HUMAN-AI CO-OPERATION

Karel van den Bosch
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MILITARY DECISION MAKING

CONTEMPORARY WARFARE

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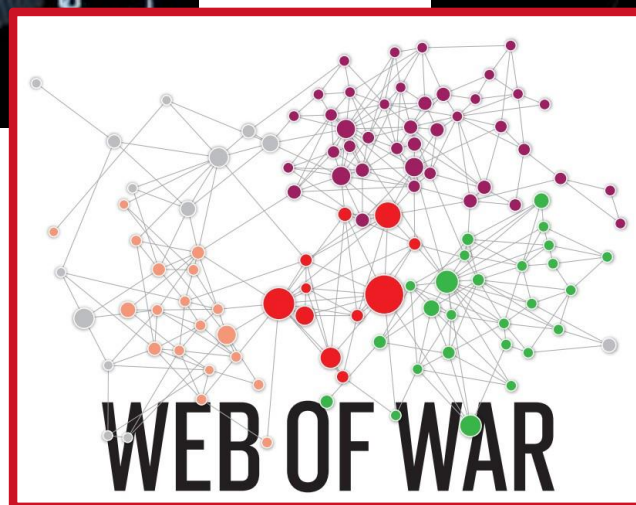# CONTEMPORARY WARFARE

HUMAN DECISION MAKING

intuitive

hunches

heuristics

FAST

System 1

System 2

rational

systematic

thoughtful

slow

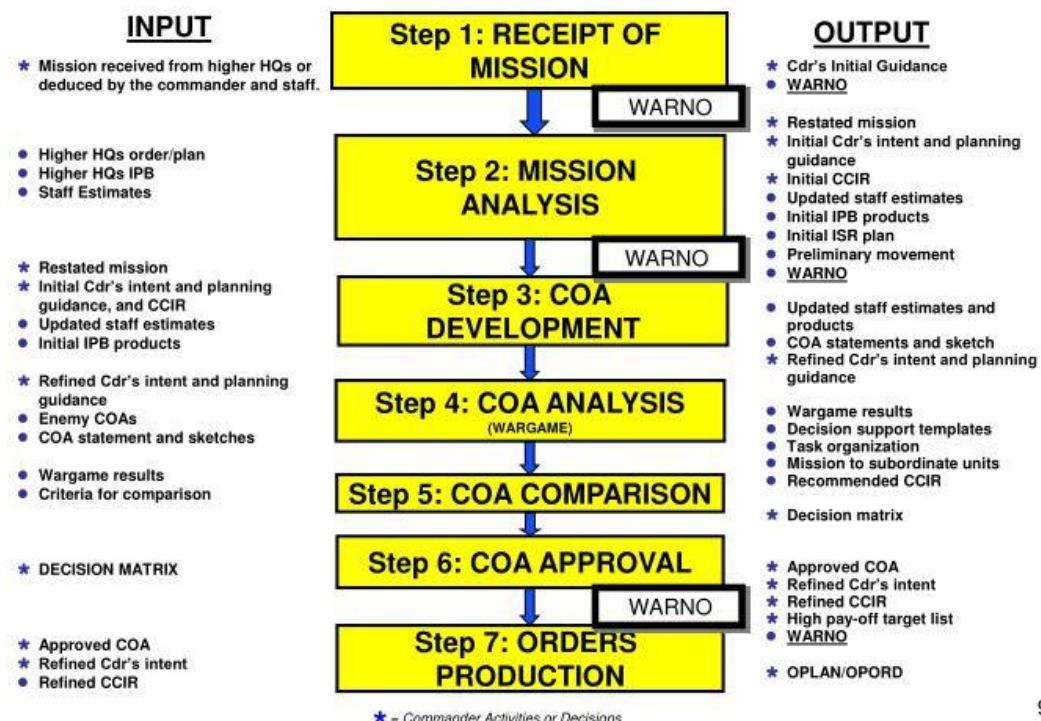# UNCERTAINTY, HEURISTICS & BIAS

Heuristics and Biases in Military Decision Making

Major Blair S. Williams, U.S. Army

Williams, B. S. (2010). *Heuristics and biases in military decision making.* ARMY COMBINED ARMS CENTER FORT LEAVENWORTH KS.

