



People make Projects

Or

The Dialectics of Project Management.

What I'm going to tell you about project management reflects our 'corporate opinion & attitude' about the business we're in, and our ideas of how best to do that business.

Our company, perhaps surprisingly, doesn't have much of an opinion about Hegel's philosophy; my remarks on that subject are, therefore, strictly my own.

Ironies of history: the popularity of the philosophy of G.W.F. Hegel.

"The real world of values is inconsistent; that is to say, it is made up of antagonistic elements. To grant them full recognition simultaneously is impossible, yet each demands total acceptance. This is not a matter of logical contradictions, because values are not theoretical theses. It is a contradiction which lies at the heart of human behaviour".

Leszek Kolakowski: In Praise of Inconsistencyⁱ

I am aware that the term 'dialectics' must ring familiar in some of the audience's ears. I am also aware that the term is associated with systems of ideas (once called 'ideologies'), very different from those which brought forth Artemis products.

It has been the posthumous misfortune of Georg Wilhelm Friedrich Hegel to have had a follower (Marx) who reversed & possibly partly misunderstood his (Hegel's) thoughts, and linked them with a dream he (Marx) had of a new & better society. For Hegel's current popularity it was a further blow that this follower had, in turn, another follower (V.I. Uljanov), who again reversed some of his "guru's" thoughts, and, when the opportunity came, started implementing such a new & better society.

It is yet another coincidence that this follower again had a follower, by the name of Gaprindashvili, who killed all his predecessor's followers as well as his own, but yet had a successor; and so on & so forth, until God decided that enough was enough, sent in His crack team of Ronald Reagan, Margareth Thatcher, Gorbachov & Lech Walesa, and the new & better society duly collapsed.

Hegel has never been a widely popular philosopher. He has, however, been enormously influential, not only in Marxism. His belief in the absolute & singular truth of reality as we perceive it, is no longer tenable e.g. in the light of 20th century insights in physics. If there are many virtual realities, as a/o Casimir's parallel plate experimentⁱⁱ strongly indicates,

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then there isn't any particular reality more 'absolute' than any of the others. His treatment of change ("dialectics") remains challenging.

The idea of dialectics is, by the way, by no means central in Hegel's philosophy. In his main work "Phaenomenologie des Geistes", in which he lays down the foundation of his system, the term isn't even mentioned, though concepts such as "Entfremdung" (alienation), and "fuer sich sein" vs. "an sich sein" (being in itself and for itself) are extensively treated there.

This paper puts forward two contentions.

The first contention is that the system of a centrally planned economy collapsed,

- not because of flaws in its philosophical foundations,
- not because of capitalism's moral superiority,
- but because it was inherently unsustainable, as it must lead to an edifice of lies, which must ultimately sever the link between official statistics and reality. This renders management of the economy largely meaningless.

This system, by the very perfection of its simplicity and consistency, was its own undoing. Its death was, so to say, pre-programmed: in its "organizational DNA", or, as Marx & followers would say: "it had to succumb to its internal contradictions".

The pretention was that **all** allocation decisions, regarding **all** economic units, in roughly 1/5th of the world, are taken in Moscow. Those down the command line: Republic, Oblast, etc. were simply carrying out the Central's allocation decisions:

- sow so much wheat in these & these plots,
- apply such & such quantities of fertilizers, weed killers, etc. at these & these dates, use so & so much labour, etc.
- load the harvest in the railway trucks we'll send you.

It is evident, I think, by hindsight that this must lead to an insufficient over-all control of quantities of produce and their movements:

At every link in the command chain there was somebody (the person responsible) who had to induce, convince, cajole, blackmail or buy people to do things the way he (the responsible person) wanted, to make sure things ran as was expected of him.

This starts at the very lowest level: the kolchoznik has to plow his private plot, on which his family's survival depends. So he needs fuel, and the use of a tractor and a plow, and so do all of his colleagues. If he doesn't get a tractor and fuel, the kolchoznik will have to till his field by hand. That will take much longer, and during that time he'll be unavailable for work in the Kolchoz.

The Kolchoz Director therefore has to put away some fuel, and to lie about its use. In much the same way he has to buy the services of outsiders he sometimes needs, and he needs the wherewithal to buy those services.

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The internal dynamics of central top-down planning.

