A Flow Visualization Practionary

Scott H., System Analyst
2025-02-05

Overview

I demonstrate the practical use of a combined material and data flow model that uses just three main symbols. This provides a way to vet, analyze, change, and maintain complicated systems. I show how to create interactive models and narrative documents from the ground up, without relying on external services.

Prerequisites

My two previous papers Triple System Analysis (3SA) and Adaptive Analysis ( ) explain how to use multi-level knowledge graphs for system analysis (H. 2023) (H. 2024). A Flow Visualization Practionary ( ) uses the combined material/data flow model from , and simplifies the symbols. The reader will find it helpful to review 3SA and before tackling .

Human Cognition Before Systems

We tend to work with systems backwards. We look at the exhaust data from systems and hope to understand our direction, when we should really be focusing on where we are, where we want to go, and what dangers lie on our route before looking at the currents propelling our boat. Our systems should conform to our needs, not the needs of a provider, framework or existing systems. There can be some savings in the short-term by going with the flow and purchasing the dominant service; however, when rapid change in requirements and features are needed to adapt to new situations, the technical debt accumulated by not leading with human cognition increases the risk of capsizing in the rapids. Humans can consider roughly 3 classes of objects related in one dimension, which can be seen as players, tools, and teams towards various goals (Tomasello et al. 2005). We have limits on how much information we can consider in real-time to make decisions (Zheng and Meister 2025). What form of knowledge works best for the thin layer of communication that comprises our conscious mind (Murphy et al. 2011) (“Decoding the Void” n.d.)? Semiotics are cognitive shortcuts that can help. I use icons for 3SA , , and , rather than titles, to make it clear that I mean the idea of the entire paper. I use other conventions in the model that help the reader understand complex systems without dense dialog. Charles Peirce developed more sophisticated versions of these ideas, and the title of this paper is an homage to Michael K. Bergman, a follower of his (Bergman 2018).

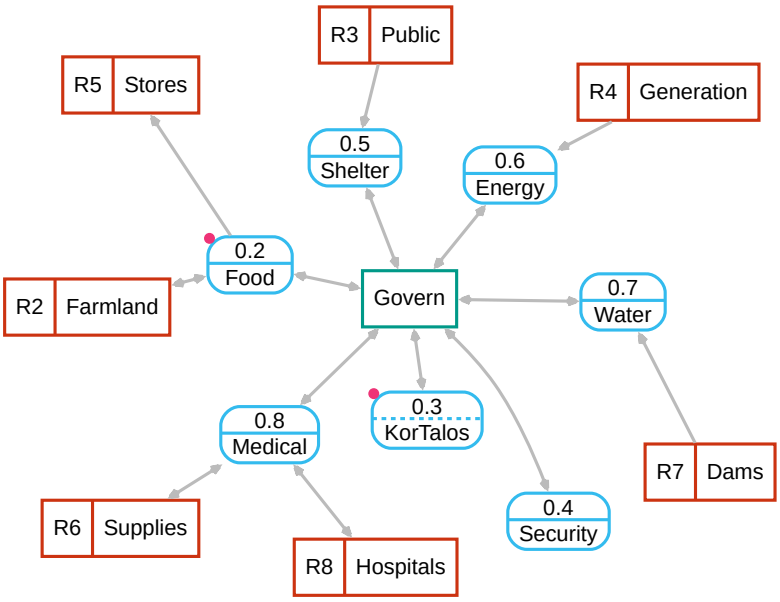

Figure 1: Top

Semiotics

I will not bog this paper down in the philosophy or regurgitate ideas from and 3SA; however, semiotics is a critical part of enabling humans to comprehend complex systems without servers, administrators, or experts (H. 2023) (H. 2024). Fig. 1 Shows the set of symbols used in my combined material and data flow model. The rounded blue boxes are transformations of data or materials. The teal boxes are agents that are the sources or sinks of data or materials. The reddish-brown boxes store data or materials at rest. Each symbol is a node that is connected with other nodes, and is called a graph. Besides color and node shape, dotted lines within the node represent data. Solid lines represent materials. As I explained in , data flow diagrams are behind agents that operate transforms. This is why I think it is OK to mix the nodes, as most of the function is behind the screens, the black box of the device or report that assists the transform. Magenta dots in the corner of a transform/process node mean you can zoom in to it by clicking. An orange dot means you can hover for notes and narrative. A blue dot in the lower right corner meand there is a connection to the associated full data flow.

First Graph

Lorem ipsum uppa doopa dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Cras 3SA pulvinar mattis nunc sed blandit. Nunc vel risus commodo viverra maecenas. Eget magna fermentum iaculis eu. Vehicula ipsum a arcu cursus vitae congue mauris rhoncus. Nunc eget lorem dolor sed viverra ipsum. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Cras pulvinar mattis nunc sed blandit. Nunc vel risus commodo viverra maecenas. Eget magna fermentum iaculis eu. Vehicula ipsum a arcu cursus vitae congue mauris rhoncus. Nunc eget lorem dolor sed viverra ipsum. ipsum dolor sit amet, consectetur adipiscing elit, sealiqua. Cras pulvinar mattis nunc sed blandit. Nunc vel risus commodo vi

dolor sit amet, consectetuLorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Cras pulvinar mattis nunc sed blanditcommodo viverra maecenas. Eget magna fermentum iaculis eu. Vehicula ipsum a arcu cursus vitae congue mauris rhoncus. Nunc eget lorem dolor sed viverra ipsum ("Pandoc - Index" n.d.).

Bibliography

Bergman, Michael. 2018. "A Knowledge Representation Practionary. AI3:::adaptive Information." 2018. https://www.mkbergman.com/a-knowledge-representation-practionary/.

"Decoding the Void." n.d. Accessed February 5, 2025. https://radiolab.org/podcast/anesthesia.

H., Scott. 2023. "Triple System Analysis," May. https://doi.org/10.5281/ZENODO.7826793.

———. 2024. "Adaptive Analysis," August. https://doi.org/10.5281/ZENODO.13684896.

Murphy, Michael, Marie-Aurélie Bruno, Brady A. Riedner, Pierre Boveroux, Quentin Noirhomme, Eric C. Landsness, Jean-Francois Brichant, et al. 2011. "Propofol Anesthesia and Sleep: A High-Density EEG Study." *Sleep* 34 (3): 283–91. https://doi.org/10.1093/sleep/34.3.283.

"Pandoc - Index." n.d. Accessed January 3, 2025. https://pandoc.org/index.html.

Tomasello, Michael, Malinda Carpenter, Josep Call, Tanya Behne, and Henrike Moll. 2005. "Understanding and Sharing Intentions: The Origins of Cultural Cognition." *Behavioral and Brain Sciences* 28 (5): 675–91. https://doi.org/10.1017/S0140525X05000129.

Zheng, Jieyu, and Markus Meister. 2025. "The Unbearable Slowness of Being: Why Do We Live at 10 Bits/s?" *Neuron* 113 (2): 192–204. https://doi.org/10.1016/j.neuron.2024.11.008.