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NOTE

From:	French and German delegation
To:	Working Party on Information Exchange and Data Protection (DAPIX)
No. prev. doc.:	6495/19
Subject:	Information Management Strategy (IMS) action No 2 – Action EPRIS-ADEP - final evaluation report – ADEP Technology - Services and Applications

Delegations will find in annex the complete final evaluation report of the EPRIS-ADEP pilot project dealt with in the framework of the Information Management Strategy (IMS).
In order to further discuss the topic, delegates are kindly invited to send comments and questions related to the report or to EPRIS-ADEP in general until 03 May 2019 to the German lead (ZI-ADEP@bka.bund.de) with dapix@consilium.europa.eu in cc.

EPRIS-ADEP
ADEP Pilot Implementation and Evaluation by MS

EVALUATION REPORT

(760832 – EPRIS-ADEP)

Version 1.0

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G.A. Reference:	Work package 3 – D3.2 'Evaluation report from Member State' – France/Minit Work package 4 – D4.4 'Status report of deployment Germany' – Germany/BKA Work package 5 – D5.5 'Evaluation report from Finland' – Finland/Poliisihallitus Work package 6 – D6.6 'Final evaluation report of Spain' – Spain/MIR-PN Work package 7 – D7.3 'Final evaluation report of France' – Ireland/AGS

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Content

1 Executive summary of the pilot project

Basic data of the pilot project

ADEP (Automation of Data Exchange Processes) is the name of action 2 of the 5th Information Management Strategy (IMS) action list of the Working Party on Information Exchange and Data Protection (DAPIX).

Within the project 'ADEP Pilot Implementation and Evaluation by MS' the European Police Records Index System (EPRIS) has been piloted. The pilot led by France has been funded by the European Commission with an amount of 1.5 million euros for the period from the 1st of July 2017 to 31st of December 2018. In addition to France, Finland, Germany, Ireland and Spain participated in this pilot project, as well as Europol[1]. Three countries were associated as observers: Hungary, Belgium and Austria[2].

Business object of the pilot

According to the project-specific communication strategy (see chapter 3.1), this project is also called 'EPRIS-ADEP'. The scope of EPRIS-ADEP is the automation of presently manual and therefore labour and time-consuming processes for identifying whether certain law-enforcement-related data is available in one or several Member States (MS) in order to enable and facilitate the subsequent bilateral or multilateral information exchange. The pilot project aimed at creating a technical system for cross-checking index databases provided by each participant, containing an extract of law enforcement records (with pseudonymised biographical data such as family name, surname, any other names/aliases, date of birth, place of birth, gender). The index database is located at each participant. The independently initiated search in the indexes of the other participants results in the indication of a 'hit' or 'no-hit'. In case of a hit, additional data has to be requested using existing channels for law enforcement cooperation such as SIENA (Secure Information Exchange Network Application).

Thus, EPRIS-ADEP applies the principle of privacy by design by its decentralized architecture and the use of pseudonymised data – whereby the identity of persons of interest will not be revealed as long as no potential hits have emerged. It is based on a decentralized architecture – thus avoiding storing copies of personal data in centralized databases – and an UMF[3] compliant interface, which is planned for the follow-up communication as one major task in the continuation of the activities. The EPRIS-ADEP system uses already existing Europol infrastructure, in particular the Europol Operations Network (EON) and SIENA. Furthermore, in the future the question of supplying the Europol Information System (EIS) with the relevant results from the national indexes will be assessed.

1 Europol is not a partner/beneficiary of the Grant Agreement. The before mentioned countries are in the following entitled as Member States (MS).

2 Austria attended partly.

3 Universal Message Format

The envisaged system is based on the automation of the existing standard in information exchange while distinguishing two phases of the request process using advanced privacy by design solutions.

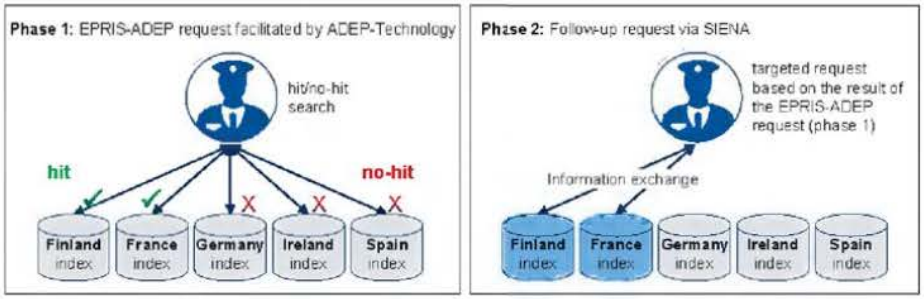


Figure 1: Phases of the request process with EPRIS-ADEP (example)

Phase 1 serves to locate with the help of the ADEP-Technology where relevant data of a person of interest is – with high probability – available in another MS indicated by a hit. A search resulting in a no-hit means that there is no information available in the other MS concerning the person of interest. Prior to search in EPRIS-ADEP, all preconditions for the bilateral information exchange have to be fulfilled (e.g. principle of proportionality and legal requirements). The request contains a very restricted set of search criteria (first name, family name/alias, place of birth (not in the scope of the pilot project), date of birth and gender). In the example in Figure 1, the query has been sent to five countries. So the law enforcement officer has initiated a search in the indexes of the selected MS. The request only contains a set of pseudonymised data. The law enforcement officer will immediately receive all relevant hit/no-hit-results from the addressed MS. In the example in Figure 1, the law enforcement officer receives hits from Finland and France and no-hits from Germany, Ireland and Spain. This phase 1 was in the scope of the pilot project.

In case of a positive result (hit or hits), the next step, i.e., ***phase 2***, can be initiated by the requesting law enforcement officer after assessing the results obtained in phase 1. The issuance of follow-up requests is not mandatory. Using SIENA, a request is forwarded to the MS holding the information (the MS where the matching of the pseudonymised data resulted in a hit), clearly indicating that the request is a follow-up on an EPRIS-ADEP hit. With reference to the example in Figure 1, follow-up requests are therefore sent only to Finland and France. The requested MS manually verify the hit and send their response via SIENA to the requesting law enforcement officer. The relevant and available information is exchanged in accordance with the provisions of the Swedish Framework Decision 2006/960/JHA, without any change to the current procedure.

The decentralised approach complements other EU initiatives including the interoperability agenda[4]. It increases the availability of information by complementing the centralized European information

4 Proposal for a Regulation of the European Parliament and of the Council on establishing a framework for interoperability between EU information systems (borders and visa) and amending Council Decision 2004/512/EC, Regulation (EC) No 767/2008, Council Decision 2008/633/JHA, Regulation (EU) 2016/399 and Regulation (EU) 2017/2226; 12.12.2017, COM(2017) 793 final, 2017/0351 (COD) and proposal for a Regulation of the European Parliament and of the Council on establishing a framework for interoperability between EU information systems (police and judicial cooperation, asylum and migration), 12.12.2017, COM(2017) 794 final, 2017/0352 (COD)

systems with the decentralized information systems of the MS. ADEP-Technology's matching algorithm, whose functionality has been proven in this pilot project, could also be interesting for other European systems and projects.

EPRIS-ADEP helps to create links to other cases. Since participants can be queried more purposefully, it helps to limit the spread of suspicion against a person (principle of limitation of recipients). Moreover, EPRIS-ADEP enables the shortening of investigations by providing '*real and workable solutions to the problems stemming from the lack of interconnectivity of decentralised information systems and help foster trust and cooperation between the Member States*'.[5] The technical architecture of the described system meets highest data protection and data security standards. Therefore, this hit/no-hit approach complies with the principle of data ownership, which is crucial for ensuring confidence of data.

Overall objective of the pilot project

The overall objective of this project was to demonstrate and evaluate the feasibility of the EPRIS-ADEP approach and ADEP-Technology described above with regard to the specific legal, organisational, functional and technical requirements of the participating pilot MS and Europol. This included aspects of cost-efficiency of the ADEP-Technology in terms of the software itself and its deployment in the MS, process optimisation of the exchange of information, easy integration in different existing environments of the MS, easy EON connectivity and high level of usability.

The project successfully achieved its overall objective following the approach below.

Approach of the pilot project

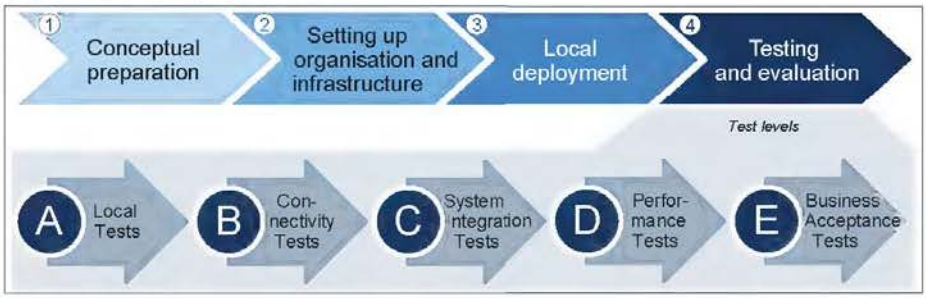


Figure 2: Approach of the pilot project

The project's approach consisted of four main activities:

1. Conceptual preparation, in particular the creation of an organisational and technical target conception for the pilot including further specification of requirements for the ADEP-Technology,
2. Setting up the organisation including resources and infrastructure for the project and at national level,

5 European Parliament resolution of 12 December 2018 on findings and recommendations of the Special Committee on Terrorism (2018/2044(INI))

3. Deployment of the ***ADEP-Technology*** at the involved pilot partners (different versions of the ADEP software solution have been deployed during the pilot project) and
4. Testing and evaluation in local, pre-production and production environments of the involved pilot partners.

In order to demonstrate the feasibility of the ***ADEP-Technology*** in a real environment, the pilot partners planned and successfully performed the following test levels: local tests in the local test environment, establishing the connectivity via EON, both system integration tests (SIT) and performance tests in the pre-production environment and business acceptance test (BAT) for business validation in the production environment (with real data in the indexes from the national systems of the MS involved using the EON).

Results of the pilot project

All planned test levels have been performed successfully. In particular, the SIT and BAT delivered the main results demonstrating the feasibility of the EPRIS-ADEP approach. The SIT focused on the technical feasibility of the ***ADEP-Technology*** including network topology and algorithms used, whereas the BAT concentrated on the business validation of the EPRIS-ADEP approach including the usability of the software (matching algorithms, etc.) and SIENA for the follow-up communication.

EPRIS-ADEP's added value

It was proven that EPRIS-ADEP makes it possible to

- make decentralised data available without revealing the content of the data in full respect of data ownership,
- retrieve relevant data through well-targeted follow-up requests by independently determining where data can be expected, while at the same time determining with certainty where no relevant data is available.

This added value of the EPRIS-ADEP approach was demonstrated in detail by verifying the feasibility of the following technological capabilities for law enforcement activities related to the European information exchange:

- ☑ ADEP-Technology – pseudonymisation features and search algorithms
- ☑ ADEP-Technology – hit/no-hit approach
- ☑ ADEP-Technology – micro services supporting the solution (e.g. for index management)
- ☑ ADEP-Technology – organisational indexes with pseudonymised real biographical data from the national source system(s) of the participating MS
- ☑ Network – interconnectivity of decentralised systems of the participating MS via EON
- ☑ Network – capability of the EON to deal with the traffic generated by ADEP for five MS

Moreover, the potential benefits of this unique EPRIS-ADEP approach could be further confirmed by the experiences gained within the pilot.

The results including the potential benefits are described in detail in chapter 5.

Conclusion

In light of the positive results of the pilot project and the promising benefits, all pilot partners, including Europol, declared their commitment to continuing the work in the ADEP initiative, particularly in a dedicated follow-up project, in order to preserve and strengthen the present achievements.

Considering the evaluated optimisation potentials and the next step towards operations, a mutual roadmap for a follow-up project with the working title 'ADEP 2' has already been prepared.

The overall strategic objective of ADEP 2 is the further automation of the data exchange processes between MS in order to strengthen the processes and increase their efficiency and effectiveness. Therefore, the software solution used in the pilot for the data location has to be further developed and transformed from a pilot into a productive system. In this context, new requirements considering business and operational aspects become more relevant. New tests have to be carried out based on data expected in a future productive use and linked with new features. Additionally the automation and integration of the follow-up communication in the existing environment is a major challenge.

Moreover, the envisaged main elements of ADEP 2 (see chapter 6.1) could be:

- Stabilization of the software solution and processes,
- Building trust into the system,
- Establishing central services at Europol,
- Involvement of more partners,
- Clarifying legal issues,
- Process improvement towards more automation,
- Identification of other use cases and
- Harmonization with other European initiatives.

2 Objectives

2.1 Overall objective of the pilot project

The overall objective of this pilot project, proving and evaluating the feasibility of the EPRIS-ADEP-approach including the dedicated ADEP-Technology with regards to the specific legal, organisational, functional and technical requirements of the participating MS has been achieved.

The results of the pilot project 'ADEP Pilot Implementation and Evaluation by MS' demonstrate this clearly. They are described in chapter '5 Results of the pilot' of this report.

