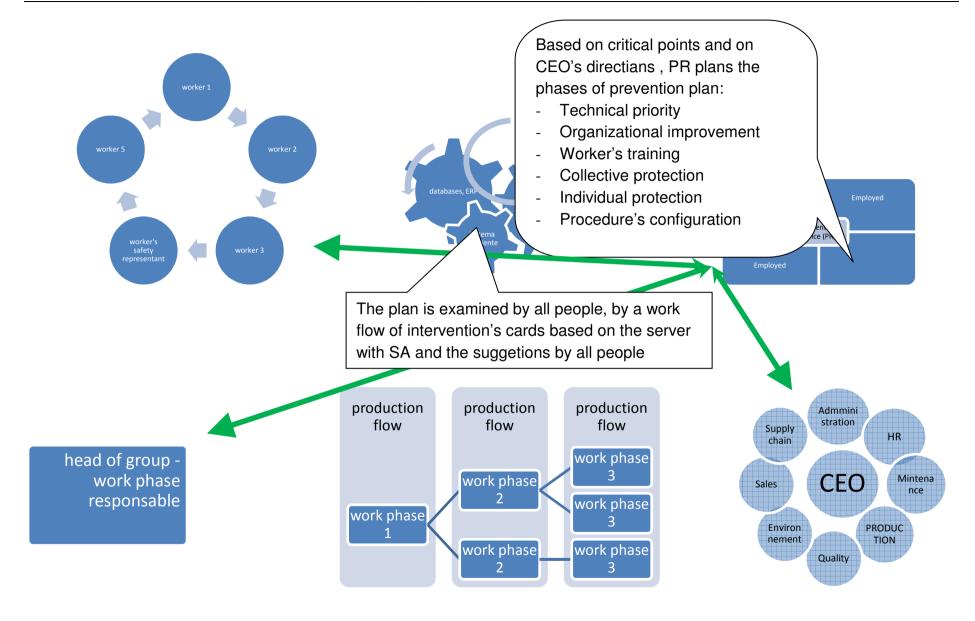




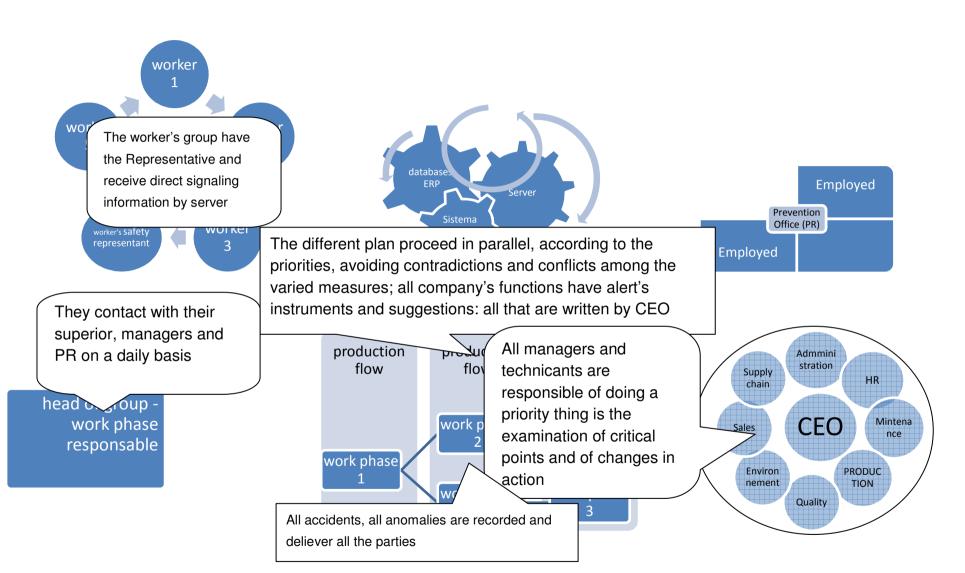


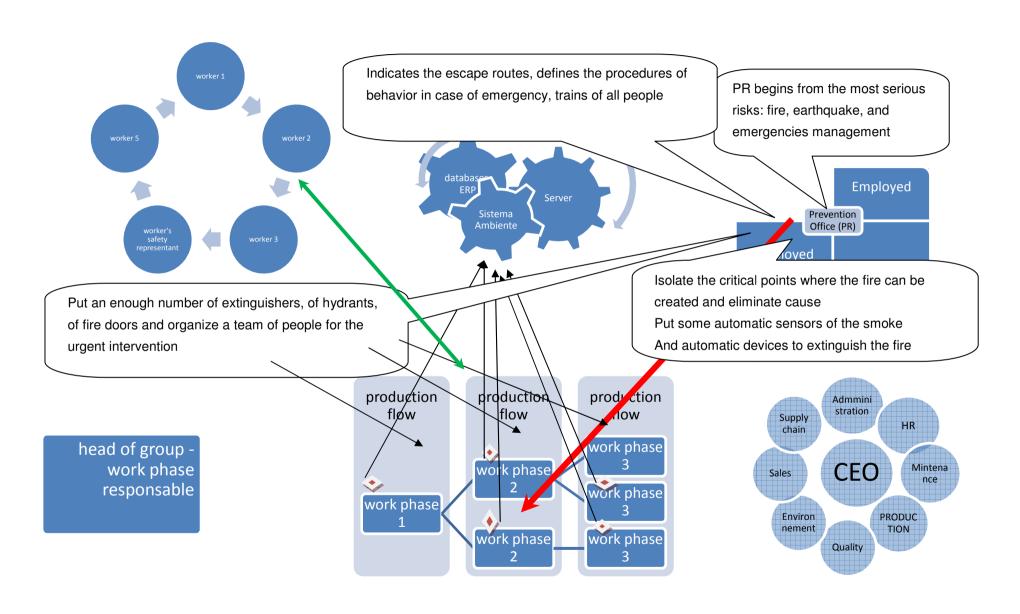


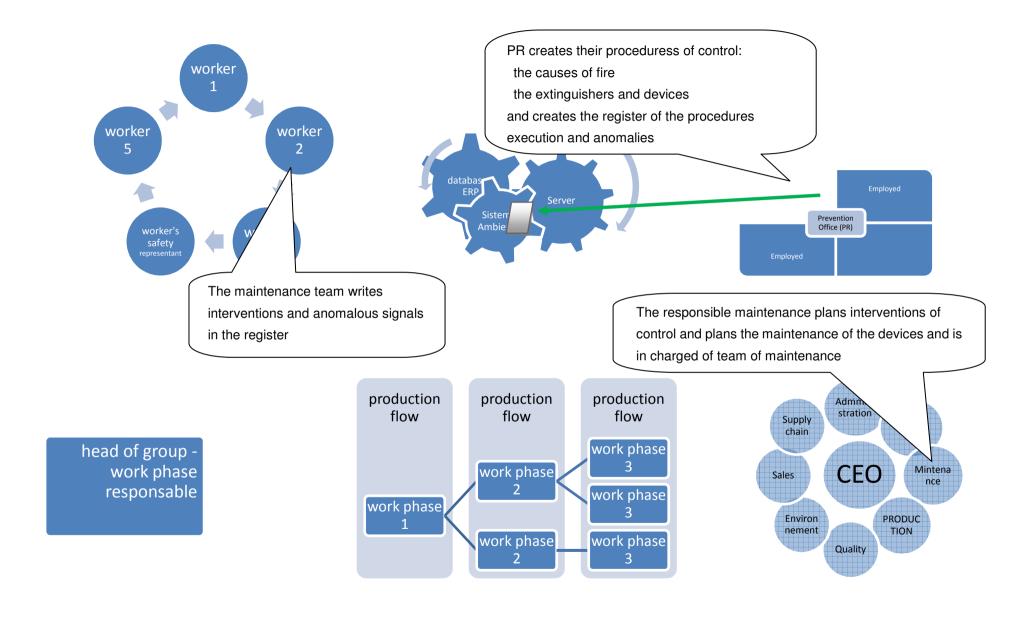


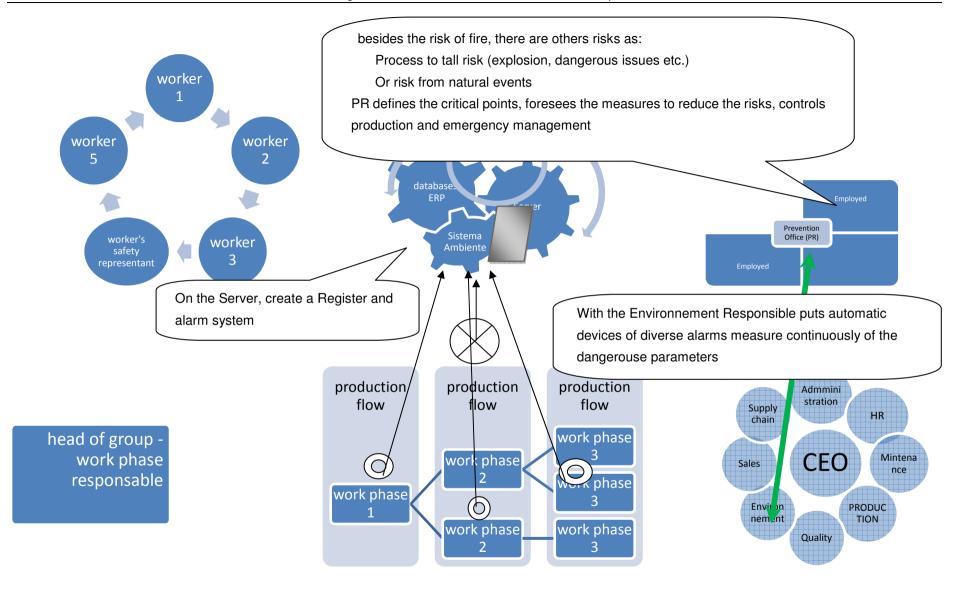


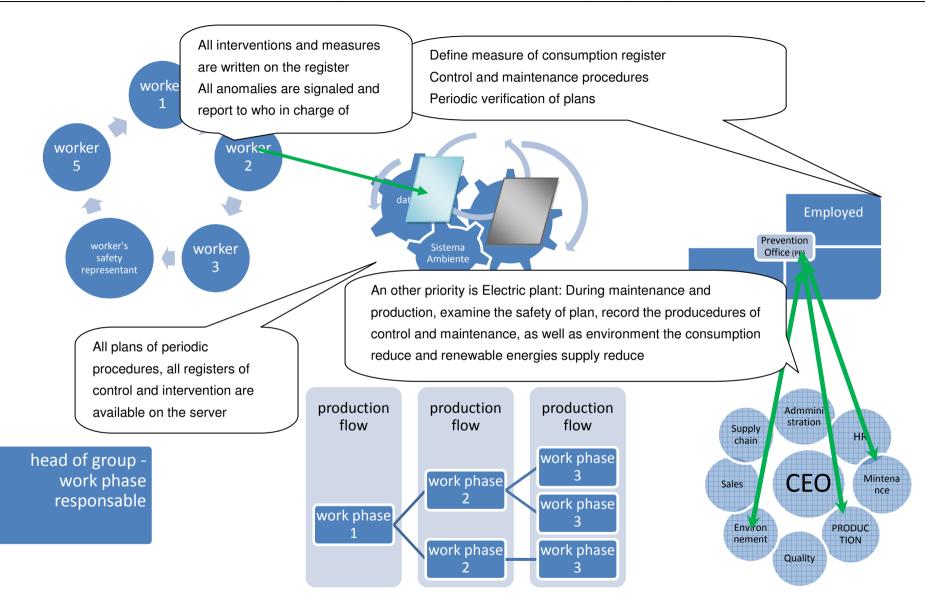
**Prevention organization and Prevention Plan** 

