



# NATO - OTAN

**The Research & Technology  
Organisation (RTO)**

**The NATO Modelling & Simulation  
Group (NMSG)**

NATO  
|  
OTAN

*North Atlantic Treaty Organisation*

**Briefing to the MSG-079 Workshop  
Farnborough, UK, 24-25 Feb 2010**

**Prepared by NATO M&S Coordinaton Office (MSCO)  
Speaker: Adrian Voiculet, MSCO Technical Officer**

## Report Documentation Page

*Form Approved*  
*OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE <b>FEB 2010</b>	2. REPORT TYPE <b>N/A</b>	3. DATES COVERED <b>-</b>	
4. TITLE AND SUBTITLE <b>The Research &amp; Technology Organisation (RTO) and The NATO Modelling &amp; Simulation Group (NMSG)</b>		5a. CONTRACT NUMBER	
		5b. GRANT NUMBER	
		5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)		5d. PROJECT NUMBER	
		5e. TASK NUMBER	
		5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>NATO M&amp;S Coordinaton Office (MSCO)</b>		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)	
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release, distribution unlimited</b>			
13. SUPPLEMENTARY NOTES <b>See also ADA564685. 2010 Coalition Battle Management Language Workshop (Atelier 2010 sur le langage de gestion du champ de bataille pour les operations en coalition). RTO-MP-MSG-079</b>			
14. ABSTRACT			
15. SUBJECT TERMS			
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>SAR</b>
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>	
19a. NAME OF RESPONSIBLE PERSON			



# Content

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NATO  
+  
OTAN



Securing our Future  
1949 - 2009  
Garantir l'avenir de notre sécurité

60th Anniversary  
North Atlantic Treaty Organization

# North Atlantic Treaty Organization



**28 Member Nations**

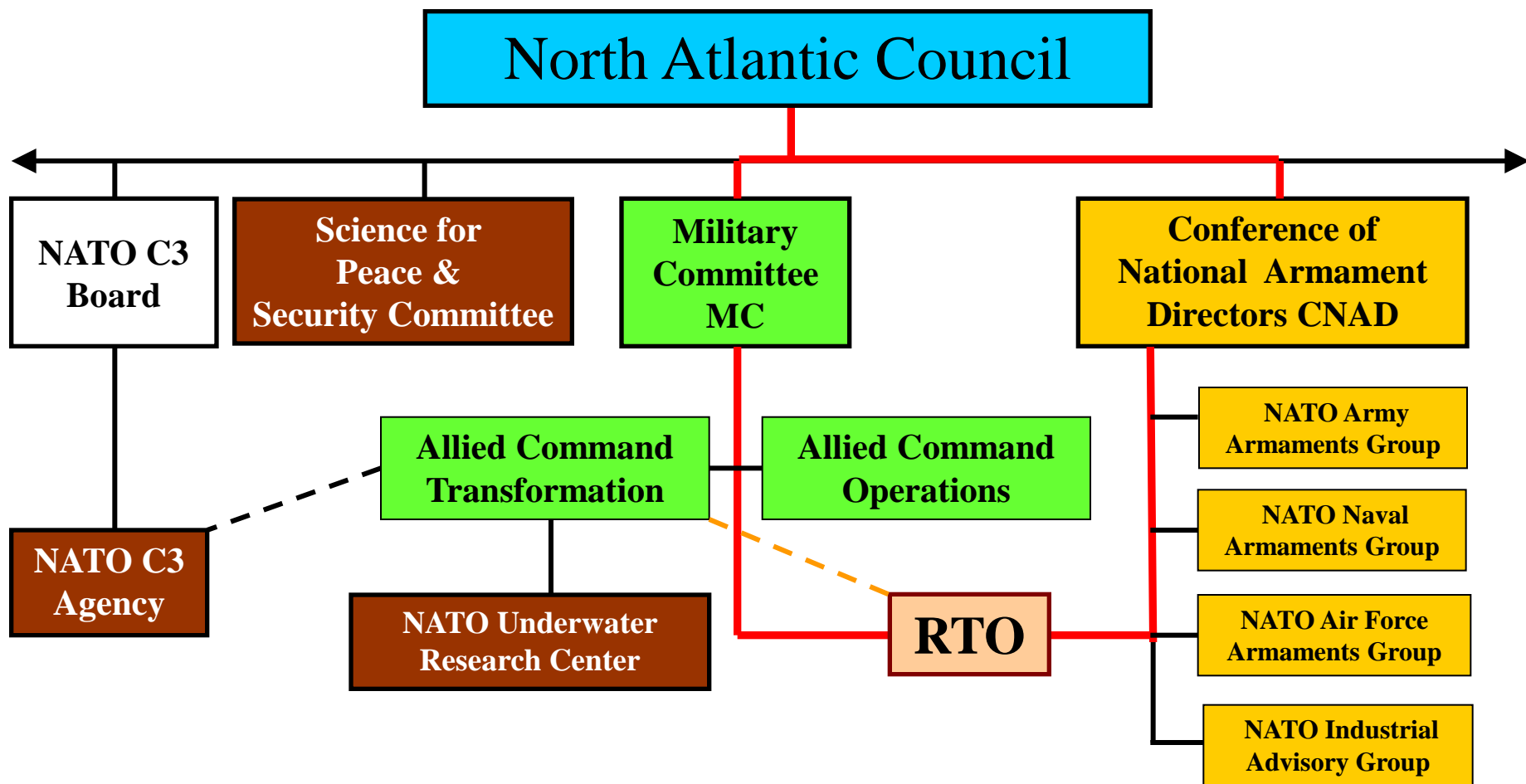


# The Research & Technology Organization

- NATO Body funded 1<sup>st</sup> Jan 1998
- Unique forum for Technological Exchange
- Leader in NATO R&T
- Considered as a force multiplier in NATO
- Young organization but still in evolutionary phase: need to adapt to new NATO
- Many challenges ahead
- Includes RTB, RTA, Panels, NMSG ....



# The Place of the RTO in NATO





## The RTO Mission

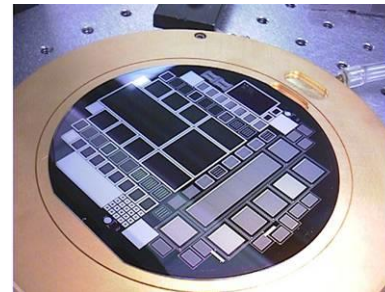
To conduct and promote **co-operative research and information exchange** within NATO and with its “Partners”.





# The RTO Objectives

- To support the development and effective use of national defence R&T and thus to maintain a **technological lead** within the Alliance,



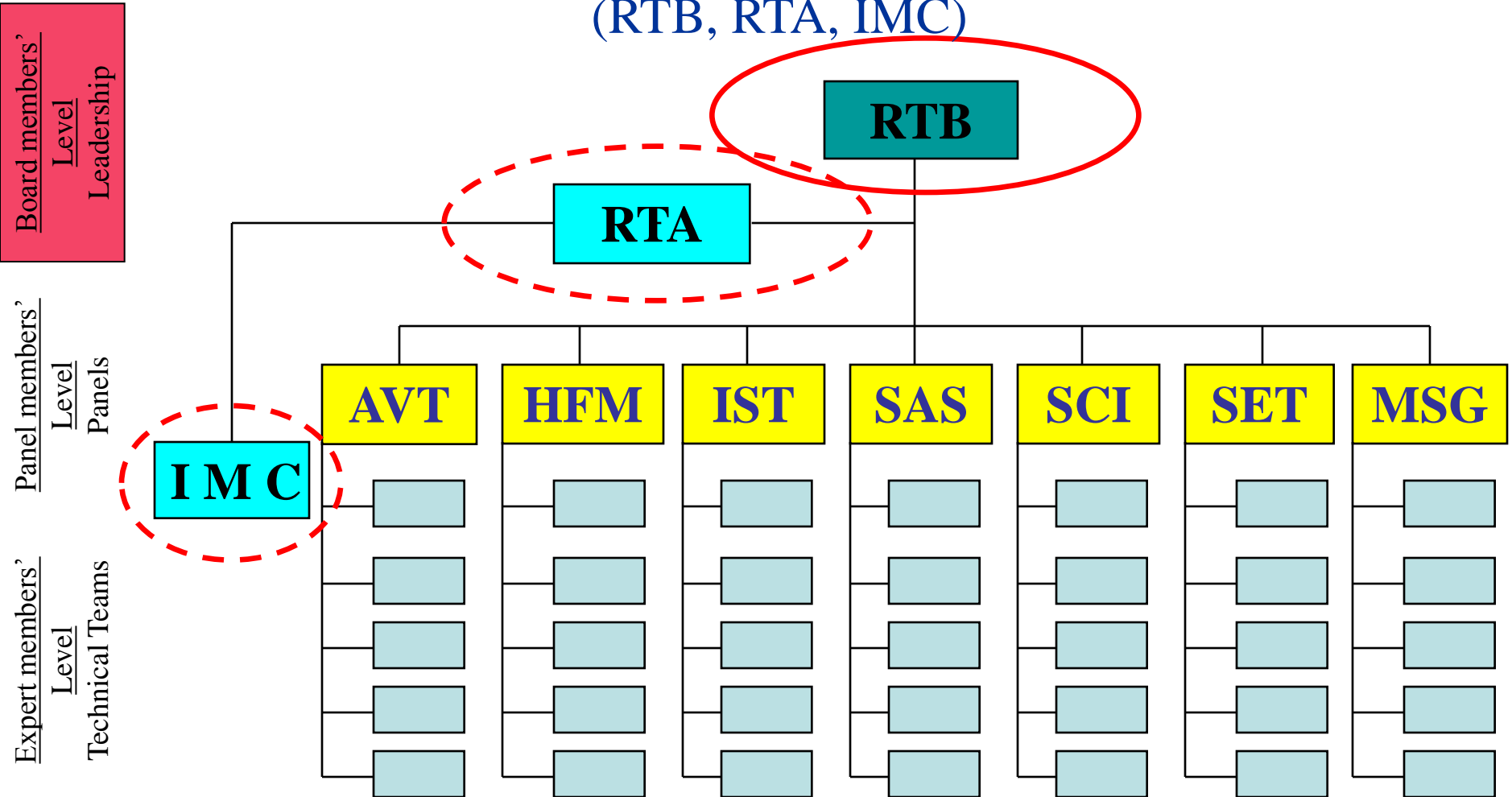
- To meet the **military needs** of the Alliance,

