In which role are you here today?

15 Ontologist

0 Database expert

2 Application developer

6 End user

1 Business developer

4 Other
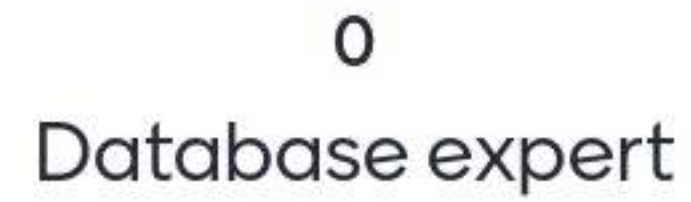
Where does your institute/company sit on this map?

What are the main application domains of your company/institution?
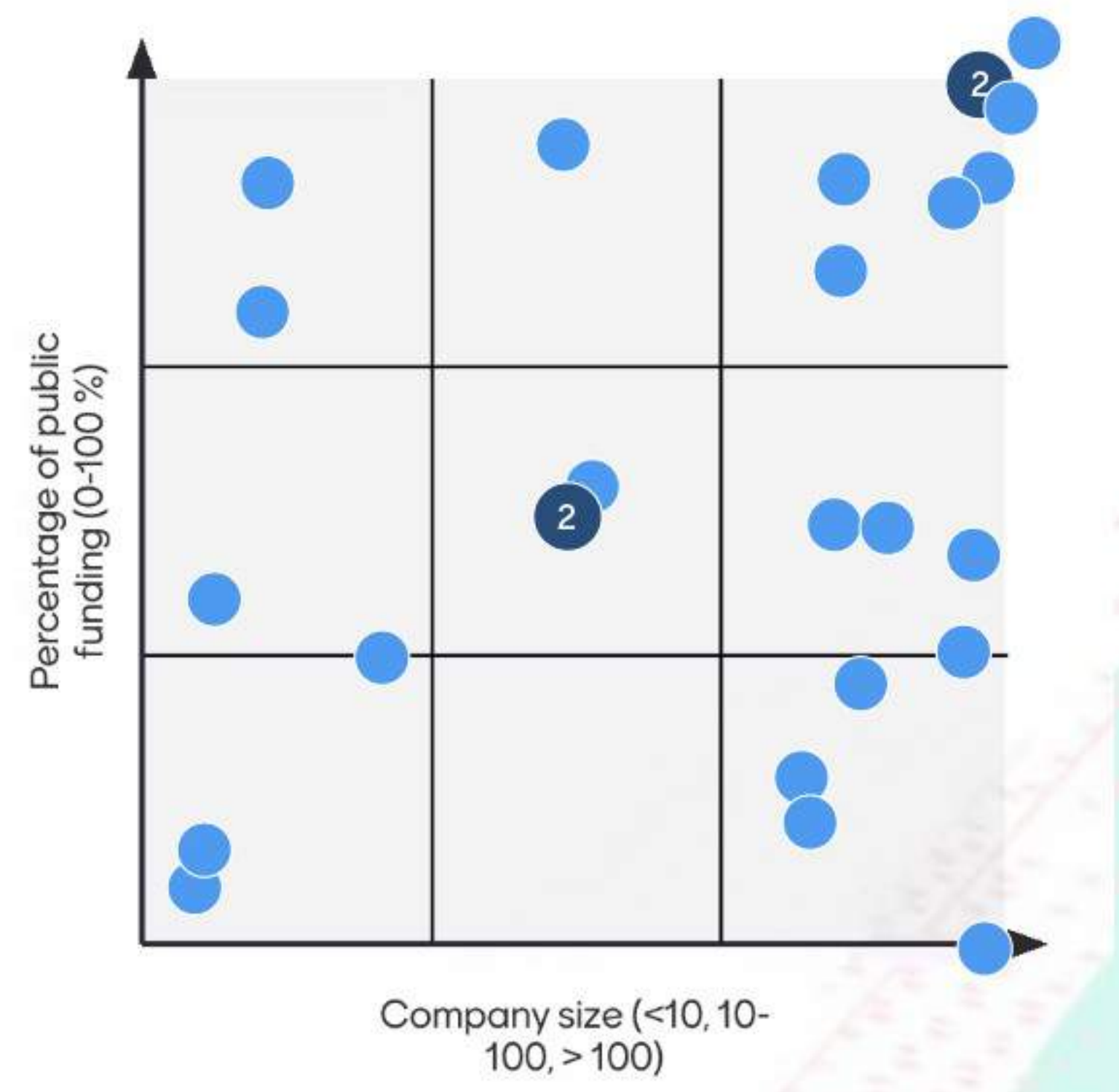
How is materials & manufacturing data at your institution today?

