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Context-Compatible Information Fusion for Scientific Knowledge Graphs

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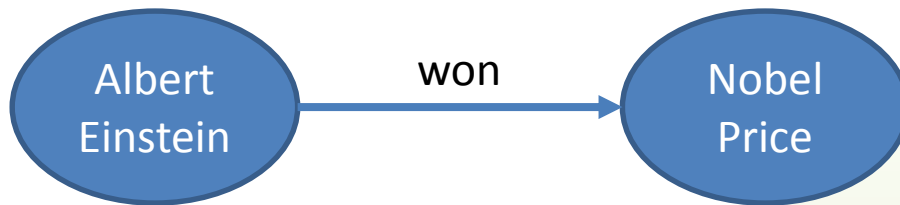


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Knowledge Graphs

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



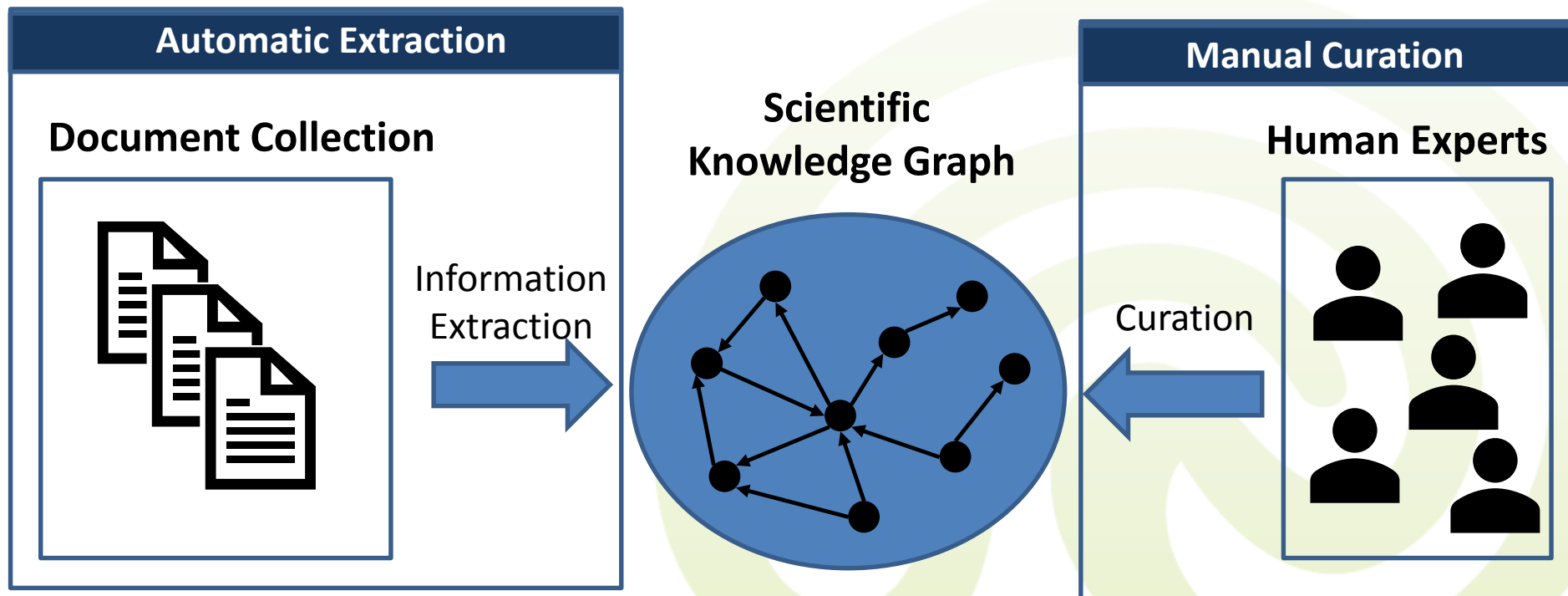
- KGs empower several applications
 - Smart assistants
 - Question answering
 - Knowledge discovery





Scientific Knowledge Graphs

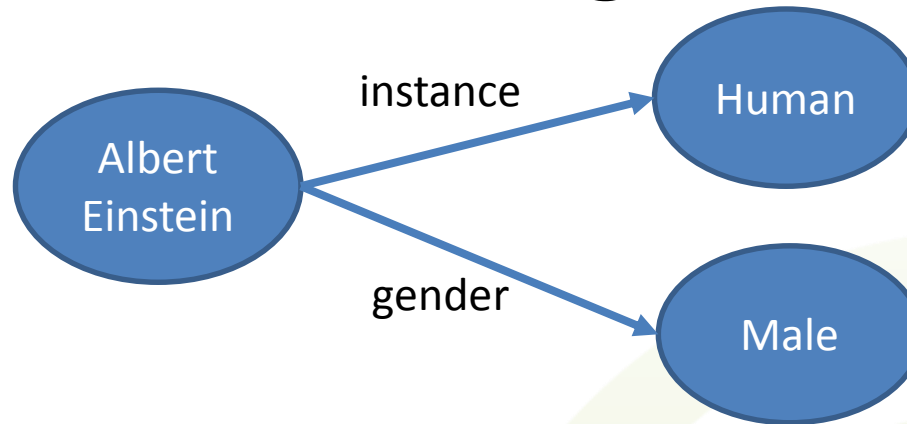
- Usually capture knowledge of a specific domain
 - SemMedDB (medicine), Wikidata (several), etc.



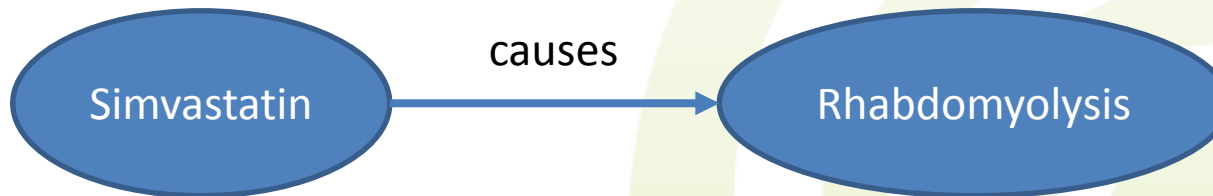


What about Validity?

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

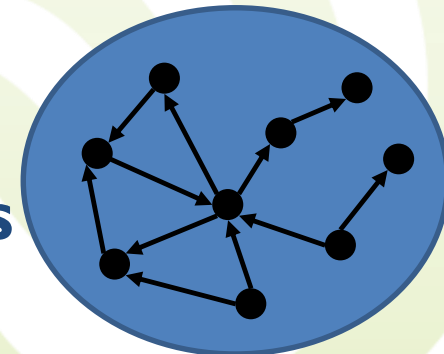


- But some facts are **not valid in general**:



– depends on several **context conditions**

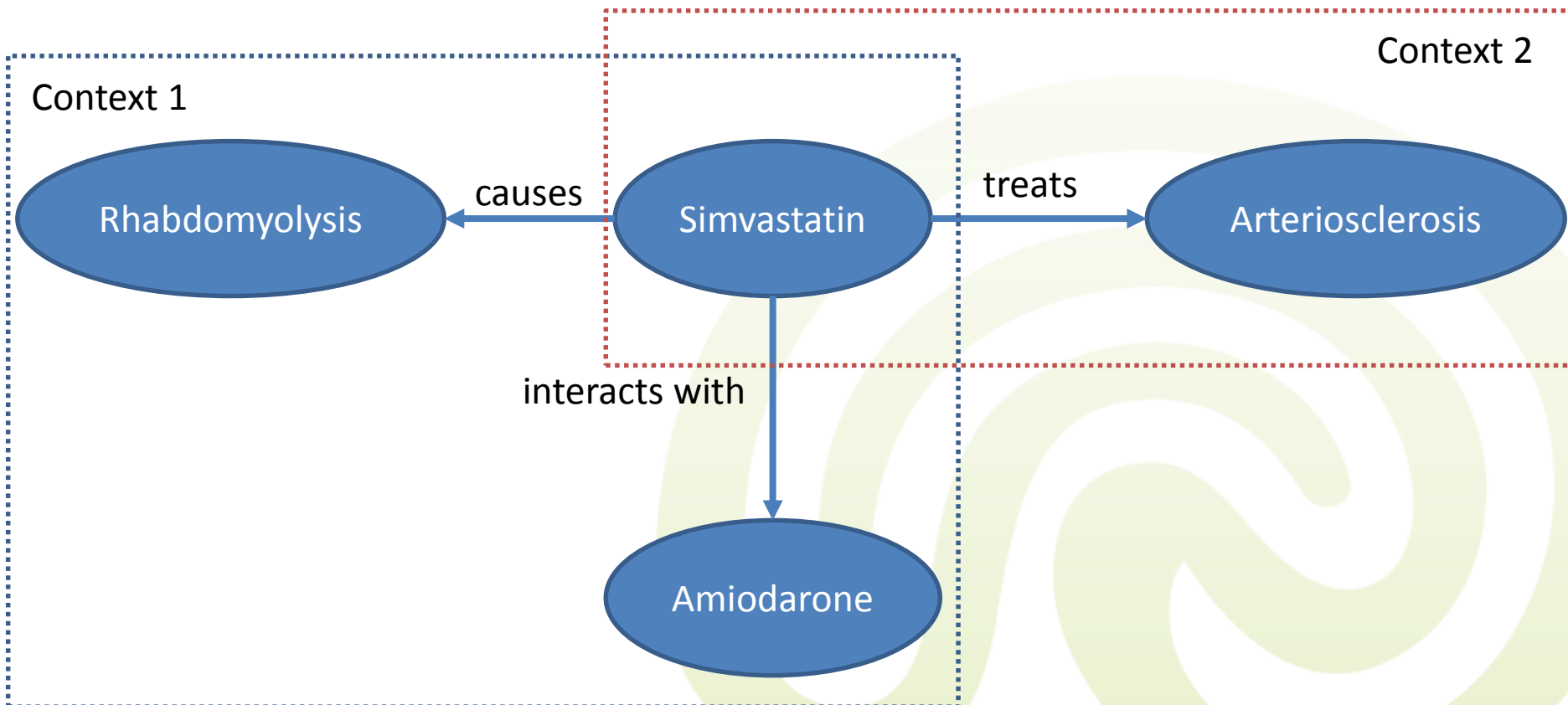
Scientific
Knowledge Graph





Consequences of Validity

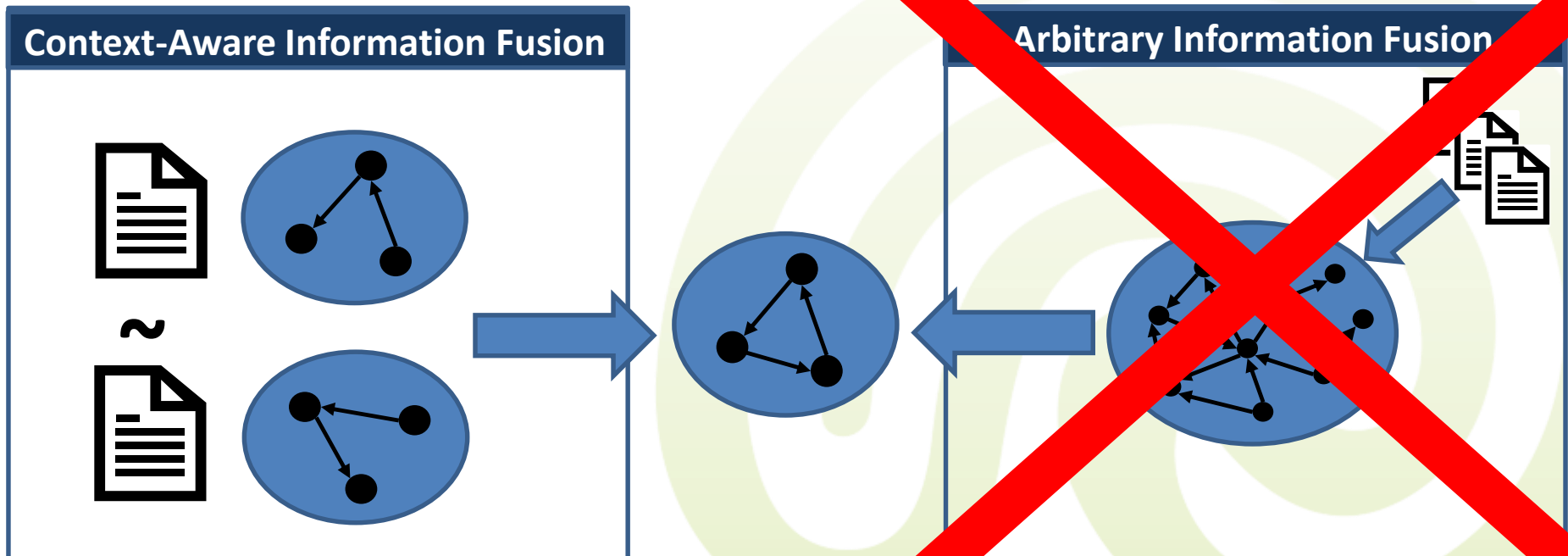
- Which are the known adverse effects of a Simvastatin treatment for Arteriosclerosis?