- To provide **advice** to NATO and national decision makers.





# RTO: 1<sup>st</sup> Level (RTB, RTA, IMC)





## RTO 1<sup>st</sup> Level: Decision body RTB

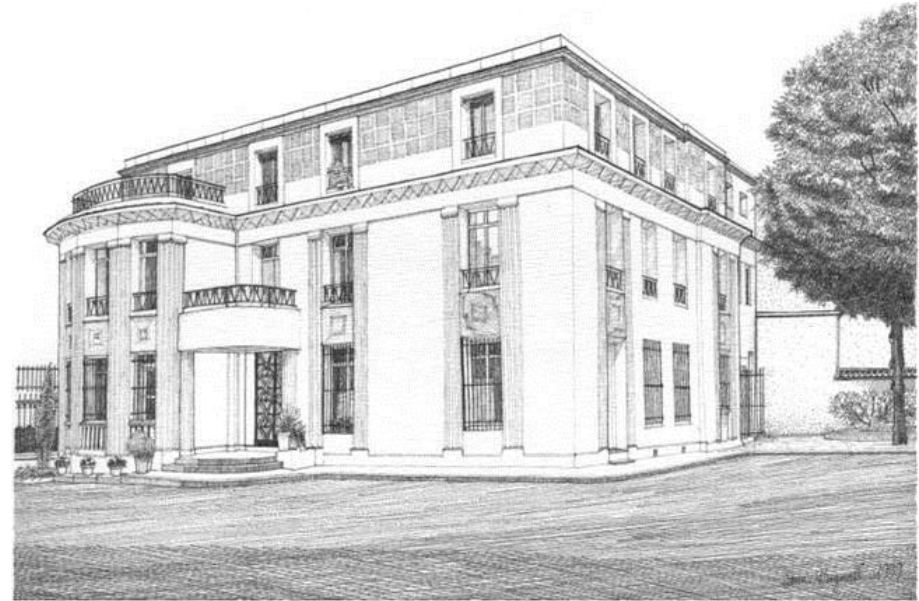
- A Research & Technology Board (**RTB**)
  - Decision on RTO policy
- Supported by an Agency (**RTA**)
  - Permanent Support
- Which is supported by the IMC

Information Management Committee



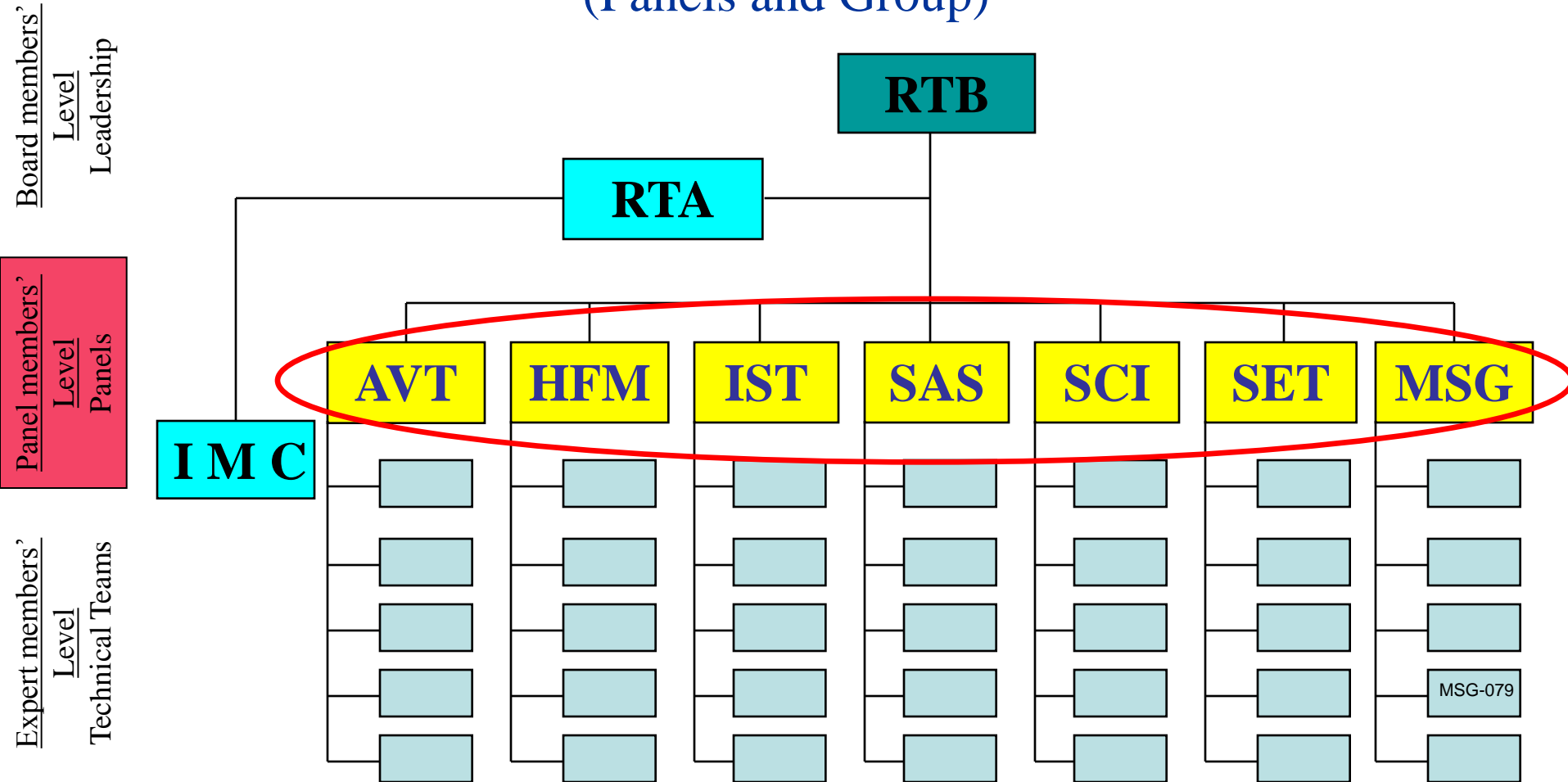
# RTA: The Research & Technology Agency

- RTA is the permanent structure for the RTO
- Unique mix of NATO Civilians (39) and IMPs/VNCs (14)
- Located in Paris,  
small group in NATO HQ
- Provide administrative support to the RTB, Panels, NMSG and to the scientific RTO community.