Central planning, top-down, once adopted as a principle, as a psychological if not practical necessity, must evolve towards a more-and-more detailed planning of primary production activities and logistics. If you plan so-and-so much wheat to come from Kolchoz Red East, then you must make sure that Red East gets the supplies it needs, secure the transport to deliver those, etc. etc.

The system denied a 'discretionary decision space' to people who, on each level of the hierarchy, had to get things done. These people were responsible, without having, in principle, any means to exercise their responsibility: they, and everyone else, just had to do what the Plan said, there wasn't anything for them to decide outside of that: the Plan was complete and perfect.

People throughout the system, and at every hierarchical level, created 'discretionary decision space' for themselves a/o by withholding some resources destined for 'regular' use, so as to buy with those 'illegal resources' things like services, influence, access to scarce resources, etc. This withholding of resources created structural shortages in the system, which made it all the more important to buy influence, access, etc.

Lying was so much at the core of the system, throughout, as a necessity for the functioning of the system, that already for that reason control and planning could not but fail, because official statistics ultimately had only a remote relationship with reality. In my frequent dealings with 'authorities' before and after 'the transition' I've often noticed an attitude of "we're only going through the motions; you & I know better".

The system of putting away an illegal 'operational fund' at every organizational level, and of consequent official lying, unavoidably led to a shortage of resources to allocate to the lowest level (farms & factories). This only reinforced directors' need to have the means to 'buy' access to scarce resources from the people who could make sure this farm or factory would be served first. Therefore: to salt away enough to outbid his neighbour/competitor.

As the official statistics had less and less relation to reality the system must, by necessity, rely more and more on purchased access to resources, i.e. on corruption.

Small group interaction preference.

Many sociologists and psychologists have put forward that man's mind is pre-programmed to function in small, face-to-face groups. A consequence of this is that people, even in large organizations, or in the framework of a comprehensive management system, will strive to create 'pseudo small groups' a/o by developing a 'ingroup culture': jargon, types of behaviour towards ingroup members, etc.

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Alvin W. Gouldner, an American organizational sociologist, has pointed out that every organizational unit also strives to achieve some discretionary decision space, within which it can operate autonomously (i.e. with freedom of choice) ⁱⁱⁱ. Gouldner investigated defensive strategies sub-units in organizations employ to defend their “breathing space”.

One way of doing that is by shielding its doings from the outside world’s view. Another is to create a ‘discretionary decision space’ by withholding resources (information, money, manhours, etc.) and using these to buy “desirable goods”, from influence on decision making higher up in the organization, to leisure, status, and other. I’ll come back to this later. For the moment I underline that this universal tendency limits the possibility of exercising complete control from a centre, through a chain of command.

When people lower down in the organization feel that they don’t have the breathing space to take decisions on matters they consider important for their work satisfaction, they’ll develop defensive mechanisms to create and defend a discretionary decision space.

Under-used grey matter, failure to arouse commitment.

The centralized system of planning activities and allocating resources couldn’t but fail in the long run, because it denied, at least left unused, the creative and thinking capacities of the whole command chain between the Gozplan planner and the Kolchoznik in “his” field of wheat in Kazakhstan.

In the West, at least in smaller and medium sized enterprises there is a permanent push towards doing things cheaper, simpler, faster, better. In larger enterprises permanent improvement is a pre-supposition (Philips: routine: every year 2% efficiency improvement, therefore 2% reduction in overhead expenses). This necessitates a constant attention for ‘ways of doing things better’, throughout the enterprise. It is a matter of course for any employee of most organizations, to think about, and routinely apply, better ways of getting his job done. It is also a matter of course for management to encourage, even reward, such initiatives.

A centralized planning system must lead to complacency, and to the idea, on the workfloor, that “it isn’t my responsibility”.

The **second contention** of this paper is that in project management something has happened/is happening that comes very close to, if it isn’t, what Hegel described as ‘dialectics’.

This dialectic process is a consequence of the widening of perspective of project management support software, from a single project to portfolios of – often interrelated – projects.

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Hegel writes a very dense and obscure German, that works by allusion as much as by direct reference. His treatment of 'dialectics' is a prime example. Dialectics is a way of describing change. Human minds are not very good at grasping change. We are pre-programmed to see statuses, even when the evidence points towards change.

