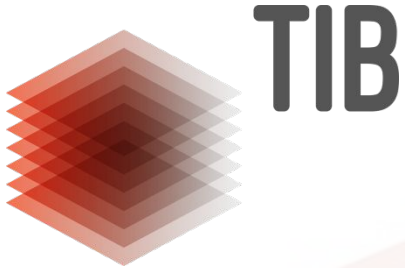
LEIBNIZ-INFORMATIONSZENTRUM
TECHNIK UND NATURWISSENSCHAFTEN
UNIVERSITÄTSBIBLIOTHEK



Open
Research Knowledge Graph
Digital Libraries for Semantic Scientific Knowledge

Markus Stocker (@envinf), Viktor Kovtun, Manuel Prinz, Sören Auer, et al.
London, September 11, 2018
ITOC Workshop, British Library

Leibniz Gemeinschaft

European Heart Journal (2017) **38**, 362–372
doi:10.1093/eurheartj/ehw333

BASIC SCIENCE

Iron-regulatory proteins secure ir
in cardiomyocytes to prevent hea

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Valentin Hirsch[1,2], Abdul M. Baru[1,2], Fatemeh Rostami[1,2],
Jörg Heineke[2], Ulrich Flögel[5], Stephanie Groos[6], André Re
Fabian Zimmermann[9], Stefan Engeli[10], Jens Jordan[10], Johar
Matthias W. Hentze[3], Kai C. Wollert[1,2], and Tibor Kempf[1],**

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See page 373 for the editorial comment on this article (doi: 10.1093/eurheartj/ehw386)

http://doi.org/10.1093/eurheartj/ehw333

Table 3. Monthly means of event start time, event end times, event duration, Sunrise and Sunset for nucleation events from (2002–2005) together with the Minimum (Min), Maximum (Max), Mean and Median for the whole study period.
Note that the September month is not statistically reliable.

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7	9:43	14:25	04:41	04:50	19:48
8	9:57	15:37	05:40	05:24	19:10
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10	11:57	17:37	05:40	06:39	17:18
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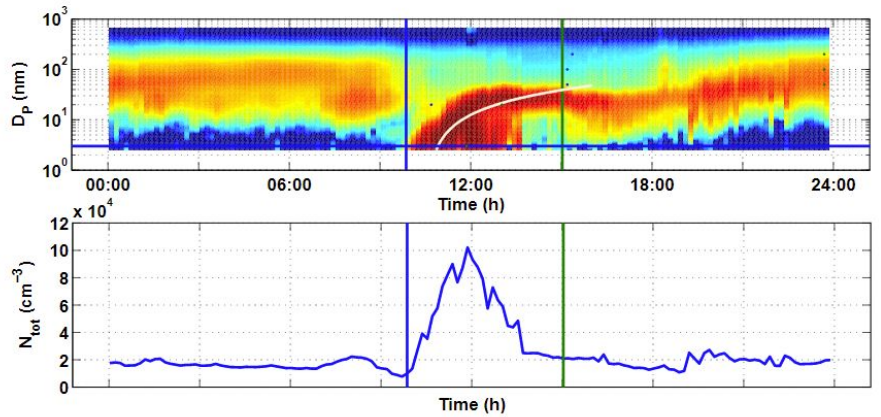


https://doi.org/10.5194/acp-7-355-2007

publications-9

SCHOLIX

researchobject.org

ResearchGraph

RMap

Google Dataset Search Beta

What is Scientific Information?

- Information concerned with the study of natural phenomena (broadly)
- Information that is methodologically sound, published in scientific literature and thus credible
- To be scientific, information/knowledge (as justified true belief) must be communicable, general, conceptual, true or probable, argumented

https://encyclopedia2.thefreedictionary.com/scientific+information
https://harald-walach.de/methodenlehre-fuer-anfaenger/19-was-ist-wissenschaftliche-information/
http://www.cs.joensuu.fi/~whamalai/skc/knowledge.html

What is Scientific Information?

Information, two examples:

- Contributor 0000-0001-5492-3212 published 10.1016/j.envsoft.2014.04.006 at Institution grid.9668.1

- The average duration of new particle formation events is 5:47 hours

The latter is scientific information, more so than the former

OPEN RESEARCH KNOWLEDGE GRAPH

DIGITAL LIBRARIES FOR SEMANTIC SCIENTIFIC KNOWLEDGE

Open Research Knowledge Graph

- Digital libraries for scientific knowledge communicated in scholarly literature
- Focus on the communicated content rather than the context
- The content is semantic i.e., machine readable (interpretable)

