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Deliverable DNA1.3: Summary of AARC2 Main Achievements and Sustainability and Exploitation Plans

Deliverable DNA1.3

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Abstract

This document presents AARC2 final results. The document describes the AARC2 project overall dissemination and exploitation strategy and for each key exploitable project result lists the actions that are being proposed to ensure adoption of AARC2 results beyond the project lifetime.

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Executive Summary

This document presents AARC2 main achievements and the overall dissemination, outreach and exploitation approach taken by the project. For each key exploitable result, the document describes the actions to maximise the impact as well as to ensure further adoption of AARC2 results beyond the project lifetime.

It is important to note that in the context of this document (and more in general of AARC2), 'research collaborations', 'research infrastructures' or 'research communities' terms are used interchangeably to refer to a community (either in the form of real legal entity or a virtual collaboration) that undertakes research in a specific field.

E-infrastructures henceforth refers to EGI, EUDAT, GÉANT and PRACE, organisations that offer infrastructure services (such services that benefit different research collaborations) for the benefit of different research collaborations.

As the AARC2 project took AARC1 results as input and expanded them further, the project team agreed to promote any key results under the name 'AARC'. This ensured a more consolidated approach, preserved the branding, and allowed the team to use one website across the two projects, thereby maximising the potential to build on brand recognition and reach of the project outputs.

Chapter 1 describes the goals of AARC2 and provides a general overview.

Chapter 2 presents the general approach to dissemination and exploitation activities and the key results.

Chapter 3 presents the Key Exploitable Results and the exploitation strategy for each of them.

The last chapter presents the conclusions and provides inputs for future work.

1 Introduction

The Authentication and Authorisation for Research and Collaboration project, AARC2, builds upon and further expands the work of the previous AARC1 project (May 2015- April 2017).

The AARC2 project ran for two years (2017-2019) and built on the work done by the AARC1 project. The aim of both projects was to empower research collaborations to deploy scalable authentication and authorisation infrastructures (AAI) that would support federated access to manage and share their own resources. This would preserve privacy and security and would allow researchers to use their own institutional credentials to access the necessary resources.

At the start of the AARC1 project, although all infrastructures recognised the need for a scalable and reliable AAI and could see some of the benefits of federated access, there was no consistent approach to how best to build an AAI that would address specific community requirements and enable access to different types of resources, whilst at the same time enabling access to services via eduGAIN. In particular, one of the main challenges that research collaborations face is that service authorisation is often based on the collaboration the research is part of, rather than the institution the research belongs to. However, the home institution of a researchers does not handle such information; this information is unknown to the identity provider and therefore is not transported via eduGAIN. The AARC project found a way to address this.

AARC2 focused on:

- **Championing federated access -** Making federated access the main access means for research collaborations by addressing technical and policy challenges and reflecting them in the AARC Blueprint Architecture [BPA] [1].
- **Supporting global policies -** Developing key policy frameworks to minimise diverging policies and empower research- and e-infrastructures to inter-operate with each other.
- **Running pilots with research collaborations participating in AARC2 (and beyond as needed) -** Supporting research communities to scope their requirements and deploy matching solutions based on the AARC Blueprint Architecture.
- **Promoting AARC results and making them sustainable** - Entrusting operations with existing research- and e-infrastructures whenever possible.

To respond to these needs, and taking as a starting point the list of requirements and challenges for federated access that was identified in both the TERENA AAI Study and the first FIM4R paper, the AARC projects produced a **Blueprint Architecture,** which defines a consolidated approach to building an AAI for research collaborations that operate across multiple administrative domains. The BPA empowers research collaborations to manage their own resources and how they are accessed, and removes complexity from the service providers by offering a central point to which they can connect. The BP, is technology agnostic and builds on top of eduGAIN, therefore enabling federated access. It defines a set of technical components as well as a policy and privacy framework to ease the deployment. The **BPA** and its visual representation had a tremendous impact and **has become the reference model for AAIs** used in the research and education (R&E) domain not only in Europe but beyond.

To learn more about the purpose of AARC, refer to the two-minute AARC video for more information.

[1] The first AARC BPA [AARC-BPA-2016] was defined during the AARC1 project; during the AARC2 project the architecture has further evolved to cover authorisation and different policy aspects. [AARC-BPA-2017] A new version of the BPA was produced at the end of AARC2 [AARC-BPA-2019].

