

WHAT WILL THE FUTURE BRING?*

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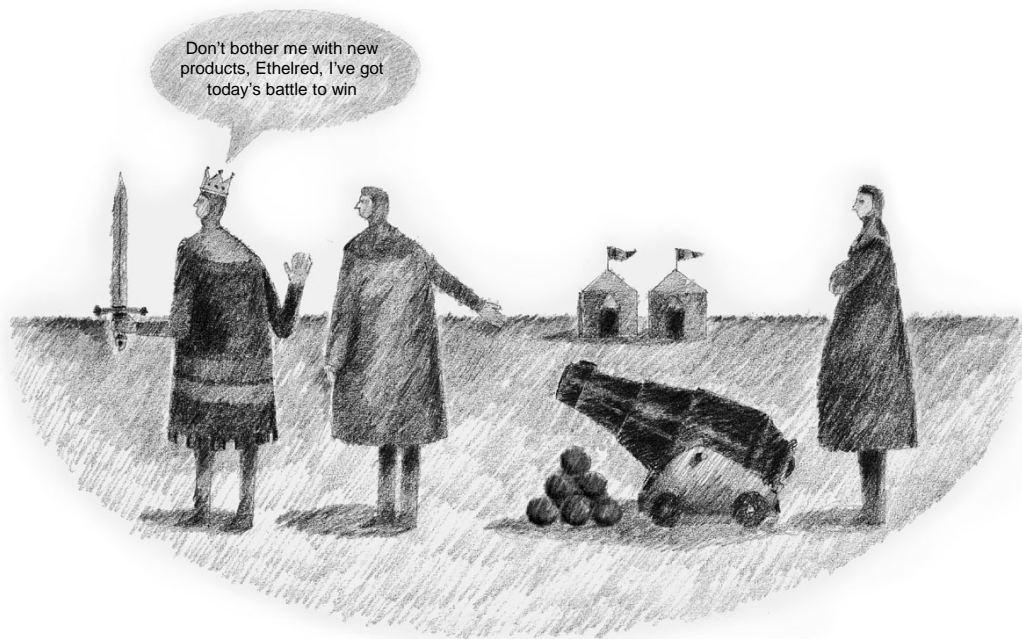
One of the biggest pressures on business today is getting new products designed and to market faster. Increasingly, innovation is becoming key to competitive edge.

Annual surveys e.g. by the Bourton Group¹ have seen this pressure steadily rising. In their 1992 survey it was way down, at ninth in a list of ten; last year it was exceeded only by the need to cut product costs and increase shareholder returns (which in themselves are inextricably driven by new, well designed, products).

In the public arena the need for action is widely recognised: for example, the DTI's *Managing into the 90s*^{2,3} and *Manufacturing Foresight* programmes highlight excellent innovative capacity as key to future success, and the Engineering Council agrees that "constant innovation is vital for companies to survive and thrive."

What are companies doing to respond?^{4,5} 'Not enough' is the short answer (Figure 1).

Figure 1 – There is a better way



Whilst I realise that if you are bleeding to death today worrying about whether you will die of senile dementia in two to three years time is not critical. However if you are not actually in the death throes at the moment then taking time to ensure future profitability will be time well invested. Failure to do so will mean that in two to three years time you will be in a very similar position to that which many of companies find themselves in now. New ideas (in products, technology and ways of working) will be

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few and far between, products will be “me to” and your basis for competition will be on cost. This is not the way to profits and growth.

So how well prepared is your company to be able to deliver a profitable future? To start you thinking, the checklist in Figure 2 will help you to assess how far your strategy and operations practices are helping or hindering

Figure 2: How effective is your company.

