



INFORMATION
TECHNOLOGY
FACULTY

MEASURING IT RETURNS

MAKING INFORMATION SYSTEMS WORK INITIATIVE



Making information systems work initiative

Measuring IT returns addresses the theme of value and is the first report to be published in *Making Information Systems Work*, the thought leadership programme of the IT Faculty of the Institute of Chartered Accountants in England and Wales (ICAEW).

New technology has transformed the way we interact with one another and do business. However, as the number of technology opportunities grows, so too do the challenges of successful implementation. The *Making Information Systems Work* programme considers these opportunities and challenges, engaging all sectors of the economy in the debate.

This initiative is not just about making technology work. It is about making technology work with the wider systems around us. In order to do this, information systems need to be based on:

- value: the economic case for IT investment;
- trust: a secure environment to transfer information; and
- standards: a sound technical basis for the exchange of information between parties.

Measuring IT returns considers the challenges faced by many businesses in applying financial analysis to IT investment opportunities. In doing so, it aims to help businesses apply such techniques more meaningfully, thereby improving decision making and implementation in practice.

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ICAEW's IT Faculty provides products and services to help its members make the best possible use of IT. It also represents chartered accountants' IT-related interests and expertise, contributes to IT-related public affairs and helps those in business to keep up to date with IT issues and developments. As an independent body, the IT Faculty is able to take a truly objective view and get past the hype surrounding IT, leading and shaping debate, challenging common assumptions and clarifying arguments.

We welcome views and other comments on this work and the other themes in this programme. For a copy of an abstract of this report or for further information, please email informationssystem@icaew.com or telephone +44 (0)20 7920 8538.

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Contents

Page

Table of figures and examples	iv
Executive summary	1
1. Rising to the challenge of IT value	7
1.1 Aims of this report	9
1.2 The economic importance of IT	9
1.3 Challenges in measurement	10
1.4 IT failures and sceptics	11
1.5 Our definition of the solution	13
1.6 Measurement overview	14
2. Developing a measurement regime	15
2.1 Appraising investment projects	17
2.2 Understanding the role of measurement	18
2.3 Measuring costs	20
2.4 Measuring financial benefits	22
2.5 Identifying indicators of value	23
2.6 Reporting process measures	24
3. Understanding the business	25
3.1 Business models	27
3.2 Investment appraisal and the business model	32
3.3 Information and businesses	33
3.4 IT and the economics of information	37
3.5 Creative destruction and IT	42
3.6 Impact of IT projects	43
4. Generating ideas for value creation	45
4.1 Acknowledging the investment context	47
4.2 Thinking about benefits	48
4.3 Creating new types of value	49
4.4 Improving the search process	52
4.5 Increasing efficiency	53
4.6 Improving control and governance	56
4.7 Removing operational constraints	56
4.8 Improving value propositions	59
4.9 Damaging competitors	61
5. Managing implementation	63
5.1 Research into management practices	65
5.2 Management challenges of IT	65
5.3 Managing risk and uncertainty	66
5.4 Transforming information systems	69
5.5 Making a business case	71
5.6 Achieving business change	74
6. Looking to the future	77
6.1 Improving measurement	79
6.2 Measurement regimes in practice	82
6.3 Outstanding research issues	84
6.4 Current research agenda	84
6.5 Next steps	86
Appendix – Questions about IT projects	89
Acknowledgements	90
Bibliography	91

Table of figures and examples

Page

Figures

Figure 1.1: Earning returns from IT	14
Figure 2.1: A measurement regime	19
Figure 3.1: Value exchanges with customers	28
Figure 3.2: Summary business model	28
Figure 3.3: Investment costs and financial benefits	32
Figure 3.4: Information in value exchanges	36
Figure 3.5: Information supply and demand curves	38
Figure 3.6: Impact of IT on information quantity	41
Figure 3.7: Creating value from IT projects	43

Examples

Example 2.1: Data sharing	21
Example 3.1: Costco business model	30
Example 4.1: Travel agencies and the internet	51
Example 4.2: Radio frequency identification technology	54
Example 4.3: Sabre system	55
Example 4.4: Amazon.com	57
Example 4.5: Wikipedia	59
Example 4.6: Electronic patient records	60
Example 4.7: Novell wiki	61
Example 4.8: Encyclopaedia Britannica	62
Example 5.1: Shinsei Bank	67
Example 5.2: ING	68
Example 5.3: Britannia Building Society	71
Example 5.4: Google	73
Example 5.5: Open source software	74
Example 5.6: City of Edinburgh Council	76
Example 6.1: Real options and software platforms	80
Example 6.2: Sears' employee customer profit chain	81
Example 6.3: Emissionstech balanced scorecard	83

Executive summary

Rising to the challenge of IT value

This report addresses the challenge of measuring returns from IT projects. It aims to help senior management better understand the business opportunities that IT presents and how to realise value from them.

IT is a major area of expenditure for businesses of all sizes and in all sectors across the world. Claims are made that it has brought new ways to deliver value, new ways to create value and even new types of value. Yet it is often unclear whether returns from IT justify the money spent. All too often, IT expenditure seems to be based on little more than a leap of faith or a fear of being left behind or a resigned acceptance that there is no alternative.

The need to understand the potential of IT to create value is particularly important during an economic downturn. Businesses which are confident enough to buck the trend and invest selectively in IT may be able to gain significant competitive advantage.

Continuing difficulties in measuring the value of IT have been evidenced down the years by:

- Robert Solow's so-called productivity paradox;
- firm level measures of IT spending which are of little use;
- limited internal reporting of IT investment returns;
- high profile IT project failures and overruns;
- cycles of hype and perceived underachievement; and
- Nicholas Carr's claim that IT doesn't matter.

This report focuses on the challenge of achieving financial returns from IT expenditure at the level of the individual business. Businesses prioritise potential investment projects using appraisal techniques based on cash projections. But there is a problem in applying these techniques to IT projects. It is difficult to isolate and predict IT project-related cash flows, particularly for financial benefits.

However, there are no radically different techniques which will overcome the problems typically experienced in the context of IT investments. Searching for new techniques ultimately risks missing the point of investment activity which is to generate positive net cash flow. Consequently, rather than looking for new investment appraisal techniques, the report looks at how businesses can apply existing techniques to better effect. This involves developing a measurement regime to anticipate and monitor the cash flow costs and benefits of IT projects. It does this by supporting three essential activities:

- understanding the business;
- generating ideas for value creation; and
- managing implementation.

We ground our ideas of IT value in mainstream thinking about how businesses generate positive cash flows and the role that information plays in this process. We put little focus on the technology itself. Rather, we aim to provide a common language in which IT specialists and the wider business community can discuss how IT can enhance the value a business offers to a range of parties. By linking measurement with three essential activities frequently undertaken in isolation, we can also develop a rich picture of the opportunities and challenges presented by IT.

While the report refers primarily to businesses, much of the analysis is applicable to organisations in the public and not-for-profit sectors. In addition, the focus on costs and benefits is consistent with a view that public policy and regulatory interventions to promote expenditure on IT need to be justified on the basis of the net benefits that they will deliver.

Developing a measurement regime

An investment represents the transformation of costs into financial benefits through the activities of the business. Investment appraisal techniques are designed to compare two sets of numbers for costs and financial benefits.

Investment appraisal techniques determine a return on investment (ROI) which summarises a project's net financial impact, indicates whether a project is worthwhile and allows it to be compared to other projects and ranked. The four principal techniques used in practice are: payback period; internal rate of return; net present value; and residual income.

Businesses applying any recognised technique need to develop a measurement regime to calculate the ROI earned from IT projects. A measurement regime helps to build a common understanding of investment opportunities and builds confidence across a business that it is spending resources wisely. It also provides a focus and discipline for management and, by building organisational commitment, it increases the likelihood of earning good returns.

However, while measurement is important, it is not an end in itself. What ultimately matters is the return a project achieves. The regime for predicting, tracking and validating such returns needs to be proportionate to the business and the IT projects involved. A measurement regime is also part of a wider accounting system and needs to fit with an organisation's systems for:

- setting targets and budgets;
- establishing individual performance accountability and incentives;
- determining hurdle rates of return and payback periods;
- allocating capital and sharing resources;
- centralising and delegating authority; and
- defining the relationship between the IT function and the rest of the business.

Against this background, an effective measurement regime will have certain common features related to the types of measures used and the measurement cycle of a project. A business can consider four types of measure when assessing returns from IT projects, namely costs, financial benefits, leading indicators, and process measures. Three phases of a project measurement cycle are setting expectations, tracking performance and validating results. Over these three phases, management will use measures of costs, financial benefits, leading indicators and processes in different ways.

The measurement of IT project costs is complicated by the need to pick up the full range of indirect and hidden non-IT costs that might arise. Financial benefits of IT projects are generally even harder to isolate and quantify because the process of transforming costs into financial benefits can be complex. In recognition of this, leading indicators are intended to be non-financial measures of improvements in the operations of a business or perceptions of its value which will ultimately lead to improved financial performance. The complex linkages between costs and financial benefits also call for strong management supported by appropriate process measures.

Understanding the business

Creating value through the use of IT depends on understanding the business which is undertaking the IT project. Analysis of this essential activity is underpinned by:

- a representation of business models in terms of value exchanges;
- the central role that information plays in explaining why any business exists;
- the impact of IT on information supply and demand within a business; and
- the potential of any technology for creative destruction.

Just as economic models are useful in explaining how economies work, so a business model represents an understanding of a business which is intended to show how it works. It simplifies complex relationships and dependencies to enable analysis and comparison. Because this report is concerned with how IT projects create value for a business, its presentation of business models focuses on how a business engages in exchanges to create value for different parties.

A business can be seen as existing in order to serve counterparties, including shareholders, lenders, customers, employees and suppliers. A business undertakes exchanges of value, providing each of its counterparties with something of value to them, and getting something of value to the business in return. Value can be exchanged in the form of cash or labour, products, services and other resources including information.

To survive with a sustainable business model, a business needs to maintain a set of relationships with counterparties which balances their interests and delivers value to all of them. A business also needs to monetise the value delivered to counterparties so that it does not run out of cash. Furthermore, the survival and success of a business are fundamentally affected by competition.

With regard to investment projects, a business needs to earn returns on the cash invested through suppliers and employees by generating cash from additional sales to customers and reduced payments to suppliers and employees. However, before this analysis is applied to IT projects, attention is drawn to three features of IT projects that make them special.

- Information is central to all businesses. It underpins why a business exists, what it does and how it provides value to counterparties. Information enables a business to communicate value propositions to potential counterparties and understand their needs. It enables a business to co-ordinate activities across different counterparties and thereby deliver value to all of them. Information also supports organisational knowledge and the ability to codify and share learning across a business or with counterparties.
- IT has a dramatic effect on the economics of information. Although information is pervasive within any business, its availability is limited because it is subject to the laws of supply and demand. There is a benefit to having information. But there is also a cost attached to the activities of collecting, storing, securing and communicating it. Therefore a business and its counterparties only have access to some of the information that could be available. However, IT has very significant effects on information supply and demand curves and the result is an information explosion.
- IT embodies technological change that has the power to unleash the 'creative destruction' written about by Joseph Schumpeter. Therefore any business should be aware that it could pay a heavy price if it does not exploit the value creating possibilities of IT to the full but its competitors do.

The overall effect is that all businesses need to bear in mind that they can earn returns on their investment in IT not only through revenues from information services and cost savings but also from information about value, information for co-ordination and information that codifies knowledge.

Generating ideas for value creation

Creating value through the use of IT depends on generating ideas for value-creating projects. Analysis of this essential activity is underpinned by:

- a proposal that businesses actively seek to maximise value even from projects that they apparently have to do;
- a clear understanding of the central role that information plays in all businesses; and
- a framework for thinking about the benefits of applying IT to information that represents a new service, communicates value, supports co-ordination or codifies knowledge.

The aim is to promote confidence in the value of IT projects by basing IT expenditure on more than a leap of faith, a fear of being left behind or a resigned acceptance that there is no alternative. It is also important to provide substance to back up claims that IT brings new ways to deliver value, new ways to create value and even new types of value. Whether a business is in a period of growth, stability or retrenchment, it will benefit from clear thinking about how IT projects can deliver value.

Some IT projects appear to involve little choice. There can be compliance or regulatory reasons for making IT investments. Hardware or software may no longer work and so need to be replaced. There could be compelling non-technical reasons for making an investment such as uneconomic manual workarounds or the control problems associated with old systems. Other projects are seen as reactions to outside events aimed at tactical rather than long-term strategic advantage.

While many IT projects will appear to suggest themselves, it is proposed that businesses develop a more active and benefits-led approach to IT investments. This means looking for value opportunities in all projects and also generating ideas for projects by starting with benefits the business would like to achieve and assessing how to achieve them at minimum cost through IT. A business is likely to increase its chances of success by developing a clear structure to identify benefits. Six main types of benefits which may be achieved through the effective implementation of IT systems are presented with supporting examples.

Investment in IT can create value by:

- creating new types of value because IT is applied to information that will support new information services, encourage new information intermediaries and enable users to create their own value;
- improving the search process because IT provides information on value that will reduce search costs, provide access to new markets and improve supplementary information that is available from new sources in the marketplace;
- increasing efficiency because IT is applied to information for co-ordination that will reduce the cost of information-related activities, improve co-ordination through more accurate information, automate and improve decisions, reduce the need for physical assets and improve processes through knowledge sharing;
- improving control and governance because IT provides information for co-ordination that will reduce the risk of error and improve visibility of operations;
- removing operational constraints because IT provides information for co-ordination that will handle an increased volume of counterparties, enable outsourcing to suppliers, support global operations, encourage collaboration and create organisational flexibility; and
- improving value propositions because IT provides knowledge that will give better understanding of counterparty demands, enhance counterparty experiences and strengthen innovation through knowledge sharing.

The power of these benefits is also demonstrated by their ability to damage competitors through new competition, network effects and destruction of value propositions.

Managing implementation

Creating value through the use of IT depends on managing the implementation of IT projects. Analysis of this essential activity is underpinned by a recognition that the association of specific management practices with successful outcomes is helpful but does not establish cause and effect.

Despite all the opportunities there are for businesses to create value through IT and a wealth of documented project management practices, achieving demonstrable benefits remains stubbornly difficult for many businesses. Four major implementation challenges are discussed. For each of the challenges, management techniques drawn from a wide range of literature are outlined and illustrated.

First, managing risk and uncertainty is complicated by the difficulty of predicting how counterparties and competitors will react to changes in information flows. Here it may help to:

- apply options thinking to recognise the value of waiting and delaying irreversible commitments;
- recognise path dependency to focus on simplicity, openness and flexibility and maximise future choice;
- adopt a portfolio approach to balance the risk and reward profile of IT projects; and
- maintain strategic focus in the risk management activities associated with specific projects.

Second, transforming information systems is complicated by the fact that businesses already have their information systems configured to their current ways of operating and changing them can require significant effort. Here it may help to:

- encourage radical thinking by allocating time to trying out new ideas;
- map information flows outside traditional accounting areas so that current ways of operating are better understood; and
- commit to business change so that IT projects are seen as being about people not just technology.

Third, making a business case for IT projects is complicated by the frequent difficulty of articulating the base case and anticipating the monetisation of benefits without which an IT project will deliver little value. Here it may help to:

- explain the base case of doing nothing in an outward facing way that considers the actions of competitors and considers different scenarios; and
- understand monetisation and explore what is known about different approaches that the business might take to generating cash from new IT-driven processes.

Fourth, achieving the broader business change that comes with IT projects is complicated by the need to manage the demand for resources across a business. Here it may help to:

- formalise IT decision-making by drawing on the emerging practice of IT governance;
- establish IT reporting structures, for example choosing whether the IT function is a service provider or a business partner; and
- manage benefits starting with the identification of specific registers of anticipated IT project benefits.

Nevertheless, the complexity of many IT projects means that successful implementation will continue to be demanding and frequently elusive.

Looking to the future

We identify a number of steps that management can consider to support the development and improvement of measurement regimes for IT projects. In particular:

- when measuring costs, there is scope to improve records of expenditure on previous projects based on post-implementation reviews;
- when measuring financial benefits, there is scope to use real options thinking to mitigate the problems of trying to predict the ultimate consequences of decisions which can be deferred until more information is available;
- when identifying leading indicators, there is scope to make better use of business models and bring together knowledge that is widely dispersed throughout the business; and
- when reporting process measures, there is scope to link these to the financial evaluation of risk and return and incentive systems designed to encourage particular behaviours.

However, if confidence in IT returns is to improve, then more needs to be done. Although there is some strong research into measurement regimes that contain a wide range of measures, it appears to be particularly difficult to share and transfer learning and there are a number of barriers to the type of research which may help businesses improve their performance.

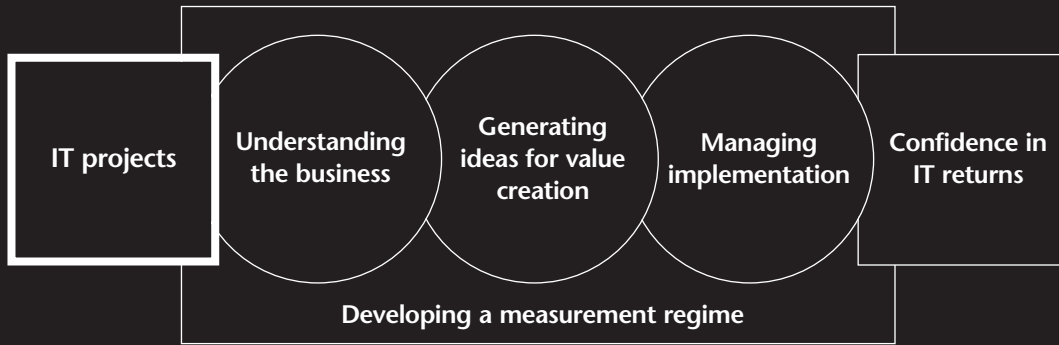
Case studies, in particular, can highlight practices which have helped specific businesses but the time and resources required to perform case studies present significant challenges. Furthermore, the data supporting case studies are typically not publicly available and, as a result, little challenge or critique of such studies is possible, reducing their perceived credibility and the validity of their conclusions.

Given the importance of IT investment to the success of businesses and the wider economy, there is a need for further learning through a range of interdisciplinary academic research, continuing debate and sharing of knowledge and experience. Repeated project failures cannot be attributed simply to poor management. Achieving value from IT projects is a major and difficult endeavour which demands serious analysis.

While we highlight a number of possible management practices to address specific challenges of IT projects, we do not promote any single approach. Different businesses will develop different approaches based on their specific needs and we aim to provide opportunities for all ideas to be freely discussed. To help encourage this, research questions are presented around the four main themes of this report: developing a measurement regime; understanding the business; generating ideas for value creation; and managing implementation.

1. RISING TO THE CHALLENGE OF IT VALUE

Information technology (IT) provides many opportunities to create value for businesses. However, problems in measurement can undermine confidence in the value of IT projects and reduce management's ability to deliver value in practice. Addressing these problems can therefore directly impact the ability of a business to benefit from IT.



Summary

This report addresses the challenge of measuring returns from IT projects. It aims to help senior management better understand the business opportunities that IT presents and how to realise value from them.

IT is a major area of expenditure for businesses of all sizes and in all sectors across the world. Claims are made that it has brought new ways to deliver value, new ways to create value and even new types of value. Yet it is often unclear whether returns from IT justify the money spent. All too often, IT expenditure seems to be based on little more than a leap of faith or a fear of being left behind or a resigned acceptance that there is no alternative.

The need to understand the potential of IT to create value is particularly important during an economic downturn. Businesses which are confident enough to buck the trend and invest selectively in IT may be able to gain significant competitive advantage.

Continuing difficulties in measuring the value of IT have been evidenced down the years by:

- Robert Solow's so-called productivity paradox;
- firm level measures of IT spending which are of little use;
- limited internal reporting of IT investment returns;
- high profile IT project failures and overruns;
- cycles of hype and perceived underachievement; and
- Nicholas Carr's claim that IT doesn't matter.

This report focuses on the challenge of achieving financial returns from IT expenditure at the level of the individual business. Businesses prioritise potential investment projects using appraisal techniques based on cash projections. But there is a problem in applying these techniques to IT projects. It is difficult to isolate and predict IT project-related cash flows, particularly for financial benefits.

However, there are no radically different techniques which will overcome the problems typically experienced in the context of IT investments. Searching for new techniques ultimately risks missing the point of investment activity which is to generate positive net cash flow. Consequently, rather than looking for new investment appraisal techniques, the report looks at how businesses can apply existing techniques to better effect. This involves developing a measurement regime to anticipate and monitor the cash flow costs and benefits of IT projects. It does this by supporting three essential activities:

- understanding the business;
- generating ideas for value creation; and
- managing implementation.

We ground our ideas of IT value in mainstream thinking about how businesses generate positive cash flows and the role that information plays in this process. We put little focus on the technology itself. Rather, we aim to provide a common language in which IT specialists and the wider business community can discuss how IT can enhance the value a business offers to a range of parties. By linking measurement with three essential activities frequently undertaken in isolation, we can also develop a rich picture of the opportunities and challenges presented by IT.

While the report refers primarily to businesses, much of the analysis is applicable to organisations in the public and not-for-profit sectors. In addition, the focus on costs and benefits is consistent with a view that public policy and regulatory interventions to promote expenditure on IT need to be justified on the basis of the net benefits that they will deliver.

1.1 Aims of this report

Measurement enables a business to identify, compare and prioritise potential IT projects. It can bring discipline to the execution of IT projects and help management focus on earning returns. Measurement can also generate shared understanding across a business of the value of IT initiatives, thereby building organisational commitment to their success. With IT projects, however, there appears to be a problem with applying measurement techniques effectively.

This report therefore addresses the challenge of measuring returns from IT projects with two principal aims in mind:

- to help senior management improve performance by better understanding the business opportunities that IT presents and practical issues in realising value from them; and
- to stimulate research and learning by identifying key questions about how businesses create value through IT.

1.2 The economic importance of IT

IT expenditure has become a major component of developed and developing economies across the world. Worldwide spending on IT and communications is estimated to top \$3.4 trillion in 2008.¹ Spending purely on IT operations constitutes on average 1.5% of a company's revenue, and this can increase significantly in IT-intensive industry sectors.² IT typically represents a major area of capital expenditure in businesses of all sizes.

Investment in IT has provided tremendous opportunities for businesses to operate on a scale and in a manner that was not previously possible. Globalisation has been assisted by new IT systems and communications networks, and the ability to outsource and offshore an increasingly wide range of work has fundamentally changed many businesses and whole economies. Supporters would claim that IT has brought new ways to deliver value, new ways to create value and even new types of value.

Furthermore, these opportunities have inspired the public sector in many countries to undertake major reform based on new IT systems. The Transformational Government programme in the UK has set out an ambitious agenda of modernising public services using technology, joining up services, increasing efficiency and improving services for citizens. To support this, IT expenditure in 2006/7 in the UK public sector exceeded £13.2bn,³ about 2% of public spending. In the US, IT investments by the federal government were set to reach \$64bn in 2007.⁴

Individual consumers and citizens have also seen new systems and devices transform their lives, from the way they work to the way they spend their leisure time. IT systems have radically changed how individuals interact with businesses, how they purchase goods and services and how they communicate and socialise with one another.

However, it is often unclear whether returns from IT justify the money spent. All too often, IT expenditure seems to be based on a leap of faith that new technology will improve the way that things are done, or a fear of being left behind, or a resigned acceptance that there is no alternative. This raises significant public policy questions about the allocation of resources and whether they are being deployed in the most efficient and worthwhile manner, both in the private and the public sectors. Without greater clarity about how IT creates value, it is difficult to address these questions with much confidence.

The need to understand the potential of IT to create value is particularly important during an economic downturn, such as that which began in 2008. IT projects are vulnerable to indiscriminate cutting if their value is unclear and there is reduced pressure to spend just to keep up with others. Businesses which are confident enough to buck the trend and invest selectively in IT may be able to gain significant competitive advantage.

¹ Gartner Inc, 'Gartner Says Worldwide IT Spending on Pace to Surpass \$3.4 trillion in 2008', press release 18 August 2008.

² Computer Economics, *IT Spending, Staff and Technology Trends 2008/2009*.

³ HM Government, *Transformational Government Annual Report 2007*, available at http://www.cio.gov.uk/transformational_government/annual_report2007/html.asp.

⁴ United States Government Accountability Office, 'Information Technology; Improvements Needed To More Accurately Identify And Better Oversee Risky Projects Totaling Billions Of Dollars: Statement Of David A. Powner, Director', *Information Technology Management Issues*, GAO-06-1099T, 7 September, 2006.

1.3 Challenges in measurement

There are continuing difficulties in measuring the value of IT. Ever since widespread implementation of IT systems began, questions have been raised about their economic value and researchers have looked for evidence.

1.3.1 Macro-economic level

An economy grows by increasing outputs. This can be done in one of two ways; by increasing the inputs to the economy or by improving the ratio between inputs and outputs so as to increase outputs. The latter represents improved productivity.

In the 1980s, Nobel award-winning economist Robert Solow observed that 'he could see the computer age everywhere except in the productivity figures'.⁵ In other words, although many businesses had invested substantial amounts in new computers, there was no discernible impact on a key indicator of economic performance. This disparity became known as Solow's productivity paradox.

In a study which summarised the evidence gathered since Solow's observation, the OECD⁶ highlights possible problems in measurement, such as inadequate government data to enable identification of IT investment, as a partial explanation for the paradox. Many early studies were based on data from individual firms, and may not have been representative of the economy as a whole. However, the study goes on to summarise a wide range of research which demonstrates the contribution made by IT to the economic growth of the 1990s, particularly in the US.

Dale Jorgenson and Khuong Vu, for example, directed their analysis at GDP growth in various countries and provided evidence that IT investments have contributed significantly, albeit primarily through increases in inputs to the economy.⁷ Erik Brynjolfsson and Lorin Hitt, by contrast, looked at firm level data and concluded that IT investment contributed to increases in output and productivity across a wide range of firms.⁸ However, they also found that substantial productivity improvements occur in line with investments related to IT and over a long period, not in the short term. Therefore, the timing of costs and benefits can differ significantly, with a time lag before benefits are seen.

There has also been significant research on the extent to which announcements of IT investment impact the market value of firms.⁹ This research has shown positive correlations, reflecting a belief amongst market analysts that IT investments will result in improved financial performance. However, the belief in such improvements is limited to transformational investments rather than investments that merely automate processes or provide information to management, as any benefits in these cases are unlikely to give sustainable competitive advantage.

In summary, there is now substantial evidence rebutting the productivity paradox, and demonstrating a correlation between IT investment and improved economic performance. However, this evidence also suggests that achieving significant productivity gains at a firm level remains a challenge, that value is achieved in many ways and that benefits are dependent on many factors.¹⁰ The contingent nature of the value of IT spending is highlighted by recent evidence that IT's contribution to US productivity growth has been declining since 2001.¹¹

⁵ Robert Solow, 'We'd better watch out', *New York Times Book Review*, 12 July 1987 p36.

⁶ Dirk Pilat, 'The ICT Productivity Paradox: Insights from Micro Data', *OECD Economic Studies*, No.38, 2004/1.

⁷ Dale W. Jorgenson and Khuong Vu, 'Information Technology and the World Economy', *Scandinavian Journal of Economics*, 107(4), 2005, pp631–650.

⁸ Erik Brynjolfsson and Lorin Hitt, 'Computing Productivity: Firm level evidence', *The Review of Economics and Statistics*, 85(4), 2003, pp793–808.

⁹ Bruce Dehning, Vernon J. Richardson and Robert W. Zmud, 'The Value Relevance of Announcements of Transformational Information Technology Investments', *MIS Quarterly*, 27(4), 2003, pp637–656.

¹⁰ Rajiv Kohli and Varun Grover, 'Business Value of IT: An Essay on Expanding Research Directions to Keep up with the Times', *Journal of the Association for Information Systems*, 9(1), 2008, pp23–39.

¹¹ PricewaterhouseCoopers, *Why isn't IT spending creating more value?* 2008.

1.3.2 Firm level measures

Another measurement challenge relates to measuring the costs and benefits of a firm's spending on IT to enable comparisons to be made between firms. The financial measure which is most usually cited is IT expenditure as a percentage of revenues. Yet it is a problematic measure, with no standard definition of what constitutes IT expenditure.

A distinction can also be drawn between spending simply to keep a business going and genuine new investment. Understanding the balance between these two types of expenditure may be helpful in assessing the value that a business is achieving from its IT spend and promotes calls for more granular and detailed figures. However, as with overall IT expenditures, such figures suffer from a lack of standard definitions.

A lack of clear measures presents challenges to companies and stock market analysts in assessing the effectiveness of expenditure on IT in an individual firm, and in comparing firms. Given the amount of public and private money that is spent on IT, there is an argument for requiring greater disclosure of IT costs and greater standardisation in how IT costs are defined and analysed. Such information may be useful to markets in estimating future cash flows and holding managements to account, and announcements of transformational IT investments have been shown to be relevant to stock market values. Improved transparency may also provide opportunities for well-managed companies to distinguish themselves.

However, the challenge remains to find meaningful measures of the value created by IT, rather than just what is spent on IT. Expenditure figures can provide comfort that a business's spend on IT is in line with competitors. They can trigger questions when spending is out of line. However, they provide little insight into what returns are being earned from IT.

A business may have a high spend relative to competitors and get tremendous advantage through using IT effectively. Alternatively, costs could be high due to inefficiencies, with little value being realised. Likewise, comparatively low levels of expenditure could either reflect great efficiency or under-investment and missed opportunities. Analysis of IT expenditure may also alarm people if it shows that overwhelming proportions of IT budgets are devoted to maintenance and upkeep rather than enabling innovation in business processes and products. However, this would not prove that IT spending was not creating value.

In summary, while some industry leaders in IT usage are commonly identified, such as Wal-Mart, Dell and UPS, this is largely on the basis of anecdote and journalistic observation because, at the firm level, reported measures of spending are of little use and measures of value are virtually non-existent.

1.3.3 Project level measures

Businesses appear to find it particularly difficult to measure the returns achieved from specific IT projects and internal reporting is limited. For example, a survey of finance directors in 2006 indicated that only 40% of respondents measured how IT contributed to business goals.¹² That year, another survey of IT managers showed that 62% of respondents found it difficult to measure the return on IT investments.¹³ In an influential academic survey from 1998, over 80% of those surveyed had problems quantifying relevant benefits, and 65% had problems simply identifying benefits.¹⁴

1.4 IT failures and sceptics

Despite the transformational potential of IT, the evidence supporting IT's contribution to the economy and the anecdotal success of individual firms, in the public's mind, IT is frequently associated with failure and underachievement.

