Process Improvement at HM Naval Base - Clyde

Achieving Operational Effectiveness in a Critical Environment

Synopsis

Faced with the challenge of reducing the costs of running HM Naval Base Clyde by about £40m per year over a ten-year timeframe, while not compromising the UK's submarine-launched strategic deterrent, Babcock Marine has had to choose carefully how to implement the huge variety of tools, techniques and initiatives available to help process improvement campaigns.

Adopting a 4-phase framework spanning 8-10 years has proved invaluable in structuring and time phasing hundreds of approaches by ensuring that the most immediate issues are tackled with the simplest tools and that change is sustained as the problems become more difficult and the tools more complex.

Although deciding not to campaign under a Lean or Six Sigma banner, the adoption of tools from these schemes was essential in getting the best return from process re-engineering efforts and has seen huge strides made and targets achieved on an annual basis over the first three-four years.

Avoiding the pitfalls of adopting highly publicised cure-alls and their associated 'flavour of the month' risks – while being seen to be making real change with no reduction in output - has been strongly supported by such a disciplined approach. This has also helped to focus traditionally broad-brush external offerings from consultancies, head-office and a customer who is closely integrated with daily operations

Maintaining themed phases for a roughly 2-3 year period has also simplified communication with and understanding by the workforce and allowed many recruitment, development and investment decisions to be taken with confidence, despite an ever-growing choice of techniques.

This paper outlines the operational and commercial challenges, relates how the objectives are deployed, explains the framework and roadmap adopted and justifies the grouping of potential solutions into well-defined timeslots, adding a new dimension to the selection of the right tools for the job. Successes, problems and the current status are discussed, in order to assist potential adopters and those who might already be mired down in the sea of options currently available.

1 HM Naval Base Clyde

1.1 Role

Her Majesty's Naval Base Clyde at Faslane and Coulport is home to the United Kingdom's Strategic Nuclear Deterrent. It is the largest military establishment in Scotland and the biggest single-site employer in the country, with more than 6,000 civilian and naval personnel. The workforce is fully integrated and comprises Royal Navy, Ministry of Defence civilian, Babcock Marine - the MOD's commercial partner - and regular contractor personnel. The base contributes around £270 million a year to the Scottish economy.

HM Naval Base Clyde is the home port for the ships and submarines it has in its care, a repair facility for visiting vessels of all nations and a very large hotel and leisure facility for the crews of those ships while they are alongside. Amongst its support facilities are a Shiplift and Explosives Handling Jetty which are comparable with only two or three others in the world.

It is the base port to the ships and submarines of the Faslane Flotilla, made up of four VANGUARD-class and one SWIFTSURE-class submarines and a squadron of eight SANDOWN-class Mine Counter-measures Vessels (MCMVs). The Base is also preparing for the arrival of the new ASTUTE-class submarines in 2009. All of Clyde's submarines are nuclear powered and the VANGUARD-class carries ballistic nuclear weapons.

1.2 Contractor Arrangements

Babcock Marine – part of the Babcock International Group - is the commercial partner to the Ministry of Defence, responsible since 2002 for the eleven year partnership agreement to manage a significant part of the Base's output. The HMNB Clyde partnering agreement was the first of its kind between the MOD and private industry and the contract was part of a Warship Support Modernisation Initiative (WSMi) to seek wider industrial involvement in the running of the UK's three naval bases. As well as managing around 1500 employees, 200 staff seconded from the Royal Navy and 50 from the MOD, Babcock Marine manages engineering work on all ships and submarines at the base and provides a comprehensive range of support services, including logistics, facilities management and the provision of accommodation, catering and domestic services for Royal Navy personnel. Babcock Marine also operates the naval base at Devonport and owns and operates the dockyard facilities at both Devonport and Rosyth.

The primary purpose of the partnership agreement is to provide the same service as was provided by the MoD itself but at an annually reducing cost. This strategy emerged from the fact that there is overcapacity in the industry – three naval bases but a smaller navy –

but no political or operational justification for closing any one of the bases. A lack of customer affordability due to large demands on the armed services in general and the requirement to update its equipment adds to the demand for 'more for less' in service terms. The local challenge includes the inheritance by Babcock Marine from the MoD of a very expensive industrial relations culture and constraining operating procedures, some necessary from a nuclear safety perspective and many inefficient compared with modern industrial and commercial best practice. A plethora of government and industry led initiatives to rationalise and consolidate the industry also encourages improvement and greater value for money and has led to significant realignment, in Babcock Marine's case capitalising on the operational effectiveness and partnering performance at Clyde to facilitate the take-over of the former DML Ltd at Devonport, thus creating a single UK submarine support organisation.

At its core, the target cost incentive fee (TCIF) arrangement is a pricing mechanism based on the agreement of a target cost and profit, set within agreed levels of confidence of costs. Cost savings exceeding the target cost are shared in accordance with an agreed ratio or share line so that both parties are appropriately incentivised. The benefit to MoD is obvious - reduced cost - whilst Babcock Marine (Clyde) is free to pursue its profit aspirations within defined parameters. Costs in excess of the target cost are shared on a similar basis.

Since the contract commenced, Babcock Marine (Clyde) has exceeded every performance target or KPI and delivered £114m of savings to the MoD against the initial £76m target. As a result, in recognition of the benefits delivered by this partnering arrangement, in 2005 the MoD enhanced the original £400m, 5 year contract with a £425m 5.5 year extension. Along with the re-let came a savings target of a further £67m over the second term of the contract, forming the challenge currently being pursued by all parties.

1.3 Operational hurdles

1.3.1 Cultural clashes

By far the biggest obstacle to change is the complex culture of the Naval Base. Although MoD civilians and Royal Navy staff had worked together for decades, no attempt had been made to institute process improvement (generally processes were augmented rather than refined) and therefore there was no track record of, appetite for or expertise in change management. The 2002 'contractorisation' of 1500 jobs – mostly MoD civilians who were transferred to Babcock under the TUPE regulations but including 300 RN personnel – sent waves of uncertainty through the organisation and complicated the culture significantly. There would thereafter be civilians working for MoD, civilians working for Babcock, RN officers and rates working for the MoD, the RN and for Babcock and MoD civilians interspersed, during the early years, with the Babcock organisation to ensure compliance with nuclear safety standards.

The conflicting ethos of MoD and industrial cultures – one structured, selected, trained and encouraged for not making changes and the other, conversely, set up and rewarded for stripping back, restructuring and removing waste and inefficiency - inevitably led to culture clashes. Nonetheless, over the years and aided by Babcock's policy of protecting the business it had just won and making only incremental changes, the attitude of many has moved significantly towards one of realisation that change is not only demanded by the MoD's desire to save money but inevitable, due to the adoption of increasing instances of best practice by the Company.

Currently, after six years, including three years adhering to the framework outlined below and of adopting Lean and Six Sigma tools and methods, significant inroads have been made – money has been saved, management at lower levels have begun to see change as part of its role and many of the staff have acknowledged that change was long-overdue and less of a threat than anticipated.

1.3.2 Partnership

The concept of partnership in a traditional contracting environment introduced yet another element of complexity into the challenges described above. Although the contract is structured as Target Cost Incentive Fee, as indicated above, the idea of a partnered implementation on the Base was the original aspiration at the highest levels of the MoD. Thus, it was anticipated that both sides would cooperate locally at all levels and that the usual working relationships involving constant, adversarial, negotiation around every subtlety of the contract as unplanned activities and demands emerged over its life, would be avoided and be replaced with cooperation, flexibility, teamwork and other, constructive, approaches resulting in mutual benefit, speedier resolution and faster, more sustainable, savings.

Although not the subject of this paper, much work has gone into the institution and development of the partnering relationship over the years. Based on studies by Rosabeth Moss Kantor, a partnering model has been used to articulate the key features of a partnership and various measures have been used to determine areas of strength and weakness. This has been particularly necessary and beneficial in coping with the instability forced upon the collective partnership by the frequent changes in staff at the most senior levels. There have been three Naval Base Commanders and two company Managing Directors in the last six years and almost all of the senior directors in all three organisations have changed at least once. Having a methodology that transcends these changes and allows smooth transition during staff changes has not been easy since each incumbent brings their own view of what it should be like and, generally, takes six to nine months to adapt.