2.2 Objectives of the pilot partners

In addition to the overall objective, each participating MS has set its own objectives (see [GA] work packages 3 to 7). They are quite similar and therefore can be roughly summarized in four core objectives as follows:

1. To enable searches within relevant databases of other MS,
2. To define technical requirements for the implementation of the ADEP-Technology in order to be able to exchange information between MS law enforcement agencies (LEA),
3. To integrate the ADEP-Technology into the national IT infrastructure,
4. To test the application and evaluate the results.

In general, these objectives have been achieved by all pilot partners.

Originally, one of the objectives of the pilot was also to make available data stored at Europol. In the meantime, Europol successfully implemented an interface in order to search and to retrieve Europol's data independently in MS (QUEST – QUerying Europol SysTems). Thus, this objective was no longer valid. Since Europol is a partner of the pilot, these circumstances have been taken fully into account and are in alignment with Europol.

The specific objectives of the pilot partners (MS and affiliated organisations), as defined in the [GA], are shown in Table 1 with the degree of achievement:

Degree of achieve-ment	No.	Objective
	WP[6]1	**France – CIVI.POL**
complete	1.1	Overall project management, administrative and financial follow-up, final reporting

[6] work package

Degree of achieve-ment	No.	Objective
	WP2	**Germany – BMI/Fraunhofer FOKUS**
complete	2.1	Continuous improvement of the ADEP software during the test and evaluation to further enhance the quality of search results as well as the overall performance and manageability of the system
	WP3	**France**
complete	3.1	to optimize information flow for law enforcement information exchange and particularly to enable searches within other MS relevant databases and from Europol's EIS ***Comments:*** France completed all test stages successfully. In particular, the results of the BAT show that EPRIS-ADEP could enable the optimisation of the current flow of information for law enforcement between MS. On the one hand, France enabled searches in its index with pseudonymised real data from the national source systems during the BAT. On the other hand, it was able to locate data in the indexes provided by the other participants during the BAT. 'Go live' here means to conduct the BAT in a production-like environment with real data and with the help of SIENA for the business validation.
complete	3.2	to define functional, technical and legal requirements for EPRIS-ADEP implementation to be able to exchange information between MS LEA and EIS and the French National System of Police Information by the current legal framework ***Comments:*** The goal is considered to be achieved. The functional, technical and legal requirements of France for the pilot implementation were defined (i.e. the conception of organisational index, internal adaptation of the ADEP software, secure network architecture, internal legal compliance and SIENA flow management architecture via the French SPOC for the BAT).
complete	3.3	to implement needed changes into existing police infrastructure and applications in order to allow police officers query information from the MS and EIS, by an automation process directly on the screen of each investigator involved in the hit/ no-hit process ***Comments:*** It can be considered that building the interface and making it compatible with both French screens and the other participating countries, was achieved. However, its implementation has been limited. For a France-wide roll-out, the ADEP software solution used in the pilot has to be developed further and transformed from a pilot into a productive system within the follow-up project ADEP 2.
complete	3.4	to test the application and go live ***Comments:*** France completed all test stages successfully: local testing, connectivity tests, SIT and BAT. For the BAT, a French index with real data has been provided. A central unit was responsible for querying the partner countries during the BAT. 'Go live' here means to conduct the BAT in a production-like environment with real data and with the help of SIENA for the business validation.

Degree of achieve-ment	No.	Objective
	WP4	**Germany**
complete	4.1	to optimize information flow for law enforcement information exchange and particularly to enable searches within the relevant databases of other MS, by using the IT infrastructure of Europol Operation Network and respecting the principles of privacy by design ***Comments:*** The possibility in optimising the information flow has successfully been proven within the pilot project's timeframe. Germany was successful in enabling the other pilot MS to search Germany's operational data by connecting successfully to EON. Germany was able to locate persons out of the data the other participants provided. IT infrastructure was sufficient for this purpose and no privacy concerns were raised while doing this.
complete	4.2	to define technical requirements for EPRIS-ADEP implementation in Germany in order to be able to exchange information between MS LEA ***Comments:*** Technical requirements were defined, communicated in an agreed way and partly already implemented.
complete	4.3	to implement the EPRIS-ADEP pilot system within the IT infrastructure nationally at Europol National Unit (ENU) and interconnect with pilot partners ***Comments:*** Germany was able to implement the ADEP-Technology according to the IT infrastructure already operated within ENU Germany. The integration in the common case management system of ENU Germany was successful.
complete	4.4	to test the application and evaluate the pilot ***Comments:*** Germany was able to test the ADEP system both in local and in interconnected manner. All test stages were completed successfully. A continuous monitoring and evaluation of the tests was ensured.
	WP5	**Finland**
complete	5.1	to optimize information flow for law enforcement information exchange by automatically locating relevant information in the EU and particularly to enable searches within the relevant databases of other MS, by using the IT infrastructure of EON and respecting the principles of privacy by design ***Comments:*** The information flow was successfully optimised within the pilot project's timeframe. Finland was successful in enabling the other pilot MS to search Finland's operational data and Finland was able to locate persons out of the data the other participants provided. The IT infrastructure was sufficient for this purpose and no privacy concerns were raised while doing this.

Degree of achieve-ment	No.	Objective
complete	5.2	to further define technical and legal requirements for EPRIS-ADEP implementation in Finland in order to be able to exchange information between Member State law enforcement agencies (MS LEA) ***Comments:*** Technical requirements for Finland were successfully fulfilled during the pilot project. From the legal point of view, Finland had an approval from the National Police Board to operate ADEP and exchange ADEP messages based on the real Finland's police operational criminal data. In conclusion, there are no identified issues why the technical and the legal aspects could not work for Finland.
complete	5.3	to implement the EPRIS-ADEP pilot system within the IT-Infrastructure nationally at Europol National Unit (ENU) and interconnect with pilot partners ***Comments:*** Finland was able to implement the ADEP pilot system according to the IT infrastructure already owned or operated within Finland's police. No completely new or out-of-standard IT management processes were required in the implementation, which partly testifies on behalf of the well thought-out ADEP system design.
complete	5.4	to test the application and evaluate the pilot ***Comments:*** Finland was able to test the ADEP system both in local and in interconnected manner. Therefore, the evaluation objective was also successfully reached. Clearly, there were some learner's troubles during the final BAT evaluation phase but altogether Finland was able to conclude the ADEP system as fit for the purpose.
	WP6	**Spain**
complete	6.1	to enable the Spanish national system searches within the relevant databases of other MS, by using the IT infrastructure of Europol Operation Network
complete	6.2	to define technical and legal requirements for EPRIS-ADEP implementation in Spain in order to be able to exchange information between MS LEA
complete	6.3	to implement the EPRIS-ADEP pilot system within the Spanish National IT infrastructure and interconnect with pilot partners
complete	6.4	to test the application and evaluate the pilot
	WP7	**Ireland**
complete	7.1	to optimize information flow for law enforcement information exchange and particularly to enable searches within other MS relevant databases and from Europol's EIS ***Comments:*** An Garda Síochána participated in the EPRIS-ADEP pilot, which provides an entry point to integrate these workflows into existing EU policing infrastructure.
complete	7.2	to define technical and legal requirements for EPRIS-ADEP implementation to be able to exchange information between MS LEA and EIS (authorised to process classified information) by the current legal framework

Degree of achieve-ment	No.	Objective
partly complete	7.3	to implement needed changes to existing police infrastructure and applications to allow police officers query information from the MS and EIS, by an automation process directly on the screen of each investigator involved in the process of investigation (hit/no-hit process) ***Comments:*** The ADEP pilot application was installed and fully tested in the pre-production environment; however, existing infrastructure issues prevented the application from being deployed into the production environment. These issues are currently being investigated and hoped to be rectified in the coming months.
complete	7.4	to test the application and go ahead ***Comments:*** The ADEP pilot application tested in our pre-production environment alongside the other participating pilot MS. The testing included functional, performance and end user testing.

Table 1: Specific objectives of the pilot partners according to the [GA]

3 Details about the pilot project

This chapter provides details about the pilot project such as the project-specific communication strategy (see subchapter 3.1), organisation of the pilot project including pilot participants, the overall and the national pilot organisations (see subchapter 3.2), internal and external communication (see subchapter 3.3), project period (see subchapter 3.4), overall milestone planning (see subchapter 3.5) and legal aspects of the pilot project (see subchapter 3.6). In addition, it provides information on the EPRIS-ADEP infrastructure and software (see subchapter 3.7).

3.1 Communication strategy

An ADEP communication strategy, which precisely defines certain terms, was developed within the pilot project in order to reach a common understanding.

The ADEP communication strategy consists of four components:

1. ***ADEP*** (Automation of Data Exchange Processes) is the name of action 2 of the 5th IMS action list of Working Party on Information Exchange and Data Protection (DAPIX), piloting EPRIS-ADEP (European Police Records Index System). The pilot 'ADEP Pilot Implementation and Evaluation by MS' was funded by the European Commission and supported by Europol.
2. ADEP is a ***general approach*** following the principle of availability by providing the law enforcement end user a smooth and efficient workflow in order to EU-wide locate and retrieve the data relevant to fulfil their tasks. In this regard, ADEP is related to other EU initiatives and activities, such as the interoperability agenda[7] and UMF[8].
3. The ***ADEP-Technology*** refers to the cost-efficient software solution for locating the data and facilitating its retrieval (see chapter 3.7.2). The composition of this software solution was tested in the EPRIS-ADEP pilot[9]. The software solution is easy to install, versatile and adjustable to different use cases aiming at locating and facilitating the retrieval of alphanumeric data no matter if stored centrally or decentrally. By using pseudonymisation, the software solution supports the concept of 'privacy by design', serving robust data protection.
4. ***EPRIS-ADEP*** is a system for making available certain biographical data contained in national police records, using already existing Europol infrastructure, in particular the Europol Operations Network (EON) and the Secure Information Exchange Network Application (SIENA) for the follow-up communication (see chapter 4.2.3).

[7] Proposals for a regulation of the European Parliament and of the Council on establishing a framework for interoperability between EU information systems (police and judicial cooperation, asylum and migration; borders and visa)

[8] Universal Message Format

[9] Officially called 'ADEP Pilot Implementation and Evaluation by MS'

3.2 Organisation

3.2.1 Pilot participants

Five MS and Europol worked closely and very constructively together in the pilot project in order to achieve the pilot's objectives.

Table 2 includes the pilot partners and affiliated entities stipulated in the Grant Agreement [GA] and the further partner, Europol, in detail:

MS	ADEP project partner	Work Package (WP)
1) France:	• French Ministry of Interior – Ministere de L'Interieur (roles: project manager, pilot participant, head of the IT Working Group, head of the Legal Working Group) • Civi.pol Conseil (role: Financial Management - Coordinator)	Lead of WP3 Lead of WP1
2) Germany:	• Federal Ministry of the Interior – Bundesministerium des Innern, für Bau und Heimat (BMI) – Fraunhofer FOKUS – Fraunhofer Institute for Open Communication Systems (role: Central Deployment Management) – Partnerschaft Deutschland – PD – Berater der öffentlichen Hand GmbH (role: Central Project Management) • Federal Criminal Police Office – Bundeskriminalamt (BKA) – (roles: pilot participant, Central Test Coordinator, head of the Business Organisational Working Group)	Lead of WP2 Support of WP2 Support of WP1 Lead of WP4
3) Finland:	Police of Finland – Poliisihallitus (role: pilot participant)	Lead of WP5
4) Spain:	Spanish Ministry of Interior - Ministerio del Interior (role: pilot participant)	Lead of WP6
5) Ireland:	Police Force of Ireland – An Garda Siochana (role: pilot participant)	Lead of WP7
ADEP participant according to Europol's letter of support for the EPRIS-ADEP project dated 21.04.2017 [LetterEuropol]:		
6) Europol[10]:	European Union Agency for Law Enforcement Cooperation in Netherlands (roles: EON network service provider and pilot participant)	

Table 2: ADEP project partners

Hungary (Belügyminisztérium)[11], Belgium (Politionele informatie & ICT)[12] and Austria (Bundesministerium für Inneres – Bundeskriminalamt)[13] took part as observers and guests. These were ADEP

[10] Europol is not a partner/beneficiary of the Grant Agreement.

[11] Hungary is an observer country within the Grant Agreement.

[12] Belgium has regularly attended the plenary sessions of the pilot project since the kick-off meeting in September 2017.

