NATO OTAN

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S&T organization

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The NATO STB Chair MajGen Husniaux with the two STB Co-Vice Chairs Mr. Herold and MGen Kocian

In this issue

EDITORIAL BY THE CHIEF SCIENTIST

Dear all,

It is hard to believe, but the STO celebrated its second birthday on the 1st of July. It seems like just yesterday we celebrated its birth.

That time has flown by shows how active we have been in making progress on implementing S&T Reform while continuing to deliver a top-notch S&T programme to the Nations and to NATO, all the while without looking at the clock and without counting the hours.

I am grateful to all of you for your valuable contributions to the accomplishments of our first two years. Like all new organizations we experienced some growing pains, but they were overshadowed by the successes we achieved.

Looking forward, let us to continue to make progress but also find the time, during this summer period, to raise a glass to the good health of the STO and to the talented men and women contributing to its achievements.

Yours,

MGen Albert Husniaux,

NATO Chief Scientist

Making Progress

1-2 June: NATO Parliamentary Assembly (PA) Committees

The Coordination and Outreach Section of the Office of the Chief Scientist attended the meetings of the NATO PA Science and Technology Committee on 1 June and the NATO PA Defence and Security Committee on 2 June. It has become apparent that both committees and the Science and Technology Organization (STO) share comparable interests that deserve attention and continuation of the established contacts. The Directors of both Committees will be invited to attend the NATO Science and Technology Board (STB) in Bratislava in September of this year. It is anticipated that the NATO Chief Scientist will address both Committees in their next meetings during the NATO PA in The Hague in November of this year.

3-4 June: Translation Workshop, Royal Military Academy, Brussels

The workshop gathered a group of experts from all relevant NATO S&T stakeholders, including STB members as well as a significant number of ACT Defence Planners, to discuss the translation of requirements into S&T language. Participants worked through all Long-Term Aspects of the Minimum Capability Requirement to identify the respective underpinning S&T topics. The results from this workshop form an indispensible stepping stone for the ongoing work in setting NATO S&T Priorities.

11-12 June 2014 NAAG

The NATO Army Armaments Group (NAAG) held its plenary meeting at NATO HQ on 11-12 June. The Coordination & Outreach Section of the Office of the Chief Scientist provided a briefing on STO activities in the domain of Power & Energy, during a special session of the meeting, and a more comprehensive briefing highlighting the new STO activities of interest to the Land armaments community. The meeting was also an opportunity to take stock of the many interactions between the NAAG and the STO, that are evolving into the development of synergetic collaboration (e.g. between the AVT Panel and the Land Capability Group on Land Engagement).

18-20 June: SPSP - ISEG meeting

A meeting of the Independent Scientific Evaluation Group (ISEG) was held on 18-20 June in Brussels. The ISEG main task is to provide independent scientific advice on the proposed new projects to be undertaken under the aegis of the Science for Peace and Security Program (SPSP), NATO's main policy tool for enhancing cooperation and dialogue with all Partners, mainly based on civilian science. The collaboration between STO and the SPS Programme is constantly increasing, and two STO staff representatives are regular ISEG members.

25-27 June: JCGISR

In the meeting of the Joint Capabilities Group on Intelligence, Surveillance and Reconnaissance (JCGISR) at NATO HQ, the Coordination and Outreach Section of the Office of the Chief Scientist highlighted the latest developments within the Science and Technology Organization (STO) including the relevant parts of STO's Programme of Work. It triggered JCGISR to investigate the potential for more close collaboration with the STO.

MGen Albert HUSNIAUX, NATO Chief Scientist

News out of NATO HQ (Brussels)

10 June: Meeting with Finland

The Finnish Director for Research and representatives to the Finnish delegation to NATO met with the Chief Scientist. The meeting was very fruitful and confirmed Finland's high interest in the Science and Technology Organization and the will for even stronger collaboration with the STO.

17 June: Meeting with Mr. Hans Pechan, new Swedish NADREP

The Chief Scientist had an informal meeting on 17th June with the newly appointed Swedish Representative of the National Armament Director (NADREP). Sweden is the strongest Partner nation contributing to STO and the meeting confirmed this strong commitment and the will to investigate possibilities for even further collaboration.

