Managing organizational change
# Part 3 Implementation of information technology: from the laboratory to practice

This article is the third in a series dealing with the issue of managing change in organizations. Each article deals with a specific problem and proposes measures or approaches for dealing with it. This article deals with a number of classic problems arising in the implementation of information technology and, more specifically, the decision-making process.

A difficult experience

Let us get to the heart of the matter by examining the experience of Litmus Paper Corporation [1], a company specialized in the production of fine paper. We are in September 1999 and the company, which has 7 850 employees, operates five plants located in three countries, two of the factories having been acquired only a few months earlier. Seven unions represent the employees and two of the collective labour agreements are being negotiated.

> **IT implementation** projects involve **significant change management problems** and often entail losses which, according to some sources, amount to some **100 billion dollars a year**

At the weekly meeting of the management Board, the CEO announces that after several months of analysis and reflection, he has

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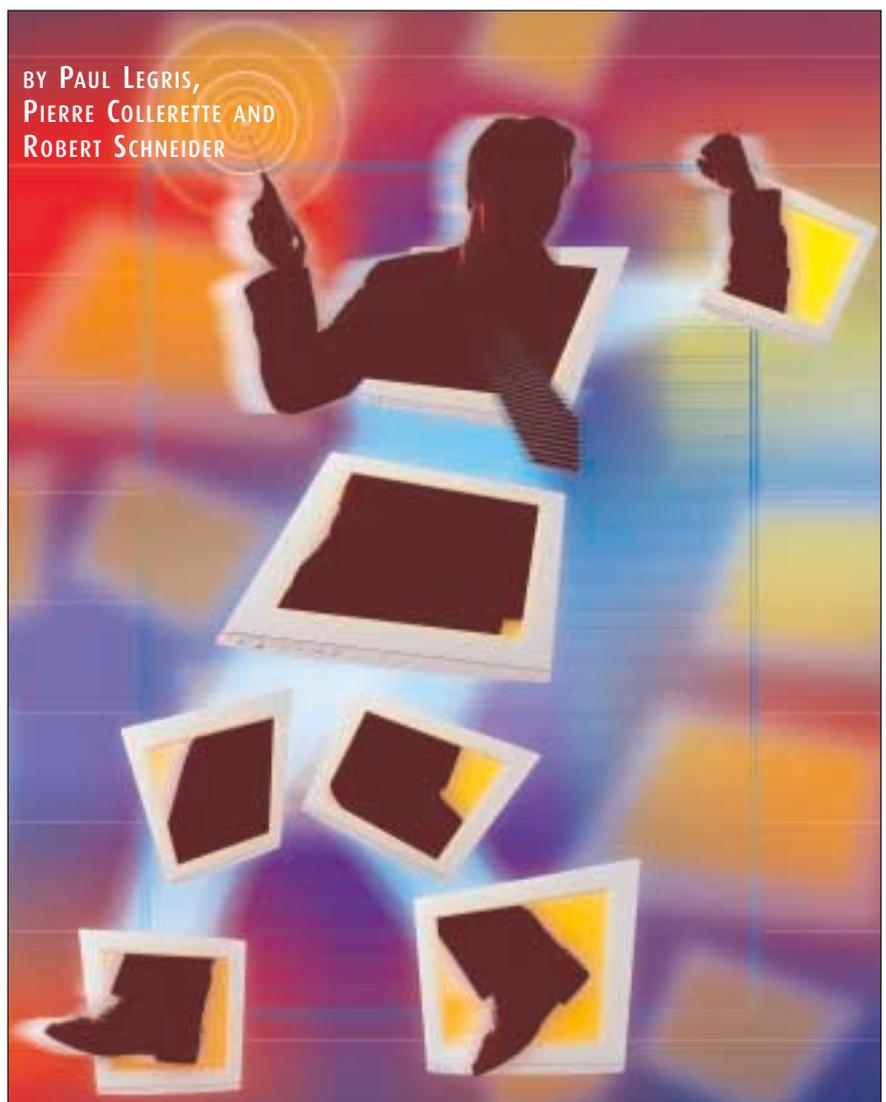
come to the conclusion that there is a need to integrate all the company's information systems into a enterprise resources planning system (ERP)[2]. It is a fact that a number of different systems cohabit within the company and he fears that this may be a weakness in relation to the anticipated growth in demand.

