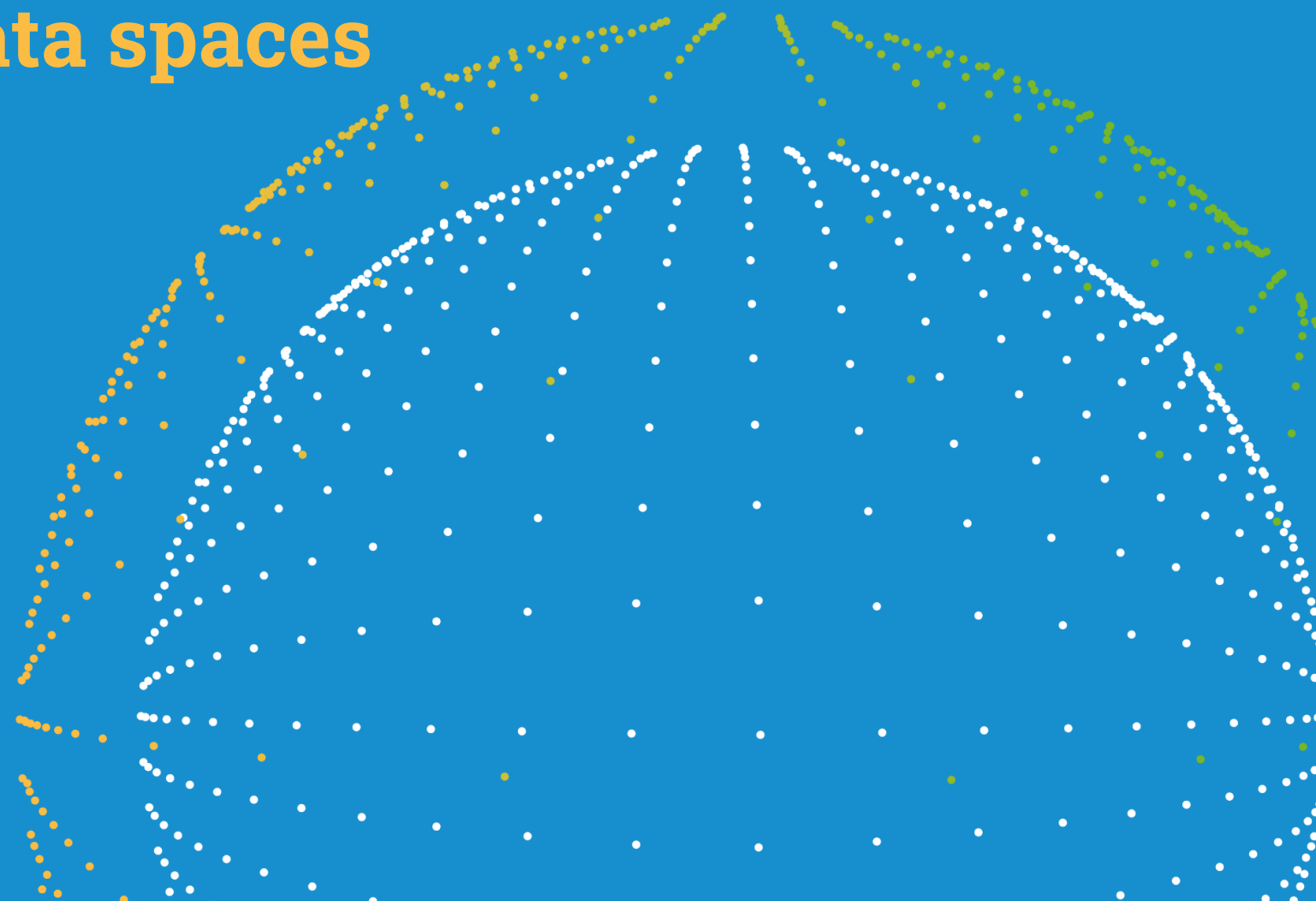


# Data Spaces Symposium

Minimal Interoperability

Mechanisms and data spaces

Michael Mulquin  
OASC



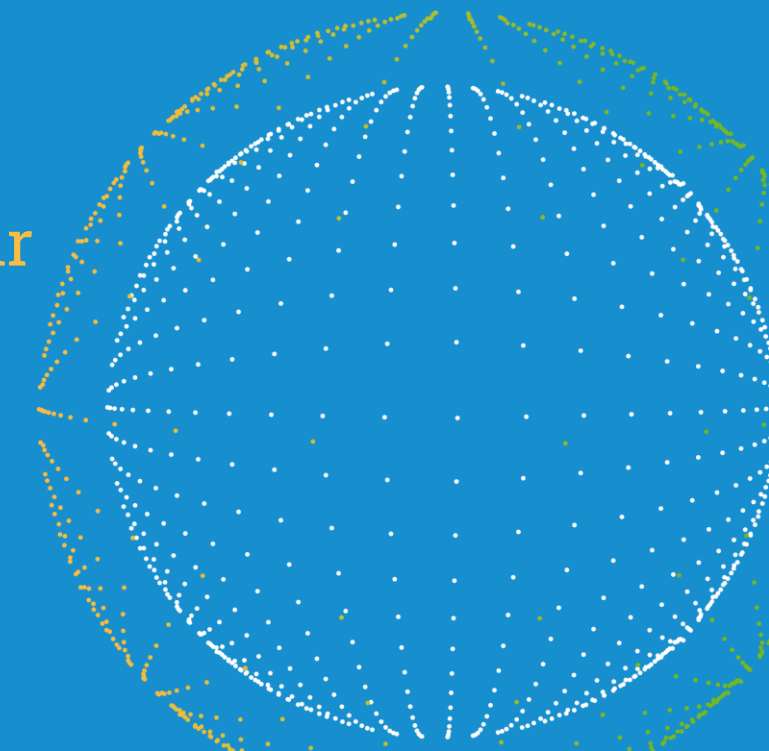
# Data space – the interoperability challenge

- A data space supports an existing ecosystem of organisations that are already working together to deliver on common priorities
- The individual organisations continue to hold their data, but make it available for sharing within the ecosystem

## The challenge:

- The organisations collect and manage their data according to legacy processes designed to support their individual goals.

It is not practical to expect them to change all their processes overnight to follow detailed common standards



# Many obstacles to data sharing between agencies!

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How to use data to manage physical assets?

How to handle data analytics?

How to ensure fair AI?

How to manage data security?

How to ensure data quality?

How to link context data?

How to ensure common data models?

How to manage personal data?

How to gather data usage information?

How to find the data I need?

How to agree compliance with conditions for data sharing?

How to find out about the conditions for data sharing?

How to manage geospatial data?

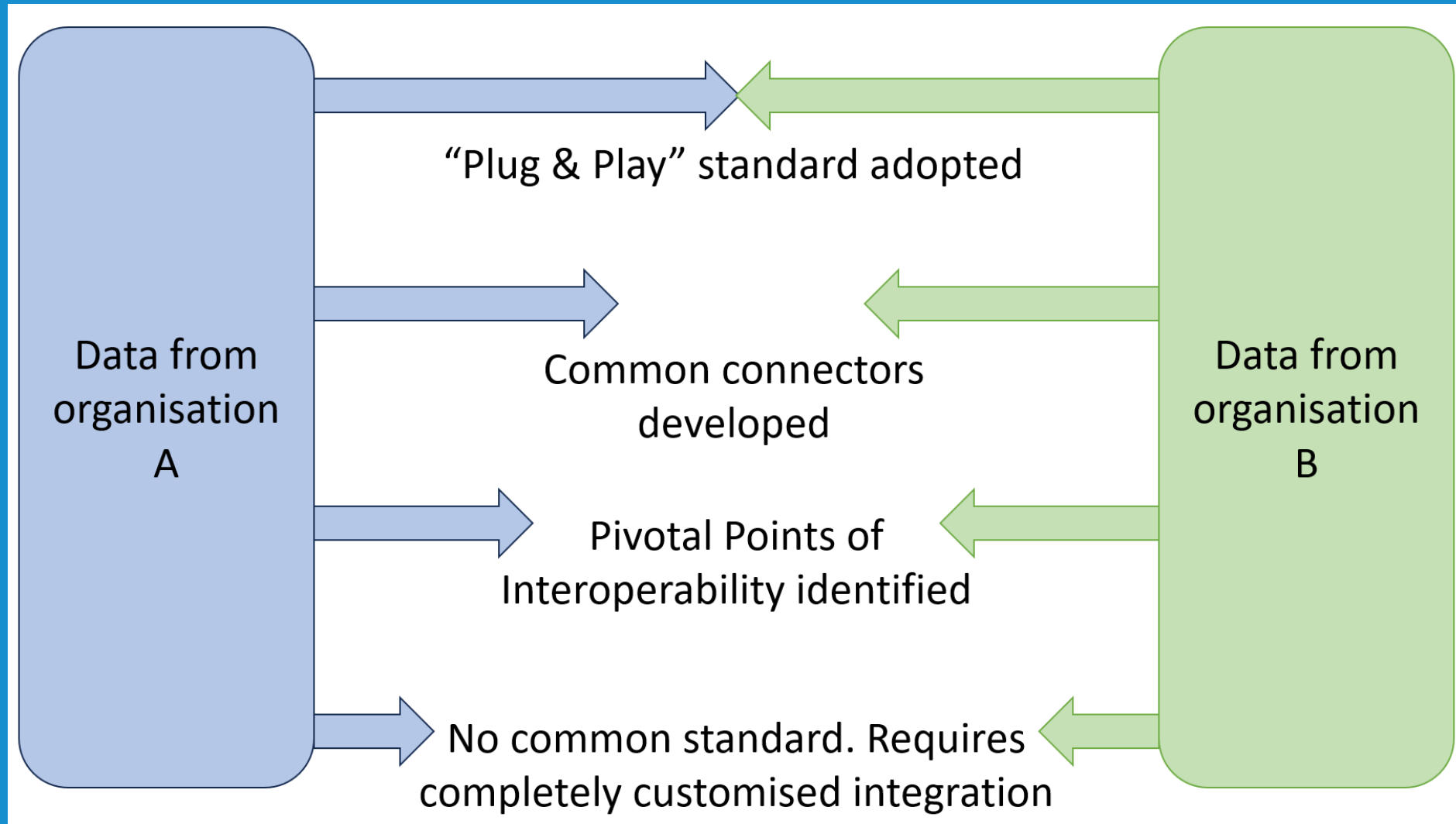
Alignment is needed to enable interoperability

# Interoperability

*The capability of systems or units to provide and receive services and information between each other, and to use the services and information exchanged to operate effectively together in predictable ways*



# Degrees of interoperability



# Minimal Interoperability

*The capability of systems or units to provide and receive services and information between each other, and to use the services and information exchanged to operate effectively together in predictable ways with minimal user intervention*

# Minimal Interoperability Mechanisms (MIMs)

The MIMs came from early projects where cities were beginning to experiment with using the data from IoT to develop applications such as smart parking.

The challenge was to identify a common way for cities to collect and manage the data to enable applications developed for one city to be easily ported to another

Also, to enable data coming from one application in a city to be used in other applications in that city

The MIMs are developed by Open & Agile Smart Cities & Communities (OASC) and by the Living-in.EU movement

# What are MIMs?

- MIMs address the practical challenges of supporting data sharing between organisations that may use different standards or proprietary solutions in the way they collect and handle data.
- Rather than require all organisations to change their existing practices, MIMs propose simple modifications that will enable “good-enough” interoperability.
- Their use simplifies the task of aligning data sets coming from different organisations and enables a useful data space to be speedily and easily put in place.





