

# Searching for Educational Resources in a Study Assistant: An Open Search Use Case

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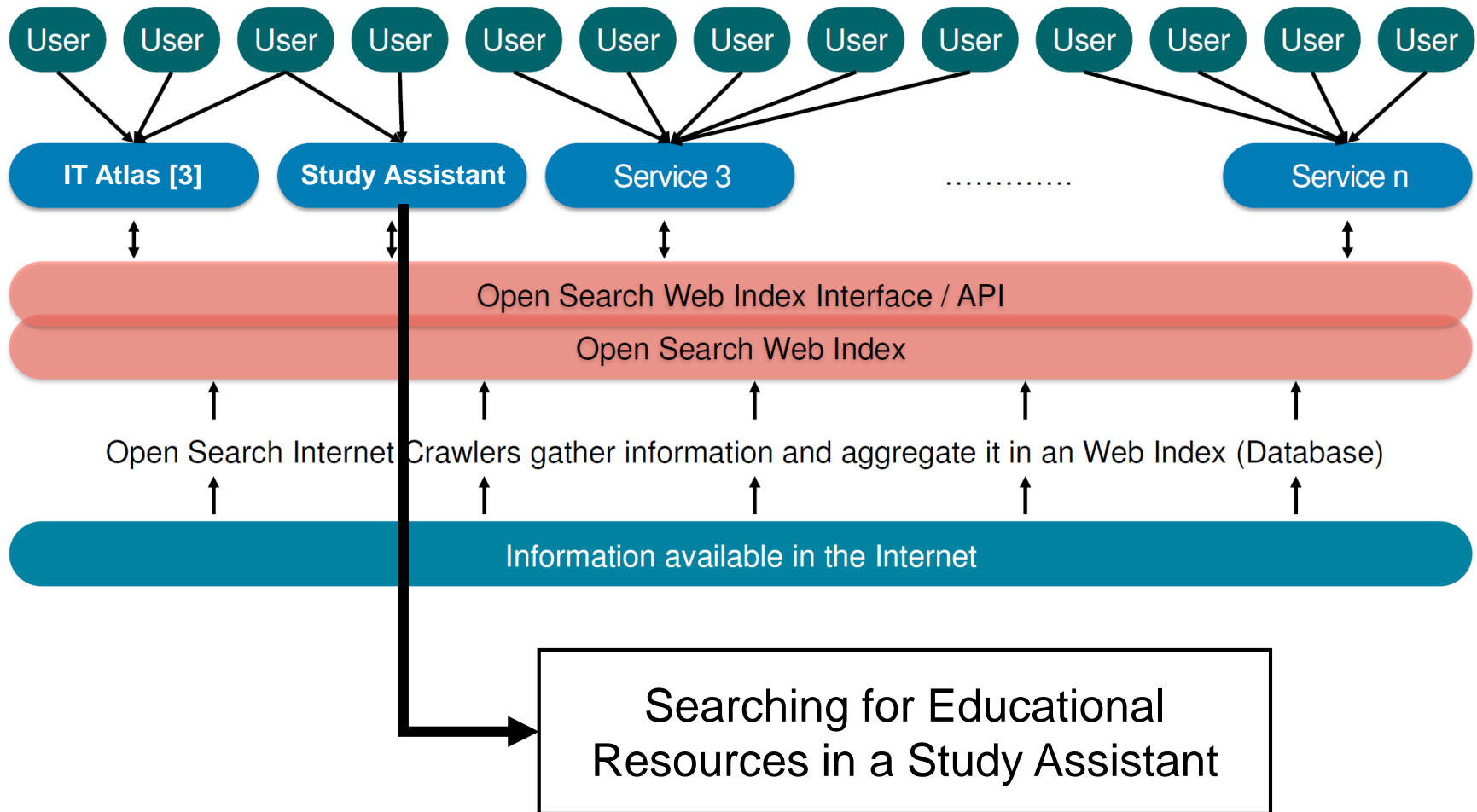
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<https://www.uni-bamberg.de/minf/>



1. Motivation
2. Study Assistant
3. Search for Educational Resources
4. Planned Research
5. Conclusion

# Motivation: Additional Use Case



<https://opensearchfoundation.org/>



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# Study (Planning) Assistant



## ■ Core functionality:

- Selecting modules (courses) for short-term and long-term planning (study course)
- View individual study progress

## ■ Extended functionality

- Module recommendations
- Search for learning resources



## Deine Studienpläne

Manage (several) long-term study plans

... Du Dir mehrere Studienpläne anlegen und aktiviere hier Deinen aktuellen Studienplan, auf bequ Coastem über die Navigation zugreifen kannst.