When Einstein wrote down his formulae of general relativity, he realized that – if his equations were right – the universe, as he understood it, namely static, should collapse under the pull of gravity. So he invented a 'cosmological constant' to counteract the force of gravity. It didn't even occur, then, to Einstein that the universe might not be static, but expanding, as Hubble found out later. The ideas of a static cosmos was so 'self evident' up to that time, that any other possibility wasn't even contemplated.

The way in which our minds deal with change is, in many instances, to divide a continuous process into successive 'steady states', and to describe that succession. An example is our mathematical treatment of e.g. ballistic trajectories: we suppose that the bullet, or other object, 'jumps' from one infinitely brief straight trajectory (i.e. steady direction of motion) into the next, throughout its flight.

Hegel treatment of 'dialectic' change may be taken as an instance of a reduction of change to a succession of steady states. By 'dialectics', so Hegel says, "werden Gegensätze (or Widersprüche) aufgehoben^{IV}." Gegensatz means 'opposite' or 'antinomy'. Widerspruch means 'contradiction'.

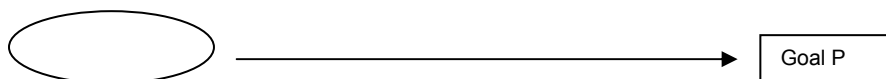
The verb 'aufheben' may mean, alternatively or concurrently:

- to preserve, to store away,
- to resolve, to end, to lift (e.g. a restriction)
- to elevate, to lift up: literally of a physical object, or figuratively 'to a higher level'.

The process I refer to elevates 'project management'

- from the level of single-minded pursuit of a limited goal,
- via the level of optimizing several, unrelated if not incompatible, parallel goals,
- towards that of over-all 'business performance', i.e. an optimization across multiple goal dimensions.

