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Socio-Semantic Networks of Knowledge, Common Meanings and Common Problems

Logic4Peace

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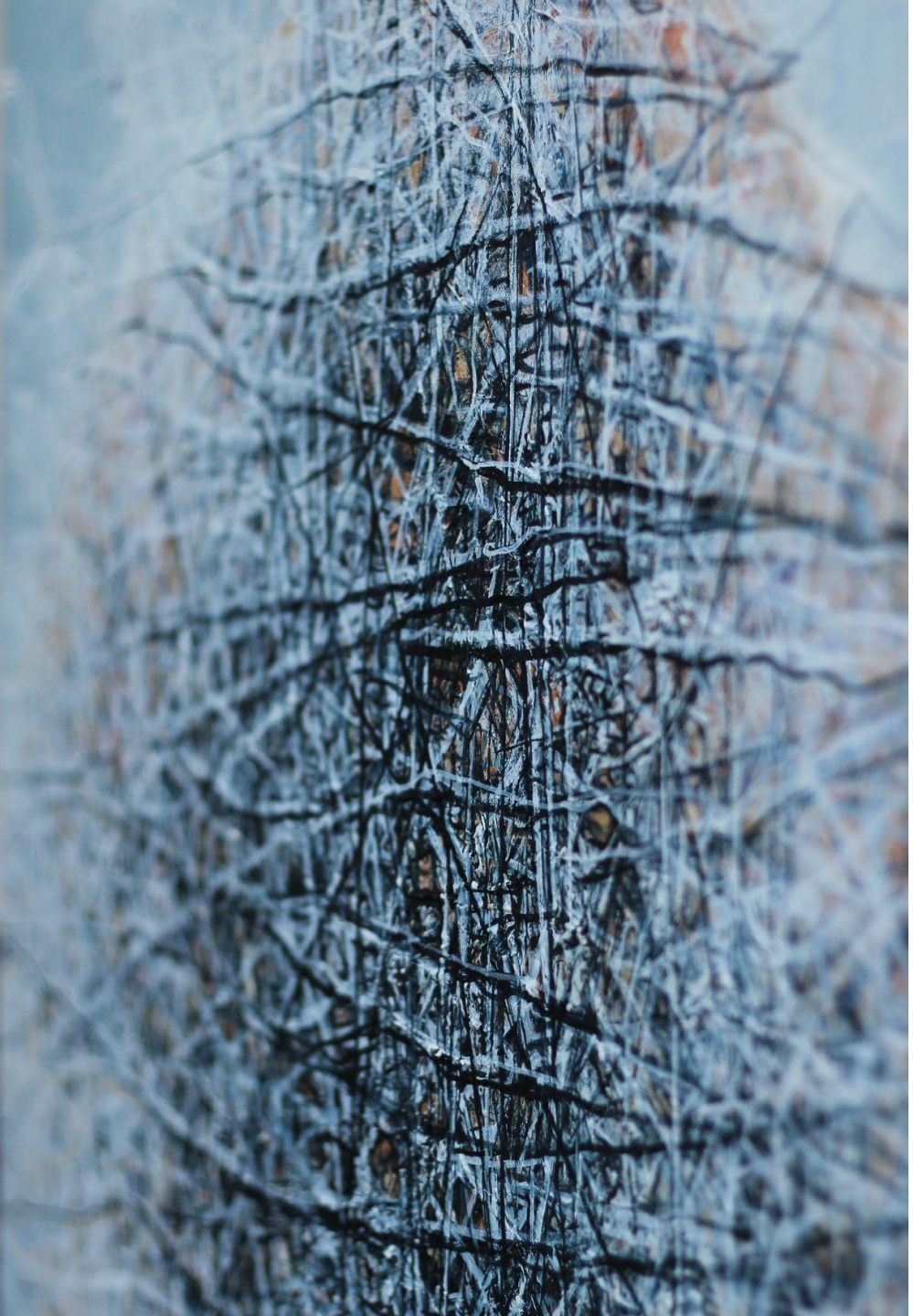
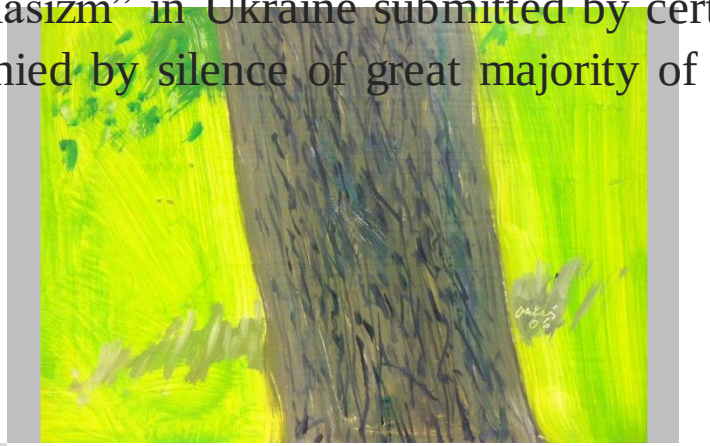
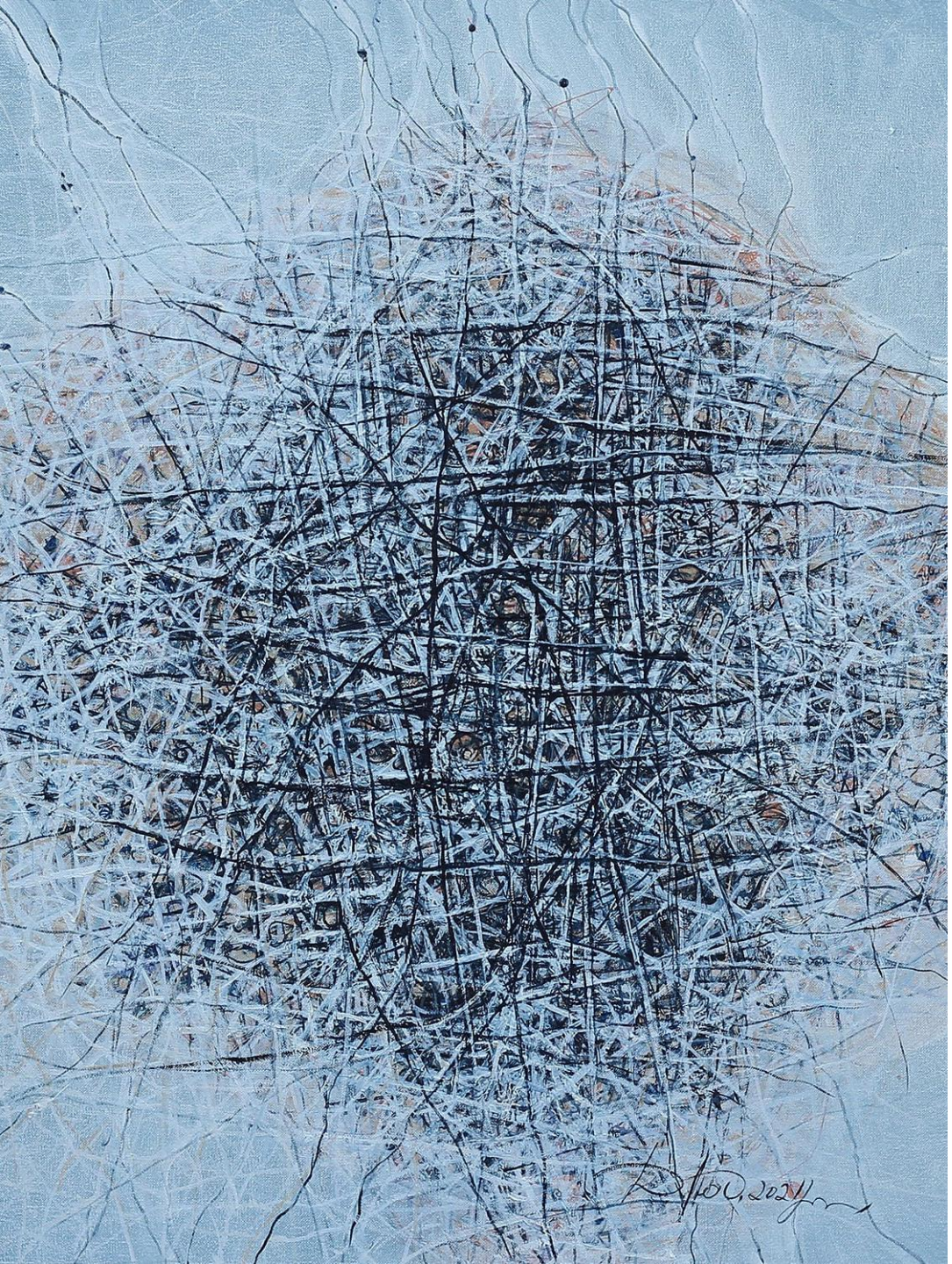
- The development of computer technology has given birth to the world of so-called digital traces. Great number of knowledge and science areas have been filled by powerful streams of textual content. This process demands navigating the practically limitless amount of information [Lobbe, Delanoe, Chavalarias, 2022]. That is why, at the crossroads of social sciences and computer science there are interdisciplinary fields, consisting of communities of scientists, programmers, authors who write articles for encyclopedia, bloggers etc. All of them, along with many other factors, form knowledge networks.



