Network Infrastructure to APIs – How Open Source Enables Speed of Innovation and Monetization

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LEADING DIGTAL TELCO

LEADING
TELCO BRAND

#1 **EUROPEAN** BRAND

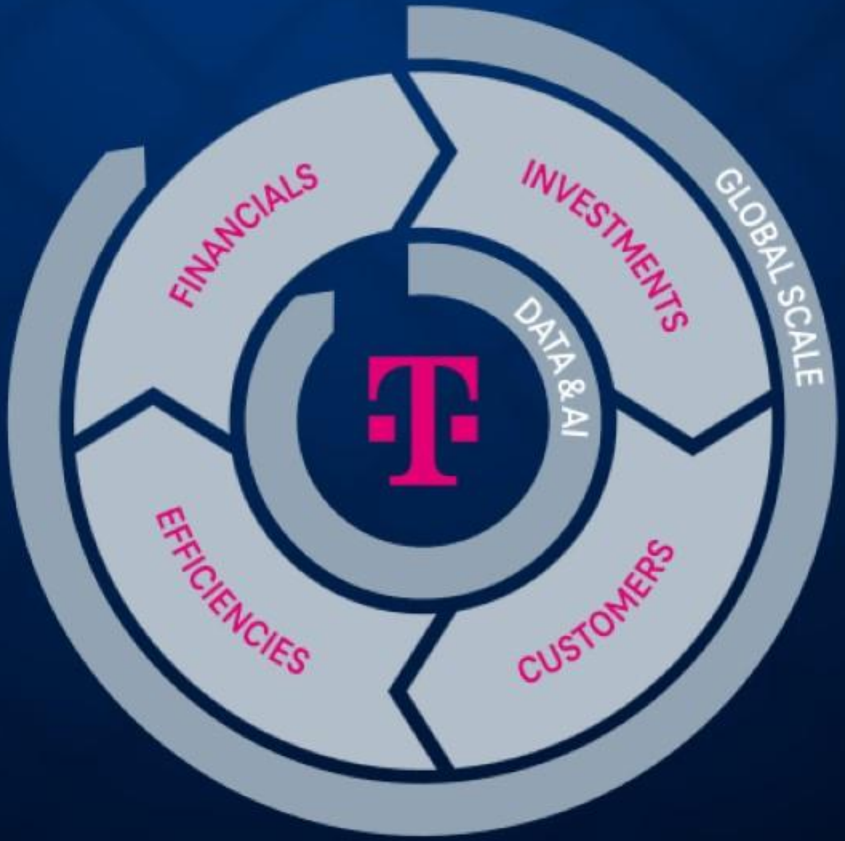
#1 **GLOBAL** TELCO BRAND

#9 **GLOBAL BRAND**

LEADING
IN AUTOMATION

~ 70% AUTOMATED TICKET RESOLUTION

