

A Study of Swedish IT Firms

Purpose of the Study

There is an old story about a plumber who came to fix a noisy pipe. After considering the problem for a moment, he took out his hammer and gave the pipe a sharp knock. The banging stopped. A week later the house owner received an invoice for 2 000 kronor. He was a little upset and called the plumber up. The plumber agreed to itemise the bill. Two days later the revised invoice arrived. 'For knocking with a hammer 10 kronor. For knowing where to knock 1 990 kronor.'

Economists have a name for this. They talk about transaction costs. It took many years of apprenticeship before the plumber had the knowledge and the confidence to strike that blow. In the IT Sector the knack of keeping down transaction costs may turn out to be critical. The best firms will be hard wired into the country's technical high schools. They may not always know where to knock. But they will always know a man who does.

Ten years hence the value of this study may be seen to be a dramatic reduction in transaction costs in the allocation of public and private investment capital in Sweden.

But there is a long way to go.

The current foundations of the study are three hunches and a gamble.

The three assumption are that two sets of four variables can be discovered or invented; that these eight variables can be measured and that a model can be designed that relates these eight variables to some measure of success for the firm as a whole.

The gamble is that some form of 'tag' or 'cookie' can be developed that allows these eight 'values' to be embedded in a firm's web site in such a way that they can be 'fetched' by 'search engine robots' and used for company and share analysis. The way to do this has probably not been invented yet.

Project Timetable

30th April 1999

- Select a control group of 18 firms from the IT 100 List of Swedish IT Firms
- Start trading with an unweighted investment of 10 000 kronor
- Open IT 100 web site

31st August 1999

- Refine the concept of 'nutritional portfolios' to allow comparison of their performance with the control group for the period from 31/8-99 to 31/12-99.
- Establish whether weightings need to be introduced to trading portfolios
- Develop procedures for placing 'outside bets' on the four portfolios based on:
 - i. a three-weekly buy/sell cycle
 - ii. public access to the IT 100 website
 - iii. index-based (or 'tag-based') reports to the website
- Start new trading accounts for the three 'nutritional' portfolios

31st December 1999

- Cease portfolio trading at midnight (Stockholm-time) on 31st December 1999... not at the close of 1999 trading on the Stockholm Stock Exchange

6th January 2000

- Final trade with all shares being sold at noon on Twelfth Night 2000

Interim Study Report

The minimum purpose of this Interim Report on Swedish IT Firms is to gather between one set of covers the material and 'micro-research' developed during the two month period from mid-February to mid-April 1999.

There are no criteria for investing in information technology. The IT sector is an investor's nightmare ...and not only in Sweden...more lottery than logic. There are no investments only speculations. There is no knowledge of risks and returns, only guesswork...some inspired, most less so. The principal purpose of this study of Swedish IT Firms is to attempt to design a scientifically based set of criteria for evaluating firms in the IT sector. Even partial success should improve the efficiency of capital utilisation...the only sound foundation for the development of a 'Silicon Skärgård' in Sweden.

This study of Swedish IT Firms has as a secondary purpose the use of the worldwide web as an integral part of the research method itself. The intention is to open a website at the start of a research study and update it half a dozen times during the course of the study thereby offering the opportunity for participation, feedback and debate.

The project timetable is intended to straddle the Y2K problems at year end. Although it is not much talked about openly, the technology problems may turn out to be insignificant compared with the fear of their consequences. This fear is set to manifest itself as a run on the Western banking system. The timetable calls for a control group of 18 Swedish IT shares to be trading as a portfolio by the end of April with three different 'nutritional' portfolios following at the end of August. The academic research portfolios will be sold off on Twelfth Night 2000.

This Interim Report on Swedish IT Firms is in three parts. Following this introduction there is a section on the Swedish information technology sector and a section on the study's research agenda.

Swedish IT Business

In 1997 *IBM* topped the foreign hardware list with a turnover of six billion kronor, *Microsoft* topped the foreign software list with almost two billion with *Partner Tech* leading the Swedish hardware on half a billion and *Alfa Laval Automation* heading up the Swedish software list with a turnover of a billion kronor. The top four IT consultants (*WM-data*, *Enator*, *Cap Gemini* and *ICL Holding*) all beat *Microsoft* but not *IBM*.

However these figures hardly bear comparison to the turnover in the telecommunications business. In both equipment and operations the number two firm was earning about the same as *Microsoft*. But at number one in telephone equipment was *Ericsson* and number one in telephone operations was *Telia*. *Ericsson* had a turnover of 124 billion, sixty times that of *Microsoft* and twenty times that of *IBM* in Sweden. And *Telia* had a turnover of 44 billion kronor, thirty times as big as *Europolitan* with its GSM mobile phone network.

In 1996 the IT sector made profits of 20 billion kronor. *Ericsson* made eleven of them. The previous year *Ericsson* made eight billion out of a total of sixteen billion. Excluding *Ericsson* and *Telia*, foreign firms accounted for roughly half the turnover and half the IT firms in Sweden in 1996. Here is the Swedish IT sector by turnover in billions of kronor:

➤ Ericsson	124	40.5%
➤ Swedish IT Firms	71	23.1%
➤ Foreign IT Firms	68	22.1%
➤ Telia	44	14.3%
➤ Total	307	100.0%

The 71 billion kronor turnover by Swedish IT companies can be compared with the turnover of 20 billion made by the top ten Swedish IT consultants in 1997 and 15 billion made by the top ten Swedish IT wholesalers...40% of it by *Scribona*, the result of *Esselte's* 1992 reorganisation in which *Esselte Information Systems* and *Svanströms* were brought together in a single company.

Like all financial and economic statistics these figures include much double counting as manufacturers, software developers and consultants sell their goods and services to wholesalers and retailers and much scrutiny would be needed to get to the bottom of what is really going on.

We have no intention of trying to do that here. Instead we will return to the question that was left hanging in the air. What is a Swedish IT firm?

People are not created to fill jobs that firms create. This is one of the more obscene heresies of the modern world. Work and jobs are for people. Work is life as Thomas Carlisle once put it. It gives life meaning and it gives the individual self-esteem and status amongst his or her peers. People are the subject of work and the greatest good of the greatest number by way of the division of labour is the reason that work has been organised into jobs.

By Swedish IT firms I mean firms in which Swedes work and which are based not on somebody else's private interests but on providing a home worth living for the people working for the firm. For this the firm must have a sense of place. It must be rooted in a real place though their products and services may be everywhere.

And the concept is of Sweden as four IT centres: the city regions of Stockholm, Gothenberg and Malmö and a fourth 'Islandia' confederation of regional Islands spread throughout Sweden with the four competing with each other for IT funds and venture capital.