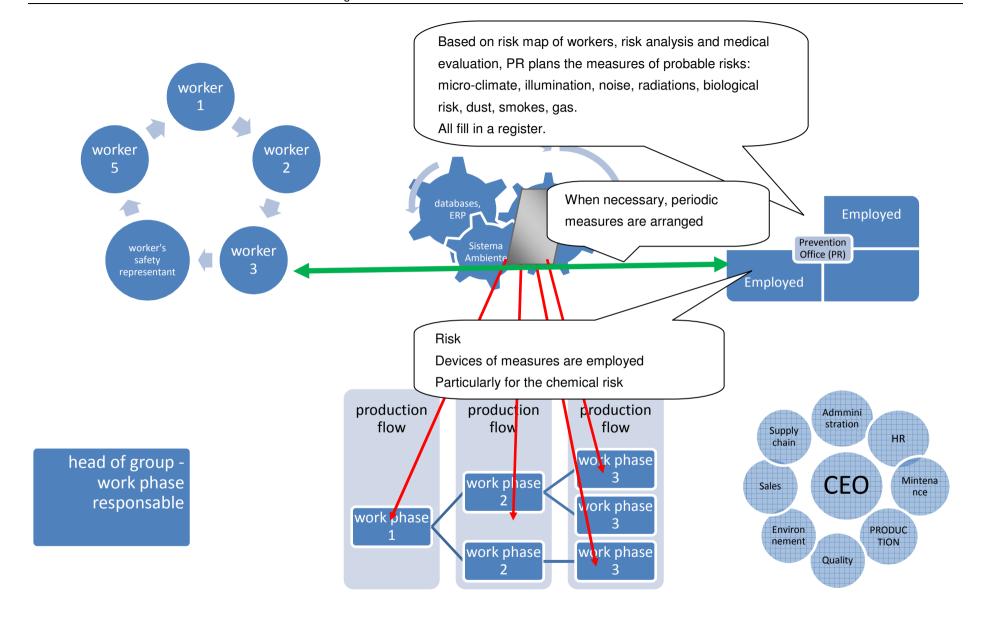


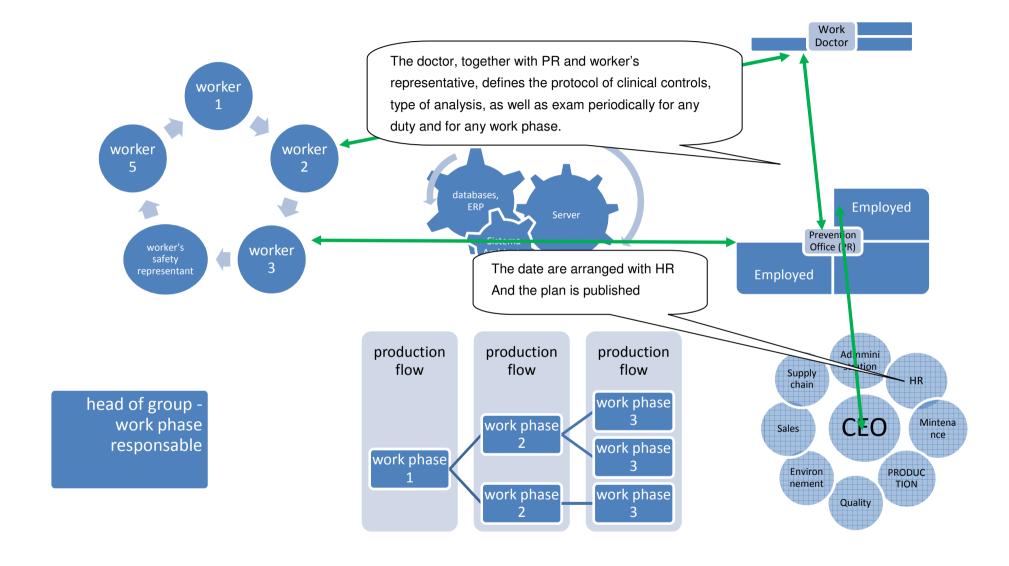


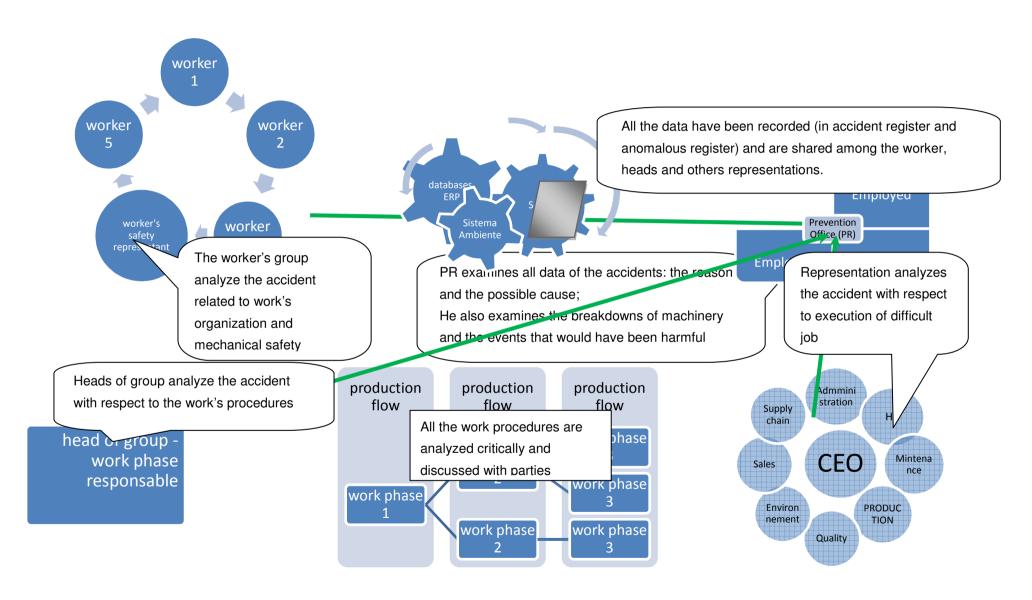


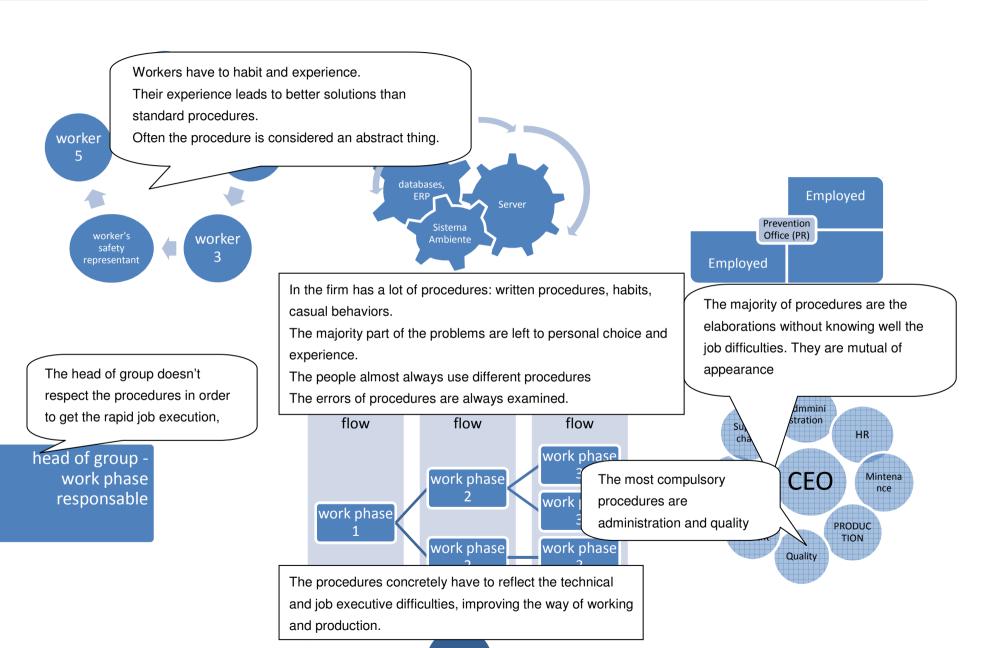


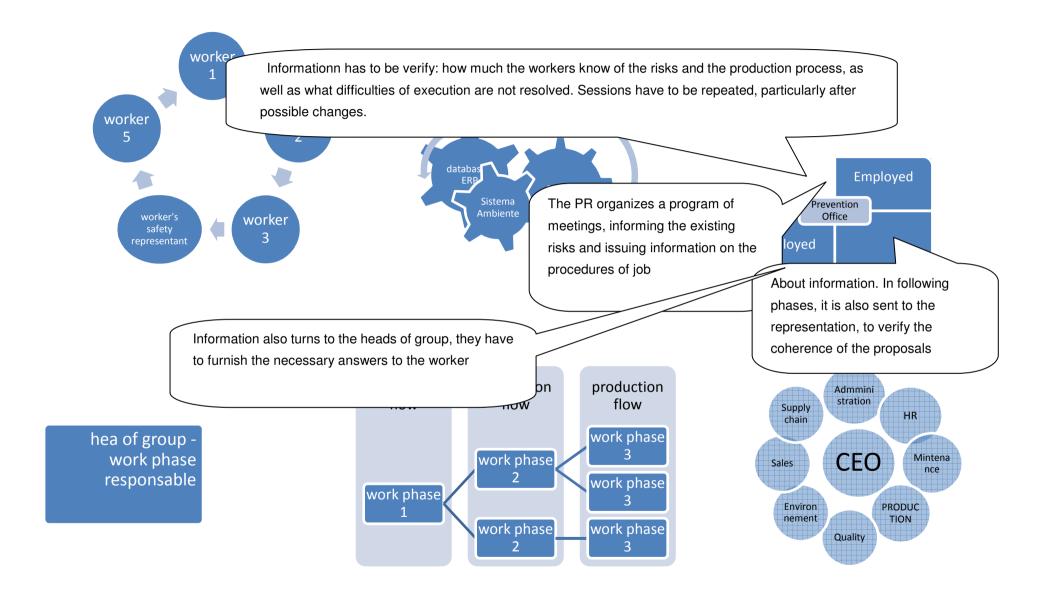


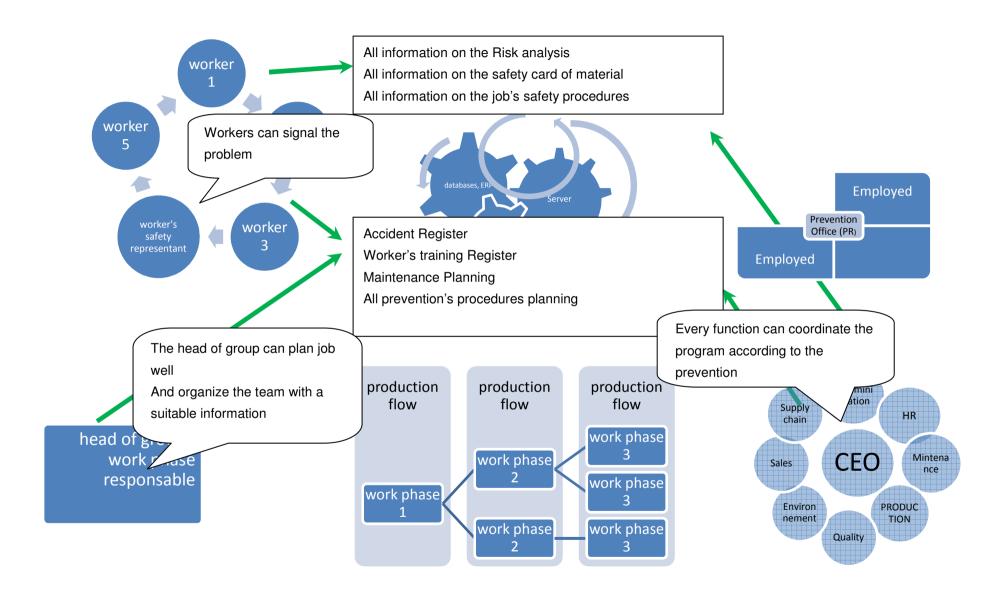


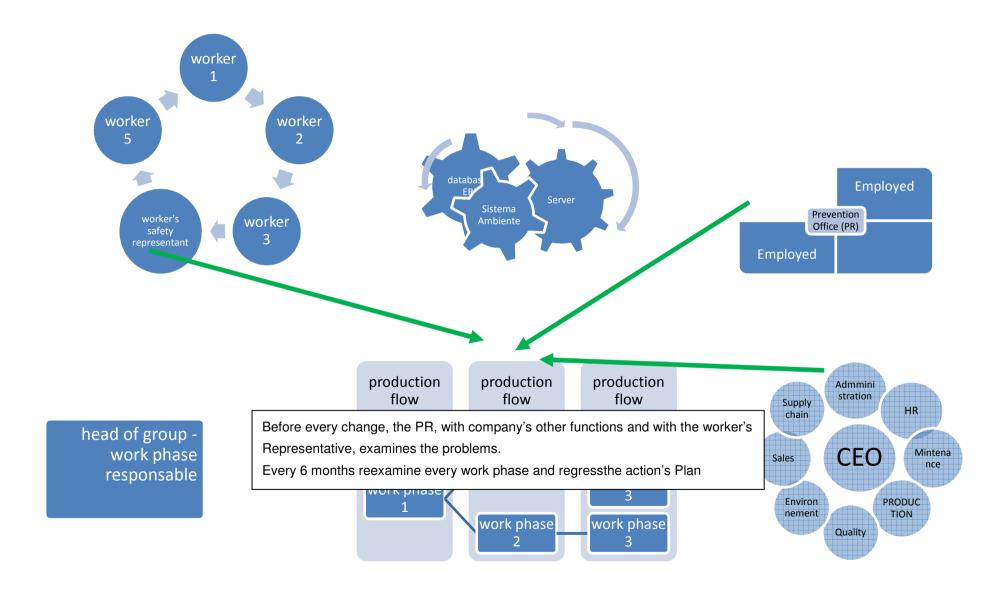


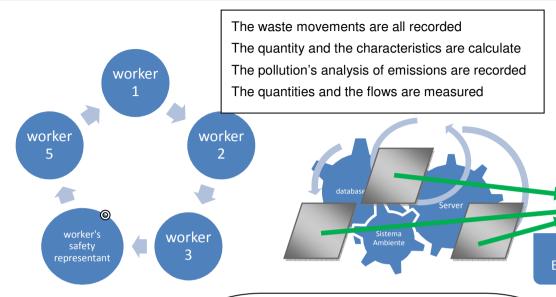












Reduction and increase the use of waste, reduction of emissions,

Materials from fossil sources, reduction of consumption, environmental compatibility of products, Health and safety at work

#### **ENVIRONMENT BUDGET**

Production Site, Public System, Ecosystem

# **Environmental Accounting**

Prevention Office (PR)

Employed

During the risk's analysis, the environnement responsibility of the phases are been individualized from which waste and emissions are originated.

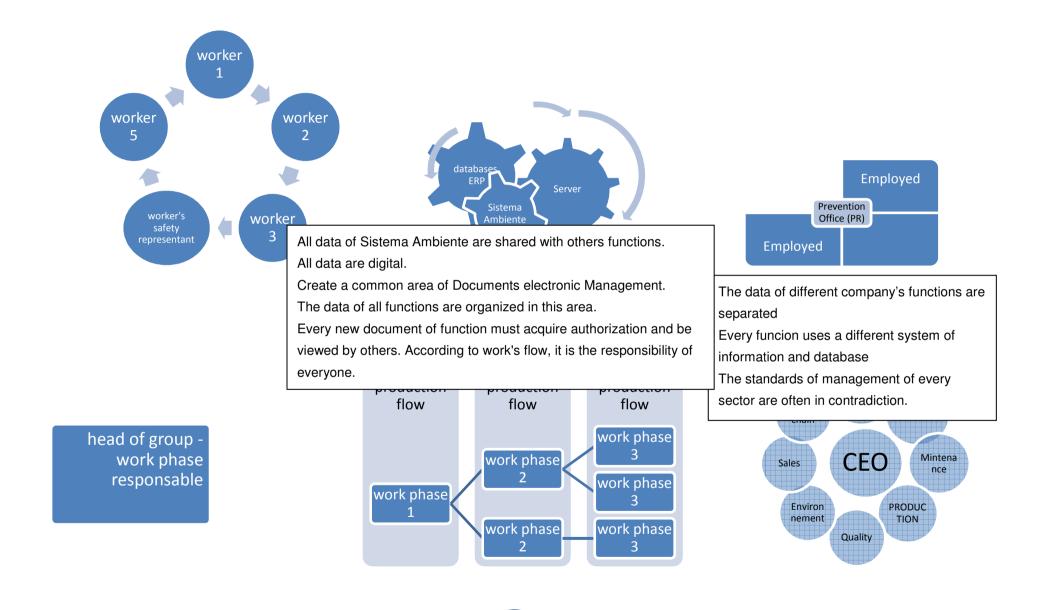
production flow flow flow work phase 2 work phase 2 work phase 3

They know the matertials and the processes that produce waste and issues and water waste

The technological responsibility they search: as to decrease the waste and issues as to eliminate the most dangerous materials As to reuse wastes



head of group work phase responsable