~ 1 min RACK PROVISIONING **FROM 1 DAY TO 1 MIN**



UNMATCHED
NETWORK LEADER

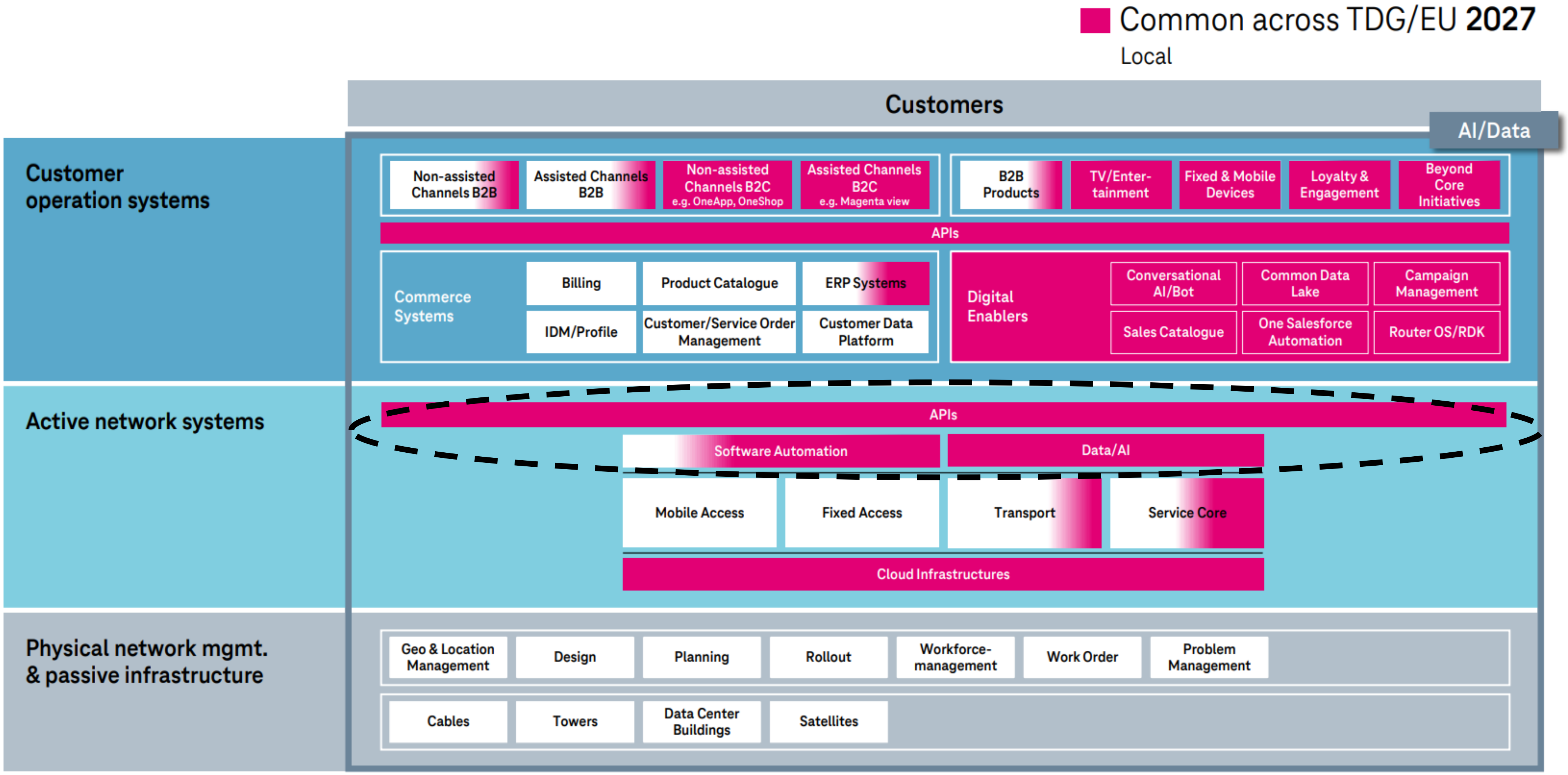
#1 LEADING 5G NETWORK In US, GER & EU

~300 mn **CUSTOMERS**

STRONG
CUSTOMER EXPERIENCE

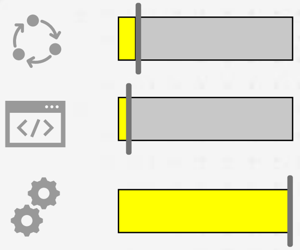
#1 Lead in TRI*M GER & EU & NPS US

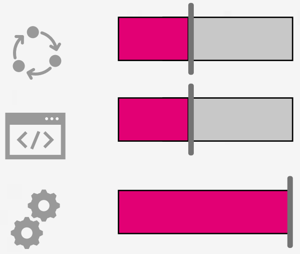
We double down on scale until 2027...