Foreign firms would be treated as Swedish IT Firms if they agreed to the principle of a Swedish management buy-out having first refusal if the foreign owners pull up roots and move out. This should be a basic condition anyway for any foreign-owned economic activity in somebody else's backyard.

The Good Company

There is a tendency to see companies as organisation charts. At the top is the chief executive officer and lining up beneath him are the workers looking up at their own immediate boss and down at the people below them in their department. Many companies think of themselves this way... unconsciously.

But the good company never looks up and down. 'There is no up and down in universe' Buckminster Fuller once remarked. 'Only in and out'. In a good company everybody in the firm looks in and out. But they also look forwards and backwards.

Backwards is important because that is how an organisation learns from its successes and failures. It is also how a corporate myth is created which in hologramatic growth has a vital role to play. But there is something else.

John Lennon once wrote 'How can I go forward when I don't know which way I'm facing?' Backwards helps define direction. Every company claims to be forward-looking and forward-thinking. Indeed they usually demand it of their new recruits...alongside self-starting and a good sense of humour. But moving forwards requires more than empty words.

The good company has a dream. And that dream is an integral part of its corporate culture. It knows where it is going. Here is a quote from W.B. Yeats

'The Greeks, a certain scholar has told me, considered that myths are the activities of the Daimons, and that the Daimons shape our characters and our lives. I have often had the fancy that there is some one myth for every man, which, if we but knew it, would make us understand all he did and thought.'

A good company has its own Daimons and its 'one myth'. There is a gestalt which can be felt even when its full reality is beyond grasping. This 'one myth' acts as a rudder...a trimtab. One knows that Microsoft has it. One also knows that both Apple and IBM once had it...and lost it...and have perhaps rediscovered it, at least in Apple's case. There is always this sense that the company knows where it is headed. Often, but not always, this 'one myth' is carried on the back of just one man. Bill Gates and Steve Jobs are the modern day Hercules of our corporate world.

Of course every good company learns to operate opportunistically. Harold Macmillan is now perhaps best known for his response to the young reporter's question 'What was your biggest problem as Prime Minister, Mr Macmillan?'. His reply? 'Events, dear boy! Events!' But events carry with them both danger and opportunity. The vision and the myth are like a chart and compass. They steer an organisation clear of the rocks. When the breeze gets up the sails are up ready to catch it and the crew is on station. When the storm hits the hatches are battened down, the sails reefed and the crew alert.

Filtering

The top level 'IT tag' will need to be a 'yes/no' tag to filter out the 'IT Traders' from the 'IT Researchers' firms.

The 'IT Traders' will tend to have low research and development costs, large advertising and large PR budgets. The 'IT Traders' might be paying high royalties for patents, franchises etc. But so too might the 'IT Researchers'. But there is a key difference. The 'IT Researchers' are interested in the 'strategic alliance value' of a royalty payment while the 'IT Traders' are interested in the 'sales price' of either the product itself or of the rights to it. 'IT Traders' come in three principal varieties: barrow boys, cyberbarrow boys and brand boys.

The barrow boys are named after London's East End cockney markets. Originally these dealt in perishables, but as jobs disappeared from such markets as Billingsgate, they took jobs across the street and became floor traders in the City. Their mottos are 'Buy cheap, sell dear' and 'Pile 'em high, sell 'em cheap'...and they discount heavily ahead of the 'sell by' date to clear. The characteristics of the computer industry are surprisingly similar to that of the fruit and vegetable trade, technological obsolescence doing the work of natural decay.

When they get smart, barrow boys get to be cyberbarrow boys. Their modus operandi is 'just in their time, not yours'. They never hold stock. It is their suppliers and buyers who are in the line of supply. They keep well clear of it. Their motto is 'Buy cheap, sell dear'...and close the sale before you buy' and 'Pile 'em high, sell 'em cheap with ready cash (in wedges) at distress prices'

The brand boys are a recent phenomenon. First order companies can be measured by the net value of the company as a going concern (assets less liabilities). Second order companies can be valued on predicted future earnings streams (discounted to today). The brand boys come in with third order companies. They purchase the future earnings stream from good second order or poor first order companies paying a cheap price today (relative to the potential) and using borrowed cash or junk bonds. They may pay well over the net asset or current p/e values, then add 'good will' and 'brands' to their balance sheet reporting to deal with value discrepancies. Trading in 'debt, brand and goodwill' shares is like trading in options instead of in the underlying securities where the ultimate brand is a South Sea or Louisiana Company with its mantra 'on the up' of 'Trust us...buy now before prices rise even more...there are fortunes to be made in the Louisiana trade etc.'

Testing

Having cleared the ground, a few words about testing, and in particular about four different types of test: the litmus test, the high leverage test, the hologram test and scale testing.

In the litmus test chemists use the change of colour of a piece of litmus paper to measure a substance's degree of acidity or alkalinity. Our corporate IT litmus test would measure the ph value of an IT firm. On the chemist's scale, neutral substances have a 'ph value' of '7'. Selecting groups of IT firms with ph values of '3', '7' and '11' would cover the full range of normal possibilities from extremely alkaline to extremely acidic.

System Dynamics theory has established that all complex systems have 'high leverage points'. Intervention at such points in these systems has a greatly enhanced effect on system behaviour than intervention elsewhere in the system. A single high leverage test at such a point might reveal as much information as a dozen tests at low leverage points.

Any fragment of a hologramatic image can be used to recreate the whole image. Hologram testing implies the use of a test sample from an IT company to reveal more widespread corporate phenomena. Though grounded in different natural laws, in practice hologram testing would be applied in similar manner to DNA testing.

Scale Testing is used extensively in engineering design. But in the engineer's wind tunnels and hydraulic tanks the linear proportions of the scale model seldom resemble those of the full-scale model, the effects being tested following 'area' and 'volume' laws and therefore being scaled to their square or cube root dimension. The social sciences do not have a theory of scale in their toolbox, even though there are hints of its importance throughout the literature (Marshall 'Principles of Economics'; Leopold Kohr's work on 'social morphology' etc.). Social scientists tend to assume first order relationships between their models and outcomes in the real world...and ignore the time lags.

Operational Definitions

A couple of business generations ago *Harvard Business School* was teaching companies the difference between 'out' and 'in'. Outward looking firms were market-oriented. Inward-looking firms were product-oriented. The task of turning a company around boiled down to shifting power from production to marketing. Then came the next seven-year turn of the business school wheel and the bean counters moved in to take control of both. But that is another story.

