INFORMATION SYSTEMS AND CREATIVE RESPONSES

INAUGURAL LECTURE

DELIVERED AT RHODES UNIVERSITY

on 29 September 1993

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Malcolm Sainsbury
BSc (Unisa), MSc (Bath), MCSSA

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Information Systems and creative responses

Inaugural Lecture September 1993

Professor Malcolm Sainsbury
Head of the department of Information Systems

Mr Vice Chancellor, distinguished guests, colleagues, ladies and gentlemen :

Tribute to the influence of past teachers and colleagues

It is a worthy tradition in inaugural lectures to pay tribute to one's former teachers and colleagues for the knowledge, insights and enthusiasm they have imparted. Among the many inspiring educators who have had a profound effect upon me, I wish to pick out just four whose influence has, directly or indirectly, contributed to what I do every day in this institution and why I am standing here tonight.

Mr Vice Chancellor, you will probably be surprised that you yourself are on that list, though you never formally lectured to me or supervised my studies at any time. At Wits University in the late 1960's, I came across *the* pioneering interactive computer system in South Africa. I watched in wide-eyed amazement as a postgraduate friend of mine interacted with the Wits computer and accomplished wonderful and useful things from behind the keys of an old IBM 'golfball' typewriter.

A typewriter that could 'talk back' was a revolutionary idea to most businessmen in the country then, let alone to an impressionable teenager. I spent many all-night sessions in front of those fascinating old terminals exploring, experimenting and thinking about the world of seemingly 'intelligent' technology. That fascination remains to this day.

That pioneering system (then five years ahead of the field) was

called (rather boringly if I might now say so) WITS (the Wits Interactive Terminal System). Its author (then the Director of the Computing Centre at Wits) was of course yourself. The provision of that exceptional piece of infrastructure not only fired my own passion for the fascinating field I now inhabit, but it did the same for several hundred others. We all thank you most sincerely.

Several other inspiring teachers had a marked influence on me. The late Professor Arthur Bleksely in Applied Mathematics was one, and while he was always so meticulously organised and precise, Professor Raymond Thomas at the University of Bath was quite the opposite. His dotty and disorganised enthusiasm and his love for his subject as well as his involvement in the community was for me, equally mind expanding at a later stage of my life.

Finally I would like to pay tribute to the teacher who taught me that **active** involvement and commitment at the deepest possible level with one's subject (indeed with any part of life) was the way to experience the true joys of that subject.

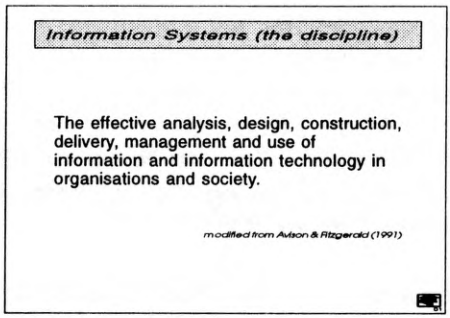
To a fine musician who taught by example that studying the theory and listening was only the start and that the practical and honest involvement in its expression would make the theory shine with bright joy. To an ever sharp and active intellectual, now in his eightieth year: I pay tribute to my father, R.G Sainsbury.

Since Information Systems is a new department at Rhodes (indeed it is one of the first two in South Africa) I cannot pay the customary tribute to my predecessors in this chair, but I do salute my first Head of Department, Professor Hugh Smith who was inordinately patient and kind in putting up with my hurry to get Information Systems established "all in one year". Professors Keith Black and Gavin Staude were also wonderful mentors and guides as this more measured process unfolded. Along with these three, the Commerce Faculty has been served by the outstanding chairmanship of Professor Philip van der Watt during my years here, and I pay special tribute to these four fine colleagues.

What is 'Information Systems'

As a field of study, Information Systems (IS) is a professional engineering discipline.
I will say more about the engineering focus later. As its name implies it deals with *systems* that manage *information*. This information is most often managed in the context of organisations (corporate information). You will find IS professionals in almost all public and private organisations around the world and our daily lives are constantly served (and only occasionally abused) by Information Systems of different kinds.

Avison and Fitzgerald's [1] modified definition of Information Systems is as close as we will get to a definition of the scope of the subject.



"The effective analysis, design, construction, delivery, management and use of information and information technology in organisations and society".

