A Framework for Warfighter Information Services – using the Concept of a Virtual Knowledge Base.

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Aims

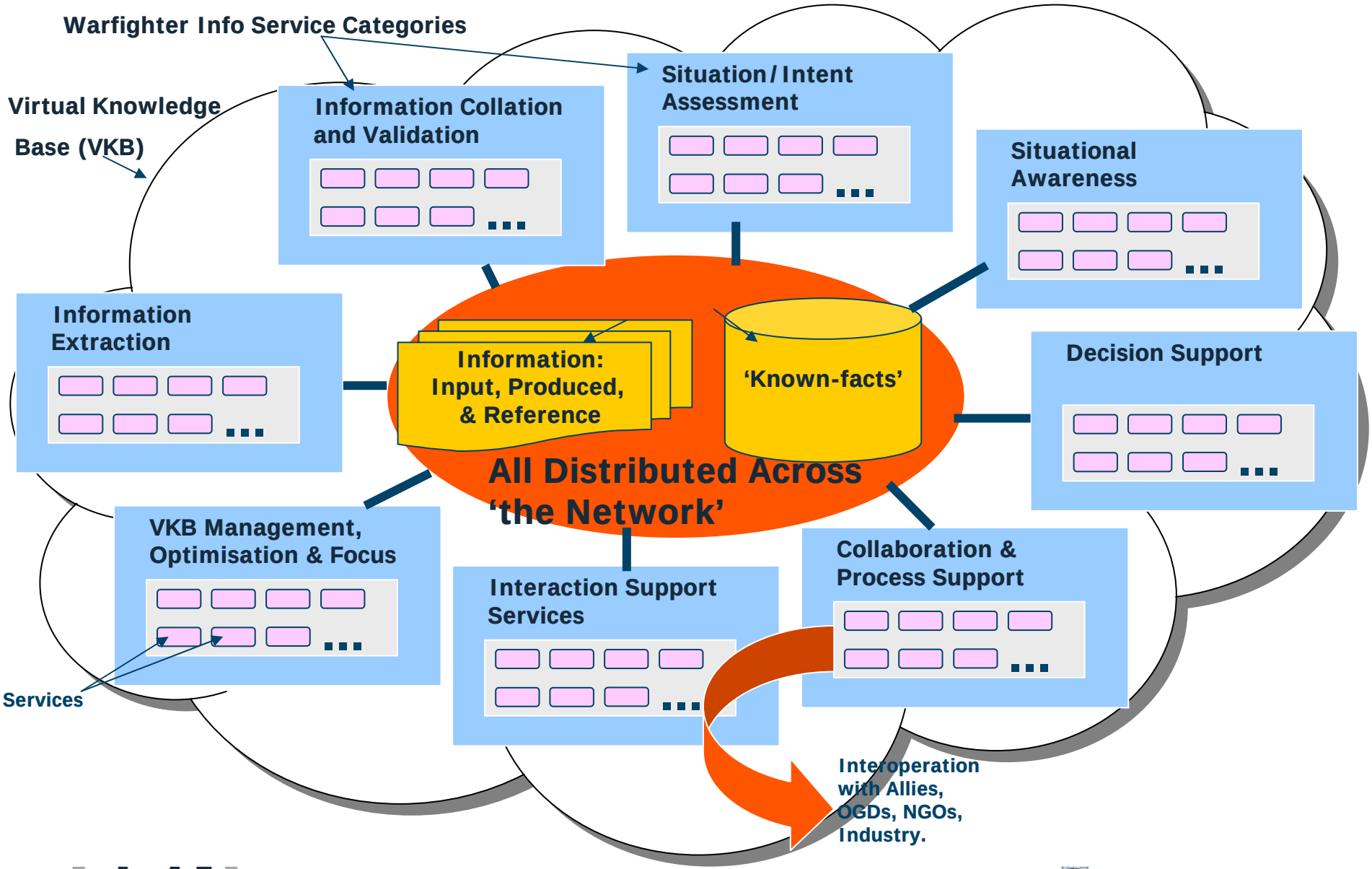
- Better use of available information and intelligence for decision-making.
  - Decisions based on all available info/knowledge in the network[1].
- Without information overload.
- Break down information stove-pipes between user-domains.
- Service re-use across different user-domains.

