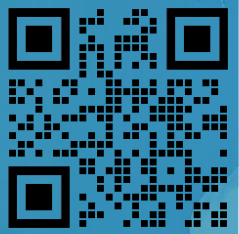
SEMANTIC INTEROPERABILITY FOR RESILIENT, SCALABLE AND RESILIENT DATA EXCHANGE

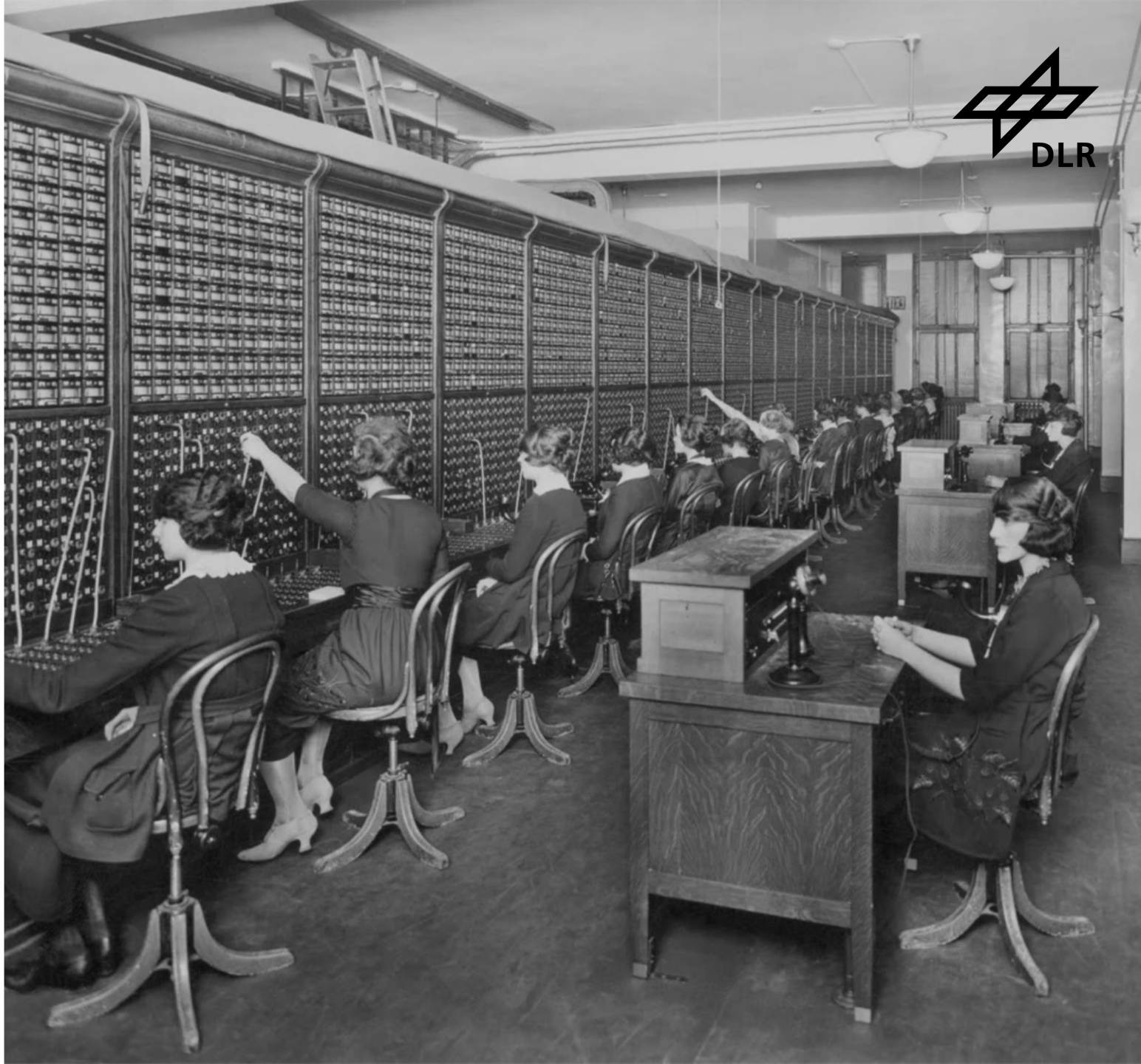
Maximilian Stäbler, 22.11.2023
DLR-Institute for AI Safety & Security – Sankt Augustin and Ulm