This is a rather wide definition, and the discipline indeed has a direct interest in *all* of these areas, but obviously the core of the discipline is still organisational and corporate Information Systems.

Information

When you announce at a party that your field of study is "information", you get the same reaction as I imagine the physicists get when they say they enjoy studying "light". A kind of "I'm very

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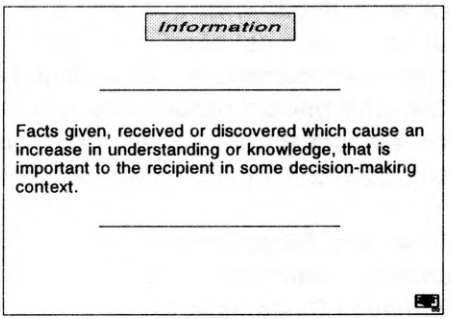
1 Avison DE, Fitzgerald G: "Information Systems Practice, Education and Research": Journal of Information Systems: Vol 1: 1991

happy for you .... Boet". (☺)

But when you really start to study information (and I'm sure 'light' too) it emerges as a fascinating exercise.

The concise Oxford dictionary defines Information as "Facts told, or heard or discovered, or knowledge....", but this is not quite good enough.



You see, let me *tell* you the *fact* that Albert J Kaplotnik is 2.2 meters tall. "Albert J Kaplotnik is 2.2 meters tall !" - So what ?. This is not information but just 'data' or fact. It is just as devoid of information as saying ".... the temperature in Copenhagen is 12 degrees Centigrade".

If however, this data has *meaning* for you in a particular context and it pertains to possible action on your part (Eg the context that you have just 'stolen' AJ Kaplotnik's girl-friend, and he is of a somewhat violent disposition) then this is indeed 'information'.

Information therefore, is more than data, in that it is 'meaningful' to the recipient within some decision-making context. Information occasions an increase in understanding or knowledge in a context which is important to the recipient.

Information is also a fascinating **commodity** to deal in, (and we all do deal in it) - some of us even make a living out of it -. When we give it or receive it or sell it, information isn't tangible in the sense that bread or fruit or gold is. It can't be touched, weighed, sliced and packed in the same way, because, if you think about it, information is a commodity in 'someone's head'. Also when we give or sell it, it doesn't leave us, our stocks do not run out. It certainly leaves us in other ways, but not, as with most other commodities, by its distribution.

Despite these (and other) strange properties, we do know that its *value* can be enhanced by concentrating on some of its unique attributes. Take for example, the attribute of *timing*. When information is delivered it must be at the right time. Not too late and not too early. We all know people who give us everything we wanted to know after it's too late, and similarly others who ply us with details of something we really don't want to think about for a month or two. It is more valuable when presented with perfect timing.

Accuracy is another important attribute of information. For example , if the information on AJ Kaplotnik's height had been given to us as 1.2 meters instead of 2.2, this might perhaps have induced an unfounded confidence in our ability to deal with the situation, not to say a great surprise when he finally appeared in the doorway.

Attributes like timing, accuracy, comprehensiveness, verifiability, focus, presentation, reliability, etc, are what IS professionals are at pains to understand and build into their systems. They are the determinants of quality in our profession. Equally they are characteristics whose understanding would enhance the way all of us listen to, and impart information in daily life.

Perhaps a quick look at just one more characteristic of information will serve to indicate some of the uniqueness of this commodity we deal in. Information only has meaning within a specific context, and its meaning differs for each individual and in each different context.

For example the news that someone is pregnant will convey a range of different information to different people in different contexts, evoking reactions of joyous celebration and reaching for cigars on the one hand, to angrily going to fetch the shotgun on the other. One of my regular golfing partners likes to say that "every shot in golf pleases someone". As your individual context differs, so the meaning of the information (and thus the information itself) differs.

Shakespearean tragedies exploit this fact only too well. The audience is aware of **all** of the different contexts of the various actors in their various sub-plots, but, (alas) the poor heroine, locked in her own context, her own little world, overhears a snippet of conversation, interprets this within her own context, plunges a dagger into her delicate bosom and dies mid-stage. The agonised audience wants to scream out the 'real' meaning of the situation but can't, because by now the proud hero, similarly ignorant of other subplots and contexts, now feels obliged to end what he also perceives to be an equally miserable life, again amidst the angst and tears of the audience.