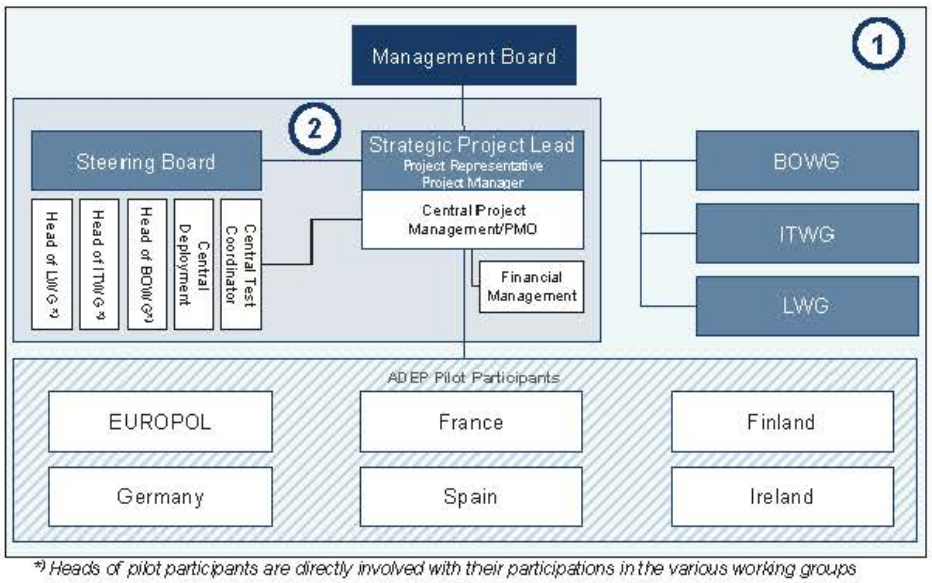
[13] Austria has attended the plenary sessions of the pilot project since June 2018.

project members taking part in the project (without any (voting) rights concerning decision-making) but did not install and test the EPRIS-ADEP solution yet.

3.2.2 Overall project organisation

An overall project organisation corresponding to the objectives and scope of the pilot project was established. It consisted of decision-making entities (Management Board and Steering Board[14]), project lead (Strategic Project Lead/Project Manager) for planning and controlling the activities, project teams (ADEP Pilot Participants) for implementing and performing the pilot and supporting entities (PMO[15] and Financial Management). Specific representatives of each pilot participant worked together in three working groups (Business Organisational Working Group (BOWG), IT Working Group (ITWG) and Legal Working Group (LWG)) when it was deemed necessary.

Figure 3 shows the project organisation, which was agreed on and established after the kick-off meeting on the 13th of September 2017 in Madrid:



*) Heads of pilot participants are directly involved with their participations in the various working groups

Figure 3: Overall project organisation chart

[14] Called `Steering Committee' in the [GA]

[15] Project Management Office

The numerical frames in the organisation chart have the meaning as follows:

① Frame contains the notified bodies, which are participants of the plenary sessions[16].

② Frame enclosed the notified bodies of the Steering Board[17].

The organisational structure of the pilot project including the roles as well as the ways of cooperation between the pilot partners are described in the project management plan [PMP] in detail.

3.2.3 National project structures

The national project structures were established in line with the overall project organisation. They met the IT and business competencies required for the implementation of this pilot project. Therefore, they mainly consisted of an IT group and a business group, which additionally has responsibility concerning the testing. Some of the participating MS subdivided the business side further for instance into a legal group and a business group or even further. In addition, a national instance for financial topics was established. The involvement of the ministries of the interior, the law enforcement organisations and other affiliated organisations was country-specifically designed and coordinated.

Figure 4 schematically illustrates the general national project structure of the participating MS:

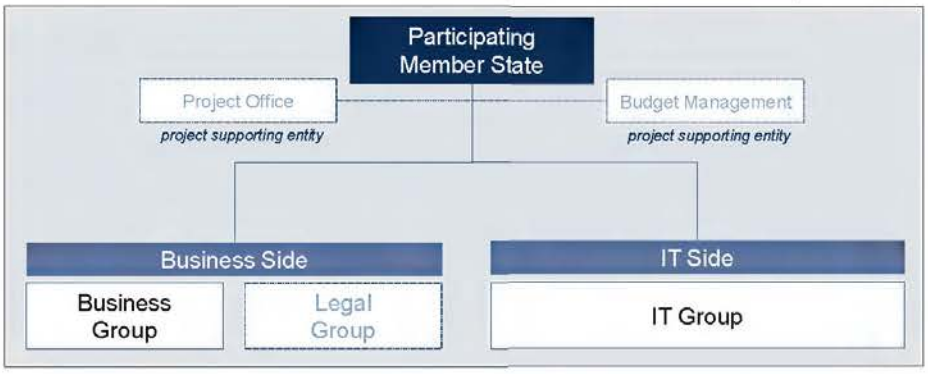


Figure 4 Schematic illustration of the general national project structure

The greyed-out boxes in Figure 4 indicate project entities that have not been established in all participating MS.

[16] In the [GA], these meetings are referred to as coordination meetings.

[17] In the [GA], these meetings of the Steering Board are referred to as steering committee meetings.

3.3 Internal and external project communication

As part of the project management, internal and external communication measures have been planned and performed whereby the focus was on internal project communication.

The following regular project meetings were held:

- Plenary sessions including the kick-off for discussing strategic and project-relevant topics such as technical, business, legal and organisational requirements, ADEP infrastructure including ADEP software and EON connectivity, SIT and BAT,
- Steering Board meetings for project monitoring, controlling and decision-making,
- Bi-weekly conference calls of the topic-oriented team at working level for discussing the pilot's status, operational topics and information exchange between the pilot partners,
- Several conference calls related to the SIT phase,
- Weekly conference calls for the information exchange of the (national) EPRIS Service Centres during the BAT in the production environment; the EPRIS Service Centres were responsible for the coordination of the business activities and for the analysis of queries/requests from other participating MS.

External events have been used for the communication of the strategic perspective and the status of the pilot project (e.g. several DAPIX meetings, a Europol WG ICT meeting and an EPCC multilateral meeting). In addition, further project output was created to support the future external communication such as the ADEP explain-it video.

3.4 Project period

The pilot project ran in the time period from July 2017 to December 2018.

The starting date of the EPRIS-ADEP pilot project set by the [GA] has been the 1st of July 2017. The pilot project was originally scheduled until the end of June 2018. As part of the amendment of the [GA], the pilot project was extended by 6 months justified as follows:

(a) The official launch of the project 760832 (EPRIS-ADEP) was set on the 1st of July 2017, but the actual start of the pilot project with all MS involved (beneficiaries) and Europol, began with the first coordination meeting on the 13th and 14th of September 2017 in Madrid ('kick-off meeting'). This delay in the start of the project was largely due to summer holidays in Europe (the key persons from each beneficiaries and Europol were not available at all or only partially at this time), but as well because of some political constraints that delayed the signing of the Concession Forms. The last Concession Form was not signed for more than a month after the kick-off meeting, and therefore the pre-financing was not available until the start of November 2017.

(b) The original planning of resources was realised on the assumption of a project start (i.e. reception of funds) on the 1st of January 2017. In particular, the staff designated for the pilot project were no longer sufficiently available. The beneficiaries and Europol were only able to start to set up their national pilot teams after the kick-off meeting in September 2017. Thus, the pilot project only came up to full speed at the end of 2017. Such additional efforts had not been planned and thus led to a further delay of three months.

(c) The amended timeline took into account and respected cultural differences in participating MS with regard to the period of summer holidays of 2018.

(d) The Steering Board (steering committee), eager to achieve the project objectives in the best conditions and in quality, had thus decided to request an extension until the 31st of December 2018. This six-month project extension provided the pilot project sufficient time to test and demonstrate the feasibility of ADEP in order to showcase a perfectly tested ADEP solution.

The EPRIS-ADEP pilot project ended on schedule at the end of December 2018. The plain administrative completion of the pilot project (e.g. compilation of the final financial report and evaluation report) took place at the beginning of 2019.

3.5 Milestone plan

At the beginning of the pilot project, a common milestone plan was developed and updated in the course of the pilot project. All planned overall milestones[18] were reached within the pilot project:

No.	Name of the Milestone	As-is date
MS01[19]	Local systems are ready and functional tests (search results) with test data carried out successfully	15/05/2018
MS 02	Connectivity is established	04/07/2018
MS 03	Minimum of three Member States ready for tests on pre-production environment (PP) – start of System Integration Test (SIT)	27/06/2018
MS 04	Minimum of three Member States ready for business validation – ready for Business Acceptance Test (BAT) part I	12/10/2018
MS 05	Pilot in the production environment is established (go-live)[20]	05/11/2018
MS 06	Completion of the business validation on production environment (ready for BAT part II - get-well-phase)	10/12/2018

[18] Target dates of the milestones were rescheduled in line with the project extension, which was enforced by the amendment to the Grant Agreement. For further details, see chapter '3.4 Project period'.

[19] The abbreviation 'MS' stands here for milestone.

[20] 'Go-live' here means to conduct the BAT in a production-like environment with real data and with the help of SIENA for the business validation.

No.	Name of the Milestone	As-is date
MS 07	Pilot/Evaluation report completed	31/12/2018[21]

Table 3: Overall milestones

3.6 Legal basis for the pilot

The Swedish Framework Decision (SFD) provides in line with the dedicated national law a common legal framework for the exchange of existing information and criminal intelligence between EU MS' law enforcement authorities. It includes rules for cross-border exchanges of criminal information and intelligence, ensuring procedures for cross-border data exchanges are not stricter than those applying to exchanges at national level. Furthermore, it regulates the conditions for exchanging information and intelligence among EU MS.[22]

EPRIS-ADEP serves the full implementation of the principle of availability laid down in SFD by providing competent law enforcement authorities with '*factual reasons [in form of a hit indication] to believe that relevant information and intelligence is available in another Member State*'[23].

The compatibility for the implementation of the pilot, in particular the use of real data in the production environment, with national law was verified and confirmed by each participating MS in advance.

The article 18.2 (d)[24] of the Europol Regulation[25] provides the legal basis for the involvement of Europol as communication infrastructure provider facilitating the exchange of information between the pilot MS during the project.

3.7 Overview ADEP-Technology

3.7.1 ADEP infrastructure

The ADEP-Technology consists of different micro-services that can be instantiated several times on different execution environments. In addition, there are applications to manage the content of the index database.

[21] The plain administrative completion of the pilot project including the compilation of the final evaluation report took place at the beginning of 2019.

[22] Council Framework Decision 2006/960/JHA of 18 December 2006 on simplifying the exchange of information and intelligence between law enforcement authorities of the Member States of the European Union

[23] Article 5, paragraph 1 of the Council Framework Decision 2006/960/JHA of 18 December 2006 on simplifying the exchange of information and intelligence between law enforcement authorities of the Member States of the European Union

[24] Article 18. *Purposes of information processing activities – 2. Personal data may be processed only for the purposes of: (d) Facilitating the exchange of information between Member States, Europol, other Union bodies, third countries and international organisations.*

[25] Regulation (EU) 2016/794 of the European Parliament and of the Council of 11 May 2016 on the European Union Agency for Law Enforcement Cooperation (Europol) and replacing and repealing Council Decisions 2009/371/JHA, 2009/934/JHA, 2009/935/JHA, 2009/936/JHA and 2009/968/JHA

Each pilot partner prepared an infrastructure, which includes among other things the ADEP software and an index database containing test data or a real extract of law enforcement records (family name, surname, date of birth, date of place, gender) depending on the deployment stage (e.g. test, pre-production and production environment) of the pilot. All micro-services run in a secure network segment.

The following figure gives an overview about a possible ADEP infrastructure:

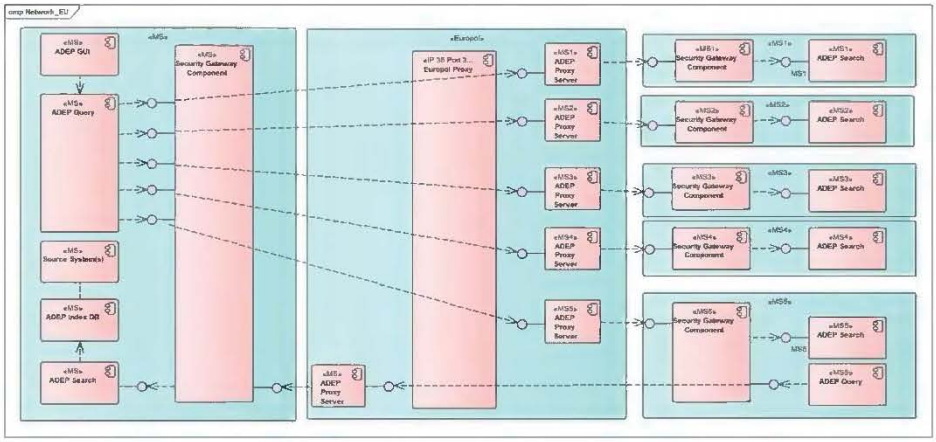


Figure 5: Overview ADEP infrastructure (example from Germany)

The actual products and/or technologies used by the participating MS for the abstract components shown in Figure 5 are listed in the following table:

Compo-nent	DE	ES	FI	FR	IE
ADEP GUI (frontend)	Own GUI (BKA's case management system)	ADEP Demon-strator GUI version 0.10.4	ADEP Demon-strator GUI version 0.10.6.1	ADEP Demon-strator GUI version 0.10.4	ADEP Demon-strator GUI version 0.10.6.1
Index DB	Oracle	PostgreSQL	PostgreSQL	PostgreSQL	PostgreSQL
Security gateway	IBM DataPower	IBM DataPower	F5	national solutions	F5

Table 4: Overview products and/or technologies used by pilot MS (BAT)

3.7.2 EPRIS-ADEP software

The EPRIS-ADEP pilot implementation is using the EPRIS-ADEP software as a specification of the ADEP-Technology designed by Fraunhofer FOKUS, Germany. This software consists of various components implemented as micro-services. The following components are used:

EPRIS-ADEP software	Meaning
Query Service:	A micro-service, which receives a query from a national client, which can be either a user interface or a step in a national workflow, validates the query, pseudonymises the parameters and distributes the pseudonymised query to the connected national search services, collects the search results from the national search services, aggregates and returns them to the initiator of the query.
Search Service:	A micro-service, which receives a pseudonymised query, validates it, performs the search in the national ADEP index and returns the search results.
Management Service:	A local service to immediately add or remove a person record from the local ADEP index.
PseudonymizationFltr:	An application that pseudonymises data in files of a given format. The pseudonymised data files than can be imported into a database with native database means.
batchInsert:	An application that reads, validates and pseudonymises data from a source database and inserts the pseudonymised records into the local organisational index.
batchDelete:	An application that reads IDs from a source database and deletes the corresponding entries in the local organisational index.

