Multi Project Control As An Information Logistics Process

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Abstract

Projects deal with a lot of information, such as information for planning and coordinating projects, follow-up reports, and knowledge stored from earlier projects. This is in particular true when referring to global projects or multi project management. Communications between different project members are more and more done over the Internet. Intranets on WWW are used to publish current state of project plans. Managing the workflow in a project is a process and can be considered as an Information Logistics Process, ILP. The basic ingredients of the ILP will be described and point out which actions are to be taken in different parts of the ILP. Stored information of similar projects is often poorly categorized, but still has to be found.

The concept of Information Logistics becomes increasingly used in European medias. How does it differ from ordinary logistics and the information systems support to it? This paper will start with a discussion on a suitable definition of the notion of Information Logistics. Furthermore, a description of the basic ingredients of the Information Logistics Process, ILP, will take place.

Some results on the distribution of project control mechanisms in the ILP process are provided, such as where to apply the time management and communication handling processes in order to guarantee that information with good quality is produced and delivered to the project members to the right place just in time.

1. Introduction

Information logistics (IL) (in German Informationslogistik) has appeared as a hot discipline mainly due to the Internet age. The interpretations of the concept differ from Europe to US. In US most references to IL allude to software that supports the physical logistics chain. The latter use of the IL concept could be denoted Logistics Information Management (LIM).

Rayport & Sviokla (1995) try to exploit the concept of Virtual Value Chain. They point out the component of the logistics process that handles information as an instrument to control the physical part of the logistics process. Information is gathered, produced and refined and finally distributed in order to support the Physical Value Chain. The outcome from a logistics process can in many cases be just information products like digital entertainment products or distribution of mail invoices. In both cases information supply is needed in order to produce a suitable product. The information can then be processed and finally distributed on paper, CD or published on Internet etc.

> "The project is an example of an information logistics business demand to achieve greater efficiency and create a foundation to business opportunities by developing a solution of how to communicate information with customers in a standardized way." (Nordström, 2002)

What is a multi project (MP)? A multi project can consist of different more or less independent projects but also of a number of subprojects. At the same time project members in an organization can be working on different and perhaps independent projects simultaneously. According to Danilovic et al, 2001, MPs can be divided into three groups convergent, divergent and parallel MPs. Former mega projects are increasingly divided into a set of smaller

projects. In the convergent case the master project consists of a number of closely related components. A good example is the manufacturing of a computer. The subprojects can work very much in parallel but are finally converged to ensure a complete product. The divergent case starts with a common platform but is finally split into different variants. This is the case when the customer wants a tailored production. The final product differs from customer to customer. MPs in parallel are usually rather independent projects perhaps globally distributed but still have the need to compete on common resources. Hence, it needs an organization through a project centre that handles concurrent usage of project members, facilities, economy and locations and controls the prioritizing among those. Projects in a multi project portfolio share resources with other projects and thus the major issue is to find ways of handling resource scarcity according to the overall strategic direction of the corporation. Grey (1997) suggests (as pointed out in (Danilovic et al, 2001) a matrix-based analysis of the coordination of activities among projects. As Wennel (2001) points out project members need a certain amount of freedom in order to work with enthusiasm. In the Microsofts Project 2002 project centers are introduced in order to facilitate the information exchange (Stover, 2002). Furthermore, resource pools are established in order to manage the project members allocation to different projects in the MP environment.

A major task is to recognize where demanded knowledge about planning, technologies, and products is situated in this complex organization. MPs need support from communication facilities. Communication is one of the basic ingredients of the ILP process. This is further discussed in section 3 and section 4.1.

Section 2 of this paper will state a suitable definition of the notion of Information Logistics. Furthermore, section 3 will describe the basic ingredients of the Information Logistics Process, ILP. The ILP process will be divided into three sub processes IS, IP and ID. IS means Information Supply, IP Information Production, and finally ID stands for Information Distribution. ILP aims to guarantee that information with good quality is produced and delivered to the 'customer' to the right place just in time. A problem that will be addressed is how to make ILP an efficient process.

