

# Ongoing Research Agenda on the Internet of Things (IoT) in the Context of Artificial Intelligence (AI)

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This talk presents our ongoing research agenda on the Internet of Things (IoT) in the context of Artificial Intelligence (AI). Three initiatives define this agenda: *integration of IoT into business process management*, *agentification of things*, and *mutation of things*. IoT is among the latest ICT developments that is making the boundaries between reality and fiction vanish. According to Mark Weiser, "...The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it"<sup>i</sup>. And according to Gartner<sup>ii</sup>, 6.4 billion connected things were in use in 2016, up 3% from 2015, and will reach 20.8 billion by 2020. In the first initiative, we adopt storytelling principles to design and develop Process of Things (PoT). A PoT is specified as a story whose script indicates the characters that things will play as well as the scenes that will feature these things. A PoT also allows things to collaborate by offering value-added services to end-users. A system implementing PoT will be presented during the talk. In the second initiative, we shed the light on some obstacles that are slowing down IoT expansion and adoption, for instance diversity of things' development technologies and communication standards, users' reluctance and sometimes rejection due to privacy invasion, lack of killer applications that would demonstrate their necessity, lack of an IoT-oriented software engineering discipline, and finally, the passive nature of things. Because of this nature, things are restricted to sending data to third parties or (basic) processing data prior to their transfer to third parties, too. We are examining how to empower things with additional capabilities that would make them proactive. This means that things can for instance, reach out to peers that expose collaborative attitude, form dynamic communities when necessary, avoid peers that expose malicious attitude, be accountable for their actions, etc. While we already see some encouraging signs of thing empowerment through initiatives like semantic things, Internet of social things, Internet of agents, and agents of things, we propose the agentification of things from a conceptual perspective exemplified with norms and an operational perspective exemplified with commitments. In conjunction with thing agentification, we present during the talk the third initiative that examines thing mutation in the sense that things will bind and/or unbind capabilities on the fly (and as they see fit). To ensure mutation success we consider first, the context in which things operate and second, policies that impact things' decisions to bind/unbind capabilities. We motivate mutation decisions with 3 factors: performance so that a thing remains competitive/attractive, adaptation so that a thing remains responsive, and survivability so that a thing remains in business.

<sup>i</sup>W. Mark, *The Computer for the 21<sup>st</sup> Century*, *ACM SIGMOBILE Mobile Computing and Communications Review*, 3(3), July 1999.

<sup>ii</sup>[www.gartner.com/newsroom/id/3165317](http://www.gartner.com/newsroom/id/3165317).