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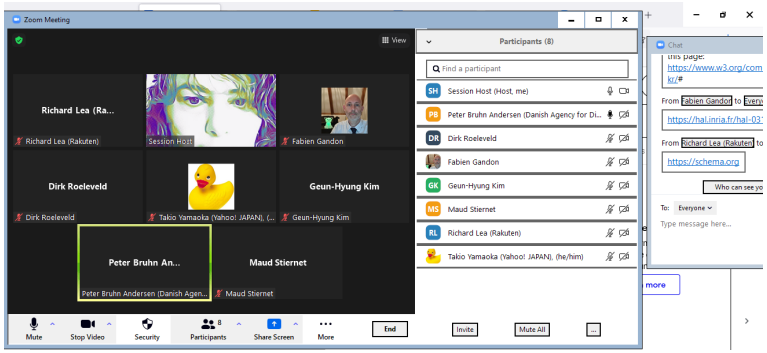
<img alt=W3C height=48 src=http://www.w3.org/Icons/w3c_home width=72>

Live screening

https://zoom.us/j/99055638533?pwd=TUxwcTMrUktKM3QwVGpQbzR2SDZtUT09

TPAC UPDATE: we had 9 participants on the call 25 th October and useful exchanges. Thanks for the participation. Suggestions for the report: insert a paragraph that relates the CG discussions to RDF/SHACKL perhaps and explain how this work fits into W3C



Notes From Fabien Gandon during the @tpac

ML+SW/KR: Learning and Reasoning for Cultural Metadata Quality :

https://hal.archives-ouvertes.fr/hal-03363442/document

Manifesto https://hal.inria.fr/hal-03189474

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W3C AI KR CG REPORT (Draft)

October 2021

NOT A SPECIFICATION (yet)

Headers and footers to be added

Due for publication 25 Oct 2021

Authored by Paola Di Maio, AI KR CG Chair

Executive Summary

This report contains background about the motivation and initial intended direction for the W3C AI KR CG, launched in 2018, together with pointers to published literature and discussions in relation to the CG core areas of interest (AI KR) It describes possible work ahead including the outline of SLKR (System Level Knowledge Representation) as the basis for an AI KR specification

The purpose of the report is to summarize the main activities carried out to date by the Chair and invites members to contribute comments and observations, and to consider making contributions along the lines proposed.

Background

The need to start a CG devoted to AI KR was prompted by a worrying trend in IT to devise systems that minimise or bypass altogether the role of knowledge, and an incumbent generation of AI designed solely to distort and misrepresent knowledge and truth.

Fragmenting and decoupling logic and representation from AI systems has become popular in ML (Machine Learning) to facilitate certain aspects of data processing. The acceptance of computation without KR has been growing in parallel to increased acceptance of the systemic deconstruction of integrity and truth preservation in AI systems presented at research conferences in recent years. Breaking up logical constructs by fragmenting them and/or rendering them irrelevant, unintelligible and inaccessible to humans (including developers users, observes, experts, analysts and researchers who end up with limited visibility of the whole) contributes to the contemporary open concerns in AI: lack of transparency, limited understandability, accountability, fairness, algorithmic bias, misrepresentation, deep fakes, and fundamentally hinders the ability to understand and explain what is going on in the box, at system level and especially system of systems level.

Given the growing importance of AI in mediating all aspects of data, information and operations and especially in science, research and computing, these concerns are now not only central to science and engineering, but also to epistemology, education, public awareness and public life. Ultimately KR as applied in AI and IT, as well as in other domains, mirrors the level of awareness and intentions of stakeholders and impacts all categories of users.

The way humans process perceive and project knowledge goes hand in hand with its representation. Eventually choices of knowledge representation and encoding in AI describe where humanity is going. It is with these concerns in mind that the CG was initiated and operates.

As of publication date of this report it counts with 69 members, mostly lurking.

A Stakeholder's Survey with some responses so far. To date members have not yet agreed on a shared plan of action nor deliverables for the CG, nonetheless a rich, diverse and even somewhat entertaining AI KR related list of topics has been discussed on the mailing list. Watch it here.

By monitoring relevant published literature useful resources have been identified which can help to answer **at least one of the questions** raised when this CG launched, namely:

1. **Which are the AI KR techniques/resources of interest to this group?** There is no reason to limit the focus of this group to a subset of techniques. Whatever KR techniques are adequate to address current AI challenges.

