

Enhancing Information Awareness through Directed Qualification of Semantic Relevancy Scoring Operations

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Outline



- **Motivation**
- **Background**
- **Semantic Mission Domain**
- **Design**
- **Applied Use Case**
- **Results**
- **Conclusion**



Motivations



- **Representation: A common representation for analytic scoring and queries.**
- **Trust: Mission domain solutions for semantic models of analytics provenance and results.**
- **Features: Enable best-fit technology tiers of analytics to evaluate document relevancy and order query results.**



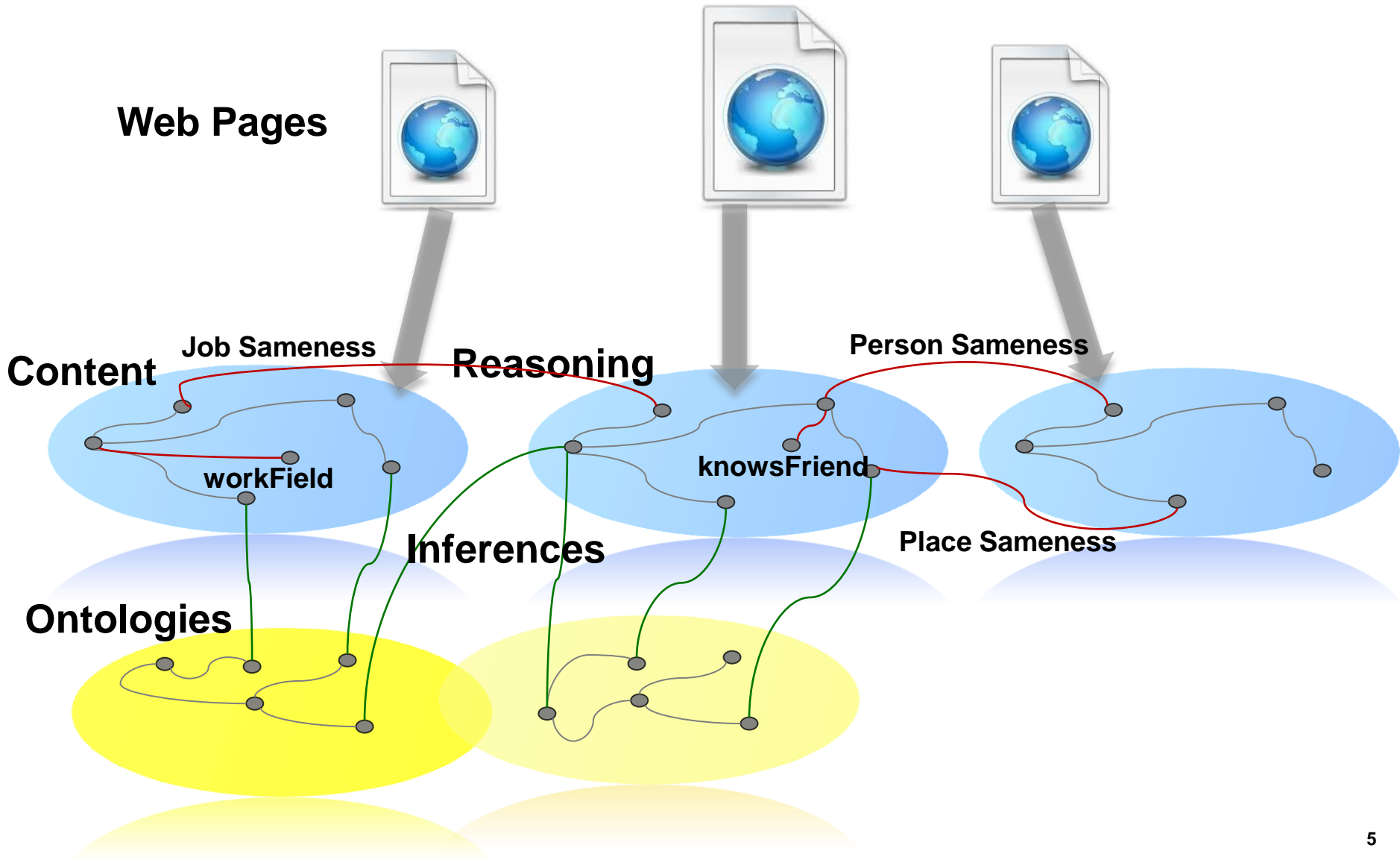
Background



- **Information environment complexity**
- **Relevancy solutions for big data**
- **Multi-structured analytics**
- **Interleaved information events, mission assets, and knowledge**



