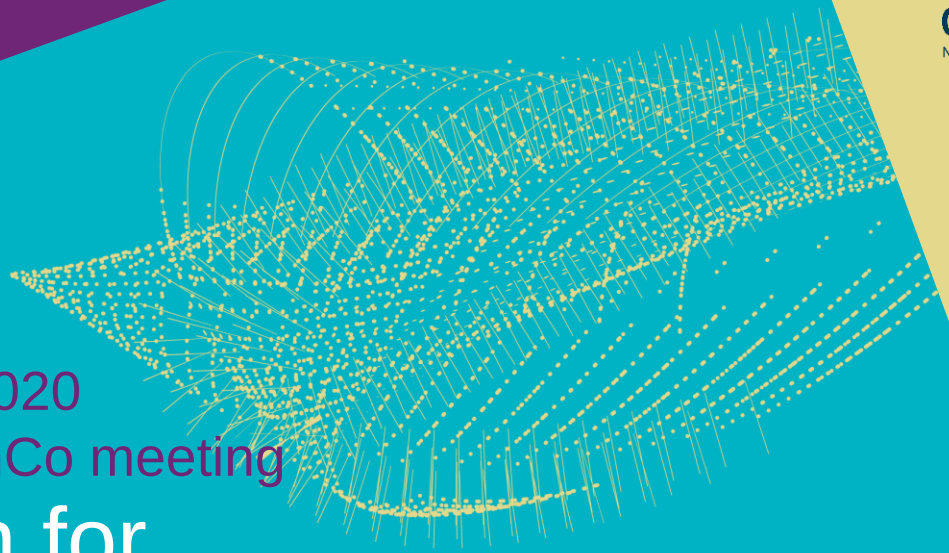
Nikhef

SURF

GÉANT
Networks • Services • People



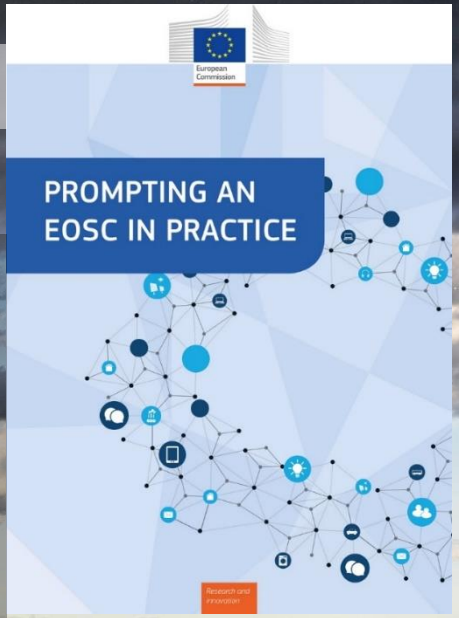
NSF Cybersecurity Summit 2020
50th EUGridPMA, AARC & EnCo meeting

# Trust Coordination for Research Collaboration in the era of EOSC

*David Groep (Nikhef) et al.*
*September 2020*
*co-supported by SURF & the GEANT4-3 project*

# EOSC? The “European Open Science Cloud”

- a ‘commons’ for research data aiming to combine all disciplines across all (European) countries
- an ongoing process, with both means and methods still very much evolving
- ‘a portal’, ‘a marketplace’, ‘a web of FAIR data’
- ‘an infrastructure’ … or its ‘data twin’




**whatever it is, it will be structuring data-driven research in Europe in the 2020s**

Photo by Pop & Zebra on Unsplash

# EOSC vision

Current model of European data infrastructures


*Source: EOSC Strategic Implementation Roadmap 2018-2020, May 2018, European Commission*

*From fragmentation and uneven access to information to a federated model, where access to data would be universal, building on a strong legacy*


Future EOSC model: federation of data infrastructures

Credits: Ognjen Prnjat– Project Coordinator- NI4OS-Europe, EOSC Symposium, 26.11.2019, Budapest 14

sources: https://www.eoscsecretariat.eu/eosc-symposium-programme

# EOSC – an ‘ecosystem of projects’ towards sustainability

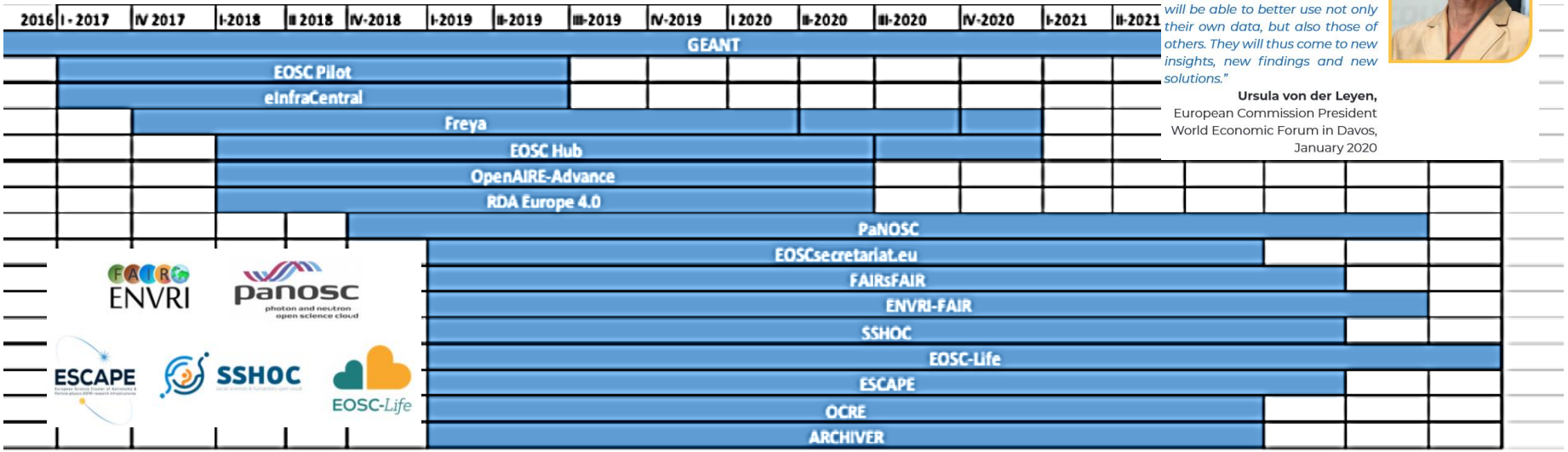
Like almost any EU endeavour, EOSC is a process

1. EOSC **Pilot**, *the design study project*
2. EOSC **hub**, *towards a core based on infrastructures*
3. EOSC {synergy, pillar, Nordic, …}, *expanding scope in domains and regions*
4. EOSC **Secretariat**, *modelling governance and moving towards the ‘EOSC ivzw’*
5. EOSC **Future** … *bringing together the infrastructures and communities in a common portal architecture, and supporting the technical roadmapping efforts*

Image: Maria Teneva on unsplash

# A driving force for both infrastructures and domains

Clustering of Infrastructures in Europe is amalgamating research either you're in a large infrastructure, or you're in the 'long tail' …



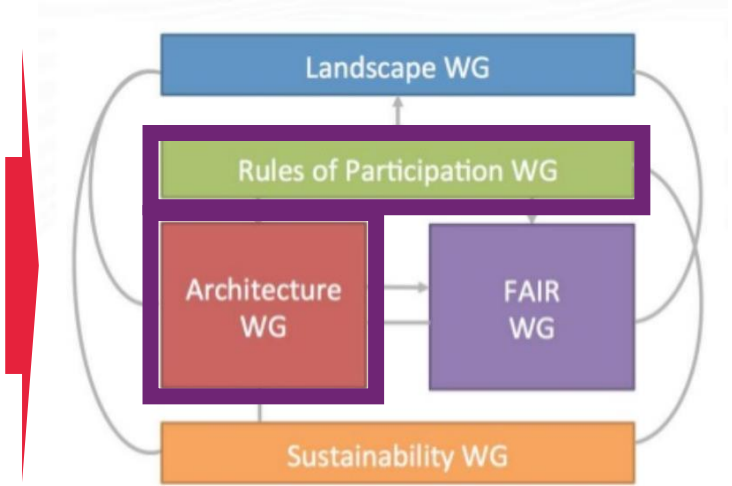

*"We are creating a European Open Science Cloud now. It is a trusted space for researchers to store their data and to access data from researchers from all other disciplines. We will create a pool of interlinked information, a 'web of research data'. Every researcher will be able to better use not only their own data, but also those of others. They will thus come to new insights, new findings and new solutions."*

**Ursula von der Leyen,**
European Commission President
World Economic Forum in Davos,
January 2020

sources: eosc-portal.eu, eoscsecretariat.eu

# EOSC is much wider than what we have known before

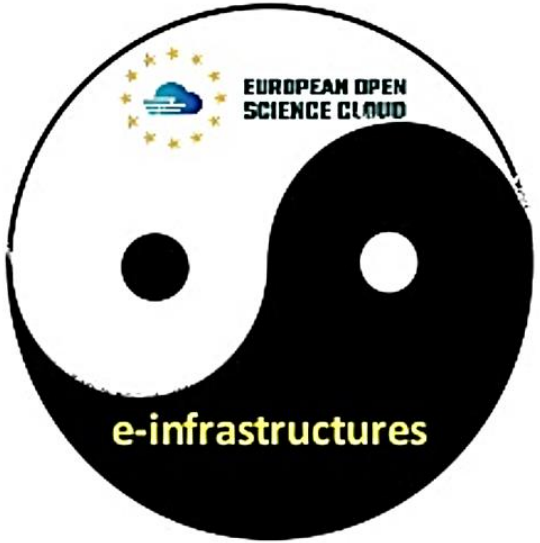
| | |
|---|---|
| **Architecture** | federated infrastructures and (data) resources |
| **Data** | FAIR data management and tools |
| **Services** | environment of user-oriented services |
| **Access & Interface** | access across disciplines, and compliance with open data |
| **Rules** | rules of participation for services, compliance with legal & trust needs |
| **Governance** | governance of the ecosystem and leadership in data-driven science |




From: EOSC portal, by way of *The added value of EOSC for research in EOSC* Zoe Cournia (NI4OS-Europe)

# Twinning the 'EOSC' to the e-infrastructure

'EOSC' could be seen as a twin sister (or brother) of the e-infra-structure organisations. One offering the compute and connectivity services and the other servicing the data and the interoperability.

