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– the case of a risk capitalist's judgment

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Have you ever made up your mind? Well, who hasn't, right? So, how did you do it?

This paper draws from a case of a professional assessor at a Swedish risk capital company making up his mind about a certain investment possibility. The company, the Swedish Industrial Development Fund (IF), is a governmentally financed fund investing in what they call "high risk, high tech projects" – i.e. projects owned by companies that due to high risk and lack of securities typically do not find financing through a bank. At this fund we will follow the assessor, Mr Wahren, on his way from doubt, uncertainty and lack of information to the certainty of a clear recommendation to his board of directors to invest in a certain project.

The professional economic assessment is, compared to the everyday assessments we may undertake, characterised by the high demand on the way the judgment should be argued. There are clear expectations on calculations, based on facts and estimated figures such as future market shares, profit margins and so on, and technical descriptions. The assessment should lead, in a convincing and legitimate way, to the recommendation to invest or not. The legitimacy and power of conviction of the assessment is probably the most important criterion for the assessor's competence – perhaps even more important than the result of the actual investment.

There are quite a few rather fascinating aspects in having the assessment of "high tech, high risk projects" as a profession. For example the development projects that the investment manager will have to make up her mind about will mostly concern new technologies, non-existent products, or non-existent processes often to be sold at non-existent markets – well working magic glass balls would probably be highly demanded. The project owners, the assessor's main source of information, will naturally be very positive about the project and its possibilities. The assessor will therefore have a rather institutionalised first critical attitude towards the project. A great number of questions will then be asked critically concerning the possibilities of commercial success of a technical development project - Is there a market? Will the financing hold? Are the estimated development costs reasonable? Does the company have the necessary technical competence, market channels, management skills, etc, etc? The professional assessor goes from doubt, by way of facts, subjective opinion, estimates, calculations, lack of information and manifold possible future scenarios, to a univocal, legitimately motivated recommendation – yes or no. Quite a trip, isn't it?

In this world of professional risk capitalist opinions some aspects of the investment opportunity at hand seem to have the ability to spread to characterise the overall assessment. Borrowing from *emergence theory* such aspects will be called *attractors*. With concepts such as these the paper aims at showing and understanding an emergent element in judgment processes such as the economic assessment. It is my hope that this will help us understand how the search for an opinion also '*becomes*' instead of merely '*is*' co-ordinated.



Getting the concepts right, Part I – Emergence and attractors

This phenomenon - order for free - or *emergence* has become quite a fad in many fields. Even the dust laden systems theory or cybernetics has experienced somewhat of a renaissance disguised in its new dress, complexity theory. Emergence – an evocative and sometimes perhaps provocative word – is, however, commonly expressed by saying that the whole is greater than the sum of its parts (Kauffman 1995). This is not meant in an purely accumulative way, but rather in the sense that the whole may have qualities that none of its parts may possess. Per Bak, the author of a book with the slight arrogant title *-How Nature works* - puts it in a similar fashion, however a bit more cynically (Bak 1996):

”Because of our inability to directly calculate how complex phenomena at one level arise from the physical mechanisms working at a deeper level, scientists sometimes throw up their hands to these phenomena as ”emergent”. They just pop out of nowhere.”

Although perhaps strange or provocative there is nothing mystical or transcendental involved in the emergence process. To reflect on the concept of emergence lets first make a slight detour into the realm of biology and chemistry. Kauffman (1995) describes an emergence theory of life – a theory that he sees as complementary to Darwin’s evolutionary theory. The basis for the emergence theory of life is the theory that sufficiently complex mixtures of chemicals can spontaneously crystallise into systems with the ability to catalyse the reactions by which the chemicals themselves are formed. The crystallised system would thus be a so-called autocatalytic set – a self-sustained network of chemical reactions – with the ability to reproduce, i.e. a living metabolism. ‘Life’ in this sense is consequently not to be found in the property of any single cell or molecule or anywhere in the details, but is instead a collective property of the interacting molecules. Life emerged whole and has always remained whole. ‘Life’ as an emergent phenomenon, did not exist until a system of molecules was autocatalytic and had the ability to reproduce, but was then whole and complete from the first moment. This should, however, not be considered mystic. The situation is rather binary in the sense that a set of molecules either has, or has not, the abilities of catalysing and reproducing from some simple food molecules. There is nothing in the whole that is not to be found in the parts except the ability to reproduce and evolve. Accordingly the whole is alive, while the parts are just chemicals.

