Biomedicine Breakout 2

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Ontologies

**Challenge for OKN:** If we want to develop a computable, intelligent knowledge representation network, we need to have a definable reference set….but the enemy of the good is the best.

**Potential Solutions, short term 1-2 years**

- **Corpus of Ontologies**, either all together in one place (equiv. to UICU for fist 100s webpages) OR smart APIs and stable location references.
  - Computable NOT Clickable
  - Humans should not (have to) create ontologies

- Converging ontologies down to a minimally convergent set
- Extracting best, consistent information
- Create Computable representations for effective spiders

➤ **Even 50% of completeness is fine**, enemy of the good is the best, let’s make incremental improvement.

➤ Minimal FTE level is needed, low hanging fruit.
Licenses, Provenance and Security

**Challenge for OKN:** Data, Information, Publications, Images....all of these have a variety of licenses, metadata, provenance.

**Potential Solution:** Sorter term 2 years
Maintain and relational link to knowledge representations (eg data) for license information, metadata, publications, provenance..

**Grand Challenge for OKN.V2:** Human-centered data is a treasure trove for meaningful inferences, how do we know where it is, what it is, format....and compute on it

**Potential Solution**, Longer term
- We need to have a way to compute on data behind a firewall. We need a schema, a mechanism, maybe infrastructure.
- This schema needs to be consistent with what is developed for open data/knowledge
- Push algorithms to the data behind a firewall, sandboxing
Building Buy-In

**Challenge for OKN:** As important to having the ontologies, data... in a converging, computing scheme, understanding the relationships and reliability of those entities is equally important.

**Potential Solution:** Midterm 3-5 years

- Develop embedding relationships with probabilities within the knowledge representations
- Develop knowledge relationships that can be evaluated against experiments, and reconcile the knowledge representations (aka not static)
- Understanding Utility and Relative Utility, useful and believable for community buy-in
Use Cases

• Help biologists use a large(r) corpus of knowledge to query what types of experiments can be done and at what costs.

• Offer Clinicians alternative treatment pathways with some sense of reliability or potential outcomes and risks (based on knowledge inferences)

**Today: RAS-Machine**—Extract facts from literature and assemble onto signaling models for RAS for RAS-related cancers.

• Updated daily
• Easy to build evaluation models and usability tests

John Bachman, Peter Sorger