



THE UNIVERSITY of EDINBURGH
informatics

A Semantic Web of Know-How: Linked Data for Community-Centric Tasks

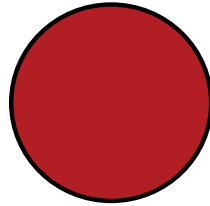
Paolo Pareti

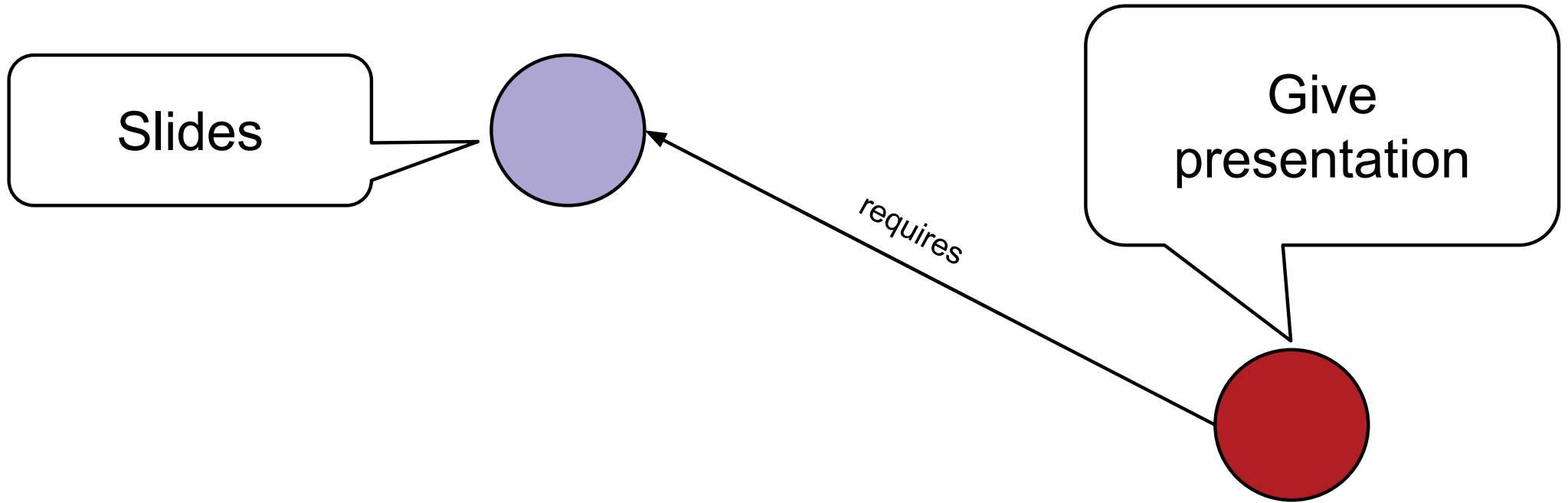
Prof. Ewan Klein

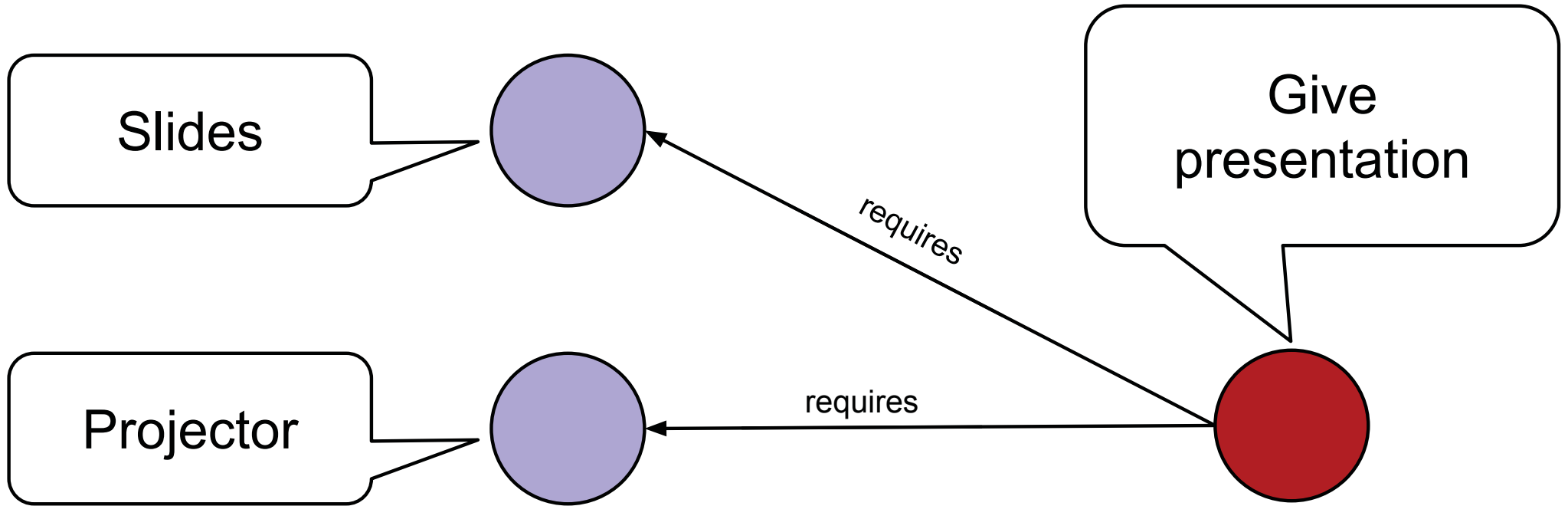
Dr. Adam Barker

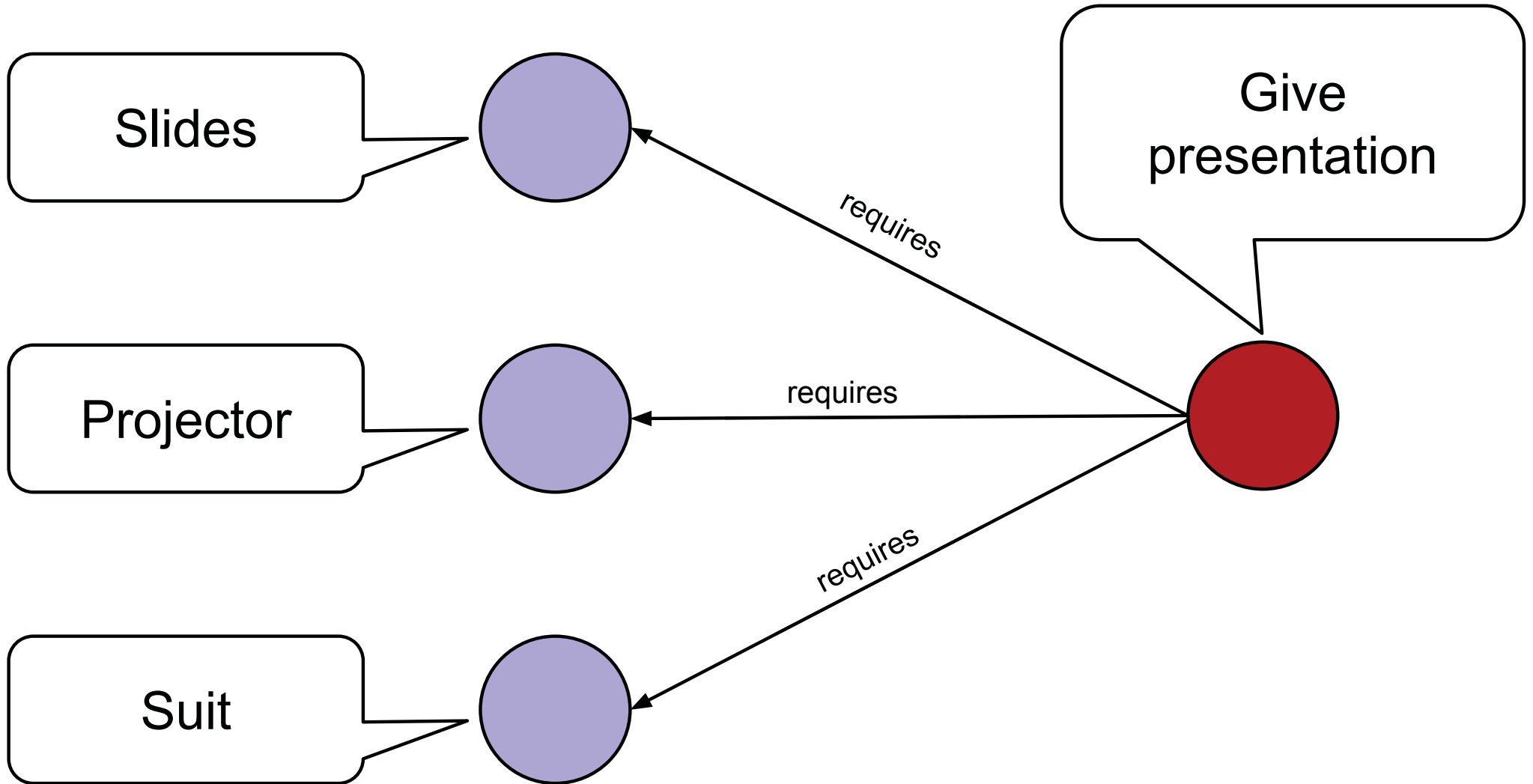


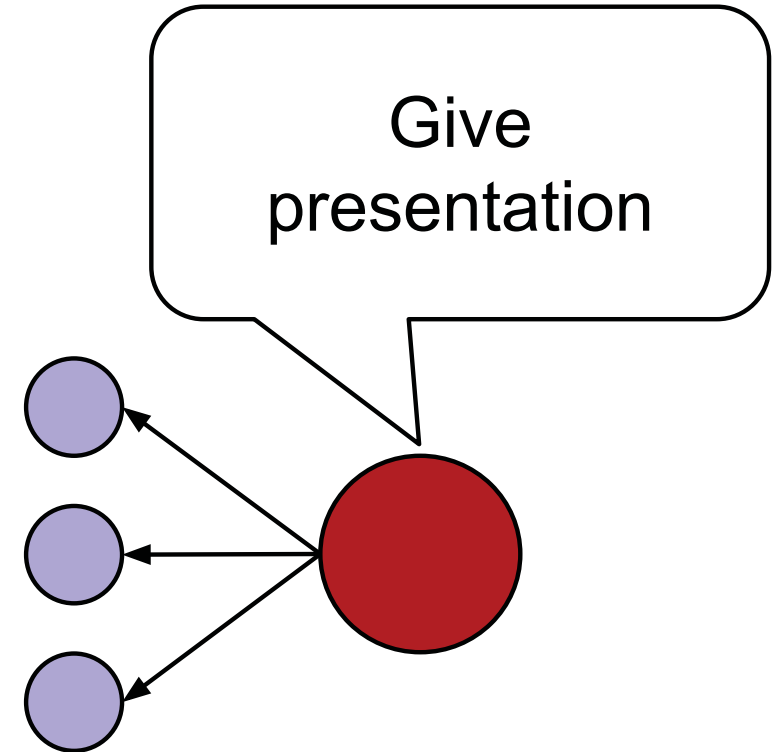
Give
presentation

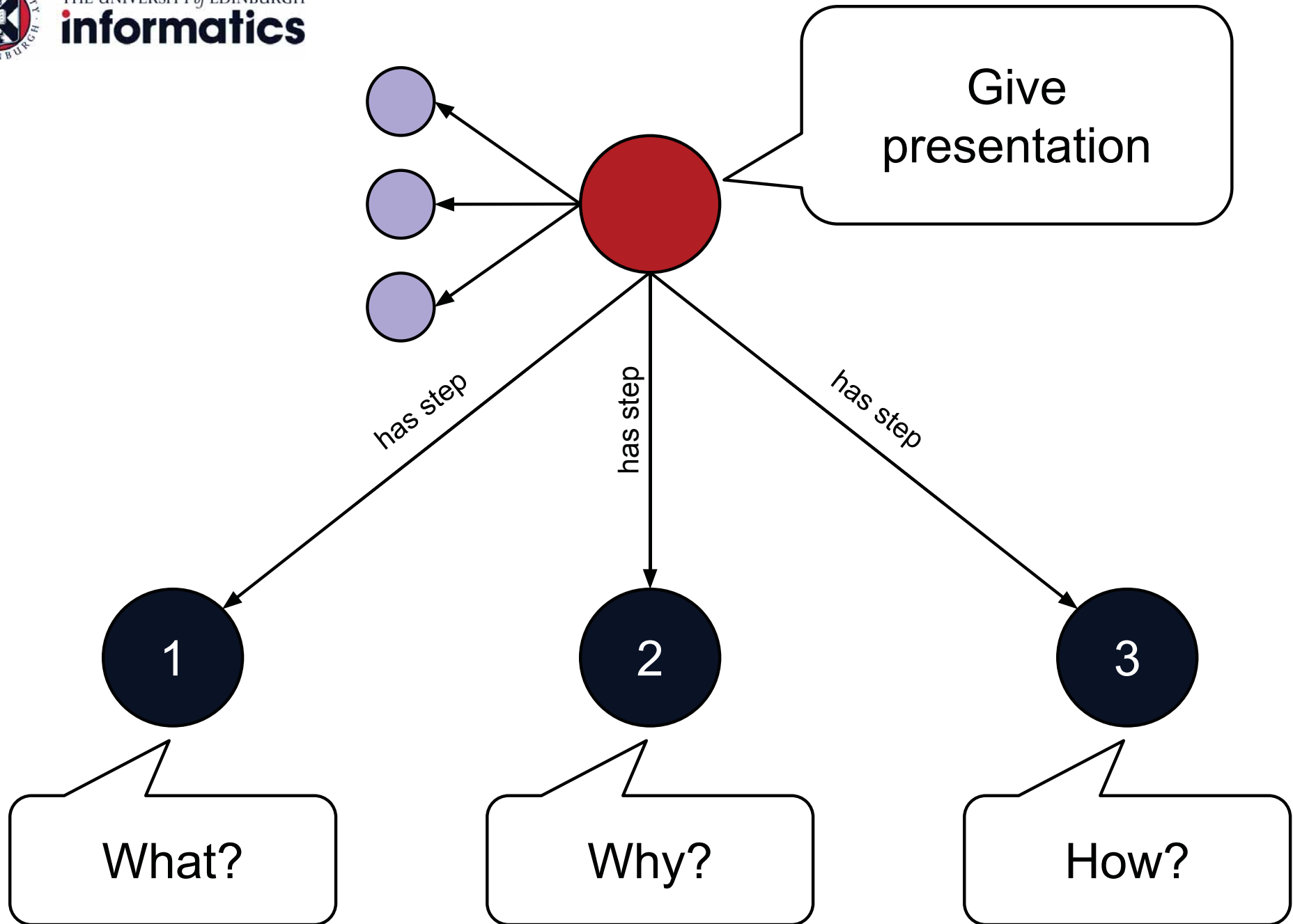


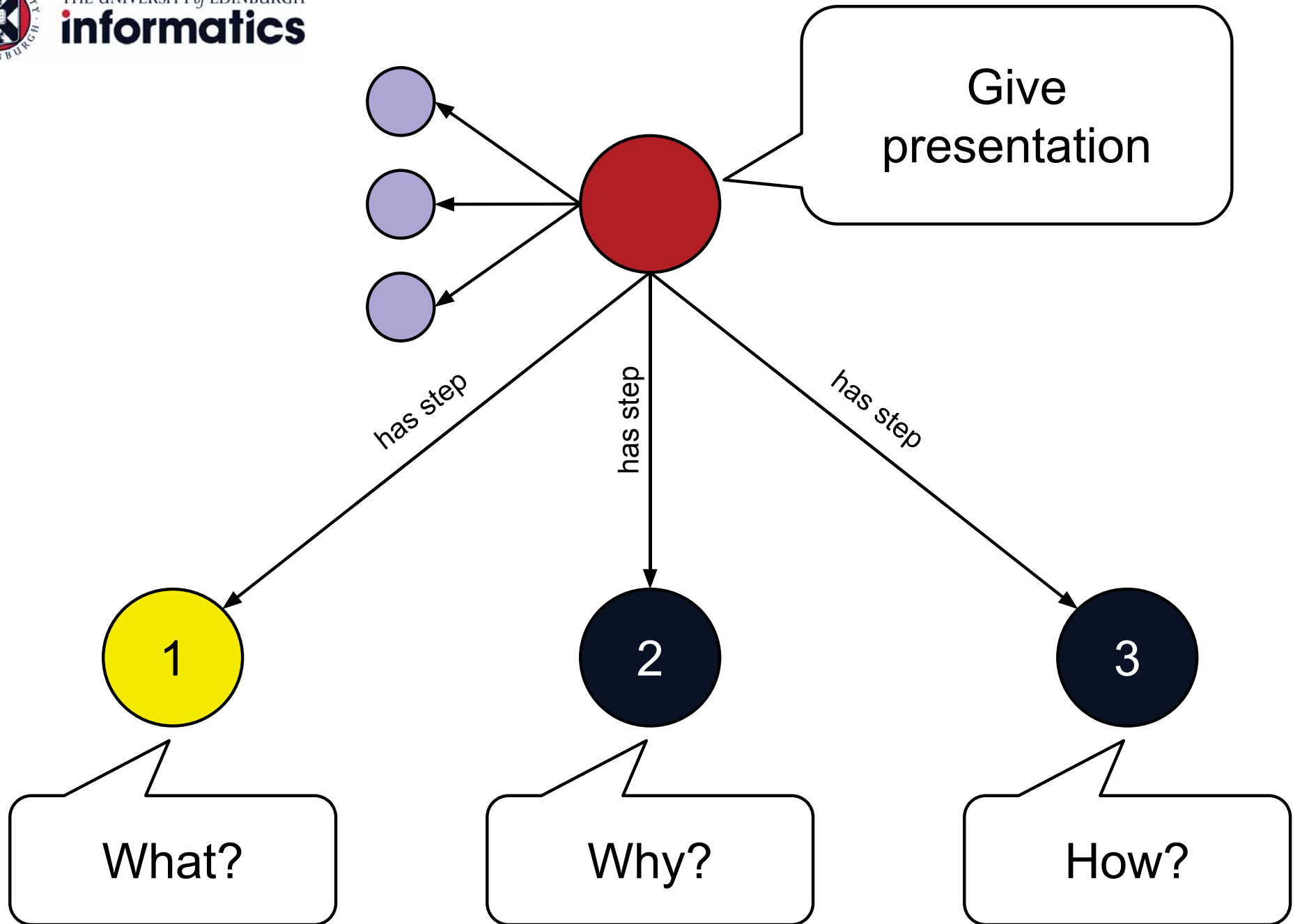


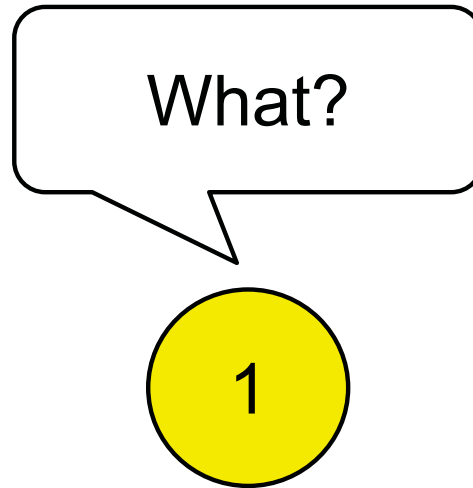




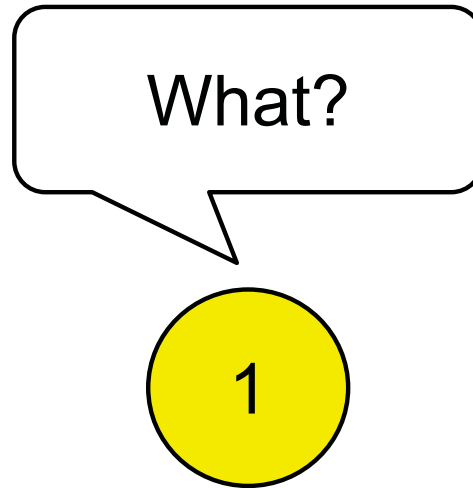








A Semantic framework to represent Community-Centric Procedural Knowledge

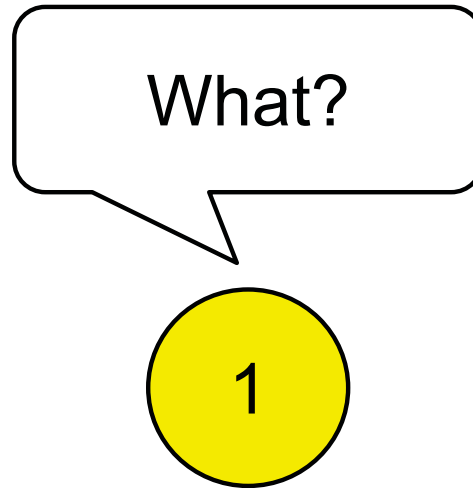


A Semantic framework to represent Community-Centric Procedural Knowledge



Procedural Knowledge

- Algorithms
- Scientific workflows
- Business processes
- Recipes