Constant development is necessary and much has been done with the top teams to develop the relationships and teamwork necessary in a true partnership. The use of 360-degree appraisals at senior levels and the adoption of personal and team coaching, including assistance from clinical psychologists on relationship development, helped immensely during the early years. More recent successes have emerged at lower and lower levels in the management organisation which not only improves the overall working relationship and aids the campaign of process and business improvement but also helps to smooth the transition during changes in the senior team, as individual personalities begin to play less of a part in the partnership.

1.3.3 Nuclear Authorisation

Inevitably, the fact that the business model centres on a Naval Base hosting nuclear-powered submarines and nuclear weapons places huge limitations on the style, pace and detail of operational and organizational changes. Many years of tried and tested protocols are in place to ensure safety of operation of the Base and these protocols themselves can prevent change of any description if that change is not properly thought through, planned and presented at various authorisation bodies. Success has come from methodical presentation and that, in turn, has been greatly aided by the Company's consistent and well-articulated change programme. Avoiding fashionable initiatives, positioning the latest proposal in a stable framework and being prepared to modify intentions and/or provide further objective

evidence of the benefits of process change have all helped to build the confidence of the authorisees and significant change has been made. For obvious reasons, this authorisation culture is not one that anyone would wish to change in a hurry, with the result that the speed of change is, on the whole, slower than it might be in a more conventional operation, a fact that will be obvious as the detail of the operational effective strategy emerges in this paper. In actual fact, the introduction of robust programme management principles has led to the Base's relationship with the regulatory community changing from one of activity permissioning to one of programme endorsement.

2 Strategy deployment

2.1 General

All of the foregoing pointed to a massive challenge for the Company – reducing the total running costs by almost £190m over 10 years on a contract value of £850m. Such an unusual business model – profit is increased by deliberately reducing turnover – merited careful delineation of business development strategy – to win more business through increasing the scope of work carried out on the Base or by diversification – and the operational effectiveness strategy – doing the same business for less expense. As identified by Porter, these lines of attack are mutually dependent in the long-term but require different skills, approaches and techniques throughout the journey. The remainder of this paper focuses exclusively on the internally-facing operational effectiveness campaign.

While gathering windfall and even harvesting low-hanging fruit yielded early benefits with only moderate risk, it was immediately obvious that a more structured and sustainable approach would be required if the effort involved in achieving these targets was to be effective over a long period of time – possibly during which many people would change careers into or out of the Company. The concept of developing an operational effectiveness roadmap emerged as a necessary methodology, not only to provide a framework for 8-10 years worth of improvement initiatives but, more importantly, to provide guidance as to what these improvements might need to tackle. The structure of this roadmap and its justification are discussed more fully in Section 3 however it is important to note that such a roadmap exists as the mechanism before the overall business strategy and its cascade is introduced. Additionally, the associated decision not to campaign under a Lean or Six Sigma banner accentuated the need to ensure that objective setting and cascading did have a suitable vehicle to ride upon and to hint at where Lean & Six Sigma tools would be required.

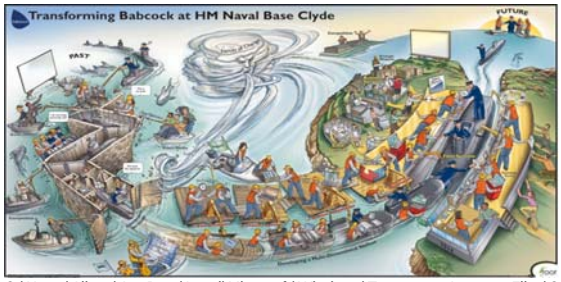
2.2 Balanced Scorecard & Business Plan Cascade

Early adoption of the Kaplan & Norton Balanced Scorecard concept provided a sound methodology for deploying performance management and for ensuring an even spread of strategic objectives that support each other, from people's skills, up through process improvement to customer satisfaction and financial success. In addition, the scorecard format provided its own framework for the development of performance measurement dashboards at various levels throughout the organisation. These will be further discussed in Section 3.

Communicating corporate objectives is critical to any campaign that has aspirations of success and longevity and the annual business plan seen is an ideal starter for this purpose. The plan was deliberately formatted in colourful booklet form, kept clear of any more than headline financial figures, filled with a mixture of graphical and plain-textual descriptions of what had been achieved in the previous year and what challenges and objectives lie ahead. The format and style are maintained and each year, in April, this document is published and posted to all employees' homes. The booklet is also used by the management team as a checklist and reminder of the objectives and its visual look provides constant reinforcement of its role and necessity in meetings and reviews, year-round. While the operational effectiveness framework is mentioned in these annual communications, the concept itself is not heavily detailed as an initiative; simply as a useful roadmap, thus staff have got used to the fact that there is a current theme without having to sell the overall structure explicitly, preferring to view it as a current way of life rather than an initiative in its own right. Objectives are reviewed and renewed each year but with a common thread running from year to year.

This approach is also extended to the customer community to ensure that the next 'big idea' or 'silver bullet' from the outside world does not wreck the overall campaign without being properly assessed. Innovative or fashionable initiatives are tested against the overall framework and either adopted or postponed 'til some future date when they will return more for any investment, in an appropriate phase. This ability to maintain a level of stability of purpose is especially important in the MoD environment where centrally-sponsored initiatives tend to be short-lived due to staff churn, lack a coherent or integrated rationale but an urgent need to change something. Once again, the decision not to pursue campaigns explicitly labeled as Six Sigma or Lean but to use their associated toolsets as appropriate, influenced by the current and time-phased improvement theme, removed the risk of the workforce experiencing the apparent regular change in direction (rather than emphasis) often experienced during long campaigns, due to management or environment changes.

2.4 Rich pictures



Since there is no single communications medium that can be relied upon to guarantee successful transmission, reception or understanding of a message, the annual business plan publication is generally backed-up by a variety of other complementary channels. While the business plan is effectively 'broadcast', fitting in with the early, planned, 'command and control' management culture essential during the early implementation of a coordinative environment, the more recent use of rich pictures or learning maps has enabled much more intimate engagement – usually within groups of eight to twelve people – and is based upon a carefully constructed

picture of the current state of the business and the future, desired, state. All elements of the environment were included and staff were facilitated to share their impressions, feelings and understanding of both why the change is needed and how the journey will be accomplished. Using the learning maps also provided a conduit for negative engagement and employees who disagreed with some aspect of the map were drawn naturally to state their view, a process well worth encouraging as it helped to establish a common language for discussion. The image also incorporated the four evolutionary steps planned for the journey, allowing staff to discuss the implications and benefits of the approach. The detail of the narrative used to generate this aspect of the image is expanded in Section 3.3. This technique allowed complete coverage of the workforce in small groups, aiding contribution and understanding, again with minimal reference to specific details but hinting at the concept of change themes rather than a perceived deluge of change initiatives.

2.5 Publicity and exposure

Providing constant back-up and reinforcement of business objectives, progress and successes along the way, various, regular, channels are utilised, including monthly magazines, corporate newsletters, toolbox talks, performance reviews and selective reward mechanisms. Generally reiterating a message or acknowledging success via publicity maintains the challenge at the front of people's minds and illustrates that progress is being made and hence change is not only possible but happening. All of the techniques employed are backed up by periodic employee opinion surveys, roadshows and annual management conferences to ensure that the message is properly translated and fully understood at all levels and many modifications and improvements have been made to these techniques, in the light of either performance assessment or staff feedback. This process continues, as an organisational culture matures that was not used to these styles of communication, far less the concept of change, gradually, responds to and begins to request more information.