Table 5: ADEP software components [ADEPC]

'*Using the ADEP system is a two-step process. In the first step, a query is received from a national endpoint and then distributed to the other participants ADEP system to search their Organisational Indices.*'[26] The Query Service provides the functionality of the national contact point. The Search Service is used to search a national index. These indexes are stored locally at each MS. The ADEP-Technology uses a sophisticated search strategy over pseudonymised data and thereby ensures an exact as well as a fuzzy search of the indexes.[27]

A comprehensive description of the pseudonymisation strategy and the ADEP-Technology in general can be found in Appendix 1.

[26] Fraunhofer FOKUS, ADEP Pilot – Architectural Issues, 07.12.2015

[27] Fraunhofer FOKUS, ADEP – Organisational Index Lifecycle, 16.10.2015

3.8 Europol's services for the pilot

3.8.1 EON (Europol Operations Network)

During the EPRIS-ADEP project, Europol performed the following activities:

- Designed, configured and deployed network infrastructure for ADEP's SIT environment and BAT environment using EON,
- Supported the participating MS by connecting to EON,
- Monitored the EON service during the SIT and BAT.

In addition to the EON, the participating MS used SIENA provided by Europol for the follow-up communication during the BAT (see chapter 4.2.3), and EPE, for which Europol configured an EPRIS-ADEP site and managed the access to this site.

Figure 6 shows the proxy infrastructure provided by Europol for the BAT:

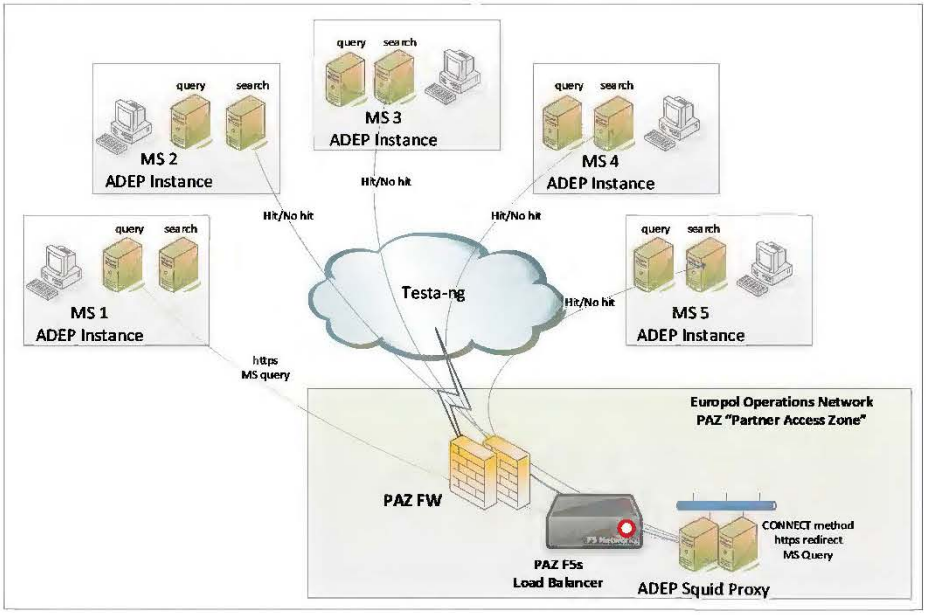


Figure 6: ADEP – Proxy infrastructure view for BAT environment

The environment contained two load balanced Squid Proxy servers that allowed routing of web service requests between participant countries without terminating the encrypted connection (https) at Europol. The certificates for the BAT were issued by the Certification Authority (CA) made available by France.

22

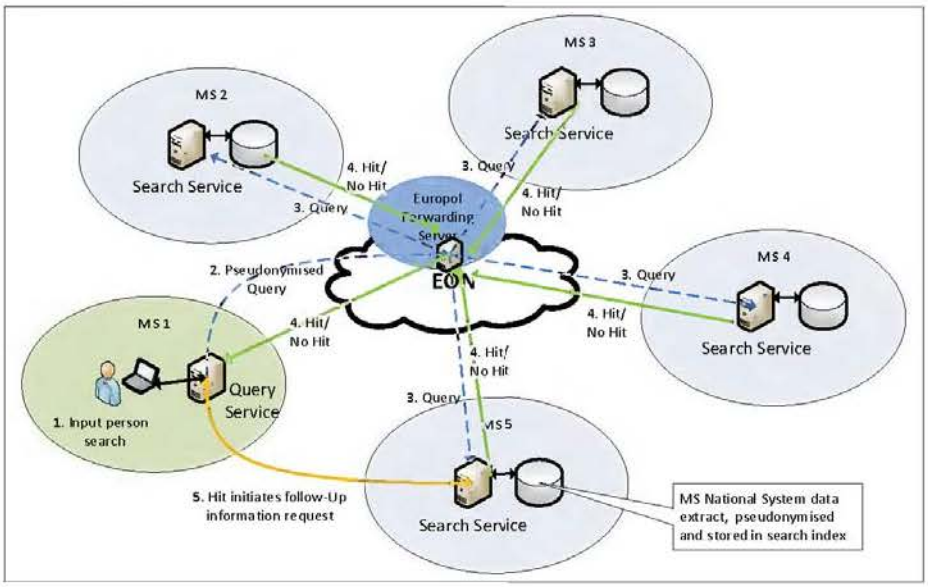


Figure 7: ADEP – Query and Search Services via EON

Figure 7 illustrates how the ADEP services (1. Input person search, 2. Pseudonymised query sent, 3. Query forwarded, 4. Hit/no-hit response returned and 5. Hit initiates a follow up process in SIENA) work via EON.

3.8.2 Europol as a pilot participant

Europol has tested the ADEP-Technology from the perspective of a central IT service provider. The focus was on the operational requirement standards of Europol.

During the EPRIS-ADEP project, Europol performed the following activities:

- Deployed ADEP-Technology on the internal infrastructure for testing purposes,
- Deployed ADEP-Technology on Europol's infrastructure and connected it to the SIT environment,
- Tested and evaluated several versions of the ADEP-Technology.
- Europol's specialists have actively contributed to the project activities within the BOWG, ITWG, LWG and also during the EPRIS-ADEP plenary sessions.

4 Approach of the pilot project

The approach of the pilot project based on the activities stipulated in the Grant Agreement. In order to prove the feasibility and practicality of the ADEP-Technology, a systematic testing was conducted across several test levels and in different environments.

This chapter summarizes the main activities of the pilot project (see subchapter 4.1) and describes the main activity 'Testing and evaluation' in more detail due to its great importance for this pilot project (see subchapter 4.2).

4.1 Activities

4.1.1 Main activities of the pilot project

The approach of the pilot project can be summarized in four main activities:

Figure 8: Main activities of this pilot project

1. Conceptual preparation

The conceptual preparation covered both overall and national specific target conception. This activity included among other things a further specification of requirements for EPRIS-ADEP, technical planning (e.g. integration concept, network concept), organisational planning (e.g. test concept, project management processes (see [PMP]) and deployment planning (see [DP]).

2. Setting up the organisation and infrastructure

The target conception was implemented. The overall and the specific project management processes including change and release management processes and organisation of each pilot partner were established. The required infrastructure for the pilot was set up.

3. Deployment of the software

This activity contained technical deployment (e.g. development, installation, configuration, integration, creation of organisational indexes), connecting the national infrastructure to the EON and organisational deployment (staff allocation and training). Furthermore, a test-accompanying software deployment and support of services for software integration and EON connectivity were provided. Several software versions (backend and frontend) were developed and released during the pilot project.

4. Testing and evaluation

Testing and evaluation were conducted based on the common test concept (see [MTP]). The tests were conducted systematically over several test levels and in different environments. Support services were provided for the test duration. The evaluation addressed mainly technical and functional aspects (see subchapter 4.2).

4.1.2 Activities of the pilot partners

The following Table 6 summarizes the status of the activities ordered by the work packages (WP1 to WP7) stipulated in the Grant Agreement:

Status	WP	ID	Activity
	WP1		**France - CIVIPOL**
✓	WP1	A1.1	Central project management
✓	WP1	A1.2	Pilot project coordination and monitoring
✓	WP1	A1.3	Supporting of the implementation process by Business Organisational Working Group
✓	WP1	A1.4	Supporting of the implementation process by Technical Working Group[28]
✓	WP1	A1.5	Outreach and coordination with relevant partners
✓	WP1	A1.6	Dissemination of project results to relevant target groups
	WP2		**Germany – BMI/Fraunhofer FOKUS**
✓	WP2	A2.1	Establish a suitable change and release management
✓	WP2	A2.2	Test/evaluation-accompanying software development
✓	WP2	A2.3	(Technological) support for software integration
✓	WP2	A2.4	Support for testing and evaluation
	WP3		**France**
✓	WP3	A3.1	Conceptual preparation
✓	WP3	A3.2	Local deployment
✓	WP3	A3.3	Testing and evaluation
	WP4		**Germany**
✓	WP4	A4.1	Conceptual preparation
✓	WP4	A4.2	Local deployment

[28] Also called IT Working Group

Status	WP	ID	Activity
✓	WP4	A4.3	Testing and evaluation in pre-production environment
✓	WP4	A4.4	Testing and evaluation in live environment
	WP5		**Finland**
✓	WP5	A5.1	Conceptual preparation
✓	WP5	A5.2	Local deployment
✓	WP5	A5.3	Testing and evaluation in pre-production environment
✓	WP5	A5.4	Testing and evaluation in live environment
	WP6		**Spain**
✓	WP6	A6.1	Conceptual preparation
✓	WP6	A6.2	Local deployment in test environment
✓	WP6	A6.3	Testing and evaluation
✓	WP6	A6.4	Testing and evaluation with real data
✓	WP6	A6.5	Deploy the whole system in live environment
	WP7		**Ireland**
✓	WP7	A7.1	Conceptual preparation
✓	WP7	A7.2	Local deployment
(✓)	WP7	A7.3	Testing and evaluation/deployment to live environment ***Comments:*** Due to legacy setup of the EON in the Irish networking infrastructure, the Irish ADEP team decided to delay their ADEP deployment into the production environment. A full analysis of the Irish infrastructure used for EPRIS-ADEP is ongoing which will identify the final requirements for progression into our live environment. Ireland conducted and evaluated all tests except the BAT in the production environment.
✓	WP7	A7.4	(NEW): Design of gateway infrastructure ***Comments:*** Details can be found as part of the deliverable 'D7.1 Deployment plan' ([DP]).

Table 6: Activities of the pilot partners

4.1.3 Risk management

Within the context of the project management, a risk management system was established. This risk management included the identification, assessment, and prioritization of risks as well as the definition and realisation of preventive and reactive measures, in order to prevent or at least to minimize the likelihood of risk occurrence or damage. The main objective of the risk management was to ensure the success of the EPRIS-ADEP pilot by removing obstacles. The identified risks were successfully managed during the pilot project.