Web Domain





Mission Domain



Messages
and
Publications

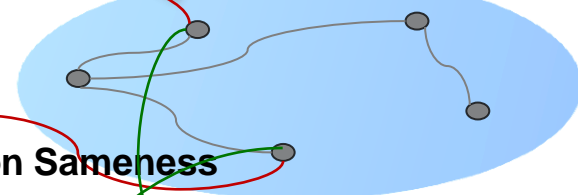
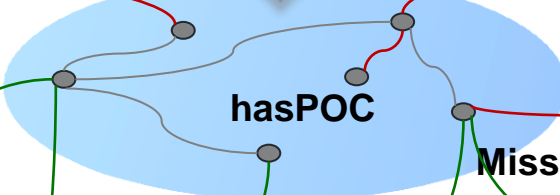
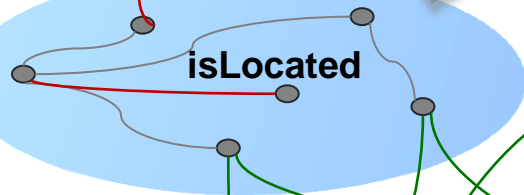


Content

Role Sameness

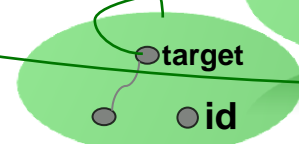
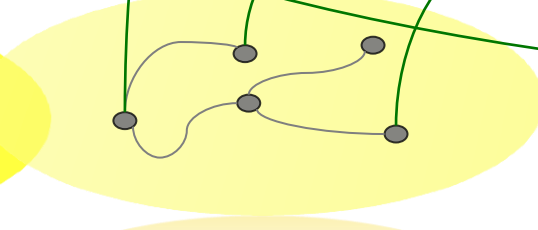
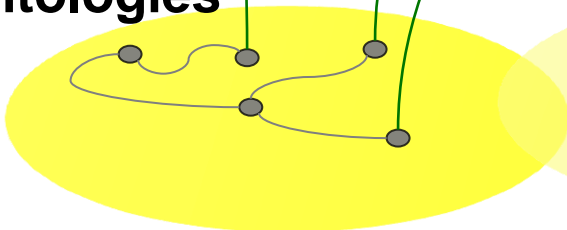
Reasoning

Target Sameness



Inferences

Ontologies

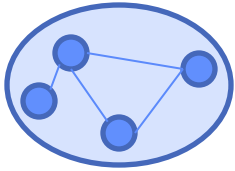




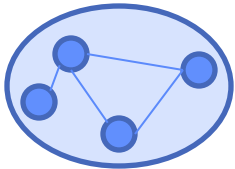
Inferencing & Reasoning

Named Graphs

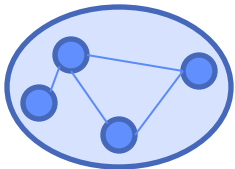
Information A



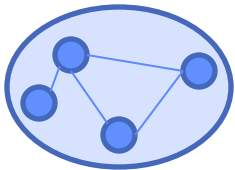
Information B



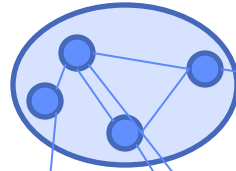
Information C



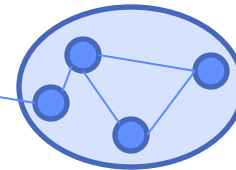
Information D



Information A



Information B



Identity
Sameness

Mission
Sameness

Asset
Sameness

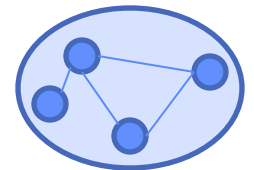
Typing

Information D

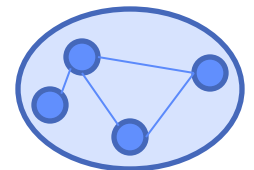
Information C

Sorted Results (Mission)