# The MIMs being developed by OASC

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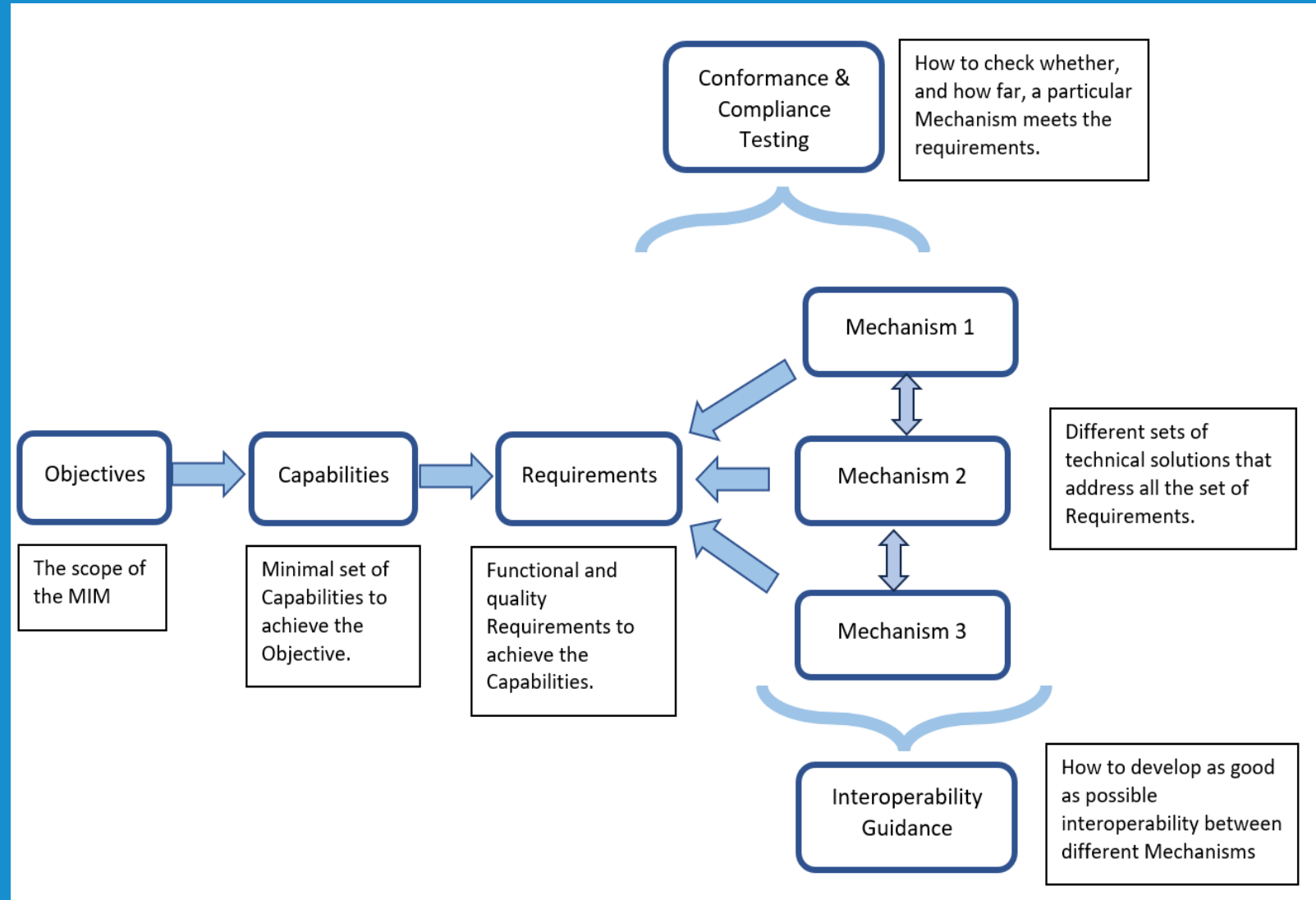
<b>MIM</b>	<b>Function</b>
MIM1: Context	Data sets/streams can be linked according to context
MIM2: Data Models	All data sets/streams use consistent data models
MIM3: Contracts	Appropriate data sets/streams can be found, and agreement can easily be reached for their appropriate use
MIM4: Trust	Citizens can take charge of how data about them is used so that it can benefit themselves and their community
MIM5: Transparency	Decision making algorithms will use data appropriately to make fair and transparent decisions
MIM6: Security	Data can be held and shared securely
MIM7: Places	Geo-temporal information can be accurately described in consistent ways
MIM8: Indicators	KPIs can rely on consistent data from across the ecosystem to enable reliable measurement of progress
MIM9: Analytics	Models and analytics used within the ecosystem can work well with other models and analytics
MIM10: Resources	Information about city related resources can be appropriately shared

# There will be other MIMs later

- The 10 MIMs are designed to help data flow in a data sharing ecosystem, but others will need to be added as gaps are identified
- For instance, with the increasing implementation of local digital twins and the CitiVerse, we need to support minimal interoperability between models and not just data.