Such an understanding of the contexts of our information recipients, an ability to "put ourselves in other people's shoes" as it were, is essential to anyone wanting to make a living out of creating Information Systems. What we say, write and do conveys information, the meaning of which differs to different people and in different contexts.

Some of our politicians might do well to note this.

There is the true story of the man, hired by one of our very large parastatal industries, in Pretoria who on his first day of work was requested to extract some very important data from the previous month's production reports and produce some rather complicated graphs. He set to his new job with enthusiasm and care, produced the charts after a week's work, delivered them to the offices of the general manager and was commended for his exceptional effort and asked to continue with this task.

Some twelve years later, the 'time and motion people' were analysing the tasks performed by various members of this organisation and came upon our intrepid 'chartist' still carefully producing these complicated graphs. In the course of their job they interviewed him about his work, where he got his raw data and where his output was delivered, then (as these people do) they walked across to the general manager's offices and followed the trail of his documents. When they asked the GM's secretary what she did with the charts, she indicated that she had only been

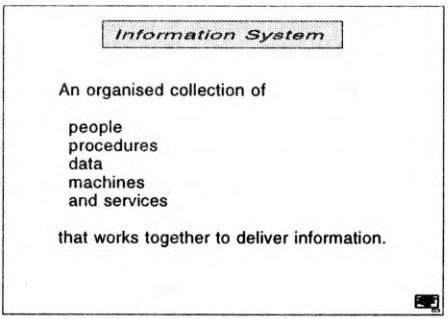
working there for 10 years and had *never* known what to do with the "nice old oomie's graphs", so she just put them on the top of the cupboard each week, and removed some from the bottom when the pile got too high.

It turned out that the information he provided in the first four weeks of his career had been absolutely vital *in the context of a pending decision*, but that after the decision had been taken, the context had changed, and for twelve years no one had told him about it. Thankfully the matter was handled with tact and decorum and the charts were phased out in favour of some other responsible task, and when he retired two years later he never knew what had become of almost twelve years of careful effort.

We'll probably have to treat all the SAPSE people in the same way in a few years time. (☺)

An understanding of the attributes and nature of information is essential. If you want to construct high quality Information Systems, you start by trying to understand people and the nature of their information needs. The days of the 'technological nerd' writing programs to produce 'information' for '**users**' are long gone. Without a thorough understanding of people, of organisations, of business, of the contexts within which information will be provided and of the many attributes of information itself, it is impossible to create a valuable Information System.

I have spoken about *Information*, but what about the *Systems* part of things. An "Information System" is an organised collection of people, procedures, data, machines and services that work together to deliver information.



For a simple example, take the milk account that pops through the

letterbox at the end of the month.

To deliver this *information* to you, the dairyman needs a collection of people, procedures, techniques, data, machines and services working together to this common purpose. (an Information System).

Similarly, and at a more complex level when you go to the ATM at your local bank to draw money, there is quite a complex Information System (people, procedures, data, machines, services working together) which must act to allow this transaction to take place.

Someone had to design and construct that system, and someone has to manage, maintain and improve it on a daily basis. These are the Information Systems professionals at various levels who come through a department such as ours and whose work influences and most often enhances our daily lives.

Information Systems as an Engineering discipline

I mentioned earlier that IS was a professional *engineering discipline*. Let me briefly expand on that. We fairly easily identify with the kind of things that civil, electrical, chemical and other engineers do. These professionals design, construct, deliver and maintain things like roads, bridges, electrical motors, cars, medicines etc. They have their own recognised professional knowledge, formalised design methodologies, standards, techniques and tools with which they build these objects. They build up their artifacts using subsystems and can put together the most complex of bridges, buildings, chemicals and motor vehicles, by understanding all of the many smaller building blocks of their profession and combining them together.

In just the same way, IS engineers build Information Systems. We design an Information System as a real and tangible creation. We have our own recognised body of knowledge and formalised design principles and drawings. We use data, computers, procedures, people and services to create a working system.

It exists as a real entity in just the same way as a bridge or a motorcar exists and its regular use, management and maintenance are just as important as those constructed by our fellow engineers

The mechanical engineer (for instance) has an easier time of it because of the materials he uses. For example a car, when finished and working comprises gears, metal, glass, rubber and other physical things. The physical properties, tolerances, strengths, reactions to stress and wear and tear of these components are well known to the mechanical engineer. They obey the laws of physics.