There are a lot of applications of the ILP process. Just to mention a few:

- Digital production and distribution of music, videos, forms
- ERP systems configuration
- (Multi) Project Management
- Knowledge Management
- Coordination of information among the EC members

ILP differs from the ordinary logistics process due to:

- Stock replenishment is no problem, just make a new copy of the information product
- The first product item has a cost to manufacture, then reproduction is more or less at no cost
- Digital assets are not consumed when delivered, but can quickly be obsolete

In the last section there will be a discussion on the possibilities to apply ordinary logistics theories such as SCM, Inventory management, Production planning, when the outcome from the logistics process is just information.

2. A definition of the concept of Information Logistics

In Apelkrans & Åbom (2002) they tried to answer the question: How does the concept of IL differ from the concept of ordinary logistics and the information systems support to it (LIM, Logistics information management)?

IL can be viewed as a new discipline, where methods from the logistics area are applied to the distribution of information, information products and information services. This fundamental way of looking at the concept can be found, for example, by:

> "By IL we mean exactly what IL sounds like: send correct information to the right people at the right times" (Netguide, 2002)

or

"IL will supply the right information at the right time, in the right shape and at the right place"

From a LIM perspective (Turban et al, 2002) a definition can look like

IL is the information supply needed to perform excellent logistics.

The latter definition means that IL (or LIM) is just a subset of the informatics domain.

Logistics takes care of different process flows, and hence, process thinking is quite natural. Methods and the philosophy from Supply Chain Management (SCM) are quite useful in this connection.

A definition of IL used in practical applications

This paper concentrates on an application of the IL concept that covers the areas of Information Management and Information Supply. IL in our sense can also be wrapped up information packed through different information carriers like CDs, Smart Cards, printed reports and even as PDF files. Hence, IL is the discipline that takes a process oriented and logistic view to supplying, storing, producing and distributing information.

In other words IL is the discipline

- that will supply the right information at the right time, in the right shape and at the right place
  - in a user-friendly way
  - with desired quality
  - to the lowest possible cost
- and where the final product is distributed by some kind of information carrier like paper, card, CD, Smart Card, Internet

As we said in the introductory section ILP differs from the ordinary logistics process. The information supply in ordinary logistics is essential and often time consuming and expensive. Much effort must be taken in order to handle inbound logistics, checking deliveries or out-of-stock problems or destroyed materials. In IL stock replenishment there is no problem, just make a new copy of the information product. The first product item has a cost to manufacture, and then reproduction is more or less at no cost. The whole SCM (see Chaffey 2002) in IL is different, but not without other types of problems.

3. The ILP process

This section will discuss IL from a process perspective. An information process transforms a given input to some form of output. The process will deliver an information product. Let us call this workflow the **Information Logistics Process (ILP)**. Scheer et al (2002) describes how to use ARIS to illustrate Business processes from different perspectives. We have used the ARIS 'modeling language' to describe our ILP process.

The input to ILP should be some kind of information that can be handled automatically or manually. Information suppliers deliver information to the ILP process. We call the consumer of the ILP deliverables for Customers. There are applications where even the customers deliver some input to ILP.
The sets of suppliers and customers can contain 0,1 or several elements. Some ILPs need no input. They can produce the necessary information by themselves. Furthermore, some ILPs produce information, which is not delivered immediately but stored for future use and delivered in the right time.

