CALL FOR PAPERS

– New Deadlines –

21st International
Command and Control
Research and Technology Symposium
6-8 September – London, UK
2016

http://www.dodccrp.org/

C2 in a Complex Connected Battlespace

History of the ICCRTS

In 1995, the US DoD Command and Control Research Program (CCRP) (1994-2015), within the Office of the Secretary of Defense, held the first International Command and Control Research and Technology Symposium (ICCRTS) at the National Defense University in Washington, D.C. This meeting built upon a series of meetings during the 1970s by the Office of Naval Research and the Massachusetts Institute of Technology that brought together interested researchers to exchange ideas on command and control (C2), its measurement and assessment, and the impact of new technologies on C2 processes.

While the initial meeting was modest in size (63 participants) and included only a handful of non-U.S. participants, ICCRTS has grown substantially, to include hundreds of participants from dozens of nations. Nowadays, the Symposium provides an unparalleled opportunity for professional researchers, academics, active duty and reserve officers, and policymakers to interact with one another, understand the state of the art of C2, and influence the state of the practice among defence coalition partners. The ICCRTS focuses on leading-edge issues involving (a) new concepts in C2 (b) new technologies and their potential impact on C2, and (c) feedback and evidence from experiments, exercises, and real-world operations. The Symposium is also an important forum for discussion of coalition and collective C2 issues and for examining the complex endeavors (stabilization, operations, disaster relief) involving a variety of entities including military, civilian, government, international organizations, Private Voluntary Organizations (PVOs) and Non-Governmental Organizations (NGOs).

The efforts of the community to ensure that the CCRP and its annual symposium products and events endure are strong evidences of their value to the community. The non-profit International Command and Control Institute has assumed responsibility for the CCRP website and research archives (www.dodccrp.org). The UK MoD has joined with researchers from around the world to plan and

conduct the 21st ICCRTS that will be held in London, UK in September 2016 (www.ietvenues.co.uk/savoyplace). This event will be collocated with the 8th Knowledge Systems for Coalition Operations 2016 (www.ksco.info/ksco-2016.html).

Theme

The theme for the 21st ICCRTS is "C2 in a Complex Connected Battlespace". It is intended to provide an opportunity to discuss the challenges associated with operating in a cyber-contested multi-dimensional battlespace characterized by a high level of connectivity and inter-dependence. In such battlespace, the omnipresence of interconnected smart/intelligent applications and devices, some with varying degrees of autonomy, will directly impact the way C2 is conducted. These networked devices will provide opportunities for improving the battlespace situational understanding and stretch out the spectrum of potential effects that can be used to achieve commander's intent. This multi-dimensional environment will also require considerable C2 and operational agility in order to manoeuvre effectively, especially given the variety of actors from different organisations, each with their own evolving purposes and interconnections.

The 21st ICCRTS will contribute to improve our understanding of C2 challenges associated with operations conducted in a "Connected Complex Battlespace". It will look at the role of information and influence and the use of information technologies to effectively and efficiently support the accomplishment of C2 functions in highly contested environments. This year's ICCRTS will address questions such as: What are the C2 challenges associated with operating in an extremely connected environment (such as large urban environments), where information is flowing widely and rapidly and influence activities are being executed skillfully by multiple actors? How will the Internet of Things (IoT) affect the battlespace from the multiple perspectives of Joint, Interagency, Multi-National, and Public? What are the challenges associated with the management of national and coalition activities in the multi-dimensional battlespace (including land, sea, air, space, electromagnetic spectrum, information, time and human/social) in such connected environments? What C2 approaches are more relevant, and how can they be operationalised in this environment e.g. mission command?

Review and Acceptance Process

Abstracts constitute a first submission step and are used to validate the potential interest of the paper for the symposium. However, since the submission approval will be undertaken on receipt of the complete paper, we ask authors to submit complete papers for review as soon as possible. Timely feedback will be provided to authors in order to maximize the time available for authors to improve their papers before the final submission deadline.

All accepted papers will be included in the Symposium proceedings posted on the DoD CCRP website (www.dodccrp.org) and, in due course, will become part of the ICCRTS archive. Please review the author guidelines and timelines to ensure that you are aware of, and adhere to, the ICCRTS submission process.

Key Dates – New Deadlines –

	Initial deadlines	New Deadlines
Submit your abstract no later than	**18th December 2015**	**29th January 2016**
You will receive an invitation to submit a formal draft paper by	**14th January 2016**	**15th February 2016**
Your formal draft paper must be submitted by	**18th March 2016**	**15th April 2016**
You will receive reviewer comments by	**20th May 2016**	**30th May 2016**
Your final revised paper must be submitted by	**30th June 2016**	**15th July 2016**
Your final presentation must be submitted by	**5th August 2016**	**5th August 2016**

Topics of Interest

The 21st ICCRTS will be comprised of tracks on various topics that explore ***C2*** from a number of different perspectives. Authors are asked to think about this year's theme as they prepare their papers and discuss the theme in the context of their research and analyses.

Topic 1: Operational Issues in Complex Connected Environments such as large Conurbations
This topic is concerned with the challenges associated with operating in large urban environments, involving many different actors connected from different perspective (e.g. human, social, cultural, religious, technology, activity). Papers submitted on this topic should support the development of an understanding of large cities which are complex connected environments and identify and explore the relevant C2 challenges. This might include C2 operational needs, gaps, overlaps, lessons learned, and best practices for working with "Mission Partners" (Ministries', Departments', Bureaus', Agencies', Governments', Militaries', Special Operations and Conventional Forces).