GOAL DEFINITION

Telephone Switchboards:

The first Interoperability Service (1915)



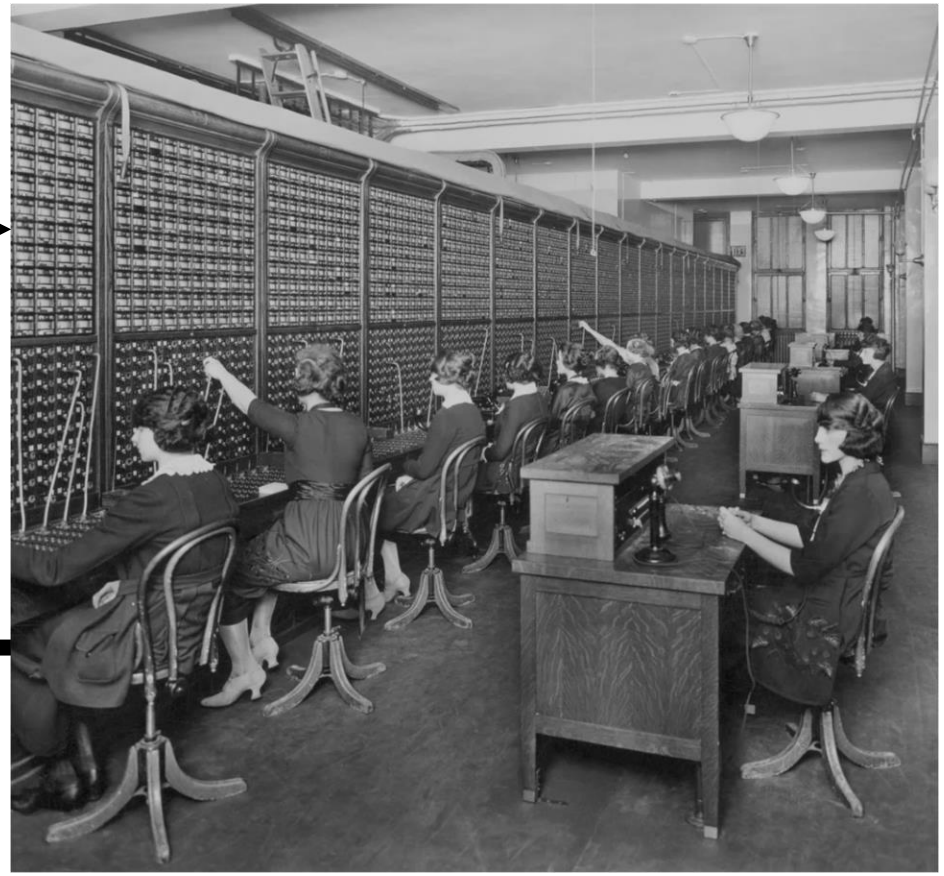
Automated, scalable and resilient Semantic Interoperability

Status Quo

“hallo”

{language : german}

“hallo”