#### Support system analysis

#### **Premise**

Based on the analysis of information processes and internal management to the company, it was possible to identify the need for technical support, organizational and administrative. In some cases must be received from the outside:

The firm has necessity to be helped to formulate its program for the prevention and the environment.

Coaching the trusted people in the analysis, in the evaluation of the risks and in the search of solutions, it will concretely improve the formation of the people (in their different assignments) and the information and the formation of the workers will be helped.

The firm need to improve his organization IT to favor an effectiveness circulation of the information for the prevention and the environment, to share the information among the different responsible, to improve the harvest of the information and to integrate the different systems of management. One of these tools is the Environmental System, another is the electronic management of the documents, with a good system of work flow.

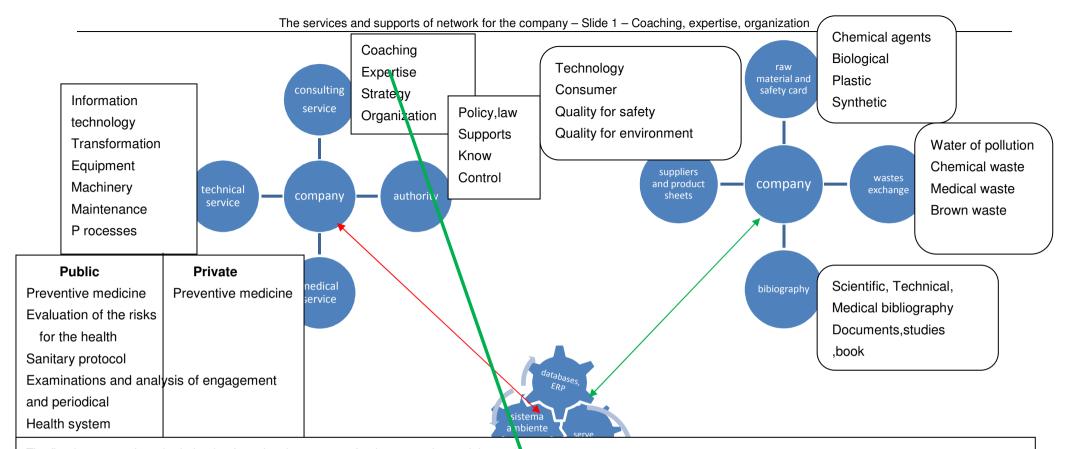
