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RESEARCH AND TECHNOLOGY ORGANISATION

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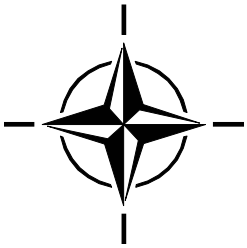
RTO MEETING PROCEEDINGS MP-088 **HFM-084**

The Role of Humans in Intelligent and Automated Systems

(Le rôle de l'homme dans les systèmes automatisés intelligents)

Papers presented at the RTO Human Factors and Medicine Panel (HFM) Symposium held in Warsaw, Poland, 7-9 October 2002.



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The Research and Technology Organisation (RTO) of NATO

RTO is the single focus in NATO for Defence Research and Technology activities. Its mission is to conduct and promote co-operative 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 co-ordination 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 co-ordinates RTO's co-operation 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 co-operation.

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 co-operation 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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The Role of Humans in Intelligent and Automated Systems

(RTO MP-088 / HFM-084)

Executive Summary

On 7-9 October 2002, more than 100 NATO, Partnership for Peace, and Non-NATO nationals from 22 countries met in Warsaw, Poland to discuss the role of humans in intelligent and automated systems. Sponsored by the Human Factors and Medicine Panel of the North Atlantic Treaty Organization's Research and Technology Organization, the symposium participants discussed the problem, research approaches and techniques for how automation technology can take advantage of human strengths and compensate for human disadvantages.

Automation may increase efficiency, but it also raises doubts about adequate human control over automated systems and making sure that system effectiveness is not jeopardized. This symposium focused on the interaction of humans with a growing array of automated functions and automated systems. During the symposium, participants discussed how to harmonize the interactions of humans with automated and semi-automated systems to increase overall mission performance. The symposium participants outlined recommendations for development of human-centered automation in military environments, addressing key areas such as providing levels of automation that are appropriate to levels of risk, examining procedures for recovery from emergencies, and ensuring human control of automation.

Le rôle de l'homme dans les systèmes automatisés intelligents

(RTO MP-088 / HFM-084)

Synthèse

Du 7 au 9 octobre 2002, plus de 100 participants provenant de l'OTAN, des pays du Partenariat pour la Paix et de 22 pays non-OTAN se sont réunis à Varsovie, en Pologne, pour discuter du rôle de l'homme dans les systèmes automatisés intelligents. Organisé par la Commission sur les facteurs humains et la médecine de la RTO, ce symposium a permis de discuter de ce problème, ainsi que des initiatives et des techniques de recherche dans le domaine des technologies d'automatisation permettant de tirer profit des atouts de l'homme tout en compensant ses lacunes.

Si l'automatisation peut conduire à une plus grande efficacité, elle soulève aussi des questions concernant la capacité de l'homme à gérer des systèmes automatisés sans compromettre leur efficacité. Ce symposium a privilégié l'interaction entre l'homme et une panoplie toujours croissante de fonctions et de systèmes automatisés. Au cours du symposium, les participants ont discuté de l'harmonisation des interactions de l'homme avec les systèmes automatisés et semi-automatisés dans le but d'améliorer les performances opérationnelles globales. Ils ont formulé des recommandations concernant le développement d'une automatisation axée sur l'homme en environnement militaire. Ces recommandations portent sur des questions clés, telles que l'adéquation des niveaux d'automatisation prévus par rapport aux risques, les procédures de récupération en cas d'urgence et l'assurance du contrôle de l'automatisation par l'homme.

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Asynchronous learning environments	Integrated systems	Revolution in military affairs
Automated systems	Intelligent systems	Risk
Automation	Man machine systems	Systems analysis
Aviation safety	Mission profiles	Task analysis
Cognitive automated systems	Modeling	Team effectiveness
Cognitive work analysis	Naval warfare	Uncertainty
Decision aids	Network-centric	Undersea warfare
Decision making	Networking	Uninhabited military vehicles
Design	Operational effectiveness	Unmanned aerial vehicle
Electronic warfare	Performance evaluation	Unmanned land vehicle
Human-machine interface	Pilot automation	Unmanned underwater vehicle

14. Abstract

On 7-9 October 2002, more than 100 NATO, Partnership for Peace, and Non-NATO nationals from 22 countries met in Warsaw, Poland to discuss the role of humans in intelligent and automated systems. Sponsored by the Human Factors and Medicine Panel of the North Atlantic Treaty Organization's Research and Technology Organization, the symposium participants discussed the problem, research approaches and techniques for how automation technology can take advantage of human strengths and compensate for human disadvantages. The Symposium consisted of an Opening Session, three sessions on design philosophy, two sessions and a roundtable discussion on design methodology, two sessions on design evaluation, and a Capstone Panel with open discussion. Six Keynote Addresses were interspersed throughout the program. All told, 18 papers were presented, and 5 poster-boards were available for review.

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