The Role of the Coalition Warrior Interoperability Demonstration in the Canadian Forces Joint Experimentation Program

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Outline

- Introduction
- Joint Warrior Interoperability Demonstration 2004 (JWID 04) Trials
- Strategy for Integration into the Canadian Forces Joint Concept Development and Experimentation Plan
- Conclusion

Introduction

- Canadian Forces Experimentation Centre (CFEC)
- Joint Warrior Interoperability Demonstration (JWID)
  - What is JWID?
  - Case Studies
  - Use of Venue
  - JWID Assessment Process

Canadian Forces Experimentation Centre

- CFEC is responsible for the development of the Canadian Forces Joint Concept Development and Experimentation Plan (CF JCD&E Plan) and for conducting Joint Concept Development and Experimentation in the Canadian Department of National Defence (DND).
- From its initial charter in 2001, CFEC inherited responsibility for managing the Joint Warrior Interoperability Demonstration (JWID) program, renamed Coalition Warrior Interoperability Demonstration (CWID) in 2005.
- This parallels the situation in the United States where the U.S. Joint Forces Command (USJFCOM) J9 Joint Experimentation took over the leadership of CWID this year.

What is JWID?

- JWID is the US Chairman of the Joint Chiefs of Staff's annual event that enables the US combatant commands and the international community to investigate command, control, communications, and computer (C4) solutions that focus on relevant and timely objectives for enhancing coalition interoperability.
- The intent is to conduct trials of systems that can then be quickly transitioned into operational use.

Case Studies

- Canada led a total of five Coalition Interoperability Trials (CITs), sponsored either by the Air Force or by Defence Intelligence.
- The two trials presented in this paper used technologies developed by Defence Research and Development Canada (DRDC). They are:
  - the Portal-to-Portal Interoperability Trial; and
  - the Collaborative Operations Planning System (COPlanS) Trial.
- These trials were selected as case studies since both technologies had a broader role in Joint Experimentation in DND.

Case Studies

- The Canadian technology in the Portal-to-Portal Interoperability Trial was a situational awareness (SA) portal developed by the Common Operating Picture in the 21st Century Technology Demonstration (COP 21 TD). This application was developed for use by the Canadian Forces Joint Staff and Joint Operations Group.
- COPlanS is an integrated suite of planning, decision-aid and workflow management tools designed to support collaboration by distributed military staff in the military planning process. An early prototype was tested in JWID 03.

Use of Venue

- The formal objective of JWID/CWID is to demonstrate technologies that should be ready for operational use within a year.
- Not all of the technologies tested will be successful and so some will take longer.
- This paper proposes that nations should consider using CWID not only for maturing technologies ready for operations, but also for maturing technologies that could be used in experimentation.
- In both of these case studies, the JWID venue served other requirements beyond demonstrating technologies for operational use.

JWID Assessment Process

- Three types of assessments:
  - Warfighter/Operator Utility Assessment
  - Interoperability Assessment
  - Security Assessment
- Warfighter Assessment questionnaires are generated specifically for each trial based on:
  - trial objectives
  - trial capabilities
  - applicable measures of performance (MOPs) designed for each trial
  - predefined scenario events and/or test schedules

JWID 04 Trials

- Portal-to-Portal Interoperability Trial (CIT 04.05)
- Collaborative Operations Planning System (CIT 04.08)
  - Trial Background and Objectives
  - Data Collection and Analysis Plan
  - Analysis Results
  - Conclusions
  - Recommendations

Portal-to-Portal Interoperability
Trial Background and Objectives

- The COP 21 TD investigated how applying a systems architecture approach could help deliver knowledge management concepts and advanced visualization capabilities using portfolios in an enterprise level portal application – known as the COP 21 Portal.
- Trial objectives:
  - Assess the portals' capabilities for sharing applications
  - Assess the visualization capabilities of six visualization applications

Portal-to-Portal Interoperability
Data Collection and Analysis Plan

The analysis plan developed for CIT 04.05 used three data collection methods:

1. Direct observation of players by the analysis team;
2. Player feedback through structured surveys; and
3. Quantitative analysis of portal data captured by an application event logger.