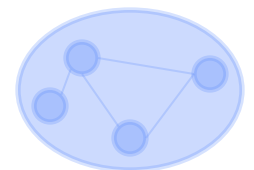
Information A



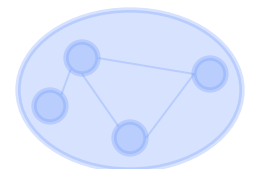
Information B



Information C



Information D

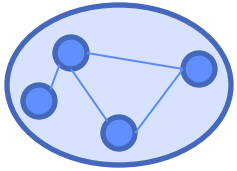




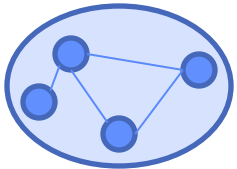
Mission Domain Directed Qualification

Named Graphs

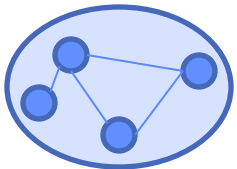
Information A



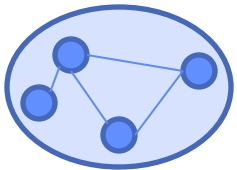
Information B



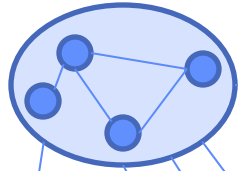
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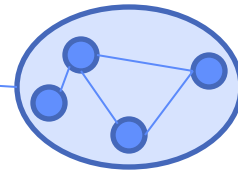
Information D



Information A



Information B



Publisher
Geospatial
Nearness

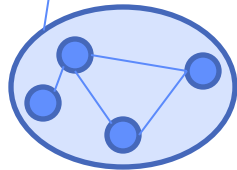
Asset
Geospatial
Nearness

HITS
Relevancy

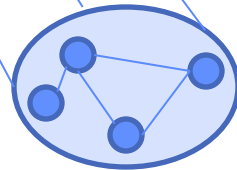
VSM Target
Similarity

Mission
Asset
Relevancy

Information D



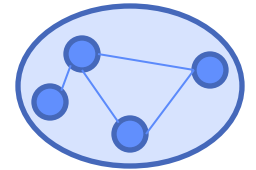
Information C



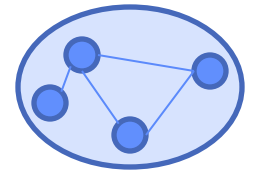
Sorted Results

(Relevancy)

