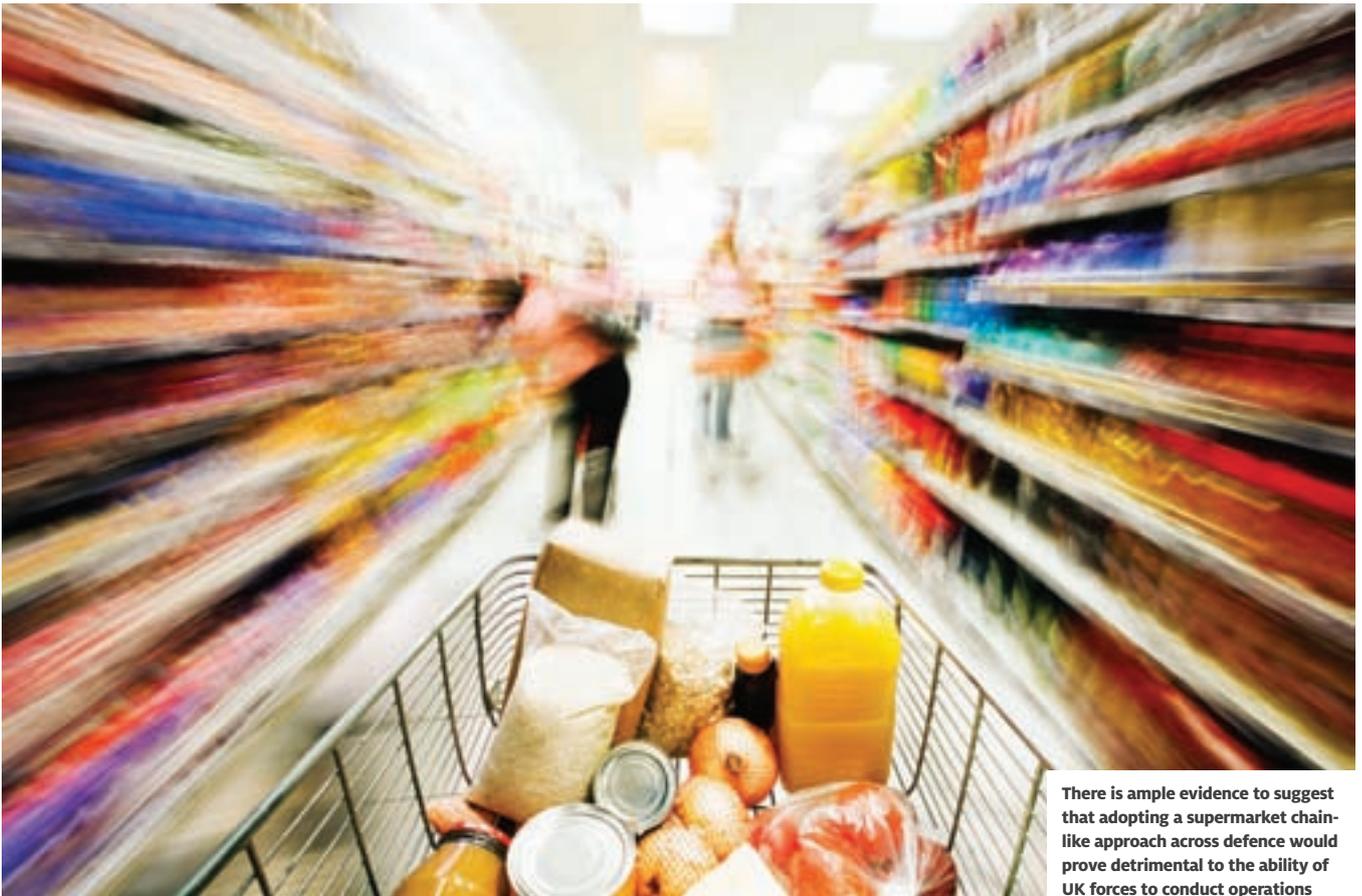


The Defence Enterprise is More Than Just a Supermarket Chain

Patrick Beutement, from The abaci Partnership LLP, explains why the UK defence enterprise should not be seen as a single homogenous activity, in the same way that a supermarket chain is regarded



There is ample evidence to suggest that adopting a supermarket chain-like approach across defence would prove detrimental to the ability of UK forces to conduct operations

Would it be a good idea if the whole of the defence enterprise were organised with repeatable, 'identikit' structures, with standardised barcodes and metadata, and harmonised and optimised processes from end to end? Surely, this would be a good thing for efficiency, similar to a supermarket chain? But what about operational effectiveness? Would there be any unintended consequences arising from such uniformity and homogeneity? The evidence is that enterprise-wide adoption of a supermarket chain-like approach would be damaging to the UK's ability to carry out operations – especially of the kind that the nation was involved in during 2011. An alternative 'agile enterprise' approach is far more applicable to defence and this article uses a systematic approach to indicate why.

Characterising enterprises

To characterise enterprises in general, a simple 'enterprise framework' will be used (shown in its most basic form in Figure 1). The framework¹ indicates that there are five interdependent aspects to any enterprise, as follows:

- **Governance hub:** There is an enterprise 'governance hub' that is responsible for overall strategy, direction, coordination and oversight of trade-offs between the other aspects;
- **'Customer-facing' operations:** The quadrant 1 (Q1) aspect operates in the real world, and adapts and reconfigures what it is doing concurrently with changing circumstances;
- **Policy and vision:** The quadrant 2 (Q2) aspect is concerned with policy and vision, and provides design guidance that is cognizant of the wider external context beyond that of the immediate enterprise;
- **Capability acquisition:** This quadrant 3 (Q3) aspect arranges for appropriate capability to be researched, designed, built and tested and delivered to the enterprises' users;
- **Development and experimentation:** This quadrant 4 (Q4) aspect is where users bring together the available capabilities and engage in development and integration, including establishing ways of working, as part of pre-adaptation before deployment.