To develop the sanitary prevention and to prevent the illnesses caused by the job, it is necessary that the medical service knows the risks for the health of the company's workers: the business informative system has to furnish all the necessary data to the work's doctor.

It is not passive media (databases, search engines, consultations) or media business or general consulting (as is prevalent in the current situation).

These are centers prepared for the company and its staff with communication channels configured and records where it can compare the various stages of its progress.

Also this part of our analysis that relates to a second level of the network, with characters multibusiness, has been represented in some graphic slides.

# The services and supports of network for the company



The firm has necessity to be helped to formulate her program for the prevention and the environment.

A service (public or private) can follow the different footsteps of the project.

In first phase: to define the specific objectives that the firm can have.

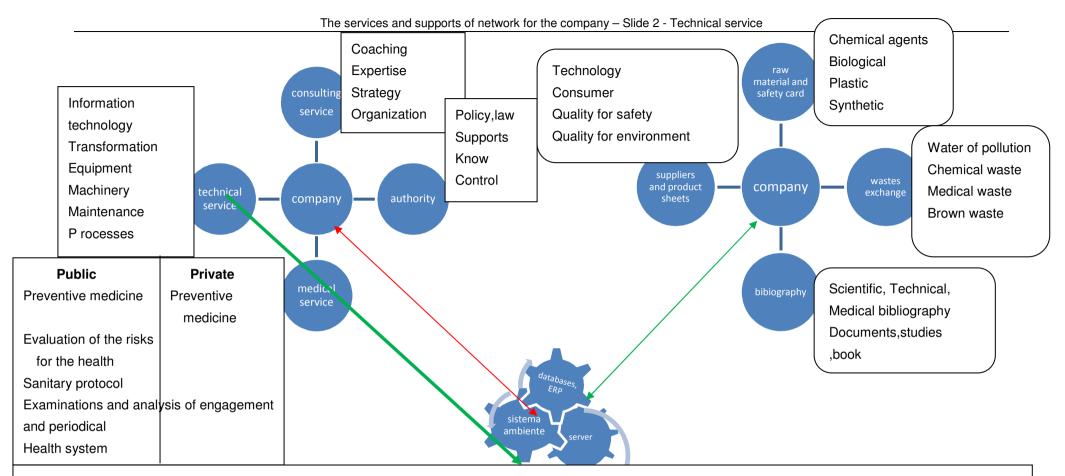
In second phase: to define the charges and the organization most effective (choice of the people and the responsibilities)

One necessity of the firm is to know the tools that can use (of informative systems and of the net).