[1] Subject to security authorisation.

Roots

- MOD Interim “Inform Concept” introduced concept of a Virtual Knowledge Base, stimulating research efforts.
- JDL Model of Information Fusion
- Consideration of needs of Intelligence Community
- W3C, OMG, DoD and NATO standardisation of “SOA core services”.
- Service-Composition approach to military functional-services.

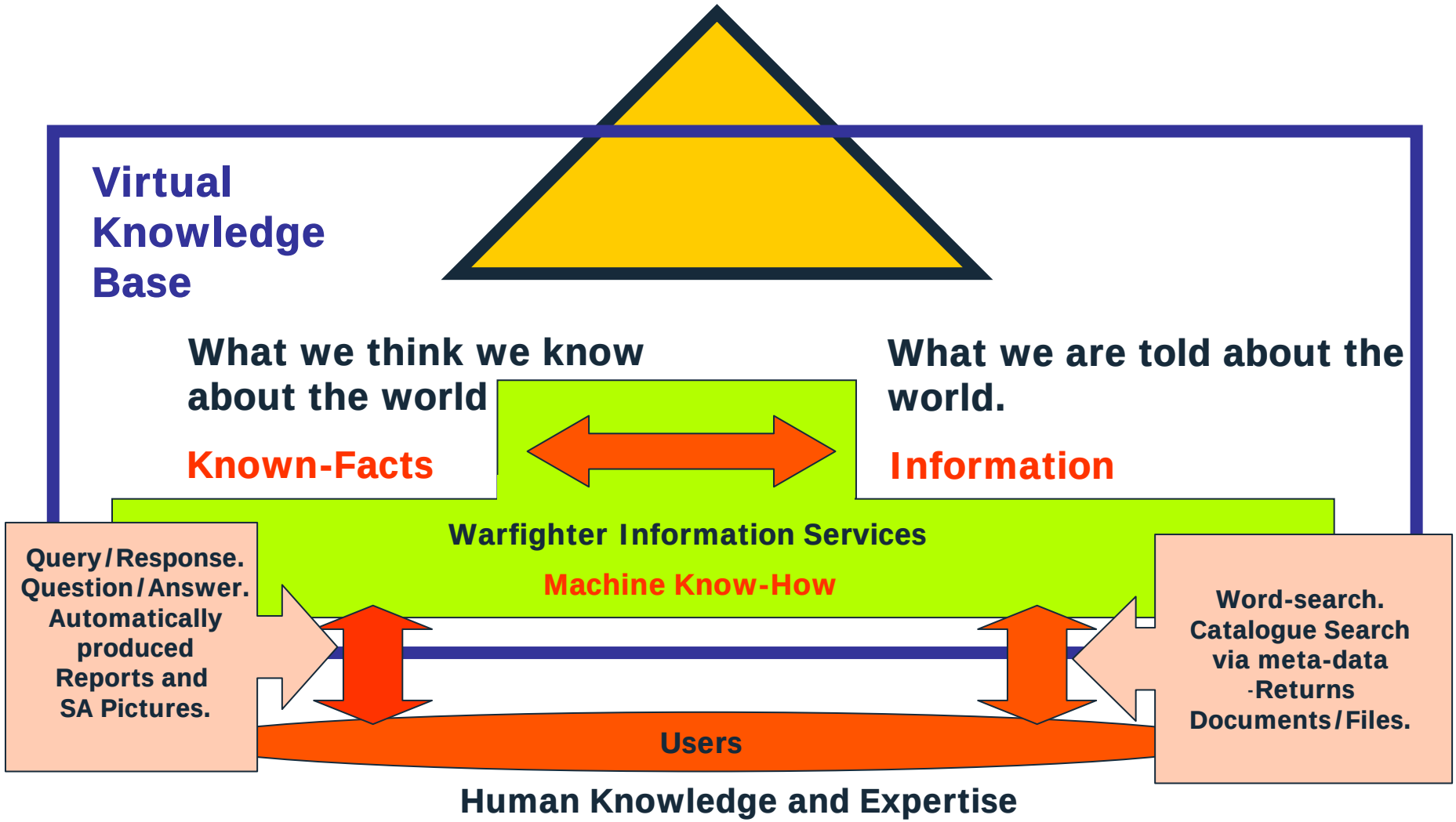
Warfighter Information Services Framework