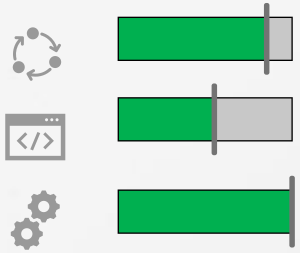


[1] For EU: Common Operating Model

DT deepens value creation – differentiating where needed and leveraging ecosystem where possible

Operator	Main focus	Ambition	Evaluation
Example Operator X	• Focus on Buy & Operate • Vendor responsible for Cloud & SW management layer • Vendor responsible for multi-vendor RAN Integration & SMO SW automation layer		DEPENDENCY RISK

	• Integrate & Operate with selected “Make / Open Source” to deepen value creation – becoming a TechCo
	• Requires stronger skills & capabilities for:
	  • SW development
	  • Integration
	  • Co-Build
			DT SWEET SPOT

Example Operator Y	• Automation platform completely developed inhouse • After initial Integration has been supported by vendors now full responsibility for Integration • Stack monetized externally to increase scale		SNOWFLAKE RISK

INTEGRATION   SOFTWARE DEVELOPMENT   OPERATIONS

Why do we build a SMO platform based on ONAP ?

Being part of a global industry community committed to driving the change

Impact to the workitems by direct R&D investments and benefit from the contributions of others like Orange, AT&T, China Mobile, Ericsson, Nokia, IBM. Partnering with 3rd parties opens additional operational models.

 # lines of code reused

 # lines of code contributed

€ saved by shared efforts

Reference implementation beyond specifications of standards

Improved interoperability through open APIs and model driven languages by alignment with 3GPP, ETSI, CNCF (K8s), O-RAN and TMF bodies, challenging the supplier mainstream and reduce the lock-in.

 # suppliers integrated

€ saved through less customization

Enabling future business and use cases like Open RAN

Internal development is focusing on modelling, integration and realization of operational aspects. The FCAPS use cases shall pilot the SMO concept. Differentiation through those developed key assets as intellectual property.

 # use cases supported with one platform

€ invested in own upskilling

New concepts allow more automation and shorten time to market

New technologies introduce complexity, which needs to be managed by adapting new ways of working and leveraging the programmability. This accelerates OSS modernization cycles and allows for operational efficiency.