MILITARY DECISION MAKING PROCESS

MDMP Steps

INPUT

★ Mission received from higher HQs or deduced by the commander and staff.

- Higher HQs order/plan
- Higher HQs IPB
- Staff Estimates

★ Restated mission
★ Initial Cdr's intent and planning guidance, and CCIR
- Updated staff estimates
- Initial IPB products

★ Refined Cdr's intent and planning guidance
- Enemy COAs
- COA statement and sketches

- Wargame results
- Criteria for comparison

★ DECISION MATRIX

★ Approved COA
★ Refined Cdr's intent
- Refined CCIR

Step 1: RECEIPT OF MISSION → WARNO

Step 2: MISSION ANALYSIS → WARNO

Step 3: COA DEVELOPMENT

Step 4: COA ANALYSIS (WARGAME)

Step 5: COA COMPARISON

Step 6: COA APPROVAL → WARNO

Step 7: ORDERS PRODUCTION

OUTPUT

★ Cdr's Initial Guidance
- WARNO

★ Restated mission
★ Initial Cdr's intent and planning guidance
★ Initial CCIR
- Updated staff estimates
- Initial IPB products
- Initial ISR plan
- Preliminary movement
★ WARNO

- Updated staff estimates and products
- COA statements and sketch
- Refined Cdr's intent and planning guidance

- Wargame results
- Decision support templates
- Task organization
- Mission to subordinate units
- Recommended CCIR

★ Decision matrix

★ Approved COA
★ Refined Cdr's intent
★ Refined CCIR
★ High pay-off target list
- WARNO

★ OPLAN/OPORD

★ = Commander Activities or Decisions

9

- illusion of completeness; - systematicity; - rationality
- time- and manpower consuming

Decision support is needed, because of:

- the vulnerabilities of human decision making;
- the diversity and complexity of conflict situations;
- the information and technology means employed in warfare;
- the amount of information needed to be processed in real time.

INTELLIGENT DECISION SUPPORT SYSTEMS

Intelligent Support Systems may assist the decision maker by:

❯ discovering familiarity in patterns of events

❯ being alert to possible cognitive biases of humans in general, and of the individual decision maker

❯ speeding up the process of sense making and situation understanding

SHORTCOMINGS OF CURRENT I-DSSs

› Emphasis on modelling the world, little emphasis on modelling the user

› Incomprehensibility of models

› Limited or even rigid scope of models

› Insufficient trust

› Model vulnerability

DO YOU TRUST THIS COMPUTER?

Intelligent Machines

The US military is funding an effort to catch deepfakes and other AI trickery

But DARPA's technologists admit that it might be a losing battle.

MIT Technology Review   May 24, 2018
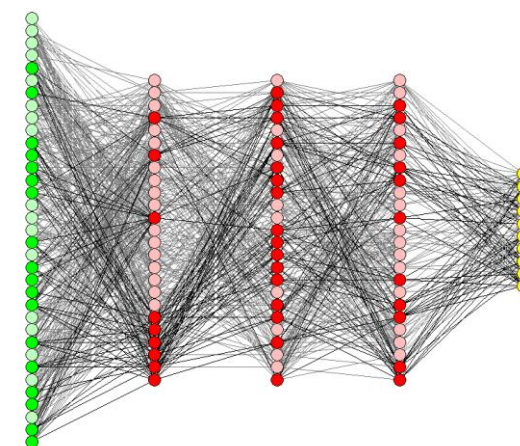
TOWARDS INTELLIGENT HUMAN-AI DM

Requirements of Human and AI:

❯ be mutually predictable in their actions

❯ be mutually directable

❯ maintain common ground

Principles of Human AI collaboration:
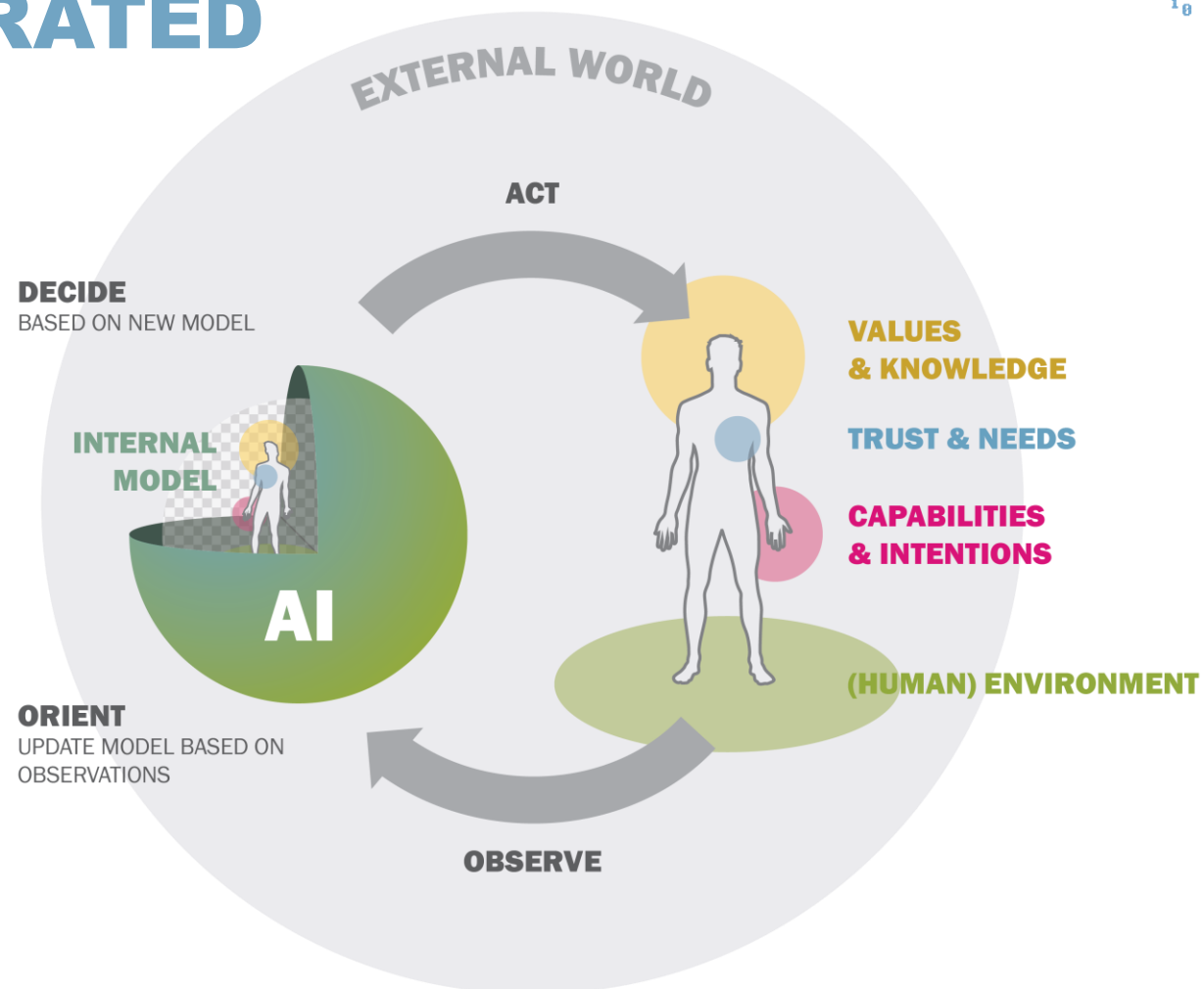
❯ Predictability

