

WHEN BAE Systems was appointed as prime contractor to build Britain's latest warship, it had a vision to establish project management systems and an infrastructure that would be the benchmark for the future.

All involved, including the Ministry of Defence, the shipyards that would build the new destroyer and those that would arm it, were committed to best practice. The Ministry also required payment through earned value management (EVM) for such a complex, high value programme.

The purpose was to enable and expedite delivery of the agreed scope of supply within time and cost targets, an aim common to most projects. What makes the Type 45 process different is that it began with a clean sheet. Project managers had a major input into drafting the contract and subcontracts, ensuring that the required management techniques and performance measures were embodied across the programme.

As prime contractor, BAE Systems was to manage all aspects of the Type 45 programme from design to sea trials from its base in Filton, Bristol. This presented big challenges and a need for innovative thinking. It also meant convincing the shipyards that the EVM approach was the way to go. The approach adopted by Type 45 is disciplined, managing the business to optimise performance.

The result was a seven-stage project control system (PCS) that is already being adopted for other defence contracts, such as the new Nimrod MRA4 for the RAF, for which BAE Systems is also the prime contractor.

"This was a new project with no infrastructure," said Ros Downs, who is responsible at BAE Systems for the implementation and control of the programme at the 200-strong project control office. "It

was going to be a highly demanding programme with a rapidly growing team of people coming from far and wide, who were culturally diverse, had a wide experience and knowledge base and were willing to contribute to defining best practice. However, they had limited knowledge of earned value in the way that Type 45 wanted to approach it.

"The contract was to be open book and, ultimately, to include payment by EVM, but we knew that the EV culture was limited and there is a reluctance to embrace it within contracts led by UK prime contractors.

"We had to define what project control system was wanted."

Time spent at the start of the process was essential, said Ros. As an industry, the tendency has been to rush into contract writing, preparing an ambitious schedule to win the contract and not putting the necessary resources in place until you know if you have won.

"We needed to sit back and plan, to put a structure in place to ensure that we had what was needed to deliver the project. It was essential to define baseline budgets and schedules from the outset."

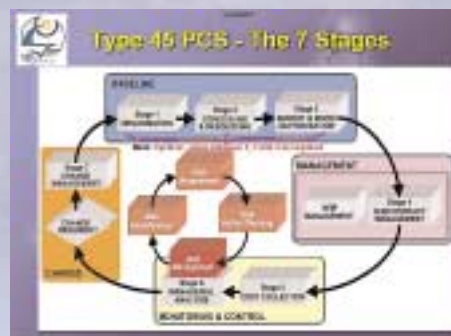


FIGURE 1: The project control system for the development of Type 45.

This baseline planning is the foundation of the Type 45 programme strategy and is one of the four principle areas of control, within which sit the seven-stage process (Fig 1- the principles, see below).

The organisation has been designed to be customer facing, ensuring that contract requirements are met and balancing customer expectations with what has been agreed in the contract. A responsibility assignment matrix (RAM), where the work breakdown structure (WBS) meets the organisational breakdown structure (OBS) is flowed right through to the shipbuilders.

A master schedule network for scheduling and resourcing, underpinned by Artemis Views Integrated Product suite, has been set up to meet the critical objectives of delivery to time, specification and cost. Sets of activities, key events and milestones are logically linked, with each set representing a single work package within an individual 'project' within the main programme and is in turn linked to other related packages under the same control account.

Duration

Open work packages focus on clear objectives within the next three to 12 months, with closed packages representing the duration of a control account. All drive towards the master milestones. As work progresses, closed work packages are converted to open, using a rolling wave principle. This allows costs to be collected and earned value to be generated, as well as giving a more accurate resource and spend profile.

"This single programme is under regular review," explained Ros. "We check the plan monthly and are now looking to working further with the programme so that we can

download nightly into the shipbuilder's system."

High-level commitment had been made to the principle of using earned value. It was regarded as providing a disciplined approach to setting up and managing the work, schedule and budget and giving early warning of problems. The approach is continuously reviewed for possible improvements.

"It is not going to make us build the ships more quickly," stressed Ros. "But it tells you where you are a bit sooner and reduces the risk of failing to hit the delivery 'bullseye'. Payment by earned value sharpens management systems, overcomes 'just missed' milestones and gives some flexibility to both parties – it is the drumbeat of the project."

BAE Systems took the decision to adopt EVM based on the Eurofighter and the Australian model for the Hawk Lead In Fighter (LIF) and this became part of the contract. Managing the sub-contractors included overcoming the limited culture of and inherent reluctance to EVM within the ship building industry and putting it into the supply chain.

TYPE 45 FACTS

- The Type 45 anti air warfare destroyer will replace Type 42 and provide specialist air warfare capability until 2040.
- It will be able to engage a large number of targets simultaneously and defend aircraft carriers or groups of ships from future threats from the air
- At 7,350 tonnes, it is one of the largest ships to be built for the Royal Navy since World War II
It will carry the powerful Principal Anti Air Missile System (PAAMS), which is being developed jointly by the UK, France and Italy
- Powered by integrated electric propulsion (IEP), driven by a Rolls Royce 20MW gas turbine – a first for a warship
- The complement will be some 190, with space for 235 and the design includes a fitness centre for the crew – another first for a destroyer

**TYPE
CAST**

Work has begun on the new Type 45 destroyer, which will help to provide the backbone of the Royal Navy's air defences for the next 50 years. It is also providing a project management model for the industry.

Project spoke to the programme implementation and control manager at BAE Systems, Ros Downs.



"There are 12 major sub-contractors and some 80 B category sub-contractors using disparate systems. We need to be careful that we don't become bureaucratic and silly about this, so we asked how we could manage it to suit them.

"We aim to keep it simple, so we take some other method and flow it into our EVM through meaningful, smart payment milestones as opposed to just drawing down cash to the satisfaction of the cash profile."

The seventh stage, ensuring that change is incorporated in a timely and controlled manner, is perhaps the biggest step change of all, admitted Ros.

"We have always been pretty good at managing change from the cost and contractual aspects, but not particularly good at people change. We had to improve the process and make sure that those involved go through it to see why they are making changes. Is it because of something in the baseline over which they have no control or is it because they are not managing properly?"

Intent

"Change has to be done in a controlled manner so that you always know where you are, how you are performing against what is properly measured. When we make changes, it does not change the baseline so it does not change the intent."

Monthly reviews determine how well the programme is performing against the baseline plan. This overview of data from all areas allows the project control office to identify problems or delays and take action to resolve the situation.

Work has now begun on the manufacturing stage of HMS Daring, the first of the six ships ordered so far. Sections are being built at BAE Systems' Clydebank yards in Scotstoun and Govan and by Vosper Thornycroft in Portsmouth, for final assembly at Scotstoun.

A robust baseline and processes are in place, but there are still areas for improvement, such as better motivation to improve the culture, developing the project control system to meet changing needs and improving the flow of information to sub-contractors.

It is a continual learning process and the lessons will be taken on to the next stage or project. For example, the need for progressive 'at elbow' support and training rather than training everybody at the outset and then letting them get on with it.

"We were learning by the seat of our pants and we must learn from this experience and try not to have to make up so much as we go along.

"At a personal level, my people skills have been put to the test. I have learned that you cannot just throw something at them and expect them to take it on board. You have to appreciate they have different perceptions, regardless of what you believe in.

"You are dealing with intelligent people who have very clear views on the way they want to go forward – and they are not wrong."

• BAE Systems is a corporate member of APM.

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