# RTO: 2<sup>nd</sup> Level (Panels and Group)





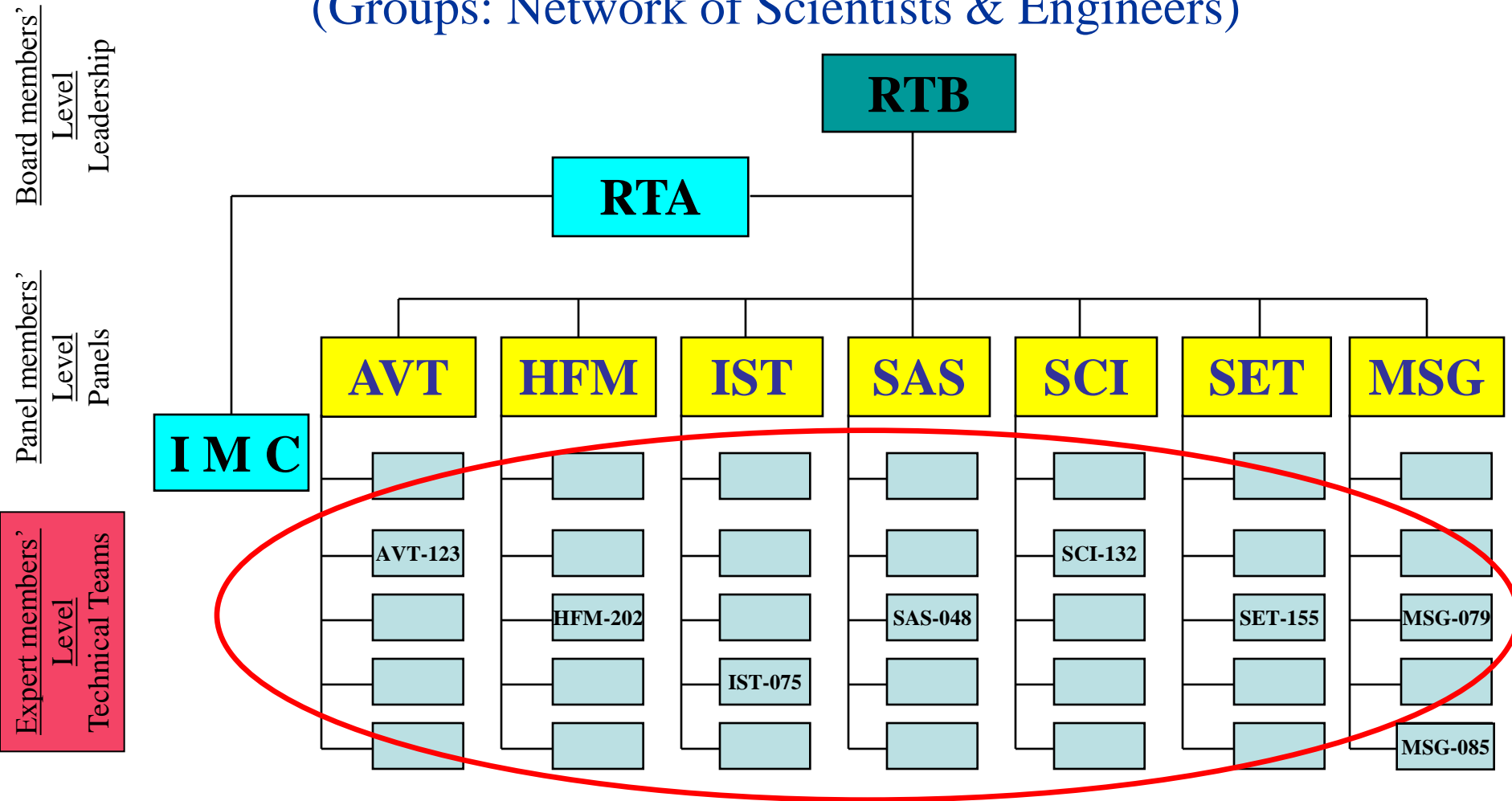
## RTO 2<sup>nd</sup> Level: Support Body (Panels & Group)

- **AVT**      **Applied Vehicle Technology Panel**
- **HFM**      **Human Factors and Medicine Panel**
- **IST**      **Information Systems Technology Panel**
- **SAS**      **System Analysis & Studies Panel**
- **SCI**      **Systems Concepts & Integration Panel**
- **SET**      **Sensors & Electronics Technology Panel**
- **MSG**      **Modelling and Simulation Group**



# RTO: 3<sup>rd</sup> Level

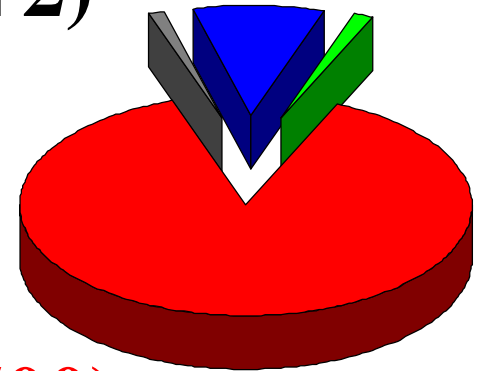
(Groups: Network of Scientists & Engineers)





## The RTO Network

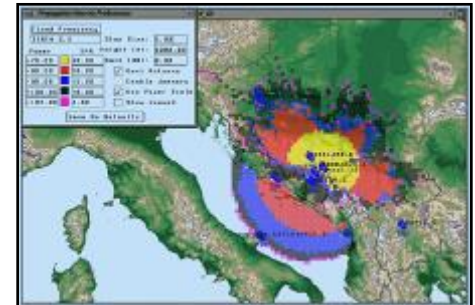
- **RTB Board Members (54)**
- **RTA Headquarters Staff (51+2)**
- **Panel/Group Members (344)**
- **Scientists/Engineers - (est. 3500)**





# The NMSG Mission

To promote co-operation among Alliance bodies, NATO member nations and Partner nations to maximise the effective utilisation of M&S.





# NMSG Leadership



**NMSG Chairman: Mr. Rob SMITH (GBR)**  
**Head of Weapon System Simulation & Experimentation**  
**MBDA**

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**Senior Advisor, MSc.**

**DNK Ministry Of Defence**

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**E/M : [voiculeta@rta.nato.int](mailto:voiculeta@rta.nato.int)**



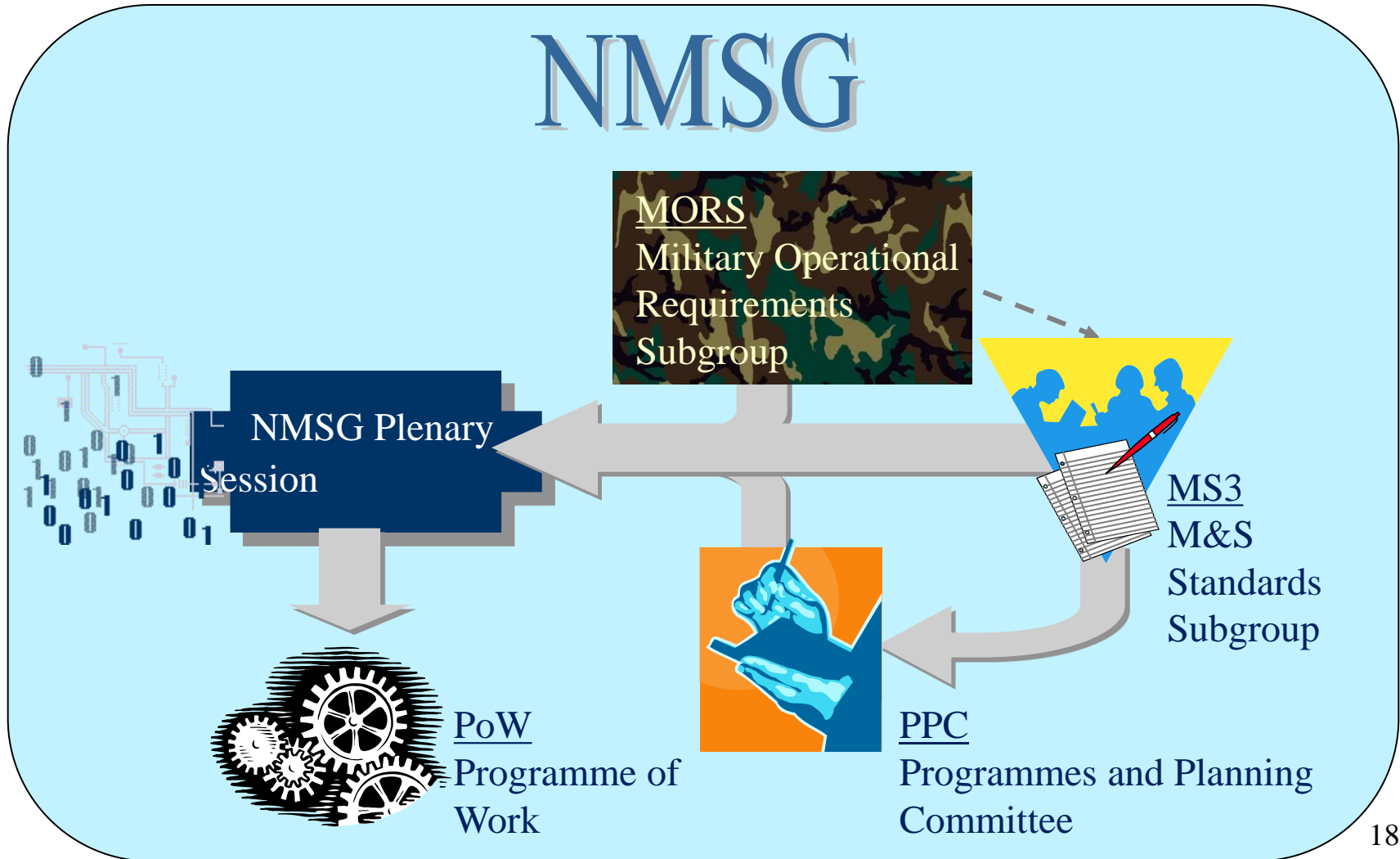
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**Tel : (+33) 1 55 61 22 94 Fax : (+33) 1 55 61 96 19**

**E/M : [ganzi@rta.nato.int](mailto:ganzi@rta.nato.int)**



# NMSG Structure: MORs, PPC & MS3





## NMSG - Membership

- Main nations are represented by both
  - Technical M&S Experts (from M&S **national offices**) generally responsible for M&S policy and development in their nation,
  - Military Officers (mainly interested in M&S **application** to support military activities).
- NMSG fully open to PfP nations and recently opened to Australia. MD under discussion.
- NMSG - the best opportunity for dialogue with nations!!
  - MORS: Military/Civilian Personnel from MoD
  - MS3: Technical Experts in Standards Mil./Gov./Acad.
  - PPC: Technical Experts in M&S from M&S, OR Offices
  - PLENARY: National reps with decision authority.



