

Post abstract for 2016 SPSP Methods workshop:

Technological determinism in systems engineering : Insights from comparing satellite instrument developments in the United States and European Union

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Technology develops hand in hand with society, affected by a mix of social, technical and scientific influences. One framework for assessing how technology develops is technological determinism, which some scholars view as a type of internal logic that guides and shapes decisions about technologies over time (Smith and Marx 1994). Studies of technological determinism have been largely dismissive, but some scholars (Ceruzzi 2005, Wyatt 2008) advocate that the constraints technology imposes over time are significant and worthy of more study.

We seek to offer an empirical assessment of how technological determinism may or may not occur by developing a detailed case study. Our case study examines two space science instrument developments that reflect independent developments of the same functional technology. Two separate teams, based in the United States and Europe respectively, attempted to build the same sensor for detecting incoming x-rays. However, the teams made different systems engineering decisions as they went about the development of their sensors, and their exact components in their sensors were distinct. Within their separate technical and political environments, the teams encountered substantially different technical challenges over time.

A series of interviews were performed with members of each sensor team in addition to extensive archival research of the design and policy decisions made over time. By triangulating across a variety of different sources, we sought to explain different technological decisions made by each group. By assessing parallel decision paths made by each group, one can see what types of ‘logic’ played a part in a decision, and to explore to what extent there is a ‘determinism’ in technological development.

Our results show that many of the major decisions were strongly influenced by past technological decisions. While social and organizational influences affected the overall designs, a caveated discussion of technological determinism may be appropriate interpretation of the data.

Citations:

Ceruzzi, P.E., 2005. Moore's law and technological determinism: reflections on the history of technology. *Technology and Culture*, 46(3), pp.584-593.

Smith, M.R. and Marx, L., 1994. *Does technology drive history?: The dilemma of technological determinism*. Mit Press.

Wyatt, S., 2008. Technological determinism is dead; long live technological determinism. *The handbook of science and technology studies*, pp.165-180.