

# Modelling & Simulation In Support of NATO, Nations and Partner Nations

**NMSG Briefing at CAX Forum 2013**

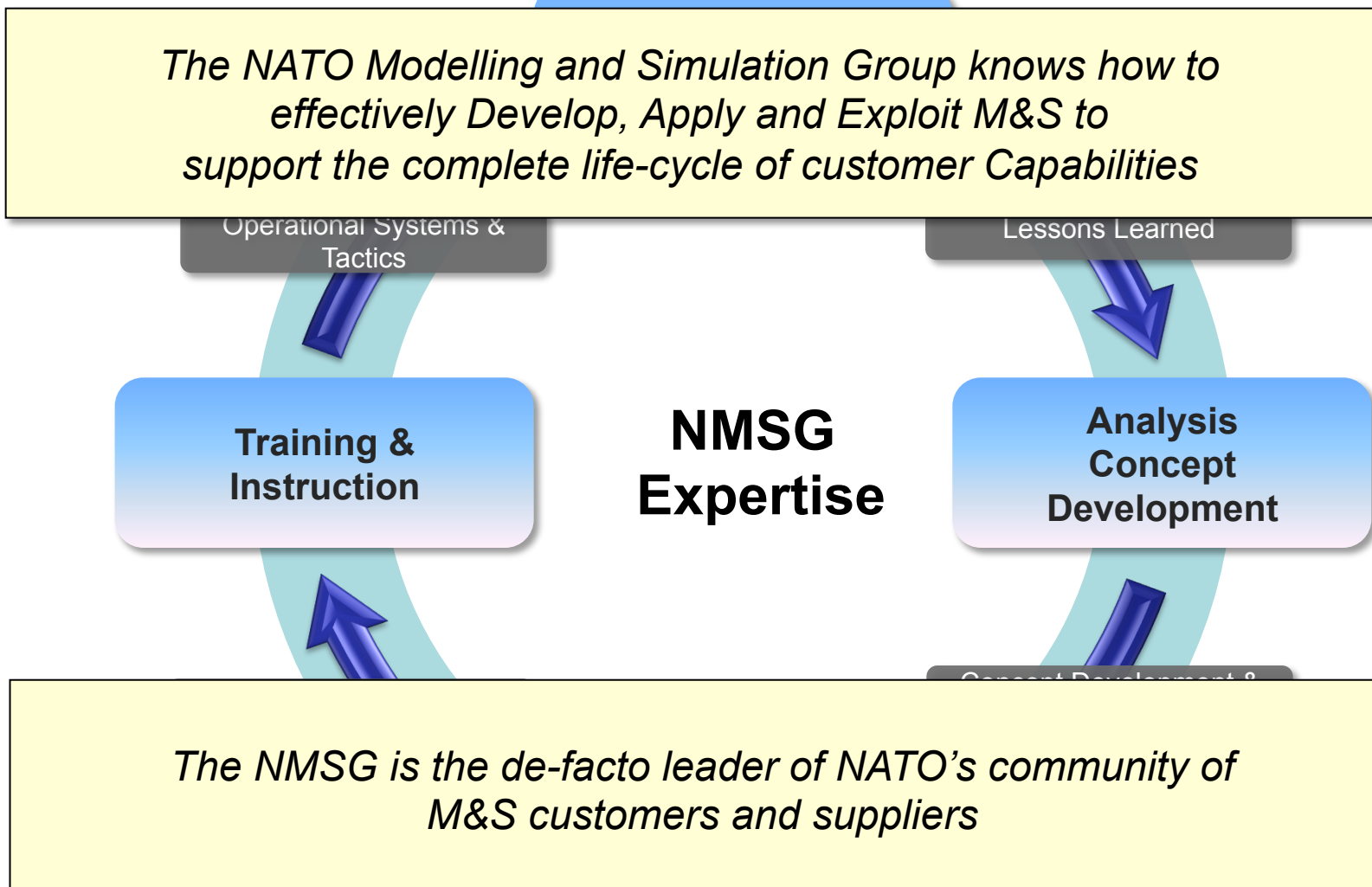
**Wim HUISKAMP**  
**Acting Chairman, NMSG**

# NATO and National Challenges where M&S can contribute solutions

- Training (Prepared Force)
- Decision Support,  
Mission Planning, Mission Rehearsal
- Concept Development and Transformation
- Green Technology
- Cyber operations
- ....



## Capability Lifecycle



## NMSG' s Mission

The **Mission** of the NATO Modelling and Simulation (M&S) Group (NMSG) is to **promote co-operation** among Alliance bodies, NATO Member Nations and Partner Nations to maximise the effective utilisation of M&S.

Primary mission areas include **M&S standardisation, education, and associated science and technology**. The Group will provide M&S expertise in support of the tasks and projects within the STO and from other NATO organisations.