The finished product of the IS engineer comprises all of these physical things, as well as computers (which are perhaps less predictable but nevertheless perfectly understandable) **but** the completed Information System will have **people** as vital elements in the finished product, and these 'building blocks' have their own understanding of their roles, their own ambitions and hopes and their own very individual strengths, weaknesses, tolerances to stress and other unique qualities. A working Information System is a complex beast and the engineers who design, construct and manage them need all the traditional engineering skills based around physics as well as a knowledge of people and how they too can be successfully 'built into' working systems.

The term "Software Engineer" has become popular in the last decade, but this is such a poor and limited description of the professional Information Systems engineer I am describing. The emphasis on 'Software' in this designation is unfortunate, because the programming of computers and the design aspects around the 'computer-specific' procedures are but a small percentage of the time spent and a small percentage of the total responsibility associated with creating Information Systems.

As with any engineering discipline, we need a range of different people with different training and talents at different stages of the life-cycle of an Information System.

We have people with talent and training in the art of determining

information requirements. They are expert at working with individuals and groups and determining with great accuracy all the requirements of an Information System. Others are skilled in the *analysis of data* and its many facets, representing reality in structured symbols. Some have skill with *business functions and procedures* of many different kinds. Some are skilled at *programming computers* and can take the standardised designs and cause computers to behave in the desired way. There are specialists in the *implementation* phases where training, documentation and testing are important and still others who can monitor the performance of the system and take care of its ongoing *management and maintenance*.

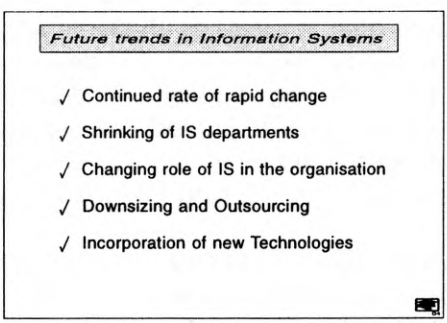
Our graduates will start their careers in IS in one of these specialist areas, but will hopefully have a good enough understanding of the higher level processes and issues and of the skills required at these higher levels, to be able to accept more and more of the responsibilities of the professional Information Systems engineer.

The professional IS Engineer *oversees this whole process*, understanding the nature of each of the phases in the life-cycle of the Information System and wisely co-ordinating the whole project, using the various specialists along the way.

A view of the future of Information Systems

So much for the description of Information Systems and its *current* state.

What then about the future of this discipline and the contributions it can make to individuals, organisations, communities and society.



Firstly the future of Information Systems.

One thing seems certain and that is that the nature of our Information Systems will continue to change quite rapidly. Change is endemic in all engineering professions and it is certainly a constant fact of life in our relatively new branch of engineering.

As an example we have estimated that every year for the last 12 years, at least 20% of the material we have taught in any one of our courses has been scrapped to make way for new insights, new tools and new techniques in the next year. This rate of change will certainly continue into the future.

I believe that the traditional IS department we have become used to in organisations will undergo dramatic change over the next seven years. The major change is that its size will shrink dramatically.

Where the average size of a medium-to-large IS department might be about 90 centralised people, I see this number reduced to about 10 people by the end of the decade. Even in IS empires of 2000 people, I see a reduction to under 50 by the end of the decade. This will depend upon a number of external factors, such as the availability of specialist outsourcing facilities in the South African market.

Even now this statement is regarded as controversial, since there are many very large IS 'empires' in organisations all over the country who do not want to hear this message. Three years ago at a conference of IS professionals in Johannesburg I explained this likely change. You can believe that three years ago the statement was a lot more controversial than it is now. The IS manager of a very large organisation (and at the time also in high office of the Computer Society of South Africa) took me to task during the question time and a lively debate followed.

However the past three years have in fact confirmed this trend and (ironically) one of the prime examples of such movement is in the organisation headed by the gentleman in question. It was not

something he wanted to hear three years ago, but now he embraces the inevitability of this movement and indeed acknowledges its positive effect on the business as a whole.

I believe we will also see a fundamental change in the role of the traditional IS department. The role of most of these new smaller centralised IS people will be associated with 'IS architectures and IS infrastructures'.