He concludes his explanations by saying: "All our competitors have their ERP and we should follow the trend. It is a matter of survival and we must make this a priority." In the corridors, however, the gossip is that the representatives of the ERP provider have done a good selling job... At the same meeting, the Vice-President, Information Systems (VPIS), is given the task of managing the project and reporting progress to the Board.

In the following weeks, on the basis of a rough specification approved by the Board, together with a cost-benefit analysis, the VPIS selects an ERP provider and a system integrator[3]. A budget of USD 10,6 million is assigned to the project and the work begins. In the meantime, the existing systems will continue to operate and be supported by the company's information technology (IT) staff, which will eventually have to conduct the migration to the new system.

At the beginning of March 2000, the project has reached its seventh month and the VPIS is facing a series of problems. This is how he spends his Monday:

09:00 *Meeting with assistant and administrative secretary*

He reviews the week's agenda and makes sure he has all the necessary information. He finds out about the latest rumours: the staff in the IT department is unhappy because it feels left out of the project and thinks

Only 26% of the attempts to implement information systems were successful

that the latter is a bad investment. The Vice President, Operations (VPO), keeps telling anyone who cares to listen that the IT department "lives in an ivory tower".

10:30 *Working meeting with the managers in charge of existing systems*

The tension is manifest. Once again, delays are noted in the work. The people in charge complain that requests for changes in the existing systems are increasing even though essential changes only were to be made.

11:15 *Meeting with one of the managers*

The manager in charge of the current systems database informs the VPIS that he is resigning. He has accepted an offer from another company. Moreover, he does not agree with the current policy.

12:00 *Lunch with the Vice President, Operations*

The VPO explains the difficulties faced by his department which, in his view, are due to the poor support received from the IT department. Changes in the systems are not happening fast enough and are too often plagued with bugs in spite of the fact, according to him, that his staff only request essential changes!

13:30 *Answers correspondence and makes telephone calls in his office*

The VPIS collects data on the reliability of the information systems and on the substance of the changes requested by the VPO. The data does not tally with the latter's claims.

1) Fictitious name to protect the company's true identity.

2) "Enterprise Resources Planning", or "ERP" (e.g., SAP, People Soft, Baan, Oracle).

3) The firm in charge of facilitating the integration of the company's business processes into the various functions of the ERP.

4) Lientz P., Rea K. (1998). Breakthrough Technology Project Management. Academic Press, Harcourt Brace & Company.

5) The Standish Group International (1998). *Chaos: Charting the Seas of Information Technology,* a special Compass report.

14:15 *Working meeting with the system integrator*

The system integrator's representative describes the difficulty he experiences in gaining the commitment of the people in operations to the cost estimates for the new business processes. The work is falling behind schedule. In his opinion, the staff assigned to this task by the VPO does not have the required competence.

15:15 *Management Board*

At he sets out to the weekly management Board meeting, the VPIS is still hesitating about what attitude to adopt. Should he table the problem as he perceives it, or should he rather avoid any confrontation with the VPO and tell his colleagues that the project is progressing satisfactorily? He finally chooses to avoid confrontation.

In the 18th month of the project, the VPIS retires and, in the 20th month, because of the many problems and delays, the CEO orders an audit by an external company. The auditors' recommendation is to abandon the project because after USD 7,9 million having been spent, at least a further USD 8,8 million would have to be invested to complete the work and re-do part

of the preliminary analysis. Much to his regret, the CEO has to announce that the project is abandoned.

The shock of reality

The story is indeed true and, unfortunately, there are many others just like it. IT implementation projects are frequent in companies, but experience shows that they involve significant change management problems and often entail losses which, according to some sources, amount to some 100 billion dollars a year [4].