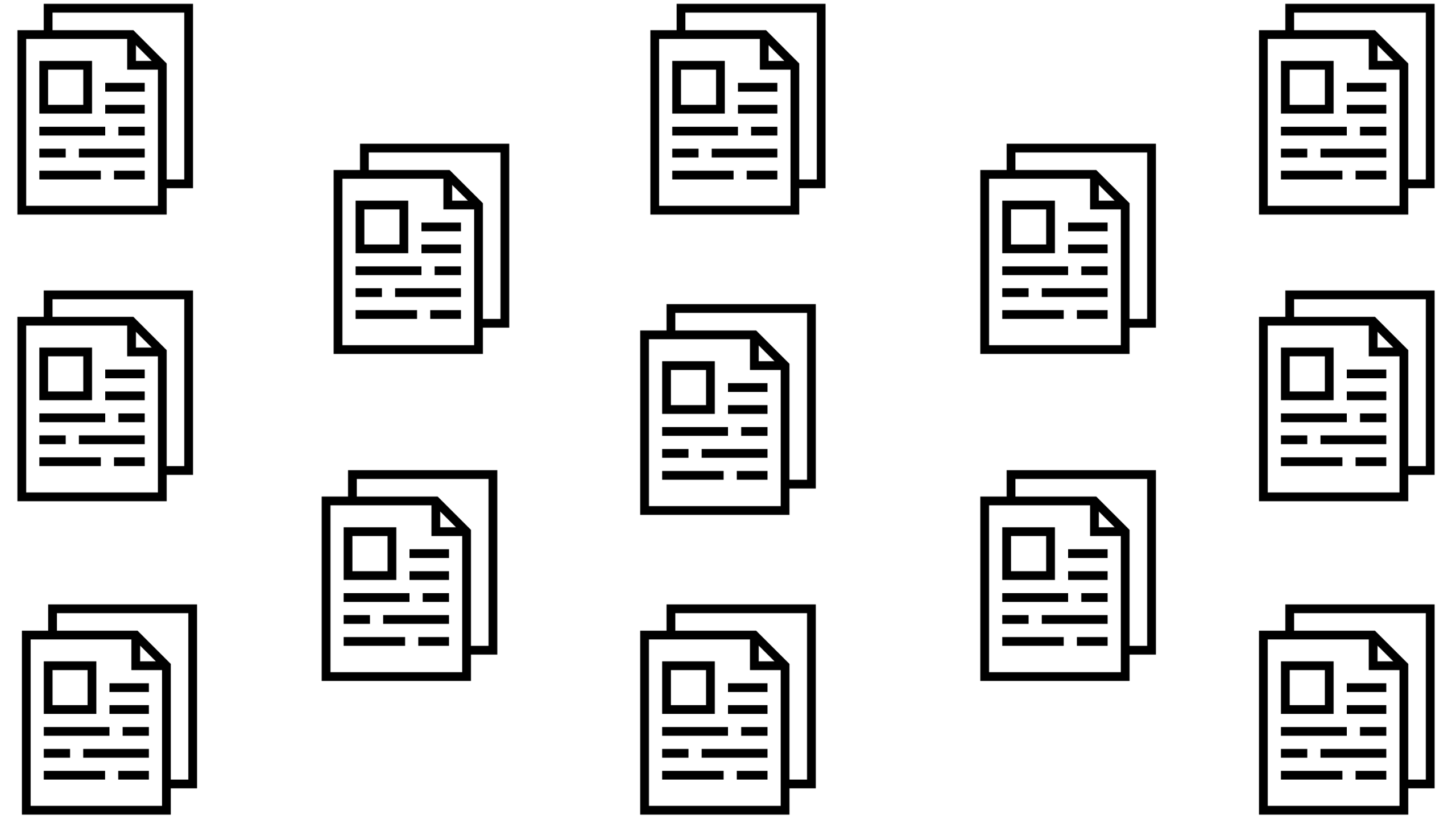
http://orkg.org

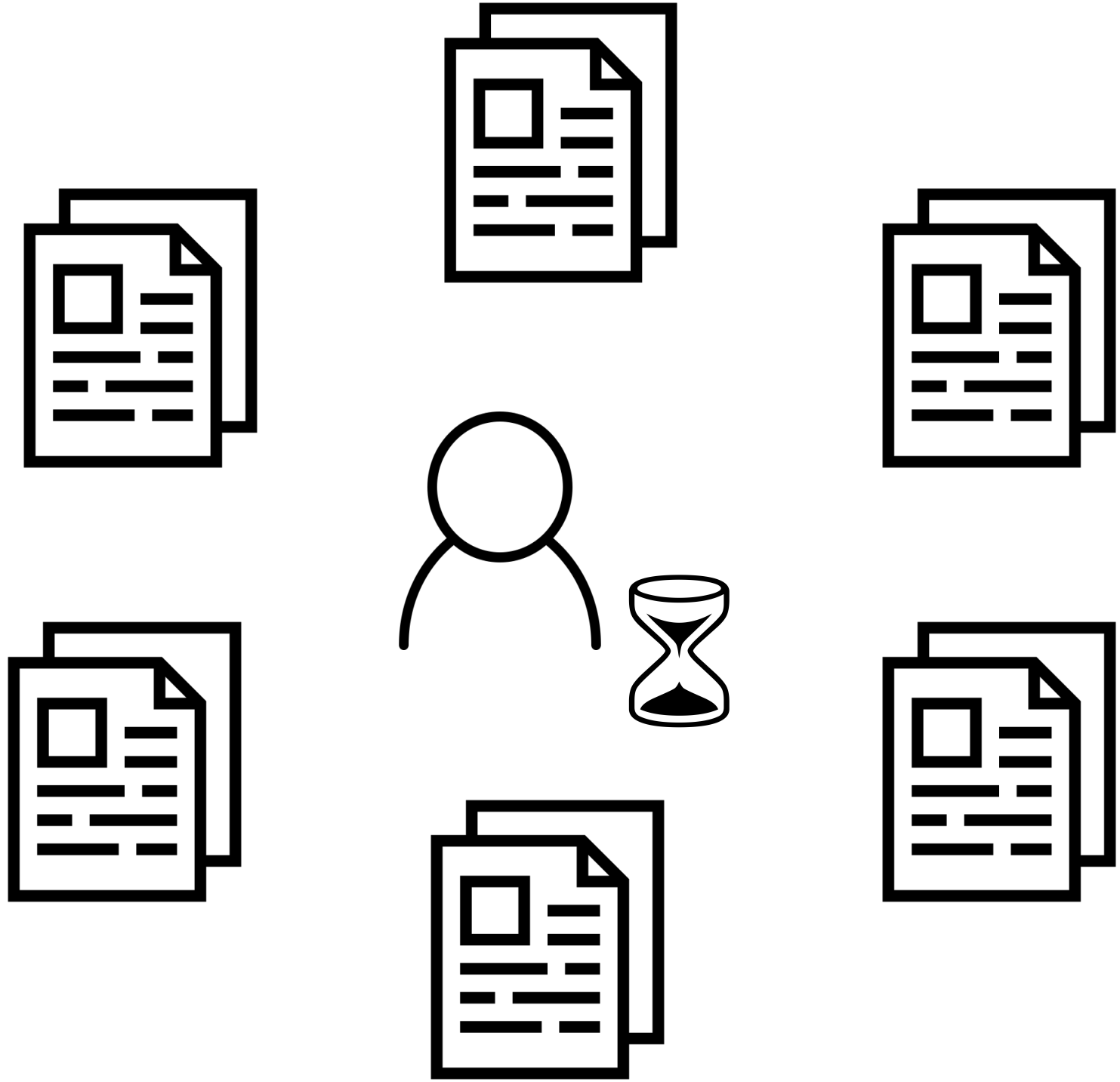
Open Research Knowledge Graph

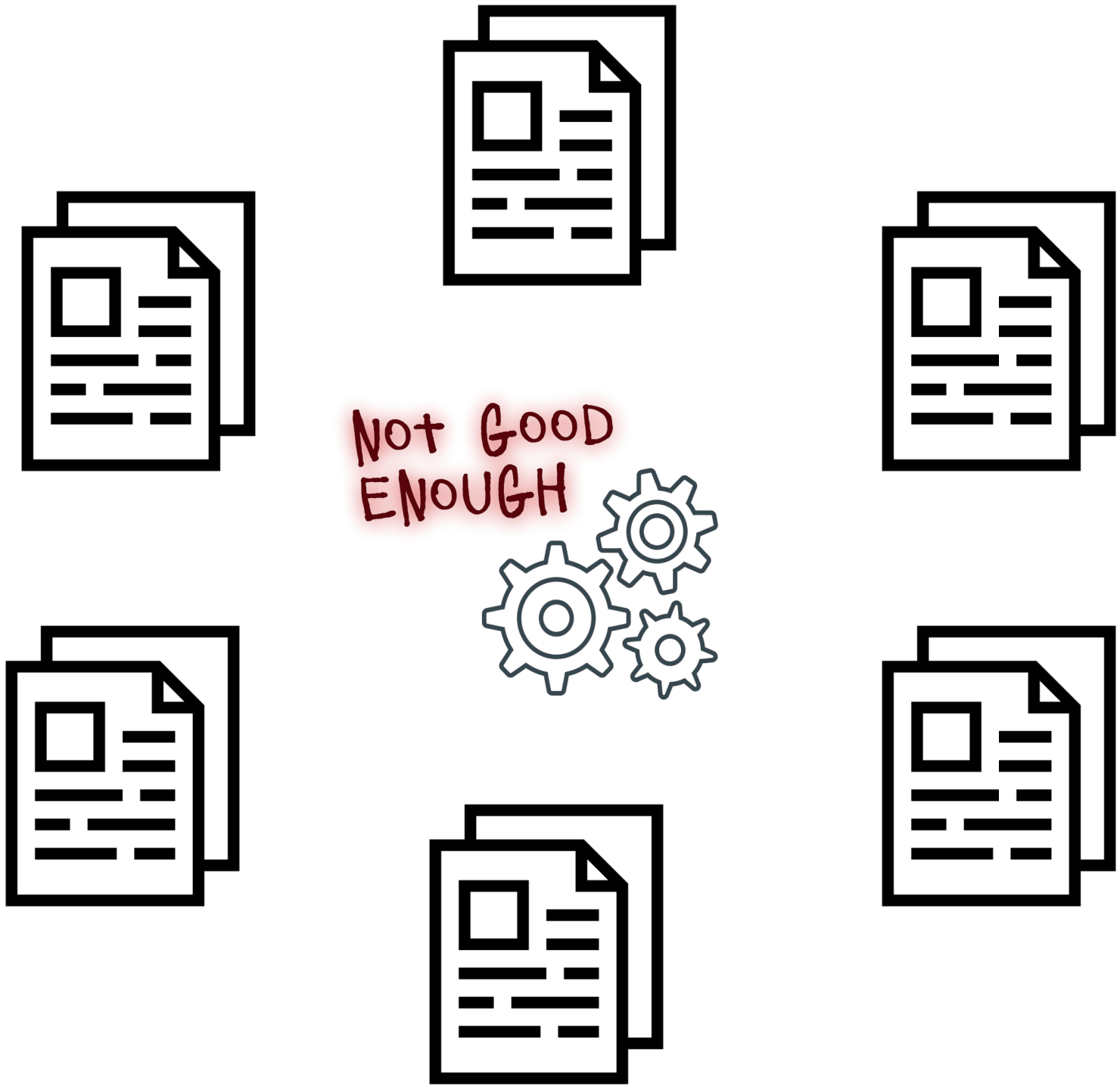
- Represent original research results semantically
- Link existing metadata, data, knowledge and information resources
- Can be curated collaboratively by research communities
- Ensures provenance and represents the scientific discourse
- Makes concepts unambiguously identifiable and links them semantically