These people will mostly be professionally recognised IS engineers. They will set the standards, ensure that the correct technical architectures are in place and act as vital consultants in defining and designing Information Systems.

Most of the work will be contracted out to a growing Information Systems services industry. In research completed in the department last year we have seen the strong trend towards the 'downsizing' of IS departments, and the strong movement towards 'Outsourcing' of responsibilities once regarded as the exclusive domain of centralised IS departments. These dramatic movements are also coinciding with the trend towards 'distributed computing'.

These trends are not unique to South Africa, they are happening all over the world. One of the manifestations of these very significant movements has been the worst three years in the history of the mighty IBM corporation. They too have not yet been able to reconcile themselves to the shifting scene.

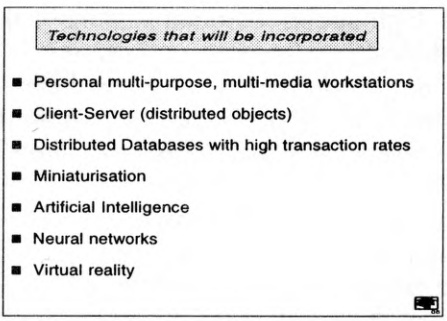
The most important driver of these trends all over the world is cost. Large centralised IS departments based upon centralised, proprietary mainframe technology are simply not competitive any more. In research we completed last year, we predicted a compounded 14.6%pa total cost advantage over the next five years for organisations downsizing their technical architectures. Preliminary indications, as we follow up that study indicate that these figures might even be conservative.

Much (though not all) of Information Systems change is driven by the availability and price of *technology and tools*. The technology

we use has constantly become more accessible, more powerful, cheaper, smaller and easier to use as the years have passed. As such, much more of the technology has become *viable* to use in more and more applications.

The driving nature of the technology has been one of the things that has kept our discipline so very interesting over the years.

It is interesting to speculate on some of the technologies that will induce further changes in the future.



Workstations: Computing power is moving into user interface issues, the "Human Computer Interface". Some industry analysts believe that over 90% of all computing power in organisations will be devoted to the user interface in the latter 1990's. A large swing from the present scenario of very high power in the centre with relatively dumb terminals around it.

Workstations of the future will be quite different from those we use now. They will be many different shapes and sizes, from pocketbook size to full consoles. Indeed, the Human-Computer interface will be an important issue in most household appliances like toasters, vacuum cleaners, TV, telephones, doors, windows and chairs.

The workstations of the near future will undoubtedly have multi-media capability. ie the ability to speak, sing, play high quality music, have brilliant text, graphics, show movies etc., and will react to our eye contact, voice and gestures. Since they will be connected to world-wide networks via cellular radio or other non-physical links, traditional telephones, radios, fax, post, and TV could be completely replaced by these new workstations.

I am not talking in speculative terms now, since all of this technology exists already. Some of it is not yet available in the quantities or at the prices that make it generally viable. It is not a matter of 'if' this technology becomes more generally available but 'when'. Certainly all of it in the next five years.

An emerging model of computing is the so-called '*client-server*' model, in which powerful user workstations are connected together via high-speed communications links. Attached to the same 'network' are specialised 'servers'. We believe that the 'client-server' model will actually be better described as a 'distributed objects' model in the not too distant future, but an explanation of this will have to wait till another time.

The 'servers' in this new model might be specialist database machines, number-crunchers, educational systems, banking, insurance or consulting services, etc. They provide their services to the 'client' systems such that these capabilities appear (by magic - 'automagically') to reside in the users' own machine.

If you have an information service to offer, you will no longer have to sell that service on floppy disks, you will simply grant access to your service on the network. Your customers will be using the very latest service as soon as it is implemented.

The implications of these technologies lie in our ability to communicate with each other directly in ways which were impossible before.

Computers will do business with other computers directly (indeed this is already common practice in Europe) placing orders, receiving and sending payments, cutting out a mountain of traditional business correspondence and speeding up business processes at the same time. It is an uncomfortable fact that technology is replacing a whole 'layer' of middle management because it enables top management to run their companies by automating many of the traditional business processes.