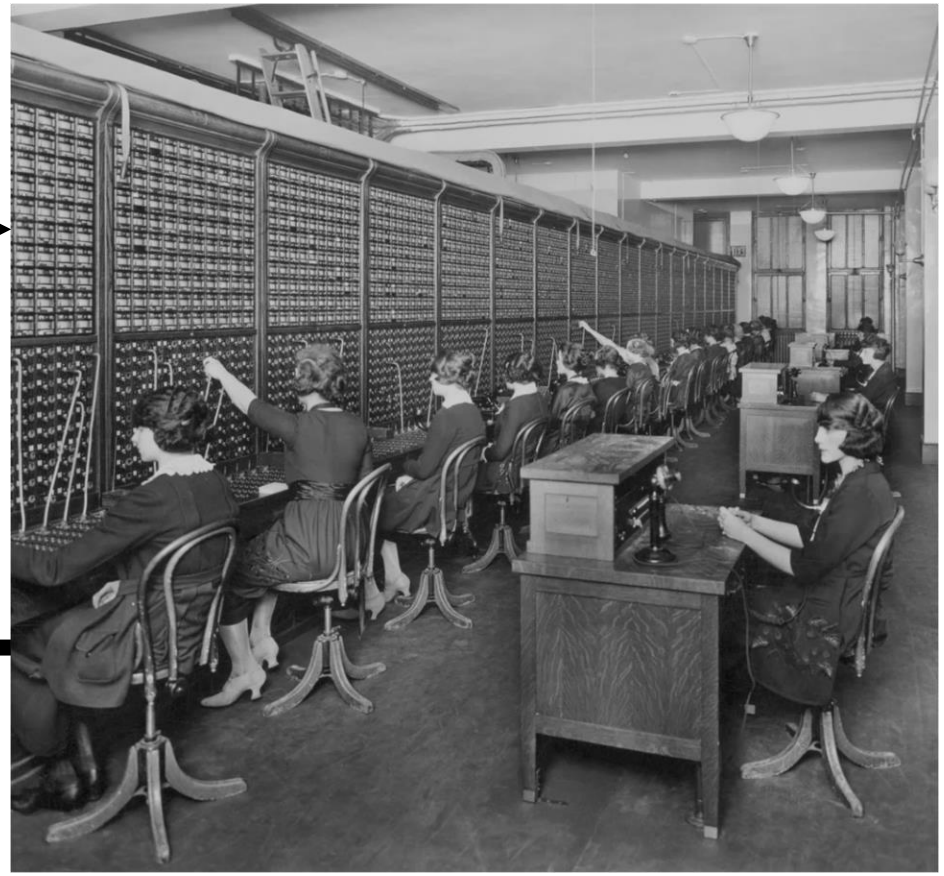
Automated, scalable and resilient Semantic Interoperability

Goal – a **S**emantic **I**nteroperability **S**ervice (SIS)

“hallo”

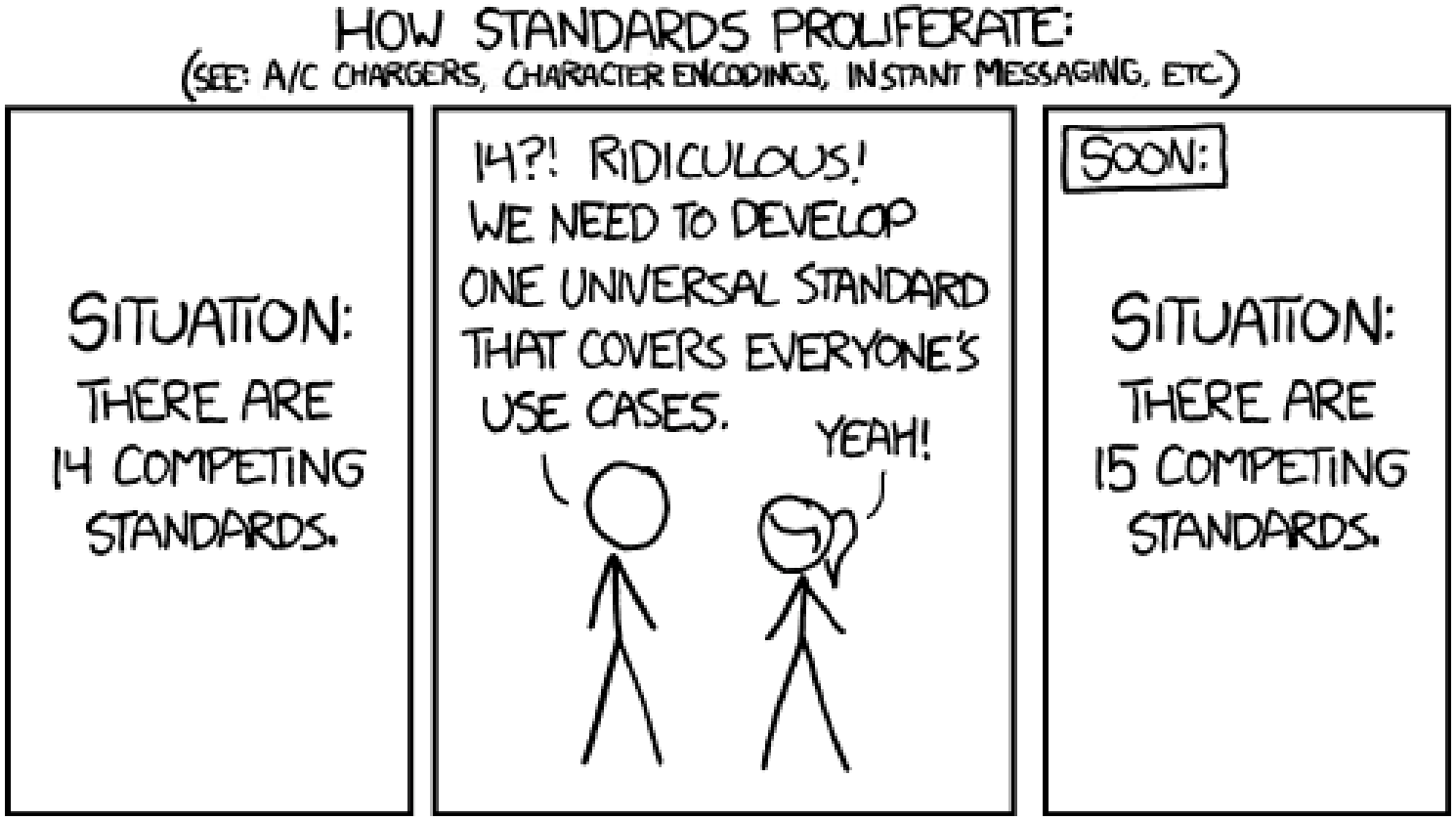
{language : german, korean}

“안녕하세요”



PROBLEM DEFINITION

(Meta) Data is hetergogeneous – Problem solved?



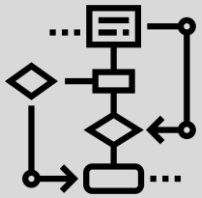
https://xkcd.com/927/

Interoperable Solutions / Applications
Currently: Incompatible Semantics

Data Models of the supply side are misunderstood and misused by the **exploitation side**

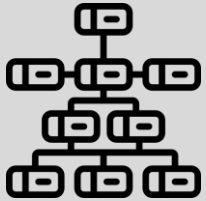
Data Requirements of the exploitation side are misunderstood by the **supply side**