   Useful starting points can be gathered from published literature

   a) KR Knowledge Representations in Technical Systems -- A Taxonomy Kristina Scharei, Florian Heidecker, Maarten Bieshaar https://arxiv.org/abs/2001.04835

   b) A mind map of KR

   c) A visualisation (Image 1)of the convergence between AI/KR and COGAI (Kotsuba et al) At the bottom, a range of COGAI techniques is **mapped to KR paradigms This diagram** shows an interesting correspondence between KR and CO GAI.

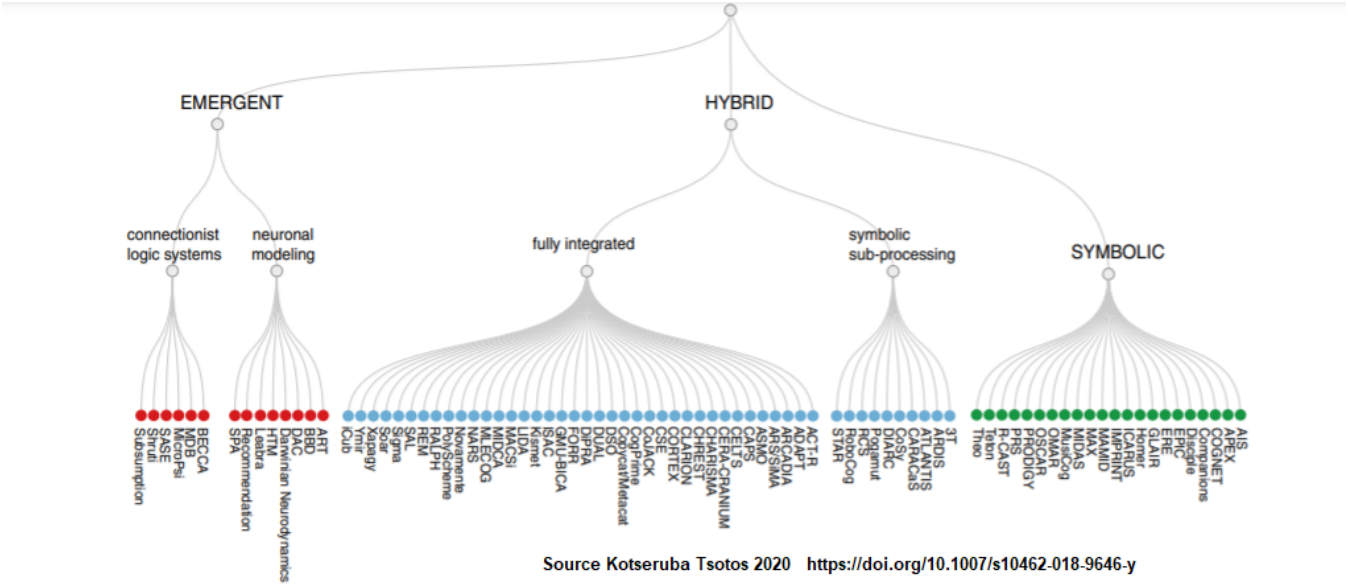

Image 1. Kotsuba et al 2020 (reproduced with permission)

PROBLEM STATEMENT

Most of the risks currently associated with AI, as well as general challenges related to belief systems and misinformation in society, can be ascribed to non adequate KR. Despite the wealth of resources, tools, techniques, literature, expertise available on AIKR there are huge gaps in the understanding and application of KR to resolve key open AI concerns. Ironically, KR itself can be used (misused?) to misrepresent knowledge such as making false assertions, and to render intelligent systems seemingly perfectly functional while making the underlying data and knowledge unintelligible, opaque thus rendering systems untrustworthy and ultimately unaccountable. For example, KR can be used to inject bias into algorithms

This misuse of KR is a type of Systemic Deviation. [1], one that adequate KR can attempt to identify and resolve. I discuss Systemic Deviation and KR adequacy elsewhere.
With these considerations in mind, the work carried out within the CG intends to shine some light.

OPEN QUESTIONS

- How can KR be used to address knowledge misrepresentation in AI, from algorithmic bias, to deepfakes, and truth preservation in massively distributed environments?

- How can KR be used to balance the trend in ML which is attempting to minimize or avoid the role of K (Knowledge) in systems automation?

- How can KR be used to make explicit the continuum between human evolution, higher cognition, intelligent systems design, automation, decentralization, knowledge sharing and participatory paradigms?

