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KMDI

COMCONF

Supporting the DIME/PMESII/ASCOPE/ICR2 framework of Military OPLAN by Artificial Intelligence

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NKE-KMDI

Ph.D Research subject:

Military OPLAN supported by AI

With regard to strategic military planning, the use of AI is intended to play a crucial role in PMESII (Political, Military, Economic, Social, Infrastructure, Information) methodology and evaluating the expected impact of the planned Course of Action (COA).
The objective of my research will extend to explore and present these possibilities.

One State decides to influence another State

with

Effects-based operations (EBO)

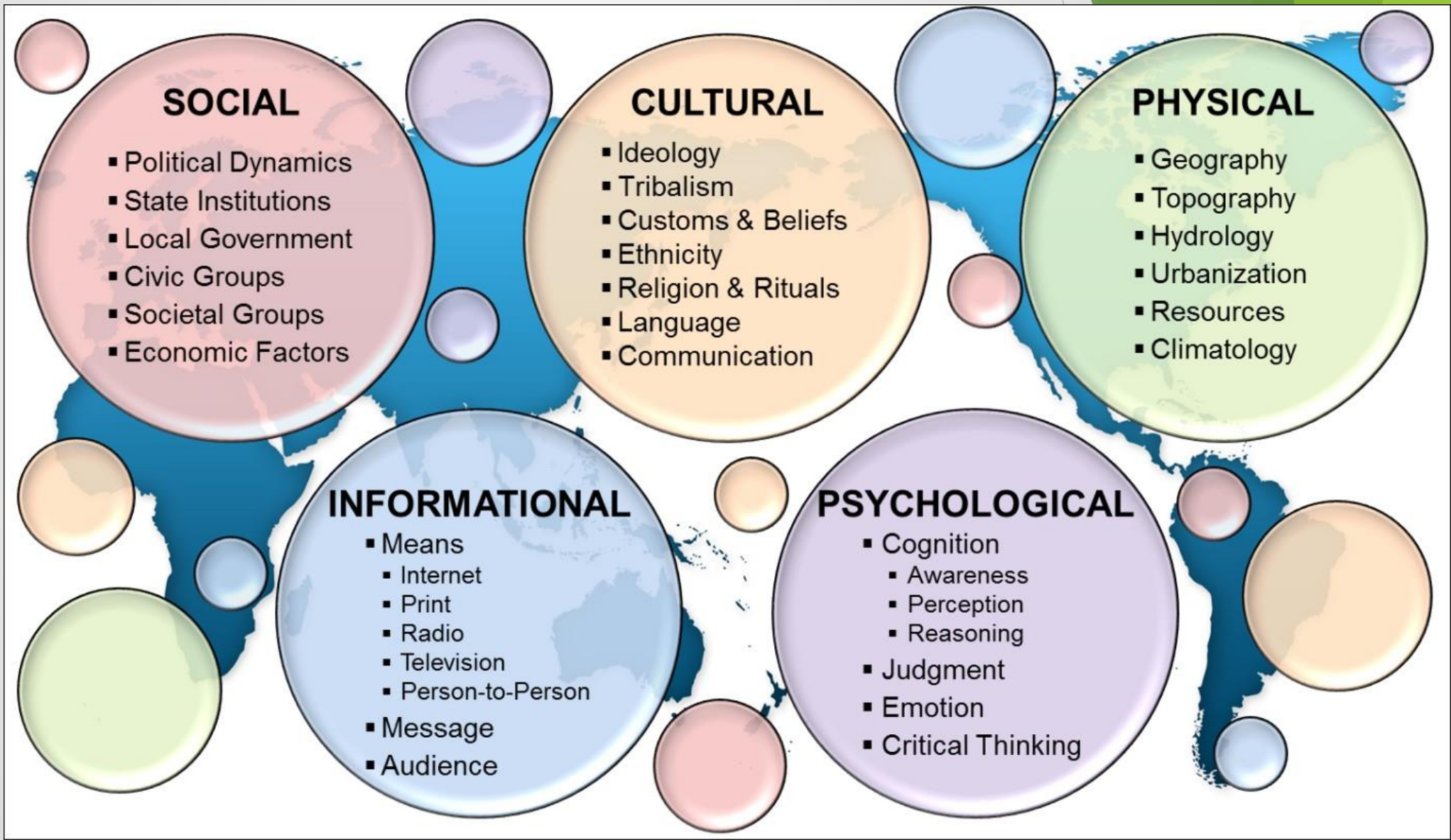
- a methodology for planning, executing, and assessing operations to attain the effects required to achieve desired national security objectives.

-a holistic view - considers the full range of direct, indirect, and cascading effects

EBO - effects that may - with different degrees of probability - be achieved through diplomatic, psychological, military, or economic actions (*DIME actions*).

EBO's system-wide view considers not just military effects, but also political, economic, social, information, and infrastructure effects (*PMESII effects*)

Understanding the Operational Environment – Key to Success



Source: Sociocultural Aspects (U.S., 2015)

The evaluation of the expected impact of the planned COA is built along the DIME/PMESII/ASCOP framework

- The DIME: Diplomacy, Information, Military and Economy.

- PMESII describes the operational environment in six domains: Political, Military, Economic, Social, Information and Infrastructure.
- ASCOPE encompasses Areas, Structures, Capabilities, Organization, People and Events.
- In addition, the aspects of information collection requirements (ICR) and information capabilities requirements (ICR)

We can refer to as DIME/PMESII/ASCOP/ICR2.