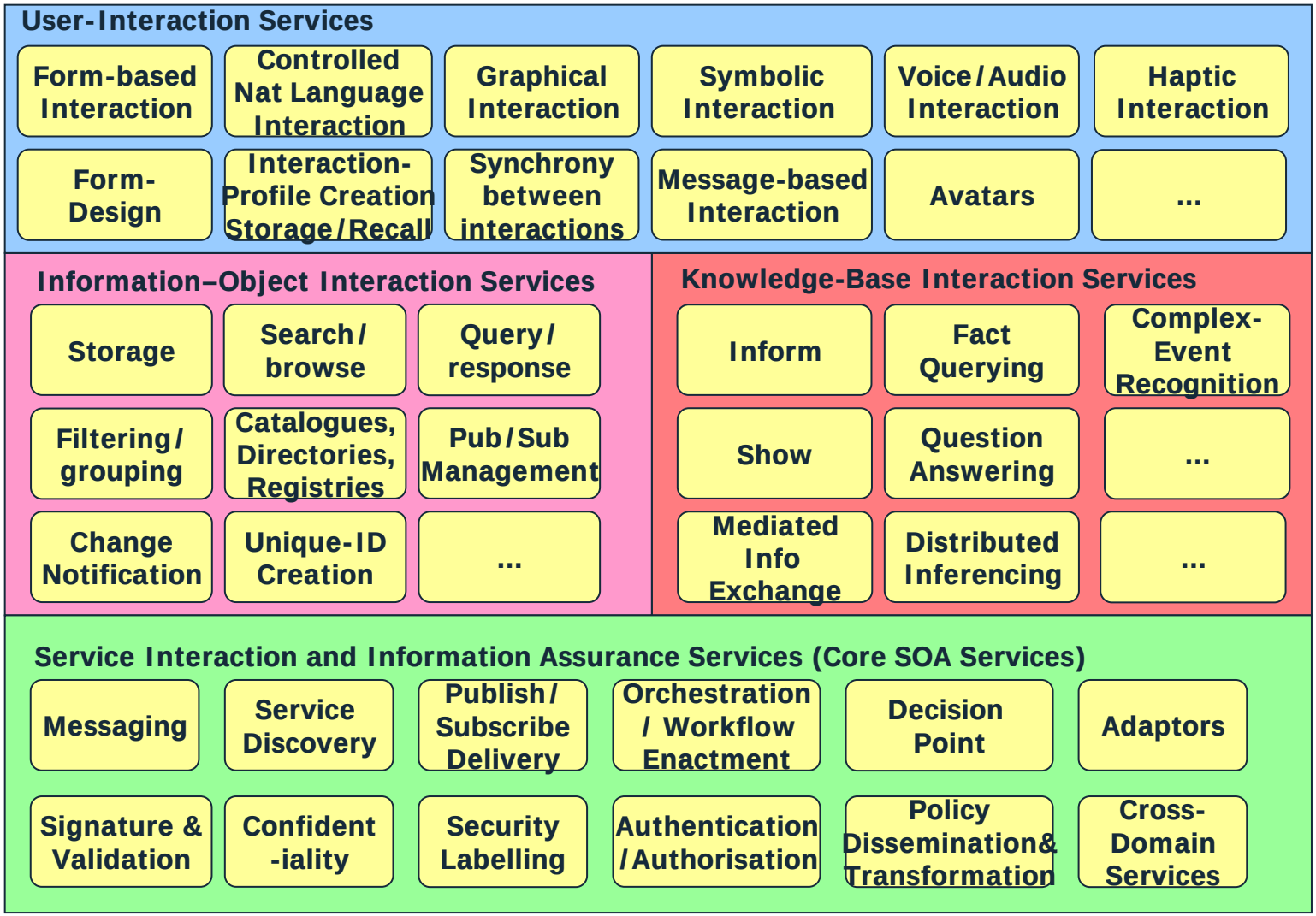
Definitions

- Information:
  - What we are told about the world through communications.
- Knowledge:
  - What we think we know about the world: a representation of how we believe the world is, was, will be, or could be.
- ‘Known-fact’ (a.k.a Proposition):
  - A statement with a subject, predicate and object which can be asserted or declared to be true or false, with a number of qualifications which clarify its context.
  - Propositions are the atoms of knowledge through which we can build complex representations of the world.
  - For further details see ICCRTS paper #186 “Human and Machine Interactions with Knowledge Bases”, SE Bray, Jun 2010.

