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Managing Investments in Information Systems and Technology

Grindley¹¹ summed up the mistrust of conventional justification methods in two insights from his survey:

- 83% of IT directors admit that the cost–benefit analyses supporting IT investment proposals are a fiction;
- quote from a CEO: ‘It’s like there is a spontaneous conspiracy to exaggerate the benefits.’ Many others would agree, no doubt!

On the other side of the coin, identifying and quantifying the benefits of any system can be a difficult, even impossible, task, as suggested above. In their book, Parker *et al.*¹⁴ assess in detail the ways in which information and systems benefits accrue and how they can be quantified to help in justifying investments. They consider three main types of application:

1. *substitutive*—technology replacing people with economics being the main driving force, to improve efficiency.
2. *complementary*—improving organizational productivity and employee effectiveness by enabling work to be performed in new ways;
3. *innovative*—achieving a competitive edge by changing trading practice, creating new markets, etc.

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1. *Traditional cost–benefit analysis*, which allows for efficiency improvements in organizational processes resulting from automation (e.g. automating invoices and sending them electronically to customers via e-commerce, saving labour and data entry costs for all parties).
 2. *Value linking*, which estimates the improvement in business performance, not just savings made, from improving the linkages between processes or activities (e.g. automatic reconciliation of orders, invoices and payments to enable accounts staff to spend more time resolving customer queries and issues, leading to fewer bad debts and less dissatisfied customers); or interactive component design with suppliers via a shared Computer-Aided Design (CAD) system, to reduce the number of iterations needed.

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3. *Value acceleration*, which considers time dependence of benefits and costs in other departments of system improvements (e.g. giving sales data to buyers on a daily basis, improving their ability to respond to changes in demand and negotiate more effectively with suppliers). This implies that benefits can occur in other parts of the business, not just where the system is actually implemented.
 4. *Value restructuring*, which considers the productivity resulting from process and organizational change and change of job roles (e.g. information-intensive tasks such as forecasting and planning can often only be improved by a combination of better systems and a change in organizational responsibilities).

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5. *Innovation evaluation* attempts to estimate the value to the business of new business or new business practices levered from IS/IT (e.g. the launch of an online banking service may change the company image and attract new types of customers).

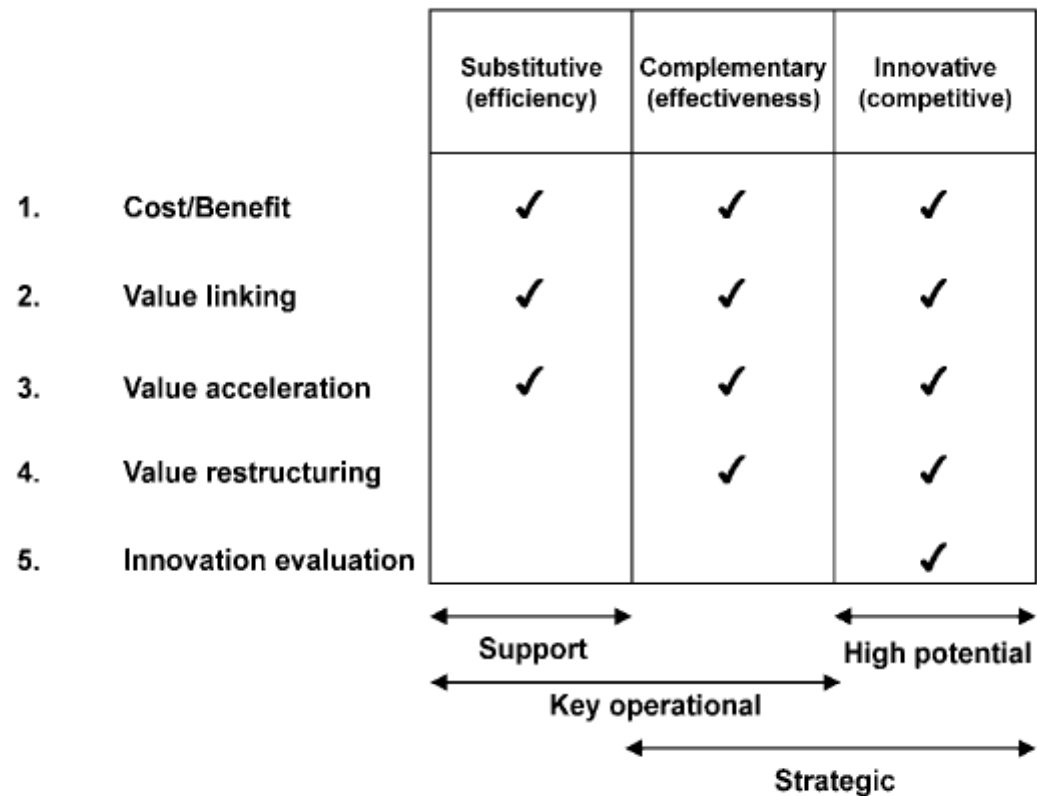


Figure 9.1 Relationship between benefit types and the application portfolio

The portfolio approach suggests that:

- Quantified, financial justification of applications is easier in the key operational and support quadrants, where most aspects of the application will be better known or can be determined, risks are lower and the rate of change is slower.
- A singular approach to investment justification will tend to produce one type of application to the exclusion of others. This argument is particularly strong where a scarce resource approach has been adopted and pure financial return on investment decides investment priorities—support applications will always be easier to justify financially.
- The way in which applications are planned and managed by the organization will also affect the way in which they are justified—whether they are customer-related applications integral to achieving business objectives or systems intended to save major costs in one part of the organization.

STRATEGIC	HIGH POTENTIAL
<p>Enable the achievement of <i>business objectives</i> via explicit critical success factors</p> <p>£</p>	<p>R&D project to explore potential value and cost - fund from R&D budget</p> <p>£ <i>Risk money</i></p>
<p>Disadvantage/Risk if it is not done (<i>critical failure factors</i>) and/or quantified performance improvement</p> <p>£</p>	<p>Net cost reduction through <i>quantified savings</i></p> <p>£</p>
KEY OPERATIONAL	SUPPORT

£ extent to which benefits can be justified financially

Figure 9.2 Investment justification

Priority setting

Hence, three factors need to be included in the assessment of priorities:

- *What is most important to do*, based on the benefits identified.
- *What is capable of being done*, based on the resources available.
- *What is likely to succeed*, based on the risks of failure of each investment.