PMESII – The interconnected Operationa Environment

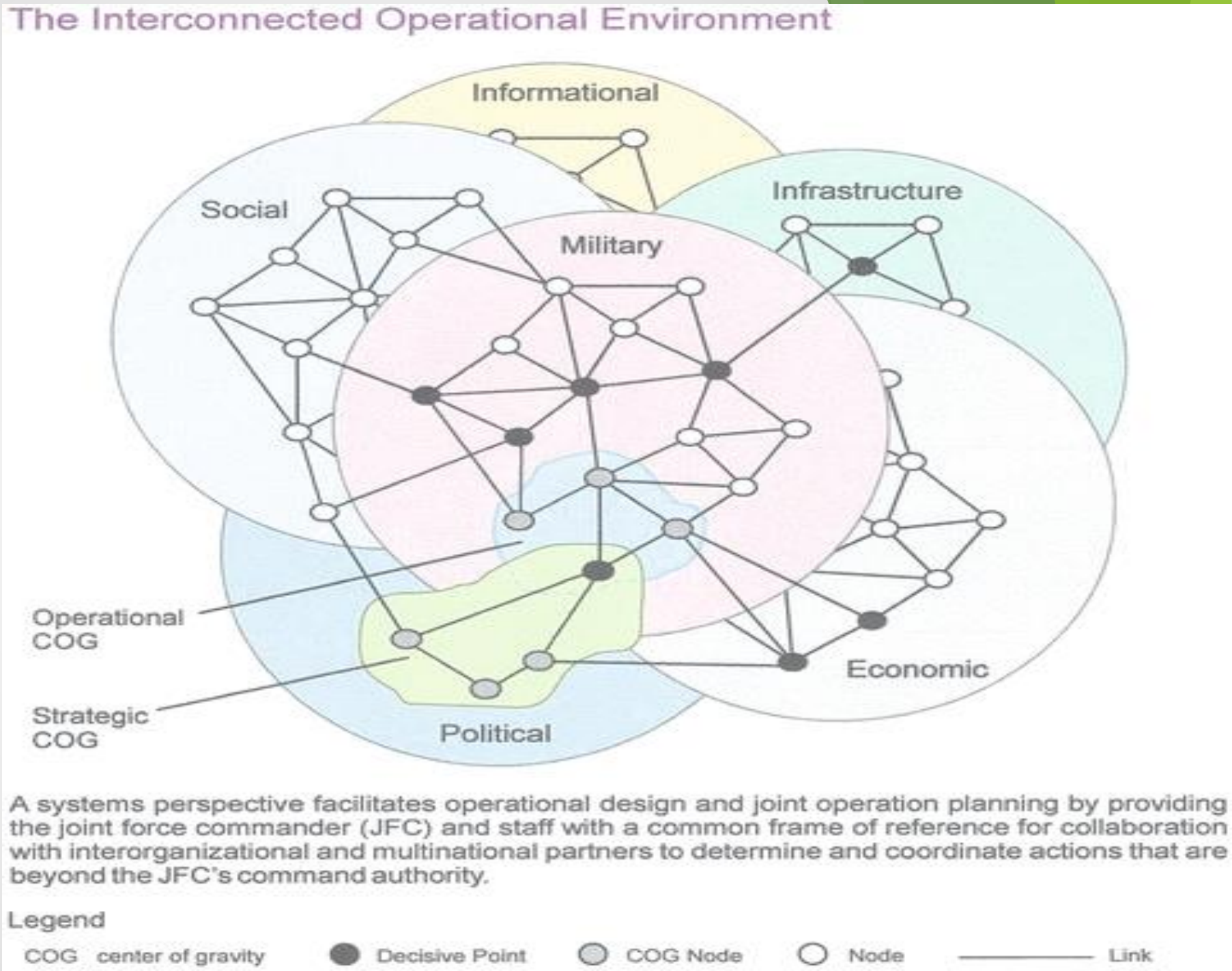
Objectives:

Influence in Center of Gravity (COG)

Strategic – Political domain

Operational – Military domain

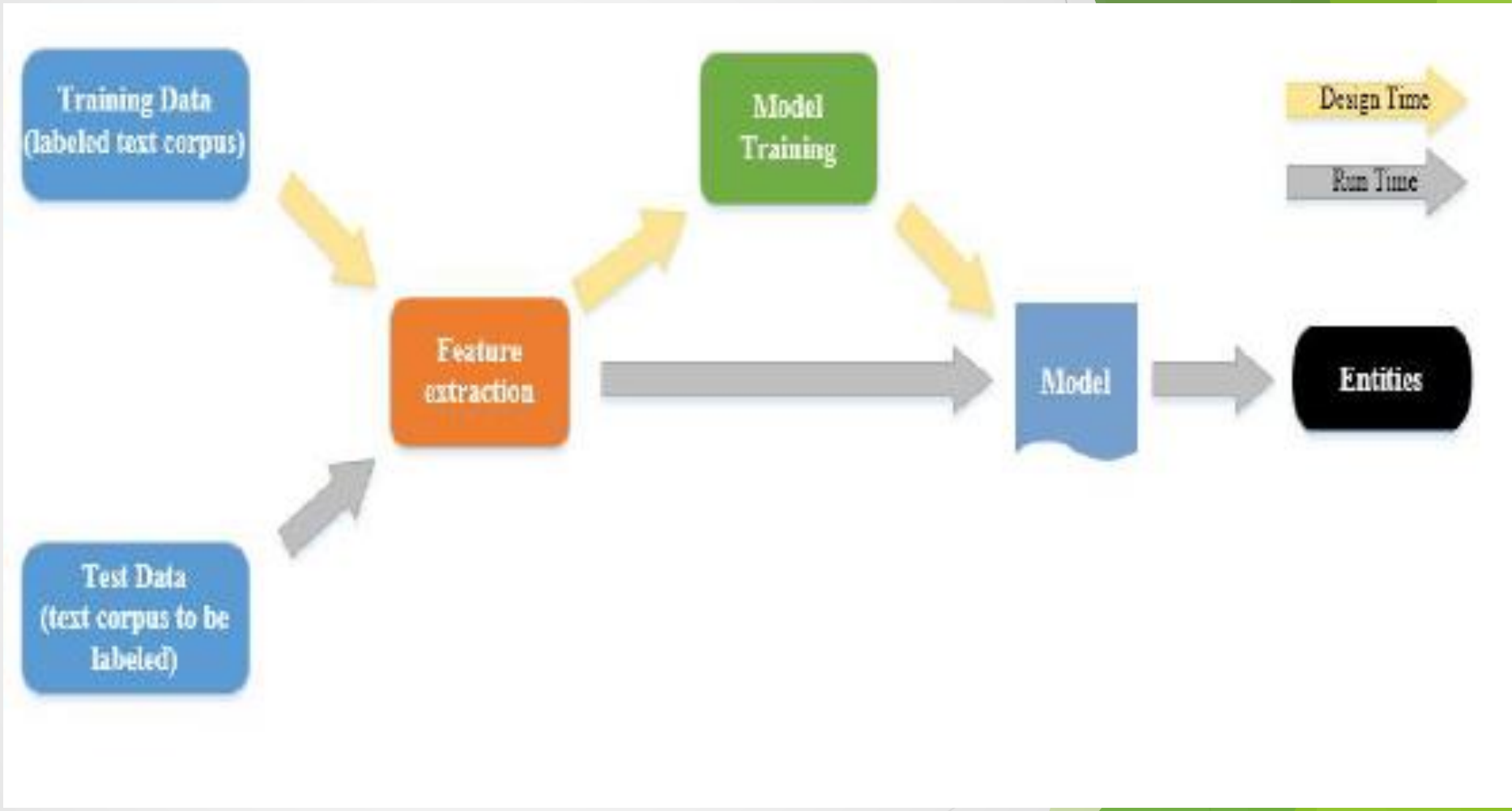
Source: The DIME/PMESII Paradigm, February 2017, DOI: 10.1007/978-3-319-51935-7_4, In book: Unconventional Conflict, Dean S. Hartley IIIDean S. Hartley IIIDean S. Hartley



Variables	Description
Political	Describes the distribution of responsibility and power at all levels of governance — formally constituted authorities as well as informal or covert political powers.
Military	Explores the military and paramilitary capabilities of all relevant actors (enemy, friendly and neutral) in a given operational environment.
Economic	Encompasses individual and group behaviors related to producing, distributing and consuming resources.
Social	Describes the cultural, religious and ethnic makeup within an operational environment and the beliefs, values, customs and behaviors of society members.
Information	Describes the nature, scope, characteristics and effects of individuals, organizations and systems that collect, process, disseminate or act on information.
Infrastructure	Is composed of the basic facilities, services and installations needed for the functioning of a community or society.
Physical environment	Includes the geography and manmade structures, as well as the climate and weather in the area of operation.
Time	Describes the timing and duration activities, events or conditions within an operational environment, as well as how the timing and duration are perceived by various actors in the operational environment.