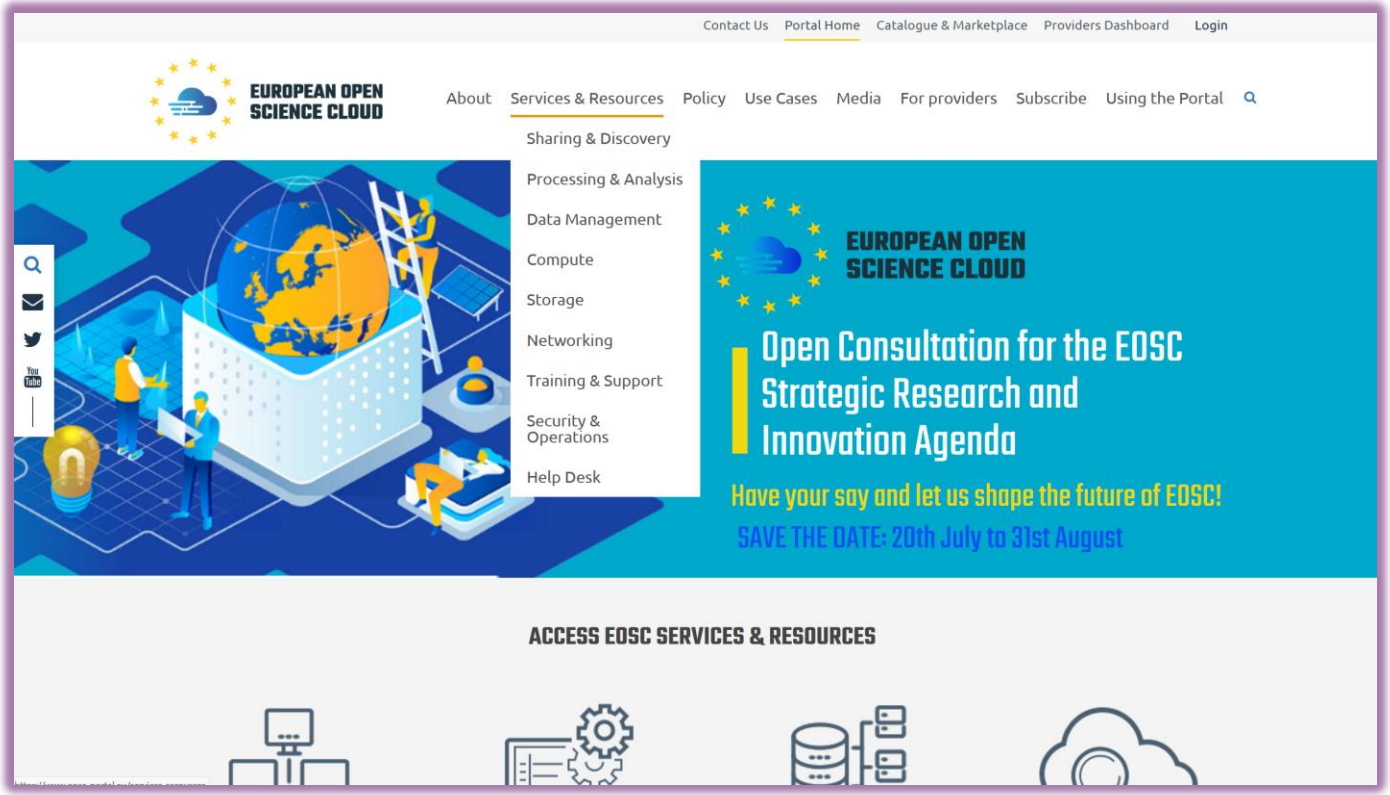



EUROPEAN OPEN SCIENCE CLOUD

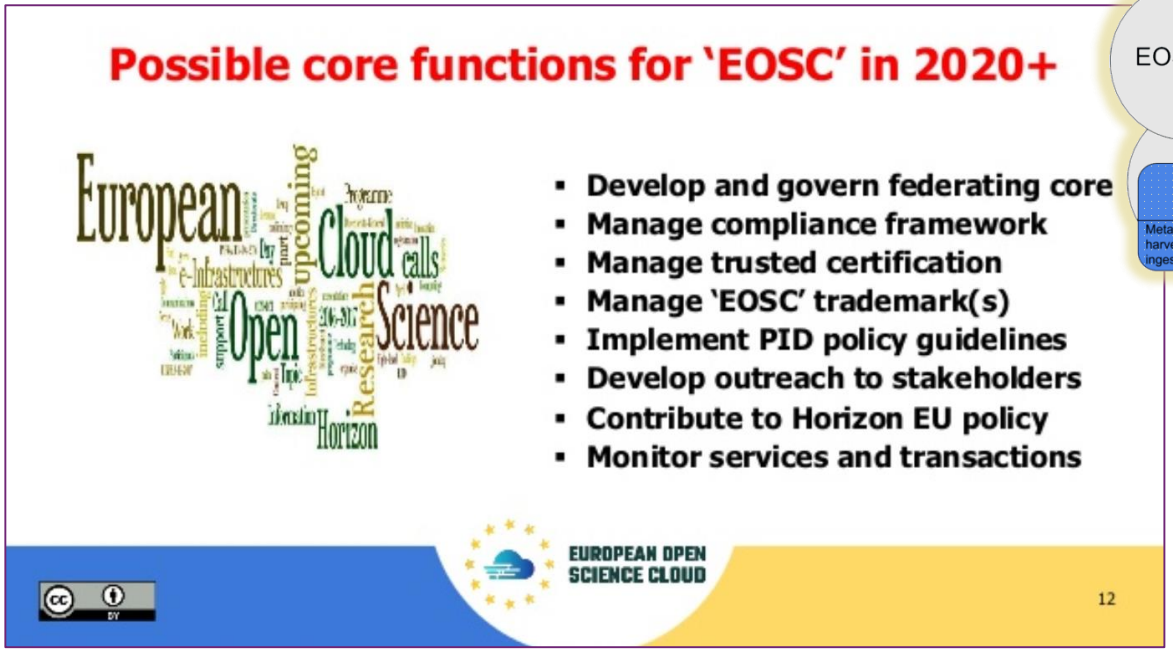
13

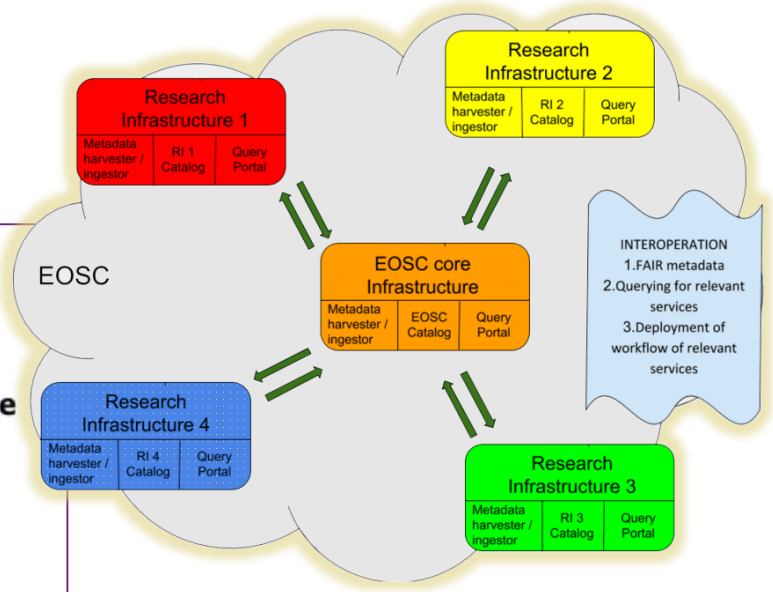
source: Karel Luyben, IFFIS2019 conference, Stockholm November 2019
*https://www.slideshare.net/kbredaktion/european-open-science-cloud-205323223*