**NMSG Chairman:** Rob SMITH (GBR), **Vice-Chair:** Niels KRARUP-HANSEN (DNK)  
**MSCO Head:** Juan J. RUIZ (ESP), **Deputy Head:** Vacant, **Chief Scientist:** Vacant,  
**Tech. Officer:** Adrian VOICULET (ROU), **Assistant:** Ms Illeana GANZ (USA)

### NATO:

- |            |  |                   |  |                  |  |
|------------|--|-------------------|--|------------------|--|
| - Belgium  |  | - Greece          |  | - Spain          |  |
| - Bulgaria |  | - Italy           |  | - Slovakia       |  |
| - Canada   |  | - Hungary         |  | - Slovenia       |  |
| - Czech R. |  | - The Netherlands |  | - Turkey         |  |
| - Denmark  |  | - Norway          |  | - United States  |  |
| - Estonia  |  | - Poland          |  | - United Kingdom |  |
| - France   |  | - Portugal        |  |                  |  |
| - Germany  |  | - Romania         |  |                  |  |

### Partners for Peace:

- |           |  |           |  |              |  |               |  |
|-----------|--|-----------|--|--------------|--|---------------|--|
| - Belarus |  | - Georgia |  | - Moldova    |  | - FYROM       |  |
| - Finland |  | - Sweden  |  | - Uzbekistan |  | - Switzerland |  |

### Contact Nations:

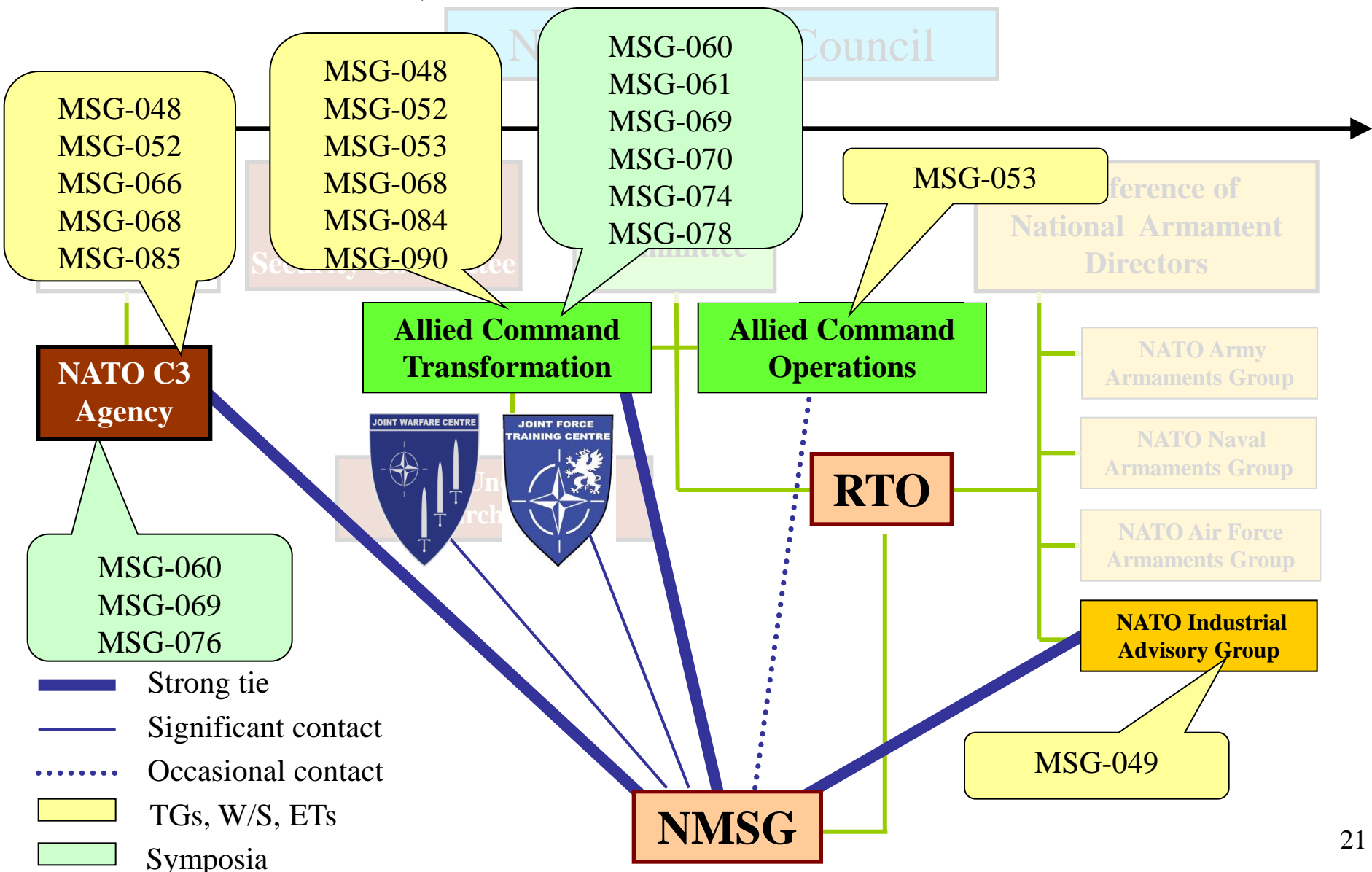
- |             |  |
|-------------|--|
| - Australia |  |
|-------------|--|

### Ex-Officio:





# NMSG PoW, Involvement with NATO S&T





## The RTO Panels and Group

- R&T: Research
- S&T: Science
- R&D: Research
- New Technologies
- Low TRL scales
- Pure Sciences
- PoW driven by LTCR, DAT, ...

VS

- Technology
- Technology
- Development
- Applications
- High TRL scales
- Applied Sciences
- PoW driven by M&S MP objectives, LTCR, DAT, ...
- MSCO Should Provide Expertise (Chief Scientist)
- STANDARDS Activity

Scientists

Engineers



# NMSG PoW

Source: Nations  
Benefit: Nations

Natural Process

– Driven by Nation needs.

- MORS 15%
- PPC 85%

Total 80%

Bottom-Up



Source: NATO  
Benefit:

– NATO & NATIONS

Forced Process, driven by:

- LTCR, DAT, PSA
- NATO HP

Noticeable examples:

- MSG-068
- NATO M&S MP Update

Total 20%

Top-Down



# NMSG Terms of Reference

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

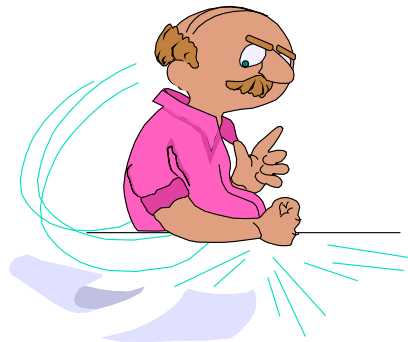
Primary mission areas include: **M&S** standardisation, education, and associated Science and Technology. The Group will provide **M&S** expertise in support of the tasks and projects within the RTO and from other NATO organisations.

The activities of the Group are **guided** by the RTO Rolling Plan and **governed** by the NMSG Strategy and Business Plan.

# M&S $\neq$ Interest for NMSG

- **MODELLING:**

Action of creating a physical, mathematical, logical etc. representation of a system, entity, phenomenon, or process.



- **SIMULATION:**

A method for implementing a model over time.

- **COMMON MISTAKE:**

Not all M&S activities that fit the definitions are of interest to the NMSG, most of them are NOT!

RTO Panels work on a daily basis with M&S, they (sometimes) do not know and we (sometimes) do not care.