Results from CIT 04.05 1/2

Question	Week 1 Ave ± Std Dev	Week 2 Ave ± Std Dev
Portal		
The portal capability significantly improved my situational awareness in JWID.	5.37 ± 1.28	5.71 ± 1.46
The customization features allowed me to significantly improve the utility to my portal work.	4.61 ± 1.17	4.42 ± 1.21
The portal was able to handle production activities associated with managing information.	4.80 ± 1.63	5.68 ± 1.03
My access to the production tools from the portal was straightforward.	4.54 ± 1.27	5.21 ± 1.59
Portfolio		
The portfolio approach to collating information improved my situational awareness of the operations.	5.89 ± 1.15	5.92 ± 1.06
The portfolio features improved my ability to contribute to JWID operations.	5.80 ± 1.04	5.74 ± 1.29
Search and discovery		
The search tool produces sensible summary information that eases operator workload.	5.40 ± 1.19	5.17 ± 1.15
The feature that uses prior search results to extend contextualized searches contributed to the discovery of new information.	5.18 ± 1.26	5.17 ± 1.03
The query agents that automatically search for new or updated information saved me significant time and/or effort to discover information needed to conduct operations.	5.52 ± 1.21	5.00 ± 1.17
The five icons displayed with each search result item allowed me to use different perspectives to better exploit the data.	5.32 ± 1.31	5.13 ± 1.14
The quality of search results contributed to my situational awareness.	5.39 ± 1.12	5.22 ± 1.17

Results from CIT 04.05 2/2

Question	Week 1 Ave ± Std Dev	Week 2 Ave ± Std Dev
GIS Browser		
The GIS Browser interface with the C2PC interface helped me to improve my situational awareness by allowing me to display unit locations with other geo-spatial information in the portal.	4.91 ± 1.27	4.83 ± 1.19
I found the GIS Browser was responsive to retrieving and displaying new data.	4.92 ± 1.22	4.83 ± 1.20
The GIS Browser allowed me to select the appropriate geospatial layers in order for me to build a customized map.	4.65 ± 1.11	4.77 ± 1.02
I found useful the possibility to set bookmarks of geospatial views.	4.68 ± 1.04	4.77 ± 1.23
Integration with Other Tools in the Portal		
The associated stand-alone applications (i.e. GRID, RFI Manager, Incident Management System (IMS)) were well integrated within my portal	4.92 ± 1.21	4.83 ± 1.20
General		
The training that I received during training week prior to JWID execution was sufficient to complete my assigned tasks.	3.33 ± 1.80	3.92 ± 1.75
The capabilities of the portal to portal trial are an improvement over current capabilities I use.	5.25 ± 1.29	5.25 ± 1.36
This portal to portal trial should be taken to the field in its current configuration.	4.61 ± 1.71	4.96 ± 1.49
The portal to portal process worked well during JWID.	5.59 ± 1.22	5.64 ± 1.44
Overall, the portal to portal CIT provided value-added to perform my JWID tasks. List the specific tasks and how they contributed.	5.33 ± 1.14	5.42 ± 1.50

Portal-to-Portal Interoperability Analysis Results

- CIT 04.05 successfully supported the JWID Objectives on ISR Dissemination as well as on Database Fusion.
- Connected together several portals and shared portal applets within and between portals in a distributed fashion.
- The portals involved used various implementation approaches to provide each participating organization an opportunity to investigate design viewpoints and consider the interoperability implications these methodologies might pose.
- Ottawa participants felt training was marginal to good while other sites were critical about lack of training due to failures of the collaboration service during training week.

Portal-to-Portal Interoperability 2/2
Analysis Results

- COP 21 Portal employed a portfolio concept that worked very well at integrating and displaying a wide variety of information to support situational awareness.
- Was strongly endorsed with positive comments on range and depth of functionality
- Positive feedback on flexibility and utility of the portfolio, portal and search functions
- Integration of applications and ease of access was appreciated by users.
- The visualization portion was moderately successful in demonstrating the fusing of information from various data sources.