¹² Touchpaper Consultants, 'The role of Key Performance Indicators in managing the contribution of IT to business success', 2006.

¹³ CIO Insight, 'Survey: What's the Value of IT? At Many Companies, It's Just Guesswork', July 2006.

¹⁴ Joan Ballantine and Stephanie Stray, 'Financial appraisal and the IS/IT investment decision making process', *Journal of Information Technology*, 13(1), 1998, pp3–14.

1.4.1 Project failures

IT offers many potential benefits to businesses and it would be possible to cite many IT projects, in both the private and public sectors, which are highly successful and have delivered significant and visible benefits to businesses, consumers and citizens. However, it has been far from straightforward for organisations to implement IT systems successfully in practice and realise identifiable benefits. Despite a wealth of literature on best practice IT project management, there continues to be a regular stream of IT disaster stories.

There have been many high profile failures, especially in the public sector, with budgets and time frames exceeded and functionality not delivered. For example, in the UK, reforms to the child support scheme, underpinned by a new IT system, cost £539m. The IT contract itself was £381m and yet the system had over 500 defects more than three years after it was delivered.¹⁵ Another system for the Department of Work and Pensions, the Central Payments System, was estimated to be 70% over budget and was expected to be completed four years behind schedule.¹⁶ In the US, of the 2007 federal IT investment budget of \$64bn, approximately \$12bn was identified with projects that were not planned or performing well.

Of course, fiascos are not unique to IT. There are large-scale engineering projects which visibly run over budget or fail to live up to expectations. The level of IT project failures however represents a substantial waste of resources. This is exacerbated, where public money is involved, by difficulties in establishing why things went wrong, who was responsible and what has been learned to prevent the recurrence of similar problems. The resulting lack of confidence in the value of IT, and cynicism around major IT projects, could lead to new opportunities being missed.

1.4.2 Hype and bubbles

As is frequently the case with new technology, IT has been the victim of many cycles of hype and perceived underachievement. While many individual applications have been the subject of such hype, the dotcom bubble provides the best ammunition for sceptics of the economic value of IT.

The initial public offering (IPO) of Netscape.com in 1995 was an early example of the dotcom boom. Netscape developed the most popular internet browser of its time and gave it away free. The company never made a profit and, at the time of the IPO, could not predict when it would do so. Nevertheless, its issue price valued the company at more than a billion dollars, and at the end of the first day of trading the market value was \$2.2bn.

A host of companies followed suit, with similar high valuations despite an absence of profits or other measures of financial success, such as revenue or positive cash flow. Rather, the emphasis was on building large user numbers, with an assumption that revenues would follow, once the company was established as the market leader in its area.¹⁷ As has been well documented, this was a flawed assumption and was not sustainable. Although a small number of dotcom companies survived and flourished in subsequent years, the market crashed in early 2000, with most of the companies involved going out of business, and investors losing all their investment.

It is possible to note that bubbles of this kind have been seen with many types of new technology. Indeed, Karl Marx summarised his observations of 'the great difference in the cost of the first model of a new machine and that of its reproduction' and 'the far greater cost of operating an establishment based on a new innovation as compared to later establishments' with the blunt observation 'trail-blazers generally go bankrupt'.¹⁸ However, confidence in the economic worth of IT was severely compromised by the dotcom bubble and we should expect future developments in IT to lead to similar phenomena.

¹⁵ House of Commons Committee of Public Accounts, *Child Support Agency: Implementation of the Child Support Reforms*, Thirty-seventh Report of Session 2006–07, HC 812. London: The Stationery Office Limited.

¹⁶ Parliamentary written answer to question tabled by Vince Cable made on 5 March 2008.

¹⁷ William Forbes, *The Boys in the Bubble: Searching for Intangible Value in Internet Stocks*, Edinburgh: ICAS, 2008.

¹⁸ Karl Marx, *Capital: A Critique of Political Economy, Vol III, The Process of Capitalist Production as a Whole*, Part I.V.V, first published 1894.

1.4.3 IT doesn't matter?

It was in the post-dotcom bubble climate of 2003 that Nicholas Carr wrote 'IT Doesn't Matter'.¹⁹ Carr attracted attention by questioning the strategic role of IT in businesses. In his article, he asserted that IT had become so ubiquitous and freely available to all businesses, that, like the supply of electricity, it could not give a business a sustainable competitive advantage.

This viewpoint resonated in a time of economic slowdown, following the heightened investment of the 1990s which had apparently created little economic value. As a result, many businesses cut IT budgets and reduced investment. Carr declared that the IT infrastructure, like the railroad network in the US, had been built and that now businesses simply had to spend money on IT, like any other utility, in order to keep operating. As such, the role of IT managers was to minimise spending, follow trends, avoid taking risks and focus on minimising vulnerabilities to the interruption of IT availability.

Continued investment in, and reinvention of, IT infrastructure, notably through the 'cloud'²⁰ might cast doubt on Carr's railroad analogy and Carr's wider argument has been challenged by many commentators. They have typically argued that it is not the technology itself that gives competitive advantage. The way IT is implemented and combined with complementary resources within a business can provide sustainable advantage over competitors. Such arguments will be developed later in this report.

1.5 Our definition of the solution

This report focuses on the challenge of achieving financial returns from IT expenditure at the level of the individual business. It is crucial for any business to have a means of prioritising potential IT-related projects on the basis of their contribution to its success. Businesses typically use investment appraisal techniques to address such issues. All these techniques are based on projections of two financial measures: cash that comes into the business and cash that the business pays out. These tools structure management's thinking around the costs and financial benefits of an investment and enable comparison and prioritisation between competing projects on the basis of their net returns.

From the evidence cited earlier, it is clear that in this regard there is a genuine problem with IT. Financial measurement is difficult to apply in the context of IT-related projects. In particular, financial benefits can be problematical to isolate and predict, reducing the practical utility of investment appraisal techniques. The problem is not that the techniques are inadequate and need to be replaced. There are no new radically different techniques which can be developed to evaluate IT projects. Existing techniques capture the goal of any investment, namely positive returns rooted in positive net cash flow. Searching for new techniques ultimately risks missing the point of investment activity.

Moreover, a clear focus on the net cash effects of IT-related expenditure makes it clear that there is no particular need to distinguish between IT investment or capital expenditure on the one hand and IT running costs or revenue expenditure on the other. In this report we will often, for reasons of convenience, refer simply to IT investment, as this is the simplest level of analysis. All expenditure, though, can be ultimately traced back to a value-based decision which was made at some point.

Instead of looking for new techniques for investment appraisal, this report looks for ways in which businesses can better understand the potential cash flow costs and benefits of IT projects so that they can apply existing techniques to better effect and ultimately earn better returns from their IT spending.

Our focus on costs and benefits also provides a basis for recognising broader public policy reasons for investment in IT systems in the public and not-for-profit sectors, such as social inclusion and improved delivery of services. Regulators also may push businesses to make IT investments on public interest grounds. The mandating of XBRL technology for regulatory filings calls for investment which may not look rational or optimal from the standpoint of an individual business.²¹ However, cases for public policy and regulatory interventions to promote expenditure on IT need to be justified on the basis of the net benefits they will deliver.

¹⁹ Nicholas G. Carr, 'IT Doesn't Matter', *Harvard Business Review*, 81(5), 2003, pp41–49.

²⁰ 'Let it rise: A special report on corporate IT', *The Economist*, 25 October 2008.

²¹ ICAEW, *Digital Reporting: A Progress Report*, London: Institute of Chartered Accountants in England and Wales, 2004.

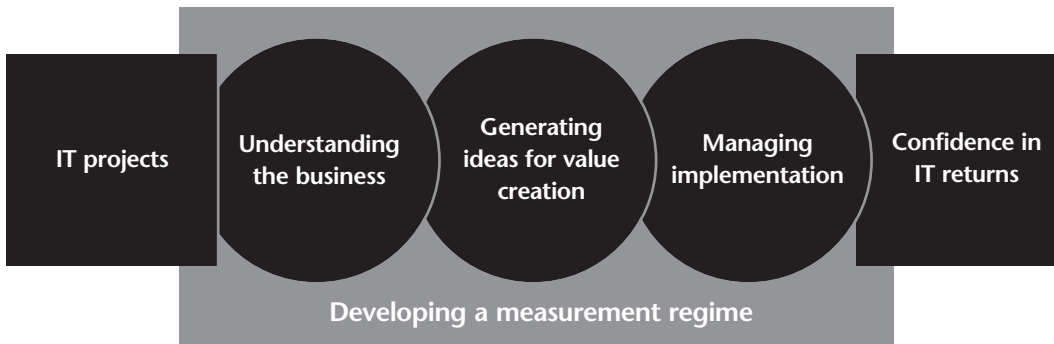
1.6 Measurement overview

For a business to manage IT value effectively, it needs to anticipate and monitor the financial costs and benefits of IT expenditure and this is a significant challenge in many IT projects. To do this, a business needs to understand the nature of the benefits and how they will be achieved. This report therefore analyses the possible benefits of IT projects and the challenges of achieving them in practice, presenting a number of analytical frameworks to help management to structure their thinking.

In particular, we ground our ideas of IT value in mainstream thinking about how businesses generate positive cash flow and the role that information plays in this process. We put little focus on the technology itself. Rather, we aim to provide a common language in which IT specialists and the wider business community can discuss how IT can enhance the value a business offers to a range of parties.

We begin our analysis in Chapter 2 by identifying the types of measures that help businesses have confidence that they are earning returns from IT projects. Having looked at what is involved in developing an effective measurement regime, we go on to look at three essential activities that such a regime should support. By linking measurement with these essential activities that are frequently undertaken in isolation, we can also develop a rich picture of the opportunities and challenges presented by IT. Figure 1.1 summarises the resulting structure of the report.

Figure 1.1: Earning returns from IT



Our first essential activity is understanding the business, introduced in Chapter 3. We make use of business models to describe and analyse a business and how it creates value for a range of different parties. Central to our analysis is the idea that information is at the heart of any business and its business model and therefore the economic impacts of applying technology to information by implementing IT systems are profound.

We go on to consider how IT may bring benefits to individual businesses. In Chapter 4 we outline a structure for understanding the main types of IT benefits and generating ideas for value creation. This represents our second essential activity.

The third essential activity is managing implementation. In Chapter 5 we highlight specific management challenges of IT projects and some of the management practices that may be particularly relevant to delivering value from IT.

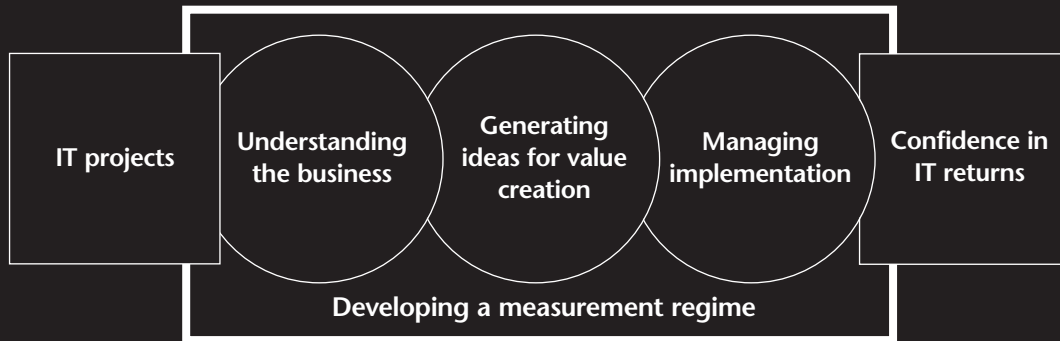
Finally, Chapter 6 looks at how measurement regimes for IT projects might develop in future in the light of our analysis and presents an example. It also sets an agenda for future work to develop understanding of how IT value measurement and management can be improved in practice.

In the appendix, we draw on the ideas we develop in this report to suggest some questions for management to ask themselves when they are considering an IT project. It is not a checklist, and does not address the technical aspects of an IT project or ongoing issues. Rather, it is intended to help management consider the management of an IT project and think through how it will help the business create value.

Throughout this report, we primarily refer to businesses rather than other types of organisation. The term 'business' is however used in its broadest sense and we think that much of our analysis is applicable to organisations in the public and not-for-profit sectors.

2. DEVELOPING A MEASUREMENT REGIME

A worthwhile investment project converts the cash spent by a business into financial benefits that exceed the costs involved. Applying a range of measures throughout this transformation process provides a focus and discipline for management and helps to build organisational commitment for projects based on a common understanding of their value.



Summary

An investment represents the transformation of costs into financial benefits through the activities of the business. Investment appraisal techniques are designed to compare two sets of numbers for costs and financial benefits.

Investment appraisal techniques determine a return on investment (ROI) which summarises a project's net financial impact, indicates whether a project is worthwhile and allows it to be compared to other projects and ranked. The four principal techniques used in practice are: payback period; internal rate of return; net present value; and residual income.

Businesses applying any recognised technique need to develop a measurement regime to calculate the ROI earned from IT projects. A measurement regime helps to build a common understanding of investment opportunities and builds confidence across a business that it is spending resources wisely. It also provides a focus and discipline for management and, by building organisational commitment, it increases the likelihood of earning good returns.

However, while measurement is important, it is not an end in itself. What ultimately matters is the return a project achieves. The regime for predicting, tracking and validating such returns needs to be proportionate to the business and the IT projects involved. A measurement regime is also part of a wider accounting system and needs to fit with an organisation's systems for:

- setting targets and budgets;
- establishing individual performance accountability and incentives;
- determining hurdle rates of return and payback periods;
- allocating capital and sharing resources;
- centralising and delegating authority; and
- defining the relationship between the IT function and the rest of the business.

Against this background, an effective measurement regime will have certain common features related to the types of measures used and the measurement cycle of a project. A business can consider four types of measure when assessing returns from IT projects, namely costs, financial benefits, leading indicators, and process measures. Three phases of a project measurement cycle are setting expectations, tracking performance and validating results. Over these three phases, management will use measures of costs, financial benefits, leading indicators and processes in different ways.

The measurement of IT project costs is complicated by the need to pick up the full range of indirect and hidden non-IT costs that might arise. Financial benefits of IT projects are generally even harder to isolate and quantify because the process of transforming costs into financial benefits can be complex. In recognition of this, leading indicators are intended to be non-financial measures of improvements in the operations of a business or perceptions of its value which will ultimately lead to improved financial performance. The complex linkages between costs and financial benefits also call for strong management supported by appropriate process measures.

2.1 Appraising investment projects

Businesses are faced with many alternative potential investment projects and need to know not just which ones are worthwhile but how to rank the worthwhile ones. Investment appraisal techniques compare the costs and financial benefits of a project to determine a return on investment (ROI) which summarises its net financial impact and allows it to be compared to other projects.

Surveys consistently show that in practice businesses use a wide range of techniques to calculate ROI and frequently they will use more than one technique.²² All techniques ultimately aim to measure improvements to cash flows net of the cash outlays required to achieve them but they do so in different ways.

They differ principally in the way that they aggregate cash flows occurring at different points in time. Below we present a summary of the four principal techniques used in practice but do not attempt to provide an explanation of how to apply each technique or an analysis of their advantages and disadvantages. Such matters are not the focus of this report and are well covered by other publications.²³

2.1.1 Payback period

The most basic technique simply compares the cost of a project with the expected improvements to cash flow on the basis of how long it takes for a business to recoup its costs and earn a positive return. Investment projects can be evaluated according to whether they satisfy a target payback period and can be ranked on the basis of the length of the payback period. No account is taken of cash flows after the payback period.

2.1.2 Net present value

Net present value (NPV) is a discounted cash flow (DCF) technique and is more sophisticated than payback techniques since it seeks to take account of all the cash flows associated with a project, not just those that occur up to the point when an initial outlay has been recovered. Because these cash flows may extend far into the future, all outflows and inflows are discounted to a present value to recognise the time value of money. Money today is worth more than money in the future. This preference is not dependent either on inflation reducing the real value of money or on the increased risk that money in the future may not ultimately materialise. However, both these factors might enter into the determination of an appropriate discount rate and increase the rate that is applied to future cash flows.

NPV is typically cited as representing best practice in investment appraisal. When the benefits of a project outweigh the costs, the project has a positive NPV and, in this sense, earns a positive return. Investment projects can be ranked and prioritised on the basis of the size of their NPVs. We briefly consider in Chapters 5 and 6 a more sophisticated variant on NPV which incorporates the value of options, not just cash inflows, as benefits.

2.1.3 Internal rate of return

The internal rate of return (IRR) is another DCF technique and is based on the same cash flow projections as NPV. The IRR represents the discount rate percentage at which the NPV of a project is equal to zero. On this basis, every project has a rate of return, even if it is negative. For decision-making purposes the IRR needs to be compared to a minimum hurdle rate of return set by a business. Projects that exceed a hurdle rate can be ranked and prioritised on the basis of the size of their IRRs

2.1.4 Residual income

Residual income is a further DCF technique and is a variant on NPV in which the discount rate used to calculate an NPV is the cost of capital of the business in question. It therefore focuses on whether a project shows a return in excess of the cost of capital of the business. Residual income is a more accurate measure of shareholder return than NPV. However, it is also a more complex technique as it requires the cost of capital to be estimated.

²² Patricia Ryan and Glenn Ryan, 'Capital Budgeting Practices of the Fortune 1000: How have things changed?', *Journal of Business and Management*, 8(4), 2002, pp355–364.

²³ IFAC, *Project Appraisal Using Discounted Cash Flow*, New York: International Federation of Accountants, 2008.

Where the profitability of a project is less than the cost of capital, shareholder value will be destroyed by undertaking the project and it would be better to do nothing. Where a project's profitability is greater than the cost of capital, it will generate an excess return or residual income and improve overall shareholder value. Investment projects can be ranked and prioritised on the basis of the size of their residual income.

2.2 Understanding the role of measurement

In the context of IT investment, businesses need to develop a measurement regime to calculate the ROI earned from a project based on any of the investment appraisal techniques we have described. Measurement plays an important role in delivering value from projects. The aim of any measurement regime is to provide a structured way of analysing and presenting practical business issues. By gaining general acceptance within an organisation, a measurement regime can confer legitimacy and authority on information, enabling it to be used for a range of purposes, including making decisions and holding people to account.

A measurement regime for investments, therefore, provides a repeatable and comparable process around which to build consensus and a common understanding of opportunities. The legitimacy derived from measurement can build confidence across a business that it is spending resources wisely. Moreover, it provides a focus and discipline for management when designing, evaluating and implementing projects and this increases the likelihood of earning good returns.

However, we recognise that a pragmatic approach is likely to be necessary in developing a useful measurement regime because:

- measurement, particularly in the context of IT investment, can be as much art as science;
- some measures are extremely difficult to define and apply, and understanding the linkages between measures can be very challenging;
- measures need to be reviewed and improved over time, as their impact and effectiveness become clearer;
- while measurement is an important discipline which underlies achieving value, it is not an end in itself, since all that ultimately matters is the return a project achieves, not how well it has been predicted, tracked and validated; and
- there is always the need for judgement and common sense to make sure that the measurement regime and its costs are proportionate to the business and the IT projects involved.

2.2.1 Organisational context

Any measurement regime for IT projects has to be part of a wider accounting system which meets a variety of internal and external needs, including external financial reporting requirements. It also needs to fit within a wider organisational context. These considerations influence the types of measures used by a business as well as the management processes which underpin them.

For example, most businesses use a system of targets to drive performance improvements. Target-setting may be incorporated into the budgeting process. Alternatively, or in addition, targets may be set to stretch management which are not formally budgeted. In many cases, targets will be linked to a performance management system, rewarding individuals for meeting or exceeding targets. While linking these elements can drive improved performance, it also raises a risk of gaming, or manipulating results to meet targets, and a business may look for ways to mitigate this risk.

Consequently, targets and budget-setting are important organisational factors which may affect the measures applied to investments. A business can link the benefits expected from investments into the budgeting and targeting process, for example, to reinforce the formal accountability of managers through incentives. However, the adoption of such practices varies considerably between different businesses.

There are also more general parameters which may impact the measurement regime for specific investments. The risk management of the wider business may dictate the level of risk that can be taken, and may be reflected in factors such as centrally determined hurdle rates and payback periods.

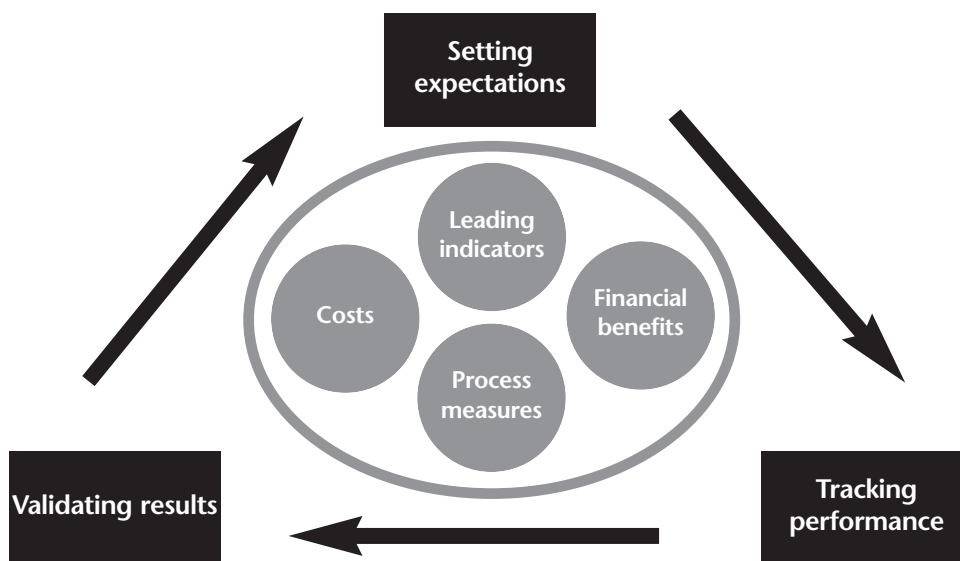
Moreover, every business will have its own approach to the allocation of capital and the sharing of resources across the organisation. Ideally, any approach would aim to optimise the allocation of capital and pursue the best opportunities open to the business. However, in larger organisations this frequently has to be balanced with other factors such as the benefits of delegation and decentralised decision making, as well as the need to mitigate the risk of gaming.

A business may take a centralised approach, for example, and approve investment opportunities which have the best potential ROI no matter where in the business they arise. However, in larger organisations, many investment decisions are taken at a divisional or functional level. There may be competition between units for resources. Alternatively, fixed amounts of capital may be made available which the relevant unit can spend on the basis of its own prioritisation of projects.

In the case of IT investments, the approach taken will also depend on governance structures and the relationship between the IT function and the rest of the business. Given the number of potential IT investment opportunities, capital is frequently capped and individual businesses or the IT function are left to prioritise their requirements on that basis. Furthermore, to provide incentives to the IT function to increase its operating efficiency, a business can cap the total amount it spends on IT, rather than capping IT investments. If the IT function can reduce its operating costs, it can make more cash available for investment.

Against the background provided by the organisational characteristics of an individual business, we propose that an effective measurement regime will have certain common features. These relate to the types of measures used and the measurement cycle of a project and are summarised in Figure 2.1 below.

Figure 2.1: A measurement regime



2.2.2 Types of measures

We highlight four types of measure which can be considered by a business in the assessment and delivery of returns from IT projects:

- costs;
- financial benefits;
- leading indicators; and
- process measures.

The specific measures used in any particular context are likely to vary depending on the business and the type of project. There is no single solution which fits all situations and therefore we present these measures simply as options which can supplement each other and provide a richer picture of an investment.

An investment represents the transformation of costs into financial benefits through the activities of the business. Therefore, any measurement regime for an investment is concerned with tracking this process and the two core components will be the costs and financial benefits. The comparison of these two sets of numbers determines a project's financial return or ROI and is reflected in any standard investment appraisal technique. The main challenge in this comparison is the prediction and measurement of financial benefits. In many cases, the transformation process from costs to financial benefits is complex and this makes financial improvements difficult to predict and problematical to attribute to specific initiatives.

Leading indicators address the challenge of anticipating and quantifying financial benefits. Such measures are non-financial in nature, and reflect improvements in the operations of the business or perceptions of its value which will ultimately lead to improved financial performance. Therefore, they mediate between costs and financial benefits and aim to capture specific points in a complex transformation process. The combination of these measures should enable a business to have a full picture of the return on an investment, and how costs will ultimately be translated into improved financial performance.

The complex linkages between costs and financial benefits are also likely to require good management if financial benefits are to be achieved. On this basis, there is a role for further appropriate measures that can support management in delivering value and we refer to these as process measures.

2.2.3 Measurement cycle

Figure 2.1 identifies three phases of a project measurement cycle which have different objectives. For any IT project, management needs to consider these different phases and the measures related to costs, financial benefits, leading indicators and processes that may be required over the lifecycle of an IT project:

- **Setting expectations:** here, measurement is providing an objective and comparable way of presenting potential costs and how they will be converted into benefits for the purposes of investment evaluation and decision making. Expected costs and financial benefits will be incorporated into the calculations of ROI required by the relevant investment appraisal technique.
- **Tracking performance:** measurement in this context provides information to assist management as the initiative is implemented. Comparing actual costs, process measures and leading indicators with expectations can focus management attention on issues that will need to be managed if expected benefits and value are to be achieved.
- **Validating results:** after the project is finished, it is useful to understand what has been achieved, to consider the realism of the original business case and ROI calculations, to hold management to account where failures have occurred, and to reward success. This phase is also a key component of organisational learning and should feed back into the expectations stage of the next comparable project.

The feedback loop shown in Figure 2.1 is particularly important to discourage people from gaming the system. Where managers are competing for resources, they are likely to present the best possible case for projects in order to gain approval. Without accountability for performance and results against original expectations, and the possibility of sanction in the event of failure, there may be few incentives to be realistic in the early stages of projects and to learn from experience. However, the evidence referred to in Chapter 1, as well as anecdotal evidence, suggests that few businesses formally apply this feedback loop to IT projects.

In the remainder of this chapter, we consider each of the four types of investment measures in the specific context of IT, outlining some reasons why it can be difficult to apply them effectively.

2.3 Measuring costs

Understanding the costs of an IT initiative is conceptually straightforward. A business spends cash through specific transactions and these can be predicted, tracked and managed. However, businesses seem to have particular difficulty in identifying and predicting the costs of IT initiatives.²⁴

²⁴ Frank Bannister, Patrick McCabe and Dan Remenyi, 'How much did we really pay for that? The awkward problem of information technology costs', *Electronic Journal of Information Systems Evaluation*, 5(1), Paper 1.

2.3.1 Identifying costs

The pure IT costs of an IT project should be easily identified. These are the costs incurred on hardware, software and external consultants, as well as internal IT resources. In addition, although so-called sunk costs which have already been incurred should be ignored, some costs of any shared IT infrastructure, including one-off and ongoing maintenance costs, may need to be included. Identifying all these costs is essential to understanding the total cost of an IT project.

However, a business may also need to identify a range of costs which go beyond the IT function. In Chapter 5, we highlight the wide-ranging demands that are placed on a business to deliver value from IT investments in practice and the change management that could be required. This results in many potential hidden costs which arise throughout the business.

While some of these costs may be clearly identifiable, such as the costs of external trainers or consultants to support the change process, the largest cost is likely to be in human resources. A substantial commitment of employee time is typically required to deliver a successful project. This may have significant effects in terms of disruption to the business and loss of other opportunities. Businesses will require resources to undertake tasks such as:

- assessment of current processes, design of new processes and the development of system requirements;
- analysis, cleansing and migration of data;
- training and other change management activities, such as communication of changes; and
- system and process testing.

By identifying the full requirements of an investment, whether or not the cost of internal resources is formally budgeted, a business can assess whether it has sufficient resources to support the delivery of the benefits. Where this capability is not fully assessed, a project can fail. An IT system can be successfully implemented from a technical standpoint and yet, without the involvement and resources of the business, it may not be aligned with the way that the business actually operates or wants to operate. As a result, the system may deliver little by way of benefit to the business and it may ultimately add costs.

It can also be a challenge to isolate all the relevant costs that may arise as a result of a new IT system. Information is shared throughout a business, which may lead to additional information-related costs that are not easily identifiable by one part of the business working in isolation. This is illustrated by Example 2.1 below.

Example 2.1: Data sharing

The concept of governments maximising the value of digital information held about citizens or businesses and sharing it between relevant departments brings a number of potential benefits. Even within single agencies, such as the health service, there are substantial benefits in sharing information between different parts of the service.

This can enable a better service. It can provide greater efficiency for the citizen or business, which only has to submit data once, rather than providing data separately according to each specific request. It also has substantial benefits for the efficiency of government, reducing administration and data management costs. Moreover, it may assist in fraud and crime prevention, where identity fraud is common.

However, data sharing can lead to a range of additional information costs across an organisation. Where information is collated and combined from multiple sources, it becomes difficult to manage in practice. The time and cost involved in ensuring consistency and compliance with common standards can be substantial. Likewise, the cost of maintaining the privacy of confidential information, such as medical records, and the risk of inappropriate access can be high.²⁵

²⁵ Christine Bellamy, Perri 6 and Charles Raab, 'Joined up government and privacy in the UK: managing tension between data protection and social policy', *Public Administration*, 83(1), 2005, pp111–133 and 83(2), 2005, pp393– 415.

Consequently, although improvements may be made in one area as a result of increased information availability, these could be offset by additional costs elsewhere. In practice, responsibility for looking at different impacts of the same information may well sit in entirely different parts of the business and have no visibility to each other. Therefore, it can be easy to overlook indirect consequential costs of IT investments.

2.3.2 Predicting costs

Even when the types of cost involved are well known, it seems to be particularly challenging to predict accurately the ultimate costs of an IT project. This problem is reflected in the level of project budget overruns. While there are many potential reasons for the overrunning of IT projects, a root cause may be the pervasive role that information plays in every business. This role is discussed in Chapter 3. The stickiness of information flows and structures hard-wires the business into its current way of doing things. As a result, IT projects can encounter costly resistance to change and are highly dependent on the context of each business and the level of change required to implement a specific system will vary significantly between businesses.

For this reason, predicting the costs of specific initiatives is likely to be problematic and will call for the presentation of some sort of sensitivity analysis. The costs of the purely technical components of an IT project may be easily identified and predicted. However, exactly what a business will need to do to implement a system successfully will depend on how it currently operates and therefore will vary considerably according to the situation. This is particularly the case with broader business change costs, as well as costs of system configuration and changes to data. Consequently, previous experience in systems implementations, and the experience of peers may provide a limited picture of the costs involved. A business can only estimate costs with reasonable accuracy by developing a detailed understanding of its specific project requirements.

