



Platforms: Quantity v. Quality

In our last issue, contention@rusi.org examined the funding of the UK's defence policy, which is seen to be inadequate. As the funding shortfalls escalate, salami slicing and moving programmes to the right increasingly produce an unbalanced programme with the danger that the UK is falling between the two stools of quality and quantity. Too little of the former and we risk being unable to operate effectively in high-intensity warfighting, while too few platforms and servicemen undermine our ability to carry out counter-insurgency and counter-terrorism over lengthy periods. Have we got the balance right? If not, do we need more quality or quantity?

The following experts try to unravel the arguments: Paul Beaver, Professor Keith Hayward, Professor David Kirkpatrick, Dr Jeffrey Bradford, Major General Giuseppe Maggi, Vice Admiral Emmanuel Desclèves.

QUANTITY V. COMPLEXITY: OUT OF BALANCE?

by Paul Beaver

Paul Beaver is a Westminster defence consultant. He believes that the key lies in finding the right balance between quantity and quality, a balance which has recently favoured quality at the expense of quantity.

Half a century ago, Chairman Mao is reputed to have remarked that 'quantity has a quality all of its own'. 'Up to a point, Lord Copper', one might respond – in fact, China's Central Military Committee (CMC) did respond in just that way in 1993. It reversed the Maoist doctrine of quantity for quality, drawing on the lessons from the 1990–91 invasion and then liberation of Kuwait – and China went further than others, not just identifying the lessons of quality in modern warfare, but learning them.

In today's cash-starved defence procurement it is obvious that the UK Ministry of Defence (and most other defence ministries for that matter) cannot afford large numbers of very costly, complex platforms. Quality is important, but at what cost?

Two hundred years ago another most quotable figure, Admiral Lord Nelson, is said to have remarked that a frigate cannot

be in two places at once. That is just as true of the Royal Navy of today. Too few frigates and the jobs don't get done, as press reports in early January would seem to suggest; too complex and they are unaffordable in the first place, but not complex enough and they are not sustainable as combat ships.

Affordability is key to procurement in these budget-stretched times. But once the salami-slicing begins, where does it stop? The Second Permanent Under Secretary's requirement for the Royal Navy to save 0.5% of its support costs year on year has seen quantity shaved, irrespective of quality.

'The Royal Navy has been too keen to issue requirements for "dense, complex warships" that lack the exportability of vessels such as German MEKOs'

Today, more than ever, exports can play an important role in reducing the overall cost of platforms to the UK's armed forces. But, it is here in the export market for warships that Britain fails miserably. Past criticism that the Royal Navy has been too keen to issue requirements for 'dense, complex warships' that lack the exportability of vessels such as German

MEKOs is well-founded – but the Royal Navy is not in the job of specifying warships for foreign navies. It is not up to the MoD but industry to sort out exports – meeting delivery of recent export warships has been fraught with problems.

So, does the Royal Navy gold-plate? Does it make its warships too complex and then have difficulty in supporting them? With fewer ships and capability gaps opening up everywhere, probably not. But even if the Royal Navy did gold-plate, it would be the ever-growing ranks of the scrutineers who should bring the admirals down to earth a little. The problem with affordability in procurement is institutional; as one senior official put it: 'The DPA always wants to give the customer the best and can't change its ways any more than the leopard can change its spots!'

There is an argument, however, that says that more, simpler platforms would give better long-term affordability, as they could be replaced with newer, often more economical technology sooner. But in naval terms, we just aren't going in that direction – the new carriers will be designed for 50 years.

Do the Royal Navy and the Royal Air Force really need the most complex new combat aircraft – a 'day one' of the high-intensity war weapon? Surely, with current defence planning assumptions giving the armed forces Iraq and Afghanistan to think about, we need more, affordable combat aircraft. Ones that a Minister will be

prepared to deploy – and able to deploy without reference to another country.

So, are the battle lines drawn? Fewer complex systems and more, affordable, less gold-plated ones? Probably not. The only place where quantity really scores over complexity is IT. But modern IT programmes are not really platforms; they are systems with which there are small, often insignificant (in affordability terms) hardware packages associated.