Although this model is very straightforward, it captures all of the essential elements and relationships needed to characterise different types of enterprises. Of course, these five aspects do not operate in isolation – there is continual dialogue between them (omitted from Figure 1 for simplicity). Therefore, Figure 1 should *not* be thought of as an anticlockwise sequential cycle.

Instead, each quadrant has its own ‘internal’ patterns of activity (design principles, organisational structures and ways of working, etc) and operates semi-autonomously, yet concurrently with the others. The quadrants are, in reality, semi-independent organisations working within a ‘federation’. It is the responsibility of all of the parts of the enterprise to engage in the pan-enterprise interactions that are required for overall success. The degree of coupling between the quadrants and the extent of the standardisation imposed determines whether or not the whole behaves either as a homogenous, single entity (directly under the control of the ‘governance hub’) or alternatively, more adaptively, as sets of Communities of Interest (CoIs).

It is simply a design issue to determine where along this continuum of behaviours it is desired that the enterprise will be positioned at ‘run time’. For example, a clamped-down organisation will have quadrants that communicate with each other in stereotyped ways, providing predictability, but proving to be brittle should the unexpected happen.

In contrast, if agility is required, then this can be realised by facilitating more flexible interactions within and between the various aspects. Indeed, the overall behaviour of the enterprise can be ‘tuned’, by changing the degree and nature of the collaboration.

This tuning can be carried out top-down (for instance, through policy or by altering permissions, authorities and responsibilities), or bottom-up (by individuals being innovative and taking the initiative) or through self-regulation/self-organisation that propagates through various social structures (such as via ‘meetings at the water cooler’, ad hoc interest groups and so on). All of these basic patterns of behaviour, their underlying mechanisms and the dynamics of the phenomena that result are largely understood and have been articulated for use by operators, managers and practitioners².

The supermarket chain

Let us now consider the characteristics of the supermarket chain. Figure 2 uses the framework to illustrate that supermarkets are largely structured as homogenous enterprises, as follows:

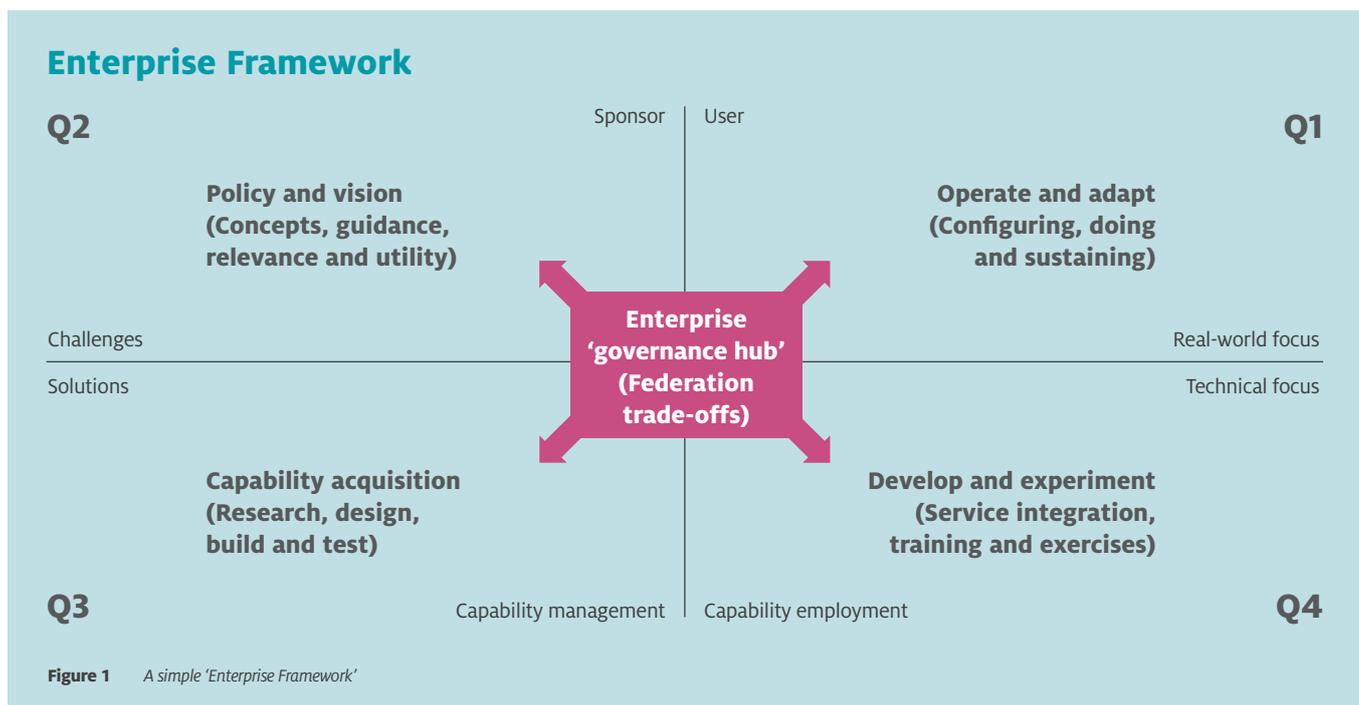
- Front-office activities, customer services, and shop floor ‘shelf-stacking’ and presentation are part of Q1, which is largely where brand projection and engagement with customers occurs;
- In Q2, market trends and public opinion are monitored, as are policy, legislation, the regulatory environment, and the wider activities of commerce and competitors, as part of strategy development;
- Q3 sources the commodities for sale, deals with suppliers, and sets up and maintains the back-office services that the whole enterprise relies upon, eg, logistics and human resources (HR);
- Q4 is where staff training is undertaken and where new procedures and processes are evaluated before they are rolled out across the enterprise;
- The head office functions direct the overall operations to ensure that there is the optimised end-to-end coherence of performance required for accountability and brand predictability.