3 4-phase Framework

3.1 Manufacturing evolution

While the natural work of supporting submarines falls most neatly into the 'low batch/high variety' and even the 'batch size of one' categorisation of Womack, Jones and Roos, there is more than enough of a pattern to this work, such that, when added to the other support work required to keep the Base and its estate running, the parallels with traditional manufacturing evolution are strong. The phases of operational evolution which follow were first categorised by Jaikumar at Harvard in the mid-1980s, based on unpublished research into the evolution of companies such as Casio, Sony, Hitachi, etc and have been developed to various degrees by companies such as the former Pilkington plc (in both defence electronics and float glass production), Yarrow Shipbuilders Ltd and MacTaggart Scott. More formally, this work has become the basis of the enterprise improvement programme and checklist championed by Lawrie Rumens and Andrew Purton of the Oliver Wight organisation, with Class A status becoming the aspiration of many manufacturing and service companies across the globe.

As manufacturing evolved from the era of individual craftsmen, with their unique and personal skills, into groups of people who could follow patterns to produce a much higher number of products, managers began to realise that these people could be much more effective if their work was planned so that the right number of people with the right skills were given the right material at the right time. The benefits that were gained by the organisations that adopted such coordinative disciplines – championed by Taylor – were immense and set the scene for the next stage of evolution. Known for its focus on quality improvement, this scientific management phase focused on numerical techniques like statistical process control and six-sigma. The benefits here come from attention to process understanding and control. Following on from this phase or era, companies are then able to invest in automation, such as numerically controlled machines and computer-aided design, where everything possible is done to remove tedious, wasteful, time-consuming and error-prone processes by systemising them, thereby releasing the time and energy of the people to 'think' – about further improvement and innovation. Finally, any islands of automation created in this era are linked together or integrated to form a very efficient and agile design and computer-integrated manufacturing process.

Jaikiumar's work indicated that, where a company set out specifically to pursue this evolutionary model, each phase, or era, would last two to three years. Based on this work and in order to structure a potentially large number of improvement initiatives into a coherent, logical and comprehensible campaign – and avoid the accusation of 'flavour of the month' – Babcock Marine adopted the 4-phase, 10-year approach, with each phase planned to last 2-3 years and providing the necessary foundation for succeeding phases.

These inward-facing operational effectiveness steps complement the development of the company's outward-facing business development strategy, enabling it to compete in ever-more complex marketplaces, in ways not previously possible or even contemplated.

3.2 Framework

3.2.1 Outline

Each phase majors on a theme – **Coordination** (*doing the right things at the right time*); **Process Control** (doing things right); **Systemisation** (doing things at lowest cost); and **Integration** (doing business in new and agile ways) – and focuses on specific solution groups – project management, planning & mrp (material requirements planning), with knowledge vested in key people; quality control and process analysis, with knowledge captured in the processes; process automation, information systems and knowledge management; and, finally, independent businesses applying knowledge to influence its markets. Looking at this sequence in practical terms, it's justification stems not just from the research & application described above but from the naturally emerging sequence of problems needing addressed when reasons for failure are recorded and

analysed. For example, lack of the correct resource, un-matched skills and the non-availability of tools always surface amongst the primary reasons for failing to achieve a plan. Once these are tackled, process repeatability and quality control issues tend to emerge next, in Pareto style.

In each of the phases, or eras, any of the tools from the plethora available under, for example, ERP (Enterprise Resource Planning), Six Sigma and Lean Manufacturing can be applied but campaigns based on these headings alone were carefully avoided, since fashionable groupings can tarnish both the aims and the tools, which are timeless.

So, if you want to be agile & flexible in the future, you need to have highly integrated systems providing free & accurate information to a highly skilled & motivated staff.

Before you can integrate you must automate or systemise as many repetitive, non-value-added processes as possible – *you cannot connect up typewriters but you can join up word-processors !*

Before you can automate you must make sure that you can carry out jobs without error – *there is no point in giving a clerk a typewriter in place of his pencil and paper if he can't spell - you'll just get garbage out faster !*

But before you get the job done at all, you must make sure that material, resources/skills and facilities are available on time – *there is a clerk available, he has paper & pencil and a desk to sit at and he can complete a job when you need it !*

3.2.2 People, processes & systems

The following sections indicate yet another dimension to this framework; namely the implications on the development of people, processes & systems of moving through time-phased improvement themes. In addition, following the Balanced Scorecard dictates that success will only follow from a customer and shareholder perspective if the current business processes and systems can be performed and operated by people who have been given the right skills and attitudes to carry them out.

3.2.2.1 People

The role of the individual will change markedly during the journey. Leadership styles will move from command & control, through self-managed teams, to agile enterprises, capable of leading their own markets and morphing to suit prevailing conditions. As this happens, the individual will move from being a well-defined resource, holding a particular set of skills and whose day is planned to minimise his time-wastes, to an adapter of knowledge who influences the business and capitalises on the capabilities of the systems around him and the people who augment his skills with their expertise, across the supply chain and probably physically remotely. Behaviours will therefore range from 'do what the plan says' to 'seek out and influence your business future' – requiring clear commitment and involvement from those responsible for organisational and resource development throughout the journey and demanding a clear HR strategy that is complementary to and supportive of the overall operational effectiveness and business development strategies. Clearly, there is no point in time at which the cultural behaviour changes across the organization so there will be periods near the transitions when some people, teams or areas will be at a more advanced stage than others. Provided that this is recognized, it can be managed by using this vanguard to provide an exemplar to those farthest behind.

3.2.2.2 Processes

Traditionally, process improvement or re-engineering has been the focus of campaigns to right a company's wrongs, getting rid of wastes and turning processes that might have been effective but were never efficient into shining examples of best practice. Often, too, the lists of processes to be improved are long and, in the better environments, subjected to some form of assessment or prioritisation of resources to provide a fix. It is at this point that the adoption of the 4-phase framework differentiates the broad-brush application of Lean and Six Sigma as catch-alls for a variety of improvement strategies from using the general principles and tools of waste reduction and process predictability in a much more focused way, not as panaceas for a company's ills.

The particular attractions of applying Lean and Six Sigma tools in a more methodical and time-phased manner at the Base are twofold. Firstly, there was and remains much to be done and hence prioritisation at a gross level, above that of endless sifting and sorting of proposed opportunities for process change, is a useful capability offered by the framework. Secondly, the inescapable fact that change will take a long time - probably twice as long as in other engineering-oriented companies due to the complexities of nuclear regulation and cultural history – means that achieving sustainable change and, more importantly, a sustainable and consistent change culture beyond the tenure of several top leaders, is critical.

The implications of the 4-phase framework on the application of tools encouraged by Lean and Six Sigma philosophies are that the tools are and will be applied, but in reasonably strict order, such that they are applied, firstly, to the elimination of waste due to poor planning and coordination processes (at which time many other, non-Lean or Six Sigma, tools such as project management, planning and general mrp will have much more effect) and only then, in the second phase, to process control in a much more traditional 'quality improvement' sense.

3.2.2.3 Systems

The role of systems is one of the most difficult to manage during the early phases of the journey. Whereas, in later eras, systems are critical to automation, as vehicles for interconnectivity, knowledge hosting and management and to enable interactive communication, the dilemma during Coordination & Process Control phases is where, when and whether to invest in automation if there is no certainty about the quality of data being processed and the processes being modeled: the guidance involves scale. If the business to be planned or the process to be modeled or measured is complex or involves large amounts of data, then systems support will be necessary. Typical examples are computer-aided design and manufacturing, project management and material requirements planning tools and the ubiquitous PC. The secret then is to ensure that no investment is made without a complementary suite of data accuracy and process improvement initiatives, designed to guarantee that the output is worth the investment. In other words, the proposed use of a piece of

automation must invoke a rapid pass through the first two phases, even within an overall campaign (of several years) of coordination or process control.

Systems solutions are also expensive. Ensuring that time-related wastes and process-related wastes have been eliminated in early years will maximise the return on systems investment by ensuring that operational effectiveness has reached the point where investment in automation will be accepted as the way ahead, since all less-expensive people and process improvement avenues will have been exploited.