+ Erstellen

Neuuu	⋮
<input checked="" type="checkbox"/> Aktiv	15.09.2022
Studienplan 2	⋮
<input type="checkbox"/> Inaktiv	16.09.2022

Angebotshäufigkeit: WS, jährlich      ECTS: 6  
Empfohlenes Fachsemester:

Select modules for long-term study plan

Lehrveranstaltungen:

In den Studienplan einplanen:

- Sommersemester 2020
- Wintersemester 2020/21
- Sommersemester 2021
- Wintersemester 2021/22
- Sommersemester 2022

# Additional Use Case for an OSI



- Study planning assistant for university students shall be extended towards a more general study assistant
- Extension shall include the possibilities of
  - searching for (open) educational resources
  - Receiving (personalised) resource recommendations based on one's user profile
- Aim: a more thorough understanding of a vertical provider's requirements for an OSI (like the IT Atlas)





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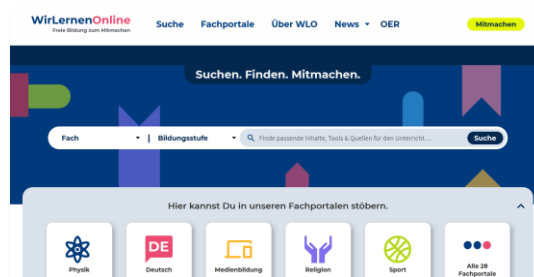
- Educational Resources (ER) „are learning, teaching and research materials in any format and medium” [1]
  - Educational Videos,
  - Software Documentations,
  - Tutorials, ...
- Open in the context of open educational resources (OER) refers to a publication „in the public domain or [...] under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others.” [1]
- For usage in the study (planning) assistant:
  - Meeting the demand for (missing) information of the individual learner
  - Focus on open access for personal usage, not on reuse of ER



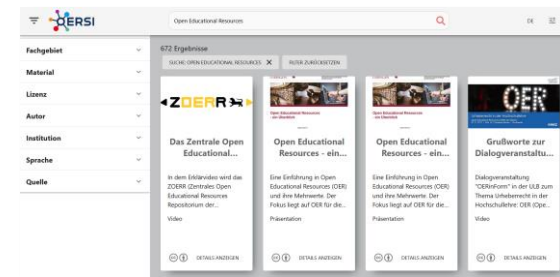
# Search for Educational Resources



oercommons.org



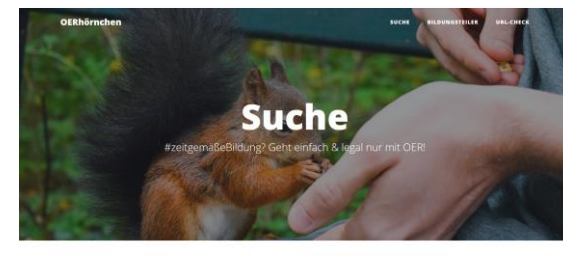
wirlernenonline.de



oersi.org

## ■ Focus on...

- different educational level
- re-use for educators (e.g. school teachers)
- simple queries (e.g. term search)