Computers are not new in the corporate environment. However, their presence is far more pervasive since the massive arrival of personal computers, the introduction of which was frequently chaotic and unaccompanied by any real corporate vision. In the 1990's, a number of companies invested considerable amounts of money in restructuring their information systems and re-engineering their business processes.

These reorganizational efforts were far from easy. According to a study by Standish Group International [5], only 26 % of the attempts to implement information systems

The perceived usefulness of the system and its ease of use are the two main factors that have an influence on the intention to use a new system, and on its actual utilization
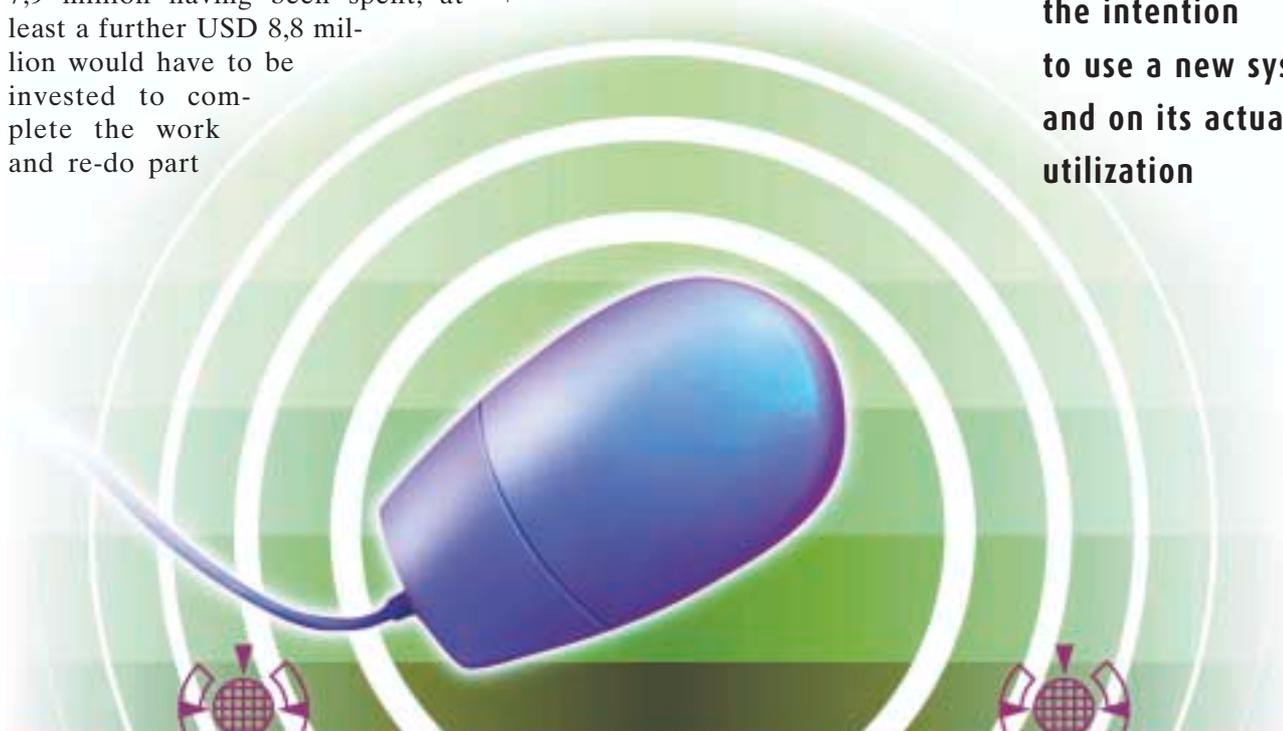
were successful, i.e. completed within the anticipated timeframe, budget and delivering all functionalities. More than 46 % of the projects experienced delays, budget overspending and did not deliver the functionalities stated in the specifications. More than a quarter of such projects (28 %) were abandoned.
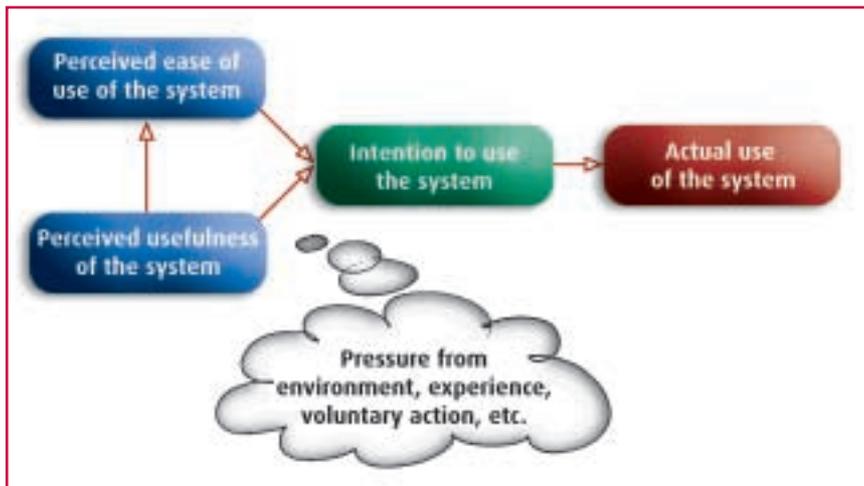