3.3 What 'good' will look like

The following sections describe, in narrative fashion, how a manager will recognise and communicate to his staff the achievement of each of the four phases of evolution. A detailed roadmap necessarily contains more specific goals and gives examples of typical measures and targets for each phase but offering staff a description of the end-game also helps them to 'picture' the future and to work back from that, translating the vision into harder and smarter objectives. These definitions also help senior managers to cope with the transitions between phases. As will be seen from the figure of merit discussed in Section 5.1, there is unlikely to be a clear point at which a transition can be announced. It is more likely that it happens piecemeal, with some functions or processes ready to move ahead faster than others. This can be problematic if the overall transition is too spread out and the distinction between phases becomes blurred – you could end up with two themes in play at the same time and hence confusion. Early recognition that a transition has begun can help management accelerate the pace in lagging areas and carefully moderate the enthusiasm of the pioneers. Although no formula exists to determine how long a transition should last, experience indicates that if it is much more than a year, confusion begins to creep in and the cascade, from business plan down, becomes difficult to keep simple.

3.3.1 Coordination

In this phase, the emphasis is on gaining visibility and then control of our processes so that we can plan our work properly. By getting our data accurate and our work scheduled properly, we can have a clear view of the important issues and therefore have a much better chance of carrying them out. Customers will see products being delivered when we promised and there will be a reduction in the amount of resource and material being wasted on unimportant or non-value-added activities.

As we approach the end of the Coordination phase, we will have gained significantly more visibility of our business processes and we will know the limitations of them from a general capability viewpoint eg if we have limited skills in an area or a demarcation issue, we will see the implications of these issues more systematically. We will have plans and performance measures in all areas - in a level of detail appropriate to the complexity and timescales involved - and we will regularly review the aggregate effect of progress on existing work and the need for and implications of new work. Our management team, from the Board to Team Leaders, will have visibility of the operation, unity of purpose, loyalty to the campaign and each other and will be in control and accountable for achieving a simplified business. We will be able to make decisions on investment - in buying or specifying materials, improving processes and training & reorganising people - with a lot more confidence and we will have reduced the risk of either failing to meet contracted targets or in bidding for new work. Customer delivery performance will rise because we step back from the firefighting and take the time to plan - not endlessly and needlessly but in a style which is both effective & efficient in any area - and we will measure teams against this plan in order to flush out all the reasons for failure to achieve the plan. Knowing these basic reasons - which will inevitably be made up generally of a lack of the right skills, materials and facilities in the right place at the right time - will allow us either to change the processes causing the shortages or to acknowledge that, at this stage, we cannot and to build the appropriate factors into our planning process. People at all levels, including our customer, will accept that planning has changed our performance and is critical to our ongoing success. We will have learned to say 'no' when it is clear to all that what has been requested is not possible but we will have gained the ability to deliver against what we do promise and those we say no to will see a much-improved service against some alternative date. We will have reinforced & embedded planning and performance behaviour and culture. We will get frustrated by and constantly try to remove any reasons for late delivery. We will have done this intelligently - sticking rigidly to our principles but applying them pragmatically and flexibly across our diverse operation. The techniques used to plan the next major submarine maintenance programme will not be the same as those used to plan the on-going support of the building fabric, although the daily implementation of a large maintenance plan for a vessel will use very similar techniques. We will become much more operationally efficient during the coordination phase because we will have exposed and removed a tremendous amount of waste (of time in particular) and we will have set in place the foundation for beginning the phase of tackling our processes in all areas in much more detail, looking for opportunities to remove waste from many other sources. We will also have become much more comfortable with the concept of a long-term improvement strategy and with our own and our managers' ability to be responsive on the one hand but confident in our policies on the other, often while people around us are skeptical and not used to the concept that investment (or measured action) today means a better service tomorrow.

3.3.2 Process Control

This is the phase in which the major focus is doing things error-free and on time. Having improved the accuracy of planning and delivery in the previous phase, it is important to ensure that the goods and services that we produce actually satisfy the Customer (internal & external). In this phase we look at our quality failures, analyse the trends, find the root cause of the problem and take corrective actions to guarantee that it doesn't happen again. Thus our Customers will start to see a massive improvement in the quality of our work and will begin to acknowledge that we are indeed a supplier with whom they want to do business This will also allow us to begin to tackle new markets - which demand quality, and dependability - with our existing products. In addition, this vital stage positions us well for beginning to automate our wasteful processes.

As we approach the end of this phase, we will have gained complete control of our business processes and be able to perform them with no errors. The concept of redoing or reworking a job will embarrass people because they will have let down their team's performance and they will understand the full cost implication of their actions. People will also be trained to be on constant alert for opportunities to improve their processes and will not accept that there is no room for improvement. Measurement - including Statistical Process Control techniques - will be in common use and we will have determined how far along the Six Sigma path we wish to travel and have achieved that aim. We will have applied these tight measurement and control techniques to all aspects of our business - from physical operations

such as submarine repairs, through the availability of key services such as cranes, to the data that we use such as times, routings, stock, skills, bills of material and all other aspects of performance measurement. Our customer will acknowledge the quality of our work and we will have involved RN/MoD staff in our culture of 'right first time'. We will be developing key suppliers and specially selected contractors to ensure that they contribute to our process control culture and we will be recognised externally as a quality outfit where people take a pride in their work at all levels. Previously administrative necessities, like ISO 9001 and ISO 14001 accreditation and all forms of regulation and authorisation will be embraced to such an extent as to be kept fully up to date, seen as valuable structures and be fully integrated into every aspect of daily work. Our standards will be demanding and unrelenting. We will strive for continuous improvement. We will celebrate success but move on quickly to seek further improvement and this will not always be driven from the top down - teams will be responsible for their own performance and will be acknowledged for achievement and self-generated, novel, approaches to process improvement. People from other companies will want to visit HMNB Clyde to see our techniques in action and our teams will host these visits & present their work to these visitors. We will be asked to present the top stories at external conferences and will be the subject of trade articles. Our workforce will be in demand by external companies wishing to convince their workforces that change is necessary and rewarding. Our ability to deliver savings - contracted and beyond - will be greatly enhanced and we will have moved into areas of potential business not previously open to us due to our costs.

3.3.3 Systemisation

By identifying processes that are time-consuming, tedious or error prone, we can then invest in systemising them using whatever technology is available. Although this is the phase where this investment - ranging from Intelligent Knowledge-based Systems (IKBS) to Automatic Test Equipment (ATE) - is the key focus, we will already have introduced limited systemisation where we could identify clear, early benefits, even although, as a Company, our drive was previously on coordination or quality. Thus we can begin to offer a clear and competitive 'value for money' response to our Customers' demands and therefore win additional business - especially by defeating competitors - which, in turn, will help to pay for the investment in the current and future systems.

The work we have done in the preceding phases - firstly, to become coordinated and reduce the waste caused by failure to support planned delivery and, secondly, to reduce the waste caused by poor processes, rework and lack of quality - will have given us the necessary basis for removing the remaining process inefficiencies and associated costs from our business. Regardless of the level of process improvement made in the second phase, we are bound to have residual opportunities for waste - either due to errors in the handling of information through overly-complex or clumsy processes and systems or resulting from mistakes which are inevitable in repetitive, boring or unchallenging processes carries out by people. Success in the systemisation or automation phase will come from maximising the use of systems support and introducing relevant automation in all areas. Single databases; universal access to the intranet; e-noticeboards; RF tracking of material, plant, equipment and other assets; instantaneous job booking; RF security access & time & attendance logging are all areas ripe for implementation in this phase. Maximisation of computer-aided planning, computer-aided design, modelling of maintenance schedules & through-life cost models will merit significant investment in this phase, even though they may have been introduced during earlier phases to suit opportunities emerging during process improvement initiatives. Challenging our manual / maintenance processes will reveal many areas open to automation or systemisation eg calibration, automatic diagnosis of faults, modelling and scheduling of reliability centred maintenance, some forms of welding and non-destructive testing and advanced analyses of trends in motor, generator and transformer performance. Clearly there will remain very specialist areas of manual skill but we must learn to challenge even these. (even the concept of berthing or docking a submarine without teams of labourers on ropes is not beyond the realms of modern tracking and positioning systems). In other words, our prices will come down through efficiency improvements and our versatility will come up, due to the fact that we will rely more on the brains of our people (with systems support). By this stage, we will be operating a business at the appropriate level of lean-ness for our marketplace and available levels of investment and the release of the cost of inefficient human effort in these areas will take us a major step forward to valuing people for their intellectual contribution - instead of tedious 'doing', people will be more involved in thinking, planning & learning, thus giving us huge scope to carrying out business opportunities currently excluded through cost.