The consulting can help the presentation of the first plan of prevention to the company's staff, to the responsible and the workers (During the presentation of the plan, it is necessary that the workers effect their representatives for the prevention); subsequently, every year, the plan will be adjourned.

Coaching the entrusted people in the analysis, in the evaluation of the risks and in the search of solutions, will concretely improve the information of the people (in their different assignments) and the information of the workers will improved.

The objective of the consultation is to give enough ability and autonomy to the firm and its people. The service of consultation can happen predominantly online.



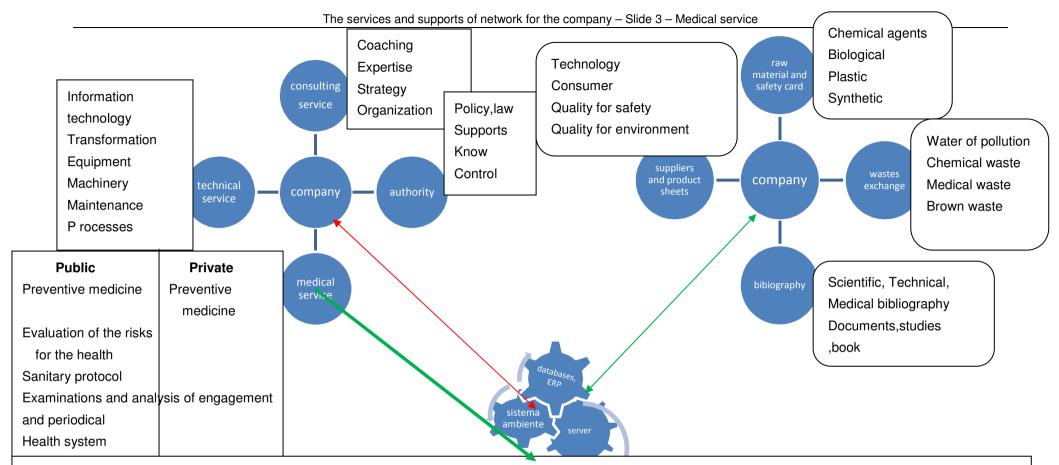
The firm needs to improve its organization IT to favor an effectiveness circulation of the information for the prevention and the environment, to share the information among the different responsible, to improve the harvest of the information and to integrate the different systems of management.

One of these tools is Sistema Ambiente, another is the electronic management of the documents, with a good system of work flow.

The firm has the necessity to receive a help in the choices to improve the processes and equipements and machinery. This can be furnished by the experience of other firms and by the technical studies.

A service is also necessary of effective maintenance.

It deals with services that can be furnished by the companies association of sector.



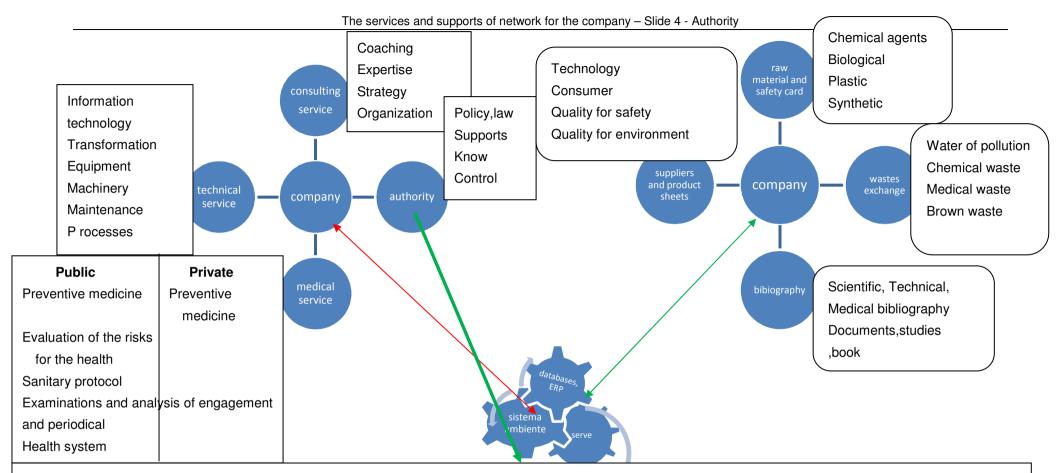
To develop the sanitary prevention and to prevent the illnesses caused by the job, it is necessary that the medical service knows the risks for the health of the company's workers: the business informative system has to send all the necessary data to the work's doctor.

The medical service has to extract an effectiveness information on the risks of the health to the firm and all the workers.

For a good control in the time, it is necessary that appropriate sanitary protocols of examinations and clinical analysis of the workers are shaped, according to their risks and with the opportune periodicity.

For the control of the health it is necessary that all the data on the health of the worker (also those reported to the job) is recorded in the individual sanitary card and in the informative system of the health. This activity is above all of the system sanitary public.

The periodic service of medicine of work has to elaborate the bio-statistic data (in base to the specific risks, to the age, to the seniority and the kind), on business level and on territorial level. This helps to reduce the effects of the most serious risks.



The firms need to know with clarity the laws.

The laws have to directly be known on the net, encoded with the necessary comments and explanations.

If a firm has some centers in varied regions, it needs to find the same rules and the same fulfillments.

Fulfillments have to be simple (permissions, authorizations, declarations, reports of accidents etc.), can be performed online in driven way.

The administration responds online to the doubts of the firms, so that intermediary is unnecessary.

The administration receives the data required by the firms and implements the control.

#### Knowledge support analysis

#### **Premise**

The request for knowledge that arise in any company is very large and very often requires an immediate response to provide a solution in the short-term and in some cases the middle.

Often these unexpected problems or innovations are to be implemented quickly,

It is not ordered research on diverse sources that nowadays, but guided research, often it would be useful to compare with other companies that have faced the same problem.

The firms need to know with clarity the laws.

The firms need to use the best technology for the safety and for the environment and to the carrying out of their trials.

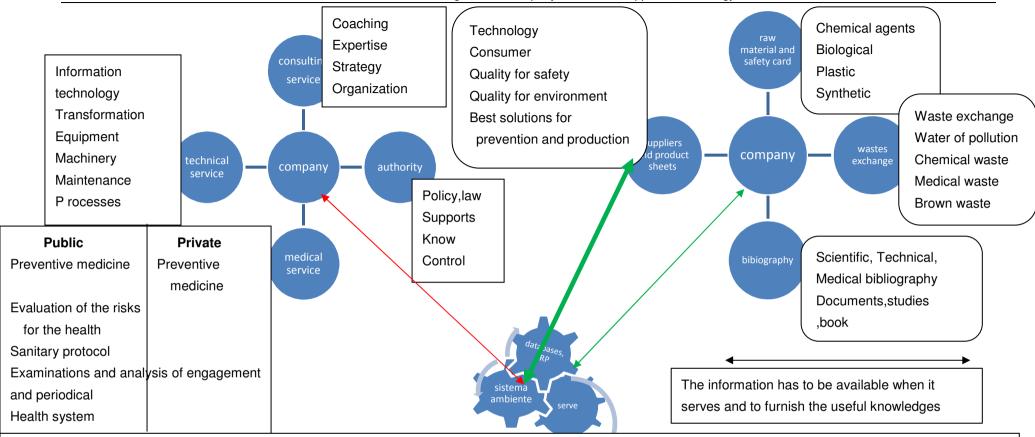
They used materials must with a safety card that documents what methods of use are dangerous. The production and processes that doesn't have to produce waste, the residues of production or disposal of the product. They have to be able to be re-used in production.

For the majority of people, the firm has a technical information and a practical preparation, which looks for the useful documentation for its activity.