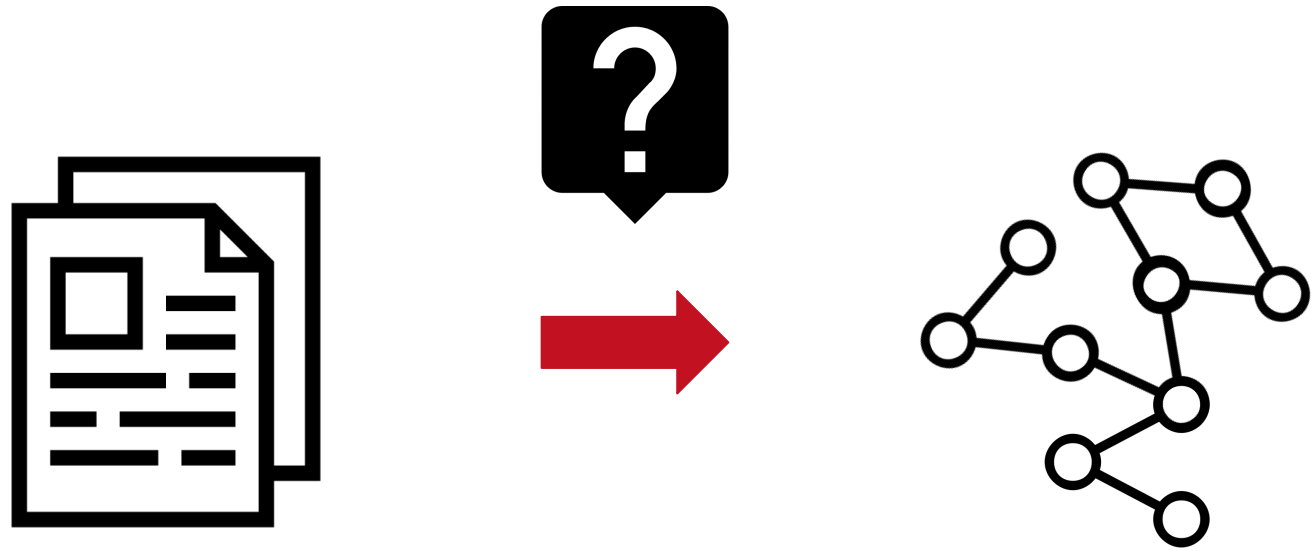
http://doi.org/10.5281/zenodo.1157185

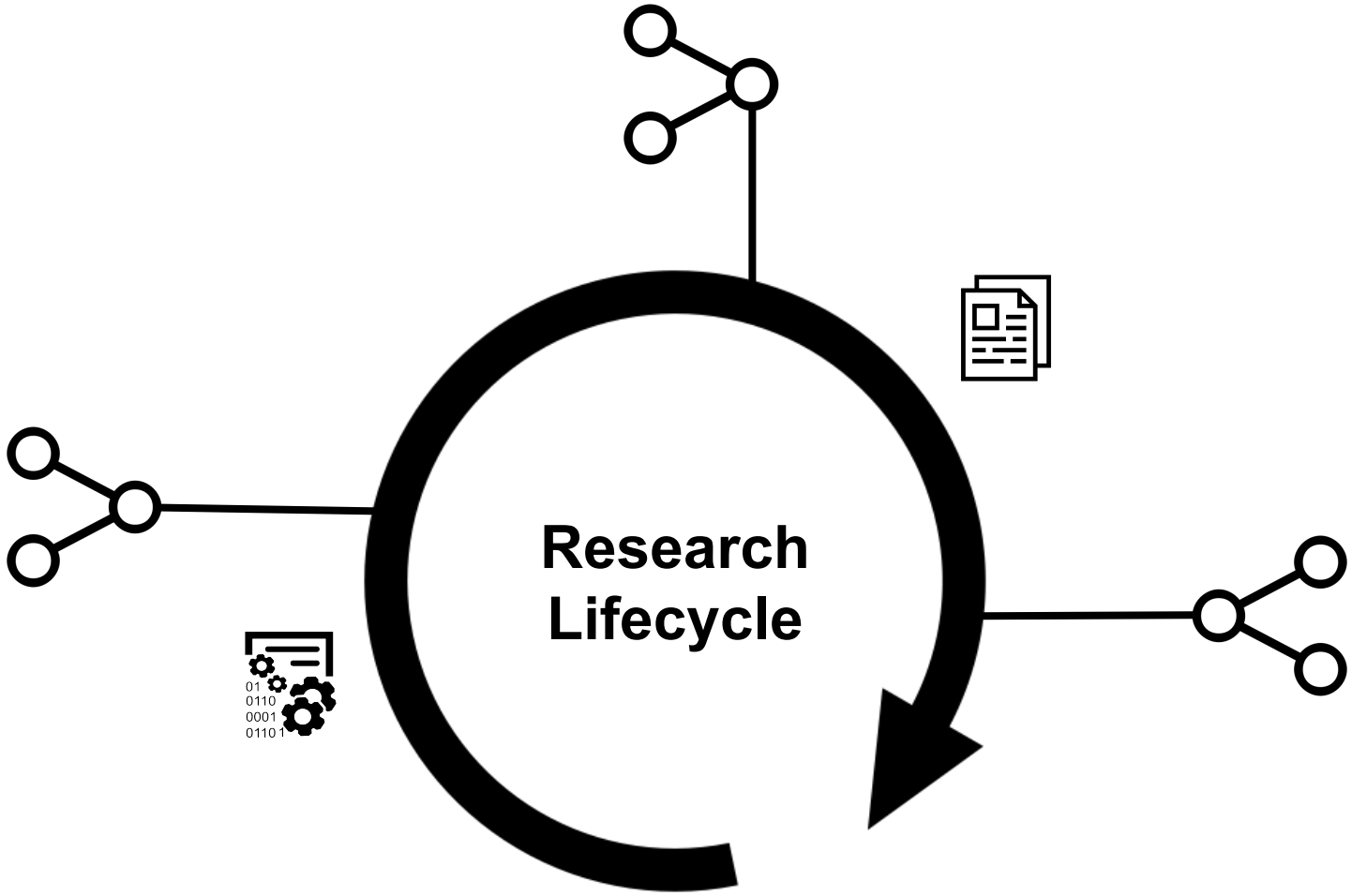
Why

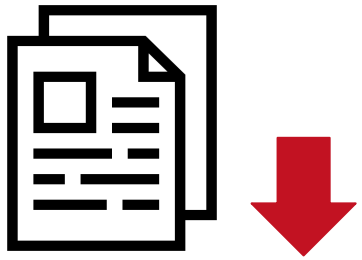


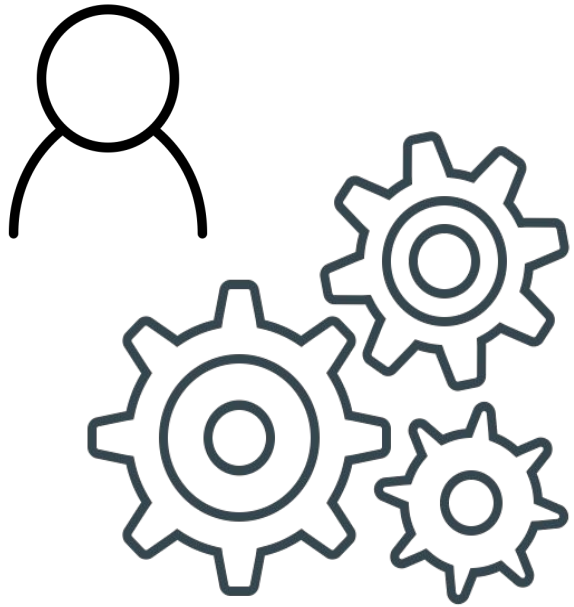


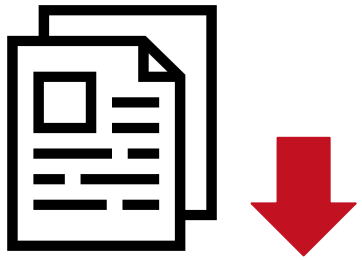

Not Good
ENOUGH