The key to affordability will be balance. The balance of investment between having sufficient numbers to do all the jobs that Government requires of the Armed Forces and having platforms capable of undertaking them. I have a feeling that the balance has been on the complexity side for too long. But this is something that the new DE&S will have to address, sooner rather than later. ■

QUANTITY V. QUALITY: THE ETERNAL MILITARY DILEMMA

by Professor Keith Hayward

Keith Hayward is Head of Research at, and a Fellow of, the Royal Aeronautical Society. He considers that the demands of the real world of nasty low-tech engagements do not appear to be fully appreciated.

Ever since a couple of hundred Spartans took on the might of the Persian army, the question of quality versus quantity has puzzled defence analysts. A better illustration closer to our time was the Tiger tank that took out a succession of D-Day Shermans until the crew ran out of ammunition. It was a conundrum that obsessed NATO planners facing the mass of the Red Army. Here, the assumption was that the West would trade numbers for better equipment – never an entirely convincing argument. As one USAF pilot was reputed to have said: ‘I can hit four bogies, but what if there are five out there?’

Just as the MoD’s Defence Technology Strategy (DTS) asserts the clear link between investment in technology and equipment superiority and in turn the edge this brings to UK armed forces, the age-old dichotomy is coming back to haunt us.

Why? Because events – real messy conflict as opposed to the wars we would like to fight – are creating havoc with shiny new assumptions about a ‘smaller, smarter’ defence capability.

‘What is reprehensible is the sacrifice in numbers caused by rising development costs’

In Iraq, the much-vaunted US doctrine of military transformation – essentially the ability to prevail with fewer boots thanks to the hi-tech networks and enhanced sensor-to-shooter capability, all the trappings of Network Centric Warfare – has got bogged down in an urban attritional slog. As junior partners on two fronts, the UK is beset with problems of both quantity and quality. Some of our equipment has not shaped up and we are forcing our soldiers and airmen to the limits of their endurance. Not very smart!

A simple answer to the conundrum is to have high quality equipment in appropriate numbers. Naively simple in practice, but economic realities will inevitably impose upper limits on numbers. What is more reprehensible is the sacrifice in numbers caused by rising development costs. This is what the DTS implies by the statement that air power is pricing itself out of business – and while air power, if defined by F-22s, B-2s and even Typhoons, is perhaps an extreme case – there are maritime and land examples too.

“Hmm... if I take some off both sides it’ll still balance...”



There is something of a vicious circle in this process. We have to design more capable aircraft to make up for declining numbers, which increases complexity and costs and thence to the inter-generational trade-off of quantity in favour of quality. There are always other drivers, including the reluctance of a diminishing cadre of young people to follow the recruiting sergeant.

We continue to hope that networking technology will provide a further force multiplier – getting more out of less by believing that a system of systems will be greater than the sum of its platform parts. This may reduce the pressure to develop the highest performance platforms based on standards largely set by US design and technology trajectory. But one suspects not.

‘The UK will continue to accept a relatively high level of technical risk to stay on the curve. There will be further pressure to trade off quantity against quality’

The DTS’s 25-year outlook chooses as its reference point the technological standing of the UK’s major arms-producing competitors, with a putative Chinese capability as the implicit adversary for the 2020s. This is a more modest target than the twin super-power criteria that were used during the Cold War. But given a two-decade timescale and China’s impressive growth rate and commitment to science and technology, it may nevertheless still require some costly programmes. Equally, we are set on staying in touch with the US in some areas to retain our position as partner of choice in critical technologies. And of course, we want the Rolls-Royce of platforms and delivery systems for the nuclear deterrent force. So, there is to be no real lessening in the pace of the defence technology escalator. The UK will continue to accept a relatively high level of technical risk to stay on the curve. There will be further pressure to trade off quantity against quality.



Now we are moving to the prospect of deploying cheap, but clever and expendable platforms. Well, maybe not so cheap, but cheaper. Again, there is a danger here that these platforms (and in the future this goes beyond just unmanned air systems) will become so clever and expensive that they too become less expendable. But on face value, there is a promise of producing enough platforms of sufficient quality – and sufficient is a vital qualifier – to take the pressure off an over-stretched military.

Yet a sceptical voice whispers in one's ear: 'Don't hold your breath'. We are still a generation, perhaps two, away from the swarm of clever machines that we take off a shelf when needs arise and the operational tempo increases. We can hope that cleverer equipment like the Joint Strike Fighter (JSF) will give us some effective answer to the quality versus quantity challenge; but there has never been a convincing reply to the question 'How much is enough?'