# An ecosystem more than an infrastructure



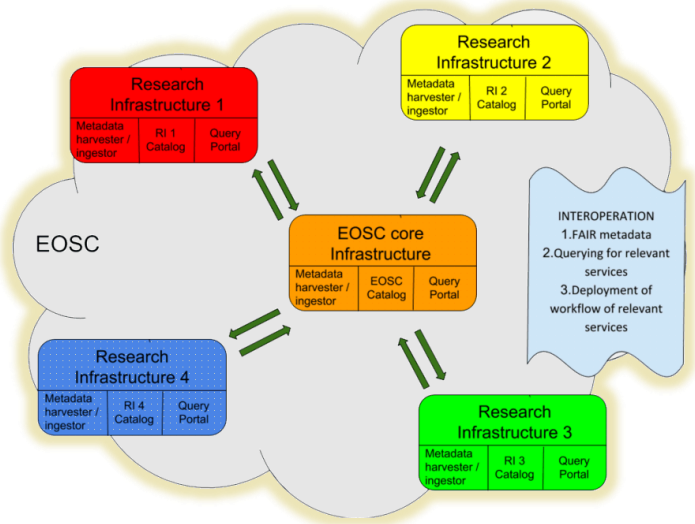
# With a structuring EOSC ‘core’




sources: EOSC Secretariat, Karel Luyben, EOSC-Future drafts, CNECT_RTD_Orientation_Skeleton_RIs_v14

# Core services and ‘the exchange’




What constitutes a ‘core service’? A thin layer, with

- at least the portal itself
- finding & sharing of services,
  with a recommendation engine & messaging
- authentication and authorization,
  based on the ‘AARC BPA’
- IT service management for the core
- operational security capabilities, trust policy, and security risk structuring

*rest set via including criteria of the Sustainability and Architecture WGs*

the *Architecture WG* and its taskforces will set the interoperability standards

# A challenging landscape

**Entities of all kinds** – diversity in the EOSC range
from *data sets* to *storage* to *computing* to *publications*

**An open ecosystem** – rules of participation will favour no barrier to entry
regarding operational maturity, service management quality, &c

**A diverse ecosystem** – providers will come from e-Infrastructures,
from member states, from research infrastructures, and private sector

**An *interdependent* ecosystem** – aim includes composability and
collective service design through an open AAI federation

# Great (trust and security) expectations

‘the EOSC is a journey, and not at its final destination just yet’

## Core

‘a distributed and participatory EOSC-Core in a collaborative way by reaching consensus on interoperability standards, APIs, and their implementation via best practices’

## Exchange & Portal

‘research enabling services’
- national & regional
- institution & domain based
- including commercial providers

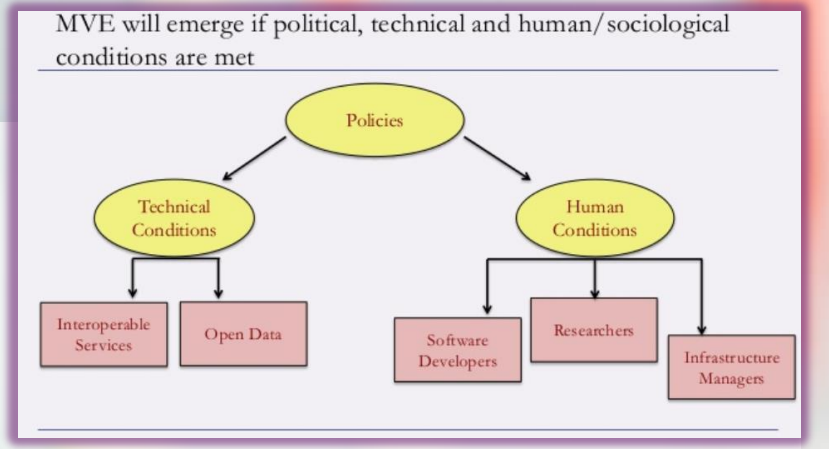
‘a catalogue … covering the full research life cycle’

So what are the requirements on each? And the interdependencies?

# Minimum Viable EOSC

today's world is agile, so focus is on the

**'MVE – MINIMUM VIABLE EOSC'**




including mechanisms to encourage adoption through policies
For trust & security, who should provide that capability?

- the infrastructures, or the service providers?
- a core team near the EOSC portal? Or (also) close to the AAI?

it will be a mix, but in all cases providers will play an important role
*… and Sirtfi shows that is not completely unrealistic*

Photo: Patrick Perkins (Unsplash)

graphic: Prompting an EOSC in Practice – Isabel Campos, CSIC & EOSC HLEG

# Back to Basics: the few tenets for the EOSC ecosystem security

**From** *promoting and monitoring capabilities* **to** *managing risk*

**A service provider should**

- **do no harm** to interests & assets of users
- **not expose *other*** service providers in the EOSC ecosystem to enlarged risk as a result of *their* participation in EOSC
- **be transparent** about its infosec maturity and risk to its customers and suppliers

this will mean *some minimum requirements* in the Rules of Participation

Photo Hippokrates tomb: Melania Stubos, CC-BY-SA-3.0
http://himetop.wikidot.com/hippocrates-funeral-monument

# Making the EOSC a trusted place

**Risk-centric self-assessment framework**

- based on federated ISM guidance including WISE SCI

**Baselining security policies & common assurance**

- AARC, REFEDS, IGTF, PDK & practical implementation measures

**fostering trust through a known skills programme**

- so that your peers may have confidence in service provider abilities

**An incident coordination hub and a trust posture**

- spanning providers and core, based on experience & exercises

**Actionable operational response to incidents**

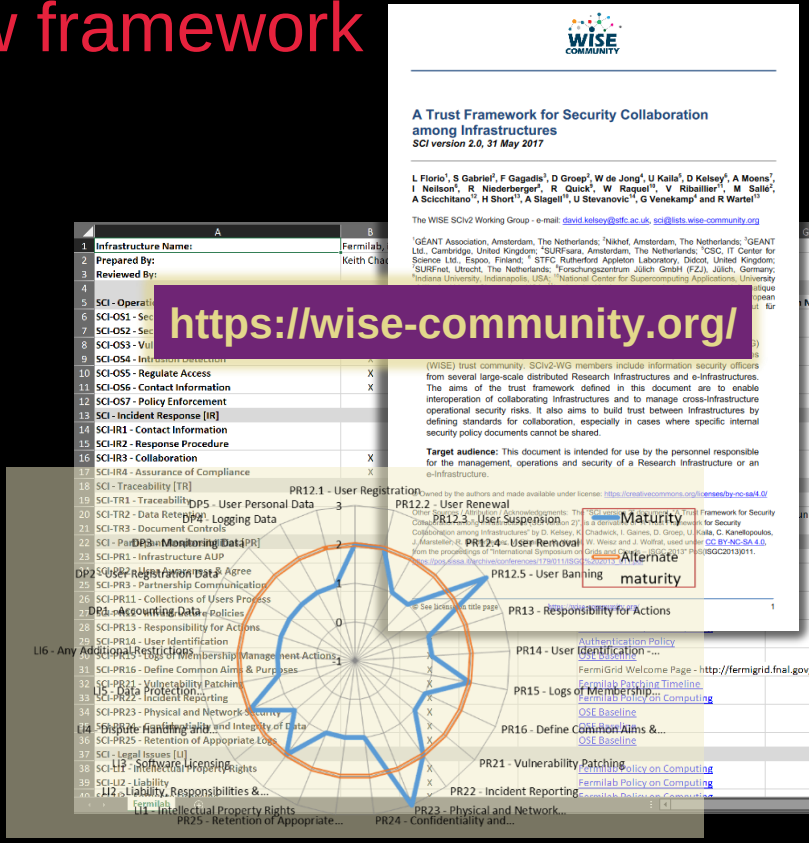
- EOSC core expertise to support resolution of cross-provider issues

# Assessing risk … in a peer-review framework

An information security risk assessment framework for EOSC services based on a federated evolution of the WISE SCI framework and a multi-tier maturity model, inclusive of data security and protection.