A Semantic framework to represent Community-Centric Procedural Knowledge



What?



Community-Centric Procedural Knowledge

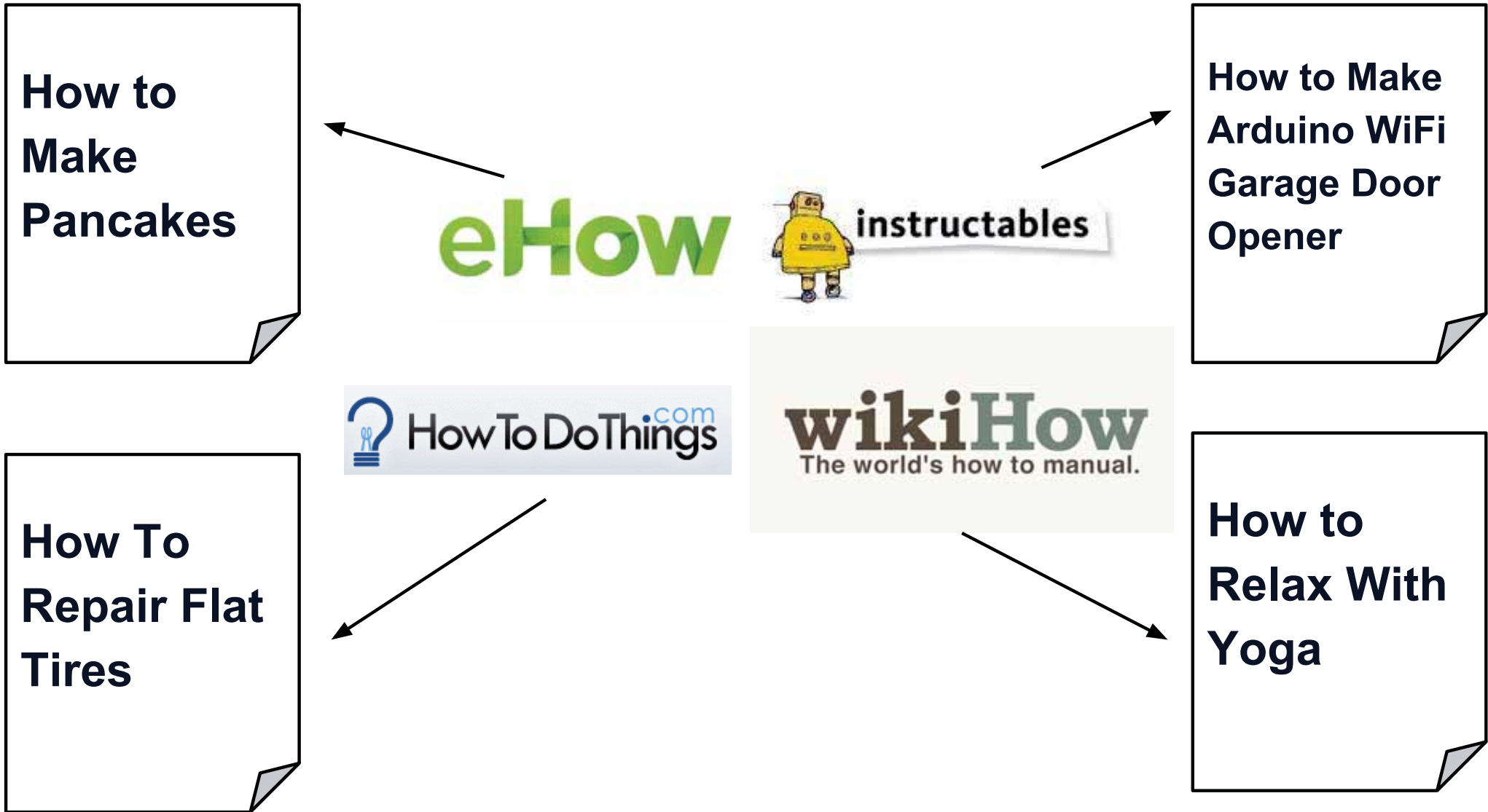
eHow





What?

Community-Centric Procedural Knowledge





Community-Centric Procedural Knowledge

Characteristics:

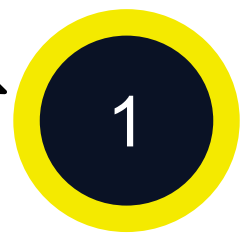
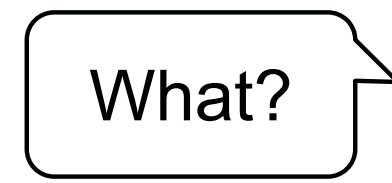
- Uncertainty
- Knowledge gaps
- Lack of a centralised knowledge base
- Evolution over time
- Community participation



Know-How Communities

Interested in:

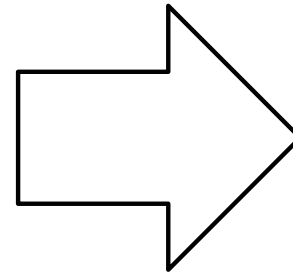
- Knowledge creation
 - Comprehensive
 - High-quality
 - Structured
- Knowledge share



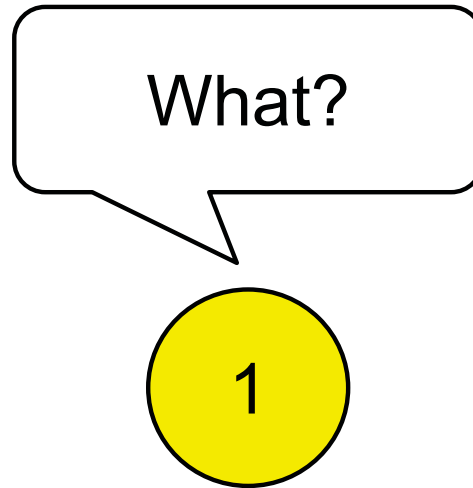
Know-How Communities

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Collaborative knowledge editing



A Semantic framework to represent **Community-Centric Procedural Knowledge**



What?

