Towards Holistic Service-Orientation in Technical Systems Engineering for Digital Services

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The paper extends a recently published work [1], which defined *digital service* and *digital service membrane* as new concepts and abstractions within service science and service systems [2, 3]. As part of the ongoing digitalization of global society, service systems are increasingly facing pressure to digitalize and automate human work in services. This can be done by introducing highly complex technical semi-autonomous and autonomous systems. These systems are mix of Information, Communication, Computing and Automation Technology (ICCAT), including Artificial Intelligence (AI) components, as well as sensors and actuators capable of near real-time interaction with people and the physical world (a.k.a. IoT, CPS and robotics). Accordingly, the technical systems involved in digital service can be characterized as socio-cyber-physical technical systems, which need to comply to requirements, regulation and constraints from related systems and environment;

- social systems: people and society consisting of individuals and social organizations with their different cultures, ethics, laws and norms,
- physical environment: energy, laws of physics, built environment, artefacts and materials
- natural environment: biological entities and natural resources.

Accordingly, digitalization of services or service systems is a highly complex and multidisciplinary undertaking requiring multi-dimensional systems thinking and availability of wide expertise on related systems and the environment. However, no integrated approaches or processes to digitalization of service, addressing both digital service and technical systems engineering in parallel as complementary activities, can be found in the literature. This paper will formulate and propose such an approach with holistic service-oriented world-view for improving inclusion, engagement and efficient co-operation multiple different stakeholders in engineering processes related to digitalization of services.

The paper will review the different levels/dimensions of service dominant logic and systems thinking, which are present in the overall process of analyzing, designing, realizing and governing digital service within service systems. Further the paper will introduce and address the relation between digital service engineering and technical systems engineering processes and proposes holistic service-orientation as a unifying design approach for analysis, design and development of digital service. The paper will address value-driven requirements engineering with wider stakeholder participation in order to improve the value co-creation and interaction during engineering of a digital service and a technical systems realizing it.

The contribution of the paper is to extend and link the earlier work [1] with service-dominant logic and to describe and propose an approach of holistic service-orientation for wider stakeholder involvement and engagement in analysis, design, realization and governance of digital service within service systems.

References (max 1 page)

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