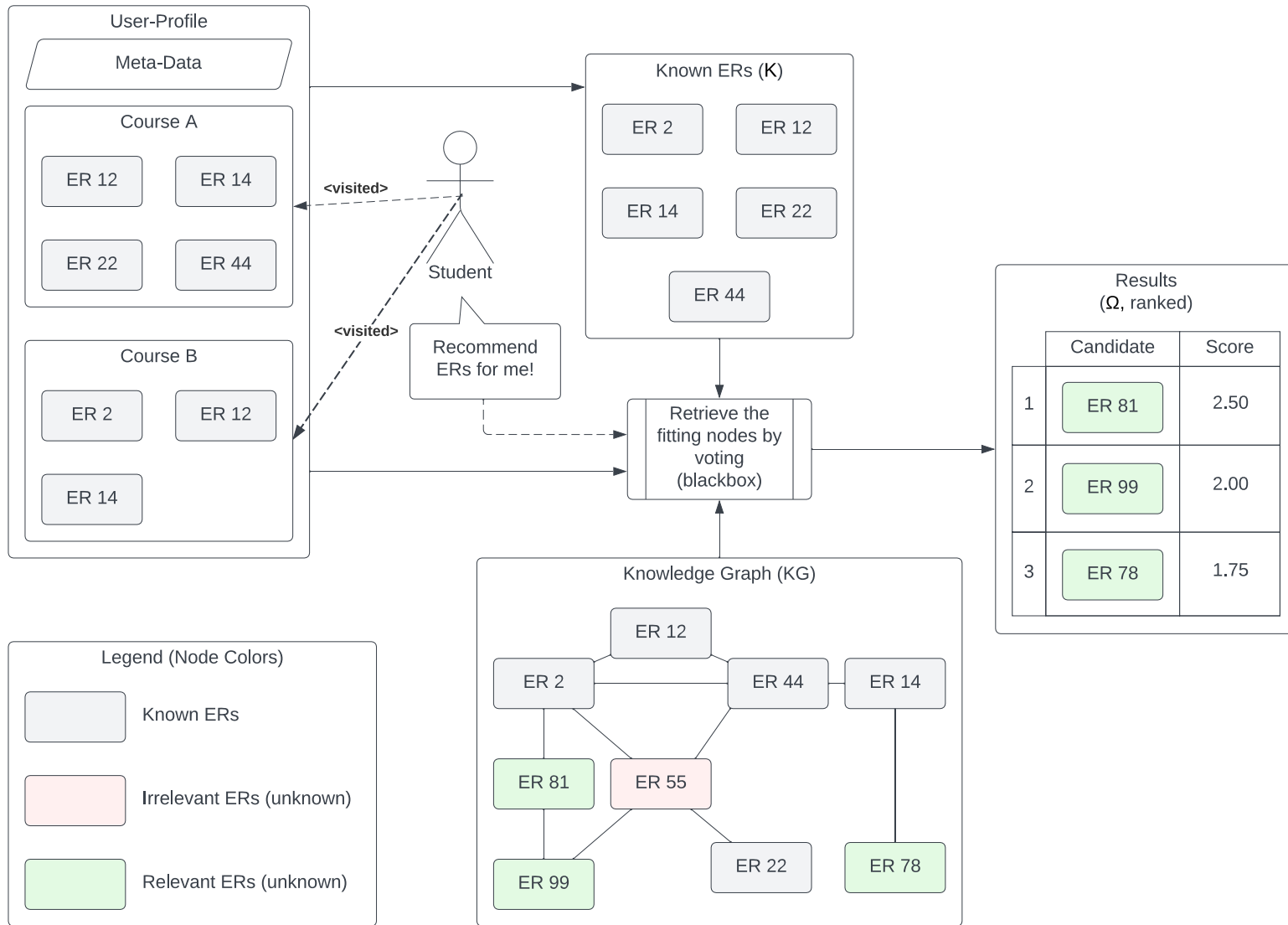
oerhoernchen.de

- Study (planning) assistant extends context for query and demands a broader learner-centered search for material