Company 1
Department 1
Domain 1
…



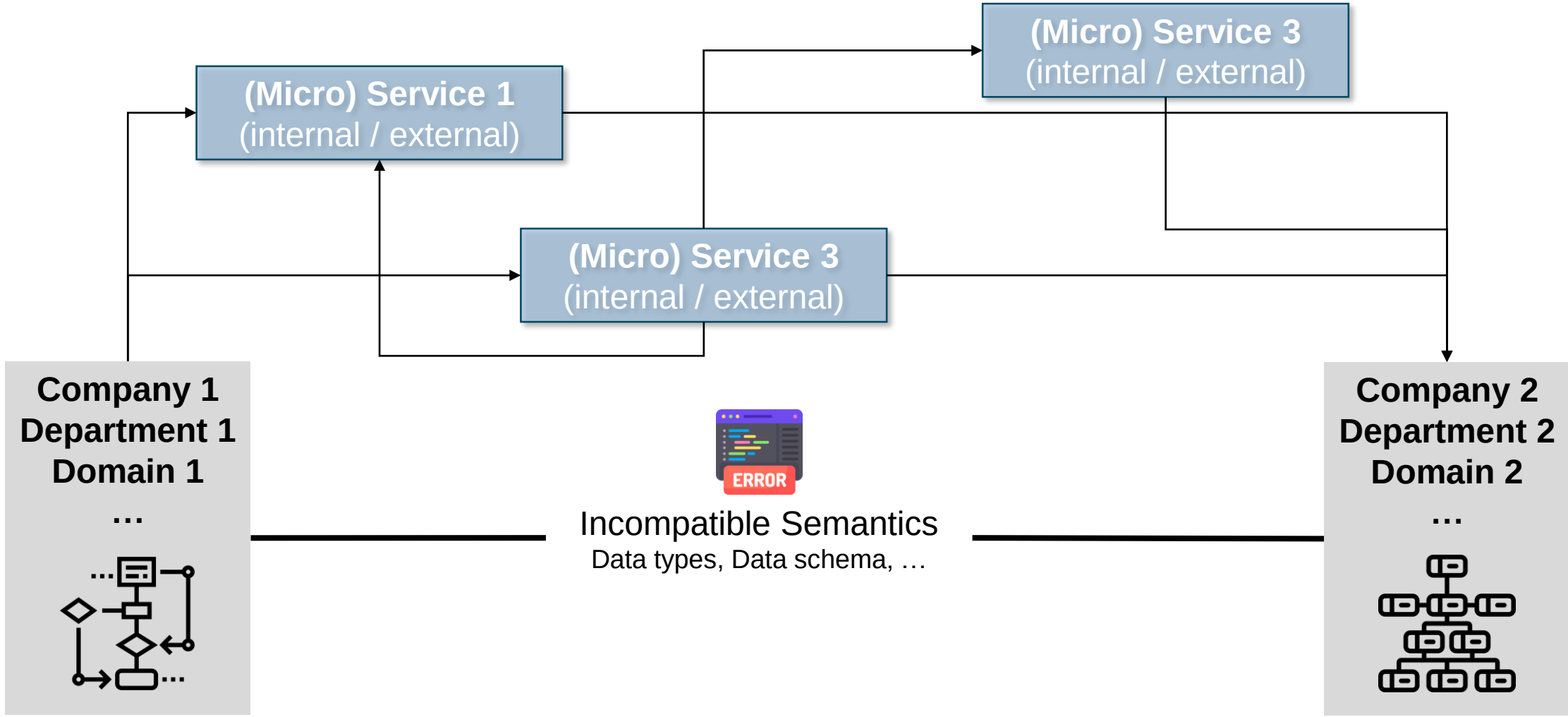
Incompatible Semantics
Data types, Data schema, …