Portal-to-Portal Interoperability
Conclusions

- Trial achieved its two planned trial objectives:
  - Sharing portal applications between portal systems was a success
  - The demonstration of advanced visualization capabilities was more limited but was still considered successful
- With time, players became comfortable which quickly increased their confidence in the portal services.
- Need adequate engineering support when fielding any sophisticated technology

Portal-to-Portal Interoperability
Recommendations

- COP 21 Portal could be fielded after modifications.
- The existing version of the portal and its services were deemed suitable as a core service for future experiments and demonstrations.
- The advanced visualization capabilities should be developed further and tested in future trials.
- The COP 21 Portal developers, the COP 21 TD, were encouraged to pursue a strategy that would field the existing portal as quickly as possible.

Trial Background and Objectives

- Also supported the JWID objective on ISR Dissemination
- Based on a technology designed to provide the ability to plan an operation in a net-enabled environment using integrated collaborative tools
- Flexible suite of planning, decision-aid, and workflow management tools
- Can help synchronize the staff workflow, automatically document the decision-making process, and replay the decision-path.

Trial Background and Objectives

- The planning tools help warfighters to sketch courses of action (COAs). The decision-aid tools help the staff to rationalize the planning process, to evaluate and compare the COAs, and rapidly produce documents to support the Commander's decisions.
- Has collaborative tools including chat, white board and a map planner. A context sensitive search engine is also available.

Trial Background and Objectives

1. To demonstrate and evaluate COPlanS as a multi-level workflow management system, a distributed OPP collaborative planning system, a decision support system, and as an information broadcasting system; and
2. Within the JWID environment:
   i. to support distributed planning by multiple headquarters engaged in multiple operations at the operational level;
   ii. to allow coalition HQs to collaborate from different sites; and
   iii. to allow reach back to different sites and support automatic dissemination of properly formatted information (i.e. Operation Orders, Operation Plans).

Data Collection and Analysis Plan

- The analysis plan for CIT 04.08 was based on
  - direct observation of players by the analysis team
  - player feedback through structured surveys
- The data collection was designed based upon metrics identified from the experiment hypothesis and the capabilities of the technologies under trial.
- The trial attempted to quantify these metrics, however, data collection in this experiment was limited and some estimates and approximations were employed.

Data Collection and Analysis Plan

- Both methods were used to:
  - determine the level of situational awareness of the participants
  - characterize the distributed mission analysis activity process
  - assess the quality of the staff assessment and quality of the information brief
  - estimate the improvement to the decision-making process and decision quality in this trial

Results from CIT 04.08 1/2

Question	Week 1 Ave ± Std Dev	Week 2 Ave ± Std Dev
Calibration		
In general, distributed collaboration is useful for conducting the operational planning process (OPP) collectively.	5.47 ± 1.61	5.47 ± 1.68
In general, the operational planning process provided in COPlanS corresponds to my understanding of that process.	6.00 ± 0.88	5.79 ± 1.13
Synchronization and Situational Awareness		
Situation awareness within our group was improved using COPlanS compared to existing tools.	4.84 ± 1.57	4.42 ± 1.26
The synchronization of the staff was improved using COPlanS to execute OPP activities compared to existing tools.	4.84 ± 1.38	4.63 ± 1.64
COPlanS improved the tempo of the decision making within my group.	4.11 ± 1.20	4.00 ± 1.49
COPlanS improved the quality of the decision making within my group.	4.42 ± 1.35	4.63 ± 1.46
Distributed Mission Analysis		
COPlanS supported the distributed mission analysis activity effectively.	4.84 ± 1.46	4.63 ± 1.01
COPlanS helped to improve the quality of the staff assessment and the information brief.	4.79 ± 0.92	4.79 ± 1.08

