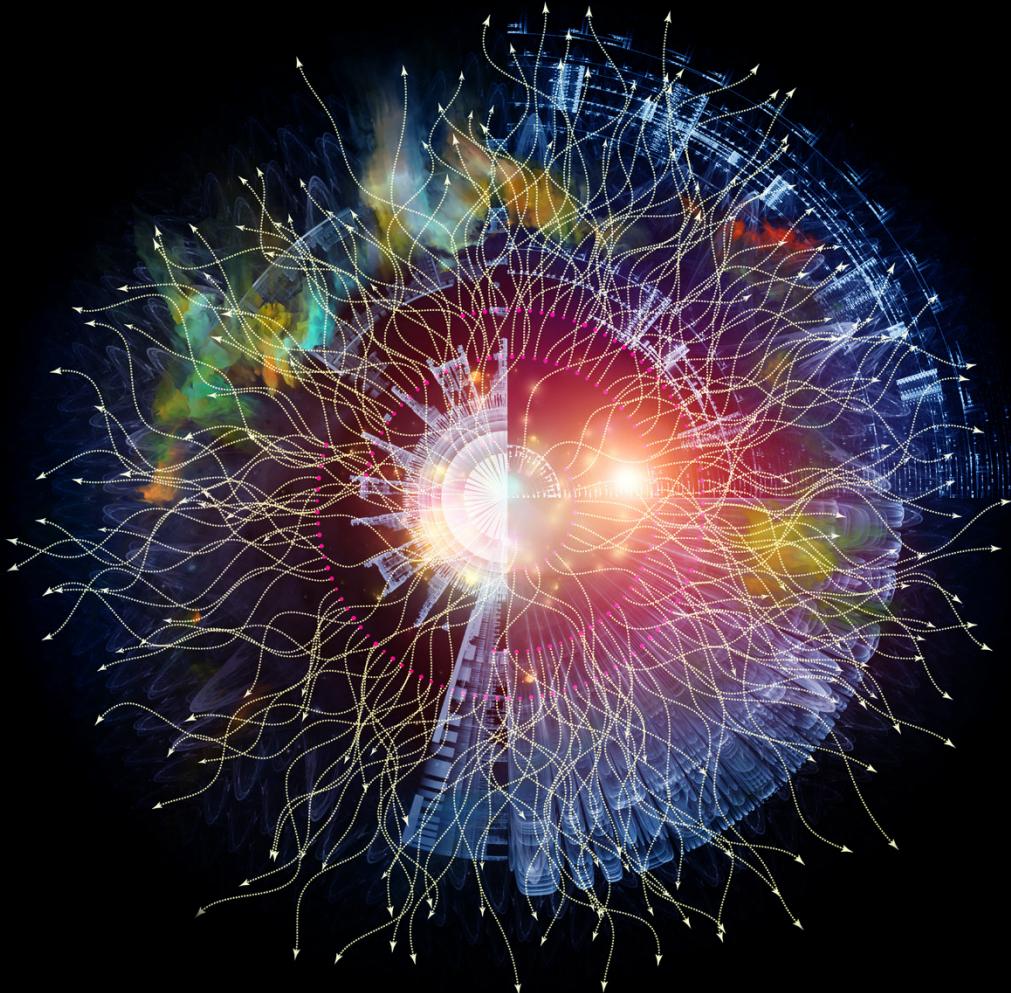


Deloitte.



European Smart Middleware for Data Spaces

30 May 2022, Deloitte Gateway

Welcome at Gateway



Hans Verheggen

*Partner,
Technology Strategy,
Deloitte Consulting*



Simpl event agenda

Welcome at Gateway	9:00 – 9:05	Hans Verheggen
Intro by Pearse O'Donohue	9:05 – 9:10	Pearse O'Donohue
Keynote: the state of Cloud in Europe	9:10 – 9:25	Alfons Buxo Ferrer
Keynote: the rationale behind Simpl	9:25 – 9:40	Pierre Chastanet
The Simpl target: <i>Requirements and architecture</i>	9:40 – 10:35	Deloitte team
Q&A session	10:35 – 10:55	All
Coffee break	10:55 – 11:20	
The Simpl plan: <i>Existing solutions, MVP roadmap, and governance</i>	11:20 – 12:05	Deloitte team
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Closing remarks	12:25 – 12:30	Hans Verheggen
Walking lunch & networking	12:30 – 13:00	



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Pearse O'Donohue
*Director, Future
Networks, DG CNECT,
European Commission*

Intro by Pearse O'Donohue



Alfons Buxo Ferrer
*Global Cloud
Transformation Leader,
Deloitte*

Keynote

The state of cloud in Europe

- Why Cloud Computing matters
- How the market is evolving
- What are the challenges for the EU

Why Cloud Computing matters

Cloud Computing is a generic term used to describe the disruptive transformation in I.T. towards a service-based economy driven by a set of economic, cultural and technological conditions as Industrial Revolution was.



INTERNET

Democratized access to information
Removed entry barriers to market access



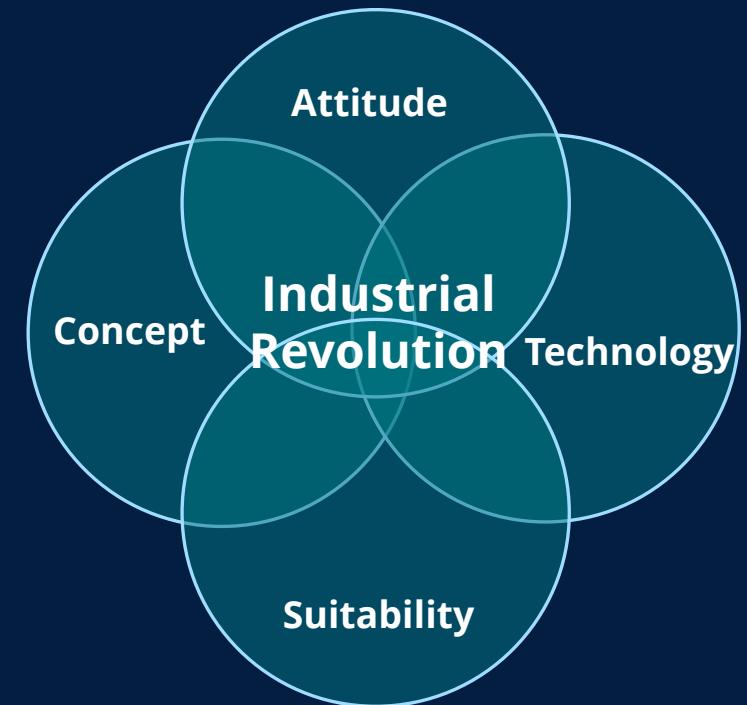
CLOUD

Democratized access to IT services and Innovation
Removed entry toll to access disruptive technologies

It shifted the value from physical assets to digital ones

It enables anyone to compete with well established players

TRANSFORMATION DRIVERS



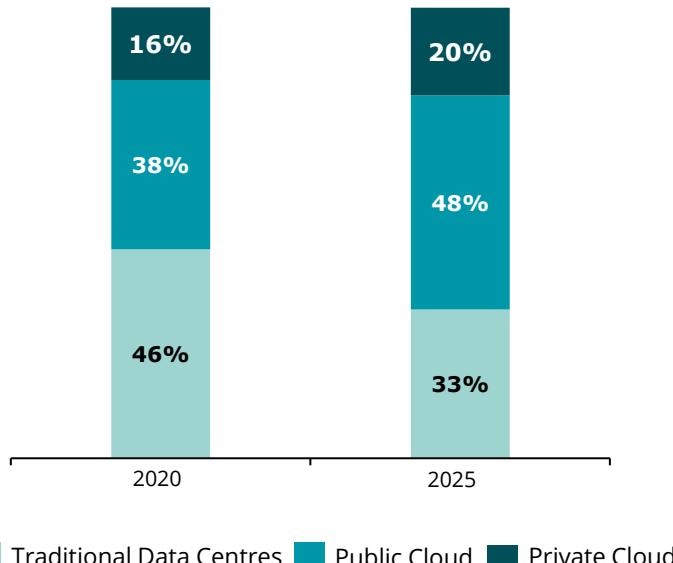
How the market is evolving

Discussions at executive level underscore that Cloud is one of the biggest technological shifts of our times. Our clients are right now moving into the cloud to transform their businesses and build a foundation for growth

By 2025, The Cloud Adoption rate will surpass 68% and Public Cloud expenditure will surpass on-prem

Spending on IT Infrastructure Forecast¹

% of total spend, 2020-25

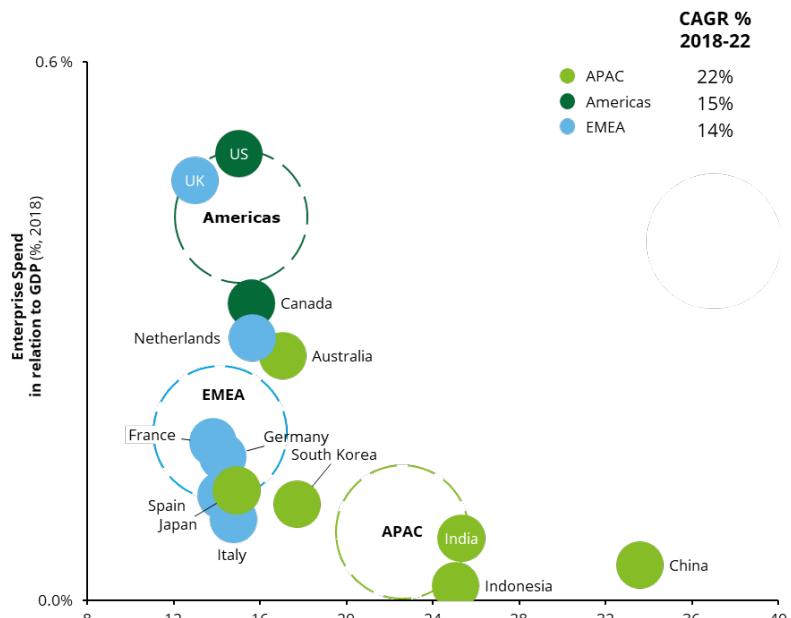


Sources: 1. Worldwide Enterprise Infrastructure Buyer&Cloud Deployment Forecast (IDC 2022);

In 2022, the Americas is accounting for 61% of the Public Cloud service spend, EMEA for 23% and APAC for 16%

The Public Cloud market, by region

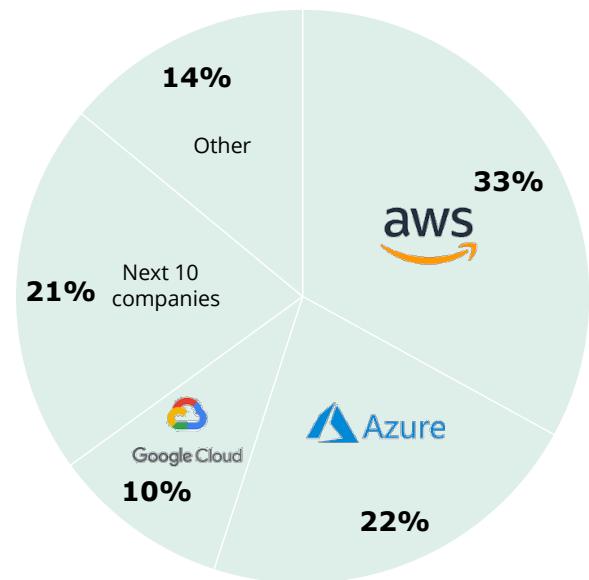
Enterprise Spend related to GDP / CAGR, 2018-22



AWS, Microsoft, and Google collectively harvested 65% of global spend on cloud computing in Q1 2022

Cloud Infrastructure & Platform Services Market

(IaaS, PaaS, Hosted Private Cloud)



Sources: 1. Synergy Research Group: Cloud Infrastructure Services Market Q1 2022

What are the challenges for the EU

Sovereignty, and value creation, from tactical to strategic thinking. Shifts in Business and Technology



De-Globalization



Sovereignty



Faster Innovation through Ecosystems



Data centric organizations for differentiation and growth



Shift from infrastructure to data platforms



Industry clouds as the new value target creation



Cloud to edge for new use cases



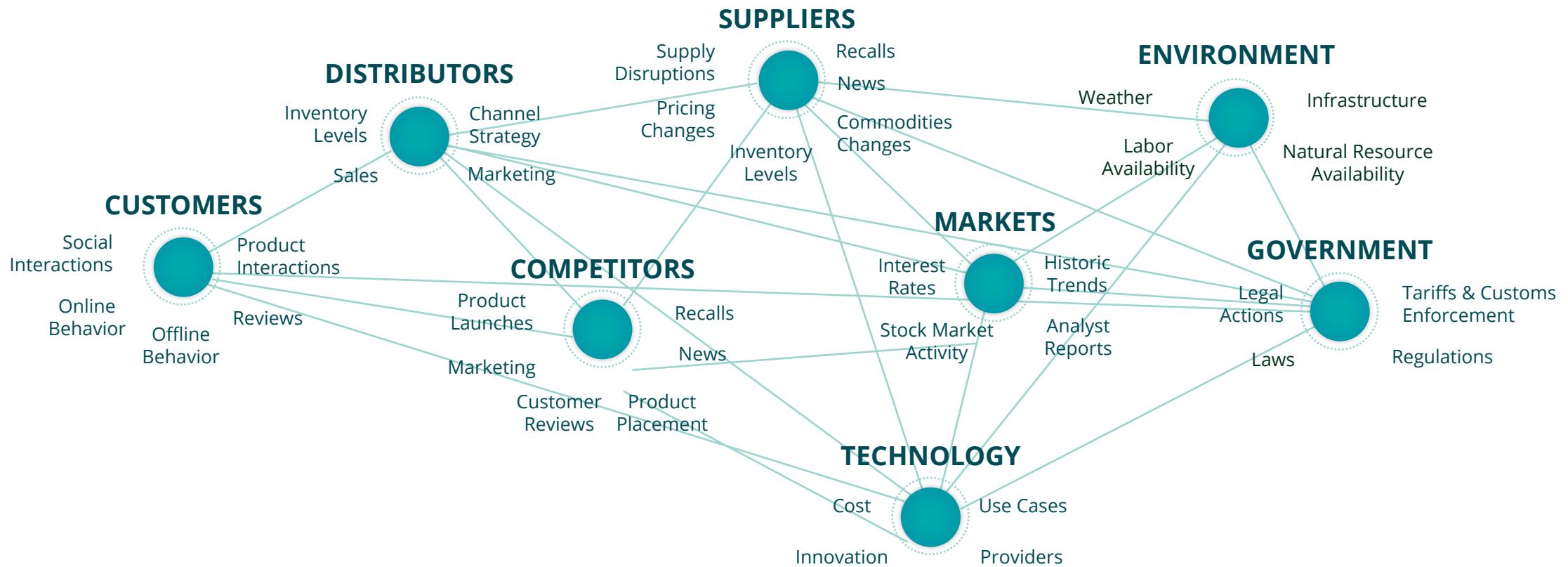
Distributed Data Platforms



What are the challenges for the EU

Sovereignty, and value creation, from tactical to strategic thinking.