Priority / support

Within the *support* segment, setting priorities should not be too difficult. Those with the greatest economic benefit that use the least resources should get the highest priority. This will encourage users to express benefits financially and look for resource-efficient solutions, like software packages, to obtain a priority. Most organizations are experienced in delivering support applications and, consequently, they tend to be relatively low risk. The main consequence of failure is money wasted rather than major business problems, hence any more detailed priority assessment should be based on the relative financial risks of the investments.

Within the strategic segment, the basic rationale is to give priority to those applications that will contribute most to achieving business objectives, and use the least resources in the process. To assess this, some form of simple decision matrix, like that shown in Figure 9.3, can be useful in assessing the relative strategic contribution or weighting of the competing projects. Each application should be explained in terms of the degree to which (high, medium or low) it is relevant to achieving each of the critical success factors. It produces a 'score' or value for each potential investment based on the level of expected contribution to the current objectives.

		APPLICATION CONTRIBUTION		
		HIGH (3)	MEDIUM (2)	LOW (1)
OBJECTIVE A:	CSF 1 CSF 2 CSF 3, etc.			
OBJECTIVE B:	CSF 1 CSF 2, etc.			
OBJECTIVE C:	CSF 1 CSF 2, etc.			
OBJECTIVE D:	etc.			
TOTALS				

OVERALL
TOTAL

Figure 9.3 Strategic weighting via critical success factors

Setting priorities among key operational systems is more complex than support, but involves less uncertainty than strategic applications. The arguments for (i.e. benefits of) key operational investments will essentially comprise:

- financial;
- critical success factors (either directly or by enabling strategic developments);
- risk to current business (critical failure factors);
- infrastructure improvement.

High potential applications are difficult to prioritize and will tend to be driven somewhat in the reverse of strategic applications: what resource is available to do it and then which application might best employ that resource? As discussed in Chapter 7, high potential applications are often ‘individually’ driven, a champion usually exists; it is the secondary resources that are the problem. While it sounds wrong to suggest that ‘he who shouts the loudest’ or ‘has the most influence’ will obtain priority, in this segment it may be the best way to allow priorities to be set because:

- the results will depend not just on the value of the idea, but also on the force with which it is pursued;
- setting objective priorities on scant evidence is not very reliable anyway.

Table 9.1 Examples of effect on weighting of various factors (High, Medium, Low)

<i>FACTOR</i>	<i>Objectives/ Business</i>			
	<i>CSFs</i>	<i>risks</i>	<i>Infrastructure</i>	<i>Economics</i>
1. All types of investment have to be cost-justified to meet strict ROI hurdles	L	L	L	H
2. Business is in weak position or in decline—short-term profitability	L	M	L	H
3. Business is in a high-growth market and satisfying the market demand is paramount	H	H	M	L
4. Environment is very competitive and business performance must be improved	H	H	L	M
5. Need for redevelopment of old systems. Systems and/or technology are out of date compared with competitors or peer organizations	L	H	H	M
6. New systems are required to support major business/organization change or rationalization	M	H	M	L
7. Technology cost performance enables lower costs for existing systems if redeveloped	L	L	H	H

BENEFITS MANAGEMENT

One of the factors that differentiates successful from less successful companies in their deployment of IS/IT, according to a number of surveys,²¹ is the management resolve to evaluate IS/IT investments before *and after* they occurred. A survey of approaches to managing IS/IT benefits in 60 major organizations²² revealed that only 26% of the companies always reviewed projects after completion to determine whether benefits were delivered—a finding in line with earlier surveys.

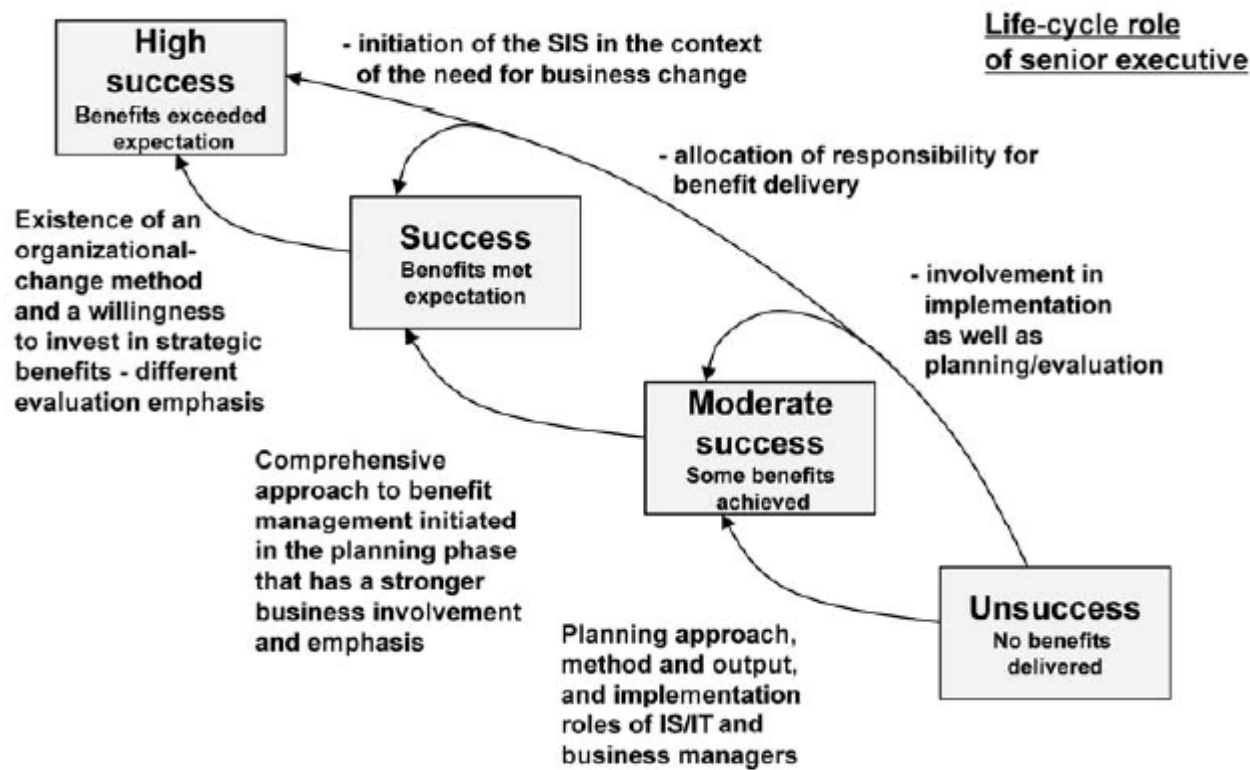


Figure 9.4 Factors increasing the degrees of success in strategic information systems

Benefits Management: the process of organizing and managing such that potential benefits arising from the use of IT are actually realized.