From the analysis carried, based on the configuration of the company, you must create "intelligent" filters, capable of guiding the company technologically, to put it in contact with the other party (supplier or company in the same industry) with which increase knowledge and assumptions.

# The data banks and interactive exchange for the company

The data banks and interactive exchange for the company - Slide 5 - Suppliers, Technolgy and solutions



The firms need to use the best technology for the safety, for the environment and to the carrying out of their trials.

The search of technology is difficult and time-wasting.

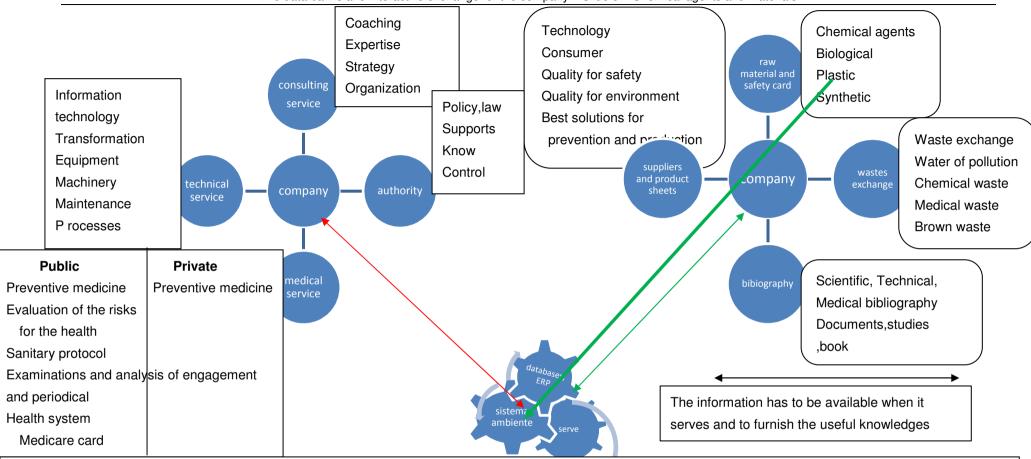
The net can offer a driven and selective search.

It has to be simple to individualize the application of the technology and quickly develop the technical characteristics in the product card.

For every product, it is possible to clarify the different scenarios of possible use and the qualities for the safety on the job and for the protection of the environment.

Must be immediately connection with the suppliers.

The data banks and interactive exchange for the company - Slide 6 - Chemical agents and materials

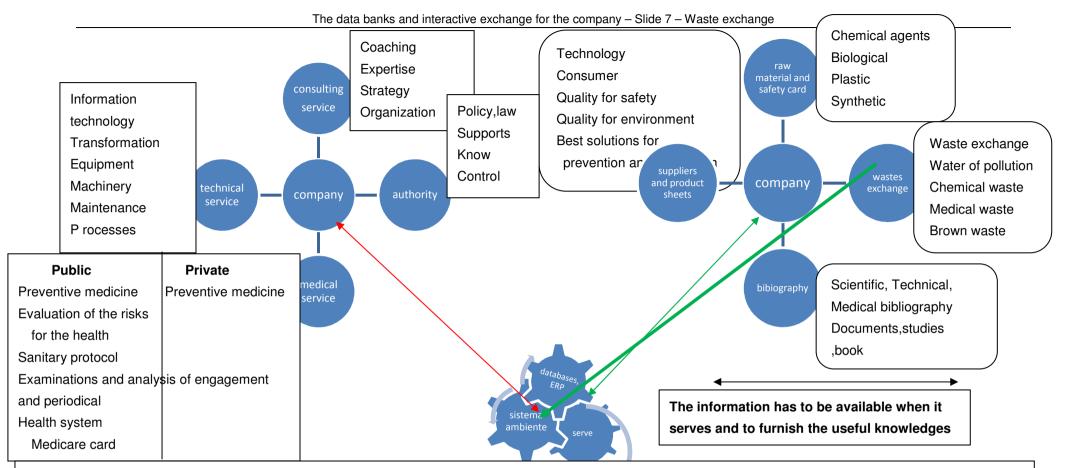


The used materials must have a safety card that documents the methods of use are of certain level of danger.

Every biological material and chemical agent, to be put in commerce, have to be first analysed. They had to show possibly consequences on the health and in the environment. It had to verify in which process can be used.

Many materials have provoked thousand of deathes and serious damages to the environment, before being forbidden.

The firm needs to know well these information, before deciding use of a material and, above all, need have clear conditions of manipulation, use and disposal.



The waste is the result of a process that uses bad material, producing some residues.

The waste is also the result of the bad elimination of product.

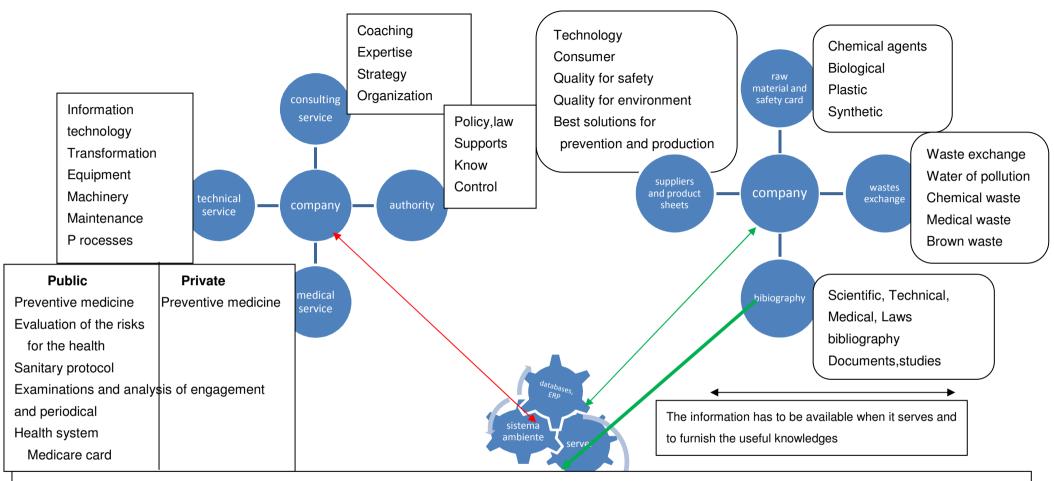
The waste is not reused in production, because the result of a bad choice of materials and processes, which provokes wastes, costs and damages for the environment.

The resources of the planet are not infinite, they must be saved.

The design of the product and the processes doesn't produce a lot of waste and the residues, in production or in disposal of the product. They have to be able to be re-used in production.

The net can help the contact among who produces about the refusals, who transforms them and re-use.

The net can help to design products to reduce the wastes.



The necessity of scientific and technological documentation is of great significance

Currently, the search of documentation is not effective. There are a lot of information, and many documents without distinguishing what are valid, what are generic or wrong.

The bibliographical search has to be organized well, as the most useful selective and furnish the documentation: in practice and in scientific.

To achieve this they have to collaborate the Universities and the Centers of Search.

For the majority of people, the firm has a technical formation and a practical preparation, which looks for the useful documentation during its activity.

#### database URL Card price Supplier Safety Techn.Info describe name type use equipments **User of Company** Machnery Check Tools Find The intelligent filter that organizes the useful information on the Materials base of the necessity of whom wants to furnish and of whom chemistry wants to receive information. waste extinguishers server Server Data Communication XML SQL The direct system of communication among two subjects that are connected to informative level Supplier Station Insert data Communication B2B 49

#### **CONCLUSIONS**

I tried to make my presentation to be read easily even for layman's.

To design the architecture of the network, I had to build a new global vision, however superficial, of concrete problems.

I think I can confirm and expand on the initial working hypothesis.

1

You can set up an information system coordinated among the business organization, a system of public and private services, as well as a database system; the hypothesis examines the ability to activate and guide the supply and demand information

To same extent, it is possible that the architecture is built starting from the problems of the user and not from the offer of information.

In particular, we found that the massive presence of services and portals with different settings are often with a strong market reduces, rather than enlarges, the tools and the information for the company, since it is virtually impossible to select and group that is needed.

Even the solution offered by the search engines, which increasingly are characterized with commercial requirements, is more useful to a superficial approach for a problem, only occasionally for a discussion, however, almost never systematically.

With the same infrastructure can however rebuild, starting with the business dynamics, a system driven services and documentary archives.

2

You can integrate the management systems by appropriate functions of the corporate network, making the data sharing at all levels of the company and the interactivity by groups of workers.