1.1 Project Structure

To achieve its objectives the project was structured in five work packages, each with a clear role; the project governance was kept very lean to ensure a fast decision-making process. The picture below describes the AARC2 project structure.

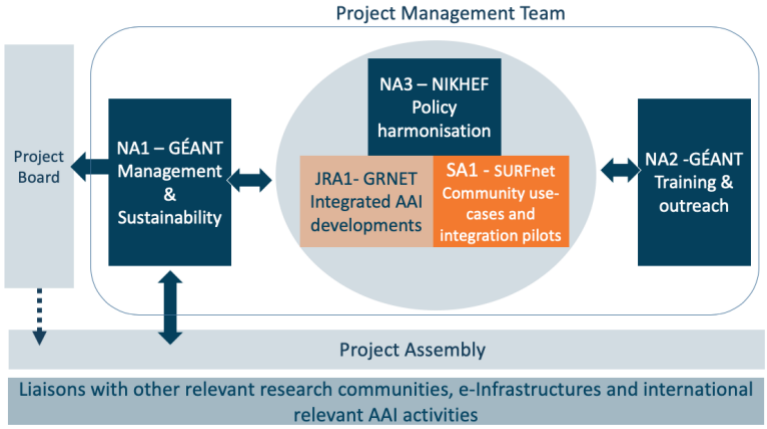

Figure 1: AARC2 Project Structure

1.2 Description of the AARC2 consortium

The AARC2 project was led by GÉANT and brought together 25 partners that represented key stakeholder groups, namely the national research and education networks (NRENs), ESFRI[2] projects [ESFRI] that cover different research areas, and the research- and e-infrastructures. Each of the partners brought the necessary expertise and requirements to manage and share resources, as well as representing the communities that each of them supports.

- **Five NRENs**: CESNET, GARR, GRNET, PSNC and SURFnet;
- **Two SMEs**: DAASI International (representing DARIAH-EU, the Arts and Humanities research collaboration) and Reti SpA;
- **Ten research communities and research infrastructures** representing different scientific communities:
    - EMBL (and their third party, ELIXIR), BBMRI-ERIC, Infrafrontier and Instruct ERIC representing the life science communities;
    - CERN representing the Worldwide LHC Computing Grid (WLCG)**;**
    - INAF representing the Cherenkov Telescope Array;
    - EISCAT representing EISCAT_3D (scatter radar to provide 3D atmospheric images);

[2] The European Strategy Forum on Research Infrastructures (ESFRI) was established in 2012 with a mandate from the EU Council to support a coherent and strategy-led approach to policy-making on research infrastructures in Europe.

- CYFRONET, representing the European Plate Earth Observation System (EPOS);
- KIT, one of the infrastructure service providers;
- University of Cantabria, representing the LifeWatch (environmental research) community;
- University of Cardiff, representing the Laser Interferometer Gravitational-Wave Observatory (LIGO);
- STFC, the UK Science and Technology Facility;
- Nikhef, the Dutch National Institute of Subatomic Physics

- **Two library partners**: LIBER and the Moravian Library;
- **e-Infrastructures and e-infrastructure liaison partners,** EGI, GÉANT, and STFC and Jülich representing EUDAT and PRACE.

1.3 AARC2 Results IPR

All AARC (AARC2 and AARC1) results are available whenever possible under open-source licences, namely:

- Creative Commons CC BY 4.0 for documents, reports, presentations etc., unless otherwise agreed and for justified reasons;
- 2-clause BSD license, for any new software developed within the project, or an equivalent open source licence should this not be applicable.

2 Approach to exploitation and dissemination in AARC

This section provides an overview of the process followed to identify the Key Exploitable Results of AARC as a whole.

In line with what was described in both AARC1 and AARC2 technical annexes, the exploitation of AARC results as a whole rests within research and e-infrastructures, which are best positioned not only to deploy relevant AARC results (i.e. the BPA and the policy results) to their constituency but also to maintain them in the longer term. Also, both AARC1 and AARC2 projects took the view that no services would be operated within the project. This was a strategic choice given the temporary nature of the AARC projects and the need to ensure longer term sustainability. The AARC project has produced some important results and recommendations were made to ensure that AARC work can be useful beyond the project lifetime.

The main target for the exploitation of AARC results are research collaborations and e-infrastructures operating in the research and education sector, as well as resource providers that offer their services to research and e-infrastructures.