The Good Company does not see 'out' and 'in' in these terms. Indeed it would argue that both marketing-oriented and product-oriented companies are inward-looking companies. Instead it sees itself as an organising organism. Its metaphors are organic. Sometimes chooses not to see 'the wood for the trees'. At other times it lifts its gaze and shifts its focus. Then it sees the forest and the fields beyond...the 'wood' that is the English proverb's bigger picture. In and out are contextual concepts. *The Good Company* sees itself as part of a broader pattern of life. Survival is not 'of the fittest', but 'of the fitting'.

Central to this study of *Swedish IT Firms* is the idea that operational definitions can be found for 'backwards', 'forwards', 'in' and 'out'. In particular the current study seeks to explore the notion that four 'internal factors' and four 'external factors' are sufficient to sketch a portrait of a company along the 'in' and 'out' dimension. To some degree these 'internal' and 'external' factors encompass the 'backwards' and 'forwards'. But it is not their principal purpose. And it may be that a further set of factors will be required to operationalise the 'backwards' and 'forwards' characteristics of *The Good Company*. Also there is a suspicion that too much of any of the four factors is bad for a company's health, that balance is key and it is excess that should be avoided.

There is within the research design some possibility of reaching tentative conclusions on this, at least as regards the 'in' and the 'out'. But the principal task is to develop a 'modus operandi' based on meaningful operational definitions

As to the factors themselves, the external quartet seek to define a *Swedish IT Firm's* approach to technology, alliances, people and pace while the internal quartet concerns itself with its attitudes to work, growth, identity and money.

Oct'tag'gonals - External Quartet

Technology

There are two distinct aspects to this technological competence. The first concerns the particular technological mix that the firm has embedded in its products and services. And the second is the quality of its technological probing. Technology never stays still but continuously forms and reforms itself into technological clusters. A firm must be able to map these 'cluster shifts' to avoid ending up with a dead-end technology.

Rumour and shared information seem to be a significant component of success or failure for new products in the IT sector. Is the IT sector, like the financial sector, dependent on herd psychology? Does this become self-fulfilling so that 'lock-in' and 'PR' become the critical technological variables? Or do deeper realities eventually make it through?

Do firms cope with the technology question systematically or do they respond to 'technological anarchy' with a more intuitive 'individual hunch' approach? Is the best way to measure technological competence a group of eight wise men meeting once a year and scoring individual companies? Will methodology evolve with the criteria?

Alliances

In a world of shifting technological clusters one way to protect a firm against unfavourable movements is to reduce risk by holding a portfolio of technological options. Strategic alliances can provide this insurance by maximising contingency options.

However alliances also have the potential to create opportunities. There is a Swedish proverb that 'Happiness doubles and sorrow halves when shared'. IT knowledge falls into these categories. Alliances can be a way to double the 'R&D wins' and halve the 'Lock-in losses'.

It may be possible to score IT firms on the basis of formal agreements, spending on royalties and patents and so on. But successful working alliances may not work in this manner at all. The real critical interface may be at the personal level between individual researchers and their university counterparts...at which point the question becomes one of openness. Are the company's files stamped 'top secret'. Or does it encourage its people to share their work?

Can 'alliance propensity' be gauged from talking to a company or visiting its web site and its intranet? Is the best way to measure a firm's alliance culture a group of eight wise men meeting once a year and scoring individual companies? Will methodology evolve with the criteria?

People

The number of corporate employees and headcount figures are poor measures of the true size of organisations. As labour is shed to avoid high social costs at home and in response to shareholder pressure to downsize and outsource so an increasing part of the price content of goods and services comes from the 'vertically disintegrated' parts of 'the extended company'.

It should be possible to develop a measure for the 'virtual size' of an organisation based on a scientifically-based weighted index of (a) numbers directly employed, (b) those working full time as agents, (c) businesses with a dependency of more than 30% from derivative business from a corporation.

The index's validity could then be tested across different industries by comparing second wave organisations producing cars (Volvo), chemicals (Monsanto) and oil (BP) with large third wave organisations in the IT sector (Ericsson & Nokia), the post-privatised government sector (Telia and BT) and perhaps the 'basic research network sector' (academia & the internet).

Is it possible to measure the virtual to actual headcount ratio in terms of output delivered per person? Does this provides meaningful data within each IT category? And does this measure of an IT Firm's efficiency in the use of 'public information' correlate with a company's success?

Pace

The Good Company has the ability to 'shift up a gear' and work at a higher tempo when the going gets tough. The analogy is between a VW Beetle and a BMW. The power under the bonnet is what determines the difference. The VW Beetle has a high revving slow accelerating engine while the BMW has a low revving fast accelerating engine.

Two possible indicators of a firm's ability to shift up the gears are its approach to crisis management and its success at rapid development. Computer programmes are perhaps the most complex of human creations and their utility and pervasiveness makes rapid development essential. This seems to be a characteristic feature of the entire IT sector.

Can a firm's 'crisis management' competence be assessed? Do the trains run on time and is it possible to find out whether a firm's schedules...their delivery promises...are met?

Oct'tag'gonals - Internal Quartet

Work

The study of complexity has discovered a domain on the 'edge of chaos' in which there is neither too much order nor too much chaos. This zone is the breeding ground for novelty and creativity. It is here that 'emergent properties' originate.

Brian Arthur, one of the pioneers of complexity science, believes that an economic model could be devised in which an economic domain is a mix of 'diminishing' and 'increasing return' agents. By changing the proportions of the two agents very different economic behaviour could be elicited. Increasing R&D inputs, for instance, could be a way to shift the ratio between resource and mind workers and move a company closer to the creative 'edge of chaos' domain. Could this idea be used to develop an operational yardstick for IT Firms?

Or might it instead be possible to go directly to the annual accounts and measure the ratio of the operations budget to the R&D budget and use this as a surrogate? Might there be an optimum structure of company size at which the ratio of muscle to mind is 'ideal'? Is market niche size or relative size important? Can the man-hours being spent at the all important creative 'edge of chaos' be counted?

Growth

Fast growing companies with an eye on the stock market tend to release target growth rates. In 1997 *WM-Data* told the markets that it aimed to 'double its turnover every three years'. When organic growth begins to flag, these targets are met by acquisition. Is this healthy growth?

In nature growth continues until the organism has reached 'the right size'. What is the right size for a Swedish IT Company? What is the purpose of growth? Business in general has never really applied itself to this question, but nature has.

Perhaps it is time to look afresh at the work of Linnaeus and think in terms of economic species. Would it be possible to give each 'ecoting' a binomial classification? E.F.Schumacher was moving in this direction when arguing that there were four categories of economic commodities.

