

# With All Your Knowing Get Understanding

## Conceptual Interoperability and the Net-Centric Value Chain

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# Introduction and Special Thanks

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- This work represents the opinions of several researchers, at the PhD and PhD-Candidate level, at VMASC. It is supported not only by pure research, but also by several cases of applied research in the fields of both C2-C2 and C2-M&S interoperability.
  - Work and Research requirements prohibit either of the two authors from attending CCRTS this year, however the findings are graciously being presented by [Maj. Kevin Galvin](#) (UK), DEC (GM) but embedded with QinetiQ to provide SME support.
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# Roadmap to the Presentation

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- The paper seeks to accomplish a few things
    - Present the Levels of Conceptual Interoperability Model
    - Present the Net-Centric Value Chain
    - Show how, at the various levels of value, in a Net-Centric enterprise, increasingly conceptual levels of interoperability are required between the organizations of that enterprise, and their information sharing processes
  
  - The presentation will follow this same flow
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# Part I – What is Interoperability and Why do I Need it?

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1. Effects Based Operations requires support from Agile Organizations
2. Agile Organizations have Agile Information System Needs
3. Interoperability with Meaning

# Effects Based Operations requires support from Agile Organizations

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- It is pretty well established (Alberts, Hayes, etc) that satisfying the requirements of Net-Centric Warfare will require Agile Organizations
  - Agile Organizations are those that are required to combine and re-combine (all the while self-synchronizing) in order to satisfy the needs of effects based operations
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# Agile Organizations have Agile Information System Needs

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- Just as traditional organizations require a number of different information systems to provide for their information needs, so Agile Organizations have a similar need
  - However, as an Agile Organization may need to rely on other Agile Organizations to satisfy a mission, they may need to combine a number of different information systems to provide for their operational needs
  - Production and Consumption of data inside of a Net-Centric enterprise must be supported by ease of interoperability
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# Interoperability with Meaning

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- In order for an agile organization to gain value from all of this information system interoperability, the exchanged information must be charged with conceptual meaning
  - How do we measure the level of that meaning?
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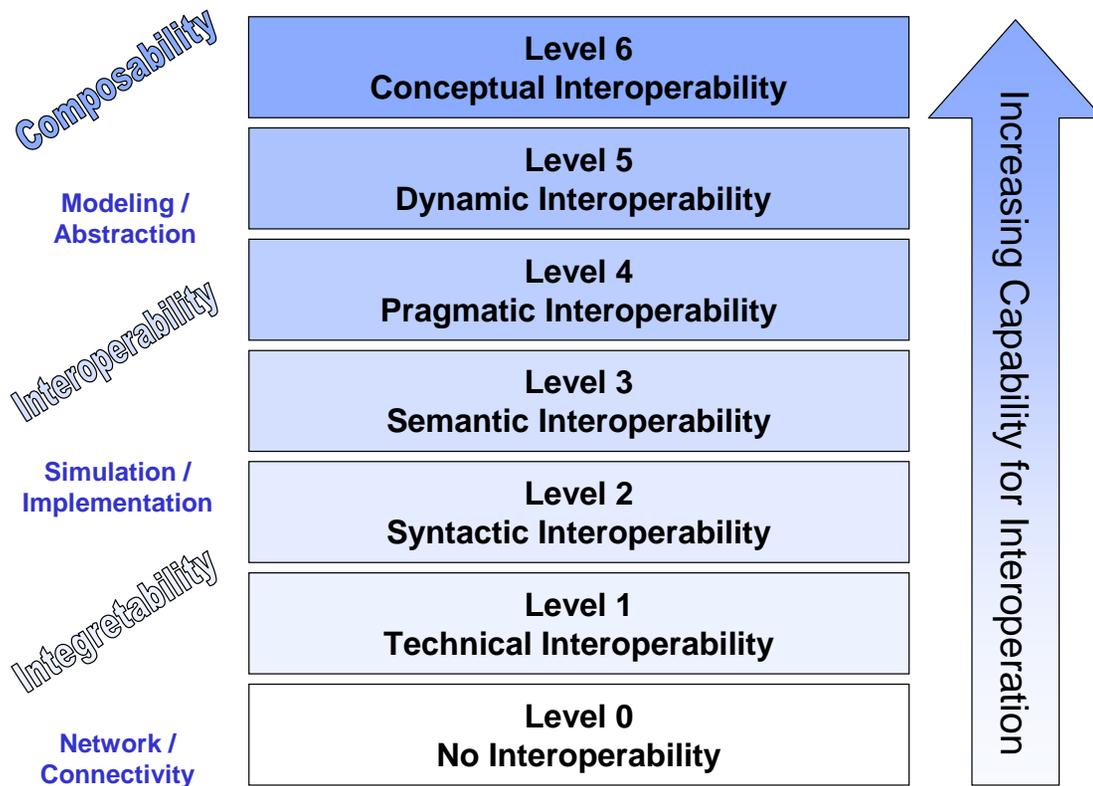
# Part II – Levels of Conceptual Interoperability

