Good Uses for Crummy Knowledge Graphs

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Coping With Scale

- Browsing
- Filtering
- Search
- Summarization
- ➢ Reasoning

Good Applications for Crummy Machine Translation

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ABSTRACT: Ideally, we might hope to improve the performance of our MT systems by improving the system, but it might be even more important to improve performance by looking for a more appropriate application. A survey of the literature on evaluation of MT systems seems to suggest that the success of the evaluation often depends very strongly on the selection of an appropriate application. If the application is well-chosen, then it often becomes fairly clear how the system should be evaluated. Moreover, the evaluation is likely to make the system look good. Conversely, if the application is not clearly identified (or worse, if the application is poorly chosen), then it is often very difficult to find a satisfying evaluation paradigm. We begin our discussion with a brief review of some evaluation metrics that have been tried in the past and conclude that it is difficult to identify a satisfying evaluation paradigm that will make sense over all possible applications. It is probably wise to identify the application first, and then we will be in a much better position to address evaluation questions. The discussion will then turn to the main point, an essay on how to pick a good niche application for state-of-the-art (crummy) machine translation.

Church & Hovy, 1991

- MT is “crummy” by existing measures
- MT may be good enough for some task
- Evaluation measure may not reflect that task
- If so, it is evaluation–not MT–that is deficient

My Central Argument

- Knowledge graphs are useful
- Knowledge graphs are crummy
- IR is the art of making crummy things useful

HLTCOE Knowledge Graph Browser

KB summary:

- **Run ID**: Protest over arrest of Sri Lanka reporter linked to Fonseka [AFP_ENG_20100318.0623]
- Annotations
- Entities 34
  - 14 people
  - 17 orgs
  - 3 GPEs
- Facts 32
  - gpe:employees_or_members 3
  - gpe:residents_of_country 1
  - org:alternate_names 3
  - org:employees_or_members 4
  - org:top_members_employees 1
  - per:age 1
  - per:charges 1
  - per:countries_of_residence 1
  - per:employee_or_member_of 7
  - per:siblings 2
  - per:title 7
  - per:top_member_employee_of 1
- Source Documents 3
  - Protest over arrest of Sri Lanka reporter linked to Fonseka
  - 'No democracy' in S.Lanka, says top Fonseka supporter
  - Roundup: Sri Lanka's war hero to face trial before key polls

HLTCOE Knowledge Graph Browser

- **Entity ID:** e_XIN_ENG_20100312_0139_27
- **Type:** PER
- **Canonical mention strings:**
  - Vijitha Herath (x1)
- **Mention strings:**
  - Herath (x2)
  - Vijitha Herath (x1)
- **Mentioned in Documents:**
  - Roundup: Sri Lanka's war hero to face trial before key polls (x3)

	Subject	Predicate	Object	Sentence
Annotate	Vijitha Herath	per:employee_or_member_of	Sri Lanka	Herath also said as he was the senior most military officer of the country and the junior officer could not be in the bench.

Roundup: Sri Lanka's war hero to face trial before key polls (x3)

by Amanda Sri

COLOMBO, March 12 (Xinhua) -- The glorious days where he plied on Colombo roads escorted by hundreds of elite Commandos were over.