19 June: Visit of Mr Dale Ormond, Director U.S. Army Research, Development and Engineering Command

The NATO Chief Scientist hosted Mr. Dale Ormond at NATO HQ to enhance the coordination between their S&T organizations. Mr. Ormond was able to gain a broader understanding of S&T activities and opportunities in NATO S&T through meetings with the OCS, the Emerging Security Challenges Division, and the Defence Investment Division during his visit.

27 June: Von Karman Institute Graduation Day

The 58th graduation day of the Research Master in Fluid Dynamics took place at VKI this 27th of June 2014. After the introductory remarks and report on the Academic Year by Dr. Jean Muylaert, Director VKI and the speech of Professor Jean-Pierre Contzen, VKI chairman of the Board who congratulated the graduates on behalf of the VKI Board of Directors, MajGen Albert Husniaux, on behalf of NATO's Science & Technology Organization was invited to address the audience. During his speech, the NATO Chief Scientist highlighted the importance of VKI for the NATO countries.

News out of Neuilly-sur-Seine

AVT-235 Research Lecture Series on "Uncertainty Quantification in Computational Fluid Dynamics"

2-3 June: AVT-235 Research Lecture Series on "Uncertainty Quantification in Computational Fluid Dynamics", Stanford University, CA, USA

This 2-day lecture series focused on methods for uncertainty quantification in computational science.

Lectures were given by experts in the field from Academia and Sandia National Laboratories: Michael Eldred (Sandia National Lab.), Catherine Gorle (VKI & Stanford University), Gianluca Laccarino (Stanford University), Todd Oliver (University of Texas), Paul Constantine (Colorado School of Mines), Sankaran Mahadevan (Vanderbilt University), Tim Sullivan (Caltech) and Krzysztof Fidkowski (University of Michigan).

The Lectures Series Directors were Catherine Gorlé, Gianluca Laccarino and Thierry Magin (von Karman Institute).

The event was attended by 68 participants, among them 8 lecturers from France, Canada, Germany, Greece, Italy, Norway, Spain, Sweden, United Kingdom and the United States. The audience very much appreciated the quality of the lectures provided.

4-6 June: HFM-252 Research Task Group 252 on "Aircrew Neck Pain", CSO, Paris, France

NATO nations' aircrews continue to report neck pain that impact not only their mission performance and effectiveness but also their health. In December 2013, the HFM Panel approved a new Research Task Group (RTG): HFM 252 on Aircrew Neck Pain who conducted their first meeting at the Collaboration Support Office (CSO) on June 4 - 6, 2014. The group will convene semi-annually over the next 3 years.

The HFM 252 overall objective is to seek creative administrative, procedural, preventive as well as ergonomic and engineering solutions for reducing neck pain that will be presented as recommendations in the RTG's final report. The RTG has taken a multi-disciplinary approach that involves engineers, human system integration and ergonomics specialists, physiologists, medical officers, physiotherapists, helmet manufactures, and operators.

The Program of Work begins with Problem Definition. Over the past two decades, there has been a lot of work in defining the neck pain problem. It is time to compile existing research and identify knowledge gaps. As an aid for future NATO neck pain surveys that aim to understand the problem, the group plans to develop a core set of questions that nations may use to define neck pain, and thus meta-analyses can be performed across the nations.

The next major item of work will be to identify neck pain Mechanisms and Factors that adversely affect performance and lead to injury. The RTG will also identify the necessary tools and techniques to investigate these factors such as neck and spine models. Knowing that solutions will need to be evaluated for their ability to reduce neck pain, the group will identify Research Metrics including joint angles, electromyography (EMG), as well as pain and other subjective measures for assessing changes in neck pain.

Finally, the RTG will identify and assess Preventative/ Mitigation Solutions from amongst those used and currently being investigated by nations. These solutions may be divided into engineering based solutions (e.g., lighter integrated helmet, and ergonomic seats) and intervention programs (e.g., exercise, and helmet fit). RTG members will assess the solutions, and together develop a series of recommendations for the prevention and mitigation of aircrew neck pain.

9-10 June: SAS-106 Research Symposium on "Analysis Support to Decision Making in Cyber Defence and Security", Tallinn, Estonia

With gracious assistance and support from members of the Estonian Ministry of Defence and Symposium co-chairs Ms. Melanie Bernier (CAN) and Ms. Piret Pernik (EST), the SAS Panel conducted an extremely successful Symposium at the Estonian Ministry of Foreign Affairs in Tallinn.