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# Planned Research



- ERs possess various properties

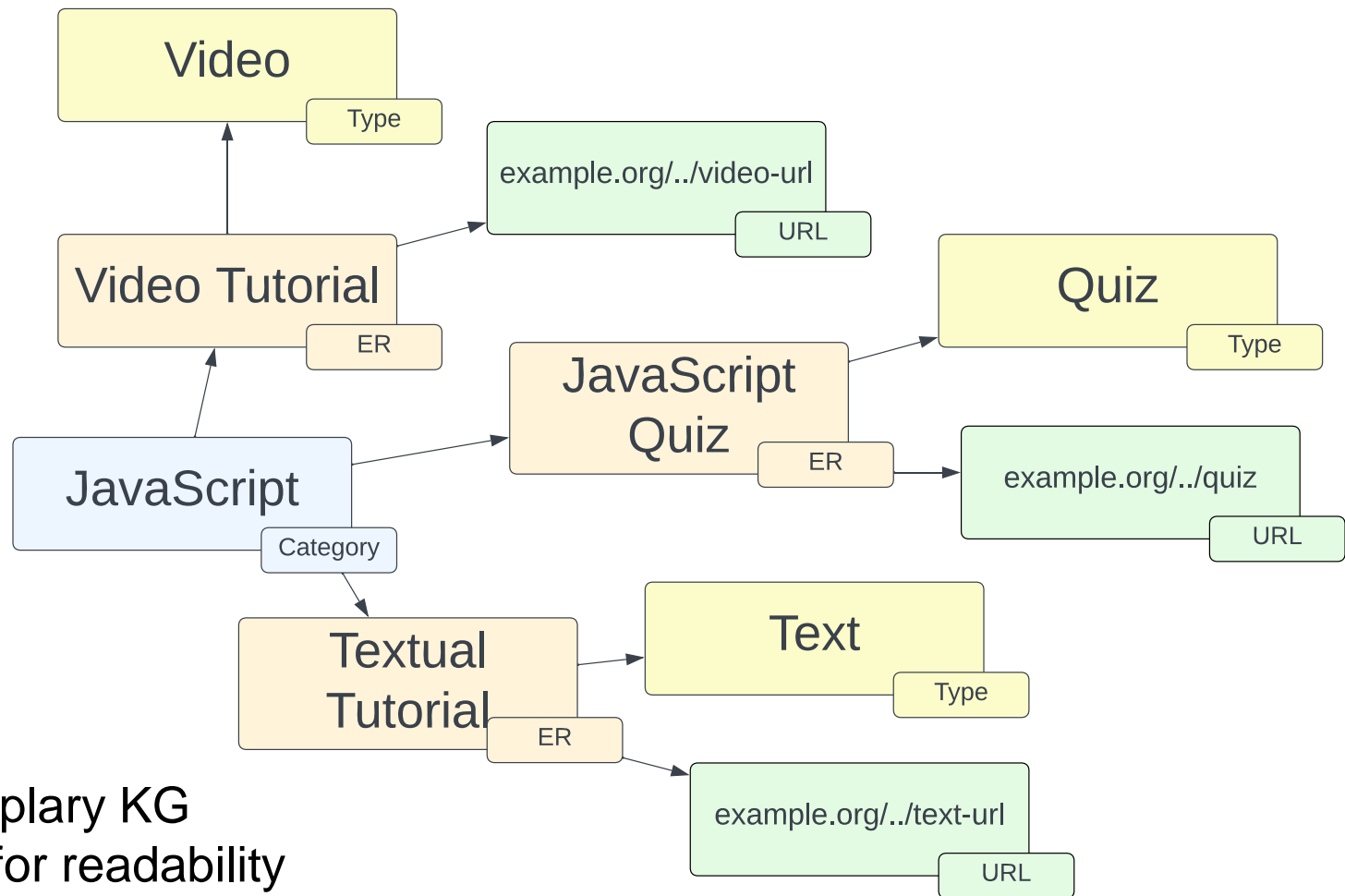
- A URL
- A type
- Target audience(s)
- Author(s)
- Focused topic(s)
- ...