It is an interesting scenario (indeed now unfolding even in South

Africa) when computers of different organisations are directly linked. It is not necessary for these organisations to use the services of a bank to the same extent. Their computers can simply make a calculation of the net amount agreed as owed and do a direct monetary transfer. The traditional middlemen (the bankers) are understandably worried about such trends and we in the department have been monitoring with some interest the conflict between Pick'n'Pay and the major banks in this country.

Distributed databases with high transaction rates : The traditional way in which high transaction rates have been handled in the past was to use high-powered mainframe computers, especially designed for high throughputs of data. However there have been severe bottlnecks at around the 1000 transactions per second mark and the additional costs of improving this rate have been high.

However I believe we will find that our databases will be designed more around holding local data on local servers, and centralised transactions per second will be less critical.

Miniaturisation of processing power continues at the same amazing pace. We can put ever more processor power onto ever smaller surface areas. It is technically possible to put the kind of processing power onto a can of peas that will allow the can to look down the aisle of the supermarket, figure out what kind of customer is walking past and change its appearance to suit the perceived taste of the buyer. Imagine the whole rack of peas doing little dances, preening and otherwise vying for your attention.

The technology is available, but not yet at the price that will make it part of small-scale packaging. If I were in the packaging industry, I would be monitoring these trends.

Artificial Intelligence encompasses fields such as computer reasoning, expert systems, voice recognition, robotics, vision, and others

I thought I would give you some of the answers that were published last year, when AI practitioners in Industry and academia were

asked what AI technologies would be in use after the turn of the century. *These were some of their responses :-*

> Domestic robots that do all the cleaning, laundry, dishes and cooking will be the basis of a multi-billion dollar market.
>
> Self guided and self driven cars will be common on public highways before the turn of the century.
>
> We will be able to purchase a 'friend' the way we typically buy software. you could customise it as to gender, age, interests, etc
>
> Newspapers, magazines & books in current form will no longer be published.
>
> TV's will have enough AI built into them to delay the screening of a movie and cut out the commercials when it plays for you.
>
> Pictures on the wall will change their appearance to suit the perceived mood in the room, based on the conversation and voices they hear.
>
> In 2025, computers will define the meaning of intelligence, and we humans won't qualify. (☺)
>
> By 2025, direct connections of powerful processors to the human brain will allow us to enhance our decision-making capability, memory retention, etc. The processors will be small enough to be biologically implanted.
>
> (This is revolutionary stuff - holding out the possibility of intelligent politicians, though I doubt that the industry could keep up with the demand that currently exists in Pretoria. (☺))

Neural networks : A Neural Network is a network of many simple processors (units), each with a small amount of local memory, working in parallel and connected to other (surrounding) units by simple uni-directional channels that carry very basic data only. We

will not have the time to describe this technology, but suffice it to say that this processing model is based upon the way the human brain works, though obviously in a much more simplified form.

Neural networks have proven far superior to other methods in things like pattern recognition. They are *trained* to work, we don't 'program' them like other processors.

Virtual Reality : Virtual reality is a science which creates an artificial environment that the user *enters* and experiences interactively

Example : A hiking tail. You want to go on a hiking trail, so you put on your helmet, goggles, gloves and body suit, and in so doing you step into a computer-generated hike, which gives you the impression that you are there.

> You see the 3D scenes, because the computer projects independent images at your two eyes so that your view corresponds to the 3D image you would see if you were there. As you move your head and even your eyes, this is detected by the computer which projects the properly changed 3D view to you instantly.
>
> Your helmet contains headphones that simulate 3D sound. ie you can hear what sounds are behind, in front and to the sides of you. As you tilt or turn your head, so the computer generates the necessary changes in pitch and intensity to make you believe that you are actually in the environment.
>
> Tactile sensors and pressure pads are built into the gloves and body suits. This allows you to feel it when you (say) brush past a bush or touch a tree. This technology is still the most primitive and needs much work.
>
> To stop you from bumping into the lab wall as you walk along the hiking trail, there is a steerable treadmill, that the computer can swivel and control so that although you are physically walking in the VR, you pretty much stay in the same place in the room. If you see a snake and jump sideways, you might

fall off the treadmill though. (☺)

An allied technology is "telepresence". Where a robot actually does go on the hiking trail and it feeds back exactly the sounds, sensations, sights and smells that it is experiencing. These are relayed back to you (in your helmet, goggles, and body suit) and you *experience* these senses in emulation. When you move your head, the robot moves its head, when you walk, the robot walks. The robot is an extension of you.