# The format for each MIM



# The two Minimals

**A minimal but sufficient set of capabilities and the functional and quality requirements** needed to achieve them.

**A minimal but useful level of interoperability** between two different mechanisms that offer alternative methods to provide the capability to achieve the same data-related objective.

# 1. Minimal set of capabilities

- To achieve an objective completely might demand many different capabilities, requiring the expenditure of significant time and resource.
- However, a much smaller set of requirements can often enable the key aspects to be achieved quickly and affordably. Further capabilities can then be put in place, as and when they prove appropriate.
- By encouraging the organisations in a data space to implement mechanisms that address the same set of key requirements, this will simplify the work needed to provide interoperability between them.



# Capabilities to achieve an objective

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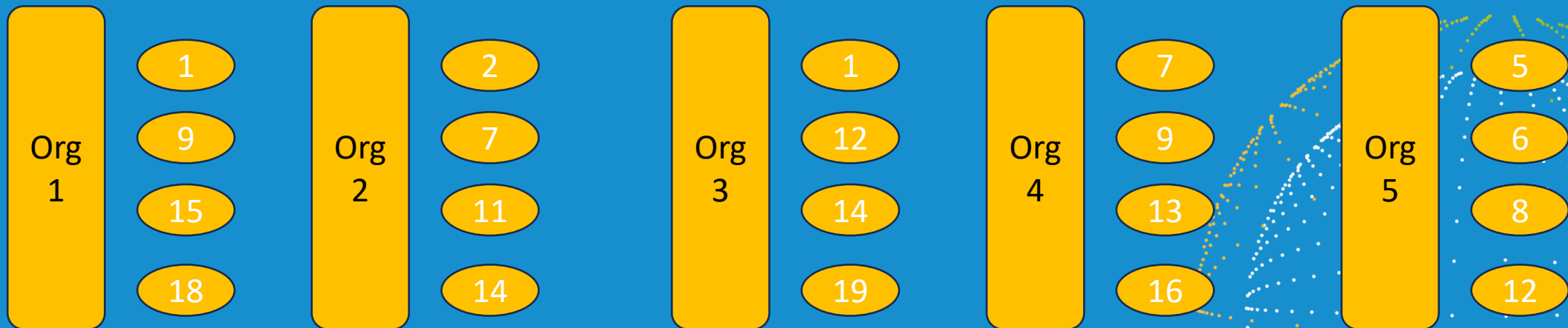
Let's consider MIM 6: data security

The objective is:

- That communities and the organisations that serve them can implement affordable and effective cybersecurity measures, especially relating to the data coming from IoT devices and data being shared between organisations in a data space

# Capabilities to achieve that objective

- Imagine 20 possible important capabilities/requirements.
- Few organisations could implement all of them and so different organisations might implement different combinations.

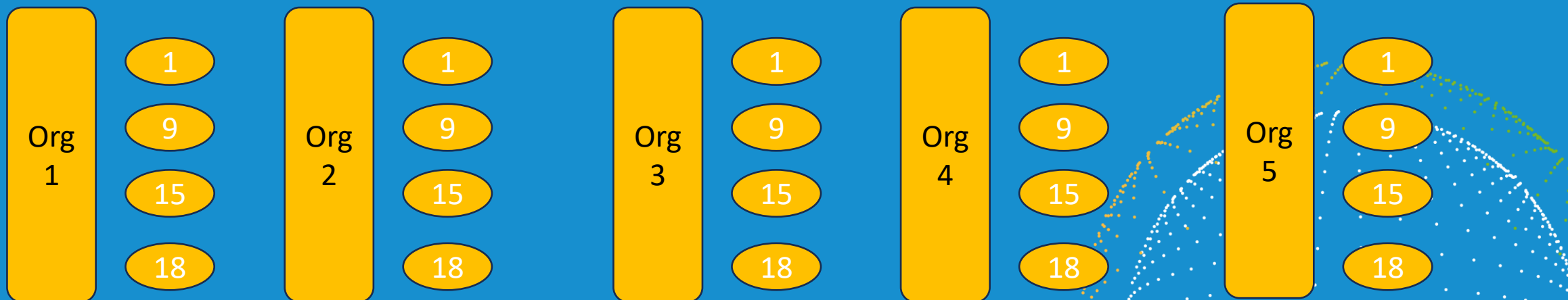


How to bring interoperability between them??



