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Five Dimensions for Exploiting Technology Intelligently

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Abstract

The successful extraction of business benefits from the use of information and communications technologies (ICT) has been a persistent problem. This study introduces the “Intelligent Exploiter” framework as a mechanism for improving the effective application of these technologies. This paper reports on evaluation of this framework within a large organization in health care – a sector with a history of resisting the adoption of integrated ICT systems. However, Western Healthcare (WHC) in the USA has received high praise for its ability to use ICT to help it provide better healthcare at lower costs. With this experience, senior executives of WHC have supported the efficacy of the Intelligent Exploiter framework.

Keywords: IT strategy, IT models/frameworks; Healthcare; case study (max. 6 words)

Note: Western Healthcare is a pseudonym

1.0 Background

For two decades we have been studying the application of information and communications technologies (ICT) for business benefit. Applied appropriately, ICT promises to enable tasks to be performed more efficiently and effectively (Alavi & Palmer 2000). Our quest has led to the development of a number of diagnostic tools and approaches that can help people harness these capabilities. The tools and approaches have been assembled together to form a toolset for obtaining value from investment in new technologies. In this paper we describe organisations that achieve this goal as ‘intelligent exploiters’.

Western Health Care (WHC) is a healthcare group established in the Western USA for the benefit of its members. WHC has focused continuously on its mission - to deliver the best medical result at the lowest necessary cost.

To achieve this WHC has pioneered the science of medical informatics. This work, combined with quality management principles and reproducible methods, has led to the development of electronic systems that provide decision support for physicians.

WHC wishes to share widely the knowledge it has built up over the last 40 years. The third generation of WHC's award-winning systems is now being developed in partnership with a large healthcare IT company in the hope that this will make it possible for other healthcare organisations to replicate WHC's achievement of better care at lower cost.

2 The driver for this paper

A consistent problem that has been widely observed over the last 20 years is that a majority of managers across the world lack the understanding, knowledge and skills to benefit from modern information and communications technologies (ICT) (Earl 1998). The focus here is about 'C-level' jobs like Chief Executive, Chief Finance Officer, Chief Operating Officer (Strassmann 1990). Are these managers making decisions in technology and architecture on a popularity contest, or on business needs (Weill & Ross 2009)?

The problem is not the technology. It is relatively easy to implement technologies but difficult to get organisations to take up and use those technologies effectively (Orlikowski 2007).

We need well-informed business executives who take a strategic view about technology and the business and get maximum value from their ICT investments. This is strategic information management, which we regard as a prerequisite of top management (Strassmann 1994).

The potential of ICT is high and has been growing for twenty years. But the actual reality is of overall modest achievement. So there is a gap between the potential and the relatively disappointing view of actual achievement.

A few organisations are extracting business value from ICT (Weill & Ross 2009), but there are not many of them. We have dubbed such organisations as 'Intelligent Exploiters' of ICT. No Frills airlines like easyJet and Ryanair are obvious private sector examples. In the UK public sector notable examples would include the National Lottery, HM Revenue & Customs and Transport for London, a public sector organization which is responsible for all buses, main streets and the underground train system in London. Transport for London has implemented two very large and extremely successful ICT systems – OysterCard and Congestion Charging (Leape

2006). Many public authorities are looking to such systems as exemplars internationally.

But the UK public sector has an unenviable record of disastrous ICT projects (Cross 2005). Currently, there is increasing concern in the UK about the government's investment in ICT systems for the National Health Service (Heath, 2009A; 2009B). The UK National Audit Office has said that Connecting for Health, the electronic patient records programme, will not be completed until 2014, four years late, and is expected to cost £12.4 billion - substantially more than the original budget (Times Online; 6th July 2009).

This stark forecast prompted us to investigate whether or not the Intelligent Exploiter framework is an effective tool for highlighting the factors required for successful implementation of IT systems in the health sector.

3 Our research approach

We needed to examine in depth how relevant and appropriate the framework is to an organisation which is both technologically leading edge and nationally recognized for its achievements in achieving benefits from its IT.

President Obama has been citing Western HealthCare (WHC) as an exemplar whose executives kindly agreed to review the Intelligent Exploiter framework in the context of their organisation's noted success in this field.