INNOVATION CHECKLIST: STRATEGY AND OPERATIONS		Always	Some times	Rarely
1.	Products have clear plans linked to business strategy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	There are clear technology route maps for all products, and these drive new product development.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Projects are led by empowered project managers in a supportive matrix environment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Projects are adequately resourced, full-time, and co-located.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	New opportunities are assessed and categorised against the business plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Plans, targets and milestones are set at the start of projects and reviewed throughout	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	A clearly defined process is followed, reviewed and improved for each new product introduction project	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.	Production is involved throughout projects, and clear criteria are established for handover, which is gradual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Appropriate tools (QFD, DFA, FMEA etc) are routinely used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Customers and suppliers are routinely involved in all aspects of the development process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

KEY: Always = 9 points, sometimes = 3 points, rarely = 1 point
 70+ = Best practice; 40-69 = Room to generate more benefits; 20-39 = Low innovation and change capability; 0-19 = Major cultural and structural changes needed to compete

Are you expecting enough? Improving innovation processes and getting new products to market faster is a survival issue. There are short-term ‘quick hits’ that can be achieved, as well as long-term benefits that will pay for any costs of change.

If you find most answers in the *some-times* and *rarely* columns, you should be expecting significantly more. There is a better way.

Most companies report⁶ that they are disappointed or unsuccessful in key aspects of their innovation projects, and 90% report no great success in meeting such profit-critical criteria as product cost targets, planned volumes and market plan. Even more disturbingly, a majority view this state of affairs as ‘satisfactory’ - a view not supported by the evidence, or by the rising pressure to perform better. “Few have mastered the management of this process” says the Engineering Council.

Addressing this issue can no longer be postponed or set aside as ‘too difficult’. To avoid shooting itself in the foot, industry needs to raise its sights.

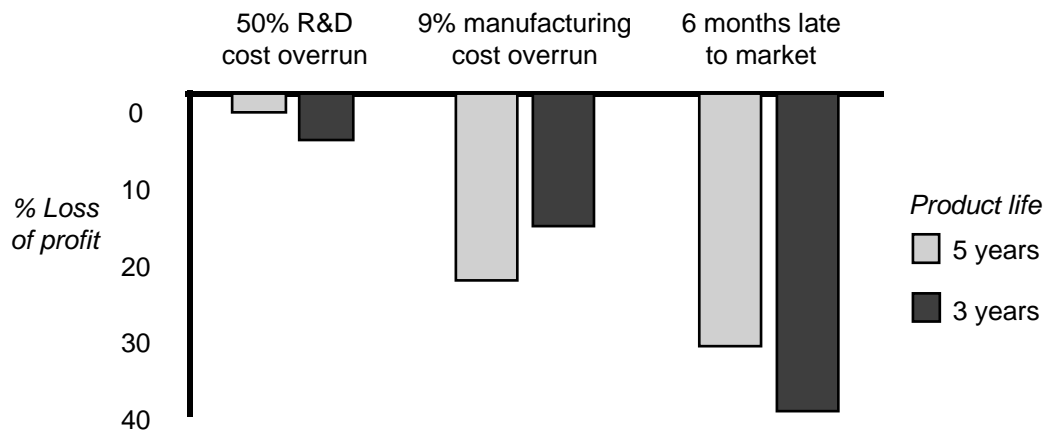
WHY IS IT IMPORTANT

For several decades now the emphasis in Western companies has been on improving manufacturing operations, and there is no doubt significant benefits have been obtained. However, whilst we must continue to improve operations, future gains in this area are unlikely to provide the major differentials in competitiveness achieved in the past.

Yet the business pressures continue to increase, making improvements ever more urgent.^{7,8,9} Product life cycles in all sectors are decreasing rapidly. Toyota now develops a new car in 15 months and a new engine at 30% less cost. New foodstuffs go from idea to supermarket shelf within a few weeks. Hewlett Packard and other

major electronic companies earn 50% of their sales from products less than three years old. In this environment, achievement of time to market, milestone adherence and product cost is critical (Figure 3).

Figure 3 – Attainment to milestones is more influential than non-recurring development costs



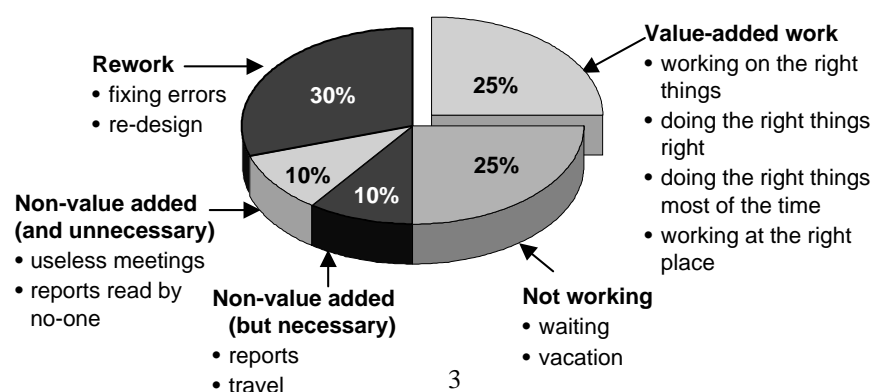
Source: Donald Reinertson

It seems to me that there is now a general recognition amongst business leaders that they must do something different in innovation and new product development to meet these challenges. They are ‘talking the talk’. However, most are not yet ‘walking the talk’ in the sense of doing something about it. Maybe the pain threshold for action has not yet been reached, or more likely the pain is there but the belief is that there are still easy, non radical, solutions that will deliver the required improvements. For example, some software providers are promoting Product Data Management (PDM) as the solution to all product development ills. Be cautious and remember MRPII! Automating ineffective ways of working will simply enable you to make the same old mistakes more quickly.

Information Technology is vital in supporting the development process but will not in itself change the process to make it more effective. The ways in which your company works are more critical than the technology you use. The contribution of people to making new systems work can easily be overlooked in the rush to implement software. All areas, whether organisation, systems, or processes, need to be considered.

In traditional Western companies only 25% of effort on product development actually adds value (Figure 4). Automating this way of working with software will not improve the situation.

Figure 4 – The way we undertake NPI can be much more efficient



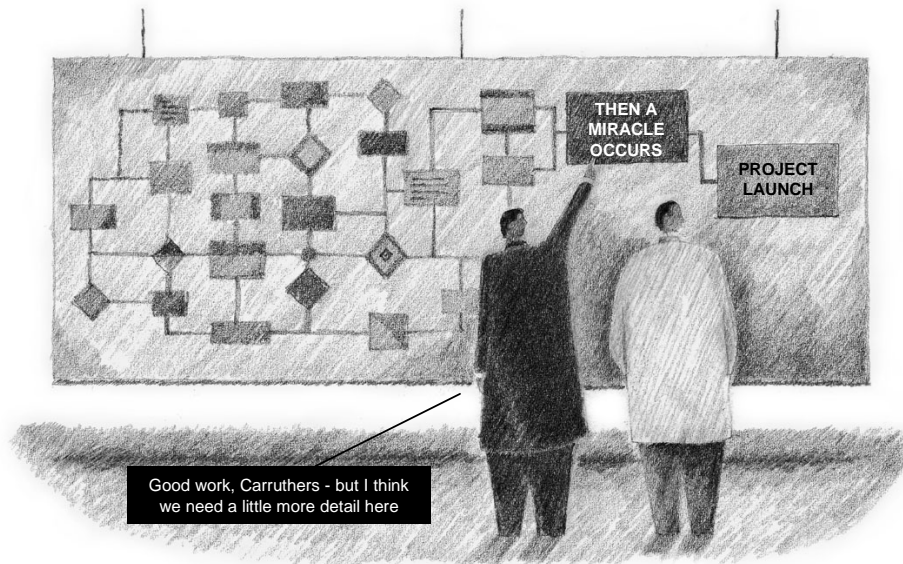
Most time is spent on re-work, waiting or unnecessary work. Although often a perceived solution, increasing engineering resources is not the answer.

THE OPPORTUNITIES

The financial benefits of successful innovation are enormous.^{10,11,12,13} New products lay the foundation for future profitability through enhanced market attractiveness, increased sales and higher margins. Yet getting better products to market faster often proves difficult.

Why is this? I often find that new product introduction follows an ill-defined, poorly controlled process implemented by a part-time teams working without direction in different departments (Figure 5).

Figure 5 – Ill-defined, poorly controlled processes



Last years Bourton Group survey on innovation produced a revealing summary of inconsistencies between how companies manage innovation projects and the business objectives they seek to fulfil (Figure 6). Equally telling is some of the detail behind this. *For example, only 12% of companies routinely measure the key project performance criteria of cost, time, and quality.*

Figure 6 – Our behaviour does not match our objectives

SITUATION	NEVERTHELESS IN COMPANIES SURVEYED...
While few projects are a great success...	..only 40% always have clear accountability for project deliverables
While reduced time to design and market new products is a major business pressure...	..only 30% always use milestone control to ensure on-time delivery ..only 25% always have a well defined, mandatory planning method to ensure that they know what is going to be done ..only 20% always use timing and resource planning for multiple projects to ensure projects are adequately resourced and hence delivered on time
While cost and shareholder returns are the greatest business pressures...	..only 20% always use systematic cost planning and control ..only 20% always assess the risks in projects ..only 10% always have well defined criteria for killing projects.
While performance measures are seen as the best enablers to improved performance...	..only 28% always have well defined criteria for project reviews ..only 30% always use agreed measures to ensure that projects meet their targets

So it is extremely worrying to find that over half of companies regard their innovation project management as generally ‘satisfactory’. Continuing to compromise with firefighting and overruns will not enhance future capability. There is a better way. Successful companies have:

- A high quality new product introduction process
- A clear and well communicated new product strategy
- Senior management commitment and accountability
- High quality, cross functional teams
- Best practice project and programme management
- NPI measures of performance that are regularly reported and reviewed
- Process tools and techniques that are routinely used

Expect more

A paradigm shift is needed in expectations, and a new mind-set that demands world-class performance in innovation. The starting point may be a **strategic reappraisal**. How does the development process really operate in your company? What changes are really needed?

To do this an audit that covers all aspects of the company’s innovation process may be appropriate. Such an audit will enable you to:

- Focus attention on an area that is critical to the success of your business
- Establish a consensus on the vision for the future
- Develop an understanding of the areas of good practice and areas for improvement

- Generate plans to improve areas of weakness
- Provide fresh thinking on the process of introducing new products
- Generate a desire for change and initiate the change process

To support this you need to think strategically to avoid designing new processes around yesterday's problems, but to ensure that they are appropriate for future projects. It is essential to ask the right questions at the start, for example:

- Should innovation be focused on existing products and markets or on seeking new opportunities?
- Will emerging technologies render products and processes obsolete?
- Is innovation in areas such as sales and distribution more urgent than product innovation?
- Are operations evolving fast enough to accommodate innovation in products?

Radical change delivers radical benefits

A good example of the success of this approach is a tier 1 automotive and aerospace supply business who's business success relies heavily on the design and development of new products but who was facing significant problems with the rapid changes in the global supply base.

Most technical departments' processes were inadequate to meet new demands and projects were disorganised and out of control with poor accountability for deliverables. There were difficulties in meeting programme dates and costs with frequent project overruns and eroded margins due to high product costs. There was a perception in most parts of the company that significant increases in engineering resources were rapidly needed.

A comprehensive review and redesign of the development processes and organisation was undertaken to deal with the changing demands. A new product introduction process with a strong phase gate discipline was implemented, as were improved resource planning and performance measures, and finally enhanced systems and technologies. Project responsibility was moved away from Engineering, reporting to Programme Directors, which clarified and improved accountability for product cost and design quality. Co-located, multi-functional project teams delivered projects. Not only was additional resource not required, but results achieved were:

- 25% productivity improvement in design and development
- Project bid success rate up from 50% to 80% in some areas
- Project resource requirements down by 30%
- Major culture change, "no surprises" on projects
- Project performance visible from top to bottom of the organisation
- Improved milestone achievement to 90% plus
- Significant reductions in change requests, right first time

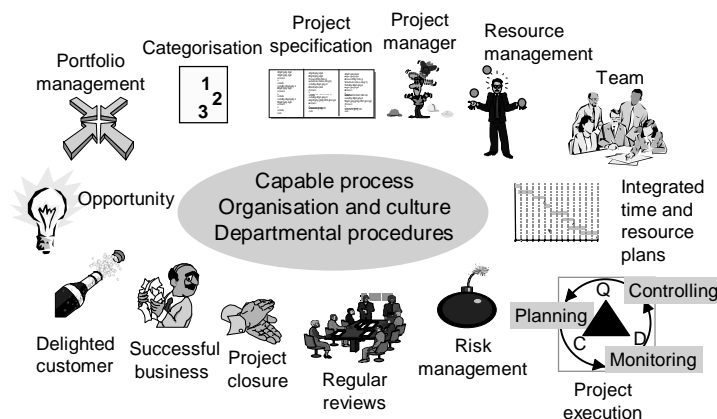
In addition, customer perceptions of company capability were much enhanced.

THERE IS A BETTER WAY

A fundamental redesign of the way we innovate and develop new products is not rocket science:^{14,15} the ‘hard’ areas of *process* and *organisation* design are relatively simple. It is the ‘softer’ *people* issues, the culture change that is much more difficult. It requires commitment and effort from all areas of a business. Product development, though traditionally seen as an *engineering* or *marketing* issue is too important to be left to any one function.

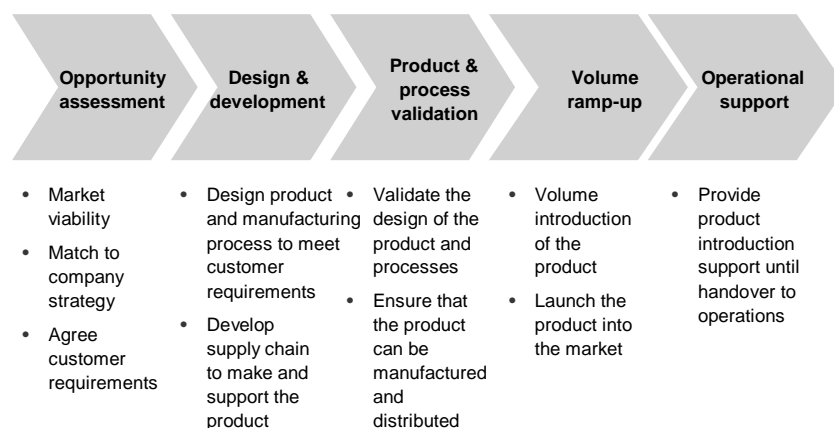
New product introduction starts with an idea or opportunity, which is then developed all the way through, into production for delighted customers (Figure 7). It is a business issue and has an impact on all areas of the business. It is complex even if the individual elements are not difficult. All areas of process, organisation, culture, project categorisation by risk, teamworking, project and programme management, planning, risk management and senior management reviews must be in place.

Figure 7 – Aspects of new product introduction: the principles are easy, applying them is harder



Although the detail of a product introduction process will be unique to an individual company, a generic structure that considers all these is shown in Figure 8.

Figure 8 – Typical five phases of product introduction



At top level such a process shows how products are taken from opportunity through to production. At lower levels it details the activities and tasks that need to be

undertaken to meet the process requirement. All phases must be 'gated', with milestone deliverables at the gates, and involve true concurrent engineering by multifunctional teams.

To drive the process and individual projects, measures of performance (MOPs) must be defined and applied to all projects.¹⁶ At the start of a project, targets for the MOPs should be set that are a significant improvement over previous similar projects. These measures must then be routinely tracked and reviewed throughout the project.

Businesses also need to define a balanced kit of tools that must or should be used, and when and how they should be used. These will encourage project-to-project learning and continuous improvement.

WHERE DO YOU START?

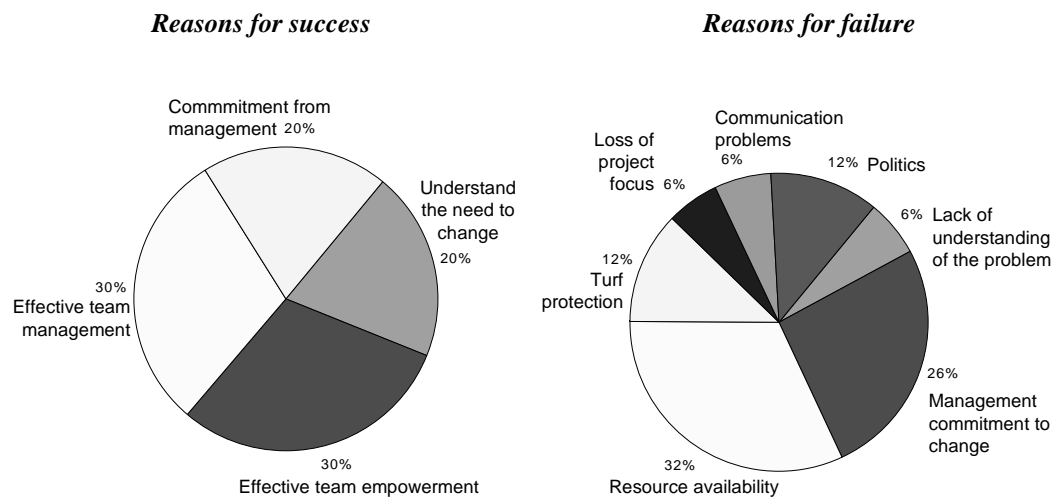
The simple answer is almost anywhere! Doing something, somewhere is preferable to doing nothing. In new product introduction it is very easy to fall into a paralysis by analysis syndrome. Because NPI crosses all functions and areas of a business it is very easy to get into endless management and team meetings trying to design the optimum process in detail whilst resolving all functional conflicts. This route tends to result in either nothing getting done because it is too difficult or in a very bureaucratic and non-empowered solution that protects everyone's turf.

By far the best approach is to start somewhere, now - normally on a critical project but with a rapid roll-out across the business. But choose a project that is high profile, critical, 'do-able', where significant improvements are possible and with a relatively short time scale.

Remember that the biggest challenge is to change the culture,^{17,18,19} to change the behaviour of people. Integrated teamworking is a process not an objective, and it will impact everyone – directors, managers, supervisors, support and team members. Experience shows that introducing a new structure and new processes alone will not achieve change – people will behave in the old established ways inside the new structure. People need to be encouraged to test and explore the new structure. The essence of the change is agreement and negotiation. Imposing ideas from above without providing opportunities for feedback and experimentation must be precluded. However, leadership from above is vital. It must be clear to everyone in the organisation that change is not optional. The design of what we change into is the area for agreement and negotiation, not the need for change itself.

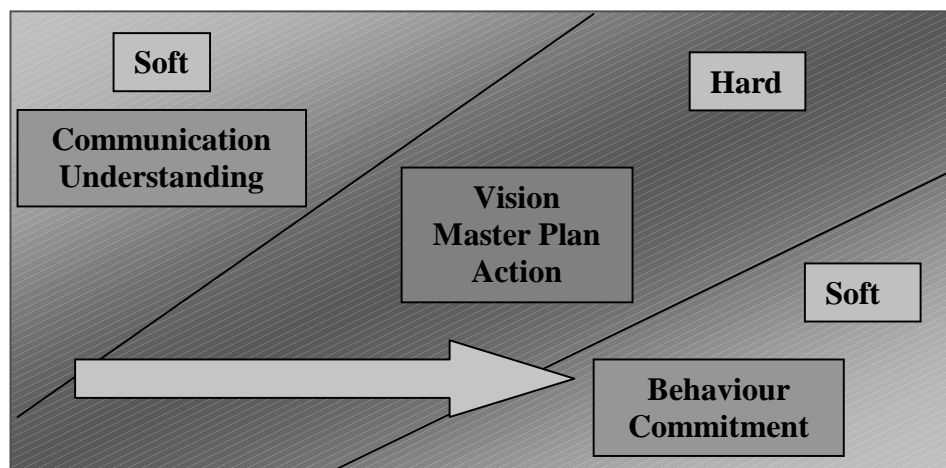
In a recent process improvement review in British Aerospace²⁰, the reasons for success and failure for change projects were analysed (Figure 9). None, whether success or failure, related to the 'hard' issues; all revolved around people. The keys to success were: teams that were effectively managed and empowered, where everyone understood the need for change, and where senior management were totally committed to the change.

Figure 9 – Results of process improvement review



Lasting and successful change depends on a ‘hard’ framework of vision, planning and action (Figure 10) supported by attention to ‘soft’ issues of communication, understanding, behaviour and commitment.

Figure 10 – Managing the change process



Typically communication is one of the first issues to challenge attitudes and the old ways of working, and the need for communication to all levels and in all directions should never be underestimated.

FINALLY

There is a better way and successful companies, which compete on innovation, are already taking it. They:

- Put 60-70% of their R&D capacity towards proactively developing new and existing products rather than supporting current products in production.
- Realise high-risk ideas by doing their own pre-development work, whilst recognising that in these high-risk endeavours failure is an acceptable outcome.
- Take care to plan all aspects of the management of their innovation process.
- Systematically plan for free, creative time for their R&D people.
- Invest around 8% of their turnover in new product development.

As a result, when compared with less successful businesses, they:

- Protect their technology with patents.
- Transform 5-6 times as many ideas into successful products.
- Achieve twice the sales for their new products.

¹ Bourton Group, Annual Surveys of Trends and Attitudes in Manufacturing Industry, Rugby, 1989-1999

² PA Consulting Group, *Manufacturing into the Late 1990s*, produced for the Department of Trade and Industry, HMSO 1993.

³ The Design Council, *Successful Product Development Management Case Studies*, produced for the Department of Trade and Industry, HMSO, London, 1994.

⁴ Balbort A and Pazdani B, *New Product Development Survey 1998*, Warwick Manufacturing Group, The University of Warwick, 1998.

⁵ Jenkins S, Forbes S, Durrant TS and Bannerjee SK, 'Managing the Product Development Process (Part I: An Assessment)', *International Journal of Technology Management*, Vol.13, no.4, 1997.

⁶ Bourton Group, *Still in Development, A Survey of the Management of Innovation in Manufacturing Businesses, 11th Annual Survey of Trends and Attitudes in Manufacturing Industry*, Rugby, 1999.

⁷ Parker AG, 'Engineering is Not Enough,' *Manufacturing Engineer*, Institution of Electrical Engineers, London, December 1997.

⁸ Business Process Resource Centre, The University of Warwick, *Understanding Best Practice for Key Elements of the New Product Introduction Process*, produced for the Department of Trade and Industry, London, 1998.

⁹ Kidd PT, *Revolutionising New Product Development, a Blueprint for Success in the Global Automotive Industry*, Financial Times Automotive Publishing, 1997.

¹⁰ Drucker, PF, 'The Discipline of Innovation', *Harvard Business Review*, November-December 1998.

¹¹ 'Proctor & Gamble, Jager's gamble', *The Economist*, 30 October 1999.

¹² Staley JL and Boche DG, 'Breaking the Downsizing Cycle with New Product Development', *The Mercer Management Journal*.

¹³ Deschamp JP and Ronganoth Noyak P, 'Becoming a Product Juggernaut', in Arthur P Little, *Prism*, 2nd quarter 1996.

¹⁴ Hunter, G, *New Product Development, Automotive Components*, Cranfield University, 1997.

¹⁵ James, P, *How Can Concurrent Engineering Reduce Redesign in UK Electronic Companies*, MSc dissertation thesis, University of Bath, 1999.

¹⁶ Curtis CC and Ellis LW, 'Balanced Scorecards for New Product Development', *Journal of Cost Management*, 1997.

¹⁷ Schaffer R and Thomson HA, 'Successful Change Programs Begin with Results', *Harvard Business Review*, January-February 1992.

¹⁸ Morton C, *Beyond World Class: Achieving Lasting Competitiveness*, lecture presented at the annual general meeting of the Manufacturing Industries Division, Institution of Mechanical Engineers, London, May 1999.

¹⁹ Nonaka I, 'The Knowledge-Creating Company', *Harvard Business Review*, November-December 1991.

²⁰ Harding DJ, 'The Challenge of Change', *Manufacturing Engineer*, Institution of Electrical Engineers, London, August 1999.