3.3.4 Integration

A totally integrated business environment is our ultimate aim. We will be using the skills and intellect of our people to innovate technology applications, services and the processes which enable them. Data, relating to our products, will be captured once, early in the project, and will be added to as concepts become reality. This information will be reused time and time again but will be maintained in a paperless environment with no human transcription. In this environment, our people will be spending a greater part of their time thinking and adding value to our knowledge-base. Having the ability to capitalise on knowledge and experience of how to manage efficient and effective core processes will allow us to adapt flexibly to, and even create, market and business opportunities that, in turn, will allow us to take new products into new markets.

We will be ready to compete seriously in the any appropriate external markets required for significant business growth. Having systemised our competencies as far as possible, we will be able to transport them, supported by people skilled in applying the techniques, both at management and craft level, to other locations or applications. The move towards universal access to highly-accurate data by all staff begun in the previous phase will give us a business advantage in being able to apply rules, techniques, analyses, measurement & improvement in new business environments and to new processes. The freedom of information and the sharing of knowledge and experience across business units around the world will be our strength while the attraction for our customers will be certain knowledge that our reputation for efficiency and value for money will be delivered. Concepts such as the Babcock Marine 'Naval Base Management Manual' or 'Nuclear Site Process Review Manual' will be a familiar concept and the training of staff to accredited levels will be acknowledged in the industry.

4 Implementation roadmap

The remainder of this paper focuses on the implementation of Phase 1 – Coordination - and some early preparation for Phase 2 – Process Control. Although opportunities to invest in process automation or systemisation were reviewed and pursued, these instances were few at this stage, with the biggest benefits so clearly available from basic, foundation work.

4.1 Practical approach

In the first couple of years of the partnership contract, significant savings had been made, based primarily on highly visible opportunities, including renegotiation of subcontracts, unwieldy procedure review and rationalisation of expensive maintenance regimes. Nonetheless, the outlook was challenging, with a long list of ideas, including further known areas of inefficiency but no robust implementation plan and no method of prioritising one initiative over another, leading to a certain level of 'flavour of the month' selection. The risk of continuing in this *ad hoc* manner, given the commercial targets that had been set, firstly for a five and then ten year period, was too high. Additionally, the concept of approaching process improvement in areas of high regulation, both real and perceived, or surrounded by sensitive industrial relations, with enthusiasm but not enough logic or objectivity and often with no forewarning to the recipients, was deemed to have too high a chance of failure. The application of the 4-phase framework was therefore adopted, based on positive experiences in other, reasonably similar, industries. At this time, it was also decided that the framework itself would not be classified as a campaign or an initiative – rather a useful management and communications tool that would be used to set other campaigns and initiatives in context and to help managers with limited resources to prioritise their efforts.

Early in 2005, the Board and Heads of Department were briefed and became involved in early awareness workshops to help them come to grips with the logic, the timescales and some practical ways of redefining – or in many cases seeing for the first time - just what had to be done to move the Company forward. Many proposed initiatives were shelved or postponed and new ones listed, all within the framework, with decisions being made against hard questions regarding 'fit' and likelihood of success, using the descriptors of 'what good will look like' presented earlier.

Following this early work and as part of the preparation of the forthcoming Business Plan for 2005/6, new objectives were set under Balanced Scorecard quadrants and in line with the 4 phase framework. The scorecard and the framework were not, themselves, given significant publicity; they were described as part of the overall management strategy but the major emphasis was always on the improvement objectives themselves. The long-term horizon of the framework also supported the desired intention of keeping the Business Plan 'look' and content consistent from year to year, aiding gradual acceptance and understanding in an environment not used to such explicit communications and presenting apparently incremental improvements within a structure which encouraged periodic radical shifts in emphasis.

4.2 Key Coordinative initiatives

Many initiatives were planned for the first 2-3 year era, all aimed at achieving a coordinated workplace and building the foundation for future improvement eras. The following sections pick out the key themes pursued during this period.

4.2.1 Management re-structure

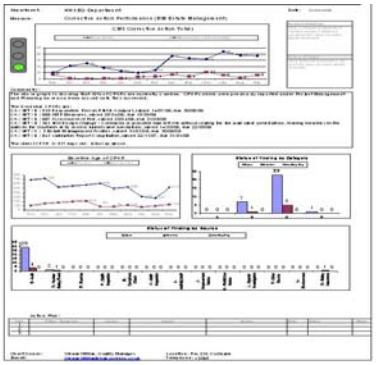
Much has been said elsewhere about the role or importance of making changes to the structure or the people as an improvement initiative in its own right. While it was prudent, on accepting the contract, to adopt the existing organisation and people, in order to build the confidence of our partner and the regulatory bodies in our ability to competently manage the business, after a couple of years, there was one major rationalisation of the structure and two equally important reasons to review the people required to implement the new structure.

In the first instance, coordination demands visibility of purpose, simplification of the processes associated with the achievement of that purpose and control of those processes at all times. The existing structure was clumsy, confusing and complex and did not allow clear accountability for the achievement of business goals: it had to change and so it was simplified, from the Board down, to be quite explicitly functional, with clear ownership all the way down to shop-floor supervisory level. The Board was reduced from nine to five and a new Head of Department structure created, with fifteen positions held accountable for running the business. Up to eight tiers of management were reduced to a maximum of four and, in many cases, three, thereby improving the chance of messages and objectives reaching all levels.

Moving on to the people responsible for fulfilling the structure, the new, improved, ownership and accountability demanded that the roles be filled with subject matter experts with good management skills. Significant external recruitment took place to populate the management structure with people who would bring expertise and best practice and who would champion constant change and improvement.

While good management practice might suggest that highly functional structures are a shade jaded, there is no doubt that, in a command and control era where clear line-of-sight is required, it is the only option and avoids, at a crucial stage, the complexities and constraints of a matrix structure, which fits more appropriately in later eras.

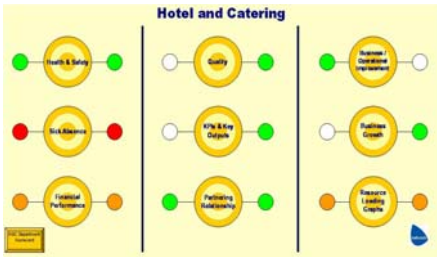
4.2.2 Performance management



4.2.2.1 Process performance

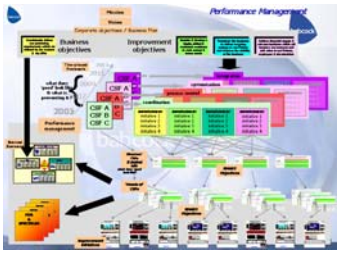
Performance management plays a key role throughout the overall picture but carries its own complexities of implementation. According to the framework, the key processes to be monitored during the coordinative phase include on-time delivery, due-date performance, lead-times and data accuracy – all classical mrp measures. However, experience has shown that the heavy demands placed on process performance management as an essential part of a second phase implementation programme striving for process control means that it is essential to commence construction of a detailed performance management regime long in advance of a formal process control campaign. Thus it will mature in structure, quality of data and application before it is needed.

Babcock Marine began construction of its Balanced Scorecard-based monitoring system in



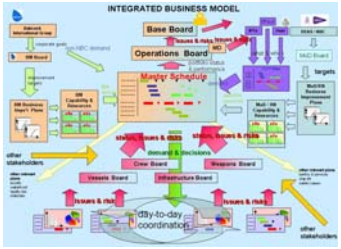
parallel with its Coordination campaign – using it initially to focus on delivery measures as discussed but quickly widening it to cover all areas of the business and a broad spectrum of processes. Presented as an electronic dashboard, available at this stage to all management levels, and using the standard DMAIC format for each of several hundred structured metrics, this policy has yielded many benefits beyond visibility of performance. It has advanced the acceptance of performance management to a point where it could roll seamlessly into a Phase 2 era, it has encouraged managers to begin to question process performance in areas deemed as sacrosanct in the past and it has yielded genuine process improvements through the application of DMAIC and other Six Sigma and Lean tools.