Perhaps it is possible to give new life to Linnaeus' 'unnatural' classification in terms of a plant's sexual characteristics. Firms could be considered 'unnatural' organisms that might lend themselves to such a classification.

Identity

The good company has a 'dream'; it embodies a 'myth'; it understands itself as an 'organising organism'; and it 'operates opportunistically'. Where these four are out of harmony a firm is heading for its 'doooom'.

In their 1997 *Annual Report on the IT Sector*, *Datavärlden* wrote that *WM-Data's* unrivalled success in Scandinavia was due to 'competent leadership' and a very strong 'corporate culture', noting that the company's organisation was still 'surprisingly flat' with considerable 'delegation of responsibility'. And they went on to remark on the rapid transfer of *WM-Data's* corporate culture with new acquisitions.

Terms like competent leadership, delegation of responsibility, flat organisation and corporate culture are loose verbal correlates for these 'd', 'm', and 'o-o' factors. Can a tighter, more scientific operational definition be found? Psychologists have developed tests that enable them to score a person for different psychological traits.

Could such a formula be used on companies? Should top management fill out the questionnaire or is 'factor diffusion' throughout the organisation so essential an ingredient of 'success' that survey participation needs to be spread across the whole company?

Increasingly the 'personality' of good companies will be reflected in their websites. So perhaps the way to go is not to test people but to develop a 'web personality test (wpt)'? What better way to encourage the seamless integration of worksite with website?

Money

It costs a lot of money to be poor. An individual can run out of money and survive...just. But for a company no money is synonymous with no company. The money problem has to be addressed and it has to be solved in a way that helps rather than hinders the company's development.

It is a myth to believe that money is a scarce commodity. The world is awash with money. This is what accounts for the hyperinflation of the second half of the 20th century. Think about what a krona buys today and compare that with what it bought twenty or thirty years ago. And if this does not convince you, then look at any graph of 20th century price development and pose the 'contrafactual question' of what could have been done differently to prevent it.

The financial world is a world of private money clubs. The money problem boils down to joining one of these clubs. Pensioners have formed themselves into a money club. Pension Funds issue money to individual members.... as long as the pension fund can order up a supply of money and as long as its suppliers can deliver. With pension funds heavily dependent upon dividends from transnational corporations pensions for club members are at risk.

In 1996 Sir James Goldsmith founded *The UK Referendum Party* to provide the British electorate with an alternative to the 'Brussels Federalist Party'...the only other party running candidates at the election. he also started a money club. His money club supported a large number of people, including myself, for over a year. When he closed the club down, we all had to go off and join another club.

Every individual and every firm has signs up with some money club or other. In doing so they agree to abide by the written and unwritten rules of the club, particularly as they apply to the issue of money to individual members and the receipt of money from them. For each club, there arises three key: (a) How does it get its money?; (b) How does it issue its money? (c) What are the club's membership rules?

Good companies use money wisely. High growth high tech companies use money wisely and creatively. Bill Gates, for instance, has built Microsoft on a rising share price by paying his staff in share options to compensate for low salaries. This growth engine can go into reverse but it has not done so yet and there are currently more than 3000 Microsoft millionaires...one in ten of the workforce. But uncashed share options in the Microsoft money club are currently running at about thirty billion dollars....quite an 'overhang'.

Is it possible to measure an IT company's 'cash productivity' and 'cash creativity'? Is the quality of the money club critical to the long-term success of a Swedish IT company? Do good companies maximise their delivered output per kronor spent? Is the velocity of company money a key measure of efficiency? Is this information on the company's website?

The Future for Large Organisations

This article first appeared as the sixth of nine papers selected for the Work & Human Fulfilment workshop at the Radical Consultation in Swindon, Wiltshire from 13-15 September 2001. The other eight papers in the collection were *The Duke of Buen Consejo* by Leopold Kohr, *Towards A Theory of Large-scale Organisation* by E.F. Schumacher, *The Scott Bader Commonwealth* by E.F. Schumacher, *Beauty & Community* by Leopold Kohr, *Tea-Time at Marshbeck* by James Robertson, *The Foundations of Structural Sociology* by William Shepherd, *Mind Your Own Business* by Chris Wright and *Limited Life Organisations* by Shann Turnbull. In October 2003 this set of workshop papers were Number Three in the Download Top Ten from the www.cesc.net website (click on Radical Consultation and go to Workshop Papers).

Introduction

In the much-neglected final part of *Small is Beautiful: Economics as if People Mattered*, E.F. Schumacher included an essay entitled *Towards A Theory of Large Scale Organisation*. The essay was based on his experience at the *National Coal Board* during the 1950s and 1960s when coal was still being mined in the United Kingdom. In this paper I refer to first, second, third and fourth generation large organisations. When Lord Robens and Fritz Schumacher first started to address the management problems of what was at that time the largest organisation in Europe, they found themselves dealing with a typical first-generation company. These companies dominated the industrial life of the early and middle years of the 20th century and their names...Ford, Edison, du Pont, Unilever etc... were regarded as bywords for industrial efficiency.

Robens and Schumacher strongly disagreed and set about inventing something completely different. By the end of their time at the helm, the *National Coal Board* had been transformed into a second-generation large organisation. In North America much the same transformation took place at the General Electric Corporation. Not everybody welcomed the shift. On Wall Street and in the City of London it gradually dawned on the bankers and their derivative professions that they were engaged in a fight to the death with the industrialists for control of these second generation large organisations. Future historians may view the strange goings-on around the ignominious collapse of Pehr G. Gyllenhammer's failed attempt to merge Sweden's Volvo Corporation with Norway's Oil Industry as the crucial watershed in this battle between the power to issue money and the power to organise the means of production.

Bankers become redundant once they lose the power to create their own portfolios by deploying monetary patronage thereby effectively hiring and firing corporations. But by creating their own portfolios of strategic business units within their own organisation corporations can outflank the moneylenders by effectively issuing their own currencies as transferable shares and bonds through the stock exchanges and through private placements through nominee companies and other legally sanctioned devices. Henry Ford was perhaps the first industrialist to recognize this flaw in the seeming omnipotence of the Money Power, though many inventors like Thomas Edison in the USA and Gustav de Laval in Sweden fell foul of the counter measures deployed by both the money and production powers to protect their special privileges from encroachment by either the personal or the common weal and were destroyed. The current crop of transnational corporations sitting astride today's world of globalisation are the survivors of these civil wars. After years of trench warfare an uneasy truce has settled over the battlefield.