→ Graph-based representations are suitable  
→ Knowledge Graphs

- Different types of relationships

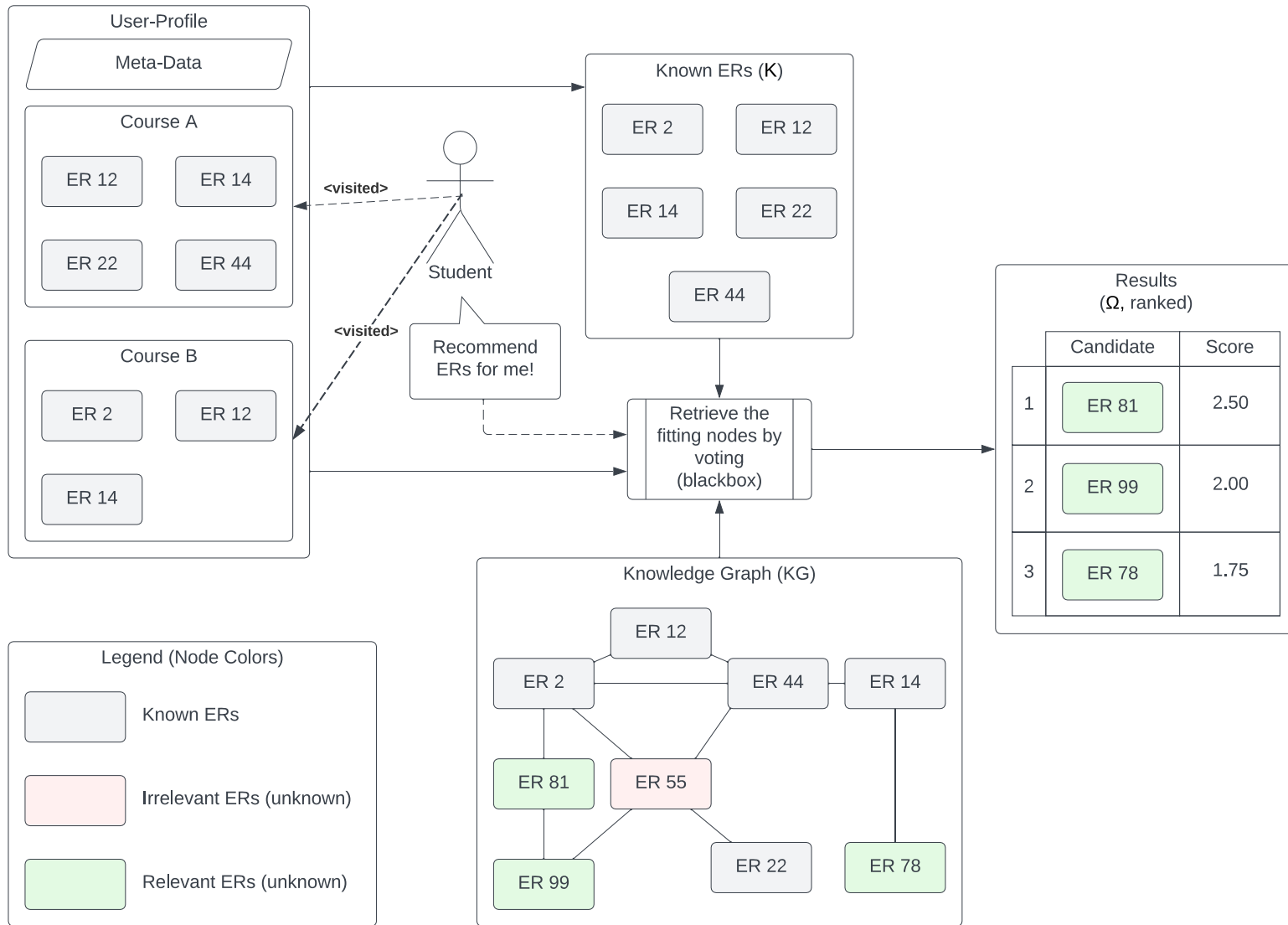
- One-to-one: One ER has exactly one URL
- One-to-many: One ER has one or more content parts
- Many-to-many: One or more ERs have one or more authors