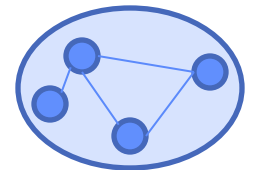
Information A



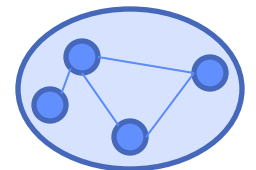
Information C



Information D



Information B





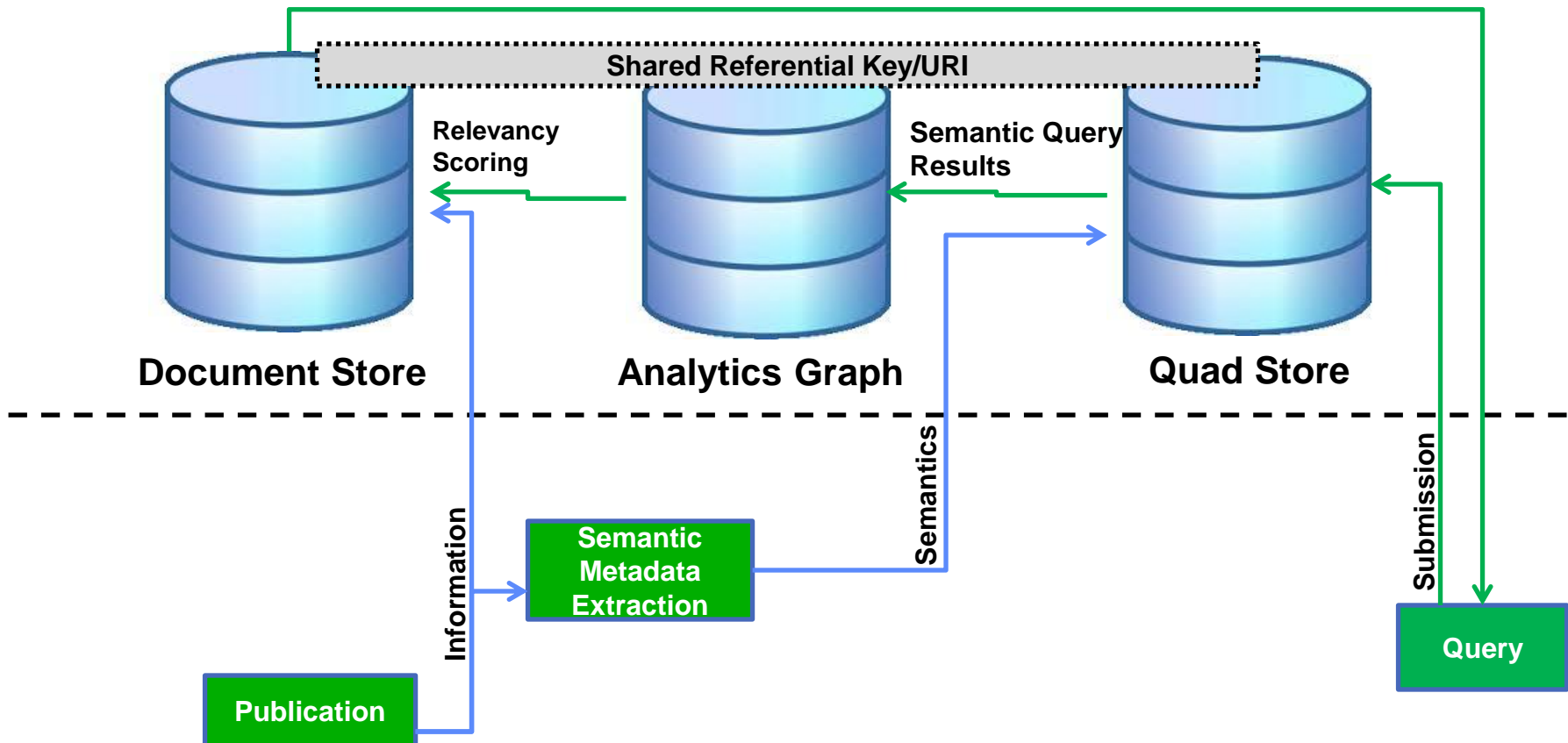
Proposed Solution



**Enable trend-based analytics queries =
Analytics + PROV-O W3C + Relevancy
Ontology**

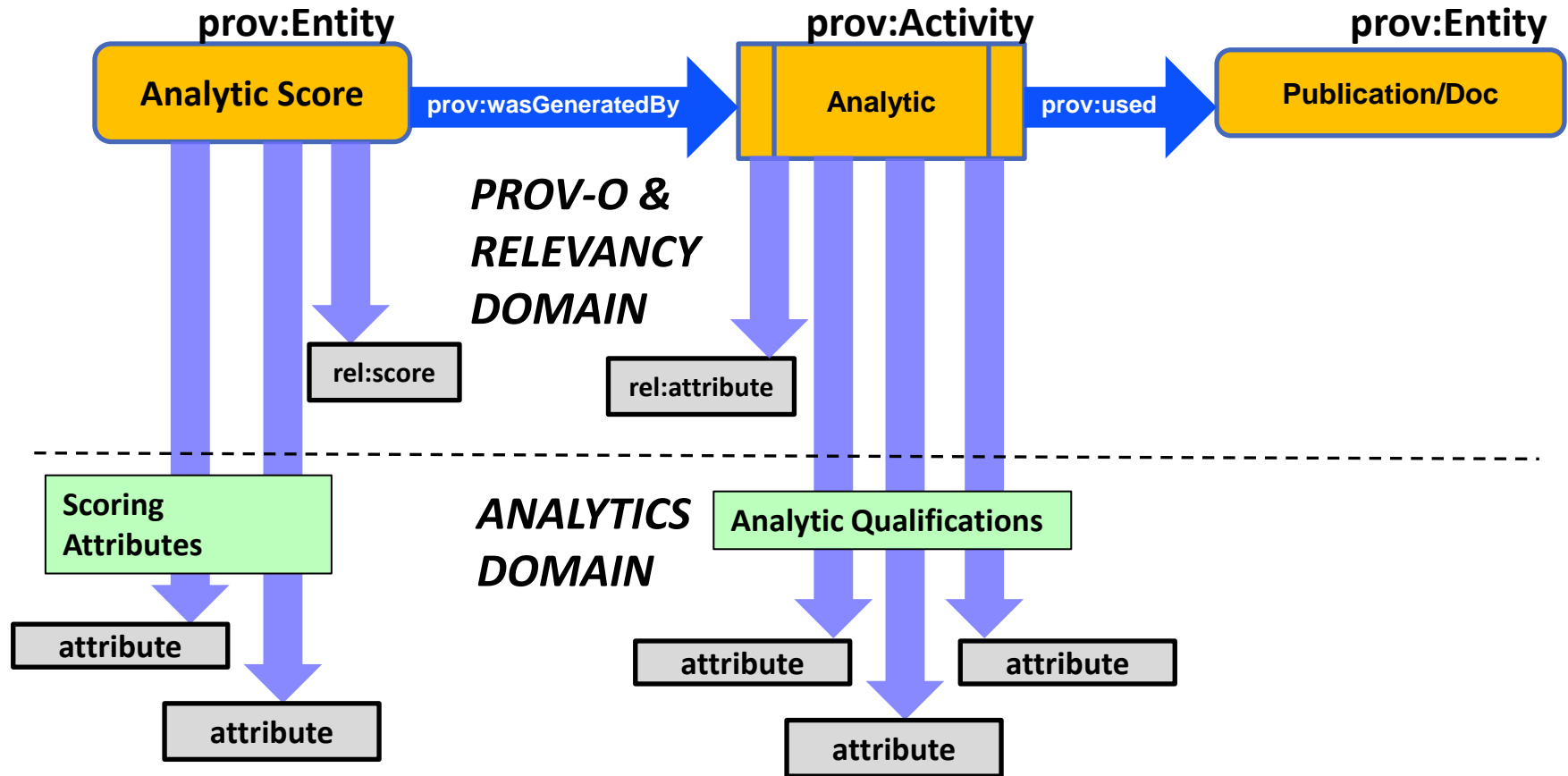


Ordered Information Results



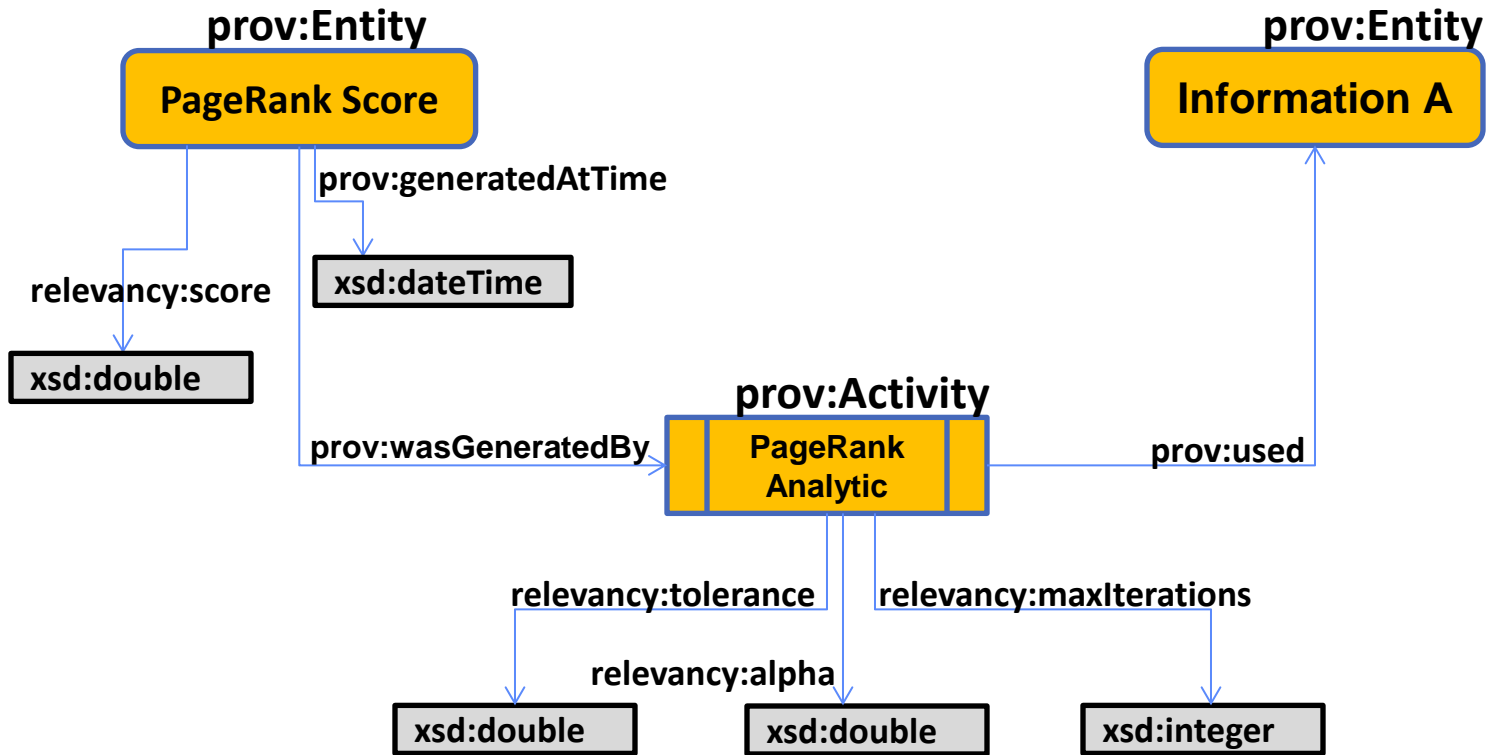


General Use Case



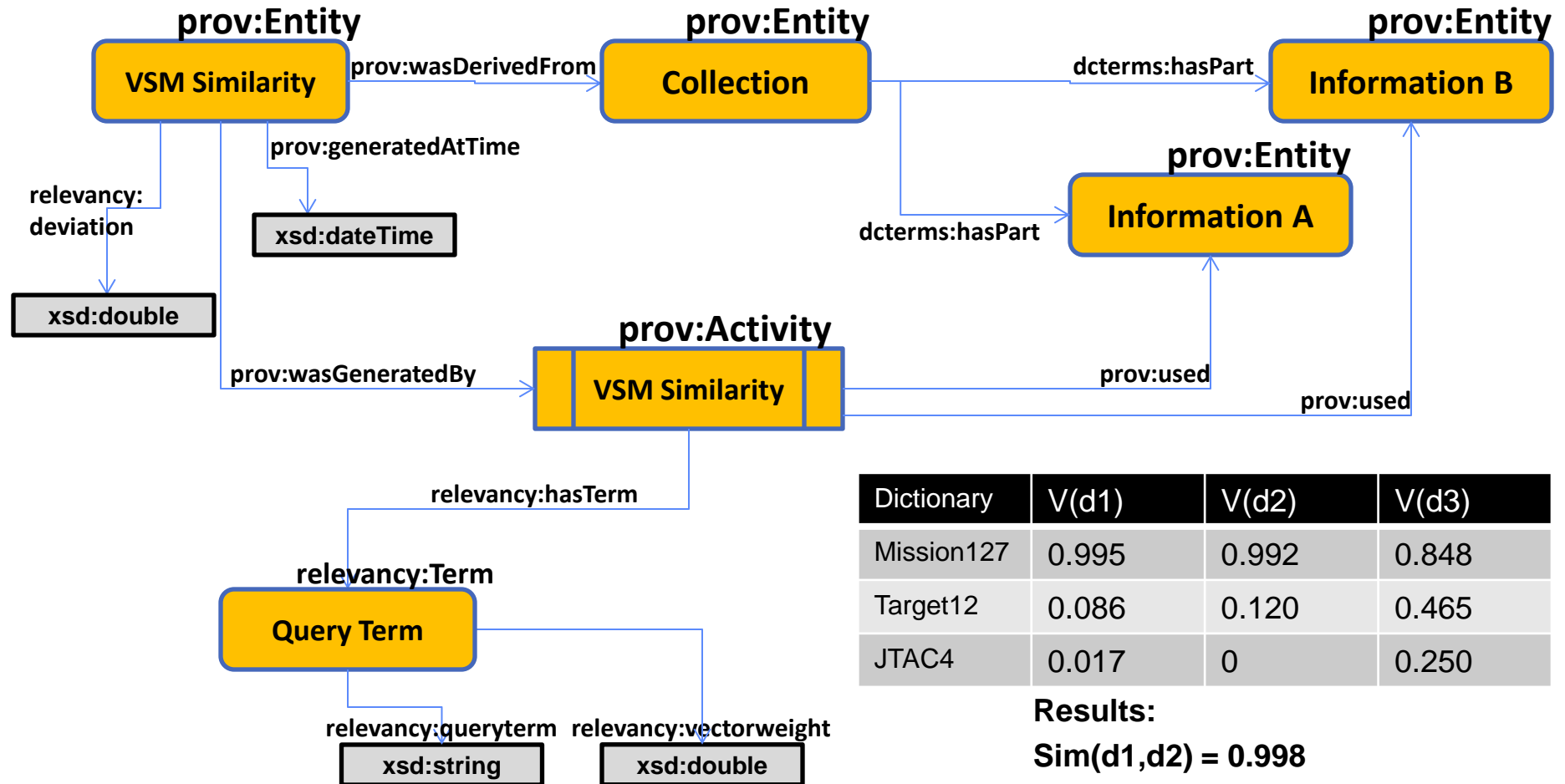


PageRank Use Case





Multiple Source Use Case