4.2.2.2 Staff performance



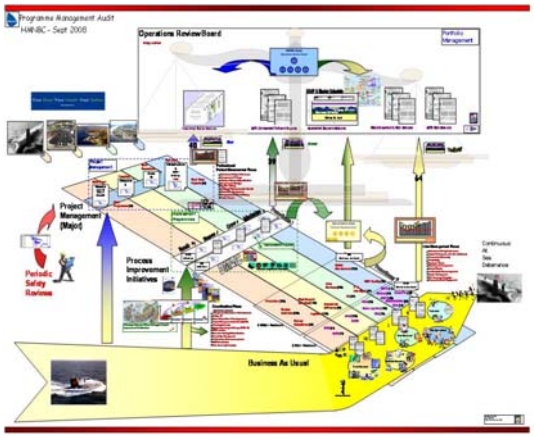
Selecting staff for development and ensuring that efforts are focused on the business goals requires a versatile staff performance management system. Linked intimately with the process performance mechanisms described above, the business plan objectives are cascaded to all managers and staff, to provide line-of-sight visibility. This is aided by the graphic 'dashboard', allowing users to access the goals, initiatives and their current and historic performance in a paperless environment and it is reviewed by managers and the Board on a monthly basis. Ownership is ensured by cascading the business goals to individuals via their performance development reviews, thus providing a mechanism for performance assessment and personal development through regular appraisals. Backing this up for the longer-term, a management potential assessment process is carried out annually, identifying the capability of key staff and others to progress one or more levels within the organisation. Other development assessments, like 360-degree appraisals, are used to ensure some level of peer review while financial bonuses are offered at most management levels to reward success against specific objectives.

4.2.3 Integrated business planning



The cornerstone of coordination is an integrated planning process. Adopting manufacturing best-practice, a major new process was developed and has been operational now for almost two years. Centred on an integrated programme, or master schedule, this mechanism provides for the collection of all relevant demands on Base resources and facilitates the balancing of this demand with available resources using rough-cut capacity planning (RCCP). The current status of major Base projects is taken into account along with current and planned operational performance. Using traditional tools, such as Sales & Operations Planning, has enabled a much clearer and confident picture to be developed, exposing areas of imbalance due to peaks or troughs in demand or the lack of or surplus resource. Major decisions, both commercial and operational, have been encouraged and supported by this model, which is executed in stages on a monthly basis, at a level of detail appropriate to the each function.

4.2.4 Programme and project management



Integrated business planning can only operate if it is fed with accurate demands and a true reflection of the status and performance of ongoing work. Forward-looking project management (rather than daily reactive scheduling) had existed previously and significant investment has been made in developing, through recruitment and training, a more modern capability in project management. The use of work and organisation break down structures, cost and work package accounts, risk assessment and forecasting and the introduction of earned value management have made an extremely valuable contribution to the coordinative push. Although operating in a less predictable environment than traditional manufacturing organisations, much work has been carried out to develop standard templates, akin to product family profiles, so that forecasting of workload and timescales has moved from the almost non-existent to around eighty percent accuracy. External auditing has placed the Base's capabilities in this area above the average, significantly ahead of its position only three years ago and work continues to widen and strengthen capabilities here, in line with current Association of Project Management standards and coaching.

4.2.4 Materials planning

The concept of materials planning, using existing knowledge, accurate lead-times and a bill of materials was another novel concept to traditional processes at the Base. Repairs to vessels requiring new or replacement equipment often depended on coincidence that material was available or suffered long delays when material and parts were only ordered when needed, without regard to availability or lead-times. Despite that fact that 97% of all materials were delivered to the Base on time, the late 3% inevitably resulted in programme slippages and so mrp principles are now being applied, again based on templates which, themselves, are built from past experience and information that has always been around in some format but never before seen as relevant. Much remains to be done in this arena; to improve supply chain integration, to increase the accuracy of lead-time and specification data and to move towards a much greater just-in-time rather than a much too early or way too late environment.

4.2.5 Data accuracy

Data accuracy is an obvious requirement in the materials and operations planning spheres, as described above, but it plays a significant part on the other side of the balance; namely resources and their capabilities. Several programmes of improvement have taken place to drive up the quality of information and the integration of HR and training databases. More work is required here, particularly to counter the forecast engineering and nuclear skills shortages. Training and recruitment will have to be much more effective in future and so knowledge of people's skills and capabilities will have to be much more timely and accurate. In getting to the current level and in striving for further improvement, many Lean tools have been employed to support process improvement and statistical metrics are in place in areas where trends are extremely important, such as recruitment and retention. This is another area where having a Company and often Base-wide framework for improvement has paid dividends, since people from all areas understand the same language, follow the same general set of objectives and pursue improvement initiatives geared towards coherent progress on a wide front, all with access to the same powerful tools.

4.3 Facilitation & support for the campaign

4.3.1 Training

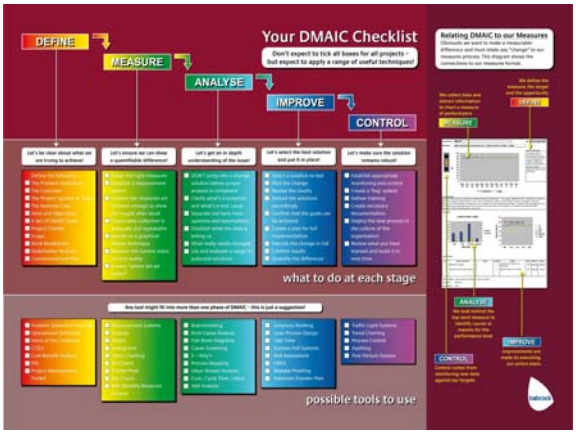
Training plays a key part in the successful implementation of an operational effectiveness programme and the Babcock Marine policy has been to focus that training on two key areas, namely; process change skills and tools under the Change Leader banner and project planning & management skills at a variety of levels. In addition to this change-oriented training described below, various other offerings are available to staff. All managerial and supervisory staff undergo development as part of a results-based leadership programme and part-time masters degrees in operations and supply chain management are offered to nominated individuals,

Approximately sixty people from the business at all levels have been trained in basic process change tools, as indicated below, in a series of four, two-day modules. These people were then returned to their normal duties where they support the challenge placed on line managers, via the Business Plan, to increase performance in their areas. Specific training in statistical measurement and in measurement principles is focused on areas identified as benefiting from these skills and this is an area that will be stepped-up in preparation for the transition to the process control phase, where SPC and Six Sigma techniques will become more effective. The table below illustrates the methods and tools taught in each of the modules of the Change Leaders' course.

Module 1 ***Problem Solving***	**Module 2** ***Project management***	**Module 3** ***Lean Process Improvement***	**Module 4** ***Leadership***
DMAIC Problem definition statement (aims grid) Histograms Checksheets What Makes a good measure? Flow charting Brainstorming Cause & Effect Cause screening 5 why's Pareto Solutions selection Grid Run charts	Project definition - TORs BOSCAAR, Team Selection, Stakeholder analysis, Risk Assessment, Project Initiation. Planning – WBS, Network Diagram, Critical Path analysis, PERT, Gantt Charts, MS Project Overview Project Execution – progress updates, team meetings, action planning, Milestones Project Closure – Completion Criteria, Close out meeting, Post Project Evaluation	5 S 7 wastes Value Stream Mapping Kaizen Takt Time Kanban "Pull" system Visual factory (scorecard)	Sense of Urgency Powerful Team Compelling Vision Gained Buy-in Empowered for Action Quick Wins Determined to Succeed Reinforcing new behaviours

4.3.2 Planning Specialists, PI coaches & Production Engineers

Following the guidance of the 4-phase framework, where the bulk of planned improvement comes from better coordination through workload planning and project management, a large investment was made in procuring these skills – mostly from outside the Company – and a new function was created at a senior level to structure, implement and coach across all areas. Specialists in operations, materials and project planning have been injected with great effect into areas where these techniques had not been understood or used and local coaching and development follow from these injections. In support of this, process improvement coaches, at green belt level and production engineers are distributed around the business as required to bring professional back-up.