# Server-side Representation of ERs

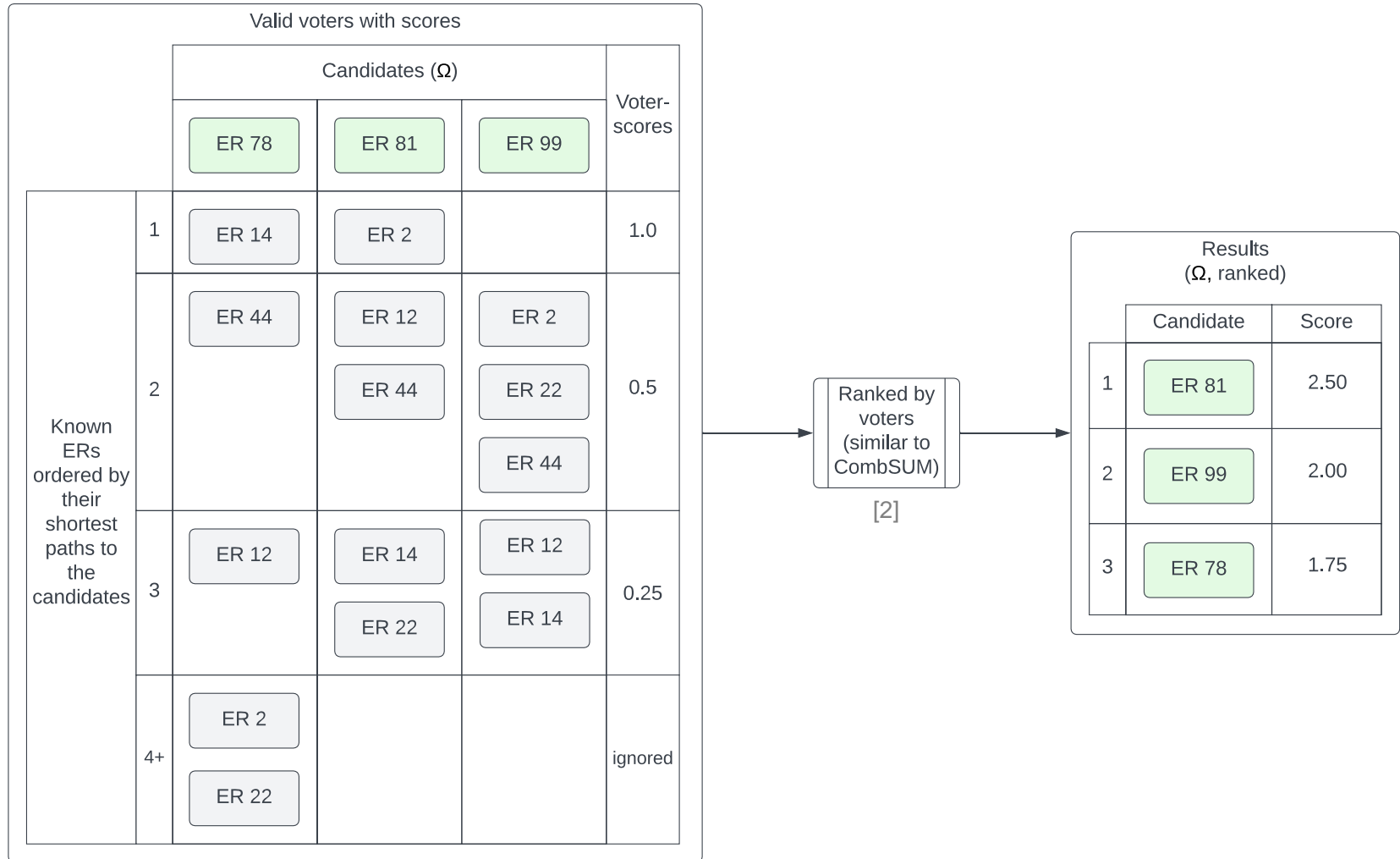


- Simple exemplary KG
- IRIs omitted for readability
- Only URLs and type information of ERs are included

# Voting – Model with voting



# Voting – Explained





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- Proposal for use case of a vertical provider
- Requirements for an OSI resulting from this proposal:
  - Providing an interface for the integration of KGs or a KG-Service
  - Developing a strategy for integrating external indices (e.g., OER search engines like oersi.org)
  - Handling personal data – especially enabling the configuration of the geolocation of hosted personal data
- Thereby the requirements from the first use case (IT Atlas) are complemented