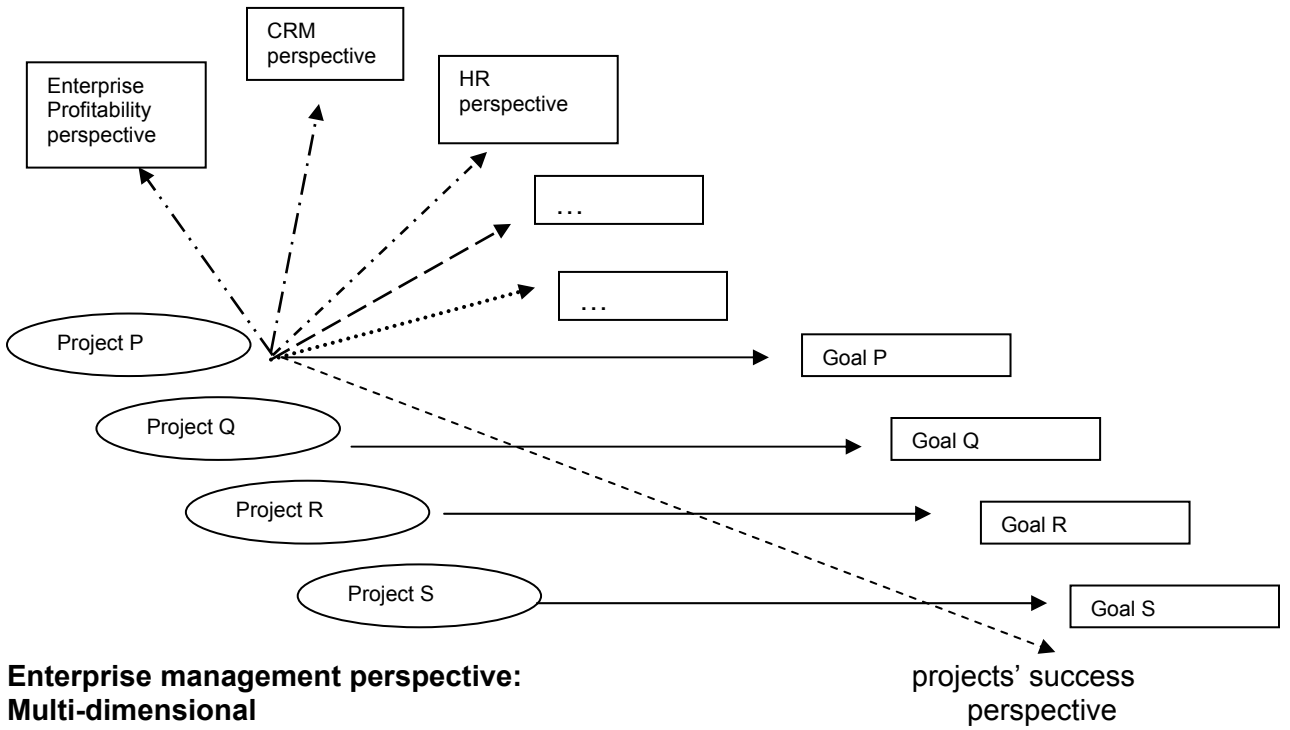
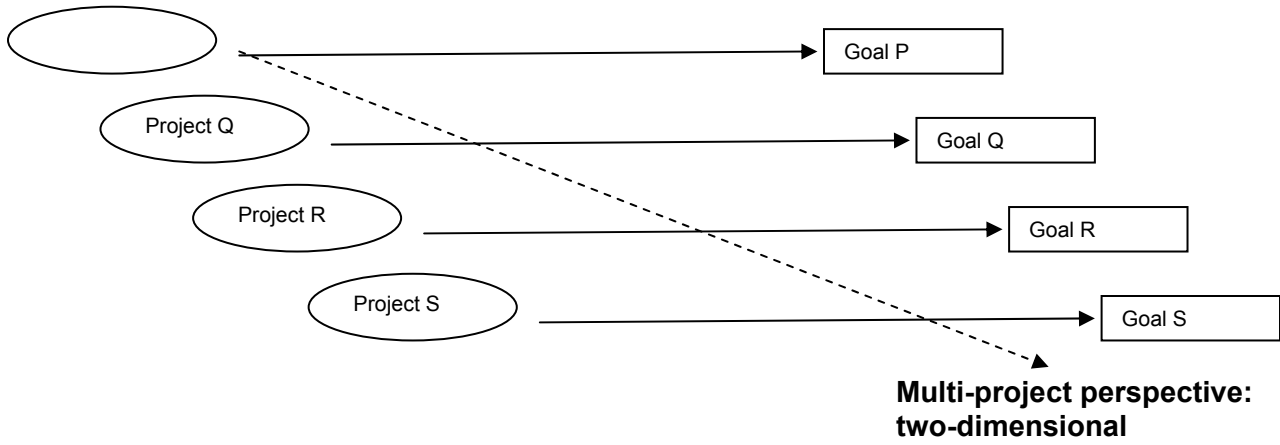
Single project management perspective is one-dimensional:



Managing multiple projects from a single hand extends the perspective to two dimensions: instead of optimizing towards a single goal, achievement is optimized

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across separate goals: the optimum in one project may be sacrificed to allow a more satisfactory performance in another.



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Significance of the step to multi-project management.

The significance of project management (software) tools changes fundamentally, if not dialectically, upon the step from single to multi project management: it is now not only possible to manage more than one project 'from a single hand' (a quantitative step), it is also possible to take into account the interdependences between separate projects. Within one business unit all projects are in principle inter-connected, even if they're not for the same client: all projects draw their resources from a common resource pool.

The qualitative step, which changes the significance of the 'project' concept, is that it is now possible, thanks to multi-project capabilities, to address all the major concerns of those responsible for the running of the entire company (i.e. one or two levels above that of the project manager), if that company's 'prime production process' can be described in terms of projects. The concern is then no longer only whether one or all projects is/are on time, but a range of concerns in which 'overall profitability' is necessarily prominent, including 'corporate image', legal liabilities, office equipment & maintenance, employee remuneration policy, etc. etc.

The extra-significance is, of course, also a result of the increasing accessibility of information throughout companies, thanks to a/o the increasing 'portability' of information across applications, the use of open databases, etc. Thus key management information from different sources is easily obtainable: profitability, planning vs. reality, occupancy rates, about the (very recent) past as well as about the foreseeable future.

The step from single to multi-project capabilities even transcends the qualitative: Because it is now possible to effectively address the major 'natural' concerns regarding the management of entire enterprises (namely those that produce projects), this has led to a widening of application of the 'project' concept itself.