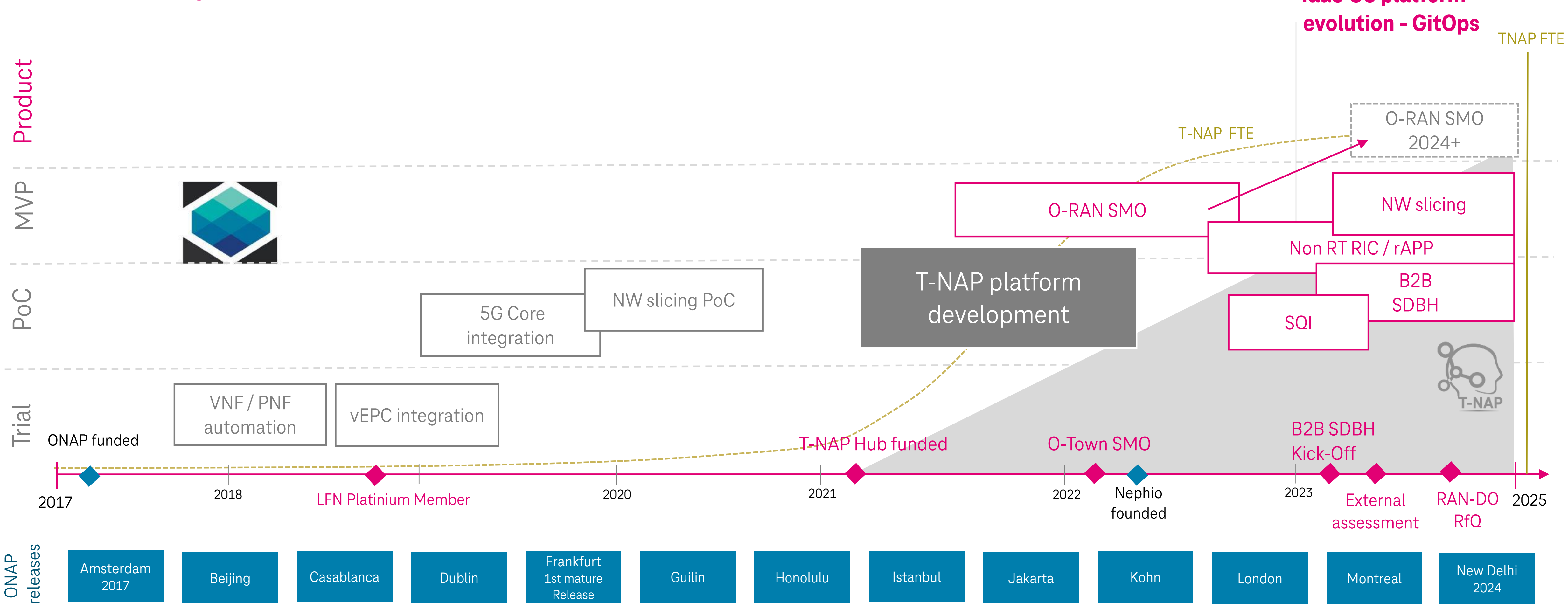
# of reduced OPEX spent

 # tests automated and passed

 # errors detected before rollout

t to production

History of T-NAP / TaaS OS evolution



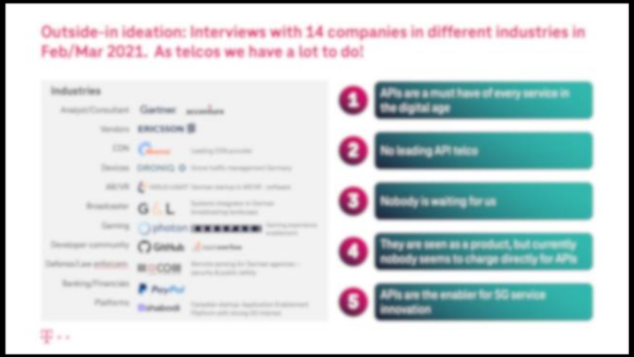
T-NAP has developed over time a network automation platform based on open-source SW. Through TaaS-OS platform adjustments in 2023 we have adopted more use-cases and evolved from providing only PoCs to MVPs/Products.

Key Take-Aways

- Carefully select where you want to use Open Source
- Preferably go for strategic relevance. Potential triggers:
  - Vendor independence
  - Network differentiation
  - Short lifecycles / new technologies
- Start small, but start
- Solve real business problems
- Adopt agile mindset

We won‘t stop!

How we got here...



- **Telcos has many valuable assets within our network**
  - Data about our customers
  - Control Points within our network
- **We can monetize these assets**
- **It has been a journey to get to where we are today, and this is not the first time we have tried**
- **Many customer interviews, Trials, Demos and PoCs**
- **As an Industry we have made some APIs available!**

How we got here… Different customer* needs

Type 1: Single-Market Single-Operator

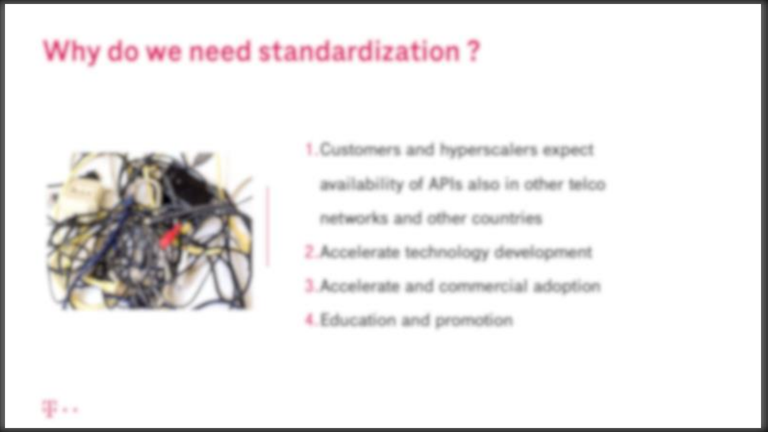
- National player
- Multi-national but operates independently
- Has all the services from a single CSP
- Strictly B2B no B2C needs
- No roaming needs
- Single endpoint in single market
- No aggregation needed

* Example Customer

Learnings

- Very few customers fall into the category that want a single market operator
- Developers usually need a minimum market coverage
- Our Telco APIs are too complex