2.1 Methodology

The main objective of the exploitation was to maximise the adoption of AARC results beyond the duration of the project. The project took a very simple approach towards the **exploitation**.

Because of the very specific focus on AAI aspects within research infrastructures, the specific nature of AARC results and the fact that, by design, any operational aspects would be addressed by the interested research and e-infrastructures, the consortium agreed to follow a non-commercial exploitation approach, based on the following principles:

- *Knowledge transfer*, based on the training modules and online documentation. All AARC1 and AARC2 material has been reviewed during the second year of the project to be used online as much as possible.
- *Community building*, AARC has built a community and has strengthened the relations with and between different research infrastructures and e-infrastructures. AARC2 has also explored synergies with other projects, like GN4-3, EOSC Pilot and EOSC-Hub, that will continue beyond AARC.
- *Research and development*, AARC videos and presentations have been widely promoted at relevant events and via social media. Additional webinars have also been organised to disseminate and promote results at large.

During the PY2 of AARC2, results were prioritised and, particularly for guidelines and specifications, a suitable venue to host and maintain them for the future was found.

AARC builds on two main pillars:

- the Blueprint Architecture (BPA), which is the main **key** result of the project and since its inception (during the AARC1 project) gained a lot of attention. An initial version of the BPA was produced during the AARC1 project, but during the AARC2 project it was enhanced to address authorisation aspects across multiple infrastructures, assurance, various policy and privacy aspects, and, by providing specific guidelines, to ease the BPA deployments among research collaborations and e-infrastructures. More information on the BPA and its impact are provided further down in this document; however detailed aspects of the latest version of the BPA are presented in DJRA1.4 [DJRA1.4].
- and the policy frameworks needed to make the BPA secure and compliant with the data protection regulation.

The AARC2 pilots carried out with the research collaborations showed that the BPA can be deployed in different scenarios and provided useful lessons that were taken on board and reflected in the latest version of the BPA as well as in the AARC guidelines. The AARC team invested significant effort in promoting and disseminating (via videos, training, webinar, blogs etc.) the BPA, the policy frameworks and the auxiliary guidelines.

Engagement with research collaborations and e-infrastructures was a key aspect in AARC2 and was given high priority; given that these communities would be exploiting AARC results they were consulted as early as possible in the process to get their buy-in. AEGIS (AARC Engagement Group for Infrastructures) was an enabler in this process and provided a way to identify gaps that could hinder the adoption of some of the results. AEGIS participants, the operators of AARC BPA-compliant AAIs in research- and e-infrastructures, provided useful feedback to AARC guidelines and, by 'endorsing' them, indicated they could adopt them in their production infrastructures. At the start of the project the AARC engagement plan [MNA1.1] was prepared to outline the

approach to reach out to and engage with research communities and research and e-infrastructures considered key beneficiaries of the AARC results.

The dissemination and training activities were powerful instruments to facilitate the adoption of AARC results and to provide inputs to develop them further. The dissemination and outreach activities are further detailed in DNA2.3 "Summary Report on Training, Communication and Outreach Activities". To ensure continuity, the AARC2 team started to deploy the message 'start with AARC' at the start of 2019. This message is being used throughout the video materials as well as on social media and will continue to be used to further promote AARC results.

3 AARC Key Exploitable Results

The table below summarises the key exploitable results of the project.

KER	Description	Impact	Beyond AARC2	Category
AARC Blueprint Architecture (AARC BPA)	Provides a reference architecture that is meant to guide architects in research collaborations in building interoperable AAIs.	The BPA has become the reference model for AAI among research and e-infrastructures worldwide. To date 13 research and e-infrastructures operate an AARC BPA-compliant AAI. EOSC-Hub AAI implementation is based on the AARC BPA. OpenAIRE and ESA are also considering the AARC BPA for their AAIs. Currently also NRENs (SURF and Jisc) are considering the AARC BPA to manage their own services.	The BPA is currently hosted on the AARC website. After AARC, it will be hosted by AEGIS for future development and maintenance.	Specification
Policy frameworks / 'PDK'	AARC contributed significant effort to the specification of	The Policy Development Kit materials are already being used for the evolution of the e-infrastructure policy	The Sirtfi framework will continue to be hosted and supported by the REFEDS Sirtfi Working Group.	Specification /training module

