



Machine Learning-Enabled Narrative Search in the Information Environment

Bruce Forrester, Valcartier Research Centre

Shadi Ghajar-Khosravi, Toronto Research Centre

Suzanne Waldman, Centre of Operational Research and Analysis





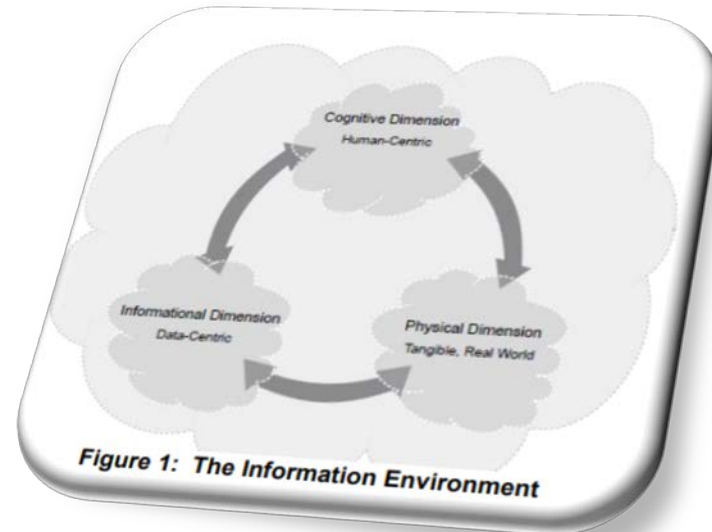
The military importance of the IE

New information technologies have significantly reduced the spatial, temporal and information gap between troops and command and controls. Frontal clashes of large groups of troops (forces) at the strategic and operational level are gradually a thing of the past. Remote non-contact impact on the enemy becomes the main way to achieve the goals of the battle and operation.

--General Valeriy Gerasimov

We need to detect previously unseen patterns in complex social media data...and respond to changes in the information environment in real time.

--Gen J. Votel, U.S. Special Operations Command, 2016



From US
Joint Concept
for Operations
in the
Information
Environment,
2018



Narrative dynamics in the public IE

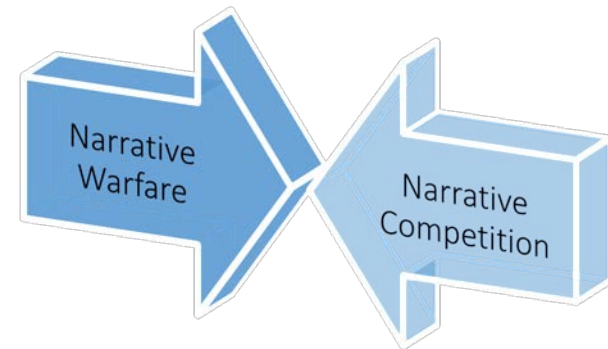
In the Battle of Narratives, the role of technology and media is essential to coordinate and mobilize otherwise dispersed groups of audiences, and to gain domestic, international and in theatre attention and support for political goals and military objectives...

By using new media technologies to frame the context of the battle... actors present themselves as moral subjects with legitimate claims and thereby shape the perceptions and behaviour of relevant audiences.

