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RESEARCH AND TECHNOLOGY ORGANISATION

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RTO MEETING PROCEEDINGS 73

Future Modelling and Simulation Challenges

(Défis futurs pour la modélisation et la simulation)

Papers presented at the RTO NATO Modelling and Simulation Group (NMSG) Conference held in Breda, Netherlands, 12-14 November 2001.



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RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote cooperative research and information exchange. The objective is to support the development and effective use of national defence research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective coordination with other NATO bodies involved in R&T activities.

RTO reports both to the Military Committee of NATO and to the Conference of National Armament Directors. It comprises a Research and Technology Board (RTB) as the highest level of national representation and the Research and Technology Agency (RTA), a dedicated staff with its headquarters in Neuilly, near Paris, France. In order to facilitate contacts with the military users and other NATO activities, a small part of the RTA staff is located in NATO Headquarters in Brussels. The Brussels staff also coordinates RTO's cooperation with nations in Middle and Eastern Europe, to which RTO attaches particular importance especially as working together in the field of research is one of the more promising areas of initial cooperation.

The total spectrum of R&T activities is covered by the following 7 bodies:

- AVT Applied Vehicle Technology Panel
- HFM Human Factors and Medicine Panel
- IST Information Systems Technology Panel
- NMSG NATO Modelling and Simulation Group
- SAS Studies, Analysis and Simulation Panel
- SCI Systems Concepts and Integration Panel
- SET Sensors and Electronics Technology Panel

These bodies are made up of national representatives as well as generally recognised 'world class' scientists. They also provide a communication link to military users and other NATO bodies. RTO's scientific and technological work is carried out by Technical Teams, created for specific activities and with a specific duration. Such Technical Teams can organise workshops, symposia, field trials, lecture series and training courses. An important function of these Technical Teams is to ensure the continuity of the expert networks.

RTO builds upon earlier cooperation in defence research and technology as set-up under the Advisory Group for Aerospace Research and Development (AGARD) and the Defence Research Group (DRG). AGARD and the DRG share common roots in that they were both established at the initiative of Dr Theodore von Kármán, a leading aerospace scientist, who early on recognised the importance of scientific support for the Allied Armed Forces. RTO is capitalising on these common roots in order to provide the Alliance and the NATO nations with a strong scientific and technological basis that will guarantee a solid base for the future.

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Future Modelling and Simulation Challenges

(RTO MP-073 / NMSG-010)

Executive Summary

The 3rd NATO Modelling and Simulation (M&S) Conference was organised by the NMSG and hosted by The Netherlands, at the Royal Netherlands Military Academy in Breda (12 to 14 November 2001).

The specific topics highlighted in the Calling Notice for the Conference were as follows:

- Future trends and limits in M&S:
 - Gaming Industry and NATO needs,
 - Incorporating the human element into M&S.
- M&S best practice and policy:
 - Standards and architecture,
 - Integration of M&S systems to C3I systems,
 - Verification, Validation and Accreditation (VV&A) of M&S systems.
- Support to Operations, Exercising and Training:
 - Decision Support,
 - Campaign Planning and Mission Rehearsal.

More than 60 abstracts were proposed to the Conference Programme Committee, which was constrained to select only 24 Papers. The general level of Papers presented was judged overall good, even though this NATO M&S Conference was probably not of such a high standard as in previous NMSG M&S Conferences. The Conference was organised in four sessions by a grouping of Papers in the following themes in order to facilitate and generate discussions on common concerns:

- M&S Organisations, Perspectives and Policy
- Support to Operations:
 - Training at all Levels,
 - Communication systems and M&S.
- Future trends:
 - Virtual Forces and Artificial Intelligence,
 - Gaming and Agent Technologies,
 - Long Term Previsions and Perspectives.
- M&S best practices:
 - VV&A,
 - Standards.

The proceedings contain a technical evaluation of the Conference, copies of published papers and PowerPoint presentations.

Key outcomes and conclusions from the Conference:

- a. The modelling of human behaviour is considered as a priority research area for the M&S community. This is an extremely difficult and challenging area. Whilst there is much that is still required to be achieved in this area, it is apparent that real progress has been made.
- b. New NATO member nations and invited PfP nations are showing interesting progress in their approach to national M&S activities. It is recommended that the PfP should be considered as full partners of the NMSG community and be given the opportunity and encouraged to participate more often in a wider range of RTO technical activities.