- risks ‘play out’ differently in different infrastructures
- more than just storage or compute, but also risks for (open!) data

Many risks are common, some need domain expertise to assess. Or are under regulated regime



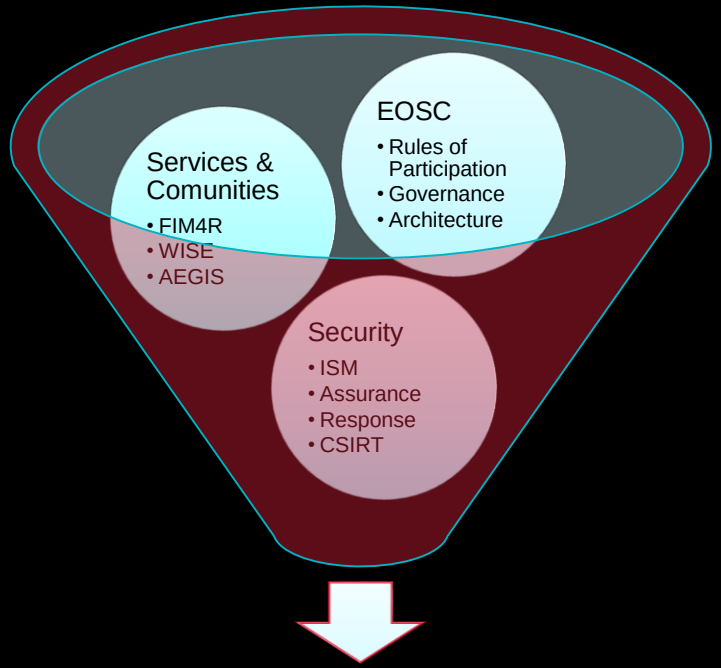

this spider diagram is fictional – idea by Urpo Kaila, CSC

# Managing a policy baseline and assurance

A diverse set of requirements

- EOSC mechanisms & working groups
- Community and e-Infrastructure requirements
- Operational security need for response, containnment, and resolution

*and remain practical and manageable*




security baseline, trust and assurance profiles

# Shared understanding of a baseline?

Closely coordinated infrastructures – e.g. WLCG, EGI –
started with a single common policy set and assurance level

- service providers and users ‘understand’ its meaning and compliance
  - and the understanding is shared

Move towards differentiated models
adds flexibility, but also complexity!

- different means to achieve same goal
- varying means to achieve
  different goals with diverse risk

# Diversification is complex

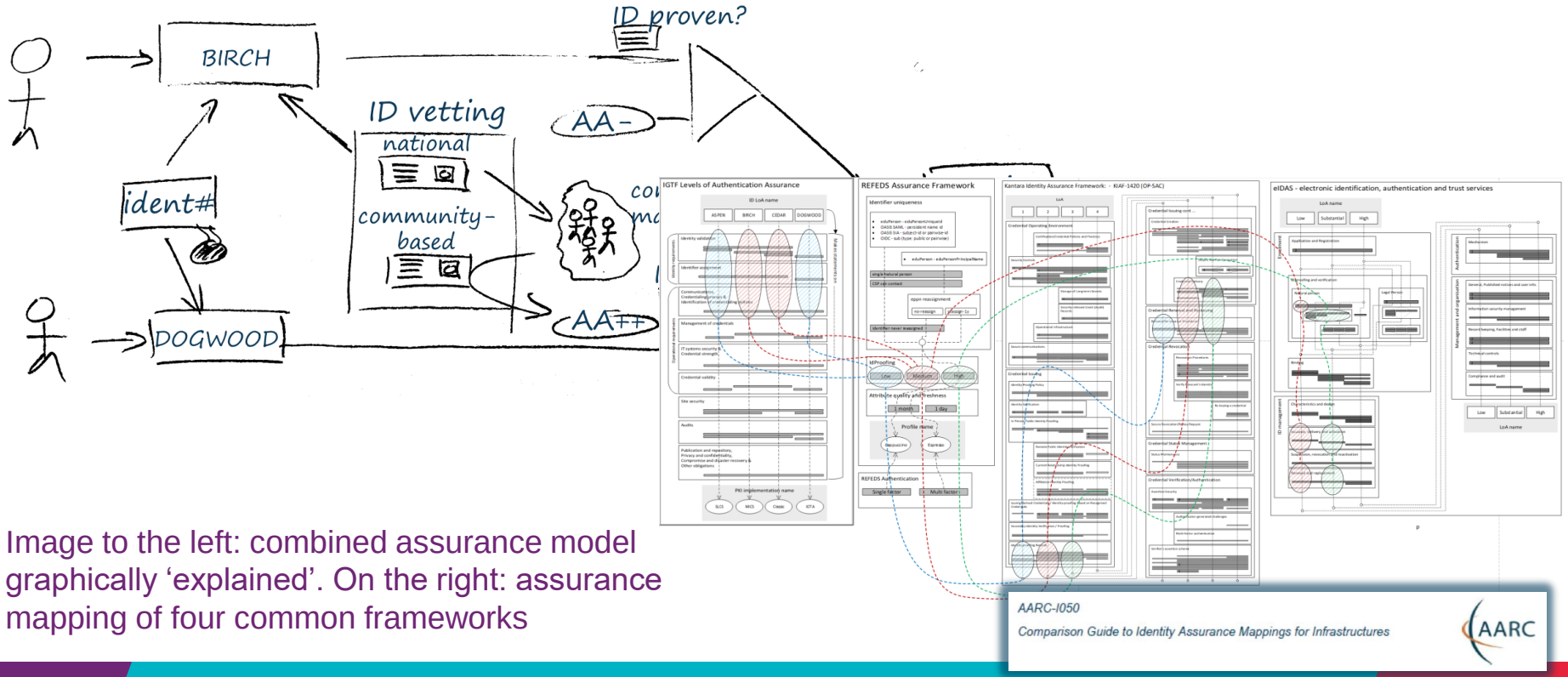
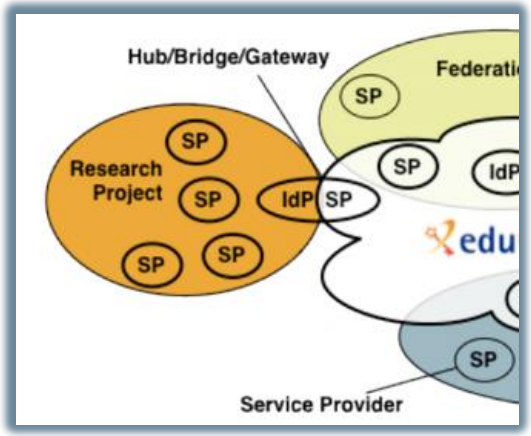



Image to the left: combined assurance model graphically ‘explained’. On the right: assurance mapping of four common frameworks

# **Snctfi**, maybe?

*Scalable Negotiator for a Community Trust Framework in Federated Infrastructures*




Snctfi v1.0 AARC

Scalable Negotiator for a Community Trust Framework in Federated Infrastructures (Snctfi)

Licia Florio (GÉANT), David Groep (Nikhef), Christos Kanellopoulos (GÉANT), David Kelsey (STFC), Mikael Linden (CSC), Ian Neilson (STFC), Stefan Paetow (Jisc), Wolfgang Pempe (DFN), Vincent Ribaillier (IDRIS-CNRS), Mischa Salle (Nikhef), Hannah Short (CERN), Uros Stevanovic (KIT) and Gerben Venekamp (SURFsara)

AARC - Version 1.0 - 26 Apr 2017

e-mail: david.kelsey@stfc.ac.uk

**Abstract:** This paper identifies operational and policy requirements to help establish trust between an Infrastructure and identity providers either in an R&E Federation or in another Infrastructure, in each case joined via a Service Provider to Identity Provider proxy.

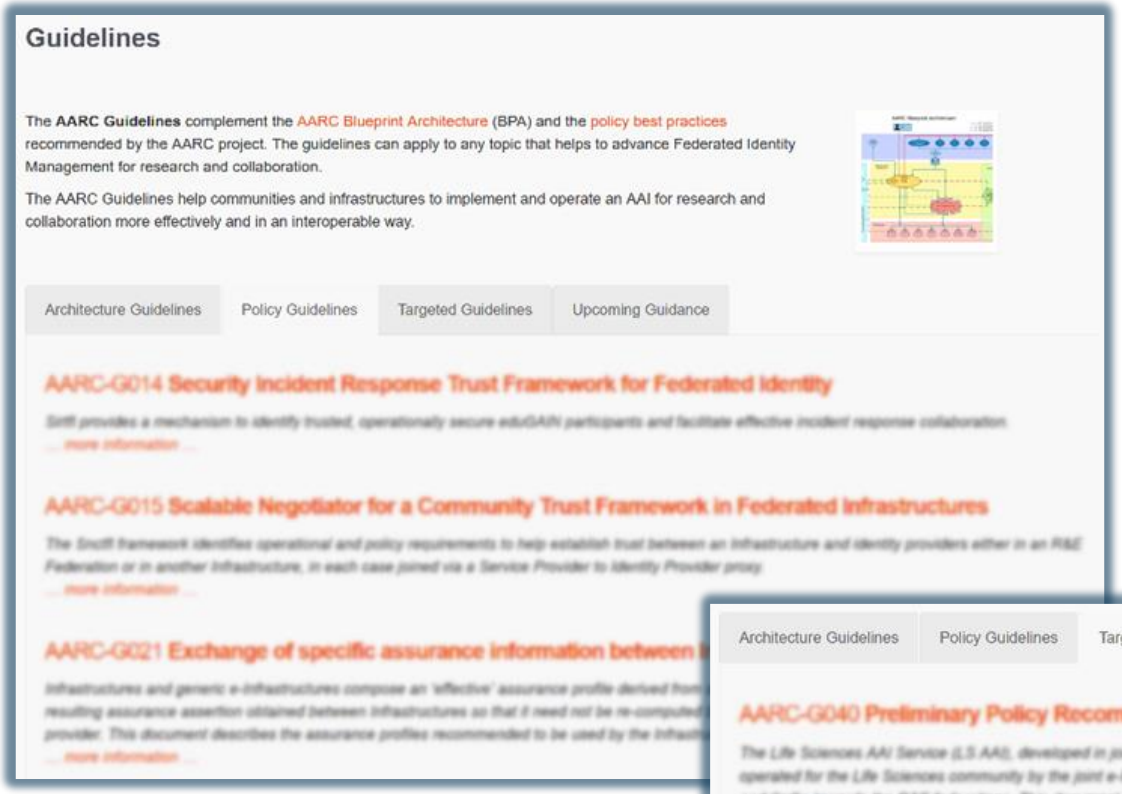
**Audience:** This document is intended for use by the personnel responsible for the management, operation and security of an Infrastructure and those wishing to assess its trustworthiness.