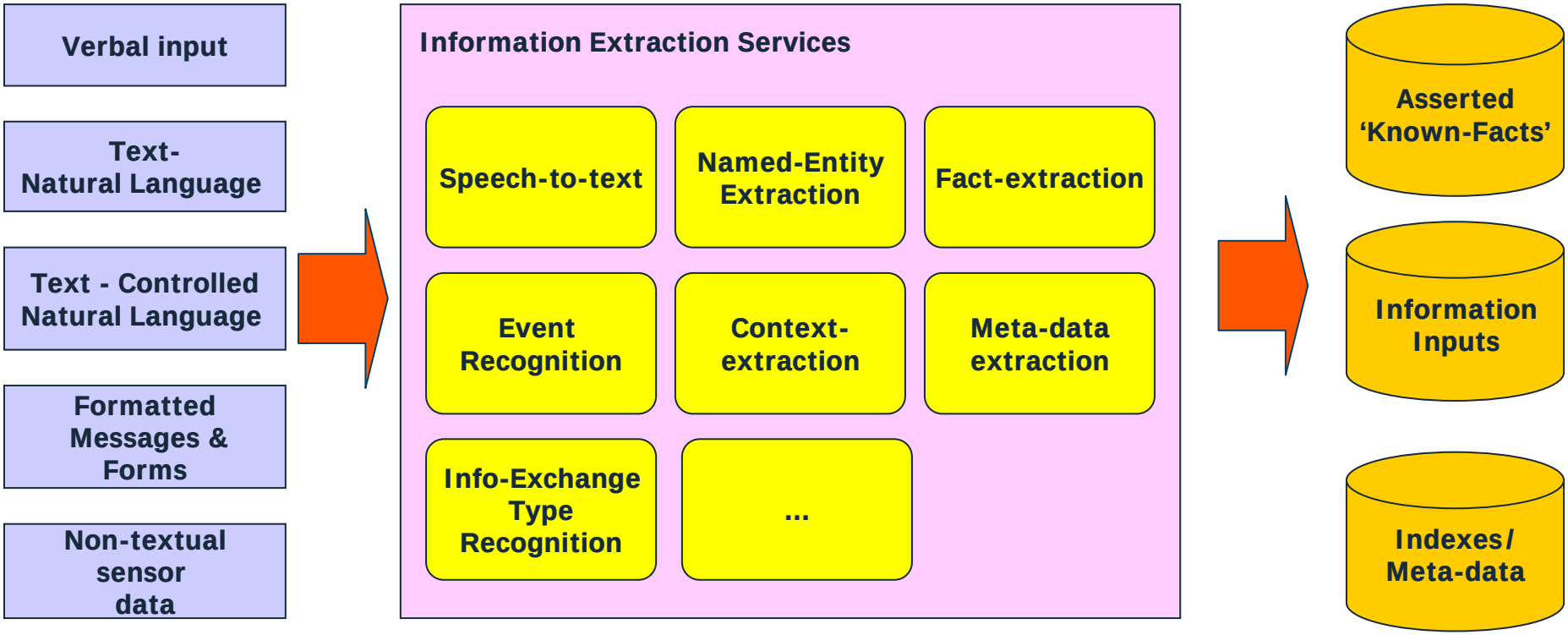
Human-Machine Teaming



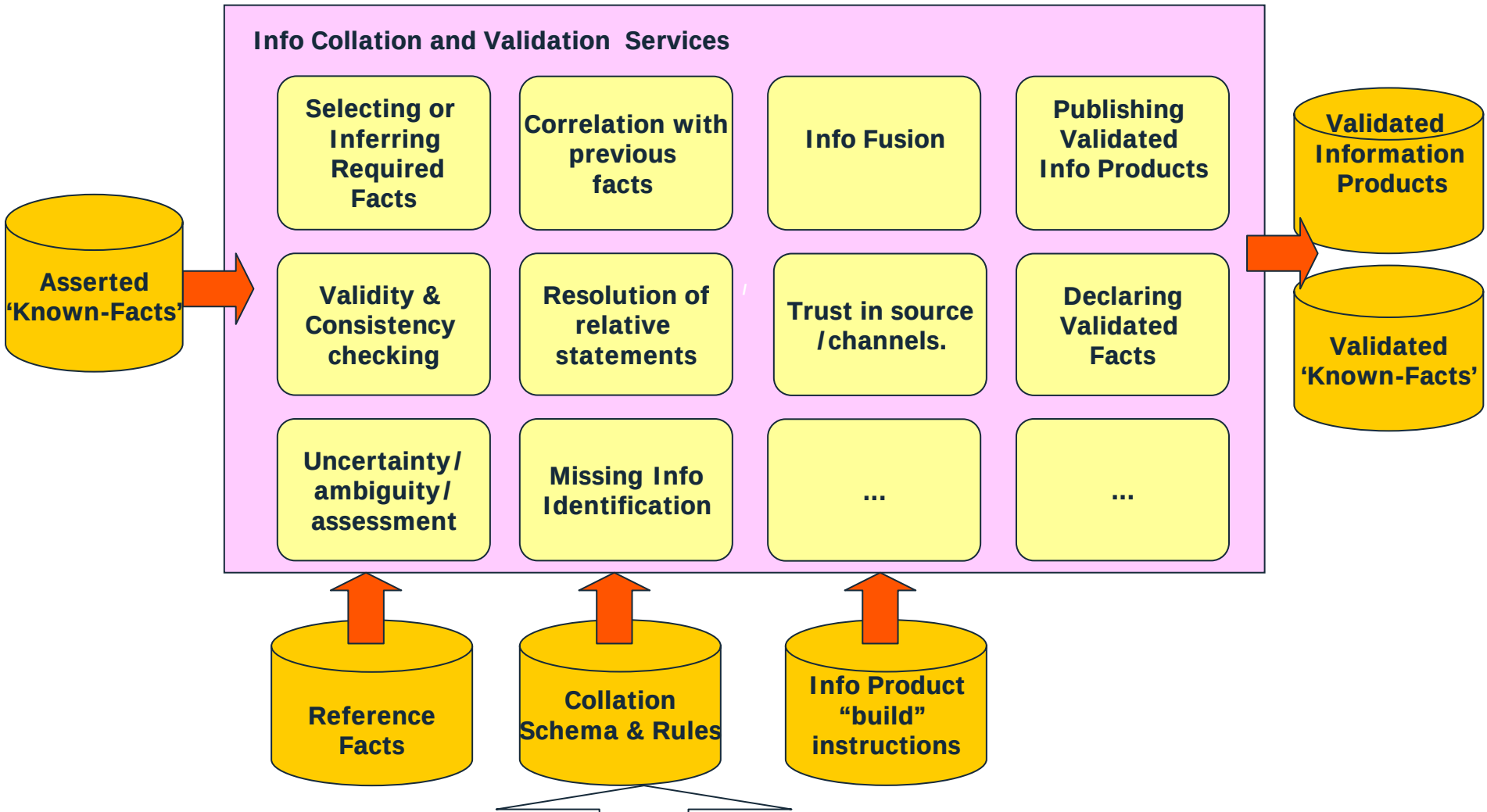