2.4 Measuring financial benefits

A business can achieve financial benefits in two ways:

- it can pay out less money through a reduction in costs; and
- it can bring in more money through increased revenues.

While an IT investment will aim for one or both of these goals, as in any other type of investment, financial benefits can be particularly difficult to articulate and predict.

2.4.1 Quantifying financial benefits

The benefits that can be achieved through the effective implementation of IT systems are described in some detail in Chapter 4. While some of these can be easily quantified through financial measurement, particularly improvements in the efficiency of operations, in many cases this is not possible. Many benefits are dependent upon external factors, and the financial impact is inevitably more difficult to predict. Once again, as with costs, a sensitivity analysis will need to be presented to give a fair indication of the range of outcomes that might arise under different assumptions.

Even operational efficiencies may not lead to direct cost savings. IT systems, by automating and improving the way things can be done, enable a business to save time and resources. However, that benefit can be reflected in many ways. It may result in a reduction in staff numbers and a direct cost reduction. In other cases, resources are simply redirected to other activities which would not otherwise have been possible. As a result, while efficiencies can be quantified as potential cost savings, frequently the benefit will not ultimately be realised in this way.

We also highlight a number of ways in which IT may remove the constraints of operating in particular ways and enhance flexibility. Investing in IT infrastructure may enable a business to react quickly to changing market conditions in the future. Decisions around infrastructure investments are frequently characterised as some of the most difficult types of decisions in IT because the ultimate benefits are so uncertain. Indeed the value of building an infrastructure which is flexible derives from that fact that the business may have a number of different options as to how it is used, and may not therefore have total clarity about the outcome. In this context, identifying and quantifying specific financial benefits are likely to be particularly difficult.

Moreover, as with costs, financial benefits are strongly dependent on the context of a specific business. For example, the value a business can derive from more information about customers is dependent upon the extent to which tailoring products and services for its specific customers is likely to result in increased prices or sales volumes. Therefore, the specific benefits which could be realised from the same customer relationship management system will differ considerably according to the specific circumstances of a business. While in some cases the benefits may be substantial, in other cases, the benefit could be marginal. As a result, while it may be easy to identify generic benefits from a system, pinpointing benefits in a specific business is far more difficult.

2.4.2 Isolating financial benefits

Complexity means that benefits from IT investments are difficult to isolate and attribute directly to an IT project. Benefits arise as a result of many actions, including process and behavioural change. Therefore, attempts to separate the particular contribution of an IT project to financial benefits will be difficult. However, if it is difficult to ascribe benefits to an IT project, it must be virtually impossible to ascribe benefits to an IT system in isolation. The interplay between systems, processes, users and non-IT assets, means that isolating the value created by an IT system will be quite arbitrary.

It is for this reason that we do not pursue the possibility of placing an explicit financial value on IT systems, for example on the basis of NPV calculations. Although academics such as INSEAD's Professor Dutta²⁶ argue that businesses should ascribe a specific financial value to assets such as IT systems, we do not see such information as being useful for management decision making about IT and IT projects.

Such proposals are symptomatic of a desire to report 'missing assets' in response to an alleged problem with external financial reporting in that net assets in the balance sheet are less than the value of many businesses. The relevance of such solutions for external investors is as dubious as it is for management.²⁷

2.5 Identifying indicators of value

Management ultimately wants to understand the financial impact of an IT initiative. However, where the financial benefits are difficult to predict, leading indicators can be useful as intermediate points between costs and benefits. Our analysis in Chapters 3 and 4 will underline how predicting and attributing financial benefits can be particularly problematic for IT investments. In many cases, the benefits are specific to the business. Moreover, the transformation from costs to benefits is rich, complex and frequently difficult to articulate. As a result, the identification of leading indicators may be particularly helpful if IT investments are to deliver financial benefits.

2.5.1 Developing leading indicators

Financial measures of costs and benefits are lagging indicators. They demonstrate what has actually been achieved by a business, for example in terms of sales made and expenses incurred. By contrast, non-financial measures can act as leading indicators, measuring improvements to the performance of the business which may ultimately be reflected in financial measures. While predicting the financial impact of an initiative can be very difficult, predicting direct improvements to operational performance should be easier. Mixing financial measures and leading indicators, as in a balanced scorecard, can provide management with better information on which to make decisions.²⁸

The main challenge in using leading indicators is defining the actual measures that should be used. While there are many possible measures, very few of them are genuine indicators of future costs and financial benefits. Therefore, the success of such tools in practice is mixed.²⁹

²⁶ Soumitra Dutta, *Recognising the True Value of Software Assets*, INSEAD/Micro Focus, 2007.

²⁷ Douglas J. Skinner, 'Accounting for intangibles – a critical review of policy recommendations', *Accounting and Business Research*, 38(3), 2008, pp191–204.

²⁸ Robert S. Kaplan and David P. Norton, *The Balanced Scorecard: Translating Strategy into Action*, Boston: Harvard Business School Press, 1996.

²⁹ Christopher D. Ittner, 'Does measuring intangibles for management purposes improve performance? A review of the evidence' *Accounting & Business Research*, 38(3), 2008, pp261–272.

Customer satisfaction is a common leading indicator that is used by many businesses. While improving customer satisfaction scores will reflect an improvement in the performance of a business, the crucial issue is whether the business is able to monetise this improvement and cover the cost of achieving it. Increased customer satisfaction could lead to increased revenues, as customers spend more money with a business. Alternatively, increasing or maintaining levels of satisfaction may be necessary simply to retain customers and maintain revenues. Understanding and acting on relationships between leading indicators and financial measures are crucial if indicators are not to become ends in themselves, rather than a means to realise financial benefits.

The link to cash flow benefits is particularly important in the case of IT systems, which can provide a vast range of new functionality and enable businesses to do many things differently. However, in many cases, this will have no impact whatsoever in terms of cost savings or increased revenues. It can simply mean doing things differently or providing customers with more functionality.

Identifying leading indicators for IT initiatives also presents particular challenges because a single initiative could impact a number of outside parties, as well as enabling improvements to numerous internal processes. A measurement regime may therefore contain measures which are drawn from many different business areas, and could end up looking like a scorecard for running the whole business. This is a substantial difference from many other types of investment, which may only need a relatively narrow and self-contained measurement regime.

2.5.2 Valuing technology companies

A notable example of the problems of leading indicators is provided by the dotcom bubble and analysts' use of non-financial measures such as 'sticky eyeballs' to predict future cash flows for the purposes of valuing companies. Given that the businesses involved were in many cases start-up companies, and therefore had no existing cash flows or established competitors to use as a comparison, analysts were forced to look for proxy measures of value.

A recent study examined the extent to which the number of people visiting a site was an actual indicator of future financial value, based on UK companies which survived the market crash.³⁰ While some evidence was found to support website traffic as having value relevance, the linkages were found to be highly complex. This example emphasises the difficulty of finding effective leading indicators.

2.6 Reporting process measures

Our fourth type of measure supports the complex management practices required to realise value from many types of investment and, like leading indicators, process measures may be particularly useful for IT investments.

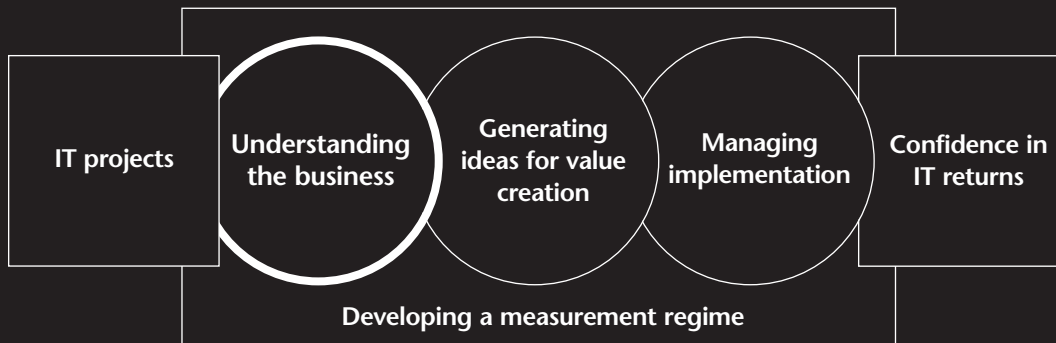
Fundamentally, process measures are needed to support good IT project management and ensure that new IT systems do what they are supposed to do, on time and within budget. This requires the co-ordination of internal suppliers of hardware, software, consulting and training, and internal staff providing process descriptions, data and testing time. None of this will happen unless project managers and oversight groups have access to relevant and reliable process performance measures. Tested project management methodologies are widely available supported by measures that satisfy the SMART acronym (specific, measurable, agreed, realistic and timed).

We will explore in Chapter 5 how the management processes and practices required to manage the effective implementation of IT systems are likely to be particularly complex. A business may need to extend its process measures to take account of a range of external factors, such as the activities of competitors. It may also need to manage many different interactions between IT specialists and wider organisational functions linking together IT projects and business change programmes. Moreover, IT projects often exhibit a high degree of uncertainty and unpredictability, raising the level of risk and placing demands on an organisation's risk management. As a result, businesses will want to consider a wide range of process measures to support the management and delivery of value from IT initiatives.

³⁰ William Forbes, *The Boys in the Bubble: Searching for Intangible Value in Internet Stocks*, Edinburgh: ICAS, 2008.

3. UNDERSTANDING THE BUSINESS

Creating value through the use of IT depends on understanding the business undertaking the IT project. Analysis of this essential activity is underpinned by the concept of business models, the role of information in the theory of the firm, the impact of IT on information supply and demand, and the idea of creative destruction.



Summary

Creating value through the use of IT depends on understanding the business which is undertaking the IT project. Analysis of this essential activity is underpinned by:

- a representation of business models in terms of value exchanges;
- the central role that information plays in explaining why any business exists;
- the impact of IT on information supply and demand within a business; and
- the potential of any technology for creative destruction.

Just as economic models are useful in explaining how economies work, so a business model represents an understanding of a business which is intended to show how it works. It simplifies complex relationships and dependencies to enable analysis and comparison. Because this report is concerned with how IT projects create value for a business, its presentation of business models focuses on how a business engages in exchanges to create value for different parties.

A business can be seen as existing in order to serve counterparties, including shareholders, lenders, customers, employees and suppliers. A business undertakes exchanges of value, providing each of its counterparties with something of value to them, and getting something of value to the business in return. Value can be exchanged in the form of cash or labour, products, services and other resources including information.

To survive with a sustainable business model, a business needs to maintain a set of relationships with counterparties which balances their interests and delivers value to all of them. A business also needs to monetise the value delivered to counterparties so that it does not run out of cash. Furthermore, the survival and success of a business are fundamentally affected by competition.

With regard to investment projects, a business needs to earn returns on the cash invested through suppliers and employees by generating cash from additional sales to customers and reduced payments to suppliers and employees. However, before this analysis is applied to IT projects, attention is drawn to three features of IT projects that make them special.

- Information is central to all businesses. It underpins why a business exists, what it does and how it provides value to counterparties. Information enables a business to communicate value propositions to potential counterparties and understand their needs. It enables a business to co-ordinate activities across different counterparties and thereby deliver value to all of them. Information also supports organisational knowledge and the ability to codify and share learning across a business or with counterparties.
- IT has a dramatic effect on the economics of information. Although information is pervasive within any business, its availability is limited because it is subject to the laws of supply and demand. There is a benefit to having information. But there is also a cost attached to the activities of collecting, storing, securing and communicating it. Therefore a business and its counterparties only have access to some of the information that could be available. However, IT has very significant effects on information supply and demand curves and the result is an information explosion.
- IT embodies technological change that has the power to unleash the 'creative destruction' written about by Joseph Schumpeter. Therefore any business should be aware that it could pay a heavy price if it does not exploit the value creating possibilities of IT to the full but its competitors do.

The overall effect is that all businesses need to bear in mind that they can earn returns on their investment in IT not only through revenues from information services and cost savings but also from information about value, information for co-ordination and information that codifies knowledge.

3.1 Business models

Our analysis of understanding the business is underpinned by the concept of the business model and our representation of business models in terms of the exchanges of value that they involve.

Although the term 'business model' has been in use since the 1950s, it became widespread in the 1990s, particularly during the dotcom boom.³¹ The explosion of the internet, and the growth in technology throughout businesses in general, was a significant factor in spreading the use of the business model concept. The passage of the term into common parlance has been confirmed in the credit crunch that began in 2007 with mass media discussion of alleged flaws in various financial institutions' business models.

Alexander Osterwalder, Yves Pigneur and Christopher Tucci point out that the use of the term in peer-reviewed articles followed a very similar pattern to the rise and fall of the Nasdaq index through the 1990s and early 2000s. New and cheap technologies enabled businesses to create new types of value, or to create value in different ways, frequently crossing industry lines. Traditional management tools such as value chains were typically industry-based and were not able to capture the complex network of relationships frequently seen in many 'new economy' companies. Therefore, analysts and academics sought different ways of analysing businesses to help them understand why some were more successful than others. The resulting business models have increasingly become tools used by managements to explain and manage their businesses.

Just as the economic models used by governments and forecasters are useful for explaining how economies work, a business model represents an understanding of a business which is intended to show how it works. It simplifies complex relationships and dependencies to enable analysis and comparison. However, it is neither a perfect representation of reality nor a business necessity. A business can be successful without ever articulating a business model. Likewise, a business may develop an apparently compelling business model which is never successfully implemented.

Although business models are a new and emerging area of study, this is not the reason why there is no common verbal or visual language for representing them and we should not expect such a common language to emerge any time soon. This is because different people:

- apply different metaphors to explain how businesses work (eg, machines, organisms, brains, societies and political systems);
- adopt different perspectives because they have different purposes for using models (eg, setting strategy, raising finance, managing risk, improving information flows, developing people, and managing physical logistics); and
- have competing theories about how to help businesses succeed (eg, Porter's Five Forces,³² the 7S Model adopted by McKinsey,³³ Kaplan and Norton's Strategy Maps,³⁴ and the Performance Prism of Neely, Adams and Kennerley³⁵).

In our presentation of business models in this report, we focus on how a business engages in exchanges to create value for different parties so that we can then consider the value that IT projects might create for a business. We recognise that we are representing simply one of many possible views of a business but it is one that is relevant to understanding the value of IT.

3.1.1 Relationships with counterparties

A business exists to serve what this report refers to as 'counterparties'. Businesses attract and retain counterparties to derive value from them through the exchange of cash, labour,

³¹ Alexander Osterwalder, Yves Pigneur and Christopher Tucci, 'Clarifying Business Models: Origins, Present and Future of the Concept', *Communications of the Association for Information Systems*, 2005(16), pp1–25.

³² Michael E. Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York: Free Press, 1980.

³³ Robert Pascale and Anthony Athos, *The Art of Japanese Management*, London: Penguin Books, 1981; Thomas J. Peters and Robert H. Waterman Jr., *In Search of Excellence*, New York: Harper & Row, 1982.

³⁴ Robert S. Kaplan and David P. Norton, *Strategy Maps: Converting Intangible Assets into Tangible Outcomes*, Boston: Harvard Business Press, 2004.

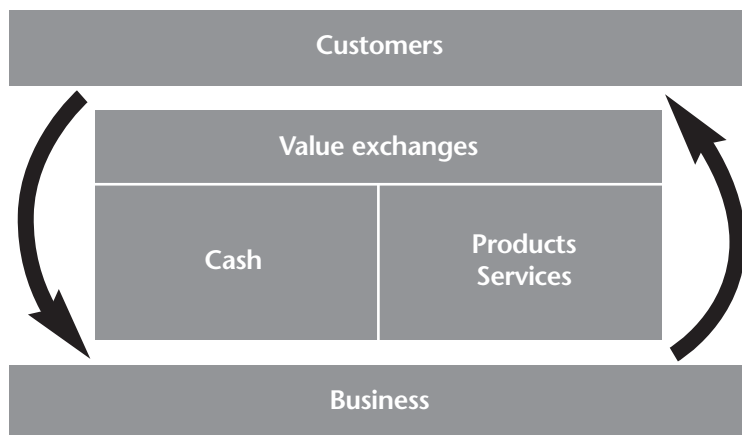
³⁵ Andy Neely, Chris Adams and Mike Kennerley, *The Performance Prism: The Scorecard for Measuring and Managing Stakeholder Relationships*, London: Financial Times/Prentice Hall, 2002.

products, services and other resources. Counterparties generally include:

- shareholders;
- lenders;
- customers;
- employees; and
- suppliers.

A simple exchange of value between a business and its customers is illustrated in Figure 3.1 below. A host of such value exchanges with various counterparties can be seen as describing, and indeed defining, what a business does.

Figure 3.1: Value exchanges with customers

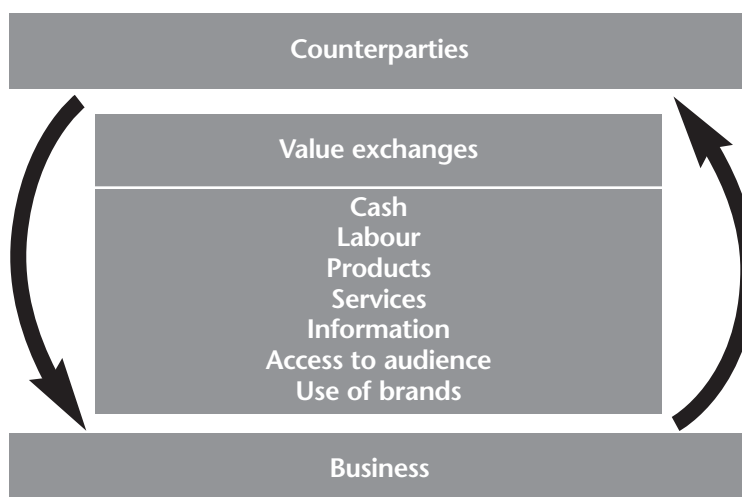


For a relationship with a counterparty to be sustainable, both parties must be satisfied with the exchange. They must believe that what they get out of the exchange is worth more to them than what they put in and are happy to repeat the exchange on this basis. If not, they will move away from the relationship and spend their resources in ways they believe will bring them more benefit.

We use the term counterparty throughout this report, rather than alternatives such as stakeholder, associate, contact or interested party, to capture the idea that a transaction and an exchange of value are involved. Alternatives tend to include a wider range of people who have an interest in, or impact on, the way that a business operates.

As well as deriving and providing value from physical products and personal services, businesses can also exchange information, access to specific audiences and rights to use brands and other assets. Businesses that exchange information with counterparties by buying and selling information services will clearly have an interest in the ways that IT investment can alter their business models. Some of the main sources of value that feature in business models are shown in Figure 3.2.

Figure 3.2: Summary business model



We use the term business model to describe and analyse the way that a business creates and delivers sustainable value to counterparties. Through this report, we highlight factors that are relevant to the sustainability of business models including:

- the value which is delivered to individual counterparties;
- the value which the business gets back from exchanges with counterparties;
- the existence of competitors offering alternative value propositions; and
- the ability of the business to co-ordinate and deliver value to these different counterparties through its use of information.

3.1.2 Types of value and return

The value received by a counterparty or business may be purely financial. A shareholder looks for share price appreciation and dividends, an employee wants wages and a supplier expects payments. A business is paid by customers and receives funds from investors. These can all be clearly stated as monetary amounts.

However, value can also be more subjective. The customer, for example, receives a product or service which he or she values at least as highly as the amount paid for it but what is perceived as valuable will differ from customer to customer. Factors to consider include:³⁶

- functional aspects of value, relating to the practical use of a product or service;
- experiential aspects of value, such as emotions, senses or relationships;
- symbolic aspects of value, which relate to the ego or identity of the individual or to wider social meaning; and
- cost aspects of value, including direct costs, convenience and time costs.

Likewise, while employees receive financial recompense for their labour and knowledge, there may be a range of additional, more subjective factors which influence the extent to which they are satisfied with the relationship with the employer. These could include considerations relating to lifestyle, the degree of autonomy given by the business and its wider culture.

As it is based on an exchange of value, the sustainability of the relationships in a business model does not depend solely on what is received from the other party. Rather, it depends on a comparison between what is given and what is received, or the return. The return for shareholders and lenders is conceptually straightforward. They put cash into the business with the aim that they will get more cash back in return albeit with uncertainty affecting the timing and size of the relevant cash flows. Therefore, shareholders are comparing the same thing, namely cash, and can easily identify the net difference. For other counterparties, the comparison is more complex. They are typically comparing an experience of some kind with cash and, as a result, while there is a return, it is not clearly comparable and quantifiable.

3.1.3 Balancing value propositions

To survive and maintain a sustainable business model, a business needs to keep a range of counterparties satisfied at any given time. However, counterparties are likely to have demands which conflict with one another to some extent, as they all compete for their share of the resources of a business. Therefore, balancing the value delivered to various counterparties is a key concern for any business.

A business can change the balance between counterparties by moving cash around. They can pay employees more or less, cut or raise prices to customers, or pay higher or lower dividends to shareholders. However, as the cash resources of the business are likely to be limited, there may be trade-offs when cash is reallocated in this way. By reducing prices, for example, a business prioritises the need to keep customers ahead of other claims for cash.

The idea of shareholder value gives primacy to the shareholder as a counterparty and sees shareholder interests as driving the actions of a company.³⁷ On the basis that shareholders bear residual risks and do not have any contractual rights to guaranteed returns, it is argued that a company should be focused primarily on increasing the profits and cash flow delivered to them. In contrast, the interests of the beneficiaries of services are typically seen as the prime

³⁶ J. Brock Smith and Mark Colgate, 'Customer Value Creation: A Practical Framework', *Journal of Marketing Theory and Practice*, 15(1), 2007, pp7–3.

³⁷ Alfred Rappaport, *Creating shareholder value: The new standard for business performance*, New York: Free Press, 1986.

driver to action for not-for-profit organisations. Ultimately, though, a balance between different parties will always be required, and if the value to any one counterparty is reduced too much, the counterparty may be lost.

3.1.4 Monetising value

Regardless of the value offered or exactly how counterparty needs are balanced, a business needs cash simply to survive. The core challenge for a business is therefore to turn the value which it delivers to counterparties into cash and balance its different value offerings so that it does not run out of cash.

Monetising the value they deliver to counterparties is ultimately what distinguishes successful businesses from those that fail and the dotcom bubble clearly demonstrated this point. Many companies developed internet applications that had many users. However, users were not prepared to pay for the experience and the value of those services could not be monetised. The survivors of the crash were those that were able to monetise the value of the services before the cash injected by investors ran out. This may have been as a result of true insight into what customers would pay for or finding alternative sources of cash for services, such as advertisers. However, finding an answer to the challenge of monetisation is essential to creating a successful business.

3.1.5 Competition

The survival and success of a business are fundamentally affected by the existence of competitors both of the business and of its counterparties. The former try to get counterparties of the business to switch their value exchanges away from the business, and the latter try to get the business to switch its value exchanges to themselves.

Counterparties will compare the value they receive from a business with that on offer from competitors to the business. Ultimately, if a competitor offers better value, through a better product, service, price, wages or overall experience, the counterparty may be lost. The activities of competitors, therefore, can ultimately have a destructive impact on a business. By offering a better value exchange, competitors can diminish or destroy the value that is offered by a business in the eyes of counterparties.

Conversely, a business can enhance its business model by comparing its counterparties' value propositions to those offered by their competitors and being prepared to switch its allegiance by shedding and replacing customers, employees, suppliers and investors.

In Example 3.1, we provide a short analysis of the value provided by a real business, Costco, based on existing published research on the company's operations in the US.³⁸ It is a particularly interesting case because it is possible to see how Costco's business model differs from its competitors' in how it assigns priorities to balance the value it offers various counterparties.

Example 3.1: Costco business model

Costco is a large warehouse/retail company which sells high volumes of goods at low prices. It serves four main groups of counterparties, namely customers, employees, suppliers and investors.

Relationship with customers

Costco earns revenues from customers through two mechanisms, namely membership fees and individual transactions. In return, Costco provides value for customers with a particular focus on low prices. It keeps the margin on goods low, and derives its revenues from high volumes of sales, as well as the membership fee. In order to sustain low margins and remain profitable, it focuses on low cost operations, achieved through an efficient supply chain and minimal extras for customers, for example providing no carrier bags.

³⁸ Wayne Cascio, 'Decency means More than 'Always low Prices': A Comparison of Costco to Wal-Mart's Sam's Club', *Academy of Management Perspectives*, 20(3), 2006, pp26–37; Steven Greenhouse, 'How Costco Became the Anti-Wal-Mart', *New York Times*, 17 July 2005; Mike Troy, 'A model business: long-term vision benefits customers, employees', *DSN Retailing Today*, 19 December 2005.

Example 3.1: Costco business model (continued)

However, there is a strong focus on the overall customer experience in other areas to differentiate Costco from its competitors. It provides a generous returns policy, for example, which enables customers to bring back goods up until their expiry date. In addition, there is a focus on quality products, and creating a 'treasure hunt' of new and interesting goods amongst the standard lines.

This mixture of factors creates a strong loyalty among customers for the store, resulting in high renewal rates for members. Moreover, it creates a strong brand in the marketplace so that the company incurs minimal marketing expenditure.

Relationship with employees

It is in the area of employees that Costco's different priorities are best documented. Costco takes a markedly different approach to the management of employees to that of some competitors, paying higher wages and providing benefits, such as healthcare provision, which are substantially better than the industry average. The company believes that by rewarding staff well, it gets lower staff turnover, higher productivity and improved customer service in return. Product theft by employees is also reduced. This potentially results in lower costs overall, as well as higher revenues.

Relationship with suppliers

The relationship with suppliers is based on a standard exchange of products for cash. Costco has a high priority on low prices for customers and therefore manages suppliers on this basis. In order to do this, it focuses on a relatively small number of product lines and aims for large discounts based on volumes. It also manages suppliers actively to gain the lowest price.

Relationship with investors

The impact of paying employees more and reducing prices as far as possible is that short-term profits may be reduced in comparison to competitors'. This leads to potentially lower returns for shareholders, and contrasts with the approach taken to balancing counterparty interests by competitors such as Wal-Mart, which is more focused on maximising profits for shareholders. Costco takes the view that its approach brings long-term returns for shareholders through higher customer loyalty and better employee performance in particular.

While analysts have been quoted expressing some concern at the approach taken and the impact on short term profitability, there is no conclusive evidence that the share price is adversely affected.

3.1.6 Public and not-for-profit sector business models

This chapter has considered primarily commercial business models. However, our analysis of value exchanges is applicable to all types of organisations, including those in the public and not-for-profit sectors. Although some counterparties are different in these cases, the core concepts are equally applicable. Such organisations still need to provide value to a range of parties, such as employees and suppliers, and monetise the benefits they deliver to counterparties so as to have a positive cash flow and not run out of cash.

The prioritisation of counterparty interests will be different to the private sector. A public sector or not-for-profit organisation does not seek to maximise the value of the organisation to shareholders. A not-for-profit organisation will instead focus on ensuring that its volunteers and donors see it as delivering value by furthering the cause which it promotes and supporting the beneficiaries of its services.

Public sector organisations have even broader goals, which have most recently been articulated in the idea of public value.³⁹ While there are many theories of the role of the public sector and what is valued by the taxpayers who fund it, objectives generally fall into three broad areas:

- delivering high quality services to the citizen;
- improving outcomes, for example reducing crime on the street; and
- building trust in the government.

3.2 Investment appraisal and the business model

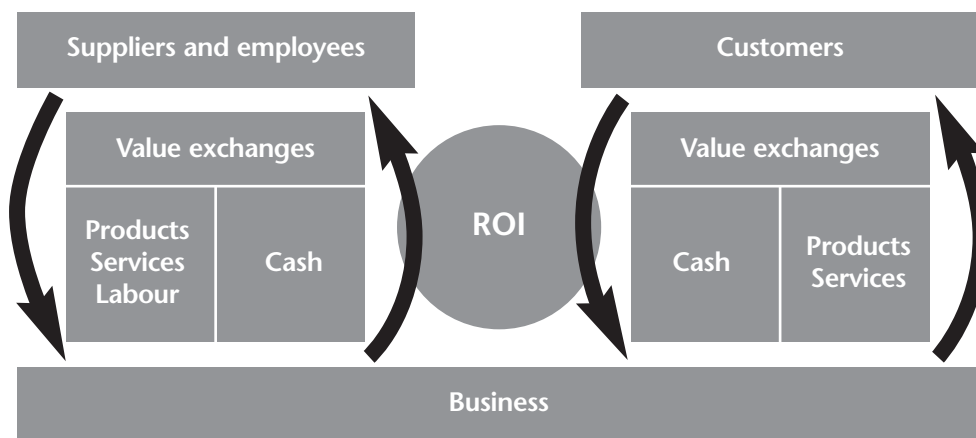
Our representation of business models in terms of value exchanges can be used to describe an investment and the process of transforming costs into financial benefits described in Chapter 2. Therefore, analysing a business, and an investment opportunity, through the lens of the business model may help in the development of an appropriate measurement regime for IT projects.

An investment project generally entails value exchanges with suppliers and employees, and customers. Firstly, a business invests in resources provided by suppliers and employees in return for cash and secondly, through the processes of the business, these resources are combined and transformed to generate benefits. Through investment, the business can:

- improve its internal processes so that it reduces its costs, thereby paying out less cash to suppliers and employees in future; and/or
- develop new or enhanced products or services that customers will pay for, thus generating cash which is fed back into the business as increased cash revenues.

These value exchanges are shown in Figure 3.3 and the success of an investment is ultimately dependent on the relationship between the related cash outflows and inflows. To the extent that there is a net cash inflow, this will represent a net return to shareholders from an investment.

Figure 3.3: Investment costs and financial benefits



By selecting measures from each of the four categories highlighted in Chapter 2, a business can measure its success in transforming costs into benefits and thereby identify the net impact of an investment. It can measure:

- costs, namely the cash paid out by the organisation to build resources and capabilities;
- financial benefits, in the form of changes to cash inflows or outflows as a result of the investment, reflecting reduced costs or increased revenues;
- leading indicators of changes to operations within the business or changes to the value delivered to counterparties which may foreshadow future changes in cash flows; and
- processes performed and completed in the business which are central to achieving value from an investment.

³⁹ Mark H. Moore, *Creating Public Value: Strategic Management in Government*, Boston: Harvard University Press, 1995.

However, before applying this analysis in more detail to IT projects, we draw attention to three aspects of IT projects that make them special:

- information is central to all businesses;
- IT is having a dramatic effect on the economics of information; and
- IT embodies technological change that has the power to unleash creative destruction.

