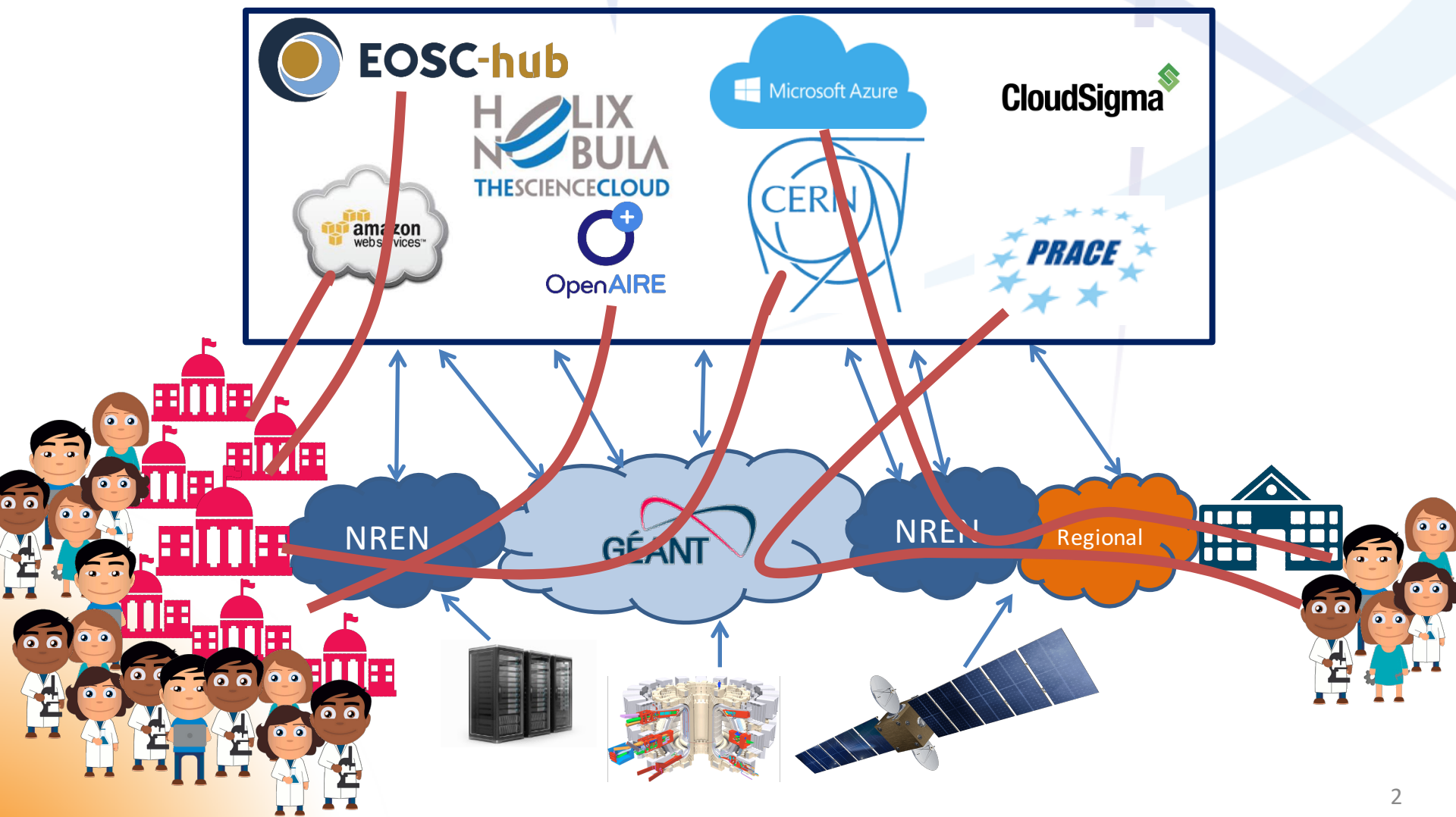


Ενορχηστρωμένες υπηρεσίες: δίκτυο και cloud

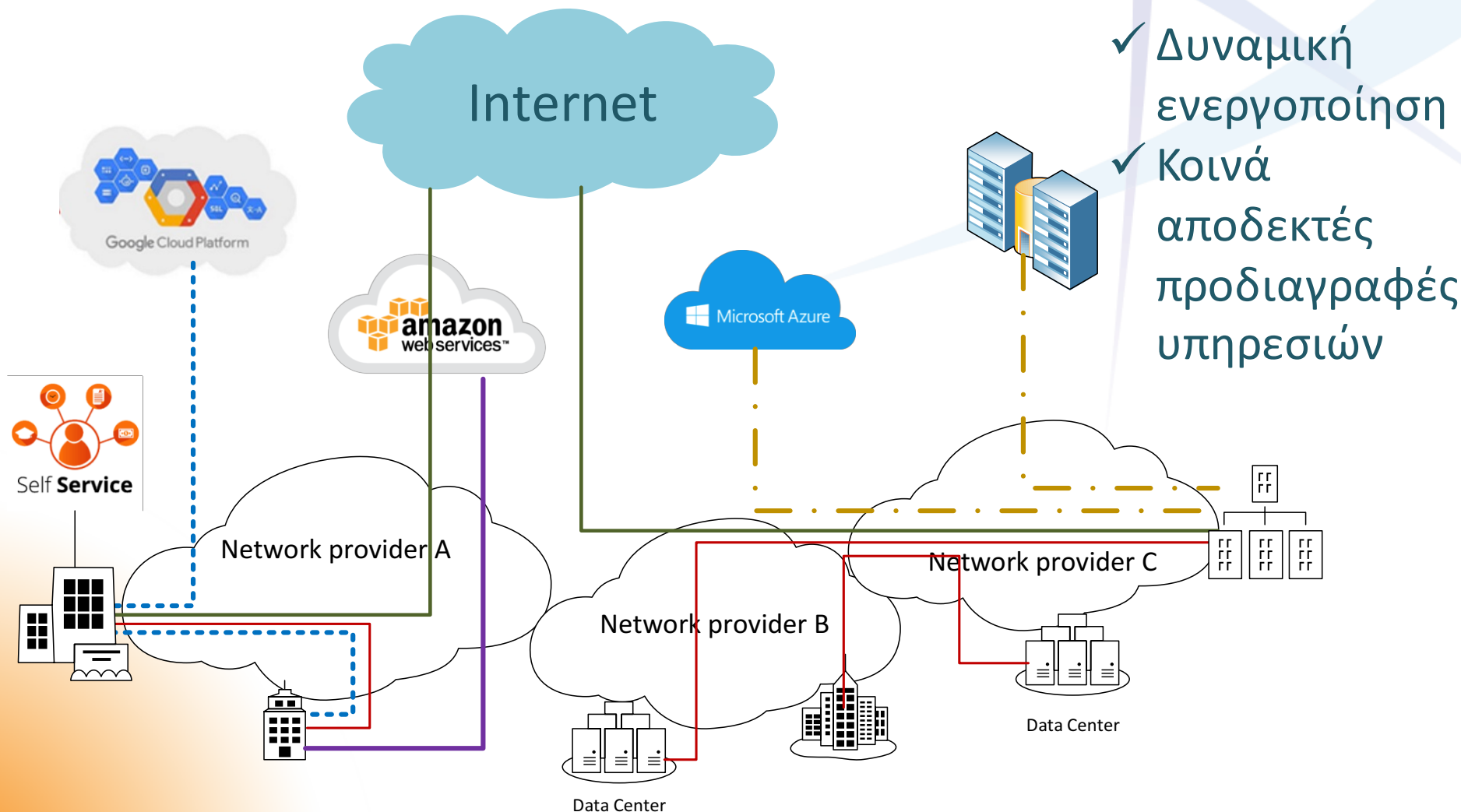
Αφροδίτη Σεβαστή

Διευθύντρια Τεχνολογικής Ανάπτυξης, ΕΔΕΤ