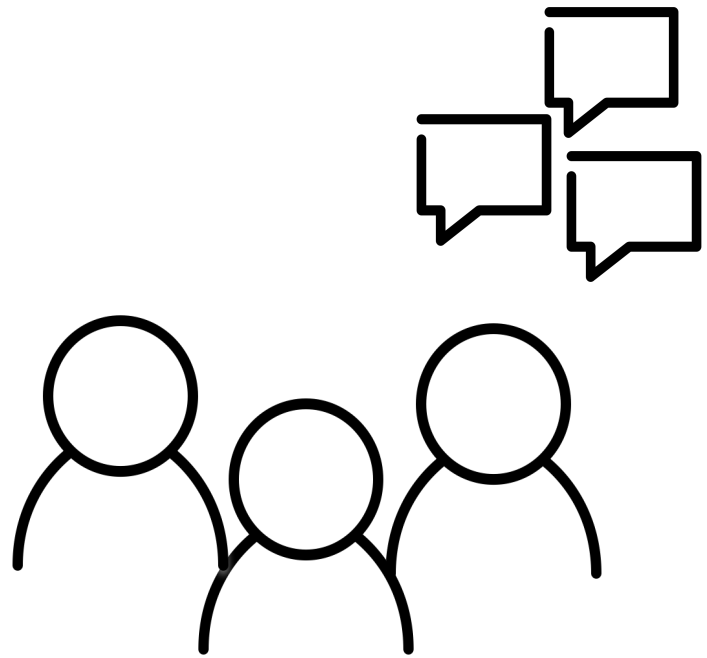


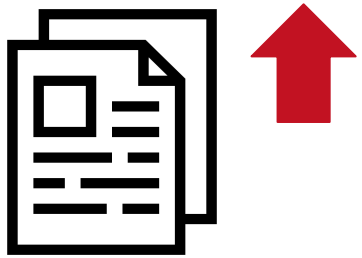

Research
Lifecycle
01
0110
0001
01101

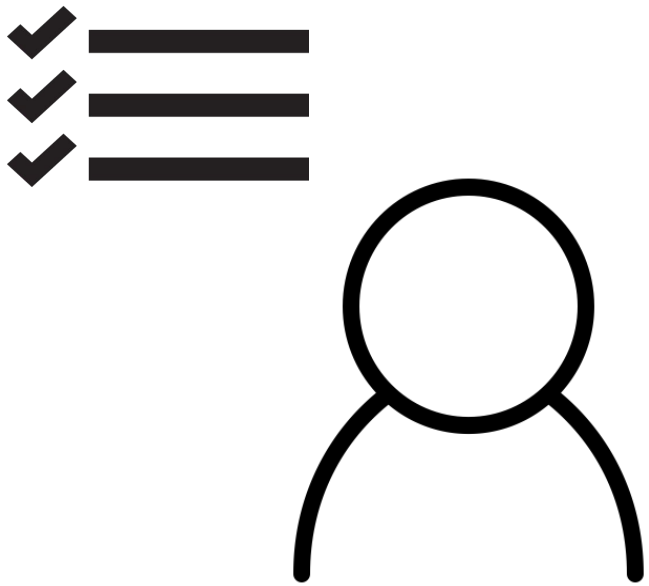


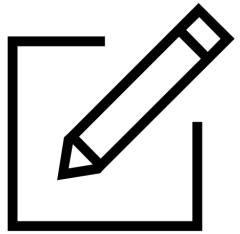


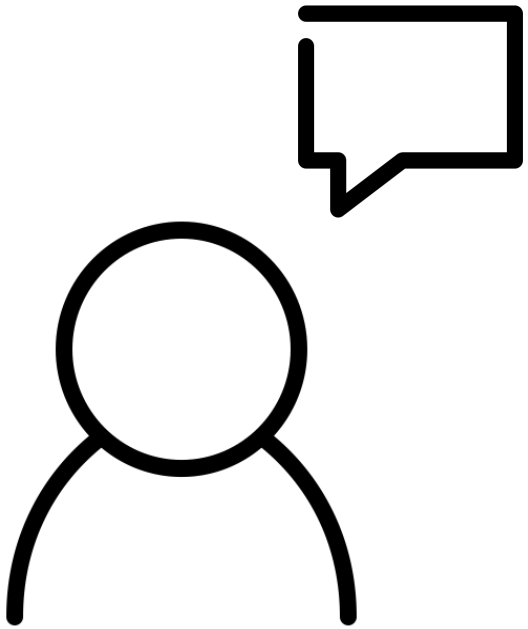


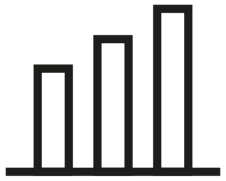


