



KONGSBERG

SIMflash

Kongsberg Defence & Aerospace - Simulation & Training - ISSUE 2/2008



Visit us on stand #3710 I/ITSEC 2008

Kongsberg Defence & Aerospace - Simulation & Training will exhibit this year at I/ITSEC in Orlando, Florida from 1st to 4th December. We will represent KONGSBERG, together with Kongsberg Maritime, which has a long tradition of exhibiting at I/ITSEC, with a focus on its bridge simulators for large vessels.

Kongsberg Defence & Aerospace - Simulation & Training will highlight our PROTECTOR Training System at I/ITSEC. We have enjoyed great international success with our gunnery simulator for the PROTECTOR Remote Weapon Station and systems to contain e-learning and interactive tools for maintenance training have been developed.

Our new training system is the most complete and innovative system within electronic training in this market. We will carry out many demonstrations during the trade fair.

We would like to encourage our present and potential new customers to contact us before the trade fair to allow us to set aside time for a demonstration.

Please contact

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so we can arrange a time and an agenda.

Component-based Software products

Building a system based on recycling ready-made building blocks is clearly a cheaper alternative to manufacturing new building blocks every time. The challenge is to manufacture building blocks initially so that they can be used to build different systems, especially systems that you have not yet predicted will be made.

Dag Gravningsbråten – 2008-10-06

Cheap re-use of a block assumes that you do not have to spend a lot of time tearing out the block that you want to re-use from other blocks. The blocks must be “loosely” coupled (Lego blocks are easier to use than bricks that are cemented in place). This requires that the blocks have well-defined interfaces against each other. A framework is often necessary to ensure that the blocks can be manufactured in a correct and cheap way. Lego blocks are not handmade. A framework in the form of machinery and moulds is needed to manufacture them.

Recyclable building blocks come in various sizes. Entire systems can be recycled by, e.g., connecting them together in an HLA federation. In this article, we focus on small building blocks to build software applications, such as e.g. drawing a symbol for a vehicle in a map, or a format that the map coordinates are shown with. But we are also looking at loose couplings between larger components in systems with distributed processing.

Component Based Development (CBD)

has been a direction in software development for a long time. It has constantly been renewed in theories and technologies that will make the intentions possible in an effective way. Service-oriented Architecture (SOA) can be seen as a currently popular representative of these technologies. The overall properties of a software component in CBD include:

- Stable interface
 - Can be used in many contexts
 - Can be used together with other components
 - Encapsulated: the content cannot be investigated through the interfaces
- These are stringent requirements and it is especially difficult to imagine future ways of using the components. The result may be that the component is copied and modified, and you end up with multiple versions of a functionality that must be configuration controlled and maintained. This is not cost-effective in the long run. It may be profitable for a project, but not in a product development context.

The challenge

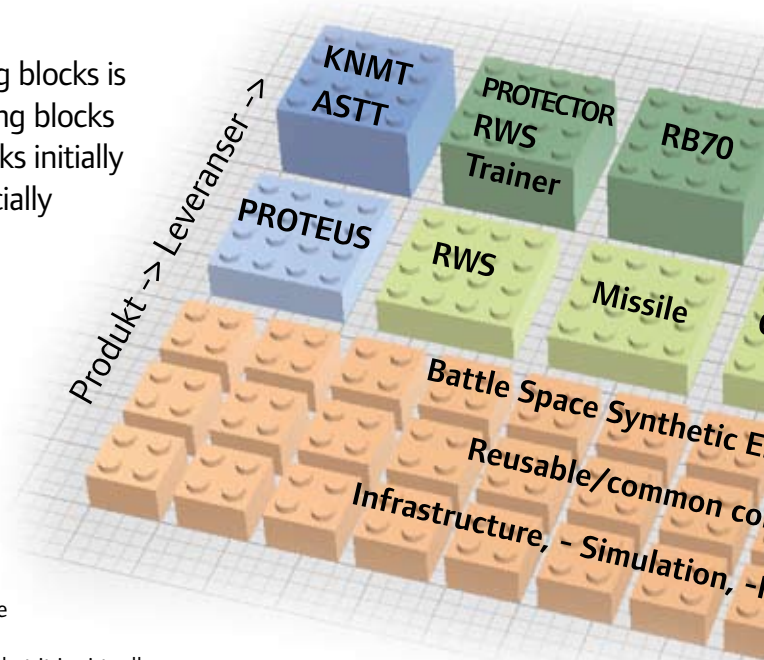
It is said that to succeed with CBD, the application that is to be made must be very well defined before the coding starts. Agile processes are popular in modern software development communities. The basis for these is that it is virtually impossible to define an entire system before starting implementation. Less time for product specification and initial design is preferred in agile processes. The focus is on short intervals between prototypes, which are evaluated together with the parties involved, in order to ensure that the correct product is achieved. Agile processes claim to result in cheaper and better products, because there are lower costs involved in making early changes, than clearing it all up in the end. But isn't there a contradiction then between using agile processes and component-based development?