Figure 1: Simplified version of the TAM.

However, it should be possible to do better than that. Let us first take a look at what research in the field can teach us about improving the score.

The lessons of research

Research efforts over the last 30 years can be subdivided into two main trends: research in the area of user satisfaction, and research into the processes of technology integration.

User satisfaction

In the 1970's, researchers wanted to understand what it was that made people accept to use information technology. To this end, they concentrated on means of measuring user satisfaction, on the assumption that if people liked IT, they would then use it. This research identified 39 factors that have an impact on user satisfaction, including: involve-

ment of top management, priority setting, attitude of the IT department staff, systems integration, systems reliability. Even though in terms of research these conclusions were interesting, in practice, managing such a range of factors and their interactions proved to be impractical.

Researchers then tried to group these factors. This resulted in several models such as the following one: uncontrollable variables (task-technology, organizational milestones), partly controllable variables (institutional climate, inventory of computerized tasks), and controllable variables (training of users, status of the IT manager, IT policies). While this approach enabled research to move forward, once again the results were of little practical use.

The technology integration process

From the end of the 1980's, researchers focussed on the process of integrating technology. Among the various models developed, the most noteworthy was the "Technology Acceptance Model[6]" (TAM). This model isolates the factors which most affect the integration process and which, therefore, enable predictions of the extent of IT use. **Figure 1** provides a highly simplified illustration of the proposed explanation.

It shows that the perceived usefulness of the system and its ease of use are the two main factors that have an influence on the intention to use a new system, and on its actual utilization. The other factors are less important, come into play indirectly and fall into rather complex combinations.

According to the model's logic, by acting on the factors that influence people's perception of the system, one can increase the probability that the system will be used and, therefore, the likelihood of a successful implementation.

The main problems reported are of a human character and the technological problems are actually rather marginal

6) Davis, F. D., Bagozzi, R., and Warshaw, P. R. "User Acceptance of Computer Technology: A comparison of two theoretical models". *Management Science* (35:8), August 1989, 982-1003.

Several studies have been conducted with this model in the last 15 years. Generally speaking, it should be able to explain about 40 % of the variance in the use of IT. This is a relatively high rate from a statistical point of view, and it confirms the relevance of the identified factors. However, when about to make significant IT investments, top management would hope to have a higher predictive value.

Experience suggests that to the factors identified in the TAM model, other factors – organizational, in this instance – need to be added to explain better the

Figure 2: A few lessons to be drawn from research on technology integration

The following factors should facilitate the integration of a new technology within an organization, bearing in mind that their importance will vary according to the context.

□ Users perceive that the technology will be useful in the performance of their work*.

□ They believe that the technology will be easy to use*.

□ They already have IT experience.

□ The technology introduced provides relevant data for the performance of their work.

□ It is well perceived by the leaders in their work environment.