In early 2009 we conducted extended, semi-structured and filmed interviews with 11 senior managers, clinicians, researchers and IT experts at WHC. Components of the framework were presented to each interviewee according to their particular sphere of expertise. They were then asked to comment on these in the context of the situation at IMC.

Transcriptions of the interviews were then analysed and responses about each component were collated. The findings are incorporated in section 6.

4 The solution: being an 'Intelligent Exploiter' organization

The modern business computer was introduced by Lyons Bakeries in November 1951 at Cadby Hall, London (Ferry 2004). There has never been any doubt since then of the importance of technology in all its forms, hardware, software and communications, both to individual businesses and to create the whole fabric of a modern economy.

Technology innovation, fuelled by advances in science as well as by inventors' ingenuity in coming up with new tools and applications, continues to advance at a remarkable pace.

Yet when it comes to harvesting the benefits of base technologies and of that stream of innovations, the picture is much less (Strassmann 1990). So we have a capability gap. Business management is often much less effective in that harvesting of benefits, than technology management in creating the potential for such benefits..

In our research programme now over more than two decades, we have become increasingly preoccupied with this gap, as have many others in research and consulting in particular. It is clear, from the hundreds of case studies that we have examined, what lies at the heart of the problem. Organisations of all types are even today still not geared up exploit the potential of IT (Green & Bate 2007). The term we have coined to summarise what is needed is "intelligent exploitation".

This term deliberately shifts the emphasis away from the technology itself onto the behaviour of the people involved with it both on the business side and on the IT side.

Our overall framework addressing intelligent exploitation has five components. These are concerned, respectively, with ICT Strategy, Information and Knowledge, Effective Systems, Roles and Skills, and Mindset. The first four components each constitute a conceptual model with supporting diagnostic tools. Each results from a tried and tested phase of our longitudinal research to ascertain how organizations can extract value from their investments in ICT.

The fifth component, Mindset, provides an integrating context that draws together the discrete components to create a holistic framework, as depicted in Figure 1.

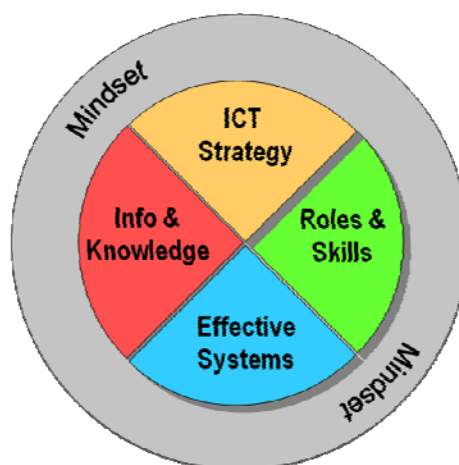


Figure 1. The overall framework developed

If one imagines this figure symbolically, as a childrens' toy, it would have four central sections made out of wood, held together by the mindset. We see organisations that are tackling the four core central components but do not have the mindset needed to hold them all together. An organization may have four of the five but without the appropriate mindset it cannot achieve the full benefits.

There is an overall logic to the framework. Each component has a distinctive shape. 'Effective Systems' is located to indicate that the input from this component is coming from the bottom up. Conversely, the ICT Strategy component works from the top down.

The five components of the Intelligent Exploiter framework have been developed discretely in the course of the authors' longitudinal research. For example, the Effective Systems model was originally derived in 1995 from analysis of a database of over 450 business-IT case studies. Each component has been repeatedly tested and refined in collaboration with client companies such as the corporate members of the IT Skills Forum 1995-98. The integration of the five components to create the Intelligent Exploiter framework has been tested by 160 mid-career executives in the UK each of whom has applied it to their employer organisation.

It is our belief that to obtain the desired and expected business benefits from ICT investments an organisation must embrace the concepts underlying each component. However, absolute excellence in all five components is not a pre-requisite for becoming an 'Intelligent Exploiter' organisation.

5 The evolution of Western Health Care's success

The first hospital in the group now comprising WHC was founded in 1905 in the west of the USA. By 1974 there were fifteen hospitals and the founders decided that this work was not central to its aims. Despite an offer reputedly for \$200m, the founders preferred to donate the hospital group as a secular and not-for-profit institution for the benefit of all citizens in the state.

