Protocols are Systems

Implications for a Grand Unified Protocol Modeling Theory

Shingai Thornton · Protocol Symposium 2026

Grand Unified Protocol Modeling Theory

55
GRAND CHALLENGE

Explore the many existing formalisms for modeling systems that could be described as protocols (state machines, process calculi, temporal logics, etc) and unify them elegantly in a way that captures the phenomenology of most protocols. This should not just be a brittle integration, but an evolvable modeling formalism that enables future research, proving of results, accommodation of the phenomenology of new protocols, etc.

By Venkatesh Rao · June 8, 2026

Starting interest: 8

👀 22 Value: 372

- How can a GUPMT benefit from the lessons learned from systems theory?
- The history of systems science shows the pitfalls, and opportunities of ambitious efforts to integrate various theories into a grand unified one
-

What is a protocol?

- **Rules** created by humans that shape the **behavior** of **groups of people** *(Walsh 2023)*

- Simple **codified set of behaviors** when adopted by sufficient number of participants, **reliably leads** to good enough **outcomes for all** *(Rao, Beiko, Ryan, Stark, Van Epps and Aue 2023)*

- *A set of explicit or implicit **rules or procedures** intended to **govern, guide, or influence behaviour** in a way that allows the emergence or construction of **coordinated behavior**. (Tay 2024)*

What is a system?

Constructivist	**Things, relations**	**$S = (T, R)$**
Realist	**Composition, environment, structure, mechanism**	**$S = \langle C, E, S, M \rangle$**
Perspectivist	1. Components 2. Internal flow networks (matter, information, energy) 3. Environment 4. External flow networks 5. Boundary 6. Transformation Functions 7. History 8. Time interval of interest	**$S = \langle C, N, E, G, B, T, H, \Delta \rangle$**

Protocols ARE systems

- **Things =** Participants (Humans, agents, etc.)
- **Relations (between things) =** Codified rules and behaviors constraining participant behavior.

Handwashing

How it works

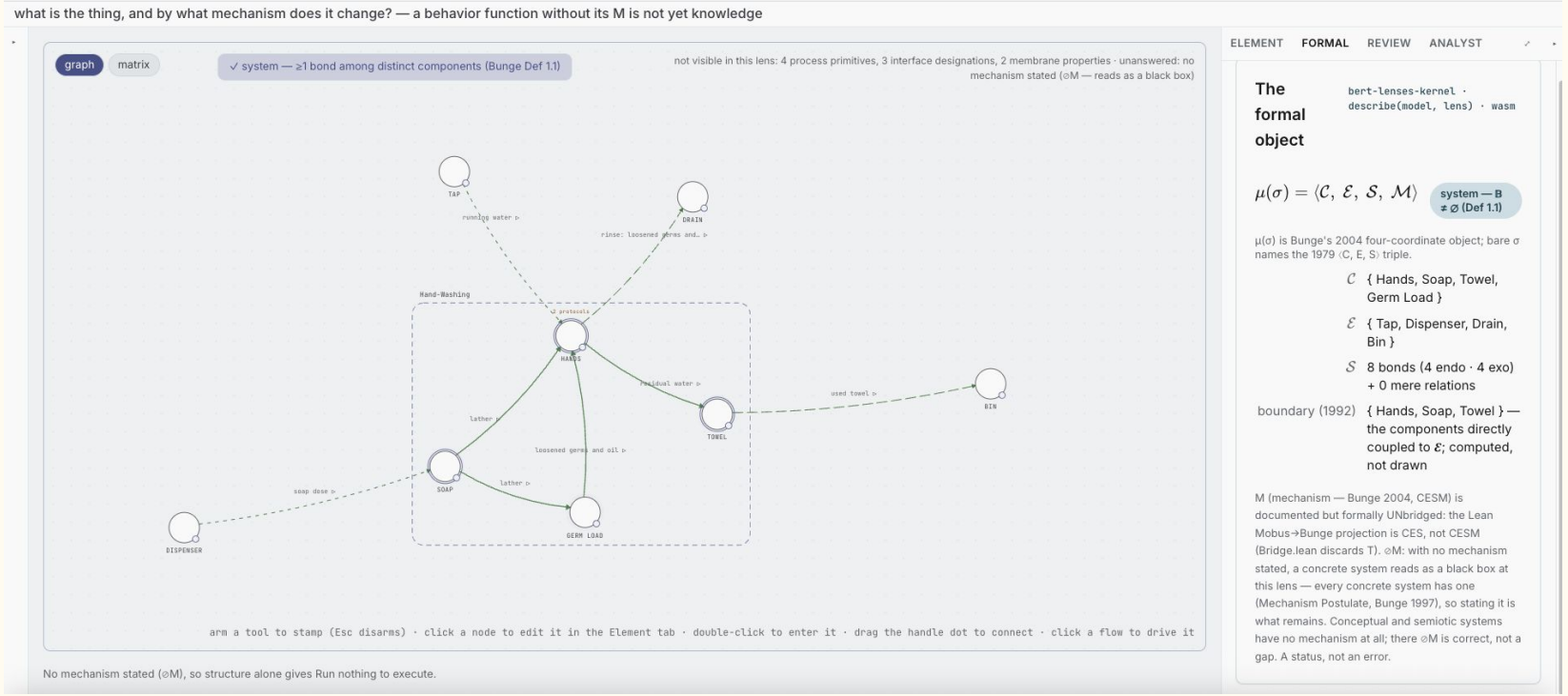
Washing your hands is easy, and it's one of the most effective ways to prevent the spread of germs. Follow these five steps every time.