1

Semantic Procedural Knowledge



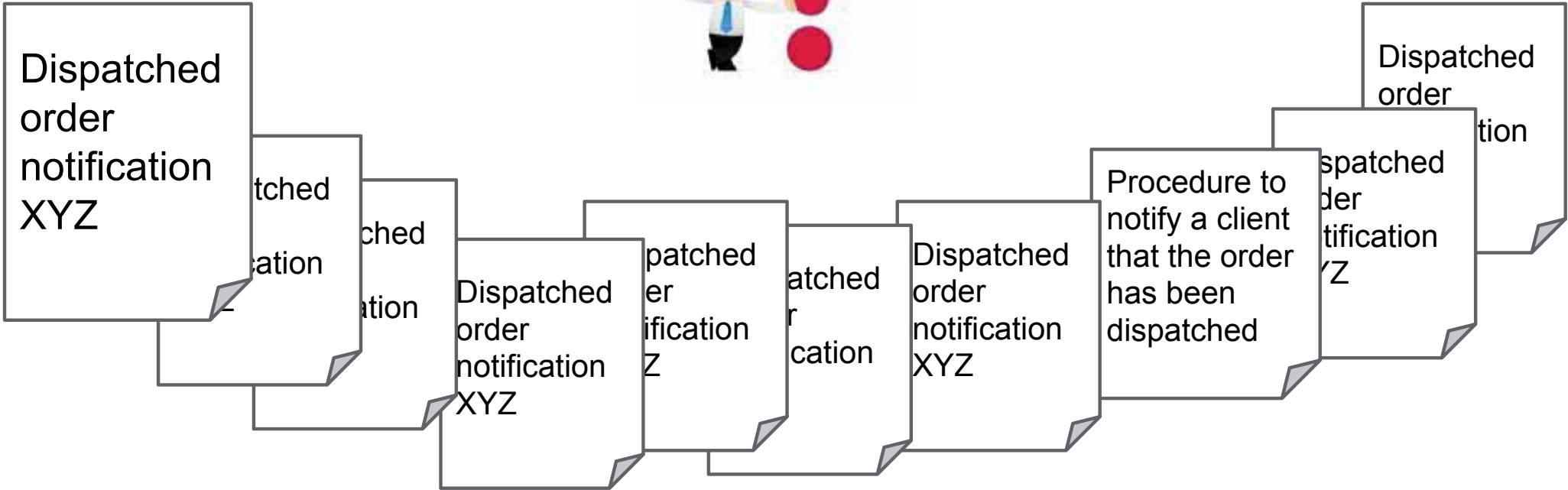
Semantic Procedural Knowledge

How to notify a client that the requested order has been dispatched?



Semantic Procedural Knowledge

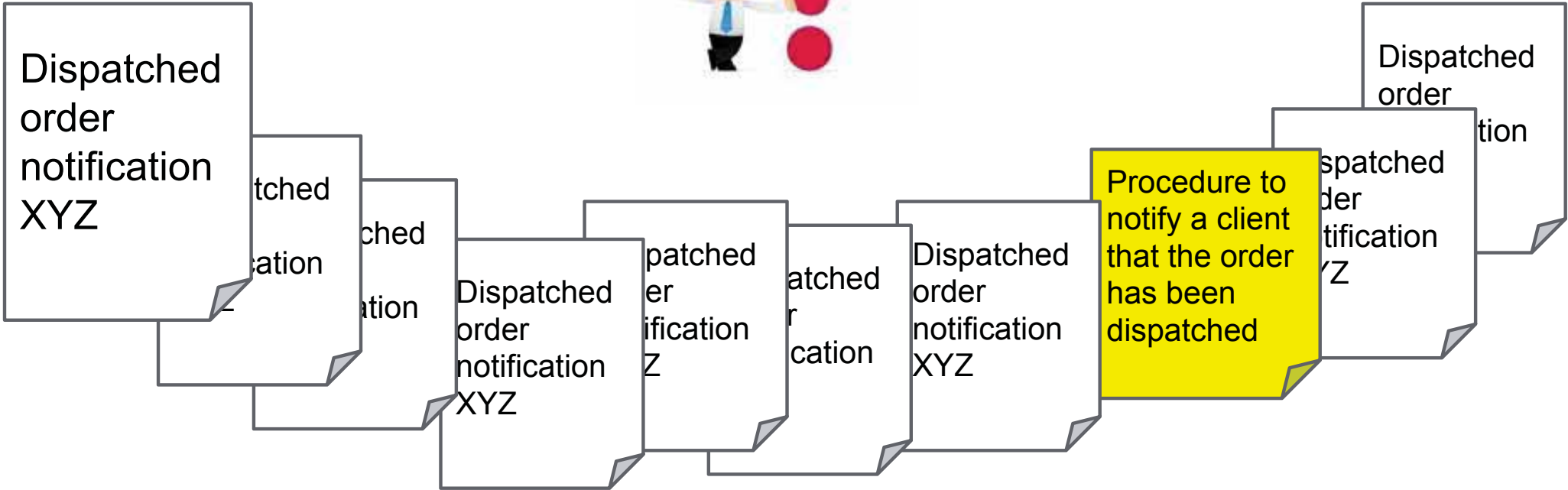
How to notify a client that the requested order has been dispatched?



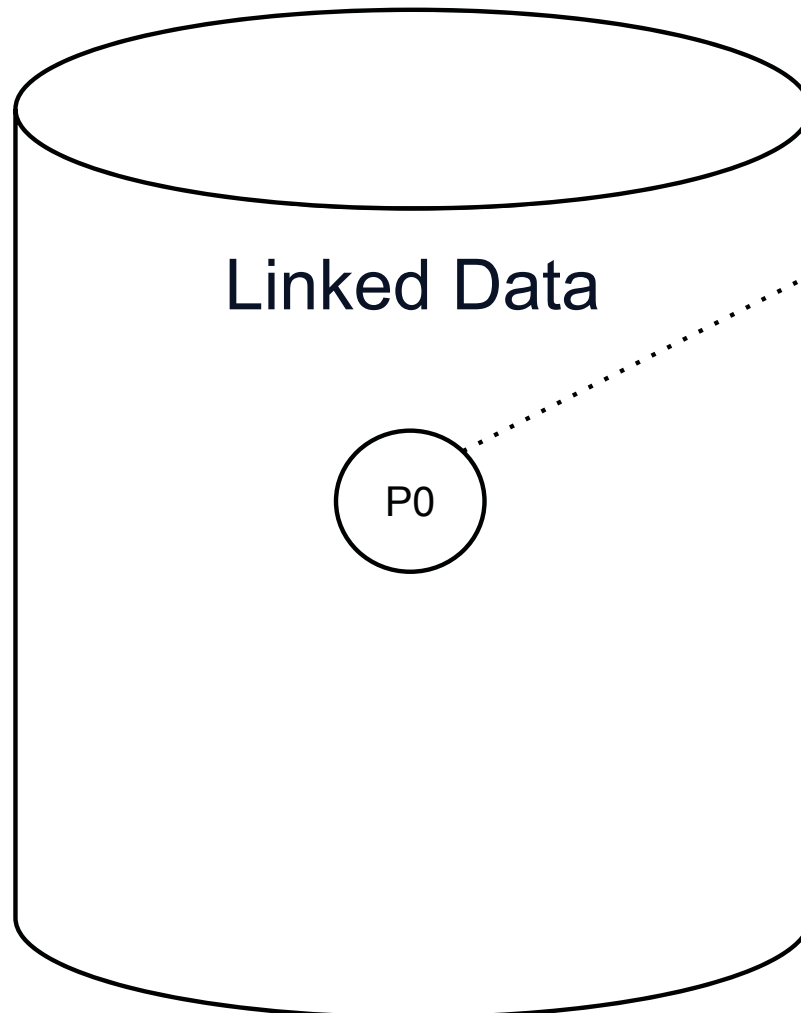


Semantic Procedural Knowledge

How to notify a client that the requested order has been dispatched?



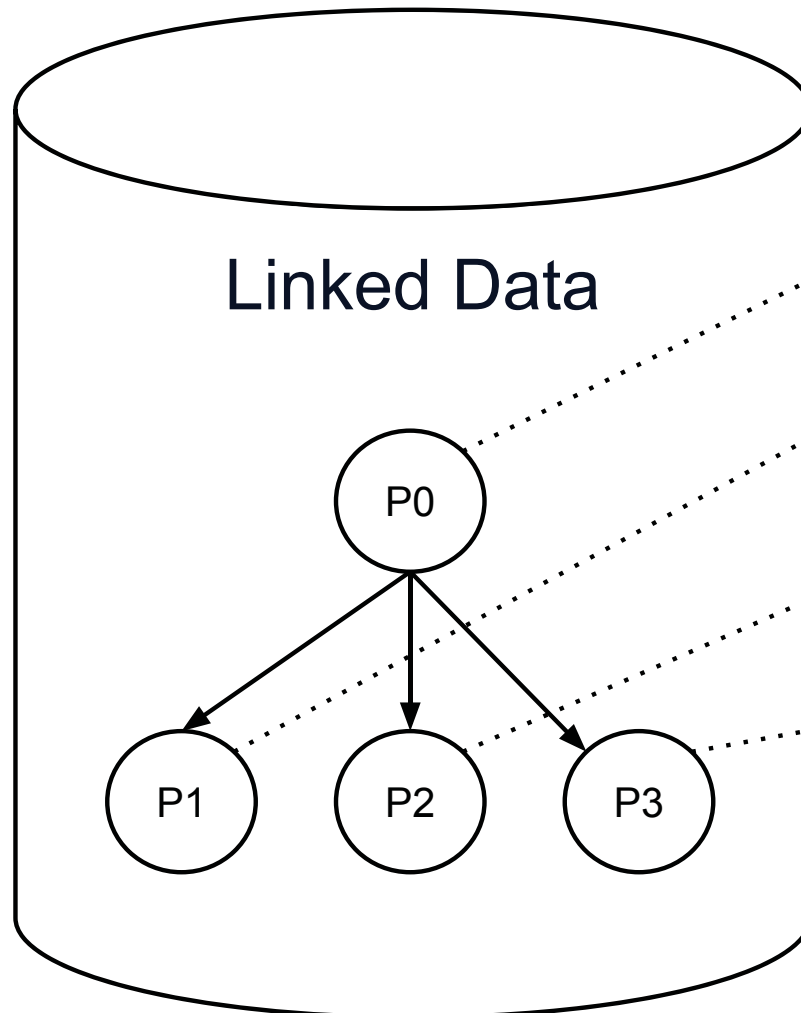
Semantic Procedural Knowledge



Procedure to notify a client that the order has been dispatched:

1. Make a copy of the dispatch receipt
2. Send the receipt to the client
3. Send a confirmation email to the client's email address

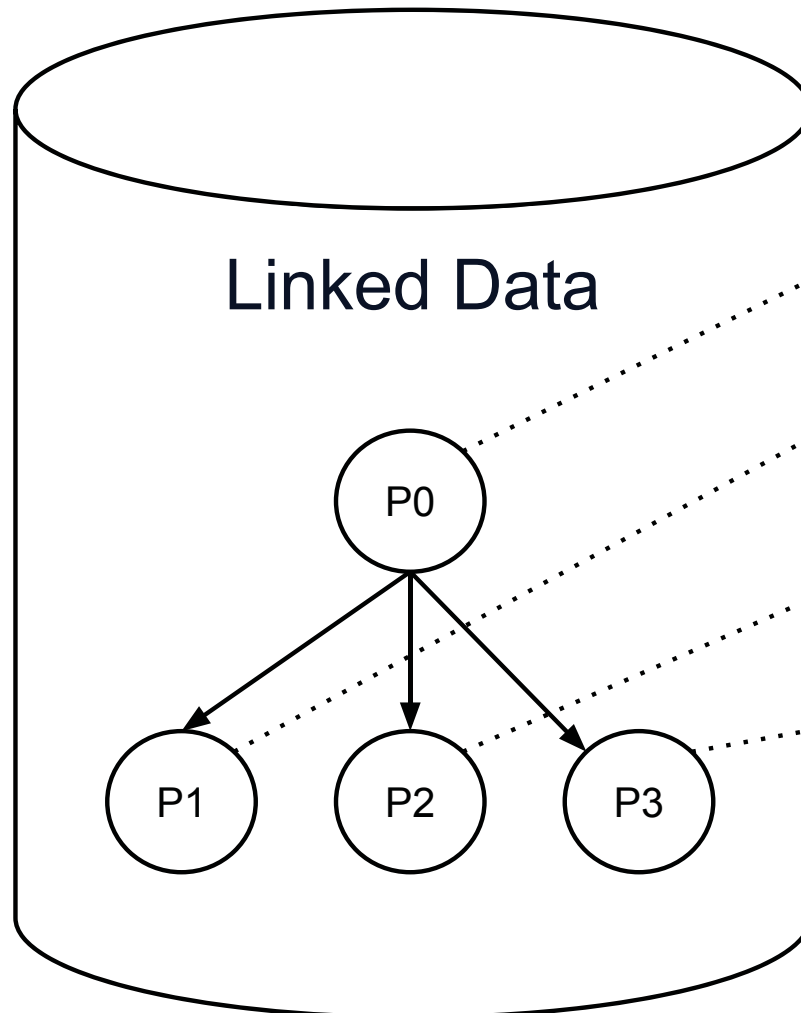
Semantic Procedural Knowledge



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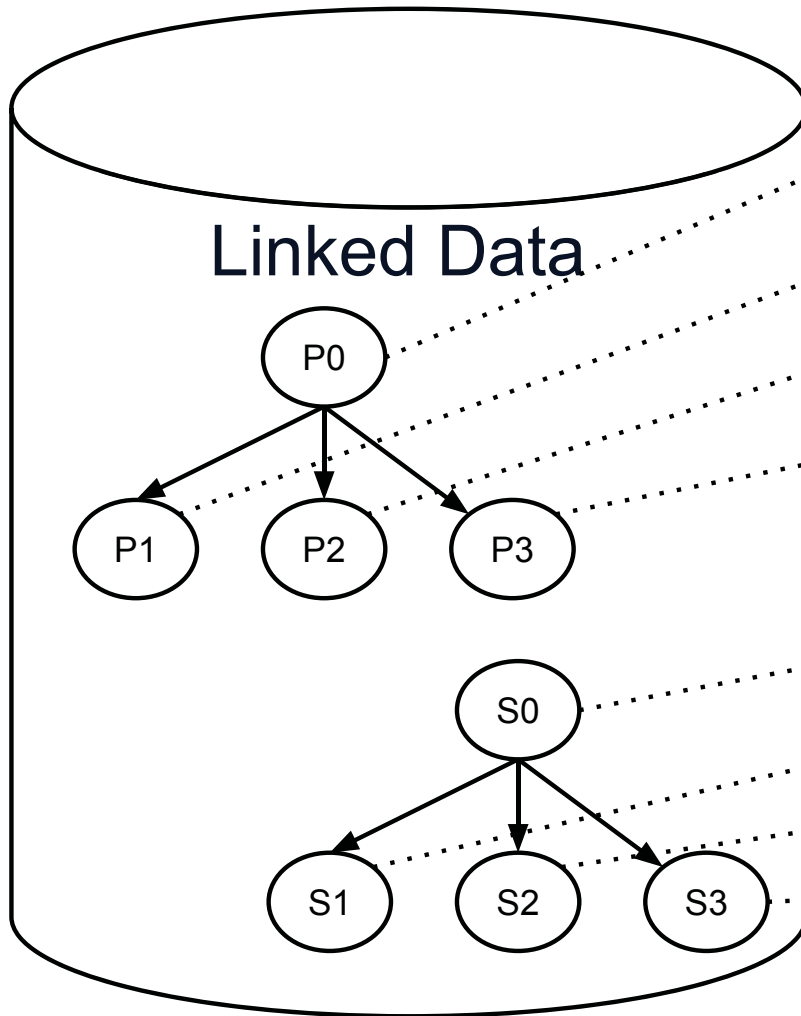
Semantic Procedural Knowledge