By the mid 1980s WHC had added a health insurance arm and been joined by several more hospitals in the region. Today WHC has 30,000 employees at 22 hospitals with 800 employed physicians and provides services to 2,500 independent physicians at 120 clinics across two Western States. In June 2009, President Obama praised award-

winning WHC as a role model that US health reformers should follow (WHC, 2009A).

From inception the newly formed WHC pioneered medical informatics in collaboration with academics at the main state university with the goal of developing computer-based protocols for managing patients in controlled clinical trials (WHC, 2009B)

In the same period Dr J the head of medical informatics at WHC, was working with the statistician Professor Edwards Deming to see if his principles for quality management in manufacturing (Deming, 1993) could be applied in a medical context. By 1986 a combination of these initiatives resulted in the HELP system (Health Evaluation through Logical Processing) – a computer-based tool to record patient information and from this offer to guidance to the physician – and the first of several ‘protocols’ developed by pulmonary surgeon Dr M who has been at WHC since its formation. Dr M describes a protocol as ‘an instantiation of tacit medical knowledge made available in a reliable explicit form’. WHC’s protocols have delivered significant results. For example the Mechanical Ventilation protocol monitors heart-lung machine support for patients with life-threatening heart and lung failure and continually provides the physicians with instructions for care. The survival rate at WHC has increased from 10% to 70% and the method has worked equally well in trials in other States, and in Canada, Singapore and Milan.

However, two attempts in the late 1980s to develop HELP into an enterprise-wide management system for care delivery failed. Dr J and his team diagnosed that this was because it had been assumed that the system could use the same data for clinical care delivery as had been used for facilities management.

In 1996 the board of WHC authorised a third attempt to be made – starting with key process analysis and developing data around the process of clinical care delivery. The successful result – HELP 2 – has produced striking improvements in clinical outcomes on a broad scale, plus roughly \$100m in productivity enhancements.

In July 2009, WHC was named as one of the best hospitals in the US in the use of computer technology:

“For the tenth time in 11 years, Western Healthcare has been named one of the nation’s most technologically savvy hospital systems. Western is the only Utah healthcare provider to be named in this year’s 100 Most Wired hospital list by Hospitals & Health Networks, the Journal of the American Hospital Association.

“The study of more than 1,300 hospitals found that the nation’s 100 Most Wired hospitals show better outcomes in several key areas, including lower mortality rates and in adopting patient safety measure that lead to higher quality care.

“Western has been developing computerized medical systems since the 1970s. Four years ago Western launch a new venture with GE Healthcare to jointly create the next generation of medical information systems for hospitals.”
(WHC, 2009C)

What WHC has done is to couple management and business visions with their information and technology capabilities. It has taken forty years to develop their Electronic Medical Records system. It is so sophisticated that WHC is now partnering with GE so that they can fund ‘ECIS’ - the third generation of the HELP project - and share it for the public good.

How can WHC’s acknowledged success be explained when so many institutions and nations are striving for the same ‘holy grail’ ... and failing?

In the following section 4 we report on our testing of this belief in collaboration with eleven senior executives and clinicians at Western Health Care:

6 The Intelligent Exploiter framework

In the following sub-sections we describe the five dimensions of the framework and use WHC’s stated behavior in each context to help explain why and how WHC has successfully employed ICT to deliver better patient outcomes at lower cost.

6.1 Effective Systems

Investment in technology is often wasted. The whole process of design and implementation of systems is too frequently flawed, or applied inappropriately. The process needs to be considered over time, not just as meeting some specific one-off need. We summarise the need to apply coherent modern approaches to systems development as “effective systems”.

Our model here, developed progressively since 1998, is concerned with critical success factors (CSFs) for business information management. It relates two vital business ingredients - information and performance. To survive and prosper in the ‘Information Age’ an organisation must manage and exploit both internal and external information. And, in terms of business performance, its technical and managerial

capabilities will determine how it uses and manages ICT to take charge of this information.

Progress is made via four steps, with the CSFs being widened at each step. Most organisations have achieved the first step - deploying technology, such as computerised accounting systems, to deal more efficiently with internal information. Then the CSFs can be used to foster improved skills to use technology. This will start with employees and then extend to suppliers and, possibly, to customers.

