

**Coalition Transformation: An Evolution of People, Processes and
Technology to Enhance Interoperability**

Topic:

C4ISR/C2 Architecture

Title:

New, Open, and Modular C4I Base System
Ready for Network Centric Warfare Operations

presented by:

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Abstract Issues:

New Development for DK Navy

On the 22nd December 2003 the Royal Danish Navy officially accepted its new Combat Management System (CMS) for the first 6 units of the Standard Flex 300 multi-role ships. The system has been named 'C-Flex' and has been produced by Terma A/S with Systematic A/S as a co-operating partner.

In 2003 the Danish Navy has also signed a contract to put C-Flex systems in the new, much larger Flexible Support Ships (FS), which are currently being build, and options has been taken for all other naval units, existing as well as new ones.

Same Basic SW in All Units – Commonly Maintained

The challenge of the requirements was to develop the new CMS in a way the it would be equally adequate for the upgrade tasks of the existing fleet as well as for the upcoming Danish ship building programmes, which encompass the large Flexible Support Ships (FS), small Standard Vessels for homeland patrol purposes, Fishery Patrol Vessels, and possibly the new VIKING submarines.

The special challenge to the system was to:

- Provide maximum operational functionality as specified in the various mission models – including interfacing of current and future weapons, sensors, and communication systems.
- Provide a system, which makes the maximum use of COTS and mainstream technologies.
- Provide a software system, which accepts changes and upgrades without major rewrites of current software, and which can be used in all types of ships without major changes.
- Provide the system at the lowest possible cost.

In addition to the Navy requirements, the producers added requirements, which would truly fulfill the long standing wishes of making a core-software that would allow “eternal” upgrades and porting to other hardware without having to start almost from scratch each time.

The Modular and Reusable Software

Terma and Systematic has produced a CMS-software, which constitutes a huge leap ahead for C4I designs, and which is a true innovation in reusable software systems. This was achieved in that:

- All basic C2-functions are held in a core (named 'T-Core'), which can be commonly used and maintained on all types of platforms. They are functions, which are required in all systems – Air, Land, or Sea – to gather, correlate, and store information, to display situation pictures, and to communicate information. Also the core software holds system administrative functions by which to control the underlying hardware and operating system. The T-Core software is modular, which allows for modules to be changed or replaced without disruptive effects on other modules.
- To enhance the interoperability qualities, the system has been provided with a data model, which adheres to the message format of STANAG 5516 and provides the basis for international and joint operations
- The T-Core software interfaces to the hardware and operating system via a 'Java'-layer, which leaves the user with full flexibility in the choice of hardware platforms and operating systems.
- The T-Core software has fully open APIs, which allows addition of functional applications and subsystem interfaces, and such additional functionality can be smoothly added and produced either by Terma/Systematic or by a third party, if this is the wish of a specific customer.
- The Human-Machine-Interface (HMI) layer is separated in its own layer of software and can be changed and tailored very easily to any customer's language, needs, and preferences.

Maintenance

This new approach to C4I software design has vast potential for use in many types of systems, large or small, and the introduction into the Danish Navy is expected to drastically reduce maintenance cost as the Navy is introducing the “rolling replacement” concept to the system upkeep.

Market Issues

In parallel with complete CMS proposals for specific projects, the T-Core software is marketed separately and sold on license terms to customers among both users and fellow industries.

The presentation on the 9th International Command and Control Research and Technology Symposium will brief the above issues in detail.