	Sirtfi, the Security Incident Response Trust Framework for Federated Identity. AARC also developed **Snctfi**, the Scalable Negotiator for a Community Trust Framework in Federated Infrastructures. To better support research and e-infrastructures to deploy the AARC policy framework, AARC developed the Policy Development Kit [**PDK**] that provides training, templates as well as documents on how to adopt Sirtfi and Snctfi.	suites (e.g. in EOSC-Hub and WLCG), and it is expected that the PDK becomes a useful instrument for new research collaborations that plan to deploy an AARC BPA-compliant AAI. The Baseline Acceptable Use Policy developed in AARC through the WISE community has been adopted by multiple infrastructures at both a community, national, and European level.	Snctfi is hosted by IGTF. The AARC PDK will remain on the GÉANT e-learning platform and project website, but further discussion and updates will be jointly supported by WISE, IGTF, GN4-3, EOSC-Hub projects and other interested parties.	
Pilots results / 'AARC in Action'	Pilots were carried out in AARC2 in collaboration with research infrastructures to deploy an AARC BPA-compliant AAI.	The pilots have been a very effective way to engage with different research communities, to validate the AARC BPA enhancements and the relevant guidelines, and also to gain an insight on deployment aspects.	The sustainability of the pilot results is out of scope for AARC2, as each research infrastructure will decide how to exploit the pilot results based on their needs and on their resources. The lessons learned from the pilots have been turned into case studies and are available on the	Documentation

			'AARC in Action' web section. The pilots' results have been widely promoted at relevant events.	
Training modules	Provide general information on key aspects of federated access; offer guidance to learn how to implement AAIs and how to leverage AARC project results.	AARC2 delivered various training modules, some in the form of online courses. Some were more tailored for specific communities or specific aspects of the BPA, whilst others were more general purpose.	All training modules will remain available via the AARC website.	Training modules
AEGIS	Brings together research and e-infrastructures, operators that operate an AARC BPA-compliant AAI to discuss operational aspects.	In April 2019 there were 7 infrastructures participating in AEGIS.	AEGIS will become the place to continue some of the current AARC work. An AEGIS website is under preparation. Research- and e-infrastructures participating in AEGIS provide the effort for their key people to attend AEGIS Calls. The GN4 and EOSC-Hub projects have agreed to support AEGIS beyond AARC.	Forum

Table 1: AARC2 KER

3.1 More details for each Key Exploitable Results

3.1.1 The AARC BPA and the guidelines

The AARC Blueprint Architecture (BPA) defines the key components for building an authentication and authorisation infrastructure (AAI) in a scalable and secure way. These building blocks can be mixed and matched according to needs. This flexibility gives software architects and technical decision makers a head start in building a customised solution for their research collaboration. eduGAIN and the national R&E identity federations enable the federation of identities and services globally. The AARC BPA leverages eduGAIN as the foundation for federated identities and adds the dimension of the research collaborations, addressing common use-cases within research collaborations such as access to non-web services and access to resources based on community membership. Furthermore, the BPA also addresses the needs of members of research collaborations to manage, access and share resources based on their roles in these collaborations.

The AARC BPA champions a proxy architecture (IdP / SP Proxy) in which services in a research collaboration can connect to a single point, i.e. the proxy. The proxy itself provides the connection to the identity federations in eduGAIN, towards which it acts as a service provider. This reduces the need for each service to separately connect to a federation / eduGAIN. The first version of the BPA was published in 2016. In 2019, AARC published the AARC BPA community first approach.

