Paper Title

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Abstract

In 1995, the US DoD Command and Control Research Program (CCRP), within the Office of the Secretary of Defense, organized the first International Command and Control Research and Technology Symposium (ICCRTS) at the National Defense University in Washington, DC. This meeting was built upon a series of meetings organized 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. The 1995 event was also arguably a follow-on to a similar international event held at Eynsham Hall, Oxford UK in 1994, on C2 and Information Systems Research. This event was supported by both the UK Defence Research Agency and the US Joint Directors of Laboratories.

# Level 1

While the initial ICCRTS meeting was modest in size and included only a handful of non-U.S. participants, the event has grown substantially over the years to include participants from many nations. This Symposium series provides an unparalleled opportunity for professional researchers, academics, active duty and reserve officers, and policymakers to interact with one another to discuss future challenges and concepts, understand the current state of the art, and influence future thinking and practice across coalition partners.

## Level 2

ICCRTS has evolved to include (a) leading-edge concepts in C2, (b) new science and technology and their potential impact on C2 and the conduct of Multi-Domain Operations, 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 challenges emerging from complex endeavours (*e.g.*, hybrid warfare, counter-terrorism, stabilization operations, disaster relief) that involve a variety of entities including military, civilian, government, international organizations, Private Voluntary Organizations (PVOs) and Non-Governmental Organizations (NGOs).

### Level 3

In 2015, a real test of the value of this activity emerged when Government funds were no longer available to cover the costs of organizing and administering the Symposium. The challenge to the C2 Research Community was to find a way for this event to survive as an independent activity. Ultimately, it would require the combined efforts of the international research community to ensure that its annual Symposium and the body of literature associated with the CCRP would endure without direct Government funding. The fact that this did indeed happen provides evidence of the importance of this resource and opportunity to the community.

#### Level 4

In 2016, the non-profit International Command and Control Institute (IC2I) assumed responsibility for the organization and running of future ICCRTS and hosting the research community's website and research archives. This website can be found at

**http://internationalc2institute.org**

# Level 1

The 28th ICCRTS, to be hosted at the Johns Hopkins University Applied Physics Laboraotry in Laural, Maryland



Figure : Figure Caption

# Level 1

ICCRTS themes, over the years, have served to highlight many C2-related problems and challenges that require attention. The theme for this 26th ICCRTS is *Artificial Intelligence, Automation and Autonomy: Implications, Opportunities and Challenges*. In recent years, C2 processes, tasks and environments have evolved to contend with increasingly complex endeavours, requiring automation-powered systems that, to varying degrees, can perceive, infer, decide or act autonomously and intelligently to create an information dominance and decision superiority. It is anticipated that the recent and significant advances in many technological areas, such as *machine learning*, *data science*, and *computer systems*, will accelerate this trend to create both greater effectiveness and efficiency. From a C2 perspective, this reality enables unprecedented access to extended C2 approach space regions, creating the need to consider what (when and how) *decision rights* can be delegated to these intelligent systems to enable a C2 advantage. The various implications of this delegation, such as the trust that can be placed in those systems, and the data and information they provide, will also need to be considered. The 26th ICCRTS plenaries and track sessions are intended to offer the participants a venue to discuss these opportunities and challenges. This edition of the Symposium will focus on the following topics and the related ideas, concepts, problems and solutions:

* Complex enterprise C2- harmonization
* Operating in a Contested Cyber Environment
* Coping with constraints, complexity and ambiguity
* C2 and human-AI/autonomy teaming
* Emerging concepts and technologies, and their implications for C2
* Connected battlespaces and forces
* Experimentation, analysis, assessment and metrics
* Military C2 applications, requirements, concepts and solutions
* Other C2-related research and analysis

Contributors and attendees are reminded that ICCRTS is a public forum. Papers, presentations, and discussions must be suitable for general public release.

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References

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