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Semantic Procedural Knowledge



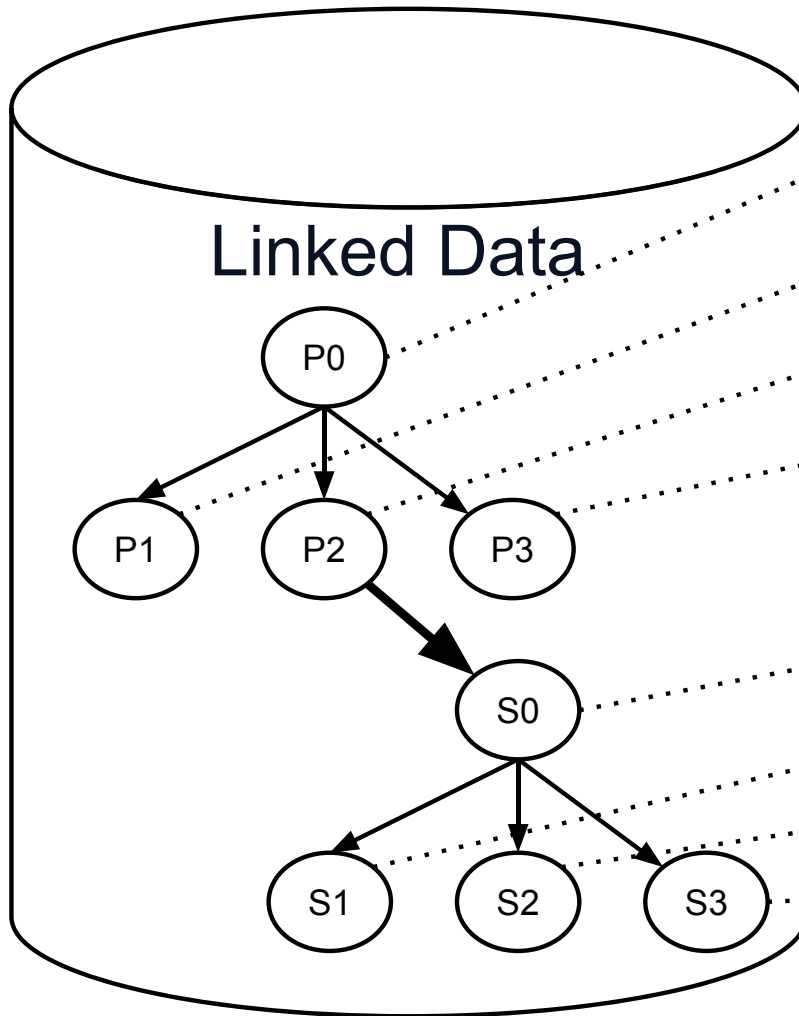
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How to send a receipt to the client:

1. Put the receipt in an A6 envelope
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3. Send using a 1st Class signed stamp

Semantic Procedural Knowledge



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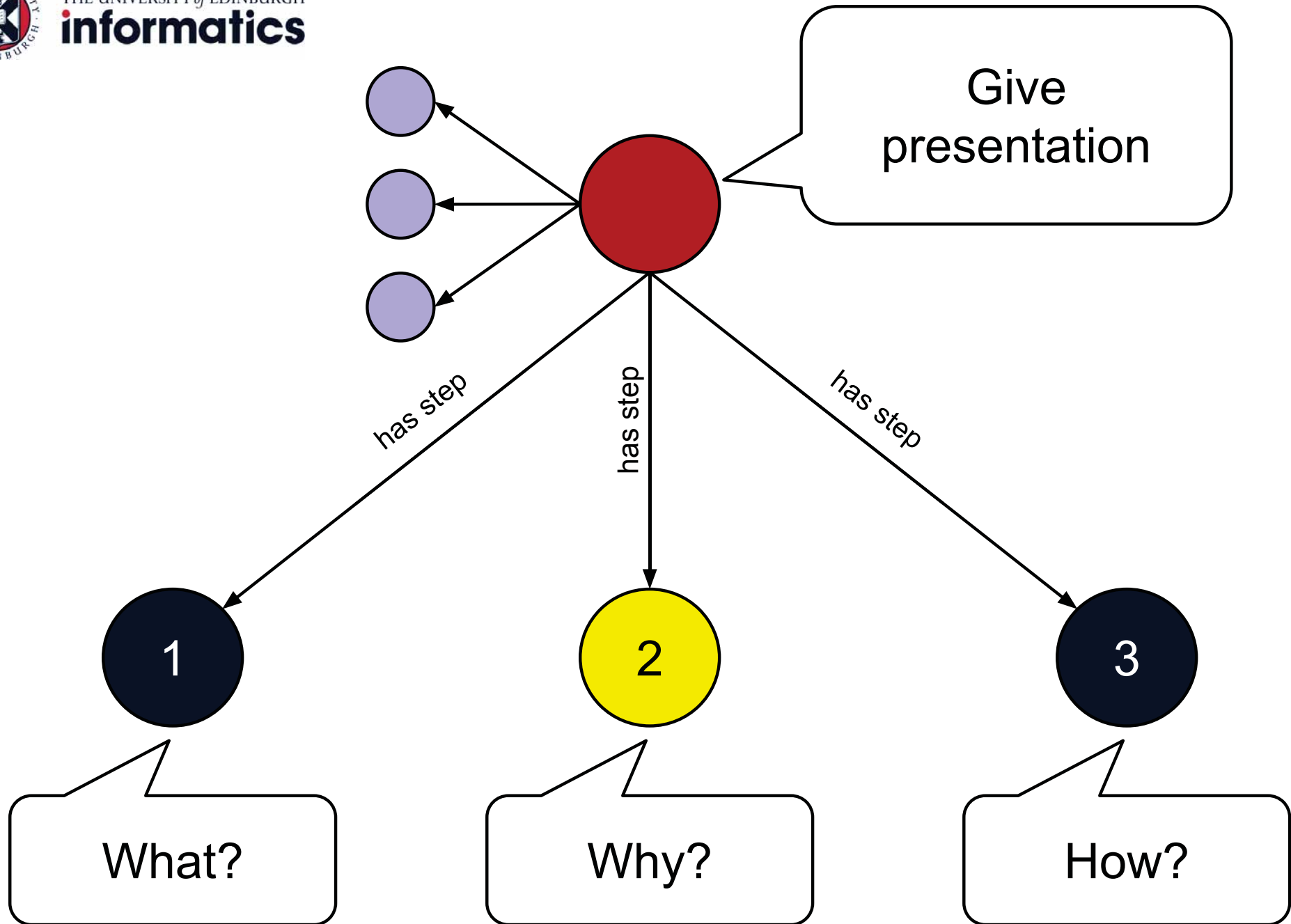
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Why?

2

The benefits of semantics



Why?

2

The benefits of semantics

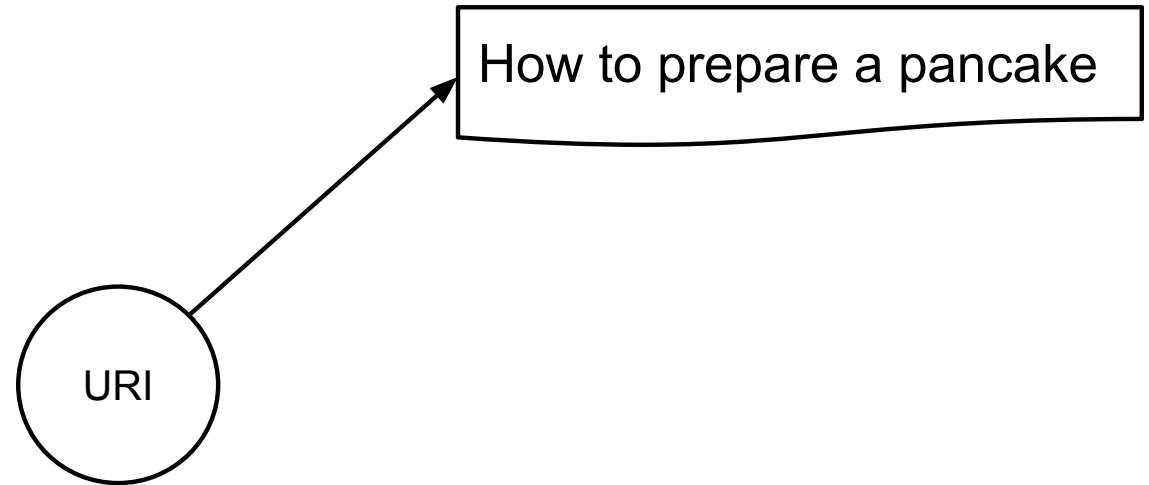
URI



Why?



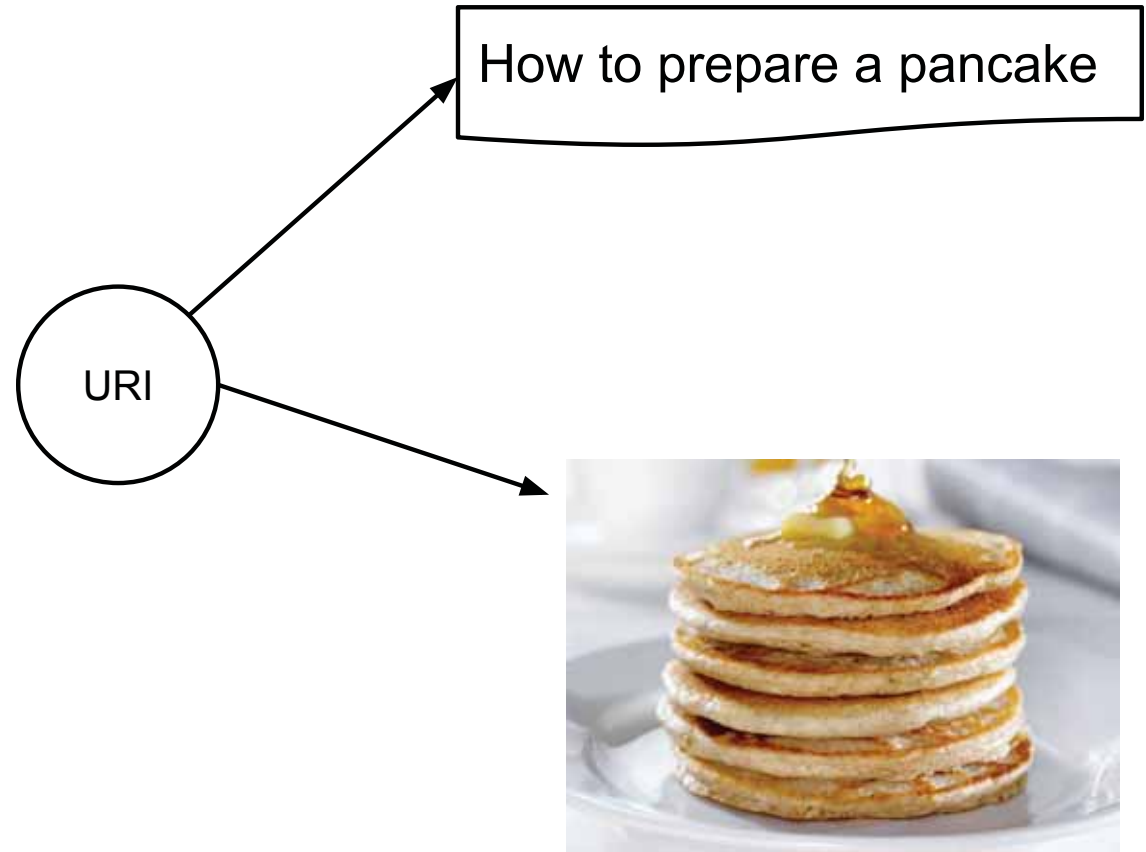
The benefits of semantics





Why?

