



Distributed Simulation for Training: Promises, Barriers and Pathways

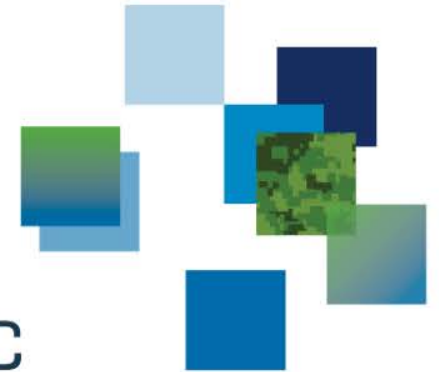
Dr. Jerzy Jarmasz, Dr. Blake Martin

Defence Research and Development Canada

Toronto Research Centre

NATO MSG 159 Symposium, Ottawa, 11-12 Sept 2018

DRDC | RDDC



Outline

- Distributed Simulation for training:
 - What is it?
 - Why do it?
 - What is Canada doing?
- Technology Adoption and Barriers
 - What we have observed
 - A framework for understanding barriers adapted from Reid (2014)
- Pathways to better adoption to distributed simulation for training
- Some conclusions

Quick primer on distributed simulation for training

- The use of multiple simulators at remote locations, interconnected via data networks (e.g., the Internet), to create a common synthetic environment across these locations for collective training
- Can use centralized (e.g., Distributed Mission Operations Centre aka DMOC) or de-centralized architectures
- Many standards and protocols (e.g., Distributed Interactive Simulation/DIS, High Level Architecture/HLA) available to ensure consistent experiences and interoperability across sites
- Pioneered by the US Air Force, has been progressively adopted by many Services, nations and organizations (e.g., NATO's First WAVE events)

The Promises: Why use distributed simulation for training

■ General to simulation:

- Perform training difficult or unsafe to do live
- Avoid wear & tear on operational equipment
- Access to performance data & metrics difficult to obtain live
- Potential for AI-assisted training (tutoring, automated measures, synthetic role players)

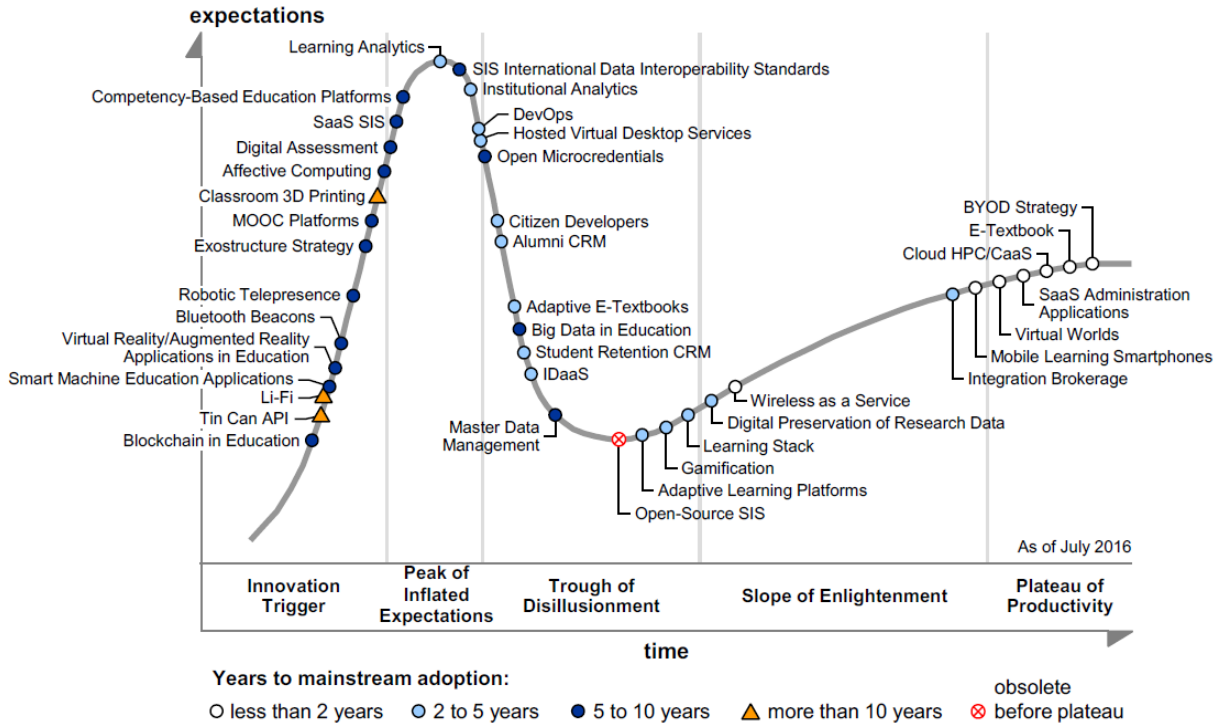
■ Specific to distributed simulation:

- Reduce travel costs & time away from home, local burden on staff & resources
- New opportunities to enhance Joint or Coalition effectiveness and interoperability
- Practice sensitive collective manoeuvres in a “secure” environment
- New opportunities for team performance feedback & After Action Review (AAR)

Canadian picture

- RCAF:
 - Advanced Distributed Combat Training System (ADCTS) and Canadian Advanced Synthetic Environment (CASE)
 - DMOC capability, used in Exercise Virtual (EV) Series
- Navy: participated in EV16 & EV17, developing a DMOC capability
- Army: extensive experience with collective training with co-located simulation (Ex Unified Resolve series), developing distributed capability
- Joint: Early design of distributed system architecture (Rafei & Vallerand, 2006), best practices, regular distributed events (e.g., JOINTEX series) at Joint Warfare Centre

Challenges of instructional technology adoption



Gartner Hype Cycle for education (2016)

- Adoption of new training is not a smooth road
- Even after a tech is in use it can face “growing pains”
- Unclear where distributed sim for training is in terms of acceptance

Some anecdotal evidence for barriers

- Unclear training objectives
- Insufficient local resources to support events (Ex planning, design, role players)
- Distributed AAR technology not mature
- LVC integration not mature
- Challenges integrating simulators despite existing standards (DIS, HLA)
- Technology not always updated
- Inadequate access to simulators
- Challenges in coordinating planning team objectives, vision across multiple sites.
- Difficulty of managing systems remotely
- Concerns around network security
- Negative perceptions of distributed simulation
- Lack of time and opportunities to gain experience, understanding of distributed sim
- Lack of expertise in employing distributed simulation, variable expertise in employing sim technology in general

A framework for barriers, adapted from Reid (2014)

Technology	Access Reliability Complexity
Process	Project management; add TNAs, training objectives, instructional design, assessment/evaluation Support for users (trainers and trainees) Instructor training/education around tech
Administration	Control of tech (procurement, authority over) Institutional strategy/policy for tech Perceptions of effort requirements
Environment (organizational)	Organizational change Tensions between organizational and training system goals Legal issues Organizational perceptions of tech effectiveness
Faculty → Training Stakeholders	Instructor use of tech (skills & knowledge, self-efficacy) Resistance to change/perceptions of tech effectiveness

Applying the framework to distributed simulation

Category	Observed Barriers (selected)
Technology	Challenges in applying existing distributed simulation standards Distributed AAR, LVC integration not mature Technology not always updated Inadequate access to simulators
Process	Lack of collective event methodology, including unclear training objectives Challenges in coordinating planning team objectives, vision across multiple sites
Administration	Personnel and resources: insufficient local resources due to high cost, competing demands Difficulty of managing systems remotely
Environment	Concerns around network security Unclear buy-in from chain-of-command in certain training communities
Training Stakeholders	Negative perceptions of distributed simulation Lack of expertise in employing distributed simulation, variable expertise in employing sim technology in general

Solutions: Looking at Barriers as pathways

Category	Solutions
Technology	Apply best practices for managing, applying technology R&D to improve Distributed AAR, LVC integration, etc. with user-centred design
Process	Institutionalize Professional Development for Distributed Sim R&D to further develop collective training theory R&D on tools for collective training support (e.g., scenario generation)
Administration	Institutional commitment to providing resources for distributed sim Develop policies & strategies supporting distributed sim Research to understand true cost & value of distributed sim
Environment	Top-down buy-in Concerted institutional effort at culture change Research on training effectiveness of distributed simulation
Training Stakeholders	PD to improve instructor skills, self-efficacy R&D on training support tools (e.g., automated measures, content authoring)

Conclusion

- Reid's adapted framework proved useful for making sense of the barriers to distributed simulation for training
- Most of the barriers are not technological
- Some solutions will be technological, many will not
- Solutions in one category may address barriers in others
- Pathways to improved distributed simulation for training involve both applying best practices and continued R&D
- Conducting a more systematic study of barriers and pathways using the framework (Canada & NATO) could help advance distributed simulation from Trough of Disillusionment to Plateau of Productivity

DRDC | RDDC

SCIENCE, TECHNOLOGY AND KNOWLEDGE
FOR CANADA'S DEFENCE AND SECURITY

SCIENCE, TECHNOLOGIE ET SAVOIR
POUR LA DÉFENSE ET LA SÉCURITÉ DU CANADA