The operational lessons and demands of the real world of nasty low-tech engagements do not appear to be fully appreciated. There are some exceptions – better protection for soldiers and a general improvement in the technology invested in ground forces must be applauded. But in the end, the DTS and the earlier Defence Industrial Strategy (DIS) have been insufficiently ruthless in determining priorities and making more room for quantity. A judicious application of networking technology should allow some room for manoeuvre, but one suspects this will not be enough to head off future over-stretch. ■

QUALITY RULES, OK?

By Professor David Kirkpatrick

David Kirkpatrick is an Associate Fellow of the Royal United Services Institute. Here he examines evidence from military history that shows that quality is more important than quantity.

Throughout the 18th Century and the first part of the 19th there were no significant developments in European military technology. Because all of the developed nations had

virtually the same weapons, generals and admirals strove to bring the greatest possible number of fighting units into action at the decisive point in time and space. Voltaire concluded that, 'God is on the side of the big battalions', and Clausewitz ignored weapons and commented that, 'Superiority of numbers becomes every day more decisive'.

'Lanchester's analysis was based on the assumption that all of the fighting units could fire effectively at their enemies, and thus ignored range limits and terrain screening'

The situation was entirely different in the latter part of the 19th Century and through the 20th Century, when a succession of technological developments yielded rapid increases in the performance of weapons on land, at sea and in the air. Each new weapon in a particular class had significantly higher performance than its predecessor, and those nations which failed to equip their forces with the latest and best weapons were decisively defeated. In the earlier period the loser/winner loss ratios in land battles rarely exceeded 2, but subsequently disparities in the weapons deployed by opposing forces have yielded ratios of 5–10 in intra-European warfare and vastly greater ratios of 40–300 in colonialist/imperialist conflicts. This period includes many examples (particularly in conflicts between developed and undeveloped nations, but also in populist uprisings) where small numbers of well-armed troops defeated much larger numbers of ill-armed enemies.

In this period of rapidly advancing military technology, military commanders demanded weapons of ever-higher performance to maintain parity (or ideally superiority) with their potential enemies. This competitive pressure yielded great improvements in weapon performance, but also produced a rapid and persistent rise in the unit cost of successive generations of many classes of defence equipment. Since

that increase in unit cost was faster than that of most national defence budgets, governments have been forced to strike a balance between the quality and quantity of equipment which their budgets could afford.

In 1914 Lanchester's mathematical analysis concluded that, on a modern battlefield dominated by fire power, the overall effectiveness of a military force was proportional to the square of the number of units in the force multiplied by their individual effectiveness. This implied that a force that was twice as large as its opponent would win unless the opponent's weapons were four times more effective, and supported Clausewitz's emphasis on the importance of superior numbers. However, Lanchester's analysis was based on the assumption that all of the fighting units in each force in combat could fire effectively at their enemies, and thus ignored range limits and terrain screening. Contemporary politicians tended to overlook that caveat and paid great attention to the number of 'rifles and sabres' which a nation could deploy; their obsession with the 'Russian steamroller' is symptomatic of this mind-set, as is Lenin's comment that 'quantity has a quality all its own'.

'Other things being equal, quality has almost always defeated quantity'

Despite the misconceptions of politicians, military commanders in that period had no doubt about the importance of the quality of their forces' equipment. In World War One General Trenchard complained that his pilots were having to fight in 'last year's aircraft' and Admiral Troubridge decided that his force of four British armoured cruisers was inferior to a single German battle cruiser (5 years newer and 60% larger) and consequently declined to engage; his judgement was reluctantly endorsed by the subsequent court martial. But popular opinion remained focused on numbers, and even during the Cold War the numbers of combat aircraft, warship and armoured fighting vehicles (AFV) deployed by the opposing alliances were tabulated and compared with little attention to their

respective levels of performance.

Because of concern about the rising unit cost of defence equipment and the associated reduction in national force levels, it is periodically argued that nations should procure larger numbers of lower-performance weapon systems. These arguments rely on the perceived importance of superior numbers, on demonstrable economies of scale in production, and on the dubious claim that 'the best is the enemy of the good'. This case has several flaws:

- The best is the enemy of the good only when 'best' has been defined using inappropriate criteria (such as sheer size) – on the contrary, excellence is the key to success in war, business and sport.
- A reduction in the performance requirement of a weapon system can cause a disproportionately large decrease in its combat effectiveness; military personnel generally hope to offset minor inferiorities in their weaponry by their own superior qualities (skill, motivation, etc.) but they abhor fighting with equipment which is significantly inferior to their enemy's and only the most fanatical warriors are willing to engage in such situations.
- Economies of scale have a much weaker effect on the through-life cost of a weapon system than on its procurement cost (which normally attracts more attention in national debates).
- I know of no examples of conflicts which have been won through superiority of numbers alone, and thus argue that superior numbers are less important than has been claimed.

It is often argued that superior numbers were decisive in the battles of Little Bighorn (1876), Isandhlwana (1879) and Adowa (1896), but in all of these cases other factors were also important.

- At the Little Bighorn about 200 of the large number (2000?) of Sioux and Cheyenne warriors engaged had repeating rifles, and another 400 had various other rifles and muskets, so Lieutenant Colonel Custer's 212 men of the 7th US Cavalry were outgunned as well as outnumbered.

- At Isandhlwana the Martini-Henry rifles of the outnumbered British force shattered the first Zulu attacks, but the British defence was overwhelmed when it proved impossible to supply sufficient ammunition from reserves in wagons far behind the firing line.

- At Adowa an Italian expeditionary force was defeated by a much larger number of Abyssinians. The latter were not an ill-armed mob; French companies had, in exchange for mining concessions, supplied them with modern rifles and quick-firing artillery, so there was no great disparity in the weaponry of the opposing armies. The Italian defeat may also be attributed to indifferent generalship, and to the mountainous terrain which favoured irregular forces.

In World War One the superior numbers of the Entente armies did not triumph until they deployed plenty of heavy artillery and AFV and the German economy collapsed. On the Russian front in World War Two, the larger Russian army was victorious only after it had sufficient T34 and other AFV of comparable quality to the Panzers. The history of conventional warfare provides no example of a larger force using superior numbers alone to defeat a smaller force with significantly better weapons (i.e. without other factors affecting the outcome).

In 20th Century wars of national liberation it has often proved possible for ill-equipped rebel forces, which were sufficiently motivated to endure the hardship and casualties suffered by the weaker side in asymmetric warfare, to win against an imperial invader by using disruption and propaganda to undermine the invader's economic and moral justifications for continued occupation, without necessarily defeating the imperial military forces directly in battle. In these wars the limited resources of the rebels generally gave them no choice but to use quantity against quality, and they enthusiastically adopted superior weapons whenever they could.

Other things being equal, quality has almost always defeated quantity, and that accumulated military experience should continue to guide defence equipment acquisition. It remains important to define quality appropriately, taking account of all lines of development, and to select equipment designs which maximise national military capability within a given budget. ■

QUANTITY VERSUS COMPLEXITY: STOP DELIBERATING, GET ITERATING!

by Dr Jeffrey Bradford

Jeffrey Bradford is Group Business Development Manager at Babcock International Group plc. He argues that lengthy acquisition of ever smaller numbers of platforms gives rise to six clear reasons why we need to move towards greater numbers of low-risk, simple-to-operate equipments.

Since the end of World War Two, defence management practitioners across the western world have become locked into the acquisition and through-life management of fewer numbers of each successor generation of key platforms, with a correlating growth in the length of acquisition time and complexity of the bureaucratic processes involved. Additionally, the tempo and diversity of military operations since the 'gridlock' of the Cold War has led to ever more lessons learned, causing military establishments to seek ever broader, more complex requirements to cover the breadth of potential operations.

'There are six somewhat negative behaviours which lengthy, ever smaller acquisition of equipments reinforce'

Is it not time to break this cycle as through-life management (i.e. the cost of in-service operation) takes greater precedence over cost of initial acquisition?

Whilst the lessons derived from the history of defence and international security can be used to justify diverse opinions, it could be suggested that there are six somewhat negative behaviours which lengthy, ever smaller acquisition of equipments reinforce.

The first is a reluctance to put platforms



‘in harm’s way’ due to smaller platform numbers leading to less presence and therefore slower response times to international crises. The Royal Navy (RN), for example, once went through a period where no new ships were built for 50 years leading to an atrophying of capabilities. Additionally, at its height the yardstick for the RN force structure was the number of nautical miles between each vessel – regardless of the capability of newer warships it is true that presence, defined as the visibility of the White Ensign to potential foes, has diminished. If the ‘new’ strategic environment is one more akin to Victorian times, our Navy has fewer ‘gunboats’ to send to ‘fly the flag’ thereby deterring aggression without using military force.

