

Evaluation of e-Cohesion

Pilot case study – Greek e-Cohesion system MIS v.02

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1. Introduction

The Greek e-Cohesion system was chosen for a pilot case study due to its potential of providing good practices for other Member States (MS). This report is based on findings from the desk research, as well as in-depth interviews with institutional users from the managing authority (MA), certifying authority (CA), representatives of MIS Special Agency (the service provider responsible for the development and operation of the e-Cohesion system), as well as beneficiaries (complete list of interviewees provided in Annex). This report is structured to present the basic tenets of the e-Cohesion system; discuss its development process; assess how it meets key requirements and contain key functionalities for e-Cohesion systems; examine the results that the use of electronic data exchange system brings and bring forth good practice examples, as well as present potential challenges.

TABLE 1. INTRODUCTION TO GREEK E-COHESION SYSTEM

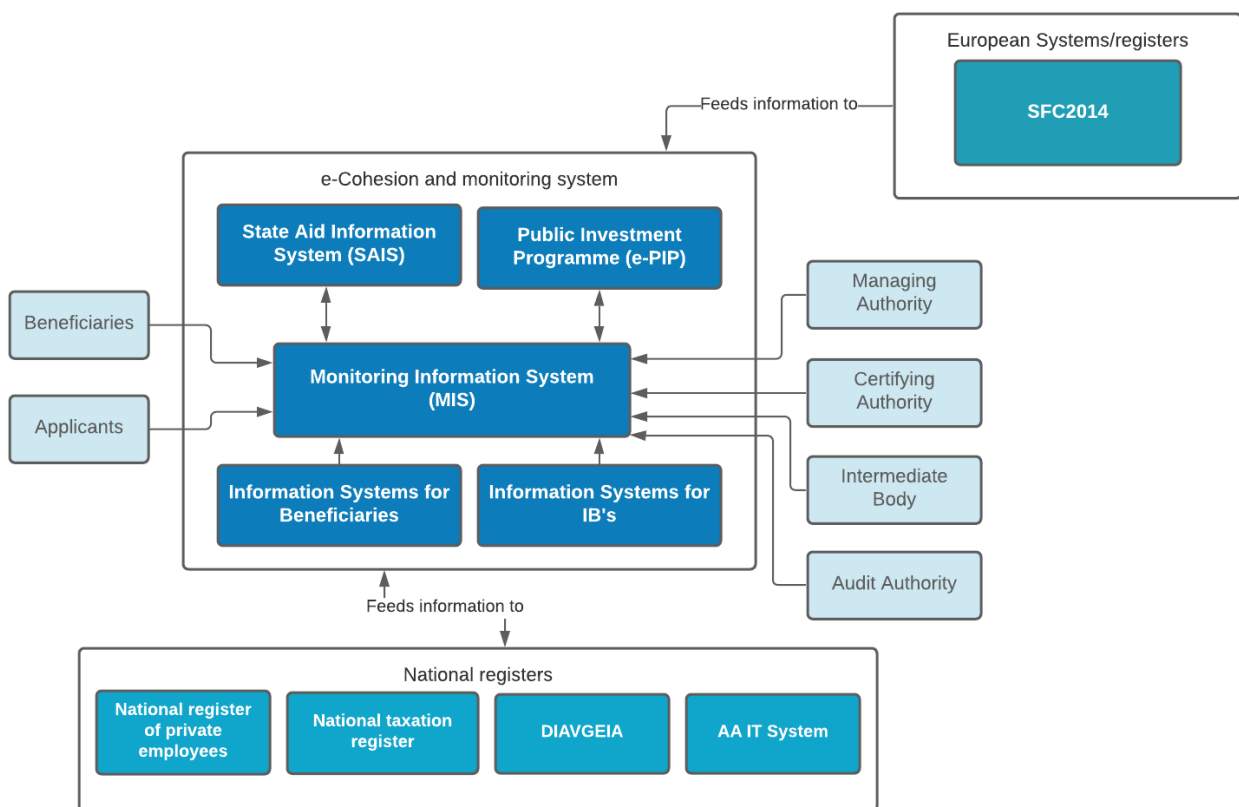
e-Cohesion system title	MIS
Years of operation	First version 2007, current version 2018
ESI funds covered	ERDF, CF, ESF, EAFRD, EMFF
Other EU funds covered	FEAD, YEI EMPL; AMIF HOME, ISF B HoME, CEF INEA, EFG EMPL, ISF P HOME and EEA
National / regional OPs covered:	
Competitiveness, Entrepreneurship and Innovation OP (CCI: 2014GR16M2OP001)	Transport Infrastructure, Environment Sust. Dev. Op (CCI: 2014GR16M1OP001)
Reform of The Public Sector (CCI: 2014GR05M2OP001)	Human Resources Development, Education and Lifelong Learning (CCI: 2014GR05M9OP001)
Eastern Macedonia-Thrace OP (CCI: 2014GR16M2OP014)	Central Macedonia OP (CCI: 2014GR16M2OP002)
Thessaly OP (CCI: 2014GR16M2OP003)	Epirus OP (CCI: 2014GR16M2OP004)
Western Greece OP (CCI: 2014GR16M2OP005)	Western Macedonia OP (CCI: 2014GR16M2OP006)
Continental Greece OP (CCI: 2014GR16M2OP007)	Peloponnesus OP (CCI: 2014GR16M2OP008)
Ionian Islands OP (CCI: 2014GR16M2OP009)	North Aegean OP (CCI: 2014GR16M2OP010)
Crete OP (CCI: 2014GR16M2OP011)	Attica OP (CCI:2014GR16M2OP012)
South Aegean OP (CCI: 2014GR16M2OP013)	Technical Assistance Programme (CCI: 2014GR16M3TA001)
Interreg programmes covered	
(Interreg V-A) EL-CY - Greece-Cyprus (CCI: 2014TC16RFCB055)	Interreg V-A Greece-Bulgaria (CCI: 2014TC16RFCB022)
(Interreg V-A) EL-IT - Greece-Italy (CCI: 2014TC16RFCB020)	Interreg IPA CBC Greece – Republic of North Macedonia 2014-2020 (CCI: 2014TC16I5CB009)
Interreg IPA II Cross-Border Cooperation Programme Greece – Albania (CCI: 2014TC16I5CB010)	Balkan-Mediterranean (CCI: 2014TC16M4TN003)

Source: PPMI consortium

Greece follows a **centralized** approach, in which the Management Information System (MIS) is used for electronic exchange of information for all 18 national/regional Greek Operational Programmes, as well as 6

Interreg Operational Programmes financed by both European funds and national sources. In the period 2014-2020 Greece benefits from ESIF funding of EUR 21.4 billion – 55,5% of which are covered by the European Regional Development Fund (ERDF) and the Cohesion Fund (CF)¹. MIS captures data of more than 200 000 projects dating back to the year 2000. In 2020 more than 8000 users used the system and conducted over 4 million writing transactions (data exchanges). This number excludes read-only access for reporting, analysis, and navigation for information gathering purposes. State aid projects are managed by an additional e-Cohesion system, SAIS (State Aid Information System), which is located upstream from MIS. Applicants and beneficiaries of state aid projects access the SAIS during the application and implementation phases. State aid beneficiaries are private companies/firms while public projects beneficiaries are public bodies. MIS is only used by public bodies' officers. However, starting from the level of intermediate bodies (IB's), information of approved state aid projects is also managed by MIS. The MIS receives data of approved state aid projects automatically from the SAIS. In addition, the SAIS receives data on process status from the MIS. For further discussion on the integrated systems in MIS, see Table 3, and for further explanation of how each major user group use the MIS, see Table 2.

FIGURE 1. STRUCTURE AND INTEGRATION OF GREEK MONITORING INFORMATION SYSTEM (MIS)



Source: PPMI consortium

The Greek MIS provides a standard solution for funding programmes. **It provides the appropriate flexibility to support the entire range of programmes which implement different kind of projects effectively and**

¹ <https://cohesiondata.ec.europa.eu/countries/GR#>

efficiently – such as infrastructure and buildings, research and development, educational services, and cross-border cooperation. To a large extent, this is due to the unified managing and control system of Greek national/regional ERDF programmes. On a national level, the structures, processes, and documents of program implementation are harmonized and streamlined. In this regard, the Interreg programmes form an exception; from a legal point of view, each of the Greek Interreg programmes has its own managing and control system. However, given the fact that processes and structures are more or less the same and because the relevant documents are identical, this difference does not play a major role with regard to support of the workflows provided by MIS and all interviewed beneficiaries of Interreg programmes use MIS as the only information system to exchange data with programme authorities during the project application and implementation phases. The MIS mainly differentiates between national/regional and Interreg workflows. Interreg documents are bilingual (Greek and English).