The following risks for the ADEP pilot were identified:

No.	Risk description	Consequence	Probability of occurrence[29]	Potential extend of damage[30]	Measures to prevent or to minimize the likelihood of risk occurrence or damage
1	Lack of communication between the pilot MS (lack of realising synergies, exchanging experiences and finding solutions)	Endangers the pilot's successful completion within the set period - End 2018	1	2	Establishment of an interdisciplinary team at working level which communicate regularly (at least two-weekly); establishment of a regular status reporting; executing plenary sessions and Steering Board meetings as planned in order to intensify communication and exchange of experiences
2	Lack of legal basis for the usage of real data	Endangers the pilot's successful completion; main objective (confirming the feasibility of ADEP) cannot be achieved for the business perspective; project fails	2	1	Legal assessment and timely initiation of the necessary national actions in order to obtain authorisation for the use of real data
3	Lack of ADEP performance/ efficiency	Endangers the pilot's successful completion; main objective (confirming the feasibility of ADEP) cannot not be achieved; project fails	3	1	Close and coordinated co-operation within the project organisation; agreements for support of approval, configuration, release and change management processes; testing and test management
4	Delay and quality losses due to lack of know-how	Endangers the pilot's successful completion within the set period - End 2018	3	2	Adequate procedures for the selection of appropriately qualified personnel resources
5	Lack of EON performance / efficiency	Endangers the pilot's successful completion within the set period - End 2018	2	2	Monitoring the EON connection during the whole pilot; test of the EON performance/latency; close and coordinated co-operation within the ADEP project

[29] probability of occurrence: 1 = high, 2 = medium, 3 = low

[30] potential extend of damage: 1 = high, 2 = medium, 3 = low

No.	Risk description	Consequence	Probability of occurrence[29]	Potential extend of damage[30]	Measures to prevent or to minimize the likelihood of risk occurrence or damage
6	Complex, time consuming changes to business and legal requirements	Endangers the pilot's successful completion within the set period - End 2018	2	3	Close and coordinated co-operation with all ADEP participants; implementation of a workable change process / change management
7	Complex, budget consuming changes to business and legal requirements	The costs exceed the provided budget. Pilot cannot be completed successfully (i.e. with not enough results for confirming the feasibility of ADEP).	3	1	Close and coordinated co-operation with all ADEP participants; monitoring of the budget; securing financial resources
8	Competition and loss of core resources due to reorientations/ reprioritization	Endangers the pilot's successful completion within the set period - End 2018	2	2	Continued raising of awareness of decision-makers; securing financial resources for external support in development activities
9	Lack of the availability of organisational indices (not complete) and real data/cases	Endangers the pilot's successful completion within the set period - End 2018; lack of acceptance; interference of the live operation	2	1	timely creation of organisational indices and provision / selection of real test cases
10	Incoherent ADEP runtime configurations and lack of cadence in deployments among the participating MS	Endangers the pilot's schedule and outcomes - test results especially; therefore poses a risk to the pilot's successful completion	3	2	Delivery and deployment guidance for ADEP software including a lightweight but controlled process to upgrade versions and runtime configurations among the participating MS

Table 7: Risks of the pilot project

These overall risks of the pilot project were tracked and updated in the course of the pilot project. The defined and implemented measures mentioned in Table 7 were highly effective in preventing the project from failing and ensured its success by the end of 2018.

The specific risks of the pilot partners were managed and tackled at national level.

4.2 Testing and evaluation

This chapter gives an overview about the test levels applied (see subchapter 4.2.1), describes the SIT and BAT (see subchapters 4.2.2 and 4.2.3) as well as the used test and collaboration tools (see subchapter 4.2.4).

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4.2.1 Test levels

In order to demonstrate the feasibility of the ADEP-Technology, the pilot partners planned and successfully conducted the following test levels:

Test level	Short description
Local tests	System tests were performed in the local test environment of the participating organisations Objective: verify deployment and functionality of ADEP-Technology including organisational index in the local test environment
Connectivity tests	Connectivity tests in pre-production environments of all pilot participants Objective: verify that the deployed systems of the pilot participants can communicate with each other via EON
Systems integration tests (SIT)	Tests in pre-production environment with interconnected systems of at least three pilot participants Objective: verify the functionality of the ADEP system with interconnected systems[31] of at least three pilot participants
Performance tests	Performance tests have been performed in the pre-production environment Objective: validate the performance of the ADEP software and the EON network
Business acceptance tests (BAT)	Business validation by end users in three or more MS on interconnected ADEP systems in production with real data Objective: verify the correctness, usability and fitness for its intended purpose of ADEP based query workflows

Table 8: Test levels of the EPRIS-ADEP pilot

A detailed description of the scope, objectives and approaches for the conjoint tests is given in [MTP].

4.2.2 System integration tests (SIT)

Based on locally tested implementations of EPRIS-ADEP and after successfully establishing connectivity between all participants, the integrated EPRIS-ADEP systems have been tested in SIT on pre-production environments with test data. The intention of the SIT was to test the integrated ADEP-Technology and the underlying EON as technical artefacts that should behave as specified in the requirements specification and as expected by the users.

The SIT phase of the ADEP pilot project started in May 2018 and ended with the end of August 2018. It was set up as three iterations of cycles of test planning, preparation, testing, wrap-up and problem solving with increasing complexity of the test objects, test cases and test data volumes. The first iteration focused on the verification of plain service functionality in the interoperable system. In the second iteration, the test database was broadened, different configurations were tested, failure scenarios were added, etc.

[31] Systems which are able to communicate with each other

During the final iteration, more fundamental re-configurations of the ADEP-Technology on a further extended set of test data were tested and the configuration to be used in the business validation phase was determined.

4.2.3 Business acceptance test (BAT)

The business validation phase of EPRIS-ADEP took place from September to December 2018. During the last iteration of this BAT, starting end of October 2018, the law enforcement organisations of Finland, France, Germany and Spain validated the fitness for the use of EPRIS-ADEP on their respective production systems and with real case data, using the EON provided by Europol. Due to legacy setup of the EON in the Irish networking infrastructure, the Irish ADEP team decided to delay their ADEP deployment into the production environment.

BAT approach

To work in realistic scenarios compliant with the legal regulations for law enforcement work and data exchange, the following process was chosen.

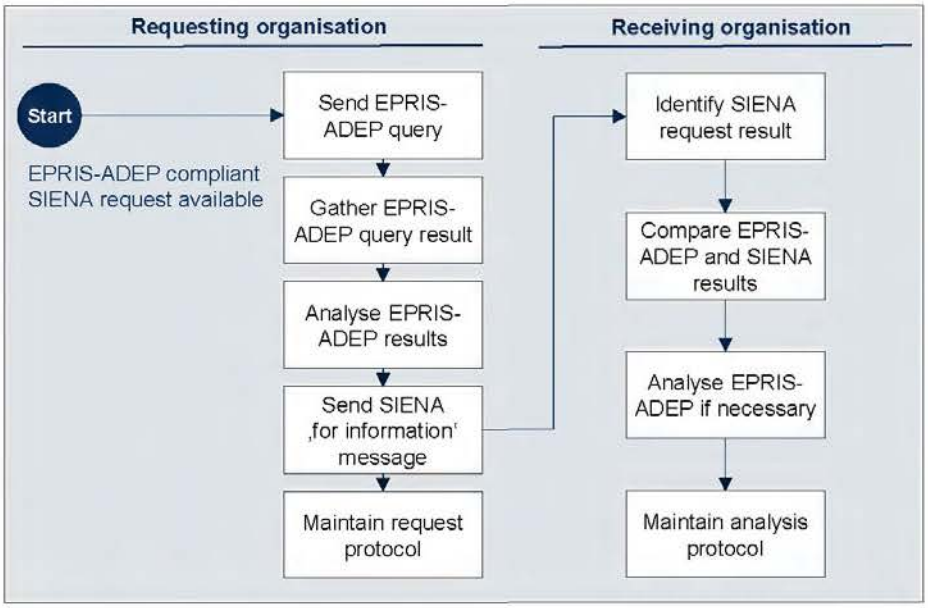


Figure 9: BAT process

The querying partner (requesting organisation) identified an occurring or existing SIENA request with appropriate content as reference. Subsequently, EPRIS-ADEP queries for the personal data contained in the SIENA request were made. The target organisation (receiving organisation) was informed about these EPRIS-ADEP queries in a SIENA 'for information' message, so that it could pick up and analyse the respective SIENA and EPRIS-ADEP cases.

The query activities have been protocolled in an organisation's query log file.

Triggered by the incoming SIENA 'for information' message, the requested MS (receiving organisation) compared and analysed the results of the SIENA search and the EPRIS-ADEP query. As a result of this analysis, an EPRIS-ADEP query either matched the SIENA result, turned out to be a false positive or a false negative or the EPRIS-ADEP query delivered additional information that had either not been revealed by working on the SIENA request or it showed in an organisation that had not been the target of the original SIENA request (additional result).

The analysis activities have been protocolled in an organisation's analysis log file.

A more detailed description of the BAT approach can be found in [BATP].

4.2.4 Test and collaboration tools

The 'Europol Platform for Experts' (EPE) was used as a main collaboration platform within the ADEP initiative. All documents were shared between the project partners on EPE.

Due to the lack of a centrally managed bug-tracking tool, the problem management workflow was done using the message board in EPE. Bug reports were issued as messages by the pilot participants. Their status tracking, control and aggregation was carried out by the central test coordination.

Given that the technical infrastructures and personal skill sets had been different in the participating organisations, the usage of certain tools had not been required or enforced. Instead, a locally differing variety of tools was used to support test conduction and test data management.

For testing the behaviour of the system with manually created test messages in addition to used input, the tools Postman and SoapUI were used. At later iterations, the web application testing tool Selenium was also used by Ireland to simulate manual testing from the ADEP frontend level. This tool allows for the automation of any web browser based application by recording a user's actions on the website and saving them for later reuse. This tool allowed for the quick repetition of frontend-based tests whenever a new version of the ADEP frontend was released.

For a more sophisticated support of test automation on a larger set of messages, especially for load testing, the tools Gatling and SoapUI were used. The functional tests in Germany all were prepared, structured and conducted using SoapUI. Gatling mainly was used in Finland and Ireland.

Different approaches were taken for preparing ADEP test requests from test data sets available as 'comma separated value' (CSV) files. Finland used a custom-built solution named 'httper' to parse CSV files and to convert them into queries. In Germany, a Java library was written to provide the mechanisms for test request generation out of CSV files and other purposes. This library then was used in Groovy script based SoapUI test cases.

Both solutions were used to (regression) test systems with defined index content, like in the SIT phase. The Java lib mentioned also included the ability to set up an ADEP index by generating the corresponding insert request calls from a CSV database.

Linux command line tools, like curl, awk, jq, etc. were used for ad-hoc checks of connectivity, availability, etc., in addition.

For system automation tasks, Finland has applied a tool called Ansible. This tool is a well-known system and configuration management toolset, yet it is relatively simple by design and was a good fit for Finland's ADEP server environments. For example, the latest Finish ADEP pre-production deployment was completely done via Ansible.

Also related to the system automation in a broader sense, Finland's project experimented with docker containers and docker-compose tool for running pre-production's ADEP components. Additionally, Finland's ADEP implementation project wished to start experimenting with the so-called 'ELK Stack' for log management purposes, mainly due to good experiences reported by Ireland. Some service orchestration tooling like Nomad was also intended to be used, but unfortunately, the project's limited timeframe did not allow for further experiments with all these tools.

This shows a certain demand for custom support software and other such collaboration efforts provided for the ADEP pilot participants.

5 Results of the pilot project

This chapter contains the description of the pilot's results, consisting of the results of the different test levels (see subchapter 5.1), the further confirmed potential benefits of EPRIS-ADEP (see subchapter 5.2), the deliverables produced during this project (see subchapter 5.3) and the results of the 'lessons learned' session (see subchapter 5.4).

5.1 Results of the evaluation

The following subchapters describe the main results of the different test levels of this pilot project.

5.1.1 Main results of the local tests

The local tests have been conducted successfully in the local test environment of all five MS involved and Europol.

The following results have been reached:

- The successful deployment and the functionality of the EPRIS-ADEP software including the organisational index in the local test environment could be verified.
- All pilot partners were able to implement the required infrastructure and to deploy the ADEP-Technology including the national index.

5.1.2 Main results of the connectivity tests

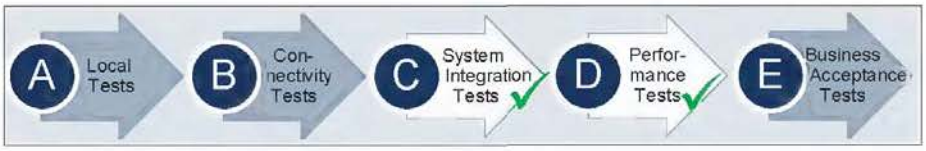
The connectivity tests have been conducted successfully by all five MS involved and Europol.

The following results have been achieved:

- It was possible to use the already existing EON infrastructure of Europol.
- Europol provided functioning support services (e.g. support for setting up the connection, support during the pilot) including the provision of bilateral technical specifications (BTS), which contain the specific configurations for each MS to connect to EON.

- These tests verified that the deployed pre-production systems of the pilot participants were able to communicate with each other via EON.
- All pilot partners were able to connect their local systems to EON and to communicate with each other via EON during the pilot project.

5.1.3 Main results of the SIT



The systems integration tests have been conducted successfully in the pre-production environment of all five MS involved and Europol. Moreover, some load and performance tests have been performed.

The main results of the SIT were

- The verification of the functional correctness of the EPRIS-ADEP services in general,
- The identification of problems that had to be fixed to use EPRIS-ADEP for business validation (during the BAT),
- The validation of the overall technical approach, including network topology and algorithms used and
- EON in its current state is capable of dealing with traffic generated by EPRIS-ADEP by at least five to ten participating partners.

5.1.4 Main results of the BAT

The BAT for business validation has been conducted successfully by Finland, France, Germany and Spain. The results of the SIT in the pre-production environment were confirmed during the BAT in the production environment.

Based on more than 100 SIENA cases with more than 250 distinct sets of personal data of suspects as reference, approximately 500 EPRIS-ADEP queries were generated of which almost 300 have been analysed with relation to 165 different cases, which resulted in 153 query analyses relevant and usable for EPRIS-ADEP validation. Multiple queries for the same suspect, cases with incomplete query-analysis-pairs, etc. had to be filtered out.