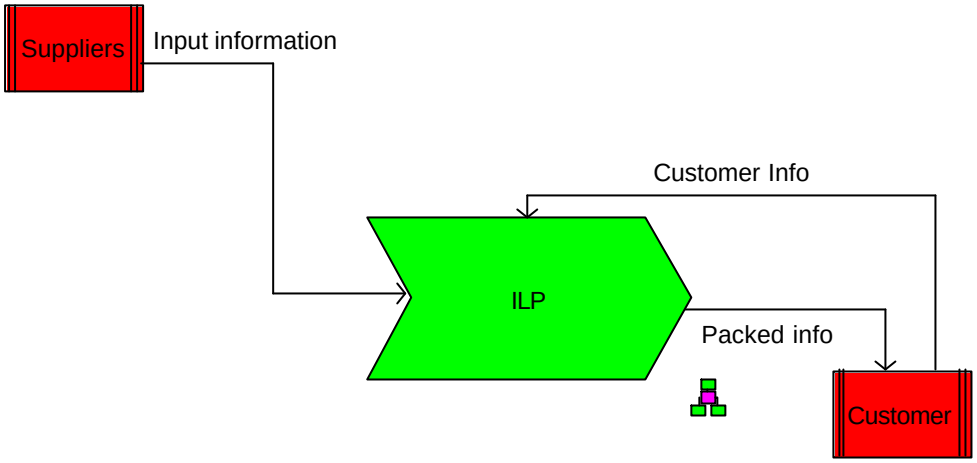

Figure 1. The ILP process.

Hence ILP can be understood as a function from incoming information I to packed output information O

$$O = ILP(I),\ O \in Pi \text{ and } I \in Ii$$

from an input domain

$$Ii = \{i1,i2,i3,\ldots.\}$$

to an output domain of packed information

$$Pi = \{o1,o2o3,\ldots.\}$$

What we could include in Pi is no wrapping at all, presentation in some digital form such as PDF-files, printouts on paper, storing on a CD or Smart Card or simply publishing on the Internet.

The set of suppliers can consist of both physical suppliers and more virtual ones like information from Internet.

Supplier = {a Physical logistics process, customer, customer's customer, ordinary suppliers, Internet,…}

In the same way we have a set of Customers

Customers= {'Ordinary' customer, Internet, a Physical logistics process, ….}

The ILP processes will be implemented with different methods from the Computer Science area. A question is what can possibly be automated and what will still be contained in the dialog between users of ILP and the ILP process. The ILP processes have to handle knowledge in some way.

In order to fulfill the task to deliver information products in the right time to the right place Frauenhofer Institute (2002) in Germany states that an ILP needs in addition CM, Communication Management and TM, Time Management.

3.1 ILP divided into sub processes

Taking a closer look at the ILP process it points out three different sub processes, the first for the information supply (IS), the second for the production process (IP), and finally, the third for the distribution process (ID). The information supply (IS) process can obtain information from suppliers, customers or create its own information. In order to enable information production IS has to extract and store knowledge. An example can be an application where IS at certain points of time produces information in order to kick-off the IP process. IS can also be the process that handles time management, i.e. IS works as a trigger for the actions of IP and ID processes.

As our definition of IL being able to also result in packed information (e. g. a CD) we must include a connection to a physical supplier in the ID process (see figure 2). ID is the most appropriate subprocess to handle communication management.

All subprocesses in ILP need to handle knowledge in some way. This knowledge has to be specified from case to case. A general question is: how should this knowledge be elicited, stored and maintained? Is it possible to automate the knowledge management in some way?

Figure 3 gives a proposal on IP process architecture. It has one subprocess for creating information, another for reproducing already created information and finally a process for leverage of the produced information to the ID process. In order to handle both information and knowledge the architecture will contain an Information Base (Data Base) and a Knowledge Base (KB). In the Information Base one will find actual and/or stored information and the knowledge base will contain rules for their use.

IL is an implementation of the virtual value chain (Rayport and Siokla, 1965) where the material is much easier to handle than in the physical value chain; it is just information. But as we pointed out in Apelkrans and Åbom (2002) we still have to look at value and quality aspects. The value of the information is dependent on the time and place (……at the right time, in the right shape and at the right place). Hence, we introduced a value function V,

$$V(I) = V(I(\text{time, place}))$$
$$V(O) = V(O(\text{time, place})).$$

Of course the desire is that ILP is a value-adding process, which means

$$V(O) > V(I).$$

However, this is not always the case. During the ILP process time and even place can be changed, so information can be obsolete, distributed to the wrong place and so forth. In global MPs partners can move around, be substituted and so forth. The problem of wrong place distribution is especially true in mobile applications. In the same way the desire is that ILP shall be a quality increasing process. If we can find a way to measure quality we denote the quality function by Q. Then our expectation is that

$$Q(O) > Q(I)$$

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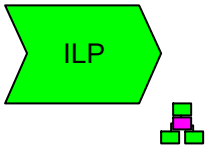