3.3 Information and businesses

Our analysis of understanding the business is supported by the central role that information plays in defining what a business is, what it does and how it delivers value. Consequently, IT is highly relevant to the business models of most if not all businesses and not just those that buy and sell information services. To explain this, we describe two broad theories of the firm related to transaction costs and organisational resources. They focus on different ways in which information is vital to businesses.

3.3.1 Transaction cost economics

Transaction cost economics starts with the principle of specialisation. According to this principle, the wealth of a society grows not only as people specialise in producing specific types of goods but also as society divides the labour required to produce goods into specialist inputs. This specialisation results in greater efficiency and higher quality, due to greater knowledge and experience of the production process, and because less time is lost in changing tasks. Different specialists can then combine their inputs to enable the creation of the completed outputs.

Adam Smith provided possibly the best known example of this concept by describing the operation of a pin factory. He noted that when the pin-making process was divided into 18 steps carried out by 10 workers, they could make a combined total of 48,000 pins per day. Yet, a 'workman not educated to this business...could scarce perhaps, with his utmost industry, make one pin in a day, and certainly could not make twenty.'⁴⁰

Having accepted that specialisation results in greater efficiency, the analysis moves on to how this division of labour, and the exchange of inputs and outputs, is best organised. The marketplace might be viewed as the most efficient way to organise exchanges, with the price mechanism balancing the supply and demand of buyers and sellers. However, this is clearly not what happens in the pin-making example. Pin-makers do not work independently and trade their various outputs. They work together within a business, which buys in specialist pin-making inputs, combines them, and sells on the pins that they produce.

The role of a business in these exchanges, rather than the market, was considered by Ronald Coase in his famous 1937 article 'The Nature of the Firm'.⁴¹ His core hypothesis was that there were costs associated with using the marketplace, and this is why firms, or businesses, existed. Transactions could be conducted more cheaply through an internal organisation than through the marketplace. He also observed that there was a wide range of ways to organise economic activity in practice, which raised further questions. If there were transaction costs of using the marketplace, why were all transactions not carried out within a single business? Why were some transactions carried out within a business, and others not? And why was there so much variation in the way that different businesses structured their transactions?

3.3.2 The importance of information costs

Coase's observations and questions have led to a wide literature over the last 70 years, outlining possible reasons for transaction costs and ways to reduce them and laying down conditions for when transactions should be conducted internally within firms and externally between firms and individuals.⁴² The core point from these debates which is relevant to this report is that market transactions involve information costs in the form of search and contracting costs.

⁴⁰ Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, London, first published 1776.

⁴¹ Ronald Coase, 'The Nature of the Firm', *Economica*, 4(16), 1937, pp386–405.

⁴² Oliver Williamson, 'The Theory of the Firm as Governance Structure: From Choice to Contract', *Journal of Economic Perspectives*, 16(3), 2002, pp171–195.

When using the marketplace, buyers may lack information on potential sellers of the products and services they need and on wider market conditions. Therefore, they need to spend time, and therefore money, searching for suppliers and understanding what price to pay. This contrasts with internal transactions within a business, where the task is simply passed on to the appropriate department according to internal processes.

Transaction costs also arise from contracting, as all exchanges are vulnerable to opportunism and exploitation of one party by the other. Counteracting the risks involves spending time and money drawing up appropriate contracts, monitoring compliance, managing enforcement and dealing with disputes. Establishing a business which enters into contracts of employment may reduce these risks and contracting costs and provide greater flexibility.

The benefits of carrying on activities within a business need, however, to be balanced against the benefits of using specialist external suppliers. Economies of scale and specialist knowledge can bring significant benefits and a business that specialises in a particular task is likely to do it better and more cheaply than an internal department that only occasionally carries out that task.

A business, in this context, is essentially a mechanism for conducting transactions which is more efficient in practice than the marketplace. The economics of information is important in this analysis and strongly influences the boundaries of the business, and what it actually does.

3.3.3 Resource-based theory

This transaction cost view of the business focuses on the efficient execution of transactions and uses transaction costs to explain the existence of businesses. Strategic management theorists, by contrast, take businesses as a given and ask instead why they differ so much in their performance. They argue that it is extremely difficult in practice to understand what customers want and how to deliver it and to identify what a business needs to do in order to create profits above those of competitors.⁴³

While there are many schools of thought in strategic management, one which has gained much currency in the literature, and which has most relevance for our analysis, is the resource-based theory. This focuses on the resources available to a business in building a competitive advantage against competitors.⁴⁴ Resources in this context are typically categorised into three broad areas:

- physical resources, such as raw materials and physical locations;
- human resources, including the skills, experience and knowledge of staff; and
- organisational resources, such as internal processes and systems.

A business combines resources so that the result is greater than the sum of its individual parts. In particular, it develops new resources, uses existing resources in a different way or creates combinations of resources that cannot easily be replicated. It is through using its resources to add value to inputs that a business can create greater value or deliver the same products at lower cost than competitors.

In this context, a business is a co-ordinator, combiner and developer of resources and information is central to what a business does. Without information, it would not be able to act as a co-ordinator and combiner of resources.

3.3.4 The role of knowledge in business

One resource that receives particular emphasis in resource-based theories is knowledge. Knowledge is a rare and valuable resource which cannot easily be replicated, and which can therefore provide sustainable competitive advantage. A business provides a particularly efficient and effective way for sharing and developing knowledge.⁴⁵

⁴³ Michael Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York: Free Press, 1980; Michael Porter, *Competitive Advantage*, New York: Free Press, 1985; Michael Porter, *On Competition*, Boston: Harvard Business Press, 1998.

⁴⁴ Birger Wernerfelt, 'A Resource-Based View of the Firm', *Strategic Management Journal*, 5(2), 1984, pp171–180; Jay Barney, 'Firm Resources and Sustained Competitive Advantage', *Journal of Management*, 17(1), 1991, pp99–120.

⁴⁵ Bruce Kogut and Udo Zander, 'Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology', *Organization Science*, 3(3), 1992, pp383–397.

Knowledge is a complex concept and there are different philosophical views on what knowledge is and how knowledge is developed.⁴⁶ Knowledge can either be developed through experience or through rational thought and logic. In the discipline of knowledge management, there is a well established distinction between tacit and explicit knowledge, which reflects these different ideas. Tacit knowledge focuses on knowledge that is developed through experience, and the idea that we 'know more than we can tell'.⁴⁷ Therefore, it is highly subjective and localised in individuals. Explicit knowledge, on the other hand, is more objective, factual and standardised.

The idea of the knowledge-based business is built on the belief that the knowledge of a business is more than the knowledge of its individual employees. If that were not the case, the knowledge of a business would be very sensitive to employee turnover. While there may be specific pieces of knowledge which are held within individuals, in most cases, the knowledge of a business goes beyond this. As a result, a business provides a community and social environment in which knowledge is transferred, shared and maintained.

A business also provides an environment for the development of new knowledge. This strongly links to thinking on innovation and the ability of businesses to learn. Innovation can be achieved through new combinations of existing knowledge which create fresh knowledge. Alternatively, innovation may be driven through the absorption of external knowledge into a business.⁴⁸

From this perspective, businesses exist in large part because of their ability to develop and combine valuable knowledge. Although knowledge and information are not the same thing, there is a relationship between the two concepts. Knowledge, particularly explicit knowledge, can be captured and codified into information. Information is therefore a key supporting resource, enabling businesses to codify and share certain types of knowledge.

Whether we view a business as a mechanism for conducting transactions, a body to co-ordinate and combine resources or an environment for building and sharing knowledge, it clearly houses a vast amount of information. Therefore, at the core of any business are the aggregation, processing and communication of many types of information, both internally within the business and externally with counterparties.

3.3.5 The pervasive role of information in business models

In our analysis of business models, we have emphasised how businesses exchange value with counterparties. These exchanges can involve providing and receiving information services. We now extend that analysis to incorporate the insight that a business delivers value to counterparties through the information that it has. As shown in Figure 3.4, all exchanges (not just exchanges involving information services) are supported by three layers of information which should reduce the cash outflows or enhance the cash inflows associated with transactions. There is information:

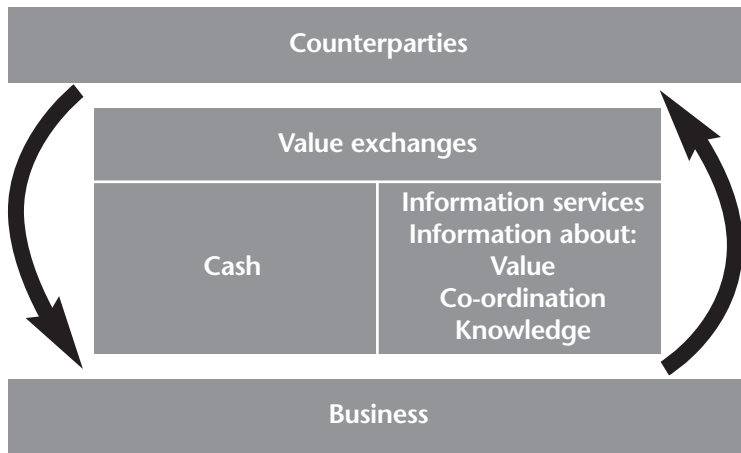
- about the value that is offered to different counterparties;
- to co-ordinate transactions and deliver the desired value; and
- in the form of organisational knowledge and learning which enables the business to provide value.

⁴⁶ J-C Spender, 'Making Knowledge the Basis of a Dynamic Theory of the Firm', *Strategic Management Journal*, 17, (Winter Special Edition), 1996, pp45–62.

⁴⁷ Michael Polanyi, *Personal knowledge. Towards a post-critical philosophy*, London: Routledge & Kegan Paul, 1958.

⁴⁸ Wesley Cohen and Daniel Levinthal, 'Absorptive Capacity: A New Perspective on Learning and Innovation', *Administrative Science Quarterly*, 35(1), 1990, pp128–152.

Figure 3.4: Information in value exchanges



Underpinning these layers of information are the physical and organisational structures of a business, including its infrastructure and processes, which support it in carrying out its activities.

3.3.6 Value information

The information flows between a business and its counterparties relate primarily to the value offered by the business. Information about the value on offer from a business and the needs and wants of its counterparties enable better matching between supply and demand and enhance the value realised by both parties to a transaction. This is reinforced by the fact that value information is also made available for comparison purposes by:

- a business to potential counterparties who are competing with existing counterparties; and
- competitors of a business who are trying to attract its current counterparties.

In the following paragraphs we summarise some of the information flows that are relevant to various counterparties.

- Shareholders need information to support their decisions on whether to buy, hold or sell shares and their ongoing needs and responsibilities as shareholders. This is provided through statutory financial reporting and other mandatory disclosure, although a company can also release a wide range of other voluntary information. In addition, there should be a feedback loop, with shareholders communicating their expectations of return and risk and providing feedback on the extent to which the business is meeting those expectations.
- Lenders focus their information demands on the ability of the business to pay interest on loans and ultimately to repay them. Therefore, a business may be asked to provide information on its credit-worthiness and its ability to meet future payments that goes beyond statutory and other mandatory public disclosure.
- Customers and suppliers exchange a great deal of information. Suppliers provide information about the nature of their product or service, its benefits, and the price, to persuade potential customers to make a purchase. Customers provide information to a business and its competitors about their specific demands and preferences, their sensitivity to price, and their feedback on the performance of the products and services they have purchased.
- Employees, prospective and actual, need to know about pay, conditions and roles and more general employer expectations concerning jobs. In return, employers need to know the skills and experience of a potential employee. These pieces of information can be exchanged between a range of potential employers and employees. There is also an ongoing feedback loop on the performance of the employee, and employer, and the extent to which expectations are being met.
- Donors and volunteers provide funds and resources to enable not-for-profit organisations to provide particular services. While the recipient of the service provides information concerning their specific needs, the donor or volunteer also provides information on what they value and for what causes they are prepared to make donations or give their time. On that basis, the organisation can match the desires of donors with the needs of particular individuals.

- Advertisers are central to many media and internet business models. The exchange of value between a business and an advertiser focuses on the access that the advertiser gets to potential new counterparties through the business. Therefore, the advertiser relies on the provision of good information by the business concerning the audience that is being reached.

3.3.7 Co-ordination information

Once a match has been made, businesses also exchange information with counterparties concerning specific transactions. This information includes:

- details of products, services and labour required or provided;
- delivery information; and
- the flow of cash between parties.

This information enables a business to carry out and co-ordinate all the activities necessary to deliver value to counterparties and manage cash as it flows through a business. These activities are at the heart of any business and consequently co-ordination information is strongly linked to the way that individuals do things, as well as the processes of the business.

A process is a sequence of activities carried out to achieve a particular goal. It will take a series of inputs, such as materials, labour and information, and result in an output of some kind, for example a physical product or a new piece of information such as an updated stock record.

3.3.8 Knowledge-related information

Processes are carried out by people, and in performing them, people rely on knowledge to follow the process and undertake tasks effectively. Embedded within processes are decisions. While some decisions are repetitive and can be standardised within a process, there will also be one-off decisions which require human judgement supported by knowledge. In these cases, the process can merely outline how an individual can take the decision, rather than dictate its outcome. Our third layer of information concerns knowledge and it supports the other two layers.

There is a wide range of knowledge within a business. It can for example concern how to do things in practice, workarounds and trouble shooting tips which might be commonly known as 'know-how'. It includes the knowledge of experts and other individuals within the business and it can relate not just to internal processes but also the external environment, new technological developments and the activities of competitors.

While much of this knowledge is explicit and can be codified into instructions or other types of information, a lot of knowledge in this context is tacit. It is developed through the social environment of the business and cannot be easily codified. The development of such knowledge also tends to be localised, and specific to the task being undertaken, as well as the social context. These factors can make this type of knowledge difficult to share and apply in different circumstances.

3.4 IT and the economics of information

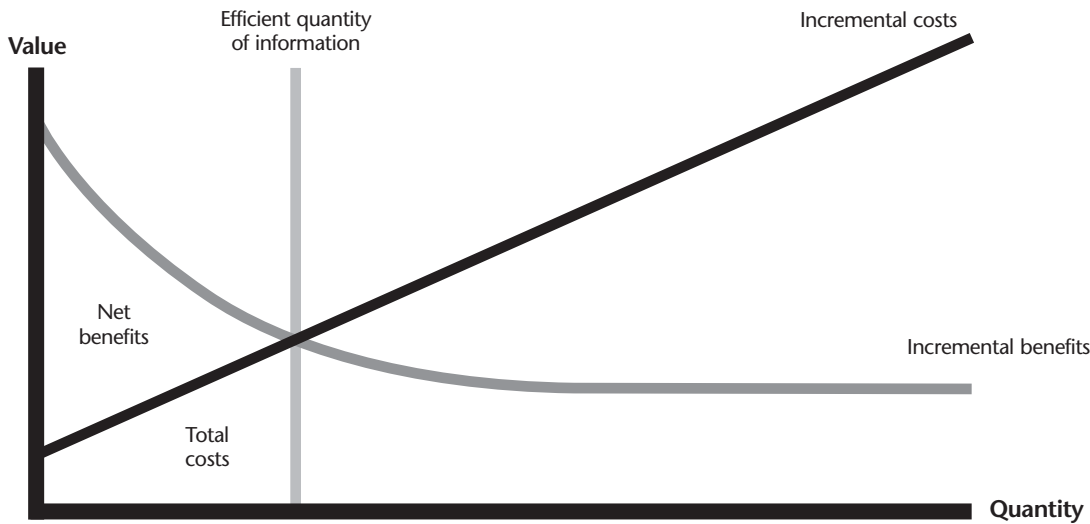
Our analysis of understanding the business depends on the impact of IT on information supply and demand. Information is pervasive within businesses and, in large part, explains why businesses exist and how they deliver value to their counterparties. However, that does not mean that businesses and counterparties have all the information they need or want. Like any other economic good, information is subject to the laws of supply and demand.

3.4.1 Information supply and demand

Figure 3.5 shows supply and demand curves that can, in principle, be drawn for each and every type of information to represent the incremental cost of providing more of that information and the incremental benefit of using such information.

The curves also provide a graphic representation of the costs and financial benefits that are the subject of investment appraisal techniques and an effective measurement regime for IT projects. The area under the supply curve represents total costs, the area under the demand curve represents total benefits and the area between the curves represents net benefits.

Figure 3.5: Information supply and demand curves



Costs are associated with the supply of information within a business because many activities are required to handle and manage information, such as:

- capture and recording of information;
- storage of information;
- processing of information;
- organisation of information;
- control and security of information;
- retrieval or output of information; and
- communication of information to others.

However, a business should also be able to save costs, increase revenues and improve services as more information is made available because there are benefits to having more information:

- more counterparties can be attracted to the business;
- activities can be better co-ordinated; and
- better decisions can be made if more knowledge is available.

Therefore, any piece of information has a cost of supply attached to it, as well as a benefit from its availability. The supply and demand curves in Figure 3.5 are drawn on the assumption that there are increasing incremental costs and decreasing incremental benefits of information. On the basis of these supply and demand curves, there is a quantity of information which it is economically efficient to produce, where the benefits of additional information exceed the costs of supplying it. Once the point is reached where incremental costs and benefits are equal, it becomes economically inefficient to produce more information. Therefore, when analysing any business model, in theory it would contain only the information which it is economically efficient to produce.

Of course in practice, matters are not so straightforward. If it were possible to draw supply and demand curves for different sorts of information, they might look very different from those in Figure 3.5. There is also no market that sets prices for information within a business so as to balance incremental costs and benefits. However, the fact that businesses limit the quantity of information that they produce implies that, in general, a business will only use information that is seen as economically worthwhile and some information will not be produced because at some point the supply curve is above the demand curve.

3.4.2 Information technology

IT is about the application of technology to information. As such, it can improve the way that information is provided and used by a business and its counterparties. In the language of the previous section, it can shift the supply and demand curves for information and prompt changes in the quantity and type of information that is produced.

Many of the technical complexities of IT arise from the fact that it comprises a number of different types of technology which interact together and have to be integrated for IT to work effectively.

On the one hand, IT includes computing technology that captures, stores and processes data. Integrally linked to the processing of information is the communication of information and therefore the second core element of IT is communications technology. Both of these technologies consist of many physical devices and component parts, all of which are underpinned by an array of software. Some of this software runs the operation of hardware, some of it provides specific applications and some of it may support the security and management of the system. In addition, there is all of the data which is held within the individual systems. Finally, a system needs a user to operate it.

3.4.3 Development of computers

Although the specific technologies referred to as IT are all relatively recent, there have been many technologies over history that have aimed to improve the handling of information. Computing and calculating technologies, for example, have existed for centuries. These apply logic to a set of data to produce an output. The abacus is probably the earliest and most familiar calculating device. This has been followed over the centuries by many tools such as mechanical calculators and slide rules, both of which were used well into the 1960s for complex calculations.

Technologies for inputting, storing or outputting data have also existed for a long time. Punch card technology was an important antecedent of modern computing and was used in the operation of Jacquard weaving looms in the early 19th century. This technology developed through that century to support greater efficiency in data processing. Punch cards were used, for example, to process the US census in 1890.⁴⁹ The data was available two years earlier than it had been for the previous census, when it had been done manually, saving \$5m in the process. This covered substantially more people in the country, and allowed for more in-depth analysis of the data.⁵⁰

There have also been many radical innovations in the development of modern computers.⁵¹ The move from mechanical technology to electronic technology, for example, was a key enabler for the large code-breaking computers of the Second World War. The first generation of commercial computers was built after this period and was based on these technologies. Such computers were physically very big and expensive and since then, the trends in technical development have been clear:

- physical components and devices have got smaller, moving from large scale computers to personal computers to mobile devices and smaller; and
- increasing amounts of speed and power have been delivered, enabling increasingly complex functionality. Moore's Law, which predicted in 1967 that 'the number of transistors on a chip doubles about every two years', has proved thus far to be an accurate predictor of the increasing speed of microchips.⁵²

Crucial to the widespread adoption of IT in business and broader society has been that all of these developments have ultimately been delivered to the customer at an affordable price. All the evidence suggests that new generations of computing will continue in similar directions, with new research focused on ever-smaller and more powerful devices and components.

⁴⁹ Herman Hollerith, 'An Electric Tabulating System, *The Quarterly, Columbia University School of Mines*, X(16), 1889, pp238–255.

⁵⁰ William R. Aul, 'Herman Hollerith: Data Processing Pioneer', *Think*, November 1972, pp22-24.

⁵¹ Martin Campbell-Kelly and William Aspray, *Computer: A History of the Information Machine*, 2nd edition, Boulder, Colorado: Westview Press, 2004.

⁵² www.intel.com/technology/mooreslaw/

3.4.4 Development of communications technologies

As in computing technology, there have been many technologies enabling communication between individuals and communities, from smoke signals and semaphore towers to the development of alphabets for reading and writing information.

Communications technologies follow one of two paths. On the one hand, there are a range of technologies that provide informational and entertainment content in various formats. These are primarily publishing and broadcast media, such as newspapers, radio, television, films, and gramophone. The second type of communications technology connects two or more individuals, enabling them to exchange information. Technologies in this context include the telegraph, the telephone and the fax machine.

It is argued that in any communications technology, at least prior to the internet, there has been some trade off between the richness of the communication and the reach of that communication:

- the greater the richness, the more detailed and personalised the communication; and
- the greater the reach, the more people can be accessed via the communication.

Broadcast media focus primarily on increasing reach at the expense of richness. By contrast, a technology which connects small numbers of individuals seeks to increase the richness of communications between people without physical presence, and such technologies sacrifice reach for richness. While computing networks have existed for many years, the internet is a more radical technology, because it builds broadcast media on these base communications technologies. This leads to less of a trade-off between richness and reach, as the internet can enable highly interactive and personalised communications between large numbers of people.⁵³

3.4.5 Format of information

Although early computers were based around the analogue format, an important characteristic of information technology today is that it is based on the digital format. Analogue technology effectively copies or records information, sounds or pictures as they exist and transmits them in waves on the basis of a continuously variable form. Analogue technologies include vinyl records and videos, as well as traditional telephones and televisions. By contrast, digital technology converts and processes all types of information, sounds or pictures in the format of two values (0 or 1). Digital technologies include DVDs and CDs as well as computers.

Because it is based on a variable form, analogue technology can capture information more accurately and the quality of reproduction is therefore higher. However, digital technology has a number of advantages over analogue technology:

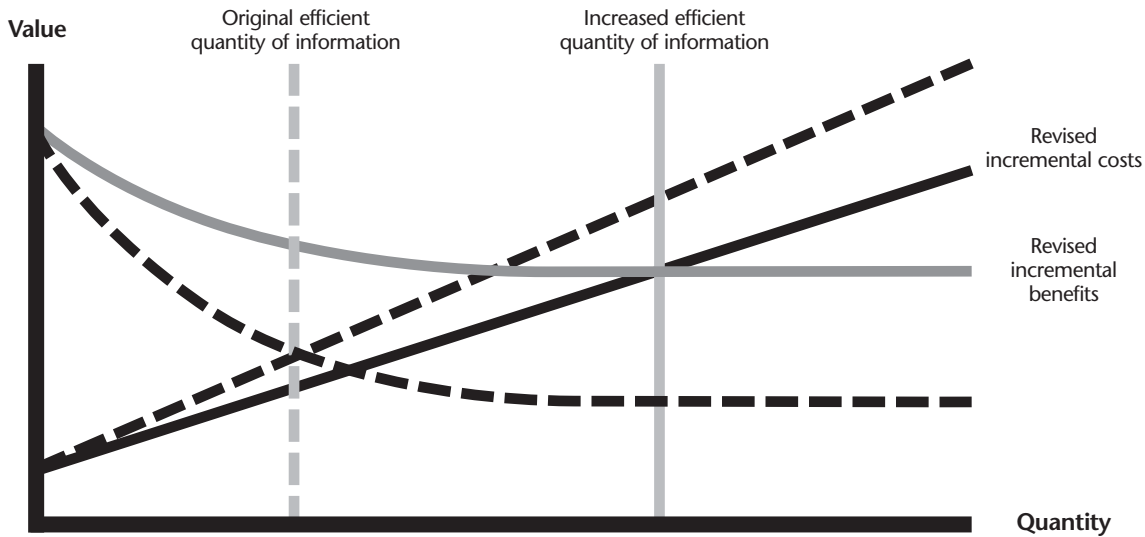
- digital information does not degrade and therefore it can be reproduced infinitely in the same state as the original;
- digitisation provides a common language for any type of communication which can be converted into digital format, such as photographs, movies, music and games and this enables the integration, or convergence, of the same content over different media; and
- digital technology is very flexible and therefore provides for a high degree of programmability and interactive communication.

3.4.6 Changing information supply and demand curves

Through the combination of different technologies, IT changes the supply and demand curves of information. It does this in two ways, frequently at the same time. It reduces the costs of information-handling and communication activities and it enables businesses to get more benefits from the use of information. By shifting both the supply and demand curves, IT potentially increases the amount of information that it is economically viable to produce and the net benefits of that information. This is shown in Figure 3.6.

⁵³ Philip Evans and Thomas S. Wurster, *Blown to Bits: how the new economics of information transforms strategy*, Boston: Harvard Business School Press, 2000.

Figure 3.6: Impact of IT on information quantity



There is much debate about the extent to which IT has flattened supply and demand curves, but, once again, the precise shape of the curves is not of great importance. The key point is that if the incremental costs of information are significantly reduced and the incremental benefits are significantly increased, the result is an information explosion.

3.4.7 Reduced costs

Progress in IT, working for example through Moore's Law, reduces the cost of information-related activities in many possible ways, for example:

- less human labour is required to undertake tasks which have been automated;
- less physical space may be needed to store information;
- information may be accessed and retrieved at less cost; and
- it may be cheaper to exchange information.

Given the amount of information held within a business, and therefore the sheer volume of information-related tasks, benefits could be expected from this factor alone. Indeed, reducing the costs of these activities was the focus of early IT systems through automating information processing and replacing human labour. However, in many cases, this has had a minor net impact in practice, as the reduction in information-handling costs has been offset by a redeployment of resources to deal with increased volumes.

Figure 3.6 shows why we should not be surprised or cynical about IT investment if it actually increases total IT costs as shown by the area under the supply curve for the increased quantity of information produced. The key question is whether net benefits are increased.

The extent of IT's ability to create value for businesses cannot be limited to saving costs by automating the status quo. A former IBM President Thomas H. Watson has been quoted with saying in 1943 that there would be a need for only five computers in the world. It was thought that once information processing was automated in all businesses, the application of IT would be complete. Even if five computers were unlikely to have ever been sufficient for the task as it was then perceived, the application of IT was nevertheless clearly thought to be very limited.

The explosion of IT throughout the economy, before the widespread availability of networks as well as after, showed that the cost-saving effects of IT systems could be increasingly wide-ranging.

3.4.8 Increased benefits

As well as reducing incremental costs, IT systems also increase the incremental benefits that can accrue from information. IT enables information to be communicated to more people, more quickly and in more interactive ways. Further, it can improve the quality of that information. In its *Information for Better Markets* initiative, ICAEW identified core characteristics of good information,⁵⁴ which should be:

- relevant;
- accurate;
- reliable;
- comparable;
- understandable;
- concise;
- timely;
- fairly presented; and
- avoid perverse effects.

Some of these characteristics can be strongly influenced by the use of IT to increase the benefits of information. IT can be used to tailor information to different users' needs so that it is more relevant. Automating the processing of information should provide more accurate and reliable information with less risk of human error. In certain cases, IT can also help make information more comparable through the enforcement of data standards and it can make information available on a timelier basis.

3.5 Creative destruction and IT

Our analysis of understanding the business sets great store by the potential of IT to unleash creative destruction. The potentially destructive power of competition has been particularly discussed in the context of competitors who apply new technology. Economist Joseph Schumpeter studied the power of technological progress to drive the capitalist economy and central to his theory is the concept of creative destruction.⁵⁵ Occasionally, a new technology is developed which has a radical impact and ultimately destroys the profits of businesses across an entire industry. New technology-based products may greatly increase the value offered to customers. Technology may improve the process of making or selling products, thereby improving quality or reducing cost. It may also change the complementary assets required in an industry, destroying the role and value of existing assets.

By creating this destructive force, an innovator can dominate an industry and secure higher profits for a period of time. However, competitors catch up with the innovation as it becomes industry standard, and the ability to extract higher profits from it diminishes. This cycle may then be repeated with a new wave of creative destruction.

The impact of this destructive power of new technology in practice is mixed, as it can be competence-destroying or competence-enhancing.⁵⁶ On some occasions, it has radically reshaped entire industries. Leading companies can be overtaken by new entrants if they are heavily reliant on the old technology base and cannot adapt to the new technology or the skills required to use it. However, existing companies may be able to utilise their existing assets to take advantage of the new technology and grow more quickly than new entrants. New technologies may also complement rather than destroy old technologies.

These points are highly relevant to information technology. IT embodies technological change that has the power to transform industries through competition in the way described by Joseph Schumpeter. Chapter 4 contains many examples. Consequently, any business should be aware that it could pay a heavy price if it does not exploit the value creating possibilities of IT to the full but its competitors do.

⁵⁴ ICAEW, *Information for Markets and Society*, London: Institute of Chartered Accountants in England and Wales, 2005.

⁵⁵ Joseph Schumpeter, *Capitalism, Socialism and Democracy*, London: G. Allen & Unwin, 1943.

⁵⁶ Michael Tushman and Philip Anderson 'Technological discontinuities and organizational environments', *Administrative Science Quarterly*, 31(3), 1986, pp439–465.

3.6 Impact of IT projects

Where a business model involves exchanging information with counterparties by buying and selling information services, IT will affect the volume and value of those exchanges by shifting demand and supply curves in the way we have described. However, given the central role of value, co-ordination and knowledge-related information in each and every business model, changes brought about by constant progress in IT should lead to far more radical and pervasive effects on any business.

By improving the content and flow of all types of information, IT projects can touch everything that a business does, sometimes in a profound manner.

- IT can improve the information exchanged with a business's actual and potential counterparties on the provision of value, increasing the reach of the business and improving understanding of counterparty needs.
- Improvements to information concerning co-ordination can have significant benefits, both to the efficiency and controls of the business, and the way that it can serve counterparties. Further, the availability of more information can address some of the transaction cost issues that define the boundaries of the firm, thereby triggering the restructuring of entire industries.
- The ability to share knowledge more effectively can also enable improvements throughout the business, both in serving counterparties and in streamlining internal operations.