Wider field of vision: **See across** not only your own organization, but also **across the ecosystem**; by integrating data sets, you can solve multi-dimensional challenges like predicting supply shortages and supply chain disruptions



What are the challenges for the EU

Sovereignty, and value creation, from tactical to strategic thinking.

We have prioritized a set of globally applicable client issues that span most clients... **Auto Industrial Cloud**

Connected Vehicle

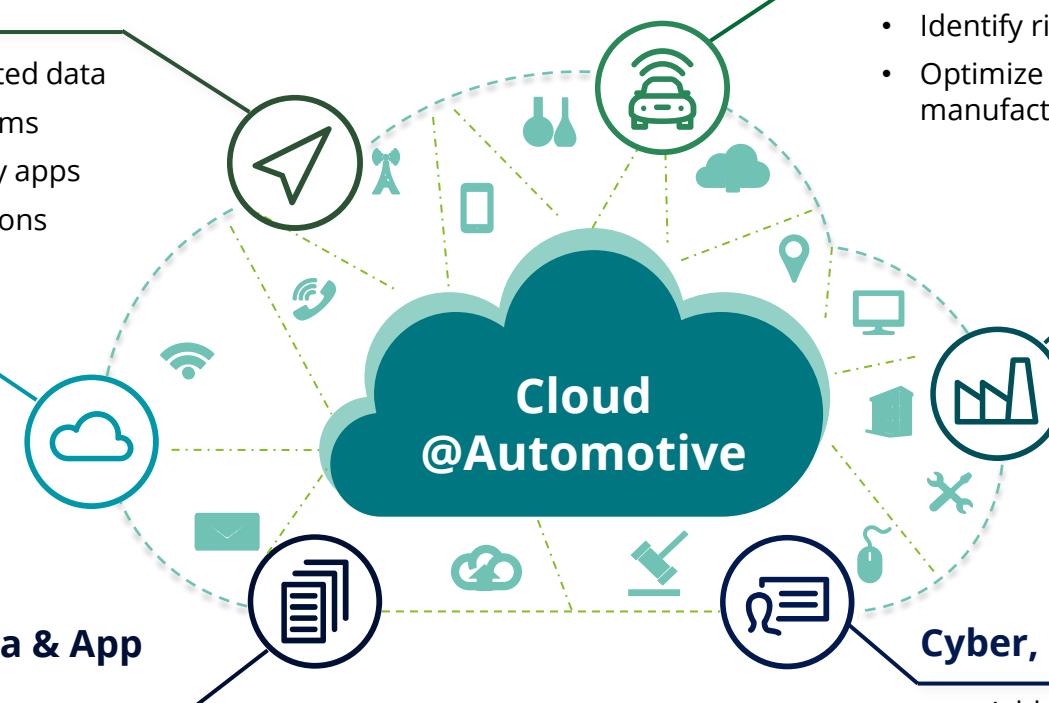
- Manage the vast amount of collected data
- Develop connected service platforms
- Develop new connected & mobility apps
- Use cloud analytics to make decisions

Autonomous Vehicle

- Accelerate time to market
- Create new business models
- Use multi-sourced data to plan & optimize deployment

Cloud Migration, Data & App Modernization

- Smart plan for reducing technical debt
- Modernize infrastructure, data and applications
- Optimize IT development & operations



- Predict machine failures
- Identify risk in my supply chain
- Optimize the efficiency and quality of manufacturing operation

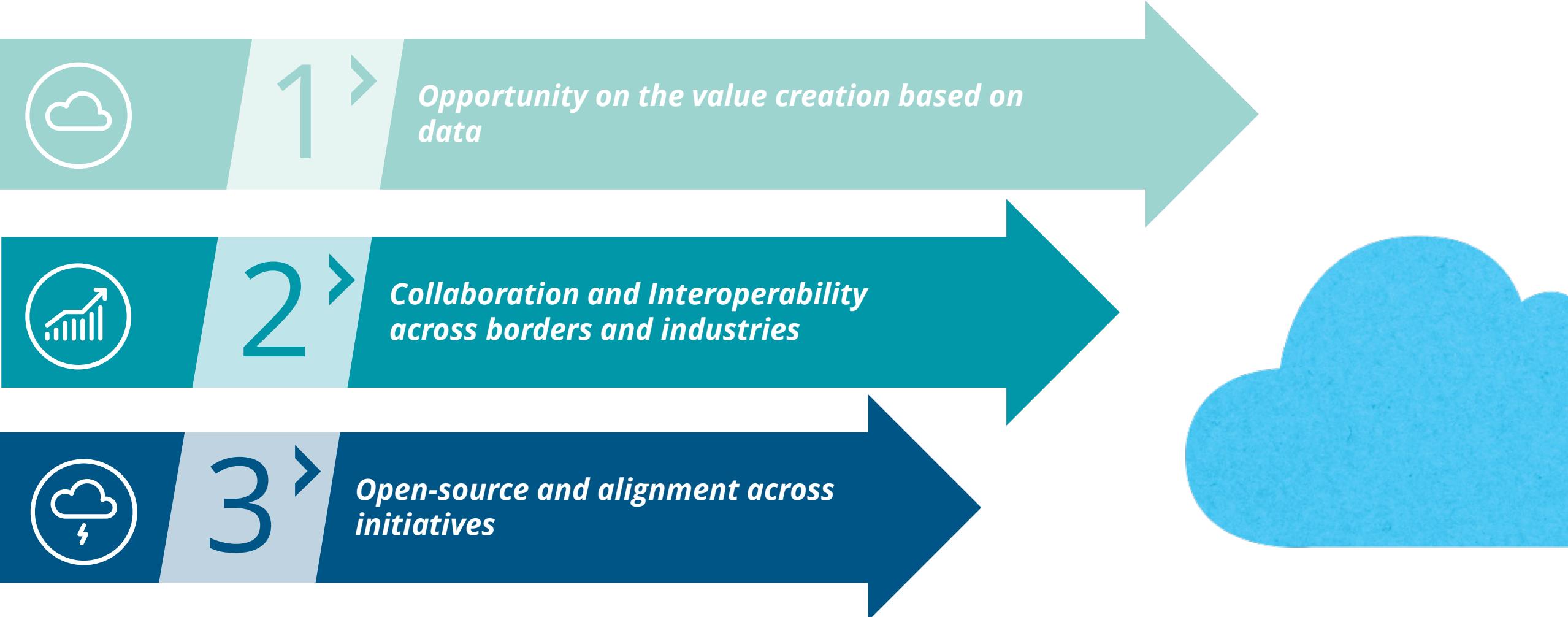
Digital Sales & Marketing

- Create new customer experiences for the buyer
- Enable new commerce and direct to consumer solutions
- Integrate data across the OEM to create a seamless experience for the customer

Cyber, Risk, and Regulatory

- Address cyber in approach to digitization, transformation and modernization
- Build resilience into operations
- Manage regulatory compliance

Some closing thoughts





Pierre Chastanet
*Head of Unit, Cloud &
Software,
DG CNECT, European
Commission*

Keynote

The rationale behind Simpl

The Simpl target

Requirements and architecture



Deloitte team



Meet the Deloitte project team



Hans Verheggen



Alfons Buxo Ferrer



Frédéric Berger



Alba Veislari



Alberto de Grado



Gerard Domènech



Jochem Hoes



Andrea Levay



Sébastien Scholaert



Adriaan Peeters



**Jorge Cantero
Gómez**



Kelly Morreels



Jose Francisco Valverde

Project context & objectives

Simpl, the smart middleware that will enable cloud-to-edge federations and support European data spaces...

- European businesses and public sector need to have access to resilient and competitive data storage and processing capacities
- The EU is enabling the deployment of European data spaces in both public and private sectors
- The EC is producing Simpl, an open source, multi-vendor, large-scale, modular and interoperable European middleware platform

...by:

- Developing the requirements, high-level architecture vision that will serve as a basis for the elaboration of the Minimum Viable Product (MVP)
- Developing an implementation roadmap to realise the vision of the smart middleware



Approach

Overview of project steps

1

Business and architecture requirements

- Analyse business use cases
- Define the business requirements and architecture requirements
- Define the high-level business processes

2

Architecture vision

- Analyse existing and relevant architectures
- Define architecture principles
- Develop the architecture vision

3

Technical requirements

- Perform market analysis of available vendor solutions and reusable building blocks
- Define information system and technology architectures requirements
- Define lifecycle requirements and the overall governance
- Define service level requirements

4

Implementation roadmap

- Define high-level activities for the implementation roadmap
- Create a cost model and estimate costs
- Elaborate recommendations for the implementation

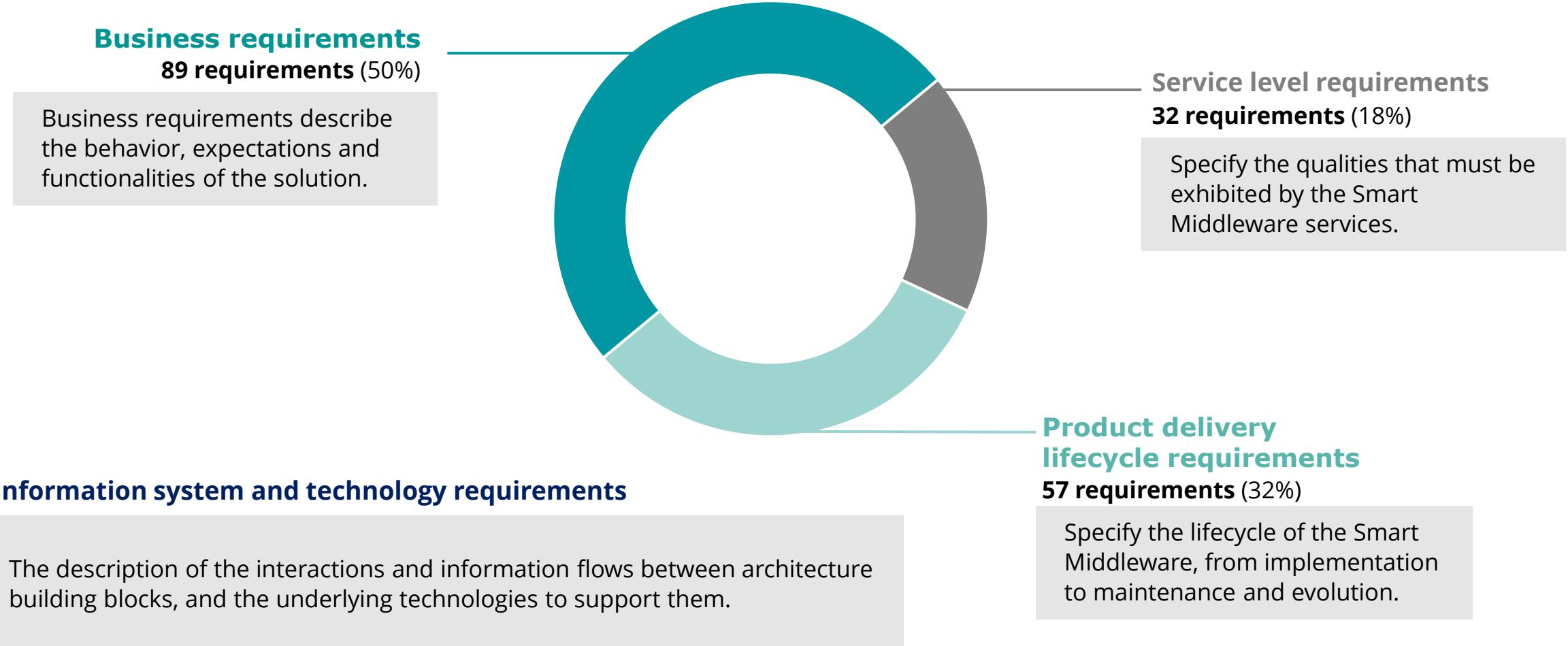
What is a data space?