The dynamics of these communities can be adequately described as the joint evolution of social and semantic networks. More precisely, it can be presented as a theoretical construction based on a social and socio-semantic network, i.e. an epistemic network of working agents, concepts and relationships between agents, on the one hand, and between agents and concepts, on the other [Cointet, Roth, 2010] Not long time ago, social and semantic networks were rarely combined in network research. However, the combination of the social structure and the values embedded in social networks - is crucial for overcoming the tension between structure and content in research on this type of communication [Hellsten, Leydesdorff, 2017].

The analysis of such a set of problems makes it possible to describe the processes within scientific communications, their development and mutual enrichment, especially the discussion networks of participants. However, this allows us to recognize the processes of emergence and spread of pseudo-scientific currents, false and chaotic argumentation, fake information as well as cultural "epidemiological" or "viral" phenomena, like russian propaganda against “nasizm” in Ukraine submitted by certain part of russian scientists accompanied by silence of great majority of the rest of them.





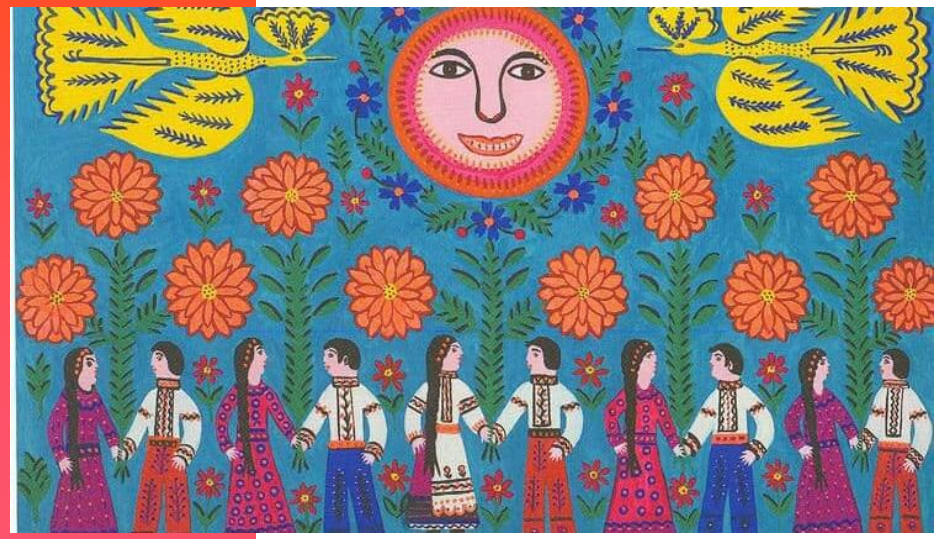
The successful as well as unsuccessful projects of the kind raise the question about the relationship between the knowledge posessed by a group and the knowledge posessed by people who make up a group (Hubgood-Coote, 2019). Another question is concerned with the phenomena of the common knowledge, group knowledge and successful imposing of false information in such countries as Russia through media and social networks.