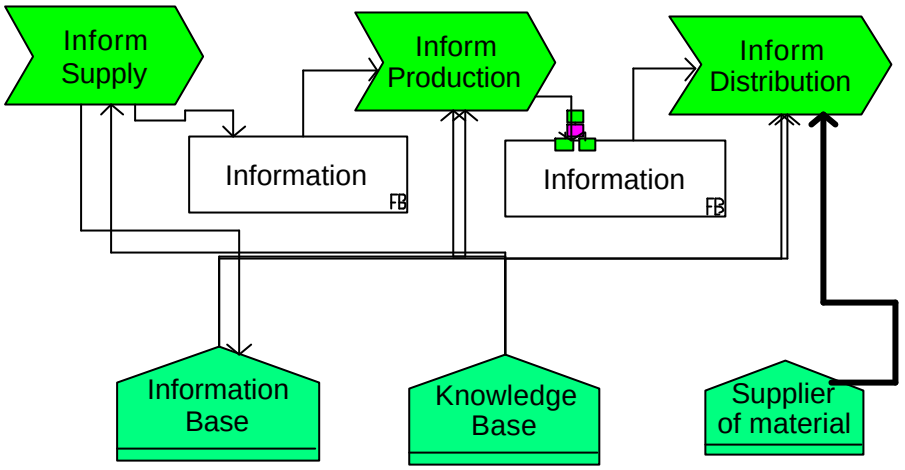

Figure 2. ILP divided into sub processes

4. The ILP process applied to Multi Project control

This section discuss how to apply the ILP thinking to Multi project control (MPC)

4.1 Knowledge management in MPC

Knowledge Management in MPC is very much about taking care of experience, experience from earlier projects in order to facilitate the choice of similar projects and reuse their project plans. Project plans on the tactical level is precisely defined according to its Work Breakdown Structure (WBS)

> "and creation of collaborative work packages (WP) enabling inter and intra-organizational coordination of people and integration of their tasks" ((Danilovic et al, 2001)

Knowledge can be stored in resource pools. Knowledge about project analysis, resource usage, communication channels can be stored in global project portfolios. In MPC a lot of small projects need coordination. Hence, it is necessary to create some type of master project, e.g. a Virtual project (see figure 4).

The Knowledge Base contains rules for project planning, rules for detecting bad behavior, suggestions for handling risks, learned from the experience from lots of other projects. The project plan is stored in the Data Base, and is complemented weekly with actual data from the IS process.

4.2 Knowledge is stored in the KB and DB part of the ILP.

Two students at JIBS (Johansson-Lid, 2002) have performed an examination work suggesting a proposal for applying the ILP concept to MP management. Firstly, they studied the information flow in the MP environment and how this flow can interact with the ILP process. This is shown in figure 4.