Results from CIT 04.08 2/2

Question	Week 1 Ave ± Std Dev	Week 2 Ave ± Std Dev
Full Scale Course Of Action (COA) Development		
COPlanS allowed me to collaborate effectively in planning activities with the national and coalition partners at other sites.	3.79 ± 1.69	4.47 ± 1.65
COA Comparison, Brief and Decision		
COPlanS was effective in supporting COAs comparison in a distributed environment.	4.63 ± 1.64	4.84 ± 0.96
COPlanS was effective in supporting the production of an online decision-briefing.	4.68 ± 1.73	4.89 ± 1.70
COPlanS helps structure and improve the process for deciding on a COA.	5.21 ± 1.69	5.21 ± 1.36
General		
The training that I received during training week prior to JWID execution was sufficient to complete my assigned tasks with COPlanS.	2.79 ± 1.32	3.32 ± 1.34
The on-line help provided with COPlanS was sufficient to complete my assigned tasks.	4.21 ± 1.55	3.79 ± 1.08
The scenario and MSELs were appropriate for the COPlanS trial plan and worked well during JWID.	3.68 ± 1.60	3.74 ± 1.19
The capabilities provided by COPlanS are an improvement over current capabilities I use. Describe the capabilities you currently use.	4.74 ± 1.52	4.74 ± 1.33
COPlanS should be taken to the field in its current configuration.	3.58 ± 1.61	3.16 ± 1.61

Analysis Results

- Found to be effective and improve the quality of the staff assessment and the information brief
- Primarily enhanced the sharing of ISR products as the scenario was not well suited for testing the dissemination of planning products
- Improved situational awareness compared to existing tools as well as team synchronization in the planning process
- Although not seen to improve the tempo of the planning process in this trial, it was judged to provide some improvement in the quality of decisions.

Conclusions

- The COPlanS technology is still developing.
- The overall feedback was positive.
- More development is required to prepare this tool for operational use.
- Comments were received that COPlanS should be trialed in a different scenario with more time available for mission planning.
- Players require significant training in preparation for trials using such a complex tool.

Recommendations

- COPlanS should be considered for operational employment after some further development.
- The development should include improvements to the user interface and to the collaboration services.
- Plans should be made for future trials that employ a more suitable scenario for mission planning and provide more time to conduct planning and the opportunity to test effectiveness of the tool in the dissemination of the products.

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Strategy for Integration into the Canadian Forces Joint Concept Development and Experimentation Plan

- CFEC's role
- Plan Pegasus 04 Implications
- USJFCOM's Pathways
- Potential Way Ahead for CFEC

CFEC

- CFEC was established with the specific mission to lead the exploration and evaluation of emerging concepts to determine the capabilities required by the DND/CF in the future.
- CFEC sponsors or champions activities that relate directly to the accomplishment of this mission.
- Mission Statement:

  As the Centre of Excellence for Joint CD&E, CFEC will lead the exploration of emerging concepts and the experimentation of capabilities that support CF transformation.