Interaction Support Services



Information Extraction

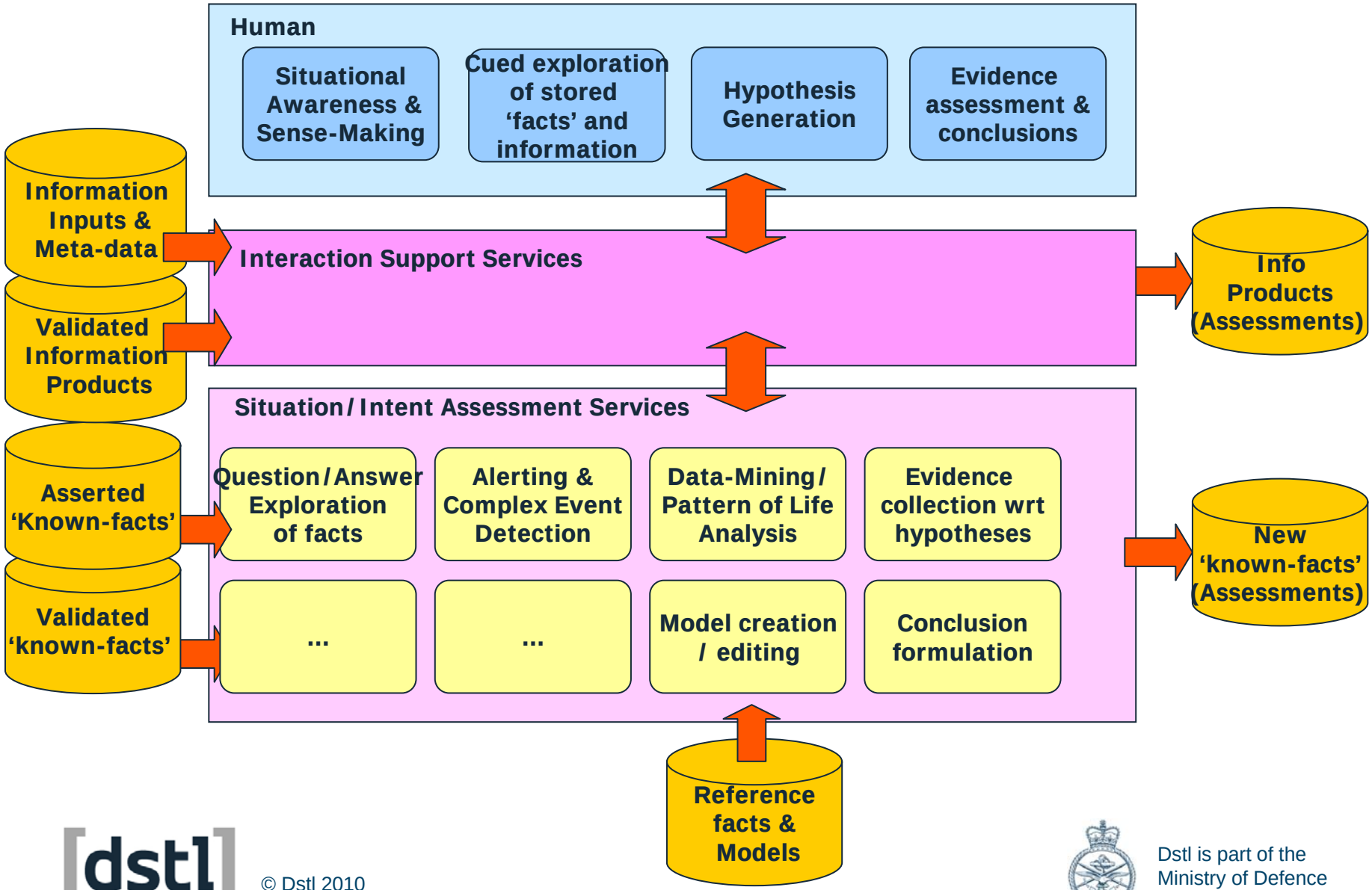


