

Modelling and Simulation at FOI

NATO SAS-115 RWS 13-15 October 2015

Outline

- M&S in General
- Examples of Research Areas and Models
- On-going activities

M&S Activities at FOI

"M&S is both a tool and a research area"

Activities

Generic M&S research

Research on the basic methods and techniques for the development, quality assurance and the use of models and simulations

Model Development

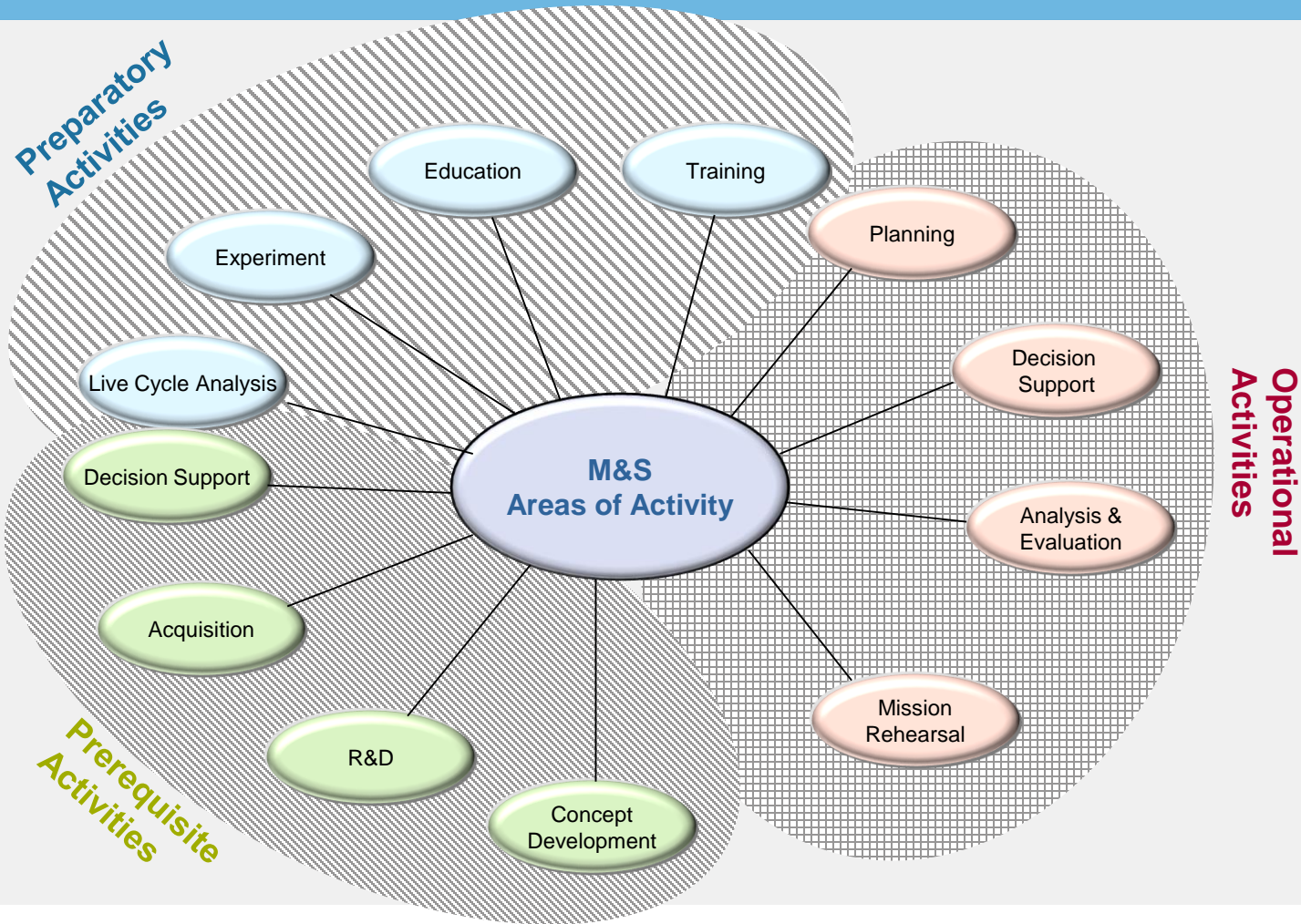
Development of complex simulation systems

Evaluation of models

Participation and expert support for the use of simulations

Courses in M&S

Defence M&S



Research at FOI

Defence Analysis

CBRNE

Command and Control Systems

Aeronautical research

Underwater research

Weapon and Protection

Sensor Systems

...