In the Hegelian sense this widening preserves the original idea of what a project is and the project planning & control methods, it abolishes 'project' as something belonging to a narrow application area by erasing the distinction between 'projects' and other discrete packages of interrelated tasks, and it elevates the project concept to a higher abstraction level.

If that 's not 'dialectics', Mr. Hegel, then it must come very close.

Some history.

The first generation of projects were large military undertakings, such as the D-day landings. The second generation were large, capital-intensive, undertakings where "failure is not an option". The multi-project capabilities have caused an extension of the applicability of the 'project' concept (third generation) to: any complex of activities aiming at an identifiable, finite goal other than the production of physical goods. In other words: for the 'project' concept to be applicable there must be:

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- a *total of foreseeable tasks* to be executed,
- which tasks are *necessary and sufficient for the achievement of a specific goal*.

It is the power of the project management method and tools, and in particular the fact that, from the lowest planning level upward, expenditure of resources can be related to the achievement of output, that has induced this widening of application: the aim of a project may now as well be the construction of a nuclear power plant, as the completion of a 'dossier' (whatever that may be), or of an assignment, or of an order.

Thus defined projects form a sub-set of the category 'systems', as normally defined in systems analysis theory. Definitions of systems generally mention as characteristics:

- complexity
- inter-relatedness of elements, and
- a focus on a goal

The first two characteristics can also be attributed to projects, the third is identical. Complexity isn't an element of formal definitions of the project concept, but it obviously does not make sense to take the trouble of handling tasks as projects unless there is some degree of complexity.

Whereas the elements of a project are tasks or activities, those of a system may be anything. In organization theory the 'project' concept may thus be said to 'dissolve' into the larger 'system' concept, as a consequence of increased practical management capabilities. This dissolution is comparable to the way in which newtonian physics 'dissolve' into relativistic (or constitute a special case of the 'wider' theory), or to the way in which e.g. probability distributions such as the normal, the hypergeometric, and the poisson, relate to each other.

Process automation and project management.

The management of a company producing projects or 'projects' has – in principle – the same concerns as their counterparts in organizations producing e.g. potatoes (farms), or e.g. electronic hardware (factories): to deliver product of a sufficient quality on time.

The factors determining whether the intended output will be available on time, and therefore the possibilities of curative intervention if necessary, are significantly different.

For the production of electronic hardware, or potatoes, it is possible to draw up an Ishikawa diagram, specifying each factor (risk) that may affect the proper running of the production process. By analyzing each factor, and establishing tolerance limits, or by dynamically steering towards an optimum, the production process can be effectively controlled in each step.

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In the case of electronics components the control can be so complete that it can be, and now is, fully automated, so that human interference to manage their production process is no longer required. In the case of potatoes this would, in principle, be equally possible. The difference, of course, is that the factors influencing the smooth running of the production of electronic components are all internal and can be manipulated, whereas most of the factors influencing potato production are external and cannot be influenced.

Western farmers rely more & more on their computers, but the production of potatoes is subject to many external risks, specific to each phase of the production cycle: temperature, rainfall, diseases & pests, illness of the farmer, etc. The farmer, in managing his field of potatoes, dynamically optimized the production process towards a maximum yield.

He cannot, like the manager of an electronics components plant can influence factors like temperatures and concentrations of etching baths, influence the weather; the only thing he can do is adequately react to it. Therefore the control of potatoe production remains largely human-controlled, though milk production, with a much shorter production cycle, is now largely a computer-managed process in many Dutch farms.

It is important to note, here, that *information is*, in each case, *the basis of all control systems*. Temperature and concentration of chemical agents can be measured (i.e. temperate and concentration data can be collected), as can lengths of waiting lines, machine speeds, average outgoing qualities, etc. These data may feed an automated production control system.

Similarly soil temperature, nutrients, humidity, etc. can be measured (up to a point), as can other factors affecting the growth of potato plants. An automated system could, in principle, take decisions e.g. on when to apply how much of which fertilizer. The farmer in fact collects this control information himself, by walking through his field, feeling the soil, and looking at his plants.

It must be said that, in comparison to industrial and even farming production processes very little information is collected about the prime production process in organizations that 'sell' services such as projects ('manhours manufacturers'). In most such organizations the only information routinely collected concerns manhours spent, and milestones achieved, or tasks completed.

