

INSPIRE: Value-Function Handoffs in Human-Machine Compositions that are under Design for the Internet of Things

Overview:

An increasing array of functions that impact values-sensing, interpreting, deciding, acting-are being built into technical systems, and at the same time policymakers and the public are affirmatively asking for technology to act with greater moral weight-to protect privacy by design, produce fair decisions etc. Decisions to handoff responsibility for specific functions from humans to machines are interrogated for their impact on societal values, while at the same time engineers and designers are directed to protect and produce societal values through technical means.

Computer scientists and engineers have responded with work that attempts to address values within technical design. This work, while impressive, is stymied by the shared insight that the function as well as ethical and political values of technologies are composed of material artifacts embedded and enmeshed in social life and political structures, that is, of socio-technical systems not solely technical choices and devices. They lack models to guide consideration of this essential question: when and under what conditions functions and values can be safely redistributed from humans to technical components of a system.

These handoffs between and across actants (and disciplines and practices) is of critical importance are our focus of inquiry. Rising to the challenge of building for and protecting values in computational systems requires both scientific advances that are useful for achieving relevant values, and their artful deployment in consort with other actants-machines, people, processes, laws-in broader socio-technical systems so that the composition coheres to advance those values in meaningfully, and ideally optimal fashion. Human values should be brought within the boundary of science: yet the goal is not a wholesale replacement of one regulator (law) with another, but rather socio-technical assemblages that leverage technical, human, legal, and other regulators in a manner that optimally exploits the variances between regulators to enhance the expression and protection of values in practice.

Reasoning about values in IT systems requires a broader field of vision, one that helps all parties understand and reason about the implications of handoffs and aids in optimizing values through composition of socio-technical systems. Our work here seeks to develop, test, and refine a model to guide considerations of value hand-offs and values in hand-offs so we can thoughtfully construct and protect values leveraging contextually appropriate modalities of regulation; and to identify interventions-methods, tools, team compositions, etc. that support productive use of our model in various kinds of technical research and practice.

Intellectual Merit :

Our project will investigate what more is needed to achieve and retain meaningful compositions of values in sociotechnical systems. The proposal identifies five key dimensions of input: agents, triggers, values, modes, and distribution of function that assist in characterizing, in terms of values handoffs, arrangements of handoffs, and outcomes, as well as a sixth, the overall composition of a value they produce, to explore through case studies. The work will explore the relevance of factors to outcomes and regularities across case studies. The proposed model will both guide collaboration with the Technical Leads in the IoT cases, and evolve through that work and the continued integration of insights from literature in science technology and society (STS), philosophy of technology and techno-regulation. Ultimately, a refined model will be honed for broader use beyond this project.

Broader Impacts :

The NSF director, France Córdova, included Shaping the New Human-Technology Frontier among nine big ideas for future investment. The White House and the Federal Trade Commission's focus on the impact of the IoT, big data, and AI are additional reflections of the urgent need to foster rigorous thinking about humans and machines in relation to one another, to making things work well across society, in concert with human need, and in service of societal values. The failure to protect values during these transitions poses a barrier to technical adoption, and often imposes burdens on the least privileged in society. Models to guide decisions about handoffs are of critical importance.