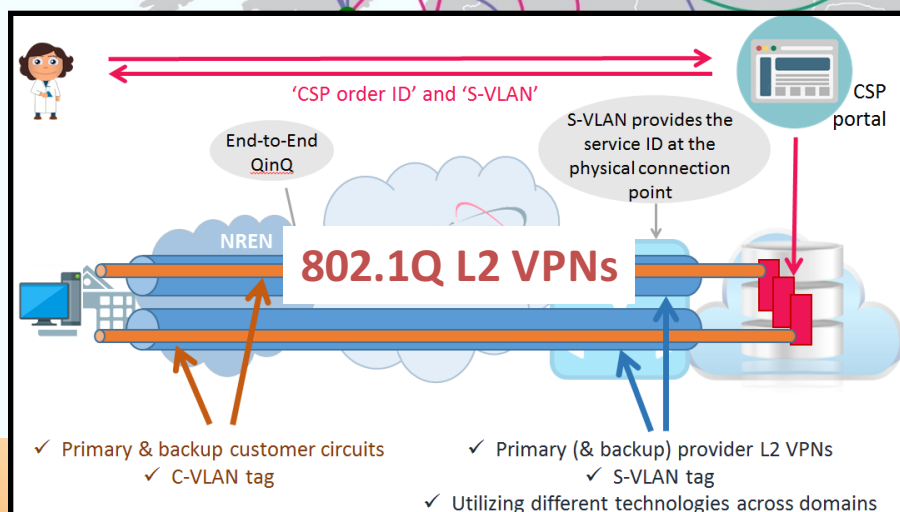
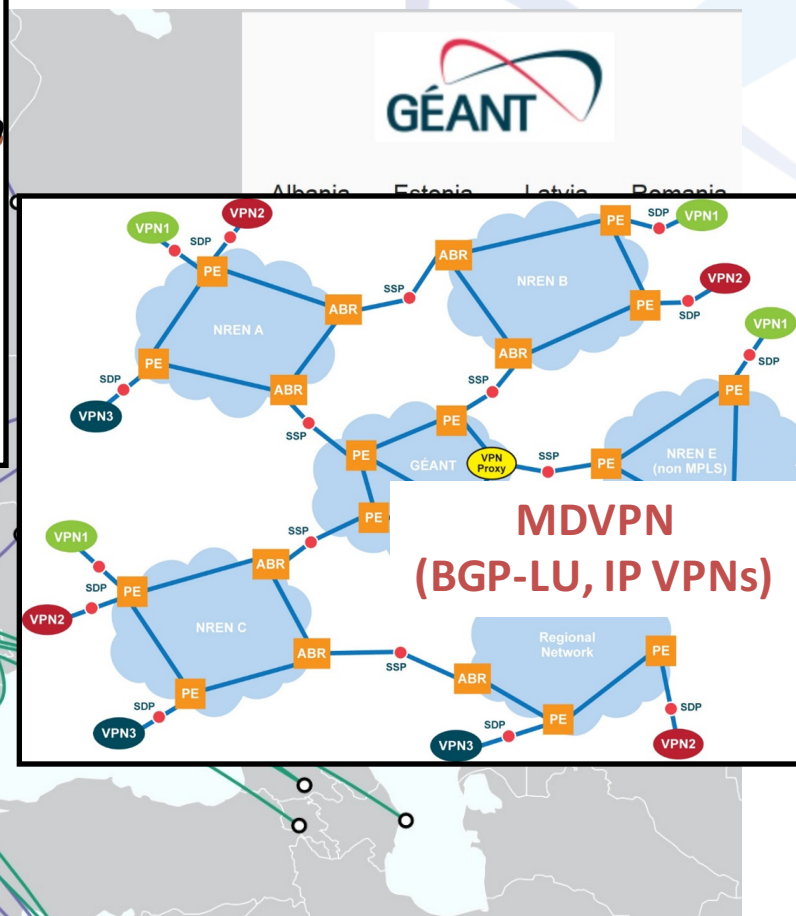
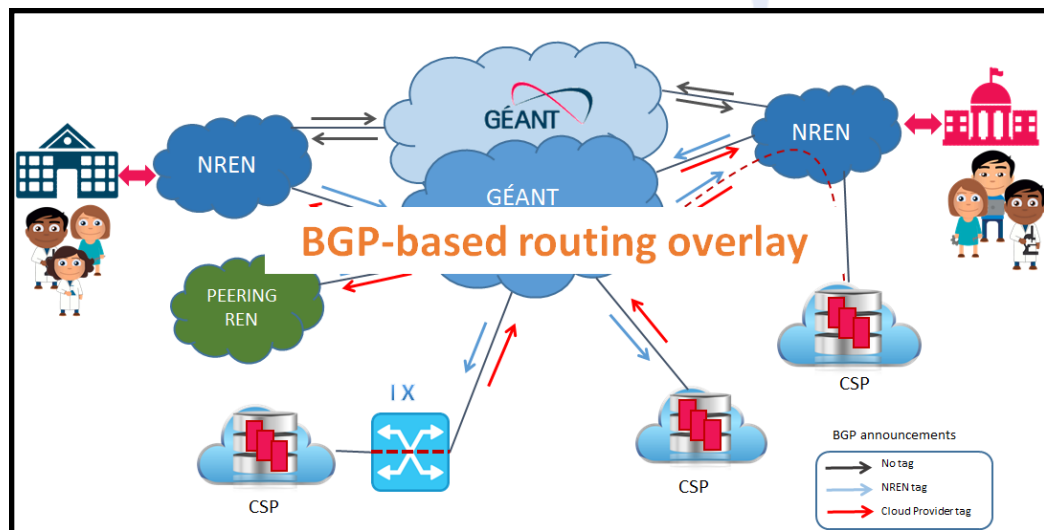
Network Infrastructure Evolution Activity Leader, GÉANT/GRNET