**M&S Fundamentals: Interoperability, Standardisation, Re-use, V&V**

# NATO M&S Vision and Guiding Principles

- **Exploit M&S to its full potential across NATO and the Nations to enhance both operational effectiveness and cost effectiveness.**
- **Guiding Principles as Reflected in the NATO M&S Masterplan (NMSMP):**
  - Synergy
  - Interoperability
  - Reuse and Affordability



# NMSMP Objectives

## Objective 1

Establish a Common Technical Framework

### Sub-objectives

- Develop NATO standard interoperability architecture and supporting material
- Establish recommended standards pertaining to data interchange for M&S and C2 systems, promotion of true interoperability, pursue trust in M&S
- Establish a NATO wide (incl. National Stakeholders) technical environment for distributed networked M&S application areas

## Objective 2

Provide Coordination & Common Services

### Sub-objectives

- Develop common process and procedures to guide actions and decisions regarding M&S application
- Compile M&S information
- Establish capability to share M&S education resources with NATO organizations and Alliance nations
- Promote the sharing of M&S resources through a knowledge management process and system
- Establish a help desk to facilitate the development and use of M&S

## Objective 3

Develop Models & Simulations

### Sub-objectives

- Identify and prioritize M&S requirements
- Identify the most effective strategies to satisfy each simulation requirement
- Allocate resources to satisfy the highest priority simulation requirements
- Execute the selected and resourced development strategy
- Provide information to the larger NATO community regarding the resultant simulations and any lessons learned during development

## Objective 4

Employ Simulations

### Sub-objectives

- Plan employment
- Provide resources to operate simulations
- Provide databases
- Operate simulations to improve all aspects of NATO/national military activities
- Conduct impact assessments and document lessons learned to guide further development / investments