The purpose and objectives of the paper - to describe the phenomenon of socio-semantic knowledge networks, to show how it is based on complex approaches and multilevel dynamics of communications, including knowledge networks, expert network, research teams collaboration, and science bloggers networks; how to study the communicative aspects in the field of scientific knowledge, cooperation of scientists, those who are interested in science, on the background and means of social and semantic networks and during their joint evolution.

Let us remind that the history of mass collaboration on the Internet began in 1991, when Linus Torvald introduced Linux (Gargiulo et al. 2021) It was the first sample of a joint project growing fast. Linux became a starting point for navigation between different data groups that gave way to the Wikipedia development, which is striving to be based on scientific results (Yang, Colavizza, 2021) which became the largest collaborative project, as well as the social coding platform GitHub. Both platforms have also shown “enormous research potential for studying cooperation models and for analyzing human behavior in general” (Gargiulo et al. 2021).

The purpose of socio-semantic or epistemic network analysis, is, in fact, the analysis of how common meanings appear, or even the methodology of how to enable the emergence of common meanings and their identification, expressed in natural language, related to social ontology and social actions. [Deutchman et al., 2022]. Digital technologies create a basis and generate new opportunities for creation and enhancing so called *semantic capital*, generating new senses and enriching our culture with new forms and stimulating scientific discovery (Floridi 2018).

Thus, the analysis of socio-semantic networks and formation of knowledge in the process of multiple communication largely gives us the way to make sense what happens during joint interaction.