*Projects business is a 'single input factor' business,
In other words: projects are made only by people.*

A potato farmer can 'play around' with many 'production factors': different seeds, different plots where he can plant them, more or less fertilizer, etc. The electronic components manufacturer may change the lay-out of his wire boards, use different chemicals, vary temperature, concentration and duration of e.g. etching processes.

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The manager of a projects or 'projects' business has only one input variable to play around with: labour. His production 'machines' are his people, no raw materials are used to produce projects (except lots of coffee & paper), quantities of all other 'means of production' (laptops, cars) are roughly proportional to the numbers of people employed.

O.k., the tools the pm uses may be a little more, or a little less, sophisticated, easy to work with, and appropriate for the job in hand. But once the tool is implemented it is there, as a part of the environment in which the work has to be done. A project manager can't vary the input of software tools to influence project output.

For a 'manhours manufacturer' the financial success of his company therefore directly depends on his ability to optimize the use, and the productivity, of the one input factor he can vary: labour.

It is a mathematically trivial, but practically difficult job to optimally allocate a number of tasks, each with a finite set of requirements, to a number of people, each with a finite set of individual characteristics. Given different fee rates plus a set of allocation rules, for different combinations of jobs an optimum solution can be found, in every case.

In practice task allocation is difficult, because people fall ill and are unavailable, and e.g. because some projects or tasks overrun their completion date, and those who work in these cannot take up a next job. Resource (re)allocation decisions typically have to be taken under time pressure, and often as a result of unexpected occurrences.

Because the financial success of projects businesses depends so heavily on the efficient use of human resources, project management tool kits typically provide information to support HR management: work allocation, skills & experience requirements matching, tracking of times spent, etc. The sophistication & flexibility of functionalities offered, and therefore the partial significance of these, may vary considerably.

Differences between human and physical production resources.

Dreams & legs.

Human resources differ from other resources in a number of important respects. They have ambitions, unlike machines, and they have legs to walk away with if they want to. So they can't be dealt with in the same way as machines or quantities of raw materials, who don't have to be listened to. Everyone knows that, and – moreover - that's what much of this conference is about. If you didn't know yet that people have dreams AND legs, you certainly will after this conference.

'Machines' & repositories of know-how.

An important difference is that human resources not only use their arms and legs, but also their heads, in most jobs, and certainly when working in projects. A human employee, it might be said, is a combination of a machine performing mechanical tasks,

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and of databases of methods, data, etc. In manufacturing process control these functions are separate, at least separately accessible.

Because employees have legs and sometimes DO walk away, it is one of the main challenges of the manhours manufacturing industry that a company's know-how isn't lost when employees leave the company. Knowledge management: learning from experience, accumulating know-how, and making that expertise available to all company employees, is one of the main challenges manhours manufacturers face.

Most of project management has probably, up to now, relied on a combination of common sense, improvisation talent, and memories, in people's minds, of how earlier comparable projects were done. There are good reasons to believe that in the near future that won't be sufficient in most environments. There are also good reasons to believe that the ability to store, build on, and re-use experience will be one of the factors distinguishing successful companies from the unsuccessful.

Output level manipulation.

I'd like to point to another relevant difference. In physical production there is a direct proportionality between quantities of inputs and quantities of outputs (within technical constraints). In manhours manufacturing, in particular in projects, that isn't automatically the case. Two differences:

- a. In project execution it doesn't automatically raise (or accelerate) output if you put in more (human) resources. In many cases 'throwing in another few engineers', when a project has problems, will even be counter-productive.
- b. The quality and the speed of output from projects depends on the qualities of the inputs of human resources at least as much as on the quantities, if not more.

For project and resource management the consequence of this is that the allocation of work to production resources (people), or vice versa, is critically important for projects' success. Do it wrong and there's little you can do except replacing people when things (threaten to) run out of hand. In the meantime your relationship with your client may have suffered, there's unrest in 'your own shop', and you're probably incurring losses on the project(s) concerned.

Attracting good quality people to your company, and keeping them in the company, is a first requirement, of course, but even having good people doesn't help when you can't put them to work where their qualities make a difference.

Like the ability to store, build upon, and work with past experience, a company's ability to systematically optimize work allocation, so that it receives the optimum out of its employees, will increasingly be a feature distinguishing the successful company from the less successful.