## NMSG Areas of Interest

There are 2 keywords to understand the PoW of the NMSG:

1 Interoperability

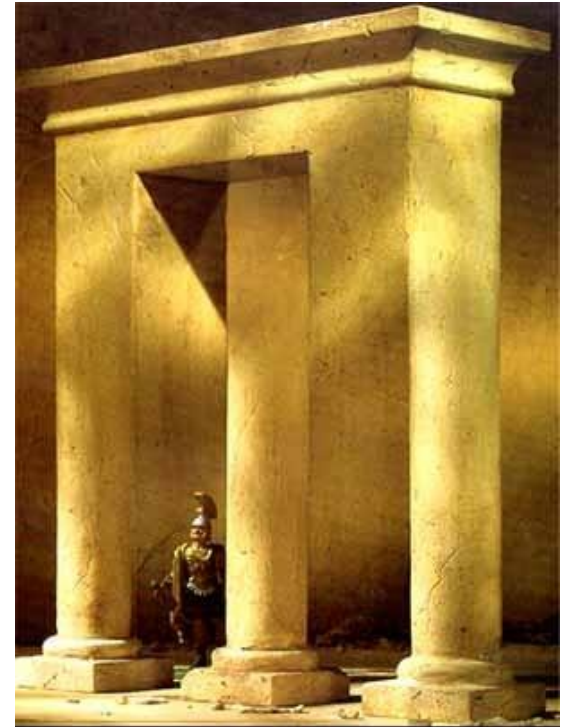
2 Reuse

There are 3 areas of interest in M&S for the NMSG:

1 M&S under a Federation Enabled Concept

2 M&S applied to Distributed Education & Training

3 M&S STANDARDS





# M&S Master Plan Objectives

**Objective      Objective      Objective      Objective      Objective**

**1**

**2**

**3**

**4**

**5**

Establish a  
Common  
Technical  
Framework

Provide  
Common  
Services in  
NATO M&S

Develop  
Simulations

Employ  
Simulations

Incorporate  
Technological  
Advances

**NMSG**

**NC3A, nations & industry**

**NATO Training Centers (JJJ) & NC3A**



# M&S Master Plan Sub-Objectives

**1**

**Establish a  
Common  
Technical  
Framework**

**2**

**Provide  
Common  
Services in  
NATO M&S**

**3**

**Develop  
Simulations**

**4**

**Employ  
Simulations**

**5**

**Incorporate  
Technological  
Advances**

**1.1 Adopt HLA  
1.2 Establish  
data  
interchange  
standards**

**2.1 Compile M&S  
information  
2.2 Provide M&S  
education  
2.3 Establish a  
Simulation  
Resource  
Library  
2.4 Establish a  
helpdesk**

**3.1 Identify &  
prioritize  
requirements  
3.2 Identify  
strategies  
3.3 Allocate  
resources  
3.4 Execute  
strategy  
3.5 Provide  
feedback**

**4.1 Plan  
employment  
4.2 Provide  
resources  
4.3 Provide  
databases  
4.4 Operate  
simulations  
4.5 Conduct  
Impact  
Assessment**

**5.1 Monitor  
M&S-  
related  
advances  
5.2 Conduct  
R & D  
5.3 Share  
information  
5.4 Implement  
advances**



# M&S Application Areas



Acquisition

Education and Training

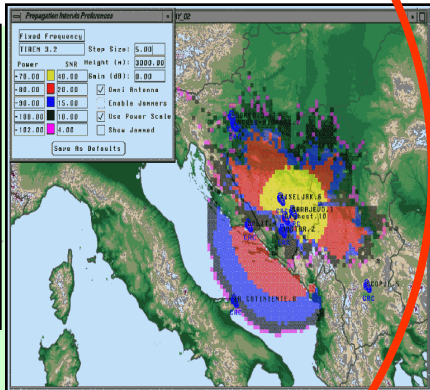
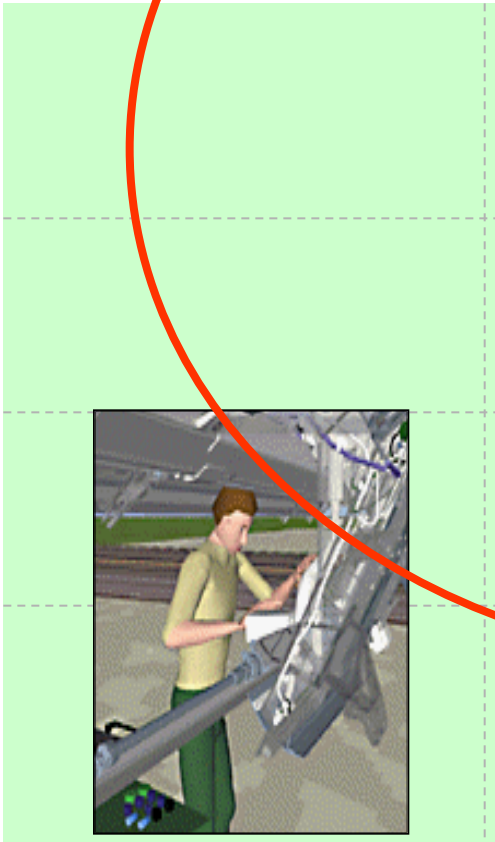
Planning and Analysis

Strategic

Operational

Tactical

Systems





# Classification of the NMSG Activities

- Standards Related - 30%
- Best practice (Info exchange) - 40%
- Applications/Experimentation - 30%



# NMSG Activities

- Working groups (**Task Groups** / **Exploratory Teams**)
  - **Minimum of 4 nations** / **Not required**
  - **3 years** / **1 year**
  - **Final Report** / **Report, TAPs**
- Organising **Conferences, Workshops, Lecture Series, Seminars, Specialists Teams ...**
  - NMSG Annual Conference 2009 Brussels, 2010 Utrecht
- Participating to M&S related events
  - ITEC, I/ITSEC
  - SISO International Workshops
  - National M&S Conferences (IberSIM 09, USMOS 09) ...



# NATO - OTAN

## **NMSG: Examples of Technical Activities**

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*North Atlantic Treaty Organisation*





# MSG-048 / MSG-085

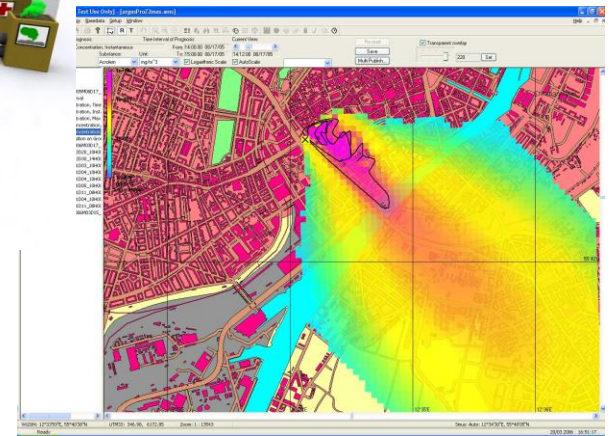
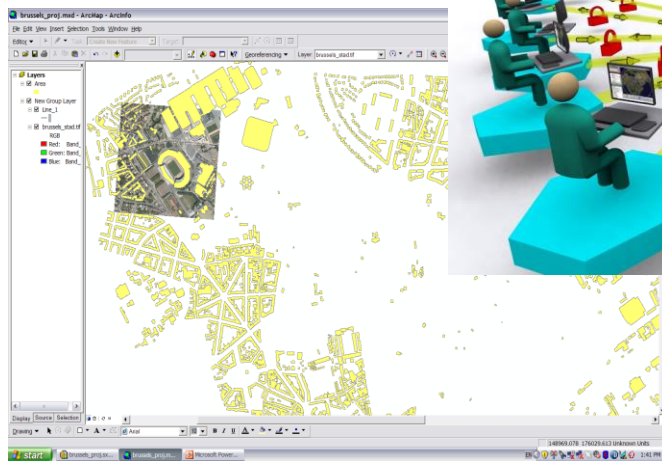
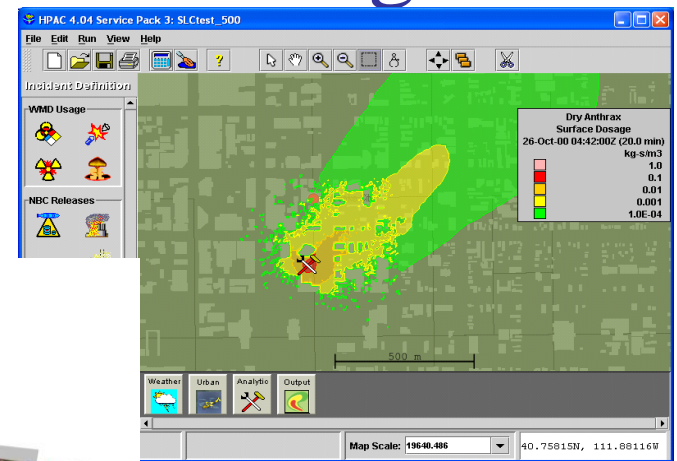
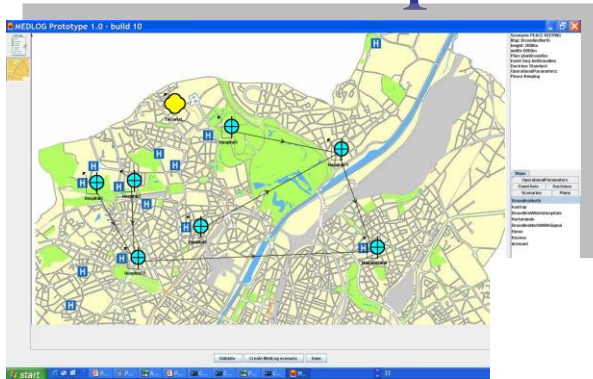
## Coalition Battle Management Language