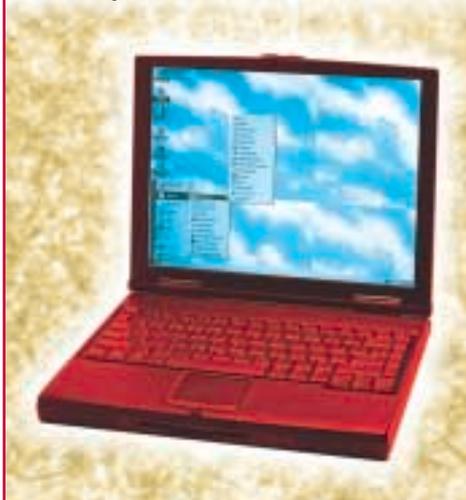* Figure 3 shows examples of instruments for measuring these factors.

Figure 3: Examples of statements drawn from research which may help in assessing the usefulness of the system and its ease of use

1. Statements for measuring people's perception of the usefulness of the system:

□ Using the system will increase my productivity.

□ Using the system will increase my performance.

□ Using the system will increase my efficiency.

□ On the whole, I believe that the system will be useful.

2. Statements for measuring people's perception of the ease of use of the system:

□ Learning to use the system will be easy for me.

□ I believe that it will be easy for me to do what I want with the system.

□ I believe that the system is inflexible and not user friendly.

□ On the whole, I believe that the system will be easy to use.
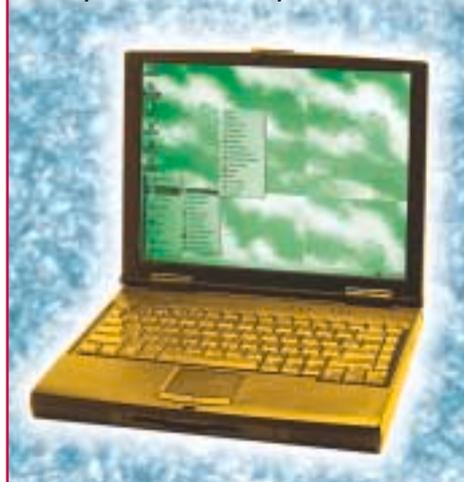
IT acceptance process. **Figure 2** summarizes the main lessons to be drawn from the research projects carried out using the TAM model.

Recently, efforts have been made to integrate into the TAM model the results of research carried out over the last few decades on the diffusion of innovations[7]. While these efforts

Whether for reasons of ignorance, tradition, the desire for a quiet life, or sheer optimism, managers have the unfortunate habit of underestimating the importance of the human factor

7) Rogers, E. V. (1995). *Diffusion of Innovations* (Fourth Edition). The Free Press, New York.

are too recent for their full impact to be evaluated, the approach seems promising. That is why we report in **Figure 4** a number of findings from that field of research which we consider relevant to the implementation of technology.

Studies on the implementation of integrated management systems (IMS)

Over the years, several surveys have been conducted among enterprises to document their experience. One of the more recent ones was car-

Figure 4: Some findings from research into the diffusion of innovations.

The following factors usually contribute to facilitating the adoption of an innovation:

- ☐ Users have had an opportunity to try out and experiment with the applications.
- ☐ Leaders in their work environment are not opposed to it.
- ☐ Among the first users are people with credibility in the eyes of their co-workers.
- ☐ The new system offers significant advantages over existing practices.
- ☐ It is easy to understand and implement.
- ☐ It is compatible with the values, practices and needs of the users.
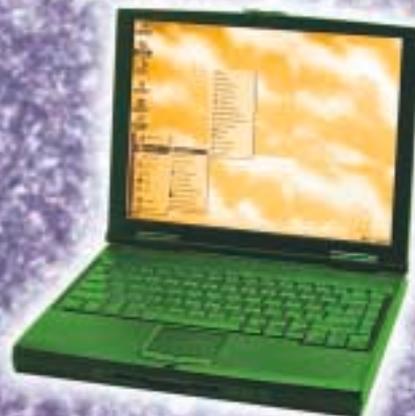
ried out in 1999 by the firm Deloitte Consulting[8] among 85 companies which had recently implemented an ERP. The survey showed that the main benefits expected from the newly introduced functionalities were as follows:

- improved quality and availability of information,
- improved business processes,
- closer integration of business processes,
- greater uniformity of information,
- ability to respond more efficiently to customer needs.