Figure 10 shows the results of the matching analysis of the relevant 153 queries compared with the answers of the dedicated SIENA-request:

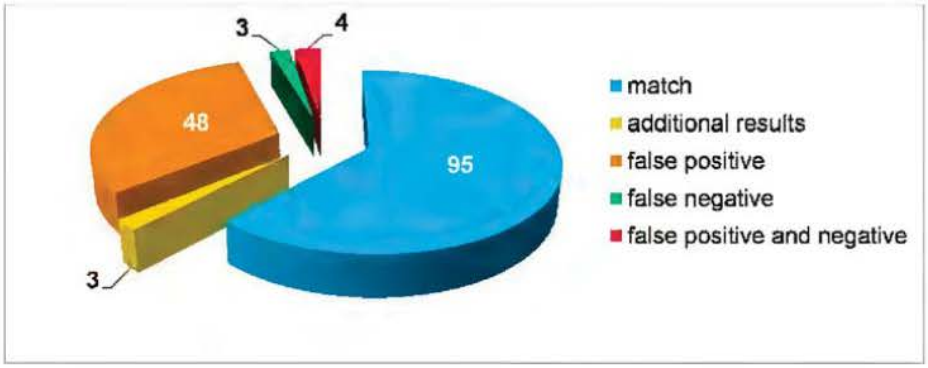


Figure 10: Results of the BAT

In the majority of the cases, the EPRIS-ADEP results matched the SIENA results. False negative results[32] occurred because:

- the respective data had not been inserted into the EPRIS-ADEP index (out of scope of the pilot project), although it was available in the source system,
- a person's name was misspelled in the first three characters, which is a known limitation in the current EPRIS-ADEP configuration,
- the date of birth was not completely correct, or
- the correct data set was found by the system, but the first and only results returned in the response (max. 10) were all false positives, thus hiding the correct match (not more than 10 results were returned) and resulting in this classification.

These four issues can be dealt with and resolved in a follow-up project.

False positives resulted from:

- queries with partially set attributes that were matched against partially attributed ADEP index entries with a different set of available attributes or
- requests that for business reasons were intentionally answered negatively in SIENA, despite data being formally available in the source system's database.

In three cases additional results could be identified: A query done with reference to a SIENA request to one MS led to a hit from a MS that had originally not been SIENA-requested. After transferring this information to the responsible law enforcement departments, it confirmed the unexpected hit in the third MS.

[32] Meaning querying EPRIS-ADEP resulted in a no-hit but the subsequent verification gave a hit

The BAT revealed no critical failures in the ADEP software release used.

In general, the EPRIS-ADEP results showed the usefulness and feasibility of the EPRIS-ADEP approach including the ADEP-Technology from the business point of view. Potential for optimisation in the matching behaviour could be identified and should be implemented in a further project stage.

5.2 Potentials of the EPRIS-ADEP approach

In addition to the demonstration of the feasibility of the EPRIS-ADEP approach, the expected potential benefits such as:

- cost efficiency of the ADEP-Technology in terms of the software itself and its deployment in the participating MS,
- process optimisation of the exchange of information,
- easy integration in the existing environments of the MS,
- easy EON connectivity and
- high level of usability

could be further confirmed through the experience gained by the pilot participants during this pilot project. There are clear indications of the usefulness and positive effects of ADEP for the IMS action of Council Working Party DAPIX.

By using pseudonymisation the software solution follows the concept of 'privacy by design' (see 53[33] and Art. 20 (1)[34] Directive 2016/680).

5.2.1 Cost efficiency

A fund of 1.5 million euros was granted for the EPRIS-ADEP pilot project. All pilot partners confirmed the cost efficiency, especially in comparison with other projects on the same scale. For example, Finland's ADEP implementation was carried out with considerably lower IT costs than initially planned.

Cost-efficient aspects of EPRIS-ADEP:

- The ADEP-Technology is a modern IT architecture based on micro services. It can be adapted for various needs (retrieval of certain biographical data by using exact or fuzzy search capabilities).
- The ADEP software and most of the other required software are 'open source'.

[33] *'(...) The measures could consist, inter alia, of the use of pseudonymisation, as early as possible. The use of pseudonymisation for the purposes of this Directive can serve as a tool that could facilitate, in particular, the free flow of personal data within the area of freedom, security and justice.'*

[34] *'(...) to implement appropriate technical and organisational measures, such as pseudonymisation, which are designed to implement data protection principles, such as data minimisation, in an effective manner and to integrate the necessary safeguards into the processing, in order to meet the requirements of this Directive and protect the rights of data subjects.'*

- It is not necessary to acquire major new components in addition to the usual infrastructure already used within the MS.
- EPRIS-ADEP uses already existing Europol services and infrastructure: EON and SIENA.

The learning curve of the participating MS was very high. The initial setting up of the system was more time-consuming and therefore more personnel-intensive than expected. However, the knowledge of the system is much greater in all EPRIS-ADEP pilot countries and at Europol today. Practical experiences and documented processes based on different national IT environments are available. In addition, Europol intends to provide support for future new ADEP participants within a follow-up project. That will ensure a time-efficient setting up of the infrastructure and the ADEP deployment.

5.2.2 Process optimisation

ADEP as a general approach aims at automation of all steps of information exchange processes which do not require any human interaction. Especially EPRIS-ADEP serves basic needs of a high number of law enforcement officers in Europe by locating relevant data which might be worthwhile requesting. It enables a well-targeted and highly standardized follow-up (SIENA) request to the data owning partner, which will most probably lead to meaningful results. More speediness could be achieved by the automated pre-processing of incoming follow-up requests, so that the law enforcement officer can start directly with the assessment of findings and their further processing. The efforts of both the requesting (through a well-targeted request) and the requested partner (through analysis of and response to fewer requests) will be reduced.

EPRIS-ADEP enables the ultimate implementation of the principle of availability committed in the SFD.

5.2.3 Easy ADEP integration

Due to the architecture of the ADEP-Technology (e.g. micro-services), all five participating MS and Europol were able to integrate ADEP into their environments. Noteworthy, problems were quickly fixed by Central Deployment (Fraunhofer FOKUS).

The target concept is the integration into the national case management systems. Germany was already able to integrate the ADEP software into its case management system. All other pilot participants used the ADEP frontend software (Demonstrator GUI by Fraunhofer FOKUS).

All pilot participants set up an organisational index. The chosen strategy of feeding a new data batch to the index works sufficiently. The implementation of the data feed was different in the participating MS. The effort depends on the implemented database system and on the national source system(s).

The efforts of all MS have been documented. This documentation can be used in further project iterations.

Therefore, the simple ADEP integration into different existing IT environments and linked business processes has been proven.

5.2.4 Easy EON connectivity

The presence of an already existing network infrastructure (Europol Operations Network) provides a simple and secure, yet robust method for all EU MS to attain access to the ADEP application and its benefits. The connection to the different gateways (as part of the security architecture) of the participating MS worked appropriately. The corresponding configurations have been documented.

5.2.5 High level of usability (end-user acceptance)

The end-users that participated in the EPRIS-ADEP test phases were pleased with the simplicity of use of the application. The ability to quickly pre-check the relevance of countries possibly involved for the case at hand satisfies an important business need, allowing the cross-border interaction between law enforcement services throughout the European Union.

From the technical IT staff's viewpoint, the usability of the system was adequate (e.g. administration/maintenance).

The general estimation is that EPRIS-ADEP would be a very good tool for dealing with international law enforcement matters. Therefore, the benefits for SIENA information exchange processes and accumulated time savings enabled by the ADEP system can be clearly seen.

5.3 List of deliverables

The main activities and results of the pilot project have been set out in documents also referred to as 'deliverables' in the [GA].

The following deliverables have been created and submitted by the pilot partners and affiliated organisations:

WP	ID	Deliverable	Short description
WP1	D1.1	Kick-off meeting report	Kick-off meeting report on implementation of the project
WP1	D1.2 - D1.12	Steering committee[35] reports 1 to 11	Align and monitor pilot projects on higher management level; decide escalation cases and provide guidance
WP1	D1.14 – D1.18	Coordination meeting[36] reports 1 to 5	Coordinate and align overall progress, discuss results of each participant; take decisions on requirements and solutions
WP1	D1.19 – D1.23	BOWG - Project management reports 1 to 5	Reports on the monitoring from the project management perspective

[35] Steering Board

[36] Plenary session

WP	ID	Deliverable	Short description
WP1	D1.24	ITWG[37] meeting conclusion	Conclusion on monitoring from the technical perspective; alignment of the technical deployment and integration through the partners; discussion of test results from the technical point of view ***Comments:*** There was no need to organize separate meetings of the ITWG during the pilot project. Technical issues have been discussed and monitored with the help of the regular established project meetings such as plenary sessions, meetings of the Steering Board and bi-weekly conference calls. The results of these meetings including technical matters were documented. In addition, the communication of the ITWG took place via e-mail, phone and a forum.
WP2	D2.1	Management plan	Release management plan to incorporate new requirements
WP2	D2.2	ADEP components 1	Functional improved ADEP components
WP2	D2.3	ADEP components 2	Functional improved ADEP components
WP2	D2.4	ADEP components 3	Functional improved ADEP components
WP2	D2.5	ADEP components 4	Functional improved ADEP components
WP2	D2.6	Workshop reports	Workshop reports, documentation for national IT operations ***Comments:*** Workshops have been planned to help participants of the project to get the software running. Due to the adequate documentation there was no need to organize dedicated workshops. Communication via e-mail and phone was sufficient.
WP2	D2.7	Description of tests	Description of test system and test cases
WP3	D3.1	ADEP Implementation screen view	Documentation linked with the implementation of ADEP in each computer/screen of the French officer of police in charge of judicial investigation (end users)

[37] 'ITWG' is also called 'TWG' in the [GA].

WP	ID	Deliverable	Short description
WP3	D3.2	Evaluation report from MS	Evaluation report from M S evaluating the project implementation at the MS scale ***Comment:*** This evaluation report includes the French evaluation report.
WP3	D3.3	FR impact analysis	An analysis of the impact at the national level of the implementation of the pilot with relevant statistics
WP4	D4.1	Deployment plan Germany	Deployment plan of the pilot project
WP4	D4.2	Status report of deployment Germany 1	Status report of deployment of Germany
WP4	D4.3	Status report of deployment Germany 2	Status report of deployment of Germany
WP4	D4.4	Status report of deployment Germany 3	(Final) status report of deployment of Germany ***Comment:*** This evaluation report includes the final status report of deployment of Germany.
WP5	D5.1	Deployment plan Finland	Deployment plan of pilot project
WP5	D5.2	Status report of deployment Finland 1	Status report of deployment of Finland
WP5	D5.3	Status report of deployment Finland 2	Status report of deployment of Finland
WP5	D5.4	Status report of deployment Finland 3	Status report of deployment of Finland
WP5	D5.5	Evaluation report from Finland	Evaluation report from Finland at the end of the project ***Comment:*** This evaluation report includes the final evaluation report of Finland.
WP6	D6.1	Deployment plan Spain	Deployment plan for the MS
WP6	D6.2	Status report of deployment	Status report of deployment in test environment
WP6	D6.3	Test report 1	Test report in Spanish test environment
WP6	D6.4	Test report 2	Test report in Spanish test environment
WP6	D6.5	Test report 3	Test report in Spanish test environment
WP6	D6.6	Final evaluation report Spain	Final evaluation report from Spain ***Comment:*** This evaluation report includes the final evaluation report of Spain.

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WP	ID	Deliverable	Short description
WP7	D7.1	Deployment plan Ireland	Deployment plan, test and evaluation concept of MS
WP7	D7.2	Test report Ireland	Test report from Ireland with pilot project partners, end users
WP7	D7.3	Final evaluation report Ireland	Final evaluation report of Ireland with pilot project partners ***Comment:*** This evaluation report includes the final evaluation report of Ireland.
WP8	D8.1	Status report of deployment Europol – Report 1	Presentation of the activities performed by Europol during the project, including testing and evaluation of the ADEP software ***Comment:*** These three deliverables are covered by Europol's final report 'EPRIS ADEP – Project Report EUROPOL'.
WP8	D8.2	Status report of deployment Europol – Report 2	
WP8	D8.3	Evaluation report from Europol	

Table 9: Deliverables of the pilot project

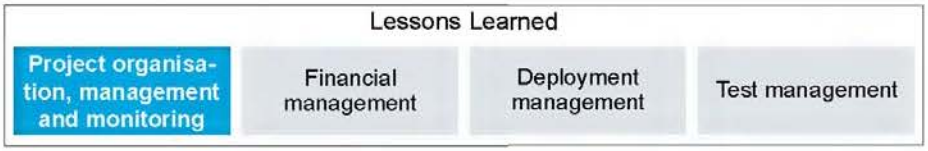
5.4 Lessons learned

In order to identify the experiences gained in this pilot project, making them useful for follow-up activities and other projects, the following areas of the pilot project were examined continuously:

- Project organisation, management and monitoring,
- Financial management,
- Deployment management and
- Test management.

The subchapters 5.4.1 to 5.4.4 contain the results.

5.4.1 Project organisation, management and monitoring



Project organisation

In general, the established project organisation (see Figure 3 in chapter 3.2.2) worked for the pilot project. In spite of this, a more lightweight project organisation should be established in the future. During the pilot project there was no need for a Management Board meeting. The composition of both the Steering Board and Management Board were similar. Due to this, it is possible to consolidate the boards.