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



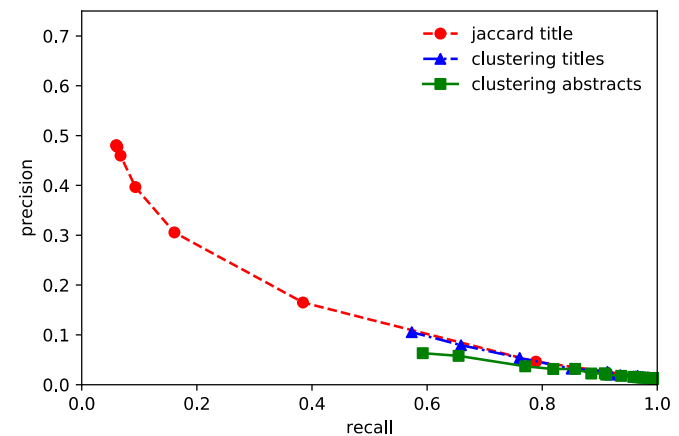
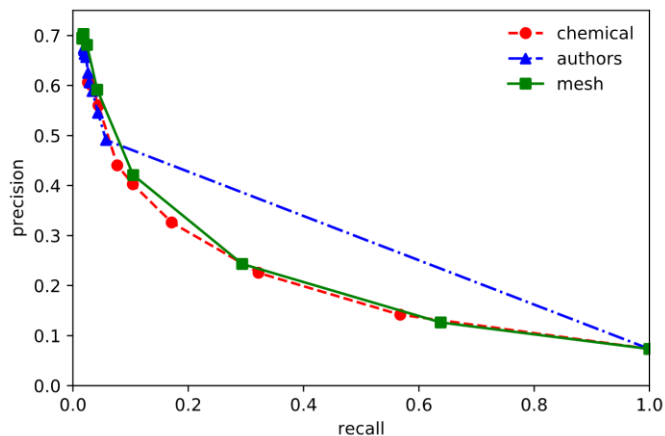


Evaluation on SemMedDB

- 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,
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