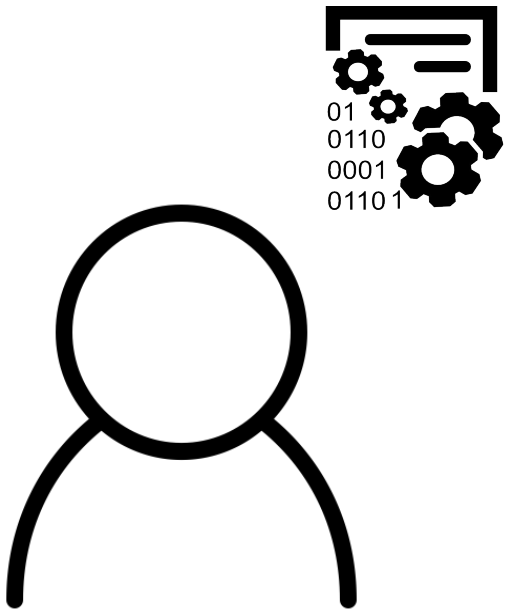











01
0110
0001
0110 1

Example

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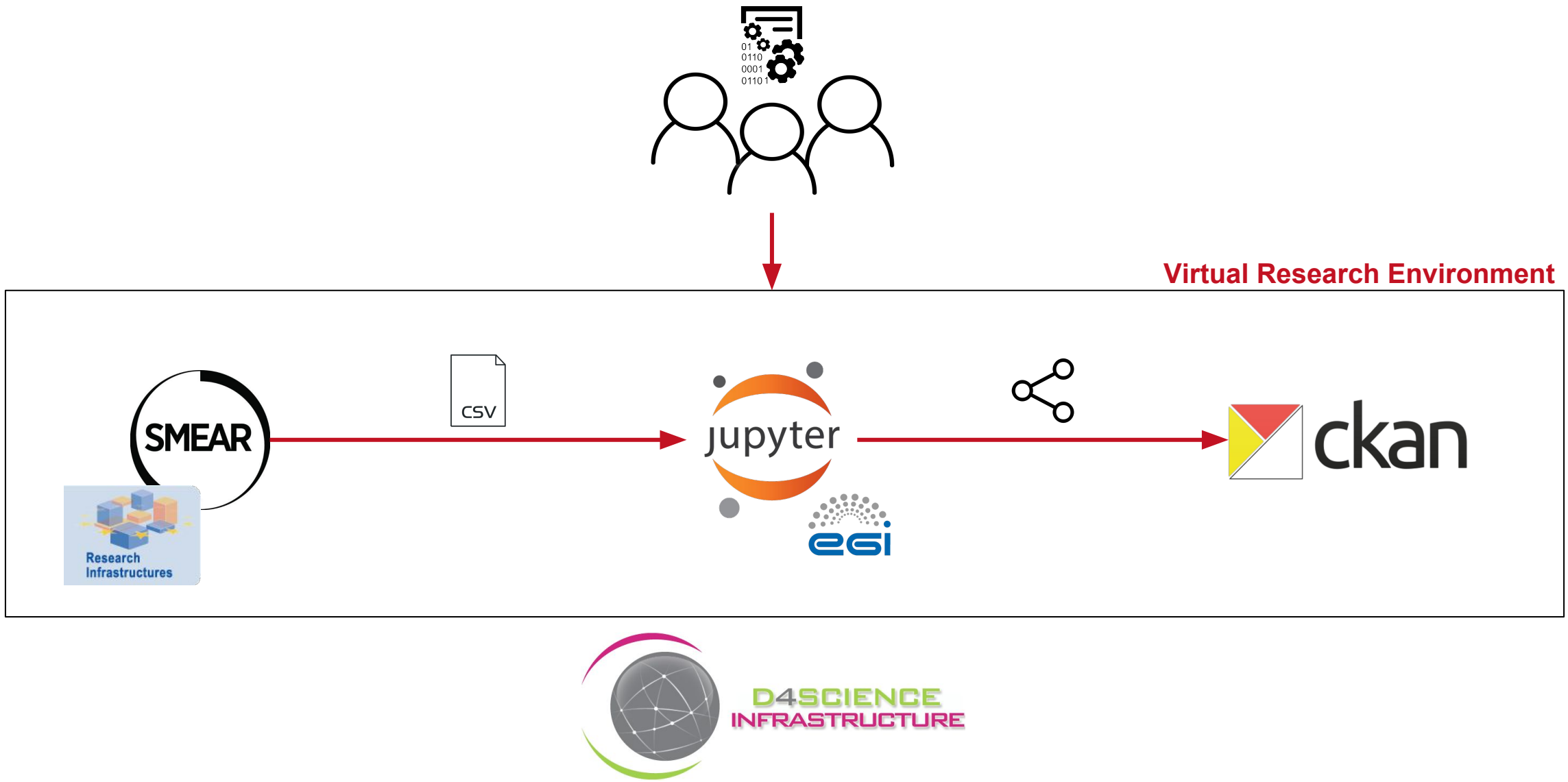
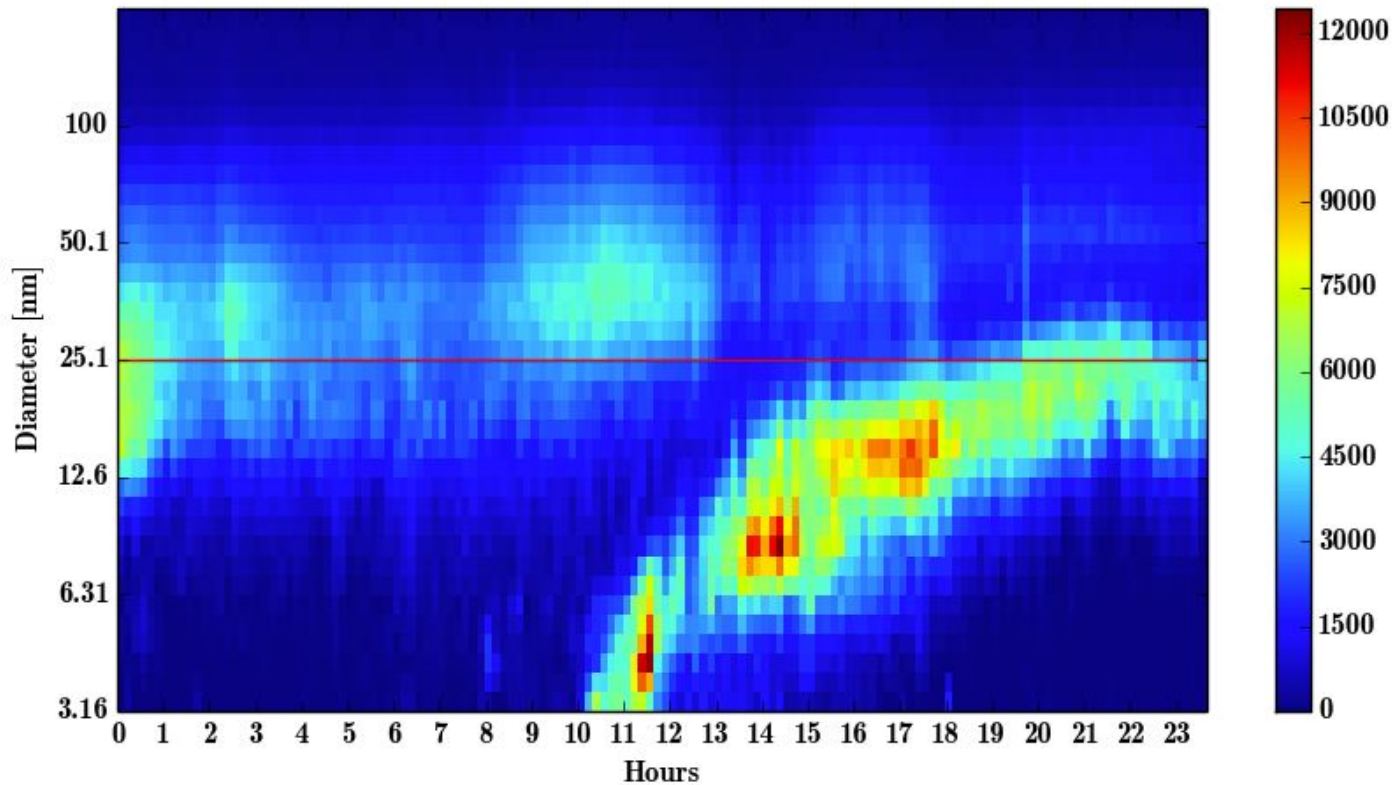
https://doi.org/10.5194/acp-7-355-2007