It makes sense for this enterprise to be homogeneous, ie self-similar in all its parts. Every shop has the same look and feel, after all, they are cloned in line with the brand. Information systems are standardised – from the barcoded tags on the cows’ ears and on commodities, to customer loyalty cards – and strive for a ‘single view of the truth’. Techniques such as demand-flow technology³ are employed to reduce cost and eliminate waste, yet be flexible within an envelope of predictable performance.

The defence enterprise

One difference that is immediately obvious between supermarket chains and defence is that defence deploys operational parts that are semi-independent, stand-alone organisations that must be able to make sense of their local context, and engage with and shape it.

These deployable parts vary in ways that reflect the military tasks. The parts can range from, for instance, an adviser team with a satellite



briefcase (as in Sierra Leone) to large deployments, such as those sent to Iraq for the first Gulf War.

This means that defence has to be able to operate at least two types of enterprise, with very different characteristics and capability needs, concurrently. The first is the 'standing enterprise', based around the Ministry of Defence (MoD) in Whitehall and at the home bases, that administers defence capability, in line with national priorities. The second type is the 'deployed enterprise' (DE), of which there may be more than one, that carries out operations under a political mandate in dynamically changing and uncertain situations.

Why aren't these two types homogenous? The simple reason is that they operate within different contexts that are driven by entirely different imperatives. This means that for each type to operate effectively, they cannot be the same. As can be seen from Figure 3, the DE(s) sit within Q1 – each of them having their own version of the enterprise framework configured to suit the situation into which they have been deployed. Note that the standing enterprise is constituted largely of the other three quadrants. Let us examine them first.

Characteristics of the standing enterprise

Other than in Q1 (operations), the characteristics of supermarket chains and the standing enterprise are remarkably consistent. Starting with:

Standing enterprise 'management hub': This management hub, where the senior responsible officers (SROs) are based, is driven by the need to have a coherent view of the overall defence enterprise, as shown in Figure 3. The main challenge for the hub is adopting approaches that accept the necessary diversity of the ways in which the deployed enterprises function and in which their activities are valued. The relationship between the hub and quadrants is a two-way street of reciprocal engagement – for example, in establishing the principles, behaviours and engineering necessary to achieve operational agility. The hub's focus ranges from days to years, and its activities are driven by the need to be able to provision, deploy, sustain and support effective operational capabilities (into Q1) consistent with national aims.

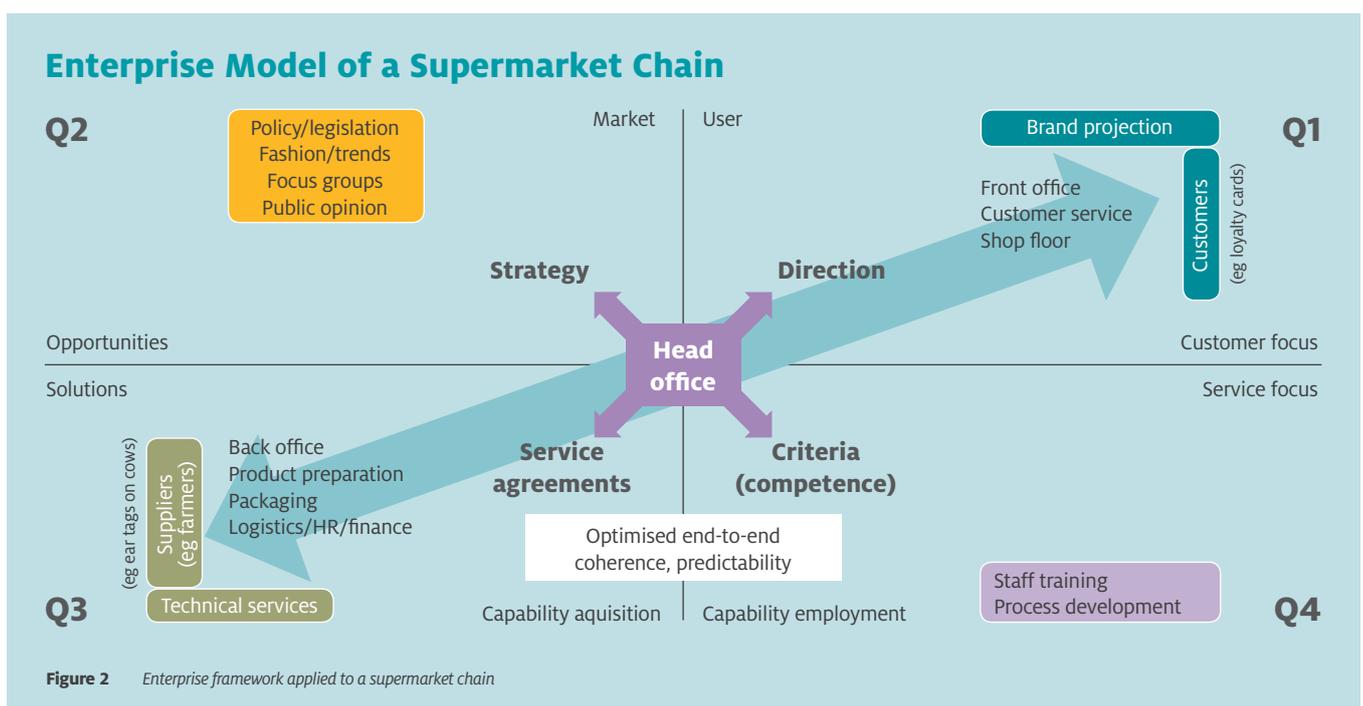
Policy, vision and strategy – Q2: The activities within this quadrant are shaped by politics, finance, foreign policy, defence priorities and public opinion. Its focus is on providing long-term direction based on a 'rational' assessment of risk/need, looking ahead from years to decades. The quadrant is driven by the requirement that it should be accountable to a number of stakeholders – especially external ones, such as the Treasury, and the scrutineers and their metrics – and to the notions of value they employ that reflect their particular sensitivities.