Παγκόσμια τάση: υπηρεσίες πολλαπλών παρόχων



Εξειδίκευση υπηρεσιών (one size does **not** fit all)



Υπηρεσίες και χρήστες



Μπορώ να σας
συνδέσω τις
υποδομές σας στο
cloud με 10Gbps

Μπορείτε να
συνδεθείτε με τον
κόμβο δεδομένων
χρησιμοποιώντας
VPN



Μπορώ να
διασυνδέσω το
τοπικό σας data
center με τον πάροχο
υπηρεσιών cloud X



- ✓ Κοινή γλώσσα για την παροχή υπηρεσιών
- ✓ Κοινά αποδεκτές διαδικασίες
- ✓ Υπηρεσίες ανεξάρτητες από τις τεχνολογίες
- ✓ Δυναμική παροχή, self-service
- ✓ Συνδυασμός υπηρεσιών

Ερευνητές και
ακαδημαϊκοί



Προκλήσεις

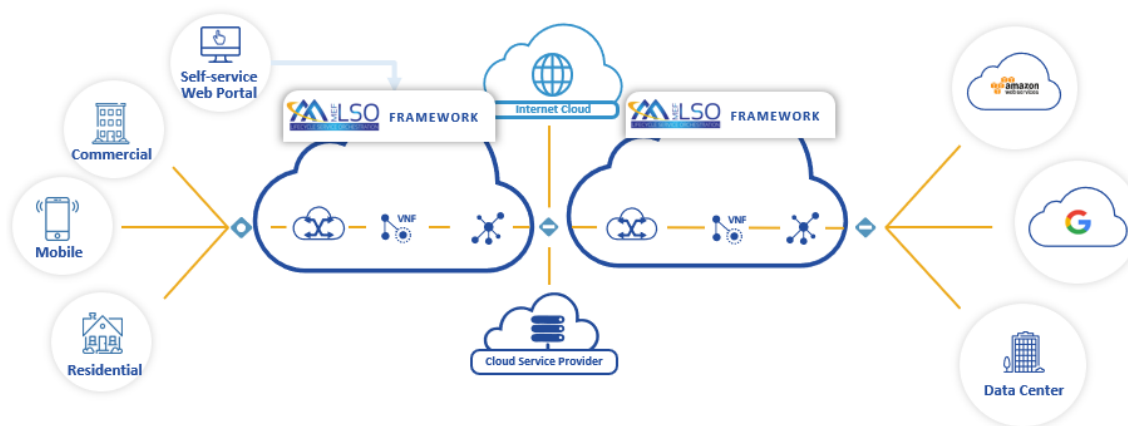
- Μπορούμε να διαμορφώσουμε τις δικτυακές υποδομές για να επιτύχουμε εξειδικευμένες υπηρεσίες:

- Shorten timescales for delivery
- Coping with demand/granularity
- Seamless user experience across the NREN footprint
- Integrate with other service providers to deliver an one-stop shop experience
- Offer SLAs & monitoring
- Offer 'after-sales'?
- Expose our service catalogues via software APIs so that they can be consumed by user applications



Open APIs

- Product ordering
- Product catalogue management
- Product inventory management
- Service Ordering
- Service Inventory
- Agreement
- Service Catalogue
- Party Management
- Activation and Configuration

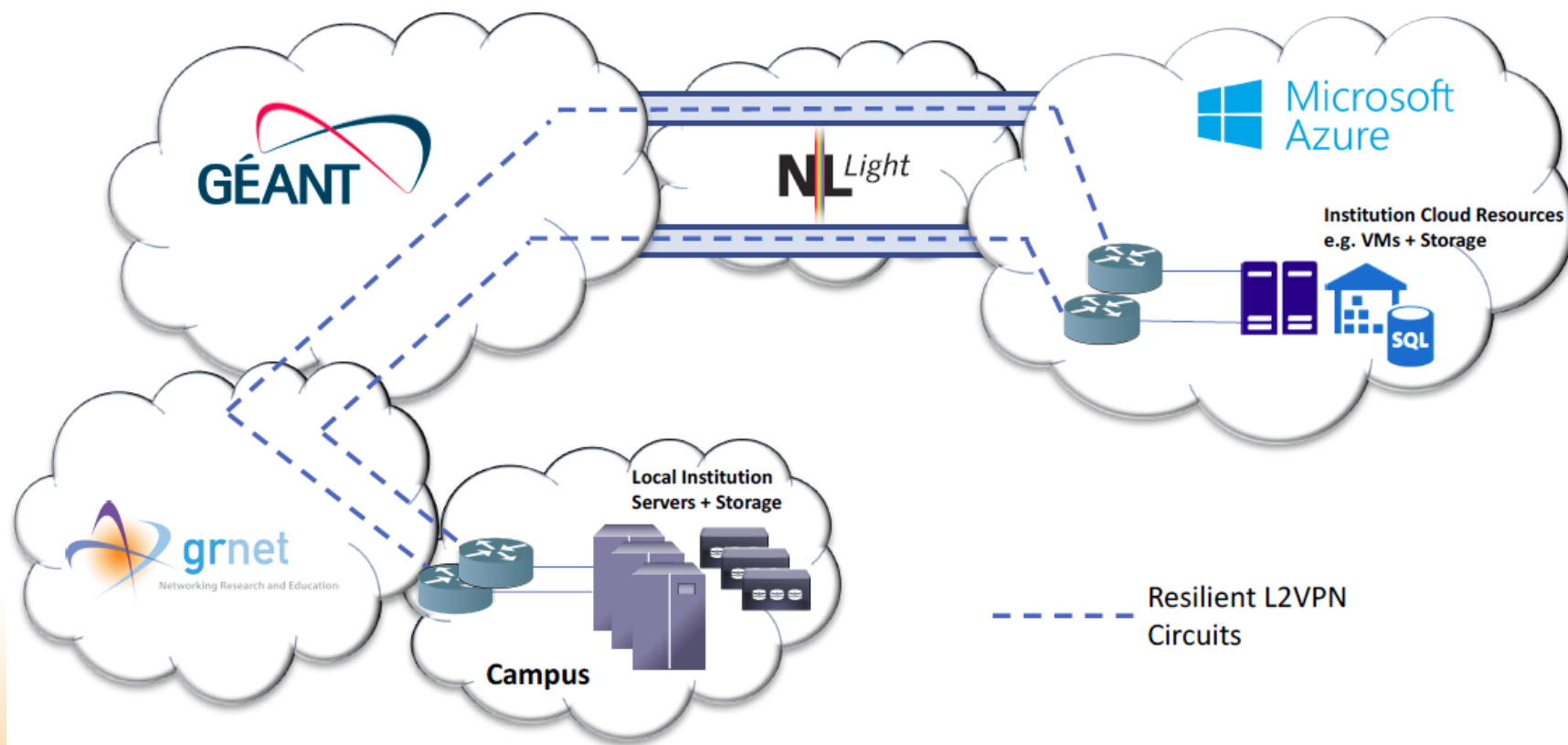


Orchestrated Services

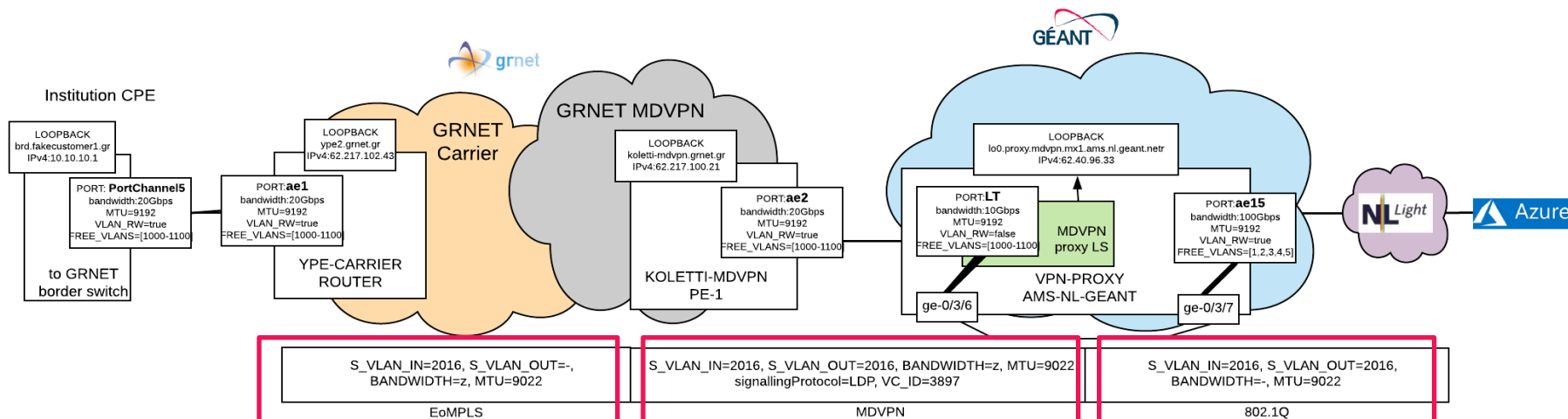
Optical	Carrier Ethernet	IP Services	SD-WAN Services	Security Services	L4-L7 Point Services	App Services
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AGILE, ASSURED AND ORCHESTRATED