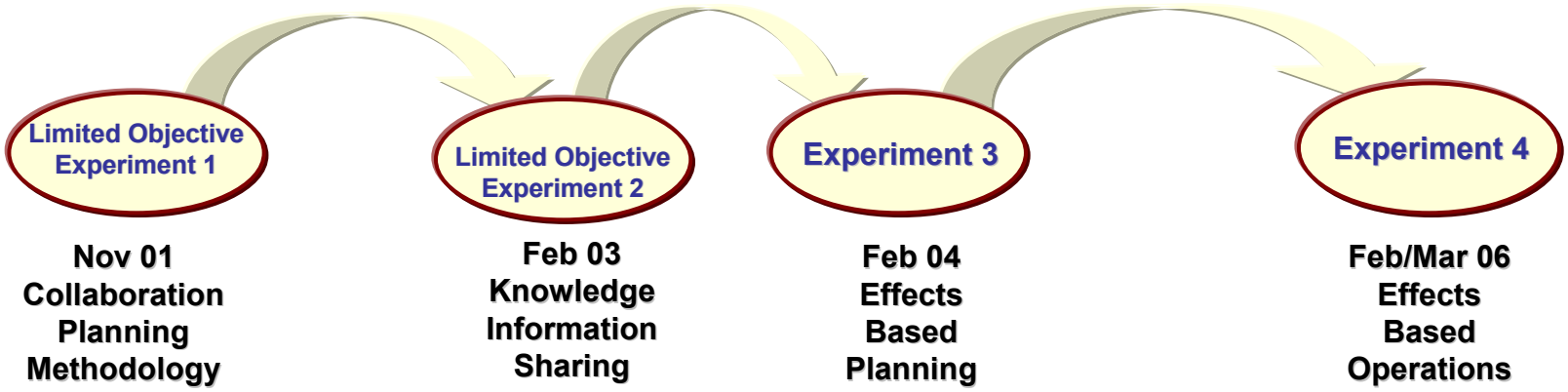
Plan Pegasus 04

- *Plan Pegasus 04* is the CF's strategic plan that details intended JCD&E activity for the coming year and outlines intentions for the next several years.
- It describes the major concepts under development at CFEC.
- CFEC's C2 experimentation objectives are to investigate C2 interoperability issues at the operational level and both internally and with external security partners.

Plan Pegasus 04 2/2

- CFEC's C2 experimentation campaign plan will focus on national involvement in multinational events such as the MNE series, JWID 04, and the CWID series starting in 2005.
- JWID/CWID series focus on near term (one to five years) concepts and implementation strategies associated with information sharing and collaboration.
- MNE series investigates near to mid term (five to ten years) concepts and implementation strategies for Effects Based Approaches to Security and Defence within a multinational coalition.

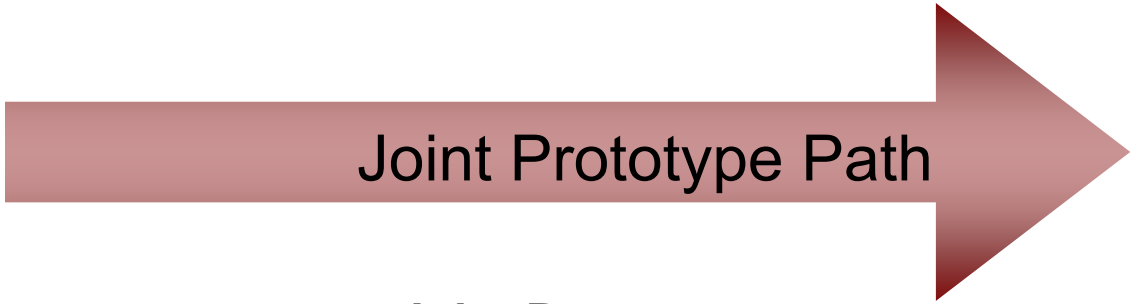
Multinational Experimentation Strategy



USJFCOM's Joint Pathways

Joint Concept

A Joint Concept is a visualization of future operations that describes how a commander might employ capabilities to achieve desired effects and objectives.



Joint Prototype

A Joint Prototype is a model suitable for evaluation of design, performance, or production potential. It can be an idea, process, organization, planning method, product, or tool.

Potential Way Ahead for CFEC

- CFEC needs both concept development and prototyping venues to evolve the products associated with concept development.
- Although the events in the MNE series are part of J9's prototype pathway, they are generally concept development opportunities for the other nations.
- It is therefore proposed that CWID, an environment traditionally for prototypes about to be taken into operational use, could also be suitable for prototype products from concept development environments.

Conclusions 1/2

- The case studies highlighted two technologies that have potential for concept development experiments.
  - The COP 21 Portal provided a capability for net-centric operations for an operational level headquarters. CFEC subsequently considered using the COP 21 Portal in their Knowledge Management experimentation for MNE 4 and has since acquired the COP 21 Portal for further experimentation.
  - COPlanS was proposed for use in MNE 3 with consideration for employment in MNE 4. The reconfigurable features of this application allow it to be applied to any planning process.
- Subsequent to a successful concept development experiment, tools should be trialed in CWID again for validation prior to integration into operational systems.

Conclusions 2/2

- CWID provides opportunities for exposing prototypes to the operational community.
- However, there are limitations:
  - No single event can meet all the requirements of the CD&E community.
  - Likewise, both pathways are needed to produce well-rounded concepts and tools.
- With careful planning, venues such as CWID and MNE4 can be used iteratively to progress CD&E in the joint environment.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