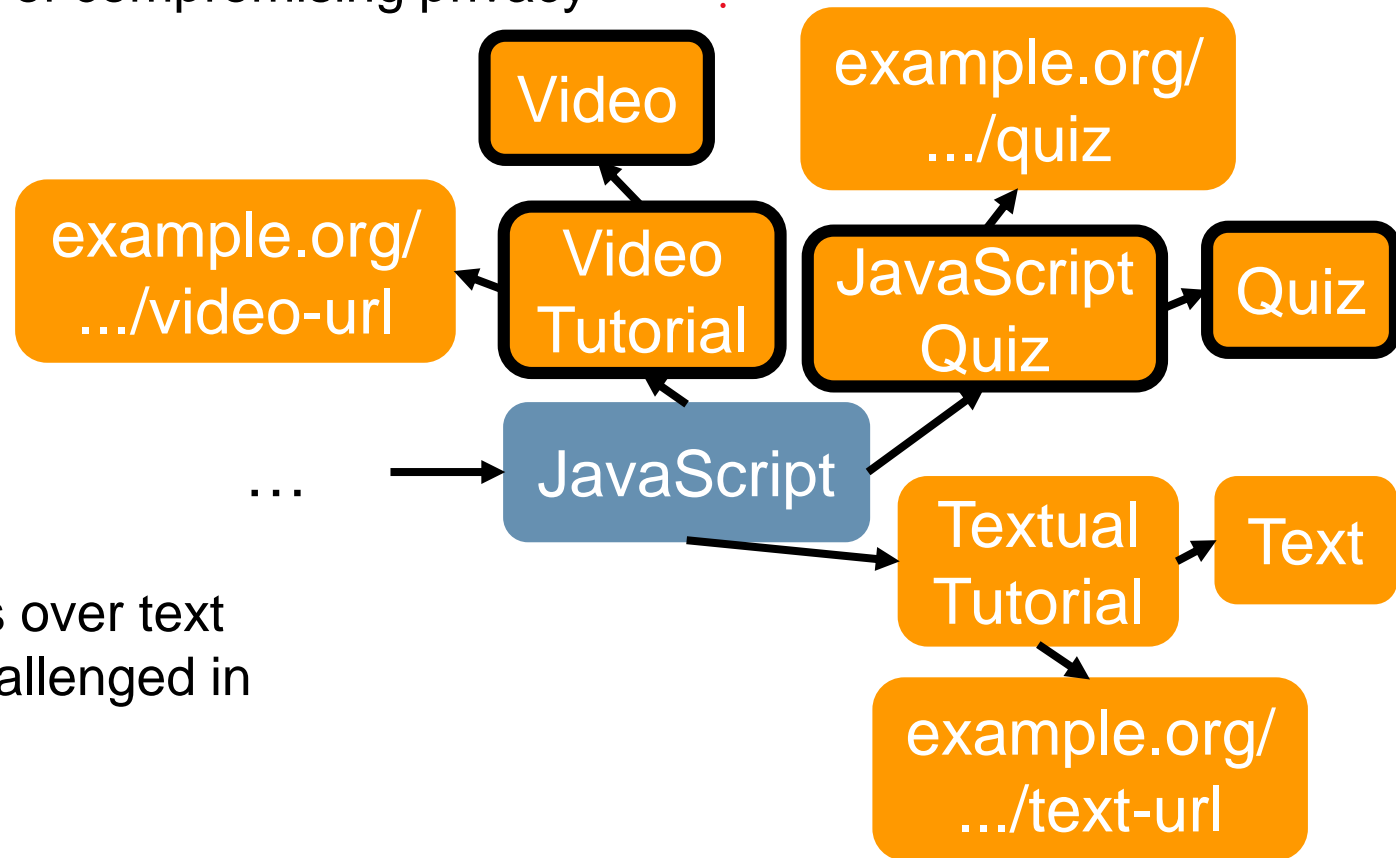
# Thank you!

1. UNESCO. “Recommendation on open educational resources (oer).” (2019), [http://portal.unesco.org/en/ev.php-URL\\_ID=49556&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=49556&URL_DO=DO_TOPIC&URL_SECTION=201.html)
2. A. Henrich and M. Wegmann, “Search and evaluation methods for class level information retrieval: Extended use and evaluation of methods applied in expertise retrieval,” in *SAC '21: The 36th ACM/SIGAPP Symposium on Applied Computing, Virtual Event, Republic of Korea, March 22-26, 2021*, ACM, 2021, pp. 681–684. doi:10.1145/3412841.3442092.
3. L. Martin, F. Engl, and A. Henrich, “Requirements for an Open Search Infrastructure from the Perspective of a Vertical Provider,” Zenodo, Oct. 2021. <https://doi.org/10.5281/zenodo.6139647>

# Representation of User Profiles



- Goal: Provide user profiles as part of the queries
  - Improve quality of recommendations and search results
  - But: Risk of compromising privacy



Example User:

- Prefers videos over text
- Likes to be challenged in quizzes

Two parts:

## Default Personas

- Study program specific
  - Derived from user studies
- Prevent cold-start problem
- Privacy preserving option for concerned users

## User Profiles

- Personalized
  - via initial questionnaire
  - via search log analysis
- Improved quality of recommendations and search results

- Voting algorithm:
  - Defines which ER in our KG is a **voter** ( $v \in \Upsilon$ ) for a **candidate** ( $c \in \Omega$ ), ER in our result-set ( $\Omega$ ), and ...
  - ... **assigns each voter** a **score** by determining a context-specific score with regards to the **candidate**.