Members are welcome to post more questions.

CONTRIBUTIONS

Some of the issues being discussed are summarized in the diagrams below:

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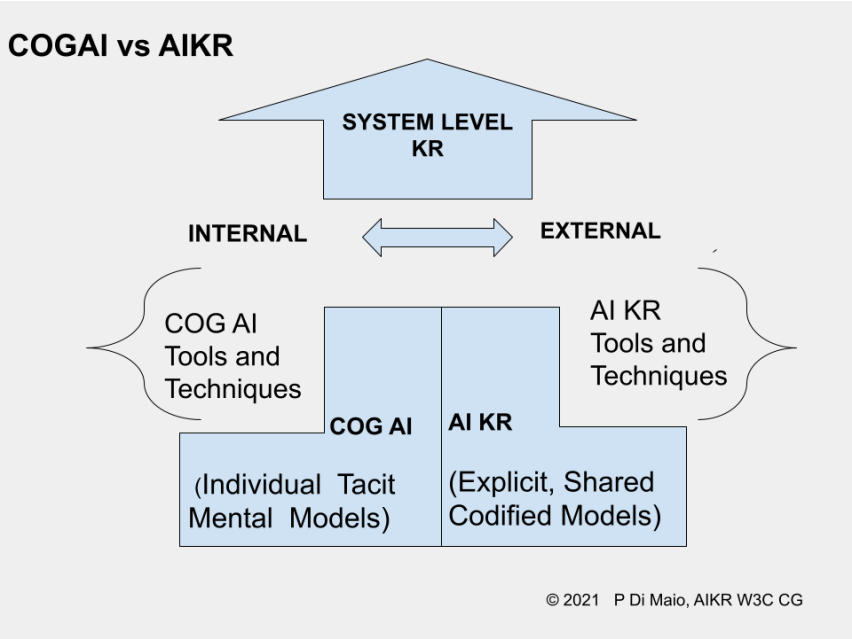
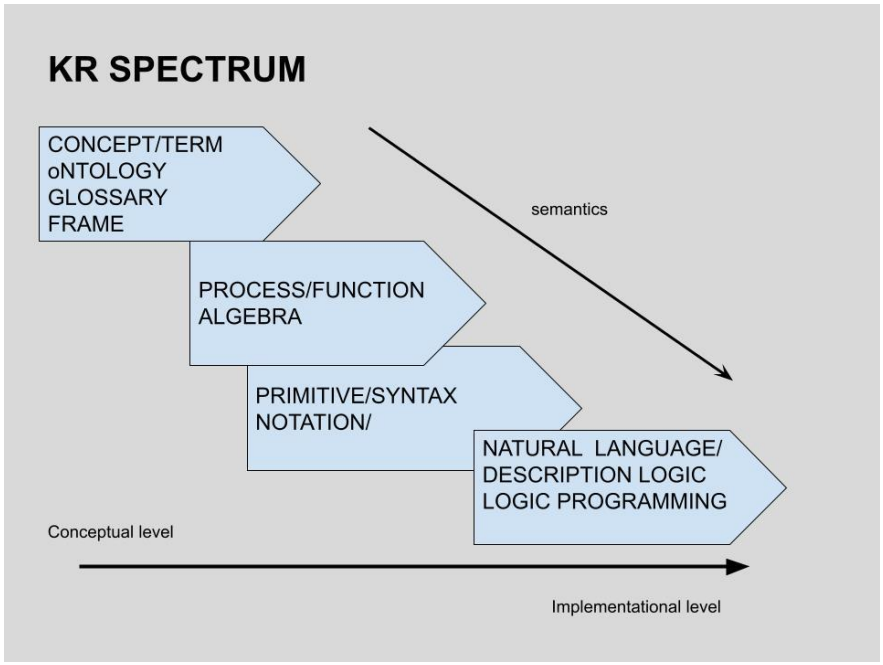
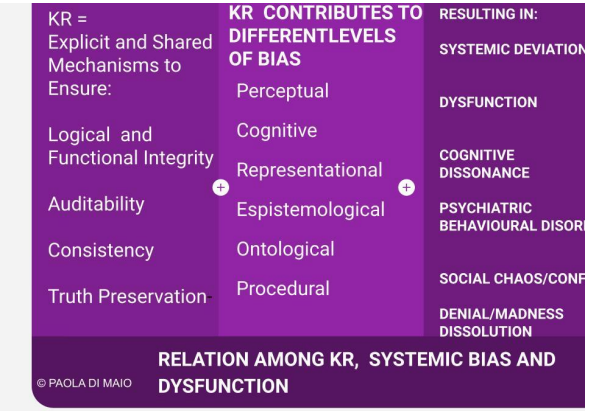