Μια 'τυπική' περίπτωση



Under the hood



Τρεις διαφορετικές **Resource Facing Services**: EoMPLS, MDVPN, 802.1Q

Ένα **User Facing Service**: L2 VPN

Ένα **Product Offering**: Azure ExpressRoute connectivity

Institution

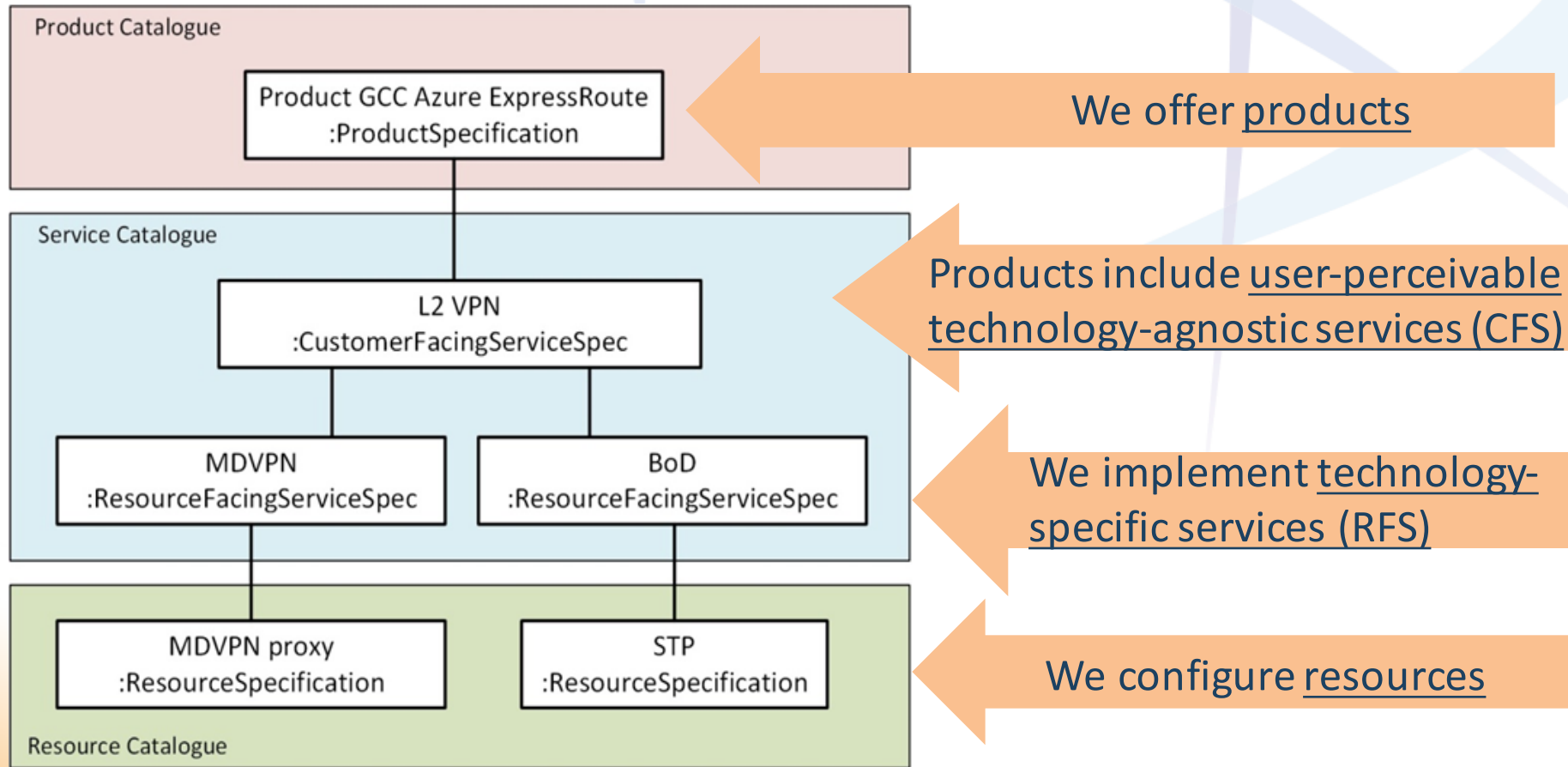
GRNET

GÉANT

NetherLight

MS Azure

Modeling time



RFS modelling

Service id στον κατάλογο υπηρεσιών

id:	"MDVPN"
identifiers:	
0:	
namespace:	"domain:itsm"
value:	"4fa595cc-602c-498a-b153-767f5bf14b29"
resources:	[...]