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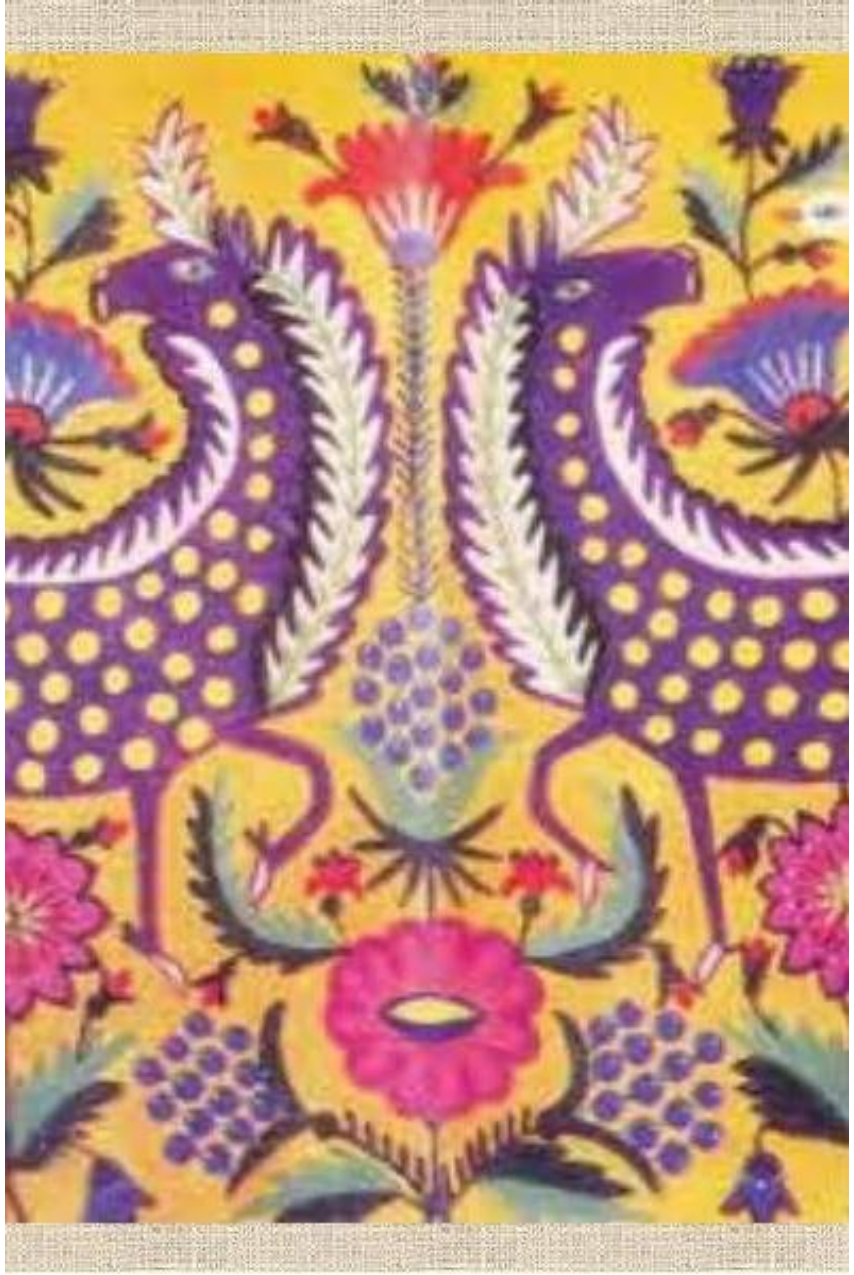
Some citations from Camille Roth:

Knowledge Community Structure

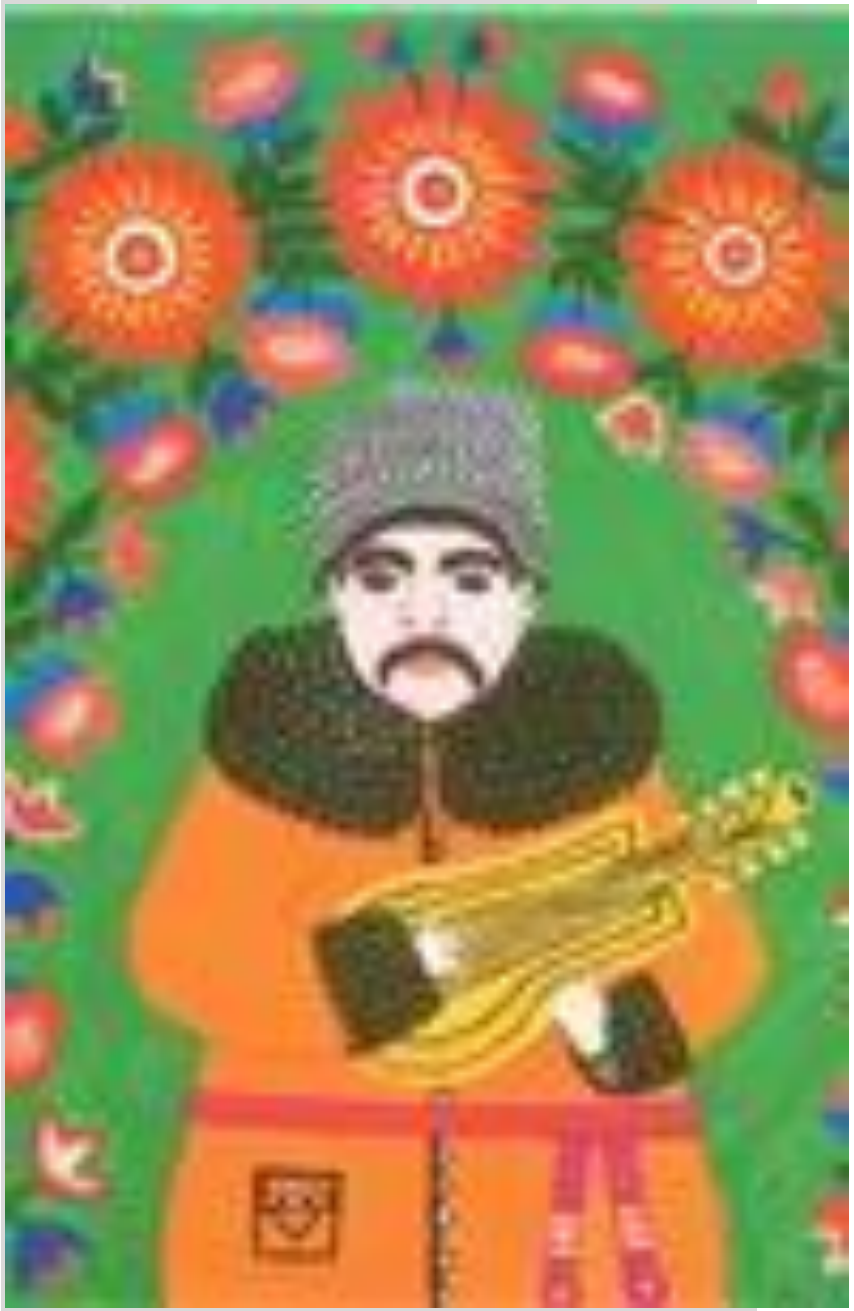
Roth, Camille, CREA, Centre de Recherche en Epistémologie A