The parallel drawn to the world of economic assessment will later be that the economical assessment process works accordingly – its parts are mere tendencies, ‘+’ or ‘-’ pointing towards a ‘yes’ or a ‘no’, whereas the whole, greater than the sum of its parts, entails something else – something of a character that is not to be found in any of its parts alone – conviction. However, let’s not drop the emergence track quite yet.



The slime mold, *Dictyostelium discoideum*, is one of “emergence theoreticians” favourite pet beside ants and termites¹. The *Dictyostelium discoideum* is actually an aggregate of thousands of tiny single-cell amoebas. This blob of slime has astonished biologists, physicists and cyberneticians alike by its rather peculiar behaviour. Under “normal” or “good” conditions, these single-cell animals operate on their own. They float around in gardens and forests minding their own business, eating decaying vegetation. When times get rough and there is little food available, these single-cell creatures come together and form a super structure, a slime mould. The slime mould then moves around to find better food supply elsewhere, where it then disintegrates and the single amoebas once again drift apart, doing their own thing. This phenomenon in itself is quite intriguing. Very small and stupid animals come together and form a super-individual, a single vehicle for many, with extraordinary qualities.

The most remarkable thing is not this peculiar behaviour in itself, how extraordinary it may seem, but that this superstructure comes into existence without any observable central planning. Scientists have searched in vain for some special amoebas with these “planning” qualities, the so-called pacemakers. One has however not been able to find any genetic differences among the amoebae group. There is simply no manager gene that calls for the gathering of this amoebae convention. Any one amoeba can be a slime initiator. It turned out that the aggregation could come about through the behaviour of each individual cell. When a single cell encounters a poor environment it increases its production of a special chemical substance, cyclic AMP, which follows the cell as a scent trail. When another cell comes across the cyclic AMP trail it starts to follow it, at the same time emitting its own cyclic AMP. The scent trail becomes stronger and stronger which make more and more cells abandon their present path to follow the “hot” trail. Gradually cells become lumped together in groups with stronger and stronger smell and finally a superstructure comes into existence, a slime mould. The mould then undergoes a transformation where it starts to produce spores that are emitted from the top part of the mould. The spores can then fly away and land in more nutrient environments where a new cycle begins. Without any predetermined initiator-cell the population of amoebas become periodically organised. High-level order emerges.

In physics and chemistry one talks about systems having as a property a preference to reach some certain configurations. It usually refers to the system’s equilibrium state where a balance is reached among the internal processes. The system is at rest when it has reached some kind of energy minimum. Prigogine and Stengers take Planck’s reflections on how nature seems to behave as an example of an early attractor discussion and exemplify it by a chemical reaction..

” Nature, Planck wrote, seems to favours certain states. The irreversible increase of entropy dS/dt describes a system’s attraction to a state that the system ”prefers” and does not abandon out of ‘free will’.”

¹ For a more comprehensive discussion on the slime molds emergence properties see for instance Prigogine & Stengers (1985).



“If a system, in which chemical reactions exist is left to itself, it will approach a state of chemical equilibrium. Chemical equilibrium is therefore a typical example of an ”attractor”-condition. Independently of the original chemical composition the system spontaneously reaches its final state, where forward and backward reactions cancel each other out statistically, so that there in total are no more changes in concentration ($dX/dt=0$).”

Another example of an explanation describing the rather abstract notion of an attractor is found in Kauffman (1995). The system to be ‘attracted’ is here a simple network consisting of three light bulbs, a, b and c, each of which receives ‘input’ from the other two, and each of which has a defined response to the signals it receives from the other. For example a is lit only when b is lit, whereas b is lit only when a or c are lit, and c . . . Thanks to Boolean algebra, the way in which the bulbs get lit or switched off will be predictable, regardless of the initial state. The bulbs will, depending on their initial state, fall into one or another predetermined ‘state cycle’, as mathematicians, referring to a dynamic system, would call it. The ‘state cycle’ would be an ordered behaviour either leading to a final state, or simply going back and forth between a few of them. Such a ‘state cycle’, i.e. the system ending up with only c lit, is what Kauffman refers to as an attractor.