The preparation of the case study is informed by desk research and interviews (see

Annex). We started the interviews with a staff member of the MIS Special Agency – a public organisation that is responsible for the development and operation of the MIS. The MIS Special Agency is not a programme authority, its unique task is to provide all IT related services for the management of the MIS. Further, we interviewed staff from four beneficiary organisations that implement projects from different operational programmes, all of which have substantial experience in project implementation. We also interviewed staff from three different MA's covering national, regional and Interreg programmes. Finally, we interviewed staff from the CA, that is responsible for all national/regional ERDF and Interreg Programmes covered by the MIS.

In addition to the functionalities relevant to the electronic data exchange between applicants, beneficiaries and programme authorities, the interviews also covered features that support programme and project implementation. According to the objective of this evaluation, we focused on those features relevant to information creation, access, and exchange which takes place within the main e-Cohesion related transactional processes. In addition, there are interrelations to other features of the system, which will be partly considered as well.

2. Development and operation of e-Cohesion system

Greece has enduring experience with IT systems to support ESIF implementation. A first portal solution was introduced already in 2002, which provided basic functionality for the exchange of information. However, its use was not obligatory, and it was not widely used by beneficiaries. In 2007, the first version of the MIS was developed. In retrospect, it is not obvious what exactly triggered the move from paper-based processes to electronic exchange of information in the realm of programme implementation. Like in many other cases, it was a case of a **slow and steady digital evolution**. However, one interviewee from the MIS Special Agency confirmed that the e-Cohesion initiative helped to convince decision-makers on all sides to strengthen digitalisation and e-government and established a strong legal basis to do so. Thus, e-Cohesion requirements provided a significant point of reference for the legal national framework in the context of information exchange between beneficiaries and programme authorities in Greece.

When the e-Cohesion initiative was made public, staff members of the MIS Special Agency had direct contacts with DG REGIO. To support the adoption of e-Cohesion related concepts and technologies, DG REGIO organised workshops and seminars during which the relevant Greek authorities participated actively, discussing approaches and solutions with other MS. At the same time, there were similar initiatives in Greece that worked in the same direction. In 2015, an Implementation Roadmap² was published in which it was determined how the future e-Cohesion system should be set up. All necessary functionalities of the future system were explicitly listed there, and the MIS of that time was adapted to meet the necessary requirements. This so-called transition system was still based on the technology of the legacy system. Large parts of these technologies were not considered state-of-the-art and included oracle forms³. However, the implemented web services of the legacy system and a large part of its business logic were still considered useful regarding the requirements of the 2014-2020 programming period.

In 2018, the transition system was replaced by the current system. The new version of MIS moved to more attractive user interface. Furthermore, it implements a more service-oriented architecture, providing a dedicated service bus⁴ to provide interoperability via web services. Most of the connections to external systems are realised via the enterprise service bus. In addition, the new version implemented business intelligence concepts and technologies that provide users with state-of-the-art features for reporting and analyses. The data access and service layer of the current MIS are mainly based on oracle technologies, the presentation layer is mainly based on HTML5 and AngularJS.

² Source: Monitoring Information System (MIS Special Agency), 2015. MIS IT System for the PP 2014-2020 – Roadmap for the Accomplishment of e-Cohesion Regulatory Requirements

³ The first oracle forms version was published in 1985.

⁴ An enterprise service bus is a technological component that facilitates interoperability.

2.1. European and national legal framework

According to a national implementation act of the Partnership Agreement, it is **mandatory** for beneficiaries to use the MIS for project application and implementation. As a result, all beneficiaries use the system. There is no parallel flow of paper-based applications, modification requests, progress reports and payment claims. Even original paper-based verification and supporting documents are uploaded into the system. Establishing the legal provisions was, according to the interviewees, a rather smooth process without substantial difficulties. The realisation of the MIS was closely linked to ‘Regulation 1303/2013 Article 122 and Article 125’, ‘Implementing regulation 1011/2014 Article 8 and 9’, as well as ‘Delegated regulation 480/2014 Annex III’.

2.2. Operational aspects in introducing and developing the system

Since the beginning of its development, the MIS is continuously adapted and extended by new features. This evolution was highlighted by beneficiary interviewees, who stated that the information process became increasingly digitalised during the project cycle. Following a combination of the methodologies RUP and SCRUM⁵, the main development work for the current MIS took place in the period between 2015 and 2018. The MIS comprises of different modules which were incrementally and iteratively developed according to the programme/project life cycle: e.g. the module for application approval was developed and introduced before the module for progress report submission which was developed and introduced before the module for certification and audit. For a period of two years, the transitional MIS and the current MIS have been both in operation until the new system became fully functional and interoperable. Both systems were connected to the same integrated database. During the transition phase, applications were managed in the transition system and stepwise migrated to the now current system.

Based on a very detailed specification that considered the structure and functionalities of the e-Cohesion system the development was fulfilled by the MIS Special Agency office in collaboration with private software development companies. While the MIS Special Agency analysed requirements, elaborated concepts, and executed large parts of the coding, documentation, and testing – the private developer companies contributed with expertise regarding specific technologies and its integration into the product. The overall budget for the external development comprised of 1 million Euros (120-person month external contractor). In addition, 2 million Euros were spent on software licenses. The overall development process of the MIS was mainly financed by technical assistance budget. It was calculated that internally (within the MIS Special Agency) 25 persons were working 2-3 years fulltime for the project.

Different user and stakeholder groups were part of the development of the system. These included policy makers as well as users from the MA’s, CA, and audit authority (AA). Whilst beneficiaries were not directly involved in the development process, their requirements were collected and synthesised by the MA’s. Also, **user-feedback regarding user-friendliness, performance, and technical issues is continuously collected and analysed** with the use of the MIS helpdesk feature. During trainings offered to MA’s and beneficiaries, user feedback is collected by MIS Special Agency personnel. During those training sessions, trainers simultaneously collect feedback and discuss potential modifications/improvements to the MIS. In addition, MIS Special Agency personnel have consistent, daily communication with MAs and beneficiaries through phone calls and emails. Indeed, there is a continuous exchange with users about the subjects of user-friendliness and system

⁵ RUP (Rational Unified Process) and SCRUM are development methodologies. RUP defines a scope and major milestones while SCRUM leads to a more agile way of working. Within the development of the MIS SCRUM was applied during the development of specific components.

performance. Whilst the main development work is now finished (there are no major extensions or adaptations planned), minor changes are still being implemented to ensure continuous improvement.

Interviewees of all roles confirmed that the transition from paper-based processes to electronic processes went rather smoothly. While some stated that processes and structures remained essentially the same, others emphasised that they were improved. This gives the impression that the rather evolutionary and long-term approach helped to pick up and integrate users effectively within the transition process. In addition, more than 2000 hours were spent for training, mainly for technical staff of the MIS Special Agency and programme authorities, and beneficiaries received additional support from the MA's. It should be emphasised that interviewees of all roles spoke enthusiastically about the MIS and its features to support their daily work.

3. Key features of e-Cohesion system

The mapping framework we developed is based on the standards and requirements set out in the Article 122(3)5 of the 2014- 2020 Common Provisions Regulation⁶, Implementing Regulation⁷, and then further elaborated in various guidance documents⁸. We asked the MIS Special Agency to validate our findings on the Greek e-Cohesion system mapping framework. The framework consists of four categories: **principles, key processes, functionalities, and data security requirements**, all of which are divided further into several dimensions.

The functionality of MIS is not limited to the support of e-Cohesion related interactions. The MIS integrates functionality of a monitoring system (financial management, monitoring, evaluation, verification and audit), of an accounting system and e-Cohesion. To outline the context the following table describes the main user roles and important tasks that are supported by MIS:

TABLE 2. MAIN ACTIVITY IN MIS FOR EACH MAJOR USER GROUP

TYPE OF USER	MAIN ACTIVITIES IN THE SYSTEM
Applicants/ Beneficiaries	Applicants use MIS to create and submit applications. Beneficiaries use MIS to create, submit, modify, and check modification requests, payment claims, projects progress reports, as well as procurement and contract related documents all on structured forms in combination with unstructured supporting documents. Beneficiaries have also access to analytical information via predefined reports.
Managing Authority (MA)	The MAs of the different operational programs use the MIS in many ways: OPs and projects monitoring, analysis and reporting. MIS supports MAs in all processes that are defined in the Management and Control Systems. In addition, the MAs use MIS to manage tenders and contracts. 'Everyday' tasks, such as approving applications, modification requests, progress reports, and payment claims are sometimes delegated to IBs.
Certifying Authority (CA)	In Greece, there is one central CA for all operational programs. The CA uses MIS to certify expenses and payment requests to the EC. Here, CA requests information for a specific time period, and the system automatically generates the financial data requested. During the process of certification, the CA checks expenses. Financial corrections are made (irregularities and recoveries) in case of irregular expenses.
Audit Authority (AA)	In Greece, there is one central AA for all operational programs. The AA uses MIS in combinations with their own IT system. The two systems are connected using MIS Web services.
Intermediary Bodies (IB)	Carries out tasks delegated by the MA, day to day project management. In addition to the MIS, the IB's use the Information system for IB's to manage organization-specific tasks.