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Increased project control?

The increased capabilities of processing meaningful data about the production process in 'manhours manufacturing' might raise hopes of a tighter control of the prime production process in such organizations. Collect more data, like the managers of electronics hardware manufacturing firms, and even dairy farmers do, then "you get a grip on things". It is a fact that the management of many service organizations has only a vague idea of what their 'productive assets' are doing at any moment. The question is whether a much tighter control is possible and, if possible, desirable.

The answer to both questions is probably "no", if the aim is to successfully survive as a company. I refer to my remarks, earlier, about the necessity of collapse of a central planning that 'does all the thinking for the entire system' at its headquarters.

It will be technically possible to reduce the discretionary operational space of project participants, by requiring them to produce more information about the progress of their work. Up to a point this will lead to a better efficiency, and perhaps to a higher output. Beyond this point it will lead to passive resistance, grumbling, and even loss of valuable production assets. Where the optimum point lies will depend on the general organizational culture in a country, and on the organization, and even the individual people, in question. Where this point lies is a matter of fallible human judgement.

As there is an inherent contradiction between the need to standardize tasks and the need to allow, and even to appeal to, employees' creativity, there is a contradiction between the need to control task progress, and that of allowing people 'breathing space'. No amount of computerization will ever solve these contradictions. Of course one needs creativity AND discipline, in an organization. But these go together uneasily.

The problem, that in organizational day-to-day life discipline **and** creative autonomy are both necessary, simultaneously, although they exclude each other in principle, is exactly what your compatriot Leszek Kolakowski^v refers to in more general terms, in his – very witty, very well thought out, and very readable – article 'In Praise of Inconsistency', quoted in the beginning of this paper:

"...total consistency is tantamount in practice to fanaticism... inconsistency is simply a secret awareness of the contradictions of this world..."

To be always inconsistent would introduce another (fanatical) consistency: "... to this extent, therefore, we propose to preserve the principle of consistency as a value, by practising the principle of inconsistency inconsistently"^{vi}.

The question, in the exercise of organizational control, isn't so much 'what is technically possible?' as 'what makes sense?'. Adding administrative duties to project participants' tasks reduces the time available for their primary tasks, therefore their productivity. It threatens to reduce their commitment and creativity, if carried too far. But it is necessary, to some extent, for the enterprise to function as a whole.

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Increased control capabilities are a consequence of any good implementation, or upgrading, of a pm system. What of those capabilities to use, and how, is one of the factors that determine the success of any system. *Intended or not, the introduction or improvement of pm practice almost unavoidably leads to a larger 'visibility' of what people do.*

By introducing such a system the company takes some 'discretionary decision space' away from its employees: the boss can now 'see' things he earlier couldn't. Project management folklore is full of stories about systems that didn't "make it", however technically excellent, because the people on the work floor refused to work with them.

In crisis situations people may grudgingly accept that they have to 'give away' some of their relative independence within their organization. In most other situations they will do so only if they see the logic of the changes to be made (so information to employees prior to introduction of the system is necessary).

New, or updated systems are introduced to improve organizations' business performance, ultimately to improve the organization's 'bottom line'. Improved control capabilities may contribute to a better performance. Control capabilities need not be used to the extent of their possibilities.

Top-down and bottom-up perspectives.

From the manager's perspective it is a matter of course that he determines how his company works: it is the manager's job to optimize the organization to achieve the best possible results. Any improvement ultimately serves the whole of the organization: those on the workflow as well as those in the board room.

From the work floor the perspective is somewhat different. Each employee has a one-to-one relationship with his/her organization. To this relationship belong formal and informal rules. Together these rules determine the 'breathing space' every employee has. When the employer asks the employee to give up some of his/her discretionary decision space, the natural reaction is "what do I get in return?" It isn't always possible to give something in return, if you tighten organizational control and discipline, but often it is. More often than is recognised, in fact.

The return for the guy who has to accept a 'new deal' with his employer may be of various kinds. Salary increase if the company really does better (but that takes time, and the connection may not be so clear). Spare time, if schedules can be tightened and the workload doesn't increase. Increased convenience is a powerful motivator, so – if applicable – is flexibility, e.g. in being able to take holidays at short notice.