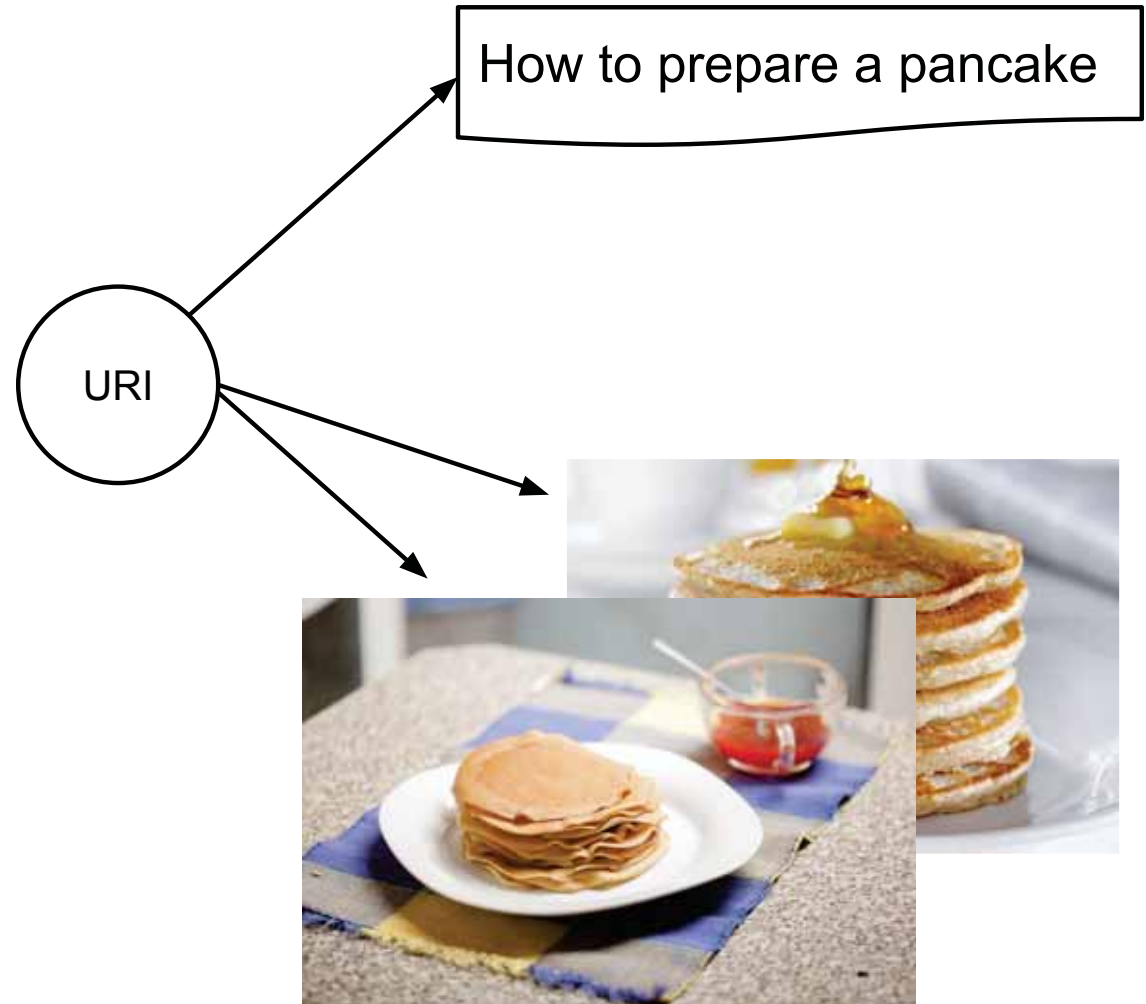
The benefits of semantics





Why?

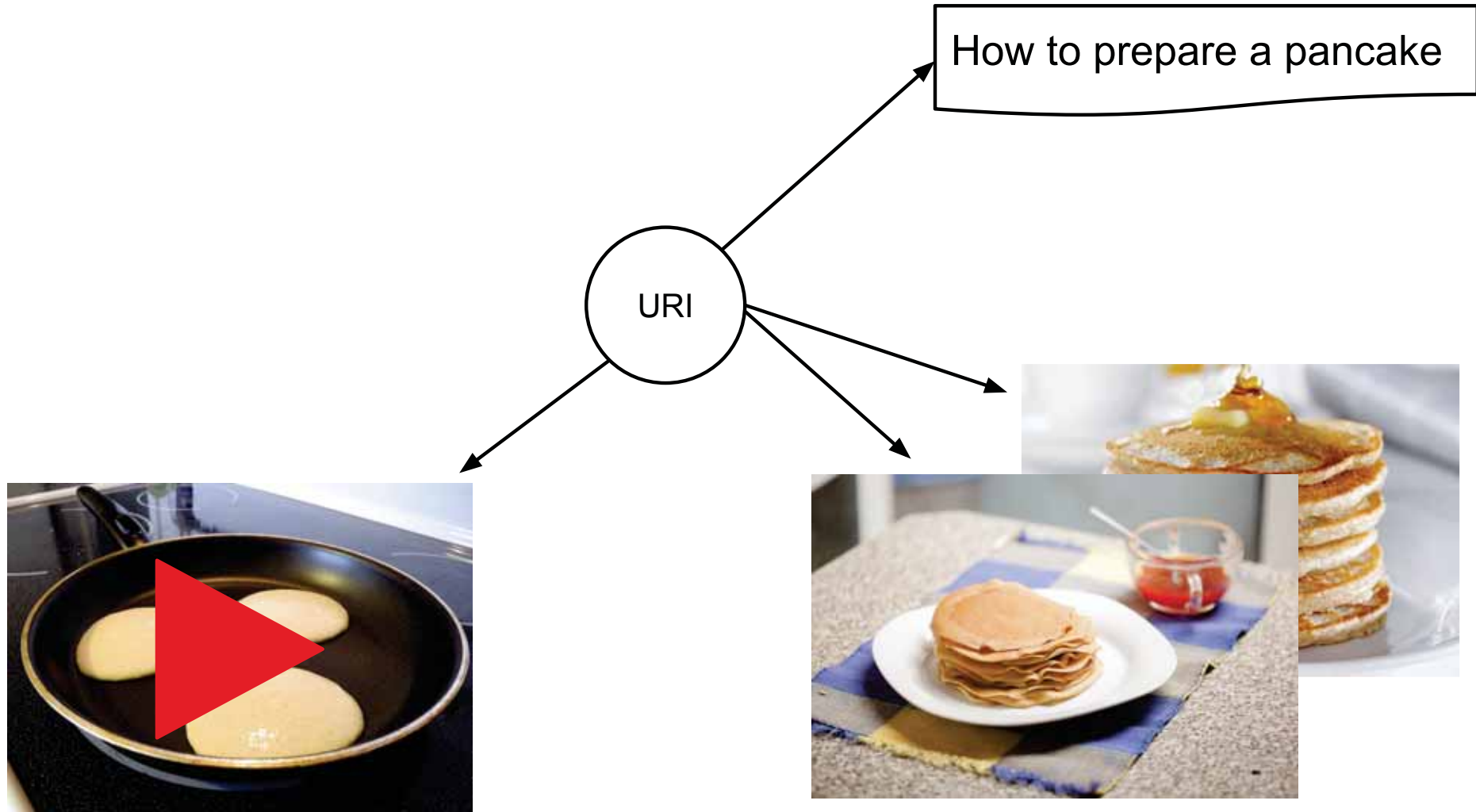
The benefits of semantics



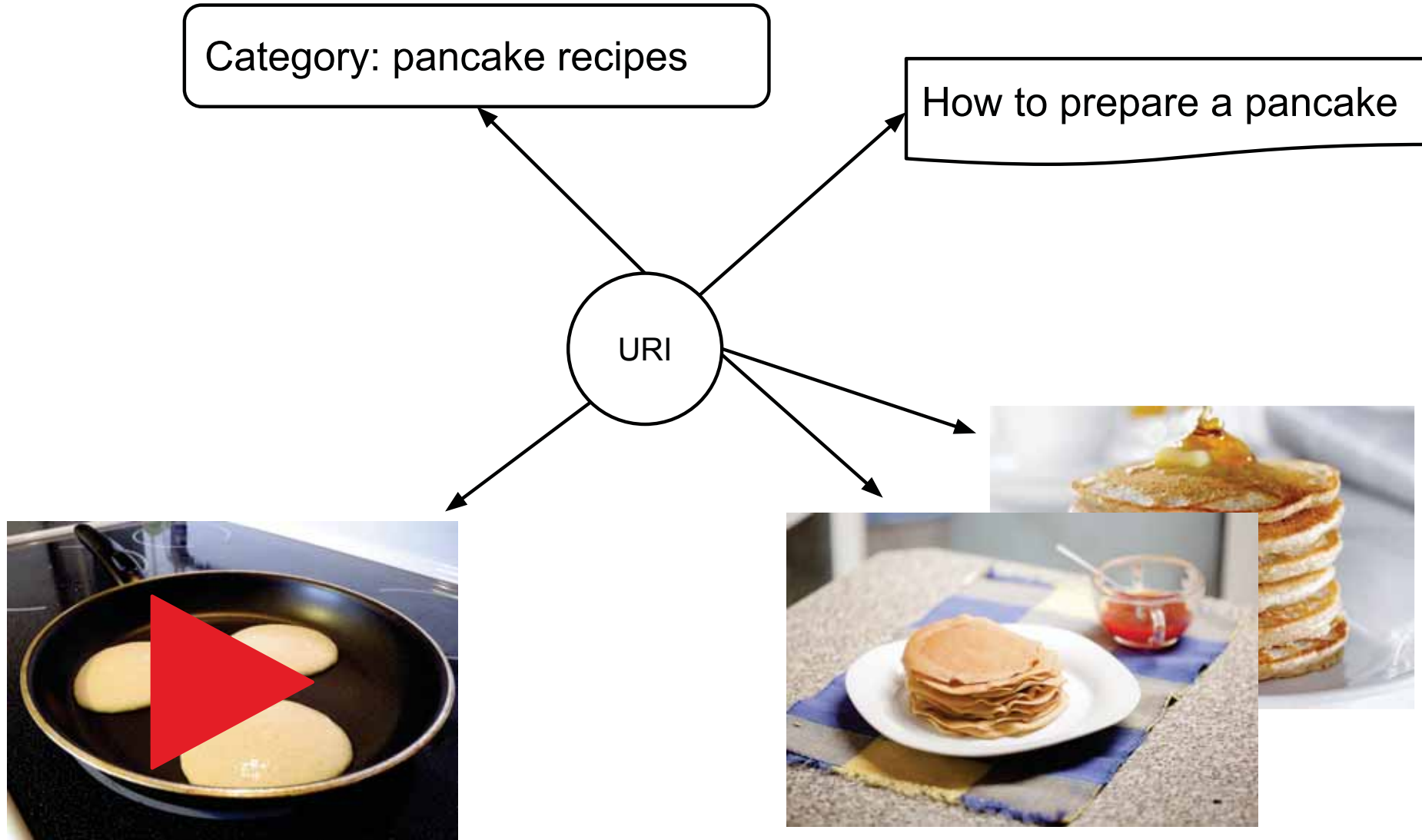


Why?

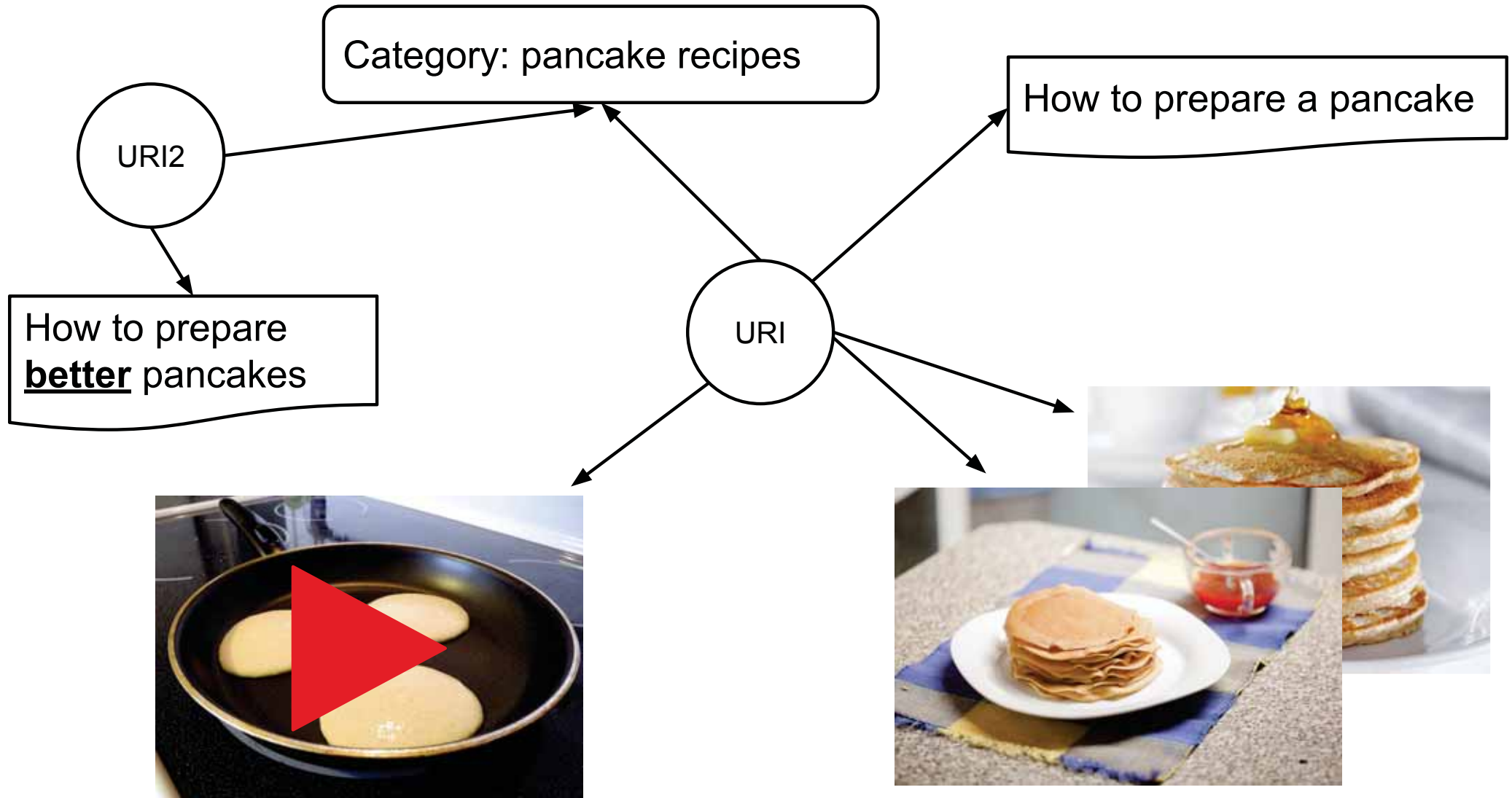
The benefits of semantics



The benefits of semantics



The benefits of semantics





The core benefits

- Integration
- Discovery / Exploration
- Share and reuse
- Semantic query answering