This has obvious applications in things like bomb disposal or working in hazardous territory. (perhaps it also has 'user-interface' applications in modern banking. (☺))

Certainly in **our** business (education), there are some wonderful applications. Think of a Geography lesson where you actually **go** to Spain and converse with the people in the streets and feel what it is like to be in the middle of Barcelona or Madrid.

Or think of the history lesson in which you actually *step into* the middle of the 2nd world war or the middle-ages etc and actually take part in the action.

Or the application in medical education, in which we define ourselves to be 1 mm tall and walk into someone's body and swim about, examining things from the inside. Perhaps even sending a tiny probe into someone's bloodstream and we 'telepresence' this probe and perform micro surgery internally.

One needs to add rather quickly that these technologies (though now in existence) are still very unsophisticated at present, and will take a number of years to develop to the point I have described above, nevertheless they will certainly be viable in many applications before the end of the decade.

All of these technologies will find some place in the Information Systems we develop in the future.

Our response to them must be creative and wise.

To be philosophical for a moment we can almost describe many of our **existing** IS tools and techniques as 'virtual reality'. By this I mean that our stock in trade is taking things in the real world and creating logical representations of them.

For example we might represent a 'sale' of a house by a set of logically structured records which capture all the pertinent facts, like the address and stand-number of the property, the surname, names and initials of the purchaser, the purchase price, the date of purchase, etc., etc. This representation of the real life sale is then stored with others structured in the same way, allowing us to manipulate these symbols and come up with information. The fact is that these logical data structures are only *representations* of the reality.

What they *don't* capture is the effort and agony of the salesperson or the real feelings of 'belonging' that the buyer of the new house might feel. Our representations of reality are therefore inadequate and poor imitations of the real event. The side effects of this type of simplification can often be seen in the unfairness and unkindness of bureaucratic decisions which are based on information produced in this way. The uniqueness of human experience and worth has been missed because we do not know or care about how to include it in our present representations of reality.

When you get to know us better you will come to understand that we are exceptionally skilled at representing things, events, people, organisations and most anything else in a symbolic model of some sort, and we have the tools that can do amazing things with these representations or models of reality.

However there is a danger in working like this because there are some people (often bureaucrats) who are more comfortable with these simple representational models of reality than with the realities of life itself and they can tend to withdraw into their simple models, hence becoming a menace to themselves and (depending upon where they work) quite often a menace to others too.

How important it is for *users* of information systems to see beyond the simplifications in front of them and actively look for the *reality* and warmth of living people.

Empowerment

Let us get back to main-stream Information Systems in our organisations and in our society for a moment, because I would like to introduce another important attribute of information for this evening. **Information is an agent of empowerment.**

People are by their nature, information seekers. We seek information to better define the world we live in. Information empowers people in their world. We try to know as much about our little world as we can. This avoids unnecessary surprises and allows us to prepare ourselves so that we can respond to new events with the maximum of prepared choices.

Take for example two builders making a living from their trade in a town like this. If one has reliable information on the costs of building materials from a *variety* of sources and the other has no such information, the first one has the advantage and can act to purchase the highest quality materials at the lowest price. The other is trapped by the lack of pertinent information and doomed to accept whatever he is offered from his single source.

Take for example a person that is victimised by an unscrupulous landlord. If **information** on her rights in the matter were available, she would suddenly have *choices* where previously she had none. Her fate is suddenly in her own hands for the first time. She has been *empowered* by the information.

Foschini's run a wonderful little Information System. Every night as the various Foschini stores begin to close down, fairly detailed data on the day's sales is relayed from the stores to the Cape Town IS department. Here it is processed to the requirements of individual executives, and it is ready for delivery on their workstations before the new day begins. In the fashion business you cannot be caught

with old stock (last season's goods) so if you happen to be the brand manager of a particular brand of (say) swimwear, you can examine the results of your promotions of those garments by branch, by region, compared to some other time-period and a number of other permutations. You also have the power to change the prices of your garments in some or all of the stores immediately. This Information System and the information it delivers to these executives, *empowers* them in their jobs.

With the right information in the right context we are made aware of more choices. We are empowered as human beings within the world we inhabit.