# C-BML



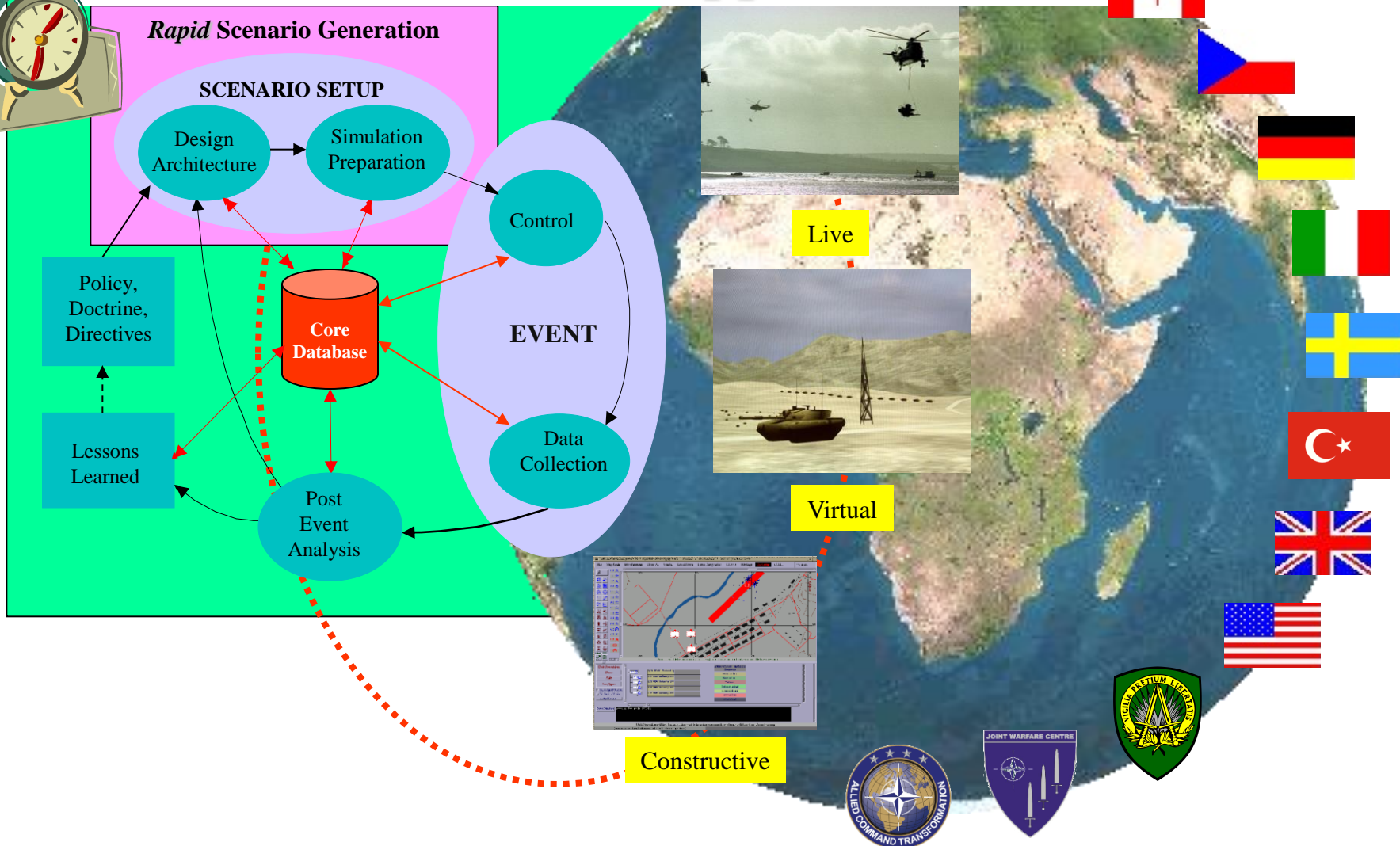


# MSG-049: M&S System for Emergency Response Planning and Training



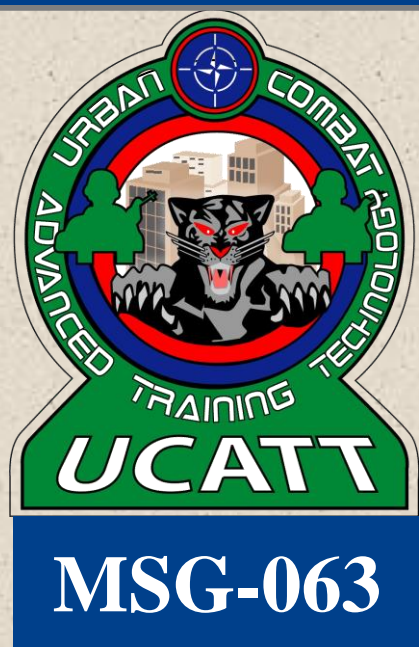


# MSG 053 – Rapid Scenario Generation for Simulation Applications





## URBAN COMBAT ADVANCED TRAINING TECHNOLOGY 2





MSG-068

# NATO Training Federation (NTF)





# MSG-069

## NMSG M&S Conference



**RMA, Brussels**  
Week of 15-16 October 09



# MSG-076

## NMSG M&S Conference 2010

*Blending LVC Simulation to Better Support Training & Experimentation*

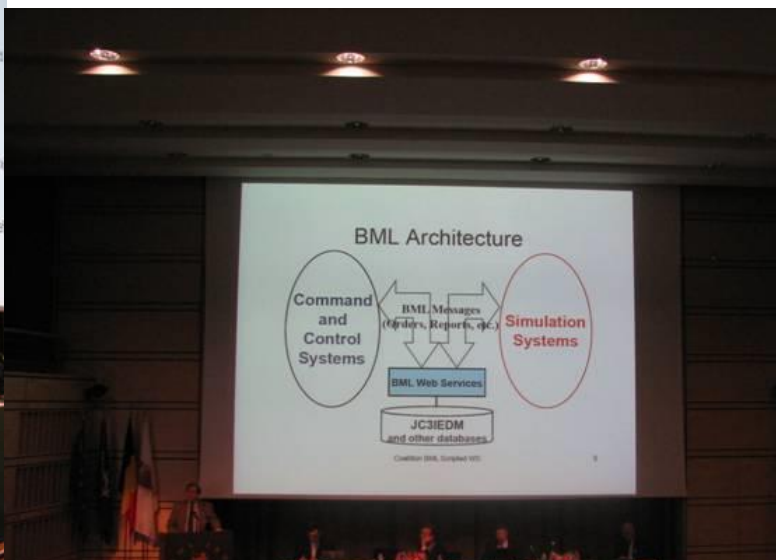


**Call for Papers – [www.rto.nato.int](http://www.rto.nato.int)**  
**Deadline for abstracts 30 May 2010**

**Utrecht, The Netherlands**  
**Conference Centre in Soesterberg**  
**16 and 17 September 2010**



# C-BML presence in the NMSG Events





# OTAN - NATO

**NMSG: MS3**

**M&S Standardisation in NATO**

NATO  
|  
OTAN

*North Atlantic Treaty Organisation*





## NMSG M&S Standards Activity:

- With the disbandment of NATO Army Armaments Group and Land Group 8 in Apr 03.
  - NMSG was officially named as the Delegated Tasking Authority for NATO M&S standards by CNAD in 2003

Thank you for your letter of 8 August requesting the delegation of authority to the Research and Technology Board's NATO Modelling and Simulation Group (NMSG) for the development, production and maintenance of NATO Standardization Agreements (STANAGs) and Allied Publications (APs).

The plan developed by the NATO Army Armaments Group (NAAG) for the closure of Land Group 8 on Simulation Interoperability for Joint Training and Operational Support proposed the transfer of that group's responsibility for fostering interoperability in the area of modelling and simulation to NMSG. This proposal was supported by the Conference of National Armaments Directors (CNAD). With responsibility must come authority, so as Chairman CNAD I fully support your request and would ask Director NATO Standardization Agency to note the delegation of this function, in accordance with Section 109 of reference, to NMSG.

To ensure good co-ordination between the efforts of NMSG and those of other CNAD bodies, I would ask that NMSG regularly brief those groups with an interest in this area on its activities, in particular the NAAG.

- NATO (RTO) Signed a TCA with SISO in 2007



# NMSG M&S Standards Activity:

- High Level Architecture (HLA) STANAG 4603; has been Promulgated by NSA 02 Jul 2008. Nations continue ratification in 2009
- Synthetic Environments Data Representation and Interchange Specification (SEDRIS) STANAGs 4662, 4663 & 4664; in ratification process right now.