How we got here... CAMARA



CAMARA
THE TELCO GLOBAL API ALLIANCE

- **CAMARA was created to act as a "Standards Definer" for Developer facing APIs**
- **CAMARA has been successful as the telco industry de-facto solution for exposing Network APIs**
- **Global CSPs have implemented CAMARA APIs**
- **Developers and Channels are now able to have a common interface**

CAMARA Stats

- 390+ Participating Companies
- 1000+ individual subscribers to the project
- 27 API Families and growing

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Type 2: Multi-Market Single-Operator

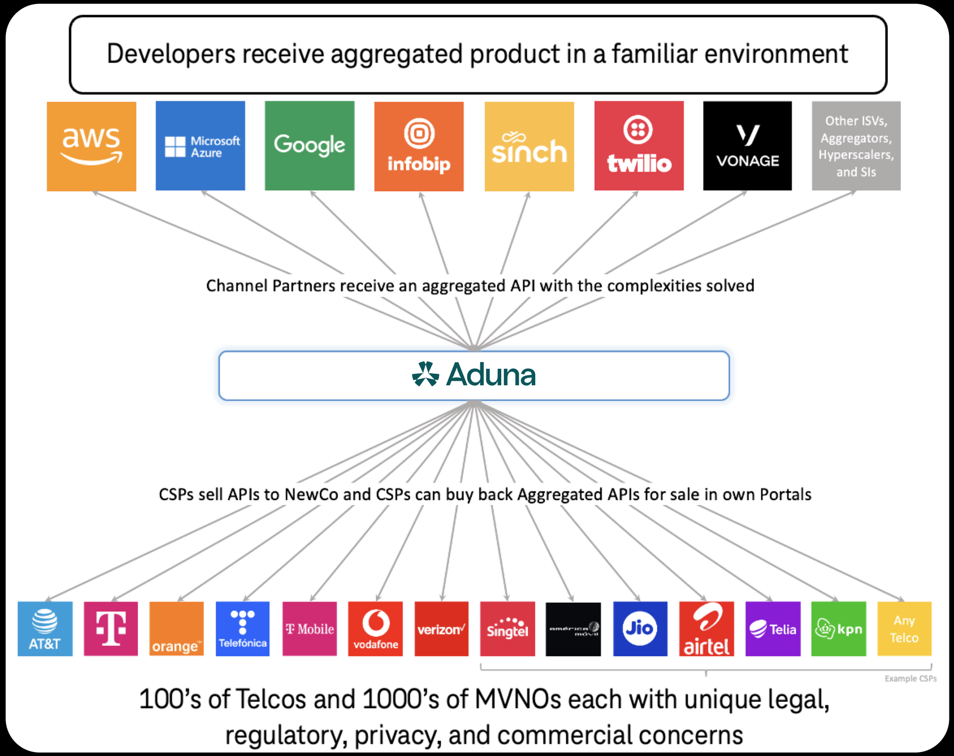
- Multi-national player
- Has separate CSP in each market
- Strictly B2B no B2C needs
- Roams but only to a limited known set of markets
- Single endpoint in each market
- Could self aggregate based on CAMARA standards
- Could use aggregation for single endpoint for all markets

* Example Customer

Learnings

- Customers want a single endpoint/entity to deal with
- Some sort of aggregation is preferred
- Unaligned deployments do not drive the market forward

How we got here... Aduna



Aduna

- **Creation of an independent slim aggregator**
- **Limit integration points both technically and contractually**
- **Accelerate the market by providing scale**
- **Have a commercial entity able to make decisions for the ecosystem (roadmap, pricing models, technical definitions, etc.)**
- **Provide common offerings e.g. consent, billing, T&Cs**

How we got here... Different customer* needs

Trucks

Consumers

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Type 3: Multi-Market Multi-Operator

- Multi-national player
- Needs all CSPs in the market
- Needs multiple markets
- Targets B2B and B2C
- Roams to many markets
- Multiple endpoints in multiple markets
- Only the largest could self aggregate
- Aggregation is essential for single endpoint for all markets

* Example Customer

We have started to set up the foundation
for ecosystem success...

But we need more adoption and common alignment!