--Thomas Nissen

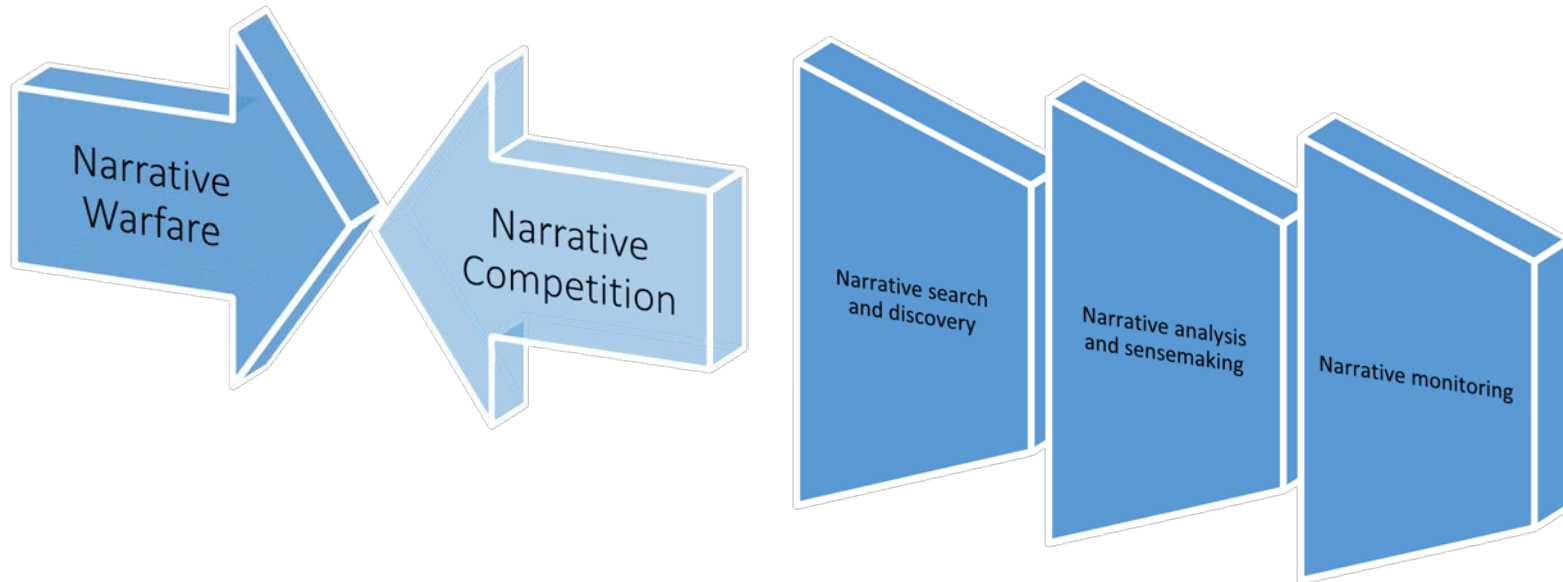
Narrative is the primary force that determines success within the cognitive dimension of warfare.

--U.S. Joint Force Commander's Handbook for Strategic Communications and Communication Strategy 3.0