The focus of this Symposium centered on the themes of approaches to Cyber Defence; metrics requirements for decision support; situational awareness and information sharing in Cyber Defence; modelling and simulation (M&S); and the utilization of analytical models and frameworks.

Additionally, the SAS Panel was pleased to welcome keynote speakers Commodore Darren Hawco (CAN) and Dr. Jarno Limnell (FIN) to the Symposium, who provided attendees with their different views on cyber defence and security from

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SCI-268 Research Specialists' Meeting on "NATO Space: S&T Developments to Enhance Resiliency and Effectiveness of NATO Operations"

both an operationally-mined military focus, as well as a cyber-expert perspective.

The Symposium was a great success, owing a great debt of thanks to the myriad distinguished experts, motivated lecturers, and interested participants who ensured that SAS-106 fostered the acquisition of new knowledge, sharing of ideas, and promotion of exchanges among colleagues, both in Tallinn and within NATO and its partner nations.

17-19 June: SCI-268 Research Specialists' Meeting on "NATO Space: S&T Developments to Enhance Resiliency and Effectiveness of NATO Operations", Torino, Italy

Co-chaired by Dr. Don Lewis (USA) and LTC Giovanni Sembenini (ITA), the activity was organized by a planning committee that included representatives from Australia, Canada, Estonia, Germany, Italy, Norway, Sweden, Turkey, and the United States. Over thirty space experts from across the NATO and Partnership for Peace countries participated in the three-day Research Specialists' Meeting.

NATO Atlantic Command Transformation established the Long Term Aspect (LTA) for Space Capability Preservation to stimulate development of cross-NATO technical and non-technical solutions leading to improved survivability and availability of NATO-critical space functionality. The SCI Panel developed the activity as part of its mandate as the designated lead for formulating and guiding a strategic program of work within the NATO Community to achieve this LTA's goals and objectives.

The objectives of SCI-268 were to develop a shared awareness of NATO's future space capability needs to include capability resilience, identifying key scientific and technical challenges that would benefit from focused NATO attention via the STO activities and to promote a NATO-wide community of interest focused on NATO's space capability needs.

One of the important components of the meeting was the opportunity for cross domain and cross Panel collaboration. Panel representatives from

News out of Neuilly-sur-Seine (ctd)

Applied Vehicle Technology (AVT), Information Systems Technology (IST) and Sensor and Electronics Technology (SET) presented on-going space activities that each of their panels are conducting. The meeting provided the forum for promoting a shared awareness objective as well as identifying the most appropriate technical investments for NATO to consider underwriting in its coalition program of work under the stewardship of the STO. Space assets are critical to successful operations across land, air, maritime and cyber domains. Ensuring resiliency of space assets during disruption or denial of space services is essential to NATO's ability to perform its tasks.

The results of the meeting will be readily available for dissemination to all Alliance member nations, participating non-NATO nations and to other NATO entities for exploitation. The SCI Panel will evaluate and recommend follow-on activities.

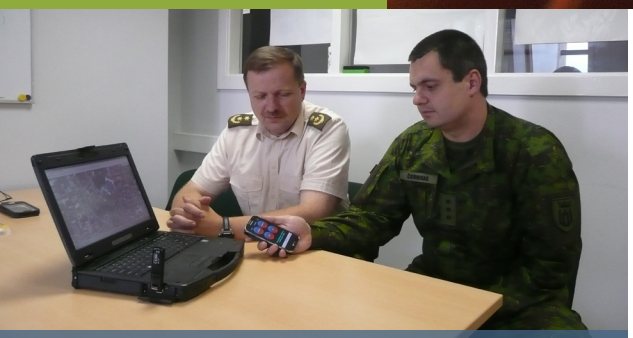
June 2014: Celebration of Lithuania's 10 year membership in AVT Panel with a Focus on MEMS Technology for Vehicle Applications

Soon after it joined AVT, Lithuania focused its contributions on Support Projects (SPs). Several SPs were conducted in the field of some specific

Introducing the CSMS Concept to President of the Republic of Lithuania Dalia Grybauskaite on a Multinational Exercise in Lithuania.

vehicle MEMS technology applications. The projects were actively supported by researchers in Belgium and the USA.