Other applications



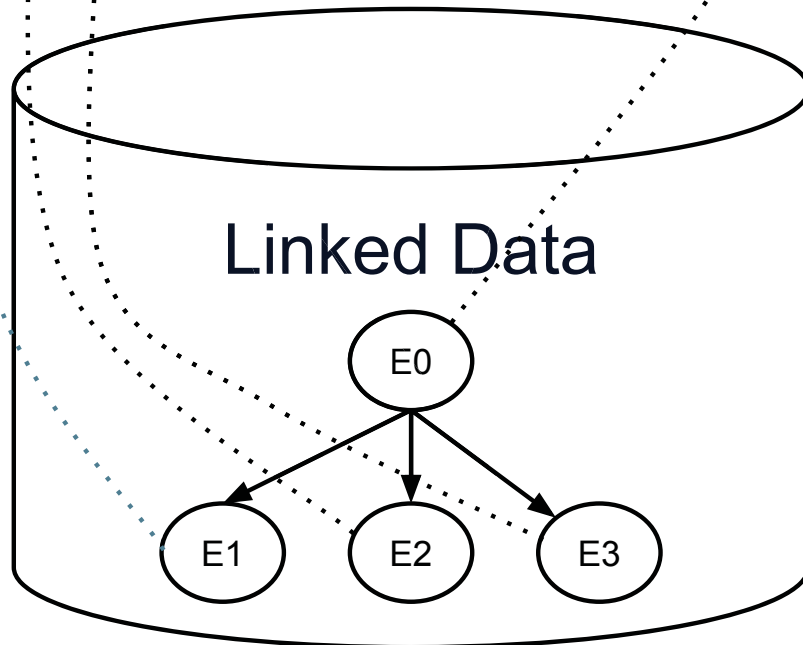
- Processes could be understood better and assisted/automated by **Robotic agents or Web Services**
- Process descriptions could be used by **Activity and Plan recognition** systems



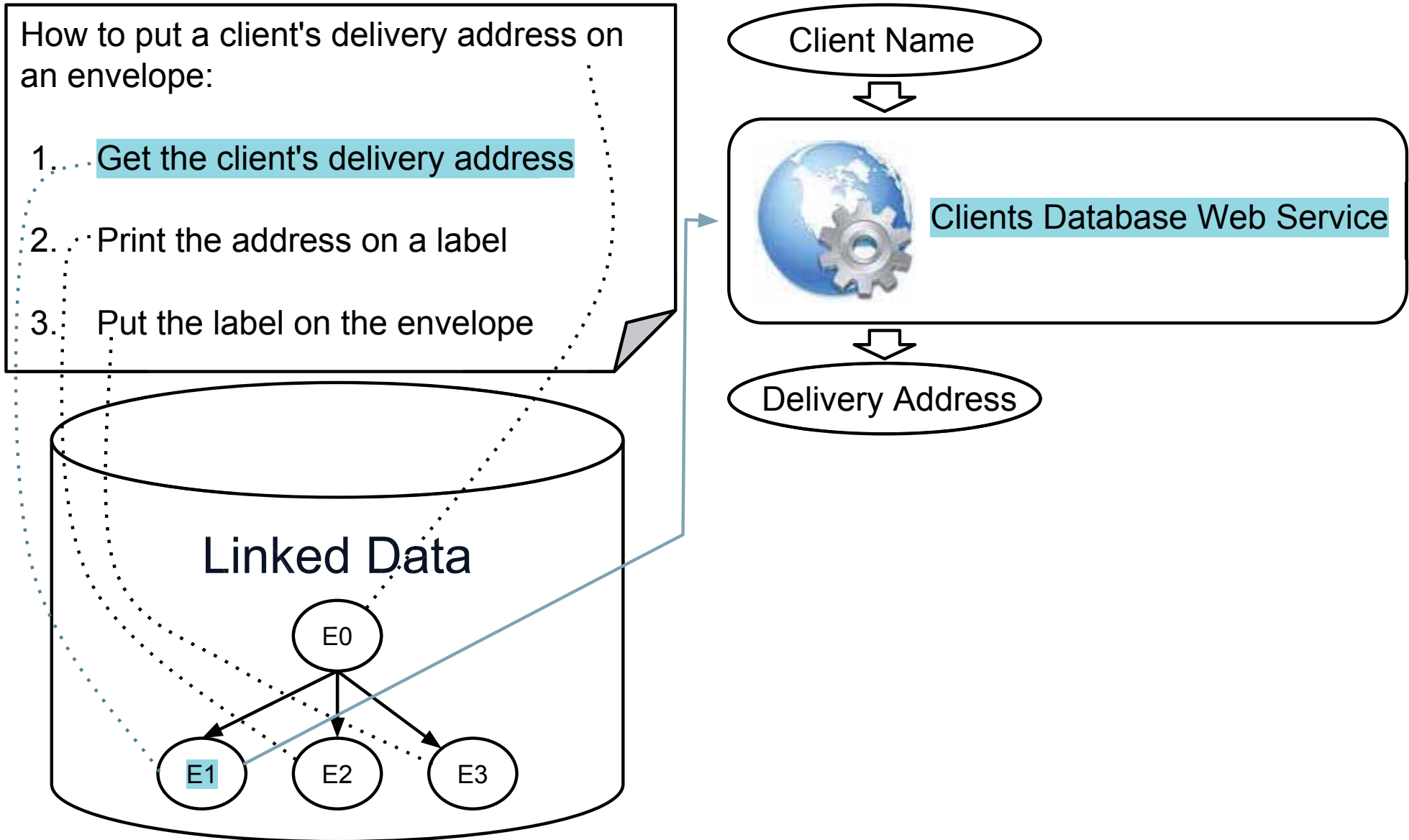
Other applications

How to put a client's delivery address on an envelope:

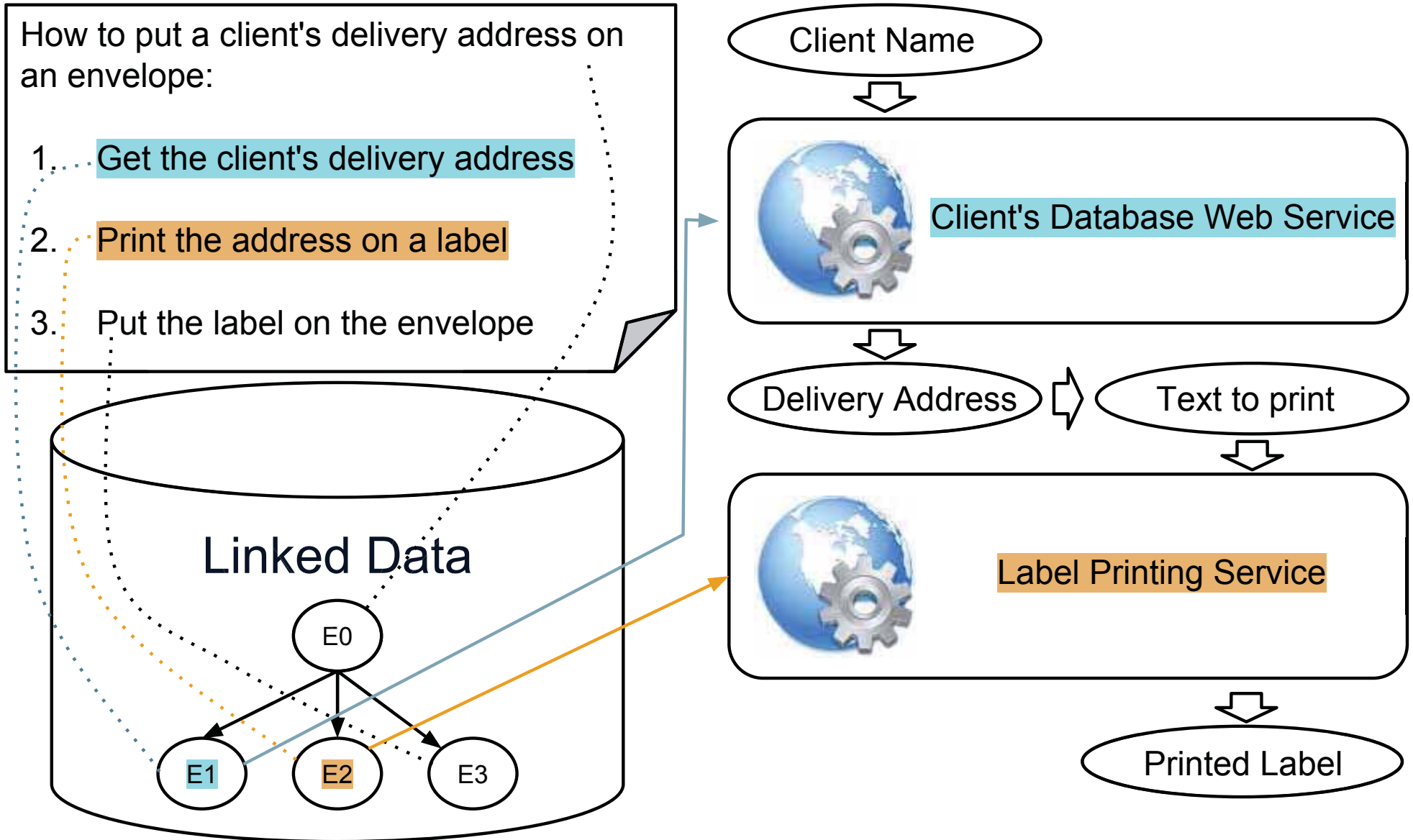
1. Get the client's delivery address
2. Print the address on a label
3. Put the label on the envelope