Dictionary	V(d1)	V(d2)	V(d3)
Mission127	0.995	0.992	0.848
Target12	0.086	0.120	0.465
JTAC4	0.017	0	0.250

Results:
 Sim(d1,d2) = 0.998
 Sim(d1,d3) = 0.888

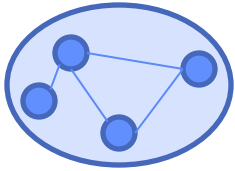


Results: Result Set Relevancy

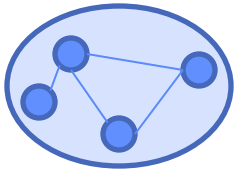


Named Graphs

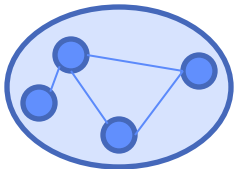
Information A



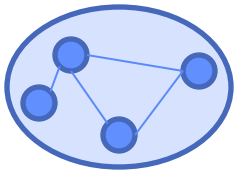
Information B



Information C

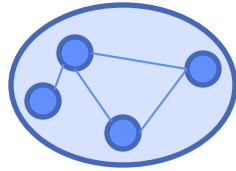


Information D

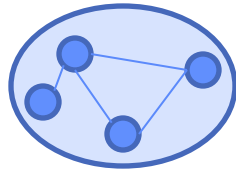


Relevancy Scores

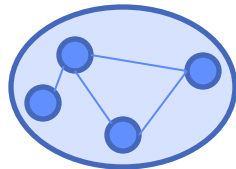