characteristicSpecifications:	
0:	
name:	"S_VLAN_IN"
1:	
name:	"S_VLAN_OUT"
2:	
name:	"BANDWIDTH"
3:	
name:	"MTU"
specificationCharacteristicValues:	
0:	
value:	1500
signalingProtocolSpecifications:	
0:	
protocolType:	"BGP"
characteristicSpecifications:	
0:	
name:	"VRF_TARGET"

Resources involved

Service-specific parameters

resources:	
0:	
tag:	"GRNET-2"
resourceType:	"PE_ROUTER"
deviceInterfaces:	
0:	
deviceInterfaceType:	"LOOPBACK_INTERFACE"
networkAddresses:	
0:	
networkAddressType:	"DOMAIN_NAME"
networkAddressValue:	"eier.grnet.org"
1:	
networkAddressType:	"IPv4"
networkAddressValue:	"62.217.102.13"
2:	
networkAddressType:	"IPv6"
networkAddressValue:	"2001:648:2ff3::13"
ports:	
0:	
resourceType:	"PORT"
characteristics:	
0:	
name:	"MTU"
value:	"1500"
1:	
name:	"VLAN_REWRITE"
value:	true
2:	
name:	"FREE_SVLANS"
value:	
0:	100
1:	101
2:	102
portName:	"<port-name>"
bandwidth:	
measurementType:	"Gbps"
totalAmount:	10
isProxy:	false
1:	
resourceType:	"VLAN_RANGE"
fromValue:	1
toValue:	100

Product modelling

Παράμετρος που αφορά το
συγκεκριμένο product specification

```
<CrossConnections xmlns="http://schemas.microsoft.com/windowsazure" xmlns:i="http://schemas.microsoft.com/2003/11/Serialization/NoReference">
  <CrossConnection>
    <Bandwidth>500</Bandwidth>
    <PrimaryAzurePort>GEANT-AMB-06GMR-CIS-3-PRI-A</PrimaryAzurePort>
    <ProvisioningState>Provisioned</ProvisioningState>
    <STag>3</STag>
    <SecondaryAzurePort>GEANT-AMB-06GMR-CIS-4-SEC-A</SecondaryAzurePort>
    <ServiceKey>3a358b6a-f400-44db-ac6e-131a0250d34d</ServiceKey>
    <Status>Enabled</Status>
  </CrossConnection>
  <CrossConnection>
    <Bandwidth>50</Bandwidth>
    <PrimaryAzurePort>GEANT-AMB-06GMR-CIS-3-PRI-A</PrimaryAzurePort>
    <ProvisioningState>Provisioned</ProvisioningState>
    <STag>6</STag>
    <SecondaryAzurePort>GEANT-AMB-06GMR-CIS-4-SEC-A</SecondaryAzurePort>
    <ServiceKey>b8cc9008-7f48-4c94-82ab-5dae1eeef079</ServiceKey>
    <Status>Enabled</Status>
  </CrossConnection>
</CrossConnections>
```

Cloud provider API

productType:	"GCCAzure"
productSpecification:	
@type:	"ProductSpecification"
specificationType:	"GCC"
characteristicSpecifications:	
0:	
@type:	"CharacteristicSpec"
name:	"S_VLAN"
extensible:	false
1:	
@type:	"CharacteristicSpec"
name:	"S_KEY"
extensible:	true
2:	
@type:	"CharacteristicSpec"
name:	"VLAN_REWRITE"
extensible:	true
3:	
@type:	"CharacteristicSpec"
name:	"BANDWIDTH"
extensible:	false
4:	
@type:	"CharacteristicSpec"
name:	"MTU"
extensible:	false
5:	
@type:	"CharacteristicSpec"
name:	"START_DATE"
extensible:	true
6:	
@type:	"CharacteristicSpec"
name:	"END_DATE"
extensible:	true
7:	
@type:	"CharacteristicSpec"
name:	"DESCRIPTION"
extensible:	true

Modelling agreements (1)

“GÉANT consortium members carry cloud transit traffic in the context of the GÉANT IaaS framework, between the framework’s cloud providers and European R&E institutions”

- GEANT signs IaaS framework agreement with CSP (MS Azure) and serves as connectivity provider
- GRNET delivers cloud traffic to the institution
- GRNET-GÉANT-NetherLight/Surfnet agree to carry transit cloud traffic between institutions and CSPs



Supplier NNI agreement



UNI agreement



Partner NNI agreement

Modelling agreements (2)



PARTNER NNI agreement

identifiers:	[...]
businessInteractionType:	"AGREEMENT"
partyRoles:	
▼ 0:	
partyRoleType:	"PARTNER"
▼ party:	
partyType:	"ORGANIZATION"
▼ identifiers:	
▼ 0:	
namespace:	"crm"
value:	"7600d3f4-6f1a-4fed-b20c-de84fe9032c2"
▼ 1:	
namespace:	"edugain"
value:	"geant-123"
shortName:	"GEANT"
agreementType:	"ENNI"
▼ agreementItems:	
▼ 0:	
businessInteractionItemType:	"AGREEMENT_ITEM"
▼ productOffering:	
href:	"http://geant.org/offerings/GCCAzure.json"
name:	"Geant Cloud Connectivity to Azure ExpressRoute"
▶ productSpecification:	{...}

- ✓ GRNET is handling GCCAzure traffic over to the institution
- ✓ GÉANT is receiving GCCAzure traffic from the Microsoft DCs
- ✓ GÉANT is transiting GCCAzure traffic from the Microsoft DCs to GRNET

! Agreements can be added/removed programmatically

Modelling orders

- An order is a request to receive an **instance of produce offering**
- The order is consistently **recorded and processed** across the involved providers
- There is order state at a global level and the user can in any point in time **track the status** of his order
- Orders are **qualified**
 - From a **business**
 - And **technical** point of view
- ... and then they are **fulfilled**



What is the status of my order?