- A primitive KG-voting algorithm for our example:

- Every ER of the KG within a distance of 3 to a **known ER** ( $K \subseteq \text{KG}$ ) is a **voter**:

$$\Upsilon = \{x \in K \mid \exists (c \in \Omega \text{ distance}(c \in \Omega, x) \leq 3)\}$$

- The **voter**-scores are determined by the formula:

$$\text{score}_v(c) = \frac{1}{2^{\text{distance}(c,v)-1}}$$

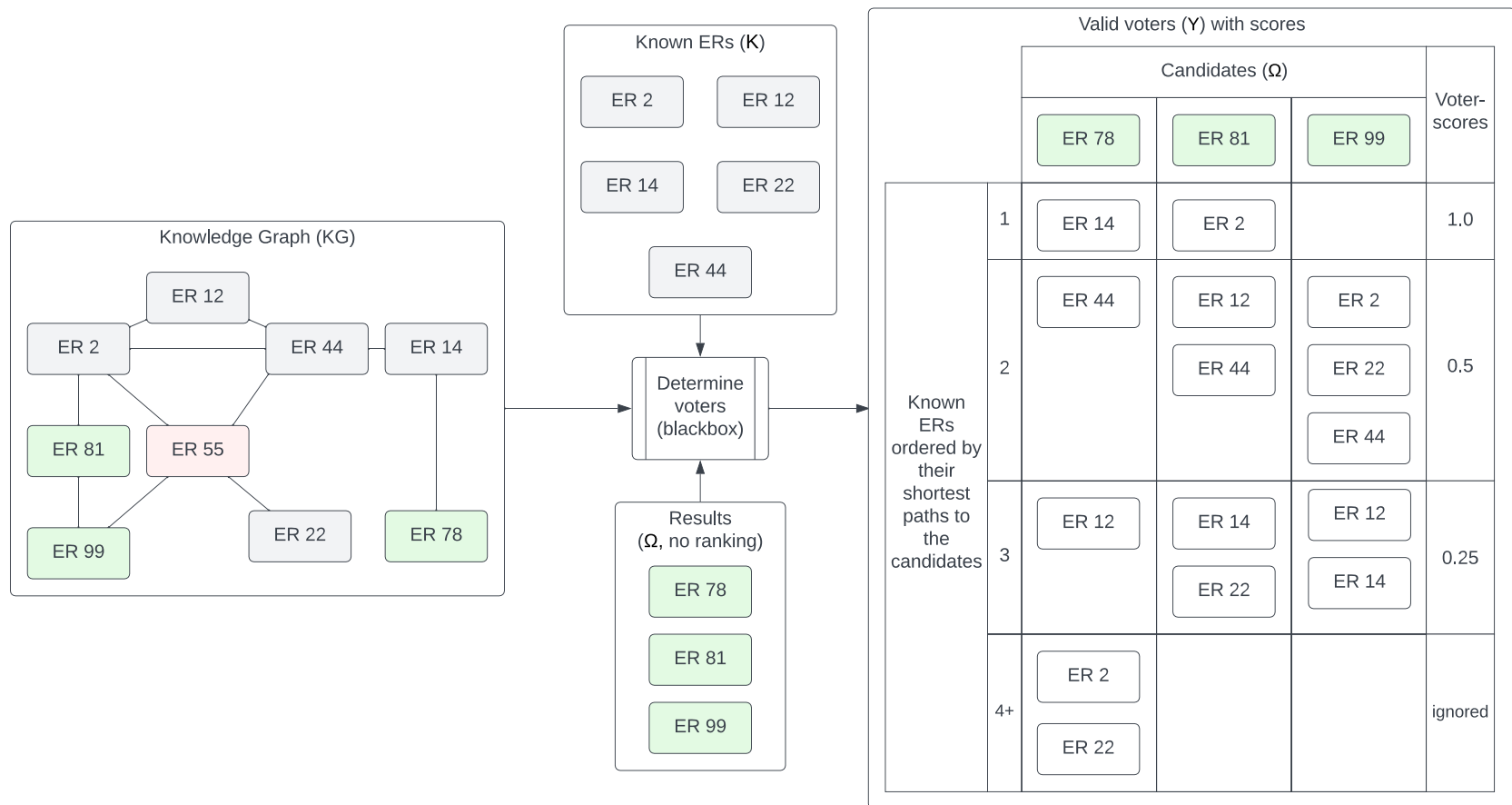
- The score of a **candidate** id determined by:

$$\text{score}_c = \sum_{v \in \Upsilon} \text{score}_v(c)$$

# Voting – Example cont.



- Determining the valid voters and their voter-scores for our example:



# Voting – Example cont.



- Rank the recommendations by their relative candidate-scores:

