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Context-Compatible Information Fusion for Scientific Knowledge Graphs

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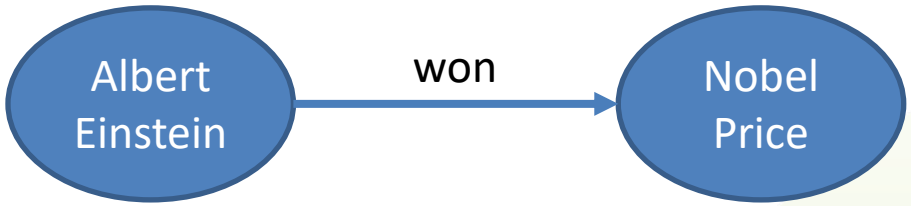
Knowledge Graphs

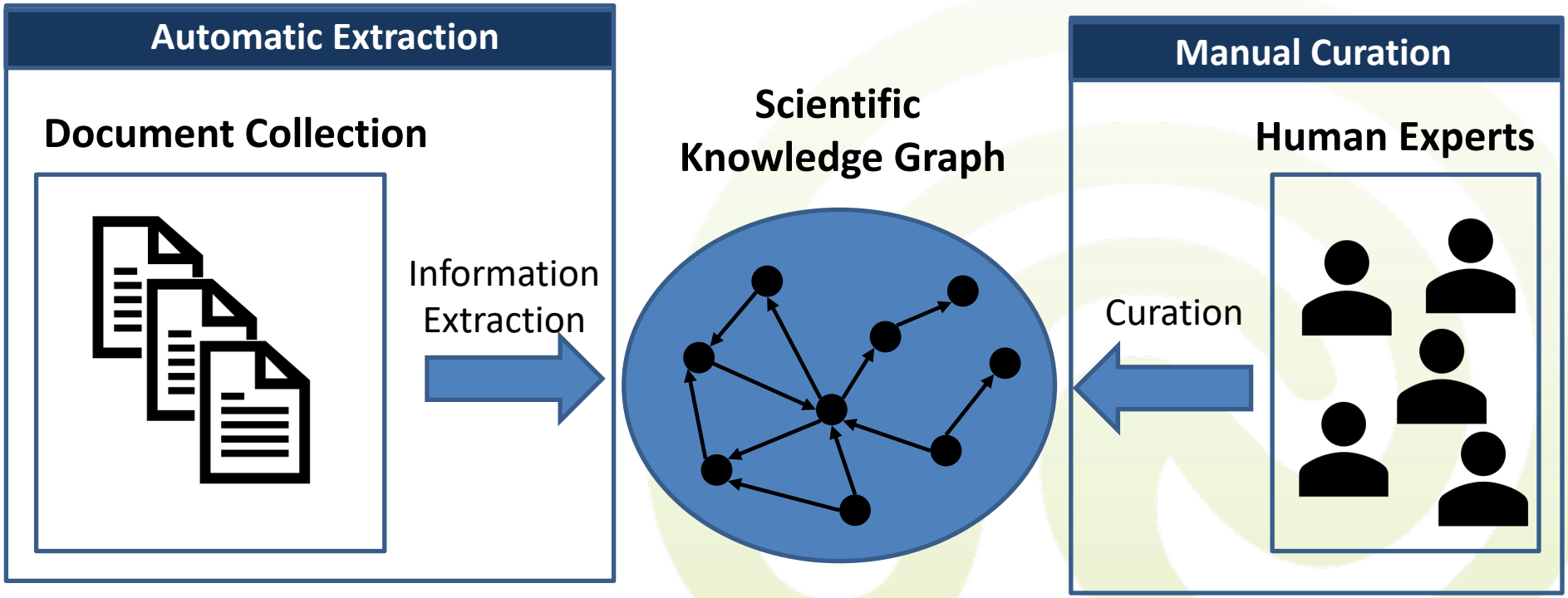
- Knowledge Graphs are large repositories of entity knowledge usually stored as RDF facts



- KGs empower several applications
  - Smart assistants
  - Question answering
  - Knowledge discovery