Steering Board

Overall, the composition of the Steering Board reflected the scope and structure of this pilot project, but the composition needs to be adapted according to future projects, e.g. Europol and all participating MS could become a member of the Steering Committee in a follow-up project due to their future role.

Plenary sessions

The plenary sessions provided the opportunity to exchange information and experiences face-to-face. Besides that, the plenary sessions provided a framework for very effective and efficient work on present topics. The frequency and regularity were sufficient.

Working Groups

The working groups (BOWG, ITWG) should be reshaped. The need of a separate LWG has to be analysed.

Although the role of the Central Test Coordinator was sufficient for this pilot, with the increasing number of pilot partners a new form of organisation for joint testing is needed. Therefore, it is recommended that a Testing Working Group be set up. Additionally, pilot participants, including observers, would appreciate being informed more regularly about the work of the working groups.

National project organisations

The commitment of the management at national level has been very satisfactory. Due to the diversity of national project structures (see chapter 3.2.3), it has sometimes been difficult to communicate effectively within the EU project. Dedicated contact persons at national level are needed for the different roles and responsibilities within the project.

New ADEP partners (pilot partners and observers)

The ADEP initiative remains open to other MS to enable organic growth of the ADEP pilot partners in the future.

Project Management Office (PMO)

The PMO kept the administrative burden low for the MS involved. In the future, the PMO and financial management should work more closely together. The financial management should be integrated into the PMO.

Communication

This pilot project focused primarily on ADEP-Technology and its feasibility. In the future, more attention has to be paid to the (external) communication management. The communication plan should include different groups of recipients at strategic and operational level. A stakeholder management is required. A consistent communication strategy must be established and lived by all.

The direct communication between the pilot MS and other partners, especially in the field of deployment management and testing, was very fruitful. Frequency and content of the communication have been sufficiently carried out. More face-to-face meetings would facilitate the cooperation.

Throughout the whole project a very close relationship and constructive cooperation between all project partners involved was established.

5.4.2 Financial management

The cooperation of all partners in applying for the [GA] of this pilot project has been very effective and efficient. Due to the limited time available for the preparation and submission of the proposal (just two months), the work packages were defined according to the pilot partners involved. The deliverables were linked to the pilot partners. For the follow-up project, a more process-oriented approach should be chosen. Deliverables should be connected with the project progress (e.g. milestones).

A larger budget should be planned for communication measurements defined on the basis of a stakeholder analysis. The costs in human resources were higher than expected. In addition, the market price for IT employees is rising. These circumstances should be taken into account in the financial planning of the next project.

The pilot's results demonstrated the cost-efficiency of using the ADEP-Technology.

Each pilot partner should name an operational contact person for the financial management.

5.4.3 Deployment management

Release management

The development was very pragmatic and suitable for fast solutions. A more stringent release management that closes a certain gap between development and 'customers' should be set up. The corresponding work product would be a release plan. The features/requirements in the release plan should be prioritized for development and implementation.

Release notes and documentation

Release notes were provided regularly and appropriately for the IT staff as required. In the future, they should be more business-oriented to make them more suitable for users and testers. The visualization of results would be helpful.

Hashes for deployment artefacts would help to improve security. More attention should be paid to the version naming convention (bump version to v1.0.8).

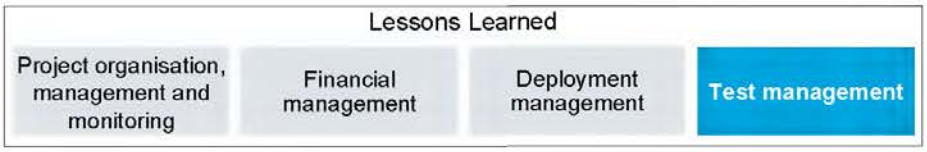
Configuration management

The configuration management should be improved. One configuration file should be strived for. The configuration management should include bug fixes, new releases and indices.

Deployment management

The different timelines of the pilot partners need to be harmonised. Furthermore, a dashboard with the used software versions and the configuration parameter set of the participants should be maintained.

5.4.4 Test management



Test experience with the ADEP-Technology

The feasibility of the ADEP-Technology has been demonstrated. It was rated innovative and regarded as even having some potential for bringing innovation to current police approaches. Testing facilitated a better understanding of the functionality and benefits. The initial quality of the ADEP software was good. The GUI prototype (ADEP frontend solution for demonstration purposes) was easy to use.

Joint testing

The joint tests were well prepared and coordinated. The national team structures could have been more transparent to others in order to be able to identify who is responsible for what task. A clear definition of roles and responsibilities is required.

Requirements management

The change request process has to be speed up. The documentation of the requirements was not always appropriate. The decision-making process should be improved and made more transparent.

Collaboration

Mutual exchange of information and experiences between pilot partners have been very fruitful. The documentation of security architecture, detailed technical information, deployment and test procedures has been useful. Other documents need some improvement. Certain documents as well as parts of the communication in the project should increase its target audience specificity in further project stages. The sharing of information and knowledge using EPE should be continued where it is adequate, i.e. for the management of documents. A problem/incident/ticket tool is required in addition.

6 Next steps

This chapter describes the next steps for the ADEP initiative with the planned activities derived from the results of this pilot project. A more business-driven follow-up project with the working title ADEP 2 is deemed necessary (see subchapter 6.1). All pilot partners have committed themselves to participating in a follow-up project. In addition, participating MS describe their specific activities (see subchapter 6.2).

6.1 Follow-up project 'ADEP 2'

6.1.1 Roadmap

In light of the promising results, all pilot partners concluded that an ADEP 2 follow-up project is needed and stated their will to join it, in order to gain a solution, which is ready for a roll-out. The follow-up project would be the necessary next step to further enhance the long-term approach of the IMS action of Council Working Party DAPIX aiming at the automation of data exchange processes (ADEP).

The overall strategic target is the automation of the data exchange processes between EU MS in order to strengthen the processes and increase their efficiency and effectivity.

Therefore, the software solution used in the pilot has to be developed further and transformed from a pilot into a (at a first stage limited) productive system, iteratively.

In this context, new requirements considering business and operational aspects become more relevant. New tests have to be conducted based on data expected in a future productive use and linked with new features.

ADEP 2 should contain the elements as follows:

1. Stabilization of the ADEP software solution and processes

   In order to improve the pilot system and its corresponding software a phase of stabilization is necessary. This phase is needed to implement the changes, which have been identified as necessary to improve the usefulness of the system and its performance. In addition to the existing requirements, further aspects from IT-operations, security and data protection, e.g. thorough analysis of logging requirements, have to be integrated.

2. Building trust into the system

   The limited scope of the BAT during this pilot project has to be widened and more test cases have to be performed in order to increase the validity of the results. This will strengthen the trust in the system.

3. Establishing central services at Europol

   During ADEP 2 the tasks and services, which have to be provided at central level, would be established at Europol while taking over the product ownership/service manager role and becoming the Central Coordination Body supporting the following activities:

- Service desk requests for production network
- ADEP network Service Level Agreements (SLA)/ADEP network management
- Central problem management/bug tracking
- Support for the future new ADEP participants
- Central management of the pseudonymisation and search parameters
- ADEP software release management and repository
- ADEP documentation repository

4. Involvement of more partners

   A limited increase of the pilot partners would assist in proving the ability to expand the system with rather low efforts. Based on the experiences gained, a common roll-out strategy for the future productive system will be drafted. Sufficiently scalable and performant capabilities have to be provided at central level accordingly.

5. Clarifying legal issues

   The legal feasibility of a future productive system needs to be investigated further. The findings of the pilot could be fed into a respective analysis of the competent EU bodies.

6. Process improvement towards more automation

   While this pilot project focused on the initial location of relevant data and its retrieval, a follow-up project could concentrate more on the manual activities that are still performed in these processes - and not necessarily need human intervention - with the aim of automatizing them as far as possible. A prerequisite to achieve this goal could be the integration of the services in the existing workflows and systems, while respecting national specifics. Only then highly efficient workflows can be implemented.

7. Identification of other use cases and harmonization with other initiatives

   The general purpose of the system to locate and facilitate the retrieval of data, which is de-centrally stored, applies to other use cases alike. The feasibility of adapting the ADEP solution to such use cases should be analysed more thoroughly. Furthermore, the complementarity of ADEP approach embedded in an EU information architecture needs to be described comprehensibly.

6.1.2 Establishing central services at Europol

During ADEP 2 the tasks and services which have to be provided at central level will be established at Europol. This includes taking over as the Central Coordination Body supporting following activities:

1) Service desk requests for production network in the first phase – After the assessment and decision from the MS side to start using EPRIS-ADEP as a production system and from Europol to support this system in production. Prior to acceptance as a production-ready solution, EPRIS-ADEP will go

through all Europol's internal processes for accepting a new application e.g. pen test, security evaluation, data protection function evaluation, operational acceptance.

2) ADEP network SLA/ADEP network management – ADEP network does not need a separate SLA as it uses existing network connections. However, a solution SLA defining the performance parameters, such as uptime, speed, number of maintenance windows per year, etc. should be defined if Europol is to be the hub of the network and the EPRIS-ADEP Central Coordination Body.

3) Central problem management/bug tracking – Europol will continue to provide an EPE[38] site for ADEP participants.

4) Support the future new ADEP participants – From the connectivity side, new participants will be configured with IP addresses/BTS updates/Proxy changes. This will be managed through Europol ICT Operations standard change requests raised internally.

   New participants will be supported with the related EPRIS-ADEP documentation and first level of support, provided by CDBPM.

5) Central management of the pseudonymisation and search parameters – This could be realized by a dedicated component within the ADEP-Technology stack developed by Fraunhofer FOKUS.

6) ADEP software release management and repository – This one is currently covered by Fraunhofer FOKUS who already have a code repository. This should stay with them, as they are the product developers. Europol will take over this activity when it will take over the ADEP software maintenance and become the ADEP product owner.

7) ADEP documentation repository

The following aspects of software development will be considered:

- refine and stabilize the software solution and processes for governance of changes,
- consider process improvement towards more automation,
- operationalize the software and the processes,
- define further roles and responsibilities.

The ADEP 2 project will require additional resources from Europol to maintain, improve and extend the provided infrastructure and support the EPRIS-ADEP participants.

[38] The new EPE provides more functionalities and is easier to use. Depending on the available resources and the project needs, a different problem/bug management solution could be used.

6.2 National activities

6.2.1 France's planned activities

France will preserve:

- A pre-production environment until the ADEP 2 project starts, in order to roll out SIT concerning new releases or further issues.
- A production infrastructure will be maintained, though the services will be shutdown.

Until EU-funding for ADEP 2 is secured, the financial, human and technical resources of the French ADEP team could be ensured by internal financing.

From the technical point of view, France plans to enhance the existing ADEP infrastructure:

1. There are needs to improve the stability and robustness of the national implementation.
2. France spent a lot of work and time to export the national data source into the ADEP index. For the BAT, only manual insertion could be realised. Hence, all the automation has to be completed to fulfil the requirements (update at least once a day).
3. The monitoring of the ADEP infrastructure has to be enhanced and the integration into the central logging solution (SPLUNK[39]) has to be finalized.

From a functional point of view, it is expected that France raises awareness about its own user interface for the ADEP system in order to serve national police end-users.

6.2.2 Germany's planned activities

In a follow-up project ADEP 2, Germany will assume European project leadership. In this context, several organizational tasks must be fulfilled, such as

- Ensuring an EU-funding,
- Adjusting the European project structure,
- Setting up a release management,
- Setting up a stakeholder management,
- Setting up a communication management,
- Specifying the requirements for EPRIS-ADEP based on the results of the pilot and the business needs,
- Elaborating further combined SIT and BAT and

[39] Software for data collection, indexing and visualization for operational intelligence, which is used for the ADEP logs

- Establishing and coordinating the handover of central processes to Europol.

From a national perspective, activities building up a national project structure need to be carried out. Moreover, Germany will preserve a pre-production environment until the ADEP 2 project will start. Meanwhile further SIT will be continued, new requirements defined, releases integrated and further issues tracked.

Until an EU-funding for ADEP 2 is secured, the resources of the German ADEP team, PD – Berater der öffentlichen Hand and Fraunhofer FOKUS, are ensured by internal financing. The possibility of integrating more data sources into the national index, the identification of other use cases for the ADEP-Technology and the planning of a national roll-out will be kept under close review.

6.2.3 Finland's planned activities

Due to the shortage of national EPRIS-ADEP budget, Finland ramped down the original Finnish EPRIS-ADEP production environment including its real national data index used for BAT.

However, Finland will preserve a downscaled pre-production environment until the ADEP 2 project starts up. Although some moderate SIT related activities can be performed in the meantime, it is expected that no major national IT resources will be spent on the EPRIS-ADEP system until the ADEP 2 budget is secured.

