Beyond *Named Function Networking*

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A) Immutable Data

B) Concurrency Control

I share this view with JMS, UPenn: Every protocol is a distributed computation.

A) Immutable Data

- In Named Function Networking, it first looked like an embarrassing constraint:
  "only works for immutable data" (no latest-version, please)

- My lesson learned: Immutability is one of the major wins.

  overwriting memory cells is the curse of computer science

  seems natural among functionally inclined people …

- In ICN, we should **leverage immutable data much more**:
  - append-only repos (more on this on the next slide)
  - kill the "version" field (move it to an architecturally safe place), think in "time cuts"
  - time-aware namespace management (Dave Reed's tech rep 205 on NAMOS, 1978, titled "NAMING AND SYNCHRONIZATION IN A DECENTRALIZED COMPUTER SYSTEM")
  - this would be a cool demo: *reverse debugging over ICN*

B) Concurrency Control, incl Consensus

- The taboo of our community: the “publish” API
  —> there is the `get()`, called interest, but not the `set()`, duh

- Any non-toy distributed application has to solve “conditional publishing”:

  ```
  only set(A,contentA) if I can also set(B,contentB)
  ```

  classic example: only decrease the balance if sufficient credit. … = a transaction

- Distributed computing is about handling race conditions, handling consensus
  … no answer in the community (sync is not enough) — Where is RAFT for ICN?

- Lack of dialogue with database community, little distributed systems mindset
  —> DB Zeitgeist: “higher-order databases” — **Where is the “higher-order ICN?”**

C) The Elephant in front of the house

- Google **PubSub**: (pubsub was meant to be a WAN thing, at most)
  - global
  - reliable delivery
  - crash resilient/HA
  - at scale

  A dream for developers: Implementing complex distributed apps in a snap, all nasty low-level problems solved for you.

  Once you can **disseminate named data** with so much ease: who wants to still look into ICN?

  Risk to be swept way by high-level development.