AI – Machine Learning

- ***Supervised Learning***
Require a set of inputs and corresponding outputs to "learn from" in order to build a predictive model. Supervised learning algorithms learn by tuning a set of model parameters that operate on the model's inputs, and that best fit the set of outputs.

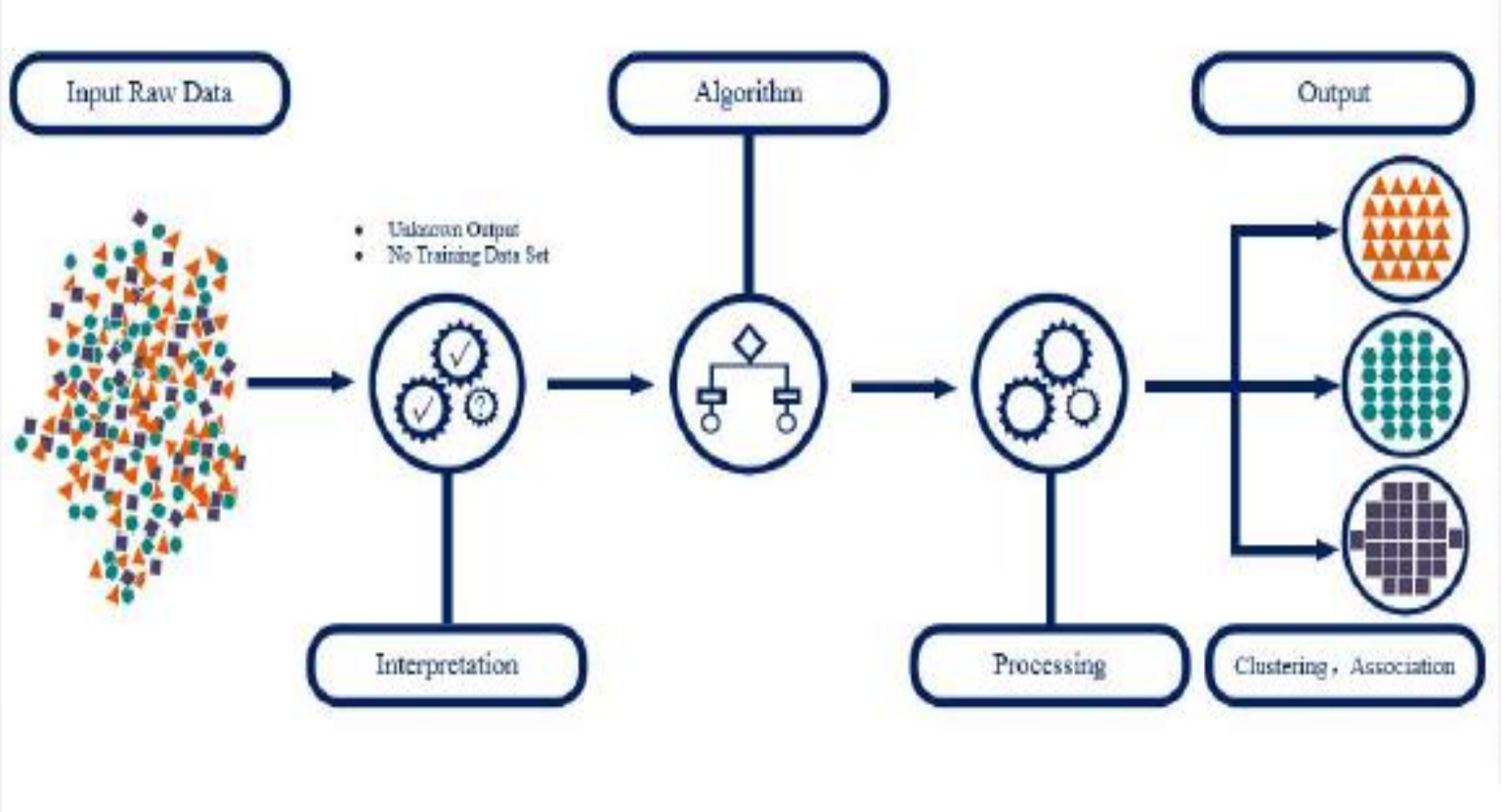


Source: (Wang et al., 2020)

AI – ML

- Unsupervised Learning

Operate without known outputs or observations – that is, these techniques are not trying to predict any specific outcomes. Instead, unsupervised techniques attempt to uncover patterns within data sets. Unsupervised learning is a useful approach for problems that do not have sufficient output or example data to train a supervised model.