The system with three bulbs would have 8 (2^3) possible states. Now, if we consider a system with 1000 bulbs, with consequently 2^{1000} possible states, predictability could however be in trouble. The hyper-astronomical amount of possible states, makes it possible for the system to be completely unpredictable. If the network were on a stage cycle passing through every possible state, the lifetime of the universe would not be enough time to detect its pattern. There will, however, also be state cycles, passing through a smaller number of stages. If the system were to enter these state cycles, these ‘tiny attractors’ would make it behave in an orderly and predictable manner. Kauffman explains:

“Just as a mountainous region may harbour many lakes, a Boolean network may harbour many state cycles, each draining its own basin of attraction. . . . Under the right conditions, these attractors can be the source of order in large dynamical systems. Since the system follows trajectories that inevitably flow into attractors, tiny attractors will “trap” the system into tiny sub-regions of its space. Among the vast range of possible behaviours, the system settles into an orderly few. The attractors create order.”

The discussion in this paper is however not about emergent phenomena or attractor qualities in nature or hypothetical systems, but about emergence and attractors in an economical assessment process. The evolution that takes place is thus the development from doubt to conviction supported by legitimate arguments. This poses some serious considerations. Initially we are now concerned with intentional creatures which at least at first sight should be



counter-intuitive to emergence, since emergence by definition cannot hold intention. Secondly, by zooming in on some particular and very focused activity, one cannot escape individual intention as easily as when attending to large aggregates of human activity, such as cities² or whole societies. The task set forth is thus a rather complicated one. Intentions have come in, both as an individual as well as a task related quality and the population of interest is very much finite. Still, it will be argued that emergent phenomena do occur and that the notion of attractors provides a fruitful conceptual approach to analysing the highly legitimised activities of assessments. Some general aspects have to be attended to though before the analysis can be brought right down into the slime mould of project judgments.

Getting the concepts right, Part II **– Asking questions in a legitimate world**

Before entering the realm of professional economical assessment lets point out a few things worth keeping in mind. Compared to the every day assessments that we all make the final recommendation that the assessor will arrive at will be highly professionalized, in the sense that it will be motivated by economic models, calculations, analysis, facts, estimates and logical arguments. In the economic market ruled thinking the legitimate ground for arguments is highly standardized. Knowing and performing judgments and arguments according to the legitimate, calculative way of reasoning is central and even one of the measures of the competence of the assessor.³ It is therefore essential, for an interesting analysis to be possible, that we, the ones asking the questions, keep clear from the habitual mental cramp that will usually force itself upon us when thinking about assessments and decisions. It is namely particularly easy to be seduced and trapped by the ‘rational’ when discussing economy and business or other areas that we beforehand know to be ‘serious’. ‘Serious’ matters are namely best dealt with rationally, as we are taught in the universities and the official discourse of the commercial and industrial life. Therefore, our open minds should on one hand be able to see the assessment and the decisions made as something ‘serious’, in the sense of being calculative, rational and analytical. But, we should also be able to see the assessment process and the emerging decision as something messy, uncertain, incomplete, arbitrary perhaps, intuitive, existential and related to the individual engagement and spontaneity.

The classical literature on decisions and assessments, however, parts from the idea that the assessment is made by someone who arrives at a conclusion by calculating and reasoning logically. This assessor is furthermore equipped with a universally valid method for how rational and logical calculations should be carried out. To ask the question ‘How?’ the assessment is made is then to ask this person to reconstruct this very rational process. In such a world, where both logic and method are universal, the assessment will be a logical consequence of the premises. In the traditional logico-deductive analysis an individual standing before some kind of problem will analyse the situation in a logical and systematic manner, until all relevant issues have been considered. Once he has done that – Eureka ! – he can make a decision.

² Cities are otherwise another favourite “emergence example”

³ See Giddens (1986), *The Constitution of Society*



Problem → Logico-deductive analysis → Eureka!

The analysis phase is the tricky part, since it leads to the solution, while the decision is trivial, since the individual, once the situation has been analysed naturally will choose ‘the best’⁴. The description fits the ‘economic man rather than the interviewees at Industrifonden. The idea in this classical description of decision is that the one having a problem immediately starts analysing, and will go on analysing until the solution stands before him.