No, not at all — Yes, fully

- Open data — 2.5
- Linked data — 2
- FAIR data — 2.4
- Semantically enriched (i.e., rich metadata) — 2.5
- Human readable and human friendly — 2.8
- Machine readable — 2.7
- Data stewardship is in place — 2.1

26

In your institute/company, semantic technologies ...
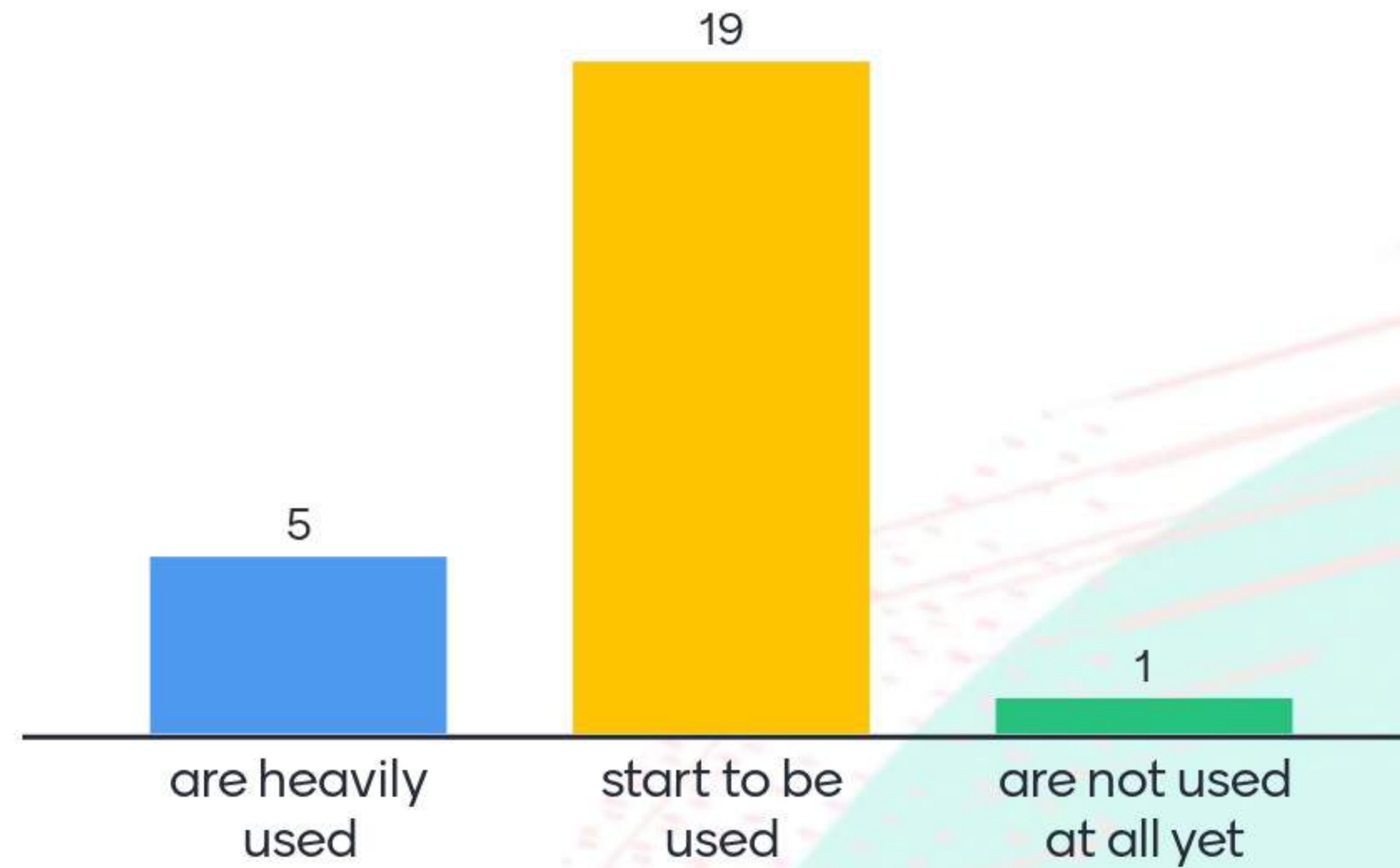
are heavily used	start to be used	are not used at all yet
5	19	1
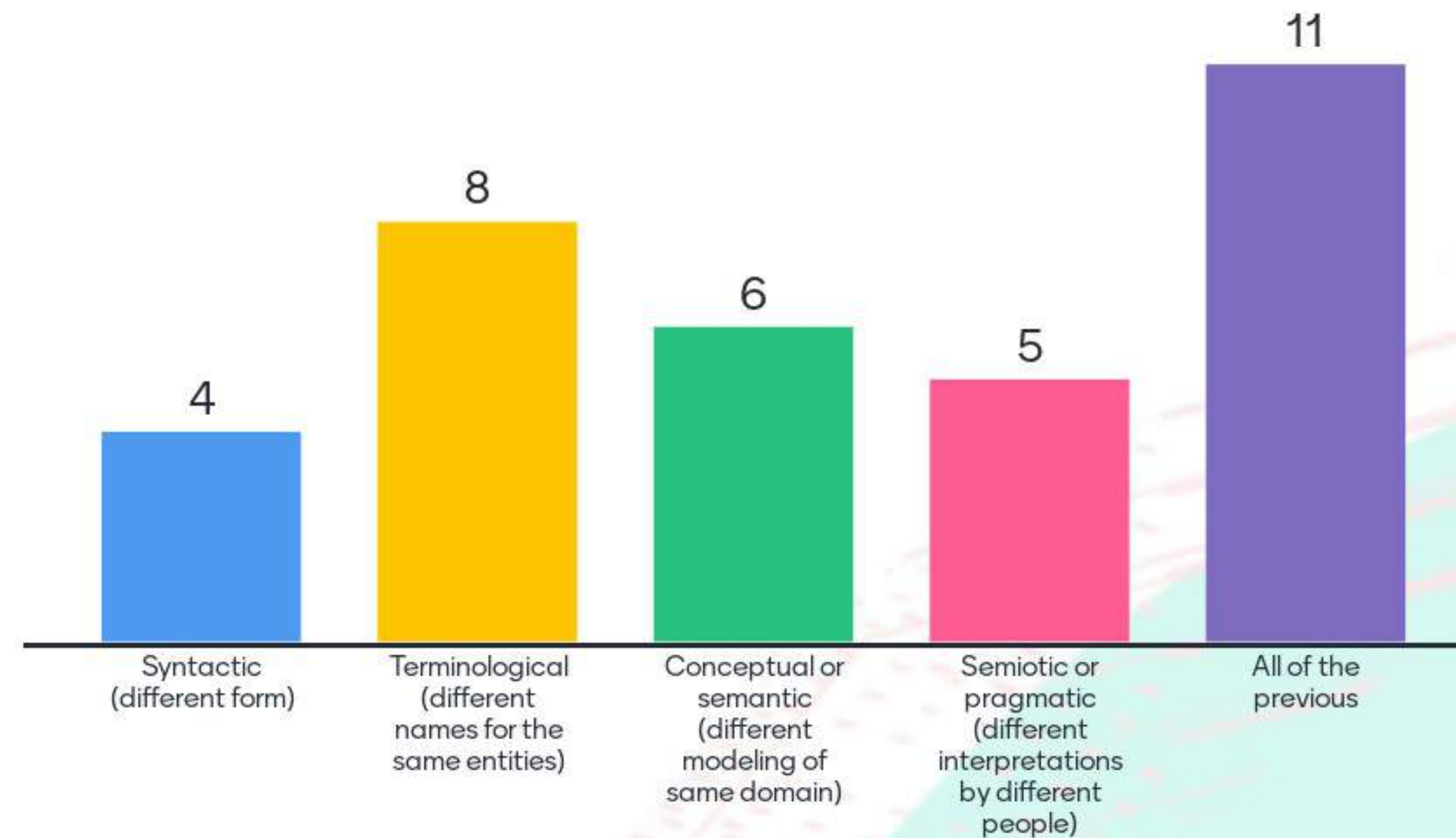
What kind(s) of systems do you make more interoperable?