1. **Wet** your hands with clean, running water (warm or cold), turn off the tap, and apply soap.
2. **Lather** your hands by rubbing them together with the soap. Lather the backs of your hands, between your fingers, and under your nails.
3. **Scrub** your hands **for at least 20 seconds**. Need a timer? Hum the "Happy Birthday" song from beginning to end twice.
4. **Rinse** your hands well under clean, running water.
5. **Dry** your hands using a clean towel or an air dryer.

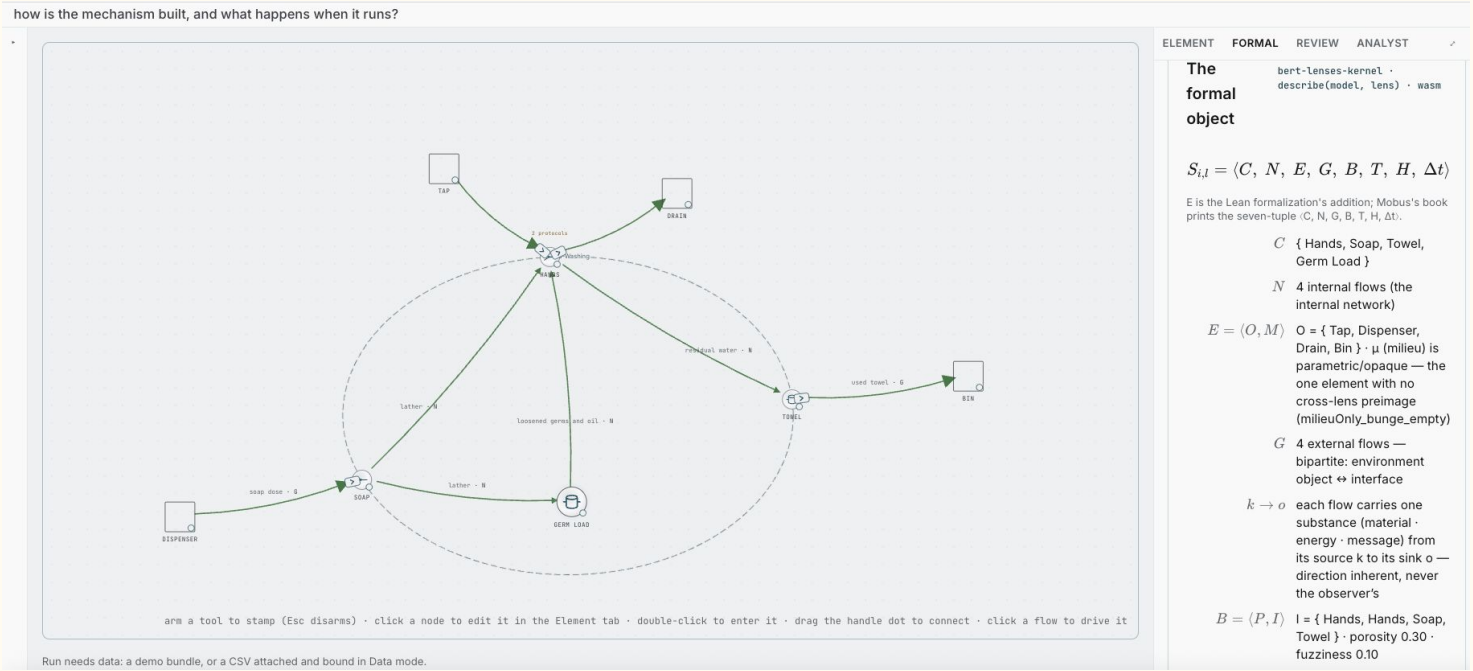
Handwashing (Constructivist)