This bias illustrates a deviation from a typical Lean or Six Sigma umbrella approach, where the emphasis is on an early infusion of related experts in these techniques and often massive internal training programmes geared-up towards giving everybody a formal capability. This would have been unnecessary, unsustainable and ineffective in the existing culture, where the vast majority of problems were quickly exposed as poor performance through lack of coordination and a general offensive to 'lean the business' or strive for six sigma performance would have been premature.

4.3.3 Six-Sigma and Lean tools

Great emphasis has been placed up to this point on the importance and benefits of the time-phased approach to long-term operational effectiveness. Avoiding large campaigns under the Lean and/or Six Sigma banners has been key to the sustainability of the change process in an environment where the pace of change is heavily regulated. Nonetheless, the tools and techniques historically collected and presented under these headings remain powerful, necessary and effective in the campaign. As described above, these tools feature heavily in training programmes and the lean-oriented DMAIC process is in daily use in hundreds of situations across the Base. The table below shows a small selection of the application of these tools and the benefits returned.

Initiative	Tools and Techniques used	Improvements	Value
NSI Maintenance Visibility Project	BOSCAAR Process Mapping Trend Charting Pareto Pie Charts Brainstorming Identifying Wastes Process Pilots Trend Charts & Traffic Lights	Improved processes. Established NSI Maintenance visibility, measures and corrective action / improvement plans. Created an environment which facilitates future productivity improvements.	Nuclear Regulations Compliance.
Faslane Maintenance Improvement Project	IDEF Brainstorming Pareto Cause & Effect	23000 Maintenance Hours Saved 5000 Hrs removed from Plan 18000 Hrs Efficiency Saving	Saving of £ 414,000 per annum
Absence Management Improvements	Process Mapping Value Stream Mapping Trend Charts SPC	Process Cycle Time Reduction Single Point Contact Phoneline	20 % Reduction in Number of Days recorded Absence
Fleet Services Planning - Planning / Production agreeing draft plan	Process Mapping Brainstorming SWOT Analysis Process measures	Implemented a one-to-one 1 hour meeting between planner and each individual production section. Feedback from production sections increased from 45% feedback to 72% and then to 100%	2950 hrs saved per annum (equivalent to £53100 pa)
Project Cochrane (Workshop Integration)	BOSCAAR Process Mapping Data Analysis	Centralised workshop, cross skilling of teams, improved facilities and reduction of 18 bodies and 1 team Leader	Savings of £850000 per annum
Shiplift Stores Review	BOSCAAR Process Mapping Force Field Analysis Run Charts Pareto	Continued high level of service with more efficient processes and less bodies	Saving of £25000 per annum

4.3.4 Publicity and feedback

Publicity contributes significantly to strategy deployment, as discussed in Section 2 and this is further exploited by on-going exposure of initiatives and their champions on a regular basis. Celebrating success is key to further commitment and to signaling the change of culture to all, including pockets of resistance. Peer group pressure can and does play a part – people do not want to get left behind while others get credit for change and improvement. Photographs and short articles on set-up, interim progress and successful conclusion cost little but have a cumulative effective on the overall campaign. In addition, low-cost awards made on an *ad hoc* basis – but not an award or suggestion scheme as these are Phase 2 contributors – boost enthusiasm immeasurably.

4.3.5 Regulation and an Incident & Injury-free (IIF) Environment

No amount of support for any major initiative would be complete if it did not fit within the context of an environment where people can go home without incident or injury. The Company's and Base's drive to adhere to its regulatory conditions and to reduce accidents to zero fits hand-in-glove with the achievement of operational effectiveness and benefits were traded in both directions.

Firstly, in a culture which has been both resistant to change and where change could have serious implications, it is very important that proposed change is properly assessed. Here, the pre-existence of various regulatory approval routes might have posed insurmountable obstacles if used to inhibit change as a political manoeuver, however, having a long-term plan, being able to position process and organisational changes in context and having a consistency of argument on each occasion forged a much smoother path through the approvals process.

Secondly, many of the tools used in getting to the root cause of accidents, analysing trends, generating improvement ideas and managing a large-scale project are exactly the same ones in play for process improvement. Thus the language is the same and there is a great deal of efficiency, with the IIF ambition benefiting from this commonality.

Finally, the major theme of the IIF project is to get to the hearts and minds of the whole workforce in a way that encourages them to be aware of their surroundings, to challenge where they see their own safety being compromised and to have a care for workmates and visitors. This is a very subjective behavioural and attitudinal approach that goes way beyond rules and regulations but which, in the long-term will yield very positive results. The benefit to the operational effectiveness programme is two-fold, namely; assisting the culture change towards one of interest and contribution – not just in safety but in daily operations - and contributing directly to waste elimination via accident and absence reduction.

5 Current Status

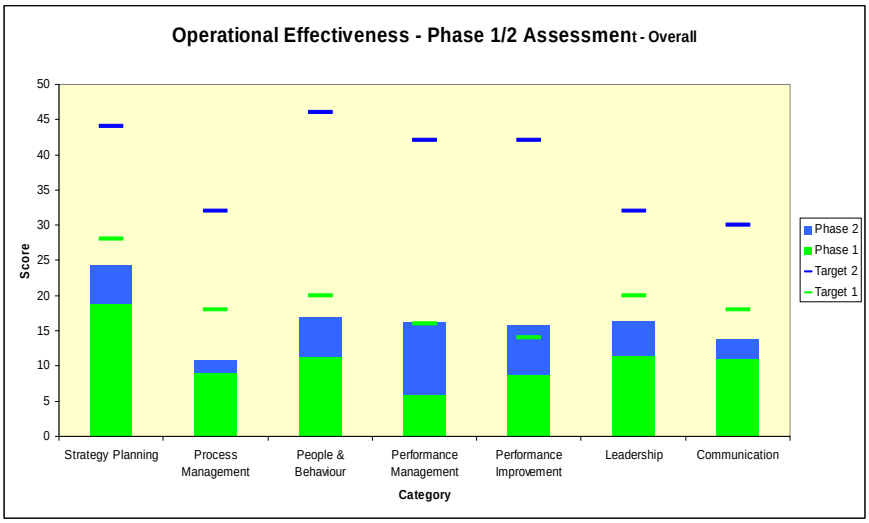
5.1 Progress measure

Assessing progress during a long-running operational effectiveness project is always difficult, although, under the business model outlined in Section 1, it will be clear that achievement of the business financial targets can only have been the result of successful reduction in the cost of running the same level of business: there is little influence from the more traditional factors such as changing market demands, changes in profit levels, major changes in the level of business carried out and planned reduction or redefinition of service levels.

These business results have been very good. Targets and objectives have been met, service levels have, in fact, improved and scope has been expanded, with the the MoD and the Royal Navy seeking more and more support from their industrial partner. This has all happened, especially in the years beyond the easy pickings, by having a well-defined operational effectiveness strategy and carrying it through. The use of the Balanced Scorecard and it's supporting dashboard of metrics provides a powerful window into this success and, as will be discussed below, enables consolidation of these gains during more difficult times.

Regardless of these gross business-oriented measures, the fact that this is a complex, time-phased framework, spread over ten years and which has significant changes in theme – up to four times – during that period, strongly suggests that progress has to be monitored at a more detailed level. The risk of resting on the laurels of early successes is that lessons are not consolidated, phase transitions are not made on time and a blurring of theme begins to creep in, contaminating the whole theme-based approach. Quickly after that comes the failure to prioritise initiatives that compete for resource, the threat of cancellation or significant change in direction due to senior management changes and, ultimately, the failure to meet targets that sit on a curve demanding more and more effort or investment.