Other — 3
Datasets — 12
Databases — 8
Software — 14
Things — 7
Humans — 11
Communities — 8
Ontologies — 12
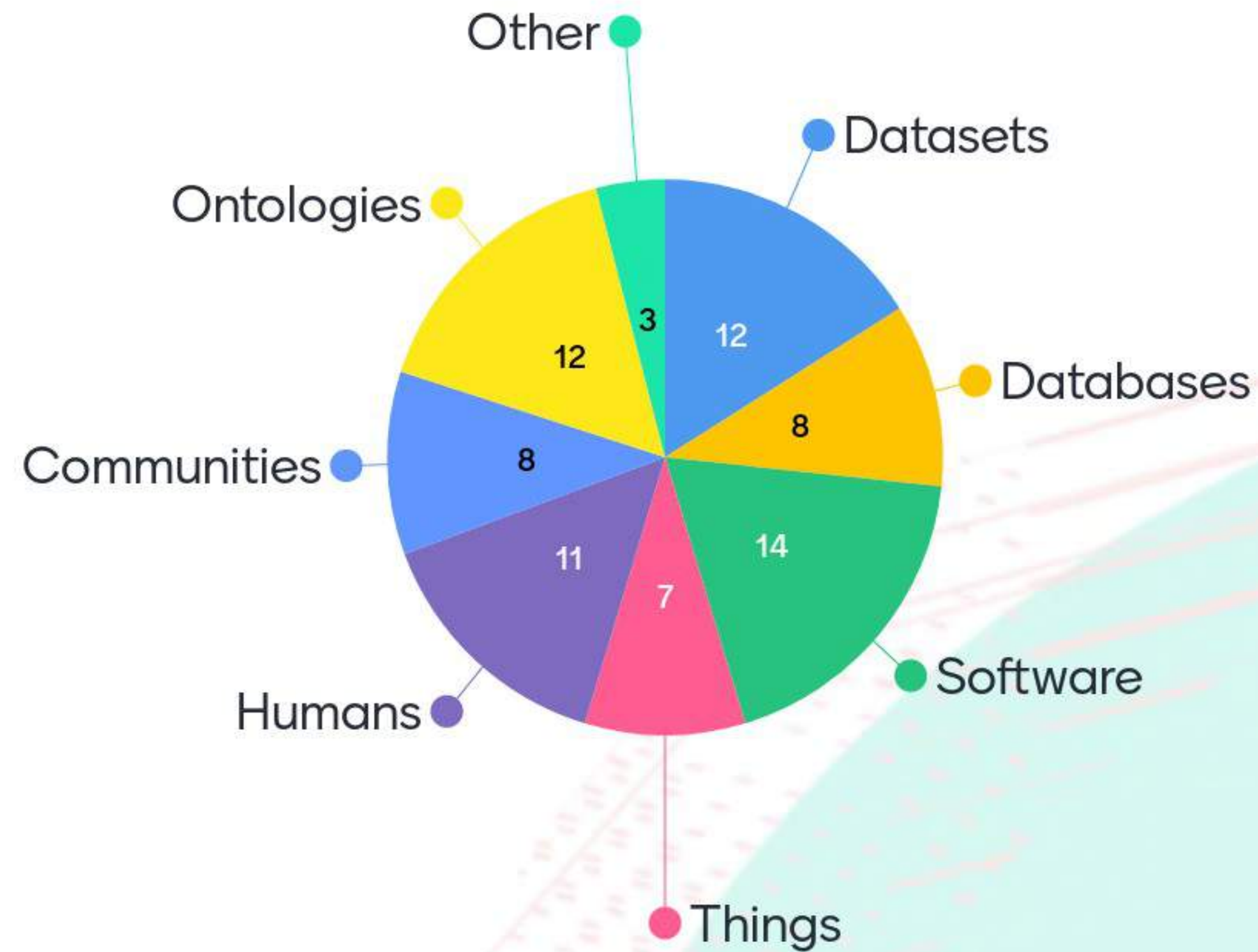
How important are these "dimensions" when assessing interoperability solutions (i.e., methods and tools)?
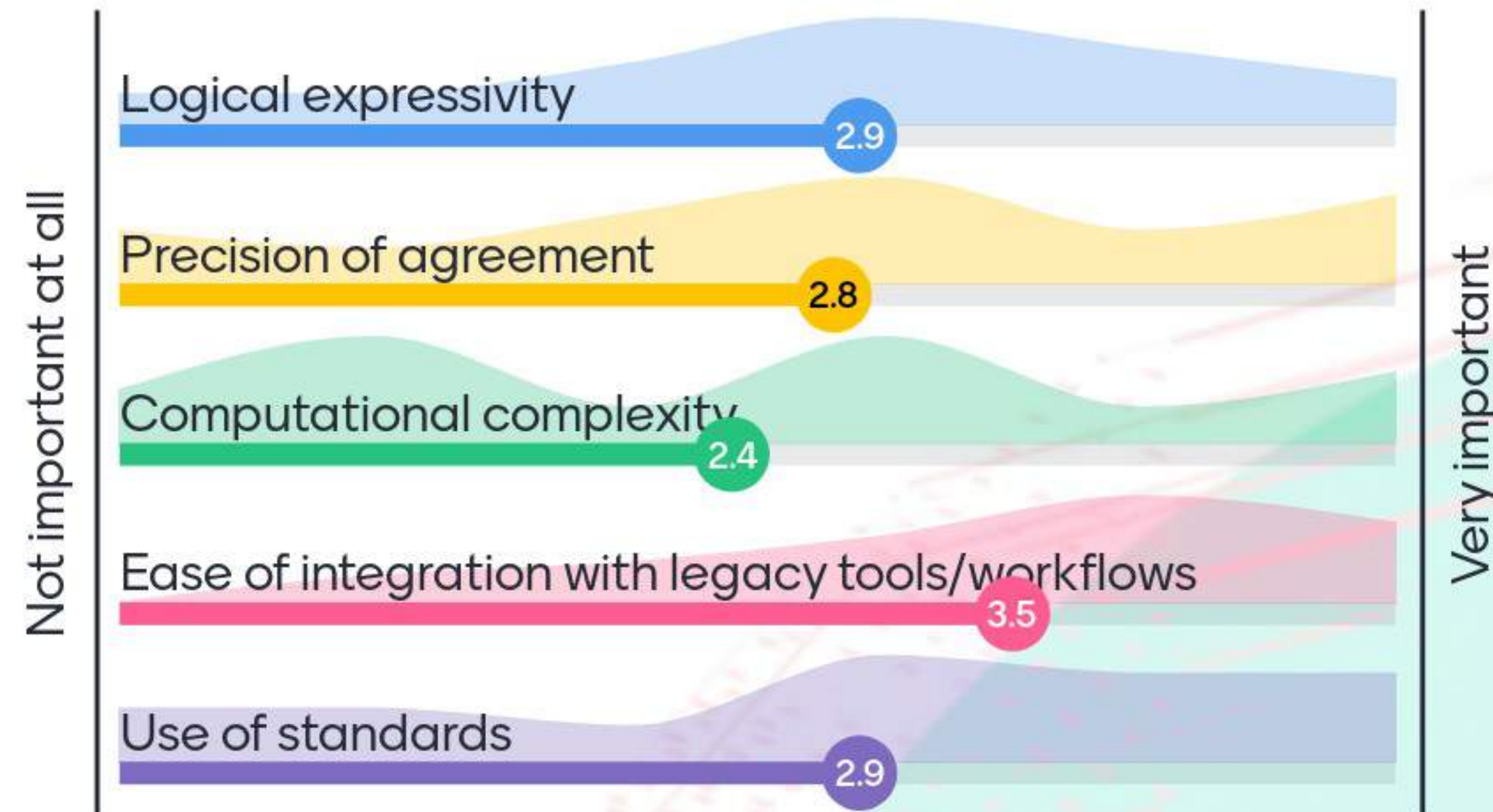
What OTHER "dimensions" are important when assessing interoperability solutions?