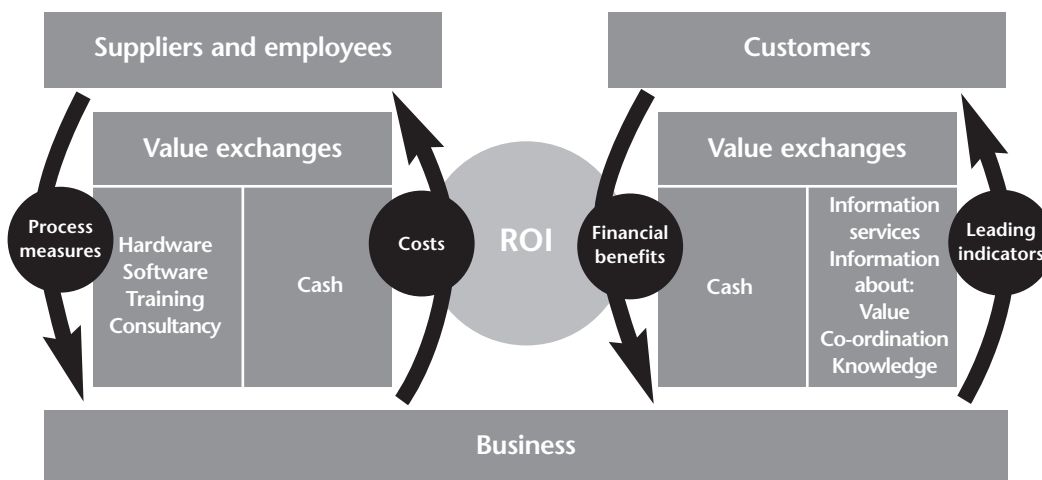
Any IT system can make improvements in one or more of these areas to provide potential benefits either internally to the operations of the business or externally, through its interactions with counterparties and the value that it offers them.

Putting this into the context of the business model, an IT investment project involves a business in spending cash on IT hardware, software, training and consultancy services, as well as internal staff time. By combining it with other investments and existing organisational resources, a business can improve its use and communication of information. The challenge in an IT investment is to understand how:

- these improvements to information will ultimately provide more value to counterparties through information services and enhanced value information, co-ordination and knowledge; and
- how the business will thereby derive financial benefits which exceed the project costs.

The challenge is summarised in Figure 3.7 which combines Figures 3.3 and Figure 3.4 to show what is involved in securing a net cash inflow from an IT investment and achieving good returns from IT.

Figure 3.7: Creating value from IT projects

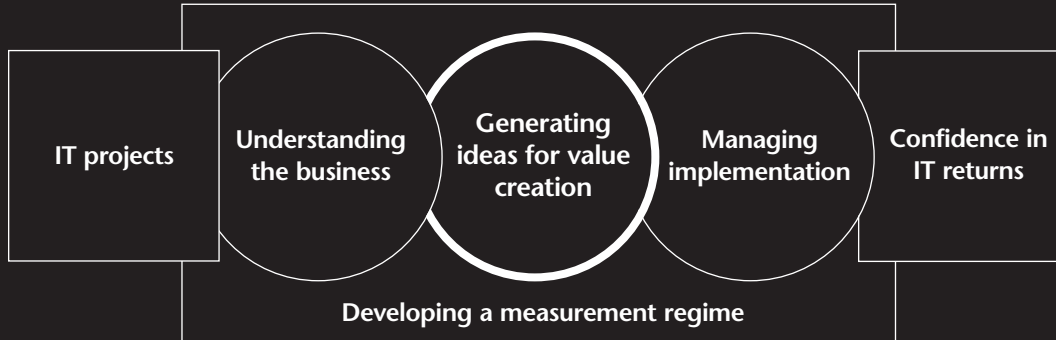


The presentation of an IT project in Figure 3.7 is also used to show the vital role of an effective measurement regime in supporting value creation and investment returns. Measures of costs and financial benefits support the calculation of ROI, while leading indicators serve principally to measure the value that IT is providing to counterparties, and process measures assist primarily in organising project inputs so that they supply new and enhanced information at reduced incremental cost.

Indeed, the left-hand side of Figure 3.7 can be seen as getting behind the information supply curve, while the right-hand side gets behind the demand curve. Underpinning it all, the business serves the vital function of the firm in Coase's theory by intermediating between market transactions. Not shown are the competitors for whom the business could become the agent or victim of IT's power of creative destruction.

4. GENERATING IDEAS FOR VALUE CREATION

Creating value through the use of IT depends on generating ideas for value-creating projects. Analysis of this essential activity is underpinned by a proactive approach to all projects, a clear understanding of the central role of information in all businesses and a clear framework for thinking about the benefits of applying IT.



Summary

Creating value through the use of IT depends on generating ideas for value-creating projects. Analysis of this essential activity is underpinned by:

- a proposal that businesses actively seek to maximise value even from projects that they apparently have to do;
- a clear understanding of the central role that information plays in all businesses; and
- a framework for thinking about the benefits of applying IT to information that represents a new service, communicates value, supports co-ordination or codifies knowledge.

The aim is to promote confidence in the value of IT projects by basing IT expenditure on more than a leap of faith, a fear of being left behind or a resigned acceptance that there is no alternative. It is also important to provide substance to back up claims that IT brings new ways to deliver value, new ways to create value and even new types of value. Whether a business is in a period of growth, stability or retrenchment, it will benefit from clear thinking about how IT projects can deliver value.

Some IT projects appear to involve little choice. There can be compliance or regulatory reasons for making IT investments. Hardware or software may no longer work and so need to be replaced. There could be compelling non-technical reasons for making an investment such as uneconomic manual workarounds or the control problems associated with old systems. Other projects are seen as reactions to outside events aimed at tactical rather than long-term strategic advantage.

While many IT projects will appear to suggest themselves, it is proposed that businesses develop a more active and benefits-led approach to IT investments. This means looking for value opportunities in all projects and also generating ideas for projects by starting with benefits the business would like to achieve and assessing how to achieve them at minimum cost through IT. A business is likely to increase its chances of success by developing a clear structure to identify benefits. Six main types of benefits which may be achieved through the effective implementation of IT systems are presented with supporting examples.

Investment in IT can create value by:

- creating new types of value because IT is applied to information that will support new information services, encourage new information intermediaries and enable users to create their own value;
- improving the search process because IT provides information on value that will reduce search costs, provide access to new markets and improve supplementary information that is available from new sources in the marketplace;
- increasing efficiency because IT is applied to information for co-ordination that will reduce the cost of information-related activities, improve co-ordination through more accurate information, automate and improve decisions, reduce the need for physical assets and improve processes through knowledge sharing;
- improving control and governance because IT provides information for co-ordination that will reduce the risk of error and improve visibility of operations;
- removing operational constraints because IT provides information for co-ordination that will handle an increased volume of counterparties, enable outsourcing to suppliers, support global operations, encourage collaboration and create organisational flexibility; and
- improving value propositions because IT provides knowledge that will give better understanding of counterparty demands, enhance counterparty experiences and strengthen innovation through knowledge sharing.

The power of these benefits is also demonstrated by their ability to damage competitors through new competition, network effects and destruction of value propositions.

4.1 Acknowledging the investment context

Our aim is to promote confidence in the value of IT projects and provide substance to claims that IT generates new ways to deliver value, new ways to create value and even new types of value. Whether a business is in a period of growth, stability or retrenchment, it will benefit from clear thinking about how IT projects can deliver value. But before embarking on an upbeat assessment of the potential benefits of IT projects, it is only fair to acknowledge that many decisions to invest in IT are not spurred by any consideration of the benefits that may be achieved. They appear to involve little choice and in that sense are non-discretionary. In reality, many IT projects are necessary in order for a business simply to operate and survive. They might bring the substantial benefit of not going out of business, but that is unlikely to feel like much of a benefit.

However, even when IT projects appear to be non-discretionary, that does not preclude securing additional benefits. Costs may be subject to downward negotiation and deferral and the value creation ideas outlined later in this chapter may still be relevant.

4.1.1 Non-discretionary IT projects

There may be compliance or regulatory reasons for making IT investments. Specific types of systems or technologies may be mandated by regulators, such as XBRL reporting technology. Alternatively, improved systems may be required to enable a business to provide the information needed to meet regulatory requirements. Finance or financial reporting systems or upgrades may commonly be implemented on this basis.

There may be clear technical reasons for an investment, where hardware or software no longer works and needs to be replaced. Upgrades are frequently considered to be in this category, although they may not always be technically necessary. In such cases, the software should continue to operate without the upgrade even though it will not be supported or further developed by the vendor. A business can choose to manage the risk involved but in most cases, upgrades will be considered necessary at some point and discretion and analysis will be limited to matters of timing.

There may also be business circumstances that compel a business to invest in new IT. It simply may not be possible to manage and control business processes where systems are old or poorly integrated. The level of manual workaround required in such cases may take substantial resources and time, making it uneconomic. In addition, a business may view it as necessary to make an investment simply to stay in business where competitors are making such investments.

4.1.2 Discretionary IT spending

In many other cases, investment in IT is discretionary but projects are still seen to be reactions to outside events. While benefits may be achieved which lead to improved performance, similar benefits are also expected to be achieved by competitors. Consequently, the business may not be able to differentiate itself in the longer run by making these kinds of investments. Rather, it makes short-term gains and keeps up with competitors.

Where a business only aims to achieve tactical benefits from new IT systems that bring a short-term improvement in performance, the potential return on investment is crucial to the decision on whether to invest. Without a net benefit and return, the investment should not be made and therefore having clarity over the specific benefits is important.

Are all businesses doomed to make decisions on a purely tactical basis or can IT investment enable a business to achieve long-term strategic advantage, thereby delivering profits which are consistently ahead of those of competitors? Such competitive advantage can be achieved in two ways, according to the celebrated work of Michael Porter:⁵⁷

- through delivering products at a lower cost than competitors; or
- through offering customers superior value.

This can only be achieved where the strategy and actions of the business cannot be easily replicated by competitors. The extent to which IT can bring a business sustainable competitive advantage has been the subject of much debate. Earlier, we highlighted Nicholas Carr's article 'IT Doesn't Matter'. This challenged the notion that IT could ever provide a business with

⁵⁷ Michael Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York: Free Press, 1980; Michael Porter, *Competitive Advantage*, New York: Free Press, 1985; Michael Porter, *On Competition*, Boston: Harvard Business Press, 1998.

sustainable competitive advantage. He argued that IT is ubiquitous and equally available to all. Therefore, any investments can be copied by competitors and any advantage gained cannot be sustained.

There has been a wide literature which challenges Carr's argument, and asserts that IT can indeed provide sustainable advantage. However, to find this advantage, it is necessary to look beyond the technology and understand how it is implemented within a specific business. In a review of the academic research in the area, Gabriele Piccoli and Blake Ives identified four types of barrier which can protect IT investments from replication and enable sustainable advantage:⁵⁸

- resources, including the IT infrastructure and information, as well as the capabilities within the business;
- complementary resources, such as physical locations;
- specific projects and the ability of a business to implement the technology successfully in a timely manner, including factors such as complexity and level of process change; and
- pre-emption, for example creating costs for customers if they wish to switch to a different provider, and/or building greater value for customers through network effects.

Even if such advantage can be obtained, however, the duration of such an advantage is also a matter of debate. While there is no doubt that companies such as Dell or Wal-Mart have used IT systems to provide sustainable competitive advantage over long time periods, there is also research that in many cases, such advantage can be short-lived.

A study by Andrew McAfee and Erik Brynjolfsson suggested that industries with heavy IT investment since the mid 1990s have seen greater concentration, turbulence and performance spread than industries with lower levels of IT investment.⁵⁹ This reflects two main trends:

- the group of top performers pulled away from the pack, thereby magnifying differences between high and low performers and increasing concentration; and
- there was greater change in market share between these top performers.

Although they acknowledge a range of factors may be responsible for these changes, McAfee and Brynjolfsson argue that IT investment is crucial. They hypothesise that new technologies enable businesses to implement and roll out new processes consistently and quickly, embedding these systems and processes in the way that people work. Therefore, local factors affecting competition, such as good individual managers, have diminishing influence, enabling high performers to extend their dominance. However, all high performers are doing the same thing across all their processes, leading to short-term advantage which is rapidly eliminated.

4.2 Thinking about benefits

Whatever the context of an IT investment, using a framework to identify and analyse possible benefits will enable a business to be more proactive in its management of benefits. Where projects are deemed to be non-discretionary, it may help to identify incidental benefits that can be pursued as part of the implementation. Where projects are discretionary, having a structure to identify and analyse the possible benefits may help it to be more active and benefits-led in its approach.

4.2.1 A positive approach

In Chapter 2, we described investment as a process of transforming costs into benefits. However, that does not prevent a business from starting with the benefits it wants to achieve and assessing how to achieve those benefits at minimum cost through IT. A business which approaches IT projects in this way seems more likely to make the right decisions and create value. While this may seem obvious, many IT projects appear to suggest themselves and start from the perspective of a possible new system and its potential cost. This is then followed by a process of identifying potential benefits.

⁵⁸ Gabriele Piccoli and Blake Ives, 'IT-Dependent Strategic Initiatives and Sustained Competitive Advantage: A Review and Synthesis of the Literature', *MIS Quarterly*, 29(4), 2005, pp747–776.

⁵⁹ Andrew McAfee and Erik Brynjolfsson, 'Investing in the IT that makes a competitive difference', *Harvard Business Review*, 86(7/8), 2008, pp98–107.

By having a clear way of thinking through the types of benefits that IT can deliver, a business may be able to reverse conventional processes, and focus more clearly on the desired benefits upfront. While the process of identifying benefits, in practice, is likely to be an iterative one, balancing what is wanted with what is possible, a business can start to develop a more proactive approach to identifying benefits by structuring its thinking in a consistent way. The ultimate aim is that no IT expenditure would be based simply on a leap of faith, a fear of being left behind or a resigned acceptance that there is no alternative.

4.2.2 Types of IT projects and benefits

There are many ways in which the various impacts of IT systems can be structured. A common typology focuses on the type of change, and the effect on the capabilities of the business. This often presents IT projects as falling into one of three main categories.⁶⁰

- Simple automation of the operations of the business. This is a low level of change, focused on reducing the costs of current operations.
- Providing more information to the business to enable better decision making. This could provide many different benefits, depending on the type of information provided.
- Transformational change that alters the way the business does things, or indeed what the business actually does.

However, in this report we build on the ideas introduced in Chapter 3 and use our representation of value exchanges in business models to analyse the types of benefits which may be achieved through IT systems. As such, we look at the way that a business creates value for different counterparties, and how IT can change these basic capabilities. In Chapter 3, we concluded that value can be created where IT is applied to information that:

- represents a new service;
- is about value;
- supports co-ordination; or
- captures knowledge.

To this end, in this chapter, we highlight six areas to look at when generating ideas for value creation through IT. Investment in IT systems can create value by:

- creating new types of value;
- improving the search process;
- increasing the efficiency of operations;
- improving control and governance;
- removing constraints on operations; and
- improving the value offered to counterparties.

We conclude this chapter by proposing that businesses should also think about how investment in IT can create value by damaging competitors, or at least forcing them into defensive, non-discretionary IT projects.

4.3 Creating new types of value

Information itself is an economic good and can constitute the actual value offered to customers. In summary, investment in IT can create value by creating new types of value because it is applied to information that will support new information services, encourage new information intermediaries and enable users to create their own value.

4.3.1 Support new information services

As might be expected, IT has had a major impact on the types of information services available in the marketplace. The development of digital technology, in particular the digitisation of increasing amounts of information and entertainment content, enables the convergence of different media, with the same content available in multiple formats. This results in, for example, television and print media competing and providing the same content over the internet.

⁶⁰ Bruce Dehning, Vernon J. Richardson and Robert W. Zmud, 'The Value Relevance of Announcements of Transformational Information Technology Investments', *MIS Quarterly*, 27(4), 2003, pp637–656.

While in itself convergence does not create new services, it provides opportunities to use devices differently and therefore may in the long term lead to new types of services.

This is also greatly helped by the economics of information, and digital information in particular.⁶¹ In contrast to physical products, a piece of information can be shared with an unlimited audience, subject to the rules applied through copyright. The only economic constraint is the cost of the physical medium of distribution and communication, such as a book or newspaper. With digital information once the infrastructure is in place, and the information is created, the incremental costs of storing and distributing new digital information services are virtually zero. This provides opportunities to provide many more products to customers that, in the physical world, would be economically unviable.

Contrast a record shop with a digital music store. A bricks and mortar shop maintains a physical inventory and replenishes stock as it is bought. From an economic perspective, it makes sense to hold only stock which will sell easily as there is a cost attached to holding inventory. What can be stocked in practice is therefore limited by the physical size of the store and by the economic need to stock products which will sell easily. A digital music store, on the other hand, has none of these restrictions. The incremental cost of storing an additional piece of data is practically zero. Moreover, the shop only requires a single copy of each piece of music as it can be copied to an unlimited degree.

Therefore, the economic need to stock only products which will sell quickly in large numbers is not so compelling. As long as a product is bought by a few people, it justifies its place in the inventory. The evidence suggests that in such cases many of the products that are stocked are actually purchased. While the top sellers continue to dominate sales, small purchases of large numbers of items make up a significant proportion of revenues. This is known as the 'long tail'.⁶²

While there is a strong economic logic to this argument, the extent to which this will change consumer buying habits has been challenged on a number of grounds. The most popular items, for example, are likely to continue to dominate sales based on wider cultural factors, regardless of the ability of stores to stock a wider range of goods.⁶³ Moreover, the cost of providing such services is not zero. There are still many costs incurred by a business in building and running the infrastructure. In addition, the content provider needs to be rewarded in some way to encourage them to create further content. Therefore, while the incremental costs of additional products may be low, the business model as a whole continues to incur significant cost.

However, despite these challenges, there are likely to be opportunities to provide access to a wider range of products and services than was previously economically viable by utilising this idea of the long tail.

4.3.2 Encourage new information intermediaries

Many businesses ultimately create value by acting as an intermediary and connecting together different counterparties. Markets are one of the simplest and most established forms of intermediary value. From the earliest days of market trading, whether in fields or coffee shops, markets have brought together buyers and sellers and provided a forum for them to transact. The stock markets of modern times are more sophisticated examples of this same basic principle, bringing together buyers and sellers of company shares and securities. Other examples include:

- auction houses, travel agencies and financial brokers, which connect buyers and sellers of particular goods; and
- recruitment agencies, which connect employers and employees.

A successful intermediary business model depends on two major variables:

- the ability of the intermediary to make good matches between counterparties; and
- the inability of the counterparties to find each other directly, at a time and cost acceptable to both parties.

⁶¹ Danny Quah, *Digital Goods and the New Economy*, LSE Centre for Economic Performance, Discussion Paper No. 563, 2003.

⁶² Chris Anderson, *The Long Tail: why the future of business is selling less of more*, New York: Hyperion, 2006.

⁶³ Anita Elberse, 'Should You Invest in the Long Tail?', *Harvard Business Review*, 86(7/8), 2008, pp88–96.

Therefore, information underpins this type of model. With the availability of more information, as well as greater reach to counterparties, there will be opportunities for new types of intermediary services. More counterparties can be engaged and better matches can be made. However, these opportunities are potentially offset by the fact that counterparties can also find each other directly, by-passing the business and challenging the value it provides. This is the process of disintermediation and is illustrated by the case of travel agencies set out below.

Example 4.1: Travel agencies and the internet

The advent of e-commerce has resulted in significant challenges to traditional travel agencies since the 1990s.⁶⁴ Central to this challenge has been the process of disintermediation. In the case of airline tickets, travel agents were traditionally paid on the basis of commission for each ticket sold. However, as airlines looked for ways to cut costs, internet technology provided new opportunities. The ability of customers to book tickets directly over the internet with airlines bypassed the travel agent entirely. This has been replicated by other forms of travel booking, such as hotels, where buyers and sellers can now be connected directly, without the need for an intermediary or through new internet-based intermediaries.

Where there are pressures for disintermediation, a business needs to create additional value in order to maintain its intermediary position between counterparties. A core driver in creating this value is network effects. Networks are generally more valuable as more people join them. This creates more potential inputs from participants or connections between participants.⁶⁵ By using IT to find and connect exactly the right people wherever they are in the world, a business can build network effects and thereby create greater value than the individual would be able to realise alone. This makes new intermediary services viable.

At their most simple, these new services can focus on aiding the search of individuals for information, such as search engines or information portals. There are services which provide more specific information to aid the evaluation of products and services, for example, price comparison sites. Finally, there are websites which enable specific transactions, such as on-line auctions or marketplaces.

However, while there may be opportunities for new services, building sustainable business models in these cases is extremely difficult in practice. For the model to work, as in any traditional intermediary model, both potential buyers and potential sellers, or potential users, need to be attracted to the business by the promise that they are going to be rewarded by good matches for whatever they are trying to achieve.⁶⁶ Attraction is therefore strongly governed by network effects. Buyers will only sign up if they think they will find good products and sellers will only sign up if they think they will find sufficient customers. As the service grows, it attracts even more users. However, the business needs to find a way to attract users with different needs to the site in the first place.

4.3.3 Enable users to create their own value

There are also an increasing number of websites which focus simply on connecting people together for social or other purposes. In these cases, the business is providing a platform for users to create their own content. It provides a framework but the content is created by the users in their own free time. Therefore, the value being delivered to the users is defined entirely by the users themselves and what they want to achieve from the service, whether network-building, social interaction or participating in games. This is quite different to many other types of website, which are ultimately geared to assisting a buyer undertake a specific economic transaction.

⁶⁴ Donald J. McCubbrey and Richard G. Taylor, 'Disintermediation and reintermediation in the U.S. air travel distribution industry: a Delphi reprise', *Communications of the Association for Information Systems*, 2005(15), 2005, pp464–477.

⁶⁵ Michael L. Katz and Carl Shapiro, 'System Competition and Network Effects', *Journal of Economic Perspectives*, 8(2), 1994, pp93–115.

⁶⁶ Thomas Eisenmann, Geoffrey Parker, Marshall W. Van Alstyne, 'Strategies for Two-sided Markets', *Harvard Business Review*, 84(10), 2006, pp92–101.

4.4 Improving the search process

Prior to any kind of economic transaction, a counterparty and a business search in the marketplace for matches that provide them with the best value. However, the act of searching has a cost attached to it, which primarily relates to the time taken to find the best match. Improving the search process and reducing the search costs of all parties increases the chances of matches being made and transactions taking place. This can result in:

- more counterparties being attracted to a business;
- better quality counterparties who can offer better value exchanges being attracted to a business; and
- counterparties being found in a more efficient manner for the business.

Improvements to the information flow between businesses and counterparties enabled through IT can provide opportunities to do all of these things better. In summary, investment in IT can create value by improving the search process because it provides information on value that will reduce search costs, provide access to new markets and improve supplementary information.

4.4.1 Reduce search costs

The internet has significantly reduced the search costs of customers in particular. With more information available instantly, customers can find businesses more quickly and easily, which may encourage them to enter into a transaction. Therefore, investments in websites and related technology are important tools in facilitating the search of a customer and gaining transactions. Indeed, such investments may be necessary in order to be found at all, as customers increasingly focus their search activity on the internet. A business can also provide better information concerning the value it offers through this medium. This can further reduce the search costs of customers, enabling them to find relevant information more easily. Moreover, businesses may be able to engage with customers in new ways which are more persuasive and lead to more transactions.

As well as reducing the search costs of customers, a business can reduce its own costs of engaging in the search process. By having better information about potential customers, through customer relationship management systems or contact databases, for example, a business can improve its targeting and focus its resources on customers who may be able to offer greater value.

These types of benefits apply more broadly to other counterparties. Not-for-profit organisations, for example, can use IT to improve their chances of success in the search process for donors and volunteers. Better targeting of potential donors and more interactive ways of engaging volunteers, for example, can be greatly facilitated through the use of the internet and customer relationship management tools.

Businesses can also improve the search process with potential employees, using sophisticated tools to filter on-line job applicants, such as pre-application questions and tests, and thereby reduce their search costs. Furthermore, businesses can provide a wide range of information on-line to engage high quality candidates and encourage them to apply to their business.

4.4.2 Provide access to new markets

Internet technology enables a business to reach new markets of counterparties, primarily in locations where it has no physical presence and therefore where it would not have previously been found in a search. Consequently, counterparties can find new businesses that may make a better match for what they want, increasing the chances of a successful transaction. As before, this can potentially lead to a greater number of customers, for example, as well as better quality customers with whom a business can have a richer value exchange. In particular, businesses may be able to locate customers who value their products more highly and will pay a premium price.

Again, this benefit can also be achieved in the context of other counterparties. For example, a not-for-profit organisation may be able to find donors who will pay more to support the cause or employees and volunteers with more suitable skills or more valuable knowledge.

4.4.3 Improve supplementary information

Counterparties can also gain access to information about businesses, products and services from entirely new sources in the marketplace. This further aids the search process and buying decisions. While communication between customers, in particular, has always been possible, IT creates new opportunities as customers can find each other more easily. Many websites include ratings or recommendations services, enabling previous customers to provide feedback on their experience to other potential customers.⁶⁷ There are also examples of websites which serve employees in similar ways, enabling them to rate current employers and compare them to other businesses.

Of course, this is not necessarily a benefit to a business. However, there are ways that businesses can use this broader information network to increase their marketing efforts and use existing customers, in particular, to promote products and services on their behalf. This type of marketing attempts to use the power of the network to market a business's value propositions less directly and at no cost to the business.⁶⁸ However, there may be mixed success in this area, as the business does not have control over the outcome. Moreover, the reactions of others can be hard to predict. Therefore, while it is another way of getting information to counterparties to aid in their search and ultimately draw them into the business, such an approach has risks attached.

4.5 Increasing efficiency

We have seen the amount of information that sits at the centre of a business, and how it underpins everything that the business does. If information can be used more effectively, there are likely to be substantial benefits for businesses. Therefore, changes here are based around the processes and activities of the business as it co-ordinates between different counterparties to deliver value to them. Greater efficiency should free up cash within the business to be used to improve counterparty value, whether through increased profits for shareholders or re-investment in new initiatives for other counterparties.

In summary, investment in IT can create value by increasing the efficiency of operations because it is applied to information for co-ordination that will reduce the cost of information-related activities, improve co-ordination through more accurate information, automate and improve decisions, reduce the need for physical assets and improve processes through knowledge sharing.

4.5.1 Reduce the cost of information-related activities

We have already seen that IT can reduce the cost of information-related activities. Improvements in this area support the increased efficiency of the business, for example:

- fewer human resources may be needed to undertake information processing;
- less physical space may be needed to hold information; and
- less time may be needed to find and process information.

There are also likely to be efficiencies from higher quality information through automated processes. By using IT systems, less manual work is required, reducing the risk of errors, and minimising the level of rework that may be necessary to correct poor information. When IT systems are initially implemented, significant benefits are likely to be found in this area. However, as systems are refined, improved and updated, and automation is completed, the opportunities for new benefits are likely to diminish.

4.5.2 Improve co-ordination through more accurate information

Many business processes are primarily focused on transforming resources to deliver products or services to customers in return for cash. All of these processes aim to make the most efficient and effective use of the resources available, for example:

- making resources available exactly when needed;
- maximising the utilisation of assets; and
- planning for the future to ensure that likely demand can be met.

⁶⁷ Chrysanthos Dellarocas, 'The Digitization of Word of Mouth: Promise and Challenges of Online Feedback Mechanisms', *Management Science*, 49(10), 2003, pp1407–1424.

⁶⁸ Special edition on word of mouth advertising, *Journal of Advertising Research*, 47(4), 2007.

To support these processes, businesses use a wide range of information relating to specific transactions, which provides an accurate picture of the current position and enables a business to achieve effective co-ordination between parties. The more accurate the information available to a business, the better it can co-ordinate resources to meet the needs exactly. Greater accuracy in information relating to past transactions also enables better understanding and analysis of past trends and assists businesses in predicting future demands.

Back office systems, such as finance systems, which process and record the transactions of businesses are at the heart of such improvements. While the benefits of such systems typically start with the replacement of human labour, and a reduction in cost of these information-related activities, they provide the information to enable much broader improvements in effective and efficient co-ordination.

IT systems provide many opportunities to improve business performance. Greater visibility of where raw materials or stock are physically situated, for example, should enable a more accurate matching of supply and demand, through radio frequency identification (RFID) technology.

Example 4.2: Radio frequency identification technology

RFID technology is the latest technology to present opportunities to improve supply chain efficiency. While it is still in the early stages of development, many retailers have shown significant interest in piloting the technology.⁶⁹

RFID technology is similar to barcode technology, in that it enables businesses to physically tag items of stock to track their progress through the supply chain. However, RFID tags emit wireless signals which can be picked up by readers without the requirement for any physical line of sight. This potentially provides significant advantages over barcodes, as information may be more easily extracted on the exact location of items.

This increase in the timeliness and accuracy of information provides many opportunities for improving supply chain processes. For high value goods, in particular, it could help in the reduction of theft and supply chain leakage in general. It should also support more accurate matching of supply and demand, increasing product availability and lowering inventory.

There are still many challenges with the deployment of RFID technology. Significant investment is required to build the appropriate technical infrastructure, for example. The data needs to be integrated into existing IT systems, which would potentially involve a large financial outlay. The sheer volume of data that can be generated, and the storage and management of it, also require serious consideration as do issues of control, security and underlying technical standards.

However, many retailers are running pilot projects and it is likely that RFID technology will quite soon become standard in the retail industry. In the meantime, the European Commission is consulting about the broader development of RFID and associated technologies as the basis for an 'internet of things', enabling communication of information about physical objects wherever they may be.

4.5.3 Automate and improve decisions

The process of co-ordination is based around many decisions: for example, what to build, when to build it and what supplies to order. We have highlighted how more accurate information can lead to better co-ordination, as decisions can be made on the basis of the exact position. IT systems can also improve the quality of decisions by automating them and applying more sophisticated logic to the decision process.

Any decision which is subject to a set of standard rules can be improved in this way, as an IT system can apply highly complex algorithms which most accurately reflect what the business wants to do. This has been seen particularly in planning and scheduling systems, which can

⁶⁹ Gaetano Borriello, 'RFID: Tagging the World', *Communications of the ACM*, 48(9), 2005, pp34–37.

enable greater optimisation of resources and assets than would be possible through a manual process. The American Airlines yield management systems provide a striking illustration.