During the past two decades a third-generation of large organisation has emerged unnoticed into this standoff between money and know-how. They constitute a second front in what is effectively a continuation of the classic Marxist battleground for control of the means of production between labour and capital. These third generation large organisations are the subject of my study of Swedish IT firms...an interim report is available at <http://www.cesc.net/siriusweb/itstudy/>.

These often vast networks of inter-working firms and individuals come in two very different genres. Sometimes they out-source the products and services they need and put these through the books as 'cost of sales' to generate enormous corporate incomes per employee. Sometimes they re-source the development of products and services by burning vast amounts of speculative money in selling future profit dreams. These large network organisations seem to take two forms. Either they are barrow boys selling dear and buying cheap (preferably in that order) or they are boffins and nerds fronted by private funds and venture capitalists. The profit and loss statements of the former appear to the world as all income with no expense while that of the latter are all expense with no income.

The fourth-generation is a glint in my eye...but one that I argue has a historic provenance...To understand this fourth form of organisation it is necessary to introduce a third dimension along the x-z axes that has to do with the form of organisation that cuts across the x and y axes with their first, second and third-generation large organisations. Here along the z-axis I talk of three organisational forms: the hierarchic, the hanseatic and the holonic I believe it may be possible to demonstrate that over the thousand year period from 1200 to 2200 much of the world has undergone a transition from the holonic to the hanseatic to the hierarchic...and back again.

Control Shifts

In the past few decades the financial control of second-generation large organisations has shifted from the direct control of labour and material costs to a more indirect financial control over the corporate hierarchy as a reaction to the increased unit cost of capital investment and the spiralling cost of unionised labour. So the financial control of large second-generation organisations now takes an indirect form with such instruments as 'return on investment' and 'headcount control' being wielded in the cause of shareholder value. What this actually means is that the money spent on capital and labour is directly rationed by top management. To understand these second-generation organisations the rule of thumb is to follow the money. Cash is king.

The consequence of this shift has been an ever-increasing capital component being added to prices as: investment payback periods have been stretched to several times their biblical seven years limit...and one year was the average payback time for investments in the Middle Ages; ever more work has been shifted onto the household from the factory in the form of commuting, depackaging etc; public welfare bills have spiralled in industrialised countries as jobs have disappeared in the large second-generation organisations. Outsourcing, industrial robots and third world wage slavery are derivative effects.

Virtual Size

Meanwhile a third-generation of large organisation has emerged. These are typically knowledge-based businesses where the 'hands' of the blue-collar workers have been replaced with the 'minds' of knowledge workers. These new third generation organisations are often loose-knit confederations of well-schooled middle class professionals brought together by entrepreneurs and designers. These organisations are flatter (i.e. less levels of hierarchy) than the older second-generation organisations.

In terms of headcount and number of employees, these third-generation organisations seldom appear to be as big as the second-generation organisations. But this could reflect a deficiency in the measure employed to calibrate an organisation's size. A broader measure extending outside corporate boundaries would often show these third-generation organisations to be of considerable size, being structured as nested networks within networks that include self-employed individuals, small businesses and 'virtual resources' developed and managed by other individuals, businesses and organisations.

Eiconic Management

In these third generation large organisations, money still matters but ideas matter more. Here cash is no longer control king. Making sense is more important than making money. So the rules are different. To control the direction of these organisations the rule of thumb is not to follow the money but follow the ideas. Instead of concentrating single-mindedly on financial management and control, large third generation organisations are often more interested in the management and control of ideas...what Kenneth Boulding was calling image or eiconic management thirty years ago...see *The Image* by Kenneth Boulding (1954). Ezra Pound was grasping at similar ideas in the 1920s when seeking to bring together a group of artists and writers under the banner of his *Imagist* movement.

In recent decades eiconic organisation as an organisational form has been increasing rapidly...even within the large hierarchic second-generation organisations...at the expense of hierarchic organisation. Knowledge, unlike manufactures, is not a zero-sum game. I do not lose my knowledge by giving it to you. This changes nearly everything...although not quite everything because the obsolescence factor associated with modern knowledge is probably significantly greater than in earlier times because of its high technology content.

Increasing Returns

Nonetheless this shift is real enough and is taking place at the same time as implementation of second-generation financial management and control theory has led to another unsuspected side effect. The scarcity upon which the economics of manufactures has been based is no longer a plausible assumption. There is now potentially enough to go around despite the fact that extrapolation of current trends imply the need for 'two more earths' to meet the needs of a future planetary population of ten billion. This shift is due in no small measure to the tacit alliance between the large global second-generation organisations and an increasingly 'third-generation trend' in the societies of the industrialised world which has led to 'doing more with less' and early signs of moves towards a sustainable third-generation recycling economy from the linear 'make and throw-away' society dominated and created by the large-second generation organisations.

But equally perplexing to conventional organisational wisdom has been the discovery that the economic theory of large second generation organisations is grounded in the idea of 'diminishing returns to scale' while the third generation of large organisation seem to follow the opposite rule of 'increasing returns to scale'. It is this that makes the *Microsoft* anti-trust case lumbering its way into the American court rooms a little more interesting than it might otherwise have been. The guiding business principles preached from the oak-panelled corridors of the *Boston Consulting Group* to the office-less offices of *McKinsey & Sons* has been to grab market share at almost any price. Without it you are dead in the water. But with it your corporate learning expands geometrically.

Repersonalising

But there is a problem. At present work and money are closely coupled in our large hierarchical second-generation societies. As the worker becomes once again the master of his work and controls (instead of being controlled by) his tools (see *'Tools for Conviviality'* by Ivan Illich) so work is beginning to return from the private and the public domains to the personal domain. In so doing, money is rediscovering its intrinsic merit...as a commodity to be exchanged for other commodities on equal terms (currently other commodities trade at a disadvantage because of their tendency to corrupt) and as a way of keeping score.

This shift will bring much social upheaval in its wake. We have so far only seen as through a glass dimly the social consequences of money having become depersonalised. At the turn of the century, Georg Simmel attempted to catalogue these effects in *'The Philosophy of Money'*. As we 'go back to get ahead', by repersonalising our money, so we will need Georg Simmel to light our way and help us muddle through the troubled times ahead.

Hanseatic Organisation

Historically the large hierarchic form of organisation represented today by the limited liability company grew out of what might be called the hanseatic form of organisation prevalent in much of Europe during the late Middle Ages. But in Europe the hanseatic form of organisation itself grew out of a feudal system in which each individual was at the heart of the large organisation in the sense of reflecting the characteristics of the whole and having access to the tools and facts of the whole organisation. The centre held because there was no centre. This organisational form can be seen as the counterpart to E.F. Schumacher's *'Economics as if people matter'*...the natural form of personal organisation in a *Buddhist Economy*. It will return once the little individual's reach allows him access to everybody else's knowledge and the freedom to use that knowledge and the tools the knowledge commands for his or her family's own ends.