Source: PPMI consortium

⁶ Regulation (EU) No 1303/2013 Of the European Parliament and of the Council of 17 December 2013

⁷ Commission Implementing Regulation (EU) No 1011/2014 of 22 September 2014 laying down detailed rules for implementing Regulation (EU) No 1303/2013 of the European Parliament and of the Council as regards the models for submission of certain information to the Commission and the detailed rules concerning the exchanges of information between beneficiaries and managing authorities, certifying authorities, audit authorities and intermediate bodies. OJ L 286, 30.9.2014

⁸ Questions & Answers on e-Cohesion Programming period 2014-2020 (ERDF, Cohesion Fund and ESF), EGESIF_17-0006-00, 06/04/2017; Building Blocks for e-Cohesion: good practices from Member States, regions and programmes, Version 2, December 2013

3.1. Principles of e-Cohesion system

Interoperability and the only-once-encoding principle are the two main dimensions for the principles of e-Cohesion system. In the context of e-Cohesion, interoperability means that programme authorities should have access to an integrated electronic repository that provides all relevant structured and unstructured project related information. On a basic level this should be the case for all programme authorities of one programme. On an advanced level this is the case for programme authorities of different programmes and on the highest level also other governmental systems are connected. The only-once-encoding principle considers the degree in which captured information is re-used in other contexts and thus, in how far necessity for repetitive capturing of the same information is decreased. Interoperability is a mean to support the only-once-encoding-principle.

The MIS is connected by webservices to a variety of other systems. These systems include data receiving systems as well as data providing systems such as different governmental registers. **The interoperability of MIS and its connection to other systems on European, national, and regional level supports the once encoding principle** not only for beneficiaries but for all user roles. According to their specific privileges, institutional users from the MA, CA, and AA have access to all relevant information submitted by beneficiaries. For beneficiaries in particular, the implementation of the only once encoding principle is not limited to the project level only. Available data is shared on programme and cross-programme level. In addition, **the only once encoding follows a logical and chronological flow of documents**: call-related information is re-used in applications and application-related information is re-used in payment claims and progress reports.

One of the main registers to which the MIS is interlinked is the national governmental application for financial management, e-PIP (Public Investments Programme). For most public organisations in Greece, e-PIP manages the financial part of the funding that comprises cost and payments. The data exchange between MIS and e-PIP is on project level. Information on approved projects, allocated budgets, and contracts is automatically submitted to e-PIP. This ensures the only once encoding mainly for members of the MA. In addition, the data exchange between MIS and e-PIP also provides beneficiaries – that may only use MIS in some cases – the option to access information which was entered to e-PIP only. This includes the status of payment requests that are further processed in e-PIP.

The interaction between e-PIP and MIS is illustrated by the following steps, which are carried out for national/regional programmes:

BOX 1. INTERACTION BETWEEN E-PIP AND MIS

1. Using MIS, the MA approves the application of the project, including its budget. e-PIP is informed about the amount of the commitment to the project.
2. The beneficiary submits payment requests via MIS (usually one payment request per year during project's life cycle). The payment request does not include a list of already made expenditures. It represents the request to allocate funds to be available for the beneficiary for paying the contractor(s). The amount covers the annual or part of the project budget. There are Intermediate Bodies undertaking the whole process.
3. The beneficiary's payment request in MIS is forwarded to the MA, who approves it in MIS. Subsequently, MIS inform e-PIP on the approval of beneficiary's payment request.
4. As the beneficiary has received invoices from contractors he logs into e-PIP, fills in the costs and executes the payment to contractors. The normal case is that money is not transferred to beneficiary's bank account but directly to the contractors. Costs related information in e-PIP is on invoice level and sufficiently detailed to be copied to MIS table of expenditure (the e-PIP lacks information

- concerning the EC categorisation of costs and the concept of eligibility because neither of them applies in the national legal framework).
5. The beneficiary logs into MIS to fill in the table of expenditures and upload the verification documents. Data related to the executed payment in e-PIP is then transferred to MIS. The beneficiary may select the fields, that have already been processed in e-PIP and copy them into MIS. The only information beneficiaries must add is the cost category.
 6. In MIS, the MA verifies the list of expenditure transmitted by the beneficiary and verifies the eligible amounts. The beneficiary, using MIS, can monitor the status of ongoing payment requests that are processed in e-PIP.

Source: PPMI consortium

Aside from e-PIP, the MIS is connected to multiple other national and governmental registers and databases. These are explained in Table 3 and Figure 2 below:

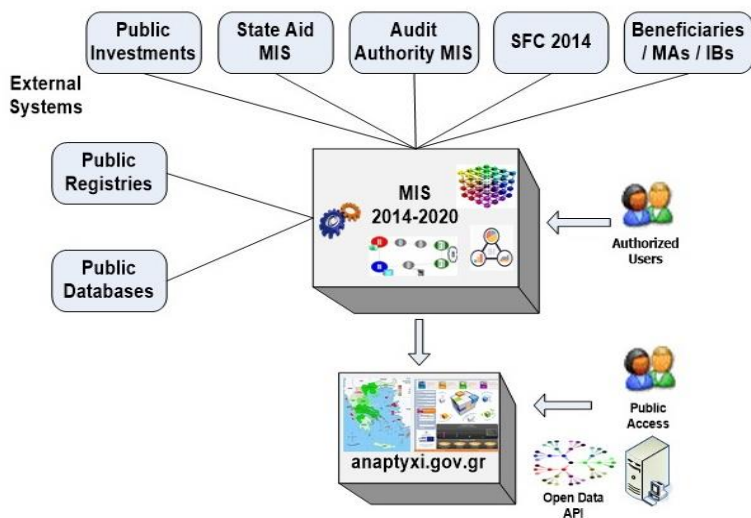
TABLE 3. EXTERNAL SYSTEMS CONNECTED TO MIS

EXTERNAL SYSTEM	SHORT DESCRIPTION	EXCHANGED DATA	DECREASE OF ADMINISTRATIVE BURDEN
e-PIP	Electronic System for the Public Investments Programme	MIS submits data on budget allocation, budget updates, payment requests and contracts. MIS receives data on the final approvals of: budget allocation, budget updates, payment requests. Furthermore, MIS receives data on executed payments. e-PIP receives data from MIS documents.	Beneficiary's data entry is facilitated through pre-filled data transferred from MIS to the e-PIP and vice versa.
SAIS (State Aid Information System)	Information System for State Aid Projects. It holds information about State-Aid projects throughout their whole lifecycle. Upon their approval, state-aid projects are reported to the MIS.	SAIS receives data on invitation for proposals. SAIS submits data on application forms, list of expenditures, progress reports.	Many thousands of entries to the SAIS are transferred to the MIS through web services thus eliminating the need for re-entering information about state-aid projects for authorities.
DIAVGEIA	National website to support transparency and prevent fraud	MIS submits information about approved projects to DIAVGEIA. Moreover, through MIS users are enabled to download/retrieve the aforementioned information as well as information on organisations that are assigned to DIAVGEIA.	Administrative burden is reduced by an automatic submission of documents directly from the MIS to DIAVGEIA by a mouse click. There is no need of a manual upload of the respective documents to DIAVGEIA. Moreover, users benefit from the option to directly access/download their respective DIAVGEIA documents solely by using the MIS.
SFC 2014	SFC2014's main function is the electronic exchange of information concerning shared Fund management between Member States and the European Commission.	MIS receives data from SFC on OPs and (annual) implementation reports. MIS submits data to SFC on: payment applications, accounts and forecasts.	MAs and CA are facilitated to keep up-to-date information with SFC.
Audit Authority	The IT system of the audit authority. The AA uses its own IT system in order to register the audit reports. In MIS, the AA has read only privileges in order to audit the projects.	Submits to the MIS information about audits and monitoring of findings.	Hundreds of entries per year are transferred from the AA IT system to the MIS through Web Services thus eliminating the need for re-entering information about audits as well as providing qualified information to all stakeholders.

IBs or Upper-level management	Information system that allows IB's to perform organisation-specific tasks.	Receives information from the MIS (web services providing reporting capabilities).	IBs can utilize web services to receive information that can be further processed in their IT systems.
Beneficiaries' IT systems	Information system that allows IB's to send project-specific data to MIS.	Beneficiaries are enabled to send to the MIS data through web services e.g. application form, list of expenditure, progress reports, list of participants for ESF actions, etc.	It eliminates the need for re-entering information while it provides consistent information to all stakeholders.
National Taxation Register	National registry of taxation data	MIS receives data from national registers to facilitate the calculation of indicators.	Minimization of the amount of information to be collected by individuals. Reduction of errors and avoidance of double work.
National Register of private employees	National registry of private employees	In the case of national taxation register information is retrieved for project contractors	Improves counter-fraud control.