❯ Directability

❯ Observability, Transparency, & Explainability

Klein, G., Woods, D. D., Bradshaw, J. M., Hoffman, R. R., & Feltovich, P. J. (2004). Ten Challenges for Making Automation a "Team Player" in Joint Human-Agent Activity. *IEEE Intelligent Systems*, *19*(06), 91–95.
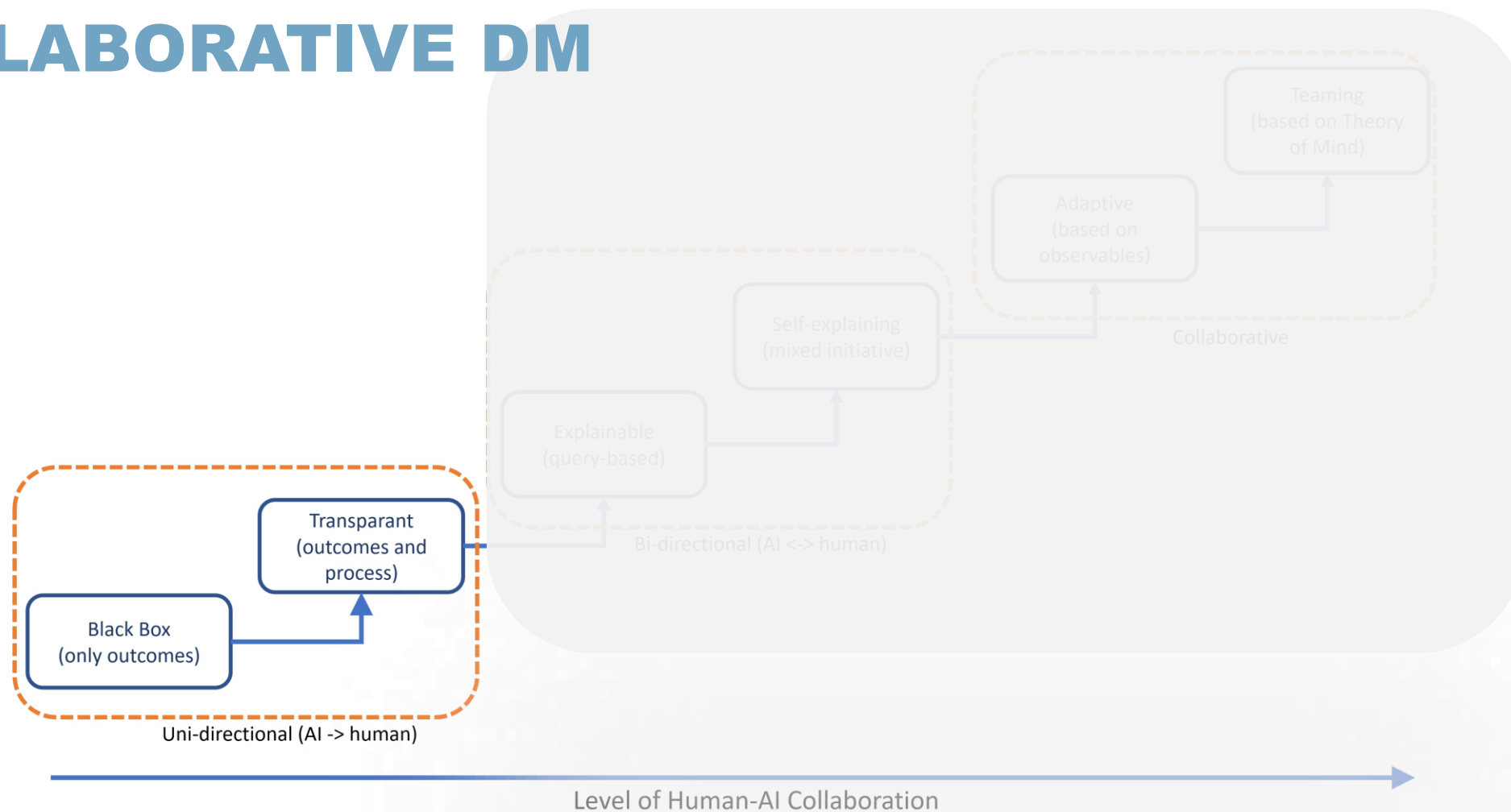
Johnson, M., Bradshaw, J. M., Feltovich, P. J., Jonker, C. M., Van Riemsdijk, M. B., & Sierhuis, M. (2014). Coactive design: Designing support for interdependence in joint activity. *Journal of Human-Robot Interaction, 3 (1), 2014*.
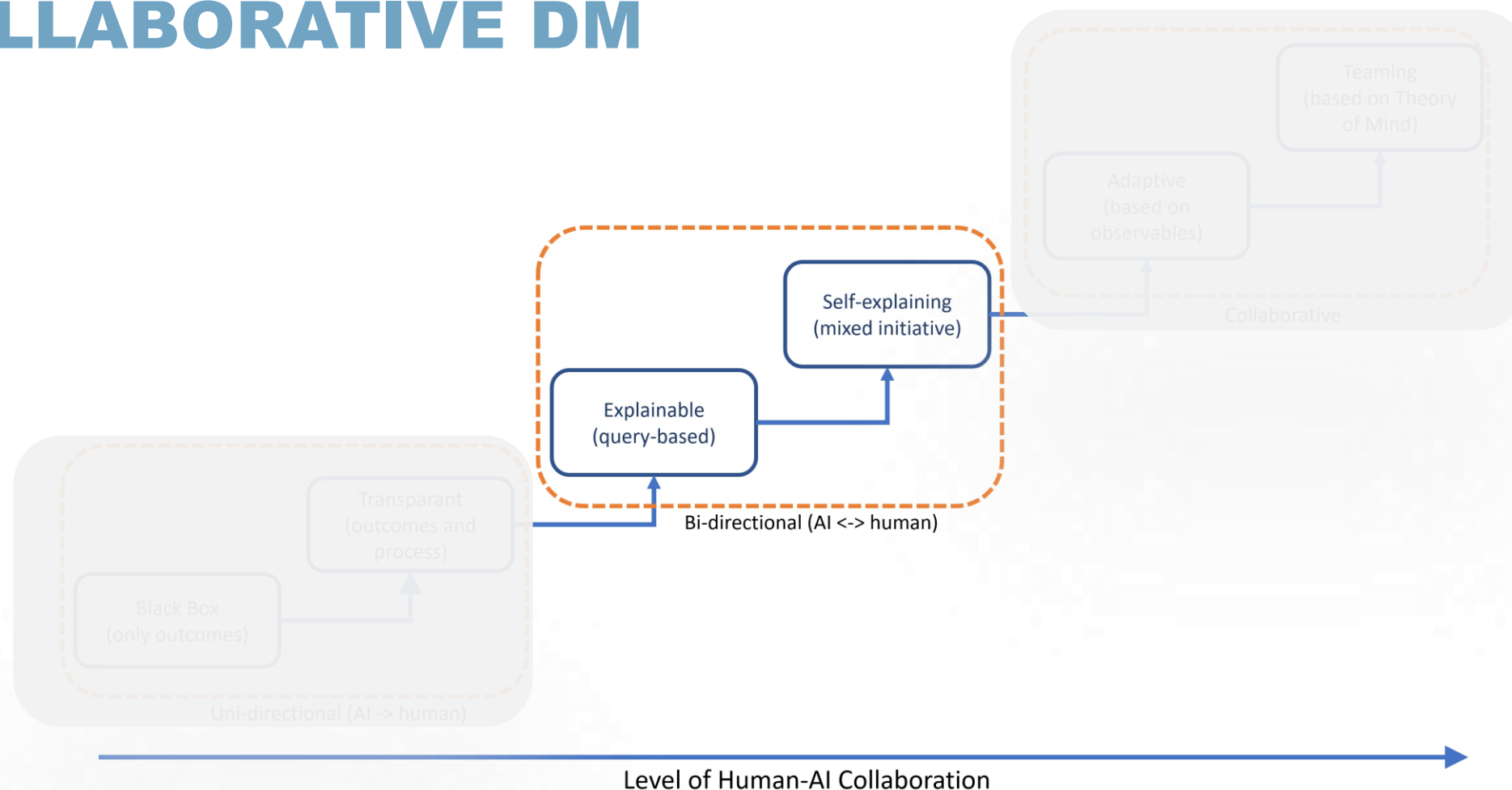
