

Complex Adaptive Knowledge-Flows and Workflows

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1. “Kw-Wk” duality

A new paradigm in various applications areas is emerging from the convergence of Grid technologies, semiotics methodologies and knowledge applications. This convergence is enabled by the duality between knowledge providers and knowledge consumers.

The impact of such a paradigm on knowledge-flows and workflows interactions [3,4] will require to reason in terms of "Complex Adaptive Knowledge-Flows and Workflows". This paper presents the first two levels of the Knowledge-Work fractal double triads that are the basis for further in-depth analysis of these flows.

2. “Kw-Wk” Double Fractal Double Triads

A double fractal double triad is obtained from the “Kw-Wk” duality between the **Knowledge (Kw)** and **Work (Wk)** w.r.t the adaptive interactions emerging from the following orthogonal dimensions:

- Behaviour Types (roles): Providers, Brokers, Consumers,
- Processes Types: Objectives, Matching and Constraints, and
- The “**To.be – As.is**” Execution duality that occurs between Preparation and Evaluation.

The complexity of these intertwined patterns is captured by the proposed fractal double-triads modeling approach derived from [1] and [2], which has been inspired by the quark-antiquark model of particles physics, and self-similar dynamics.

The processes of Knowledge Consumers consist of:

- Knowledge Consumers Objectives Specification: “**To.be – As.is**”
- Knowledge Consumers Objectives Realization: “**To.be – As.is**”, and
- Evaluation of Knowledge Objectives Consumer: “**To.be – As.is**”.

The processes of Knowledge Brokers consist of:

- Knowledge Brokers Matching Specification: “**To.be – As.is**”,
- Knowledge Brokers Matching: “**To.be – As.is**”, and

- Evaluation of Knowledge Brokers Matching Satisfaction: “**To.be – As.is**”.

The processes of Knowledge Providers consist of:

- Knowledge Providers Constraints Specification: “**To.be – As.is**”,
- Knowledge Providers Constraints Satisfaction: “**To.be – As.is**”, and
- Evaluation of Knowledge Providers Constraints Satisfaction: “**To.be – As.is**”.

Dually, the processes of Work Providers consist of:

- Work Providers Objectives Specification: “**To.be – As.is**”,
- Work Providers Objectives Realization: “**To.be – As.is**”, and
- Evaluation of Work Providers Objectives Consumer: “**To.be – As.is**”.

The processes of Work Brokers consist of:

- Work Brokers Matching Specification: “**To.be – As.is**”,
- Work Brokers Matching: “**To.be – As.is**”, and
- Evaluation of Work Brokers Matching Satisfaction: “**To.be – As.is**”.

The processes of Work Consumers consist of:

- Work Consumers Constraints Specification: “**To.be – As.is**”,
- Work Consumers Constraints Satisfaction: “**To.be – As.is**”, and
- Evaluation of Work Consumers Constraints Satisfaction: “**To.be – As.is**”.

Such a modeling approach is the basis for the architectural analysis and design of complex adaptive knowledge and workflows dynamical systems. The geometry of events emerging from the relationships between these behaviors and processes is captured by the double triads illustrated in Figure 1.

References

[1] J.-F. Mascari, "Complex Autonomic Knowledge Systems", Proceedings. *First International Conference on Semantics, Knowledge and Grid (SKG2005)* Beijing, China – (to appear).

[2] J.-F. Mascari and G. Cavarretta, "Complex Adaptive Knowledge", *First International Workshop on Knowledge-Oriented Business Processes Integration*, Amsterdam 2005.

[3] M. Nissen, *Harnessing Knowledge Dynamics: Principled Organizational Knowing & Learning*, PA: IRM Press, Hershey, 2006.

[4] Zhuge H., *The Knowledge Grid*. World Scientific, 2004.

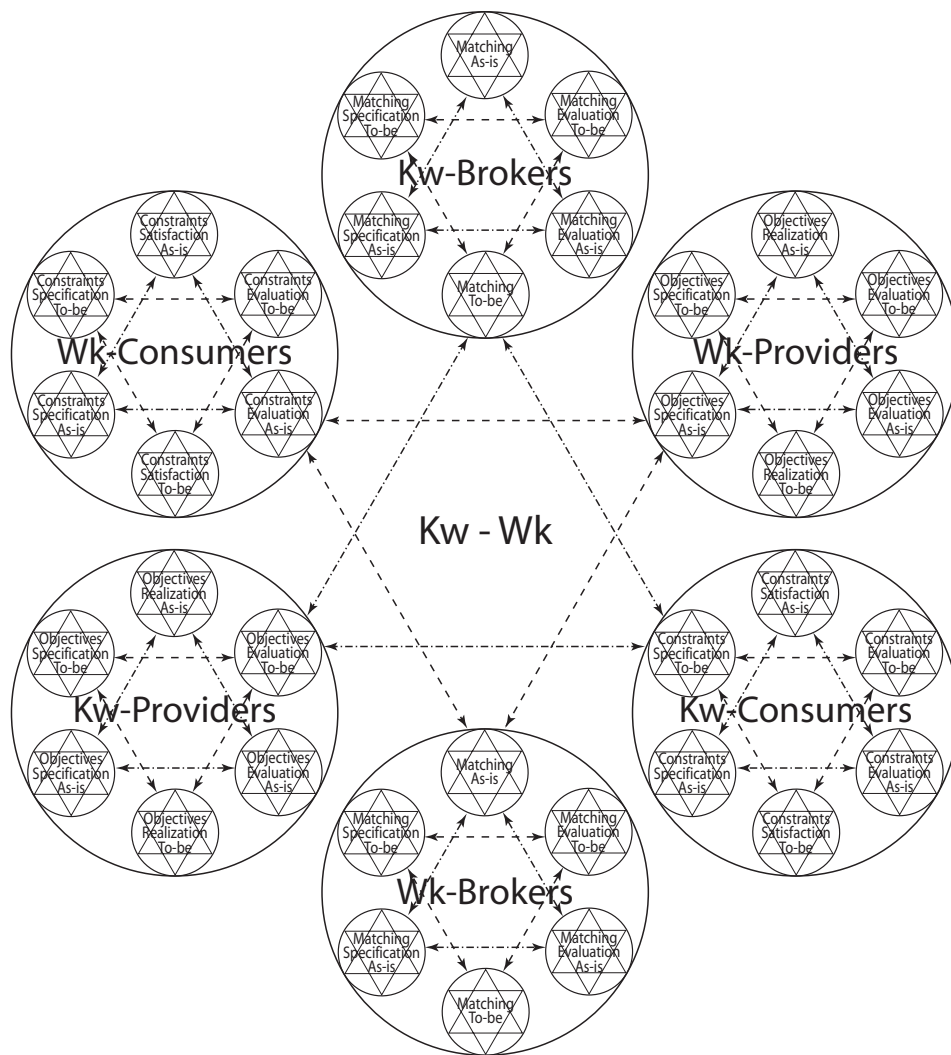


Figure 1. First two levels of the Knowledge-Work fractal double triads