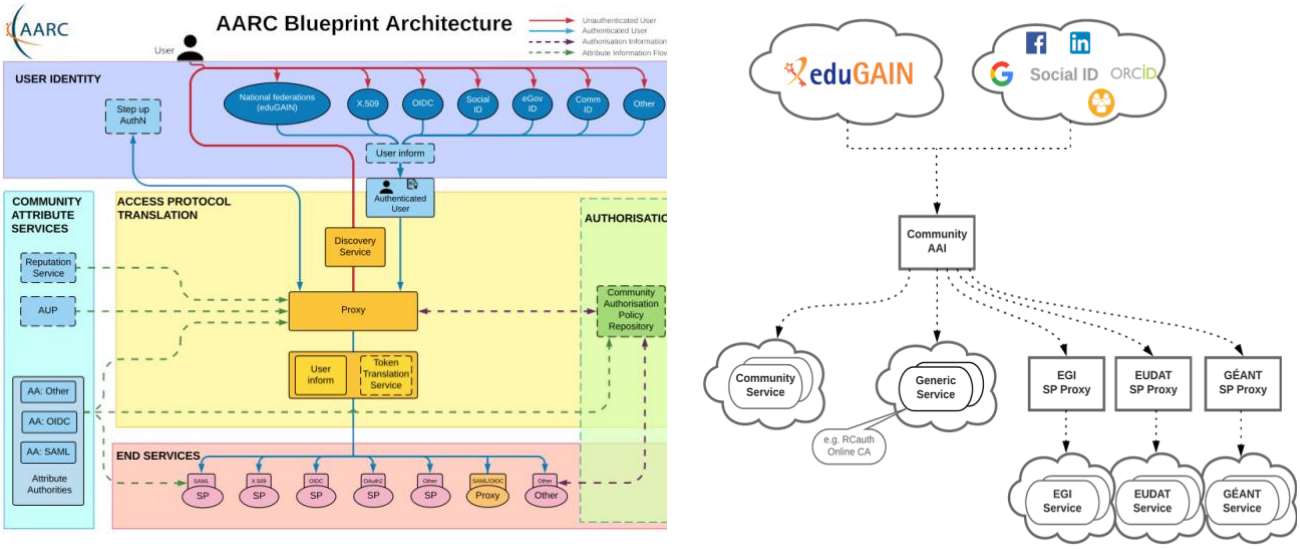

Figure 2: AARC BPA final release and the AARC BPA community first model.

The 'community-first' approach to the AARC BPA aims to streamline how researchers can access services / resources via their Community AAI using their institutional credentials from the national identity federations in eduGAIN, but also from other sources as needed / allowed by the community, such as social media or other community-managed identity providers. The Community AAI is therefore responsible for dealing with the complexity of using different identity providers with the required **community services**. Furthermore, the Community AAI enables the addition of attributes to the federated identity, that in turn can enable service providers to control access to their resources, which can range from typical web services to data repositories, scientific instruments etc. These community-specific services only need to connect to a single identity provider, i.e. their Community AAI IdP Proxy.

Apart from the community-specific services, there are **generic services** (for instance the RCauth.eu Online CA), which serve the needs of several communities and are thus connected to more than one Community AAI.

To better support research infrastructures during the deployment of AAIs that follow the AARC BPA model, the AARC projects (starting already in AARC1) produced various **guidelines** (11 guidelines produced during AARC2) and 4 informational documents to cover policy and technical aspects in more detail [AARC-Guidelines]. Each guideline went for consultation with relevant communities outside the AARC project and, once finalised, was sent to AEGIS for feedback and endorsement. The guidelines produced so far are currently hosted on the AARC website; going forward, they will be moved to the AEGIS website where they will be further maintained.

Dissemination Activities

The AARC BPA has been presented at all major conferences, such as TNC, FIM4R, DI4R, Internet2 events, IGTF meetings and was also promoted via relevant EC websites.

123 people subscribed the BPA webinar on the IAMOnline youtube channel .

A short video to continue promoting the BPA beyond AARC was published in April 2019 and promoted via newsletters, web and social media channels. Other BPA promotion took place via blogs, magazine articles and social media news.

Exploitation Strategy

The AARC BPA has become the reference model for research- and e-infrastructures interested in deploying an AAI or in the process of updating their existing one. As such, the BPA will be moved under AEGIS and effort will be made available (funded via other projects) to further develop it.

BPA Adoption

- DARIAH - Digital Research Infrastructure for Arts and Humanities
- PaNOSC, Photon and Neutron Open Science Cloud
- SSHOC - Social Sciences & Humanities Open Cloud
- Major e-infrastructures: EGI, EUDAT and GÉANT
- EIXIR, the research infrastructure that brings together life science resources from across Europe
- XSEDE - Extreme Science and Engineering Discovery Environment
- EOSC Life project, the EC-funded project started in March 2019 with the aim to deploy an AAI for all the life science projects. This AAI will also follow the AARC BPA model
- LIGO, Laser Interferometer Gravitational-Wave Observatory,
- WLCG, Worldwide Large Hadron Collider Computing Grid,
- EPOS, European Plate Observing System,
- CTA, Cherenkov Telescope Array.