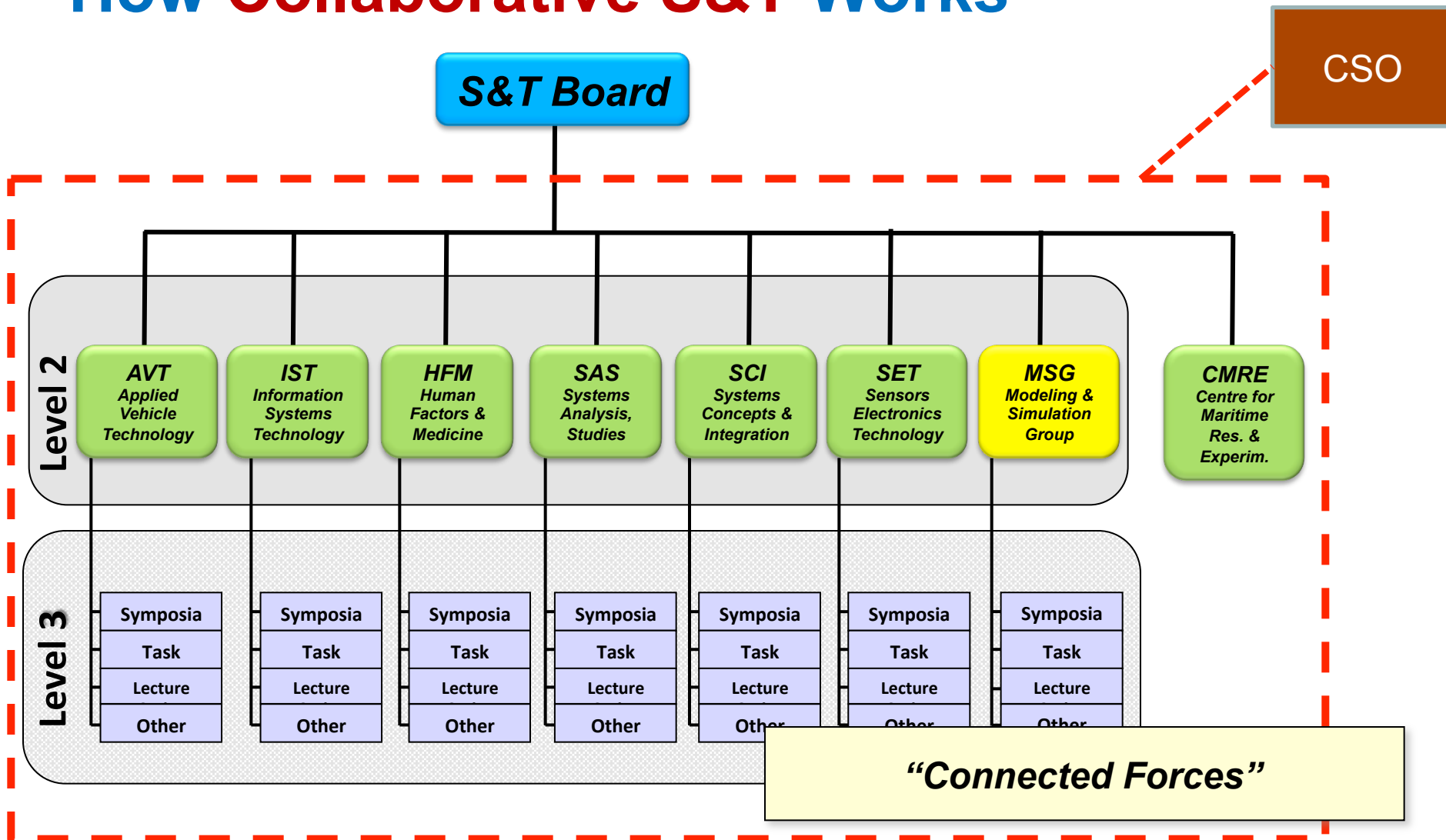
## Objective 5

Incorporate Technological Advances

### Sub-objectives

- Monitor M&S related technological advances
- Conduct R&D, experiments and pilot projects as needed to support Alliance requirements
- Share information on realized advances to facilitate incorporation
- Implement technological advances

# How Collaborative S&T Works







**23 NATO Member Nations:**

<b>Belgium</b>		<b>France</b>		<b>Netherlands</b>		<b>Slovenia</b>	
<b>Bulgaria</b>		<b>Germany</b>		<b>Norway</b>		<b>Spain</b>	
<b>Canada</b>		<b>Greece</b>		<b>Poland</b>		<b>Turkey</b>	
<b>Czech</b>		<b>Hungary</b>		<b>Portugal</b>		<b>U.K.</b>	
<b>Denmark</b>		<b>Italy</b>		<b>Romania</b>		<b>U.S.A.</b>	
<b>Estonia</b>		<b>Latvia</b>		<b>Slovakia</b>			

**6 Partner Nations:**

<b>Australia</b>		<b>Austria</b>		<b>Belarus</b>	
<b>Finland</b>		<b>Switzerland</b>		<b>Sweden</b>	

**8 Ex-Officio Members / STO:**

<b>ACT</b>		<b>JFTC</b>		<b>JWC</b>		<b>NCIA</b>		<b>NIAG</b>	
<b>M&amp;S CoE</b>		<b>CASPOA CoE</b>		<b>JCBRN CoE</b>					

# NMSG's Role in Standardization

- NMSG is THE **Delegated Tasking Authority for Standardization** in the M&S Domain since 2005 (recognized by the NATO Standardization Agency)
- A Technical Cooperation Agreement (2007) recognizes SISO (Simulation Interoperability Standards Organization) as THE Civil Standards Developing Organization for NATO M&S, supporting IEEE and ISO



# NATO M&S Standardization

## NEW PROMULGATED STANAGs:

- STANAG 4662 – “SEDRIS\*: Environmental Data Coding Specification (EDCS)”
- STANAG 4663 – “SEDRIS: Spatial Reference Model (SRM)”
- STANAG 4664 – “SEDRIS: Functional Specification And Transmittal Format”

**STANAGs UNDER RATIFICATION:** 4603 Ed 2 “High Level Architecture”

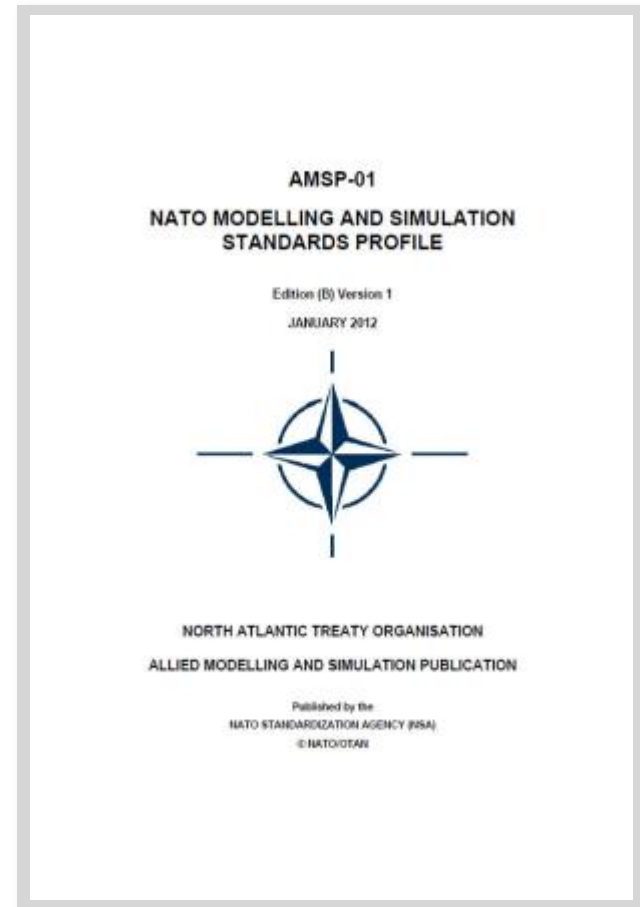
**ALLIED PUBLICATION UNDER REVISION:** AMSP-01(B) “NATO M&S Standards Profile”