Systems development methodologies such as SSADM (Structured Systems Analysis and Design Methodology), DSDM (Dynamic Systems Development Methodology) and SSM (Soft Systems Methodology) are processes and methods designed to ensure that the right system is developed in the most appropriate way to agreed quality and performance requirements.

Project management methodologies like PRINCE (Project Management in a Controlled Environment) are essential for managing the activities and resources associated with a project to deliver the system and complete the other tasks to agreed times and costs. Most organizations now recognize that this is a shared responsibility between business and IT management. Ultimately, it is the business that suffers the real consequences of poor project management and business project managers are often appointed for major IS/IT investments, although their roles and responsibilities are not always clear.

three questions:

- Why is the investment being made—what is causing the organization to change and how critical to its future is the successful management of the changes? (*the benefit drivers*)
- what *types of benefit* is the organization expecting from the investment overall—to reduce costs, improve operational performance, gain new customers, create a new capability, etc.? These need to be understood in general terms before detailed analysis of potential benefits in relation to the extent of change required is undertaken.
- How will other activities, strategic initiatives, business developments or organizational issues affect the particular investment either to facilitate or inhibit its progress and outcome? (*the organizational context*)

STRATEGIC	HIGH POTENTIAL
Business innovation and change Business process restructuring	(R&D projects)
Business effectiveness Business rationalization and integration	Business efficiency Process elimination and cost reduction
KEY OPERATIONAL	SUPPORT