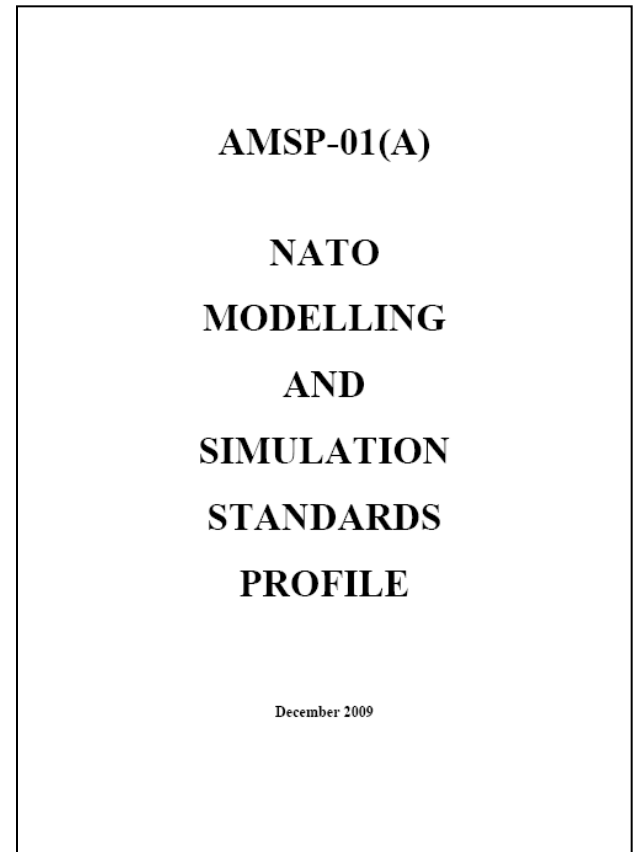
# M&S Standards Sub Group (MS3)

- First Allied Publication on Modelling & Simulation AMSP-01: **NATO Modelling & Simulation Standards Profile.**

<http://www.nato.int/docu/stanag/amsp/AMSP-01.pdf>

Promulgated and published by the NATO Standardization Agency (NSA) in Dec 2009.

- The MS3 will host the HLA Certification Advisory Group, **CeAG** following completion of RTO TG MSG-050 – HLA WG.





# NATO - OTAN

**NMSG:  
NATO M&S Master Plan Update**

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# NATO M&S Master Plan

CNAD created SGMS in 1996 to:

Craft an Alliance approach to

achieve **Simulation**

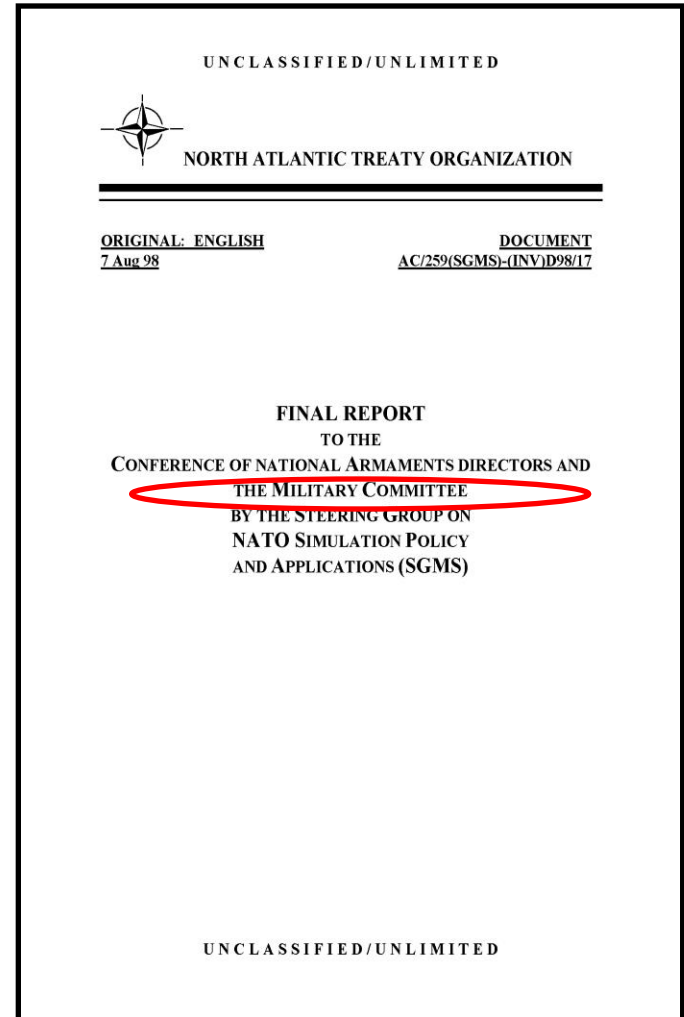
**Interoperability** and **Reuse**

Develop a preliminary **NATO M&S**  
**Master Plan**

Draft a roadmap to achieve  
prioritized NATO Simulated  
Environments

Recommend NATO Policies  
regarding M&S Management

Present a Final Report through the  
**RTB**, to **CNAD** and **MC**





# NATO M&S Master Plan

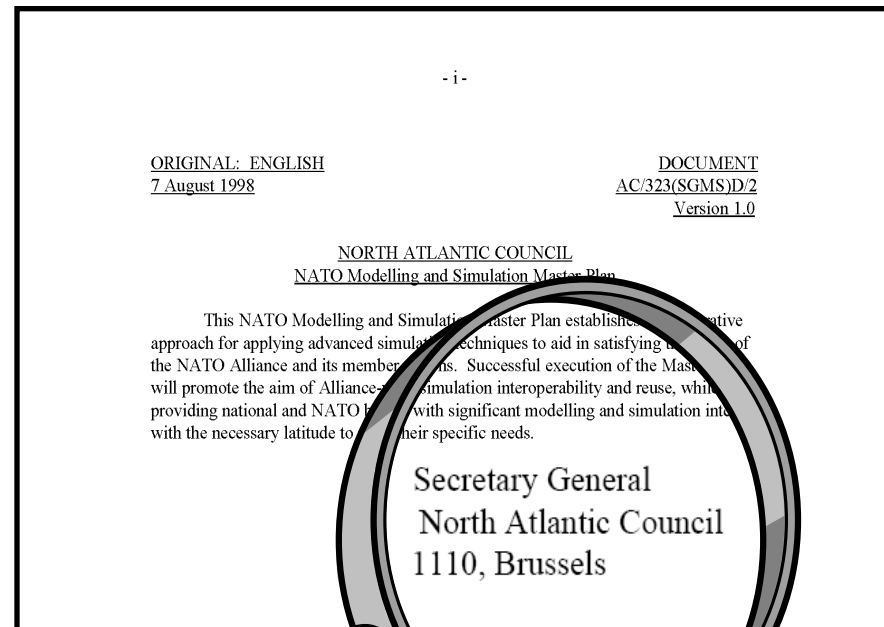
SGMS's Final Report consequences:

**NATO M&S Master Plan**

NATO Policy on M&S:

Creation of **NMSG**

Creation of **MSCO**



Approved by North Atlantic Council



# NATO M&S Master Plan



1998-9



Securing our Future  
... 1949 - 2009 ...  
Garantir l'avenir de notre sécurité

2009-10



Steering Group on Modelling & Simulation  
Final Report

*NATO Modelling & Simulation  
Master Plan*



Version 1.0

February 1999

**NATO and M&S have evolved since 1998!  
NMSG still guided by the NATO M&S MP**



# Changes in NATO since 1998 (I)

## New NATO Command & Force Structure:

ACO with Operational Responsibility

ACT with Transformation Responsibility, including  
partnership with USJFCOM

NATO Centers of Excellence

Changes in NC3A

New JWC

New JTFC

New JALLC



## Changes in NATO since 1998 (II)

NATO changed Policy:

Type of Operations, Humanitarian, DAT, Piracy ...

Relation with new Partners

New Requirements: High Readiness Forces

Rapid Reaction Corps

Rapid Deployable Forces

New player EUROCORPS

Low Readiness Forces

NATO Response Force

**In summary:**

**A whole spectrum of new Training Requirements ...**

## Changes in M&S since 1998

“The M&S market is in the middle of a disruptive transition from

Low-volume,  
High-priced simulations,  
Custom-made for each application

to a

High-volume,  
Low-priced market,  
Interoperable COTS, GOTS products.

This explosion of simulation deployment will have a similar effect to what the PC did to the mainframe or the GPS to the nautical chart or map.”

Warren Katz, Spring 2008 – EuroSATORY

... and new approaches to maximize the effective utilisation and co-ordination of M&S (NMSG Mission)

# Want to know more?: <http://www.rto.nato.int/>

**R&T Organisation**

- Home
- General Documentation
- RTO Activities
- RTO Future Events
- Search Scientific Publications
- National Distribution Centres

**R&T Coordination**

- Research & Technology Board
- National Coordinators
- Research & Technology Coordination Group

**Technical Panels**

- Applied Vehicle Technology
- Human Factors & Medicine
- Information Systems Technology
- System Analysis & Studies
- Systems Concepts & Integration
- Sensors & Electronics Technology

**Modelling & Simulation**

- NATO Modelling & Simulation Group

**Information Management**

- Information Management Committee

**Partners**

- Partner Nations

**The NATO Research & Technology Organisation**

The NATO Research and Technology Organisation (RTO) promotes and conducts co-operative scientific research and exchange of technical information amongst 28 NATO nations and 38 NATO partners. The largest such collaborative body in the world, the RTO encompasses over 3000 scientists and engineers addressing the complete scope of defence technologies and operational domains. This effort is supported by an executive agency, the Research and Technology Agency (RTA), that facilitates the collaboration by organising a wide range of studies, workshops, symposia, and other forums in which researchers can meet and exchange knowledge.

**Life Cycle Costing Spreading Throughout NATO**

It seems that nearly all national defence planners face a familiar problem: budgets for modernization are severely impacted by unanticipated expenditures necessary for training, maintenance, personnel and disposal costs associated with equipment currently in their inventory. While this is a common situation, it is manageable and often avoidable with the proper application of Life Cycle Costing (LCC) principles. What is Life Cycle Costing? Quite simply, it is the process of collecting, estimating and quantitatively analyzing cost data throughout the entire service life of a system, in order to produce a realistic projection of the "true" cost of procurement commitment.