Source: PPMI consortium

FIGURE 2. INTERCONNECTIONS OF THE MIS



Source: MIS Special Agency

In terms of **interoperability on the European level**, MIS uses the SFC 2014⁹ interface solution and exchanges data with the European Commission directly. However, there is currently no direct data exchange between MIS and KEEP (EU system for Interreg programmes). The MIS Special Agency estimate the effort to provide such a connection as moderate, but this requirement has not yet been stipulated.

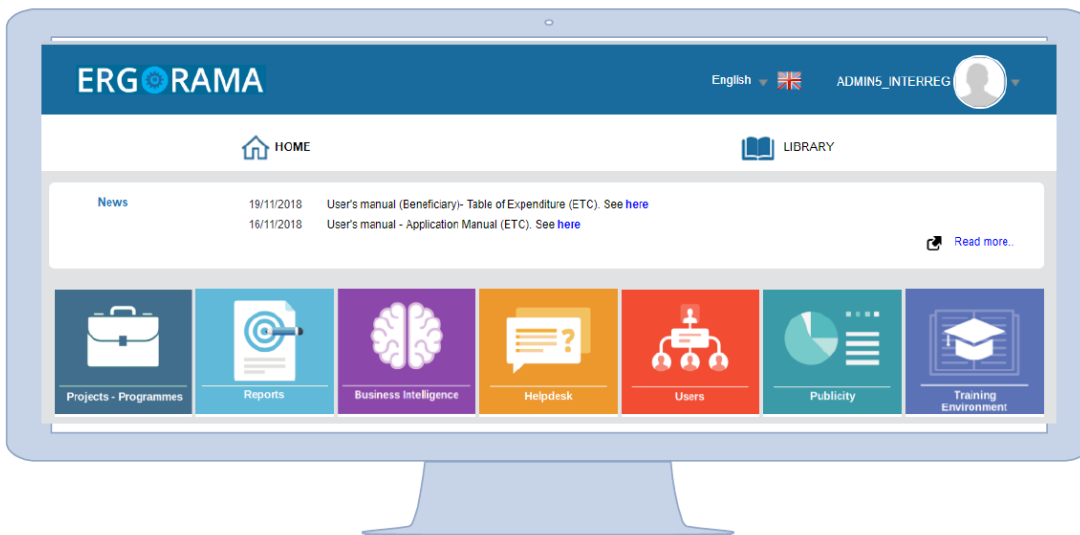
3.2. Key processes within the e-Cohesion system

The category of key processes refers to the provision of the **necessary functionalities for the exchange of all relevant information between beneficiaries and programme authorities**, and if the e-Cohesion system is used to exchange information related to audits and management verifications. The MIS provides all these functions. MIS embodies a portal architecture providing users, that work in the context of programme implementation, with a wide range of functionalities via a single sign on mechanism. Apart from features to support

⁹ An advantage of an automated interface grows with the number of transactions and the amount of data that is transferred with every transaction. As MIS manages 28 different programmes the number of transactions is higher in comparison to solutions that only manage one or two programmes.

transactional and analytical workloads, MIS also provides general information about calls for proposals and guidelines, as well as a helpdesk feature. It also provides functionality to manage programme budget as well as programme and call related settings.

FIGURE 3. ACCESS TO ALL MODULES VIA MIS



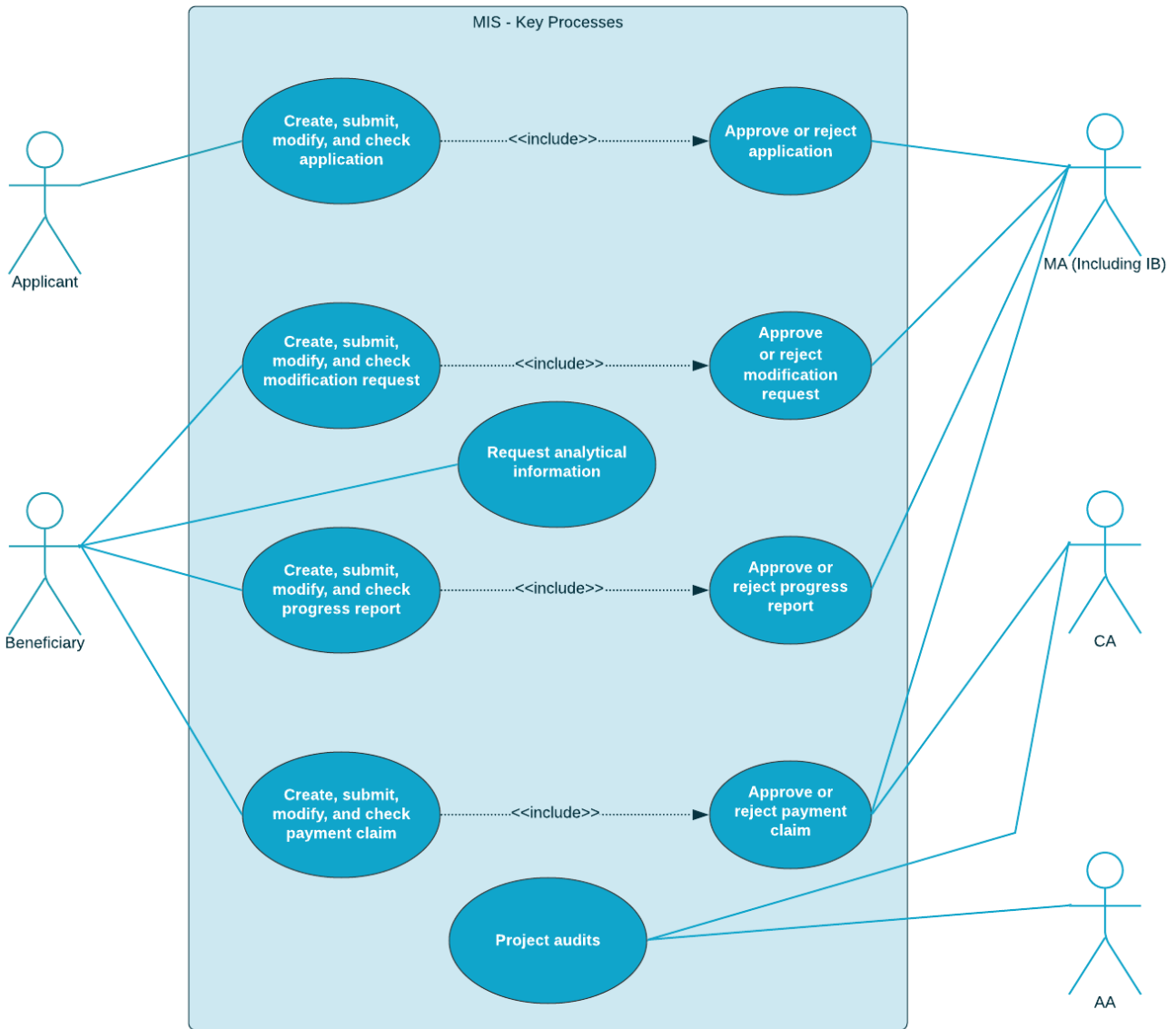
Source: MIS Special Agency

Applicants, beneficiaries, and all roles of programme authorities work with the system. The exchange of information between applicants/beneficiaries on the one side, and programme authorities on the other, mainly takes place with members of First Level Control (FLC)¹⁰, other IBs, and MA's. For programme authorities, the use of MIS is not limited to data-exchange with beneficiaries. As one interviewed staff member of one MA put it: "70% of our work is linked to MIS".

The following use-case diagram shows the different types of interaction that users of different roles have with the system to fulfil e-Cohesion-related tasks. In relation to the many different programmes that MIS supports, the depiction shows the 'normal' case. The role of external systems is not considered.

¹⁰ The First Level Control checks the eligibility of realized expenditures.

FIGURE 4. SIMPLIFIED DEPICTION OF KEY PROCESSES IN MIS



Source: PPMI consortium

MIS supports all the necessary functions for project application and implementation. In programmes that MIS supports there are no paper-based application forms, progress reports nor payment claims. The exchange of paper-based supporting documents only appears in specific cases (e. g. building designs) according to the preferences of the beneficiary. **MIS provides the appropriate functionality for the creation, submission, check and approval of applications, modification requests, progress reports and payment requests – including the upload and storage of verification documents.** Applicants and beneficiaries create the respective information objects (e. g. application or progress report) and fill in the necessary information. When they have finished, they submit the document. Programme authorities receive the documents and check them for compliance with formal standards and eligibility. During this phase there may be loops back to the applicants/beneficiaries. Besides these transactional processes that consider operational workload, the MIS also provides functionality related to business intelligence to support analytical processes of programme evaluation, financial

management, programme monitoring and audit. According to the prerequisites of different programmes, MIS supports setting up of call options that later in the project life cycle become subjects to validation. Such a call option may prescribe a specific relation between one cost category and the total sum of cost as a maximum (e.g. 20%). If a project assigned to this call exceeds this relation, then the respective validation check triggers an error.