# Let's agree a common set of essential capabilities

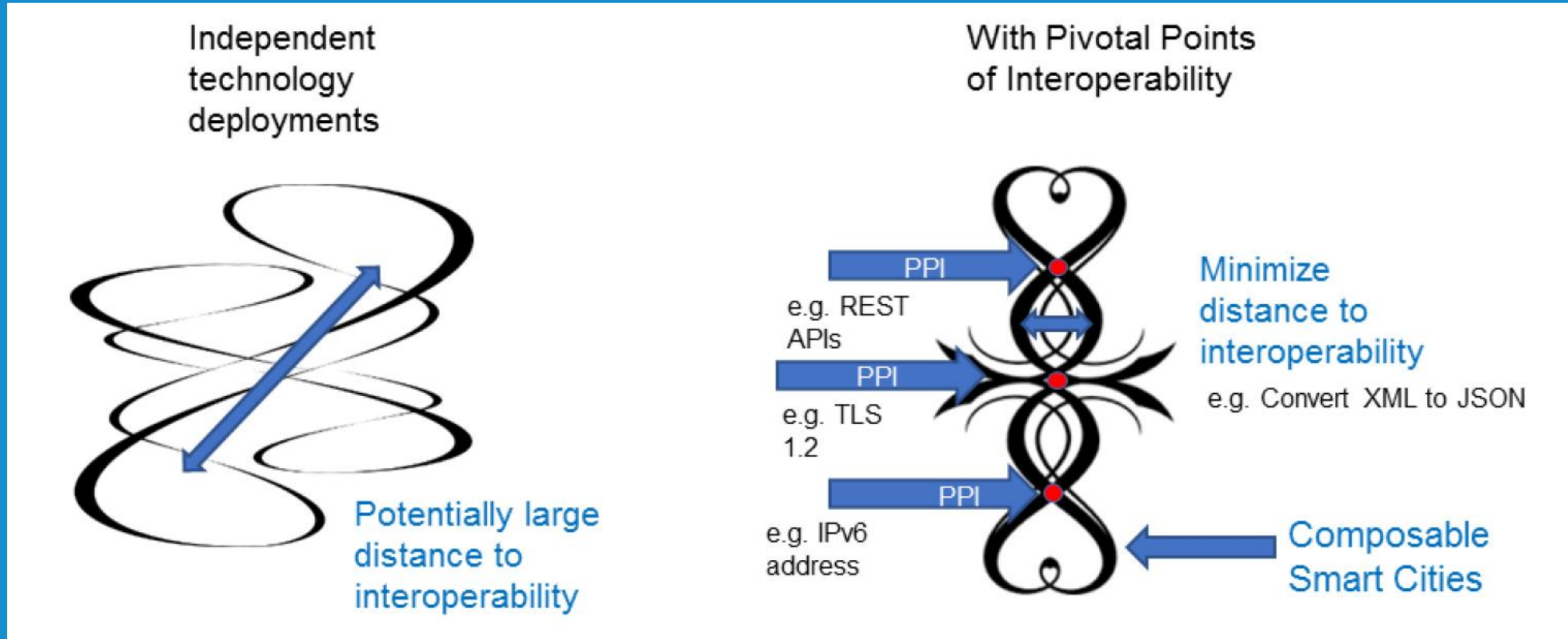
Many organisations will implement additional capabilities, but all will have at least the core set



Much easier to align



## 2. Minimal Interoperability between mechanisms



Often some concepts and component standards are common within different technology approaches. These can be considered as “Pivotal Points of Interoperability” and they can simplify the development of interoperability between divergent systems.



# MIMs – useful tools for data spaces

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