The assessment will follow compulsorily by the premises and facts available, as long as the calculations are done correctly. The work of assessing will then consist in getting the right input, whereupon the correct, and unavoidable assessment will come to the assessor, sprung from the calculations – the choice-automat – like a chocolate bar from the candy-machine.

This beautiful analytic way is however rather far from how the assessors that I met describe their work. As Mr Wahren put it:

“ Once you have made up your mind about an investment the search for arguments supporting your opinion starts.”

When the field of study, as in this case, is the process leading to fabulously rationally motivated assessments it is particularly pressing for the open mind not to dress in the straitjacket of ‘universal validity’ from the start.

Another risk of clouding the thought lies in the popular misunderstanding that there would exist, for every grammatically meaningful question that one could ask, an equally grammatically meaningful and true answer. Guillet de Monthoux (1991) talks about the ‘mad logician’ who believes that every question ‘why?’ must have a logically compulsory ‘therefore’. Although Monthoux’s way of talking about madness related to this belief in logic may be a bit bantering, this view is far to extended to be easily dismissed. For example we find a severe case of this “madness” in Beauvoir’s (1972) character “the Oblomov”. With a strong feeling of ‘seriousness’ he will be the adult defender of the absolute, factual, objective world, unsullied by human fingers. In his defence of the ‘serious’ he will deny his personal involvement and subjective engagement, thus basing his decisions and actions on the objective state of the world. I believe Oblomov was last seen in Stockholm, wearing false teeth, a toupee and medals, working as a ticket controller in the Metro.

The thought of a universally valid decision-making logic has interested passionate thinkers even to our own days. Russell’s ‘Principia Mathematica’ and Wittgenstein’s ‘Tractatus Logico Philosophicus’ are perhaps the two most famous examples. They, however, both later realised the logical impossibility of the project and – well – simply changed their minds. von Wright

⁴ The description is, of course, simplified, but will hopefully reflect the point I am trying to make.



(1968) showed that the very grammar of decision-making logic, if such could exist, would require the answers to questions concerning the decision-making processes to be in the personal subjective grammatical form. I act according to My premises and My imaginings, which result in Me doing something to realise My projects.

Assessment in the field

1996 the Swedish company Elekta AB approached the Swedish Industrial Development Fund, Industrifonden aiming for a loan of 3,3 million SEK (about 330 000 Euro). The capital was meant to finance 50% of the development of a project called the gamma-knife project. According to Industrifonden's policies the company itself, Elekta AB should finance the other half. The gamma-knife, which would become Elekta's main product, was meant to be a highly advanced surgical instrument. 201 gamma rays would be directed, through a helmet, to a specific point inside the patient's head. In this way specific kinds of malformations in the brains texture would be treated without having to crack the patients head open. The technical development in the project required competence from a number of areas, such as mechanics, electronics, programming, radio-physics, biology and, of course, neuro-surgery. Taking the assessment of this project as an example a few aspects of the project and its assessment will be described below.

Elekta was founded in 1972, by Laurent Leksell, son of a prominent surgeon Lars Leksell. By the time the company approached Industrifonden the company was selling surgery equipment, developed by the father, for about 10 million SEK (1 million euro) a year. The main product, was the so-called 'stereotactic frame', developed by the father although not patented. The frame would generate exact co-ordinates on an x-ray image of the brain if properly fixed to the patients head before taking the x-ray. The company was profitable, although not enough to carry the costs of the gamma-knife project by itself.

Mr Patrik Wahren, DR in Engineering, was the investment manager in charge of assessing this project at Industrifonden. So what did he do? Well, for starters he read the 5 pages describing the project plan, from the technical development – such as development of the helmet, dose-planning system, programming of computer tomography (CT) visualisation system, CT-communication system, patient fixation system, transport equipment and database for planning of patient treatment - to the description of the market situation and the company's financial situation. Other than that Leksell had also attached three scientific articles on stereotactic surgery, written by Leksell's father, and the company's annual reports for the last three years. Secondly he visited the company and met with the company's management for a few hours. The visit gave him the impression of a well-organised company with competent personnel.