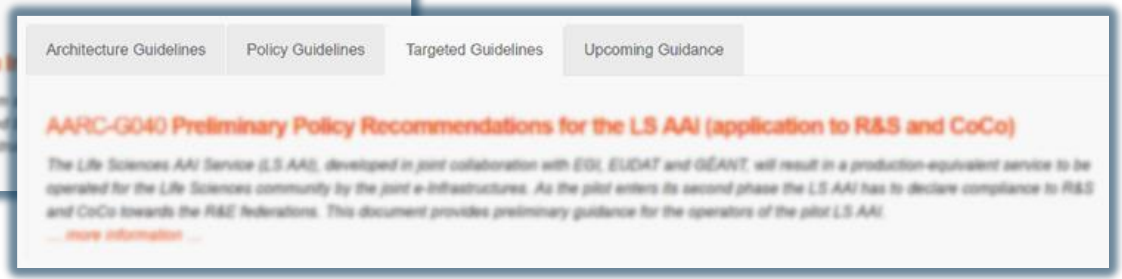
DERIVED FROM **SCIV2**: FRAMEWORK ON *SECURITY FOR COLLABORATION IN INFRASTRUCTURES* VIA **WISE**

REFERENCE POLICIES SUPPORTING *SNCTFI* FULFILMENT IN THE POLICY DEVELOPMENT KIT



*GRAPHIC IDP-SP BRIDGE: LUKAS HAMMERLE AND ANN HARDING, SWITCH*



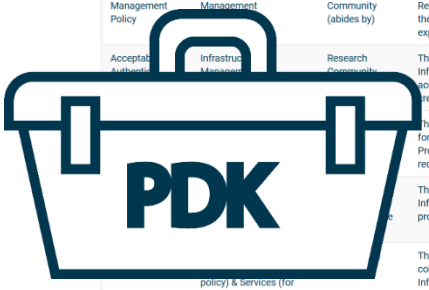

***aarc-project.eu/guidelines***

***Snctfi*** *covers both* service-centric and some researcher-centric *policies*



Nikhef

# THE POLICY DEVELOPMENT KIT




| Document | Who should complete the template? | Audience | Description |
|---|---|---|---|
| Top Level Infrastructure Policy | Infrastructure Management | All Infrastructure Participants (abides by) | This policy templat actors in the Resea binds the policy se |
| Incident Response Procedure | Infrastructure Management & Security Contact | Infrastructure Security Contact, Services (abides by) | This template pro by-step breakdown following a security |
| Membership Management Policy | Infrastructure Management | Research Community (abides by) | This policy templat Research Commun their members, incl expiration. |
| Acceptable Authentication Assurance | Infrastructure Management | Research Community, Services (abide by) | This is a placehold Infrastructure to de acceptable assura credentials. |
| Policy on the Processing of Personal Data | Infrastructure Management & Data Protection Contact | Research Community, Services (abide by) | This document def Infrastructure Parti processing person |
| Service Operations Security Policy | Infrastructure Management | Services (abide by) | This policy defines running a service Infrastructure. |
| Risk Assessment | Infrastructure Management, Services & Security Contact | Infrastructure Management (completes) | This table can be u for identifying whe Protection Impact required. |
| Service Operations Security Policy | Infrastructure Management | Services (abide by) | This policy defines running a service Infrastructure. |
| Acceptable Use Policy | Infrastructure Management (for baseline) & Research Communities (for community specific restrictions) | Users (abide by) | This is a template f policy that users m Research Infrastruc augmented by the |

Showing 1 to 9 of 9 entries

HTTPS://AARC-PROJECT.EU/POLICIES/POLICY-DEVELOPMENT-KIT/



Nikhef

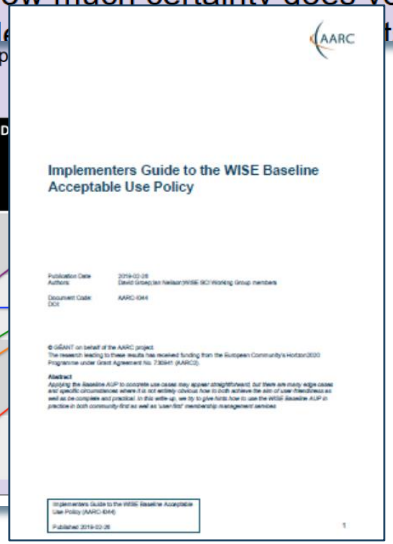
# But also the ‘PDK’ complexity will need to be managed …

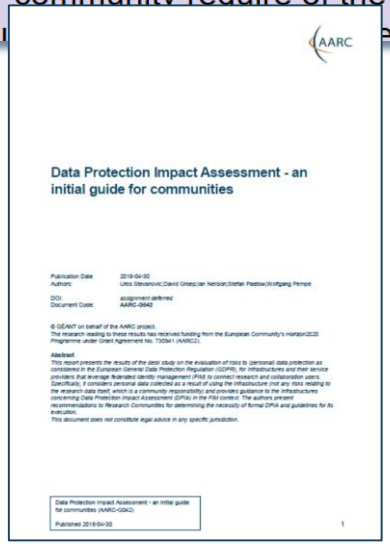
Questions to ask yourself when defining this policy:

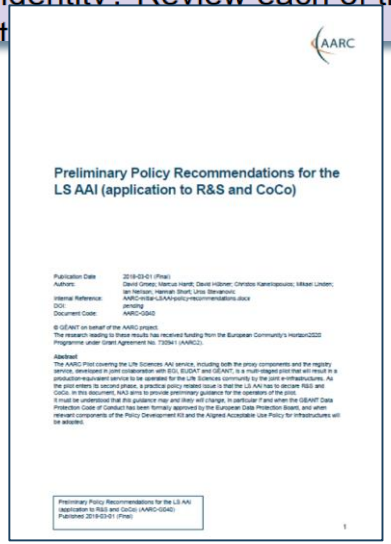
- Which identity providers are acceptable for your infrastructure? SAML Identity Federation IdPs? Social providers such as Google, Facebook etc?
- How much certainty does your community require of the identity? Review each of the elements (personal accounts, authentication strength). How
- How can you ensure that each capability at their home organi
- Do your services, or a subset,

The following chart can be used to help determine an app
Refer also to AARC Guideline 21:

| Should identifiers be unique, personal and traceable? | Should identifiers be unique across the infrastructure? | How fresh do attributes need to be? | What kind of ID Proofing is required? |
|---|---|---|---|
| Unspecified | Unspecified | Unspecified | Unspecified |
| Yes | Yes | 1 month | Low (self asserted) |
| | | | Medium (e.g. postal credential delivery) |
| | | | High (e.g. face to face) |



# Start with baselining

***baselining has been very effective with Sirtfi, for R&S, and for InCommon …***

**Trust marks or seals**
for specific service levels, access classes, types of data, regulatory domains, &c

**Good Practice implementation guidance**
small number of assurance profiles (REFEDS, IGTF, eIDAS), AARC secure operations standards, AEGIS recommendations, CSIRT capability

**SCI-based policy mapping**
leverage common templates like the WISE Acceptable Use Policy, or membership management …

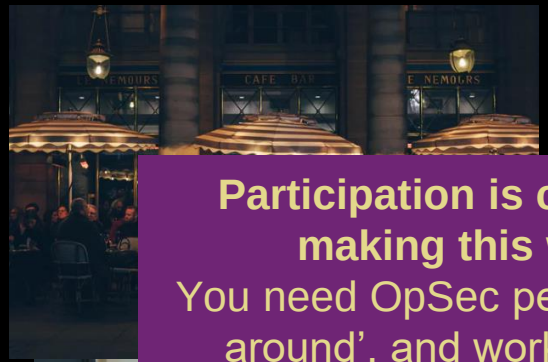
**Technical guidance**
e.g. expression of identity assurance