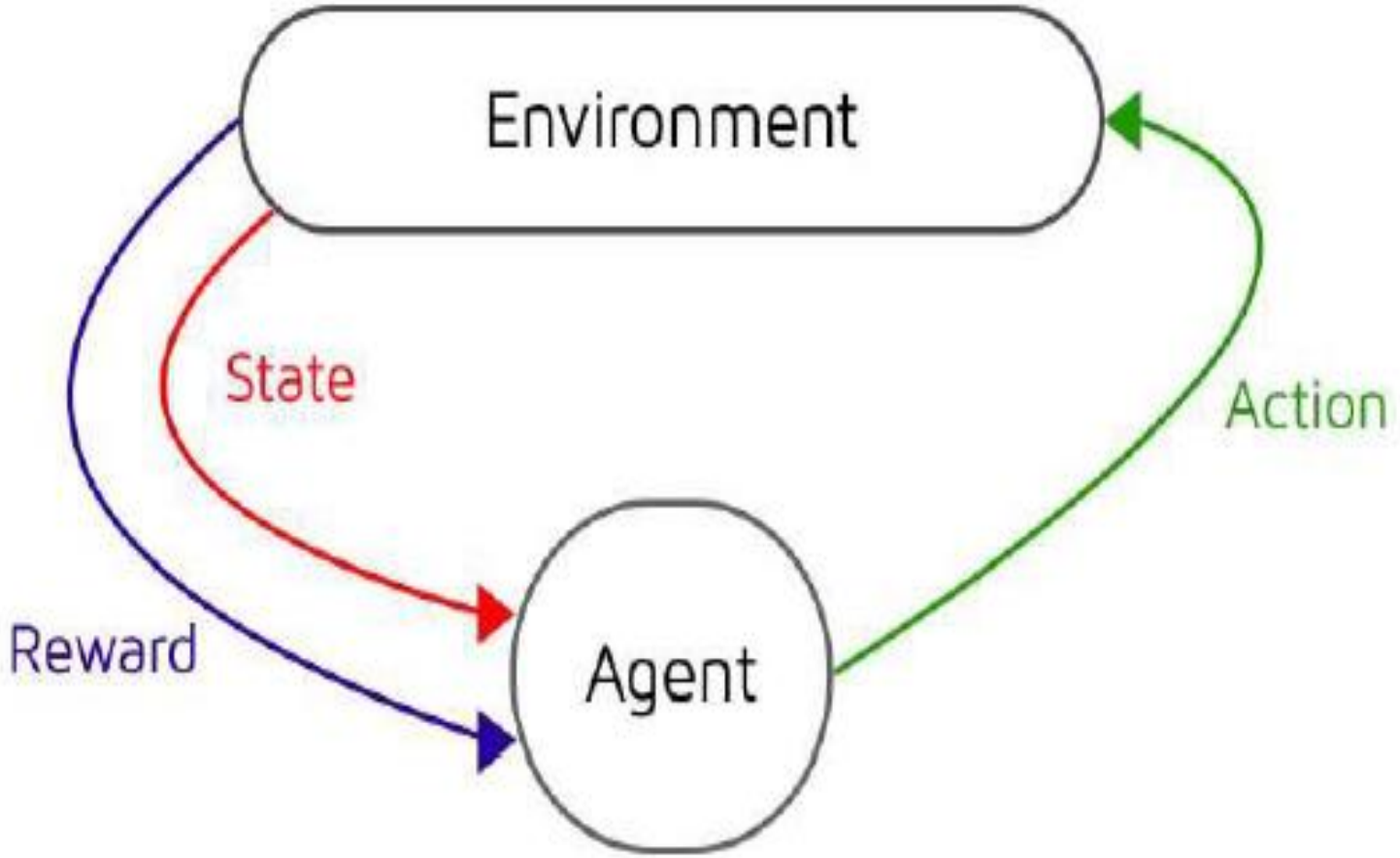


Source: (Wang et al., 2020)

AI- ML

- Reinforcement Learning

Reinforcement learning (RL) uses a trial-and-error approach. RL is a more goal-directed learning approach than either supervised or unsupervised ML. RL is a powerful means for solving problems that do not have a large historical dataset for training because it uses a dynamic model with rewards and penalties. RL models learn from interaction – an entirely different approach than supervised and unsupervised techniques that learn from history to predict the future.



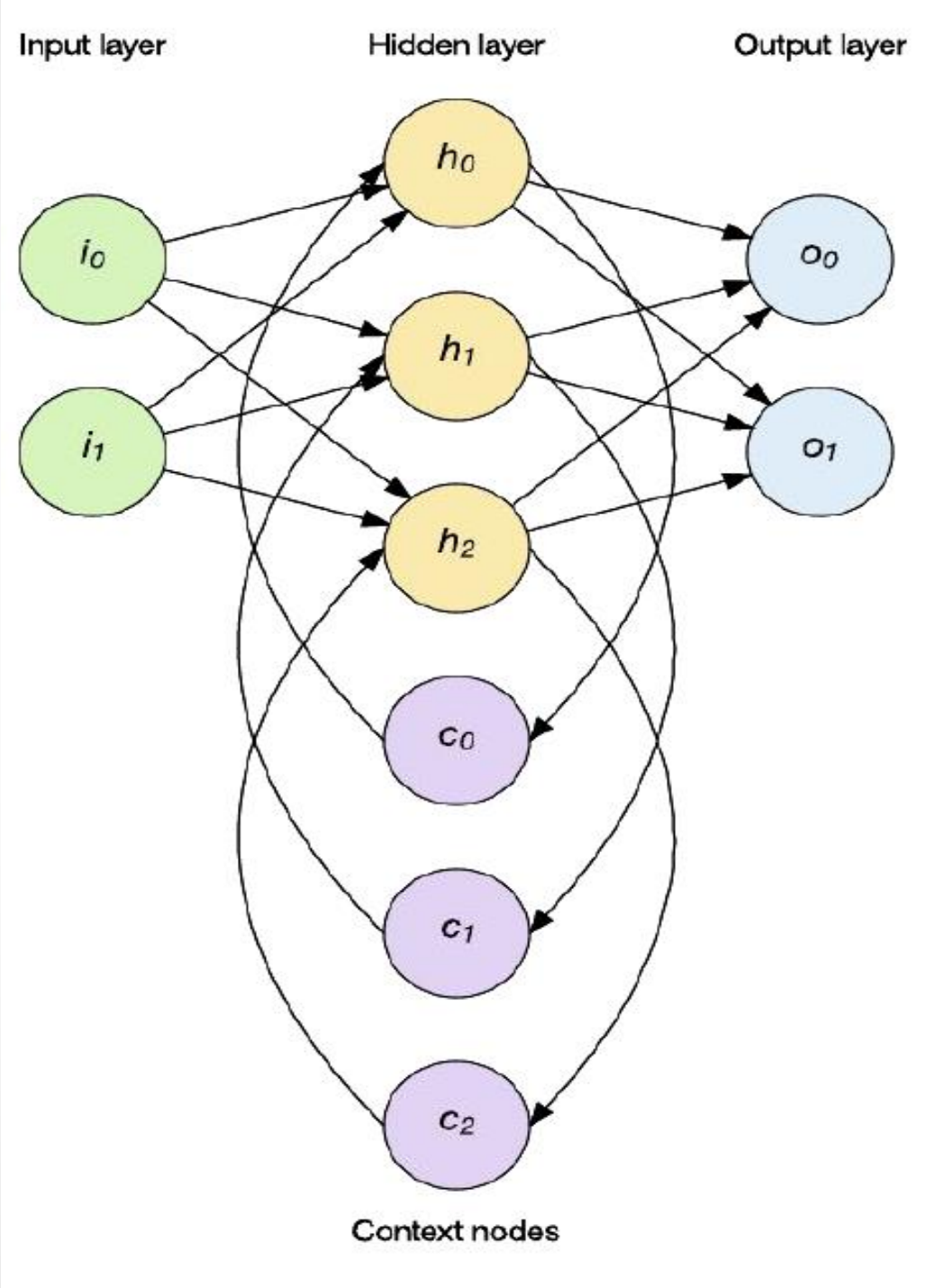
Source: (Wang et al., 2020)