An example of a current Support Project is the SP LTU/LVA-AVT-12/1 on "MEMS Technology for Vehicle Tracking Applications" which was jointly submitted by Lithuanian and Latvian researchers and firmly backed by US experts in order to both consolidate the research efforts and properly span/handle the complexity of the problem of vehicle guidance/tracking in difficult environments as well



The CSMS Demonstration to Information Management Network Team Members

News out of Neuilly-sur-Seine (ctd)

as to explore the possible avenue of improving the vehicle location capability enabled by recent advances in micro- and nanotechnologies.

During the SP, the inherently cross-panel situational awareness problem has been addressed and an experimental Casualty Soldier Monitoring System (CSMS) based on a current smart End User Device (EUD) technology was designed to explore and understand methods of applying modern sensors to both provide geo-location data and assess the medical status of deployed soldiers in near real-time. The system extends existing inertial measurements based measurement technology by adding the capability to sense biometrical parameters making it possible to estimate the physiological performance of the user as well.

The framework for collaborative interaction with partners along with the access to knowledge base of the topic has shown to be a very valuable tool, which is especially needed at the early design stage when a system development problem is not yet fully described, and the solution space is large enough.

The CSMS consists of the following three main sub-systems:

1. A small soldier-worn lightweight sensor module, which provides geo-location as well as physiological performance data. The module includes a smart EUD based on current technology (Samsung Galaxy S4 smartphone) which performs sensor data processing and analysis as well as providing physiological and psychological indices formulation and a status report to medical care team members and Information Management Network (IMN). The EUD collects data, including heart rate, respiratory rate, oxygen saturation, skin temperature, movement (agility) and body orientation as well as the geo-location and speed. The device then transmits data to IMN via wireless technology and provides a continual interactive connection between wearers and their care teams. Ruggedizing the EUD within a shockproof/dustproof/waterproof, IP-X8, case enables the users to employ the device in challenging environments.
2. A radio communication system providing reliable voice and data transfer functionality. The system comes in two different versions. The Version 1 is based on a GSM deployment, and the Version 2 is deployed over existing Joint Tactical Radio System (JTRS) family radio connected to the EUD.
3. A Rugged Portable Computer based on a PC platform to process information and to populate the display; it can run on Windows or Linux operating systems.

The system has the ability to graphically display the location of an individual user on a digital geo-referenced map image. Additionally soldier location is shown on the digital display of the Android-powered EUD.

The system also allows receiving and sending the predefined text messages and other information.

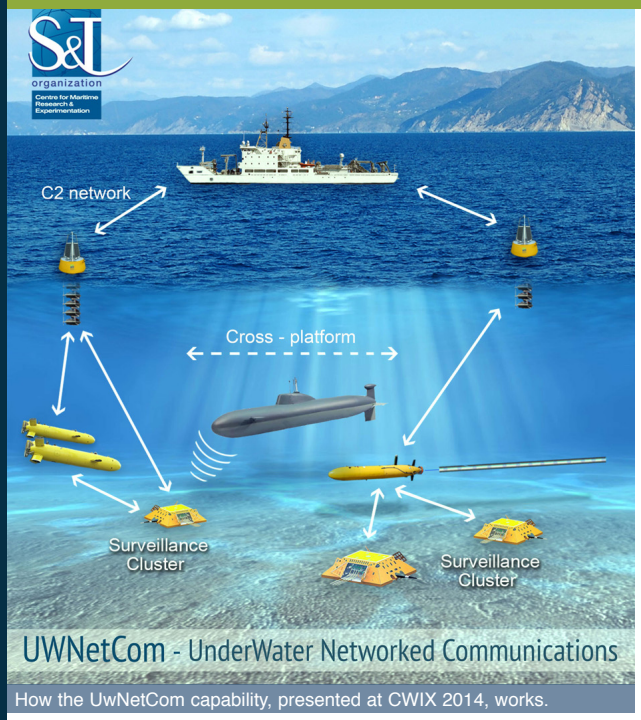
In developing the medical model, a simple but effective triage protocol designed by NATO was used. In the current model, a soldier is classified within one of the four NATO triage categories if an event is detected, and as ‘normal’ or ‘unknown’ otherwise. An event can be triggered in the following manners:

- The soldier self-triggers by pressing an icon on his EUD touch screen;
- The soldier’s buddy (another soldier nearby) indicates that the soldier is down using his touch screen and identifies the injured soldier;
- Physiological data lies outside the boundaries considered normal as determined by the status assessment software.