Based on the plan and the visit a few things about the company and the project struck Wahren as unusual: 95% of the sales today were exports, the manager of the company made a



“very competent and winning impression”⁵, the product was technologically advanced and finally the project extremely ambitious compared to the size of the company – with an equity of 163 000 SEK (about 16 000 euro) the plan was to carry out a project with cost of about 6,6 million SEK (660 000 euro) over two years. However, if the technological development would succeed the machine would be the first non-invasive neuro-surgical precision instrument in the world. Wahren noted that the project, if commercially successful, would mean the creation of a “Swedish top-of-the range-technology”⁶.

One year before approaching Industrifonden Elekta AB, had applied for financing at another state owned financier, Nutek, and had been turned down. The main reason was that Nutek had engaged two ‘expert consultants’, both MDs, who in their report assessing the potential market said that the conditions that could be treated were too rare for the machine to have a large enough potential market. One year later Wahren was trying to make up his mind about the market. Through his wife, head of a research department at the Karolinska Hospital in Stockholm, he got in contact with two doctors at the same hospital. These two new experts agreed that the conditions to be treated with the machine were “extraordinarily rare”. The doctors, however, also pointed out that the principal methodology on which the gamma-knife was based had a small but good reputation. Dr Leksell, the father of Elekta’s founder, and his team had been conducting tests on about 1000 patients over the last 15 years. These tests had been carried out with various variants of machinery – prototypes being rather remote cousins to the gamma-knife. The gamma-knife would, if successfully developed, however, have two main market advantages - the “extraordinarily rare” patient would not have to undergo an invasive operation, and the hospital would get lowered costs being able to let the patient leave the hospital the same day, instead of the normal 15-20 days of convalescence.

Wahren was not particularly impressed with the company’s business so far⁷ – there were no patents to protect the products and competitors were abundant. From the annual reports of the company he deduced that sales had taken off during the last couple of years, when the stereotactic frame had begun to be sold. Wahren, however, deduced that clients were mainly reached directly or indirectly through the father’s contacts. These, he thought, would eventually run out, since the products were not consumer products and the clients thus not likely to come back soon. Wahren reasoned that the company, with its current strategy and products would have a hard time surviving in the long run.

For a hospital the gamma-knife meant a rather large investment – about 15 to 20 million SEK (1,5-2 million euro). For Wahren this meant that the project was vulnerable - he considered hospitals to be a largely institutional environment, which meant that a number of surgeons and managers at the hospitals or at the boards of hospital funds would have to be convinced before a gamma-knife could be sold.

⁵ quotes taken from Wahren’s notes preceding the final assessment

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⁷ from the material presented to the “slaughter meeting”



The week after having visited the company Wahren was reading News Week on a plane to Paris. In the magazine he found an article describing how the American insurance systems, Medicare and Medicaid, had been changed so that the hospitals would no longer get paid for costs + overhead applied. Instead, the hospitals would be paid per treatment, fixing a certain condition to a certain amount. At the same time a new system, based on quality controls, would be implemented in order to ensure the quality of the treatments. This, Wahren thought, would, however, influence the possibilities of the gamma-knife favourably, since the gamma-knife, after its initial investment, generates low costs.

The ‘slaughter meeting’

As a mile-stone in the assessing process the assessor will present the project at the so called “slaughter meeting” where the general manager and the other about 10 investment managers will meet to discuss each project. After the slaughter meeting the assessment can go three ways: the project will either be turned down, or further assessed or the project and the assessor’s recommendation will be presented to the board of directors, where the final decision on the matter will be taken.

In the ‘slaughter meeting’ that followed two weeks after Elekta’s application had arrived, Wahren presented the project in a positive manner. Although risks were high, the project meant an opportunity of creating something great for Swedish industry – “ a new Swedish ‘top-of-the range-technology’. The general manager was however sceptic. He argued that the risk for delay in the project was considerable, since the planned technical development was advanced and due to the complicated institutionalised market Elekta would have to penetrate.