3.1.2 Policy frameworks and PDK

A set of policies is necessary to guarantee security and establish trust in any AAI. The proxy in the AARC BPA has a very powerful role and as such it must remain secure; besides acting as a technical link-pin for the AAI, the BPA proxy also functions as a 'policy bridge' between the communities, the service providers, and the federated identity management ecosystem at large. The AARC policy team defined the Snctfi security framework, which supports the community or infrastructure operating the proxy in assessing the characteristics of service providers and of the identity provider (SP-IdP) proxy itself. By addressing the structure of the security policies that bind services 'hiding' behind the SP-IdP proxy, Scntfi allows comparison between proxies, assigning trust marks for meeting requirements. It also allows a scalable way to negotiate and filter based on such policies. It eases authentication and attribute release by research and education federations as well as service providers, ensuring that the proxy correctly asserts the GÉANT Data Protection Code of Conduct (CoCov2) and REFEDS R&S.

In addition, all entities need to demonstrate that they implement policies that handle security incidents based on the Sirtfi framework. This affects not only the service providers but similarly providers of identities and the (national) operators in the R&E federations. Guidelines on incident response during federated incidents, and appropriate pathways for exchanging potentially sensitive information, were developed and exercised by means of realistic 'communications challenges'.

To facilitate the adoption of the various policy frameworks, AARC produced a Policy Development Kit, which integrates an online training package and policy templates. These policies outline the operational measures undertaken by the infrastructure to properly provide services. The policies principally cover security measures, user management and data protection.

Specific guidelines and best practices were accompanied by information white papers, detailing how to best implement the policy or practice in operational infrastructures. AARC guidance for the implementation of the baseline acceptable use policy (designed to be adopted as a global baseline and co-developed with infrastructures from Europe and the Americas) was applied for communities, cross-national infrastructures, and national-scale services. Additional white papers and guidance were published on data protection impact assessments in the BPA model, authentication assurance alignment with Kantara [Kantara] and eIDAS [eIDAS], as well as community-targeted implementation models (for the Life Sciences AAI).

Dissemination Activities

The PDK, Snctifi and Sirtfi were widely promoted. Interactive workshops as well as presentation of the policy frameworks were intentionally conducted world-wide (so as to ensure a globally coherent policy environment for research) in the US and Canada (through the Internet2 Technology Exchange and the FIM4R / RDA meetings) and in Asia Pacific (through workshops at ISGC), besides the global meetings of REFEDS, IGTF plenary meetings, and European e-infrastructure conferences and workshops.

AARC2 also produced a short promotional video to further disseminate the value of the PDK and posted videos from the online training package on YouTube to increase the potential for cross-promotion. Other PDK promotion took place via blogs, magazine articles and social media news.

Exploitation Strategy

As indicated above, the AARC PDK will continue to exist and evolve beyond the AARC2 project, with the support of other EC-funded projects and existing initiatives. The core frameworks are securely rooted in independent initiatives with well-established processes (REFEDS for Sirtfi and IGTF for Snctfi) to ensure longer term sustainability. Guideline and policy development was anchored in forums such as WISE (Wise Information Security for E-infrastructures - wise-community.org) [WISE] and the FIM4R community, and through the joint policy coordination groups of the infrastructures.

Major infrastructures that have adopted policy and best practice guidelines (with the known topical areas)

- eduGAIN federations - 28 federations with Sirtfi
- eduGAIN identity and service providers - 561 entities with Sirtfi
- GÉANT eduTEAMS – Acceptable Use Policy (AUP), PDK, Sirtfi and Snctfi
- EGI CheckIn – PDK, Sirtfi, Snctfi
- EOSC-Hub - PDK, Sirtfi, assurance exchange
- EUDAT B2ACCES - assurance exchange
- Helmholz Data Federation, Germany - PDK, Sirtfi, Snctfi
- Life Sciences AAI [LSAAI] - specific targeted guidance, piloted AAI follows PDK, Sirtfi and Snctifi
- SURF Science Collaboration Zone [SURFNET SCZ], Netherlands - AUP, PDK, Sirtfi and Snctfi
- Worldwide LHC Computing Grid [WLCG] - AUP, PDK, Sirtfi,
- XSEDE (USA) - PDK

Given that the guidelines and white papers are public and no registration is needed to obtain the documents, adoption by others cannot be excluded – the list is therefore non-exhaustive, both in terms of infrastructures as well as in terms of topical adoption areas.