it is important that interoperability standards are FINAL and not changing all the time in the background

parsimony

precision

Generality, scalability

User baseHigh-quality documentationActive community

Conformance to a single top-level ontology which already has widespread adoption in multiple domains

Guidance for application developers

Simplicity

How fast can the humans collaborating finish the solution?

What OTHER "dimensions" are important when assessing interoperability solutions?

Tools and skilks

simplicity

Availability of good tooling

cost and time especially associated with change, scalability, adaptability

Tool

simplicity

Ease of uptake. Measure how many make use of the interoperability solution after a certain maturity has been reached. And how many can make use of it without extensive help from the developers.

Ease of use

Make it EASY!

What OTHER "dimensions" are important when assessing interoperability solutions?

28 Answers

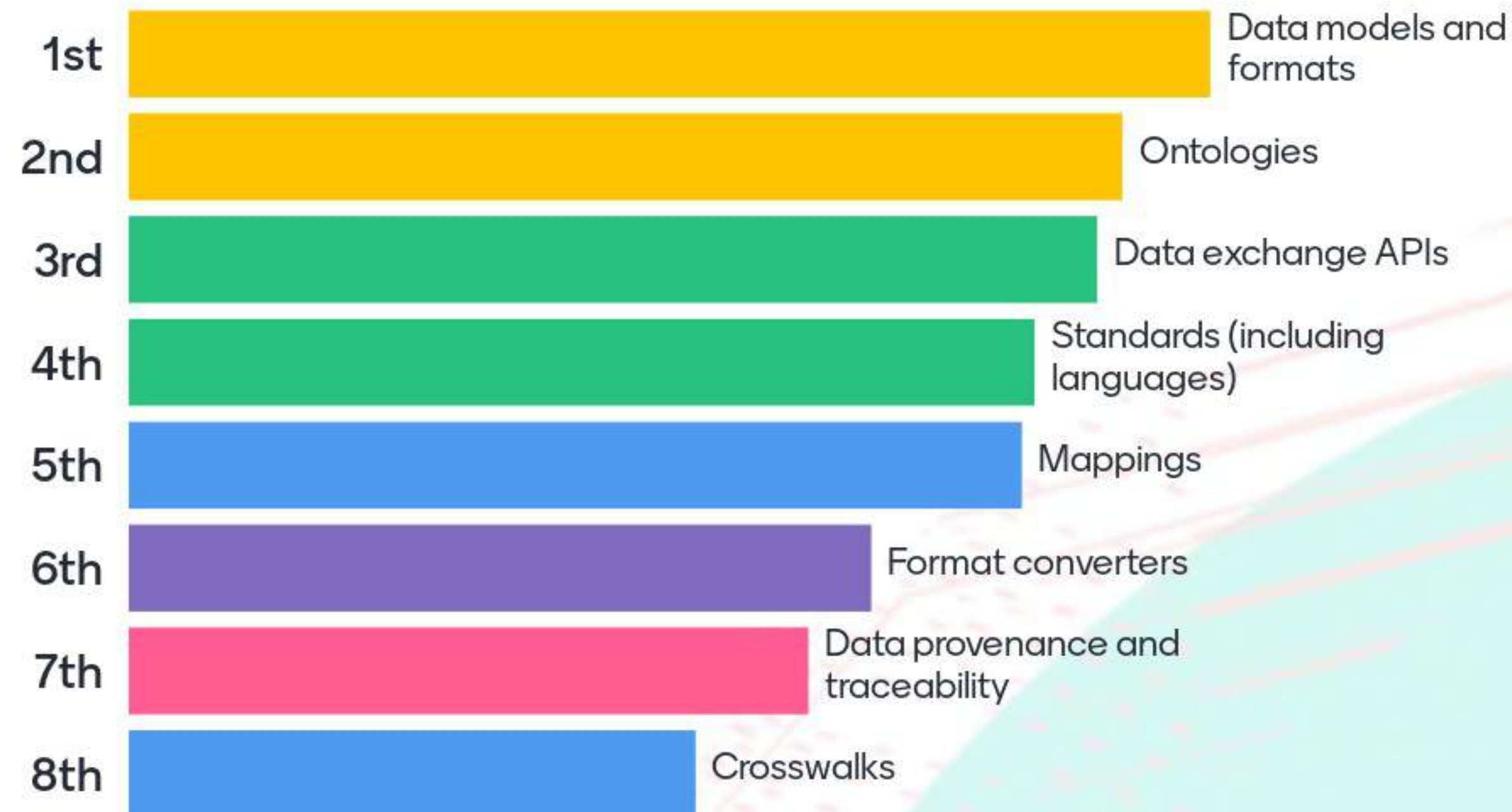|		
automatic tools	Mutual understanding	Easy extendibility to new domains
user friendliness in tooling	High quality documentation	Maintainability
Availability of multiple trained experts in using the approach	Soiid, respected, powerful governance, based on severe punishment of nonsense	How intuitive the available tooling is.

What OTHER "dimensions" are important when assessing interoperability solutions?

28 Answers

Solid respected powerful governance

17

What technical components (i.e., building blocks) are most crucial for interoperability?

Rank	Component
1st	Data models and formats
2nd	Ontologies
3rd	Data exchange APIs
4th	Standards (including languages)
5th	Mappings
6th	Format converters
7th	Data provenance and traceability
8th	Crosswalks

What OTHER technical components are also crucial for interoperability? 16 Answers

willingness

Commitment of participants

Community accepted terminologies and taxonomies

Well developed GUIs for ontology extension, datamodel construction, mapping to ontologies.

Well defined architectures of concerned systems

Simplicity

meaningful data must be present

structured data availability

taxonomies of the field

What OTHER technical components are also crucial for interoperability? **16** Answers

Good documentation

Commonly shared methodologies

smart manufacturing readiness assessment, digitalization maturity model/assessment

Solutions that validate wether your provided data has been made interopeable or not.

User friendly integration tool

Tools

Many. It is a complex issue.

12

What metrics or tools do you use to assess/quantify data interoperability and maturity?

oops and foops	Number of users	Number of years of use
end-user satisfaction	Fair metrics , FOOPS	Level of semantic annotations
End-user's satisfaction	None	We don't do such assessments.

What metrics or tools do you use to assess/quantify data interoperability and maturity?

19 Answers

not measuring this yet	Whether output is meaningful/usable	none
Not measuring this yet	adding new systems	Fair metrics, empirical results
User satisfaction	IOF	standardization

What metrics or tools do you use to assess/quantify data interoperability and maturity?

BFO

What interoperability principles/recommendations would you point out? (E.g., literature, initiatives, ...)

CWA ModGra

Adopting standards.

I in FAIR principles

epistemic metadata

FAIR for science

Case studies demonstrating real-world use

The connection between interoperability projects and value is critical.

"explainable AI ready" (XAIR)

Separation of concern

What interoperability principles/recommendations would you point out? (E.g., literature, initiatives, ...)

22 Answers

Industrial Data Ontology	Be aware about standards.	Scalability
pragmatic interoperability	Maintainability	Modularity
RDA recommendations	Safety	FAIR

11

What interoperability principles/recommendations would you point out? (E.g., literature, initiatives, ...)

opacity

standardization

we must closely read the AI Act

https://oagiscore.org/, standard life cycle management, https://scholar.google.com/citations?
view_op=view_citation&hl=en&user=OaphE3MAAAAJ&cstart=20&pagesize=80&citation_for_view=OaphE3MAAAAJ:u
Wiczbca

How to facilitate cross-domain interoperability? **26** Answers

Use existing ontologies

cross-domain interoperability is created when there are cross-domain projects with concrete work to be done

Adopting top ontologies

Ontological alignment

Use structured vocabularies and ontologies

Shared top level ontology and modelling patterns

Bring stakeholders together

Flexibility - standardise on the interfaces

Using common ontology

15

How to facilitate cross-domain interoperability? 26 Answers

Being part of eco-systems	document your work	Common standards
Adopting standards	Communication	Building communities
Good ontologies	Develop system-thinking	Data documentation

How to facilitate cross-domain interoperability? 26 Answers

Show the (commercial) benefits of adopting a cross-domain ontology (or any ontology for that matter...)

Cooperative / co-creation communities

Rigorous systems that can help find out which parts of various ontologies are compatible

Ecosystems/networks of ontologies.