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1. Levels of Conceptual Interoperability Model
2. Integratable, Interoperable, Composable

# Levels of Conceptual Interoperability Model

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# Integratable, Interoperable, and Composable Systems

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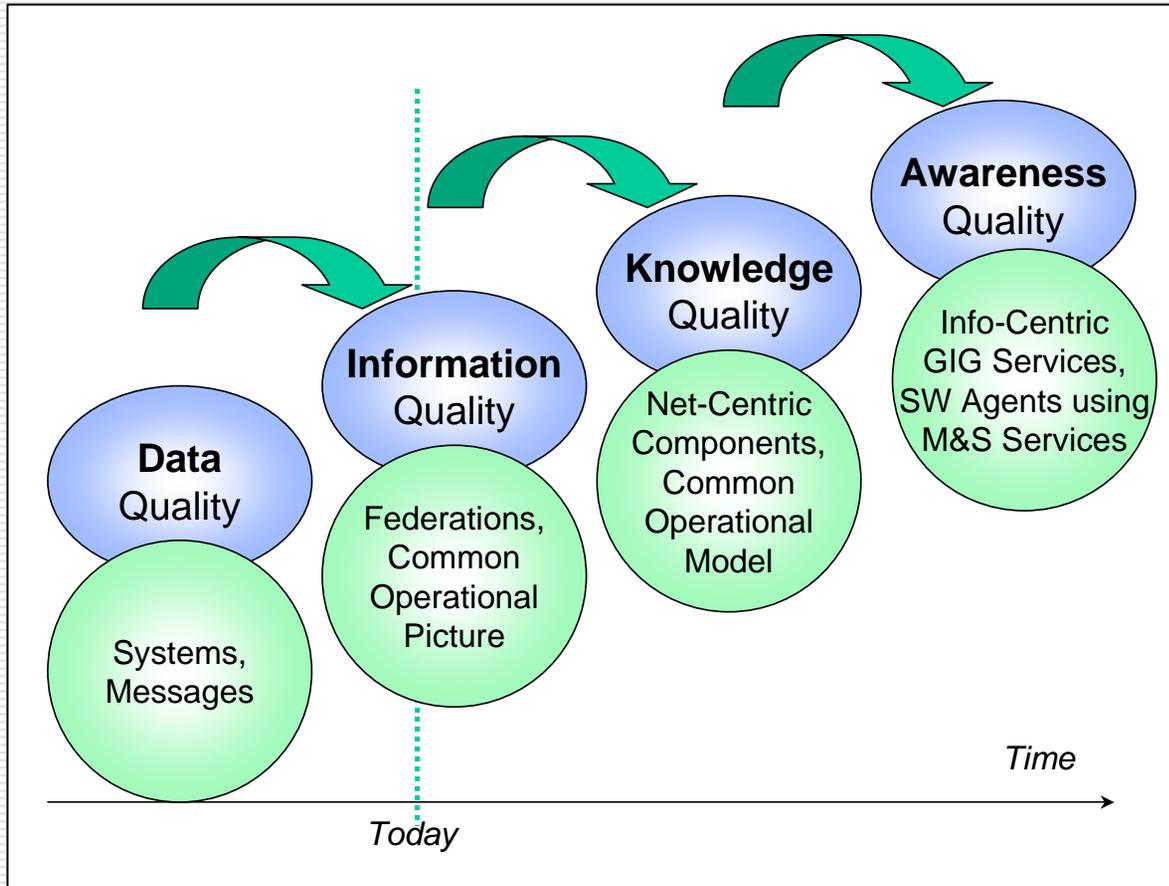
- At the Technical and Syntactic levels, systems can be integrated – they can exchange data and have some expectation of standard format and method of exchange
  - At the Semantic and Pragmatic levels, systems begin to be interoperable – they can exchange data with some expectation of meaning
  - Finally, at the Dynamic and Conceptual levels, systems become composable into meaningful supersystems that are able to make full use of all information passed between them
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# Part III – Net-Centric Value Chain