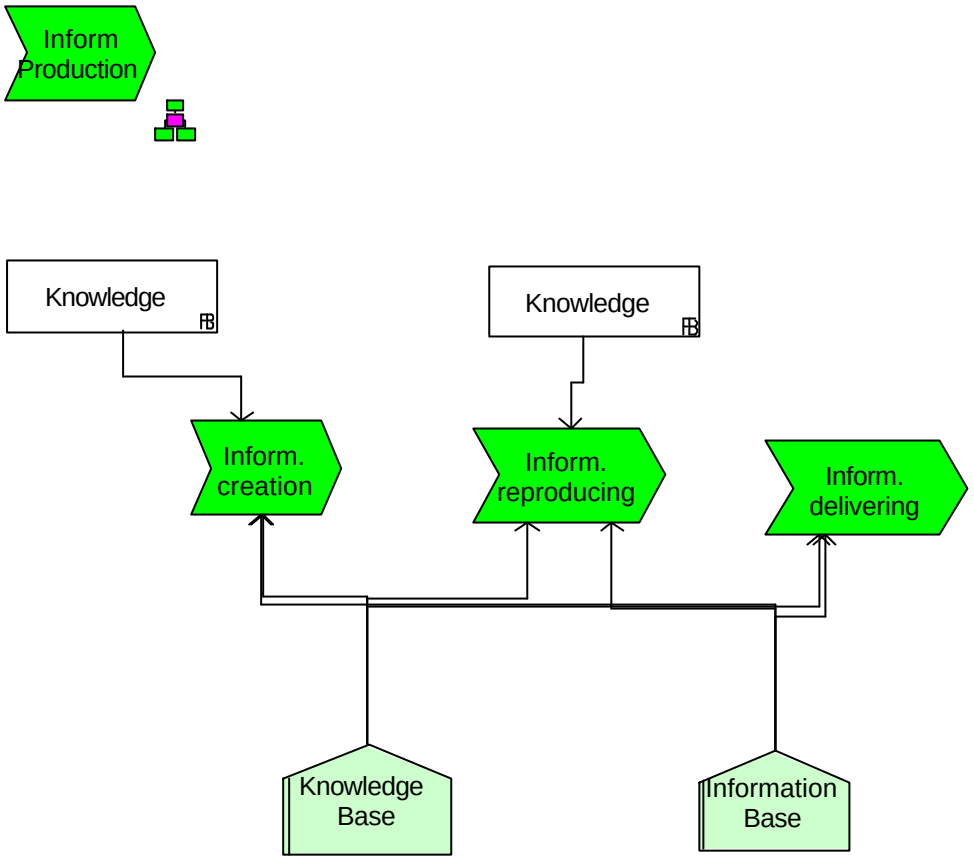

Figure 3. A proposal for an IP architecture

The ILP process is an information supplier for the Master project management. This information can take on a lot of formats such as bar coding, 3D CAD, EDI, and Extranet-HTML. ILP has *to "supply the right information at the right time, in the right shape and at the right place"*. Information to project stakeholders can be time reports, organization hints to project managers, cost evaluations, loads on different departments, lack of competence resources. The ILP process has continuously to be fed with current status of project details. In figure 5 we look more closely into the ILP process that feed projects and their stakeholder with guidelines and information.

Starting with IS, Information Supply, it has the responsibility for gathering information from different sources. It is more than just collecting data. In the Knowledge Base rules for comparing similar projects, you have to include a code for structuring data to useful formats. In a global MP environment many different formats appear created at different platforms. There can also be a need for using agents to guide the process to the sought information. A future possibility is to include CBR technology to produce search patterns for similar knowledge being brought together. Furthermore, the IS process checks that information deliveries are triggered by authorized suppliers. Finally, in order to trigger information products (e g a report to a global follow-up meeting) to be delivered at the right time a time management function ought to be built into the IS process. The Information base serves as Content repository, which includes text, graphics and programs (XML, Javascripts etc.). Knowledge is needed in how to combine these elements to good quality reports presumably presented as web pages.

MPC has a need for special skills, tools and techniques. So far very little is written about MPC. Problems around resource handling, different project platforms and knowledge transfer between projects in the project portfolio are still open questions. Perhaps the solution is a stronger standardization.

The second sub process IP, Information Production, starts with the Create sub process which establishes the original report layout, which then is reproduced and customized to special receiver categories and delivered to the Information Delivery process. In this case a content restructuring is sometimes required, depending on the

receiver's platform (e. g. web browser). The Create sub process establishes the original project plan, then it is reproduced weekly into the current status project plan and finally status reports are produced and delivered to the ID process.