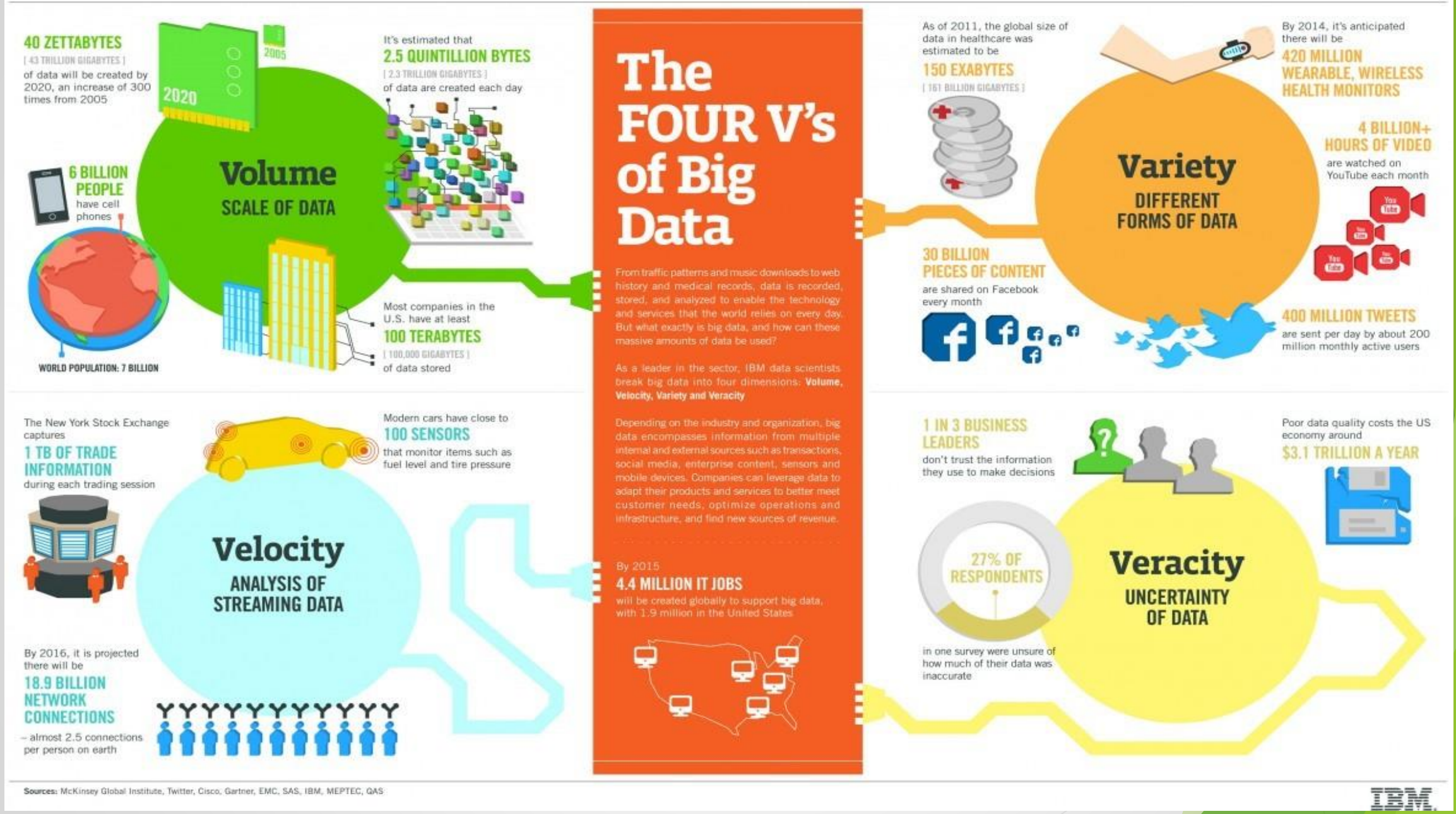
Source: (Wang et al., 2020)

AI – ML

Deep Learning

Deep learning is a subset of machine learning that involves the application of complex, multi-layered artificial neural networks to solve problems. For example, a deep neural network classifier is a form of supervised learning, while a deep neural network autoencoder is a form of unsupervised learning.
Deep learning takes advantage of yet another step change in compute capabilities. Deep learning models are typically compute-intensive to train and much harder to interpret than conventional approaches.