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1. Net-Centric Value Chain
2. Interoperability between organizations
3. Data Quality Organization
4. Information Quality Organization
5. Knowledge Quality Organization
6. Awareness Quality

# Net-Centric Value Chain



# Interoperability between organizations

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- The Net-Centric Value Chain shows the value of awareness that results from increased levels of interoperability between organizations
  - The systems that support these organizations, as the handlers of the data, information, and knowledge being exchanged must have increased interoperability
  - We believe there is a relationship between the LCIM and the Net-Centric Value Chain
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# Data Quality Organization (No Interoperability of systems)

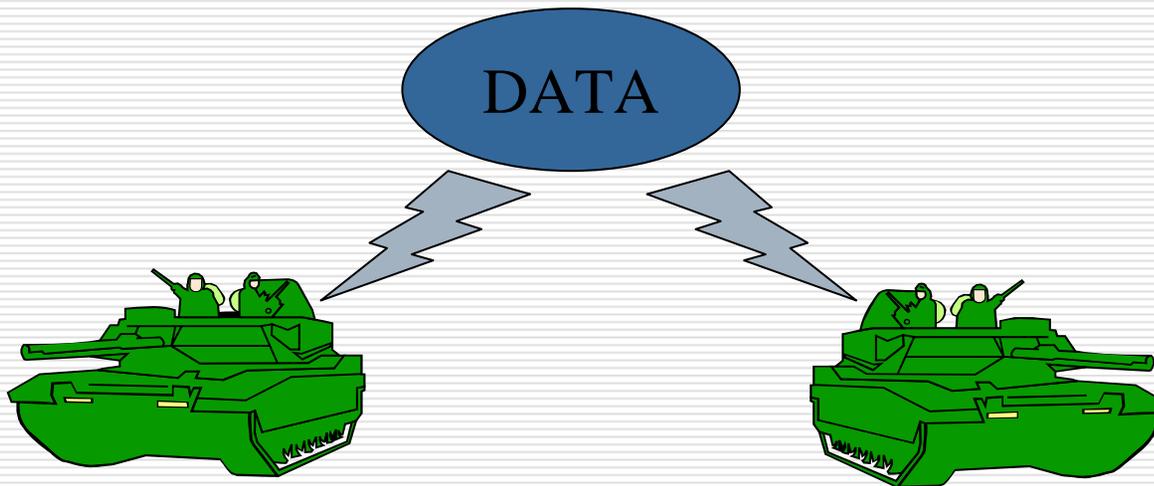
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- ❑ Achieving Data Quality for a Net-Centric organization means that it is only has access to the Data that it can produce, it is not yet interoperating with other organizations
  - ❑ This is the equivalent of Level-0 interoperability in the LCIM (i.e. – no interoperability)
  - ❑ The Organic systems of the unit may be capable of higher levels of interoperability WITHIN the unit, but not with other units (limiting its net-centric, or agile, reorganization and self-synchronization ability)
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# Information Quality Organization (Integratability of systems)

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INFORMATION QUALITY INTEROPERABILITY



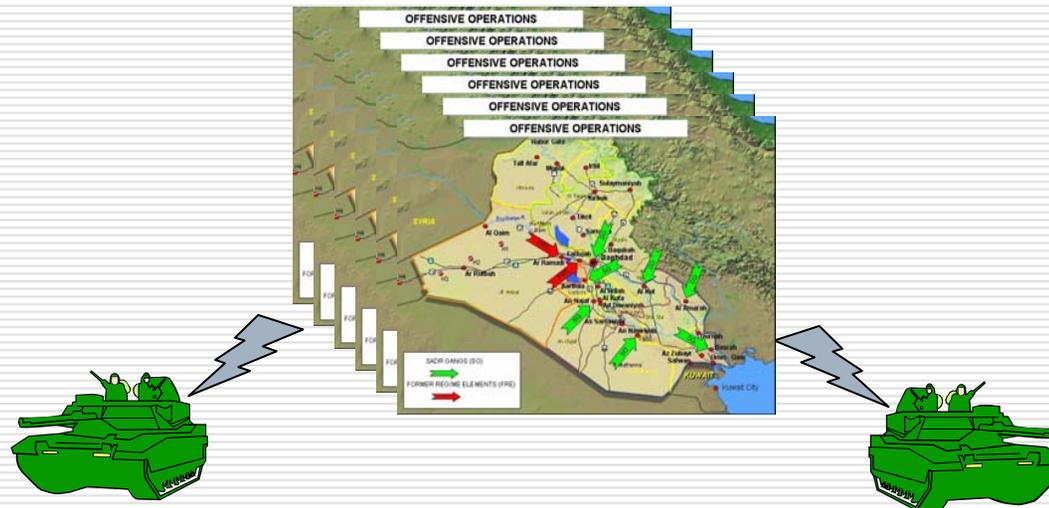
Information Quality organizations may exchange Data with Each other, but are still required to transform that Data into Information with their own Organic Systems