Information A



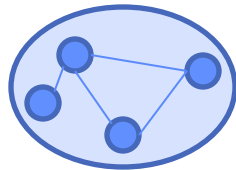
Information B



Information C



Information D



PageRank: 2.44358
HITS: 3.67681
VSM: 0.819324
Geospatial Nearness: 314.16
Role Prioritization: 8

PageRank: 1.11258
HITS: 2.67681
VSM: 0.219324
Geospatial Nearness: 716.16
Role Prioritization: 7

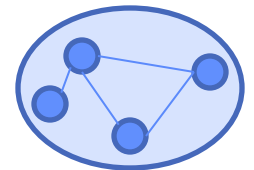
PageRank: 3.35812
HITS: 4.67681
VSM: 0.889112
Geospatial Nearness: 312.4
Role Prioritization: 9

PageRank: 4.36622
HITS: 4.12770
VSM: 0.311923
Geospatial Nearness: 288.91
Role Prioritization: 9

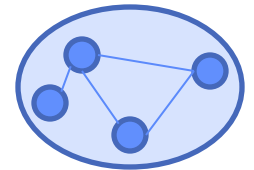
Sorted Results

(VSM)

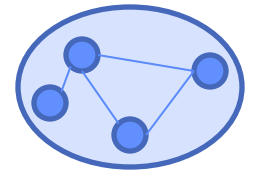
Information C



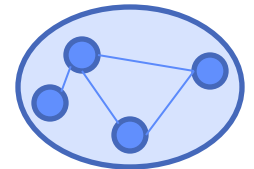
Information A



Information D



Information B





Conclusion



Stepping stone to:

- **Trend-based analytic queries**
- **Analytics inferencing and rule engine**
- **Enable a common representation for content, graph, and semantic-based analytic results.**
- **Interlinking domain knowledge, raw data, knowledge graphs, and analytic results.**
- **Query Intelligence**