Example 4.3: Sabre system

Initially developed in the 1960s Sabre, together with associated systems of American Airlines, provides a yield management capability that optimises the capacity utilisation of aircraft. The systems co-ordinate supply and demand, using highly sophisticated logic, with the overall objective of 'selling the right seats to the right customers at the right price'. This therefore balances factors such as over-bookings, late cancellations and discount tickets to improve utilisation.⁷⁰

The use of such sophisticated systems enables an airline to draw on high levels of historical data to understand trends, as well as develop algorithms which are appropriate to their needs. On this basis, airlines can discount some seats, while retaining others at a higher price. These types of systems of yield management have subsequently been implemented throughout the airline industry in particular and are now critical to success.

4.5.4 Reduce the need for physical assets

IT can be used to exchange all the information needed to complete a transaction. As a result, it is possible to conduct transactions virtually, with no physical meeting between the parties. This can enable a business to operate with less physical resources.

While it was possible to conduct virtual transactions prior to the internet, there were barriers to realising such transactions on a large scale, such as delivering physical goods to disparate locations in an economically viable manner. However, improvements in co-ordination capability described earlier have been a key building block in overcoming these barriers. A customer also needs to be able to make an informed choice and the internet has significantly enhanced the ability of the customer to find and view products and services virtually. In many cases, the customer is satisfied with this type of storefront and is willing to undertake transactions on this basis. Businesses can therefore create ways of operating which require little investment or maintenance of physical premises, such as bricks and mortar stores.

Another type of virtualisation is between employees and a business. The communications technology now available has reduced the need to meet in person. This is manifested in the increased prevalence of flexible working patterns, whereby employees can exercise greater choice about where and when they work. On this basis, businesses can reduce the cost of physical premises, as they need to find space for fewer people.

4.5.5 Improve processes through knowledge sharing

Knowledge underpins the processes of any business, helping individual employees to apply processes in practice on the basis of past experience and learning. Knowledge management, and systems that enable the sharing of related information, can therefore assist in the implementation of consistent and high quality processes and practices across a business.

Such systems are essentially repositories of information, which are structured to enable the user to find the desired information easily and help them to complete their task. The information captured could include descriptions of how things are done and contact points for particular questions. Effective knowledge sharing should also avoid re-inventing the wheel, namely inventing the same knowledge in multiple places. This can improve efficiencies, both in terms of knowledge creation and consistency and standardisation of operations.

⁷⁰ Barry Smith, John Leimkuhler and Ross Darrow, 'Yield Management at American Airlines', *Interfaces*, 22(1), 1992, pp8–31.

4.6 Improving control and governance

While improved control may result in lower costs and greater efficiency, it can also be a benefit in itself. It can reduce the risk of operational failures or financial errors. For many counterparties, such failures may not be a major concern. However, for shareholders and lenders in particular, lack of control may be a significant concern if it puts their investment in the business at risk. IT systems can improve the level of control in a business, and thereby increase the confidence of investors.

Improved governance is also likely to be an important benefit in itself in public sector IT initiatives. Enhancing the confidence of citizens in the process of government through greater transparency is frequently an underlying objective of new IT systems.

In summary, investment in IT can create value by improving governance and control because it provides information for co-ordination that will reduce the risk of error and improve visibility of operations.

4.6.1 Reduce the risk of error

IT systems can reduce the amount of manual work that is required in information-handling tasks by automating processes and the workflow between different functions, in particular, less data has to be manually input and there is less re-keying of data between systems, reducing the risk of human error or data conflicts. While this clearly does not eliminate the risk of errors, IT systems can enable businesses to make significant improvements.

Improvements in information processes also enable control points to be automated, for example approvals or authorisations for particular activities. Exception reporting enables failures to be highlighted easily and quickly. Therefore, controls can be added which are potentially effective and efficient.

4.6.2 Improve visibility of operations

Improvements in the visibility of activities should enable greater control over operations. Risks can be managed more closely, as a business may have earlier visibility of problems. More detailed information is available for the purposes of audit trails and analysis in the event of failures. It also provides greater transparency on how money is being spent and therefore it can bring major benefits by increasing accountability.

4.7 Removing operational constraints

A lack of information, or an inability to process or communicate information, constrain the ability of businesses to operate in particular ways. IT can remove many of these constraints and enable businesses to operate on a scale which would not otherwise be possible and through increasingly complex relationships. This does not in itself improve the value offered to counterparties or indeed the efficiency of the business. However, it provides new options on how to structure the business model and operations of a business which may ultimately support either of these objectives.

In summary, investment in IT can create value by removing constraints on operations because it provides information for co-ordination to handle an increased volume of counterparties, enable outsourcing to suppliers, global operations and collaboration, and create organisational flexibility.

4.7.1 Handle an increased volume of counterparties

The ability of a business to grow and take on more counterparties, particularly customers and employees, can be hampered by its ability to handle the underlying volume of information. The sheer number of transactions to be co-ordinated, processed, aggregated, summarised and reported in a controlled and timely manner can be a barrier to growth.

The ability of IT systems to capture, process and store large volumes of information enables businesses to undertake more transactions. IT can provide a platform for the growth of a business, and enable it to increase in size and scale in the long term without significant impairment of senior management's ability to run the business in a responsive manner.

4.7.2 Enable outsourcing to suppliers

Transaction costs influence whether it is more efficient to undertake tasks within a business or through an external supplier. As highlighted in Chapter 3, many transaction costs are driven by imperfections in available information. There are a number of ways in which improvements enabled by IT can reduce the transaction costs of using third parties:

- More information can be provided about the specific services provided and the performance delivered against agreed targets. As suppliers can capture more detailed information about the tasks undertaken, the risk of supplier opportunism can be reduced by providing greater transparency about the value delivered.
- More information can be made available on alternative service providers, enabling a comparison of cost and service between different suppliers.

This reduction in transaction costs enables a business to reconsider its use of external suppliers and therefore the boundaries of the business as a whole. Where activities are not specific to the business, it may benefit from using an external supplier who specialises in those activities. The quality and price may be better than could be achieved by undertaking the activity in-house, and the additional cost of a market transaction may be reduced to a level which does not nullify the benefit of specialisation.

This economic logic has been reflected in the rise of outsourcing, and enables a business to focus its resources on activities which create value for counterparties. While there are a number of factors in outsourcing decisions, and specialisation does not always result in a lower cost as suppliers themselves need to make a profit, changes in IT have enabled businesses to make more conscious decisions on the activities they will undertake themselves.

Evidence from substantial academic research on the extent to which IT has actually had a negative effect on the size of businesses because of outsourcing suggests that there has been some impact.⁷¹ However, it may be that the greatest opportunities fall to new entrants in a marketplace. New businesses can be created that require lower levels of capital investment and fewer employees, as more services can be bought from third-party suppliers. As a result, the business can focus purely on co-ordinating the activities of others and creating highly specialist value in small niches. Amazon provides a well known example of outsourcing.

Example 4.4: Amazon.com

Internet retailer Amazon.com has built a successful business initially with very little by way of physical assets or resources.⁷² The vast majority of activities were outsourced to suppliers, with Amazon itself focusing on the technology of the website and thereby creating the best shopping experience possible. Warehouses and logistics tasks were not managed by Amazon, and Amazon did not own any of the physical assets supporting these processes.

Over time, Amazon has moved away from reliance on third-party suppliers to increase the reliability of its service, and has consequently acquired warehouses. However, its business model is still substantially based on using suppliers, acting as a storefront to other suppliers and thereby minimising physical inventory and assets.

4.7.3 Support global operations

While there have been many drivers to the increase in globalisation, IT has been an important enabler, reducing some of the risks and costs of doing business on a global scale. We have highlighted the ability of a business to reach new markets of customers overseas, complemented by improvements in co-ordination to deliver goods. The increased availability of information and global communication capabilities also means that a business can have a far higher level of visibility and control over foreign operations than was previously possible and thereby

⁷¹ Erik Brynjolfsson, Thomas Malone, Vijay Gurbaxani and Ajit Kambil, 'Does Information Technology Lead to Smaller Firms?' *Management Science*, 40(12), 1994, pp1628–1644.

⁷² Robert Spector, *amazon.com – Get Big Fast: Inside the Revolutionary Business Model That Changed the World*, London: Random House Business, 2000.

source a greater level of its activities overseas.

This level of control can be further enhanced by implementing a standard set of systems, subject to local laws and regulations. Activities can be undertaken on the basis of the same processes anywhere in the world. Moreover, the improved co-ordination capability enables the global management of resources. Goods can be tracked across the world and a business can easily find out whether goods are finished, shipped, on a plane, at a warehouse or delivered to the customer. As a result, many businesses have been able to realise the benefits of specialist production and the opportunities to use resources in lower cost economies across the globe.

4.7.4 Encourage collaboration

Another possible change is captured by the term collaboration, or sharing and developing knowledge across organisational boundaries. This contrasts with co-ordination, where one party delegates or contracts a specific piece of work to another party. With collaboration, parties from different parts of a business, or different businesses, work together to share ideas, solve problems and develop new knowledge without hierarchy. Communities therefore tend to be relatively informal and do not follow organisational reporting lines or boundaries. Individuals are bound together by a shared interest, frequently directed at solving practical problems.

All businesses have a range of formal counterparties with whom they co-operate and whose activities they may manage. They also have less formally defined counterparties who may provide input or feedback in particular areas when needed.

These communities or networks vary in their importance, depending on the nature of the industry. However, where specialist knowledge is highly dispersed, collaboration across such groups can be vital.

The improved communications infrastructure offered through IT encourages the formation of such groups. It enables groups to join together more effectively with a wider membership and an interactive means to communicate, based around new tools designed specifically to facilitate greater collaboration. Wikis, for example, invite many people to create a single piece of writing through individual contributions and the editing of others' contributions. The philosophy behind these tools holds that the efforts of a group can produce a better quality product than the efforts of an individual in isolation.⁷³

Collaboration has of course always been productive. The *Oxford English Dictionary* was compiled through the most extraordinary collaborative effort of unpaid volunteers, who read books and sent in slips of paper containing quotations to demonstrate the meaning of particular words. Five million such slips were returned, which the editors had to consider and streamline for the purposes of defining 414,825 words.⁷⁴ This example shows that anything is possible with enough human determination but it took nearly 70 years to complete the process.

IT can potentially accelerate such processes many times over provided that it is used constructively and not just as a means of facilitating quarrelsome debate. The objective of Wikipedia may be similar to that of the *Oxford English Dictionary*. However, the rate at which Wikipedia has grown, in comparison to the 70 years taken to compile the *Oxford English Dictionary*, demonstrates the power of IT and the difference that it can make to such endeavours.

⁷³ Don Tapscott and Anthony D Williams, *Wikinomics: How Mass Collaboration Changes Everything*, New York: Portfolio, 2006.

⁷⁴ Simon Winchester, *The Meaning of Everything: the Story of the Oxford English Dictionary*, Oxford: Oxford University Press, 2003.

Example 4.5: Wikipedia

Wikipedia is a not-for-profit website which provides a free encyclopaedia in many languages. There are over two million articles in English, and over eight million articles in total in over 250 languages. This makes it a massive resource and far bigger than any written encyclopaedia.

The articles are written collaboratively by volunteers and the site is open to anyone to contribute. Articles can be created and edited as desired by any individual, subject to an overarching review and governance structure. As such, it appeals to the strength of peer review and the benefit of multiple contributions, in contrast to the expertise of a single individual. It also enables entries to be very current.

There are clearly risks to such an open approach. First and foremost is the risk of inaccurate entries. As entries are not subject to formal review, the risk of error or bias is potentially high. In a hotly debated article, *Nature* magazine did a comparison of scientific entries in Wikipedia and *Encyclopaedia Britannica*.⁷⁵ Interestingly, the results showed little difference in the level of accuracy in practice, a result that was challenged by Britannica. While the level of accuracy is likely to vary with obscure entries, for example, being less likely to be subject to critical review and correction, the evidence suggests that the information provided is likely to be sufficiently accurate for many purposes.

Wikipedia also employs a governance structure of volunteers to police disputes and manage the risk of malicious entries. Particularly contentious and controversial entries are reviewed regularly and inappropriate information can be quickly removed.⁷⁶ Nevertheless, certain topics are beset by running battles, and the introduction of deliberate falsehoods can go unnoticed for a long time.

4.7.5 Create organisational flexibility

While all of the benefits outlined in this section are enabled by specific applications, all of them are also underpinned by an IT infrastructure. This is the platform which underlies the applications, including the network, operating systems and database systems. Although the infrastructure can be viewed as a utility, and simply a cost to be incurred, it can also be perceived as providing a specific benefit, namely organisational flexibility.⁷⁷

By creating an infrastructure which connects the business and has capacity for growth, a business can react more quickly to new business requirements and accommodate new applications when needed. Therefore, a capability of flexibility does not provide an immediate benefit to a business and indeed, in itself, it provides no specific benefit at all. However, it underpins other benefits, and enables the business to gain value from other systems.

4.8 Improving value propositions

Increasingly, IT systems impact interactions with counterparties, and therefore can potentially be used to support improvements to the value offered through organisational knowledge. While this clearly applies to the value that businesses can offer customers, it also applies to other counterparties, and their experience when dealing with the business.

In summary, investment in IT can create value by improving value propositions because it provides knowledge that will give better understanding of counterparty demands, improve counterparty experience and improve innovation through knowledge sharing.

⁷⁵ Jim Giles, 'Special Report: Internet encyclopaedias go head to head', *Nature*, 438(7070), 2005, pp900–901.

⁷⁶ Christian Wagner and Ann Majchrzak, 'Enabling Customer-Centricity using Wikis and the Wiki Way', *Journal of Management Information Systems*, 23(3), 2006–7, pp17–43.

⁷⁷ Peter Weill, Mani Subramani and Marianne Broadbent, 'Building IT Infrastructure for Strategic Agility', *MIT Sloan Management Review*, 44(1), 2002, pp57–65.

4.8.1 Better understanding of counterparty demands

IT systems can enable businesses to capture more detailed information on the needs, wants and desires of customers. There are many possible mechanisms for this. Store loyalty cards, for example, provide a vast amount of information on individual purchases, enabling a detailed understanding and profiling of customers. Searching on a business's website leaves a trail of activity, providing potential insight as to what a customer may be looking for. Data warehouses and other data analytics tools can also pull together data from a range of sources and provide an integrated view of customer activity or profitability.

By having a better understanding of what different customers want, both in terms of general trends and the needs of specific individuals, businesses can develop new and improved products and services to meet identified customer needs more closely and increase the overall value offered.

This can also be applied to other revenue-generating counterparties, in particular, to improve the value that they receive. By building a better understanding of the specific causes that are valued by donors and volunteers, not-for-profit organisations can tailor activities to meet those particular demands and increase the perception of value for these counterparties.

4.8.2 Enhance counterparty experiences

IT can be used to enhance counterparties' experience of a business. A higher level of customer service, for example, may be possible through the effective use of IT. Products or services may be delivered more quickly, or to meet specific customer demands. By sharing information more effectively, businesses may be better able to answer queries or problems from customers and thereby provide enhanced service. Better visibility of counterparties and their total engagement with the business can lead to a more co-ordinated and higher quality service, as is illustrated by electronic patient record systems.

Example 4.6: Electronic patient records

Electronic patient record systems are being implemented in many countries and bring a number of potential benefits. Central to these is the ability to share information amongst healthcare providers, based on a single master record for each individual patient.

While there are obvious efficiency benefits to such health systems, there are also significant potential benefits to the patient from the system, highlighted in a report concerning the UK's implementation of such a system. It should reduce the risk of error from incomplete or inaccurate information, and thereby increase the quality of diagnosis and clinical care. It should also improve the communication between patient and health care provider, providing greater transparency of care and timelier transmission of information.⁷⁸

Businesses may also be able to provide complementary information services in support of their principal products. Track and trace services, for example, are built on information already available to a business to co-ordinate activities and have become an important complementary service added to the delivery of goods.

IT can make a business easier to deal with and thereby improve the experience of the transaction. Transactions completed on-line may enable the customer to complete the exchange at their convenience. There is no need to queue or transact during the opening hours of the business. Furthermore, IT is increasingly being used to change and improve the experience of the employee, thereby increasing the value of their relationship with the business. The ability to work flexibly, for example, is valued by many employees and is underpinned by IT.

⁷⁸ House of Commons Health Committee, *The Electronic Patient Record*, Sixth Report of Session 2006–07, HC 422-I, London: The Stationery Office Limited, 2007.

4.8.3 Strengthen innovation through knowledge sharing

IT can support the sharing of knowledge between a business and its counterparties, leading to improvements in the products and services available. Interactive tools, such as on-line forums, enable the customers and employees of a business to share knowledge and experience of using products and services more effectively, providing insights for product innovation and enhancements.

Example 4.7: Novell wiki

The software house Novell created a wiki which is contributed to by a mix of staff and customers to develop and share knowledge of Novell software and its practical application and installation. This originally started as a discussion group, with Q&A threads between customers and Novell developers. Although it became too big and confusing for this forum, the quality of information was high and the company wanted to build on the existing knowledge. It was able to do so using a wiki format, which provided the required flexibility and usability for all concerned.⁷⁹

This is also likely to lead to the creation of further knowledge. While there are many factors which support the creation of new ideas and innovation in general, the ability to connect people, frequently from different parts of a business, is a clear contributor. Good ideas are rarely generated in isolation. They typically come from a dialogue between different parties, combining existing knowledge, challenging each others' ideas and bringing different thinking and experience to a discussion. Therefore, the ability to use IT to share information widely and cheaply is likely to underpin the successful sharing and creation of knowledge throughout a business, thereby potentially increasing value for its counterparties.

4.9 Damaging competitors

We have outlined six major benefits from IT systems, and described some of the ways that IT can be used to achieve these benefits. However, the same benefits have a negative impact on others. As discussed in Chapter 3, businesses are surrounded by competitors, who can also make IT investments that can adversely affect a business. Therefore, a business needs to think about how its investments in IT will negatively affect competitors and the value they offer their counterparties through increased competition, through network effects and through IT's ability to destroy value propositions. Like any other technology, IT has the ability to unleash Schumpeter's creative destruction.

4.9.1 New competition

IT brings a business the opportunity to engage with new counterparties, attracting them away from competitors and enabling access to new markets. Furthermore, a business can develop new ways of engaging and serving customers, which increase the value it offers, thereby diminishing the value offered by competitors in the eyes of their counterparties. Therefore, many IT investments can lead to increased competition overall, pushing competitors to make investments merely to keep up.

Investments in technology can also open up new industries to a business. The convergence in media, for example, means that print media now compete directly with broadcasters, who would not have been perceived to be direct competitors previously. Likewise, the development of new technical devices means that phone and camera manufacturers, operating in two traditionally very different industries, now compete directly.

4.9.2 Network effects

We highlighted earlier the concept of network effects and their role in driving value in certain types of business model. The reverse side of network effects is that, when they are present, the impact of not being part of the network can be damaging. It is clearly helpful to a business if competitors become locked out of a network and find it difficult to do business with others.

⁷⁹ Christian Wagner and Ann Majchrzak, 'Enabling Customer-Centricity using Wikis and the Wiki Way', *Journal of Management Information Systems*, 23(3), 2006-7, pp17-43; Stan Gibson, 'Veni, Vidi, Wiki', *eWeek*, 23(46), 2006, pp22-28.

However, even investments that help a business establish early positions of prominence in emerging networks may force competitors to make defensive investments just to survive. This is particularly the case with communications technologies and software.

Without the ability to exchange information in a standard way, the value of many IT systems is diminished. There are many technical standards in place to enable this communication and these are regularly supplemented by data standards for specific types of data exchanges. Network effects have also been clearly seen in the field of office software and personal computers. A business needs to have particular types of systems as a necessary pre-condition for conducting business at all.

4.9.3 Destruction of value propositions

IT investment can destroy the value that competitors bring to customers, thereby threatening the viability and sustainability of their businesses. The process of disintermediation and the challenge to businesses such as travel agencies is one such example. Another example was the introduction of computers and automation at the New York Stock Exchange in the 1960s. The substantial change in cost structure enabled by this transition, and the consequent impact on the way that trading was done, destroyed some dealers entirely while providing new opportunities for others.⁸⁰

The economics of digital information is a further example. Before digital technology, it required substantial investments in fixed assets such as printing presses and distribution networks to copy and distribute content. The copying of the content, whether a book or newspaper or record, also had a significant marginal cost. Contrast this with digital technology. Once the infrastructure is in place for the business and user, digital information can be copied and recopied as much as desired, with zero incremental cost. The need for the intermediary business is greatly diminished. *Encyclopaedia Britannica* represents a well known example of creative destruction arising from IT.

Example 4.8: Encyclopaedia Britannica

The *Encyclopaedia Britannica* business model was built on hard copy and expensive volumes of books, which had a strong brand value for excellence. With the advent of the CD-Rom, and later the internet, this value proposition was strongly challenged as competitors developed alternatives which were cheaper, more interactive and more easily searchable. The priorities of the customer changed to favour a more convenient and accessible format, threatening the whole business. Sales of the print books dropped by 80% and the company was ultimately sold for half of its book value as it struggled to stay in business.⁸¹

The Britannica business has subsequently successfully changed its value proposition to meet these new challenges, shifting its content online and moving towards the community concept. This shows that new technology need not destroy incumbents but it may drive them to make substantial changes to stay in business.

As has been well documented, developments in digital technology are having a highly disruptive and potentially destructive impact on content distributing industries such as record companies and film distributors. While copyright rules continue to exist, there are conflicting priorities between the need to protect content and the benefits of sharing information products widely.⁸² Content producers can access audiences directly without the need for intermediaries at all. IT also enables audiences to share content between themselves without reference to the original distributor. Moreover, the culture of free products and services, which permeates the internet, challenges the ability of businesses to charge for many types of value.

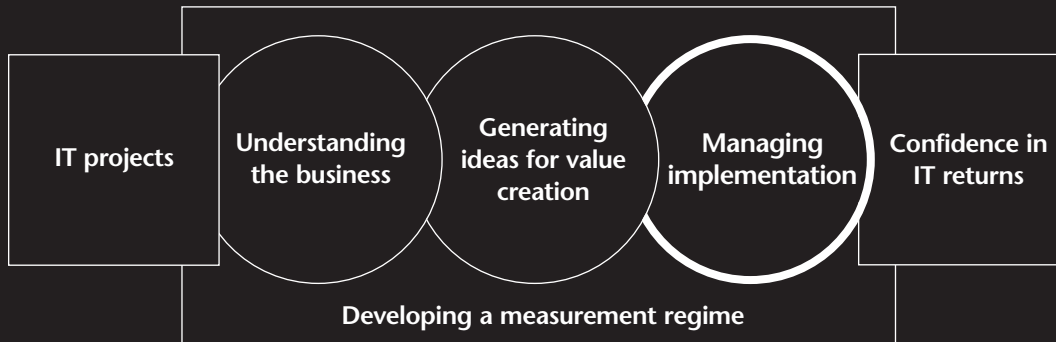
⁸⁰ Phillip Bradford and Paul Miranti, 'Finance, Technology and Associationalism: Automating Odd-Lot Trading at the New York Stock Exchange 1958–1976', working paper.

⁸¹ John Boudreau, Benjamin Dunford and Peter Ramstad, 'The Human Capital "Impact" on e-business: The case of Encyclopaedia Britannica', Cornell University Center for Advanced Human Resource Studies, Working Paper Series 00–05, 2000.

⁸² William Davies and Kay Withers, *Public Innovation: Intellectual Property in a Digital Age*, London: Institute for Public Policy Research, 2006.

5. MANAGING IMPLEMENTATION

Creating value through the use of IT depends on managing the implementation of IT projects. Analysis of this essential activity is underpinned by a recognition of the challenges involved in attributing success to specific management practices, changing information flows which are closely related to how a business delivers value, and achieving benefits from IT when broader organisational and external factors are in play.



Summary

Creating value through the use of IT depends on managing the implementation of IT projects. Analysis of this essential activity is underpinned by a recognition that the association of specific management practices with successful outcomes is helpful but does not establish cause and effect.

Despite all the opportunities there are for businesses to create value through IT and a wealth of documented project management practices, achieving demonstrable benefits remains stubbornly difficult for many businesses. Four major implementation challenges are discussed. For each of the challenges, management techniques drawn from a wide range of literature are outlined and illustrated.

First, managing risk and uncertainty is complicated by the difficulty of predicting how counterparties and competitors will react to changes in information flows. Here it may help to:

- apply options thinking to recognise the value of waiting and delaying irreversible commitments;
- recognise path dependency to focus on simplicity, openness and flexibility and maximise future choice;
- adopt a portfolio approach to balance the risk and reward profile of IT projects; and
- maintain strategic focus in the risk management activities associated with specific projects.

Second, transforming information systems is complicated by the fact that businesses already have their information systems configured to their current ways of operating and changing them can require significant effort. Here it may help to:

- encourage radical thinking by allocating time to trying out new ideas;
- map information flows outside traditional accounting areas so that current ways of operating are better understood; and
- commit to business change so that IT projects are seen as being about people not just technology.

Third, making a business case for IT projects is complicated by the frequent difficulty of articulating the base case and anticipating the monetisation of benefits without which an IT project will deliver little value. Here it may help to:

- explain the base case of doing nothing in an outward facing way that considers the actions of competitors and considers different scenarios; and
- understand monetisation and explore what is known about different approaches that the business might take to generating cash from new IT-driven processes.

Fourth, achieving the broader business change that comes with IT projects is complicated by the need to manage the demand for resources across a business. Here it may help to:

- formalise IT decision making by drawing on the emerging practice of IT governance;
- establish IT reporting structures, for example choosing whether the IT function is a service provider or a business partner; and
- manage benefits starting with the identification of specific registers of anticipated IT project benefits.

Nevertheless, the complexity of many IT projects means that successful implementation will continue to be demanding and frequently elusive.

5.1 Research into management practices

We have described numerous ways that businesses can use IT to create value. However, despite all of these opportunities, achieving demonstrable benefits has proved stubbornly difficult in practice for many businesses. As we noted in Chapter 1, the reality of IT systems and IT-driven business models has frequently failed to live up to their promise.

Although identifying management practices that are associated with successful businesses is an area rich in literature, rigorous academic research in this area is problematical. Genuine causation, for example, is impossible to prove in most cases. A particular technique may be observed in a case study and may be perceived by management, or a researcher, to be important. However, such perceptions are highly subjective. There may be many factors contributing to success, and isolating one or two practices is fraught with risk. People also typically want to ascribe success to things they have done, and will rationalise outcomes on that basis after the event. Moreover, the literature in this area is largely written in the context of success. For every business that has used a particular technique with success, there may be many more that have used it and failed without this being recorded for posterity.

While statistical studies may be more objective, archival-based research in particular focuses on correlations between factors, not cause and effect. It shows that where certain factors are present, a particular outcome is more likely.⁸³ However, while it can highlight interesting associations, research of this type is frequently of limited practical use to management as it does not look in detail at specific practices.

Success can also be transitory and stories of business success can easily turn into failure over time. Enron, for example, was cited as a great innovator in creating a new and highly successful business model.⁸⁴ Given the events that subsequently engulfed Enron, the lessons that were once drawn from that business are no longer credible. We run similar risks in presenting examples in this report.

However, despite these theoretical and practical problems, there is still substantial, credible research which can inform management on practices that may contribute to success.

5.2 Management challenges of IT

A common question in any debate concerning the creation of value from IT is why projects continue to go wrong, despite the wealth of management practices and literature available. While there are many possible reasons for these continuing failures, this report highlights the complex nature of IT systems and the challenges of translating the features and functions of systems into benefits that people value. As a result, earning satisfactory returns from IT projects can be particularly difficult in practice.

5.2.1 IT and the business model

Central to our analysis in this report is the idea that information is at the heart of any business model. It underpins everything a business does, influences its boundaries and permeates its relationships with counterparties. As a result, applying technology to information can have a profound impact. It can touch on all counterparty relationships, influencing the delivery of value and the content of value propositions themselves. It provides many opportunities for businesses simply to do things better than they currently do. However, it also provides opportunities for a business to redefine what it does and how it structures its relationships with others.

The effect of IT systems can be highly pervasive. Information is integral to how businesses do things and therefore IT systems can have a massive impact on the way that businesses operate, particularly the way that individuals do their jobs. Furthermore, business model analysis shows that any business is a complex system of value, containing a number of interconnected relationships and based on many subjective views as to the worth of its various offerings. Changing what is offered to one party can ultimately have an impact on the wider

⁸³ Kevin W. Kobelsky, Vernon J. Richardson, Rodney E. Smith and Robert W. Zmud, 'Determinants and Consequences of Firm Information Technology Budgets', *The Accounting Review*, 83(4), 2008, pp957–995.

⁸⁴ Gary Hamel, *Leading the Revolution*, Boston: Harvard Business School Press, 2000.

system, making changes to the whole business potentially unpredictable and difficult to control. This is exacerbated where phenomena such as network effects operate. In these cases, businesses may have little control over, or ability to predict, the final outcome of their activities.

Value can also be destroyed through the IT investments of others, particularly competitors. We have described the destructive capability of IT and the benefits that are available to counterparties as a result of more information being in the marketplace. This makes the role of the external environment in IT investments particularly important.

5.2.2 Summary of management challenges

Drawing on these ideas we focus on four major challenges to management in realising value from IT investments. These are:

- managing risk and uncertainty;
- transforming information systems;
- making a business case; and
- achieving business change.

In the remainder of this chapter we consider each of these challenges in more detail and how they are particularly relevant to IT projects. In addition, we outline some relevant areas of management practice which could be considered in addressing these challenges.

5.3 Managing risk and uncertainty

5.3.1 Overview of management challenge

There are many reasons why IT projects can exhibit high levels of uncertainty. The business environment may change and benefits that were originally envisaged may no longer exist. New opportunities may arise which present far better value for the business. It may not be possible to foresee the exact needs of the business in the future.

Given the type of benefits that IT may bring, the impact in many cases may also be unpredictable, with the business having limited control over the outcome. However, as business models are reliant on information, poor systems can have a significant effect on a business and its ability to deliver value to counterparties. Moreover, even initiatives that appear to be relatively minor can have a profound impact on a business's ability to create value. This can lead to significant risks in many types of IT investments.

The main challenge in managing IT risks is articulating their full impact. IT risk management techniques typically focus on the technical risks of system failures, rather than the broader business risks of an initiative. In order to articulate these, a business needs to understand how the initiative is going to create value and affect counterparty relationships.

5.3.2 Apply options thinking

Uncertainty challenges businesses in their use of techniques such as NPV because the calculations are dependent upon management being able to predict the future cash flows which an investment may bring about. Where that is not possible businesses may be able to draw from practices in fields which exhibit high levels of uncertainty, such as research and development, and find alternative tools. In these areas governance processes aim to keep options open and enable more iterative decision making. This is a different way of thinking about investments which is less fixed and emphasises flexibility. It also enables decisions to be made as more information becomes available and uncertainty is reduced.