Entity-Filled Relations

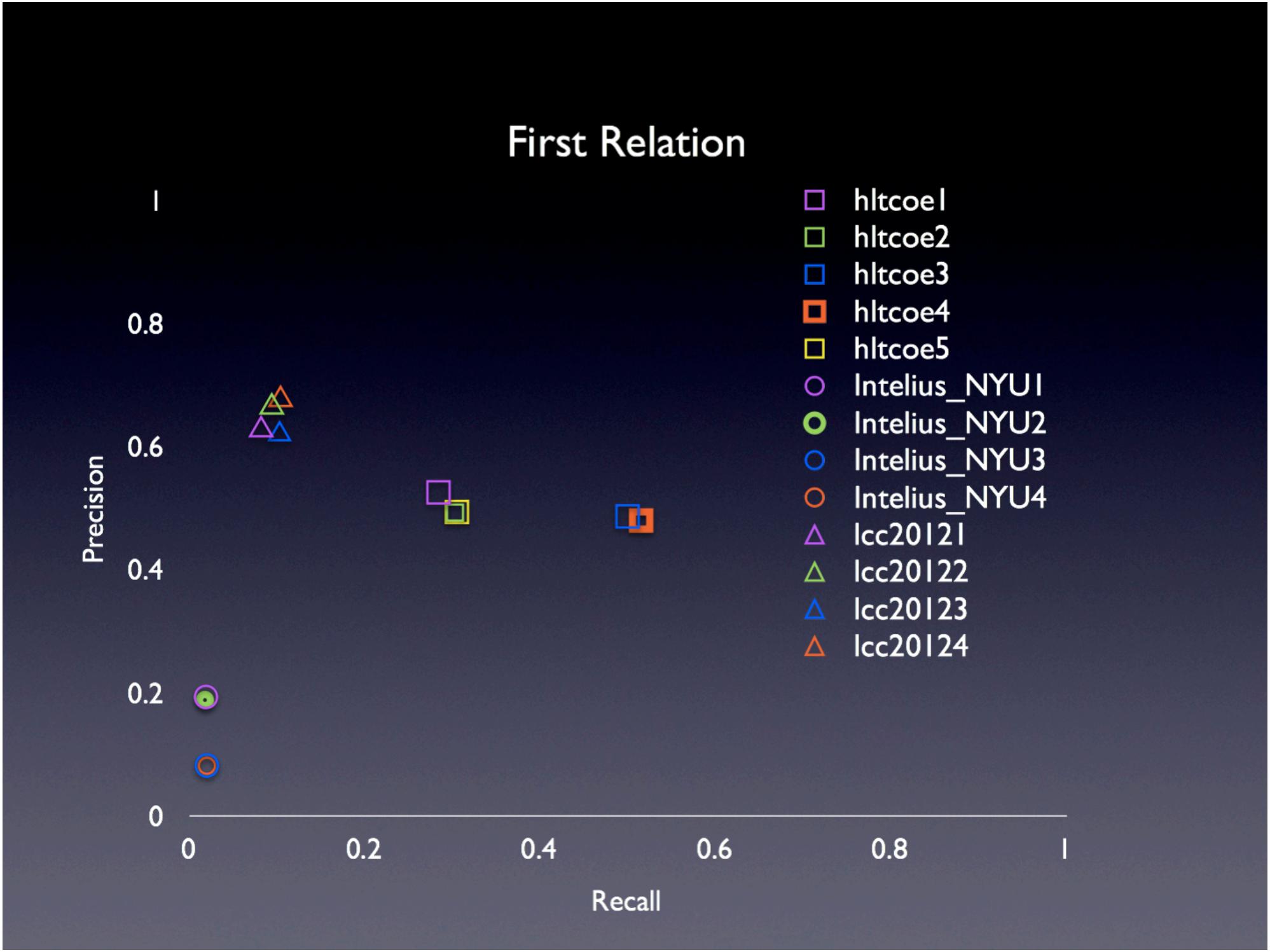
per:children	per:parents
per:other_family	per:other_family
per:parents	per:children
per:siblings	per:siblings
per:spouse	per:spouse
per:employee_or_member_of	{org,gpe}:employees_or_members
per:schools_attended	org:students*
per:city_of_birth	gpe:births_in_city
per:stateorprovince_of_birth	gpe:births_in_stateorprovince
per:country_of_birth	gpe:births_in_country
per:cities_of_residence	gpe:residents_of_city
per:statesorprovinces_of_residence	gpe:residents_of_stateorprovince
per:countries_of_residence	gpe:residents_of_country
per:city_of_death	gpe:deaths_in_city