**EXCELLENT COOPERATION WITH SISO:** Production of Standards of interest for NATO (C-BML, GM V&V, UCATT, etc)

*\*Synthetic Environment Data Representation and Interchange Specification*

# NATO M&S Standards Profile

- The M&S standards profile is a so-called NATO “Allied Publication” (reference AMSP-01)
  - Identify standards of interests for NATO M&S;
  - Include all relevant STANAGs and underpin mandatory use
  - Advice on ‘good practice’ standards (and not impose);
  - Provide basic information on standards of interest;
  - Identify gaps and propose new initiatives



## NMSG Specific Characteristics

- **Mission statement in NATO M&S Master Plan**
- **Delegated Tasking Authority on NATO M&S standardization**
- **Membership:**
  - Scientific / technical (academy, government, industry) and
  - **Operational military**
- **These characteristics have significant impact on**
  - NMSG internal organization,
  - NMSG activities that are not only technical, but very often include operational users

## Examples of NMSG activities

# Distributed Training: Combined Air Operations



F-16 ULT, Volkel



White Force  
RAF Lossiemouth



CF-18 simulator,  
Bagotville



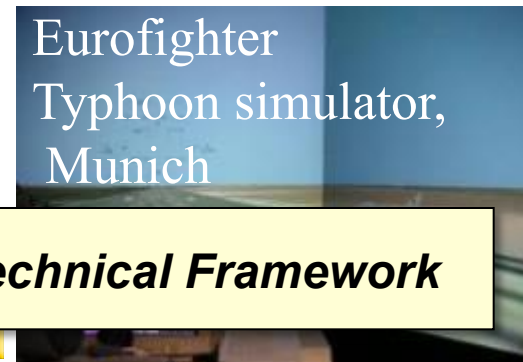
Mirage 2000C  
simulator, Orange



Italian Eurofighter  
Typhoon pilots, Turin

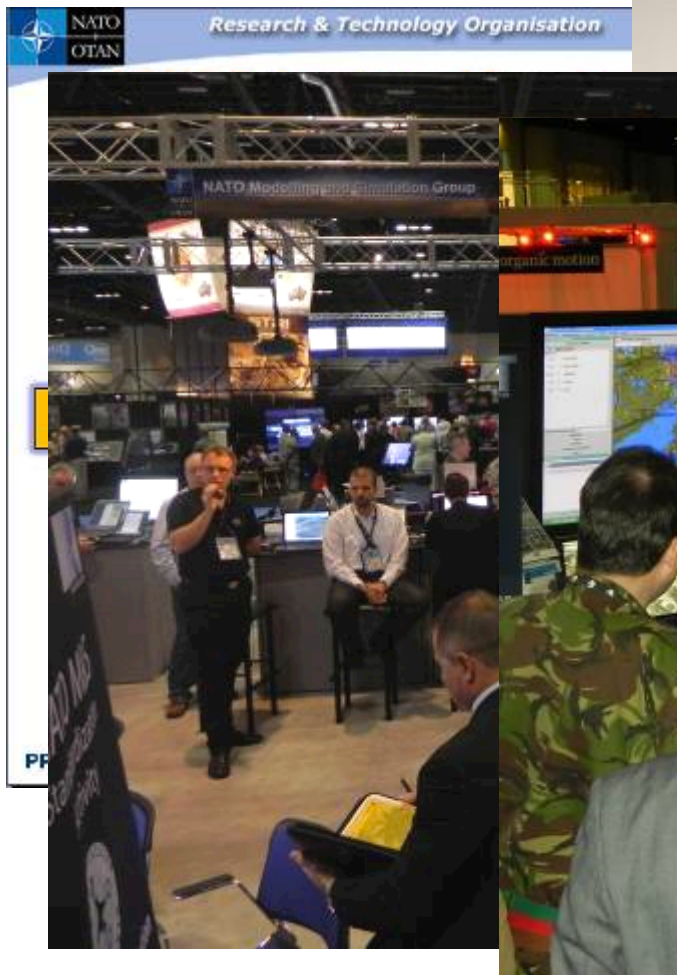


Eurofighter  
Typhoon simulator,  
Munich



**“Common Technical Framework”**

# NATO MSG-068 and MSG-106 Simulation Reference Architecture



Thursday, February 03, 2011

NATO OTAN NORTH ATLANTIC TREATY ORGANIZATION ALLIED COMMAND TRANSFORMATION

Home Organization Events Calendar Multimedia Search

## Viper 51 Meets Rattlesnake 4 In The Virtual World

"Viper 51 this is Rattlesnake 4, let me know when you clear the IP (Initial Point) for your run".  
"Roger, Rattlesnake 4".