- c. The topic of Verification, Validation and Accreditation of simulation is always considered as an important part of any M&S Conference. The Papers presented at the 2001 NMSG Conference were of variable quality and interest, but they raised the largest degree of discussion. The effort made by the NMSG to address this topic should be increased in future years.
- d. It was the first time that applications of the gaming industry have been presented in a NATO M&S Group Conference. Interesting presentations on new technologies and the use of gaming for education and training clearly demonstrated that a greater degree of interest should be given to this topic in the future.

Défis futurs pour la modélisation et la simulation

(RTO MP-073 / NMSG-010)

Synthèse

La 3^{ème} Conférence OTAN sur la Modélisation et la Simulation (M&S) a été organisée par le groupe NMSG, aux Pays-Bas, à l'Académie Militaire Royale des Pays-Bas à Breda, du 12 au 14 novembre 2001.

Les sujets précisés dans l'appel à communications furent les suivants :

- Tendances futures et limites de la M&S :
 - L'industrie de la simulation et les besoins de l'OTAN,
 - L'intégration de l'élément humain dans la M&S.
- Politique et meilleures pratiques en matière de M&S :
 - Normes et architectures,
 - Intégration des systèmes M&S dans les systèmes C3I,
 - Vérification, validation et certification (VV&A) des systèmes M&S.
- Soutien aux opérations, aux exercices et à l'entraînement :
 - Soutien à la prise de décisions,
 - Planification d'opérations et préparation de mission.

Plus de 60 propositions de communications ont été reçues au Comité du programme de la réunion, qui s'est vu obligé de n'en choisir que 24. Le niveau général des communications présentées a été dans l'ensemble très satisfaisant, même si cette conférence M&S de l'OTAN n'a probablement pas atteint le même niveau d'excellence que les précédentes. La conférence a été organisée en quatre sessions qui regroupaient les communications sous les catégories suivantes, afin d'encourager des discussions sur des questions d'intérêt commun :

- Organisations, perspectives et politiques M&S,
- Soutien aux opérations :
 - Entraînement à tous les niveaux,
 - Systèmes de communication et M&S.
- Tendances futures :
 - Forces virtuelles et intelligence artificielle,
 - Technologies de simulation,
 - Prévisions et perspectives à long terme.
- Meilleures pratiques M&S :
 - VV&A,
 - Normes.

Le compte rendu contient une évaluation technique de la conférence, des copies des communications publiées et des présentations PowerPoint.

Résultats clés et conclusions de la conférence :

- a. La modélisation du comportement humain est considérée comme un domaine de recherche prioritaire pour les spécialistes de la M&S. Il s'agit d'un domaine stimulant mais extrêmement difficile. Bien qu'il reste beaucoup de choses à faire dans ce domaine, il apparaît clairement que de réels progrès ont été réalisés.
- b. Les nouveaux pays membres de l'OTAN et les pays du PfP invités ont annoncé des progrès intéressants en ce qui concerne la gestion de leurs programmes M&S nationaux. Les pays du PfP devraient être considérés comme des partenaires à part entière de la communauté NMSG. Ils

devraient avoir la possibilité, et être encouragés à participer plus souvent à un plus grand éventail d'activités techniques RTO.

- c. Le sujet de la vérification, la validation et la certification de la simulation demeure un élément constitutif important de toute conférence M&S. Bien que la qualité et l'intérêt des communications présentées lors de la conférence NMSG 2001 fussent variables, elles ont donné lieu aux plus vives discussions. Les efforts consentis par le NMSG vis à vis de ce sujet devraient être accrus dans les années à venir.
- d. La conférence a fourni l'occasion de présenter, pour la première fois, les applications de l'industrie de la simulation dans un cadre M&S de l'OTAN. Il a été démontré par les nombreuses communications intéressantes qui ont été présentées sur les nouvelles technologies et sur l'utilisation de la simulation aux fins de l'éducation et de l'entraînement, qu'il serait juste d'accorder plus d'importance à ce sujet à l'avenir.

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14. Abstract	<p>The conference presented a series of papers in sessions that were designed to provide an overview of NATO and national M&S Organisations, Perspectives, Projects, Practices and Policy. Other topics covered were the use of M&S to support operations (e.g. training and communication systems), future trends in M&S (such as Virtual Forces and Artificial Intelligence, Gaming and Agent Technology, etc.), M&S best practices (such as Validation Verification & Accreditation (VV&A) and standards).</p>		

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