Figure 9.5 Generic sources of benefit for different applications

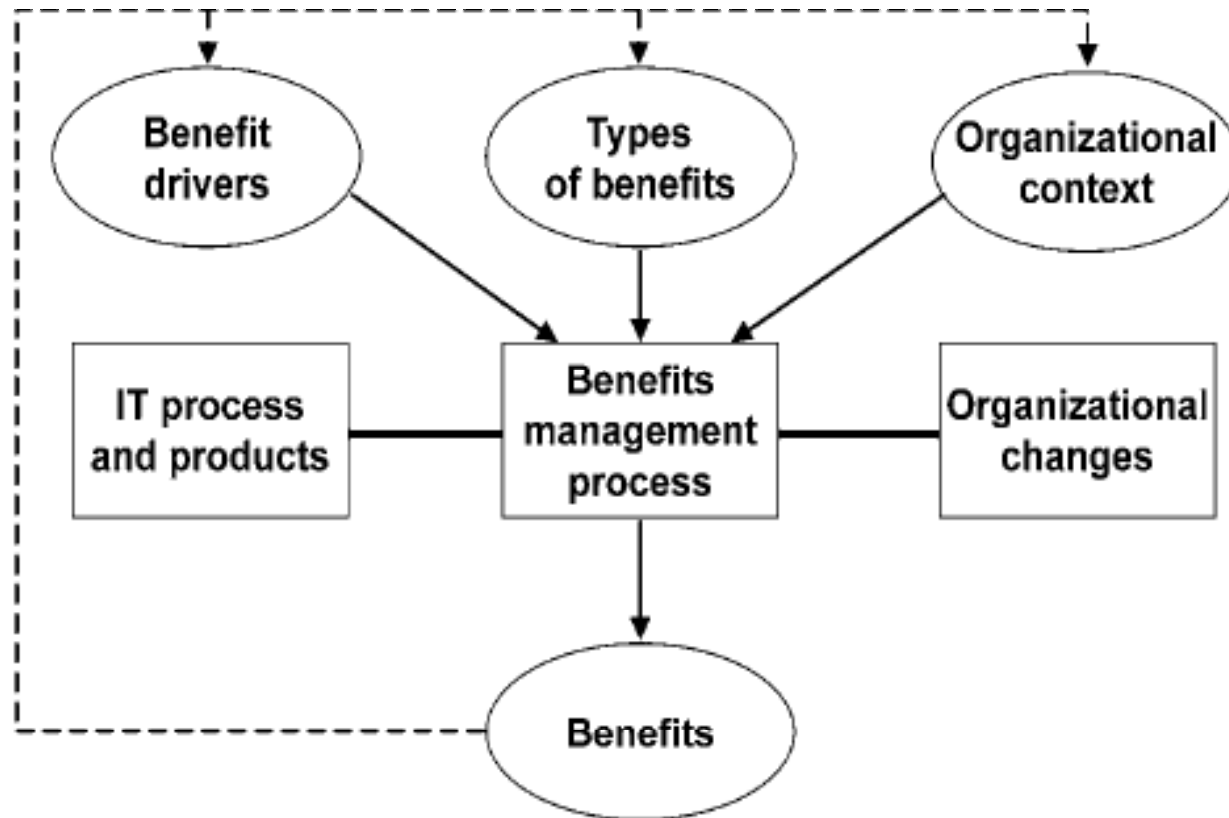


Figure 9.6 Benefits management context

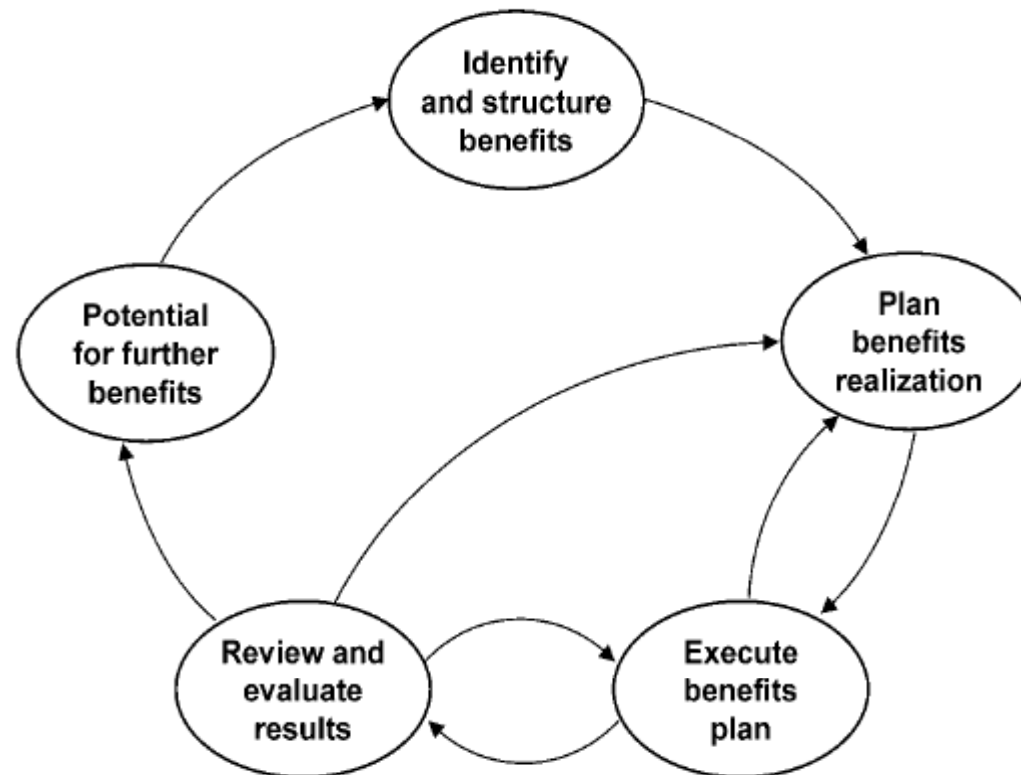


Figure 9.7 A process model of benefits management

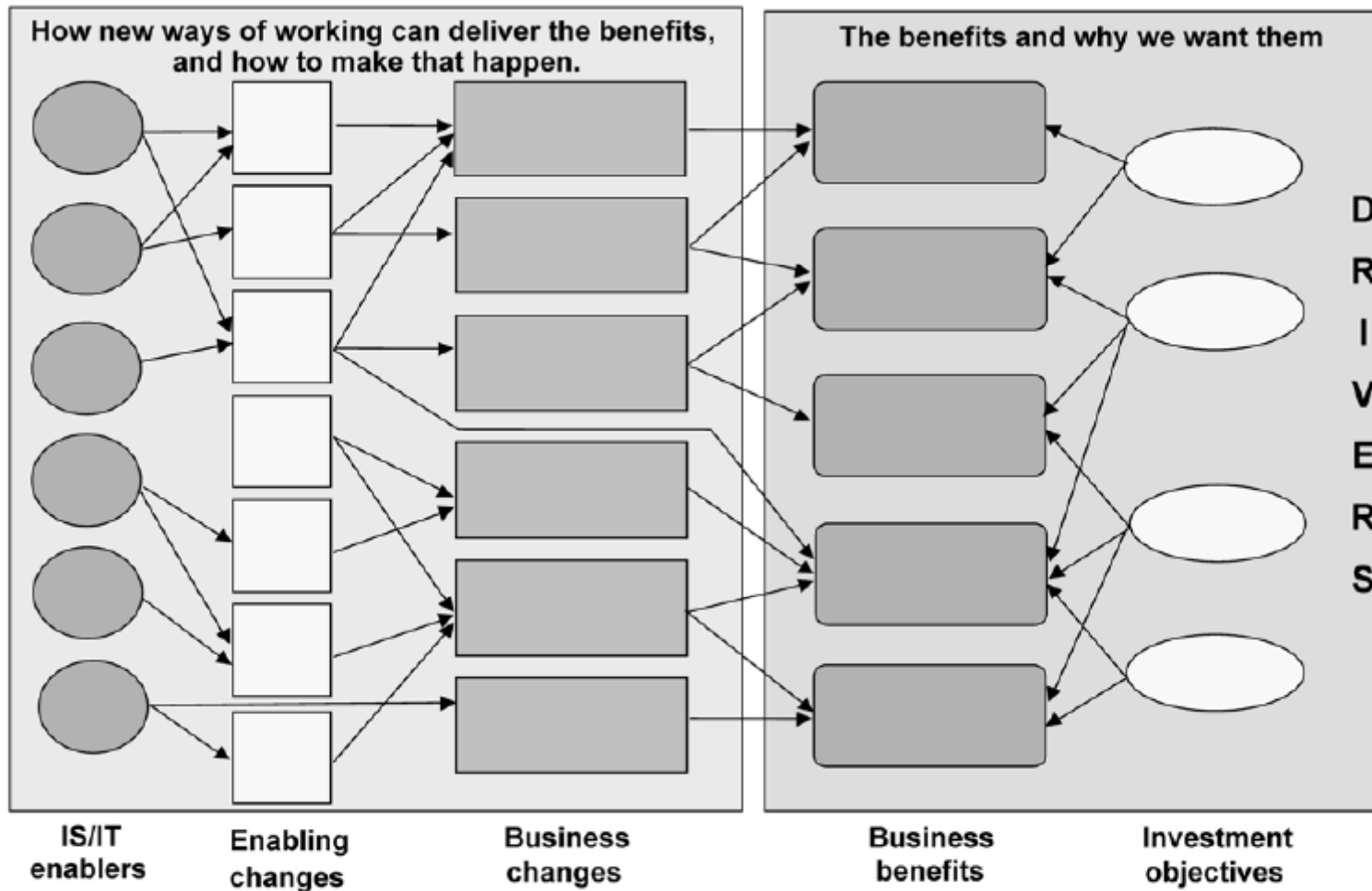


Figure 9.8 Benefits dependency network

Stakeholder group	Perceived benefits (disbenefits)	Changes needed	Perceived resistance	Commitment (Current and Required)				
				Anti	None	Allow it to happen	Help it happen	Make it happen
Customers	Configuration tailored exactly to needs - no testing / reject	None	None					
Sales and marketing managers	Improved customer service and product quality image	New incentives to get sales reps to use system with customers	Reluctance to change reps reward systems				C — Action required? → R	
Sales representatives	(Extra work in preparing requirements and quotes)	To use system and improve quality/accuracy of quotes	No time available to use/learn system. Loss of autonomy	C		Action required?	→ R	
Manufacturing/Logistics	Removes need for configuration checking. Less returns/queries	Stop current checks to put onus on reps to get it right	Do not trust sales reps' accuracy in requirements/quote	C		Action required?	→ R	
IT developers	New advanced system - remove old difficult to maintain system	Skills in expert system development	None					

Based on a project to implement an expert system for Product Configuration

Figure 9.9 Stakeholder analysis (source: after Benjamin and Levinson)