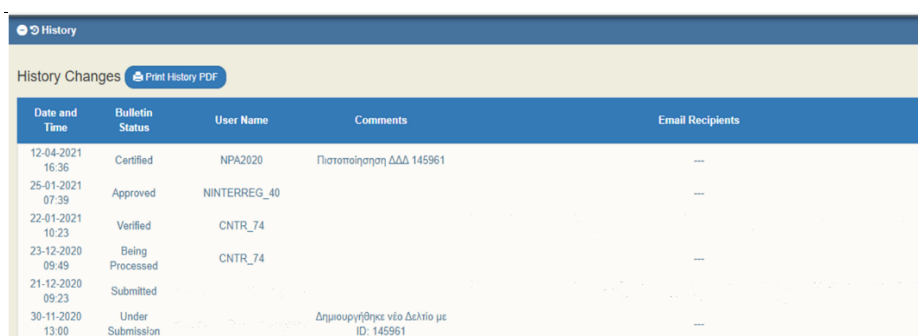
3.3. Functionalities of e-Cohesion system

The third key requirement category of functionality contains several dimensions related to functionalities of the system which enables **user-friendliness, usability, and accuracy**. The already mentioned interoperability and interfaces to external e-Cohesion front office solutions and governmental registers increases the up-to-datedness, consistency, and granularity of the data. Forms are **prefilled** and available information is displayed in the context where it is needed. Beneficiary organisations are also provided with the possibility to directly connect their proper information system with MIS using webservices¹¹. Beneficiaries that manage different projects as their core business may have specific information requirements that are not covered by MIS. In such cases it's common that beneficiaries build up their proper information systems that meet their business needs. MIS provides respective interface solutions to support the information exchange with beneficiary's information systems.

The MIS provides several other features to increase data quality and prevent fraud. These include **multiple validation checks** on missing and wrong data as well as **features to support risk assessment and prevent double funding**. The check to prevent double funding is automatically triggered and compares values of attributes like invoice number and unique organisation number. Other validation checks include checks on data type, data format, range as well as complex business rules.

Moreover, on project level, MIS provides **automatic calculation** of output and result indicators, budgeted and actual costs, and financing – this information is in a later step also used for the annual implementation reports. The feature “project electronic folder” of the system provides all versions of submitted structured and unstructured information (data records and files) and uses visual flags to indicate which document is valid at any given moment. It also records which person introduced changes to a document at a specific time. This results in an **electronic audit trail** which supports the documentation and ensures non-repudiation.

FIGURE 5. CHANGE HISTORY



The screenshot shows a web interface titled 'History Changes' with a 'Print History PDF' button. Below the button is a table with the following columns: Date and Time, Bulletin Status, User Name, Comments, and Email Recipients. The table contains six rows of data representing different stages of a project's history.

Date and Time	Bulletin Status	User Name	Comments	Email Recipients
12-04-2021 16:36	Certified	NPA2020	Πιστοποίηση ΔΔΔ 145961	--
25-01-2021 07:39	Approved	NINTERREG_40		--
22-01-2021 10:23	Verified	CNTR_74		--
23-12-2020 09:49	Being Processed	CNTR_74		--
21-12-2020 09:23	Submitted			--
30-11-2020 13:00	Under Submission		Δημιουργήθηκε νέο Δελτίο με ID: 145961	--

Source: MIS Special Agency

¹¹ Uses its own information to manage information on project indicators and costs – this information is automatically submitted to MIS

FIGURE 6. PROJECT VERSIONING

MIS	Υπόεργο	Τίτλος Δελτίου	Έκδοση	Κατάσταση	Ισχύ	Ημ/νία Τροποπ.	ID Δελτίου	Actions
5004007	1	Κατασκευή του ΧΥΤΑ/Υ 4ης ΔΕ Χαλκιδίκης	6.0	Final	Yes	14-04-2021	222394	Select
5004007	1	Κατασκευή του ΧΥΤΑ/Υ 4ης ΔΕ Χαλκιδίκης	5.0	Final	No	14-04-2021	222390	Select
5004007	1	Κατασκευή του ΧΥΤΑ/Υ 4ης ΔΕ Χαλκιδίκης	4.0	Final	No	26-08-2020	149162	Select
5004007	1	Κατασκευή του ΧΥΤΑ/Υ 4ης ΔΕ Χαλκιδίκης	3.0	Final	No	10-12-2019	123571	Select
5004007	1	Κατασκευή του ΧΥΤΑ/Υ 4ης ΔΕ Χαλκιδίκης	2.0	Final	No	22-10-2019	120456	Select
5004007	1	Κατασκευή του ΧΥΤΑ/Υ 4ης ΔΕ Χαλκιδίκης	1.0	Final	No	19-09-2018	28026	Select

Source: MIS Special Agency

According to their tasks and privileges, **users can monitor the status of processes**. The MIS indicates which step of a given workflow is currently processed. It also generates alerts to show users what needs to be done next. Furthermore, MIS automatically generates email notifications to inform users about specific events – such as the approval of a specific payment request or the submission of a modification request.

The MIS provides an email-like communication feature that users use to exchange project related information (e.g. additional explanations about a certain invoice). In comparison to conventional emails this has the benefit that all project-related information is in ‘one place’ only, which can easily be retrieved and accessed.

FIGURE 7. EMAIL NOTIFICATIONS

From: ΟΠΣ ΕΣΠΑ 2014-2020 [mailto:noreply_ops@mou.gr]
Sent: Thursday, April 22, 2021 6:01 AM
To:
Subject: Ενημέρωση ΟΠΣ 2014-2020: -Προεγκρίσεις για επανυποβολή από τον δικαιούχο - Προειδοποίηση λήξης προθεσμίας - (MIS: 5001190) ΕΠ:7 - ΑΞ:3 - Προστασία του περιβάλλοντος - Μετάβαση σε μια οικονομία φιλική στο περιβάλλον. - Πρόσκλη: 010 - ΑΑ: 1083

Ενημέρωση ΟΠΣ 2014-2020

Δελτίο ή έγγραφο: Αίτημα Ελέγχου Νομιμότητας Δημοσίων Συμβάσεων (Προέγκριση)
 Ενέργεια: Προεγκρίσεις για επανυποβολή από τον δικαιούχο - Προειδοποίηση λήξης προθεσμίας
 Αφορά: Κωδικός MIS: 5001190 ΑΑ: 1549 έκδοση: 8.0 - Διατύπωση γνώμης για την τροποποίηση της νομικής δέσμευσης (3ος ΑΠΕ) του υποέργου "ΑΝΤΙΚΑΤΑΣΤΑΣΗ ΚΑΙ ΕΠΕΚΤΑΣΗ ΕΣΩΤΕΡΙΚΟΥ ΔΙΚΤΥΟΥ ΥΔΡΕΥΣΗΣ ΚΑΛΑΜΠΙΑΚΑΣ" Α/Α1, της πράξης με mis: 5001190.
 Τίτλος πράξης: ΑΝΤΙΚΑΤΑΣΤΑΣΗ ΚΑΙ ΕΠΕΚΤΑΣΗ ΕΣΩΤΕΡΙΚΟΥ ΔΙΚΤΥΟΥ ΥΔΡΕΥΣΗΣ ΚΑΛΑΜΠΙΑΚΑΣ - Τίτλος υποέργου (από ΤΔΠ): ΑΝΤΙΚΑΤΑΣΤΑΣΗ ΚΑΙ ΕΠΕΚΤΑΣΗ ΕΣΩΤΕΡΙΚΟΥ ΔΙΚΤΥΟΥ ΥΔΡΕΥΣΗΣ ΚΑΛΑΜΠΙΑΚΑΣ
 ΕΠ:7 - ΑΞ:3 - Προστασία του περιβάλλοντος - Μετάβαση σε μια οικονομία φιλική στο περιβάλλον. - Πρόσκλη: 010 - ΑΑ: 1083
 Ενέργεια Από: 2040116-Ε.Υ.Δ. Ε.Π. ΠΕΡΙΦΕΡΕΙΑΣ ΘΕΣΣΑΛΙΑΣ
 Ημ/νία Έγκρισης: 22/04/2021

Σημαντικό μήνυμα: Επισήμανση προς δικαιούχο: η επανυποβολή του ανωτέρω αιτήματος ελέγχου νομιμότητας με τις απαιτούμενες αλλαγές έχει προθεσμία την : 22/04/2021 . (Υποχρέωση επανυποβολής του δελτίου από τον δικαιούχο μέσα σε επτά εργάσιμες ημέρες από την επιστροφή του με παρατηρήσεις από την ΔΑ/ΕΦ)
 Η ειδοποίηση αυτή, προέκυψε αυτόματα από το ΟΠΣ με βάση τα καταχωρημένα στοιχεία των δελτίων και τις ισχύουσες διαδικασίες του Συστήματος Διαχείρισης και Ελέγχου. Μπορείτε να δείτε το σχετικό δελτίο στην αντίστοιχη οθόνη του ΟΠΣ ΕΣΠΑ 2014-2020.