From a technical point-of-view, Finland has preliminary plans to enhance further the EPRIS-ADEP system and its operational processes, partly according to the ADEP 2 roadmap:

1. While the original national EPRIS-ADEP implementation in Finland proved to be a successful one, many parts of the internal system were implemented in a one-shot manner. Therefore, there are needs to improve the stability and robustness of the national implementation. This is very much in line with the ADEP 2 roadmap's stabilization of the EPRIS-ADEP software solution and processes at large.
2. Finland's original EPRIS-ADEP production environment was geared towards a successful completion of the BAT tests. Therefore, many of the tasks like monitoring the system behaviour and error situations' troubleshooting were left as manual processes for the IT staff, so far. However, in the future it is expected that this kind of involvement should be based on more automatic system management processes. Finland wishes to continue the system development by introducing more thorough central operative logging solution and system tracing capabilities and alerting procedures. ADEP 2's roadmap aims at building trust into the system, and while this roadmap item is largely a functional one, there is clearly a technical aspect to trusting the system, too.
3. Related to the previous point, the goal of reducing manual routine tasks means strengthening of system automation procedures. Finland is willing to continue with automating the ADEP setup in a manner that would not only serve Finland's IT staff but also other participants. In practice, for example, partial ADEP system configuration changes or upgrades e.g. to a newer ADEP software

release are yet to be automated. Obviously, such upgrade procedures have to be designed according to the establishment of central system services within Europol.

Business-wise and from a functional point-of view, Finland is expected to implement its own user interface for ADEP system in order to serve national police end users. The idea is to implement the national ADEP user interface as a part of a larger police service's data search front-end project. Therefore the aim would not only be to provide a national ADEP user interface but also to streamline the processes of querying ADEP indexes and to improve the utilization of the ADEP responses within Finland's own international crime suspects cases in general.

Related to the business needs of Finland's police and other ADEP MS' data discoverability requirements, Finland will investigate the possibility of including more national backend data sources to Finland's ADEP index. Finland is also keeping the eyes on other possible use cases for the decentralized ADEP-Technology.

6.2.4 Spain's planned activities

Technical Aspects:

Technically, Spain is creating a team which will be in charge of supporting the EPRIS-ADEP system. They are training staff in the use of Linux, PostgreSQL and micro-services architecture.

A main goal is to integrate the ADEP system into the national system as a subsystem of it.

Business point of view:

Once the ADEP system is integrated and tested into the national police system, the objective from the business point of view is to involve new law enforcement agencies. In this way, all national and local background databases will be available at EPRIS-ADEP.

6.2.5 Ireland's planned activities

Infrastructure upgrades:

A full analysis of the Irish infrastructure used for ADEP is ongoing which will identify the final requirements for progression into our live environment. At a minimum, the EON firewall will need to be migrated to fit best practices of the Irish Information Technology Security infrastructure. As a number of Europol applications are currently using this firewall, a phased migration plan will need to be established to ensure that interruption of services is kept to a minimum. A review of the current EON firewall hardware is to be conducted as part of the analysis.

7 Miscellaneous lists

7.1 List of abbreviations

Abbreviations	Meaning
ADEP	Automation of Data Exchange Processes
BAT	Business Acceptance Test
BOWG	Business Organisational Working Group
BTS	Bilateral Technical Specifications
CA	Certificate Authority
CSV	Comma separated value'
DAPIX	Working Party on Information Exchange and Data Protection
DE	Germany
DP	Deployment plan
DMZ	Demilitarized Zone
EIS	Europol Information System
ENU	Europol National Unit
EON	Europol Operations Network
EPE	Europol Platform for Experts as collaboration platform
EPRIS	European Police Records Index System
ES	Spain
EU	European Union
FI	Finland
FR	France
GA	Grant Agreement
GUI	Graphical User Interface
ICT	Information and Communication Technology
IE	Ireland
IMS	Information Management Strategy
IT	Information technology
ITWG	IT Working Group
LEA	Law Enforcement Agencies
LWG	Legal Working Group
MS	Member State
MTP	Master test plan
PMO	Project Management Office
PMP	Project management plan
PP	Pre-production
QUEST	Querying Europol Systems
SFD	Swedish Framework Decision
SIENA	Secure Information Exchange Network Application
SIT	Systems Integration Test
SLA	Service Level Agreements
SPOC	Single Point of Contact
UMF	Universal Message Format
WP	Work Package (WP 1 to WP 7 according to the Grant Agreement of this pilot project)

Table 10: List of abbreviations

7.2 References and related documents

Reference	Author / Title	Version / Date
[ADEPC]	ADEP Component report (Fraunhofer FOKUS) (see deliverables D2.2 to D2.5)	1 -30/11/2017
[BATP]	Business Acceptance Test Plan (BOWG)	01/11/2018
[DP]	(Local) Deployment Plan of the MS involved (see deliverables D4.1, D5.1, D6.1 and D7.1)	(different dates)
[GA]	Grant Agreement – Number 760832 – EPRIS-ADEP	07/07/2017
[MTP]	Master Test Plan (Central Test Coordinator)	1.0 – 05/04/2018
[PMP]	Project Management Plan (Central Project Management) (see deliverable D1.23)	1.4 – 19/12/2018
[Req]	ADEP Requirements Specification (BOWG)	1.0 – 20/11/2017
[WP]	ADEP Whitepaper (Fraunhofer FOKUS)	0.7 – 11/04/2016

Table 11: References and related documents

7.3 List of tables

7.4 List of figures

ADEP
Services and Applications

E. Ulrich Kriegel
Berlin, November 19, 2018

Version 1

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Change history

Nr.	Datum	Version	Status	Bemerkungen	Bearbeiter
1	2018/11/19	1.0	final		UK

Content

1 Introduction

The scope of ADEP is the automation of presently manual processes for identifying whether certain law-enforcement-related data are available in one or several Member States in order to enable and facilitate the subsequent bilateral or multilateral information exchange. ADEP incorporates the principles of *Security by Design* [1] and stores information in pseudonymized form only in local ADEP indices. Each local ADEP index contains a limited set of information (Name, Surname, Date and Place of Birth, Gender) from the national databases of criminal records in pseudonymized form.

The ADEP software is licensed under Creative Commons Attribution-NonCommercial 4.0 International license and available via a git repository.

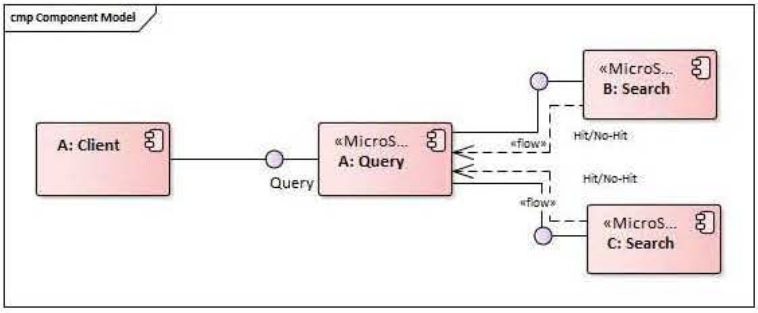
The pseudonymization is done on the base of a modified Bloom algorithm[2], which allows exact as well as similarity search on the base of written names, no phonetic alphabets are used. By definition Bloom-based search algorithms provide only hit/no-hit information with a certain percentage of false positives, false negatives are not possible. In order to reduce the number of false positives, the implementation of the pseudonymization and search algorithms are highly configurable.

In the following, the software to query ADEP indices and the software to maintain a local ADEP index are described in sections 2 and 3, respectively.

2 Software to query ADEP indices

Figure 1 shows the information flow during a query using ADEP software.

Figure 1 Logical Architecture



A client in the realm of Member State A sends a query to the Member State's *Query* service. The client could be either a GUI component or a step in a workflow. The *Query* service verifies the incoming query applying configurable rules, pseudonymizes it and distributes the pseudonymized query to the attached *Search* services of other Member States. In order to keep Figure 1 simple, only the *Search* services of Member States B and C are shown. Each *Search* service validates the query and adopts it to national peculiarities[1] using again configurable rules and then searches its national ADEP index. The search results is a hit/no-hit information, which is sent back to the *Query* service. The returned search results are consolidated by the *Query* service and returned to the client which initiated the query.

Both, *Query* and *Search* services use the industrial strength open source rule engine Drools [3] to validate incoming queries and adopt them to national peculiarities.

Even though the IT processes of some Member States are not ready to cope with paradigms like *DevOps* [4] and *bi-modal IT* [5], respectively, all services are de-

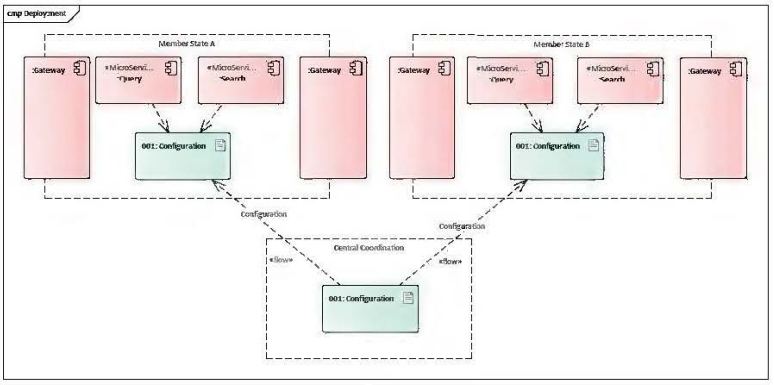
[1] For instance, Ireland doesn't have place of birth information. Therefore, an Irish *Search* service deletes a place of birth attribute from an incoming search request.

signed for those paradigms to be future-proof. Services are implemented as *Micro-Services* [6] with *REST interfaces* [7] using the open source Java framework *Vertx* [8]. The interfaces itself are described in *API Blueprint* [9].

Query and *Search* service are embedded in a national IT infrastructure. Taking into account the design principle of *Separation of Concerns*, authentication and authorization are delegated according to the *Enterprise Gateway Pattern*[2] [10] to services of this IT infrastructure. This is depicted schematically in Figure 2, where *Query* and *Search* services of Member States A and B are embedded between Gateway instances to secure the instances.

The services itself access configuration information like pseudonymization parameter, list of participants, stop words for name handling ore validation rules provided by a central coordination instance. According to a decision in November 2016, for the pilot phase all configuration information will be stored as local files. However, there are more elaborated concepts, which allow a more automated way of the distribution of configuration information in forthcoming development steps.

Figure 2 Deployment schema



[2] Even though all Member States agreed to use the security architecture described above, some of them are at the time being not allowed to do so. For that reason, it is possible to configure local key and trust stores to allow encrypted communication without using a gateway.

A detailed description of how to configure *Query* and *Search* service as well as the interface descriptions can be found in the corresponding source code repositories (see *Readme* files and the *cookbook*):

- *ADEP.git*
- *vertx-query.git*
- *vertx-search.git*.

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3 Software to maintain local ADEP indices

In order to synchronize local data processing systems with ADEP indices, there exists an additional service to modify person records one by one and there are applications

- For bulk insertion and deletion, which read input data from a database and modify an ADEP index
- To create a file with pseudonymized entries from a file with plain data.

3.1 A service for instant modification of one person record

The ADEP *Management* service can be used to immediately remove person records with a given technical ID from a local ADEP index or to add a new person record to the local ADEP index.

The *Management* Service is implemented as a *MicroService* [6] with *REST interface* [7] using the open source Java framework *Vertx* [8]. The interface itself is described in *API Blueprint* [9].

A detailed description how to configure the *Management* service as well as the interface description can be found in the corresponding source code repositories:

- *ADEP.git*
- *vertx-mgmt.git*

3.2 Applications for bulk modification of ADEP indices

3.2.1 pseudonymizationFltr

pseudonymizationFlr is a Java application to read csv-formatted plain data from a file or from a stream in a pipes-and-filter architecture and pseudonymize it. The output is a csv-file or a stream with pseudonymized csv-formatted records which can be used to initially fill an ADEP index with native database means. That is the most efficient way to create an initial ADEP index.

A detailed description how to configure the *pseudonymizationFlt* application can be found in the corresponding source code repository *pseudonymizationFltr.git*

3.2.2 batchInsert

batchInsert is a Java application to read plain data from an input database, pseudonymize it and add it to a local ADEP index.

A detailed description how to configure the *batchInsert* application can be found in the corresponding source code repository *batchInsert.git*

3.2.3 batchDelete

batchDelete is a Java application which read plain technical IDs from an input database and deletes all records with the corresponding technical IDs from a national ADEP index.

A detailed description how to configure the *batchDelete* application can be found in the corresponding source code repository *batch-delete.git*.

4 References

[1] "ENISA." [Online]. Available: https://www.enisa.europa.eu/. [Accessed: 16-Jan-2015].
[2] Bloom, B. H., "Space/time trade-offs in hash coding with allowable errors.," *ACM*, vol. 13, no. 7, pp. 422–426, May 1970.
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[6] Sam Newman, *Building Microservices*. O'Reilly, 2015.
[7] "Representational state transfer," *Wikipedia, the free encyclopedia*. 03-Oct-2015.
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[9] "API Blueprint | API Blueprint." [Online]. Available: https://apiblueprint.org/. [Accessed: 29-Jan-2018].
[10] Martin Fowler (with Dave Rice, Matthew Foemmel, Edward Hieatt, Robert Mee, and Randy Stafford), *Patterns of Enterprise Application Architecture*. Addison-Wesley.