The third part of the ILP process, the ID process, (see figure 5), has now received all the information about where and when to send the content to a special receiver. The ID process then has the responsibility to route the information message to the right place (communication management). The packing part of ID can in the project control case be a security package in order to avoid any misuse of the created content.

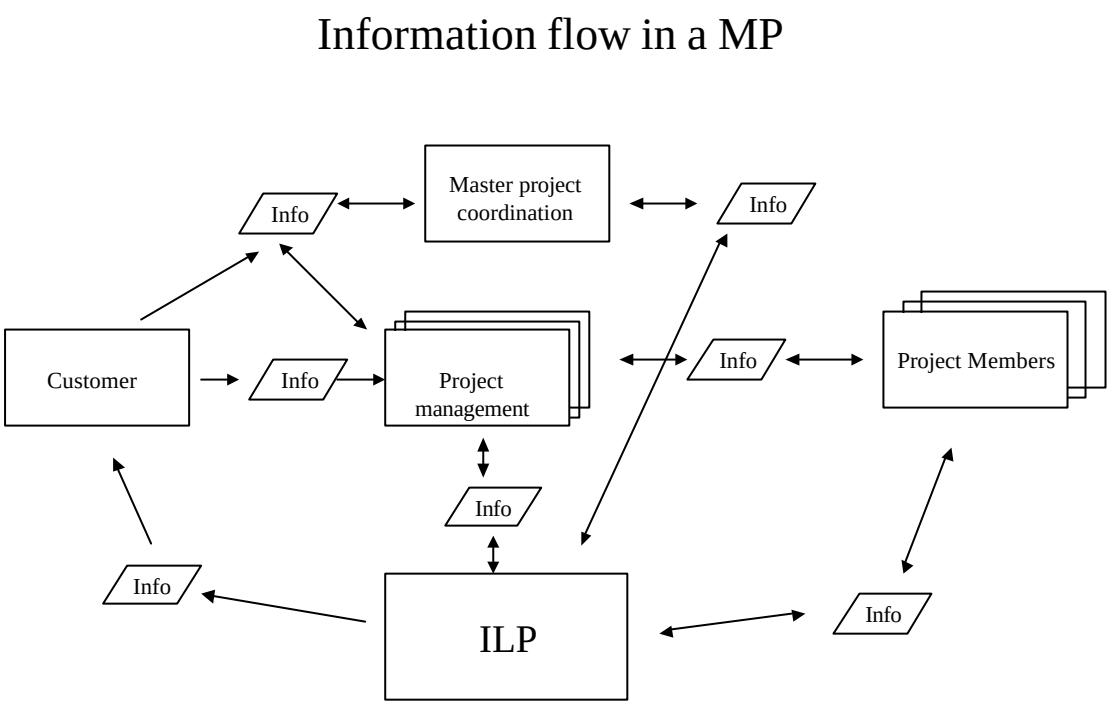

Figure 4. Information flow from a MP center view

Is ILP a value adding and quality increasing process? Looking again at the project planning example, if the reported feed-back data to the weekly report meeting is of bad quality then the output status report can just be useless. On the other hand good quality input data makes it possible for the ILP process to produce excellent reports.

5. Conclusions

In Apelkrans and Åbom (2002) we tried to put IL into a general framework. By introducing a process-oriented way of looking at the IL process the intention was that our proposed model could facilitate the cogitation of the ILP workflow. The development of ILP involves, of course, a lot of software, where component based design and knowledge management must be essential parts. Much of the information restructuring and presentation depend heavily on XML technique.

In order to make ILP an efficient process some general software routines ought to be created implementing the common ideas found in different applications of IL. Results from Frauenhofer Instiitute (2002) look most promising. Agent technology and CBR methods can also facilitate an ILP process creation.