Capability management, acquisition and manufacture – Q3:

This quadrant's activities are shaped by concerns over timelines, cost, quality, technical principles (precision, repeatability), and its focus is on providing 'raw' capability tested against engineered requirements and valued in those terms. The time horizon for these activities can shift from weeks to years and is driven largely by financial, engineering and programmatic considerations, which are informed by innovative research.

Experimentation, integration and exercises – Q4: This quadrant is shaped by the need to test and evaluate capability against current and perceived, future operational needs – not simply against technical specifications. The outputs from these activities are not just assessments of the ability of integrated capability to meet programme needs, but also provide opportunities for military forces to learn how to adapt and employ the capability creatively to cope with the unexpected. The time frame of these activities can range from the immediate to a matter of months, against

Defence has to be able to operate at least two types of enterprise, with different characteristics and capability needs, concurrently



the background of a variety of inevitably ‘contradictory’, real-world, operational performance criteria.

Despite the similarities with supermarkets, the main difference for defence is the theme that the operational environment is always an unknown. Supermarket chains do not usually have to deploy, at short notice, to a new country or cope with their shops being blown up.

Characteristics of deployed enterprises – Q1

This quadrant is where the real-world realities come into play and where the activities of the DEs are shaped by the context, the expectations on the ground, the dynamics of the current situation and the nature of possible futures⁴. Commanders must be able to make sense of this as it happens. It cannot be fully appreciated and delivered in advance as activities in this space must lead to self-sustaining change that meets the outcomes required by politicians, the people and the media etc. There are many drivers and demands in tension, not least the changing ‘complex operational realities’ and the mix of perceptions and intentions of the actors involved, many of whom influence matters behind the scenes.

There are two mutually supporting sides to DEs: the ‘informal’ side – that is to say, the command and intelligence ‘brain’ that makes sense of the changing context – and the ‘formal’ one – namely, the control and administration machine-like ‘nervous system’. There is no dispute about the fact that these two sides exist. The DSTO-inspired chart⁵ at Figure 4 has been used at front-line operator and intelligence workshops over 12 years, involving personnel from three-star generals to corporals, and across NATO to outside defence without there ever being any dissent about its validity. The issue is that its wider implications have not, in my experience, been articulated clearly enough in capability terms to gain

traction and to be taken forward into acquisition. The two sides of DEs are complementary – both are required – and the function of each is as follows:

- The informal side, built around the command-intelligence partnership, provides intent and purposeful leadership drive to control and Intelligence functions. Its activities vary with changes in operational imperatives, contexts and degree of dominance, that we, and the forces and communities that we work with, have in any specific situation. In capability terms, it is more outward looking, proving perception and sense-making ‘services’ based on human judgement. These support our own forces and, often in communities of interest and federations, those of coalition partners and agencies/other government departments (OGDs) outside defence. Without this brain, the formal side is a ‘blind machine’.
- The formal side, largely managed by staffs, ensures on-going accountability of control and administrative functions, such as issuing of orders, monitoring and reporting, security, logistics, personnel/finance, medical and office automation, including signals, messaging, transfer of data, etc. It uses standard operating procedures (SOPs) and changes little during operations. In capability terms, it is more inward-looking, providing the kind of standardised, end-to-end services (very similar to those in supermarket chains) required for the reliable execution of missions.

Implications for operational effectiveness and acquisition

The spring 2011 edition of *RUSI Defence Systems* contained articles concerning acquisition reform, coherence, information superiority, enterprise architectures and system thinking. A single, largely unspoken,