Proposal


Virtual Research Environment
SMEAR
Research Infrastructures
CSV
jupyter
egi
ckan
D4SCIENCE
INFRASTRUCTURE

```
# Event days (Class Ia)
# 2007-04-15, 2007-05-05, 2007-05-18, 2007-10-19, 2008-02-19, 2009-03-19, 2009-03-22
# 2011-03-15, 2011-04-19, 2011-10-01, 2012-05-01, 2012-05-29, 2013-02-20, 2013-04-04
#
# Non Event days
# 2007-04-20, 2008-02-20, 2009-04-03, 2011-04-21, 2012-05-05, 2013-02-21

day = '2013-04-04'
place = 'Hyytiaelae'
```

```
image = plot(day, place)
visualize(image)
```




```
record(day, place, '10:00', '12:00', 'Class Ia')
```

```
place = 'Hyytiaelae'
```

```
df = read()
```

```
df.style.hide_columns(['uri'])
```

	beginning	end	classification	place	latitude	longitude
0	2007-05-18 12:30:00+03:00	2007-05-18 14:00:00+03:00	Class Ia	Hyytiälä	61.8456	24.2908
1	2011-04-19 09:00:00+03:00	2011-04-19 14:00:00+03:00	Class Ia	Hyytiälä	61.8456	24.2908
2	2013-04-04 10:00:00+03:00	2013-04-04 12:00:00+03:00	Class Ia	Hyytiälä	61.8456	24.2908