A data space is an ecosystem of trusted partners, each of whom apply the same standards and rules to the storage and sharing of their data.



Simpl requirements

Identified product delivery lifecycle, service level, business & information system and technology requirements

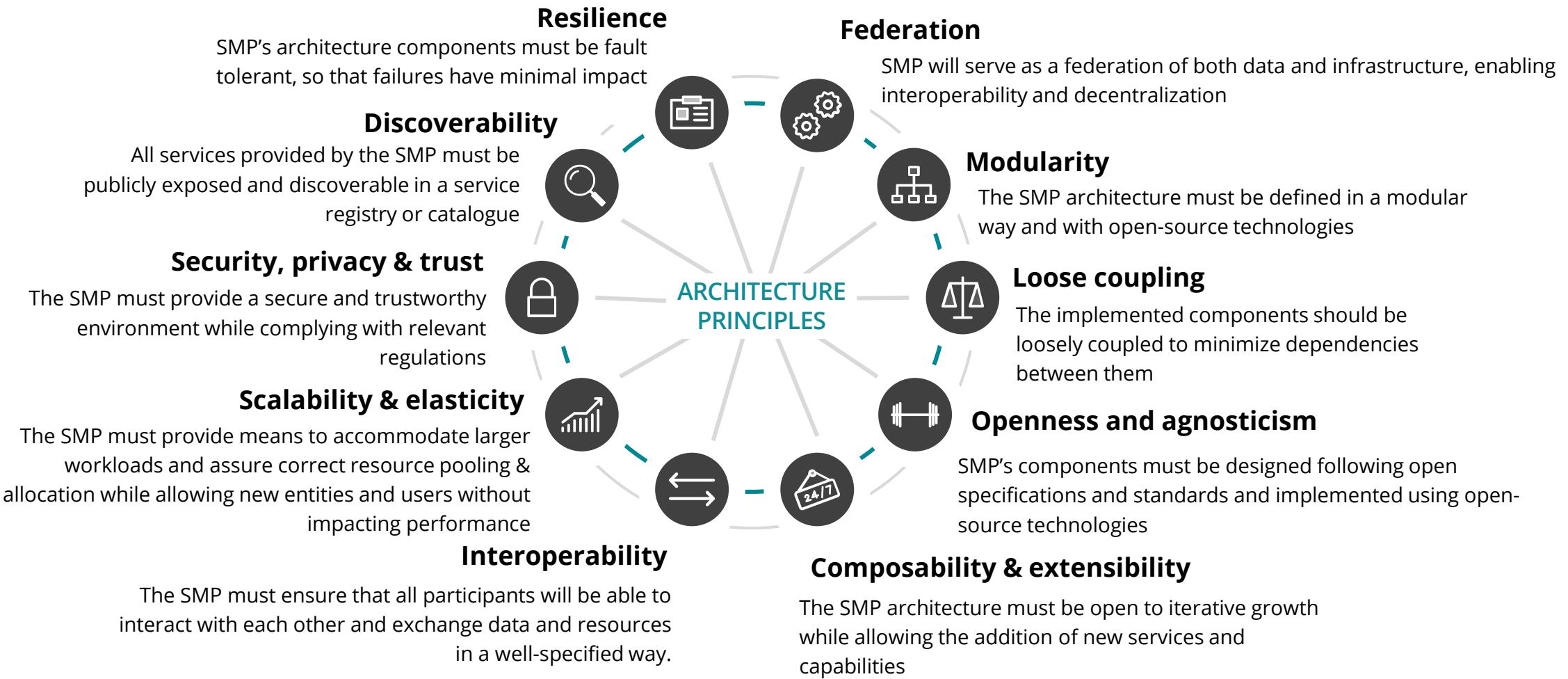


Simpl goals



Architecture principles

Ten guiding principles for designing the architecture of the open-source smart middleware platform

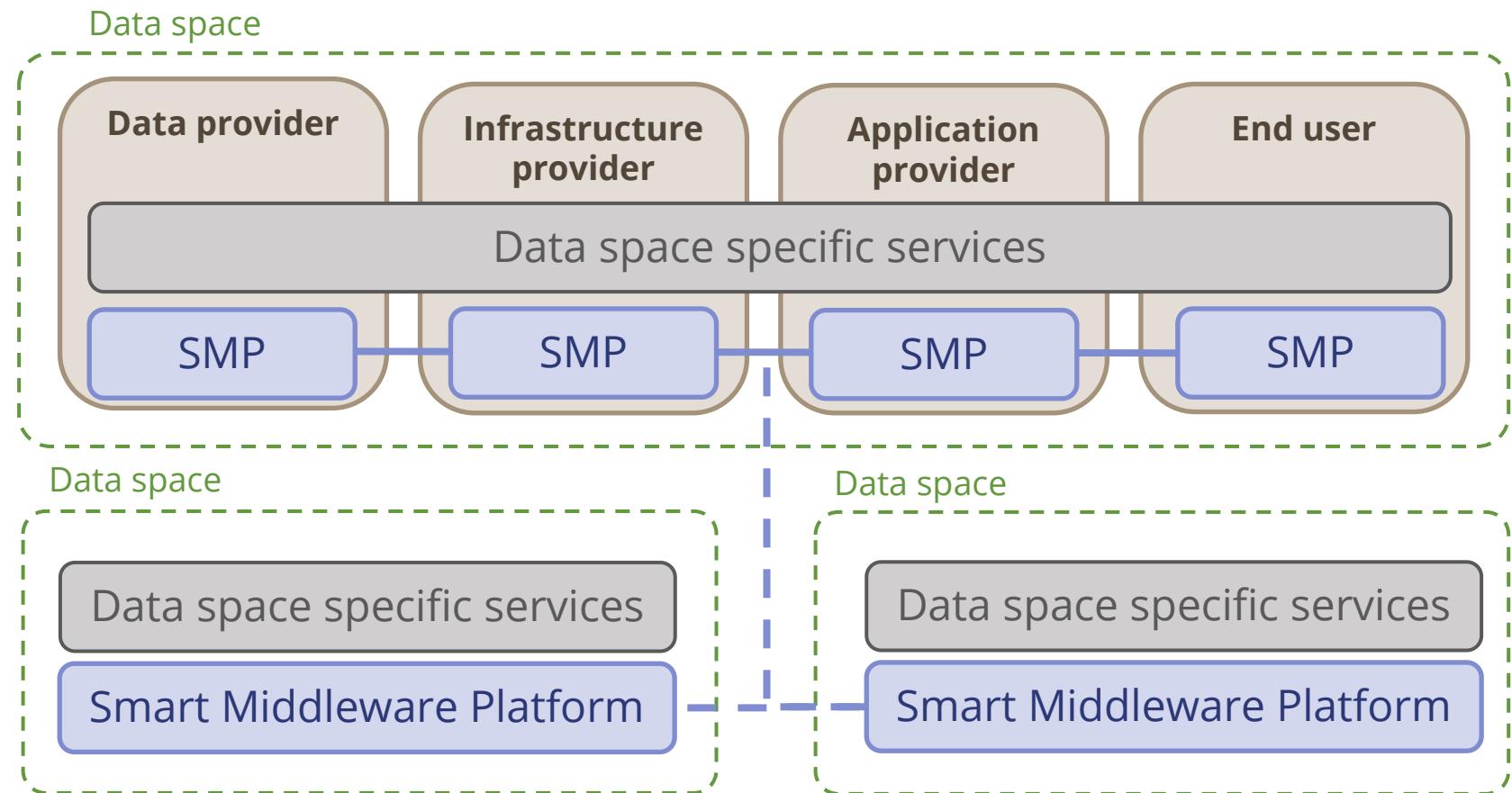


Simpl architecture vision (1/2)

EU data spaces built on top of the Smart Middleware Platform with interoperability

Key take aways

- The middleware provides common services on which data spaces can be built
- SMP components span across the four actor types, enabling them to share resources (data, applications, and infrastructure)
- Data space specific services add the ontologies, standards, or quality enforcements needed by the data space
- Interoperability between data spaces enabled through SMP

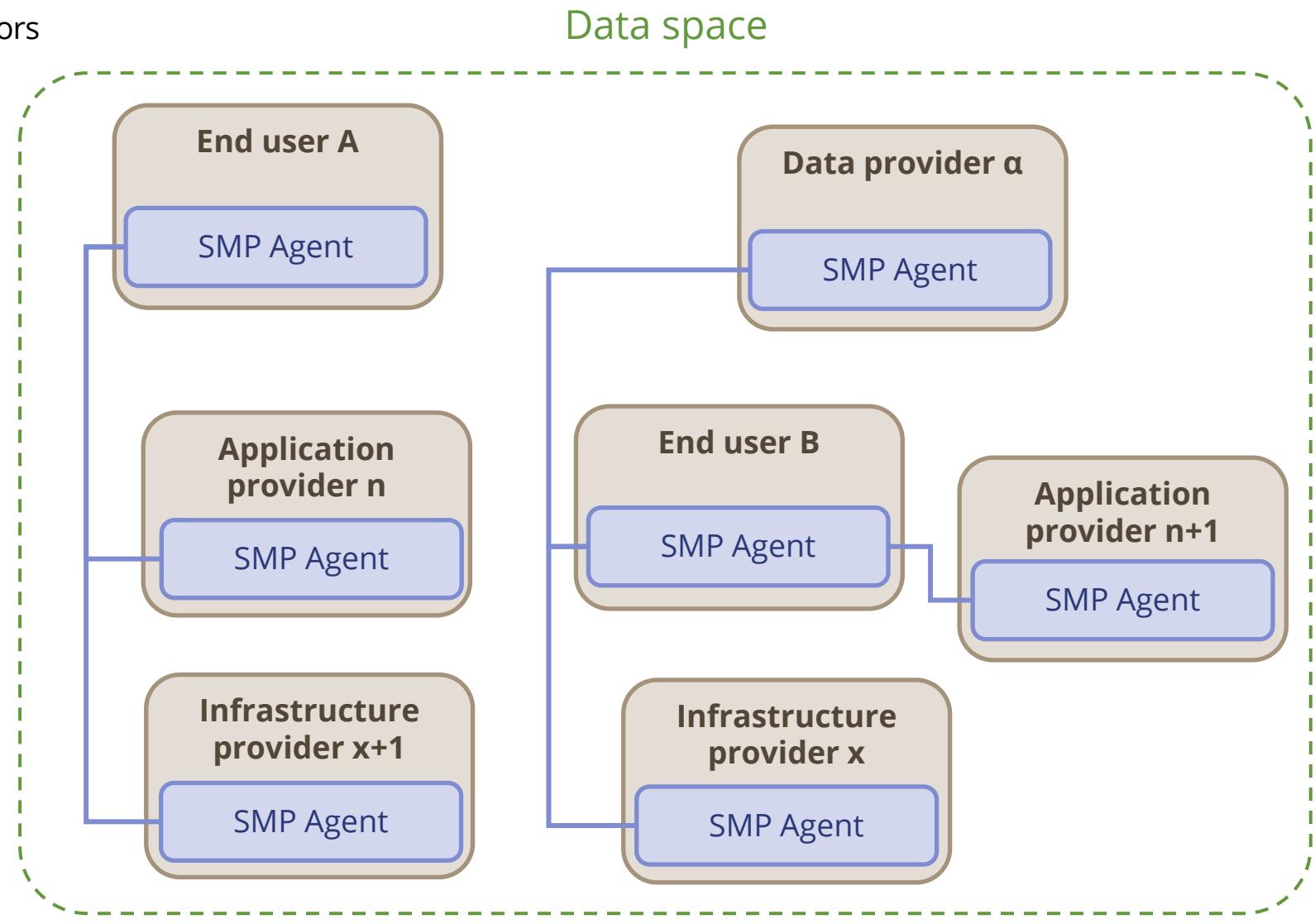


Simpl architecture vision (2/2)

Each data space is a federation of many actors

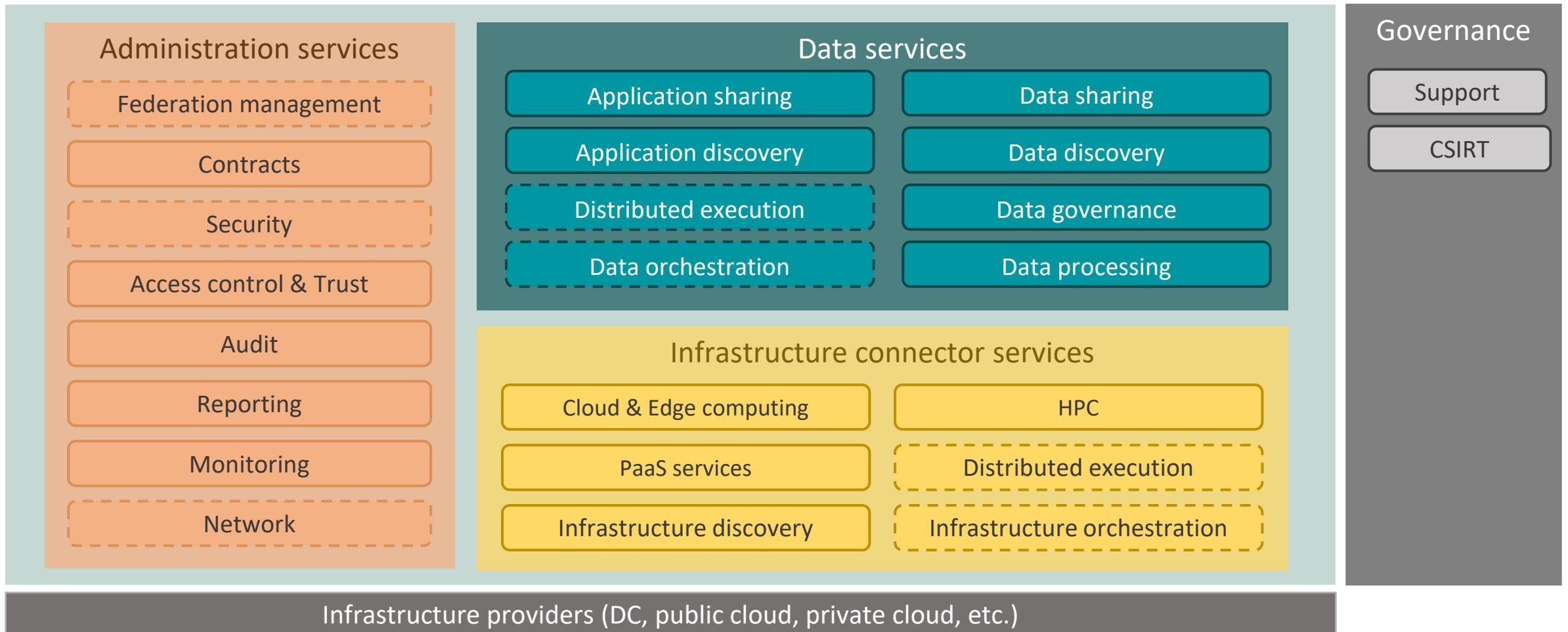
Key take aways

- SMP Agent = symbolic component to connect to data space federation
- Public and private organisations assume one or more actor roles and connect through the SMP Agent
- Actors are in charge of internal orchestration of resources they want to expose
- SMP Agent abstracts internal federation to open resources to a wider ecosystem



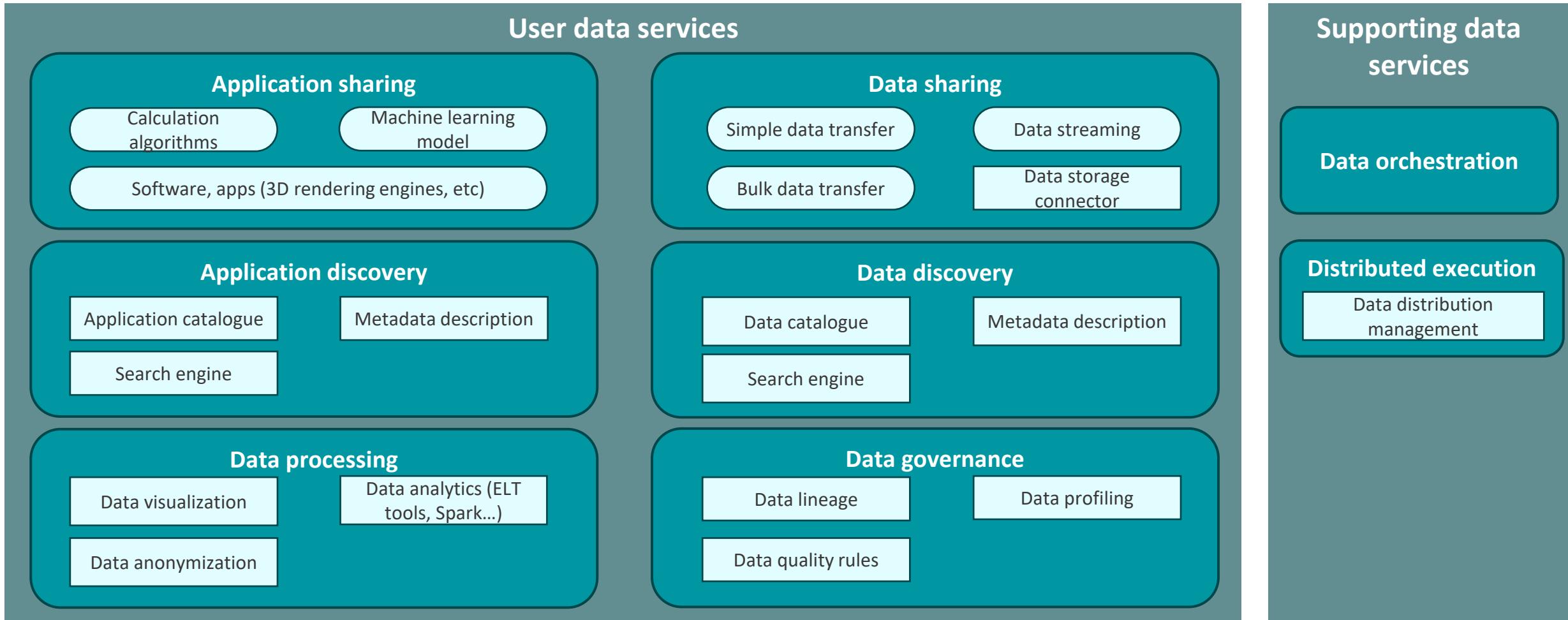
Simpl conceptual architecture (1/5)

Four architectural layers describe the capabilities of the Smart Middleware Platform



Simpl conceptual architecture (2/5)

Capabilities of the data services layer are subdivided into several building blocks

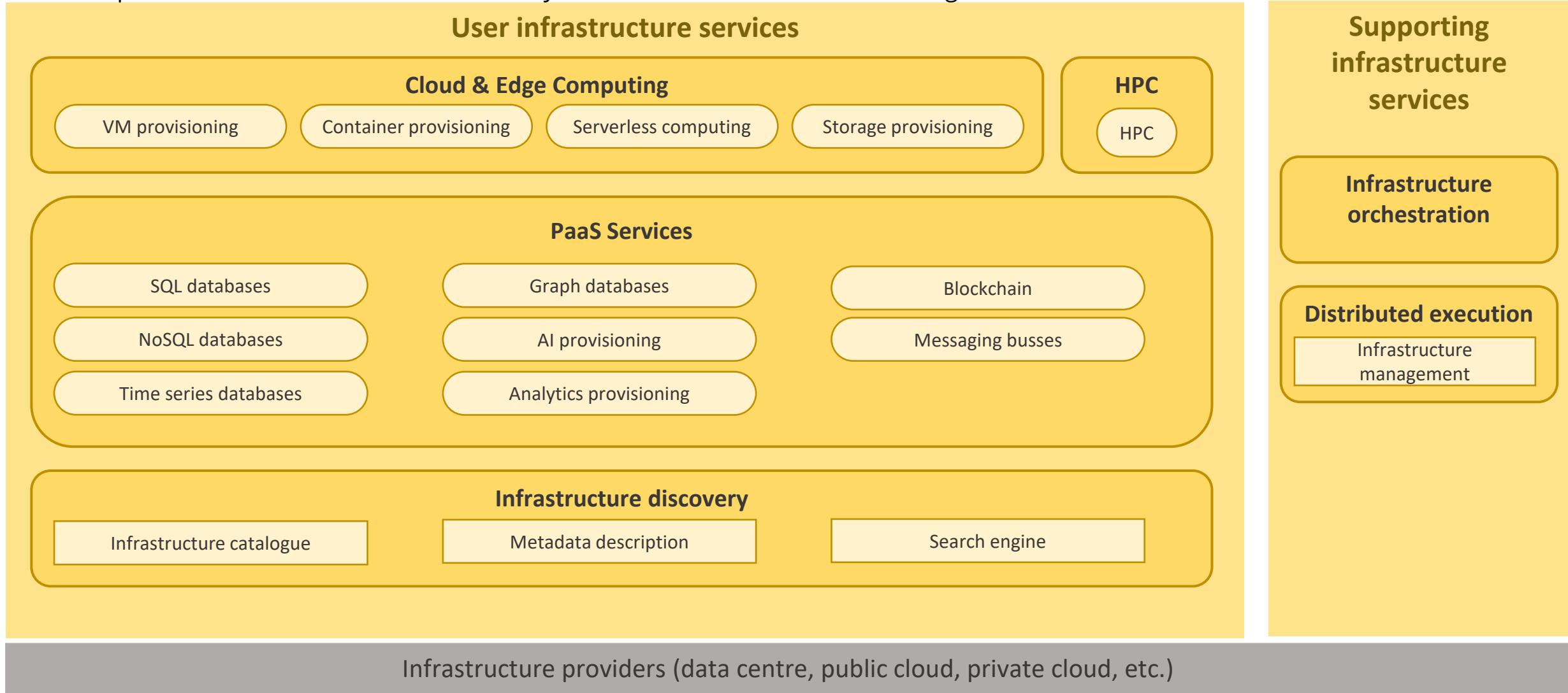


Legend: Access-through

Built-in

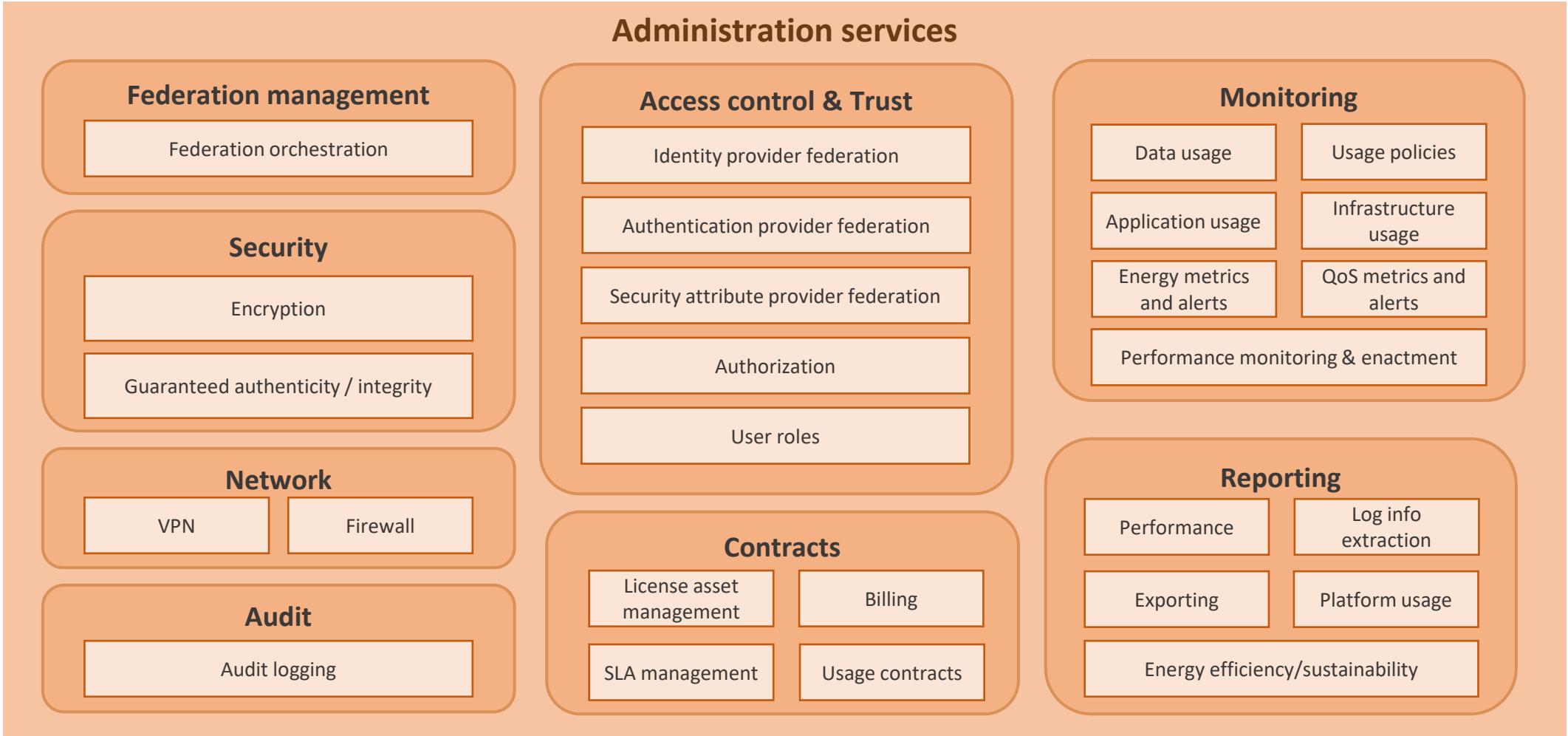
Simpl conceptual architecture (3/5)

Capabilities of the infrastructure services layer are subdivided into several building blocks



Simpl conceptual architecture (4/5)

Capabilities of the administration services layer are subdivided into several building blocks