**Rules of Participation**
minimal set of capabilities –initially maybe just contact information and responsiveness

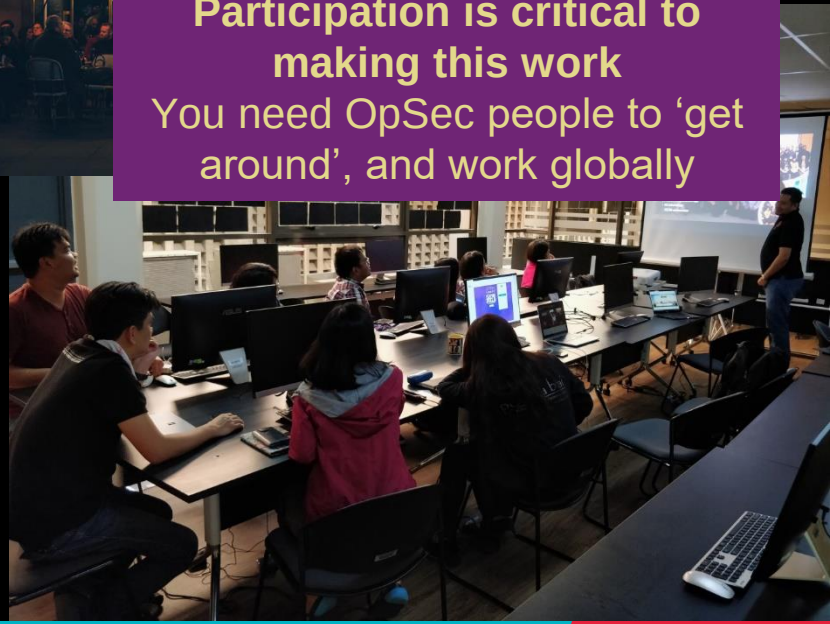
# Do I know that you know what to know about what?

Training - and ability to exercise - intelligence sharing framework and best practices, but *also* collective technical and forensic expertise!

- build up expertise to desired maturity – esp. across EOSC portal providers and research communities
- desirable, but not yet likely, to have training a requirement for participation *but hard to realise for an EOSC that does not wish barriers to entry* ☹




**Participation is critical to making this work**
You need OpSec people to ‘get around’, and work globally



# Establishing the trust basis for response

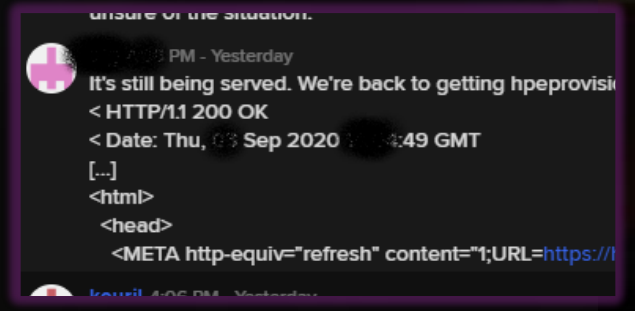
Collaboration frameworks, processes, exercises – the basis of trust
*since not everything can be done on personal trust and 'blind faith'*


# **Actionable** Response – coordination involving the Core

We *know* we cannot address all needs, but we can make progress

**‘in the end, the same people do the same work, together, and regardless of the project of funding label’**

- EOSC core will itself be a significant hub
- it will have a tightly-knit team of experts looking after the security of the core
- who can work collaboratively with peer infrastructures and groups

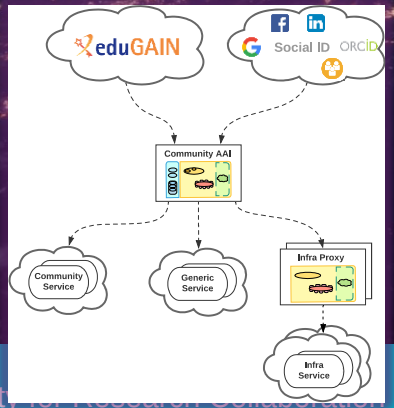


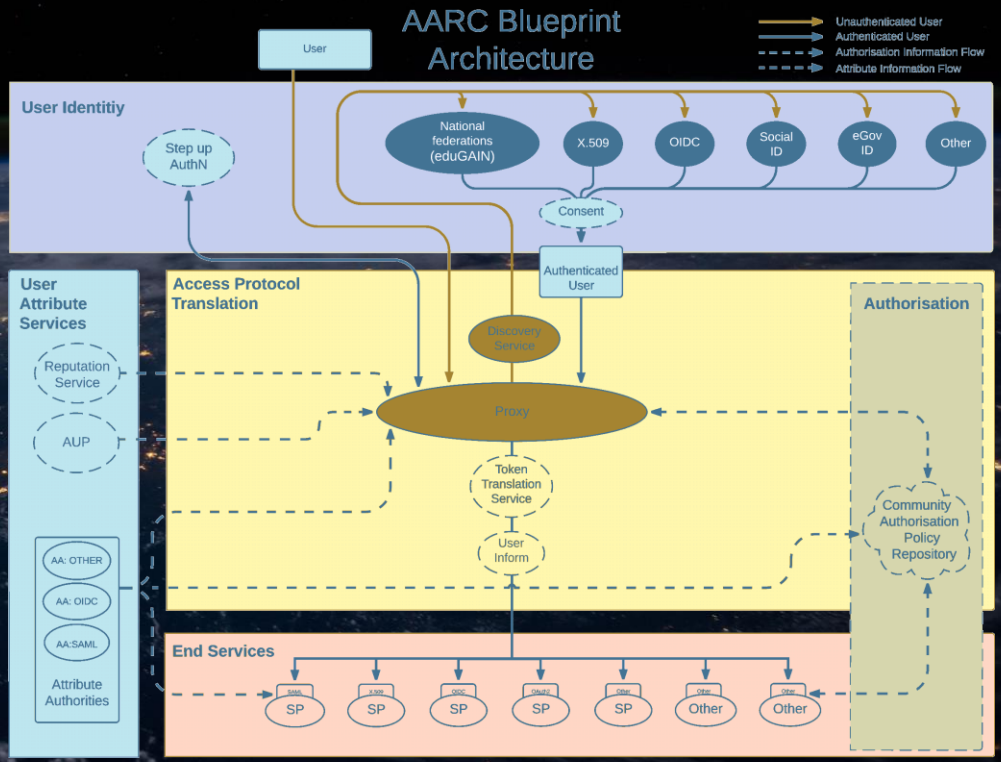

this team is essential to glue together the information during incidents – leveraging the trust built up before through engagement

# But isn’t ‘AAI’ going to solve all that ‘as a service’?

… we really heard that one …

and although the AAI is a core service of the EOSC, it only does ‘what it says on the tin’