Company 2
Department 2
Domain 2
…



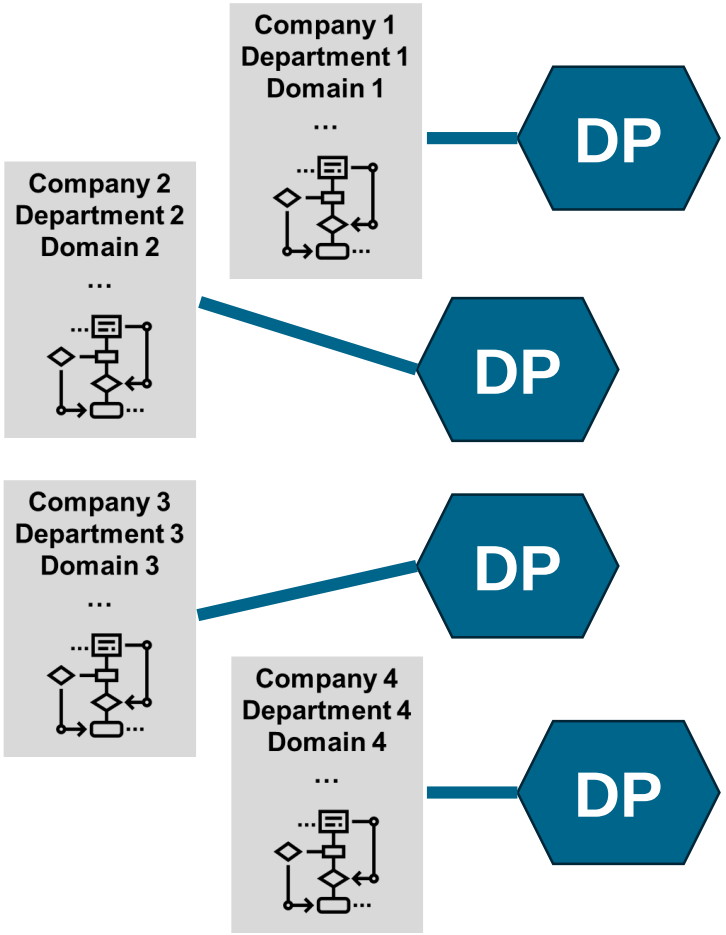
Interoperable Solutions / Applications

Current Solution: Complex and highly manual service landscape



Semantic Interoperability

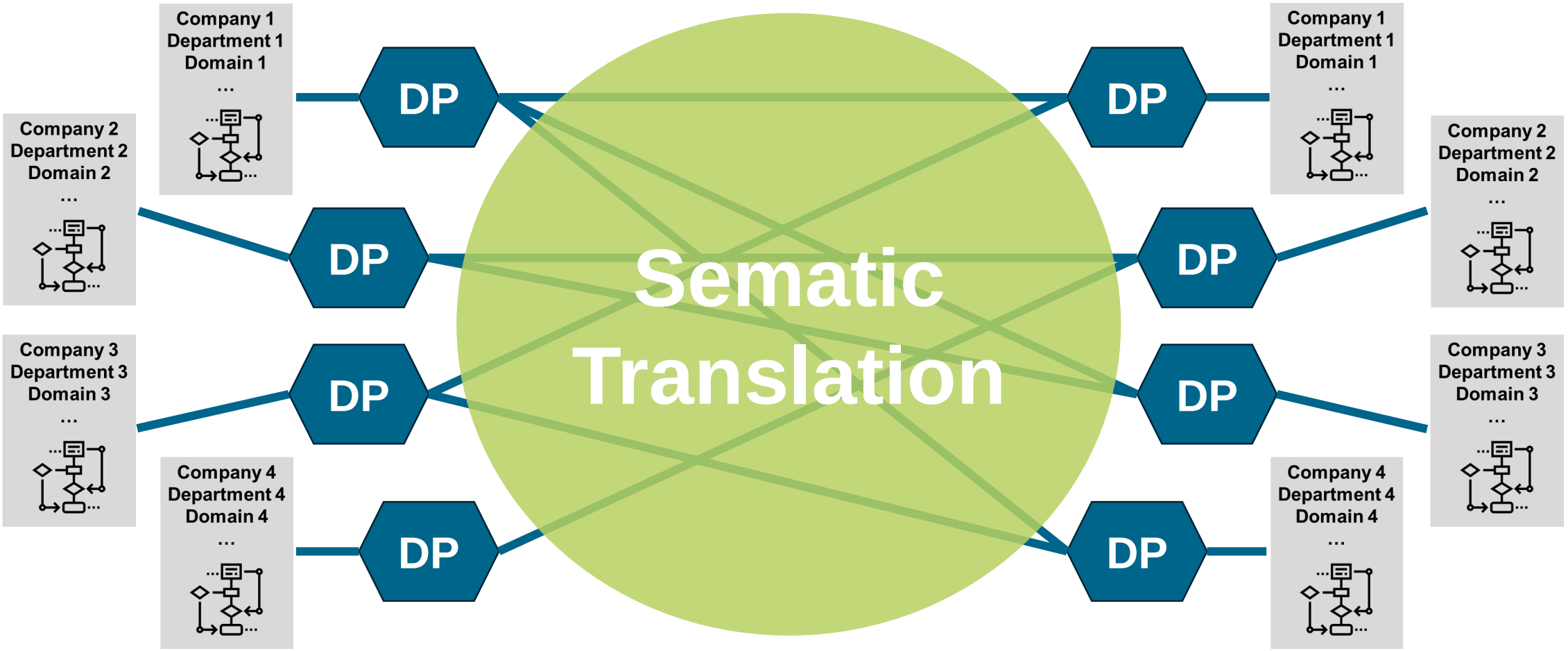
Goal: Overcome Semantic Chasm // Data Mesh Principles