Information Collation & Validation

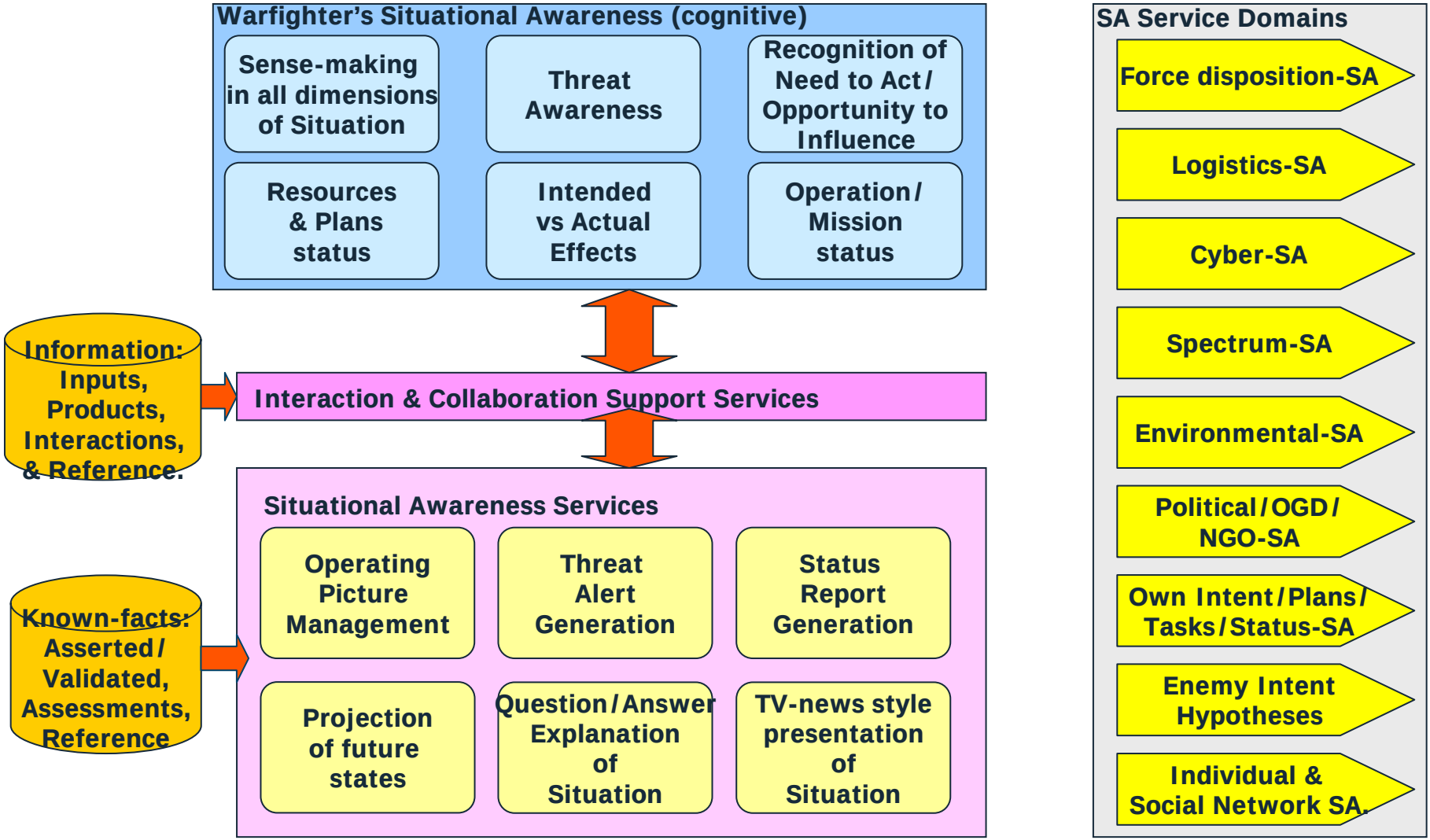


What a community wants to know, and how they wish to represent it, validate it and assimilate it.

