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Command and Control R&T
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Outline

- INTRODUCTION: THE QUESTION, THE ISSUE AND THE DISCUSSION
- WORK TO DATE OF KEY ORGANIZATIONS
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 - *TTCP JSA*
- WORK OF LEADING COUNTRIES IN THIS AREA
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- FUTURE SCENARIO DEVELOPMENT
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- MODELLING, SIMULATION AND EXPERIMENTATION
 - *Developing Scenarios*
- THE PROPOSED SOLUTION



Question:

- **How to identify and assess emerging, disruptive and surprise technologies that will have potential implications on future military and security concepts, thus affect military planning and security operations.**
- *A Highly Complex Subject (AUS)!*



The Issue:

- **It is relatively easy to look at the lists compiled by different nations from their Technology Watch efforts, which seem to be very similar.**
- **Currently, subject matter experts report through “technology watch” and “horizon scanning” efforts.**
- **These are often accompanied by a semi-quantitative analysis using Technology Readiness Level (TRL) ratings.**



Background

- Technology surprise can occur through:
 - Rapidly emerging technologies and
 - The use of commercial technologies in military and security operations and
 - The use of certain technology by adversaries.
- Predicting the use of traditional, novel or the combination of these technologies in both asymmetric warfare and public security has not yet been solved.



Background

To obviate surprise, the use of war game scenarios has been suggested, but no software has been tested in this subject area, and the resources to carry this out a war game are thought to be too extensive for just one or two nations to fulfill.

The writing of future operational scenarios have also been suggested, since war-fighting / peacekeeping capabilities in the future might be predicted by setting a future geopolitical/environmental context, but this requires extensive knowledge in many interdisciplinary fields that might be beyond most forces individual capacity to mount.

A full cooperative effort by allies is considered the best way ahead. The challenge is to assess the potential implications of these technologies on military and security operations, linking them with future military concepts in terms of “effects” or “impacts” not just technologies. (UK, AUS, US)



NATO SAS Panel (1)

- A key driver in NATO future force planning activities is “developments in technology.” Technology watch, assessment and forecast are therefore activities that are vital to all NATO partners.
- The view on future developments at system and/or concept level is an activity that national defence planners often do themselves by putting the components of technology watch, assessment and forecast together. This effort is mostly done on a national level and not at the NATO level. The results are usually not shared with others.
- It would be more effective and efficient if information on defence technology watch, assessment and forecast on system concept level would be shared between NATO partners.
- The meetings of the SAS ET on this topic have shown that a number of nations are prepared to cooperate in this field provided that the cooperation adds significantly to the national effort.



NATO SAS Panel (2)

- Objectives:
- Scope:
 - The group will investigate and share insights on expected technology developments and their predicted impact on military capabilities and consequences on Force and System concept level
- Goals:
 - The task group will collaboratively assess and enhance the knowledge in expected and so-called possibly disruptive technology developments and the consequences for military systems and operations when applied by own or opposing forces.



NATO SAS Panel (3)

Activities that support the above scope and goals include the following:

- Participating members will, where appropriate, exchange on a voluntary basis, studies and results regarding technology watch, assessment and forecast and lists of (planned) work;
- Share and further develop insight in technology developments;
- Conduct workshops (probably with support of war gaminglike exercises) on the usability and impact of new technology developments.
- Conduct conferences on the results and outcomes of the workshops and publish these results.
- The next meeting is November 2006 in Toronto, Canada as a card-based war game.
- The SAS Task Group is due to complete its work by 2009.



TTCP / JSA (1)

Formation of an AG/TP on Concept Development & Experimentation

- Among the recommendations of a pan-TTCP Workshop (Feb 2005) on the TTCP Linkages to CD&E is the proposal that JSA create a new panel to champion CD&E within TTCP and to contribute to the S&T linkages with the CD&E communities of the nations.
- The JSA-sponsored Workshop on Emerging Disruptive Technologies and the Implications for Defence advanced the view that TTCP should examine the potential of emerging disruptive technologies to inform the early stages of concept development. JSA TP-3 has been exploring emerging concepts and will be holding a workshop on the subject in early 2006.
- Finally, the TTCP Deputies have recommended that JSA take on a pan-TTCP role in the coordination of technology watch activities.
- Therefore, it was decided that a “consensus-building” meeting of national POC would be conducted in September 2005 to further explore the panel’s scope and work program.