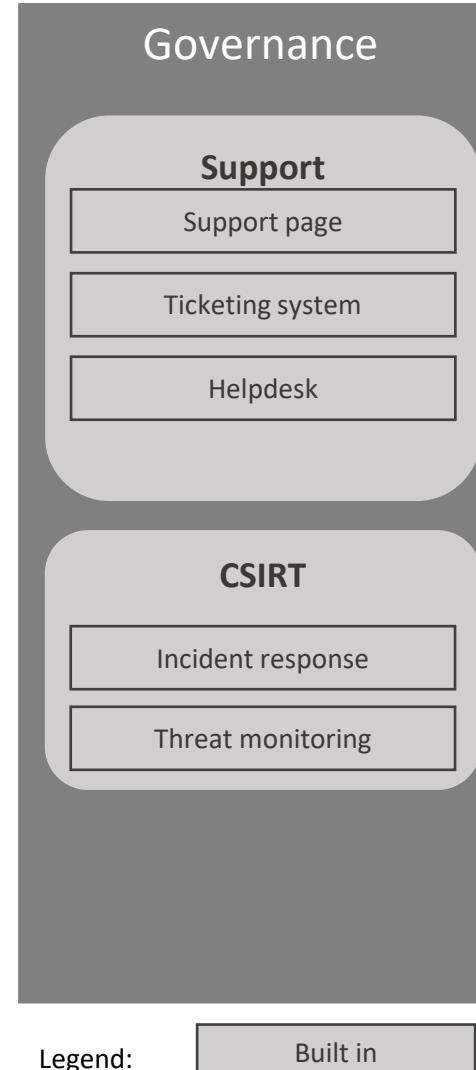


Legend:

Built-in

Simpl conceptual architecture (5/5)

Capabilities of the governance services layer are subdivided into several building blocks

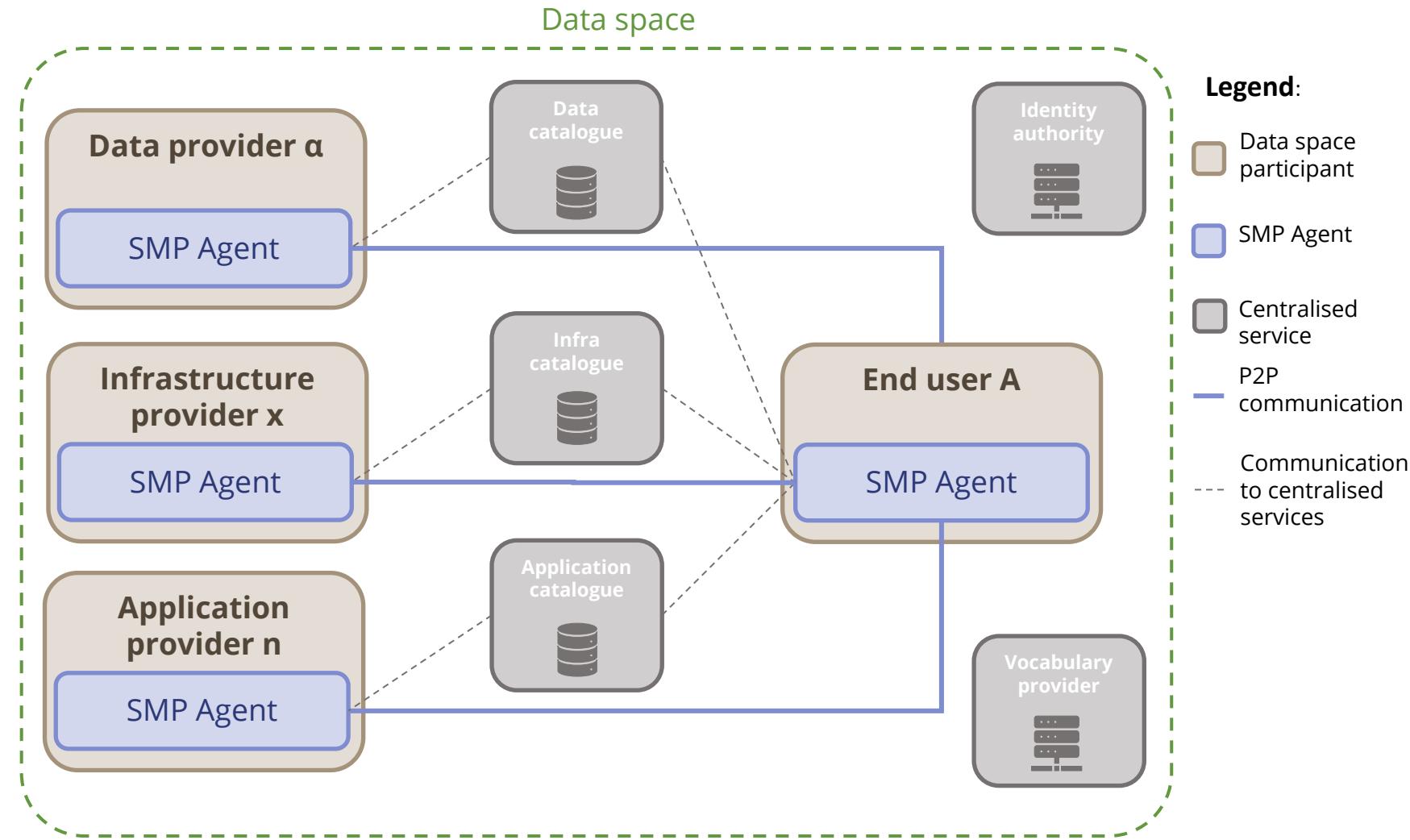


Simpl system architecture

The platform capabilities are mapped onto centralised and decentralised system components

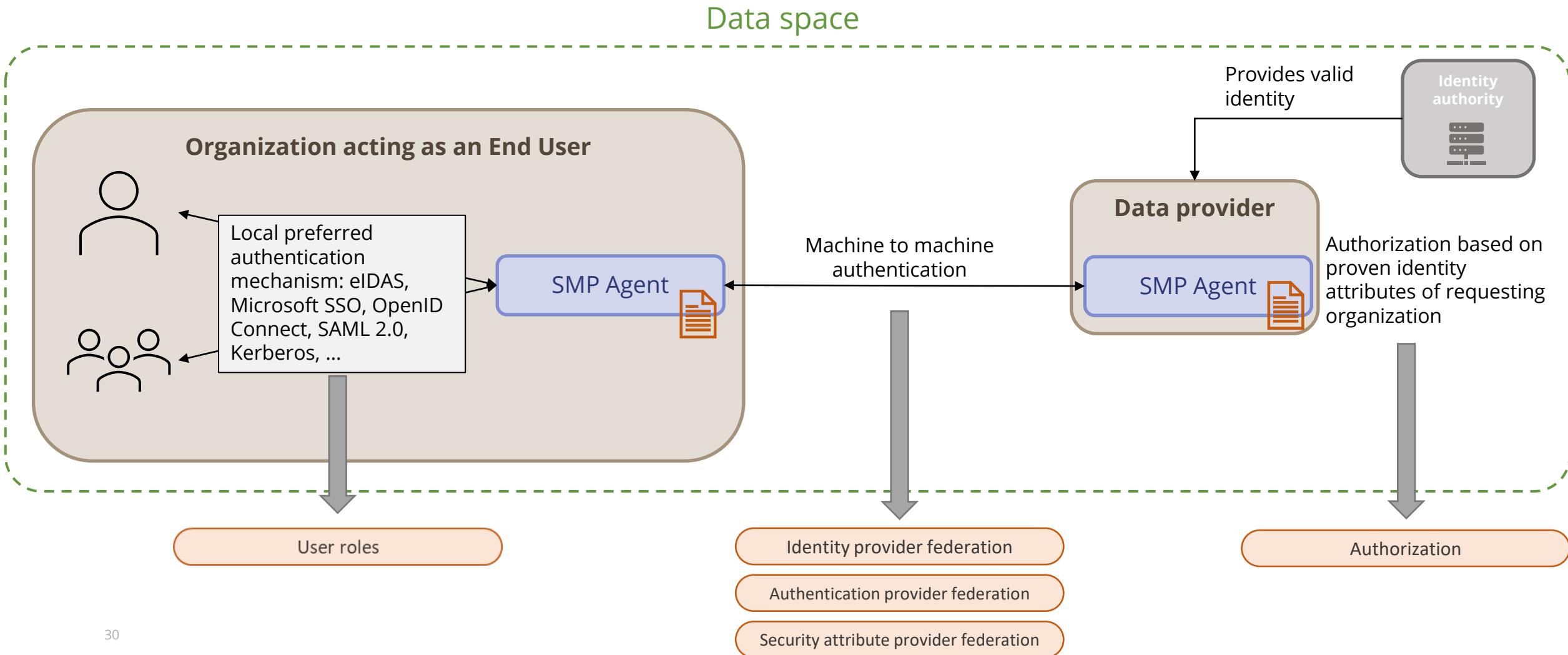
Key take aways

- *Data, Infrastructure and application catalogues* provide the cataloging service for end users to discover shared services in the data space
- *Vocabulary providers* provide the definition of metadata representation, vocabularies, and ontologies
- *Identity authorities* manage the identities of the data space participants and provides proofs that other participants can use for authentication and authorization



Some details on Simpl IAA

The Identification, authentication, and authorization happens in two tiers, a tier within the organisation and a tier within the data space

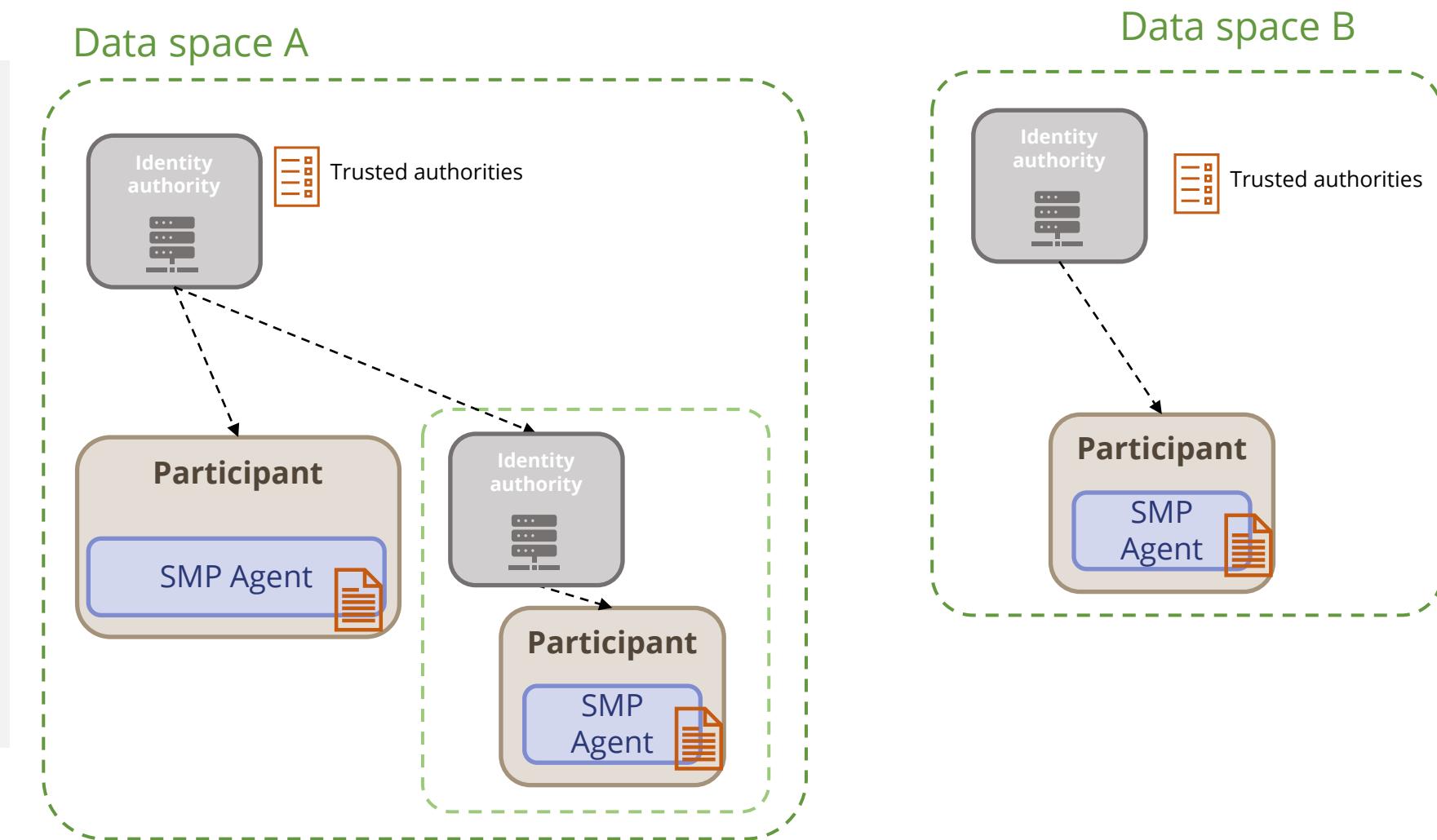


Federation of identities across data space

To be interoperable, data spaces must be able to trust identities of other data spaces

Key take aways

- Each data space builds a tree of trust with root at a single *Identity authority* of the data space
- Federating across data spaces through trust in each others root *Identity authority*
- Each root *Identity authority* manages list of trusted authorities that is distributed to data space participants



Information system and technology requirements

Seven high-coverage use cases detail the information flows between building blocks and the technologies to support them



On-boarding of a new participant



Provider adds resource to data space



End user searches data space



End user establishes usage contract with provider



End user uses data or applications from provider

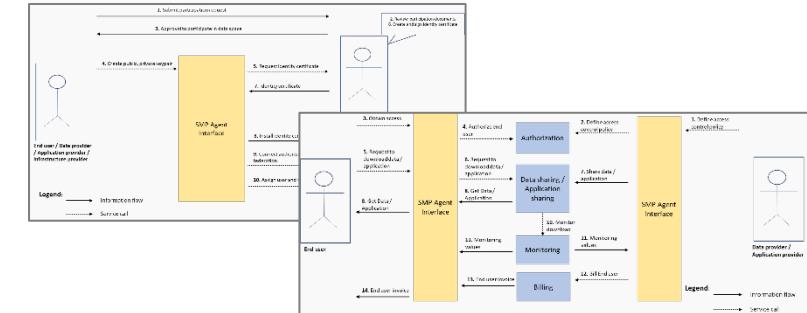


End user uses infrastructure from provider

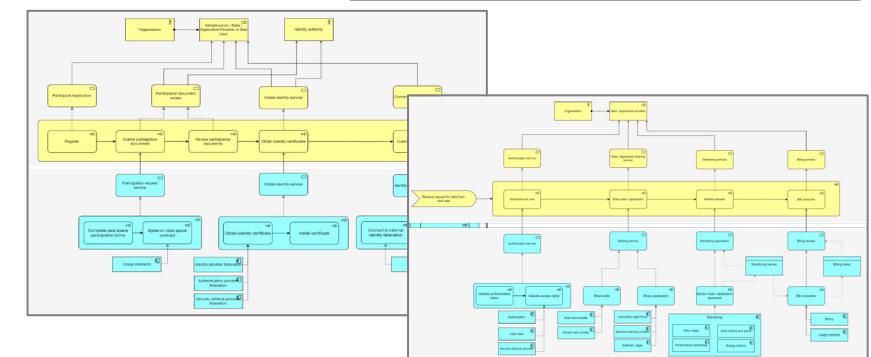


Data space governance audits participant

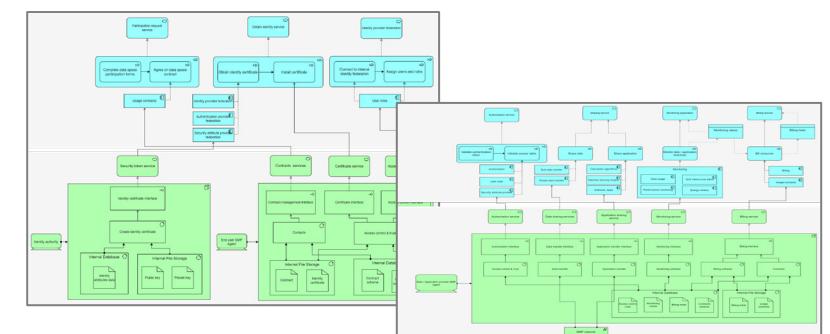
Context diagrams



Information system
ArchiMate
requirements



Technology
ArchiMate
requirements



A photograph of a concert crowd from behind, showing many people with their hands raised in the air. The stage area is visible in the background with bright lights creating vertical streaks.

Q&A

Go to menti.com







Simpl event agenda

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The Simpl plan

*Existing solutions, MVP roadmap,
and governance*



Deloitte team

Product coverage of Simpl building blocks

Selection made according to building block mapping within the Open-Source market possibilities as well as EU community usage

Infra. Layer (10 blocks)

EGI

7/10 fully covered



Data layer (18 blocks)

7/18 fully covered



Admin. Layer (23 blocks)

10/23 fully covered



Blocks not entirely covered by products

- Infrastructure layer weak building block (BB) coverage:
 - Serverless computing
 - PaaS services
- Data layer weak BB coverage:
 - Software, apps
 - Anonymisation
 - Streaming
 - Quality rules
- Administration layer weak BB coverage:
 - License asset management
 - Usage contracts
 - SLA management

OpenStack

8/10 fully covered



VanillaStack

8/10 fully covered



Linux Foundation

10/10 fully covered



X - Road

Doesn't apply to this layer



15/23 fully covered

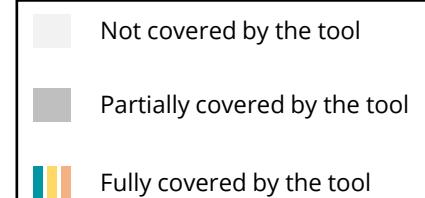


Apache

Doesn't apply to this layer

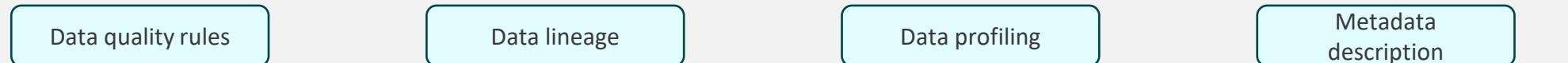
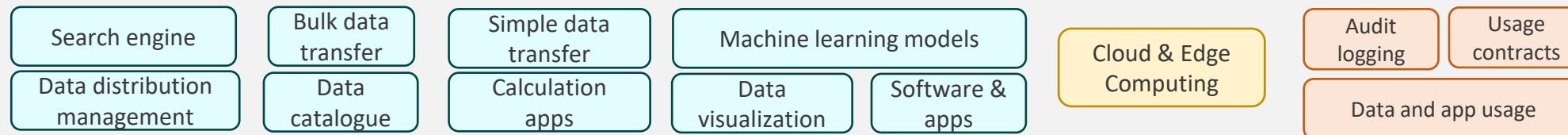


Doesn't apply to this layer



Complementary components

In addition to the main products mapping, a variety of open-source initiatives provide potentially useful tooling for specific SMP capabilities



Legend:

- Data layer BB (light blue)
- Infrastructure layer BB (yellow)
- Administration layer BB (orange)

Simpl capabilities distribution

The features to be delivered in three milestone releases and the two consecutive years

Administration services	Infrastructure services	Data services	Governance
<p>Contract</p> <ul style="list-style-type: none"> - License asset management - Billing - SLA management - Usage contracts <p>Access Control & trust</p> <ul style="list-style-type: none"> - Authentication provider federation - Security attribute provider federation - Identity provider federation - User roles - Authorization <p>Monitoring</p> <ul style="list-style-type: none"> - Data usage - Usage policies - Application usage - Infrastructure usage - Energy metrics and alerts - QoS metrics and alerts - Performance monitoring & enactment <p>Security</p> <ul style="list-style-type: none"> - Encryption - Guaranteed authenticity/ integrity <p>Reporting</p> <ul style="list-style-type: none"> - Performance - Exporting - Log info extraction - Platform usage - Energy efficiency/ sustainability <p>Federation management – Federation orchestration</p> <p>Audit logging – Audit</p> <p>Supporting – Network</p> <ul style="list-style-type: none"> - VPN - Firewall 	<p>Cloud Computing & Edge Computing</p> <ul style="list-style-type: none"> - VM provisioning - Container provisioning * - Serverless computing - Storage provisioning <p>HPC – HPC</p> <p>PaaS Services</p> <ul style="list-style-type: none"> - SQL databases - NoSQL databases - Time series databases - Graph databases - AI provisioning - Blockchain - Messaging busses - Analytics provisioning <p>Infrastructure discovery</p> <ul style="list-style-type: none"> - Infrastructure catalogue - Metadata description - Search engine <p>Supporting – Infrastructure orchestration</p> <p>Supporting – Distributed Execution – Infrastructure management</p>	<p>Application sharing</p> <ul style="list-style-type: none"> - Calculation algorithms - Machine learning model - Software, apps <p>Data sharing</p> <ul style="list-style-type: none"> - Bulk data transfer ** - Simple data transfer ** - Data streaming - Data store connector <p>Data processing</p> <ul style="list-style-type: none"> - Data visualization - Data analytics tools - Data anonymisation <p>Data governance</p> <ul style="list-style-type: none"> - Data lineage - Data profiling - Data quality rules <p>Data discovery</p> <ul style="list-style-type: none"> - Data catalogue - Metadata description - Search engine <p>Application discovery</p> <ul style="list-style-type: none"> - Application catalogue - Metadata description - Search engine <p>Supporting – Distributed execution – Data distribution management</p> <p>Supporting – Data orchestration</p>	<p>Support</p> <ul style="list-style-type: none"> - Support page - Ticketing system - Helpdesk <p>CSIRT</p> <ul style="list-style-type: none"> - Incident response - Threat monitoring

* A simplified version of container provisioning will be part of the MVP. This functionality may be improved in the consecutive releases.

** This includes data transfer with various protocols.

Simpl capabilities distribution

Prioritisation of capabilities based on workshops, feasibility and dependencies



Administration services	Infrastructure services	Data services	Governance
<p><i>Contract</i></p> <ul style="list-style-type: none"> - License asset management - Usage contracts <p><i>Access Control & trust</i></p> <ul style="list-style-type: none"> - Authentication provider federation - Security attribute provider federation - Identity provider federation - User roles - Authorization <p><i>Monitoring</i></p> <ul style="list-style-type: none"> - Data usage - Usage policies <ul style="list-style-type: none"> - QoS metrics and alerts - Performance monitoring & enactment <p><i>Security</i></p> <ul style="list-style-type: none"> - Encryption - Guaranteed authenticity/ integrity <p><i>Reporting</i></p> <ul style="list-style-type: none"> - Log info extraction - Platform usage <p><i>Federation management</i></p> <p><i>Audit logging – Audit</i></p> <p><i>Supporting – Network</i></p>	<p>Infrastructure services</p> <p><i>Cloud Computing & Edge Computing</i></p> <ul style="list-style-type: none"> - Container provisioning * <p><i>HPC</i></p> <p><i>PaaS Services</i></p> <p><i>Infrastructure discovery</i></p> <p><i>Supporting</i></p> <p><i>Supporting</i></p>	<p>Data services</p> <p><i>Application sharing</i></p> <p><i>Data sharing</i></p> <ul style="list-style-type: none"> - Bulk data transfer ** - Simple data transfer ** - Data store connector <p><i>Data processing</i></p> <p><i>Data governance</i></p> <ul style="list-style-type: none"> - Data quality rules <p><i>Data discovery</i></p> <ul style="list-style-type: none"> - Data catalogue - Metadata description - Search engine <p><i>Application discovery</i></p> <p><i>Supporting</i></p> <p><i>Supporting – Data orchestration</i></p>	<p>Governance</p> <p><i>Support</i></p> <ul style="list-style-type: none"> - Support page - Ticketing system - Helpdesk <p><i>CSIRT</i></p>

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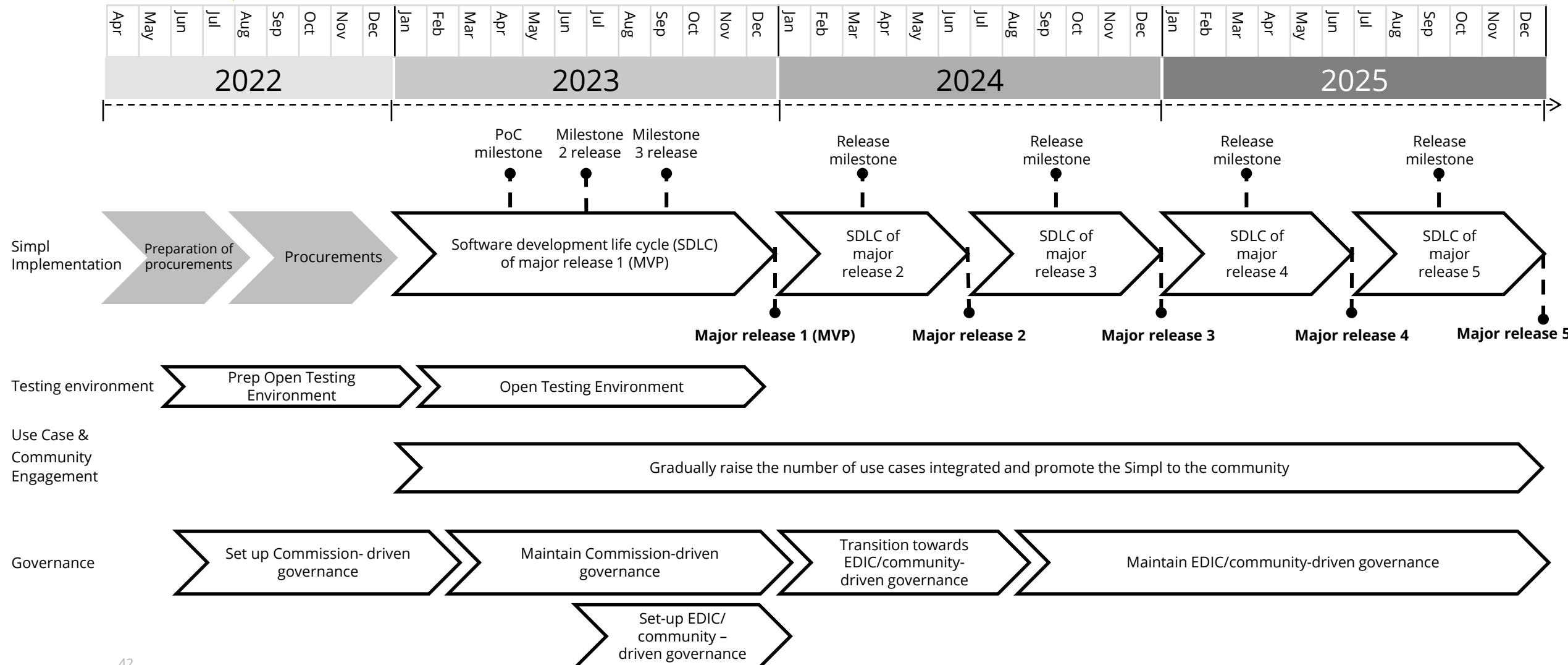
Guiding principles for the implementation roadmap

We were following a set of guiding principles throughout the creation of the Simpl implementation roadmap

-  The solution shall be designed and developed for, then tested by multiple use cases to ensure that it satisfies the needs and the requirements of multiple stakeholders.
-  Regular demonstrations shall be organised with the project stakeholders, so that they can provide early feedback; and therefore, the tunnel effect can be avoided this way.
-  A reliable schedule needs to be established to inform all parties involved in the development about planned implementation timeline.
-  Each release shall be made available for the project stakeholders including the community, so that the user acceptance test can be performed in a timely manner by them.
-  The documentation and the specifications of the components shall be continuously maintained and regularly published for the community.