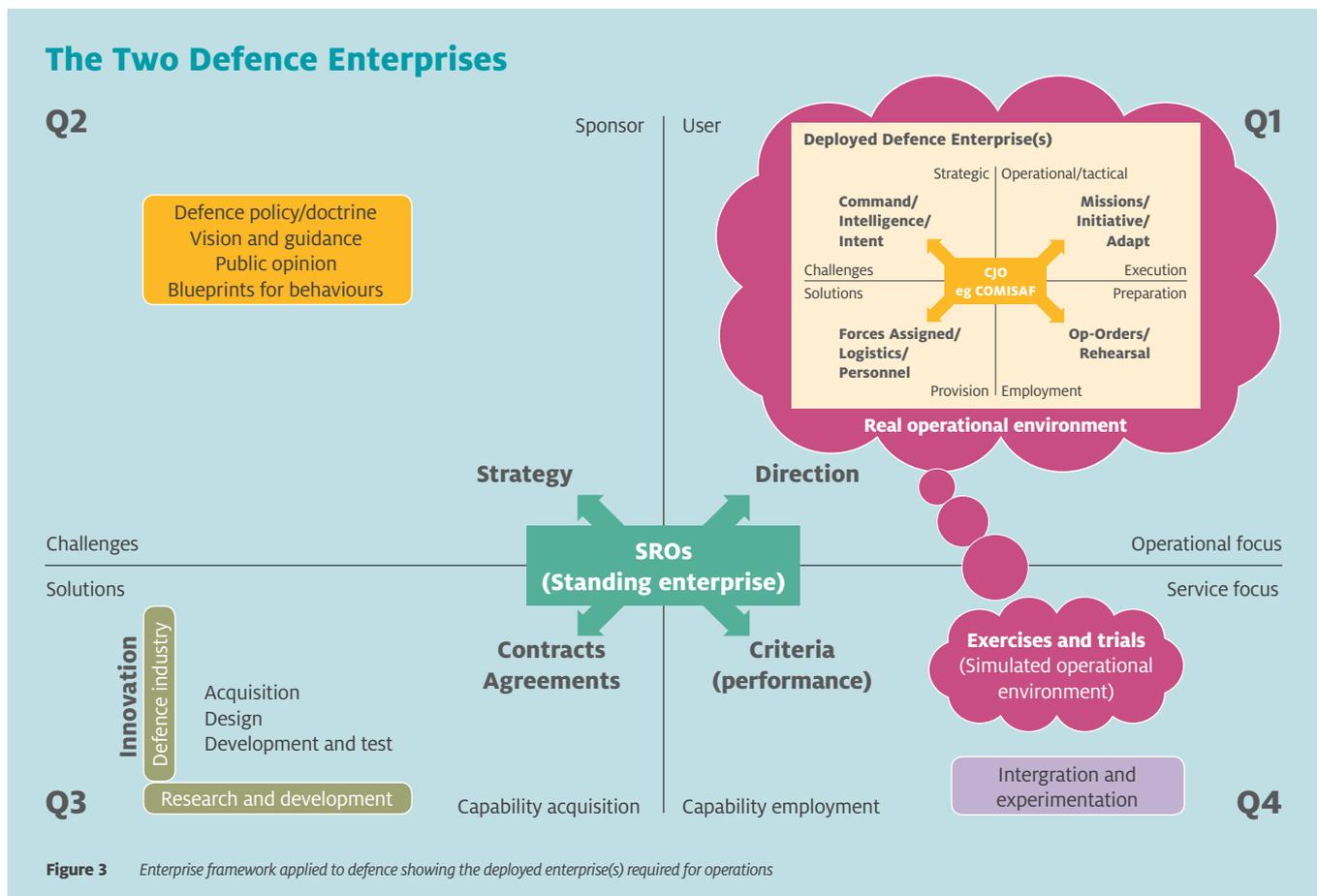


Figure 3 Enterprise framework applied to defence showing the deployed enterprise(s) required for operations

We cannot fully know the threats we might face and need to be agile and robust in the face of the unexpected

assumption underpins these papers – that defence can be thought of as a coherent enterprise, in effect, as a ‘single’, unified System of Systems (SOS), rather like a supermarket chain.

Yet, as already indicated in operational terms, this cannot be so. The UK’s defence forces usually operate in coalitions with tens or even hundreds of partners and many of these are ‘come as you are’ elements that may drop in or out at short notice. This means being able to engage in the kind of flexible, federated, collaborative working across governments, agencies and non-governmental organisations that is needed for success.

This diversity and agility is required to cope with the various values, timescales, drivers and complexities of the situations/actors involved, which cannot be predicted exactly in advance due to the inevitable uncertainty. In these situations, one can ask a number of questions, such as: where are the boundaries of the defence enterprise? What makes information ‘right’ in a particular time and place that you do not yet know? What is the extent of the SOS?

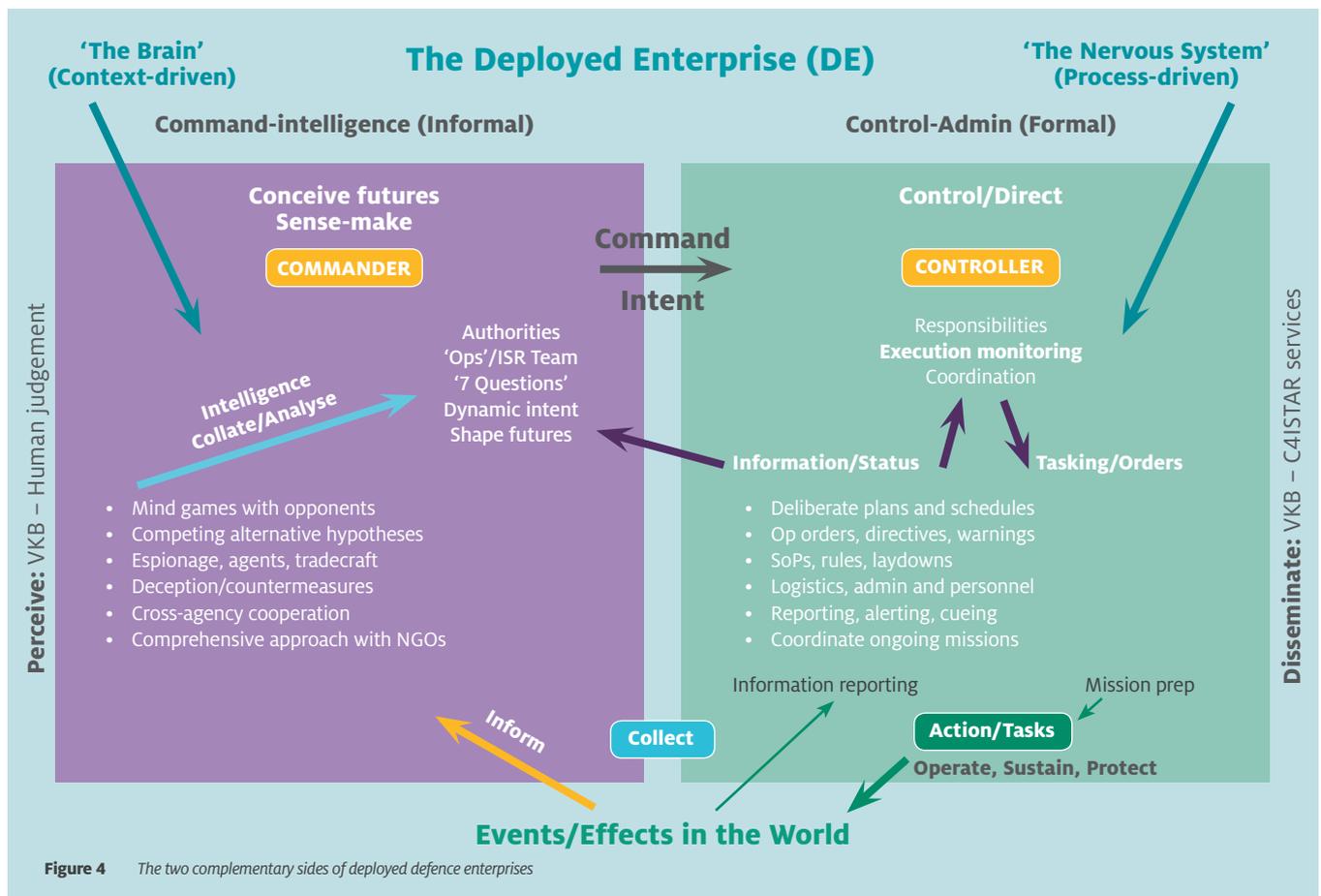
It would be a struggle to find the definitive answer if we were to try to specify a formal supermarket chain-like enterprise. It is apparent that if UK defence acquired only the capability necessary to support the formal parts of the enterprise, then it would not be possible for the command and intelligence partnership to function. For example, how could special forces, psychological operations and deceptions, agents and double agents be run if a supermarket chain-like ‘single view of the truth’ were mandated across defence?