The second is the impact on the skills and experience of senior operational commanders. Fewer platforms equals smaller formations and therefore result in either fewer commanders with experience, or else a similar number of commanders undertaking shorter command postings.

Third is the impact on personnel. Fewer platforms and a higher operational tempo, protracted by successive military deployments, will wear out the soldiers, sailors and airmen and women. In turn this affects training (particularly the husbanding of lessons learned and their incorporation through doctrine into the organisational memory), plus retention. Thomas Ricks, in his analysis of US military operations in Iraq, highlights the difficulty of getting useful lessons from the field translated into force structure and equipment modifications to meet the

“How dare you imply that I have no command experience... I’ve led dozens of successful simulations!”



operational challenges.

Fourth is a reluctance to innovate doctrine due to the force elements not enabling its ideal application to operations. Take for example the long hiatus between the articulation of air manoeuvre in the early 1980s by the UK Army Air Corps, and the formation of a true air manoeuvre capability in the late 1990s.

Fifth is the ever increasing costs of acquisition as industrial effectiveness is compromised due to the diminishing ‘corporate knowledge’ of design and production of the particular platforms. Take, for example, the concept of ‘drum beat’ in UK nuclear submarine acquisition as a way of offsetting the potential skills loss.

‘The six factors suggest that it is an absolute necessity to move towards greater numbers of low-risk, simple-to-operate platforms’

Lastly is the greater political risk for both the military organisation and political process, resulting in lengthier acquisition timescales affecting all the above challenges. Observing from the outside, the debates concerning the Future Combat System (FCS) in the US and the Future Rapid Effect System (FRES) in the UK, the difficulties of balancing requirements for less armour and more speed from the early 1990s with the immediate front-line experiences from Operation Telic/Iraqi Freedom where heavy armour was critical, seem only to exacerbate the procurement schedule when it is known that the platform chosen may be expected to be in service for half a century.

The above six factors suggest that it is an absolute necessity to move towards greater numbers of low-risk, simple-to-operate platforms. After all, General Norman Schwarzkopf suggested in the wake of the 1991 Gulf conflict that if the coalition had swapped its high-tech equipment with the armed forces of Saddam Hussein, it would have still won.

Schwarzkopf’s comments suggest that, amongst other elements, training, experience and doctrine remain the critical success factors. Would it not be good to boast mastery of straightforward equipments, in sufficient mass, technologically iterated upon as frequently as practical to underpin these core capabilities? ■

KEEPING THE BALANCE

by Major General Giuseppe Maggi

Giuseppe Maggi is Chief of General Plans/Resources for the Italian Army. He discusses how the Italian Army is finding a way through the twin claims of quality and quantity.

Armies have to face various challenges at the beginning of this new century, and the quality versus quantity paradigm has particular importance. The issue is not new. Today, however, the increasing cost and speed of development of advanced technology, the multi-faceted asymmetric threat, and the requirement for long lasting commitments make it all the more difficult. This is even truer when defence budgets are limited and unlikely to increase.

Considering first the asymmetric and multi-faceted nature of the ‘most likely’ threat, we need to be agile and effective to meet the most demanding challenges in warfighting situations and in limited offensive and defensive actions, at the same time being ready and precise (with no collateral damage) and able to maintain the forces for long periods in stabilisation and reconstruction operations.

The scenarios above highlight the importance of the land component and its presence in the area of operations with enough forces equipped with high standard systems. Of course, all of us would like to have both quantity and quality. This, however, is not possible – and not only for financial reasons.

Possible Solutions

One approach to solving the quality-quantity dilemma is to try to set the

required quantity in relation to the level of commitment envisaged, while the desired quantity should be linked to technical/operational/interoperability parameters. The latter can be expressed by state-of-the-art systems or a sufficient capability of operating with other friendly and allied countries.

If we go for an option of maintaining just a large army, with very few advanced platforms and weapon systems, we risk being ineffective in operations and marginalised within an alliance; but we still need to spend a lot of money in terms of personnel and running costs. On the other hand, a very small and ultramodern force would be costly, but still not capable of endurance in significant, long-term commitment.