How to succeed?

The software components should be as “small” as possible. Small blocks are easier to recycle than large ones. Great care has to be taken to define the components well before they are implemented and used. It is especially important that the components' interface is well-defined, so that the components can be extended in the long term, without reverse compatibility being compromised. This requires that we have a defined strategy, preferably supported by a framework for how components should be connected together. Extension of the content of the components, assembly of the components to a larger system and testing of the components before they are released for use in more situations may benefit from following the principles of agile processes.

Hva What do we do?

We use agile processes for development of our product components in our simulators, and in projects where all of the parties involved agree to their use. Our component-based develop-



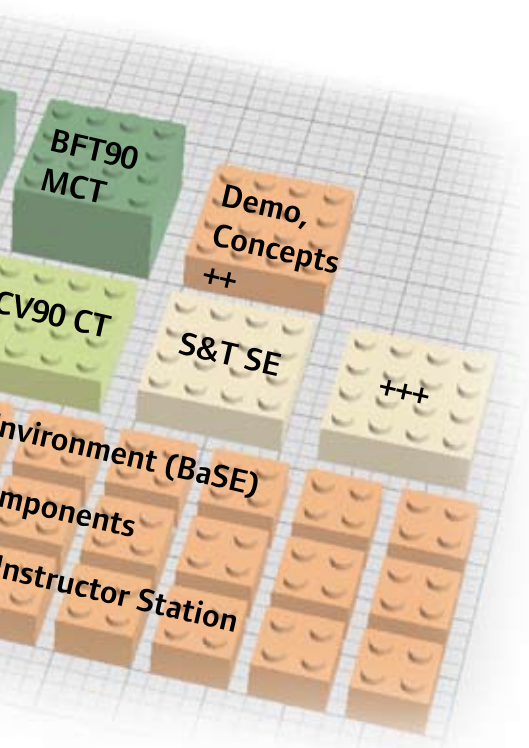
ment is based on .NET technology which contributes with technology that makes it easier to keep interfaces stable while the components are built and extended. In addition, we base our development on loosely coupled components, i.e. components that allow “co-operating components” to be replaced, or even be omitted.

We have two ways to carry out “loose couplings”:

1. One who uses a framework for building applications. This application framework contributes with a simpler way of loading and configuring collaborating components within an application. The application can be changed on execution (plug and play). This means that the systems can rapidly be adapted to clients' needs by using software components in a scalable and flexible way.
2. The other method that is used is for dynamic data exchange between components. The components can be run on the same or different computers in a network. Data exchange between components is based on publishing of, and subscription to, objects and interactions such as in HLA. An object model (as in FOM in HLA) defines the data that is exchanged

PROTEUS

“Loosely connected building blocks = Predictable implementation at low risk!”



Proteus is one of the early Greek gods of the sea, Poseidon’s son. Proteus is a shape-changer, the wise man of the ocean and herdsman for all of the animals of the sea. Inspired by this Greek god, the KONGSBERG PROTEUS technology transfers many of these characteristics to the world of training by being configurable to changing needs and surroundings, as well as being a tutor and mentor for the students.

client, at the same time as they return upgraded and new blocks to the collection.

Examples of this are the projects to deliver the Nansen Class Frigate Trainer (FT) to the Norwegian Navy (see link below) and the Instructor Station to the new Minehunting Sonar Simulator (MCMS) from Thales Underwater Systems.

The core of the PROTEUS technology at our most important client in the maritime field, Naval Training Center KNM Tordenskjold in Bergen is the PROTEUS Action Speed Tactical Trainer (ASTT) function. PROTEUS ASTT is our main product for procedure, communication, role and coordinated action training for Marine Combat organisations, and offers generic operations rooms and vessels that can train together internally in the operation room, and also between multiple vessels.

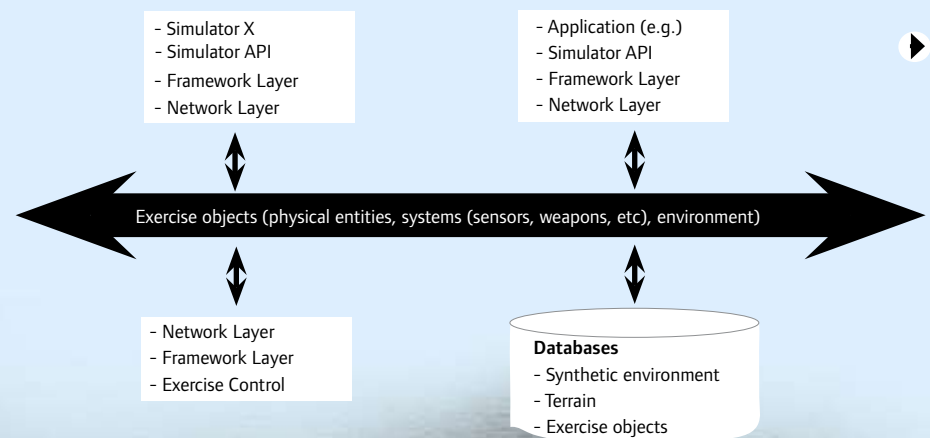
With the rich collection of loosely connected building blocks according to the Lego principle, which KONGSBERG’s PROTEUS technology consists of, we have over the last few years delivered many projects that have recycled large and small blocks. The projects are delivered on time, with the correct quality and at a price that has been agreed with the

The application framework makes flexible re-use of small software components possible in many situations, together with plugins that accommodate the special needs of various systems. Loose connection between components in a distributed system is taken care of by an HLA-based framework for dynamic data exchange.