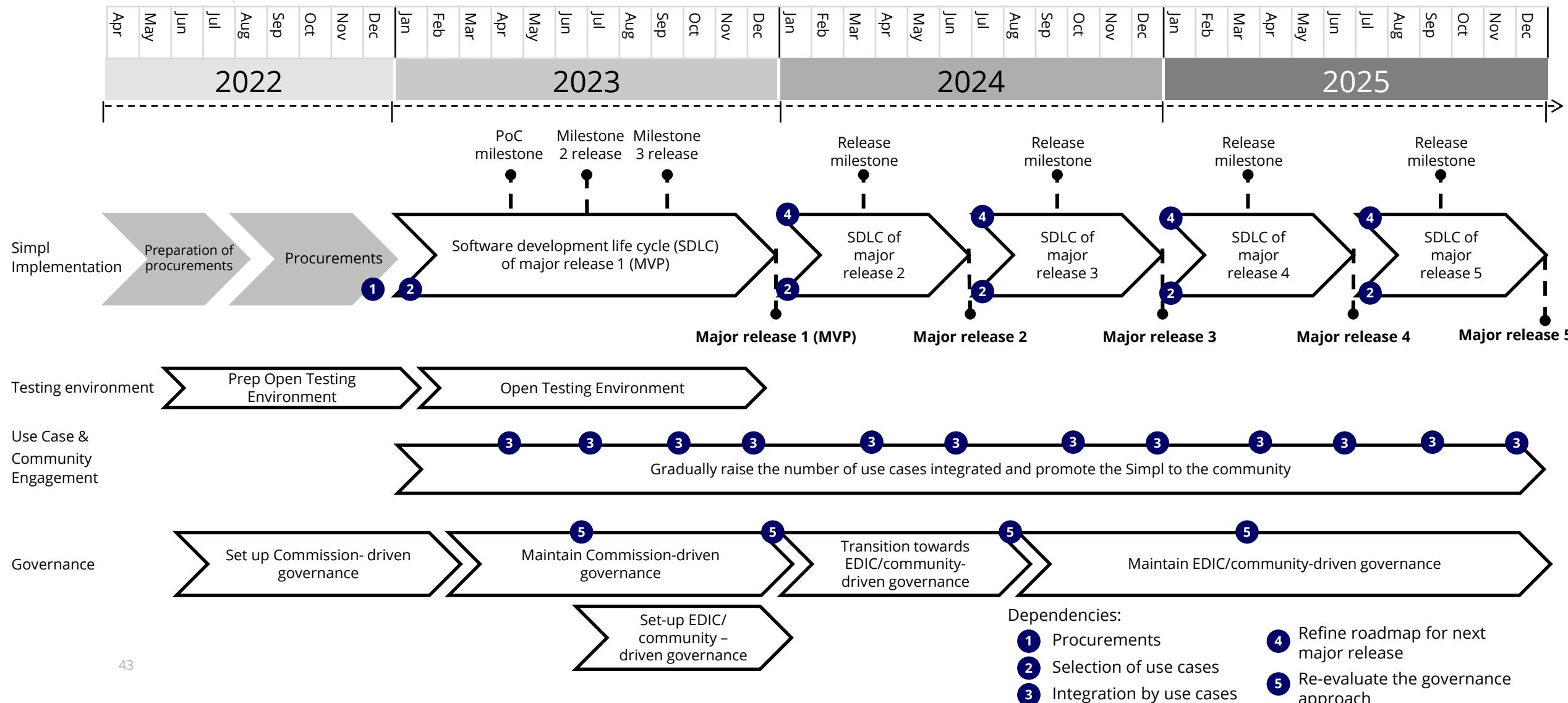
High-level implementation roadmap

Implementation roadmap covering the MVP development and the consecutive two years afterwards



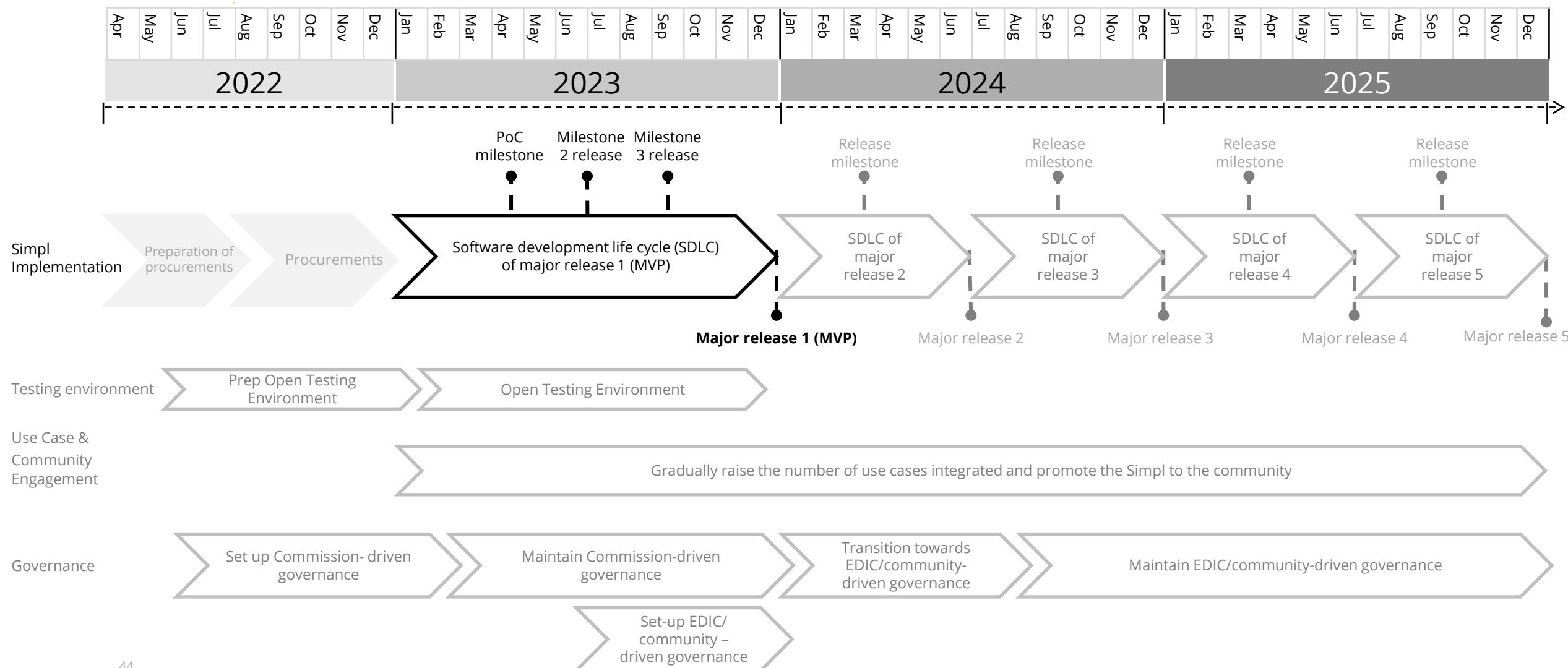
High-level implementation roadmap with dependencies

Dependencies related to the different Simpl releases & use case & community engagement