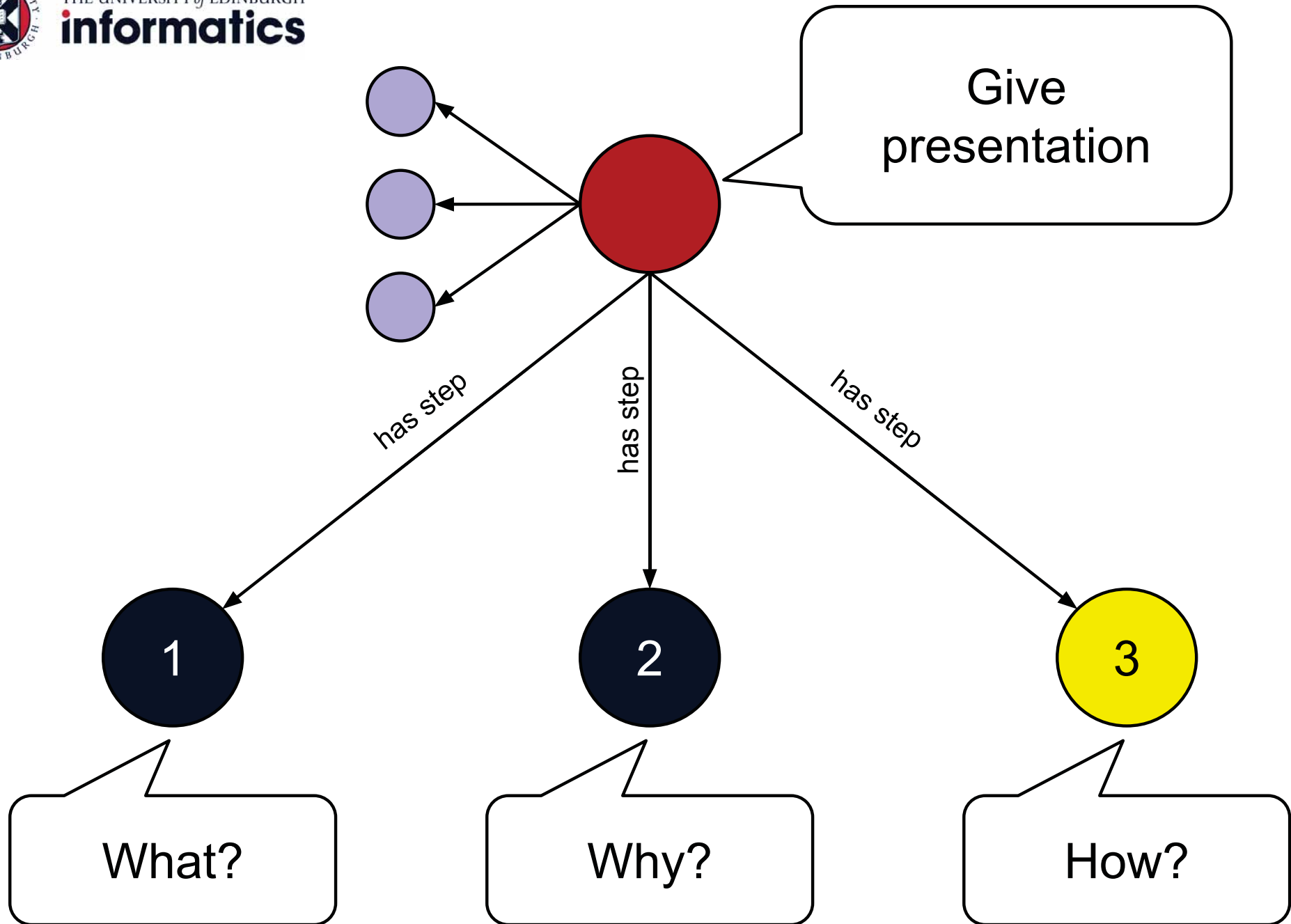


Other applications



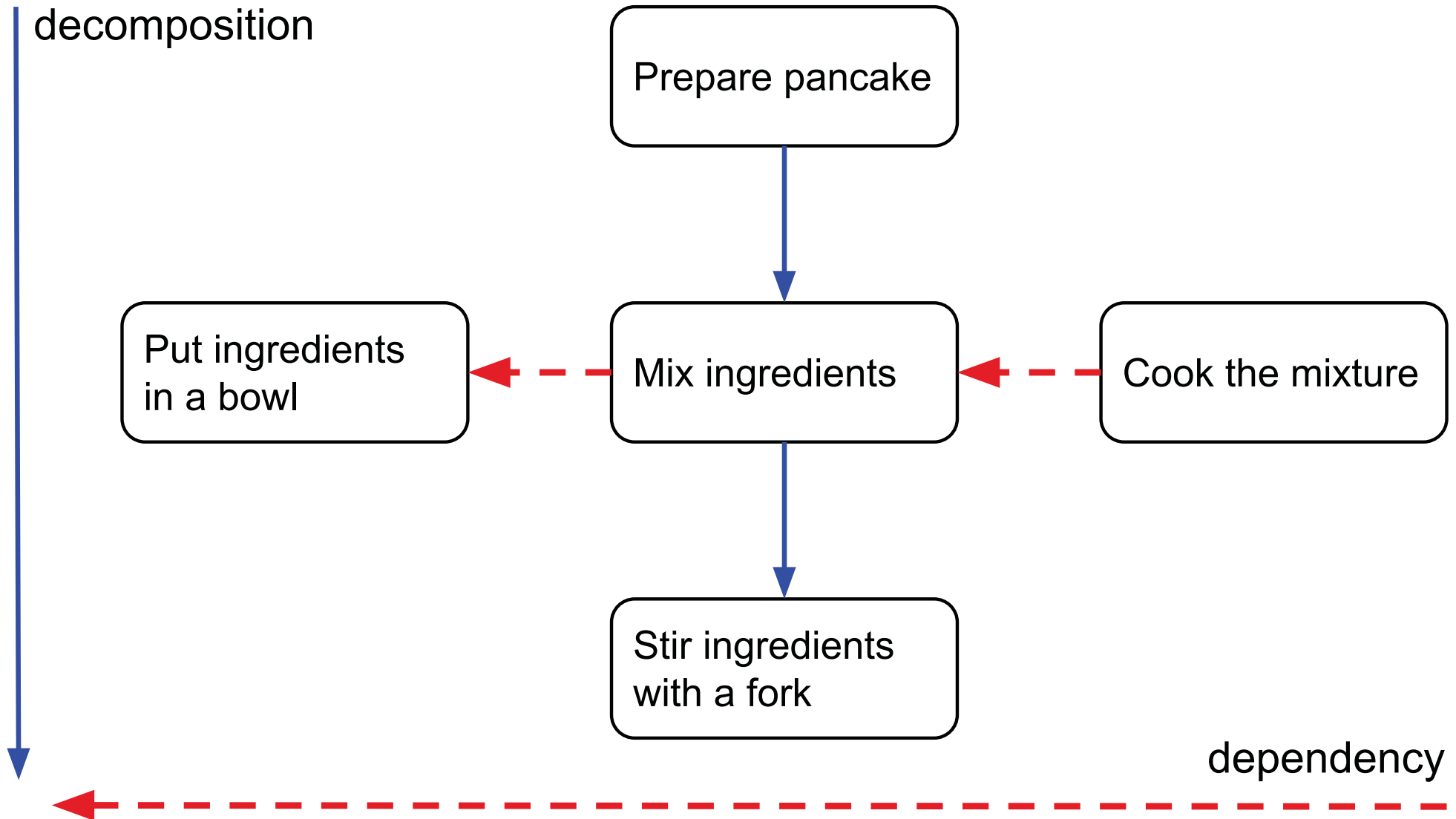
Other applications







How to represent Community Know-How





How to extract Community Know-How

Private Know-How resources

Public Know-How resources



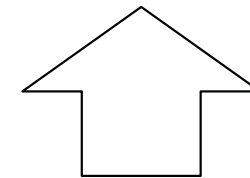
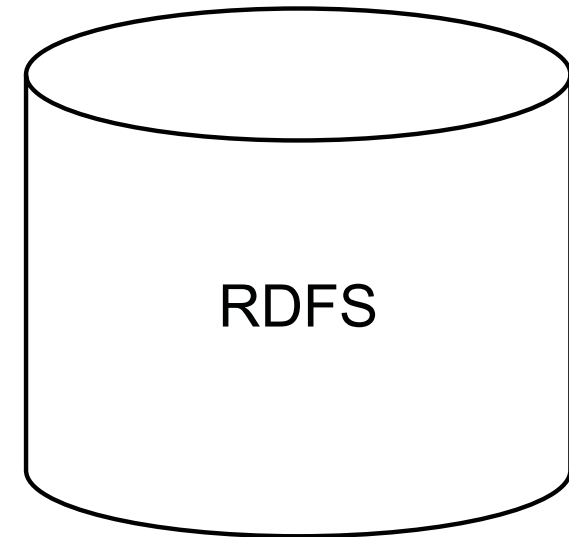
instructables

eHow

wikiHow
The world's how to manual.



HowToDoThings.com



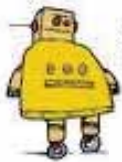
SPARQL query language



How to extract Community Know-How

Private Know-How resources

Public Know-How resources



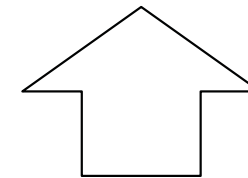
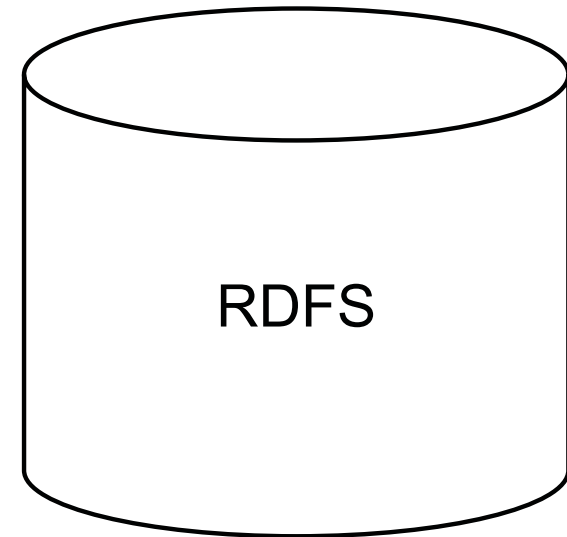
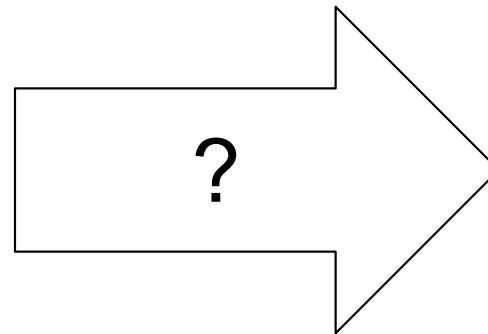
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SPARQL query language



How to extract Community Know-How

Several approaches:

- Manual annotation
- Statistical analysis
- Natural Language Processing
- Extraction of the existing structure



How to extract Community Know-How

Several approaches:

- Manual annotation
- Statistical analysis
- Natural Language Processing
- **Extraction of the existing structure**



How?

3

How to extract Community Know-How

The screenshot shows a wikiHow article page. At the top, there is a search bar and navigation links. The article title is "How to Prepare Danish Pancakes". Below the title, there is a short introductory paragraph. The "Ingredients" section lists various items with checkboxes. The "Steps" section shows the first three steps of the recipe.

wikiHow

Article · Edit · Discuss Home >

How to Prepare Danish Pancakes Edit Article

Edited by Nicole Marie, Harri, Malinix, Kalya

Danish pancakes, also called Ebleskivers, are small round pancakes that can be eaten plain, or filled with jam, chocolate, cheese, or other fillings. You do need a special 'ebleskiver pan' to make them, but it is worth the price, because after tasting one, you'll want them all the time!

Ingredients

- 3 c. (375 grams) flour
- 1 1/2 tsp baking soda
- 1/2 tsp salt
- 3 eggs
- 2 Tbsp (25 grams) sugar
- 3 c (710 ml) buttermilk
- 6 Tbsp melted shortening or vegetable oil
- Filling (jam, applesauce, chocolate, cheese, onion, etc...)

Steps

- 1** Combine all dry ingredients in a medium sized bowl. Set aside.
- 2** In a large bowl, beat together eggs and sugar. Blend thoroughly.
- 3** Add buttermilk and shortening. Mix well.



The extracted Community Know-How

Experiment done with the WikiHow website:

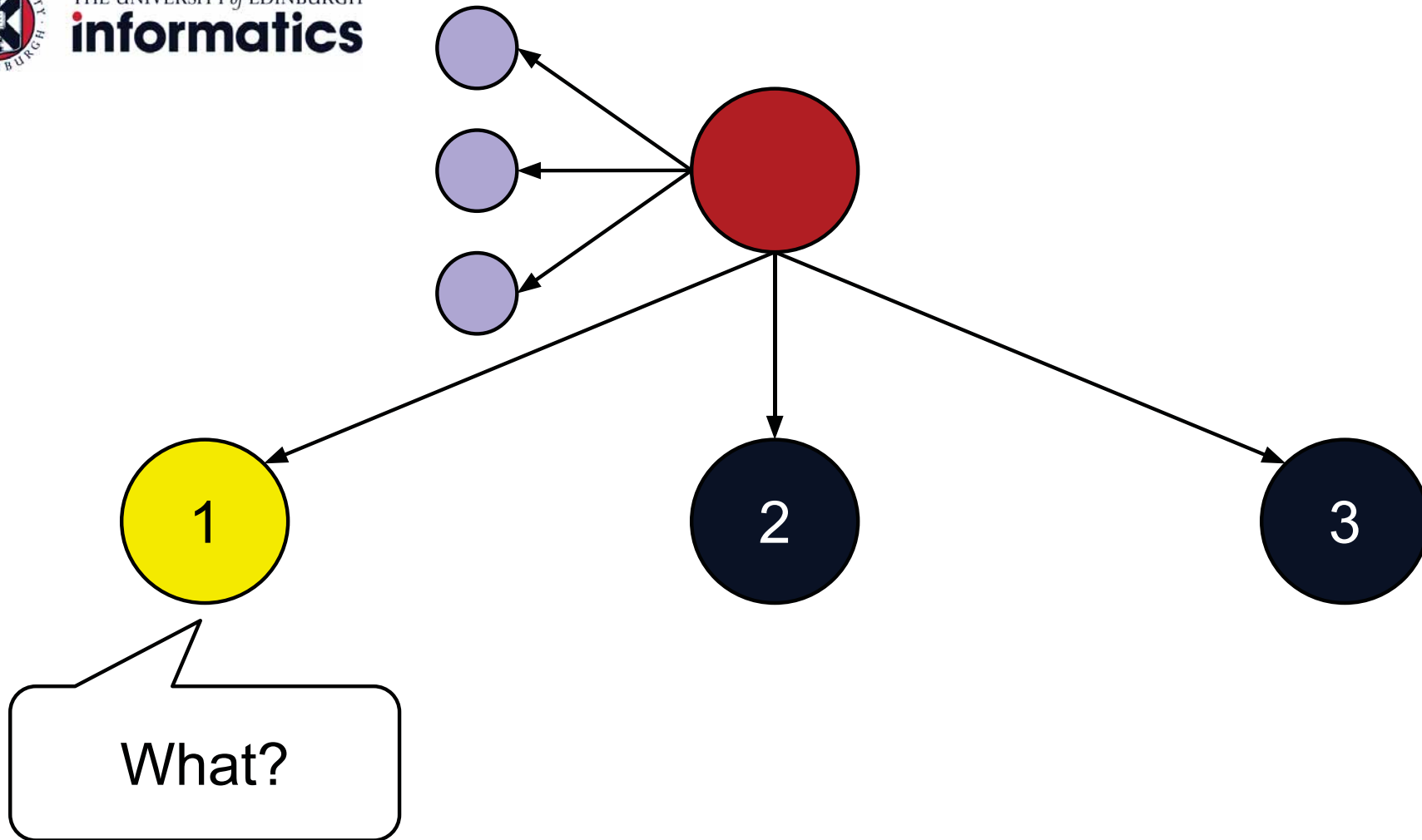
- > 160,000 tasks
- broad range of topics
- decomposed into > 1,800,000 entities
 - decomposition up to 2 levels
 - requirements (e.g. tools or preconditions)