The pilot of Viper 51 was flying his F-16 at 300 knots just 200 feet off the ground with six 500-pound MK-82 high-drag bombs under his wings.

At this speed and altitude the trees blur into one green mass as he scans the terrain.

"Cleared IP." The Forward Air Controller (FAC) has only seconds to visually acquire the aircraft. One moment it will be a dot on the horizon and the next it will flash overhead.

Rattlesnake 4 has been a FAC for years and has many combat missions in ISAF. He takes one last look at the terrorist vehicles, checking also with the ROVER UAV feed to make sure they have not moved, and that there are not any non-combatants near.

"Tip up", calls Viper 51. The F-16 begins a pull up manoeuvre to gain altitude. As he levels out, he sees the targets as his aiming dot on his heads-up display creeps across the ground toward the vehicles.

"Rattlesnake 4, tally target"  
"Viper 51, cleared hot."

Viper 51 barely gets his clearance to drop before leaving the target area. He drops the bombs as he pulls a high G turn to escape the weapon's fragmentation envelope. The explosion destroys all three vehicles; a successful high-threat low altitude target engagement.

This event did not occur in some far off land on a battlefield between two unnamed mountains. Instead, it took place all around Europe. The UAV pilot was located in Great Britain's Defence Science and Technology Laboratory. The Dutch pilot was flying his F-16 on a desktop simulator at TNO in The Hague, The Netherlands. The FAC was conducting his mission at NATO's Joint Force Training Centre, Bydgoszcz, Poland, wearing a virtual reality helmet. All of them were wrapped in a virtual environment created by the NATO Live, Virtual and Constructive simulation infrastructure, ACT, NC3A, The Netherlands and Great Britain put together this experiment hosted in part by JFTC.

Some comments from the forward air controllers, after the event, included, "doing simulated exercises before the initial live run is critical for making these more productive and for decreasing the number of failed runs". And, "practice of procedures with pilots of the different nations is essential for being ready for real operations. For example, it is critical to deal with different accents or..."

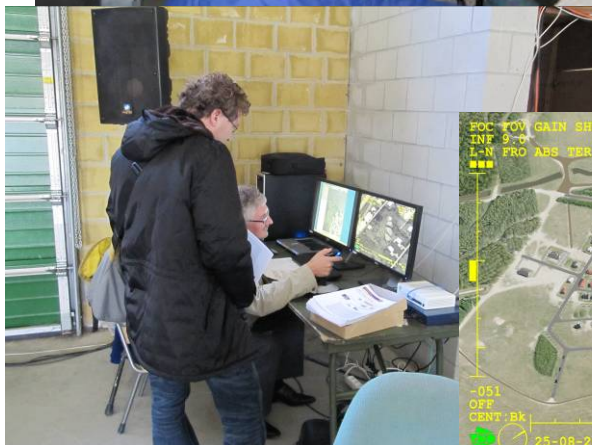
"I think this is a huge step forward to improve the Fratricide Prevention Integrated Program (FPIP) deployment and mission rehearsal preparation..."

er, David James, is crucial for pre-

***"Comprehensive Expertise"***



# UCATT – NMSG demo impressions



**“Common Technical Framework”**

# NMSG Impact: C2-Sim MSG-048 en MSG-085 demo impressions

SCIENCE AND TECHNOLOGY ORGANIZATION  
COLLABORATION SUPPORT OFFICE

Office of the Director

CSO/DIR(2013)011 10 April 2013

Mr Lionel KHIMECHE  
DGA/D/ESAIS  
16BIS avenue Prieur de la Côte d'Or  
94114 Arcueil Cedex  
FRANCE

Dear Mr Khimeche,

Further to my telephone call to the Modelling and Simulation Group Chair, it gives me great pleasure to officially confirm to you that during the Executive Session of the Science and Technology Board Meeting on Thursday 21 March 2013 your team, MSG-048 "Coalition Battle Management Language, C-BML" was selected to receive the STO 2013 Scientific Achievement Award. This Award recognizes exceptional effort in significant STO activities, excellence and originality in the scientific and technical content therein, outstanding results in terms of military benefit and, since it was about a team award, quality and degree of collaboration.

I am extremely pleased that your team has been chosen for this honour and, on behalf of the STB Chairman and all Board Members, I would like to extend to you and all of your team, my warmest congratulations. You and your team can be very proud of your accomplishments and significant contribution to the Alliance.

My office will keep you informed of the detailed plans and arrangements for the Fall 2013 Meeting as they develop.