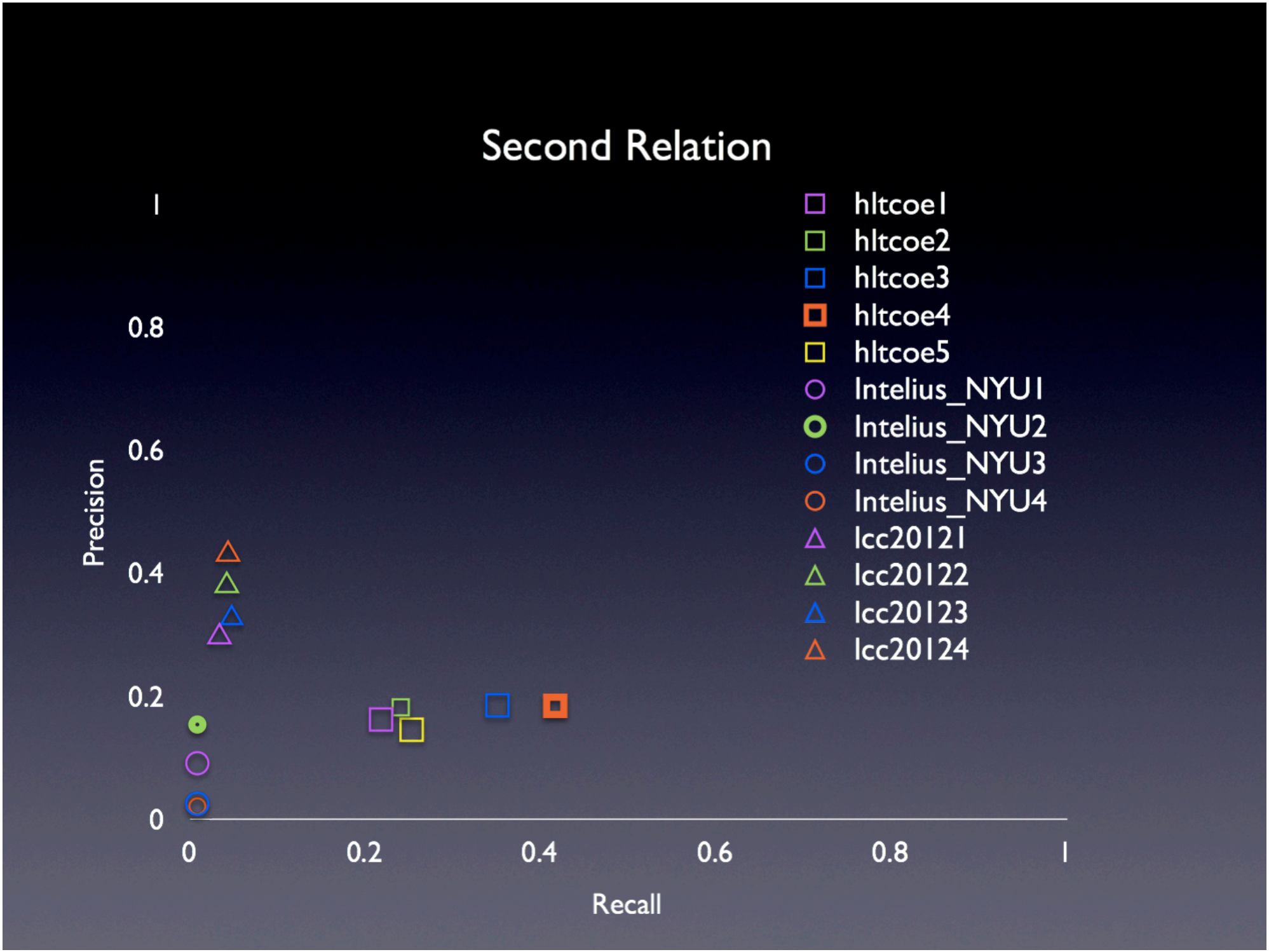
More Entity-Filled Relations

org:shareholders	{per,org,gpe}:holds_shares_in
org:founded_by	{per,org,gpe}:organizations_founded
org:top_members_employees	per:top_member_employee_of
{org,gpe}:member_of	org:members
org:members	{org,gpe}:member_of
org:parents	{org,gpe}:subsidiaries
org:subsidiaries	org:parents
org:city_of_headquarters	gpe:headquarters_in_city
org:stateorprovince_of_headquarters	gpe:headquarters_in_stateorprovince
org:country_of_headquarters	gpe:headquarters_in_country
org:country_of_headquarters	gpe:headquarters_in_country

String-Filled Relations

per:alternate_names	org:alternate_names
per:date_of_birth	org:political_religious_affiliation
per:age	org:number_of_employees_members
per:origin	org:date_founded
per:date_of_death	org:date_dissolved
per:cause_of_death	org:website
per:title	
per:religion	
per:charges	


First Relation
Precision
Recall
1
0.8
0.6
0.4
0.2
0
0
0.2
0.4
0.6
0.8
1
hltcoe1
hltcoe2
hltcoe3
hltcoe4
hltcoe5
Intelius_NYU1
Intelius_NYU2
Intelius_NYU3
Intelius_NYU4
lcc20121
lcc20122
lcc20123
lcc20124


Second Relation
Precision
Recall
0
0.2
0.4
0.6
0.8
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hltcoe2
hltcoe3
hltcoe4
hltcoe5
Intelius_NYU1
Intelius_NYU2
Intelius_NYU3
Intelius_NYU4
lcc20121
lcc20122
lcc20123
lcc20124

Sources of Knowledge Graphs

- Hand-built knowledge structures
  - MeSH, Bibframe, …
- Automatically populated graph structures
  - DBpedia, YAGO2, …
- Knowledge-base enrichment
  - Entity detection and linking
- Cold-start knowledge base population
- Machine reading / Open IE

Thinking About Use

- Interactive graph traversal
  - Autocompletion
  - Learning to rank
- Multi-hop reasoning
- Explanation
  - Provenance, attribution, accuracy, …
  - Access to contextualized sources

Co-Design

- Knowledge graph construction should reflect the needs of the application
- The application design should be informed by the error characteristics of the knowledge graph

Evaluation Design

- Test Collection
  - TAC Cold Start probes
- Search behavior characterization
  - Analysis of “query trails”
- Online evaluation
  - A/B testing
  - Interleaving

Next Steps

- Scenario convergence
  - Domain-specific?
  - Accreted pocket KB's?
- Start a company
  - Supportable Web service
- Public evaluation
  - Test collection
  - Evaluation as a service