Κοινοποίηση:

The content of the message to the Beneficiary for deadlines of submitting the bulletin

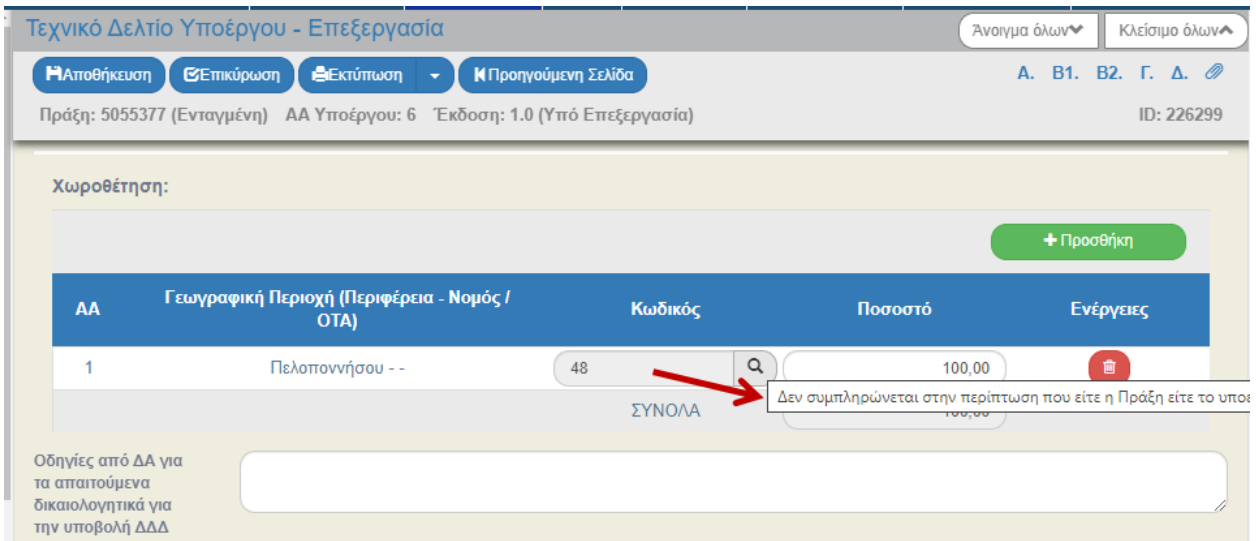
Notification to the recipients from both MA and Beneficiary

Source: MIS Special Agency

The MIS provides tool tips which pop up automatically when user hovers the mouse cursor above a field for a little time. Apart from general clarifications these tool tips include references to legal provisions from which the necessity to capture the information derives. Beneficiaries also have access to check lists of the MA, which helps

make requirements more transparent. Furthermore, MIS provides direct access to guidelines about filling-in each type of form.

FIGURE 8. TOOLTIPS



Source: MIS Special Agency

3.4. Data security requirements

The fourth and final key requirement category refers to the data security requirements denoted in Implementing Regulation Article 9 (1), which details requirements of **data availability, integrity, confidentiality of information**. The MIS integrates a wide range of features and technologies to ensure this. Indeed, MIS is certified according to the security standard ISO 27001. For sensitive information such as passwords, database encryption is used. Cryptography and techniques of (pseudo)anonymity are also applied to ensure data privacy. The connection between web servers and clients is SSL-secured to secure the confidentiality of communication.

To ensure non-repudiation, documents that are generated by the MIS are automatically signed with a digital signature. User actions are logged, and historical versions are kept available which results, in the sense of an audit trail, in a chronological record of transactions. Standards of physical and network security are applied – which comprises of regular backups, firewalls, the use of VPN connections and others. In compliance with DIN ISO 27001, user passwords must be changed every 6 months according to specified pattern.

The availability of the system is appropriate. It is always available during office hours – necessary maintenance is done outside the working time. The MIS operates 24 hours a day, seven days a week. In the past few years, the MIS Special Agency was able to measure an availability of around 99%.

4. Overall usefulness and performance of the MIS

In this section, we discuss the overall usefulness and performance of the MIS. **Important aspects contributing to its usefulness according to our intervention logic is its improvement of communication, collaboration and transparency, the re-use of available information, the reduction of errors, as well as the acceleration and standardisation of processes.** Furthermore, we discuss potential improvements of the system, as well as aspects related to user-friendliness and help-desk services.

By having a computer and access to the internet, one can use MIS independent of daytime and location. Without electronic data exchange, most tasks linked to programme and project implementation would not be feasible outside the office. This advantage becomes most obvious within the current pandemic in which working from home is the norm.

One key improvement stressed by all interviewees is that the system has **improved communication** between the users of all different roles. Because of the integrated access to the centralised database, all users immediately perceive changes to the data – there are no ambiguities regarding the question if the correct version of a document is considered or not. The feature ‘project electronic folder’ provides all relevant information – including previous versions of documents. Users of all roles emphasised that using MIS has improved the collaboration of the different actors within project application and implementation processes. Given the respective privileges – captured information is immediately accessible for everyone. There are no major categories of potential users excluded from using the MIS – all relevant user roles get access to relevant information according to their privileges.

All interviewed beneficiaries and institutional users confirmed that the **electronic exchange of information has simplified processes to a large extent compared to paper-based processes.** Important benefits result from the shared access to integrated information – which forms – so to speak – a common language. There are fewer ambiguities when people from different organisations or indeed, the same organisation, communicate about projects. The MIS repository forms **the single point of truth** to which all relevant stakeholders can relate. During the daily work it is easy to identify the right contact person to discuss a certain problem and, in some situations, it becomes necessary to check date and author of a certain change. Furthermore, communication is much faster as relevant information is immediately available and transporting time is eliminated and retrieval time minimised. In the paper-based era, project related transactional information was mainly handled by IB’s to which members of other programme authorities had only limited access.

Not only beneficiaries appreciate transparency regarding the state of processes. Users of different roles can monitor the **status of the relevant processes** that pertains to them. A beneficiary can monitor the status of a payment request – even though the payment request is partly processed in another system (e-PIP), which provides the MIS with status information. In addition, beneficiaries have read only access to MA checklists – so that they can immediately comprehend what is wrong or still needs to be done.

FIGURE 9. AUTOMATIC CALCULATION I

C. Simplified Cost Expenditure

Expenditure per amount cut

Show 10 entries Search:

+Add

Unit Cost Type				Beneficiary Statement		FLC			Actions
ID	Code	Measurement Unit	στοιχείαΔελτιων.timiMonadas	Eligible Units Ben.	Eligible Amount	Eligible Units MA	Non-eligible amount	Eligible expenditure	
3182566	MMAnapEkpEEP	Ανθρωπομήνας αναπληρωτών εκπαιδευτικών και ειδικού εκπαιδευτικού προσωπικού (ΕΕΠ)	1.652,00	18,47	30.512,44				
Total			1.652,00	18,47	30.512,44	0,00	0,00	0,00	

Source: MIS Special Agency

The **re-use of available information** – commonly known as ‘**prefilled forms**’ – help to reduce administrative burden. This turned out to be a large improvement in comparison to the paper-based era during which the same information had to be repeatedly re-captured. Results – like totals for example – are automatically calculated. It needs to be emphasized that automatic calculations are not limited to simple additions and deductions. They also cover complex conditional and recursive algorithms. Such calculations are also integrated into call **specific validation checks**. One example is the check for call specific condition which defines that a percentage of a certain cost category must not exceed a specified value.

FIGURE 10. AUTOMATIC CALCULATION II

Add a lump sum (Unit Cost) ×

Beneficiary Statement (Integrated Units)

Unit of Measure *

Ανθρωπομήνας αναπληρωτών εκπαιδευτικών και ειδικού εκπαιδευτικού προσωπικού (ΕΕΠ)

στοιχείαΔελτιων.timiMonadas

Total Units *

Eligible Units *

Επιλέξιμο Ποσό Δικ.