Use foundational ontology

Top level ontology

Standardize applicability of ontologies
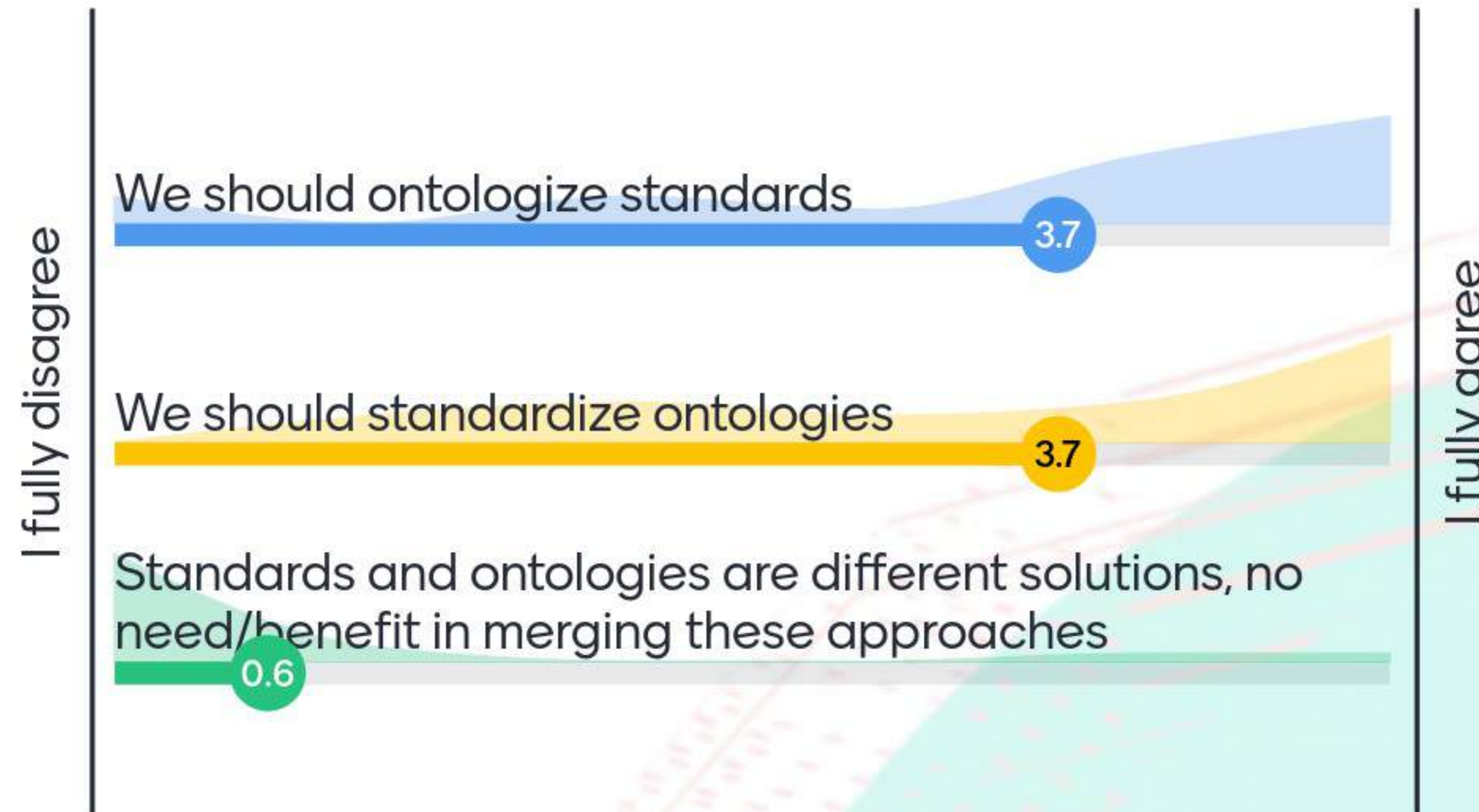
cross domain like cross industry is very difficult. I think that this would be more need base, i.e., only the parts that need to be interoperable need to be brought together and mapped.
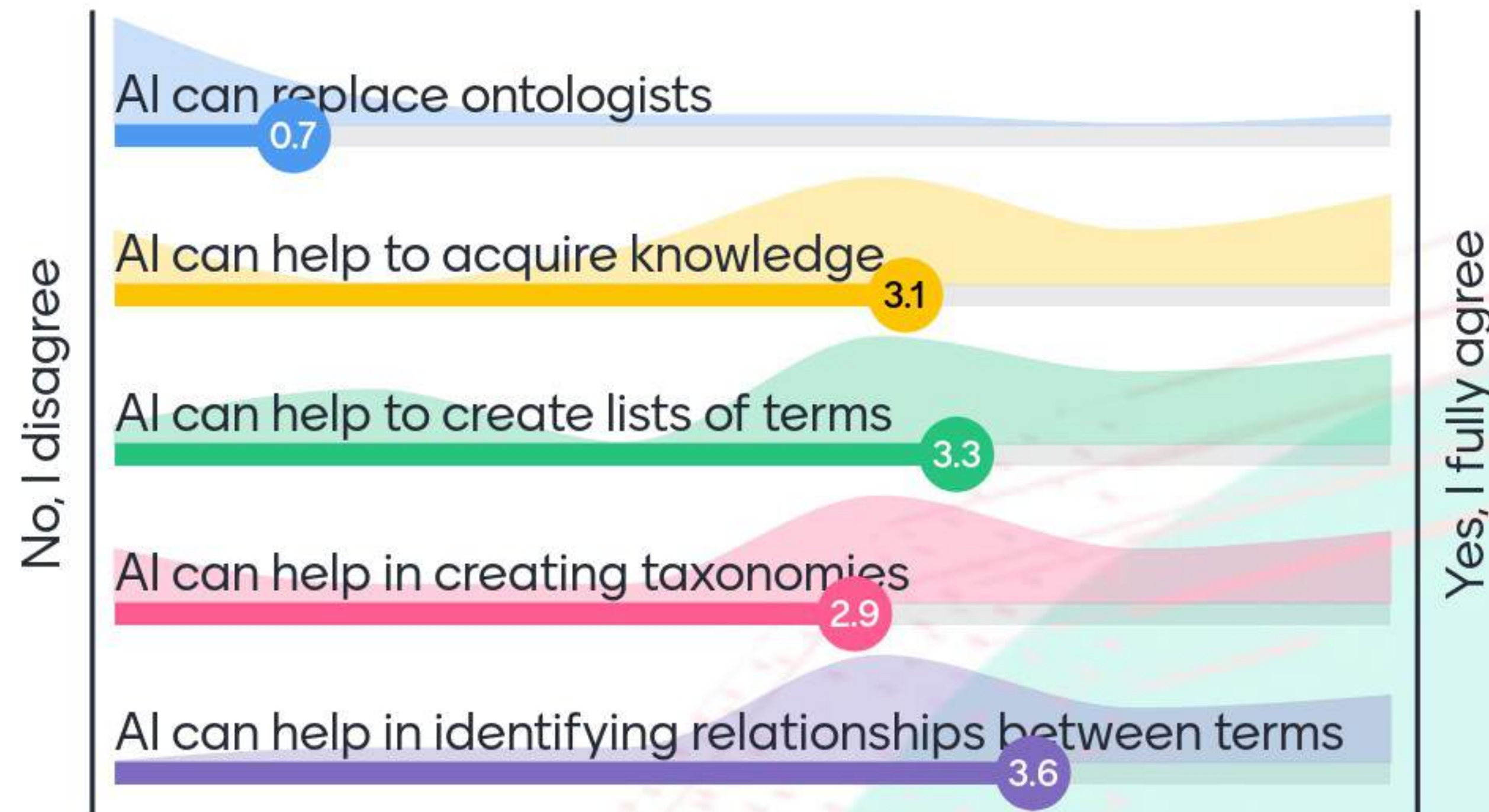
15

What role can large language models have for interoperability today?

UK Research and Innovation

No, I disagree ← → Yes, I fully agree

- AI can replace ontologists — 0.7
- AI can help to acquire knowledge — 3.1
- AI can help to create lists of terms — 3.3
- AI can help in creating taxonomies — 2.9
- AI can help in identifying relationships between terms — 3.6

19

How to best combine large language models with semantics? 3 Answers

too help speed up research

Create small sell-defined cases

Use it for making smart suggestions for providers of data so that they can validate.

Is there any interoperability major aspect we missed? **2** Answers

Data documentation

software engineering skill. new technology needs new training. somebody presented that we can rely on only phds to enable interoperability.