Even based on the experience of Environment System (shown in the annexes) data, the different management systems of which the company has, are complementary and often overlap. This is especially true, for example, between Quality and HSE and also between ERP and process analysis, or even among HR management, professional management and training system HSE.

This is possible the relevant documentation prepared by different management is organized and unified in a single platform of electronic document management, which is accessed with the appropriate automatic and with the necessary authorization procedures. To provide documents, authorize them to distribute and to consult in real time when needed.

The management that we used is already set to allow data sharing among the various functions and an interactive information system that involves the entire corporate structure.

This is the basis of a working method.

3

Streamline functions at different levels of the network allows you to practice a linearity between the functions of learning management (through the HSE management system company), training generalist by support functions and specialized training through elearning 3rd level network

As I tried to depict the sequence of slides, every element of the different levels of the network responds to the specific needs of the dynamic enterprise.

The architecture is designed to create a synergy and strengthening of all functions, with the goal of making an effective and rapid conversion program and improvement of companies, operating homogeneously and facilitating the performance of the necessary functions and planning of the changed schedule.

I designed the structure allows to integrate well the organization of the company (in all its functions) with mounting accompaniment, counseling, testing, monitoring, information, training and activation of all necessary assistance. Thus, an improvement project aiming at a land area or sector can be scheduled and properly accompanied.

4

To implement the project it is not necessary to create new infrastructure data transmission but only to complete ADSL connections and computerization within the company

In preparing the project, I examined every single function and I have "weighed" the activity to speed.

The main problem is the completion of computerization in the company, both as computerization of all the management, either as electronic document management, or as the possibility of sharing data between different functions as an extension device in the different work units.

Equally important is the creation or enhancement of the centers, to which reference is made for support and services.

The network infrastructure must also ensure the connection of each company.

#### **ANNEXES**

Documents electronic management

#### Via Belfiore 24 – 10125 TORINO (I)

digitalis@iride.to.it http://www.sistemaambiente.net



electronic filing and substitutive preservation

Document Management System
The documents management for
the health and the safety on the job

SISTEMA AMBIENTE – Management system H.S.E.



## **D**ocuments **M**anagement

## ✓ Electronic filing

- reduction costs / operational efficiency
- Unified and orderly filing of all the inherent documents the prevention coming from the outside, from the managerial HSE (Sistema Ambiente) and from the company's managerial HR and ERP. Immediate availability of every document

## ✓ Substitutive preservation

- dematerialization
- ✓ Company's portal of the prevention
  Interactive informative system and in real time
- ✓ Documents flux
  - best organization of the service of prevention, immediateness and control of the informative trials and authorization, certification of dates and notifications

papery



electronic

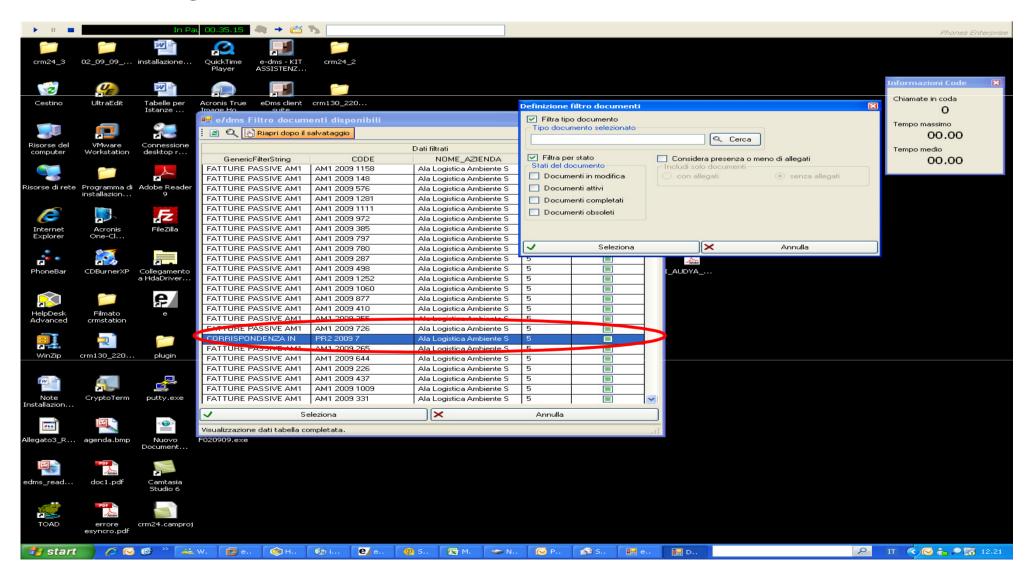


Flow of the Information **Auditors HSE Responsible** Sistema Ambiente **Analysis Environment Portal** Evaluation **Procedures User interface Planning** HR Management Sharing dates Recording **ERP Plants** Company managerial Distribution in real time solutions Technical office Consultation **Maintainers** Dms24 Immediate availability Protocolling Production Filing Classification Classification Corporate Direct and rapid search Certain date Supervisors Signs digital **Suppliers** Uniqueness of document Validation **Automatic updating** Administration Revisions Customers Sharing Substitutive preservation Supply chaini





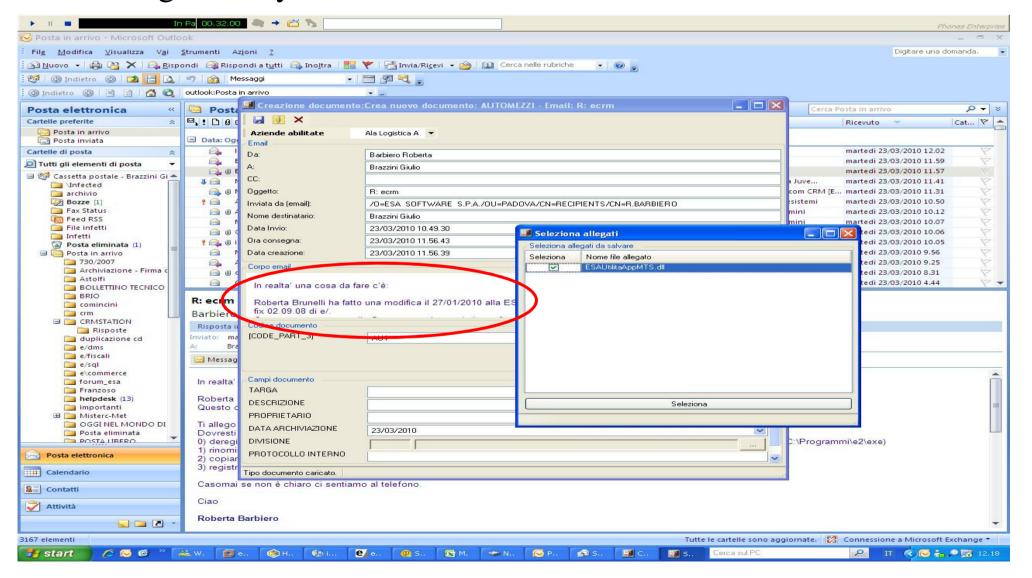
## Filing of an electronic file







#### Filing from systems of e-mail

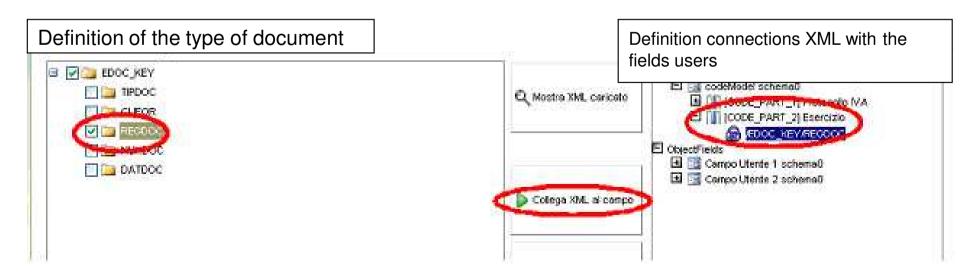




#### Automatic filing from files XML

Documents and Practices can be automatically created with the automatic importation of files produced by others managerials (which ERP, managerial HR, Sistema Ambiente).