However, Figure 3 shows that, because operational DEs have different needs to the ‘peacetime’ parts of the defence enterprise, the capabilities that acquisition must provide for DEs are radically different from those for the standing enterprise. Furthermore, ignoring this diversity and treating the defence enterprise as a single homogenous unit has, and will adversely affect the UK’s ability to apply military capabilities effectively – especially in the key areas of command and intelligence.

These realities mean that the assumptions underpinning the ‘defence as a supermarket chain’ analogy are wrong. There are two distinct, yet interrelated, types of enterprise at work here, each with specific characteristics (as listed in the table overleaf) and with different implications for policy, acquisition, experimentation and training, as well as for operational effectiveness itself. So what are the consequences?

A model for service-based agile acquisition

The starting point for an alternative model of acquisition is the acceptance that we cannot fully know the threats we might face and therefore need to be agile and robust in the face of the unexpected. This implies the need for a service-based, agile acquisition approach that can be influenced to continually evolve along capability pathways over time.



The Two Complementary Sides of Deployed Enterprises: Informal v Formal

Criteria	Command and Intelligence	Control and Administration
Function	Provides leadership, unity of purpose, intent and appreciation of possible futures to deployed enterprises	Provides accountable, assured, secure and reliable performance of the deployed enterprises' 'machines'
Governance	Always working in coalition/federation/Cols with allies, OGDs to fulfil its functions. Ownership/leadership more from operational axis of DE (CJO/JtCap)	Working as a coherent unit, largely standardised internally with clear 'technical' interfaces to allies. Ownership/leadership from technical axis of DE (info officer)
Scope	UK defence and external users/enablers	Largely within UK defence
Operational/ risk	Invoked for operations and national security issues; activities depend on circumstance. Takes risks in the face of uncertainty – accepts that there is no 'right' answer	Largely ongoing. Procedures vary little from operation to operation. Risk averse, emphasis on certainty and 'facts'. Unlikely to act without the 'right' information
Capability characteristics	User-configurable tools and services that can be adapted to current imperatives and possibilities – which enable command agility/do not constrain option space/wiggle room	Pre-defined, tightly specified systems, repeatable processes that ensure an underpinning of certainty to the DE
Ways of working (WsoW)	People work as active problem-solvers, determining the lines of enquiry based on circumstance supported by so-called 'human-machine teaming' ^{6,7}	People work as components within systems following largely predefined processes
Training	In leadership, command, tradecraft and the ability to be cunning, insightful and unpredictable as context requires	In process, procedures, 'buttonology' and ensure that the 'right thing' is done as trained
Equipment/ 'Processes'	Supports informal 'sense-making', collaborative problem solving as part of exploration/discovery/assessment of competing hypotheses	Structured process following, via office automation, control systems, databases push, communications systems
Personnel	Leaders: flexible, adaptable, imaginative and wily, challenging, devious, insightful	Followers: dependable, reliable, resourceful, precise
Intelligence/ information/ Virtual knowledge base (VKB)	Access to user-determined indicators/significant evidence that might exist/be required to support or refute hypotheses. Contradictory by intent, supported by morphable ontologies with multiple meanings	Delivery of facts and fact-like information, categorised, tagged with standardised metadata, supported by normalised (no duplications) data structures, for example, a 'single view of the truth'
Doctrine and concepts	Command, Inform, Operate and Collect	Operate, Collect, Sustain, Protect
Organisation	As established by the commander, plus informal and ad-hoc Cols, usually with OGDs/NGOs outside defence	Institutional, enduring and largely pre-defined roles and responsibilities
Infrastructure	Flexible, adaptable, 'come-as-you-are' plug-and-play components	Pre-defined, based on IERS
Logistics	On demand	Scheduled
Interoperability	Adapted as appropriate by circumstance/expediency	Largely per-agreed (eg through NATO's Standardization Agreements)
Acquisition	Needs to provide service-based, modular capability that can be adapted at point of use, people drive it (think iPhone and Apps)	Needs to provide pre-integrated systems displaying repeatability, eg, the supermarket chain
Architecture	Collaborative open federations (of SoSs) with no single owner (think of providing devices and apps into the global mobile phone market)	SoSs with predefinable boundaries and interfaces. Largely a 'closed' architecture
System engineering	Provide services which can be adapted/configured, at short notice at 'run time'. Use dynamic, resource-aware discovery. Average performance OK. Embrace 'complexity' to generate novelty, options/exploit degrees of freedom	Provide engineered systems that, as far as possible, individually and collectively perform in a known way. Eradicate 'complexity', embrace certainty. Predictable, therefore more vulnerable and brittle to change

The differences in approach between the two parts of defence enterprises, and the types of Information and Intelligence (I2) required, are highlighted above. These characteristics have been widely critiqued both inside and outside defence, and have been found to be sound.