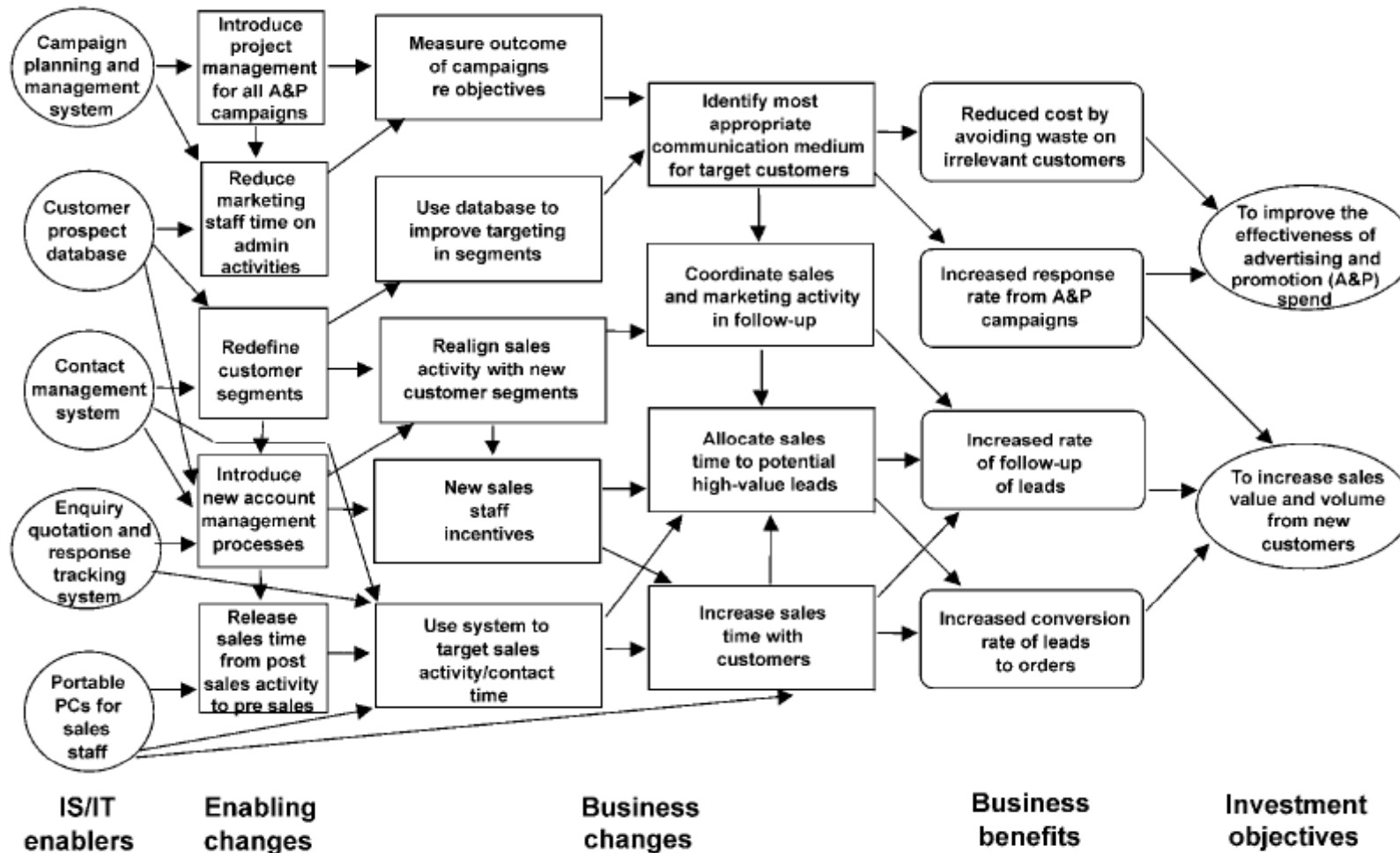


Figure 9.10 Example of (part of) benefits dependency network—sales and marketing system