Handwashing (Realist)

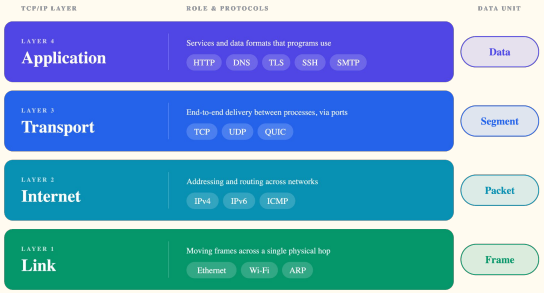


Handwashing (Perspectivist)

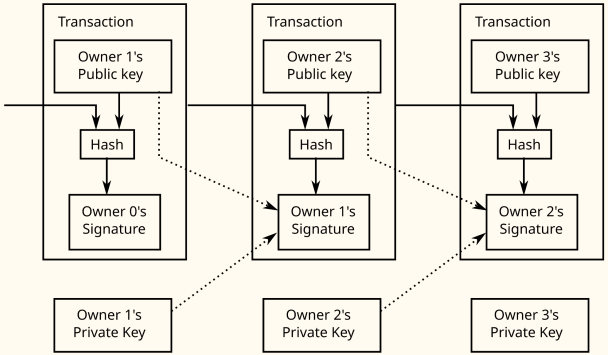


Protocols of Interest (POIs)

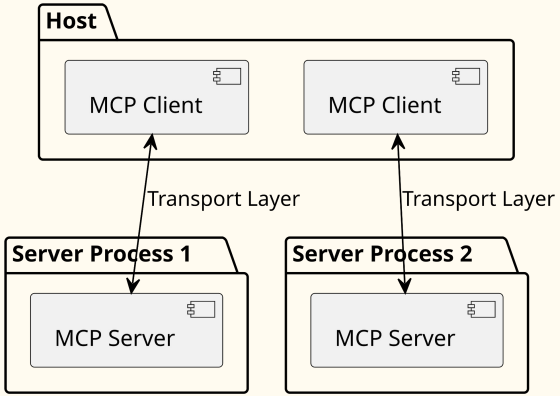
Communication (TCP)



Value (BTC)



AI Tooling (MCP)