"...we introduce a formal framework based on Galois lattices that categorizes epistemic communities automatically and hierarchically, rebuilding a whole community taxonomy in the form of a *hypergraph of significant sub-communities*. The longitudinal study of these static pictures makes historical description possible, by capturing stylized facts such as field emergence, decline, specialization and interaction (merging or splitting). The method is applied to empirical data and successfully validated by categories and *histories* given by domain experts. We thus design a valid projection function *P* from a low-level defined by links between agents and concepts to the high-level of epistemological descriptions".

“we … propose a method for exhibiting a hierarchical epistemic hypergraph for any given community”.

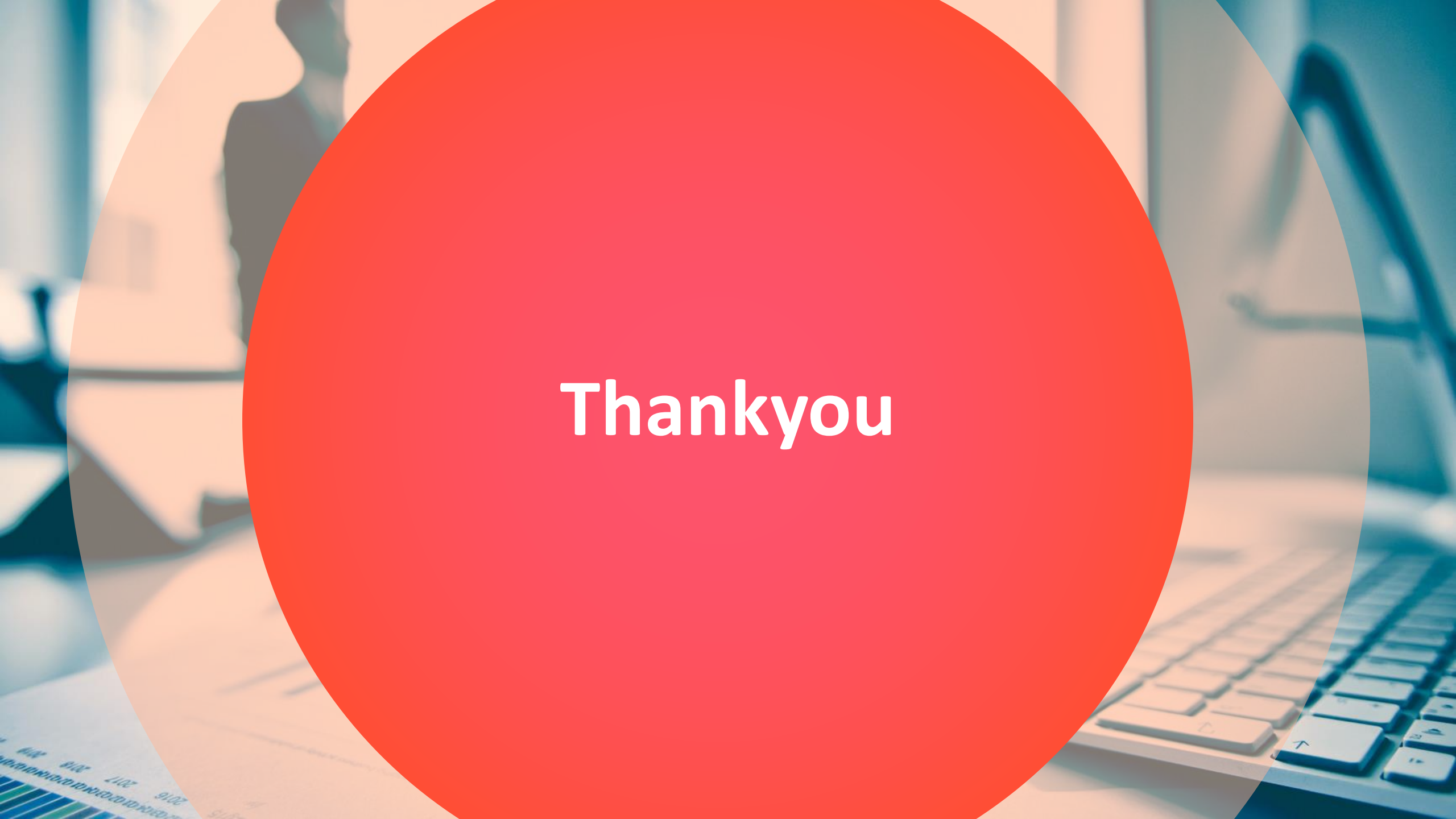


"… we … *micro-found* the high-level phenomena in the dynamics of the lower level of agents and concepts — this addresses the second issue. More precisely, we will introduce a co-evolutionary framework based on a social network, a semantic network and a socio-semantic network; as such an epistemic network made of agents, concepts, and relationships between all of them. We will then show that dynamics at the level of this epistemic network are sufficient to reproduce several stylized facts of interest".



"… we will defend a more general epistemological point on the methods and achievements of this kind of reconstruction. We will notably situate our effort within the whole apparatus of complex system appraisal. In this respect, we will suggest in particular that a successful rebuilding is no more than a claim that some particular high-level stylized facts, observed with high-level instruments (epistemologists and experts in our case) can be *fully deduced* from low-level objects (here, the epistemic network). As such, reduction of a high-level to a lower level should be understood as the successful full deduction of the higher-level from a relevantly chosen lower level. This remark will eventually support our choice of a co-evolutionary framework".

“It is nonetheless worth noting that the co-evolution occurs at the lower level of the three networks only. We are thus within the framework of “*simple emergence*”: the high-level is deduced from the lower level, but the lower level is to be influenced by low-level phenomena only. In addition, we will underscore the fact that exogeneous phenomena may also account for the social complex system evolution (including for instance ‘strength’ of concepts, external policies, etc.). We will consequently moderate the thesis, arguing eventually that reconstructing epistemic communities involves *at least* the dynamic co-evolution of agents and concepts”.


Thankyou