Non Eligible Units

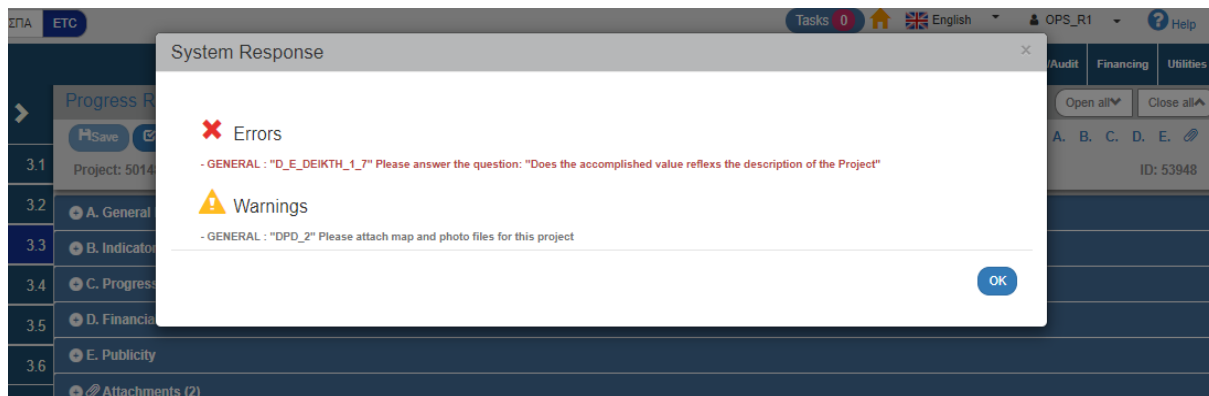
Beneficiary Non-Eligible Amount

- The grey fields require data entry
- The blue fields are automatically calculated

Source: MIS Special Agency

In addition, dialog boxes that provide a defined selection of unambiguous values, and validation checks on missing and wrong values as well as compliance with complex business rules, help to **reduce the error rate and increase data quality**. This results in a large improvement in comparison to the paper-based era in which created and changed information had to be manually checked over and over again.

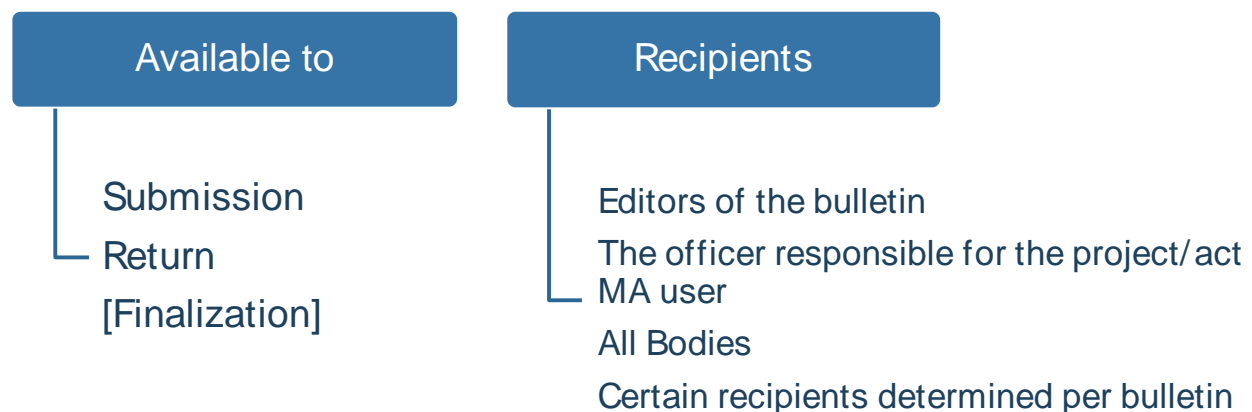
FIGURE 11. VALIDATION CHECKS



Source: MIS Special Agency

The MIS automatically generates feedback information using alerts and email notifications that indicate what needs to be done and allow status tracking of ongoing processes. The completion of every important step in the workflow is immediately transparent. Forms and uploaded documents provide a valid property which indicates if the respective version is valid or not. Using the provided feedback information users can fulfil tasks in a self-service manner. There are overviews on programme and project level that show the status of planned and actual indicators, costs, and financing. During the paper-based era, sometimes different users in different organisations needed to be contacted to determine process status or the value of certain numbers. This caused a significant reduction of dependencies between different processes. The processing of applications, progress reports, payment requests and modification requests is much faster than it was in the paper-based era. **All users expressed a high confidence in the reliability and accuracy of information MIS provides.** Specifically, with regard to analysis and reporting there is no need to consult other sources (e.g. individually maintained Excel lists). Users of interviewed programme authorities trust in the information MIS provides, which is also sufficiently detailed to answer all analytical questions.

FIGURE 12. ALERTS AND NOTIFICATIONS



Source: MIS Special Agency

Because MIS is a uniform system used by many operational programmes, authorities implementing respective programmes and projects share a common knowledge. Interviewees confirmed that this facilitates job rotation and that staff from different operational programmes can easily support each other. The fact that so many users

use the system in a similar way supports organisational learning and strengthens the reliability and maturity of the system. Staff members of different programme authorities can support each other and beneficiaries that realise different projects in different programmes have no difficulties because all programmes use the same system.

Beneficiaries have access to a wide range of standard reports that help to support answering regularly recurring questions, providing summarized overviews, and visually emphasizing specific data constellations. In total MIS provides around 50 of such standard reports for national/regional programmes and 9 for Interreg programmes. Having the respective privileges, beneficiaries have also access to analytical information on organisational level, which facilitates project-crossing aggregations. Reports for Beneficiaries are considered standard reports, e.g. list of projects, calls, project's financial data, implementation status etc. and in some cases contain calculations on financial data. More elaborated analysis and presentation of data are provided through the Business Intelligence subsystem, which is targeted to MA, IBs, CA, AA users.

The implementation of projects comes with the necessity of frequent, often monthly, reporting on physical and financial progress. In the paper-based era monthly reports had to be created and submitted even if nothing has changed. With MIS in operation, only changes must be communicated.

For beneficiaries, most effort is caused during the preparation, checks and submission of information related to invoices. The features relevant to the e-Cohesion initiative (e.g. automatic validation and calculation, interoperability with other governmental systems), provided by MIS, help to **reduce this effort**. Adding invoices to the list of expenditure in conjunction with necessary collecting, synthesising, and pre-checking activities is often time consuming. One interviewed beneficiary stated that 80% percent of his/her total workload is caused by the preparation of payment claims. Nonetheless, there are significant differences. Some beneficiaries only insert one invoice per payment request. This is for example the case for beneficiaries that manage large infrastructure projects with only one main general contractor. Others fill out hundreds of invoices per payment claim. Interestingly, this is not necessarily linked to a higher effort: One interviewed beneficiary that manages a multitude of projects has built up a proper information system to manage project related information according to the organisation's specific business requirements. To avoid the necessity of re-entering identical information, this beneficiary uses a webservice provided by MIS to import data related to invoices and indicators from his own information system into the MIS. Others insert one total sum per cost category and provide detailed invoice data only in uploaded excel files.

Institutional users emphasised the supportive character of the audit trail. An interviewed MA representative explained that before the MIS, related information had to be re-captured by the MA and an interviewed CA representative explained that limited access and the necessity of physical transport caused administrative costs. Sometimes, the first document which was exchanged was not the right one, so the process needed to be repeated. According to another MA representative, making the use of the MIS mandatory for beneficiaries was also a big step forward. Before that, digital and paper-based information needed to be managed in parallel. For CA's, the manual creation of samples for project audits and other purposes, used to be a tedious and risky task. To a large extent, the MIS automatically creates the necessary sample lists. The current version of MIS also helped to overcome rounding issues which occurred in the period 2006-2013.

In comparison to paper-based processes, digitalised processes are more standardised and streamlined. Because there is no need for physical transport, situations before and after deadlines become less turbulent. To make sure that documents arrived on time or simply because it was the fastest option, beneficiaries sometimes brought crucial documents themselves to the MA's office literally in the last minute. More than once, this caused stressful situations. One interviewed MA representative confirmed that the activity of project evaluation which

in this case takes place before the approval, takes one week less than before. As one institutional user put it: “Actions like printing, hand signing, postal sending and archiving that are typically related to paper-based processes cost time and money”. Regarded as services, project application and implementation has become more professional by means of electronic data exchange.

4.1. Drawbacks of the MIS

All interviewees agreed that e-Cohesion and the use of the current MIS did not have any significant drawbacks. However, individual beneficiaries made suggestions for improvements. One beneficiary mentioned that, to further avoid the repetitive capturing of the same information, it would be helpful to assign some attributes, that are now project related, to the profile of the organisation. In this way, the information could be prefilled for every application made by this organisation. Referring to information on certified amounts, findings, and audits, another beneficiary stated that information exchange between the CA, AA, and beneficiaries could be improved. This concerns information on irregularities and findings. It needs to be considered if and to what extent this is legally possible and worth the effort. Another interviewed beneficiary mentioned that options for full-text searching could be extended to improve the retrieval functionality.

4.2. User-friendliness of the MIS

All interviewees emphasised the high degree of user-friendliness of the MIS. Its structure is described as clear and straightforward. Although MIS covers more data and functionality, it was described as more user-friendly in comparison to other systems like e-PIP, the Horizon 2020 system, and Presage, which users had used in other contexts. The system is also self-descriptive, and interviewees confirmed that each step is immediately comprehensible through feedback and given explanations. One beneficiary stated that the only thing one needs to know is project-related information – the rest is obvious. In addition, users are supported in many ways. For example, available target values that were defined in the application are shown when actual values need to be captured in a progress report.