The developmental testing results indicate that status assessment algorithms can be used to determine physiological state over a wide range of injuries. The system has manifested a capability for providing situational awareness and communications to each equipped user.

The CSMS was also examined and successfully demonstrated during the multinational military exercise held in Lithuania.

In conclusion, Lithuania can be very proud of its 10 year membership in NATO and NATO STO so far, but that doesn’t mean it has to stop there. There is much room for improvement regarding engagement with the NATO STO activities as well as involvement in full-scale collaboration with individual countries.



How the UwNetCom capability, presented at CWIX 2014, works.

News out of La Spezia

2-19 June - CMRE at CWIX

From 2 to 19 June 2014, the Centre for Maritime Research and Experimentation (CMRE), participated, for the second time in a row, in the 2014 NATO Coalition Warrior Interoperability eXploration, eXperimentation, eXamination, eXercise (CWIX) at the Joint Forces Training Centre, in Bydgoszcz (Poland). CWIX is a unique NATO event that allows systems and network engineers to come together to solve existing interoperability issues and explore shared solutions. This year CWIX hosted fifteen NATO Nations, four partner Nations and twelve NATO commands which are bringing 175 capability configurations to conduct more than 3000 interoperability tests in the 13-day period.

For the 2014 edition CMRE scientists successfully tested operational maritime capabilities for data fusion, asset allocation and underwater communications. In particular, CMRE demonstrated how new technological tools can greatly enhance maritime situational awareness during operations, providing real-time scenario pictures to decision makers, including operational forecasts related to meteorological and oceanographic (METOC) data and maps of risk. CMRE's inputs were merged into its new Situational Awareness Viewer, a service-oriented system experimental tool. This viewer can be configured to deliver custom data feeds, information products, and improved situational awareness. CMRE tested the Situational Awareness Viewer with twelve Nations and three NATO organizations across 35 partnering capabilities with over 110 tests executed.

For more on this topic visit: http://www.cmre.nato.int/news/stories/282

6 June - NATO MARCOM Commander visited CMRE

Vice Admiral (UKN) Peter D. Hudson, NATO MARCOM Commander, visited CMRE and NATO Research Vessel Alliance for the first time on 6 June.


REP14-MED gliders fleets being shown to NATO MARCOM Commander (on the right) by CMRE Director (on the left).

During the CMRE tour, he was briefed on the CMRE programme of work, and visited the Engineering Laboratories, Maritime Tactical Theatre Simulator, and the Glider Command and Control Room.

The meeting was aimed at bolstering ties between CMRE and NATO's Maritime Command taking into consideration the new NATO Maritime Enterprise concept that should increase collaboration between operational and scientific NATO bodies. The Maritime Enterprise will facilitate the NATO maritime information flow, linking the NATO Command Structure (NCS) to the NATO Force Structure (NFS) through common interests and engagement with a wider community of key maritime players to deliver skilled maritime advice.

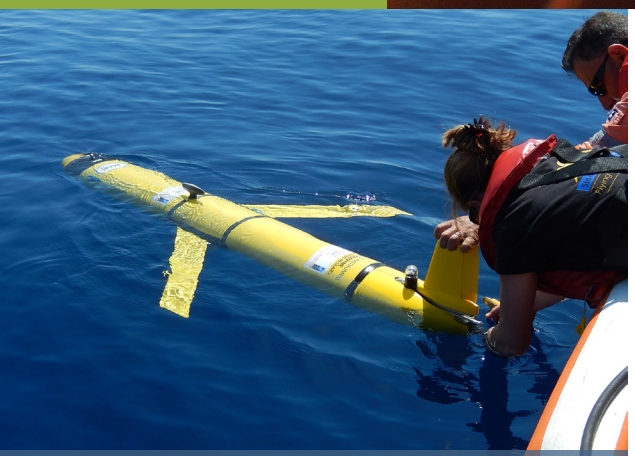
The visit was wrapped up on board the NATO Research Vessel Alliance at the pier in La Spezia, where CMRE scientists and engineers were preparing for the REP14-MED scientific trial held in June in the Sardinian Sea.

6-26 June – REP14-Mediterranean experiment in the Sardinian Sea

From 6 to 26 June 2014 the Sardinian Sea was the site of the REP14-Mediterranean experiment, led by CMRE.