A mindset change is also required away from, for example, the idea of building a house (and then paying off the builders) to the idea of the continual development of a city (where there is an ongoing partnership with the construction community). As a result, the way in which we do things would need to change and examples of what needs to be done differently are shown in Figure 5 and discussed below.

Governance: For a service-based, agile acquisition approach to work⁸, the federation of stakeholders and organisations must be governed and managed by management hubs that have the authority and oversight to deal with trade-offs across the enterprise. These hubs (where the SROs sit) will also need to be responsible for providing common approaches and enterprise services, while supporting the important differences between the complementary ways of working in the quadrants.

These hubs are currently absent, as Lord Levene's Defence Reform Report published in June 2011 has indicated⁹ and the mismatch between the roles, authorities and responsibilities of the various chiefs means that UK defence is not making the best use of what it has, let alone acquiring what it needs. If appropriate governance is to be provided, which is

focused on delivering 'plug and play' services, it needs to facilitate the cross-domain interdependencies and shape the collaborative dynamic across the enterprise to achieve operational agility in Q1. To this end, programmatic certainty may need to be traded for flexibility – especially, for example, for the flexibility required by commanders of DEs.

Required operational behaviours: Strategic defence and security reviews and pan-government thinking would need to move away from defining requirements to indicating appropriate behaviours. This means that only the long-term, aspirational outcomes are specified in Q2 as blueprints of performance indicators for the range of behaviours that military forces and capabilities are required to be able to display in Q1. These include the types of services that need to be made available to support those behaviours and the interwoven properties of the services that enable them to be employed in a flexible manner in Q1.

Plug-and-play service acquisition: Programmes initiated in Q3 deliver a range of tested, robust interoperable services – including core and enduring common services, such as those specified in the *Concept Report for the ISTAR Virtual Knowledge Base (VKB)*¹⁰, in the kind of agile manner described in the *VKB Implementation Report*¹¹. These services are not

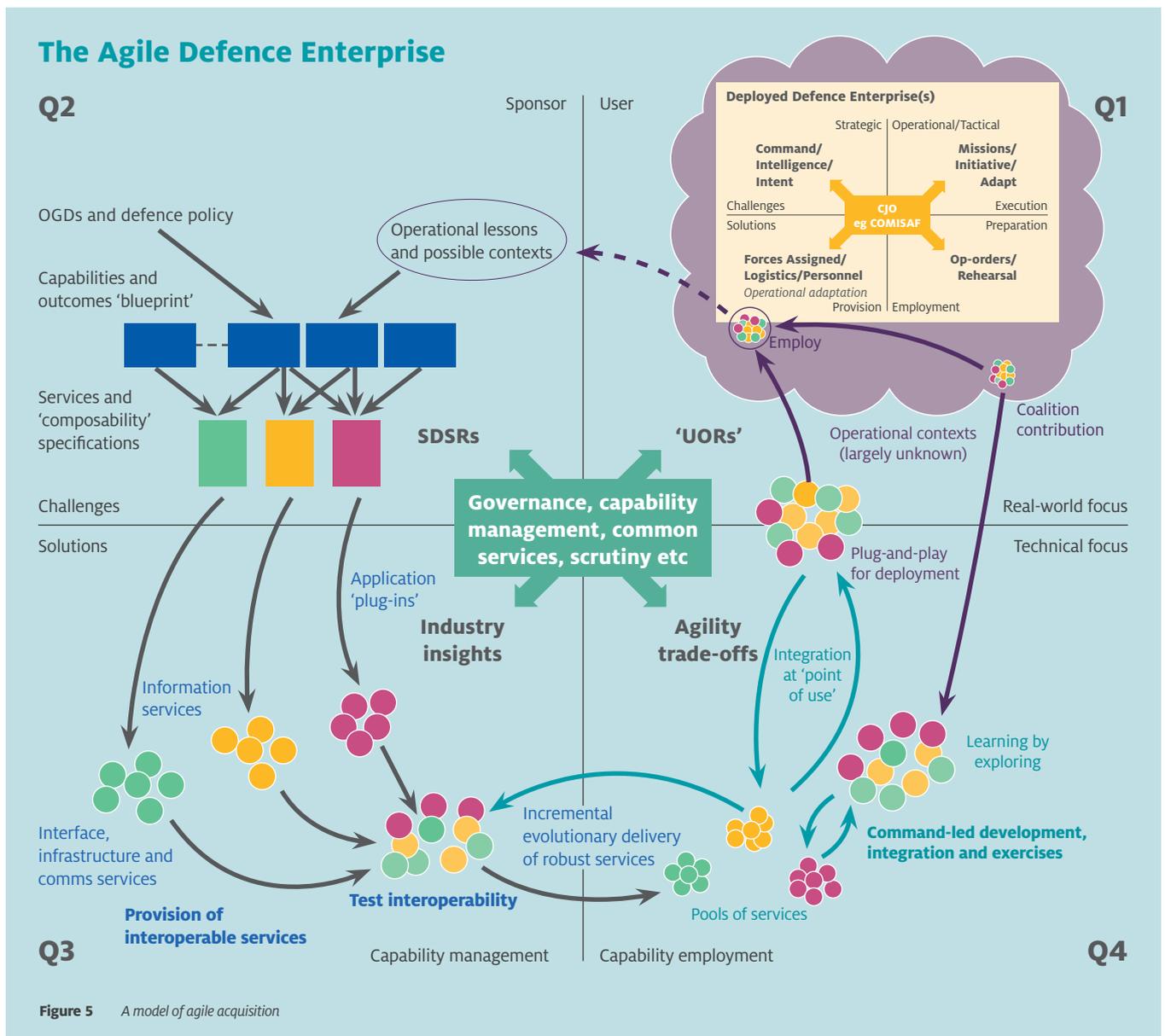


Figure 5 A model of agile acquisition

pre-integrated into fixed capability packages, as is done at present, but are delivered as a 'pool of services', ready to be employed and adapted by military personnel, in order to meet changing operational needs.