The answer is that we need to balance both quality and quantity according to our political military objectives and the subsequent resources allocated to defence. We should not forget, however, two very important factors. The first is the capability of the defence industry to deliver in time the required modern systems. The second, and of paramount importance, is related to the level of the ongoing operations, as they pose considerable limitations and delay in the process of transforming an army. We cannot do it from scratch. Therefore we need to proceed incrementally.

The Italian Army, at present heavily committed in operations, has adopted the incremental approach to upgrading the quality of its systems, while maintaining a robust quantity of manoeuvre, combat support (CS) and combat service support (CSS) units.

We believe that we should improve first in some key areas by introducing new platforms, at the same time as maintaining current ones. Our aim is to increase first of all C4ISTAR capabilities – situational awareness at various levels of command, integration into the Joint national network, and where possible the ability to plug in and operate with our allies. Another area of improvement is the fine-tuning effects in terms of lethality and engagement selectivity, minimising – and possibly reducing to zero – collateral damage and friendly casualties, as well as integrating the activities of the warfighter and replacing some soldiers with unmanned assets (i.e.

“SA80s are withdrawn and we’re to issue you with pointy sticks...”

“The costs are amazingly low... you can have as many as you want!”



UAVs).

This kind of quality does not replace, but integrates, quantity and makes it possible to operate in complex situations and over longer time spans.

Major Equipment Programmes

The major high-tech programmes the Italian Army has been developing so far concern the digitisation of HQs and forces, the further development of the so-called ‘Future Soldier System’, the increase of ISTAR capabilities with the creation of an organic formation at Brigade level (the EW ISTAR Bde), the development of medium combat forces, as well as the increase of protection for soldiers, vehicles and infrastructures.

It is a set of complex macro-programmes that involve a review of doctrine, organisation of forces, education and training programmes, and require huge financial resources. This is why we have chosen a pragmatic approach envisaging a gradual introduction into service of assets and systems in phased quantities. The first phase of the force digitisation programme – just to mention a major example – will start in 2007–2008, when a ‘pilot unit’ will be equipped. A second phase envisages the modernisation and upgrade of the capabilities of an infantry regiment, indeed the first unit that will field the medium, wheeled combat vehicle. By 2014, at the end of the third

phase, a fully digitised brigade will be completed and equipped. Meanwhile, both light and armoured units will be upgraded, the latter being equipped with the Ariete MBT and the Dardo IFV.

What is more, the gradual approach is consistent with the several commitments the Army has undertaken in various deployments abroad. There is a clear requirement to balance transformation needs with the constant availability of turnkey force packages.

Of course, in times of limited resources there is the need to review the volume of military forces. Our objective is to preserve close combat capabilities as much as possible, or better still to strengthen them. Thus, reduction in quantities will primarily affect non-operational elements and HQs, and general support units. This will be possible by rebalancing those capabilities that may be used in a different way and by using fewer, but more effective, high-quality systems and therefore fewer operators.

I don’t have the ‘Sorcerer’s Stone’ to find the proper balance between quality and quantity, but undoubtedly the two parameters have some minimum critical levels. These have a political-military and technical-military interplay and are strongly bound to financial resources.

Lack of consistency between quality and quantity will inevitably make the military instrument ineffective. In the current international scenario, with ever-growing instability and asymmetric threats, alongside prolonged commitments, this applies particularly to the quantitative dimension of the land component, where the need for a widespread and enduring presence in crisis areas does not allow a downsizing below a critical threshold of forces or number of platforms.

As a further consideration, the increase in quality should be pragmatic and gradual. There is no point in trying to achieve unreachable and the most expensive state-of-the-art technologies, because of both financial constraints and minimisation of technological risk, but also because of clear operational requirements. As a matter of fact, 21st Century armies have to evolve and transform while operating in complex and hazardous environments. ■



MILITARY NAVAL CONSTRUCTION: A REVOLUTION IN PROGRESS

by Vice Admiral Emmanuel Desclèves

Emmanuel Desclèves has been extensively involved in naval ship construction over many years and is now President of the Standing Committee for Programmes and Tests of French Navy ships. Here, he argues that following civil construction can markedly reduce costs and increase quality.

Politicians are legitimately concerned about their budgets, but increasingly sophisticated equipment accelerates the cost of military platforms, with the result that defence staff have to put forward strategic arguments to justify the number of warships by category.

Compromises will inevitably always have to be made between quantity and quality, but now this dilemma is increasingly being resolved by choosing platforms with minimal technical capabilities.