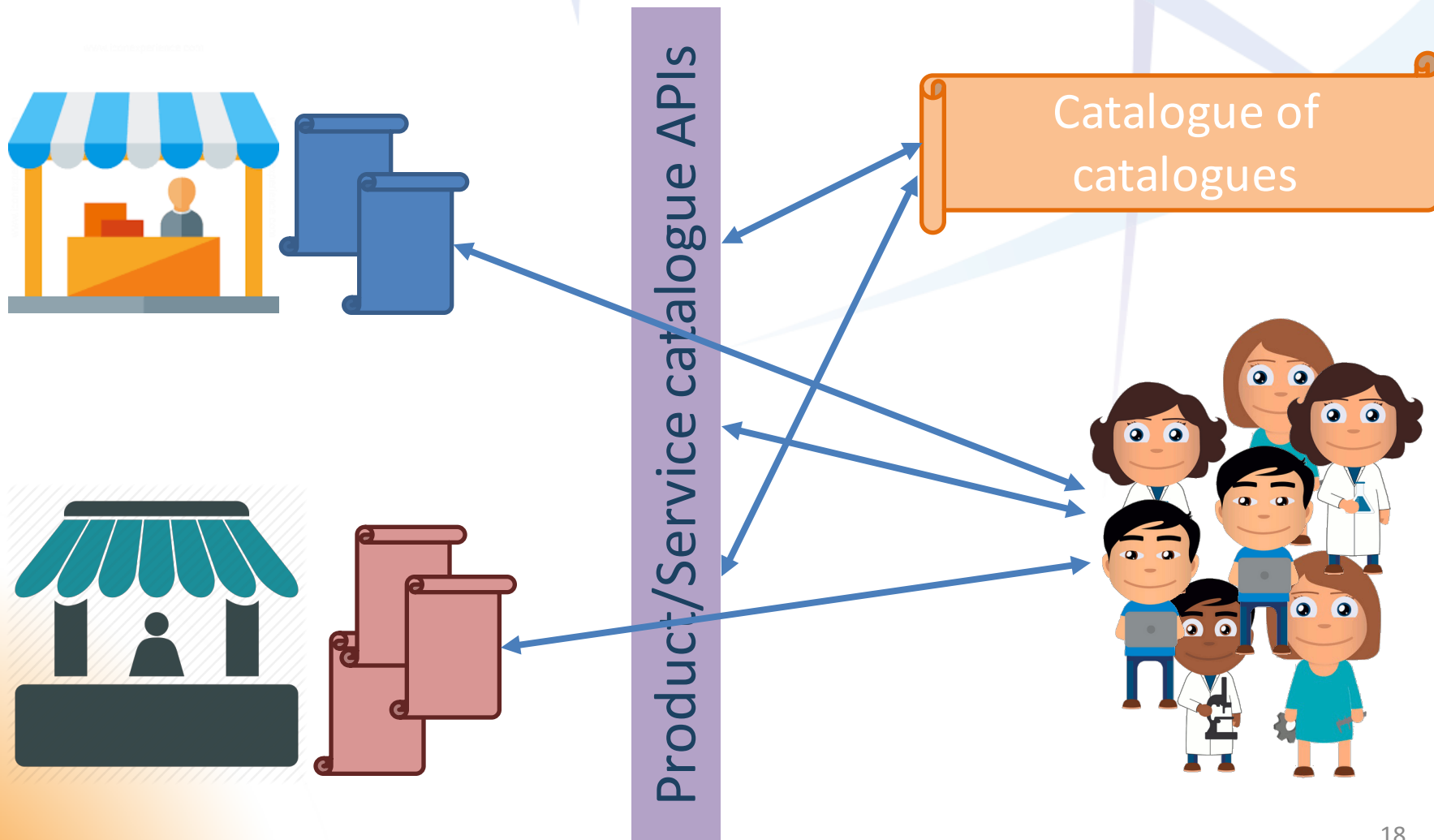


Δομημένο πλαίσιο μοντελοποίησης και παροχής υπηρεσιών

- Within each agreement, parties have **roles**, so the same entity can have different roles in different agreements
- Each agreement refers to a **specific product offering** of its holding party
- Each party keeps a **record** of its participating agreements in its local systems
- The product offering of an agreement includes or refers to a specific **user/customer facing service** and the **terms for its delivery** (e.g. timeframes, SLA, costs)
- The user/customer facing service itself may include the **resource facing service** and associated **resources**