DP = Data Product

Semantic Interoperability

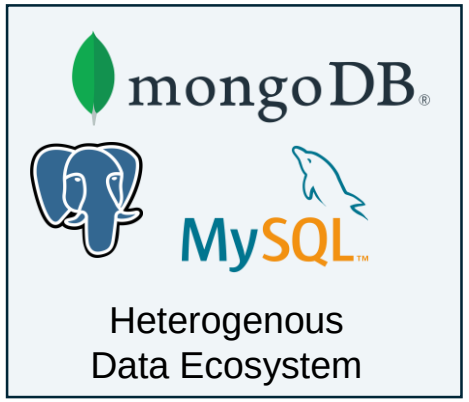
Goal: Overcome Semantic Chasm // Data Mesh Principles



Semantic Interoperability for resilient, scalable and resilient data exchange

Today

“Yes we have data”



id	…	<feature 3>
int	…	string

Semantic Interoperability for resilient, scalable and resilient data exchange

Today

"Yes we have data"

Tomorrow

"Yes we have data and it is well described"

id	…	<feature 3>
int	…	string

id	…	<feature 3>
int	…	string
xsd:int		Xsd:string

Semantic Interoperability for resilient, scalable and resilient data exchange

Today	Tomorrow	The day after tomorrow
“Yes we have data”	“Yes we have data and it is well described”	“Yes we have data and it is described so others can understand”

Heterogenous Data Ecosystem

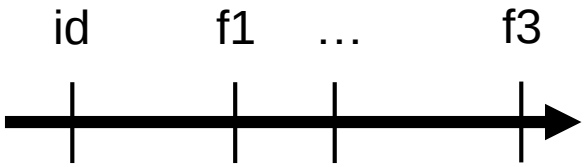
id	…	<feature 3>
int	…	string

id	…	<feature 3>
int	…	string
xsd:int		Xsd:string

id	…	<feature 3>
int	…	string
xsd:int		Xsd:string
Meta-Data		*Meta-Data*

Semantic Interoperability for resilient, scalable and resilient data exchange

Today



id	…	<feature 3>
int	…	string

Tomorrow

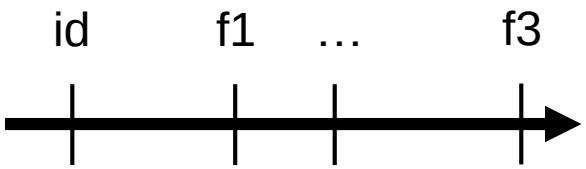
id	…	<feature 3>
int	…	string
xsd:int		Xsd:string

The day after tomorrow

id	…	<feature 3>
int	…	string
xsd:int		Xsd:string
Meta-Data		*Meta-Data*

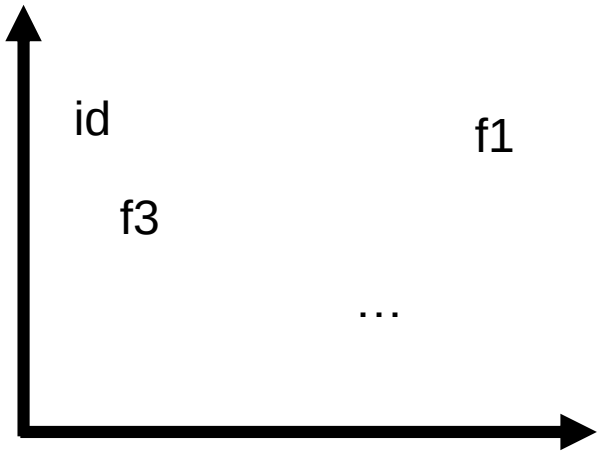
Semantic Interoperability for resilient, scalable and resilient data exchange

Today



id	…	<feature 3>
int	…	string

Tomorrow



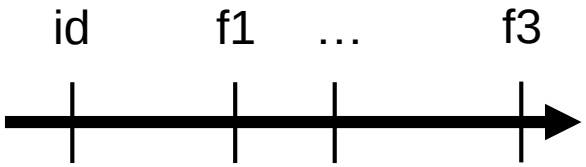
id	…	<feature 3>
int	…	string
xsd:int		Xsd:string