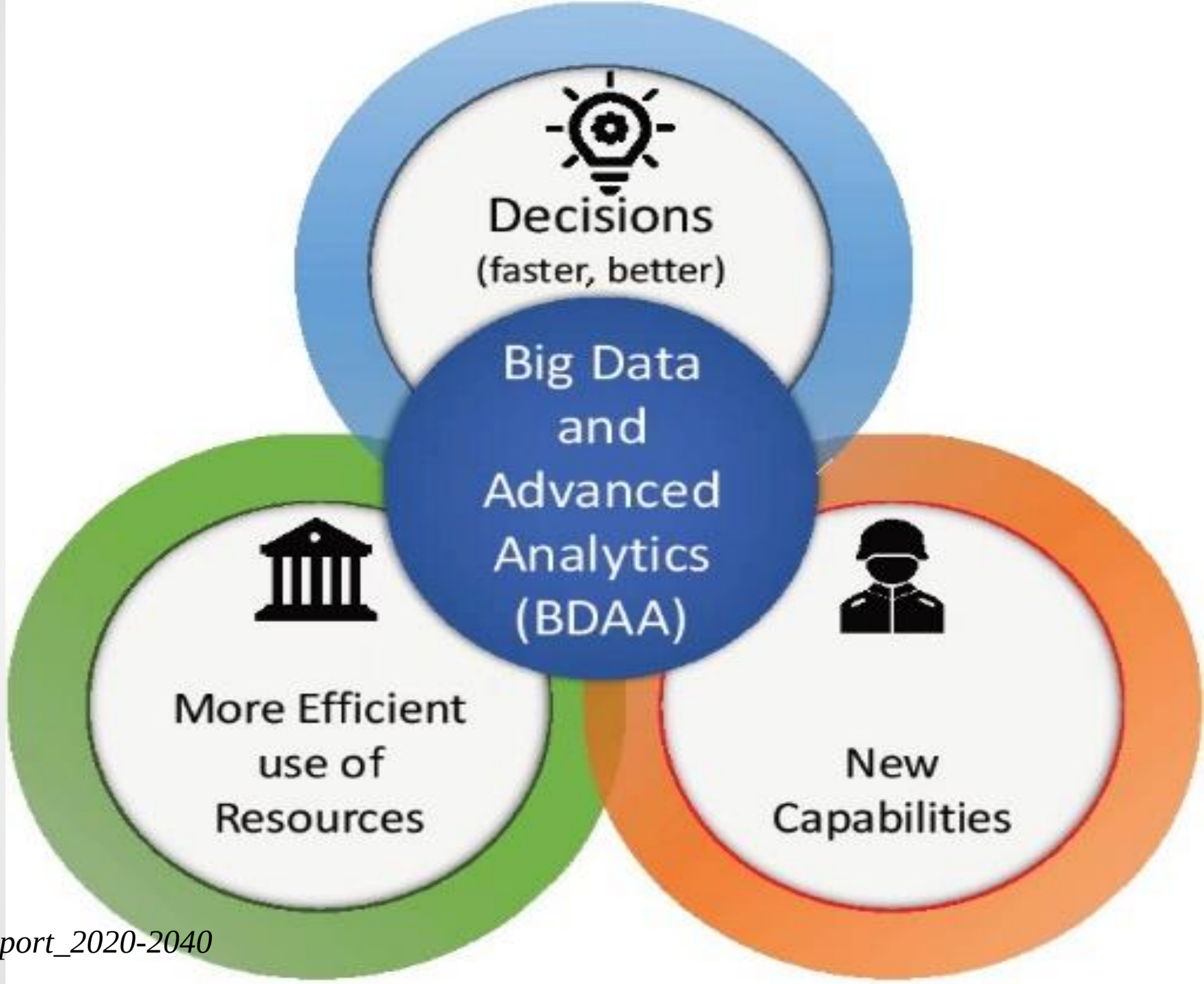




& the 5th challenge: VALUE

AI and **Big Data** Advanced Analytics **(BDAA)** in defense

- collection (sensors);
- communication;
- analysis;
- decision making



Source: NATO -ST_Tech_Trends_Report_2020-2040

Where the Data Coming from

- **All-Source Intelligence – the basis of information source is the Target's Ecosystem considered on a wholistic approach**
- **The DIME / PMESII / ASCOPE / ICR2 framework**
- **Understanding the GIE (Global Information Environment)**
- **IoT – IoMT – IoBT - The application of military specific IoT (Internet of Military/Battlefield Things)**
- **Exploit integrated AI**

(Source: 'NATO 190422- ST_Tech_Trends_Report_2020-2040.pdf p. 6)

Expectations for AI solutions in Military

- Intelligent - to exploit integrated AI, knowledge-focused analytic capabilities, and symbiotic AI/human intelligence to provide disruptive applications across the technological spectrum.
- Interconnected – to exploit the network of virtual and physical domains, including networks of sensors, organizations, individuals and autonomous agents, linked via new encryption methods and distributed ledger technologies (blockchain).
- Distributed - to employ decentralized and ubiquitous large-scale sensing, storage, and computation to achieve new disruptive military effects.
- Digital - to digitally blend human, physical and information domains to support novel disruptive effects.

AI applications in Military fall into two categories:

- **tactical AI based systems**
- **strategic AI based systems**

At the ***strategic level***, the use of AI can influence how the military leadership organizes its order, force grouping, war strategies, decisions on the scale and escalation of conflict, intelligence sharing and interpretation, the extension and nature of war, the consequences of using special means, etc.

The primary reasons for using AI-based military systems are:

- effective decision support,
- handling large amounts of data,
- situational awareness,
- visualizing a changing scenario,
- and generating appropriate responses.

In the field of military application, AI C2 systems can provide critical support if time is limited or if the number of options is too large for one to analyze alternatives for action.

Military operations - achieving political and strategic objectives of the states

Three levels of warfare:

- strategic
- operational
- tactical

military strategy is the highest level - as the ‘orchestration of war’

AI is to be applied in each level

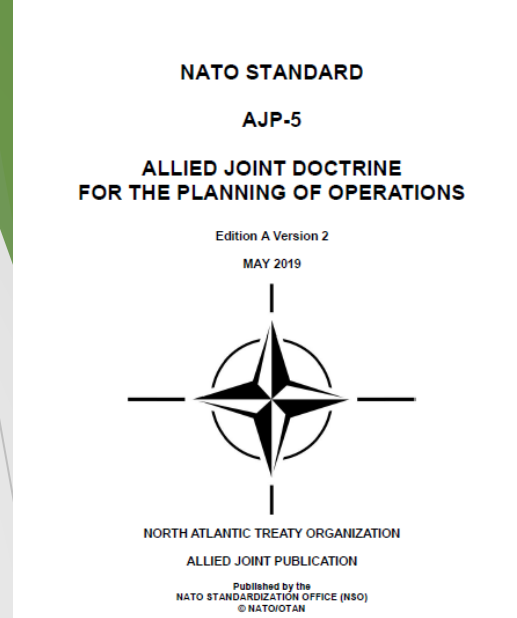
OPLAN

Doctrines:

- AJP-5 Allied Joint Doctrine For the Planning of Operations;

- Allied Command Operations Comprehensive Operations Planning Directive - COPD

- Ált/216. - A MH Törzsszolgálati Szabályzata II. rész 2015.


NATO STANDARD

AJP-5

ALLIED JOINT DOCTRINE
FOR THE PLANNING OF OPERATIONS

Edition A Version 2

MAY 2019

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED JOINT PUBLICATION

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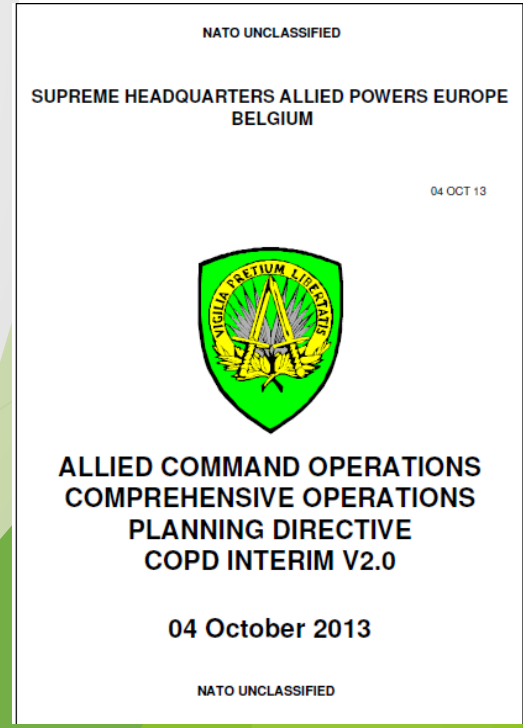
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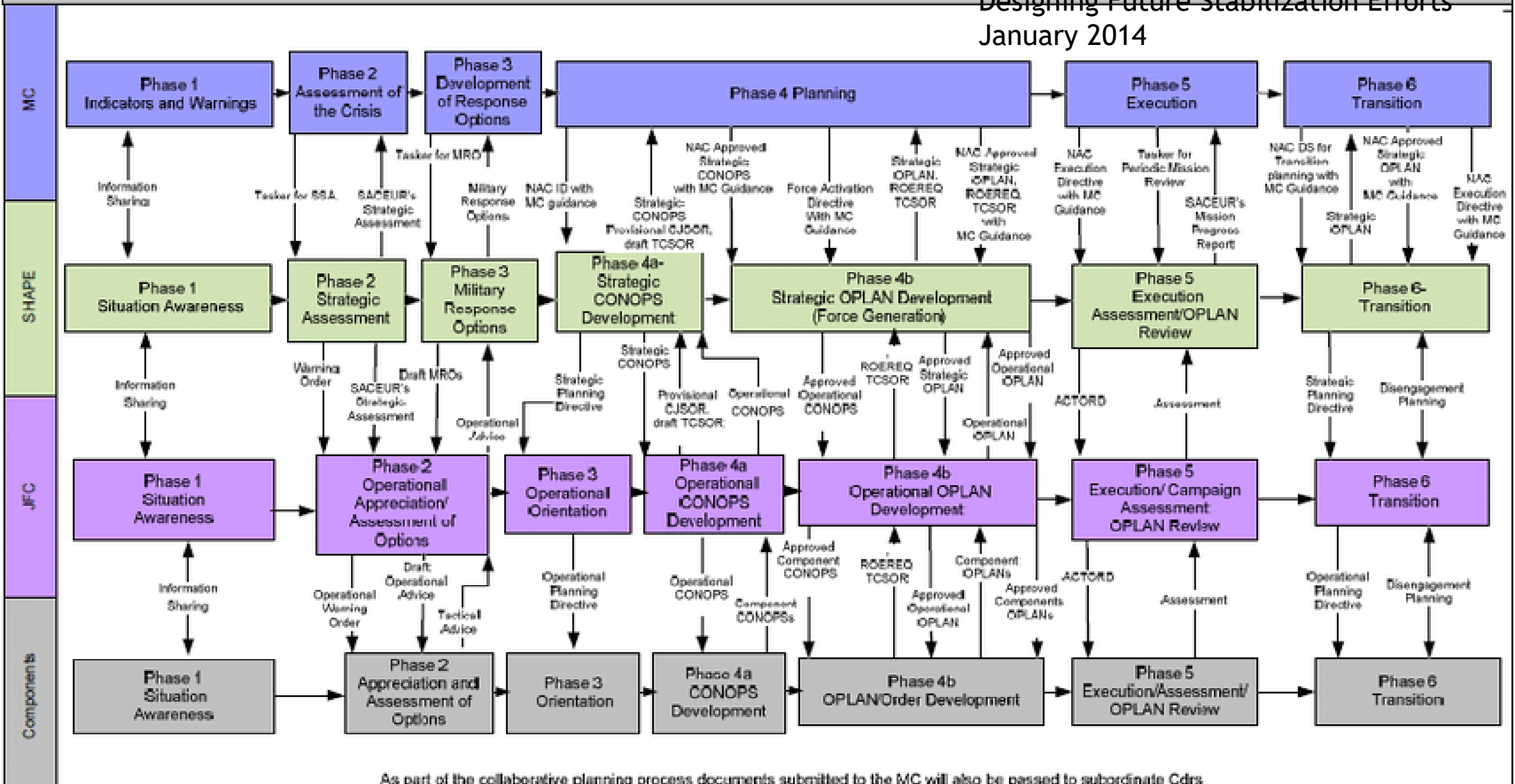
STRATEGIC LEVEL OPLAN