“The costs of medical care in the state are the lowest in the US and much admired internationally. And for quality we are typically in the top two or three. Is it because of Information Systems? No; a lot of things have to happen – people have to change behaviour – but we could not have done it without Information Systems. It’s really about data and information getting this into best practices.” WHC’s Chief Information Officer

Once steps 1 and 2 are working well, the CSFs can be broadened to encompass external information about markets, customers and competitors to support action. This will enable the organisation to develop Business Intelligence. The final step – ‘Business Innovation’ – builds on the first three steps to enable the organisation to identify and manage risk while developing new products, services and markets that will ensure the organisation’s future.

“Getting from ‘action support’ to ‘business innovation’ means enabling the frontline worker to alter their workflow, and alter the tool that supports it, at the point of implementation. Having a central office to bring together all the experts to make policy is a good thing – but it can also create a disconnect between the policy and the frontline worker.”

WHC’s Head of Medical Informatics and a senior clinician

This journey is depicted in Figure 2 below.

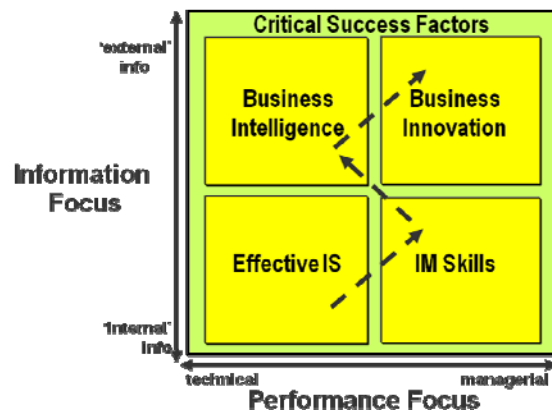


Figure 2. The style name for this kind of paragraph is "Figure title". The style for the figure is called "Figure". The title should always be placed below the figure.

“There’s no bridge from effective IT to business innovation. The sequence has to go through decision support and it takes time and effort. If it’s a focus of the organisation it might take five years.” WHC’s Vice President, Information Systems

In summary, if you don’t have effective systems, you can’t have the high level business benefits and you are wasting your time and money.

6.2 Information and Knowledge

Many of the publications on business information systems, for example in the trade and general business press, focus almost entirely on technologies and either accidentally or deliberately ignore the fundamental role of information and knowledge. The great irony of this is that the real benefits of ICT rarely if ever come from the investment in the technology alone. They come from the way in which technology allows data, information and knowledge processes to be redesigned and reconfigured. So “information and knowledge” need to put centre stage.

“The only reason for capturing information is to alter decision-making at some level – policy, admin, clinical. It is clearly valuable to organise and aggregate information. And if you make a system with the capability of managing the information to provide robust decision support it will likely be able to do everything else. But if you make a system capable of doing the financial management it is unlikely to be able to do decision support.”

WHC’s Head of Medical Research and a pulmonary surgeon

Data, information and knowledge are different states of the same thing – much as ice, water and steam are. They lie on a continuum - the ‘ladder of knowledge’.

“There’s significant effort at WHC to understand getting past data and information into the knowledge, and in defining the data dictionary. WHC has team of 30 medical informaticists defining knowledge – what it is, what it means, so that it’s common across disciplines. It’s not just a case of building knowledge repositories. The problem is making sure that, for example, a financial analyst understands what a doctor understands and that they understand what a ‘payer’ is providing. So we need to provide to them not just data and information but we need knowledge that talks about care. And then it has to translate into quality of care.”

WHC’s Chief Security Officer

BS1000M defines information as “The meaning that a human assigns to data by means of conventions used in their presentation” (British Standards Institution, 1996). But we observe that many business executives and, perhaps even worse, many IT professionals, lack a clear understanding of the concepts of data, information and knowledge. This is a serious barrier to obtaining benefits from ICT.

“Data is very unfashionable. People are interested in strategic information systems. The key aspects of data: discreet coded data - so you can access it quickly; data organised appropriately so it can be used rapidly – you don’t want a Decision Support System that takes five minutes to come up with an answer. You need instantaneous support and guidance. So we are spending literally years defining ‘clinical element models’ – pieces of data with a logical reason to be linked together. We’re very close to completing that process. It will be the underlying database for healthcare delivery.”

WHC’s Chief Information Officer

There are two types of knowledge. The first is explicit, which can be identified and written down, and the second is tacit, which remains private. The two most vital tasks in the modern enterprise are to speed up the creation of new knowledge and accelerate the sharing of knowledge within and across communities. Although this is so important it tends to be neglected.

“How can we make the transfer from data to information to knowledge more efficient? It’s so expensive to collect every bit of data for everybody who ever

might think of something. At WHC we've found efficiencies from the recursive step. How do we use the info to get better data? How do we use the knowledge to get better info? Without that feedback loop it's difficult to strategically invest in each step. And they get more and more expensive the farther up you go."

Information Architect at WHC

There are two broad types of data: hard and soft. Facts and figures are "hard". Opinions and judgements are "soft". Historically IT has been preoccupied with processing hard data - typically to convert it into hard information. Hard information is very important. Employees and suppliers must be paid accurately. Accounts need to be timely and accurate. However, almost all the difficult and important issues, especially those relating to customer service and to strategy, are heavily rooted in soft information.

"Key process analysis revealed that principles applied in manufacturing also worked in healthcare. 10 percent of clinical processes accounted for more than 90 percent of WHC work in care delivery. From the list, we developed a management system for care delivery. The first task: a data system."

WHC's Head of Medical Informatics and a senior clinician

We may have had an information technology revolution, but we still await the corresponding information revolution.

6.3 ICT Strategy

There has been considerable improvement in the alignment of IT strategies with business strategies, which have become increasingly essential as IT has moved from supporting narrow individual functions, towards meeting needs across organisational boundaries.

"To standardize, you start by deciding what you want your data model and schema to look like. Make sure it's designed in a way that's going to work for you. Then get people to put their data in it in a format that's all coded understandably. It works. But most people put together disparate applications and say 'work' ... and they don't. And then we spend billions trying to make them work together."

WHC's Chief Information Officer

This is about the positioning of ICT to secure business benefits, and is top down. Many businesses have a technology strategy, but they do not have strategy to link business with technology.

“WHC spends a lot on IT but the question of return on investment has hardly ever come up. We do something because it’s the right thing to do – to raise quality, to improve the patient care experience. And quality always lowers costs. We’re proving it on a daily basis. It’s so important to leverage the knowledge of WHC’s doctors.” WHC’s Chief Information Officer

The widespread rise in investment in communications, including telecommunications, means it is time to challenge the term ‘IT strategy’ and emphasise ‘ICT strategy’. This will ensure that the ‘C’ for communication becomes fully integrated into strategic business thinking in both a technological and a human sense.

“The more we can bring systems and support to the centre, the greater the economies of scale. We lock down a lot of things; a lot of disallowances for people to bring in their own tools. And that’s been a challenge and increasingly a challenge as we see all these new consumer devices that are network capable and that we believe are true productivity tools. They’re coming out of the consumer world; IT is behind.”

WHC’s Vice President, Information Systems

And it must accommodate the business potential of Web 2.0 and Broadband connectivity which are transforming the way that users interact with ICT in everyday life.

“As an experiment we set up a TeamSpace application on the web. It’s meant for the people and the people manage it themselves. We are getting incredible feedback: ‘this is just what we needed – something that’s in our control and purview’. And we’re getting very few support calls – which is helpful as well.”

WHC’s Vice President, Information Systems

We drawn on a specific ICT strategy model (Stace, Courtney & Holtham, 2005). This model pays homage to the original work by Miles and Snow in the field of Organizational strategy, structure, and process (Miles & Snow, 1978) and develops it in the context of the ICT domain. The result is an assessment tool to help an organization identify its behaviour regarding ICT adoption.

The model employs a typology of five behavioural characteristics exhibited by organizations in regard to the adoption and implementation of technology. Here are short descriptors for each type.

ICT Prospector: Systematically seeks and selectively exploits relevant ICT trends to gain competitive advantage and enable entry into new markets. Willing to experiment with novel ICT.

ICT Defender: Carefully evaluates ICT investment for its efficiency orientation and applies ICT primarily to reduce costs and increase communication processes rather than for market creation. Control orientated and slow to innovate

ICT Analyser: Operates in two types of market domain: one relatively stable and focused on efficiency; the other where ICT plays an increasingly important role. Applies different rates of technological uptake in each. Viewed as a fast second mover.

ICT Reactor: An organization where technology is not seen as a strategic tool. Responds slowly to change; tends to view ICT applications as standalone tools.

ICT Heatseeker: Seizes upon ICT fashions instead of strategically analysing the best ICT fit for its business problems. An organisation whose structure is in constant flux, moving to frequent new initiatives before obtaining sustained business performance.

Arranging the types as axes of a circular graph produces a pentagon-shaped mapping area.

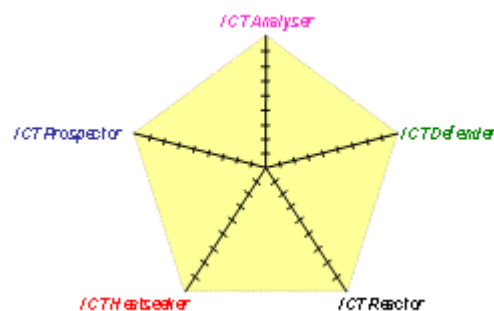


Figure 3. ICT Strategy Diagnostic “pentagon”

Organisations or their business units can characterise themselves by distributing, say, 25 ‘points’ across the types according to the exhibited level of presence of the described behaviour within the organization. This process defines a lozenge-shaped zone on the graph which, typically, is weighted towards one of the five characteristics. First a multi-disciplinary management team maps the current position,

then the situation that should be achieved in 3 years time. The result is a consensually-agreed commitment to move towards or away from particular characteristics.

Our discussions with WHC staff suggest the following analysis, in briefest summary, in terms of the five types of ICT Strategy.

Defender. No, because WHC's ICT strategy is not driven by ROI & WHC does not use universally available or easily replicable IT.

Analyser. No, because WHC has a 'single business' ethos and ICT is centralised.

Reactor. No, because WHC's many IS and applications are very integrated.

Heatseeker. No, because WHC lives by its long term vision and mission.

Prospector. Yes, because WHC is an organization which frequently gains benefits by applying ICT solutions to the business, within a culture of regular experimentation.

6.4 Roles and Skills

It is our view that some of the traditional ways of conceiving of "roles and skills" are insufficient to cope with the demands of an information and knowledge intensive society. We collated a database of over 450 case studies of business-IT implementation and found that the commonest reasons for failure lay with managers: giving themselves permission not to use the systems they required their staff to use; abrogation of responsibility for IT investment; lack of awareness of the capabilities of IT systems.

"WHC develops teams of analysts and data managers who live on the clinical side of the line with database architects on the other side – complementary set of skills. It's frustrating when IT folks think they can rush in on the clinical side – when they do, it doesn't work very well. They can't envision the problem they are trying to solve."

WHC's Head of
Medical Informatics and a senior clinician

We can consider three clusters of roles/skills. Firstly there are general managers, including end users of all types. Secondly there are the IT professionals, representing a huge variety of different sub-disciplines. Thirdly there are the information/knowledge professionals. These roles and skills are independent of who actually employs the professionals in particular. It is just as important to be concerned with the roles and skills of outsourcing providers as of in-house staff.

Each of the three clusters has a more strategic and a more operational role. For the general managers, the strategic role is the “business sponsor”, with the “user” being those directly involved in, or managing, the final end usage. For the IT professionals, we call the strategic role the “IT architect” and the more operational role the “IT builder”. Here we draw explicitly on a parallel with building/construction roles and IT roles. For the information and knowledge professionals there are again two roles. We call the higher, strategic role the Chief Knowledge Officer. The operational role we call the “information resources manager”, responsible for coordinating and augmenting data and information for onward supply in particular to managers throughout the organisation.

In the late 1980s Earl observed that a new role was required to intermediate between managers and IT professionals (Earl, 1989). These ‘hybrid managers’ would be business managers with an enthusiasm to exploit the potential of IT and, vice versa, IT people with a desire to understand business.

“We’ve had tremendous success in having the ‘information professional’ role – neither technical nor clinical nor operational. But it frequently falls apart at the time of budget-building because there’s not a strong business case for the role – it’s hard to show that it generates direct revenue. At WHC that’s OK because we’d much rather see the values accrue to the frontline. That’s sustainable and yet you’ve got to have enough empowerment and trust from operations management that the info professional’s work is facilitating the frontline value.”

Information Architect at WHC

Despite the success of adopters like Esso and Severn Trent Water the rarity of people capable of being hybrid managers undermined this attractive idea. Instead, corporates turned to outsourcing and, in the process, some even lost entirely any in-house technical capability they had. In contrast, WHC has persevered with bringing in and developing the appropriate roles and people.

“I agree with that pyramid model whole-heartedly. Information professionals – that’s our medical informaticists. The clinical program structure is key at WHC. It allows our medical informaticists and information systems people access to a broader base of physicians to help in making decisions around

screen design, workflow and decision support protocols.”

WHC's Chief Information Officer

By the mid 1990s progressive organisations were recognising that to extract business benefit from ICT three domains had to be managed: information, technology and knowledge. New roles emerged: Chief Knowledge Officer, Chief Information Officer, Chief Technology Officer.

“Our IS organisation has a series of sub-committees containing advocates, technologists, subject matter experts and facilities managers to look at the important themes that run across all areas in the organisation. When a sub-committee brings up promising recommendations we convene an architecture review board which includes the CIO, his direct reports and representatives of all the major facilities. This board looks at costs, alternatives examined and rejected, implementation issues and so on. But we don't generally debate deep technical issues - a software architecture group guards the standards of the company.”

WHC's Chief Technology Officer

The skills of the roleholders are as likely to be in business as in IT; in either case, they must be the guardian of their organisation's IT strategy and continually scan the horizon for possible new IT-enabled business solutions. We characterize this role as 'Knowledge Navigator' – a role that mediates the gap between the skills of the general manager and those of the IT professional by bringing to bear the skills of the information professional to create a powerful and effective triad.

“Most of our informaticists are PhDs with medicine and IT combined. But we still have to supplement this with practicing doctors and PhDs who are researchers who understand process. It's really process and procedures and statistics so they can show us what's sound. And our objective from all of that is to come up with best possible medical outcomes at the lowest appropriate cost.”

WHC's Chief Security Officer



Figure 4. Roles and skills

6.5 Mindset

Our application of socio-technical models (Emery, 1969) has led us to choose eight key words that characterise business as a system when viewed from an information and knowledge perspective. These are: Organisation, Direction, Technology, People, Process, Culture, Information and Knowledge. And we use the metaphor of a woven material to depict the relationships and connections between them.

In our Knowledge Fabric the concealed ‘warp’ threads are Direction, Knowledge, Process and Culture. The ‘weft’ threads which are visible to all are Information, Technology, People and Organisation. The compacted weave presents an image at a point in time.

“Most organisations and other not-for-profits would be so focused on the financials - at Western there is an expectation that we will find a way. We live that ... and that’s the mindset that holds it all together. Anyone who does not share that value soon leaves. They will not be appreciated, they will not be successful. We will not like them; they will not like us. We are a charitable not-for-profit. We exist to serve the people of this State; that’s why we are here. Western is value driven and that’s why it’s fun to come to work every day.”

WHC’s Head of Research and a senior clinician

Top managers are not just responsible for individual threads. They are the designers and weavers of the overall fabric. The first aim of leadership is to create a strategy that will transform the fabric to an improved position in the future. Secondly, it is necessary to set in train practical actions that will bring about the transformation.

“At Western we talk of change happening one funeral at a time. When new physicians start arriving familiar with these social networking tools it won’t be possible to stave off the groundswell of change. We need to embrace it,

invite thought leaders from inside and outside of medicine and find out how to incorporate it.”

WHC's

Medical Director of Information Services

In evaluating the significance of the Knowledge Fabric with managers, we find that, typically, about three of the strands are strategically significant and inter-related at any one time. In organisations where knowledge is a key dimension, managers have frequently identified skills (people) and organisational culture as the key influences. Technology is invariably cited as a key enabler, but subservient to skills and culture.

“There is a sense among all employed physicians of Western that it's not about the IT, it's about the data and knowledge that the IT facilitates and the mindset to make it happen. It's nice to have this culture that has been building over decades because it influences people's willingness to participate in new initiatives. Having once innovated we must continue to innovate or we'll end up in the history of medical informatics rather than the future of it. We need to spend 80 per cent of the budget to get 80 per cent of the desired functionality. Then we have budget left for augmentation and user training.”

WHC's Medical Director of Information Services

Our most recent work has been concerned with the “managerial mindsets”, particularly those relating to attitudes to change in particular and, crucially, the ability to think systemically. Intelligent exploiters need to commit to personal learning on an ongoing basis, because the world of technology is itself continually changing as a result both of wholly new technologies, and dramatically changed assumptions and economics relating to existing technologies. Take photocopiers for example. We only use about 10 per cent of the available functionality. Most users haven't had any training and they don't read the manual. They also don't see a copier as a scanner and network printer. Their mindset is to think of it as a copier.

“The mindset at Western is one of the strengths. When we recruit an IT Professional – perhaps as a network engineer - we want someone who has the notion and the mindset that we are delivering healthcare. We're changing outcomes of severe medical conditions, of life-threatening events that have occurred. And that's not an electronic network, that's a delivery of information, of knowledge, of prompts and patient reminders that could save lives.”

WHC's Chief Security Officer

“WHC has always been about having very strong business and clinical governance, leadership and oversight into our IT activities – especially around information and knowledge management. Our CIO has integrated this governance to identify champions out there on the business side to really drive our efforts so it’s not IT trying to lead the horse.”

WHC’s Vice President, Information Systems

Most businesses don’t get to business innovation. They don’t have the expertise or the energy to reach the final stage.

“The mindset at Western is why we are successful with IT. Our charter is to not to cut the costs of systems but to build the very best systems to improve quality of care and process. And taking this approach has produced benefits on the cost side. Quality doesn’t cost more. As quality has gone up our costs have absolutely gone down.”

WHC’s Chief

Information Officer

7 Conclusions

In summary, there are five dimensions that need to be addressed to create the conditions for intelligent exploitation of ICT. An underpinning conceptual framework makes it vastly easier to achieve all five elements of the IE model. We observe that a key characteristic of intelligent exploiter organisations is that they tackle each area purposefully even if they do not excel in every one. The UK National Health Service (NHS) tackled the Effective Systems component with vigour. But by the time the initial leader left the other four dimensions had been relatively neglected. For ICT success you need to be good but not perfect in all five dimensions.

It is a case where the whole is greater than the sum of the parts. Strategic thinking needs to embrace communications as well as IT. The capability for implementing effective systems needs to be in place. There has to be a preoccupation with information and knowledge instead of technology. The full range of roles and skills needs to be addressed. And perhaps most urgently, managerial mindsets must be extended.

Considerable shifts in emphasis are needed if there is to be a closing of the capability gap between technology-led potential, and everyday reality.

In the UK, enormous investment in health information systems, including electronic medical records, for the NHS has been controversial and slow to deliver the expected benefits. However, WHC has shown that the intelligent exploitation of ICT will deliver improved patient outcomes at a cost that is lower than the national average. The NHS saw the task as implementing a computer system; WHC saw the task as using ICT to improve service to the customer.

What we have found particularly significant about WHC is the unusual and profound depth of understanding at senior levels about data, information and knowledge. This is on a widespread basis: among strategists, business unit managers and a range of senior ICT staff. The depth of thought about the core management values of the organisation is striking.

WHC is a mature organization that started to develop its information systems forty years ago. During the last fifteen years this has been supplemented with an intense focus on Total Quality Management which has become embodied and embedded in the culture of the organization and enabled WHC to learn from and evolve its efficiencies. Surgeons at WHC have very closely embraced Quality Management as the conceptual foundation for their ICT strategy. In turn, ICT is a vehicle for implementing their bus strategy – which is built around a deeply held belief in the value of medical data in context.

This ICT visioning was a by-product of the needs of TQM rather than an end in itself. WHC was succeeded in closely coupling their management and business visions with their information and technology implementations.

Our investigation has revealed a close match between the key factors in WHC's success in extracting value ICT and the core messages from the Intelligent Exploiter framework, and this provides some initial support for the validity of that framework.

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