The day after tomorrow

id	…	<feature 3>
int	…	string
xsd:int		Xsd:string
Meta-Data		*Meta-Data*

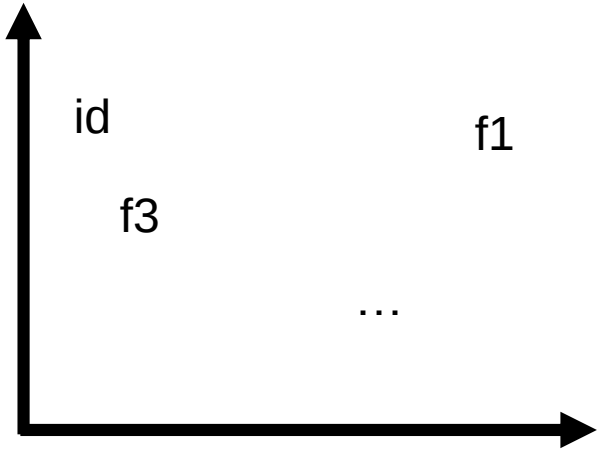
Semantic Interoperability for resilient, scalable and resilient data exchange

Today



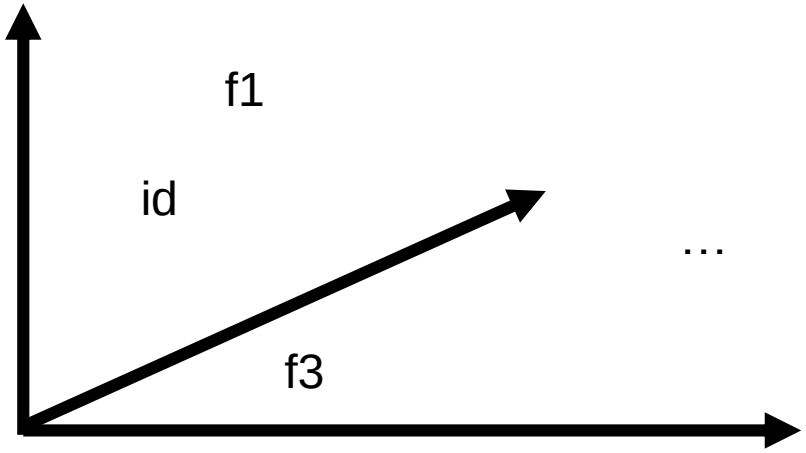
id	…	<feature 3>
int	…	string

Tomorrow



id	…	<feature 3>
int	…	string
xsd:int		Xsd:string

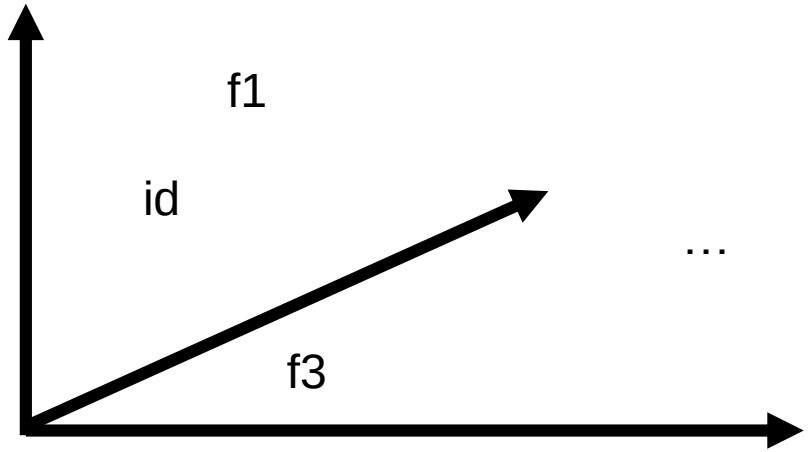
The day after tomorrow



id	…	<feature 3>
int	…	string
xsd:int		Xsd:string
Meta-Data		*Meta-Data*

Semantic Interoperability for resilient, scalable and resilient data exchange

The day after tomorrow



id	…	<feature 3>
int	…	string
xsd:int		Xsd:string
Meta-Data		*Meta-Data*

Possibility to automate processes

Benefits:

- Scalability
- Robustness by automated re-orchestration

→ **Resilience**

Contact

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