Among the benefits sought by these companies, the main ones were reductions in staff, reductions in inventory and reductions in technology costs.

As can be seen in **Figure 5**, the main problems reported in this study are of a human character and the technological problems are actually rather marginal. The human problems most often quoted were the management of change, the adequacy of the organization's staff, the training provided and the project team. The main problems in relation to processes were project management and process re-engineering. To sum up, one could therefore say that the main problems were management and human problems.

The following example provides a good illustration of the findings of the study. In 1994, an American police department decided to acquire a computer system to process its information. The experience of this implementation proved to be laborious. Four years later, full implementation had still not been achieved and the existing modules were scarcely used. Both police officers and their commanding officers claimed that the system had technical shortcomings which prevented its full implementation.

In 1998, the Chief of Police retired and his successor, who was a believer

> **The *management of current operations* and the *management of change* are all too often confused, managers being unaware that these call for different approaches**

8) Deloitte Consulting (1999). *ERP's Second Wave, Maximizing the Value of Enterprise Applications and Process*, A Global Research Report.

Figure 5: Difficulties and obstacles reported by companies having implemented an ERP.

3%
9%
8%
57%
23%

● Human
● Process
● Technology
● Knowledge base
● Other elements
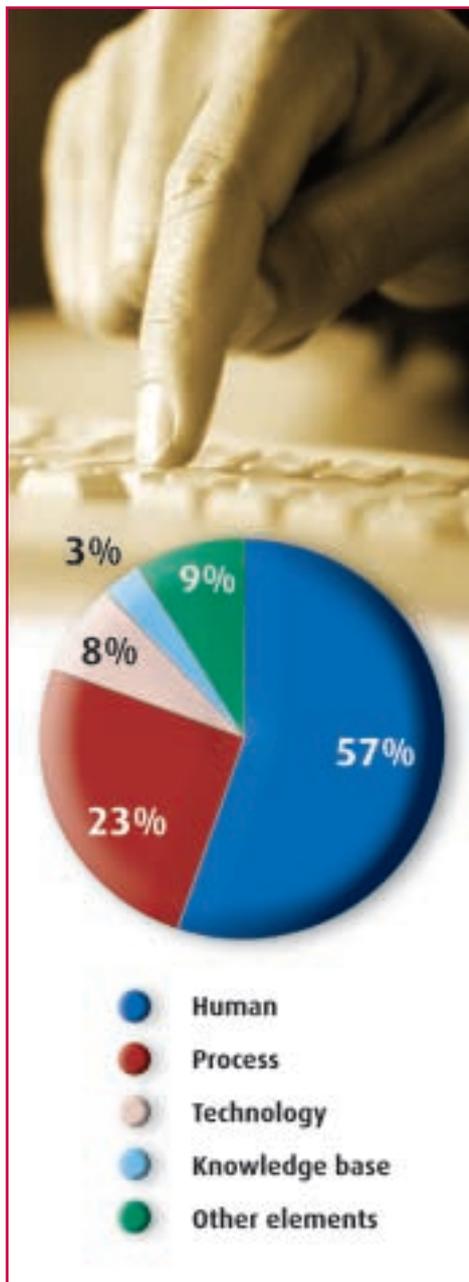
in the usefulness of information technology, asked that all necessary steps be taken to ensure that the system quickly became operational and was put into widespread use. A few months later, the goal was achieved.

According to the officer who coordinated the project throughout the period, the technology itself was never a problem. On the contrary, the reason was that the previous management was unready to commit itself

fully to carrying through the project – which created doubt in the minds of staff. As a result, staff only used the system sporadically and the information produced was thus of little value. In a nutshell, the main problem was not technological, but managerial and human.