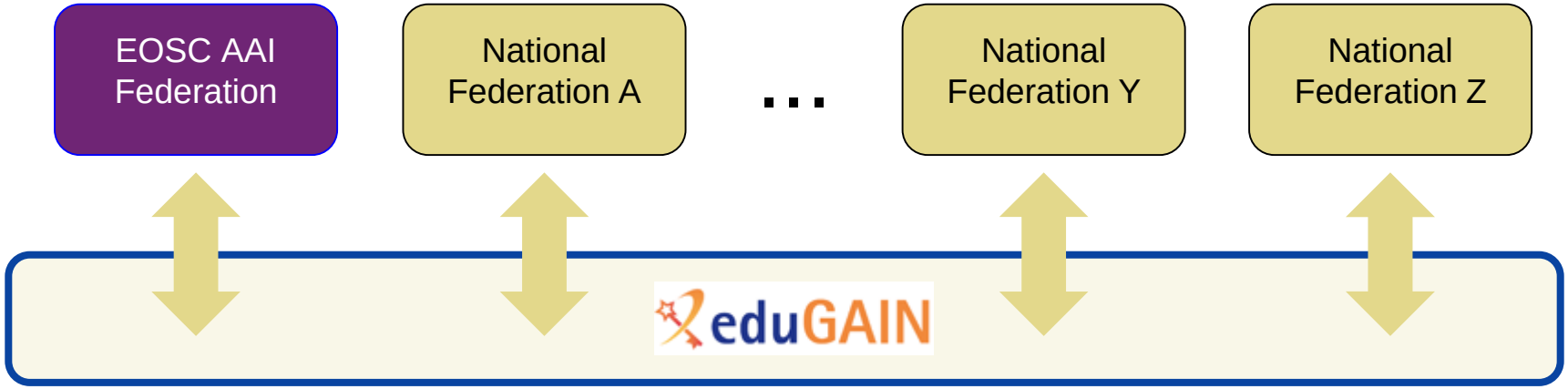


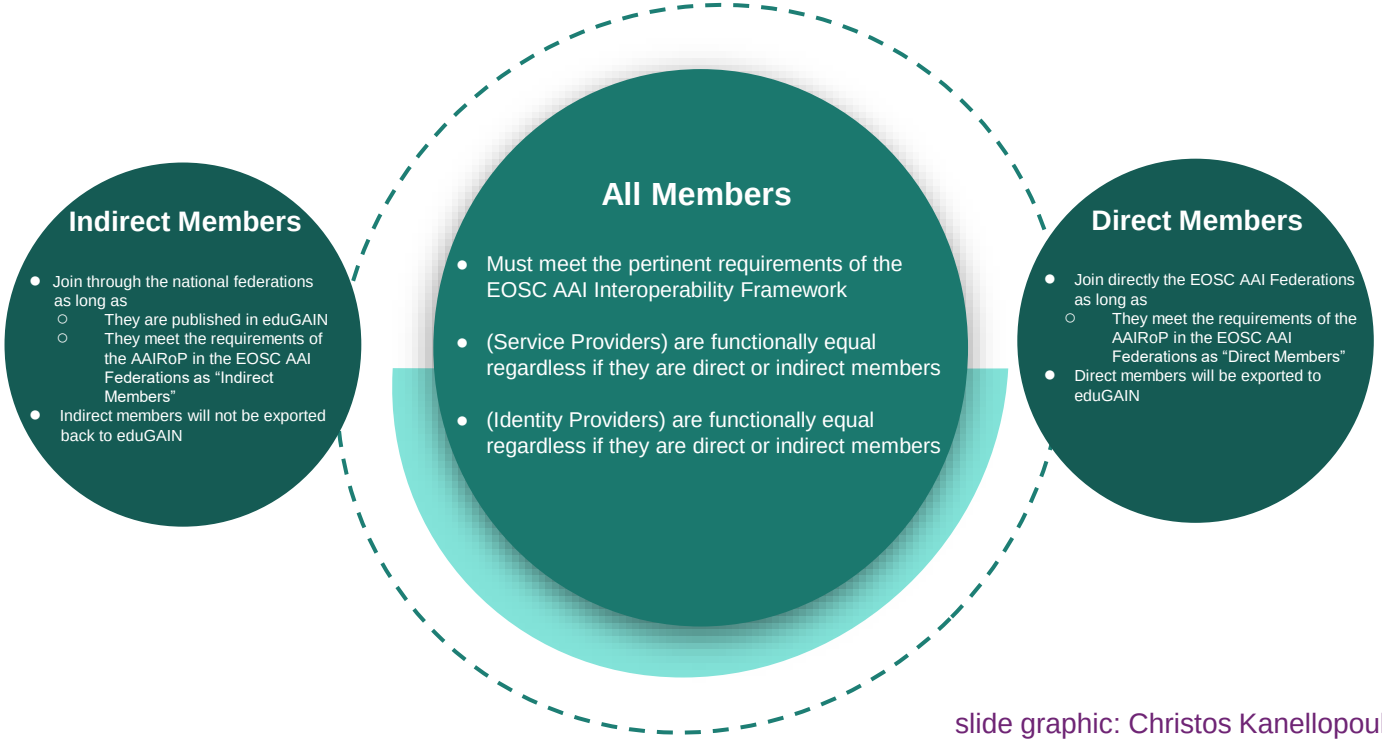
# Linking the providers and users together - AAI

AARC BPA's 'community-first' model does not cover all EOSC cases, e.g. *infrastructures acting as providers **and** suppliers **and** as attribute authority*

You need to turn the EOSC entities into a federation in itself, with carefully forged links to eduGAIN to prevent 'user loop' inconsistencies



# Linking into the EOSC federation




It has to be linked to eduGAIN, and both the EOSC and eduGAIN should mutually strengthen each other.

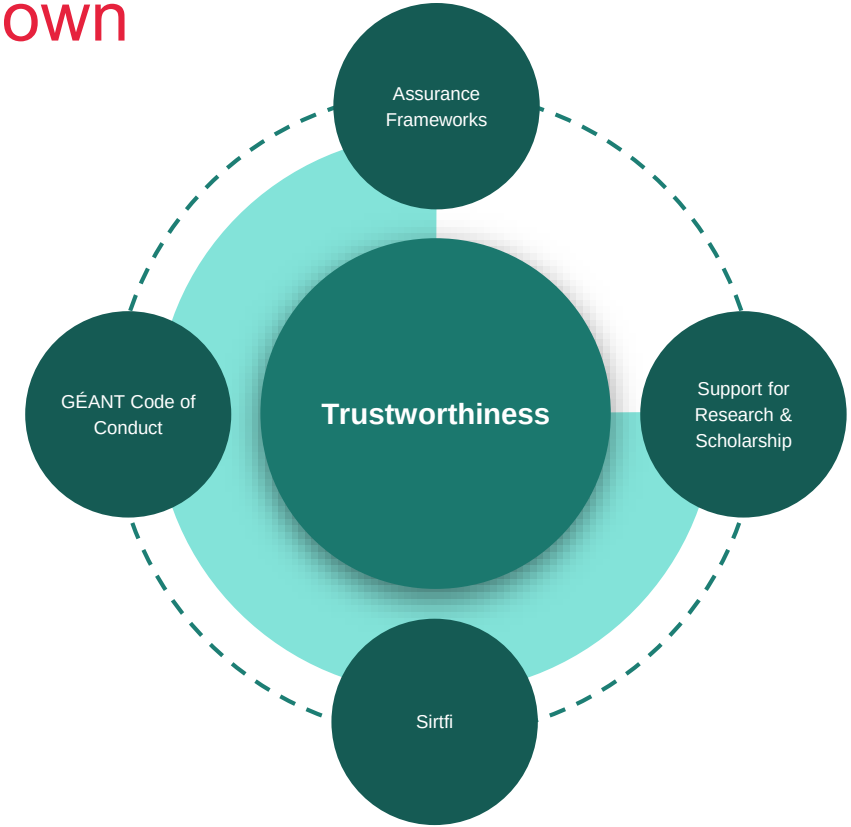
Given the broad reach of the EOSC, it may well contain new entities, both from the private sector and from international collaborations and research infrastructures

slide graphic: Christos Kanellopoulos, with NicolasL, DavideV, and DavidG

# But now … turtles all the way down

*… now that new 'EOSC' federation needs policies and a base line*

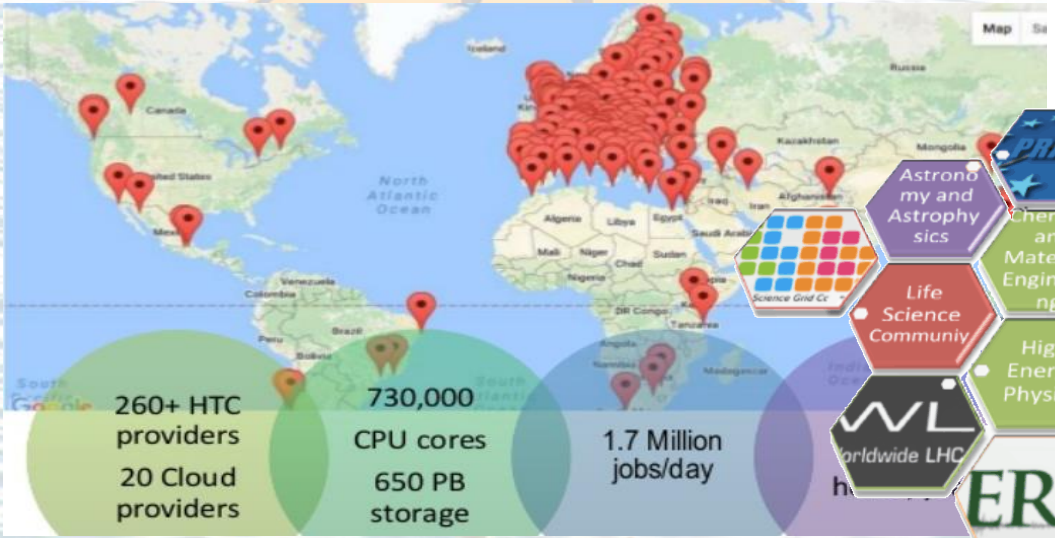
- inspired by eduGAIN constitution and other sources
- leveraging existing trust frameworks
- and not repeating earlier mistakes so implement a baseline at the start

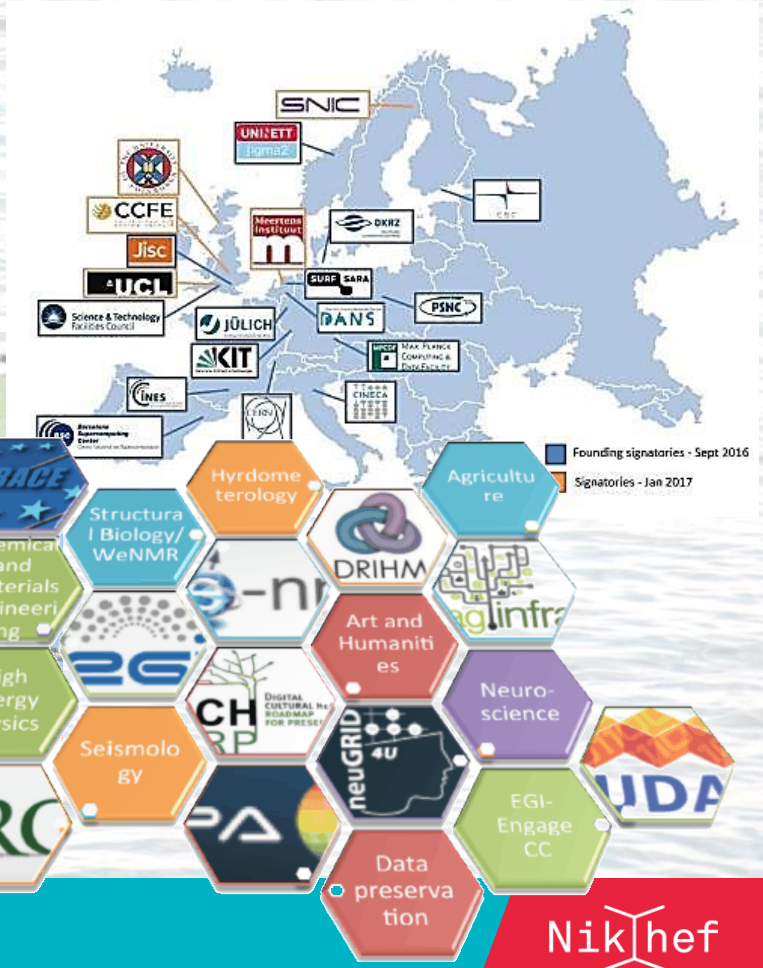



slide graphic: Christos Kanellopoulos, with NicolasL, DavideV, and DavidG

# So if not the AAI … who then?

do we face
an unbounded challenge?