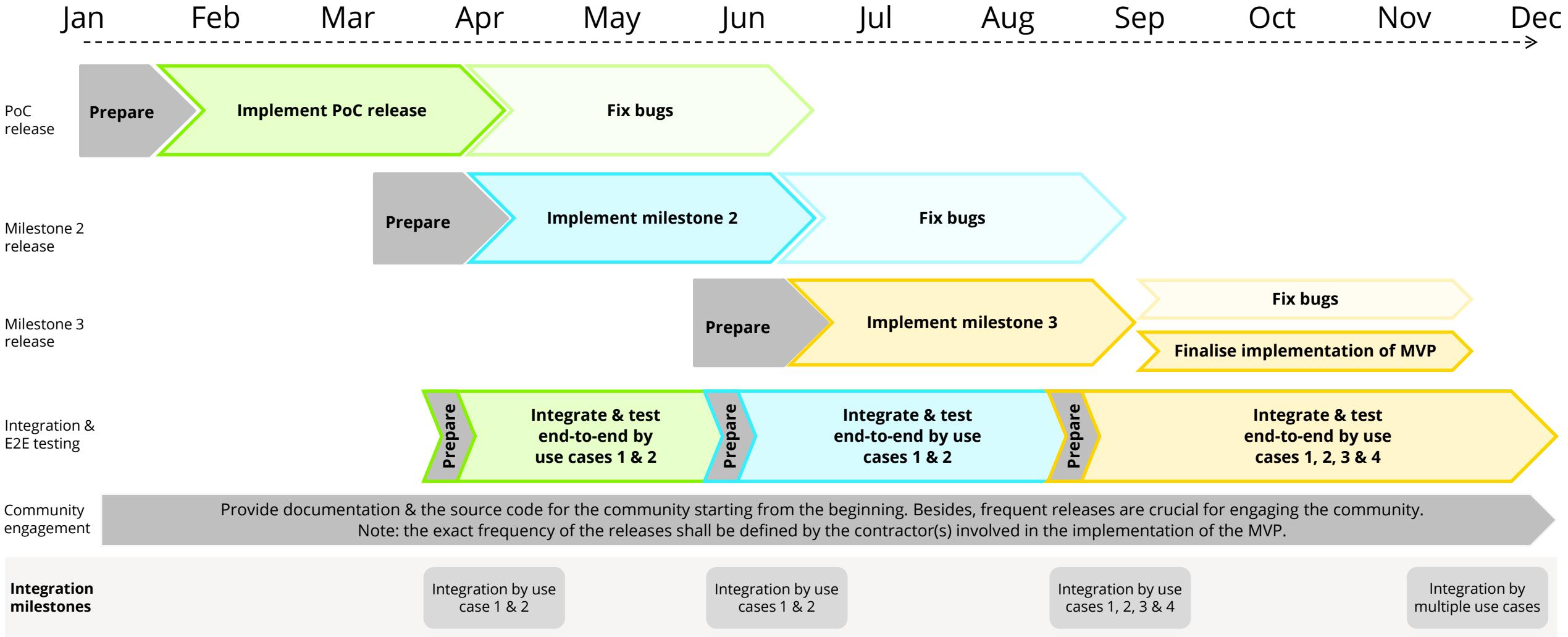
MVP implementation in the roadmap

MVP implementation within the high-level implementation roadmap



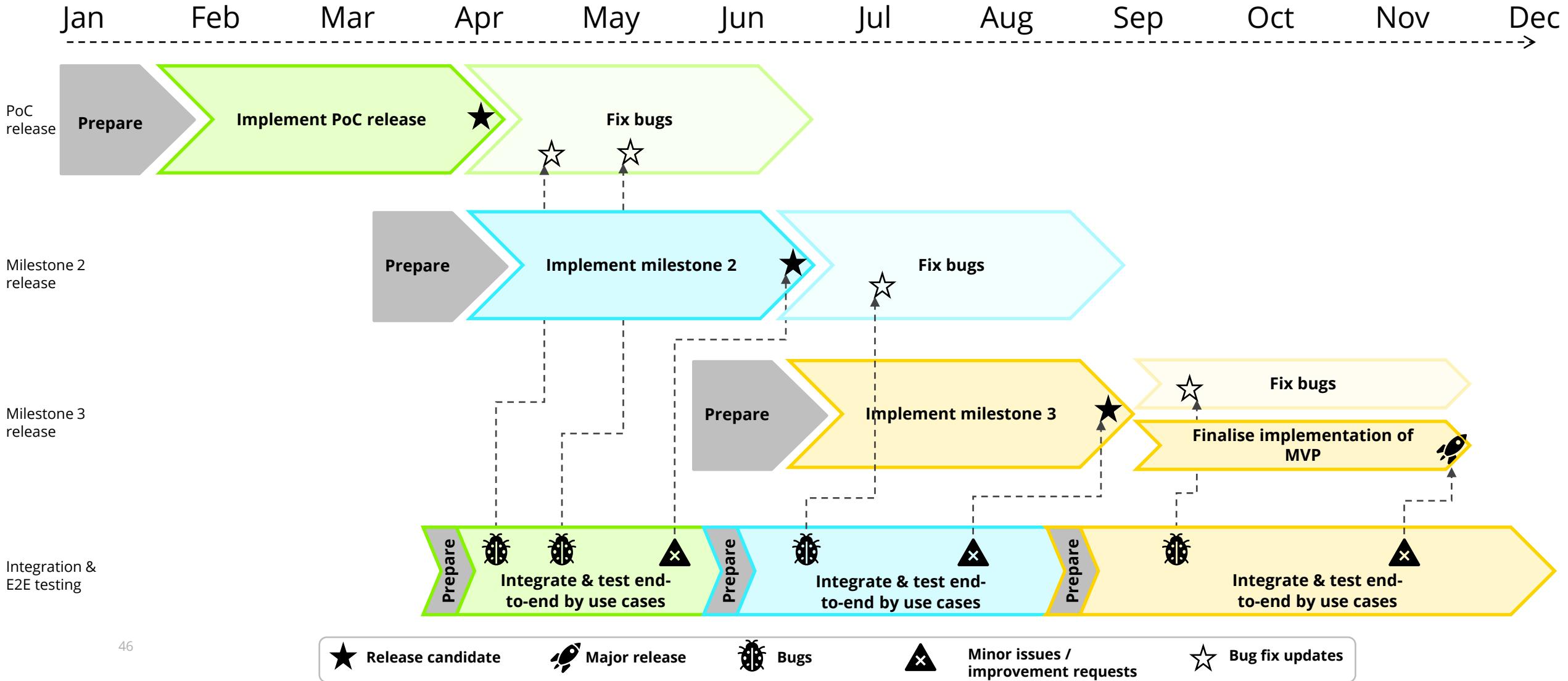
MVP implementation roadmap 2023

High-level overview of the MVP implementation



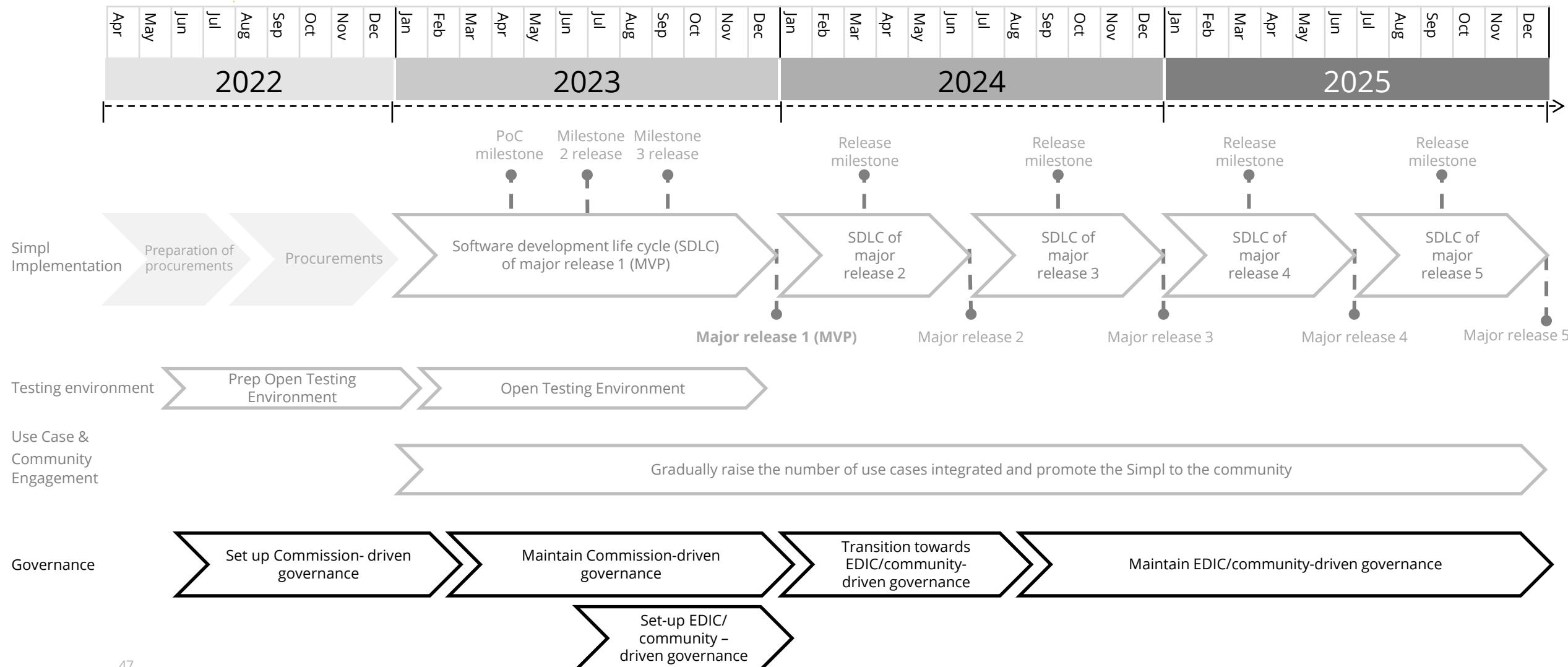
MVP implementation roadmap 2023

Organisation of the milestone releases, major release and bug fix updates



Two governance models for the SMP

Setting up and maintaining two governance models for the MVP development and Simpl development



Governance for the development, testing & deployment

Leveraging the PM² methodology as a base for the governance of the development, testing & deployment phases of Simpl

Business Governing layer:
Vision and strategy determination.

Simpl Governance Board

Business Owner
(Head of Unit from the corresponding DG)

Product Owner
(Head of Unit from the corresponding DG)

Member States

Steering layer:
General project direction and guidance.

Project Steering Committee

European Commission's side

Contractors' side

Change Advisory Board

Directing layer:
Mobilisation & monitoring.

Business Owner

Product Owner

Contractor 1 supporting DG CNECT in driving the project

Contractor 2 Project Director

Contractor 3 Project Director

Contractor 4 Project Director

Contractor 5 Project Director

Senior representative of business case 1

Senior representative of business case 2

Managing layer:
Day-to-day operation management.

Collaboration & Communication

European Commission Project Manager

Contractor 1 Project Manager

Contractor 2 Project Manager

Contractor 3 Project Manager

Contractor 4 Project Manager

Contractor 5 Project Manager

Performing layer:
Project work, implementation & deliverable creation.

European Commission Subject Matter Experts

Contractor 1 Core Team supporting DG CNECT with project work

Contractor 2 Core Team in charge of development

Contractor 3 Core Team in charge of deployment

Contractor 4 Core Team in charge of testing

Contractor 5 Core Team in charge of support

Community Members

Governance

Advises & Decides

Some Decision power

Acts

Operational

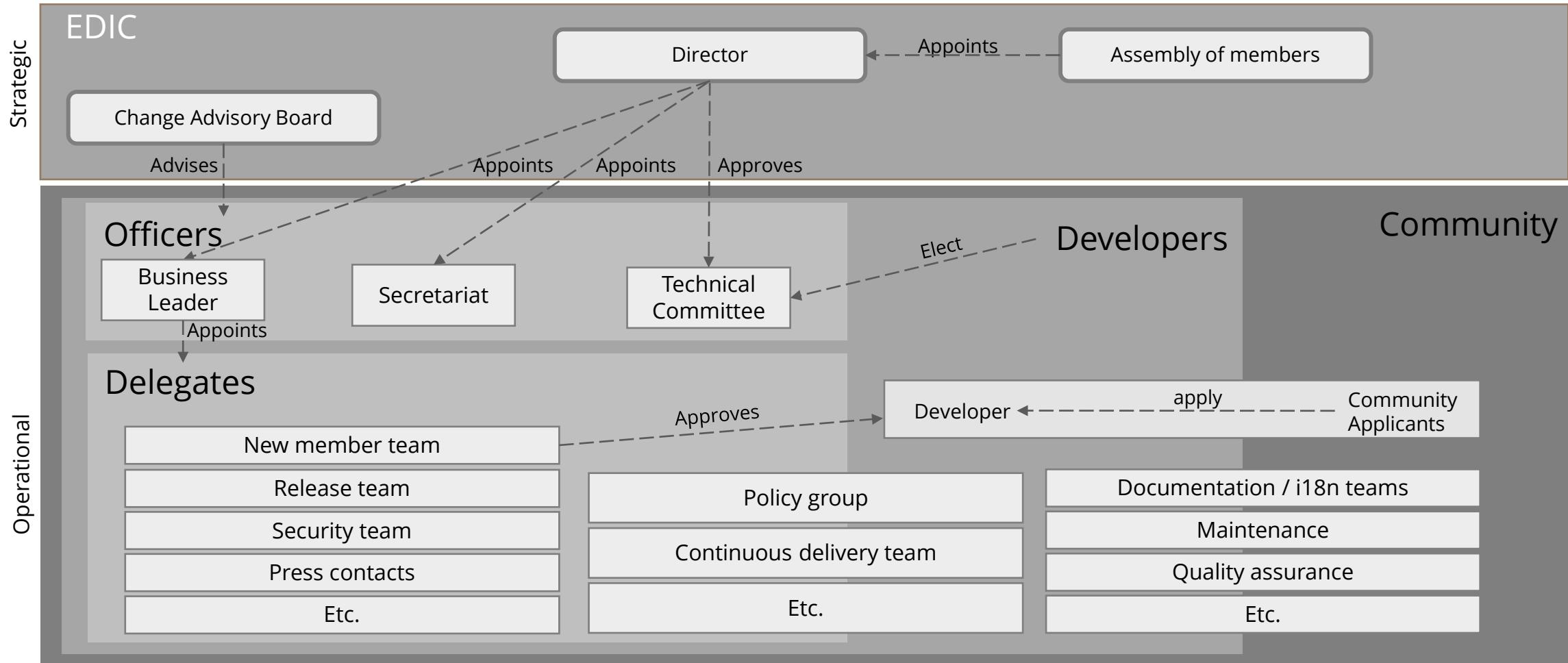
Supports (Optional)

Project Team

Advises

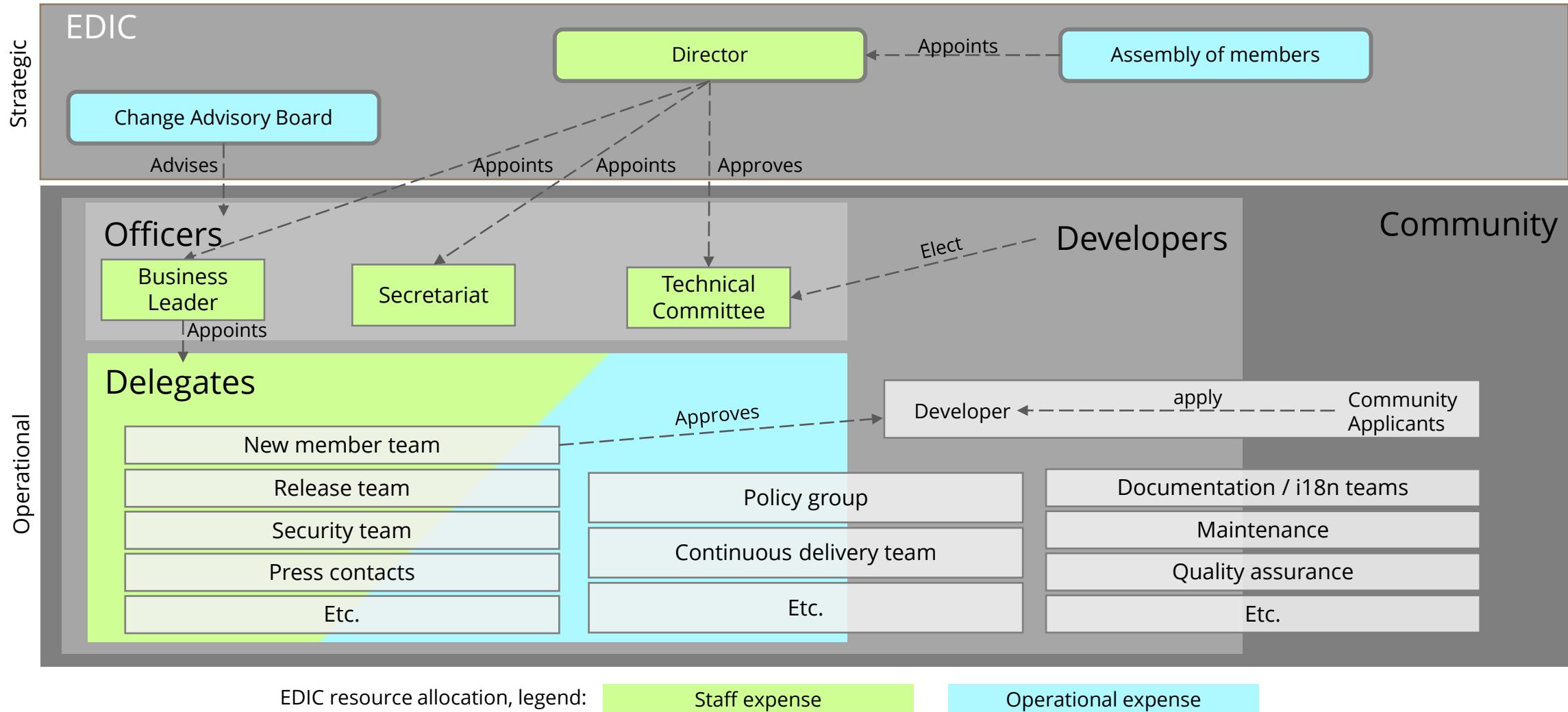
EDIC/community-driven governance model

Governance model for the SMP based on regulation 2021/0293 (COD) and combining key ideas from Open Source governance models



EDIC/community-driven governance model

Different types of expenses are assigned depending on type of role and the commitment level



A photograph of a concert crowd from behind, showing many people with their hands raised in the air. The stage area is visible in the background with bright lights creating vertical streaks.

Q&A

Go to menti.com





Mateo Manuel Goyet
*Deputy Head of Unit, DG
CNECT E2*

Looking ahead



Hans Verheggen
*Partner,
Technology Strategy,
Deloitte Consulting*

Closing remarks