Whether for reasons of ignorance, tradition, the desire for a quiet life, or sheer optimism, managers have the unfortunate habit of underestimating the importance of the human factor. A study carried out among 28 companies[9] having implemented an ERP shows that in only 24 % of cases did the strategy focus on the human dimensions and change, while in 36 % of cases, the process retained was primarily technological. The authors of this article assign this reflex action to a tendency among a number of managers to oversimplification.

What to do?

These few references to existing studies on the adoption and implementation of technology are certainly not sufficient to cover all facets of the subject. Nevertheless, they serve to show the complexity of the issue and, above all, to reveal a number of constants, including the fact that the stakes involved in implementing IT are largely managerial and human.

This is all self-evident, some may say. If so, why then such a low success rate? Perhaps because the *management of current operations* and the *management of change* are all too often confused, managers being unaware that these call for different approaches.

Let us return to the experience of the Litmus Paper to suggest a few measures that could have facilitated

9) Wood, Thomaz and Caldas, Miguel. "Reductionism and Complex Thinking during ERP Implementations". *Business Process Management Journal*, Vol. 7 No. 5 (2001), 387-393.

the project, particularly from the standpoints of the decision-making process and of certain power games.

The decision-making process

At Litmus Paper, the decision was essentially that of the CEO, who felt he was in a good position to perceive the company's problems and make a sound decision. With estimates, financial analyses and budget forecasts in hand, he had studied the technological and financial implications and sincerely believed that this was enough to support his decision to go ahead.

In our opinion, the analysis made before his decision was incomplete. In addition to the technical and financial aspects, he should have also, together with his colleagues on the Board, analyzed his organization to assess its capacity to assimilate the changes. For the sake of analogy, let us consider the case of a large building project. Before any decisions are taken, it is considered normal to analyze the selected site and check its characteristics, and to make sure that the project can be completed at a reasonable cost.

One then goes through a process of surveying and sampling with a greater or lower degree of reliability according to the nature of the project, and of ascertaining the availability of public services. These analyses are very important in determining whether or not a project is realistic and in launching the preparatory work along the right lines.

A similar approach should be followed with regard to the managerial and human aspects when planning the implementation of a new information system. This will bring clarity to the decision-making process and enable a suitable approach to implementation to be chosen. In addition,

Working relations imply power relationships and an IT implementation project may find itself held hostage in the event of a dispute

the cost of such preliminary work is usually low and can be viewed more as an investment than as an expense, without mentioning the fact that the tools for conducting such analyses are easy to use (questionnaires, interviews, consultations, discussions). Unfortunately, observations show that such analyses are frequently overlooked.

In more practical terms, here are six factors which should be part of the analysis and which are important conditions for a fruitful decision.

1. People should perceive that the IT used within the company is deficient.

Research has clearly demonstrated that people are more likely to adopt a technology if they think that it will be useful to them. If people are satisfied with the existing IT, but management anticipates that it will soon be inadequate, it should then invest time and energy into making the staff aware of the long-term problems, into demonstrating why the current IT will be inadequate, and into explaining the company's long-term vision.

This awareness building effort was absent in the case of Litmus Paper. In spite of the CEO's good intentions, he announced that he had a solution, but overlooked that his staff had not yet perceived that there was a problem.

2. People need to perceive that the outcome sought is important to the company's future.

The implementation of an ERP introduces a period of disruption for the staff, particularly when it involves a revision of the business processes. That is why it is important for the

staff to understand the project's priority status and its strategic impact on the company.

At Litmus Paper, the management should have made sure that the IT department's staff properly understood the priority character of the project, for instance by identifying people in the department with an influence on their co-workers, replacing them with temporary staff and assigning them a prominent role in the project. A bonus linked with the successful outcome of the project could also have been considered for these opinion leaders.

3. *The company should have the necessary human resources and competencies to complete the project.*

Such a large-scale project requires significant additional effort on the part of the staff and requires project management, change management

and technological abilities. Available resources should be assessed realistically and an appropriate strategy should be adopted.

The CEO at Litmus Paper should have given thought to the abilities of his team in terms of project management, and to the need for steps to improve them, or to recruit competent people from the outside.