Convenience, flexibility, and such benefits for the work floor do not emerge right out of the box. Such benefits are not even sought for, in the implementation of any system,

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unless they are consciously taken as goals to be achieved by the introduction of a new system.

By analyzing the way work is organized, in any particular client's case, from the workflow upward, one often comes across matters that bother people 'on the workflow', which can be addressed as well as the concerns of managers. In our approach of system implementation we make it a point to inform people 'on the workflow' about the new system: what it does, and which changes it entails for themselves.

We make it a point to address, or at least take seriously, the concerns of those who'll work with the system. New & upgraded systems invariably mean change. Change requires an extra effort. People will make a serious effort if they believe in the rationality and the fairness of the changes to be introduced.

Private working space.

We make it a point to create 'discretionary operating area' for small working groups. We give each project group a private working space, shielded from the rest of the organization, in which the group members can 'publish' drafts, make comments, exchange personal messages, etc. It is, we think, very important to provide this 'safe space'.

Creativity works a/o by people having wild ideas and trying to apply those. Most wild ideas are just that, of course, but often a wild idea turns out to be valuable. In the safety of a private working space people may be willing to risk making silly mistakes, and 'show' their wild ideas to their mates. If bosses and people from other departments can see their silly mistakes they will be more careful.

The common working space, of course, has another function, namely that of a repository of project documents. Not only 'peripheral' information, such as how much time mr. X spent on task Y, but the very work itself: Mr. X's drafts, the comments he received, discussions in project group meetings, relevant external documents collected, etc. This allows the company to store experience, for other project groups to work with and build upon: know-how management.

Tools vs. belief & commitment.

Belief in the success of what one is doing, and commitment to the company and the task in hand, are vital for successful change, as vital as having the right tools. Belief and commitment, once extinguished, are enormously difficult to rekindle. As company assets they should be valued at their correspondingly high 'replacement costs'.

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Tools you can buy in a box. How to deploy those tools to optimize the client's business, and how to earn and keep the client's people's loyalty and commitment, is not included in any box.

We, Artemis, think that clients are best served by adding high quality consultancy & implementation services to our – very good, flexible, etc. – software, and selling the two as a bundle. Consultancy can be sold & make sense without tools, but Artemis tools cannot be sold & be made sense of without consultancy.

At a business process analysis and modeling level this means: very carefully configure a system to just reflect, and satisfy the information needs of, the client's (improved) business processes. At the implementation level it means: remember, and provide for, the fact that

projects are made by people, for people.

HH, Sept. 7th, 2002.

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ⁱ Leszek Kolakowski: In Praise of Inconsistency, in: Leszek Kolakowski: Marxism and Beyond, London, Paladin Press, 1971, pp. 228 – 237.

ⁱⁱ Cf: Richard P. Feynman: Six Easy Pieces.
Stephen Hawking: A brief History of Time.

Casimir corroborated the theory that the vacuum is ‘a seething soup’ of massless or near-massless virtual particles and anti-particles, sometimes springing into ‘real’ existence, and then very rapidly annihilating each other.

Because these elementary particles behave ‘wave-like’, they have a frequency, and an energy level. The energy levels (i.e. frequencies and wavelengths) of such ‘temporarily realised’ virtual particles are randomly distributed, i.e. they differ from particle to particle.

By putting two metal plates very close together, closer than the wavelengths of the least energetic particles, a difference in pressure should result between the space in between the two plates, and the outside world: between the plates the longer-wave particles are intercepted by the plates before they ‘can make their move’, and therefore they cannot contribute to the pressure exercised on the plates.

Because this is true only for the least energetic particles, who contribute least to the pressure, the effect is very small. Careful measuring proved the existence of a tiny but real difference in pressure: a ‘suction’ pulling the plates together.

ⁱⁱⁱ Alvin W. Gouldner: Autonomy and Reciprocity in Social Systems.

^{iv} See G.W.F. Hegel: Wissenschaft der Logik, ed. G. Lasson, 1923, e.g. p. 115: “Das Endliche wird nicht vom Unendlichen als einer ausser ihm vorhandenen Macht aufgehoben, sondern es ist seine Unendlichkeit sichselbst aufzuheben.”

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^{vi} Kolakowski, *ibid.*, p. 237.