M&S Research

Research on the basic methods and techniques for the development and the use of models and simulations

Serious Gaming and Defence

Synthetic Natural Environments

Computer Generated Forces

M&S Support to Development of Capabilities

Simulation Based Defence Planning

Vebe – Weapon effects in settlements

Simulates the effects of explosions, fire and gas cloud ignition in urban environments

Developed and used at FOI since 1992

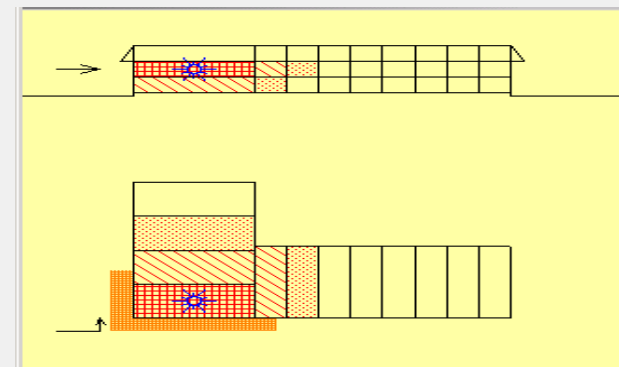
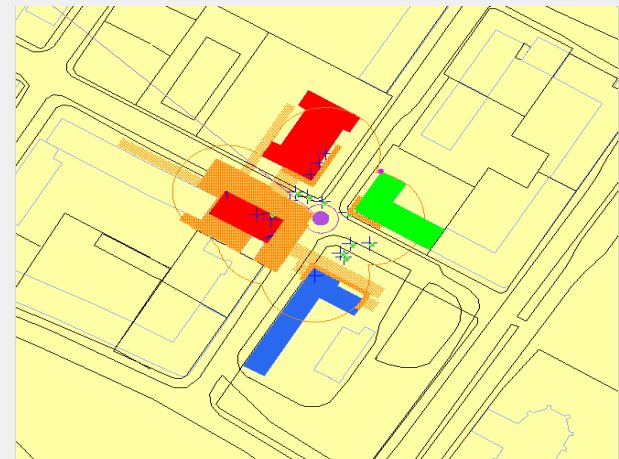
Common Use

Studies of war-time organization of rescue services

Municipal command exercises

Studies of functions and durability of shelters

Military war-games and exercises



Vebe – features

Models of buildings and construction categories

Distribution models of explosive charges

Effects of fragments and pressure on structures, people, sewer system and electricity

Models of fire ignition and distribution within and between buildings

Building collapse and fire effects on people

Gas distribution and gas explosion effects on buildings and people

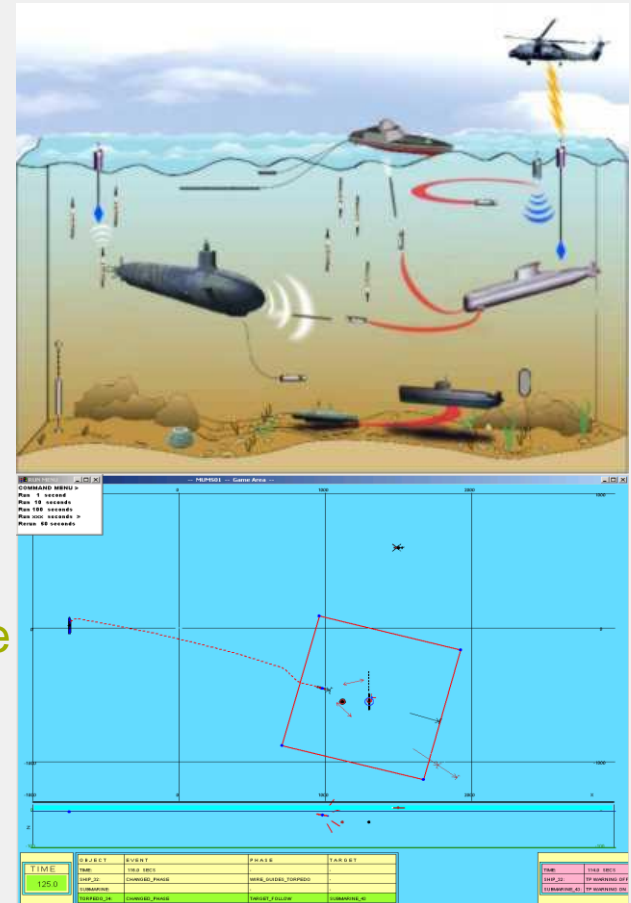
MUMS (Simulation of underwater counter measures)