This will be Good Work carried out to satisfy the limited needs of himself, his own family and his neighbours. 'Love God and love thy neighbour'...the core idea in The Sermon on the Mount...will be the ethical basis of Future Work. Technology put these things out of reach between the Middle Ages and the capitalist era but is now bringing them within reach once again as we move

from the capitalist era to a post-capitalist era that has yet to speak its name. As money loses its power and ideas become the new currency, so hierarchic organisations will move ever more rapidly into decline.

Holonc Organisation

But the large third-generation organisation is probably no more than a temporary organisational form. Where we are headed is back home to the organisation of the early Middle Ages. At the core of both large hierarchic and hanseatic organisations is the pursuit of interests that are remote to the worker's everyday life needs.

In a large second-generation organisation it is not the job that is wanted, but the money it provides at the end of the week. In a third-generation organisation the ideas being pursued may be intriguing and the pursuit disinterested but the work only indirectly meets any of the worker's 'hierarchy of needs'. This fourth-generation of large organisation we might call a 'holonic' organisation. In these organisations it is the hologram which best expresses the organizing principle.

Holonc organisations are promising because they are based on the pursuit of personal and local interests...where work is done as if 'for whom' and 'to where' matters. Indeed it may be that by pushing rapidly beyond hanseatic to holonic organisation we can kill two birds with one stone; adding meaning to living...for 'life is work' as Thomas Carlyle insisted...and concentrating our energy, skills and money in the needs of our own backyards.

Conclusion

There is much more work to be done before this *Rise & Fall of Large Organisations* can be defended academically, but this is the hypothesis I am muddling ahead with for the time being. And I would argue that the five principles expounded by Schumacher's in his essay on the theory of large scale organisations will be relevant to a theory of large-scale organisation whichever form that large organisation might take because they seek to address that most neglected factor of the theoretician the factor of scale. The practical man can never ignore it of course because nothing works unless it is taken into account. This is how Schumacher ended his essay.

'Many of us have been struggling for years with the problems presented by large-scale organisation, problems which are becoming ever more acute. To struggle more successfully, we need a theory, built up from principles. But from where do the principles come? They come from observation and practical understanding. The best formulation of the necessary interplay of theory and practice that I know of comes from Mao Tse-tung. Go to the practical people, he says, and learn from them: then synthesise their experience into principles and theories; and then return to the practical people and call upon them to put these principles and methods into practice so as to solve their problems and achieve freedom and happiness.'

Flowware and the IT Sector

Datavärlden had an interesting reaction two years ago when they decided to extend their IT categories by including 'multimedia/web' alongside hardware, software, outsourcing ...these are companies who process data such as accounts and billing information for other firms...telequipment, telcomserver, hardware service, consulting, reseller and wholesaler.

Many of the new web companies looked at them aghast and replied, 'We are not an IT firm. We are New Media'. This response is revealing. We can add another development. Some firms are now discriminating between their 'webmaster' and their 'infomaster'.

The typical webmaster is concerned with the architecture of his site and the design of its visual displays. The information presented on his website is 'not his department'. This creates a weak link in the flow of information through the pipeline from the 'workface' to the 'cyberspace'. The job of the infomaster is to strengthen or recreate this missing link.

For two decades Intel and the other chipmakers have been driving the pace of development with ever faster microchips. The result is ever more complex programme design...so that finally after two decades of promises the next generation will allow us to throw away our keyboards.

Ordinary people have an ambivalent attitude to this development. Apart from a few techno-nerds, the ordinary computer user wants an IT slave that can be switched on and off and told what to do. The television set or the sewing machine are the models ordinary people have in mind. But as the real world sees what a new generation of hardware and software can do it demands that the computer industry exploits this new potential.

Ever since the advent of the microchip, the IT industry has responded to this demand by 'layering' its business. But its an unusual form of layering because its wellspring is in the heart of the industry. A volcano is probably as good a metaphor as we will find. At first an internet or a web browser shoots into the air with a dazzling display of fireworks. All who see it are astonished. Then the lava begins to flow. Finally it starts to cool down turning into a new layer of solid rock that finally comes to rest on top of the lava from previous eruptions.

There is a myth that the internet came into the computer industry 'from left field' and caught it unaware. Only a few visionaries such as Nicholas Negroponte at MIT's Media Lab saw it coming, their gazes being set on the 10 to 20 year horizons. I think this is misleading. The internet explosion was a typical eruption and erupting is what volcanoes do. All fire and brimstone at first. Then lava flows and a new layer.

So this is the way I like to think of what is going on. There is a hierarchy reaching down into the depths of this IT volcano and it looks like this.

State	Commodity	Information Technology	Brand Names
gas	flowware	infomastery webmastery	Meta, Mosaic, Lycos Fetch, FrontPage
liquid	software	websoftware programming language	Shockwave, Acrobat HTML, Java, Word 6.0
solid	hardware	operating systems hardware platform microprocessor	MacOS, Linux, Windows Protocols Intel

Here the 'hardware' and 'software' terminology has been extended with a class of infoware labelled flowware. But the word 'ware' has a rather static commodity feel about it and linguistically we should be seeking to capture the idea of 'process'. So I have added in an analogy with physical states. Add enough people, time and energy and the ice melts and the kettle boils.

IT Categories

But all this is of only limited use for our study of IT firms. Nonetheless it is as well to be aware of the state of flux that exists. A set of definitions based on Bill Gates 'pipelines' might be possible but here are the 'IT 100' definitions used in this study.

Old Definitions	IT 100 Definitions
Hardware	Computer OEM* Computer Assembly
Software	Digital System, Digital Media, Outsourcing Digital Data
Telequipment	TelCom OEM*
Telcomserver	Telcom Server
Servicing	ITService
Consulting	ITConsulting
Reseller	ITMarketing
Wholesaler	ITDistribution * 'Original Equipment Manufacturer'

Expressed this way it is now possible to use 'Research and Development' as our discriminator and divide up the sheep...who do no R & D of their own...from the R & D intensive goats.

Figures of 20-25% for R&D as a percentage of turnover seem to be normal for American software developers but here by way of comparison are the 1996 figures for three Swedish software firms. Turnover and R & D spending in millions of kronor.

IT Firm	Turnover	R&D	%
IFS	359	72	20%
Intentia	1080	200	18%
IBS	997	82	8%

Here then are our 'sheep' and 'goats' ranked in terms of R&D Spend as a % of turnover where Class A are the big R&D Spenders and Class C spend very little.