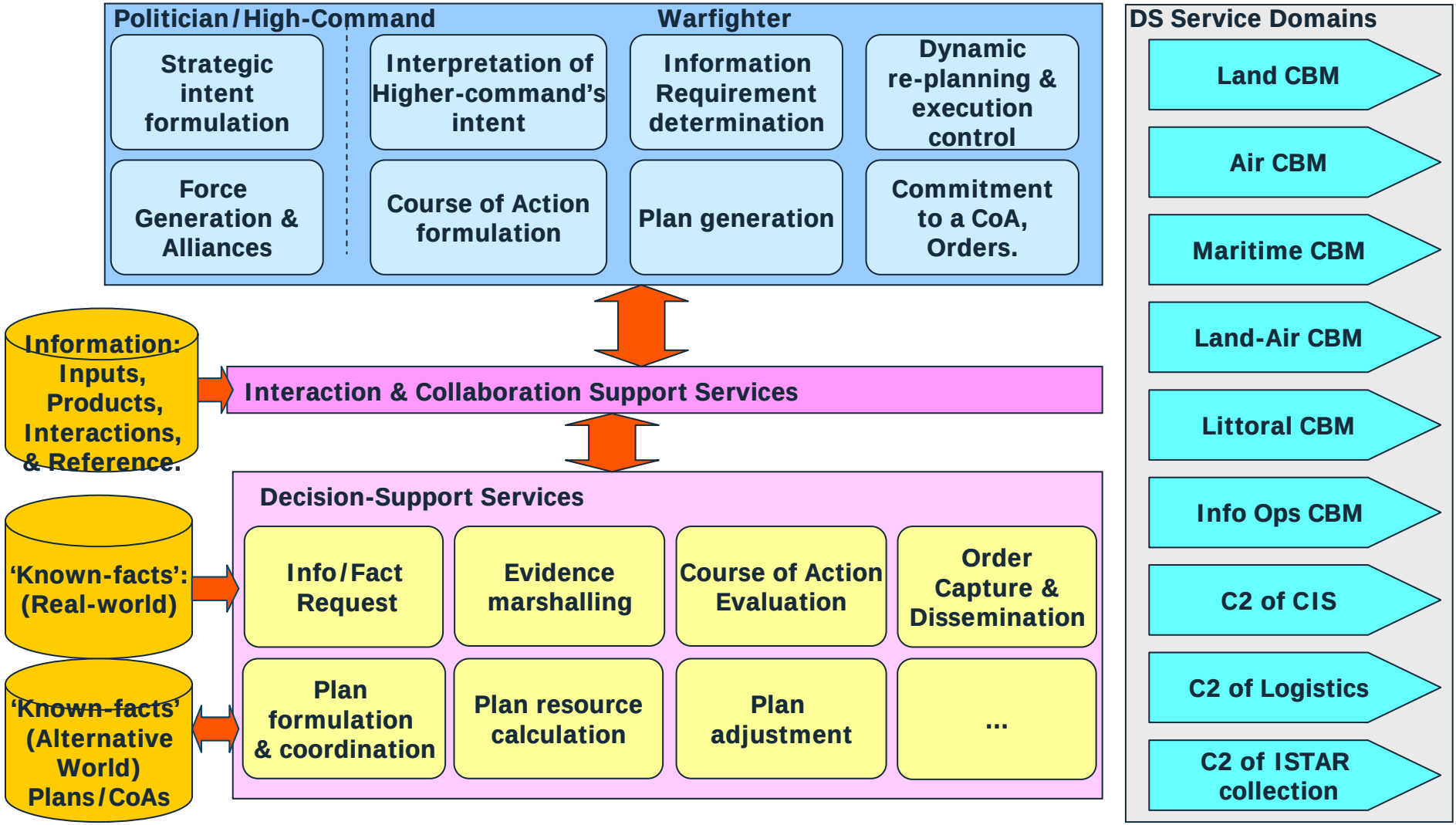
Situation/Intent Assessment - Human-Agent Team



Situational Awareness



Decision Support



Implications of this approach

(1) Cost-reduction should be possible in the delivery of IM/IX capability, and capabilities that depend on this, namely Situational Awareness, Logistics, and Decision Support.

(2) A vast improvement on current capability to access information and use it to military effect in a timely manner.

(3) A revolutionary new capability to exploit information, by harnessing the power of machine reasoning (in services) and Human-Machine Teaming.

(4) Increased capability to manage information flows over networks (responsive to operational priorities).

(5) An increased ability to configure the available infrastructure (networks and information services and security mechanisms) in a “plug-and-play” manner, and hence delivering operational agility for the deployment of CIS.

Research Challenges

- Consensus on a common-language for the expression of known-facts in communication between services of this framework.
- Fact-extraction : robustness, ease of use …
- Question-Answering: reliability, speed, mental-model capture …
- Articulation and portrayal of ‘known-facts’ to users: how to do selection, arrangement into a logical “story”, portrayal in different modalities …
- How to operate services acting on distributed ‘known-facts’ efficiently and resiliently over military networks in a near real-time fashion.
- How to optimise the distribution of services and information/’known-facts’ to minimise network loading yet provide the specified level of resilience.
- Understand the impact of the VKB concept on network capacity requirements.
- How to manage the development and deployment of services and schema by multiple parties on a large scale.
- How to maximise the effectiveness of Human-Machine Teams.