Simulates tactical situations where a submarine or a vessel uses counter measures for protection against threatening torpedoes

Also used to study how utilization of counter measures and performance of counter measures and torpedoes (in tactical situations) effect the outcome of a duel

Interactive mode with graphical user-interface

Monte Carlo simulations



FLSC (Swedish Air Force Combat Simulation Centre)

Operational simulation facilities

training for both pilots and fighter controllers as well as command team and staff personnel

Simulation Based Acquisition (SBA)

development and evaluation of the tactical requirements for new aircraft systems

A combination of man-in-the-loop simulations and Computer Generated Forces



MSSLab - MultiSensorSimulationLab

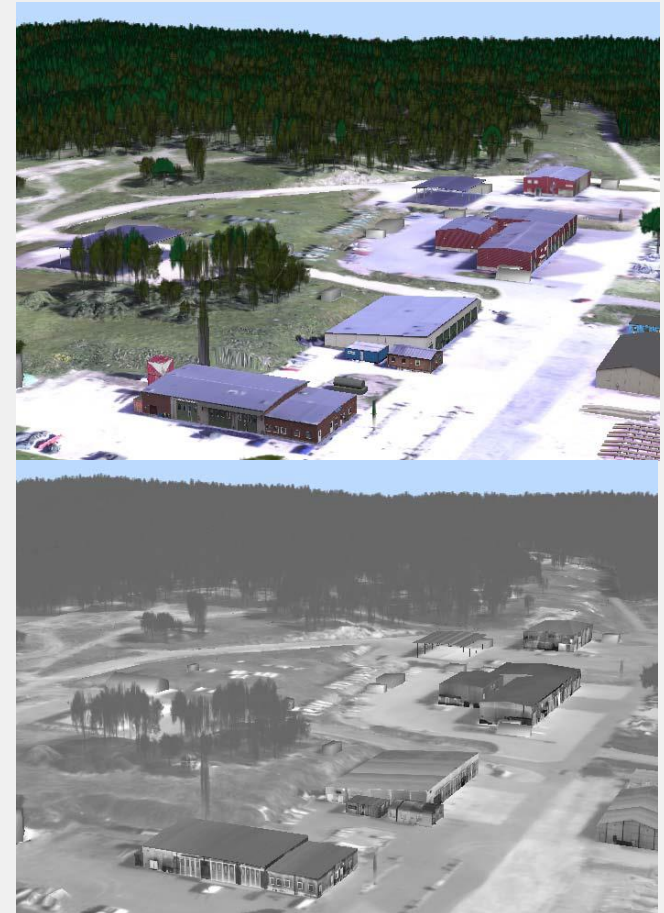
The goal for the MSSLab is to develop a modular sensor system simulation program that can simulate sensor systems in:

various environments, weather conditions and time periods

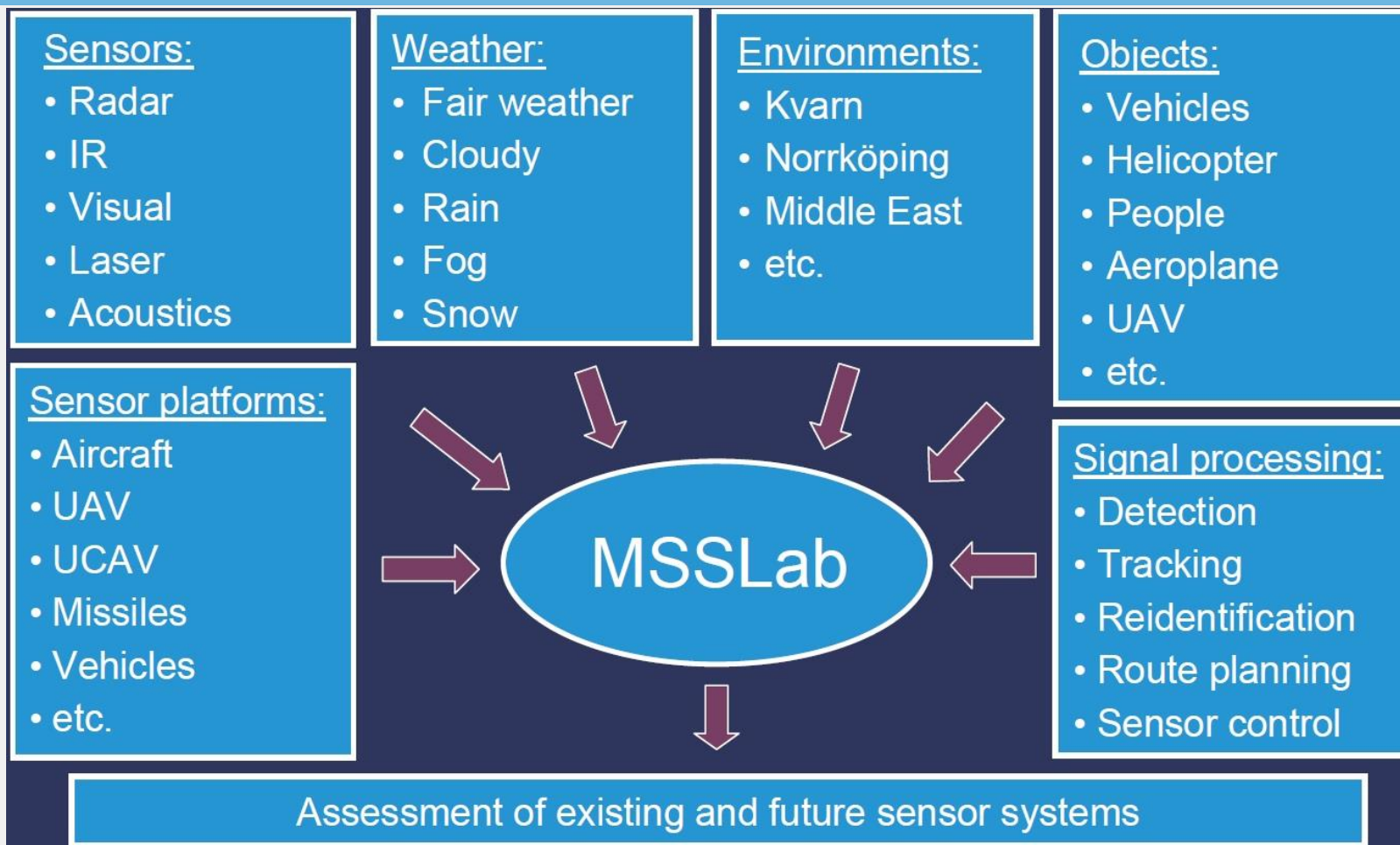
This is accomplished by integrating

environment models, sensor simulation programs, signal processing algorithms etc. to a modular simulation program

The sensor simulation programs used are all based on physical models to give good accuracy



MSSLab - MultiSensorSimulationLab



Data and tools for assessment today

- Assessment data
 - From late 90-ies
 - Limited development
 - Based on Cold War experience
 - Large number of units
- Experts
- Data gaming cards
 - Force elements
 - Equipment
 - Systems

On-going activities

Project “*Assessment and War Game Support*”

- Identify the need for assessment data and tools, methods and models
- Improve and develop assessment data in priority areas
 - in the first instance to “the upcoming game”
 - then longer term development
- Describe and prioritise the need for simulation models
- Develop a process to generate assessment data and tools emanated from identified deficiencies

Focus Areas

- Air Combat Simulation
 - Flames
 - 2on2, 4on4, ...
 - Missile models
 - Aircraft models
 - Pilot models (CGF)

Focus Areas

- Ground Combat
 - Battalion level
 - Short term
 - Support to seminar war games
 - Long term
 - Flames
 - VBS3
 - Behavioural Trees
 - Platoon Commander
 - Company Commander