A reconstruction of some of the comments would sound like this:

- It is a very difficult and time consuming market to penetrate.
- X really believes in the project, but Y does not believe there is commercial market for the product at all.”
- They have 163 000 SEK in equity and are about to run a project with costs of not less than 6,6 MSEK in two years. It is a very large and heavy project for them to run.
- The manager is highly competent and gives a winning impression.
- Their budgeted sales are far too optimistic.
- If they can sell a few first reference machines to prominent hospitals others may follow. The market for medical devices such as this one – large investment, but afterwards large savings for the hospital - will benefit from the recent changes in the American insurance system.
- The conditions that will be treated with the machine are extremely rare.
- The market was ruled out as non-existent last year.
- If the gamma-knife would successfully developed, a completed sale would mean high margins.



In the midst of estimated sales figures, reports, articles and technical descriptions it is through judgements and discussions such as the above that the assessor shall make up his mind. The slaughter meeting decided that the question of the financial possibilities of Elekta had to be further investigated. The risk was high, the manager argued, that Elekta would not be able to put up their share of the financing if the project was delayed. A financial due diligence report was commanded from an accountant consultant, who a week later, stated her conclusion that Elekta would probably manage to finance their share.

The board of directors

According to Wahren it was not difficult to get the board of directors to agree with his recommendation to invest in the gamma-knife-project. The main reasons were the following:

- Management in Elekta was competent and ambitious, and the project potentially profitable for Industrifonden.
- The possibility of the creation of a new Swedish top-of-the-range technology meant that higher risks could be admitted.
- Without the participation of Industrifonden the project would probably not take off, or be developed in a much slower pace.

Wahren explains that the board, believing in the potential of the technology, would accept a higher risk than normally, since the potential of creating a Swedish top-of-the-range technology was at hand.

| The omnipresent question ‘why’

Gustafsson (1994) calls man ‘Homo Explanans’, meaning that we constantly demand explanations. Burke’s famous pentad of questions explains what questions we ask in order to understand: what was done (act), when or where (scene) who did it (agent), how did he do it (agency) and why (purpose). Here we stop at ‘why’ – the central issue when the assessor at Industrifonden presents his recommendation to the board of directors.

Gustafsson (2000) discusses, with reference to among others Gilbert Ryles, how the perspective that in the first case defines an action is the reason behind it. Being social and thinking creatures, we are most of the time more interested in the intellectual components behind an action, than its material form and effects. We constantly assess ourselves and others – not least in the ongoing chit-chat – and calibrate our assessments. And the starting point, as well as guiding star, is how well we succeed in answering the question ‘why’.

We reflexively demand, from our selves as well as from others, an answer to the question why. The person who at an interview cannot give reasonable explanations to why she wants the job or why her carrier so far looks the way it does will probably be perceived as a bit strange. He will not give a ‘serious’ impression – he will not seem competent. The ability to explain our own or other’s behaviour (to our selves) is a central quality of our culture. Giddens (1986) called it “the reflexive monitoring of activity”, meaning that we constantly and in a routine manner monitor not only our own, but also the behaviour of others in our everyday lives. And



we expect others to do the same. Through this we rationalise our actions – also this is done in a routine manner, without our giving it too much attention – which gives us a theoretical understanding of our actions. This is mostly done in a less pronounced way than when somebody is asked to explicitly motivate her actions or conclusions end definitly in a less professionalized way than the motivations given by an assessor at Industrifonden. The “continuous monitoring” and rationalisation of our activities is according to Giddens, however, the most important criterion of how ‘competence’ is applied everyday. If somebody asks we must be able to explain most of what we are doing, and the central issue will be answering ‘why’.

Economic assessment and the question ‘why’

As stated before, the assessment aims at making up the assessors mind, reaching a legitimate conclusion to *why* the investment should or shouldn’t be made. The assessor cannot stay in-between the ‘yes’ or ‘no’. The situation is binary – he either supports or rejects the investment – and he must be convinced and convincing. The ‘why’, questioning his conviction, must be answered with legitimate reasoning.

In the following I will argue that the way in which the assessment is done, the way in which conviction appears before the assessor, entails emergent aspects. I will do this by examining the forms in which the question why can be answered, out of which I identify four possibilities, namely: logic, intentionality, causality and emergence.

