

## The Built-in Bias of Technology

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Technology is not neutral. It has an intrinsic bias that is built (designed) into it from the original inception of a particular problem, throughout the entire design process, all the way to the implementation, use, and disposal of a product. It is widely, though not universally, accepted in the literature that technology is non-neutral, i.e., it is partial to certain uses. However, this understanding is not widespread amongst engineering students, and the perception of neutrality can have perilous societal consequences. Some preliminary work has identified pedagogical approaches to instilling better understanding of non-neutrality in the classroom [1]. This paper continues that line of thought. Starting with Kranzberg's assertion that "technology is neither good nor bad; nor is it neutral" [2] I explore the cultural appropriateness of technology as a sign of inherent bias. This leads to a review of the literature on mental models of technology [3, 4, 5, 6] as an approach to understanding how the unintended consequences of a technology may not be as haphazard as first appears. With these concepts as background, I analyze the means by which bias is built into each stage of the design process. Finally, Carl Mitcham has suggested that a fruitful area of further investigation would be to examine how this bias can be identified in the structures of the technological products themselves[7]. I conclude with some initial ideas on approaches to such an analysis, e.g., using reverse engineering analysis to translate form back to intended function [8].

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<sup>1</sup> Steven H. VanderLeest, "Exposing the Values of Technology through the Liberal Arts," *Proceedings of the 2003 American Society for Engineering Education (ASEE) Conference*, Nashville, Tennessee, June, 2003.

<sup>2</sup> Melvin Kranzberg, "Technology and History: 'Kranzberg's Laws'", *Bulletin of Science, Technology & Society*, v15, n1, pp. 5-13, 1995.

<sup>3</sup> W. Bernard Carlson, "Toward a Philosophy of Engineering: The Role of Representation," *Proceedings of the 2003 American Society for Engineering Education (ASEE) Conference*, Nashville, Tennessee, June, 2003.

<sup>4</sup> Puerta-Melguizo, Mari Carmen; Chisalita, Cristina; Van der Veer, Gerrit C., "Assessing users mental models in designing complex systems" *Proceedings of the IEEE International Conference on Systems, Man and Cybernetics*, v 7, 2002, p 420-425.

<sup>5</sup> Thatcher, Andrew, Greyling, Mike, "Mental models of the Internet", *International Journal of Industrial Ergonomics*, v 22, n 4-5, Nov, 1998, p 299-305.

<sup>6</sup> Langan-Fox, J; Wirth, A.; Code, S.; Langfield-Smith, K.; Wirth, A., "Analyzing shared and team mental models", *International Journal of Industrial Ergonomics*, v 28, n 2, 2001, p 99-112.

<sup>7</sup> Carl Mitcham, *Thinking through Technology: The Path between Engineering and Philosophy*, Chicago: University of Chicago Press, 1994, p. 182.

<sup>8</sup> Kevin N. Otto, Kristin L. Wood, "Product Evolution: A Reverse Engineering and Redesign Methodology", *Research in Engineering Design*, v10, n4, December 1998 pp. 226 – 243.