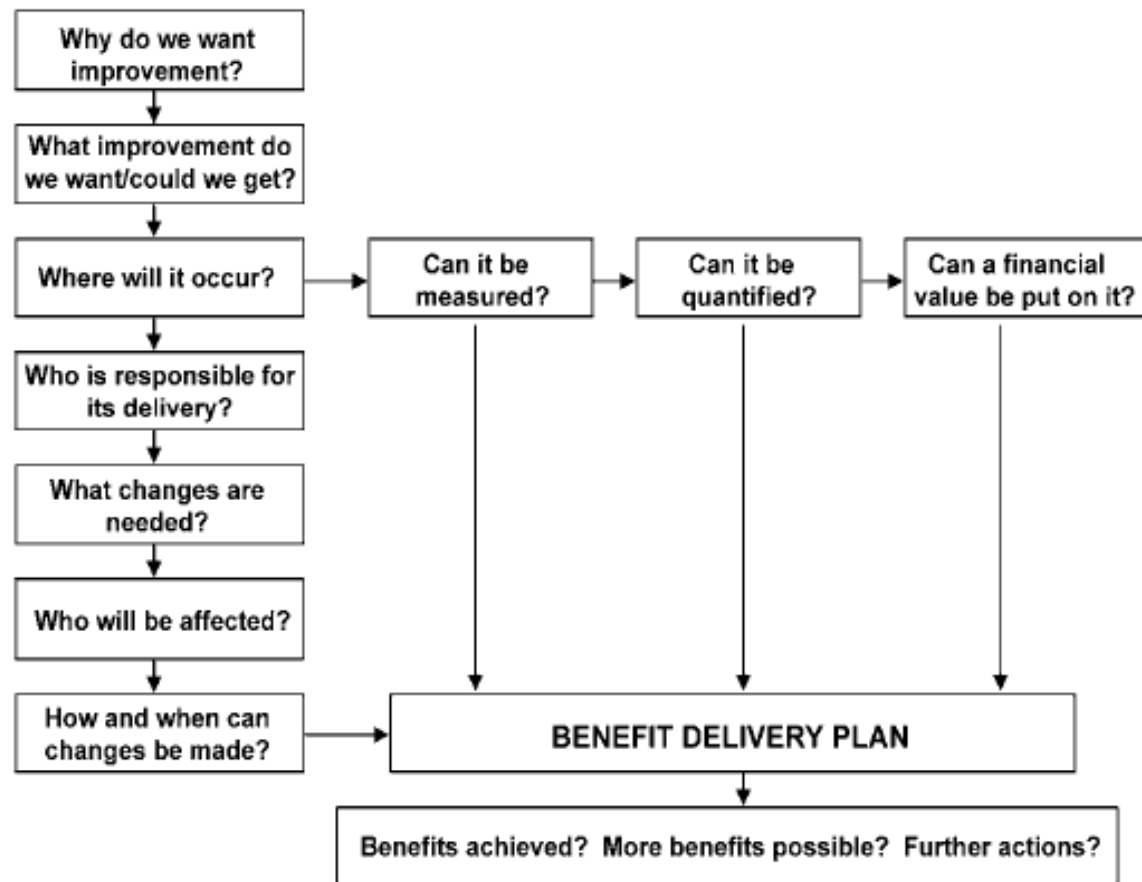


Figure 9.11 The dimensions of benefit management

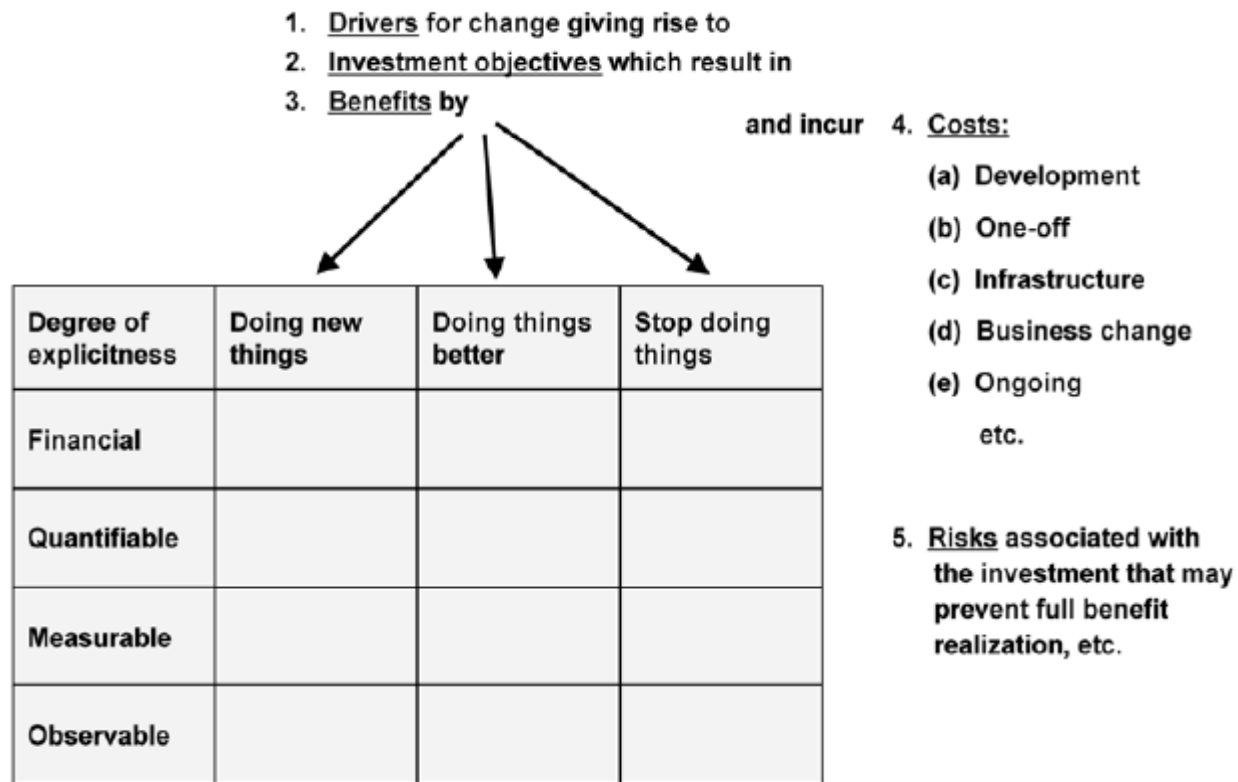


Figure 9.12 The investment proposal—making the case

ASSESSING AND MANAGING INVESTMENT RISKS

As part of the appraisal of investment viability, it is essential to assess the potential risks: both the risks of failing to deliver anything at all and, more commonly, of failing to deliver some or all the benefits. Extensive research into the reasons for information systems investment failure by Lyytinen and Hirschheim²⁹ suggested that failure can occur in four domains:

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1. *Technical failure*—this is clearly the domain of IT, who are responsible for the technical quality of the system and the technology it uses. Technical failure is increasingly less common and is often the cheapest to overcome.
 2. *Data failure*—this is a shared responsibility between IS/IT professionals and the users who input the data. Obviously, good design, processing integrity and sound data management practice are the responsibility of IS, but not everything can be legislated for and the effectiveness of business processes and procedures and data quality control fall clearly in the user domain.
 3. *User failure*—while some blame for the users misunderstanding the system may accrue to the IS/IT professionals, the primary responsibility for ensuring users are trained to use the system appropriately and to its maximum capability must rest with the business management. A major weakness in many implementations is inadequate training, and many systems become less effectively used over time as staff change and ongoing training investment is insufficient, even non-existent.

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4. *Organizational failure*—systems may be satisfactory in meeting particular functional needs, but may fail because they do not satisfy the organization overall, due to inadequate understanding of how the system relates to other processes and activities. For example, a budgetary control system specified for and by accountants at the centre may fail to meet the needs of line managers to plan and control different types of business expenditure. Responsibility here clearly lies outside the IS/IT domain and must be shared by line and senior management for not aligning systems with organizational needs.

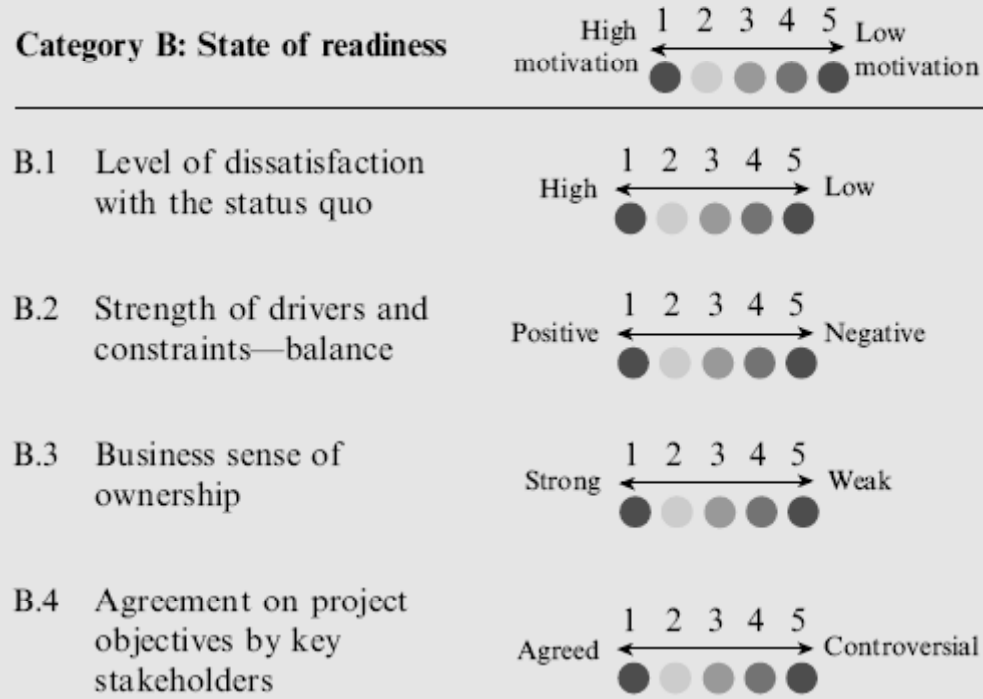
The Lytinen and Hirschheim analysis considered only these four domains, but a fifth and increasingly more serious area of failure exists:

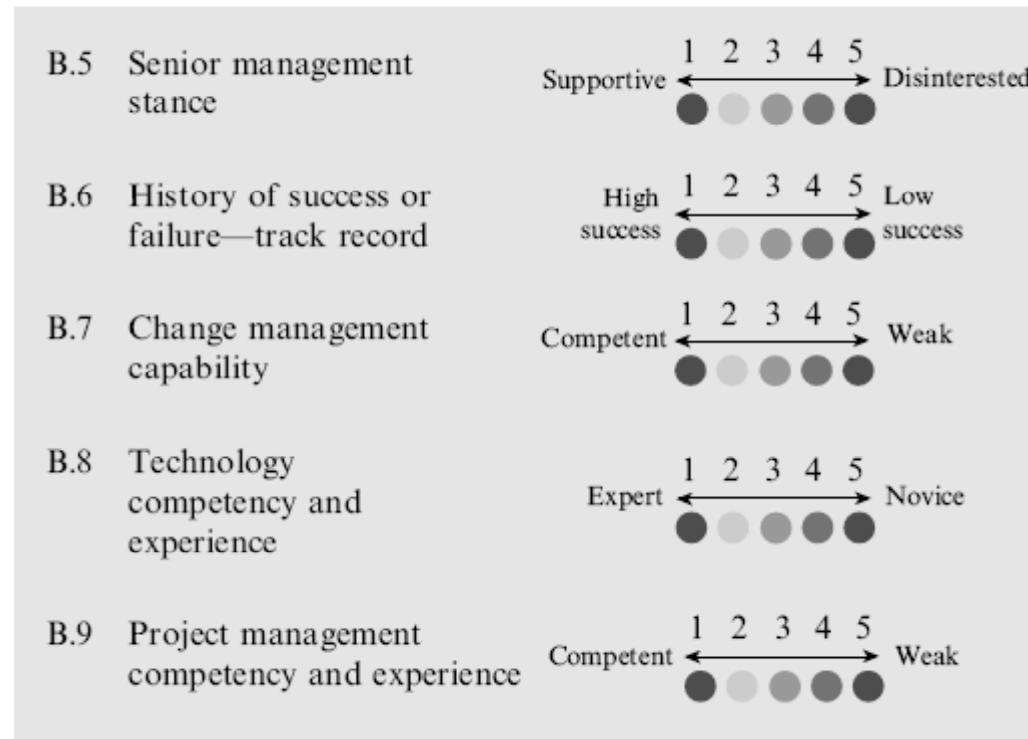
5. *Failure in the business environment*—the systems are or become inappropriate to external or internal business requirements due to changing business practices instigated by others, or by not supporting the business strategy adequately, or simply by not coping with the volume and speed of business process needs effectively or economically. The responsibility for this is essentially senior management's, although, without active user and IT input, they cannot be expected to identify or understand the problems, or be able to take action to correct them.

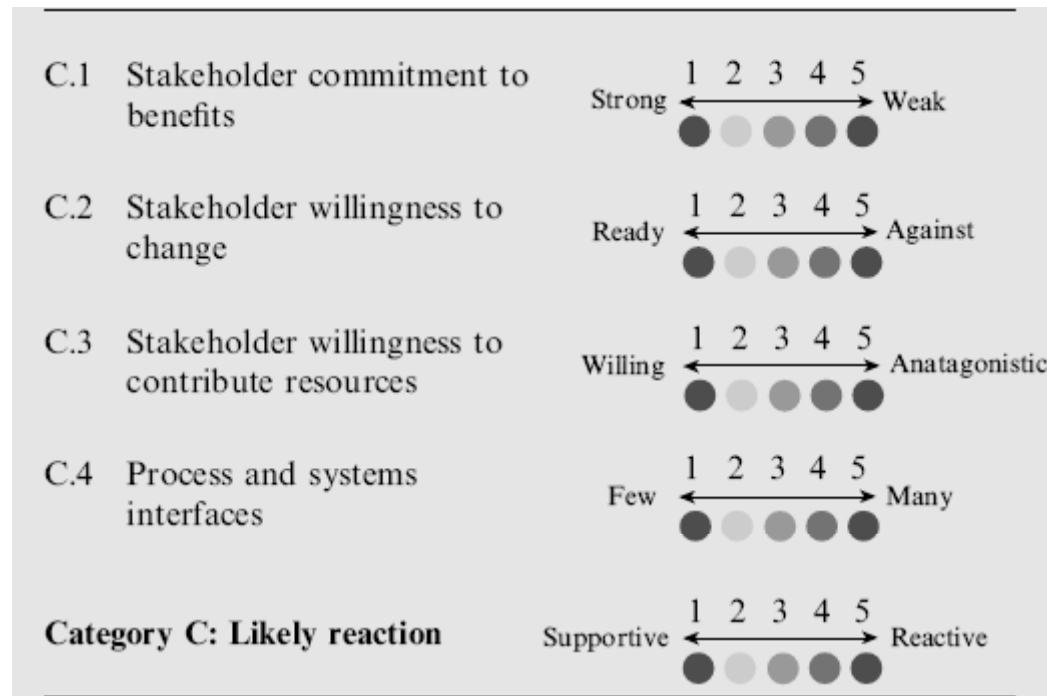
Box 9.1 IT-enabled change—risk-factor analysis

<i>Factor</i>	<i>Range</i>
A.1 Business impact	Marginal ← 1 2 3 4 5 → Core
A.2 Degree (scale, scope, size) of change	Low ← 1 2 3 4 5 → High
A.3 Pace of change	Gradual ← 1 2 3 4 5 → Rapid
A.4 Technology innovation	Familiar ← 1 2 3 4 5 → Novel
A.5 Novelty of business solution	Familiar ← 1 2 3 4 5 → Novel
A.6 Clarity of vision of intended outcome	Sharp ← 1 2 3 4 5 → Vague
Category A: Kind of change	Incremental change ← 1 2 3 4 5 → Radical change