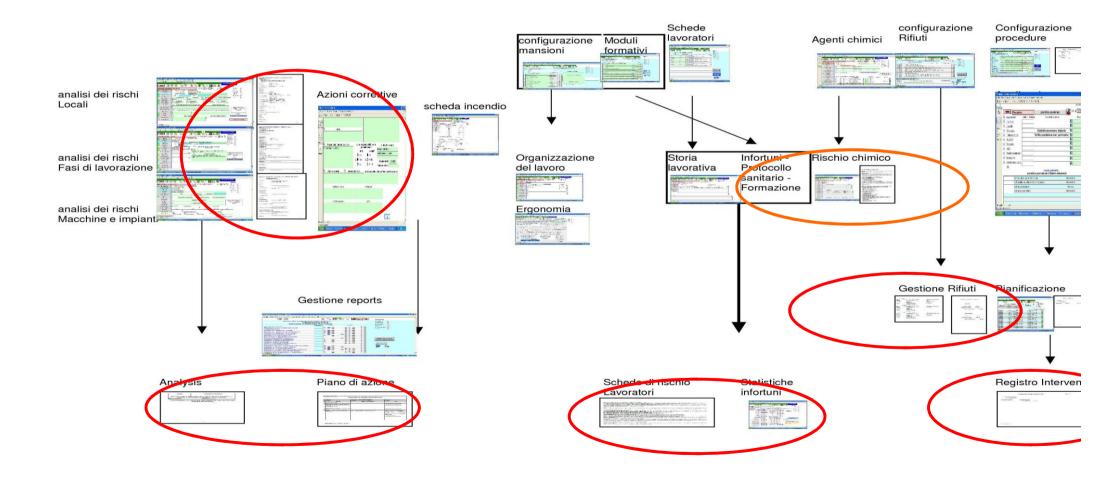
This happens shaping in the managerial of origin a code XML that is automatically recognized by the DMS, giving origin to a new document or to the revision of an existing document, or still to the creation of a practice, with the automatic activation of the workflow, if foreseen, with a list of distribution and an iter immediate of authorization.



SISTEMA AMBIENTE – Management system H.S.E.

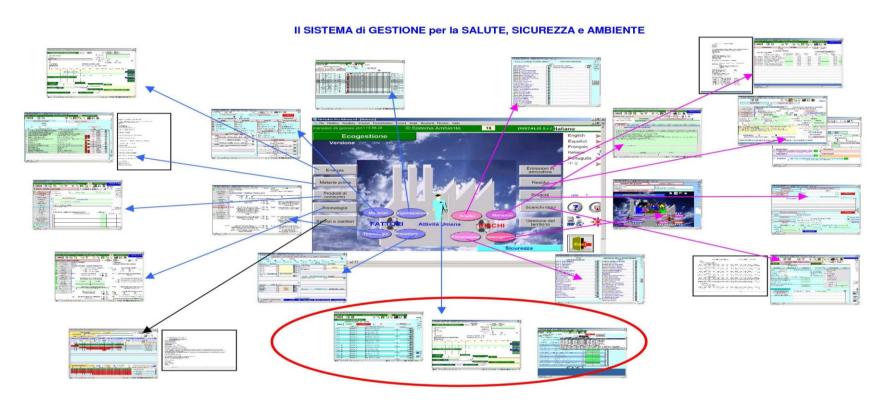


#### Filing from the managerial HSE *Sistema Ambiente*



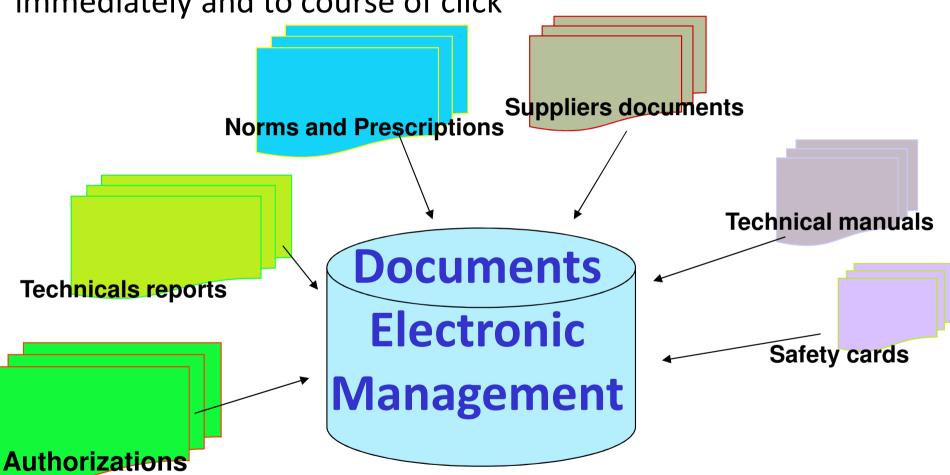


### Filing from the managerial HSE *Sistema Ambiente*



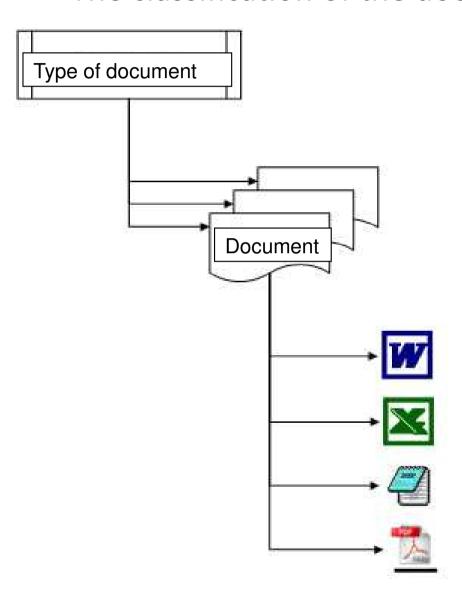


From the outside all that serves: immediately and to course of click





#### The classification of the documents



It contains the logics and the authorizations that will have the document

Endless documents can be created for every type of document

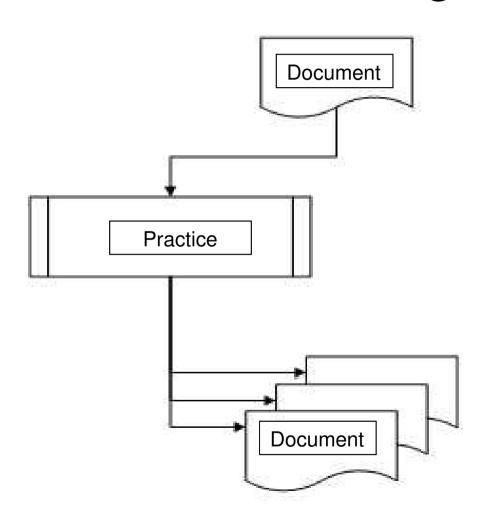
Every document is independent from the other, but it inherits all the logics from the type of document from which it is born

Every document can have endless attachments

On every attachment the operations can be effected scheduled in the Document type and transfer from the document of which the attachment is child



# To manage for practice



The **Management Practices** it furnishes the possibility to **group more documents** of different typologies.

A Practice is therefore a whole documents each of which with his characteristics and specificity.

The Practice can have a workflow and can have proper attachments.

From inside the practice it is possible directly enter to Documents that make part of it.

In a Practice you/they can be created more documents also of the same type, they can be create to the creation of the practice or in a following moment and are also possible to connect existing documents.

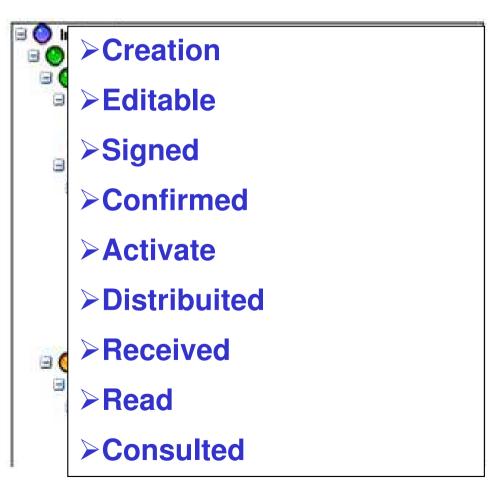


## Workflow

## to organize "the rules" of the process

#### States Logical and States of the Workflow

Every document has five logical states in which can be:



- ✓One during the creation, before the attainment of the first state
- ✓a state in which it finds the Document before being made not modifiable.
- ✓a state in which the Document is made active and therefore not longer editable
- ✓a state in which is defined completed
- √the last one is obsolete