In order to end this impasse, one solution would be to take advantage of the considerable progress made in civil maritime technology, within European shipbuilding yards.

Military Performance, Civil Progress

Surface ships have, up until now, been specifically built according to the internal rules and standards of the Ministry of Defence, under the logic of technical performance. In addition, packing the amount of equipment into the smallest volume was the rule because historically the price of a ship is approximately proportional to its tonnage. Consequently, little consideration has been given to the crews expected to use the ships.

There is the old dilemma of the weapon versus the armour. One would have needed an enormous quantity of bombs and torpedoes to sink the *Bismark* in 1941. However, the frigate HMS *Sheffield* sank after being attacked by one single missile, which did not even explode, and the destroyer USS *Cole* was seriously damaged by one suicide bombing attack. Today, one tries to protect oneself by means of deception and not by the armour of yesteryear, as true military specificity lies much more in integrated weapon systems than in platforms, which can no longer be protected against

modern armaments.

However, as with any civilian ship, the naval platform is subject to the requirements of structural strength, stability and security, as well as various competences such as speed, manoeuvrability, automation, size of crew etc. Essentially, the balance of these demands could be resolved by following the example of European shipyards, which build an array of sophisticated ships, including cruise liners, seismic research ships and the NGV,¹ at extremely competitive prices.

Construction Regulation

Considerable progress has been made in civilian ship performance over the last 30 years primarily as a result of three factors: the enforcement of maritime security and environmental protection regulations; substantive developments in maritime transport and cruise ships; and fierce competition between the shipyards.

In an effort to reduce the costs of platforms, while at the same time trying to increase performance capabilities and maintain adherence to International Conventions – such as the International Convention for the Safety of Life at Sea (SOLAS) and the International Convention for the Prevention of Pollution from Ships (Marpol) – French Naval defence staff in 1998 designed a new framework of surface ship regulations.

This official new reference frame comprised *Rules of Classification* adapted from the Bureau Veritas (BV) Naval Rules as well as other specific technical regulations, and most of the relevant requirements already imposed on the majority of sophisticated civilian ships were included. However, the regulatory framework went distinctly further by including additional categories such as fire protection, ammunition, armaments, signature electromagnetic acoustics, aviation installations and the human element.

By following these new guidelines, the Navy can now articulate its specifications and needs in the same way as shipyards do, and thus really open these up to industrial competition, which is the only real guarantee of progress. We should stop procuring military-specific equipment, because it is manufactured at much greater expense – the majority of good quality, cheaper maritime equipment available off-the-shelf is in fact appropriate for our needs.

On the subject of technical capabilities, the current aim of the merchant navy is to operate with higher performance at lower cost, but

there is the issue of immobilising ships for long periods to conduct maintenance work.

Human factors have also been a priority since they are, after all, critical to all technical and materiel capabilities. Fundamentally, it is now about putting people back at the heart of the shipbuilding concept and designing the warship around the crew.

The Example of the Mistral

The general architecture of two warship platforms, the *Mistral* and *Tonnerre*, was conceived by the shipyard company Chantiers de l'Atlantique. These very modern, 22,500-ton ships are no more expensive than the latest 11,500-ton *Siroco*, and further, they are in all respects much larger and more modern.

The fire prevention and control mechanism is more sophisticated than that of any other surface ship built according to the old standards and currently in service. This higher level of sophistication also applies to the management of electric energy/propulsion, exceptional manoeuvrability, dynamic positioning, evacuation of the crew and environmental protection. This is not to forget comfort, reliability and maintainability, which are also at a level never before reached within the Navy.

Moreover, these ships are manned by 160 naval officers, compared to 220 on the *Siroco*. Finally, the technical availability ratio is fixed at 350 days/year, an improvement of nearly 30%.

Conclusion

By deliberately leaving behind old military standards to bring the Navy more in line with civil practices, we can obtain ships that take advantage of the most up-to-date technological advances – making them de facto much more powerful – at more competitive prices.

This opening up to the world of civil maritime construction, therefore, appears to represent a significant step forward for naval surface ships, as it creates a viable means of resolving at least part of the quality-versus-quantity dilemma. ■

NOTES

- 1 The Navire à Grande Vitesse (NGV) or high-speed ship is a civilian ship model, which has already inspired the LCS. Some of these civilian ships, which can reach a speed of 45 knots, are also equipped with four lines of propellers, giving it a total power greater than that of the Charles de Gaulle