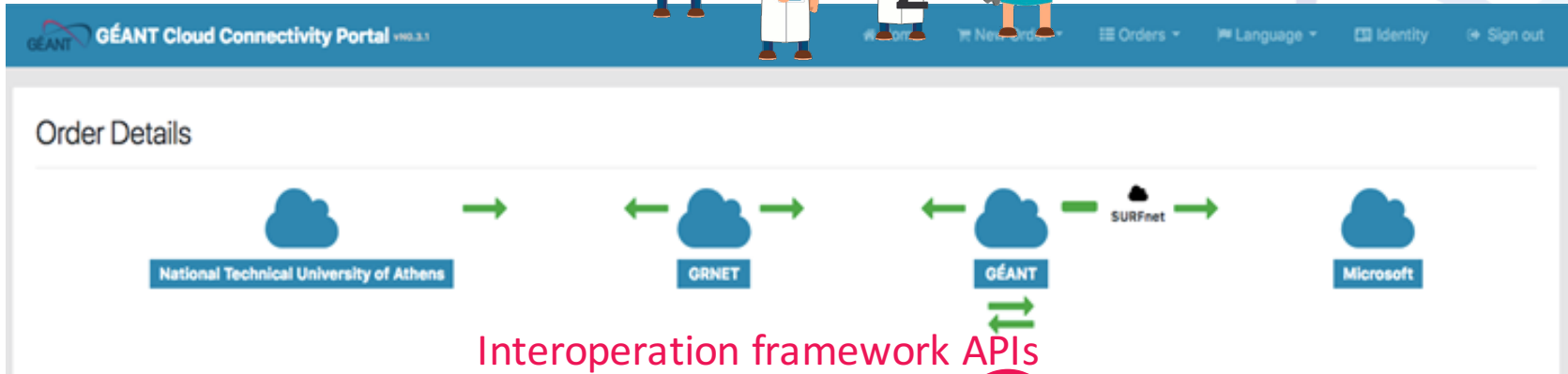
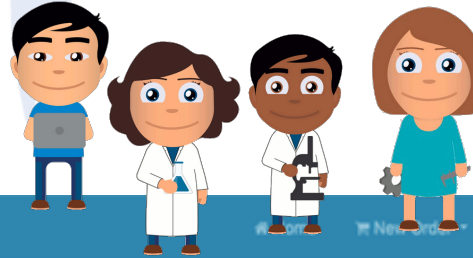


Ανακοίνωση products/services σε καταλόγους υπηρεσιών

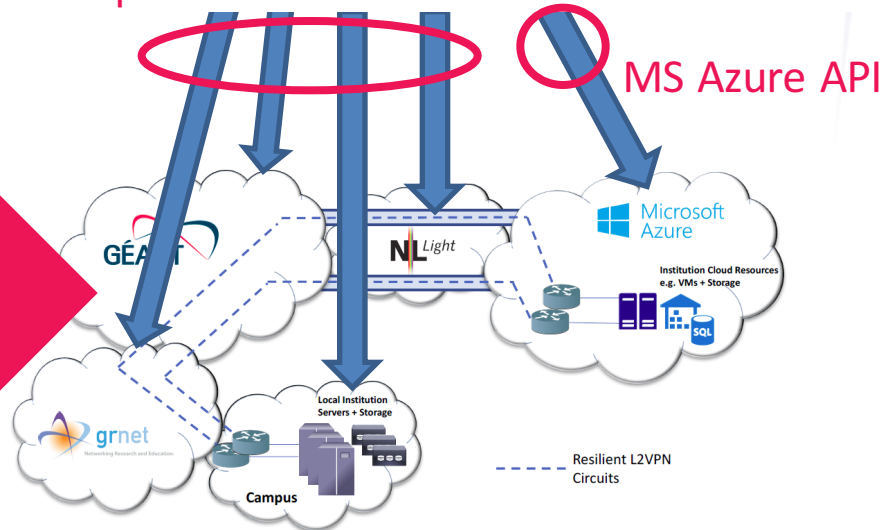


Orchestrated delivery in action!

Happy users



Providers, network operators coordinate for service delivery



Απαιτήσεις από τους παρόχους υπηρεσιών

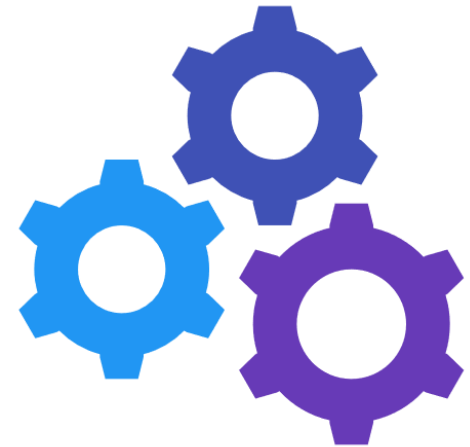
Each participating provider should be able to expose via standard, open APIs the following capabilities*

Context	Description	API
Party management (partners, institutions, suppliers)	Capabilities usually found in an organization's CRM	Party management API
Agreement management	Managing information about business agreements in a structured format	Agreement management API
Service catalogue	Managing information about customer and resource facing service offerings (to be shared with partners), usually found in an ITSM system	Service catalogue API
Product catalogue	Information about product offerings-to be shared with customers/users, usually found in an ITSM system	Product catalogue API
Order management	Managing information about orders, usually found in an ITSM system	Order management API

*In special cases: a Configuration and Activation API and Resource Inventory API

Recap: the framework's foundation

- Μοντελοποίηση και ανακοίνωση **product/service offerings** και **business agreements**
- Υιοθέτηση **inter-service provider APIs** για διαφορετικά είδη συναλλαγών (order management, service delivery, etc.)
- **Ορισμός ενορχηστρωμένων διαδικασιών** μεταξύ των παρόχων υπηρεσιών (order qualification, order fulfillment, service activation, etc.)
- Ενορχήστρωση που αξιοποιεί **αυτοματισμούς** όπου είναι εφικτό
- Υποστήριξη **centralized** και **distributed** orchestration



Η ομάδα



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Ευχαριστώ!
sevasti@grnet.gr