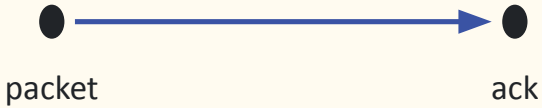


The Common Core

HAND-WASHING



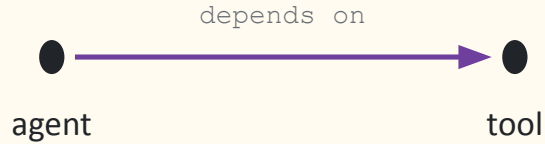
INTERNET STACK



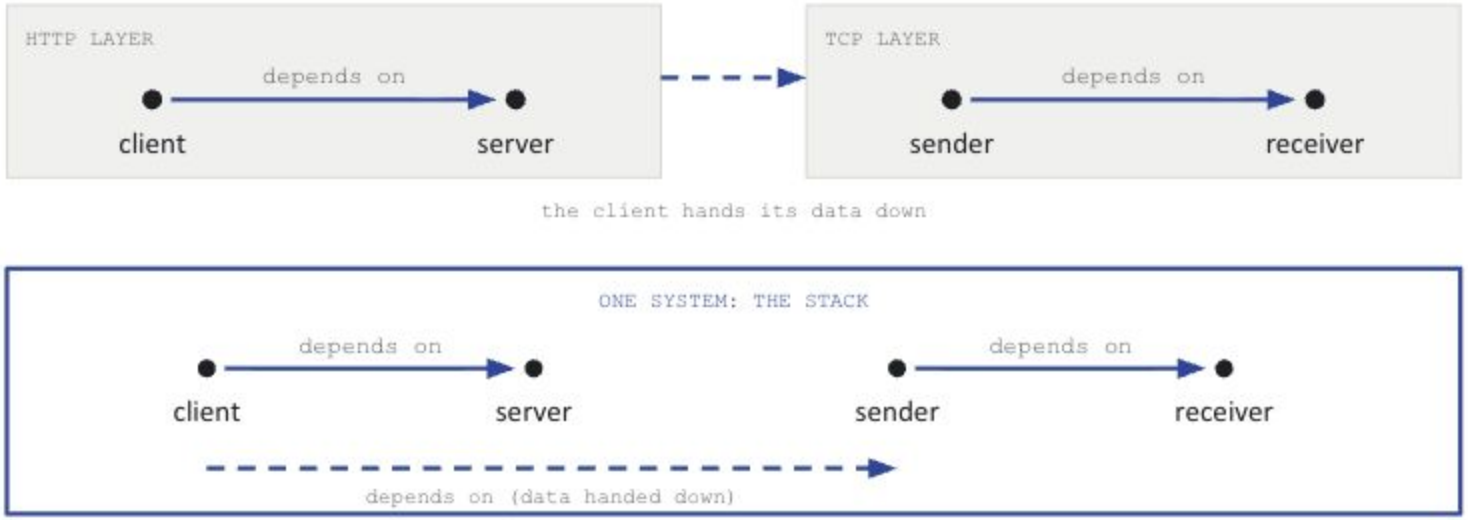
BITCOIN



NOSTR

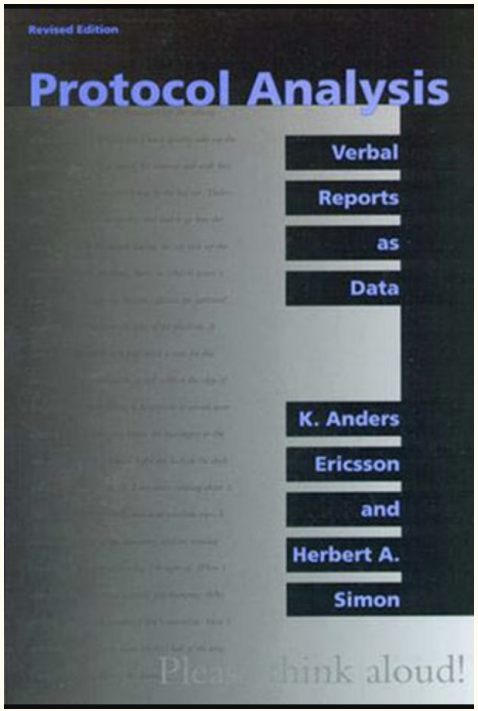


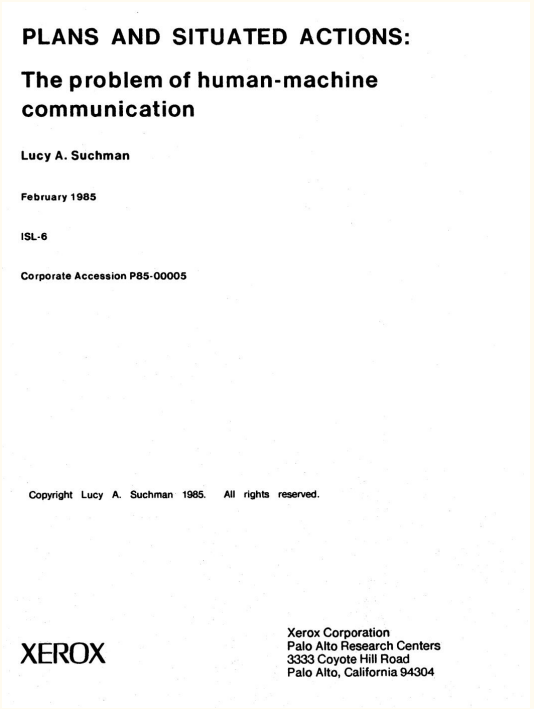
Composition!



Locating Hardness

Protocol Systems Analysis





PLANS AND SITUATED ACTIONS:

The problem of human-machine communication

Lucy A. Suchman

February 1985

ISL-6

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Towards a Grand Unified Protocol Systems Theory

The $E=mc^2$ of Protocol Systems

A protocol system is made up of a protocol, at least two people, and those people taking actions in relation to the protocol.[10] In (unnecessary) equation form, it looks like:

> Protocol system = A + B + C
> A = *a protocol*
> B = *more than 1 person*
> C = *actions by those persons in relation to the protocol*