Topic 2: C2 Concepts, Theory, Policy and Approaches
This topic is concerned with exploring the evolution of C2 concepts, theory, policy and approaches driven by operating in a complex connected environment. For example, the utilisation of multiple modes and levels of connectivity (e.g. Web, Social media, Mass media, Individual, collective) will constitutes a new reality that has to be addressed by C2 means, approaches, and outcomes suitable to highly dynamic and complex situations. Facing this new reality will raise significant questions as to how C2 can implement effective means of supporting the development of shared intent, awareness and understanding as well as facilitating collective action (e.g., C2, management, governance, self-synchronization, emergent behaviors). Papers submitted on this topic will describe why and how existing concepts, theories, policies and approaches need to be revisited.

Topic 3: Towards Internet of Intelligent Things in Highly Connected Battlefield
This topic is concerned with the potential C2 impact on military operations of rapid developments and deployments of concepts and technologies from the Internet of Things (IoT) as well as their evolution towards the Internet of Intelligent Things (IoIT). Many military processes and procedures including C2 and logistics are likely to change when the ideas, technologies, and capabilities of the IoT are brought into the battlefield environment (Internet of Battlefield Things). The expected increase of activity transfer within information infrastructure and physical environment are likely to generate new challenges for C2, from both civilian and military perspectives, and potentially new

opportunities for C2 in terms of national and coalition use. Accordingly, this topic is intended to include both civilian and military use of IoT and IoIT in a highly connected battlefield. Of particular interest are papers that examine the applicability (or lack thereof) of commercial IoT concepts and technologies within the military, and unique challenges that may need to be addressed in order to realize the benefits for C2. Papers may also consider the IoIT potential impact on C2 in a highly connected battlespace from different perspectives (e.g. role, teaming, safety, trust and security) as well as how they can enable smart cities and urban operations.

Topic 4: Socio-technical Networks in Complex Connected Battlespace

This topic is concerned with the exploitation of the information that transit inside and between the different socio-technical networks operating inside a battlespace, providing new opportunities to improve situational understanding. The development of approaches to integrate multi-source data (from the public open sources as well as the military intelligence, surveillance and reconnaissance sources) in a timely manner will enable the detection of emerging trends as well as the development of insight of unfamiliar locations and situations. This topic will cover the challenge associated with the management and the analysis of the variety, velocity, volume, and veracity of available information to support situation understanding and battlespace management. Furthermore, in respect to the mission objectives, it will look at how C2 needs to understand and take into account the influence that the flow of information may have over the different actors involved in the battlespace. Finally, it will also address how socio-technical networks can influence C2 in the execution of missions and the socio-cognitive collaboration in a connected digitized battlespace.

Topic 5: Battlespace Understanding and Management

This topic is concerned with the management of a multi-dimensional battlespace. Considering the multiple dimensions of the battlespace (including land, sea, air, space, electromagnetic spectrum, information, time and human/social), this topic looks at the challenge of developing a sufficient understanding of the situation as well as the challenge of monitoring mission execution while effectively cohering, coordinating, synchronizing, prioritizing and deconflicting activities that have to take place in a multi-dimensional battlespace. Papers responding to this topic may focus on continuous planning and execution in highly dynamic environments as well as approaches to shape and plan an operation in order to enable agility in execution whilst mitigating risks and taking advantage from opportunities.

Topic 6: Interoperability/Integration and Security

This topic is concerned with the related issues of working with a wide range of parties (Joint, Interagency, Multinational, and Public organisations) interlinked in a multitude of different ways in a connected battlespace. Interoperability between these partners is the minimum essential in a complex connected battlespace and can be achieved at different levels (human, technology, processes) between the different entities. Interoperability problems can be caused by a lack of organizational culture understanding, process harmonization, as well as ontology, protocol, technology and system compatibility. Depending on the evolution of the situation and the partners involved, the level of interaction requires can move from the ability to be interoperable to the ability to be integrated. Considering that barriers are sometimes intentionally erected to information sharing (e.g. due to security constraints), revolutionary changes in interoperability/integration and security approaches will be required to be successful in the future. Accordingly, papers on this topic should address interoperability/integration and security approaches appropriate to highly connected battlespace from the dimensions of human, technology, and processes.

Topic 7: Methodological Development, Experimentation, Analysis, Assessment and Metrics

This topic is concerned with methodological considerations on approaches for designing and undertaking experiments, metrics and analyses, that are related to any aspect of command and control such as networking, management or governance, information sharing, trust, shared awareness, shared understanding, decision-making, planning, execution, and assessment of ongoing operations. Papers would also be of interest if they address scenarios supporting analysis and experimentation on subjects ranging from the operational level of command to the network emulation and simulation.

Instructions for the submission of abstracts and papers are provided on the CCRP website (http://www.dodccrp-test.org/) as well as on EasyChair (https://easychair.org/conferences/?conf=iccrts2016). Student submissions are welcome.

Paper Acceptance Criteria

The following criteria will be used by track chairs and symposium staff in their review process:
1. The paper is appropriate for the theme and topics of Symposium.
2. The paper is intellectually stimulating.
3. The literature review is adequate/appropriate.
4. The research design is adequate/appropriate.
5. The data analysis is adequate/appropriate.
6. The conclusions are reasonable.
7. The paper advances the state of knowledge.
8. The paper is logical and consistent.
9. The paper's argument is persuasive.
10. The writing is clear and readable.

Papers will not be accepted if:
1. Topics stray from the conceptual focus of the Symposium.
2. Attempts are made to promote or sell specific goods and/or services.
3. Claims are unsubstantiated or facts are inaccurate.
4. Scientific merit is lacking.
5. Writing/explanations are poor.

Questions related to the 2016 ICCRTS can be sent to: 2016iccrts@dodccrp.org