4. *In terms of working relations, conditions should be favourable.*

Working relations imply power relationships and an IT implementation project may find itself held hostage in the event of a dispute. Care should be taken to avoid the interest of top management in the change being used as a lever in the course of negotiations.

In the case of Litmus Paper, the management team should have devoted a few minutes to assessing the risk that the ERP project be used

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at its own expense in the on-going collective labour negotiations, and then decide whether it was still wise to launch the project before agreement was reached on these.

5. *Management should clearly state its support for the project.*

This kind of project, which will run for a long period and face many pitfalls, requires considerable solidarity among the members of management and an explicit acknowledgement of its priority. The project cannot be relegated, whether formerly or informally, to the bottom of the priority list, because the staff will then interpret it as an initiative of secondary and passing importance.

At Litmus Paper, it should have been the CEO's role to secure the support and active involvement of all members of management and to take the necessary steps to secure their commitment.

6. *There should be no other major changes during the project's implementation phase.*

An organization's ability to cope with change is limited and one should be realistic. It is not desirable to impose other major changes on the staff directly concerned during the implementation period, at least during the most intensive phases, otherwise the different projects will be in competition with each other, not to mention the fact that the stability and effectiveness of operations may suffer.

In the case of Litmus Paper, the management team should have asked itself whether the company was able to cope with the integration of two new production sites, at the same

time proceeding with the ERP project. At the very least, the coordination mechanisms should have been strengthened in order to keep the situation under control.

Figure 6 summarizes these conditions in the form of a user guide.

Power games among top management

Without making this the central issue, it is worth broaching the power games among top management because these often hinder the proper running of projects. To a certain extent, it is only to be expected that the interests of top management do not converge and may even be conflicting, everyone wishing to protect or promote his own department. For example, if the Vice President for Information Systems at Litmus Paper decided to bring up the claims (made by the system integrator at their 14:15 meeting) about the shortcomings of staff supplied by the Vice President of Operations, he would have been exposing himself to retaliation about the shortcomings of his own department (expressed by the VPO during their lunch).

To prevent the project from being used to serve departmental interests rather than those of the company, it is important for the CEO to take active leadership of the management team by conducting regular management reviews, bringing up the problems he identifies and, if needed, by acting as a referee. This, of course, means going beyond the formal reports and being on the look-out for information. In some cases, it may even be necessary to rely on external assessments which bring a fresh and less directly involved viewpoint.

> **It is important for the CEO to take active leadership of the management team** *by conducting regular management reviews, bringing up the problems he identifies and, if needed, by acting as a referee*

	Agree	Rather agree	Rather disagree	Disagree
People perceive that the IT used in the company is deficient	+2	+1	-1	-2
People perceive that the targeted situation is important for the company's future	+2	+1	-1	-2
The company has the human resources and competences needed to carry the project through	+2	+1	-1	-2
At the level of working relations, conditions are favorable	+2	+1	-1	-2
Management clearly demonstrates its interest in the project	+2	+1	-1	-2
No other major changes are anticipated while the project is being implemented	+2	+1	-1	-2
Results :	9 to 12 — Highly favourable conditions	1 to 8 — Somewhat favourable conditions	0 to -8 — Somewhat unfavourable conditions	-9 to -12 — Unfavourable conditions

Figure 6: Guidance on favourable conditions for a sound decision

The CEO of Litmus Paper, who considered the ERP project as a priority, could have shown himself to be a little more inquisitive. That would have enabled him to identify problems more quickly and act to resolve them. He could also have agreed with his management colleagues to have the progress of work periodically assessed by an external firm. That could have given rise to some concern, but the financial and human risks involved in a project of this size are so critical that the advantages of such a measure largely outweigh its disadvantages.

Conclusion

Several factors may influence an IT implementation project and their relative importance varies with the state of progress. Relying on the measures described here does not guarantee the successful outcome of the project, but may significantly increase its chances. To be effective, however, these few measures must be part of a broader change management strategy. In the next articles in this series, we will be suggesting other measures that should be part of such a strategy.