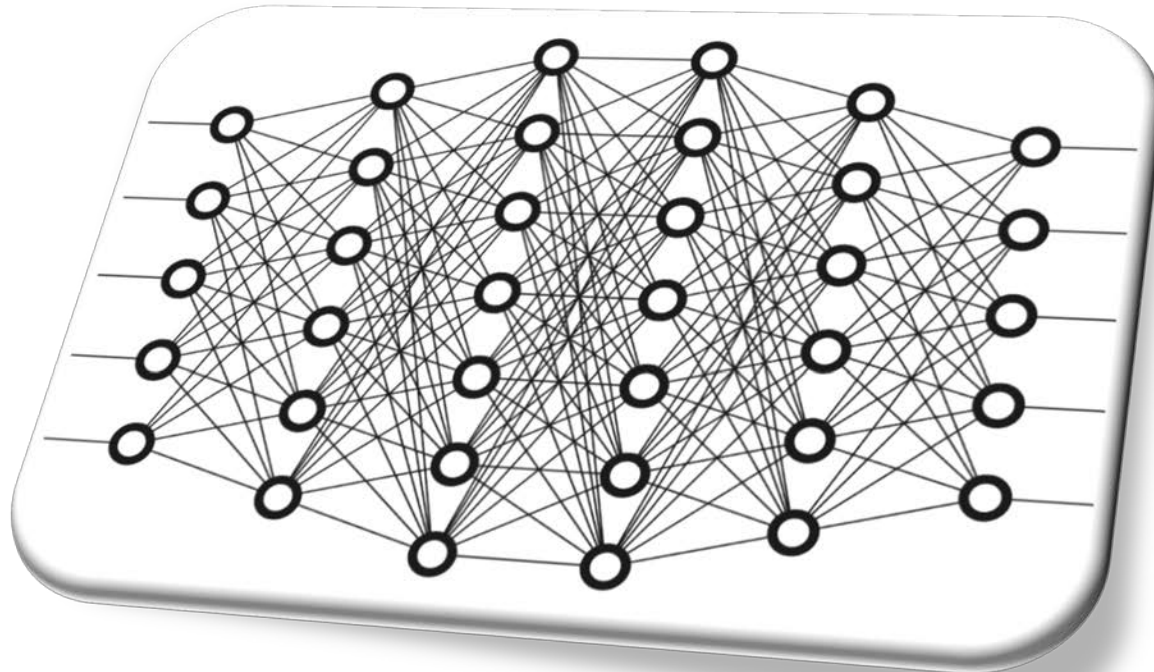


Narrative capabilities



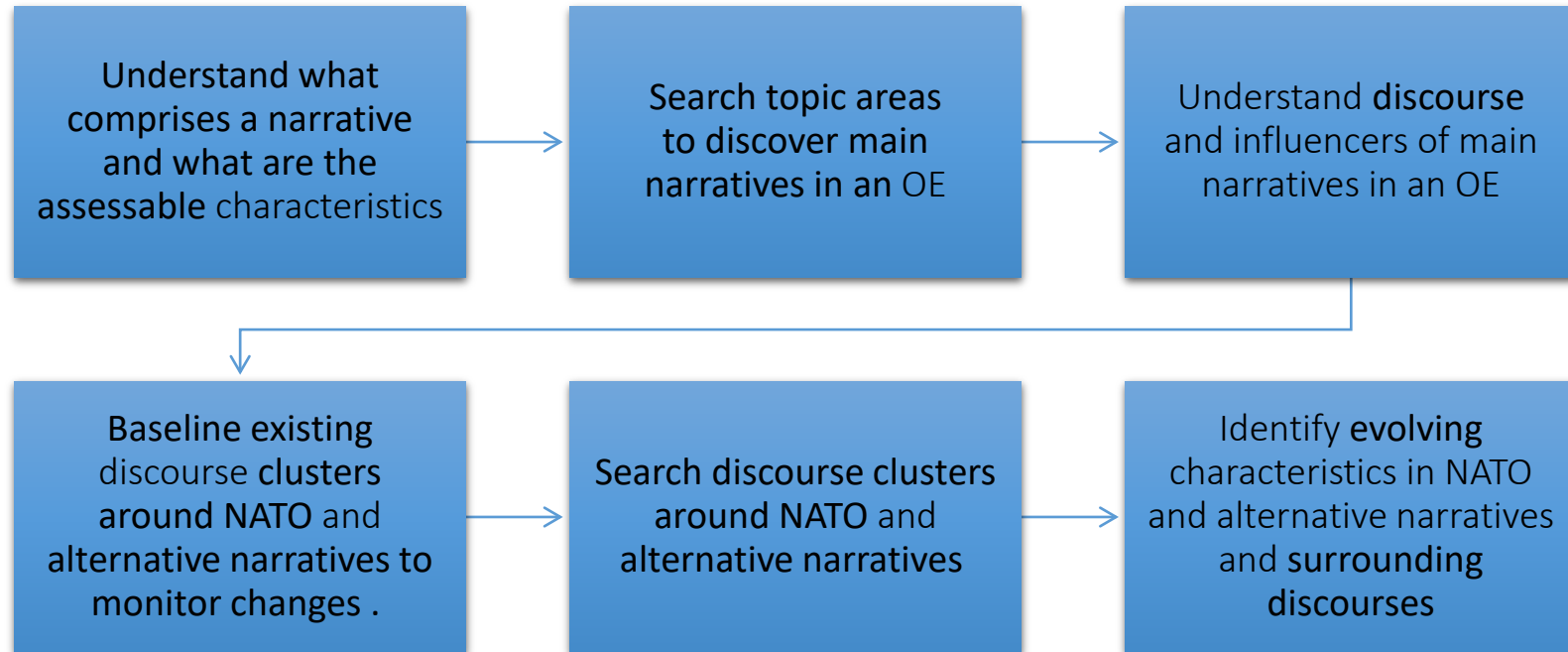


New possibilities and challenges with AI



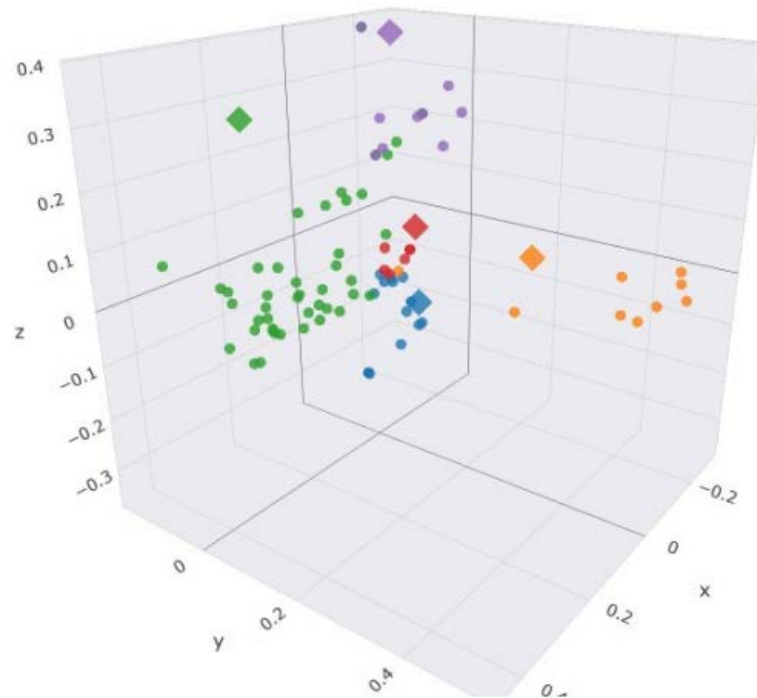


Towards validation of a machine learning engine





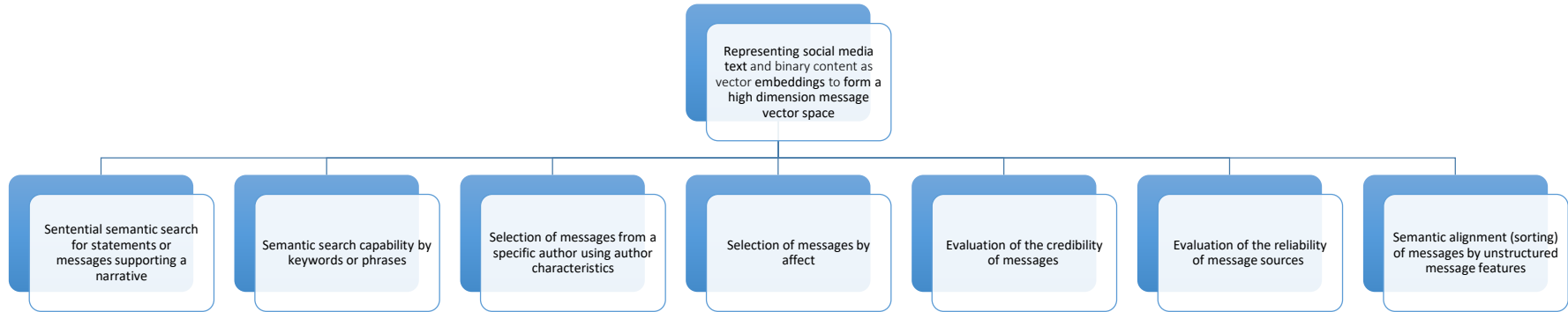
Description of our Machine Learning Engine



- ◆ Confederate symbols must come down in Charlottesville
- ◆ March to unite the right in Charlottesville
- ◆ March against racism, hatred, bigotry and violence in Charlottesville #ANTIFA
- ◆ Who's really to blame for the Charlottesville massacre
- ◆ Stand up to the racism, hatred, bigotry and violence



Description of our Machine Learning engine





Proposed narrative cluster validation process

1. Use a well-known dataset or topic area that has already undergone detailed analysis



2. Input the dataset into the ML engine to produce a message vector space



3. Identify a first cluster of messages within a specified cosine distance to each other.



4. Identify a second cluster 'close' to the first and a third cluster 'far away'



5. Perform a detailed analysis of the clusters with a known analysis tool or qualitative method



6. Note similarities and differences between the clusters



7: Repeat using data based on a single event or wider topic area until confidence is reached



Discussion and follow-on research

How similar are messages within a single cluster?

How well do discourse clusters reflect narrative?

What are the differences with individual messages that make them appear in a different cluster?

How will the ML engine handle messages that cover two or more narratives?

What are the users' explanation requirements for a better understanding of how the clustering engine is working?

What explanation techniques are most suitable for supporting users' understanding of narrative clusters?



Questions?

Bruce Forrester bruce.forrester@forces.gc.ca

Shadi Ghajar-Khosravi shadi.ghajar-khosravi@forces.gc.ca

Suzanne Waldman suzanne.waldman@forces.gc.ca