1. Situational Awareness;
2. Strategic Assessment és lehetőségelemzés.;
3. Military Response Options;
4. Strategic Design:
   - 4.a. phase: Strategic CONOPS Development;
   - 4.b. fázis: Operational OPLAN Development – Force Generation;
5. Execution Campaign Assessment – OPLAN review;
6. Transition;

The concept of operation (CONOPS) "explains" how component forces will accomplish the selected courses of action, but it is less detailed than the more formal Operations Order

NATO Crisis Response Planning

Source:Stephan De Spiegeleire, Designing Future Stabilization Efforts January 2014



OPLAN

War Game

- Modeling is a conscious attempt to predict the course of an operation. Try to predict the activities, reactions, counter-reactions, the operation, the dynamics of combat.

- The war game is conducted in order to collide the developed action variants with the action variants of the opposing party and to clarify the cooperation.

ASCOPE/PMESII

	P Political	M Military/ Police	E Economic	S Social	I Infra structure	I Information
A Areas	Political Areas (District Boundary, Party affiliation areas)	Military Areas (Coalition/LN bases, historic ambush/IED sites)	Economic areas (bazaars, shops, markets)	Social Areas (parks and other meeting areas)	Irrigation networks, water tables, medical coverage	Radio/TV/newspapers(where people gather for word-of-mouth)
S Structures	Political Structures (town halls, government offices)	Military/Police buildings (police HQ, Military HHQ locations)	Economic Structures (banks, markets, storage facilities)	Social Structures (Churches, restaurants, bars, etc.)	Infrastructure Structures (roads, bridges, power lines, walls, dams)	Info Structures (Cell/Radio/TV towers, print shops)
C Capabilities	Political Capabilities (Dispute resolution, Insurgent capabilities)	Military Capabilities (security posture, strengths and weaknesses)	Economic Capabilities (access to banks, ability to withstand natural disasters)	Social Capabilities (Strength of local & national ties)	Infrastructure Capabilities (Ability to build/maintain roads, walls, dams)	Info Capabilities (Literacy rate, availability of media/phone service)
O **Organizations**	Political Organizations (Political parties and other power brokers, UN,)	Military Organizations (What units of military, police, insurgent are present)	Economic Organizations (Banks, large land holders, big businesses)	Social Organizations (tribes, clans, families, youth groups, NGO/IGO)	Infrastructure Organizations (Government ministries, construction companies)	Info Organizations (NEWS groups, influential people who pass word)
P People	Political People (Governors, councils, elders)	Military People (Leaders from coalition, LN and insurgent forces)	Economic People (Bankers, landholders, merchants)	Social People (Religious leaders, influential families)	Infrastructure People (Builders, contractors, development councils)	Info People (Media owners, mullahs, heads of powerful families)
E Events	Political Events (elections, council meetings)	Military Events (kinetic events, loss of leadership, operations)	Economic Events (drought, harvest, business open/close)	Social Events (holidays, weddings, religious days)	Infrastructure Events (road/bride construction, well digging, scheduled maintenance)	Info Events (IO campaigns, project openings, CIVCAS events)

Source: (Wang et al., 2020)