3.1.3 Lessons learned from the AARC Pilots

The AARC2 project ran a total of 9 pilots with research collaborations.

The Service Activity 1 Pilots (SA1) demonstrated the feasibility of deploying authentication and authorisation infrastructures (AAI) for research communities and e-infrastructures that fit the overarching AAI model defined by the AARC BPA. To this end, this activity demonstrated through (pre-)production pilots that:

- The AARC Blueprint Architecture (BPA) can be instantiated to fit research communities' requirements, and deployed and operated in production environments.
- Communities at an early, initial phase in the design of their AAI solution benefit the most from the support of exports. Targeted work aimed at supporting them in the design of a scalable, robust, AARC BPA-compliant architecture proved to be fundamental to avoid issues and bottlenecks in the implementation of the AAI component.
- Research communities can operate the resulting AAI by themselves or outsource the operation of (part of) the infrastructure to third parties (such as e-infrastructures);

Further information on the pilots are provided in DSA1.5 'How-to to deploy pilot results'.

Dissemination Activities

Within AARC2, different media and settings were used to promote the results of the pilots. This was done mostly via relevant events with presentations at given by the representatives of the research infrastructures or by the AARC2 pilot team.

The key elements of each pilot were converted into case studies and are on the AARC website under the name 'AARC in Action'.

A short video to promote AARC in Action as a useful resource was produced and published towards the end of April and disseminated via newsletters, web and social media channels. Other pilots / 'AARC in Action' promotion took place via blogs, magazine articles and social media news.

Exploitation Strategy

The exploitation of the specific pilot results is left in the hands of each partner research collaboration in accord with their needs. The AARC consultancy function and training support will not be available on such a scale beyond the AARC2 project. However, new communities interested in deploying an AAI that follows the AARC BPA can benefit from the existing material, can get in touch with other communities that are more ahead, and can still contact the AARC lists for general queries.

3.1.4 Training modules

AARC delivered various training modules to cover different aspects such as basic concepts on federated access, AARC key principles, IdP-SP proxy hands-on training, Sirfti, policy training and so on.

Dissemination Activities

Within AARC2, different media and settings were used to execute training and to provide educational materials. The training events and the material was promoted via blog posts and social media

All the produced training material was released online, for further use, as static material or as examples of code on the GitHub public platform when appropriate.

Exploitation Strategy

The training modules will be kept online as long as the content is relevant. However, updates that require significant resources may not be possible beyond the AARC2 project. The consortium explored the option of creating a training programme with a charging model. However, the idea was discarded as it was felt that the income would not be sufficient to secure the availability of trainers as well as to update the material and support any promotional or administrative activities. It was felt more important to ensure that as many interested people as possible could access the training modules and benefit from them free of charge.

3.1.5 AEGIS

The AARC Engagement Group for Infrastructures [AEGIS] brings together representatives from research- and e-infrastructures, operators of AAI services and the AARC team to bridge communication gaps and make the most of common synergies. Participation in AEGIS is limited to those research collaborations and e-infrastructures that are already operating or piloting an AARC-compliant BPA. AEGIS is part of NA2, however given its importance, it is the focus of a dedicated chapter in this document.

The AEGIS group enables AARC to:

- consult the expertise of participants for feedback on project activities, in particular on the AARC guidelines;
- showcase project results;
- promote a consistent vision for federated access;
- facilitate activities that help different infrastructures adopt the AARC results in their production environments.

AEGIS has played an important role in validating AARC2 results and helping towards their adoption. AEGIS will continue beyond AARC and will host the BPA and the guidelines and support their further development.

The membership of AEGIS will be expanded to include the representatives of all research- and e-infrastructures that are deploying an AAI that follows the AARC BPA model. Currently, the membership of AEGIS includes the AARC2 Work Package leaders and two representatives from each of the participating infrastructures, namely, GÉANT, EUDAT, EGI, EOSC Life, PRACE, XSEDE and DARIAH. As more infrastructures are adopting the AARC results, the membership of AEGIS will expand.

AEGIS will continue to meet regularly, and to discuss the content of the 'AEGIS Brief', which is compiled and distributed two weeks before every meeting to allow the infrastructure operators to consult their internal technical and policy experts before deciding whether to adopt the new AARC guidelines and introduce them in their production environments. AEGIS endorsed 5 guidelines during the AARC2 project.