Class	Type of IT Firm
A	Computer OEM, Telcom OEM, Digital System, Digital Media
B	Digital Data, Telcom Server, ITConsulting
C	Computer Assembly, ITMarketing, ITDistribution, ITService

In Appendix A, the 100 Swedish IT Companies have been broken down into the old categories and in the hardware and software sectors they had been separated out into Swedish and non-Swedish firms. Here are the numbers:

Category of IT Firm	IT 100		Datavärlden 1997	
Swedish Hardware	5	5.2%	36	7.5%
Swedish Software	15	15.6%	94	19.6%
Foreign Hardware	16	16.7%	47	9.8%
Foreign Software	5	5.2%	44	9.2%
Multimedia/www	-	-	35	7.3%
Telequipment	6	6.3%	14	2.9%
Telcomservers	10	10.4%	19	4.0%
Consulting	34	35.7%	168	35.1%
Outsourcing	5	5.2%	22	4.6%
SubTotal	96	100.0%	479	100.0%
Servicing	-	-	5	-
Wholesalers	2	-	83	-
Retailers	-	-	67	-
Miscellaneous	2	-	33	-
Total	100		667	

The *Datavärlden 1997* figures have been added in for comparison purposes as some measure of distortion for the particular hundred firms selected for the IT100 List. Wholesalers, retailers and Servicing firms are probably not going to be included under the category of 'Swedish IT Firms' for this study and were systematically excluded. The exception was the enormous *Esselte Scribona* and *Computer 2000*.

Portfolio Evaluation

The principal distortion seems to be in the complete absence of 'Multimedia/www' in the IT 100 List which will probably need to be remedied once the 1998 or 1999 figures are available. In *Datavärlden* in 1997 the sector only accounted for a turnover of 460 million.

The 1997 total turnover for the IT industry was 307 billion kronor, so it was a tiny sector accounting for just 0.14% of turnover. Even excluding The Big Two, *Ericsson* and *Telia* with their combined turnover of 168 billion kronor we are still talking of these 35 firms...4.5% of the total (there is a discrepancy between the 777 firms in the full list and the sum of 667 from the sector breakdown that is not worth trying to reconcile)...accounting for only a third of one percent of the turnover of the Swedish IT sector in 1996.

Bringing in the top nine firms in the *Datavärlden List* would compensate. These accounted for 56% of the 'Multimedia/www' sector's turnover. The new firms in the Swedish IT 100 would be *Multimedia Software Scandinavia*, *Kunskaps-hammen*, *Levande Böcker*, *Spray*, *Tetre*, *AdEra*, *Ahead Multimedia*, *Projector New Media* and *PIR-New World Media*, each with a 1996 turnover of between 20 and 50 million kronor. However the 1999 list is certain to look completely different.

The other distortion is in an over-representation of non-Swedish firms in both the hardware and the telecom server lists. This brings us to the question of what it means to talk of Swedish and non-Swedish firms, particularly in the global information technology business.

Let us begin by looking at the ownership structure for the ten telecom server firms:

- Europolitan Private Swedish firm owned by NordicTel Holdings
- Global One Deutsche Telekom, France Telecom, Sprint
- MFS WorldCom WorldCom Inc. UUNet is daughter company
- Sonera Telecom Finland (?)
- Telenor Norwegian Telenor AS
- TeleNordia British Telecom, Telenor, Tele Danmark
- Telia Publicly owned by the Swedish state
- Telitel ?
- Teracom Publicly owned by the Swedish state
- TMI Telecom Italia

The background here is that Sweden together with Finland, Great Britain and New Zealand was among the first to open its home market to foreign telephone companies. Although Greece, Ireland, Luxembourg, Portugal and Spain persuaded Brussels that they needed a five-year opt-out until 2003, the rest of the European market opened for competition last year at the same time as Japan and the USA removed restrictions.

This provided state-owned telephone companies with an early opportunity to find out what competition was. Whether it has taught them much is another question because the competition from other state-owned telephone companies over the 2-5 year term is unlikely to bear much resemblance to the challenge coming in from internet telephony.

So is there such a thing as a *Swedish Information Technology* sector? The internet is what binds together the global village. Does it make any sense to speak of firms as Swedish or American or German or Japanese? To many people the whole point of the internet is its disdain for national boundaries.

If there is a Swedish IT firms, just what does it mean and who is in it? And if there is not a Swedish IT sector, perhaps a case can be made for creating one. But first it is essential to clear the decks. What is good for Ericsson is good for Sweden. Discuss.

Portfolio Selection

The 100 Swedish IT firms have been divided into three classes by their R&D spending. Later the study will look at each firm in detail. Here are the current number of firms in the portfolios

Class A	Computer OEM (21), Telecom OEM (6), Digital System (20), Digital Media (0)
Class B	Digital Data (5), Telecom Server (10), IT Consulting (34)
Class C	Computer Assembly (0), IT Marketing (2), IT Distribution (2), IT Service (0)

Computer hardware firms have been assumed to be 'OEM' rather than assemblers which is certainly not the case. Without looking at specific firms at this stage we can then provide a range

Category	Max	Min	Remarks
Class A	47	26	R&D 10-30% of turnover
Class B	49	49	less than 10% spent on R&D
Class C	4	25	No significant R&D

Seven schedules are being prepared of the Sweden's IT 100 Firms broken down into the above categories (columns) and the sixteen *Datavärlden* business activity categories (rows).

(1) Computer; (2) Microcomputers; (3) Personal Computer; (4) Data Communication Equipment; (5) Office Equipment; (6) Components; (7) Accessories; (8) Software Programmes; (9) Multimedia/www; (10) Education/Teaching Aids; (11) Telecom Equipment; (12) Consulting; (13) Outsourcing; (14) Computer Servicing; (15) Telecom Operations & Maintenance; (16) Other.

Web Site Analysis

Allgon	Annual report can be downloaded
Caran	Link to OTC List on Stockholm Stock Exchange
Ericsson	Strong site on investor relations
Europolitan	Link to Stockholm Stock Exchange
ExcOSOFT	Software plug-ins as downloads
HiQ	Web-oriented with flair
IAR	Good site map
IBM	Strong site. Shockwave. Downloads. Online AGM.
IBS	Good example of web reporting
Intentia	Applets. Online share page
Kipling	Acrobat/pdf download for annual report
KnowIT	Acrobat/pdf download for annual report
Linnédata	Acrobat/pdf download for annual report
Mandator	Link to IT List at Delphi Economics.
Microsoft*	State of the art site on investor relations
Modul 1	Small firm. Index page links direct to annual report
Motorola	Acrobat/pdf downloads. Good site map, search & Y2K coverage
Nokia	Good use of Acrobat/pdf including annual report download
Optosof	Good use of Acrobat/pdf and link to Matteus stockbrokers
Prevas	Good summary page for report downloading
Pronyx	Good 'Do-It-Yourself' share price web service
RKS	Prospectus download
Siemens	Good entry to key results
Sigma	Shockwave
Sun	Readable download for web pages created on request

*After criticism of their investor relations two years ago Microsoft has succeeded in turning the situation around. The Microsoft web site provides an early indication of the '24-hour/7 days-a-week' investor online interface that will become 'best practice' within the next few years.