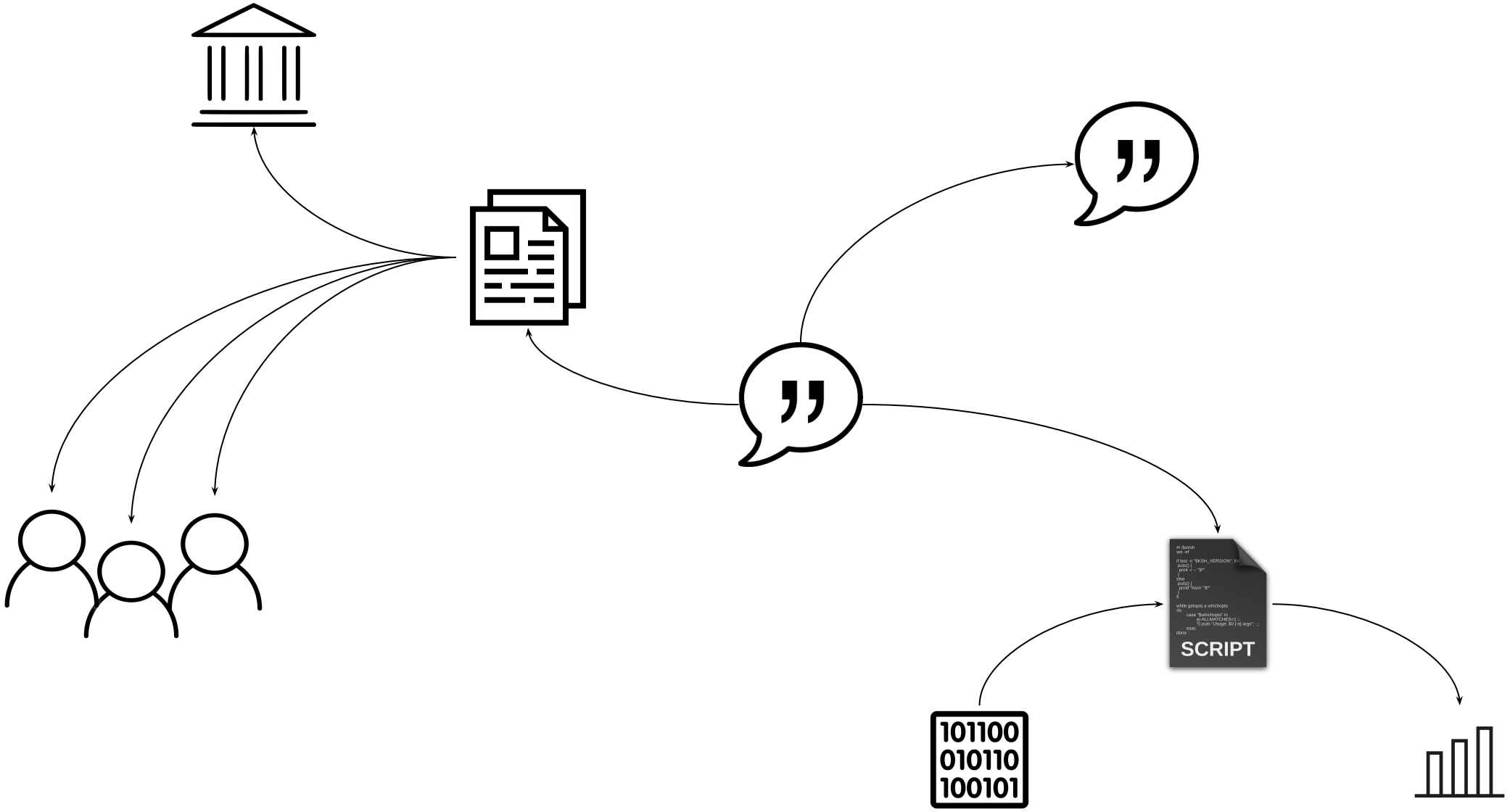
```
# Mean event duration in hours [h]
d = (df.end - df.beginning).astype('timedelta64[h]').mean()
```

```
d
```

```
2.6666666666666665
```

```
record(d)
```

```
obo:IAO_0000004 rdfs:label "has measurement value" .

obo:IAO_0000039 rdfs:label "has measurement unit label" .

obo:OBI_0000293 rdfs:label "has_specified_input" .

obo:OBI_0000299 rdfs:label "has_specified_output" .

obo:OBI_0000312 rdfs:label "is_specified_output_of" .

<http://avaa.tdata.fi/web/smart/smear/2257b3dfe45b2b5a1cd3335a491b6e53> a obo:IAO_0000032,
        obo:OBI_0000679,
        prov:Entity ;
    obo:IAO_0000004 2.66666666667 ;
    obo:IAO_0000039 obo:UO_0000032 ;
    obo:OBI_0000312 <http://avaa.tdata.fi/web/smart/smear/bed1cf864f3fef175cf783247658455d> ;
    prov:wasDerivedFrom <http://avaa.tdata.fi/web/smart/smear/2e0ed83b68c8ebe8255f7f1ca8f8aeb7> ;
    prov:wasGeneratedBy <http://avaa.tdata.fi/web/smart/smear/bed1cf864f3fef175cf783247658455d> .

<http://avaa.tdata.fi/web/smart/smear/2c3514176ca67a77a99292cbb4b6a3ae> a obo:IAO_0000027 .

<http://avaa.tdata.fi/web/smart/smear/2dfd71517e109fc779666e64788a49c8> a obo:IAO_0000027 .

<http://avaa.tdata.fi/web/smart/smear/321844eda43b77fe582abb6ce489cc4d> a obo:IAO_0000027 .

obo:IAO_0000032 rdfs:label "scalar measurement datum" .

obo:IAO_0000100 rdfs:label "data set" .

obo:OBI_0000679 rdfs:label "average value" .

obo:OBI_0200079 rdfs:label "arithmetic mean calculation" .

obo:UO_0000003 rdfs:label "time unit" .

obo:UO_0000032 a obo:UO_0000003 ;
    rdfs:label "hour" .
```


SCRIPT
101100
010110
100101

Takeaways

- Focus on semantic scientific information communicated in scholarly literature
- Linked with the context in which information is created and consumed
- Deep integration with research infrastructures and virtual research environments
- Challenging project with technical and social infrastructure dimensions
- Young project open to interested stakeholders