Using the PMESII/ASCOPE matrix
and consider the

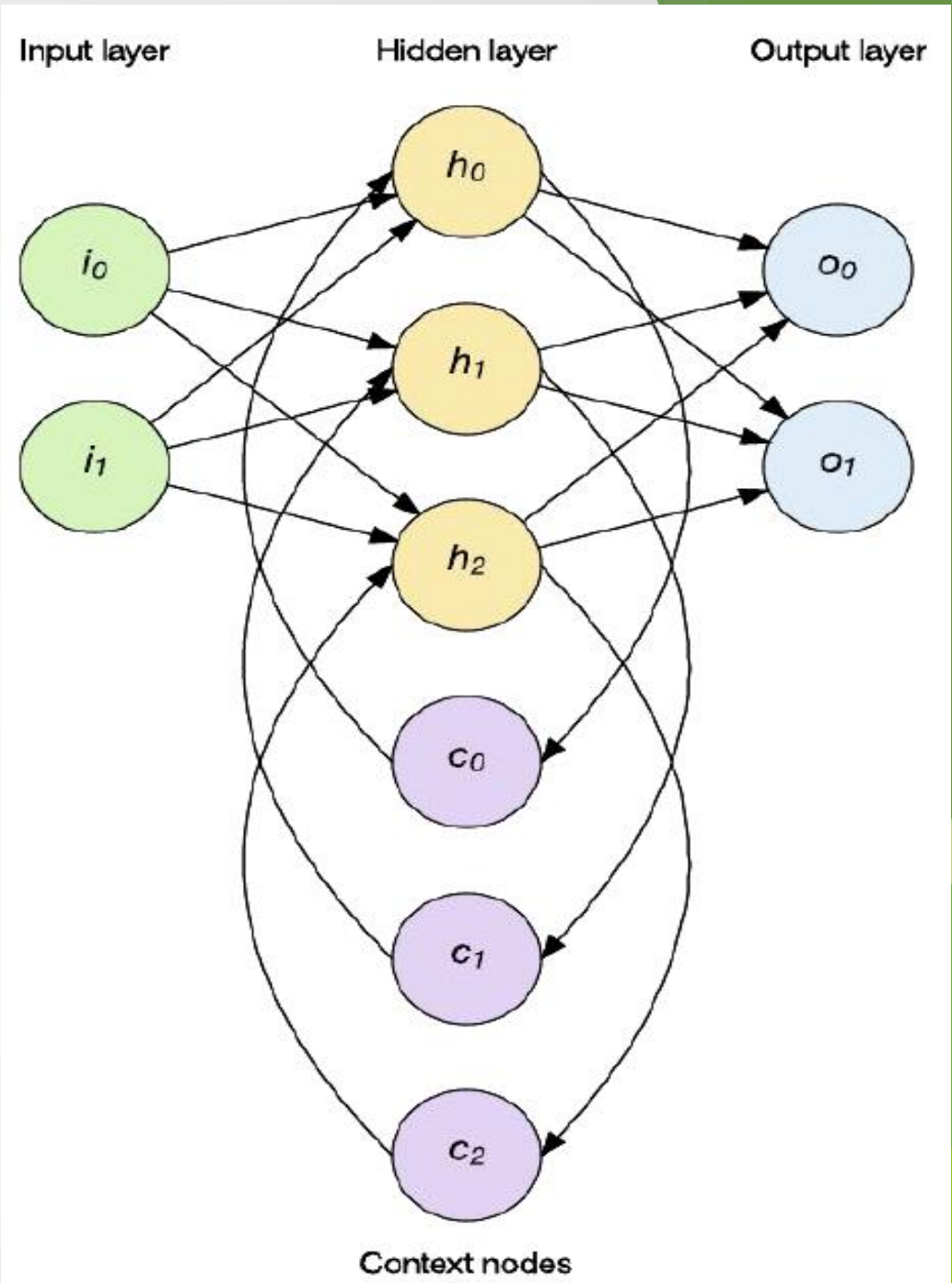
PMESII variables: Political, Military, Economic, Social, Information and Infrastructure.

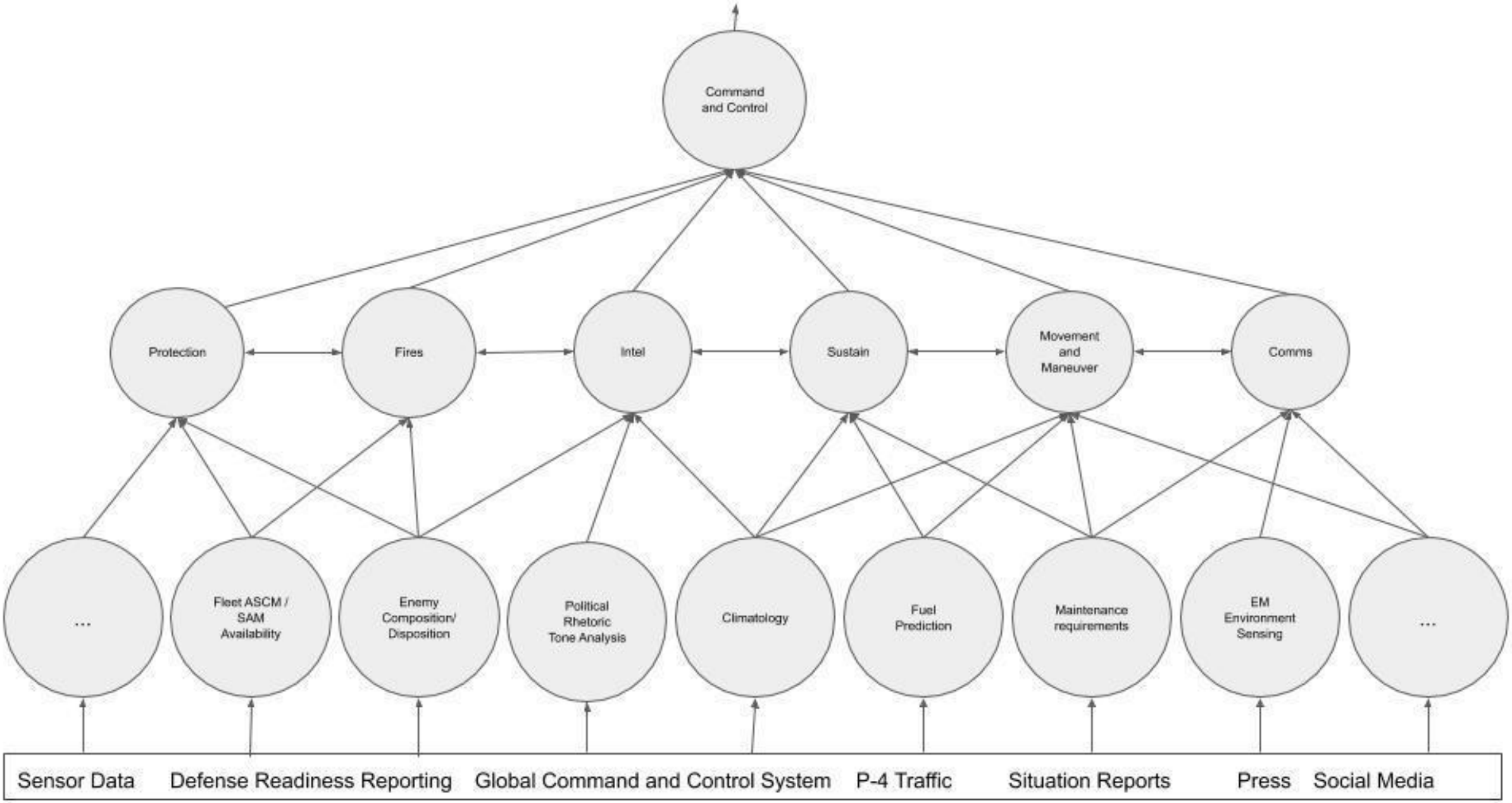
and the

ASCOPE variables: Areas, Structures, Capabilities, Organization, People and Events.

as inputs to a Deep Neural Network AI technolgy

The result would be a more close-to-reality set of scenarios used for simulation and modelling





Proposed Architecture for Maritime Artificial Intelligence System.
Source: ARTIFICIAL INTELLIGENCE AT THE OPERATIONAL LEVEL OF WAR, LCDR Steven I. Davis, U.S. Navy

Conclusion

AI is opening up new perspectives in Military OPLAN
and
generally in defense technologies.

There are high expectations regarding the application of AI techniques in many military areas, but there are still unresolved issues and further research is needed to meet these expectations.

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