Analysis of Swedish IT Sector**Class A Firms**

Schedule 1	Computer OEM	0 - 21
Schedule 2	Telecom OEM	6
Schedule 3	Digital System	0 - 20
Schedule 4	Digital Media	0 - 20

Class B Firms

Schedule 5	Digital Data	5
Schedule 6	Telecom Server	10
Schedule 7	IT Consulting	34

Product Category by Turnover

Column 1	Computer
Column 2	Microcomputers
Column 3	Personal Computer
Column 4	Data Communication Equipment
Column 5	Office Equipment
Column 6	Components
Column 7	Accessories
Column 8	Software Programmes
Column 9	Multimedia/www
Column 10	Education/Teaching Aids
Column 11	Telecom Equipment
Column 12	Consulting
Column 13	Outsourcing
Column 14	Computer Servicing
Column 15	Telecom Operations & Maintenance
Column 16	Miscellaneous

Sweden's 'Top 100' IT Firms**Swedish Hardware Firms**

10. Axis	www.axis.se	hardware
63. Nexus	www.nexus.se	hardware
68. PartnerTech	www.partnertech.se	hardware
77. Saab Combitech	www.combitech.se	hardware
78. Salcom	www.salcom.se	hardware

Swedish Software Firms

04. Alfa Laval Automation	www.automation.alfalaval.se	software
30. Entradata	www.entradata.se	software
32. Ericsson Software	www.ericsson.se	software
33. Ericsson Infocom	www.ericsson.se	software
35. Excsoft	www.excsoft.se	software
43. Hogia	www.hogia.se	software
44. IAR	www.iar.se	software
46. IBS	www.ibs.se	software
48. IFS	www.ifsab.se	software
49. Industri Matematik	www.im.se	software
52. Intenia	www.intenia.se	software
66. Optosof	www.optosof.se	software
73. Prosolvia	www.prosolvia.se	software
79. Scala	www.scala	software
98. TurnIT	www.turnit	software

Foreign Hardware Firms in Sweden

08. Apple	www.apple.se	hardware
12. Bull	www.bull.se	hardware
14. Canon	www.canon.se	hardware
18. Cisco	www.cisco.co	hardware
20. Compaq	www.compaq.se	hardware
26. Digital	www.digital.se	hardware
38. Gestetner	www.gestetner.se	hardware
41. Hewlett Packard	www.hp.se	hardware
45. IBM	www.ibm.se	hardware
51. Intel	www.intel.com	hardware
60. Motorola	www.motorola.se	hardware
65. Océ	www.oce.se	hardware
69. Philips	www.philips.se	hardware
82. Sharp	www.sharp.se	hardware
85. Silicon Graphics	www.sg.se	hardware
88. Sun	www.sun.se	hardware

Foreign Software Firms in Sweden

01. ADS Anker	www.sito.se	software
50. Informix	www.informix.se	software
58. Microsoft	www.microsoft.se	software
67. Oracle	www.oracle.se	software
74. PTC	www.ptc.se	software

Teleequipment Firms

03. Alcatel	www.alcatel.se	teleequipment
06. Allgon	www.allgon.se	teleequipment
31. Ericsson	www.ericsson.se	teleequipment
64. Nokia	www.nokia.se	teleequipment
83. Siemens	www.siemens	teleequipment
93. Teligent	www.teligent.se	teleequipment

Telcom Servers

34. Europolitan	www.europolitan.se	telcomserver
39. Global One	www.global-one.se	telcomserver
57. MFS Worldom	www.mfs.se	telcomservice
87. Sonera	www.sonera	telcomserver
90. Telenor	www.telenor.se	telcomserver
91. TeleNordia	www.telenordia	telcomserver
92. Telia	www.telia.se	telcomserver
94. Telitel	www.telitel.se	telcomserver
95. Teracom	www.teracom.se	telcomserver
97. TMI	www.tmi.se	telcomserver

IT Consulting Firms

02. Agero	www.agero.se	consulting
07. Anderson	www.ac.com	consulting
09. AU	www.au.se	consulting
11. Banctec	www.banctec.se	consulting
13. CambTechPartners	www.ctp.se	consulting
15. Cap Gemini	www.capgemini.se	consulting
17. Caran	www.caran.se	consulting
19. Communicator	www.communicator.se	consulting
22. Connecta	www.connecta.se	consulting
23. Devenator	www.devenator.se	consulting
27. Eiknes	www.eiknes.se	consulting
28. Enator	www.enator.se	consulting
29. Enea	www.enea.se	consulting
36. Extenda	www.extenda.se	consulting
37. Frontec	www.frontec.se	consulting
40. Guide	www.guide.se	consulting
42. HiQ	www.hiq.se	consulting
47. ICL	www.icl.se	consulting
53. Kipling	www.kipling.se	consulting
54. KnowIT	www.knowit.se	consulting
55. Linnédata	www.linnedata.se	consulting
56. Mandator	www.mandator.se	consulting
59. Modul 1	www.modul1.se	consulting
61. Måldata	www.maldata.se	consulting
62. Net Solutions	www.netsolutions.se	consulting
71. Prevas	www.prevas.se	consulting
72. Pronyx	www.pronyx.se	consulting
75. Resco	www.resco.se	consulting
76. RKS	www.rks.se	consulting
84. Sigma	www.sigma.se	consulting
86. Softronic	www.softronic.se	consulting
89. System	www.system.se	consulting
99. UDAC	www.udac.se	consulting
100. WMDData	www.wmdata.se	consulting

Other IT Firms

05. Alfascop	www.alfascop.se	retailer
16. Capella	www.capella.se	outsourcing
21. Computer 2000	www.c2000.se	wholesaler
24. Digidoc	www.heab.se	outsourcing
26. EDS	www.eds.se	outsourcing
70. PostNet	www.postnet.se	miscellaneous
80. Scribona	www.scribona.se	wholesaler
81. Sema	www.sema.se	outsourcing
96. Tieto	www.tieto.se	outsourcing