In the fall of 2009, the System Analysis and Studies (SAS) Panel of the RTO published the "Code of Practice for Life Cycle Costing", a practical handbook designed to illustrate LCC methods and benefits to decision-makers involved with procurement choices. This work, produced by SAS-069, captured and synthesized ground-breaking work in this field from previous SAS studies and from the AC/327 Working Group 3.

It was recently announced that because of the importance of LCC, the NATO Defence Procurement Management Course has incorporated a review of LCC principles in its finance lesson, citing SAS-069's efforts. This course, given once a year in Ottobrunn, Germany, trains middle and senior level NATO managers in defence procurement, with an emphasis on cooperative international acquisition.

Now, in order to maximize the dissemination of the life cycle costing approach, the NATO Life Cycle Management Group, AC/327, is leading the incorporation of the Code's guidelines into an Allied Publication. This will complement the current NATO

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**ENROL FOR**

- AVT-181** (10/05/2010 to 11/05/2010 in Canada) - Lecture Series on "More Intelligent Gas Turbine Engines"
- AVT-176** (12/04/2010 to 15/04/2010 in Turkey) - Symposium on "Advances in Service Life Determination and Health Monitoring of Munitions"
- AVT-25TH PBM** (12/04/2010 to 16/04/2010 in Turkey) - Enrolment



# Questions





# OTAN - NATO

**The Research & Technology  
Organization (RTO).  
The NATO Modelling &  
Simulation Group (NMSG)**

NATO  
+  
OTAN

*North Atlantic Treaty Organisation*





# Back-up slides



# *NATO Simulation Resource Library (NSRL)*

## **Background**

- a generic, distributed, multi-user application which allows for searching, retrieving and uploading of resources from different locations spread over interested NATO/PfP Nations & Organisations
- a fundamental tool to facilitate interoperability and reuse of M&S resources amongst NATO/PfP Nations
- a NATO RTA funded project – requirement derived from the NATO Modelling & Simulation (M&S) Master Plan



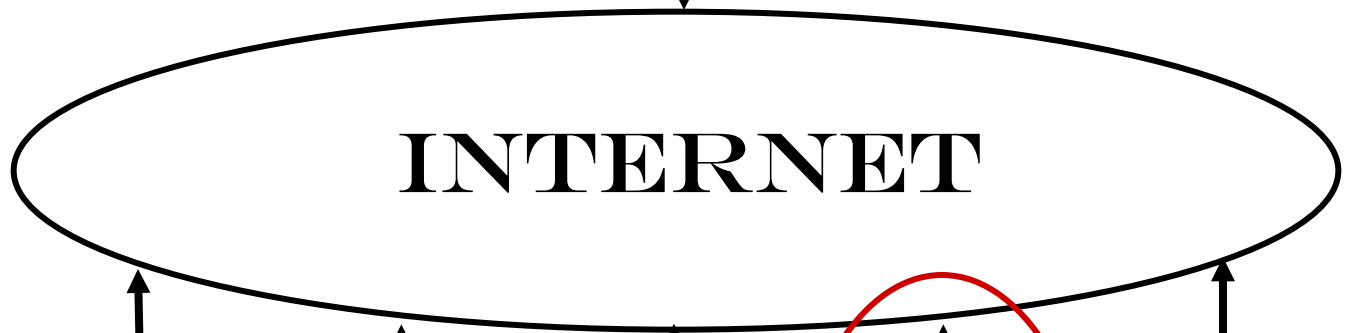
# Architecture for NSRL

RTO NSRL Web Portal  
(@ RTA)



← NSRL User →

via Web Services (IEEE 1420, MSG-012, XML Data Flow...)



via Web Service  
IEEE1420



Spain - SRL  
Library -  
Database

via Web Service  
MSG-012



Germany - SRL  
Library -  
Database

via Web Service  
IEEE 1420



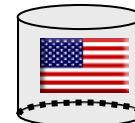
PATHFINDER -  
Database

via Web Service  
IEEE 1420

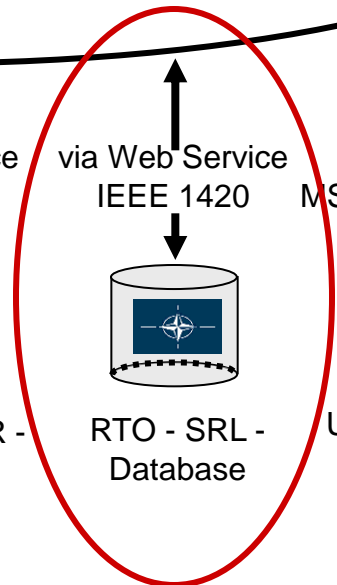


RTO - SRL -  
Database

via Web Service  
MSRR (XML Data Flow)

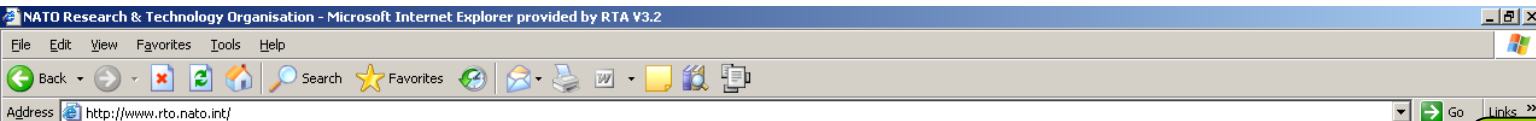


US - MSRR Library -  
Database





# NSRL REGISTRATION PROCESS



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  - RTO Future Events
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  - Research and Technology Board
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  - Human Factors & Medicine
  - Information Systems Technology
  - System Analysis & Studies
  - Systems Concepts & Integration
  - Sensors & Electronics Technology
- Modelling & Simulation**
  - NATO Modelling & Simulation Group
  - NATO SMART (Simulated Mission & Rehearsal Training)
- Information Management**
  - Information Management Committee
- Partnership for Peace**
  - Partner Nations

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## The von Karman Institute for Fluid Dynamics (VKI) Seeks New Director

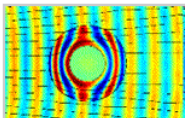


The RTO has a long-standing relationship with the Von Karman Institute for Fluid Dynamics (VKI) conducting numerous joint activities. The VKI is now advertising for a new **Director** to replacing the retiring incumbent. To enable the widest dissemination of the advertisement for this vital and prestigious position and in view that some of the members of the RTO network have an interest in this position, please [click this link](#) to see the full announcement. Responses should be sent directly to the

VKI, not to the RTA.

Mar 20, 2008

## Photonic Metamaterials for Defence and Security Applications



Metamaterials open a whole new chapter of photonics connected with novel concepts and potential applications and are promising for a variety of optical and microwave applications, such as new types of beam steerers, modulators, band-pass filters, lenses, microwave couplers, and antenna radomes. Microwave and optical superlenses have been created, and 'cloaking' devices have been proposed.

The NATO R&T SET-123 **Task Group** on "Nanomaterials for Sensors, Sources, and EM Manipulation" invited nine experts from around the world to give lectures on metamaterials, to be followed by general discussion among the participants and attendees.

Topics to be covered by this **SET-139 workshop** include: metamaterials in the optical regime for cloaking or stealth applications, light concentration or enhancement, and other optical/photonics applications and devices that may be of use in defence or security scenarios.

For further information on this workshop, please contact [guadalupie\[at\]rta.nato.int](mailto:guadalupie[at]rta.nato.int) or [dave.cardimona\[at\]kirtland.af.mil](mailto:dave.cardimona[at]kirtland.af.mil) (please replace [at] by @).

Mar 14, 2008

## RTB Chairman Participates in Weapons of Mass Destruction Workshop



The RTB Chairman, IGA Jacques Bongrand, was recently invited to attend an ad hoc Workshop on Improved Cooperation and Coordination of CBRN Activities at Senior defence Group on Proliferation DGP Plenary level, on Tuesday 26th February 2008 at NATO HQ in Brussels. The

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### ENRDL FOR

**AVT-SPR 08** (05/05/2008 to 09/05/2008 in ) - Applied Vehicle Technology Panel Spring 2008 Panel Business Meeting Week

**AVT-152** (05/05/2008 to 08/05/2008 in Norway) - Symposium on "Limit Cycle Oscillation and Other Amplitude-Limited Self-Excited Vibrations"

**AVT-154** (05/05/2008 to 09/05/2008 in Norway) - Specialists Meeting on "Advanced Methods in Aeroelasticity"

**HFM-142** (21/04/2008 to 23/04/2008 in Denmark) - Symposium on "Adaptability in Coalition Teamwork"

**IST-083** (21/04/2008 to 22/04/2008 in Czech Republic) - Symposium on "Military Communications with a special focus on Tactical Communications for Network Centric Operations"

**IST-21-PBM** (23/04/2008 to 25/04/2008 in Czech Republic) - 21st

Locate & click on MSG-NSRL

www.rto.nato.int



## QUESTIONS ?

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