Integration at the point of use: From this pool of services, in Q4, command-led integration, development and integration (informed both by new concepts and by 'learning by doing') tries out options for 'integration at the point of use' (as the iPhone already enables with the 'apps' metaphor) as part of the training and experimentation process.

These are driven in two opposing directions – by an operational pragmatism to make the best of what is available and a technical correctness towards repeatability. Feedback enables evolutionary improvement, update and delivery of service 'plug-ins' without dislocating overall capability. Industry and research are closely involved in offering options concerning the state of the art and the art of the possible.

Operational agility realised: For operations, in Q1, an appropriate range of services are selected from the pools based on their suitability to be deployed/employed in those contexts. If they are service-based, coalition contributions can easily be accommodated and integrated quickly¹². When, during operations, the inevitable mismatch between the expected and reality occurs, it can be dealt with 'in the field' because the ability to adapt 'on the fly' to the changing operational imperatives has been built in. This leads to greater force effectiveness, flexibility and a reduction in urgent operational requirements.

When, during operations, the inevitable mismatch between the expected and reality occurs, it can be dealt with 'in the field'

Agile acquisition approaches are also applicable to other domains that spawn DEs, for instance, for critical national infrastructure, or for events such as the London 2012 Olympics. Indeed, they would be required for the kind of cross-government and coalition operations needed if so-called 'comprehensive approaches' are to work effectively.

Conclusions

Much has been written about acquisition over the past few decades. There have been many initiatives launched, such as Smart Acquisition, alternative methods employed, such as Through Life Capability Management, and techniques such as Managing Successful Programmes introduced. Reports have been written concerning the need for agile acquisition¹³ and technical strategies expressed¹⁴, yet how many of them have, in enterprise terms, fully articulated that defence in its entirety cannot be a single, unified 'system-of-systems' like a supermarket chain? How many have managed to acknowledge and articulate the need for the deployed parts of defence to be necessarily different in ways that cannot always be fully specified in advance? Which of our system-engineering techniques can deal effectively with this kind of inevitable openendedness?

This article is a step along the path to express the issues that need to be addressed if we are to avoid the scenario whereby defence has been turned into an enterprise as inflexible as a call centre. ■

Footnotes:

1. This framework has been derived from the so-called DART Framework 2006 (Design Assemblable RunTime) which has already been used to good effect in a number of defence projects in the UK and US. See http://www.dodccrp.org/events/11th_ICCRTS/html/presentations/078.pdf The author would like to acknowledge the contribution of Anthony Alston.
2. Practitioners – people who work purposefully with real-world 'complexities' in their day-to-day endeavours. Beautement P, Broenner C 2011. *Complexity Demystified – a Guide for Practitioners*. Triarchy Press.
3. A complete demand-driven business strategy that allows manufacturers and distributors to adjust product volume daily in the direction of actual sales. Kay, A 2005. *Demand Flow Technology: an Absolute Business Discipline*. In *MHD Supply Chain Solutions*.
4. The command/intelligence partnership is analysed in: Treverton, GF 2003. *Reshaping National Intelligence for an Age of Information*. Cambridge University Press, New York.
5. Chin M, Clothier J, Carthigaser M. 1997. *Command and Control Capability Assessment and the Criticality Issue*. DSTO.
6. Bradshaw, JM, Beautement, P, Breedy, MR, Bunch, L, Drakunov, SV, Feltovich, P, Hoffman, RR, Jeffers, R, Johnson, M, Kulkarni, S, Lott, J, Raj, AK, Suri, N, & Uszok, A 2004. "Making Agents Acceptable to People". In N Zhong and J Liu (Eds), *Handbook of Intelligent Information Technology*. Amsterdam: IOS Press/Springer.
7. Beautement P 2009: Putting Complexity to Work – achieving effective Human-machine Teaming. At European Conference on Complex Systems, Warwick, UK. Sep.
8. Experiments and exercises by US DARPA [Ref 12] have shown that agile ways of working are feasible, including the security and policy aspects, command and operation staffs want to work differently – the bottleneck is with system engineering and acquisition.
9. Defence Reform Report June 2011. http://www.mod.uk/NR/rdonlyres/B4BA14C0-0F2E-4B92-BCC7-8ABFCFE7E000/0/defence_reform_report_struct_mgt_mod_27june2011.pdf
10. Concept Report for the ISTAR Virtual Knowledge Base (VKB). QINETIQ/D&TS/C&IS/CR0702664/2.0 dated October 19, 2007.
11. Implementation Report for the ISTAR Virtual Knowledge Base (VKB). QINETIQ/EMEA/TS/TR0801009 dated March 25, 2008.
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13. Intellect report Improving the Tempo of ISTAR Acquisition. http://www.intellectuk.org/component/docman/doc_download/4374-increasing-the-tempo-of-istar-acquisition
14. Defence Information Strategy 2011. http://www.mod.uk/NR/rdonlyres/E78188A1-9EA1-407C-AA83-F38492F6D920/0/mod_information_strat2011.pdf