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# Awareness Quality (Composability of Systems)

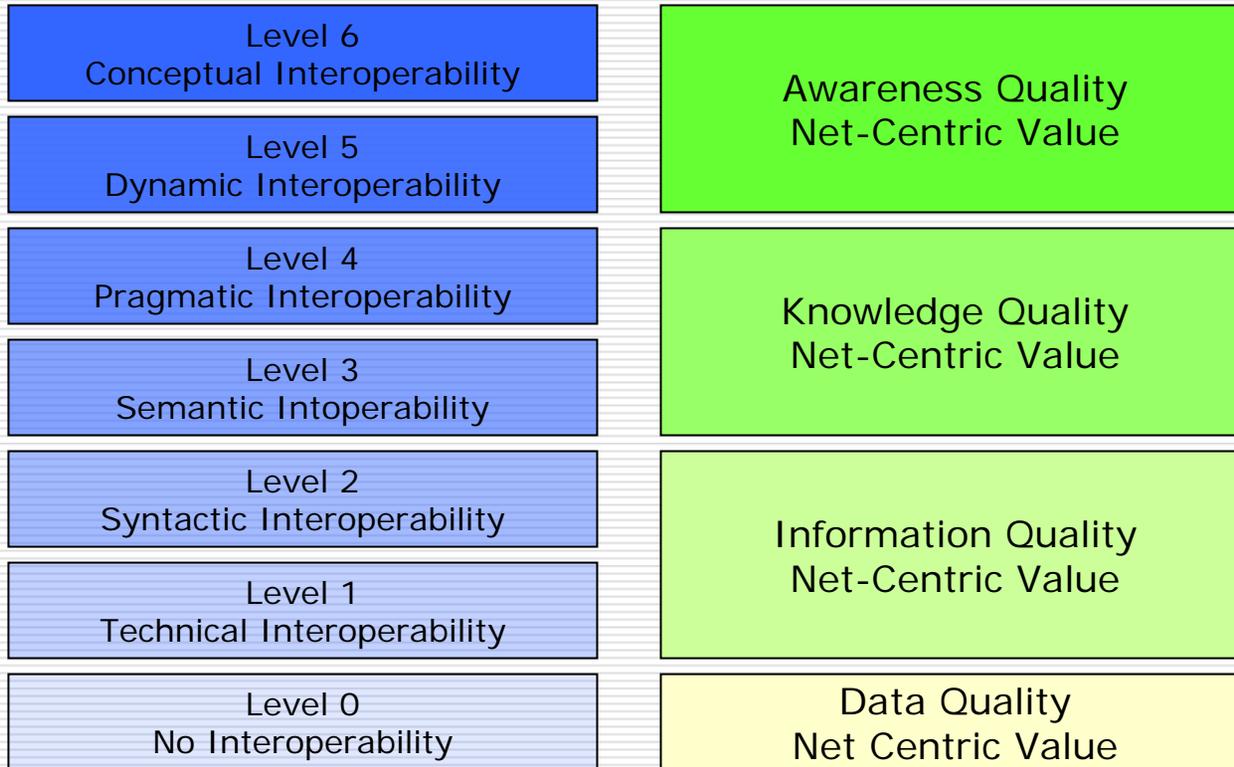
## AWARENESS QUALITY INTEROPERABILITY



Awareness Quality organizations exchange Knowledge  
With each other, and have full understanding of the Knowledge  
And understanding of the future implications of its use

# Levels of Conceptual Interoperability/Net-Centric Value

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# Any Questions?

## Please contact the Authors

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