Sincerely,

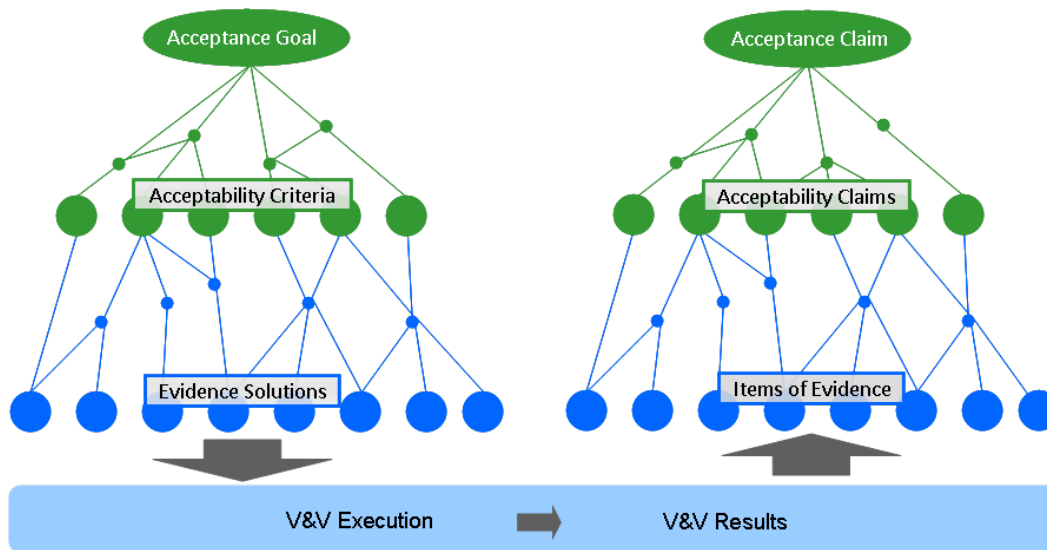
Mr René LaRose  
S&T CSO Director

BP 25 - F-92201 Neuilly-sur-Seine Cedex - France  
Tel: +33 (0)1 55 61 22 00 - Fax: +33 (0)1 55 61 22 99 - E-Mail: mailbox@eso.nato.int

**"M&S Guidelines and Policy"**

# NMSG Impact: Validation of Simulations (GM-VV)

- › NMSG Leads development of international GM-VV standard



SISO-PN-001-2012

**SISO** Simulation Interoperability Standards Organization  
www.sisostds.org

**SISO-PN-001-2012**

Product Nomination for  
Generic Methodology for  
Verification and Validation and  
Acceptance of Models,  
Simulations, and Data  
Product Development Group  
(GM-VV PDG)

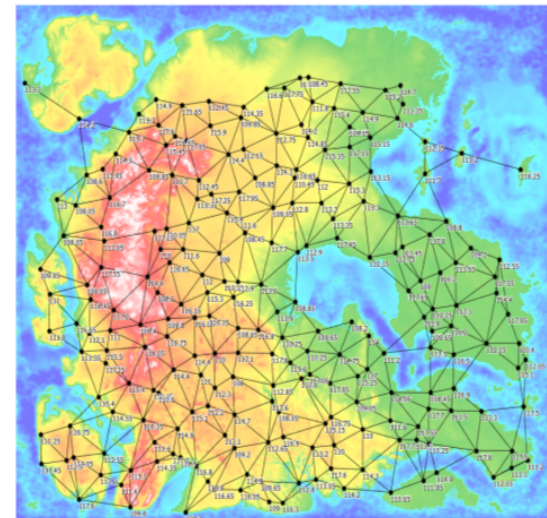
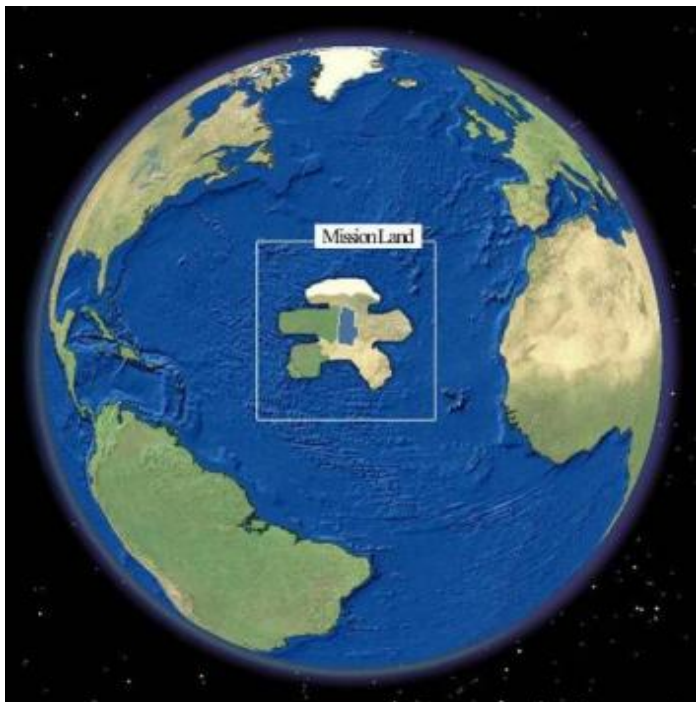
Version 1.0