TOWARDS COLLABORATED DECISION MAKING
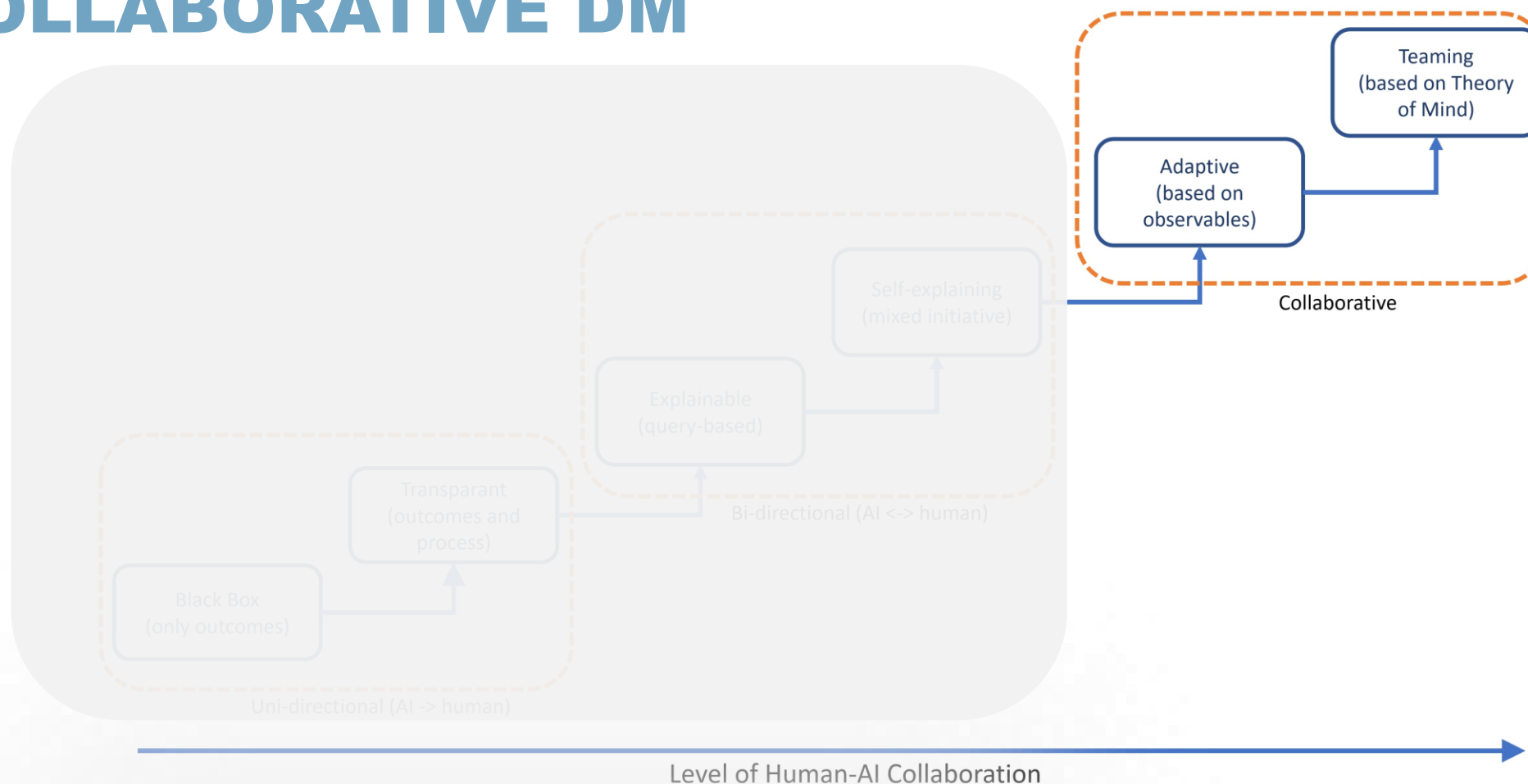
STEPS TOWARDS HUMAN-AI COLLABORATIVE DM

Teaming
(based on Theory
of Mind)

Adaptive
(based on
observables)

Collaborative

Self-explaining
(mixed initiative)

Explainable
(query-based)

Bi-directional (AI <-> human)

Transparant
(outcomes and
process)

Black Box
(only outcomes)

Uni-directional (AI -> human)

Level of Human-AI Collaboration

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STEPS TOWARDS HUMAN-AI COLLABORATIVE DM

CONCLUSION

› Military decision making can benefit from advances in AI and Big Data analytics

› Lessons of previous (I)DSSs show risks and pitfalls

› AI for (military) decision making should strive for effective human-AI collaboration

› AI should function as an adaptive team player: communicative, and aware of context and goals

› Progress requires developing functions for effective Human-AI collaboration

› Progress requires efforts from Human Factors, Artificial Intelligence, and Information Technology

Human-AI Cooperation to Benefit Military Decision Making

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THANK YOU