Dissemination Activities

AEGIS presented at relevant events, namely: DI4R Brussels 2018, DI4R Lisbon 2018, EUDAT Conference in Porto in 2018.

Exploitation Strategy

AEGIS will continue to operate beyond the AARC2 projecrt. Research- and e-infrastructures in AEGIS have agreed to continue to support the participation of their key people. AEGIS will continue to support part of the AARC discussion on the BPA and the guidelines. Additional support for periodic calls, the enhancement of the AARC BPA and the relevant guidelines will be provided by GN4-3 and EOSC-Hub projects as needed.

Number of Guidelines and Informational documents endorsed

- Guidelines on expressing group membership and role information [AARC-G002] – endorsed in November 2017
- Guidelines for expressing resource capabilities [AARC-G027] – endorsed in December 2018
- Exchange of specific assurance information between Infrastructures [AARC-G021] – endorsed in March 2018.
- Guidelines for the evaluation and combination of the assurance of external identities [AARC-G031] – endorsed in May 2018
- Expression of REFEDS RAF assurance components for identities derived from social media accounts [AARC-G041] – endorsed in March 2018;
- Specification for IdP hinting [AARC-G049] - endorsed in March 2019
- Implementing scalable and consistent authorisation across multi-SP environments (Informational doc: AARC-I047) (March 2019)
- Guidelines on stepping up the authentication component in AAIs implementing the AARC BPA – [AARC-G029] – endorsed in March 2019
- Guidelines for expressing affiliation [AARC-G025] – presented in April 2019 and under approval at the time of writing.

4 Conclusions

The AARC2 project has delivered everything according to plan and beyond. The project has been very successful and effective and has had a very big impact among research and e-infrastructures in what concerns the adoption of federated access and the deployment of AAIs. AARC has demonstrated that it is possible to provide guidance in a technology-agnostic way and without being prescriptive. AARC has also influenced the AAI direction for wider initiatives such as EOSC.

The key to success was the very diverse composition of the consortium, where different parties and perspectives could be represented and balanced. By doing this, AARC offered a neutral forum, but at the same time it also made available unique expertise to address both technical and policy aspects and to connect to existing efforts. Having the project framework (and the budget linked to it) and an open nature allowed AARC to create a community. The ending of AARC means this framework will go away and this leaves a gap. The AARC team recommends that the EC considers allocating funding for 'supporting projects'; these should be scoped in their focus and orthogonal to the larger projects such as EOSC, GÉANT, HPC and ESFRI, etc. This would give the possibility of having discussions on specific topics but involving all relevant parties.

AARC2 contributed resources to FIM4R, which became the venue to implement the Community Engagement Forum foreseen in the technical annexe. It was felt that FIM4R would be the perfect place to report and get feedback on AARC results. Having the AARC project helped inject life into this group while allowing it to retain its independence. However, the longer-term sustainability of small-scale independent groups like FIM4R is still unsolved. Having a framework in place at EC level for supporting actions would help address this aspect as well. Inspired by FIM4R (and by RA21, the Resource Access for the 21st Century) the libraries organised themselves and started FIM4L (Federated Identity Management for Libraries); this shows an appetite for these kinds of communities and for them to be more active, which is certainly a welcome side effect.

Provision has been made for the key results to be maintained beyond AARC, with some resources being secured. We are aware however that without an AARC project things may become more challenging. The AARC team is particularly conscious about the neutrality aspect and has tried to ensure that such a neutrality could be preserved for future work on AARC key results.

We will try to maintain the lifespan of AARC as much as possible through the #StartWithAARC social media tag.

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Glossary

AAI	Authentication and Authorisation Infrastructure
AUP	Acceptable Use Policy
Community AAI	An AAI service that also enables the use and management of community identities for access to resources. It comprises three (3) AARC BPA component layers: the Access Protocol Translation, the Community User Attribute Services, and the Authorisation.
eduGAIN	International interfederation service interconnecting research and education
IdP-SP proxy or SP-IdP Proxy	An AAI service of a research infrastructure or e-infrastructure (also known as infrastructure) that enables access to resources offered by Service Providers connected to that infrastructure. This AAI service does not provide community membership management. Specifically, the infrastructure proxy comprises two (2) AARC BPA component layers: the Access Protocol Translation and the Authorisation layers.