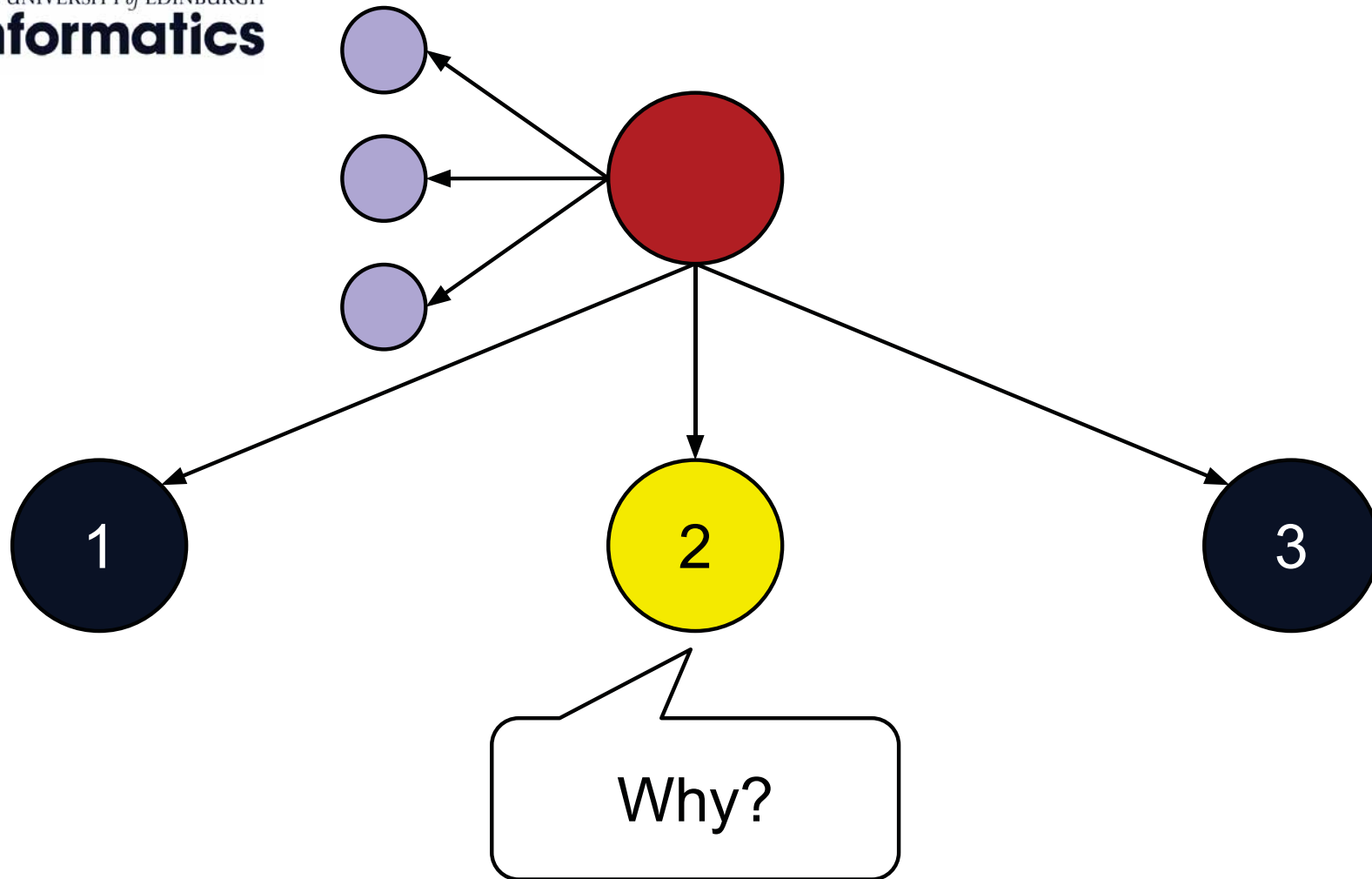
The extracted Community Know-How

Subset of the knowledge-base is now available at a public SPARQL endpoint:

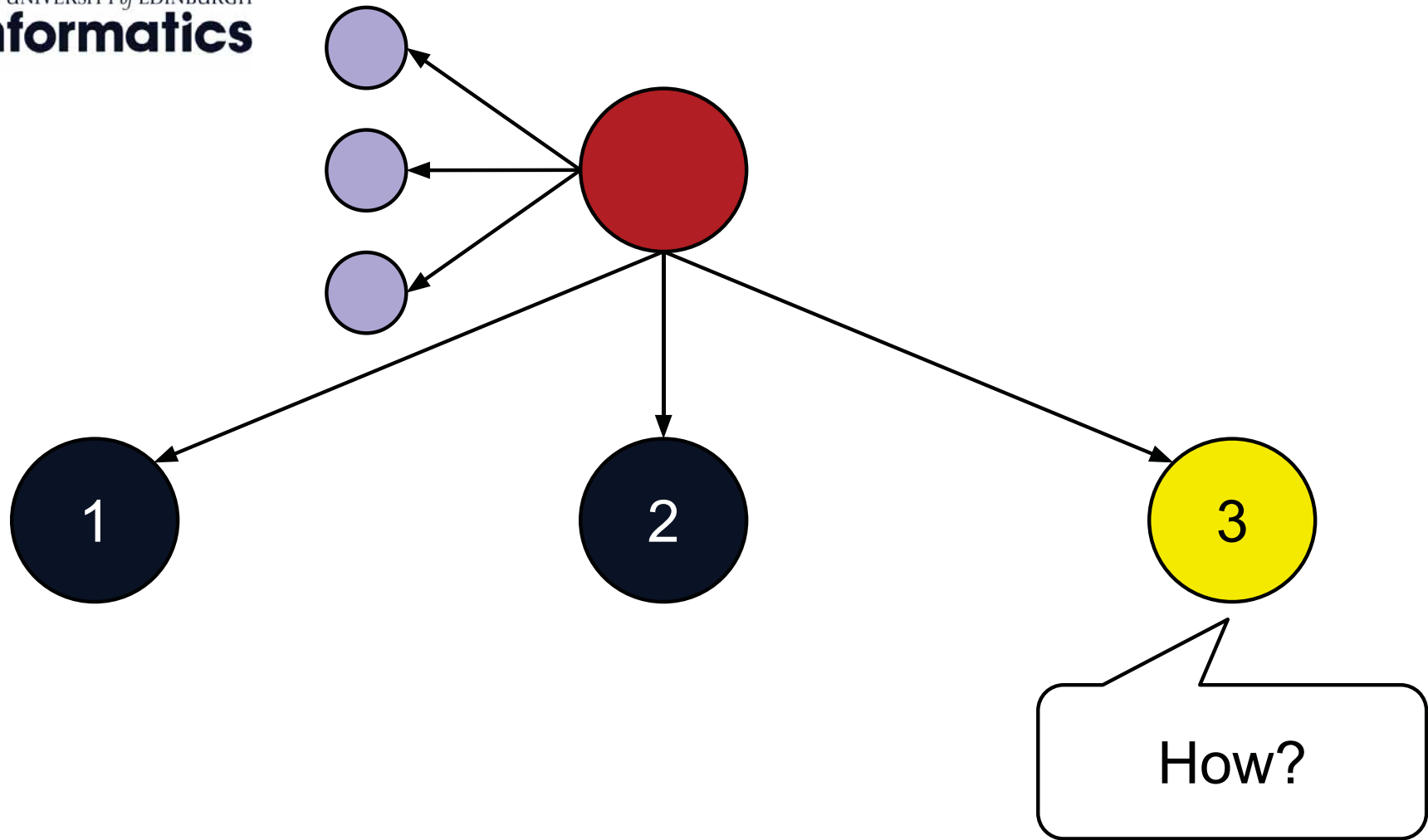
<http://dydra.com/paolo-pareti/knowhow6>



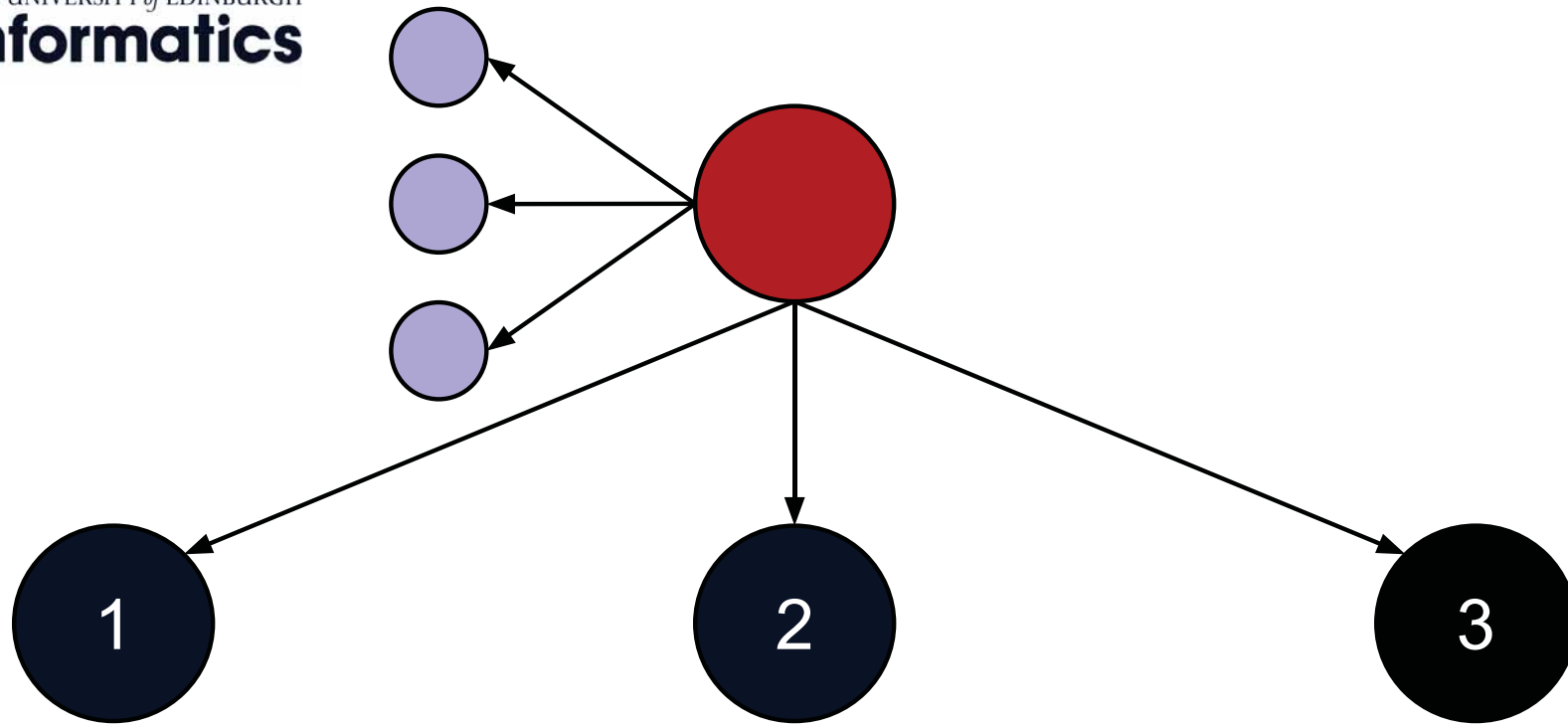
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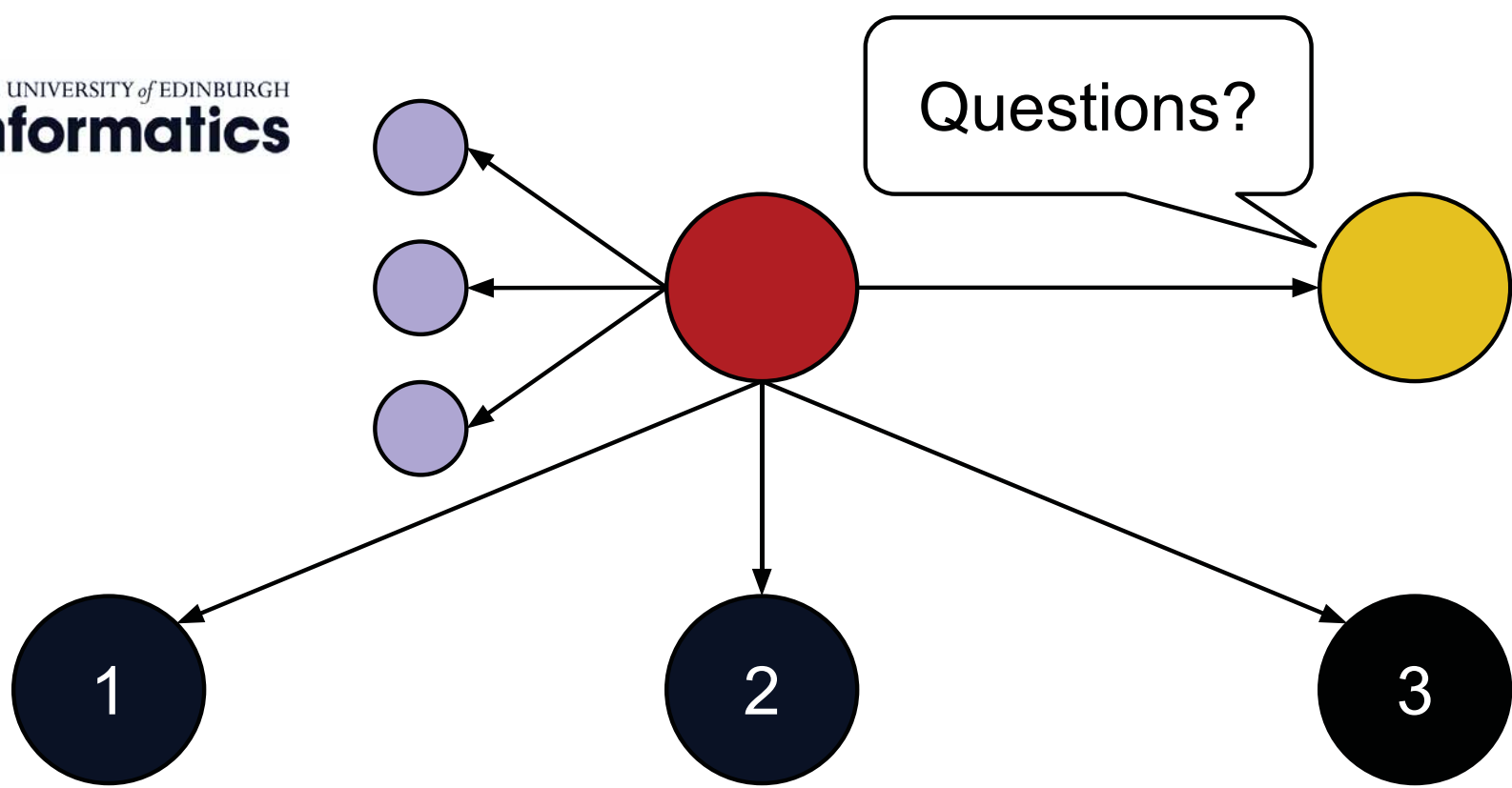


The benefits of semantics both for humans
and software agents



How it is possible to extract and represent
Community-Centric Know-How as Linked Data







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informatics

Thank you,
any questions?