At the heart of options thinking is the idea that where there is insufficient information available to forecast whether an investment will result in value, a business may benefit from creating an option to do it at some point in the future. Where uncertainty is high, the value of the option is high, as there is a chance that it may create high levels of value. There is also, of course a chance that it creates no value. However, the business only commits to the cost of creating the option, not the full investment cost. Costs of this type may include a pilot project, or research and development on products. The cost of creating an option and its value can be incorporated into a conventional NPV calculation for investment decision-making purposes.

IT projects can be well suited to the flexibility valued by real options. Systems and infrastructure can be built in a flexible way to enable options to be kept open as long as possible, and enable changes as the project proceeds. Staged implementations and pilots are also common. However, this type of thinking goes beyond periodically reviewing progress. It pushes businesses to create options, to delay committing irreversibly to a project until as late as possible and to ascribe value to waiting until sufficient information is available.⁸⁵ It also requires a management culture which is open to abandoning projects if the option proves not to be worth exercising, something which can be difficult to do in practice.⁸⁶

5.3.3 Recognise path dependency

Another line of thinking concerns path dependency, a term which is commonly found in technology literature. Research in this area analyses how new investments are strongly determined by previous investments, as they create a specific path and limit future development. On this basis IT projects should focus on simplicity, openness and flexibility. This should maximise future choices and not lock businesses into particular ways of doing things which may not remain appropriate. Shinsei Bank provides an example of this approach in practice.

Example 5.1: Shinsei Bank

In an article in the Harvard Business Review,⁸⁷ David Upton and Bradley Staats describe the approach used by Shinsei Bank to develop new systems. Shinsei wanted to update their systems substantially but recognised a number of challenges. They wanted to move cheaply and quickly and were nervous about the risk of a major systems implementation based on the experience of many others. They wanted users to accept it but also were not sure of exactly what the long-term requirements were.

As a result, they adopted an approach which emphasised future growth, simplicity and continuous improvement. Building the system around a modular approach, developers were able to work on discrete areas without impacting the whole system, thereby reducing dependencies and speeding up the process. They also concentrated on foreseeable objectives, given that they could not foresee all future needs. Therefore, the system could be built on the basis of what they knew, but in a flexible manner, allowing for future growth and change.

At a process level both options thinking and path dependency are consistent with more traditional project management methodologies which typically incorporate review stages and the use of pilots. However, they emphasise the changing environment with more explicit and pro-active means of managing this fluidity.

This leads to a different mindset for managing investments. Many types of traditional evaluation could be seen as a one-off activity for tracking delivered projects. In the case of many IT projects this is simply not the case. As more information becomes available, and the activities of others become clearer, the value proposition may become very different. As such, a more iterative investment process may be helpful. This is likely to be the case particularly where investments are more radical and innovative in nature or where there is a high level of organisational change. However, care also needs to be taken that options are exercised, and projects are completed on some basis, or cancelled, and do not simply evolve on an open-ended basis.

5.3.4 Adopt a portfolio approach

The use of investment portfolios is also a well-established management technique to mitigate the risks of individual IT initiatives. This is based on the same approach as for any financial investment portfolio, namely that any successful investor has a mix of investments that

⁸⁵ Robert G. Fichman, Mark Keil and Amrit Tiwana, 'Beyond Valuation: "Options thinking" in IT Project Management', *California Management Review*, 47(2), 2005, pp74–96.

⁸⁶ Ron Adner and Daniel Levinthal, 'What is *Not* a Real Option: Considering Boundaries for the Application of Real Options to Business Strategy', *Academy of Management Review*, 29(1), 2004, pp74–85.

⁸⁷ David Upton and Bradley Staats, 'Radically Simple IT', *Harvard Business Review*, 86(3), 2008, pp118–124.

balances risks and rewards. Therefore, while a business should take on some high risk projects which promise high reward, it should also have low risk projects to balance the risk of failures.

Val IT represents a comprehensive IT governance methodology, based on research with companies including ING. This advances the idea of managing IT investments around the concept of the portfolio.⁸⁸ It involves three levels of process:

- value governance, which sets the overall priorities and strategy;
- portfolio management itself, which is where decisions are made; and
- investment management, which is concerned with the management and delivery of individual initiatives.

Example 5.2: ING

As part of the research and development into the Val IT methodology, a case study was undertaken at ING, the financial services company, considering its use of portfolio management techniques.⁸⁹ It treats IT investments in the same way as traditional equity investments, recognising the high risk and potential high reward of many IT projects and balancing investments on the basis of risk and potential NPV. The major benefit of this approach is the greater transparency over projects, improving decision making and enabling the identification and possible cancellation of high risk, low reward projects.

While such a formal approach is likely to be useful particularly for larger businesses, thinking in terms of the risk and reward of initiatives should assist any business in structuring decision making to maximise possible value. However, IT investments should also be looked at in a broader context and not in isolation. A business may wish to balance its IT investments with non-IT investments to maximise the return on its resources as a whole. Therefore, while IT governance tools such as Val IT can help to bring structure and discipline to areas in which it may have been previously lacking, they should be implemented in conjunction with wider governance structures.

5.3.5 Maintain strategic focus

In order to manage specific IT project risks, a business needs to understand how a specific IT investment will create value, and the different ways it may impact on counterparty relationships. The concept of alignment focuses on matching the objectives of the business and of the IT function to ensure that IT initiatives support wider business goals. Therefore, through alignment, a business considers how it may be able use technology, and the information it produces, to create value for its counterparties.

Alignment can sit at a strategic level so that a business identifies how IT can support its major strategic priorities, such as cost reduction, improving customer satisfaction or standardising operations. While this has the advantage of simplicity, it creates a relatively high level process. Moreover, it assumes that the business strategy and IT are entirely separate. As we have seen with our business model analysis this is not the case and IT itself may present opportunities to do new things or operate in new ways.

Alternatively, businesses can consider alignment on the basis of specific processes. Paul Tallon has developed an approach which places alignment at the process level, on the basis that this is where businesses actually create value.⁹⁰ By building on tools such as Porter's value chain analysis to identify the processes which are particularly important to their value-creation activities, businesses can thereby target IT investments. This type of analysis may be very helpful for investments which are directed at process improvement. However, we have discussed a wide range of broader scenarios in which IT can create value and therefore concentrating analysis purely on business processes would seem to be only a partial solution.

⁸⁸ IT Governance Institute, *Enterprise value: Governance of IT investments, The Val IT Framework 2.0*, 2008.

⁸⁹ IT Governance Institute, *Enterprise value: Governance of IT investments, The ING Case Study*, 2006.

⁹⁰ Paul Tallon, 'Process-Oriented Perspective on the Alignment of Information Technology and Business Strategy', *Journal of Management Information Systems*, 24(3), 2007, pp227–268.

A business may also be able to use the business model concept to supplement these techniques. By analysing the value system as a whole, and how information underpins it, a business may be able to move beyond pure process improvement. It may be able to develop a better understanding of how information contributes to its overall creation of value. As a result, it may provide a useful framework around which to base discussions between the IT function and the wider business to identify the opportunities and the possible impacts of IT projects.

5.4 Transforming information systems

5.4.1 Overview of management challenge

We have seen the pervasiveness of information throughout a business and how the availability and flow of information strongly influence the way that individuals carry out their jobs. In addition, the information available to individuals is an important factor in establishing and maintaining the hierarchy and power structures of a business.

As a result, the information flows and structures that underpin businesses are inherently sticky, frequently resulting in significant resistance to change. Moreover, the level of change needed may well be difficult to ascertain until the business has done substantial work on the implementation of a project and defined in detail its current operations and where the new system will take it.

Implementing change is crucial to the success of IT projects and failure to do so leads to a risk of value destruction. Instead of reducing the costs of information, businesses can increase their costs through poor implementation. The individual may carry out the same task in the same way but the information to do it may no longer be readily available. This danger is sharply illustrated by the catchphrase 'Computer says no' in the *Little Britain* television series. Therefore, IT systems can mean that it takes longer and costs more to undertake the same operation and if individuals continue to do the same task in the same way, there are unlikely to be any significant benefits.

Such considerations may explain why the best exploitation of new IT systems, in many cases, has been achieved by new entrants to a market. They have been able to build new information flows and structures based on new opportunities. In contrast, incumbents have legacy IT systems and, as a result, they have to change the way people do things, and the underlying information structures, in order to realise any benefit from new IT systems. This typically requires a major investment of organisational resources to succeed and therefore involves substantial cost.

5.4.2 Encourage radical thinking

The first area of management practice we consider in this context is the generation of ideas for doing things differently based on new technology. Research into innovation in IT is typically focused on technology and media companies and how they incorporate innovation into new products. In the case of Google,⁹¹ a well-documented example of technology innovation, staff are allotted specific time for new development activities and encouraged to innovate and try out new ideas. While there may be many ideas that are flawed, a small number may have real merit and can be developed into products, features and services.

Outside the technology sector, IT suppliers tend to dominate idea generation based on their particular products. Alternatively, businesses may be heavily dependent on the skills and knowledge of specific individuals to generate new ideas. Of course, a business cannot force innovation and indeed too much emphasis on process can stifle creativity and idea generation. However, a business may be able to create an environment to encourage new ideas.

Developing a structure for identifying benefits from IT systems, for example, as we discussed in Chapter 4, may help businesses generate ideas more proactively, resulting in projects being more benefits-led. On this basis, non-IT staff at any level may be able to identify the benefits that they would like to see, based on how they do their job and the specific needs of any counterparties with whom they interact. Although the development of detailed business cases will involve interaction between the wider business, the IT function and IT suppliers, new structures can encourage a different mindset and emphasis in the business.

⁹¹ Bala Iyer and Thomas H. Davenport, 'Reverse Engineering Google's Innovation Machine', *Harvard Business Review*, 86(4), 2008, pp58–68.

Good communication is also likely to be central to innovation, particularly the sharing of ideas and knowledge and the IT function needs to work effectively with the rest of the business to identify benefits. A business needs to create ongoing communication structures which build trust between different parties, and enable knowledge sharing across different technical areas. These communication channels can also be reflected in formal structures and reporting lines. Most IT functions include both technical specialists and business-orientated personnel with the latter group typically responsible for developing business requirements, project management, training and user-related support. The positioning of this group is crucial in order to balance closeness to, and understanding of, the business with appropriate levels of technical expertise.

5.4.3 Map information flows

Historically, IT systems were principally concerned with administrative processes, frequently in the area of finance. As such, they were built on an existing understanding of information flows which was developed primarily through the accounting discipline. The process of mapping information and cash flows through the use of flow charts is common in these areas, particularly to assist in the identification of control points.

However, IT systems are increasingly spreading into entirely new areas of businesses. In content industries, for example, the entire process of making films or music is being transformed by new digital technology. Indeed, even in businesses that produce tangible outputs, opportunities to outsource large swathes of internal operations mean that, while it holds some intellectual capital, the business in many ways becomes a co-ordinator of the activities of others. In such cases, information flows are increasingly central to the value that the business creates, and IT is not simply directed at supporting processes, such as finance and administration.

Many areas of a business have not typically been subject to analysis and mapping of information to the same degree as finance and transaction processing functions. On this basis, businesses may benefit from extending techniques such as flow-charting into new processes and functions. By obtaining a detailed understanding of how things are currently done, and how information flows round the business, staff may be able to identify opportunities for improvements more readily.

5.4.4 Commit to business change

Value from many types of IT systems is realised when businesses actually change the way that individuals do things. As a result, IT projects need to be linked with business change and not looked at in isolation. This makes research into people and broader organisational structures highly relevant to realising value in practice.

While the role of the individual user in the success of IT projects has long been recognised, the emphasis has changed as the role of IT has evolved. Research in the 1980s concentrated on the need to get individuals actually to use technology, recognising a gap between the capability of technology and its practical usage. Solutions in this area typically considered psychological factors to analyse why individuals rejected or accepted systems.

The Technology Acceptance Model is possibly the best-known example here.⁹² This model emphasised the importance of two factors: the perceived benefit to the individual from the system; and the perceived ease of use of the system. Together, these factors drove an individual to decide whether the effort of using the system was justified. Therefore, systems should be designed with these factors in mind to facilitate user adoption.

Over time, the emphasis has changed with a recognition that individuals do not simply have to use a system. They also have to change the way they do things in order to gain value from it. How people do things, though, is not determined entirely by technology. There are also social and wider organisational factors which need to be considered. This has led to a strong tradition in academic IT literature which draws on social, organisational and institutional factors to understand how IT systems are accepted and used within businesses. The structuration theory of British sociologist Anthony Giddens, for example, is well established in IT research, and focuses on the interaction between users, technology and the wider context as systems are implemented. By understanding the relationship between these factors and how structures develop over time, the chances of successful implementation are increased.⁹³

⁹² Fred D. Davis, Richard P. Bagozzi and Paul R. Warshaw, 'User Acceptance of Computer Technology: A Comparison of Two Theoretical Models', *Management Science*, 35(8), 1989, pp982–1003.

⁹³ Matthew R. Jones and Helena Karsten, 'Giddens's Structuration Theory and Information Systems Research' *MIS Quarterly*, 32(1), 2008, pp127–157; Wanda J. Orlikowski and Stephen R. Barley, 'Technology and Institutions: What can research on information technology and research on organizations learn from each other?', *MIS Quarterly*, 25(2), 2001, pp145–165.

As a result of these ideas, IT initiatives have become heavily integrated with business change management initiatives. These include many management practices related to training and communication with leadership and vision being seen as particularly important to achieving success. Bringing IT and business projects together as larger programmes of work is another common technique for linking different aspects of change together and ensuring that IT projects are delivered in conjunction with the wider business.⁹⁴

The UK National Audit Office (NAO) undertook a survey of successful IT projects in both the public and private sectors, including in the Britannia Building Society, and outlined the key success factors which they drew from these projects. This survey highlighted the importance of the commitment of senior management to achieving major change.

Example 5.3: Britannia Building Society

The NAO study considered the major change programme undertaken by Britannia Building Society between March 2000 and March 2004.⁹⁵ This was a substantial project which aimed to replace the company's IT infrastructure with a number of new systems which would provide a 'single view' of their customers and products and lead to a range of benefits in the business.

The business case was exceeded and the British Computer Society awarded Britannia its Business Achievement award for the programme. According to the NAO, central to this success was the high level of senior management commitment to the programme. This was evidenced in the board's close scrutiny over the whole project, with formal business case reviews every six months, and specific decisions on scope or cost changes. Contingency was calculated at only 3% of the project budget, and therefore any major changes required scrutiny and timely decision making at board level. There were also independent quality reviews commissioned by the board to increase confidence in the process.

5.5 Making a business case

5.5.1 Overview of management challenge

The business case, the core tool of any investment appraisal process, uses the idea of the base case, and the incremental impact of making an investment. This provides the framework for understanding the potential return from an investment by comparing two scenarios with and without the investment. The business case will typically consider:

- the incremental costs of the project;
- the incremental benefits of the project; and
- the risks of the project.

For many types of investment project the base case is a relatively stable component. The business continues to do the same thing within the same external environment and the project is simply designed to make an incremental improvement to the current position. However, it can be difficult to predict the base case for many IT investments.

In order to quantify project benefits, businesses also need to understand how cost savings and increases in revenues will be realised. An increase to revenue could be created through a range of sources including increased sales, advertising, sponsorship, donations or other types of funding.

While this challenge is relevant to all types of IT investments, it applies particularly where IT is supporting directly the creation or enhancement of products and services to customers. Further, the digital environment can make it harder to protect intellectual property and

⁹⁴ John Thorp, *The Information Paradox: Realising the Business Benefits of Information Technology*, New York: McGraw-Hill, 2003.

⁹⁵ National Audit Office, *Delivering successful IT-enabled business change*, Report by the comptroller and auditor general, Session 2006–2007, HC 33-II.

thereby monetise long-term value. Ideas involving collaboration are likely to increase this challenge as it may not be clear who has intellectual property rights in the first place.

5.5.2 Explain the base case

Concentrating on what happens if a business chooses to invest may miss the broader external context of an IT project and is unlikely to capture the full rationale for making an investment in many cases. Maintaining the status quo may have substantial costs associated with it, such as upgrades. Indeed, given the pace of change, maintaining the status quo may not even be an option in many cases. Rather, there may be a number of options for change, as the technology evolves. As a result, predicting the net impact of an investment can be challenging, as the base case may be unclear, or continually shifting.

The external environment may also be continually changing through the adoption of new technology by competitors. As a result of these changes a business may need to invest simply to keep up with competitors. We have highlighted many ways in which both businesses and competitors may be able to use IT to interact with and serve counterparties better so as to create greater value for them. The availability and communication of new information may also enable the creation of entirely new types of value, which threaten the existing value propositions provided by the business. In these cases, failure to invest will lead to an erosion of value, as counterparties are lost.

A business therefore may benefit from an approach which is more outward facing and the development of a business case may need to incorporate a wide range of information, including:

- what IT investments competitors are making; and
- what sort of success they are having with these investments.

On this basis, a more dynamic evaluation and management process may also be helpful. This process needs to look beyond a simple review of budgets and the extent to which the original plan is being fulfilled. Rather, it may need to consider the continuing relevance of the business case as a whole, based on an understanding of the wider business environment.

5.5.3 Understand monetisation

The dotcom bubble witnessed many celebrated examples of the challenge of developing a business case. The companies that ultimately survived were those that managed to monetise their applications. While starting up an internet-based business may be relatively easy as little investment in physical assets is required, significant costs will be incurred to scale up the infrastructure and operations of the business in order to support large numbers of users. Therefore significant revenue needs to be found at this point to support the business.

Where cash flows directly through the business as part of a transaction, the business may be able to extract a percentage fee for their services and businesses such as e-Bay put themselves at this junction. However, where no cash flows arise between the parties as a direct result of the services offered, generating revenues is typically more difficult. Cash can be extracted from users by way of subscriptions or pay-per-use of the service. However, in practice, few businesses have been able to generate revenues in this way over the internet. As a result, most internet-based businesses have turned to advertising.

The internet has certain advantages in attracting advertisers. With traditional media advertising, the advertiser has limited knowledge of the audience who may have seen the advert. With the internet, advertisers can get much better information about the impact of their advertising. Users can directly click through onto the advertiser's website, making a clear and recorded impact which can even lead to immediate sales. Therefore, advertisers can manage the value from their expenditure more closely. Google represents a well documented example of the use of advertising to meet the challenge of monetisation.

Example 5.4: Google

Google.com claims the biggest share of internet advertising.⁹⁶ This maximises the advantage it gains from its dominance of the search market, whereby over 50% of all internet searches are run through Google. The company started simply as a technology business whose software provided the most relevant results to an individual search request. This basic technical advantage enabled it to build dominance in the search market. However, this was not a strong revenue generating business initially, as the search engine was free to use. Revenues were drawn from licensing the technology to others.

The business model has been refined over the past five years as Google, and competing businesses such as Yahoo, have pioneered the on-line advertising market. In theory, when an individual is undertaking a search, they have an intent to do something, which will frequently result in an economic transaction. Therefore, search engines provide an excellent and well-targeted opportunity for accessing potential customers.

Advertisers can pay for specific key words and their links will appear in a side bar of sponsored links when the word is searched, alongside non-paid for links. The ranking of sponsored links is based partly on amount paid but also on other criteria, such as number of click-throughs. As Google is paid on a click-through basis, this makes commercial sense for them. The fact that advertisers only pay when their link is clicked makes the advertising expenditure more transparent and accountable than in traditional media. It also means that the user should get the best result from the search, and not simply see the company which is prepared to pay the most for the link. Users also continue to see the un-sponsored search results, leaving the user free choice as to whether to click on the advertiser's link.

This business model appears to balance the needs of each of the different counterparties and the evidence suggests that it will continue to grow as the on-line advertising market increases.

There are challenges to relying on internet advertising especially as it is still in its infancy. Users themselves may respond negatively to large amounts of advertising, as it may reduce their enjoyment of their on-line experience. Advertisers may also resist not having much control over the placement of their advert.

Moreover, there are many types of internet advertising and advertisers have a range of motives. Search advertising, such as the Google model, has a particular affinity to driving specific transactions, and the click-through model supports this well. In other cases, where banners or pop-ups are being placed on websites, the advertiser may be seeking more general brand awareness and click-through models are unlikely to reflect the full value that may be achieved from the advert.

The question of monetisation is a complex issue. It is hard enough for businesses to understand demand curves for long-established products, let alone for new IT-related services the value of which may depend substantially on network effects.

There has been research on the extent to which customers have captured value from IT and been real beneficiaries through lower prices and better quality of service. While the economy and wider public good therefore may be enhanced, it is usually argued that individual businesses also need to be net beneficiaries of innovation if it is to be sustained. Nevertheless, the open source movement provides an interesting example of what can be achieved even without the monetisation and capture of benefits by businesses.

⁹⁶ John Battelle, *The Search – How Google and its Rivals Rewrote the Rules of Business and Transformed our Culture*, London: Nicholas Brealey Publishing, 2005.

Example 5.5: Open source software

The open source movement is a school of software development which believes in making its code freely available, rather than charging to use the code through licensing. Core to the ideal of open source is that individuals agree 'not to impose licensing restrictions on others.'

Open source code is therefore shared and developed by a number of project volunteers. As the code development does not follow a commercial model, volunteers typically have jobs in other companies and undertake project work in their spare time. There are likely to be many motivations for individuals giving up their time to such projects. Some may be related to career advancement and the kudos of being credited with a good product. Many pieces of development are also spurred by specific problems encountered in an individual's day job, bringing practical benefit to the volunteer and, potentially, the employer.⁹⁷

Despite this approach, which does not monetise value directly from the product created, commercial business models have developed around open source software, for example through support services for its implementation and ongoing maintenance.

5.6 Achieving business change

5.6.1 Overview of management challenge

We have considered the idea that information is pervasive to businesses and that to achieve value from information systems, a business needs to change the way it does things. As a result, IT projects are intrinsically linked to wider business change as value cannot be achieved by the IT function working in isolation. It needs to work in co-operation with other functions and with their resources and expertise.

This has clear implications for the costs of IT projects. However, it also has significant implications for the processes and ways of working required to manage IT investments. Management needs to consider the integration of IT projects with the wider business, and the demands that this linkage brings, if they are to create value in practice. It also leads to more complex management processes and accountability structures to support the delivery of value than may be seen with other types of investment.

It is this kind of thinking that leads some commentators and business leaders to argue that there is no such thing as an 'IT project'. While there clearly are some purely technical projects, the argument is built on the idea that IT projects have to be linked with the business in order to succeed. Maintaining the idea that there are discrete projects concerned purely with IT is likely to lead to project failure as these broader demands may be ignored. On this basis, a change in language can help to change the mindset of individuals and thereby integrate IT more effectively into the business.

5.6.2 Formalise IT decision making

There is a substantial literature around the question of IT governance, which includes the following aspects:

- formal decision making;
- risk management processes;
- accountability for delivery of results;
- structured project management techniques; and
- review and change processes for each initiative as it is implemented.

⁹⁷ Josh Lerner and Jean Tirole, 'Some Simple Economics of Open Source', *The Journal of Industrial Economics*, L(2), 2002, pp197–234.

While IT governance methodologies draw on common and generic principles of corporate governance, they are typically complicated by the need for many business functions to be involved in IT investments. As a result, delivery and accountability structures need to address how to get the right inputs from the appropriate technical and business resources when needed.

The Center for Information Systems Research at the MIT Sloan School of Management has conducted a substantial amount of research into the importance of IT governance and how businesses can get better at designing and implementing it. Their research claims that businesses which implement effective IT governance see 20% higher profits than those following similar strategies without IT governance.⁹⁸

The focus of the Center's work has not been to develop a singular and definitive solution to IT governance. Rather, it has been to define the different ways that governance can work effectively in different businesses and in the context of different types of decisions. There are clearly decisions concerning IT investments which are predominantly technical and in these cases input from the business may be minimal. By contrast, investments in strategic projects may be strongly dominated by the business. In the Center's research, they identify six types of decision-making structure, which reflect the needs of different types of businesses, as well as different types of decisions:

- business monarchy, where senior business executives make the decision;
- IT monarchy, where the IT function makes the decision;
- feudal structure, where local business units make the decision;
- federal structure, where central and local business leaders work together in decision making;
- IT duopoly, where IT and business work together in decisions; and
- anarchy, where very small groups have decision-making rights.

In a survey of more than 250 businesses, the Center found a range of governance structures were used in practice. Decisions concerning IT architecture and infrastructure, for example, were largely made in an IT-monarchy structure. By contrast, decisions concerning investments in new IT-systems were made by a mix of business monarchy, federal and duopoly structures.

5.6.3 Establish IT reporting structures

How to structure the relationship between IT and the business to ensure accountability and effective working practices is an area of regular debate and comment. While each business will develop a structure that seems appropriate to their particular needs, there are different approaches to how to manage this linkage.

One school of thought which has gained currency in recent years sees IT as a business or profit centre.⁹⁹ On this basis, the IT function may charge business units or functions for its services and breaks even or makes a profit. This approach has two drivers:

- it may lead an IT function to focus better on the needs of its customer, namely the business, encouraging greater efficiency and improved services. As a result, the IT function may be more focused on the value it brings a business, rather than acting simply as an administrative overhead and necessary cost; and
- it is argued that adopting such an approach improves the supply and demand relationship between the business and the IT function, driving a greater appreciation in the business of the costs of IT. Where business units are directly and transparently incurring the costs of the systems that they have requested, it is likely to result in greater restraint and focus when requesting new systems.

This business or profit centre approach therefore sees the role of IT as a service provider to the wider business, and can sometimes distinguish sharply between the purely technical input of the IT function and the input of the business. In these cases, IT may make technical decisions on how to build the solution but may be perceived to have no role in wider business discussions.

⁹⁸ Peter Weill and Jeanne Ross, *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*, Boston: Harvard Business School Press, 2004.

⁹⁹ Mark Lutchten, *Managing IT as a Business: A Survival Guide for CEOs*, Hoboken, N.J.: John Wiley & Sons, 2004.

Alternatively, the relationship can be perceived as more of a partnership, with IT and the business working in collaboration with one another to develop new ideas and implement projects. This approach could be reflected through the head of IT, such as a Chief Information Officer (CIO), sitting on the board or reporting to the CEO rather than the CFO, thereby contributing more directly to the success of the business. To some extent, these differences are more a question of language than substance, as most businesses would acknowledge the need for IT and the wider business functions to communicate and work together. However, such differences in structure can indicate the status of IT within a business, and the extent to which IT is viewed as bringing value to it or simply being a cost to be managed.

5.6.4 Manage benefits

Benefits management is a commonly cited process for delivering business change. It is concerned with the identification and active management of specific, anticipated benefits from an IT project. Businesses using this approach place benefits on specific registers and ensure accountability for their delivery. The benefits management process looks beyond the IT function and again highlights the role of the wider business in delivering benefits.¹⁰⁰

The NAO survey of successful IT projects, mentioned earlier, emphasised benefits management. The NAO's work highlighted the key success factors which they drew from their various case studies, including the City of Edinburgh Council. Five of these success factors related to accountability and benefit management:

- 'mechanisms to prioritise the programme and project portfolio in line with business objectives;
- a clear decision-making structure with agreed lines of accountability so that the right decisions are made swiftly and in line with business strategy;
- designing and managing the business change;
- selling the benefits to users and winning the support of wider stakeholders; and
- optimising the benefits.¹⁰¹

Example 5.6: City of Edinburgh Council

A case study cited by the NAO concerns the City of Edinburgh Council, and the implementation of a new system for planning applications. This aimed to enable citizens, architects and construction companies to submit planning applications online and have real-time access to information relating to the planning process. It was implemented in August 2003, after being initially suggested in early 2002.

The NAO highlights in particular the successful delivery of benefits in this case. The system has improved workflow, provided greater transparency on the process, reduced incorrect application-filings and reduced the need for paper filing of secondary material. At the time of the NAO report, administrative staff had been reduced by 10% and additional workload had been absorbed with no additional resources required.

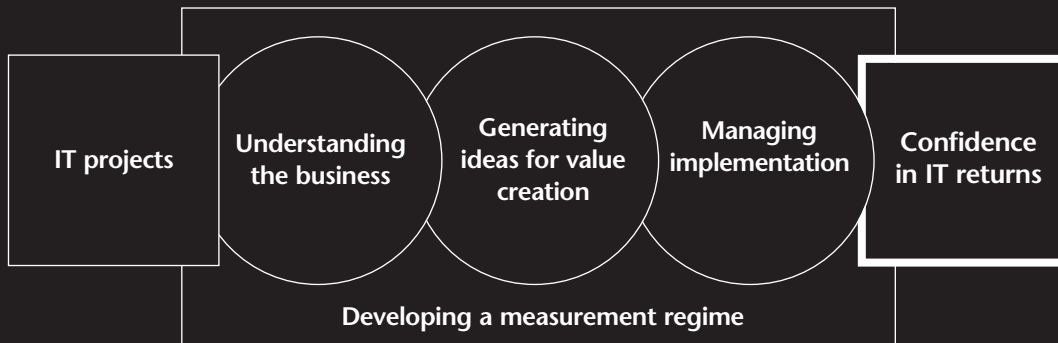
To achieve this, the project team spent significant time upfront considering the business process and workflow requirements to identify improvements. Moreover, senior management of the council were given accountability for delivering specific benefits and reporting to the project board was established on this basis.

¹⁰⁰ John Ward and Roger Elvin, 'A new framework for managing IT-enabled business change', *Information Systems Journal*, 9(3), 1999, pp197–221.

¹⁰¹ National Audit Office, *Delivering successful IT-enabled business change*, Report by the comptroller and auditor general, Session 2006–2007, HC 33-II.

6. LOOKING TO THE FUTURE

If confidence in IT returns is to improve, there needs to be learning and research covering each of the principal themes of this report: developing effective measurement regimes; understanding the business context of IT projects; generating ideas for value creation through IT; and managing the implementation of new IT systems.



Summary

We identify a number of steps that management can consider to support the development and improvement of measurement regimes for IT projects. In particular:

- when measuring costs, there is scope to improve records of expenditure on previous projects based on post-implementation reviews;
- when measuring financial benefits, there is scope to use real options thinking to mitigate the problems of trying to predict the ultimate consequences of decisions which can be deferred until more information is available;
- when identifying leading indicators, there is scope to make better use of business models and bring together knowledge that is widely dispersed throughout the business; and
- when reporting process measures, there is scope to link these to the financial evaluation of risk and return and incentive systems designed to encourage particular behaviours.

However, if confidence in IT returns is to improve, then more needs to be done. Although there is some strong research into measurement regimes that contain a wide range of measures, it appears to be particularly difficult to share and transfer learning and there are a number of barriers to the type of research which may help businesses improve their performance.

Case studies, in particular, can highlight practices which have helped specific businesses but the time and resources required to perform case studies present significant challenges. Furthermore, the data supporting case studies are typically not publicly available and, as a result, little challenge or critique of such studies is possible, reducing their perceived credibility and the validity of their conclusions.

Given the importance of IT investment to the success of businesses and the wider economy, there is a need for further learning through a range of interdisciplinary academic research, continuing debate and sharing of knowledge and experience. Repeated project failures cannot be attributed simply to poor management. Achieving value from IT projects is a major and difficult endeavour which demands serious analysis.

While we highlight a number of possible management practices to address specific challenges of IT projects, we do not promote any single approach. Different businesses will develop different approaches based on their specific needs and we aim to provide opportunities for all ideas to be freely discussed. To help encourage this, research questions are presented around the four main themes of this report: developing a measurement regime; understanding the business; generating ideas for value creation; and managing implementation.

6.1 Improving measurement

In Chapter 2, we outlined features of an effective measurement regime for IT projects, including four types of measure and three phases of a measurement cycle. We also highlighted some of the difficulties commonly encountered in applying the proposed measures to IT investment opportunities.

During the course of this report, we have considered three essential activities which should be supported by an effective measurement regime, namely understanding the business, generating ideas for value creation and managing implementation. On the basis of this work, we identify a number of steps that management can consider to support the development and improvement of measurement regimes for IT projects.

6.1.1 Measuring costs

Businesses may be able to improve the capture and prediction of costs through the consistent implementation of certain management practices. These can assist in assembling better information on which to base estimates, for example:

- maintaining comprehensive and consistent records of expenditure on previous projects to enable appropriate comparison; and
- developing links with peers or other bodies to benefit from the experience of others.

In this context, the post-implementation review, and the ability of businesses to capture and transfer knowledge between projects in general, becomes particularly important.¹⁰² Although there are many tools available to assist businesses in this area, post-implementation reviews of any type of project are typically rare in practice. Priorities tend to move on to the next initiative and there is not enough time to conduct such a review. A business may ignore the need for a review for political reasons if a project is perceived not to have been a success.¹⁰³ It can also be difficult to conduct such reviews in practice, unless there is a clear baseline comparison. If the business has changed substantially as a result of the initiative, a lot of work may be required to develop an appropriate comparison point.

The value of structured knowledge from previous IT projects is likely to be high and therefore businesses should make project reviews, or other knowledge sharing exercises, a priority. However, while the use of historical data and the experience of peers are valuable, we have emphasised the context-dependency of many IT initiatives. When relying on historical data, there is a significant risk of overlooking the specific requirements of a project and getting the costs badly wrong. This underlines the importance of investing time at the beginning of a project to articulate what the business is trying to achieve, and what it needs to do to achieve it in line with a number of management practices highlighted in Chapter 5.

6.1.2 Measuring financial benefits

We referred in Chapter 5 to various governance techniques which aim to help a business to articulate and quantify the specific benefits an IT project. For example, processes to maintain strategic focus and formalise IT decision making provide a structure by which input can be gained from the business and decisions are not left entirely with the IT function.

We also identified the potential application of iterative decision-making techniques to cope with the high level of uncertainty in many IT projects. Real options theory is a sophisticated measurement technique that supports this type of decision making. It places an explicit value on the option to do something at a later date and this can mitigate the problem of predicting the ultimate financial benefit. The benefit in this context is essentially the option to do something at a later date. As more information becomes available about ultimate benefits, the value of the option changes.

Options theory is frequently talked about in connection with industries such as energy and pharmaceuticals, which are typified by decisions about risky, long-term projects that may not be justified under a pure NPV model but that have a potentially high reward.¹⁰⁴ The business

¹⁰² Blaize Horner Reich, 'Managing Knowledge and Learning in IT Projects: A Conceptual Framework and Guidelines for Practice', *Project Management Journal*, 38(2), 2007, pp5–17.

¹⁰³ David Gwillim, Ken Dovey and Bernhard Wieder, 'The politics of post-implementation reviews', *Information Systems Journal*, 15(4), 2005, pp307–319.

¹⁰⁴ Stanley Block, 'Are "Real Options" Actually Used In The Real World?' *The Engineering Economist*, 52(3), 2007, pp255–267.

only has to commit the amount required to acquire the option to do something, not the whole investment cost.

Oil companies, for example, have to make decisions on the leasing and exploration of oil fields, which may be highly speculative in terms of whether there is oil present. Pharmaceutical companies have to make decisions on research and development spending, which can also be highly speculative and in most cases will not result in a marketable drug. Use of options techniques enables a business to make relatively small, staged investments, leaving open the options of abandonment, change or full scale implementation as more information becomes available and uncertainty is reduced.

While there are few documented examples of using real options for IT projects, some research by Taudes, Feurstein and Mild suggests that this may be an area worth pursuing.

Example 6.1: Real options and software platforms

Alfred Taudes, Markus Feurstein and Andreas Mild outline a case study in which options analysis was used to assist in a decision as to whether to upgrade from SAP R/2 platform to SAP R/3 platform.¹⁰⁵ The business involved, a motor parts manufacturer, did not perceive that there would be significant benefits in making such a major change as they were satisfied with the current level of functionality. On this basis, a traditional NPV calculation was negative.

In contrast, the IT department argued that the new platform would provide more flexibility and opportunities in the longer term. As a result, the CFO looked to real options analysis to consider these broader arguments. On top of the NPV calculation, values for specific options were included such as EDI-based purchasing, EDI-based invoicing, workflow for sales, engineering document handling and an e-commerce system. This resulted in a positive valuation and convinced the different stakeholders within the business that the implementation cost could be justified by potential future benefits. At the time the case study was written, two options were being implemented with a third planned.

The possible limitations of more sophisticated techniques, however, need to be understood. Options theory is based on an assumption that an option has a value. However, the business may lose out by waiting if competitors are making similar investments and gaining competitive advantage. Therefore, implementing such techniques needs to be done with care and with full consideration of the wider environment.

There may also be negative effects on the wider governance process and the need to engage the business in decision making. Complex measurement tools can result in a decision-making process which is dominated by a small number of experts. Confidence in IT decisions, by contrast, requires understanding and participation from across a business and this may be jeopardised where sophisticated techniques are used.

6.1.3 Identifying leading indicators

In order to develop leading indicators, a business needs to develop a specific understanding of its business model. There have been a number of approaches which aim to assist businesses in this task. Robert Kaplan and David Norton developed the concept of strategy maps to assist in populating their balanced scorecard.¹⁰⁶ By using this approach, a business can develop a better understanding of how it creates value and how value is driven through its activities. It can then align a balanced scorecard with this understanding.

¹⁰⁵ Alfred Taudes, Markus Feurstein and Andreas Mild, 'Options Analysis of Software Platform Decisions: A Case Study', *MIS Quarterly*, 24(2), 2000, pp227–243.

¹⁰⁶ Robert Kaplan and David Norton, *Strategy Maps: Converting Intangible Assets Into Tangible Outcomes*, Boston: Harvard Business Press, 2004.

Another approach is outlined by Robert Eccles, Robert Herz, Mary Keegan and David Phillips in *The ValueReporting™ Revolution: Moving beyond the earnings game*.¹⁰⁷ The authors argue for the public reporting of a wider range of non-financial information by businesses. In support of this case, they cite some companies that have attempted to map value through their business, and link measures into this process, including the retail chain Sears.

Example 6.2: Sears' employee customer profit chain

In this case, the company, a large US retail business, spent significant time and resources thinking about its business model as a single, logical entity, with a series of linked factors. In particular, it linked the actions of employees to the effect on customers and to the ultimate impact on the financial results of the company.

The attitude of employees towards the company and the job led to particular employee behaviour. This behaviour had a knock-on impact on customers, in relation both to quality of service and merchandise value, and to customer retention, recommendations and overall satisfaction. Measures were introduced into all of these areas and, while the regime was subject to ongoing development and refinement, Sears created a model which estimated that a 5 unit increase in employee attitude led to a 1.3 unit increase in customer impression which led in turn to a 0.5% increase in revenue growth.¹⁰⁸

Chapters 3 and 4 looked at how business models can play an important role in developing a regime of leading indicators by analysing the conversion of costs into benefits. For example, in relation to a customer relationship management (CRM) system, this could involve two stages of analysis:

- identifying measures which capture improvements to the non-financial value given to customers, their perception of value from their relationship with the business, or improvements to internal processes; and
- understanding the monetisation of that value, either through a reduction in costs or an increase in the revenues earned from customers.

In order to do this type of analysis, a wide base of knowledge is required, which is likely to be highly dispersed throughout the business. Identifying improvements to customer value, for example, requires a detailed knowledge of current customer offerings and what customers really value. Other parts of the business may have detailed understanding of customer relationship processes, while the IT function will have the knowledge and understanding of what the technology can do and how it may interact with other systems. The business model as a whole, and the competitive strategy of the business, are likely to be best understood by senior management.

To build this multi-dimensional analysis, a business needs to foster co-operation and the sharing of knowledge between many different functions and levels of the business. As a result, the governance and communications structures adopted by a business will strongly influence its ability to derive value from its IT investments. Where the IT function is driving the decision-making process in isolation from the wider business, measures are less likely to reflect the way that value is being created and therefore will be less meaningful.

6.1.4 Reporting process measures

As we explained in Chapter 5, the successful implementation of IT projects can require intelligent management practices which cut across the business. Management may find a range of process measures useful in supporting these practices.

For example, businesses may find measures concerning the management of projects particularly useful, such as measures supporting effective project controls and monitoring

¹⁰⁷ Robert G. Eccles, Robert H. Herz, E. Mary Keegan and David M. H. Phillips, *The ValueReporting™ Revolution: Moving beyond the earnings game*, New York: John Wiley & Sons, 2001.

¹⁰⁸ Based on original research by Anthony J. Rucci, Steven P. Kirn and Richard T. Quinn, 'The Employee-Customer-Profit Chain at Sears', *Harvard Business Review*, 76(1), 1998, pp82–97.

changes to projects. These may help management to focus their attention on projects which are failing or at risk of failing. Process measures demonstrating control over a project and its risks may also be important tools in managing stakeholders and gaining buy-in from them.

Measures of project and process risk can be built into financial measures. For example, the level of contingency applied to projects reflects levels of risk and uncertainty. Where these are high, it may be appropriate to establish significant cost contingencies, on the basis of specific identified risks. Discount factors used in NPV calculations and the hurdle rate that an IRR is compared against can also be adjusted to allow for risk. By increasing the discount factor applied to future benefits or requiring a high hurdle rate, a business can recognise the level of risk in an IT project.

Moreover, risk plays a significant role in determining which investments should be pursued. The idea of portfolio management, discussed in Chapter 5, is based on balancing risk and reward. Where risk is deemed to be high, based on the possible impact of risk and its likelihood, reward has to be high to justify taking the risk. Where rewards are low, the risks should also be low. Portfolio management techniques balance these different types of projects to ensure that a mix of high and low risk projects is undertaken. Regardless of whether such formal techniques are adopted, risk is likely to be an important component of any structured investment case.

Process measures may also be crucial in managing demands on the business and changing the way people work. This is a major management challenge in implementing many IT systems and incentives linked to performance measures may be instrumental in changing behaviour. For example, encouraging teamworking and knowledge sharing is central to achieving value from customer relationship systems or intranets. In order to gain real benefits from such systems, individuals need to take the time to update the systems and this is typically one of the greatest barriers to achieving benefits.

To encourage the right behaviours and activities, a business can include relevant measures in performance objectives, such as making a certain number of updates over a year, or making individuals accountable for the accuracy of particular pieces of information. Alternatively, a business can publicly reward individuals who demonstrate the right behaviours to encourage others to follow. If a benefits management process, as described in Chapter 5, is to succeed, it will probably need to incorporate a range of measures to support and encourage changes in behaviour and processes.

6.2 Measurement regimes in practice

Given the complex nature of IT investments, our expectation is that any successful measurement regime is likely to contain a wide range of measures. Documented examples of such IT measurement regimes are rare but in an article published in spring 2008,¹⁰⁹ Akhilesh Bajaj, Wray E. Bradley and Karen S. Cravens describe a balanced scorecard for IT investments which is designed to supplement financial analysis with evaluation of the non-financial impact of an investment. This is drawn from the use of system analysis techniques.

The authors demonstrate that by using this type of analysis, a business can develop a detailed understanding of the functionality of a specific system, and the impact it will have on the way that the business does things. This process results in a number of technical outputs, such as data maps, process maps, role-process links and reports, and the authors argue that these can provide valuable information in the assessment of IT projects. In many evaluation processes which focus purely on financial analysis, this type of information would simply not be used.

Through two detailed case studies, the authors build on this process, and the information generated, to develop a range of measures in the form of a balanced scorecard by which an initiative can be assessed. To do this, the authors:

- consider the impact of the potential changes brought about by a new system on organisational resources and capabilities; and
- link the outputs from the system analysis to predictions of costs and potential financial benefits included in the calculations required by investment appraisal techniques such as NPV.

¹⁰⁹ Akhilesh Bajaj, Wray E. Bradley and Karen S. Cravens, 'SAAS: Integrating Systems Analysis with Accounting and Strategy for *Ex Ante* Evaluation of IS Investments', *Journal of Information Systems*, 22(1), 2008, pp97–124.

As a result of this two stage process, a business can develop a wide range of criteria against which an initiative can be assessed. Some examples of the type of measures used by the authors include:

- measures relating to internal process, such as ease of system use, ease of modifying the system, timeliness of updating the system and likelihood that the system will become obsolete;
- measures relating to customer relationships, such as speed of response to customers and delays due to system failures;
- financial measures, including front end costs, ongoing costs, residual income, cost savings; and
- measures relating to innovation such as enhancement of employee skills, accuracy of work and improvement in decision making.

These measures are therefore a mix of qualitative and quantitative criteria. By scoring each of them on the basis of the potential impact of the system, a broad picture can be developed of the investment opportunity. This does not result in an overall score. Rather, it leads to a rich picture of where the benefits are likely to lie and their relative strength. Different businesses will place different priorities across these various quantitative and qualitative criteria, which also enables a business to align an investment with its broader strategic goals, such as cost control, innovation or customer focus.

The first of the two case studies provided by Bajaj, Bradley and Cravens concerns a company called Emissionstech in the article which manufactures emission control solutions and which wanted to assess a possible investment in a new sales tool. By considering the related changes to data, processes, roles and reports, the business gained greater clarity about what it was trying to achieve and what the new process would look like.

The balanced scorecard shows that there would be benefits in terms of internal process improvements, customer benefits, financial impact and innovation. Management expressed satisfaction with this approach. In particular, it enabled them to understand more clearly the initiative's fit with their strategic objectives, and its broader demands on the business. In the article, the authors lay out the detailed analysis undertaken on the financial impact and the balanced scorecard they develop is set out below.

Example 6.3: Emissionstech balanced scorecard

Internal process improvements	Score	Innovation	Score
Coordination efficiencies across the organisation from the system	5	Ease of identification of client needs	4
Ease of system use	7	Accuracy of quotes	4
Timeliness of updating the system	7	Improvement in employee decision making	4
Ability of system to adapt to changes in client preferences	6	Enhancement of employee skills	5
Ability of users to modify components in the system	6	Identification of potential customers or markets	5
Likelihood that system components will become obsolete relative to existing user needs	4	Ability of system to adapt to technological enhancements or changes	6
		Likelihood that IS will assist salespeople in attracting new customers	6
Customer benefits	Score	Financial impact	Score
Web-based user interface issues	6	Front-end costs	3
Speed of response to client requests	7	Cost changes due to new IS	3
Survey customer satisfaction with system	7	Revenue growth potential	6
Delays due to system failures	4	EVA	6
Speed of price quotes	7		

The scoring represents the following: 1 very negative; 2 somewhat negative; 3 slightly negative; 4 neutral; 5 slightly positive; 6 somewhat positive; 7 very positive.

Extracted from 'SAAS: Integrating Systems Analysis with Accounting and Strategy for *Ex Ante* Evaluation of IS Investments', Akhilesh Bajaj, Wray E. Bradley and Karen S. Cravens, *Journal of Information Systems*, 2008, 22(1), p113.

6.3 Outstanding research issues

The Bajaj, Bradley and Cravens article makes a very positive contribution to the literature in the area of IT value management by developing a specific approach to measuring IT returns and testing it through case studies. By building a blend of financial and non-financial measures, and integrating their development through the use of systems analysis techniques, the approach provides a fuller picture of the investment than either financial or non-financial analysis in isolation. It also provides a useful framework for businesses to consider the alignment of IT initiatives and organisational goals and priorities, promoting a dialogue between the IT function and the wider business on how a specific IT system can support the achievement of the objectives of the business.

However, there are still areas which require further research and development. The authors themselves recognise that this type of analysis is most useful when a business is looking to make incremental improvements to its existing operations through enhanced or new applications. Businesses may require a different approach when they are considering more strategic investments in infrastructure and platforms for the future.

The article also focuses on the process for developing a scorecard rather than the content of the scorecard. As such, it does not provide guidance for developing specific measures, another point acknowledged by the authors. The balanced scorecards for the two case studies contain quite different sets of measures and the process for selecting appropriate measures for a specific business remains somewhat opaque. In addition, the application of a seven point scale to the broad descriptions contained in the balanced scorecard might need improvement, especially under the pressure of having to report actual performance against expectations.

As a result, this scorecard provides a good basis for further research and development, as well as a tool that may be useful in practice. However, the challenges highlighted are significant and indeed not unique to IT. The difficulty of identifying the right measures in the context of any balanced scorecard, for example, is well documented.¹¹⁰ Although we referred to some specific approaches for developing leading indicators earlier in this chapter, it remains a particularly difficult challenge.

Implementing IT systems successfully is a major endeavour and there is no easy solution to the challenges identified in this report. Moreover, while there is substantial literature in this area, effective learning from previous experience appears to be particularly difficult. If confidence in IT returns is to improve, then more needs to be done. Therefore, in the remainder of this report, we consider how research and other learning can be used in the future to assist businesses more effectively and improve the value that is realised in practice from IT systems.

6.4 Current research agenda

Since the 1980s, a wide range of academic research has been carried out into the extent to which businesses can use IT to create value and the conditions under which value is most likely to be created.

6.4.1 Relevant disciplines

IT value can be studied from many angles and we have drawn on literature from a broad range of disciplines. Although the specific discipline of information systems has obviously made the greatest contribution to IT value research, researchers here build on ideas from other disciplines. Furthermore, researchers from other disciplines have made a significant impact in the area, particularly when considering the impact of IT on individuals, businesses and economies.

Economists, for example, have carried out substantial work, some of which we have referenced. The productivity paradox has been extensively researched, as has the impact of IT on transaction costs and the process of searching between buyers and sellers in an electronic marketplace. Accounting academics have also made major contributions with a range of studies on the impact of IT investments on various indicators relating to the value of businesses. However, IT remains on the fringes of mainstream accounting research and there is scope for more work building on the accounting discipline.

¹¹⁰ Christopher D. Ittner, 'Does measuring intangibles for management purposes improve performance?' *Accounting & Business Research*, 38(3), 2008, pp261–272.

There is a wide range of research in organisation theory, sociology and psychology which considers the adoption and use of IT by individuals and within organisations. There is further literature in the fields of innovation, technology theory and engineering concerning the development of new IT systems. Business schools also generate a significant literature concerning IT, frequently linked into broad disciplines such as strategic management.

Different disciplines bring different and valuable perspectives and insights to the subject of IT value and measurement. However, they can sometimes work in isolation from one another, creating confusion and difficulty in articulating what the issues and possible solutions actually are. It is hoped that this report will help encourage integration of some of the main ideas.

6.4.2 Research methods

Research into IT value broadly falls into two distinct approaches. Firstly, research can be based around detailed case studies. This involves working closely with a specific business, or a small number of businesses, to gain deep understanding of particular projects or ways of working. Researchers can then develop learning points and conclusions based on the information and knowledge they have gathered.

Statistical research, by contrast, usually interrogates large amounts of data to identify correlations between factors and thereby point to possible connections between particular practices or conditions and success. Research of this type would typically develop a number of hypotheses based on theory and use the data to validate or disprove them. This type of statistical research can be run using archival databases of publicly available information. But as the data are typically high level and contain little that specifically relates to IT, it is also sometimes thought necessary to undertake surveys of companies through questionnaires. Research on this basis can be based on more detailed and relevant information related to IT, although there are risks concerning the statistical validity of any conclusions.

In addition, there are studies that fall between large scale statistical research and individual case studies. Mid-sized studies of business may enable more statistical validation and comparison of findings than a case study allows. By getting behind the numbers in individual businesses, they may also enable a more detailed understanding of the context for broadly-based conclusions than pure archival work. Although such studies are less common, where they are well constructed around specific industry sectors, for example, they can mitigate some of the problems of much field work.

6.4.3 Research challenges

While quantitative and statistical studies may highlight interesting correlations between factors, it is through individual and mid-sized case studies that deep understanding can be obtained of specific actions taken, and their effect. However, there are a number of barriers to successful research of this type.

It can be very difficult to gain access to sufficient data from individual businesses. The amount of reliable publicly-available information from businesses is limited to statutory financial reporting and certain other ad hoc information that they choose to release in their annual reports and other communications. To get behind that information, businesses need to be prepared to co-operate with researchers, giving the time necessary to provide the information requested.

Moreover, case studies may require information about, and investigation into, areas which could be deemed to be sensitive. Where a business has had particular success, it may view that as commercially valuable and be unwilling to divulge how they have achieved success. A business may also be even more unwilling to share mistakes and project failures with a broader audience.

These problems have implications for the way that research can be carried out and the type of research that is possible. Constraints on access to information mean that little independent validation of research findings can be undertaken in practice. Without publicly available data to support research, it is very difficult to assess the merits of the findings and critique the research. This compounds a common criticism that we highlighted at the beginning of Chapter 5 before looking at management practices, namely that case studies are based on perceptions of what has driven success as seen by management and the researcher and are therefore highly subjective.

Case studies of public sector organisations, or case studies within a historical context, may be more fruitful areas for research. Although they present their own issues and challenges there may be fewer constraints in terms of the ability to share information in public.

Undertaking case study work also requires significant time and resources both from the researchers and the businesses in question. It takes a long time to develop a case study and gain in-depth understanding of the business concerned. Likewise, case studies need to take place over a significant period of time to give valid insights. As a result, such research can be costly, and obtaining funding can be difficult. Finding businesses prepared to commit time to working with researchers is also challenging.

6.5 Next steps

While there are significant challenges to research in the field of IT value and measurement, the continuing level of public interest in IT project management issues emphasises the urgency of finding ways to enable greater understanding and learning. Moreover, the amount of money being spent on IT across all economies reinforces the need to instil confidence about the returns being earned.

6.5.1 Learning from previous experience

The development of company-specific management and measurement practices can help, although the complexity of companies' different business circumstances makes it difficult to apply even conceptually sound practices in new situations. Moreover, the sheer number of possible practices to study can be daunting. Notwithstanding the difficulty in the case of IT of learning effective lessons from experience, we recognise a need for further learning and knowledge sharing concerning what practices are the most critical, how they are applied, and what really works.

One barrier to learning could be the pace of unrelenting change in technology and a bewildering variety of IT systems and components. Computer science and communications technology undergo constant, exponential development. Information management theory and information security management priorities also change in significant ways. As a result, change can outstrip users' capacities to exploit available opportunities.

The interaction between people and technology is another challenge. IT is digital and data structures have to be systematic in order to generate improvements in the quality and use of information. Human beings tend by nature to be unsystematic in their behaviours and reactions. When people, data and systems come together, there is a volatile mixture. Whether and how this volatility is controlled, and its energy harnessed, may sometimes be the most important factor in determining whether the potential value of an information system, however great it may be, is realised or not. This can make the transfer of knowledge and learning between projects particularly difficult.

The complex nature of IT benefits, and their relationship to the value of a business, also makes effective learning a major endeavour. Moreover, the process of evaluating the implementation of information systems requires the exercise of high levels of analysis and judgement. A close attention to proper governance is vital. Skills in project management and risk assessment are also needed to effect the changes that the use of IT systems makes inevitable. Therefore, management need to be able to perform effectively in many areas to achieve success.

These factors of unrelenting change, the interaction between people and technology and the breadth of thinking necessary all contribute to the difficulty of effective learning. They also highlight the need for serious thinking and research in the area. Repeated project failures cannot be attributed simply to poor management. Achieving value from IT projects is a major and difficult endeavour which demands serious analysis.

6.5.2 Themes for learning and debate

We recognise that additional research and discussion are required to further learning on the four principal themes covered by this report and we encourage new academic research to develop evidence for particular practices and consider these issues in more detail. We also want to encourage debate and the sharing of information and experience at a less formal level between businesses of all sizes and in all sectors.

While we highlight a number of possible management practices to address specific challenges of IT projects, we do not promote any single solution. Different businesses will develop different approaches based on their specific needs and we aim to provide opportunity for all ideas to be freely discussed.

It may indeed be possible to harness IT itself to do this and use the evolving web 2.0 tools to capture and share information. Such tools tend to be unsystematic in their approach, and are therefore challenging to use as a way of collating and structuring information for discussion or further research. However, there may be some scope for using tools, such as ICAEW IT Counts site, to support the process of information and knowledge sharing.

6.5.3 Theme one: developing a measurement regime

We identify four types of measure which are likely to be relevant to IT investments on the basis that businesses need to look well beyond the financial information that provides direct inputs to investment appraisal techniques. Continuing research would be valuable in determining how non-financial measures can complement financial measures. This represents our first theme for learning and research.

Possible questions include:

- What leading indicators and process measures do businesses use in practice?
- How do the criteria businesses use to make decisions on IT projects reflect non-financial measures?
- Which measures are perceived to be the most effective and why?
- To what extent are measures tracked during the implementation of IT projects and validated afterwards?
- How are project measures linked to other systems for targets and budgets, performance incentives, and capital allocation?
- How important is simplicity and does this discourage the use of some measures and techniques?
- How effective are non-financial measures in predicting costs and financial benefits?

6.5.4 Theme two: understanding the business

This report relies heavily on the concept of the business model as a way of understanding the opportunities for value creation presented by IT and to develop an appropriate measurement regime for IT projects. Therefore, our second theme concerns the concept of the business model and the extent to which it is, or can become, a useful tool for businesses.

Possible questions include:

- What different methods for representing business models are most effective and what purposes are they used for?
- What use is made of business models in the private, public and not-for-profit sectors?
- How do businesses currently capture and document business model information?
- How do organisations capture and analyse the role of information in the internal operations and counterparty relationships that make up their business model?
- To what extent do businesses make use of business models in the internal operations and decision-making processes?
- How can the business model concept be used to understand the opportunities presented by developments in IT?
- What techniques, including business models, do businesses use to understand the linkages between financial measures and to develop non-financial indicators?

6.5.5 Theme three: generating ideas for value creation

IT generates opportunities for businesses to develop new value propositions but it also gives rise to a changing business environment in which developing sound business strategy is challenging. In this context, the report highlights six main benefits of IT projects: creating new types of value; improving the search process; increasing efficiency; improving control and governance; removing operational constraints; and improving value propositions. Our third theme therefore focuses on how businesses structure their understanding of IT benefits to identify potential IT projects.

Possible questions include:

- What frameworks, if any, do businesses use to think about the potential benefits of IT?
- To what extent do the six main benefits highlighted in this report capture the various benefits of IT projects?
- How do businesses generate new ideas for creating value through IT?
- As technology evolves, where are the most valuable new opportunities likely to arise?
- Under what circumstances are IT investments seen to be strategic sources of sustainable competitive advantage?
- How do businesses structure the relationship between IT and the wider business to promote the identification and realisation of benefits?

6.5.6 Theme four: managing implementation

Aspects of business decision making and management processes have changed or are changing in reaction to IT developments in ways that remain fully to be understood. Our fourth theme focuses on addressing these challenges and improving the performance of businesses in managing IT projects to deliver value.

Possible questions include:

- What are the most important practices to achieve change in the business model?
- How can the thinking behind real options theory be made practical and intuitive?
- Are iterative decision-making processes useful or relevant in implementing IT projects?
- To what extent are IT projects cancelled, reshaped or scaled up?
- To what extent does the mapping of information flows across a business provide business insight?
- How do businesses define, quantify and give effect to the risks of IT projects in business cases?
- How do businesses estimate demand and revenues for new IT-related services?
- To what extent are the activities of competitors taken into account in decision making about IT projects?
- How do businesses identify all the effects of an IT investment throughout a business?

Appendix – Questions about IT projects

Members of senior management may find it helpful to ask themselves the following 10 questions, along with the related clarifying follow-up questions, in relation to any IT project that their business is currently undertaking.

- 1. Are we making this investment because we have to?**
 - What happens if the investment is not made?
 - What are our competitors doing in the area?
 - How are we going to maximise the net benefits?

- 2. Will this project be a source of sustained competitive advantage?**
 - What are we doing to come up with such project ideas?
 - How will we know if we have succeeded?

- 3. What are the benefits of the project?**
 - How will the project create value for customers, suppliers and employees?
 - How will we actually derive cash from this investment, whether through reduced costs or increased revenues?

- 4. Do we understand the magnitude of change involved in this project?**
 - How are the affected activities currently done?
 - What information is currently used in these activities?
 - How different is the proposed information structure?
 - How much change is actually involved?

- 5. What is the cost of undergoing this level of change?**
 - What are the pure IT costs?
 - What costs are likely to be hidden in the business?
 - Do we have sufficient resource in the business to make this change successfully?

- 6. How are we going to change the way people do things?**
 - How are we going to link this IT investment with wider business change?
 - Do we have the right skills in the business to succeed?

- 7. What is the risk surrounding failure of the initiative?**
 - What is the likelihood of failure?
 - How might customers, suppliers and employees be impacted by failure?
 - What are the other consequences of failure?

- 8. Will we benefit from delaying decisions about this project?**
 - Is more information likely to become available which will help?
 - Can we structure the project so as to leave options open?

- 9. What processes need to be in place to manage the project?**
 - How often will we review progress?
 - Who is accountable for delivering specific project benefits?
 - How will we learn from this project?

- 10. What are the right measures to support the delivery of value?**
 - What financial measures of costs and benefits do we need?
 - What leading indicators of future benefits will be helpful?
 - What process measures would be useful in managing the project?

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None of the commentators should be assumed to agree with the views expressed in this report, and they are not responsible for any errors or omissions.

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