09 January 2012

***“M&S Guidelines and Policy”***

## MSG-071 Missionland: Geo-typical Virtual Environment

- Missionland dataset
- Multi-Spectral
- Open Source

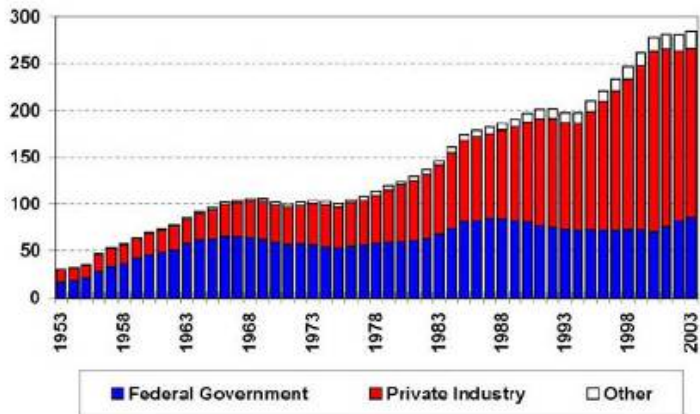


***”M&S Common Services”***

# MSG-114 RWS “Commercial Technologies and Games for Use in NATO” (12<sup>th</sup>)

- Increasing percentage of technology development originates in private sector
- Defence **must be** Smart Specifier, Buyer and Developer

U.S. R&D Funding by Source, 1953-2003  
expenditures in billions of constant 2003 dollars



Source: NSF, Division of Science Resources Statistics. (Data for 2002 and 2003 are preliminary.)  
FEB. '04 © 2004 AAAS



**“M&S Technological Advances”**

## MSG-121 RWS “M&S Support for Cyber Defence”

11 Apr 2013, San Diego, USA

- **The rapidly evolving environment of Cyber threats against the Alliance has necessitated a renewed focus on the development of Cyber Defence policy and capabilities.**

*(NATO 2020: New strategic Concept for NATO)*

- **M&S topics**
  - Representation of cyber attacks
  - Modelling Impacts of attacks
  - Cyber awareness education methods
  - Cyber training and simulation capabilities

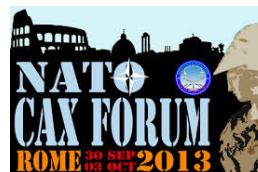


**“M&S Common Framework”**

# NMSG Participation in International M&S Related Events ITEC / IITSEC / SISO / CAX Forum



Networking with the International M&S Community  
Multiple NMSG Events (WS, TG, ET)  
Source of Ideas for New Activities  
Standards Development





NORTH ATLANTIC TREATY ORGANIZATION  
SCIENCE AND TECHNOLOGY ORGANIZATION



# Summary



# M&S Today



## A Critical Technology

## M&S Today

- Since 1990, M&S has become known not simply as an “enabling technology” but as a fundamental discipline;
- In 2005 the U.S. House of Representatives established the M&S Caucus and in 2007 they declared **M&S a "National Critical Technology"**.

**Mid ' 90s – NATO recognized the importance of M&S in support to operations**

## M&S Today

- **NATO's Connected Forces Initiative:**  
“Connected, Effective, Efficient and Affordable Education System of the Highest Quality”
- **NMSG has the Expertise and Trackrecord needed for realizing the CFI ambition of NATO and Nations.**

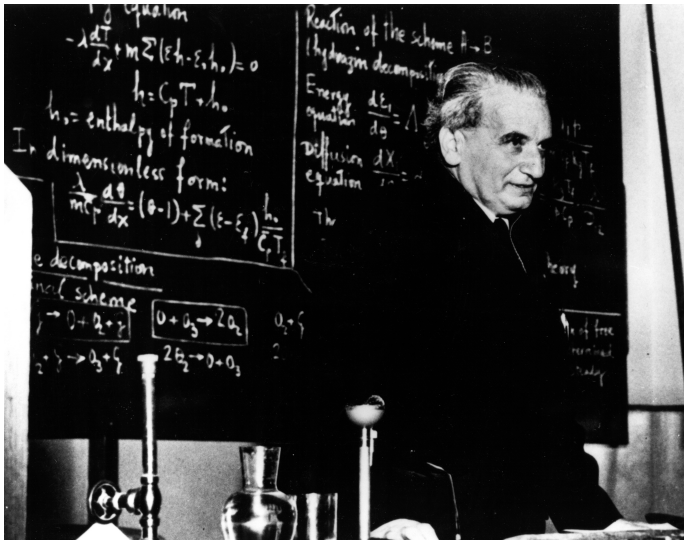


## Conclusions

- **M&S is critically important for NATO's Current and Future Operations**
- **NMSG's activities are fundamental to exploit NATO's M&S potential for the benefit of the Alliance and its Nations**