TTCP / JSA (2)

- The September meeting considered that the exploration of emerging technologies is not sufficiently integrated into the CD process, which may result in limited exploitation of the possibilities enabled by future S&T and inadequate guidance from the CD process for the future S&T program.
- Consequently, S&T programmes need to be better aligned to support the development of future operational concepts. As part of this, it is critical to understand the requirements of the concept development community. The purpose of the new panel (JSA TP 7 “CD&E Sciences) is to champion CD&E within TTCP, alleviate these shortfalls and promote better practices between the S&T and CD&E communities.
- Three Focus Areas are proposed initially, as follows:
 - **Science of CD&E** - Advancing the understanding and analytical foundations for CD&E.
 - **Integration of CD&E within the Defence Enterprise** - Fostering the integration of CD&E processes within the overall Defence approach to development, acquisition and delivery of new military capability.
 - **Defence Implications of Future Environment** - Establishing connections between concepts for future operations and emerging trends in S&T.



United States

- Databases
- Technology Surprise Conferences
- Bilateral / Multilateral Meetings



United Kingdom

- Study Methods and Software
- NATO RTO SAS Panel
- Bilateral / Multilateral Meetings



Australia

- 75% of the Resources for One Year
- Defence Intelligence with Technology
- NATO RTO SAS Panel
- Technology Surprise Conferences
- Bilateral / Multilateral Meetings



Canada

- Technology Outlook Working Group
- NATO RTO SAS Panel
- Technology Surprise Conferences
- Bilateral / Multilateral Meetings



Future Scenario Development

From The Futures Research Methods Series by Jerome C. Glenn

- Most people in 1975 would never have believed that by the year 2000, millions of people would simultaneously search key documents from millions of computers in less than one second. Similarly, many might be quite surprised today that in just 25 years collective intelligence would be dramatically increased.
- Such collective intelligence could create global participatory feedback mechanisms to make long-range thinking far more common.



Future Scenario Development

Time

- A reason to use a range of futures methods today is that the understanding of time is changing from the Agricultural Age, through the Industrial Age in to the Information Age

Studying the Future

- To study the future is to study potential change - what is likely to make a systemic or fundamental difference over the next 10 to 25 years or more.
- Studying the future is not simply economic projections or sociological analysis or technological forecasting, but a multi-disciplinary examination of change in all major areas of life to find the interacting dynamics that are creating the next age.
- Methods of futures research do not produce completely accurate or complete descriptions of the future, but they do help show what is possible, illuminate policy choices, identify and evaluate alternative actions, and, at least to some degree, avoid pitfalls and grasp the opportunities of the future.



Future Scenario Development

How to Study the Future?

- One day, futures research may become an organized body of assumptions and methods with a more formal academic tradition; in the meantime, it can be thought of as an art in that it is creative and/or as a craft in that it applies knowledge with skill.
- Concurrent interest is growing in the future, instantaneous and global communications, powerful new nondeterministic modeling techniques, sharing information, systematic questioning software, data bases, and knowledge visualization. Now futurists, scholars, and others around the world can interact globally and take a fresh look at future possibilities, policies, and methodologies in ways not previously possible.

(Millennium Project)



Modeling, Simulation and Experimentation

- The investigation in to writing, modeling and simulating scenarios, to cover technology outlook techniques has not been researched in any significant way to date, although work is underway at NATO RTO
- Experimentation tends to focus on areas such as:
 - Zoran Sea Crisis - the NATO School Ogerammorgau
 - NATO CMX, MNE
 - Non-symmetrical Urban Environment,
 - Terrorist Attack, Natural Disasters
 - Proteus – Protean Critical Thinking Game



Future Scenario Example

- **The Future and Tele-presence?**
- Imagine being able to control the functions of a humanoid robot simply by thinking about it: http://www.sony.net/SonyInfo/QRIO/top_nf.html. Then combine an intelligent humanoid robot with a network based interface and you could think about what you wanted your tele-robot to do and it could do so - its own intelligence functions compensating whenever there was a network lag or interruption: <http://world.honda.com/ASIMO/technology/intelligence.html>. Then imagine the feedback from the robot returning directly to your brain: <http://www.sciencedaily.com/releases/2004/03/040324071203.htm> providing tactile sensation <http://motorcortex.huji.ac.il/research.asp#4> as well as visual <http://www.mdsupport.org/library/chip.html> and auditory information <http://www.nidcd.nih.gov/health/hearing/coch.asp>. You could therefore 'be there' without ever leaving home. Potentially, if the sensory feedback information were at a sufficiently high resolution, in your mind, you would actually be there. *

* Thanks to Regan Reshke – Reshke.RG@forces.gc.ca



The Team Continues to Study

- Software being developed for this type of purpose, and the use by teams such as at NATO and TTCP for a.
- Fora that would likely move M&S techniques and scenario writing for technology outlook.
- The priority the allies are putting on this type of work.

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Thank you for your attention - Questions

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