On board the NATO Research Vessel Alliance, operated by CMRE, and on board Research Vessel Planet, operated by the German Research Centre WTD71, as well as remotely at research centres ashore, scientists and engineers from 21 partners institutions and six Nations, tested and developed new systems, technologies and solutions for ocean monitoring and seabed characterization, in order to enhance current Environmental Knowledge and

News out of La Spezia (ctd)



Glider deployment during REP14-MED in the Sardinian Sea.

Operational Effectiveness (EKOE) capabilities.

The main pillar of the experimentation was the use of underwater gliders from four Nations (DEU, FRA, UK, USA) and CMRE. These underwater vehicles were simultaneously at sea to collect ocean physical data in order to improve the performance of ocean forecast models; diagnose and predict physical properties of the waters west of Sardinia; develop and test efficient sampling strategies; develop and test new methods to characterize the seabed; record underwater ambient noise; and test recent developments in underwater observation techniques.

For more on this topic visit: http://www.cmre.nato.int/news/stories/284

9 - 13 June – Maritime Security Operations Boarding Team – Tactical Video System

From 9 to 13 June, CMRE conducted the Maritime Security Operations Boarding Team – Tactical Video System (MSO BT-TVS) demonstration at the NATO Maritime Interdiction Operational Training Centre (NMIOTC) in Souda Bay, Crete, Greece.

BT-TVS Operators at work during the 2014 demonstration at NMIOTC.

The purpose of the experiment was to demonstrate the capability of transferring high resolution, real time video using low-cost commercial technology as part of the Boarding Party's equipment, in order to enhance safety and operational effectiveness during vessel boarding search and seizure (VBSS) missions. The experimentation included video transmission from the boarding team, using helmet mounted cameras, back to the mother ship and from there to the operations' headquarters. NMIOTC contributed to the experiment by providing expertise in the field and helping to assess the system's capabilities as an end user, in order to use it as a basis for future training.

The experiment successfully demonstrated the technical feasibility of the system created at CMRE, including interoperability with other systems, plus the vertical integration with higher command by the real-time streaming of video and data files to CMRE via satellite.

The operational implications of the TVS are that it enables the vertical integration of all command levels by collapsing the time latency of data sharing of the "last tactical mile" from hours/days to seconds. The TVS also ensures evidence integrity of HD quality video and biometric evidence collected during the boarding.

9 June – Sim & Sea Conference

CMRE participated in the scientific committee of the first Sim & Sea Conference, held in Genoa, Italy (Sea Museum, Porto Antico) on 9 June 2014. The event was organized by the Italian Movement for Modelling and Simulation (MIMOS). Sea and serious games, modelling and simulation models for autonomous vehicles and maritime security applications were discussed.

For more on this topic visit: http://www.liophant.org/conferences/2014/simsea/index.html

9-11 June – Laboratories of acoustics for students

From 9 to 11 June, CMRE collaborated in laboratories of acoustics for students along with the Italian Navy Naval Support and Experimentation Centre (CSSN) as part of the local Italian Navy event "XXVII Trofeo Mariperman". The lab included the demonstration of a hydrophone kit for students developed by CMRE technicians in collaboration with the DOSITS (Discovery of Sound in the Sea website) of the University of Rhode Island (USA).

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www.cso.nato.int/abstracts.aspx

Scientific Publications

Measurement of non-directional and directional sea wave spectra with a surfaced Glider. A. Alvarez, CMRE-MR-2014-004, NATO UNCLASSIFIED, June 2014.

A Network of Low-Power High-Frequency Surface-Wave Radars for Maritime Surveillance in the German Bight. S. Maresca, P. Braca, R. Grasso, J. Horstmann, CMRE–FR-2014-009, NATO UNCLASSIFIED, June 2014.

Real time ASW decision support during exercise Dynamic Mongoose, 2014. C. Strode, CMRE-FR-2014-010, NATO RESTRICTED, June 2014.

Electronic Warfare Using a Software Defined Platform, STO-TR-SCI-222, NATO UNCLASSIFIED June 2014

Interactive Visualization of Network Dynamics, STO-TR-IST-085, PUBLIC RELEASE, June 2014.

A NATO Guide for Assessing Deployability for Military Personnel with Medical Conditions, STO-TR-HFM-174, PUBLIC RELEASE, June 2014.

Performance Criteria for Camouflage Systems Derived from Operational Scenarios, STO-TR-SCI-212, NATO RESTRICTED, June 2014.

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