Finally, back to the question of whether there is a contradiction between using agile processes and component-based development?

We can only say “yes, please – both”

As long as you have a focus on well-defined interfaces and a strategy for connecting components that is supported by a good framework, the benefits of agile processes can be exploited.



Complete Simulator X, Application



Link

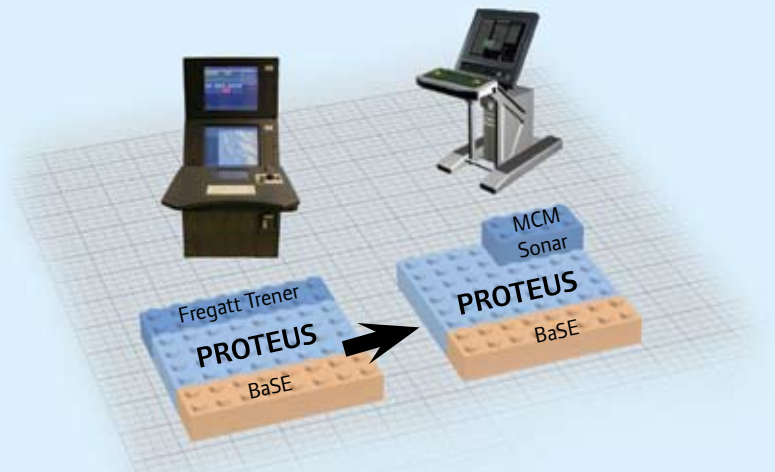
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The PROTEUS simulator technology can be described as:

- At network and framework that permits game objects (vessels, weapons, sensors) and the synthetic surroundings to communicate with the relevant simulators and applications (student panels).
- Game control for start, pause and stop of the game, changes during the game as well as planning for new games (Instructor)
- Database that contains all models of the game objects, synthetic environment and games (scenarios)
- Simulators for each game object, which subscribe to relevant information from the framework.
- Applications for each game object, which receives information from its simulator through the framework. The applications are what the students see as panels

In other words very LARGE building blocks. By connecting these loosely, it has been possible to use the blocks from PROTEUS simulator technology to integrate external systems, such as FT and MCMS seamlessly into PROTEUS. The largest building blocks re-used in these projects are, of course, the entire infrastructure such as networks, frameworks, basic instructor station, databases, etc. By re-using the same building blocks and expanding them, it means that all deliveries are completely integrated into PROTEUS, and that they also are upgraded as PROTEUS is upgraded and developed further.

Both of the above projects have also developed new large and small building blocks and



MCMS, as the last project, has again re-used (and improved) building blocks from FT.

Frigate Trainer:

- Use of student panels for communication with external systems permits coordinated training with other units.
- Developed KMessageFrame component for flexible message processing with various communication technologies and types.
- Developed basic Interface panel with XML logger, for instructor control and communication, and status of the interfaces with external systems.

Instructor station for Minehunting Sonar Simulator.

- Powerful expansion of the mine functionality and more detailed scenario descriptions, including bottom types, vegetation, etc.
- Re-use of the KMessageFrame component

with expansion of message size.

- New general component to permit the instructor to control student-controlled units.
- Role-based configuration of the instructor station.

We have also re-used many of the smaller building blocks.

Frigate Trainer and Minehunting Sonar Simulator are good examples of system designs that use loosely connected Lego blocks, where re-use enables us to deliver at a low risk for both the client and ourselves.



AUSA

Between 6th and 8th October 2008 the AUSA Annual Meeting was held in Washington DC, USA. KONGSBERG exhibited several models from its family of PROTECTOR Remote Weapon Stations, including the PROTECTOR Training Systems.

USA is one of the most important markets for PROTECTOR where KONGSBERG have enjoyed great success for many years. In August 2007, the CROWS II contract for delivery of up to 6,500 weapon stations was awarded to KONGSBERG. This confirms KONGSBERG's position as a leading manufacturer of weapon control systems worldwide. KONGSBERG has also enjoyed great success with deliveries of simulator systems for PROTECTOR, both inside and outside USA. In additions to the gunnery

simulator, systems to contain e-learning and interactive tools for maintenance training have been developed.

The interest and enquiries at the trades fair was high, especially from the US Army, but also from other international defence forces. The next AUSA fair, at which the entire PROTECTOR family will be represented, is the AUSA Winter Symposium, Fort Lauderdale 25 - 27 February 2009. Symposium, FL 25-27. februar 09.