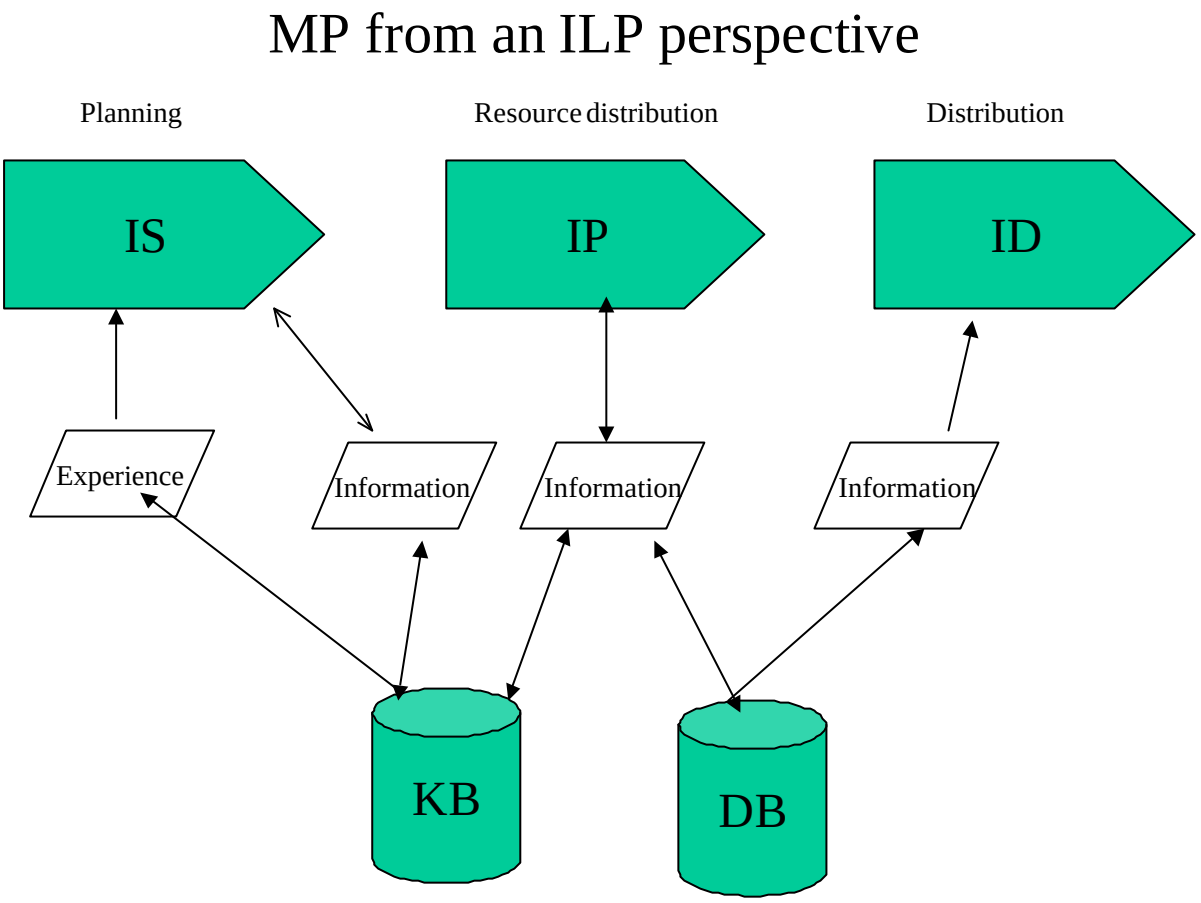

Figure 5. MP from an ILP perspective

Once the framework is established it could be easy to find applications in different scenarios from the MPC area

- Information supply for project stakeholders
- Web site maintenance
- Global information distribution
- MP integration
- Knowledge elicitation
- MP organization

Glossary

CBR	Case based Reasoning
I	Input information to ILP
ID	Information Distribution process, a sub process to ILP
IL	Information Logistics
ILP	Information Logistics Process
IS	Information Supply process, a sub process to ILP
IP	Information Production process, a sub process to ILP
LIM	Logistics Information Management, IT support to SCM
MP	Multi Project
MPC	Multi Project Control
O	Output information from ILP
WBS	Work Breakdown Structures

WP Work Packages

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