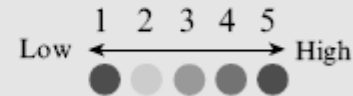
Category B: State of readiness



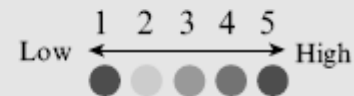




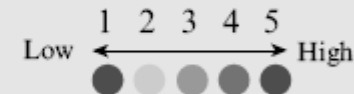
D.1 Dependence of objectives on current commercial environment



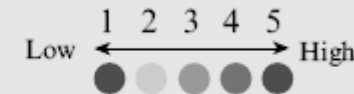
D.2 Susceptibility to regulatory and legislative changes during project



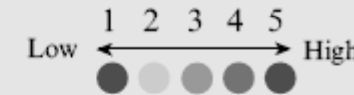
D.3 Dependence on current management structure



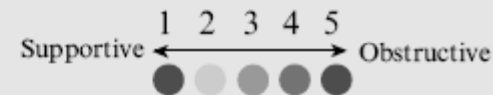
D.4 Dependence on other projects



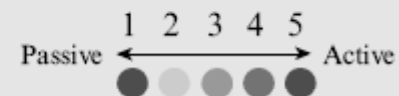
D.5 Dependence on key personnel



D.6 Appropriateness of internal control mechanisms



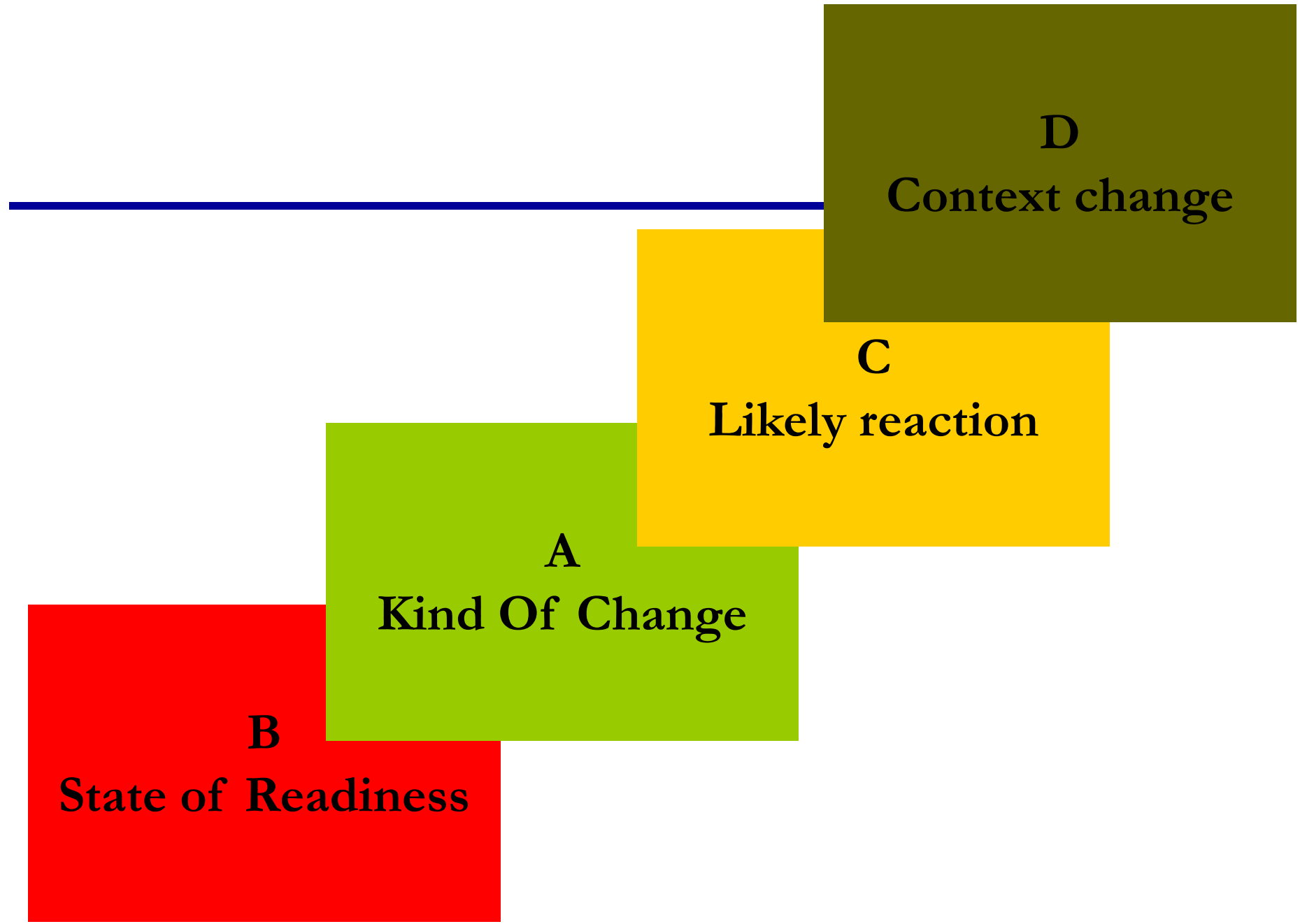
Category D: Contextual change



Strategic investments are likely to score highly in Categories A and D. Provided this is offset by low scores in Categories B and C and action can be identified per high-risk factor, as above, the project should still be viable. However, if this is not the case, actions should focus on reducing risk factors in B and C by reviewing the change components of the benefit dependence network to reduce the scale, severity or speed of change to make it more manageable.

Key operational investments are similar to the strategic projects, except that a high score in A is more serious. Given the potential impact on existing operations, unless all other categories are low, the nature and scope of the proposed solution should be considered carefully, with the objective of finding a lower-risk, alternative way of delivering the set of benefits. Again, it may be possible to address particular risk factors by specified action to reduce the overall ‘score’.

Support investments—a high score in Category A, C or D suggests that the project is not support! and its expected contribution should be reconsidered. The main risk category is C and, if this scores highly, it implies that essential changes will be resisted. While the application can still be implemented, few, if any, of the benefits will actually be realized and attention to the detailed stakeholder concerns and the reasons for them is needed.



Portfolio checking through Risks

	A change	B readiness	C reaction	D Context change
Support	Low	?	Low	Low
Key operational	High	Low	Low/High	High
Strategic	High	Low Or managed	Low Or managed	High
High potential	?	Low	Low	High Or unknown