The guidance encapsulated in the Oliver Wight Class A checklist (sixth edition) presents a very practical way to assess progress and pinpoint areas for reinforcement. This is based on classical mrp theory (being the benchmark for mrp and MRPII implementations in the 70's, 80's and 90's) but expanded and extended to cover the essence and early phases of Jaikumar's theories on the attainment of 'computer integrated manufacturing' and agility of business capability. The challenges posed in the checklist have been used to determine just where in journey Babcock Marine - Clyde sits and they clearly show progress; however they also show areas of concern, particularly in the fact that progress towards formal coordination is running behind schedule.



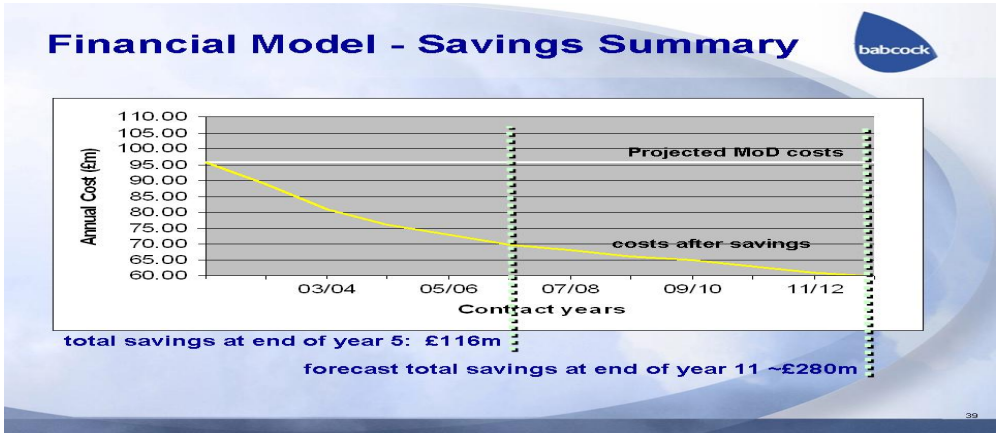
At the point when the survey was carried out – about two thirds of the way through the coordinative push – progress was at about fifty percent. There were several reasons for this; most notably a period of almost twelve months when external business demands (the acquisition of a major rival) necessarily placed progress on the back-burner. No benefits were lost – a feat in its own right – but progress against the original timescales was delayed. Nonetheless, by way of compensation – and the major reason why accrued benefits were not lost – progress was made on a couple of key Phase 2 streams. Performance Management and Performance Improvement actually benefited from the slight hiatus in the implementation of some change initiatives and became more mature in their own right and were used to influence progress, through measurement and the DMAIC approach, of those initiatives not stalled for business reasons.

While the strength of the performance-related topics actually helped overall progress in certain areas, the survey also revealed that there was a danger of Phase 2 concepts – process control and quality improvement – being muddled with Phase 1 concepts – visibility, simplification and control. In principle, these concepts can be mutually supportive, however there is a risk that two of the main justifications for adopting the 4-phase approach, particularly building a coordinative foundation on which future eras could rest and depend and forcing a prioritisation of initiatives to simplify resource allocation, would become corrupted.

As a result, increased focus has been given to the genuine Phase 1 activities, to the extent that project management and other coordinative activities are being rolled out beyond Babcock Marine's contracted scope to cover the whole Base. On the performance management side, the latest (2008/9) Business Plan has re-emphasised the need for coordination and been quite specific with it's operational effectiveness objectives.

5.2 Benefits

The table in Section 3 listed a small sample of areas where Lean and Six Sigma tools have been applied, under the overall 4-phase framework. It also gives a general indication of the value of savings made in each case. In the round, all business targets have been met and sometimes exceeded over recent years. The following chart gives a picture of the total benefits achieved, showing a reduction in the running costs of the Base compared with the best outcome of a 'no action' approach.



5.3 Lessons

While there may be alternative approaches to achieving operational effectiveness, there are some unusual, if not unique, circumstances at HM Naval Base Clyde that conspire to frustrate progress. However, this firm and phased approach has stood the test of time and other obstacles such that it provided and will continue to provide a robust framework for further improvement. The lessons learned are many and a small sample is offered here to encourage others who might be mired down in the sea of options currently available.

- Prioritisation of initiatives relieves 'initiative overload' pressures
  - eg IIP, self-directed teams, suggestion schemes – all postponed to a later era
- Confidence to withstand 'flavour of the month'
  - eg several MoD Lean campaigns and at least 6 external consultancies
- Focus any need for limited external support
  - eg only two instances required additional, external, practitioners, rather than wholesale 'consultancy' with little return
- When a major change happens, you can regress if you don't recognise the need to revisit earlier phases
  - periodic measurement of progress is necessary
  - if the change can be forecast as lengthy, consider compensating with additional resource
- Business-wide approach is difficult but has benefits
  - eg common language, mutual support and understanding, coherent business plan, more sustainable
- Programme has survived Board changes and is now fully expanded to cover MoD aspects – a huge leap forward into an area where the Company's success has rubbed-off on objectors who became bystanders and who are now in the process of becoming followers
- Measuring progress against best practice focuses effort
- Lean & Six Sigma tools are essential and practical and should be used wherever necessary, without branding as an eponymous campaign

With hindsight, only very few aspects of the approach would be changed. Further management development – especially at Team Leader level – would have allowed the cascade to operate more freely. In addition, strengthening the senior management team to cover the acquisition period would have kept the early momentum, the loss of which cost over a year of progress, although it remains difficult to see how such a forecast could have been made at the time. The effort now going on to encompass the MoD aspects of Base management actually serves to give new impetus to the campaign and the existence of the framework provides very timely and necessary bounds for this drive.

Progress to date, even including the delay, would not have been certain without the framework and Babcock Marine sees no reason why it would not adopt the same approach again, in similar circumstances.

5.4 Conclusions

Sustaining both the benefits gained from process improvement and the desire, energy and coherency of approach over an eight to ten year timeframe is not easy. The traps set by *ad hoc* initiatives, flavour of the month urgencies and banner waving saviours are frequently sprung by staff changes, mergers and acquisitions, too-early matrix structures and lack of stamina. The adoption of a simple framework, with each step building on the last, the early stages giving the biggest, fastest and cheapest returns for effort and each stage lasting, nominally, two to three years, offers a worthwhile option and extra dimension to a complex change-management problem. Babcock Marine, on behalf of their MoD and Royal Navy partners introduced this methodology in 2005 to ensure that their business model of making a profit only from year-on-year savings could be sustained over the remainder of a ten year contract and beyond.

Immediate benefits were gained by re-prioritising worthwhile but mis-timed initiatives and by identifying many initiatives that were missing from the campaign. External business constraints were coped with and changes in senior staff on both the Company and MoD sides were smoothed-over with minimal disruption. Particularly relevant in the current UK engineering climate, the early adoption of resource coordination and management processes has positioned us well in the war for talent and in countering the effects of an ageing workforce. Graduate and apprentice recruitment has been stepped-up significantly and further education emphasized.

Functional and process champions now have a test for their ideas for improvement and this avoids the feast and famine risk when initiatives are simply pulled from a list in no coherent fashion. The workforce has benefited from a consistent message and there is no desire from any quarter to attempt to 'speed things up' things up with the next biggest idea that seems to contradict the previous version.

Lean and Six Sigma play their part; not as silver bullet-style panaceas but as very valuable and useful principles and collections of tools that can be and have been applied widely, from health and safety issues to manufacturing and administrative process improvements. Wastes have been removed but in a phased manner, with most emphasis going on the wastes caused by bad planning and scheduling. Many more remain, in terms of process and material quality, staff skills and capabilities and the information and specifications associated with requirements. These will be addressed, again using tools from the Lean and Six Sigma toolsets but within a timeframe set by the overall framework and only when the improvements can be sustained by virtue of the fact that they are built on the established foundation of coordination.

Babcock Marine and the wider Base community will continue to learn from the successes and challenges of the programme and hopes to continue its run of commercial success based on a measured application of best practice.