Logic

Logic, and its form - the syllogism, is whatever line of reasoning that gives us a sense of experiencing truth. Logic parts from premises that include the conclusion and thus allows us to say - Aha! – when we ‘see’ the conclusion for the first time. An example of the theoretical syllogism would be: Since all men have beard and Socrates is a man, he consequently has beard. The practical syllogism works in a similar tautological way. Another example of a tautological argument would be to say that the economic assessment of a project couldn’t be carried out through logic, since this would imply that the conclusion would already be included in the premises. It is important at this stage to note that the conclusion of the assessment must be logical. Even the way in which the assessment process is described may be logical. This does not, however, mean that the way in which the assessment is carried out follows logic. It is easy and seductive to believe that a process, which may be described with logic, consequently also must happen in a logical manner. As exemplified by Gustafsson (1994), the boy throwing a stone through the window does not logically calculate the speed or force with which to throw the stone. He simply aims and throws it away. The logical assessment would mean that the assessment is about collecting the correct ‘data’, the right input, after which logic would do the trick leading to the correct conclusion. This is of course only possible in the beautiful dream world of Oblomov.

Recalling von Wright (1968), showing us that something as rigid as a decision-making logic could only exist in the personal subjective case – I act, my premises, my imaginings, therefore



I . . . - it should be fairly obvious that the process of assessing Elekta's gamma-knife couldn't possibly follow logic.

Thus, leaving logic behind, let's continue with the dramatic forms of arguing. As Burke's term 'purpose' indicates, in the search for 'why', he mainly refers to supposedly intentional acts. The pentad may, however, easily be transformed into dealing with all sorts of events if we instead of 'intention', talk about 'mechanism' – of which there could be three kinds: intentionality (purpose), causality or emergence.

Intentionality

Intentionality cannot be enough to explain the essence of the assessment process, since the honest assessor will not have the intention of arriving specifically at a 'yes' or a 'no' as a final recommendation. Unless corruption is at hand, he will work as a neutral, subjective assessor, with nothing to gain from either of the possible conclusions. This is therefore what will characterise the arguments. The intention at hand is the intention of arriving at a logical, rational and well argued conclusion – whatever it may be. The intention does thus not influence whether the final conclusion is positive or negative.

Causality

Causality is the process we believe exists 'out there'. Like the billiard balls hitting each other the chain of events is bound to develop in a manner preset by the previous events. Last year, at a seminar, I listened to the Swedish historian Peter Englund. According to him one of the greatest challenges of being a historian was to stay clear of the "feeling of inevitability" of the studied historic events. Or, in the words of this discussion, to stay clear of causality creeping up on us from behind and seducing our vision of the world. Take, for example, Wahren's comment of Elekta's gamma-knife as a "potential Swedish top-of-the range technology" – a year before two MD experts had deemed the same technology to have no commercial future at all . . . On the plane to France he saw the article in News Week, giving him a more positive opinion about the potential of the gamma-knife on the American market. Experts meant the market was "extremely rare". The financial resources of Elekta were scarce – a great risk, according too the general manager, but "probably sufficient" according to the hired consultant. The idea of cause-effect relations impelling the judgements is applicable to the objective world in the sense of the world of objects. For example the cobalt used in the gamma-knife has a half-life time span of (BG). This has consequences on the frequency with which the cobalt in the helmets has to be renewed. Being classified as a highly radioactive material changing the cobalt is an activity which has to be made by professionals which in turn will have consequences on the business solution when selling the finished gamma-knife. The situation in which we are required to judge is however characterised by the circumstance that the premises at hand are not enough to lead us to a conclusion – hence the need to judge... Causality is perhaps most properly present in terms of the psychology of the assessor and the the group of people involved in the judgment process. This is however not the focus, nor perspective, of the present paper, although well worth penetrating in another context.



Emergent conclusion

In order to discuss the assessment process in terms of emergence let's stop for a second at the expression "potential Swedish top-of-the-range technology". This expression was part of Wahren's presentation of the project to both the slaughter meeting and the board of directors. It is a judgement that played a crucial role in the final decision of the board, a judgement fiercely contradicted by MD's a year earlier. About a technology meant to treat "extremely rare" conditions. A process such as the assessment process is characterised by different 'facts', judgements and estimations pointing in different directions. Somewhere along the way some 'key-words', central judgements start to form. In the case of Elekta the 'potential Swedish top-of-the-range technology' functioned as an attractor. The case of the 'slaughter meeting' deciding on a further, deeper financial analysis and Elekta 'passing the test', is probably an attractor in the process of forming the opinions of the members of the board.