Creative Responses

The title of this lecture ends with the phrase 'Creative responses'. We now move towards the conclusion by dealing with these Creative responses'.

Central to this theme is the notion of 'infrastructures', and the building of infrastructures.

We have been talking of the potential of Information Systems and information to empower people. Information is not the only agent of 'empowerment'. It is in fact part of *a whole range* of 'infrastructures' that empowers people.

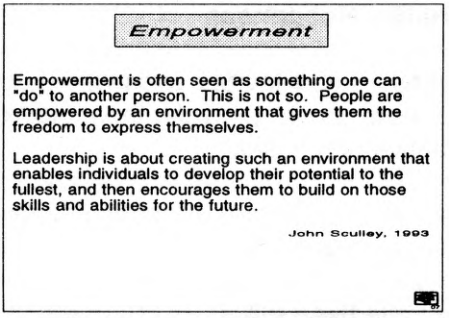
For example, a transportation system, however simple which allows a person to break free of the *barriers of location* can be a great agent of empowerment. The world might not be such a person's oyster but perhaps the horizons of the next village are now accessible. It offers *choices which were not there before.* An education system, however basic, allows people to break free of mental and skill barriers, giving them choices that were never there before.

Information Systems are just a part of whole range of 'infrastructural systems' which empowers people.

In the corporate and business world, wise managers build infrastructures to empower their colleagues. If some strategic direction of an organisation is deemed 'important', the wise organisation builds and strengthens the infrastructural blocks that surround or lead to the new direction.

For example if it is deemed important to expand the operation of a company into Africa, then the necessary contacts, communications, accesses to local skills, and pertinent information about the new direction etc are **first** cultivated and strengthened. This *infrastructure* will be the empowering agent for creative people in the organisation and the job will be accomplished by their responses to it.

When we build sensible and positive infrastructures, **people will respond to them** in a creative way.



We need no great convincing of the resourcefulness of the human being to take advantage of a favourable environment and be creative.

If our Information Systems are properly a part of this wider class of infrastructures that **empowers** people, in corporate life or in private life or in any other context or setting, then we will have demonstrated both *service* and (ironically) *leadership*.

The following quote by John Sculley [2] is worth considering, and certainly explains the point I am trying to make here. "Empowerment is often seen as something one can *"do"* to another

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2 Sculley J: Foreword in Woods B (Ed): "Communication, Technology and the Development of People": Routledge: New York: ISBN 0-415-08775-9: 1993

person. This is not so. People are empowered by an *environment* that gives them the freedom to express themselves. **Leadership** is about creating such an environment that enables individuals to develop their potential to the fullest, and then encourages them to build on those skills and abilities for the future."

Wise (and successful) leaders are the builders of infrastructures for the empowerment of people and the encouragers of people to use them creatively.

Concluding remarks

I speak as if all of these infrastructures that can be built are inherently 'good' ones. This is unfortunately not true. Witness the amazing infrastructure that has been built in Southern Africa by the distribution and sale of redundant AK-47 rifles. It is certainly an infrastructure which 'empowers' the people who avail themselves of it. The difference is that the commodity being offered also has the most oppressing side-effects on others. It encourages **destructive** responses in people.

Information Systems and Information Technology can also be in some sense 'good' or 'bad' in that they evoke either constructive or destructive responses from people. The propaganda infrastructure we have all known in South Africa for so many years is an Information System whose destructive effectiveness (in the responses it has evoked from ordinary people) can sometimes bring tears of rage to ones eyes.

Although this is not a sermon, it is clear that the *infrastructures* we build, and the *responses* we invoke or encourage will be largely determined by some deeper moral or ethical sense of what is 'good' and what is 'bad'.

Those values, perhaps learned at Grandmothers knee, or in some other way, will inevitably influence the kind of infrastructures that we put in place and more importantly whether they evoke *destructive* responses or *creative* responses in people.

Graduates of this department and indeed of this University need also to grapple and struggle with the deeper issues of the systems they build and the infrastructures they put in place and we need to encourage them in every way possible to do this.

For those of us in some area of leadership and for those of us building infrastructures (and this must surely be practically everyone here present this evening), and particularly to those of us who are building Information Systems infrastructures, it is my hope that we will build the kind of systems and those wise and good infrastructures that encourage and empower those who use them in our organisations and in our society to **good, and positive, and creative responses**

I Thank you