***Modelling and Simulation contributes to saving lives, saving time and money and preparing the war fighter better, faster and cheaper***

# Thank you for your attention!



*“Scientific results cannot be used efficiently by soldiers who have no understanding of them, and scientists cannot produce results useful for warfare without an understanding of the operations.”*

***Theodore von Kármán (1881-1963)***

## More Information: the STO's website

General Info

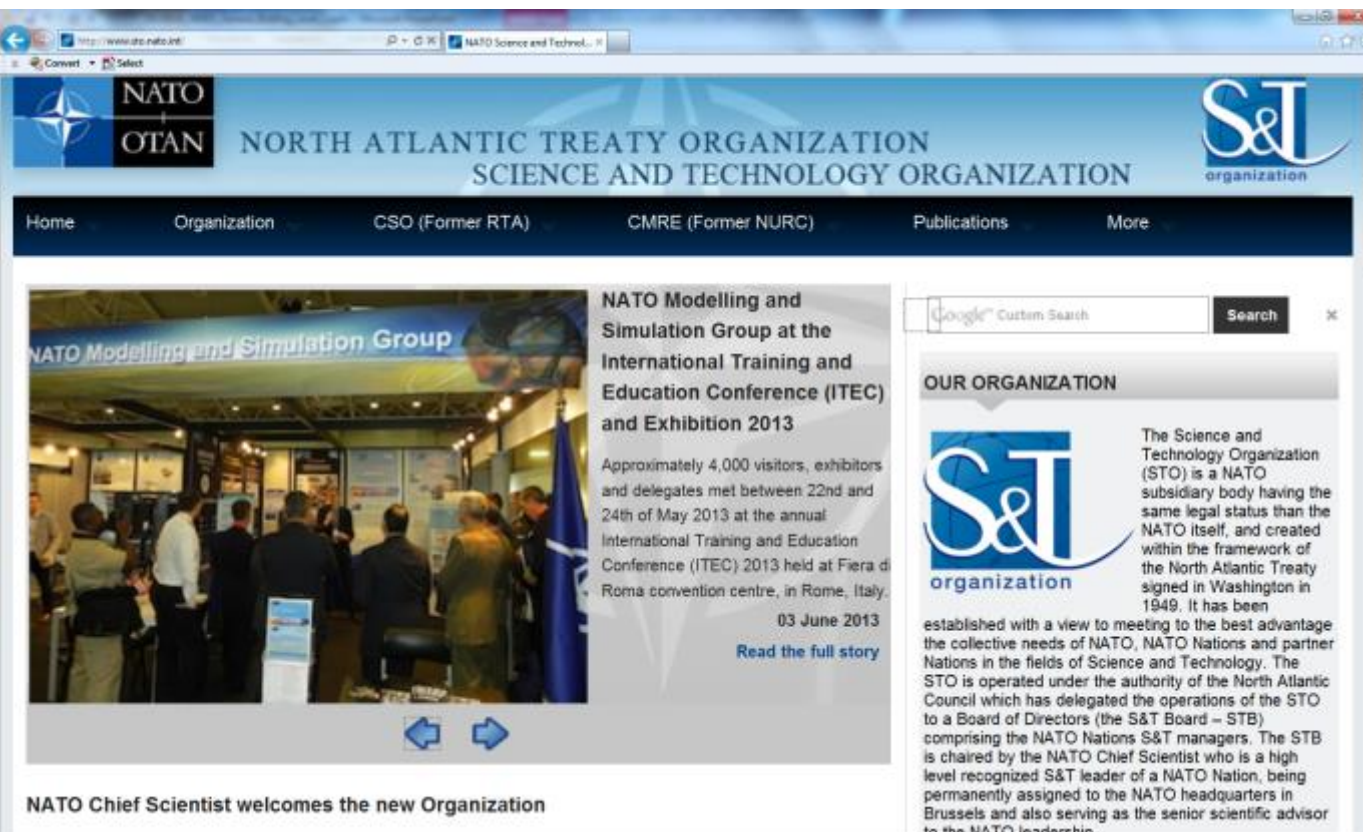
Search Scientific Reports

MyRTO Sharepoint Portal

Social Networks

STO Newsletter

STO Brochure



The screenshot shows the STO website interface. At the top, there is a navigation bar with links for Home, Organization, CSO (Former RTA), CMRE (Former NURC), Publications, and More. The main content area features a large image of a conference with the caption "NATO Chief Scientist welcomes the new Organization". To the right of the image is a news article titled "NATO Modelling and Simulation Group at the International Training and Education Conference (ITEC) and Exhibition 2013", dated 03 June 2013, with a "Read the full story" link. Below the image are navigation arrows. On the right side of the page, there is a "Google Custom Search" box and a section titled "OUR ORGANIZATION" which includes the S&T logo and a detailed description of the STO's role and history.

<http://www.sto.nato.int>