As Feyerabend (1999) explains the world is too rich for us to handle in all its abundant magnificence. Abstraction and generalisation are inevitable if anything is to be said about the world. The point is that the various judgements all direct attention and influence action with or without any central co-ordinator's help, making certain outcomes more plausible than others. At this point we are not searching for a skilful puppet-master putting hidden messages into things or routines, but rather for how the perception of certain aspects in themselves organise the perception of other aspects. It is the unintended or non-understood messages that are being mediated that call for attention.

To execute an evaluation, is a very intention-driven and rationalistic-laden enterprise. A very special and unambiguous thing has to be done, coming to a *yes or no* or. This is a simple defining condition. Together with a number of rules, such as Industrifonden only financing half of a project's costs, only investing in "high-tech", leading the assessment through the 'slaughter meeting', these aspects form the framework within which the assessment shall fit and will evolve.

In order to reach the desired end state there are several pre-defined operations and stages that have to be performed and passed. We can view these special operations and stages to be part of the rules that together form the playing ground for the assessment. Some rules also govern how a certain operation can and may be performed. In case of doubt, for example, certain experts will be employed. Routines and procedures tell about valid ways of performing a calculation or an argument. An evaluation and the following recommendation is for instance not valid if the process has not included the "slaughter meeting", neither has there in the history of Industrifonden been a recommendation to invest in a project without a calculation estimating a profit.

Despite this intention saturated and rule dense "game" of evaluating investment projects the system is very under defined, giving way to its emergence qualities. This has to do with the central core of emergence – the sum being greater than the parts – which is the complex behaviour that comes out of the relation between parts. The conviction about the project does



not lie in any particular aspect. It has to do with an individual such as Mr Wahren making up his mind and choosing to stand by his emerged conviction. Conviction emerges in the system of rules, facts habits and stories told about the projects. As for a game of chess, where the game is defined by less than twenty-four rules, the combination and re-combination of parts, parts that in them have different qualities, into different constellations give rise to an enormous amount of possible outcomes. Some outcomes are however more likely than others, giving rise to regularities and stable patterns. There are these stable patterns that we are after here and especially what it is that defines them. As long as we seek the hidden algorithm, the image of the Demiurg, the Laplacian demon operating the show, we will end up empty handed. This paper points in stead to some seemingly mundane things; a catchy phrase, a crumpled News week and some other odd stuff and arguing that they, the gnomes of attraction, are doing the Demiurg's wet business; getting things at least slightly organised.

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Pink Machine is the name of a research project currently carried out at the Department of Industrial Economics and Management at the Royal Institute of Technology, Stockholm. It aims to study the often forgotten non-serious driving forces of technical and economical development. We live indeed in the reality of the artificial, one in which technology has created, constructed and reshaped almost everything that surrounds us. If we look around us in the modern world, we see that it consists of things, of artefacts. Even the immaterial is formed and created by technology - driven by the imperative of the economic rationale.

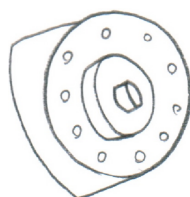
As Lev Vygotsky and Susanne Langer have pointed out, all things around us, all these technological wonders, have their first origin in someone's fantasies, dreams, hallucinations and visions. These things, which through their demand govern local and global economical processes, have little to do with what we usually regard as "basic human needs". It is rather so, it could be argued, that the economy at large is governed by human's unbounded thirst for jewellery, toys and entertainment. For some reason - the inherent urge of science for being taken seriously, maybe - these aspects have been recognised only in a very limited way within technological and economical research.

The seriousness of science is grey, Goethe said, whereas the colour of life glows green. We want to bring forward yet another colour, that of frivolity, and it is pink.

The Pink Machine Papers is our attempt to widen the perspective a bit, to give science a streak of pink. We would like to create a forum for half-finished scientific reports, of philosophical guesses and drafts. We want thus to conduct a dialogue which is based on current research and which gives us the opportunity to present our scientific ideas before we develop them into concluding and rigid - grey - reports and theses.

Finally: the name "Pink Machine" comes from an interview carried out in connection with heavy industrial constructions, where the buyer of a diesel power plant worth several hundred million dollars confessed that he would have preferred his machines to be pink.

Claes Gustafsson



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