CogAI vs AI /KR (Internal vs External representation)



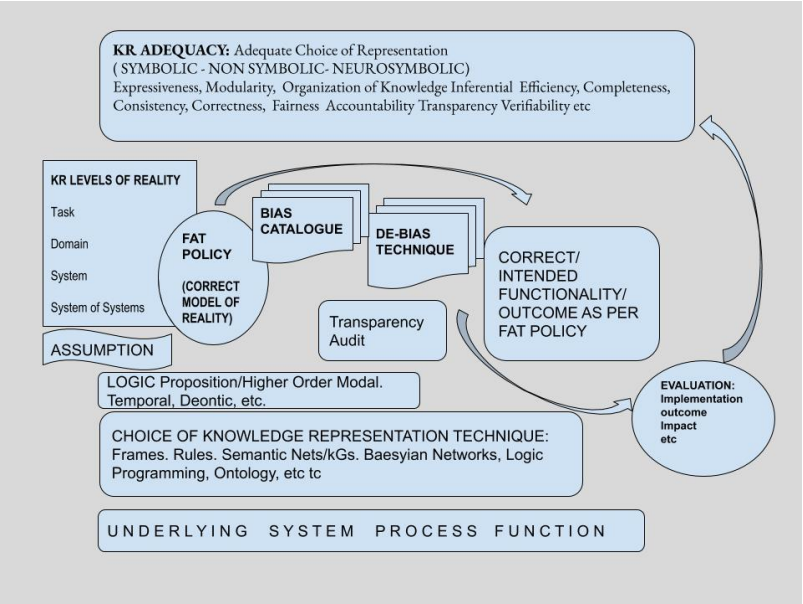
KR as a spectrum - to be discussed, completed

Role of KR in Systemic Bias



To be discussed

System Level Knowledge Representation (SLKR)



SLKR

A SLKR model has been applied to model knowledge complexity in the domains of AI, neuroscience and IOT (internet of things) in peer reviewed publications[2,3,4,5], see references.

Knowledge misrepresentation, especially when it occurs through hidden permutations, is responsible for the likelihood of corruption of logical integrity of intelligent autonomous systems

Considering the complexity and logical fragmentation whereby units of logic, System Level Knowledge Representation (SLRK) can be used as an explicit integrated model aimed at supporting logical integrity throughout the system lifecycle. It has the potential to become part of an open specification, possibly resulting from the CG becoming a WG, if enough members commit to this vision.

Additionally, discussion have been contributed in relation to

KR as a diagnostic tool for mental health, KR and gut bacteria etc *check the group's mailing list.

WORK AHEAD

Interesting ideas have been thrown around on the public mailing list, from consolidating the use of StratML to improved shared AI KR, to aligning with efforts at EU or US institutional level to the development of a schema for ethical AI registries to the compilation of shared vocabularies that specify general AI requirements for sharedness reliability and trustworthiness. The issues to be addressed are countless. Explicitly shared knowledge is a necessary foundation for responsible use of technology, algorithmic awareness and conscious socio technical society.

This CG is stressing the need and importance of the topics summarised briefly in this report and invites members to share their work and thoughts on the topics already discussed and many more ahead.

ACKNOWLEDGMENTS

Thanks to members and the co-chair for their contribution, and to EUON State of AI [6]report for including a mention to this CG.

REFERENCES

[1] Systemic Deviation, Di Maio, ISSS 2016

[2]System Level Knowledge Analysis and Keyword Extraction in Neuroscience

PD MaioInternational Conference on Brain Informatics, 225-2342021

[3] System Level Knowledge Representation for Metacognition in Neuroscience

PD MaioInternational Conference on Brain Informatics, 79-882021

[4] System-level knowledge P Di MaioLeveraging Artificial Intelligence in Global Epidemics, 261

[5] System Level Knowledge Representation for ComplexityP Di Maio

2021 IEEE International Systems Conference (SysCon), 1-6 2021

[6] EUON https://zenodo.org/record/5011179#.YXW3MRwRXjF

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