



Astute Thinking

Eur Ing Paul Parkinson, Senior Systems Architect at Wind River, outlines changing world threats on the development of naval systems and in particular the role of software in enhancing the capabilities of fleets to address new dangers

In today's uncertain world, governments are striving to deal with new emerging threats to their countries and their nation's interests around the world. They are changing the roles and the composition of their surface and submarine fleets to address these new types of threats.

In recent years, as naval systems have become more and more sophisticated (with advances in combat management systems, radar, sonar, electronic surveillance, missile defence systems and countermeasures), the complexity of the underlying systems has increased dramatically. This is particularly evident in relation to software, which in

earlier generations of naval systems could be measured in tens of thousands of Source Lines of Code (SLOC), and for current programmes is measured in millions of SLOC.

One of the underlying reasons for the increasing software content is that software provides the ability to deploy flexible multi-function systems which could not easily be achieved through hardware alone. This can provide benefits in terms of a reduction in the number of dedicated systems. For example, in radar systems, software configuration can be used to exploit the fundamental capabilities of the radar for different modes of operation. These include modes for tracking surface and airborne tar-

gets, but this could potentially even include an advanced Inverse Synthetic Aperture Radar (ISAR) mode for Non Co-operative Target Recognition (NCTR) and cross-referencing a NATO target signature database. This would enable faster classification of a target as either friendly or hostile, enabling appropriate action to be taken more rapidly as required.

Software is being used to both provide tactical advantage in combat engagements through superior capability and also to manage the increasing complexity of combat systems. The Type-45 Destroyer's air defence systems provide an excellent example in both cases. This uses the S1850 Long Range Radar, PAAMS and Aster surface-to-air missiles similar to the Franco-Italian Horizon Frigates, but uses the SAMPSON multi-function radar instead of EMPAR, which provides the ability to defend the ship and fleet against multiple threats simultaneously.

The Astute submarine provides another example of increased capability through software, where its vulnerability to detection is reduced through deployment of a non-hull penetrating optronic mast design, which can be extended from the submarine fin and rapidly perform a 360 degree scan of the above the surface, enabling the commander to analyse the image data immediately afterwards, minimising risk of detection.

Software is also being used to improve situational awareness through sensor fusion, where data from different sensor inputs is processed and integrated and presented to the crew in a coherent manner to enable them to make rapid decisions about their next actions. The implementation of many such systems is classified due to their sensitive nature, but this could include, for example, the fusion of radar data, geographic data and Identification Friend or Foe (IFF) data.

As the Digitisation of the Battlespace continues to gather pace, and even more advanced capabilities are being considered, including real-time information flow for situational awareness and co-ordination of joint operations. These operational requirements will continue to have an impact on the design of naval systems, and the software that they will contain. ●

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