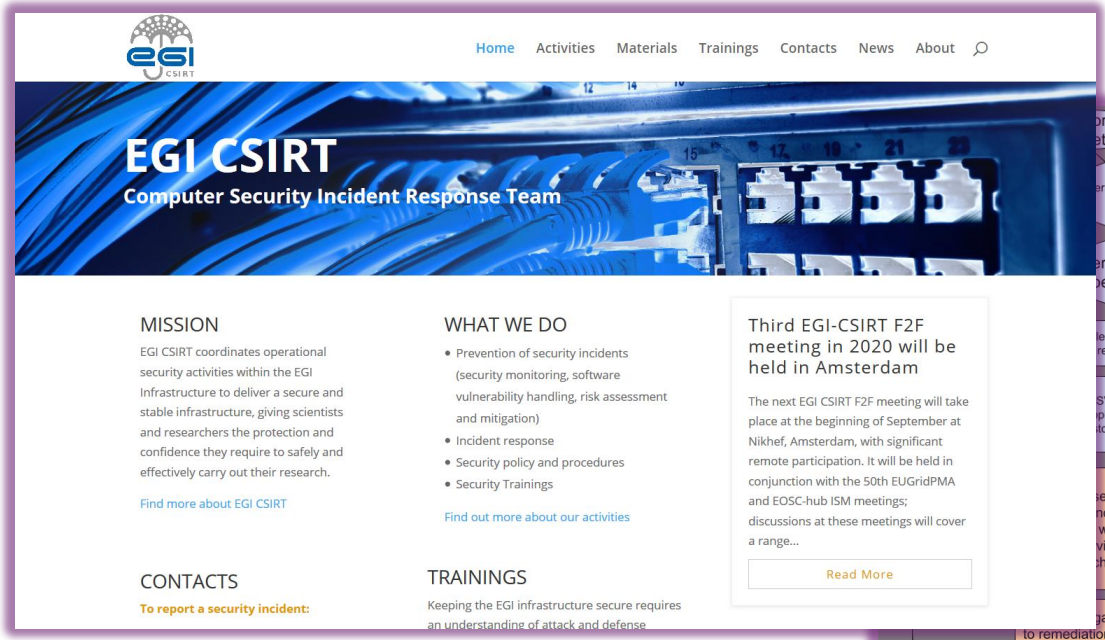
# What we expect in the infrastructures and services

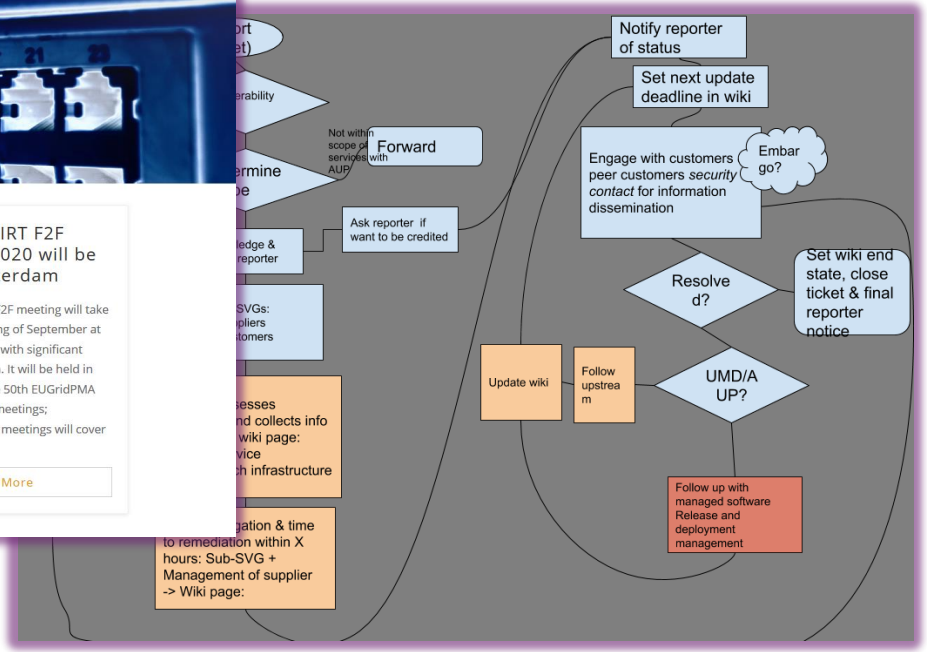
Service providers should be at - or grow towards - a mature security stance

- an **infrastructure** – both providing and using services – can provide coordination amongst similar services, making that much easier
- security merit is that service providers in an infrastructure can **benefit from their commonalities** in response & security management
- and for the EOSC that a mature security capability can be structured at the infrastructure level in a scalable way across many service providers

*and remember ‘services’ are very broad and includes data, publications, &c*

# Profiting from having a common set of services



# Complementarity within the service & infrastructures

- information security management maturity
  *looking after service integrity, responsive contacts, also for exercises, and monitoring for intrusions & vulnerabilities*
- vulnerability assessment and management
  *pro-active security management in general*
- incident response and resolution within the infrastructure and service
  *and smooth collaboration with the (EOSC) core team*

# Thus even generic capabilities will be widely distributed

## EOSC 'Portal' and ecosystem

- security for a loosely coupled ecosystem
- risk management for collective services
- security baselining and trust marking
- training and capability enhancement
- coherence of response, community readiness/collaboration, and information sharing
- resolution, forensics, resolution and remediation for core and stakeholders

Core in EOSC-Future

## e-Infrastructures, services, content

- service security & integrity, responsiveness, compliance monitoring
- vulnerability management and pro-active security management
- incident response and resolution within the infrastructure or service

EGI

membership contributions

VA core

EUDAT

GEANT

...

See also *Trust Coordination for Research Collaboration in the EOSC era,* February 2020, https://g.nikhef.nl/eosc-sec-wp; https://doi.org/10.5281/zenodo.3674676

# Common questions – open answers

***Will a core team – incident response and forensics experts and coordinators – be busied consistently with service-specific response, where the portal would not be able to add to the trust of its participating providers?***

**Or can we do better?**

- a baseline policy bringing enough trust to keep an EOSC-like ecosystem secure?
- will service providers act collectively in the common interest?
- will diverse policy and assurance establish a common reputation for services?
- will provider self-assessment and mitigation of key risks, be seen as ‘good value’?

**And do the users care?**

- and: *care enough* to make trust and security worth the cost for service providers?

Photo by Yash Prajapati on Unsplash

*based on the white paper co-authored with Jens Jensen, Dave Kelsey, Daniel Kouřil, Maarten Kremers, and Hannah Short and on discussions in the EOSC Future Security Operations & Policy collaboration*

Nikhef

David Groep
davidg@nikhef.nl
https://www.nikhef.nl/~davidg/presentations/
https://orcid.org/0000-0003-1026-6606

long read:
Groep, David L. *et al.,* Trust Coordination for Research Collaboration in the EOSC era
http://doi.org/10.5281/zenodo.3674677

# Planning ahead!

Almost regardless of what happens next, we do need comprehensive security for the EOSC. If we don't act, or leave corners open, it will some back to haunt us.

- what the EOSC will be, is still being shaped
- yet connecting services, content, data will happen, and on a *much wider, more distributed,* and *multi-stakeholder* scale

We need to engage with the new and evolving stakeholders who will not know us – and likely not trust us – until we gain such trust outside our 'usual' zone

- education, awareness and training
- security exercises based on recognised trust frameworks + Rules of Participation
- ensure collaboration of everyone when time comes – we need the portal on board
- operational expertise, forensics, remediation, and demonstrable practical impact are key to success!

this work is co-supported by the Trust and Identity workpackage of the GEANT4 project - phase 3

THANK YOU

Read: *Trust Coordination for Research Collaboration in the EOSC era*
**http://doi.org/10.5281/zenodo.3674677**

davidg@nikhef.nl

GÉANT
NETWORKS · SERVICES · PEOPLE
WWW.GEANT.ORG

THIS WORK IS ALSO SUPPORTED BY A PROJECT THAT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO. 856726 (GN4-3).