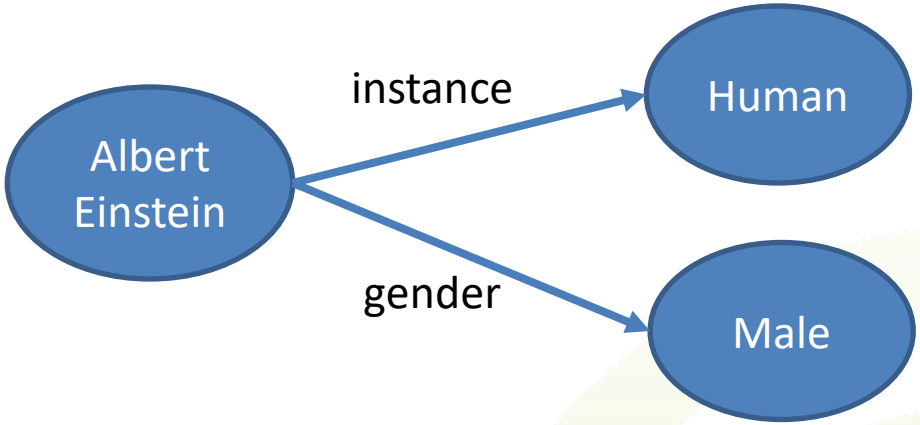
Scientific Knowledge Graphs

- Usually capture knowledge of a specific domain
  - SemMedDB (medicine), Wikidata (several), etc.



What about Validity?

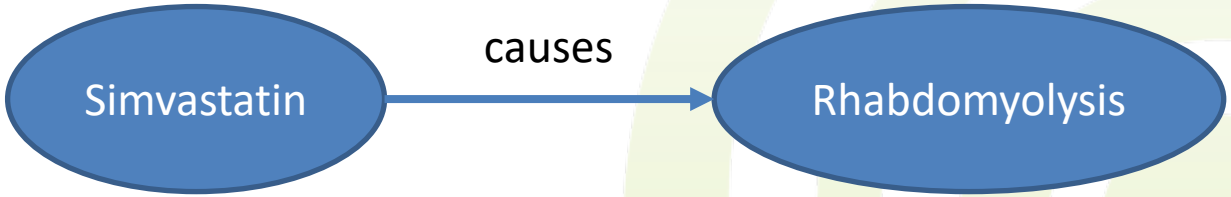
- Some facts are **valid** in **general**:



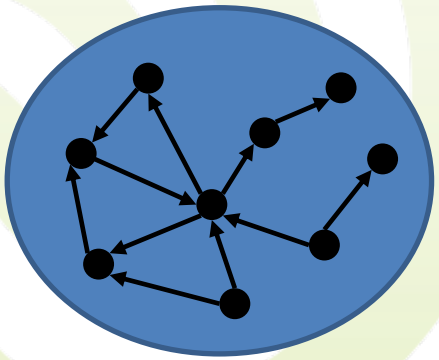
DBpedia

WIKIDATA

- But some facts are **not** valid in general:



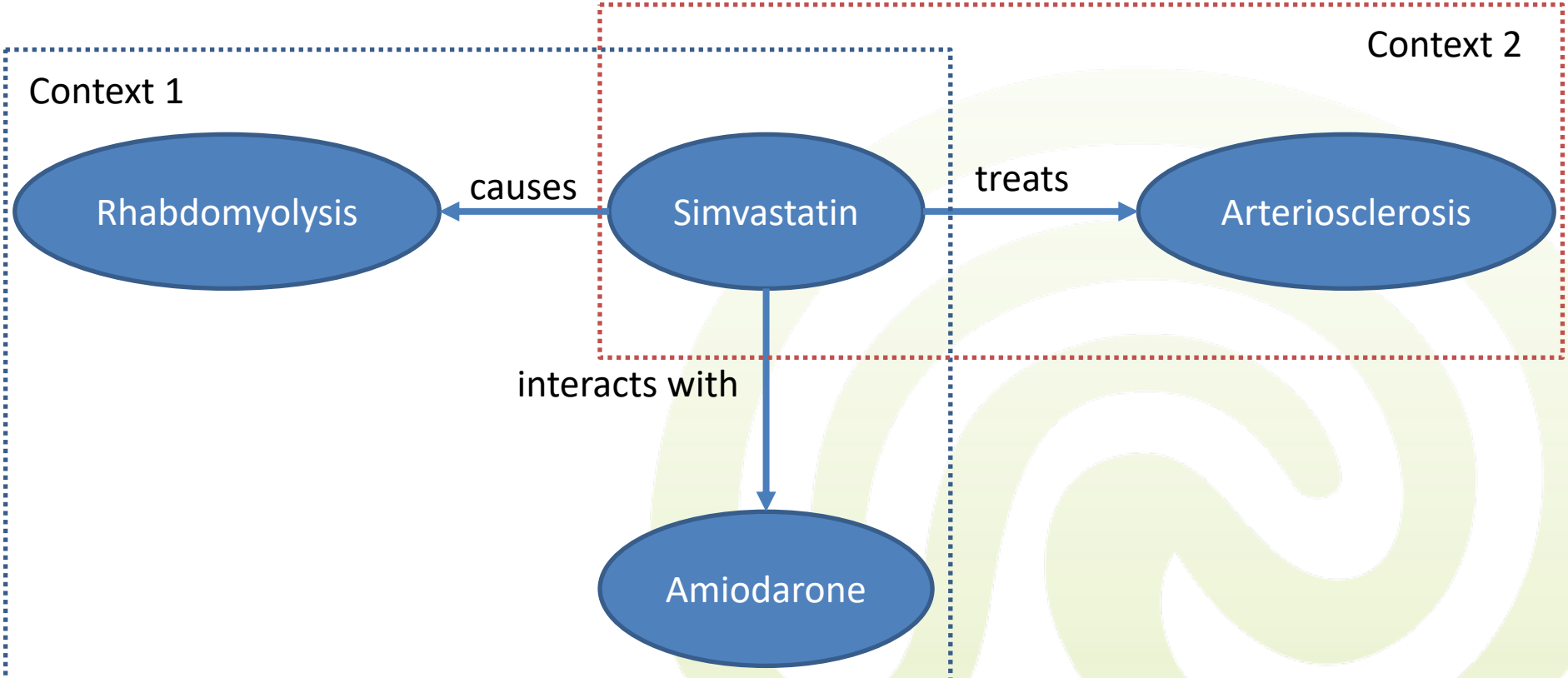
Scientific Knowledge Graph



– depends on several **context conditions**

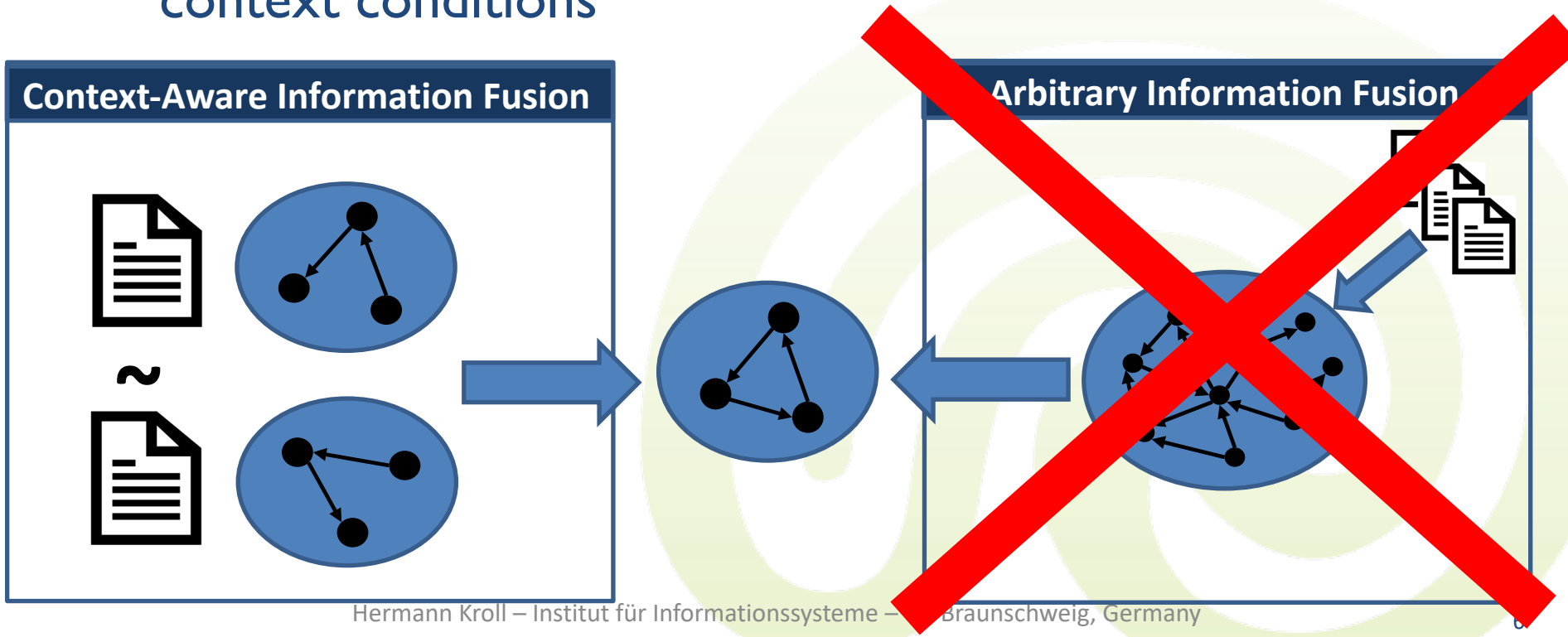
Consequences of Validity

- Which are the known adverse effects of a Simvastatin treatment for Arteriosclerosis?



Context-Aware Information Fusion

- Consider context when fusing knowledge
  - Gathering explicit context information is nearly impossible
- Consider to use implicit context
  - Scientific argumentations usually provide all necessary context conditions

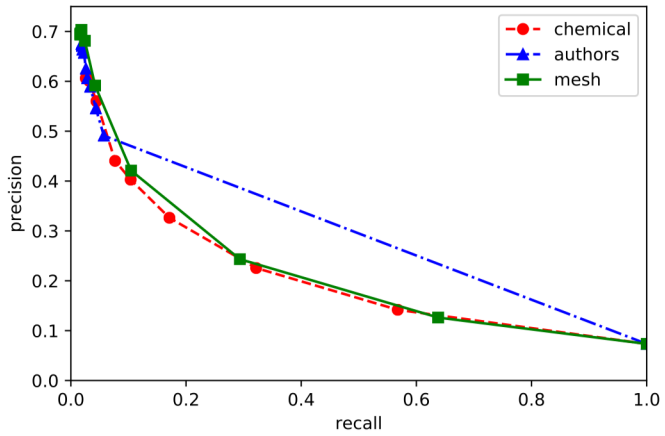


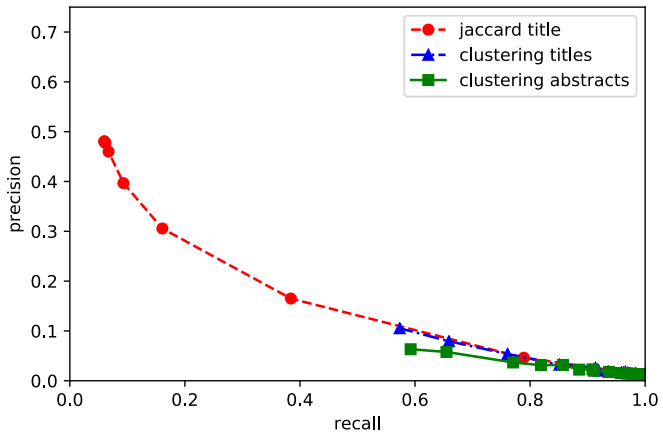
Evaluation on SemMedDB

- Discovery of Drug-Drug Interactions via a Gene

Method (DDI-G)	Precision	Recall
Knowledge Graph	7.34%	**100%**
Strict Implicit Contexts	**69.3%**	1.64%

- Context-Compatible Information Fusion





Conclusion

- **Validity** is crucial for scientific knowledge graphs
  - Some facts are general valid (birthdays), which can safely be used in any context

- Scientific knowledge graphs usually contain facts which are **not valid in general**
  - **Implicit contexts** are an easy-to-use approximation
  - Implicit contexts increase the quality of applications

Thank you!

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If you have any questions, contact me via:

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