All users described the user interface as appealing and modern and adhere to the standards they expect from an up-to-date web-application. Even during phases of high traffic, for example at the end of call, the responsiveness and stability of MIS is satisfactory. Whenever possible, MIS offers users the option to perform actions in a flexible order according to preferences and individual working styles. Most interviewees also commended the search and retrieval functionalities provided by the system. Another factor that positively influenced user satisfaction is its continuous improvement. The MIS is constantly improved, and existing bugs are fixed quickly.

4.3. Help-desk organisation and functionality

There are standard processes established on how to deal with issues and underlying problems; when an issue arises, the user first contacts the IT Officer of the MA. If no solution can be found, or if the issue is caused by an underlying technical problem that cannot be solved by the MA, the information is passed to the MIS Special Agency that will resolve the issue.

The portal has an online library, which provides relevant information to assist the user in the form of written manuals and videos. All users can also receive necessary support via the help desk feature that the MIS portal

provides. The feature works in a standard way; after selecting the problem domain from a list of predefined values, users describe the issue in a text box and send their message to the helpdesk. Interviewees describe this feature as very useful and the response time and the quality of response as satisfactory. In addition to the provision of support and help, the MIS portal provides users with news that are related to the context of programme implementation. These cover for example new guidelines and information about provided calls for proposals.

FIGURE 13. HELP-DESK SEARCH

ΚΡΙΤΗΡΙΑ ΑΝΑΖΗΤΗΣΗΣ ΕΙΣΕΡΧΟΜΕΝΩΝ ΕΡΩΤΗΜΑΤΩΝ

1) Κωδικός Ερωτήματος: 2) Τίτλος: Ερώτηση: Προώθηση Σε: Όλα

3) Κατηγορία: χωρίς κατηγορία Υποκατηγορία: Χωρίς Υποκατ. 4) Κωδικός MIS:

Ημερ. Υποβολής (Από - Έως): 01/01/1900 31/12/2050 5) Φορέας-Υπηρεσία: 6) Κατάσταση:

7) Συντάκτης (Επώνυμο - Όνομα): 8) Στέλεχος: 9) Εκκρεμότητες

Q Περισσότερα Κριτήρια

Q Αναζήτηση ✖ Καθαρισμός

Κωδικός	Τίτλος	Συντάκτης	Φορέας	Ημερομηνία	Κατάσταση	Προτεραιότητα	Προώθηση	Αναγ.	FAQ
118536	ΠΡΟΕΙΔΟΠΟΙΗΣΗ ΚΑΤΑ ΤΗΝ ΕΠΙΚΥΡΩΣΗ ΔΕΛΤΙΟΥ	ΔΗΜΗΤΡΑ ΤΡΙΑΝΤΑΦΥΛΛΟΥ	ΔΗΜΟΣ ΑΜΦΙΚΛΕΙΑΣ - ΕΛΑΤΕΙΑΣ	20/04/2021 11:53	Υπό επεξεργασία	Κανονικό (normal)		✓	⊗
118501	Αλλαγή πεδίου "Κατηγορία Έκδοσης" σε ΤΔΥ Ολοκλήρωσης	ΧΡ/ΦΟΡΟΣ ΤΡΙΑΝΤΑΦΥΛΛΟΥ	Ε.Υ.Δ.Ε.Π. ΠΕΡΙΦΕΡΕΙΑΣ ΚΕΝΤΡΙΚΗΣ ΜΑΚΕΔΟΝΙΑΣ	19/04/2021 13:45	Ολοκληρωμ	Κανονικό (normal)		✓	⊗

- 1) Code of Question
- 2) Title of Question
- 3) Category of Bulletin
- 4) Code of MIS
- 5) The asking Entity
- 6) The status
- 7) The author
- 8) The employee responsible
- 9) Unresolved Issues

Source: MIS Special Agency

5. Barriers, challenges, and lessons learnt

5.1. Good practices and lessons learnt

In 2011/12, when the e-Cohesion initiative was first announced and started being discussed, Greece embraced the idea and played an active role in its elaboration. **The frequent exchanges with DG REGIO and IT experts from other Member States helped immensely in developing ideas and shaping concepts.** Following a strategic approach, Greece implemented the e-Cohesion initiative systematically in a consistent and sustainable manner. It should be reflected if such events that aim to foster the exchange of knowledge between IT experts from different Member States should be further supported.

The different versions of MIS were not developed nor deployed in a sudden or radical manner. On the contrary, the system is extended and improved step by step and there was not a conceptual restart from scratch that would have formed a significant break regarding the way people used the system. Besides the continuity and stepwise improvement of the underlying workflow, a general openness regarding new technologies play an important role. Improved concepts and state of the art technologies are continuously implemented in such a way that users feel integrated in the development of the MIS and well supported in their work. On the one hand, building on lessons learnt and following an evolutionary rather than revolutionary approach seems to be advantageous. On the other hand, does this presume a modular system's architecture, adaptability of the underlying technology and highly depends on the knowledge and experience of the people involved – which will also be discussed in the following paragraphs.

As a one stop shop, the MIS Special Agency play a major role regarding the development and operation of the system. It provides a wide range of services linked to the development of the system that include process analysis, requirements engineering, elaboration of specifications, programming, testing, and documenting as well as project management. In terms of the operation of MIS, it provides hosting as well as technical and business support including the helpdesk. Because of its continuous interaction with MIS, its users, and other stakeholders, as well the acquisition of facts about new concepts and technologies the MIS Special Agency created a solid organisational knowledge base. The transferability of such an approach depends highly on the organisational characteristics of the Member States. In principle it would also be possible to purchase the respective services from a service provider located outside the own Member State. Following a programme crossing approach makes it crucial to find technical and conceptual solutions that cover necessary requirements of different programmes. This demands standardisation – which will be discussed in the following.

MIS supports many programmes realising different projects ranging in size and thematic objectives. The management of the resulting complexity demands decisive efforts regarding the harmonisation and simplification of organisational structures and processes. In this respect, the unified managing and control system of the national/regional ERDF programmes plays an important role. As one interviewed staff member of an MA put it: "It's the 'bible' that we all must adhere to". Considering the development of MIS and the necessary integration of different stakeholders, this demands good collaboration and coordination during process analysis, requirements management and specification. In addition, there is the possibility to meet programme and even call specific requirements with regard to validation checks, reporting, and analysis.

5.2. Barriers and challenges for the upcoming period

At the beginning of the digital evolution in Greece, there were fears people would not have trust in the integrity of digital documents. Now, on the contrary, traceability and trust in digital documents is higher than in paper-based counterparts. Common barriers and problems because of rounding issues, verification of electronic documents or programme specific requirements do not seem to play a major role in Greece. However, whilst users of different roles emphasise that as IT support gets better and better, administrative regulations become increasingly complex and demanding. In the beginning of the 2014-2020 period, not only e-Cohesion related requirements had to be handled, but also requirements regarding annual reporting (accounting period), management of recoveries and withdrawals, and the list of recorded and stored fields. This caused additional administrative cost which was only partly compensated by simplifying measures like simplified cost options that were introduced. One idea, stipulated during our interviews, is the enlargement of the reporting period for beneficiaries. However, implications of current draft regulations, like 'Annex XYX Electronic data to be recorded and stored on each operation – Article 66(1)(e), do not seem to cause great concern among interviewed decision makers.

MIS will be used for the upcoming period 2021-2027. The user-interface will mainly stay the same but new technologies are constantly observed and considered. Because of the strict distinction between the layers of presentation and business logic, changes in the user-interface can be implemented without significant implications on the business logic. However, due to changes in legal framework (both on National and European) level there are of course necessary adaptations to be implemented. For example, the national legal framework has changed in a way that makes it necessary to monitor individuals rather than only organisations. Given the great number of existing interfaces, maintenance and ensuring interoperability with other governmental systems is the most enduring challenge on a technical level. In the future, all interfaces to external systems shall be implemented via the enterprise service bus in order to reduce the effort for maintenance.

5.3. Summary

The case study has found out that MIS meets the requirements of a modern e-Cohesion system and is well prepared for the upcoming MFF 2021-2027. MIS fully supports all data exchange processes that take place between applicants, beneficiaries, and programme authorities. The users emphasise the user-friendliness of the system and praise the handling of issues arise, all of which are quickly resolved by programme authorities.

All interviewed users and stakeholders confirmed that digitalisation and electronic data exchange resulted in significant improvements by simplifying processes of project application and implementation and reducing administrative burden. The transition phase was described as rather smooth. At the beginning of the process there was however a minor reluctance because of the amount of to be scanned documents and the loss of the paper-based audit trail. Arguments like these were only mentioned at the beginning of the process and their influence was not significant.

We summarize this case study by considering MIS from a typological point of view by which it can be described as follows: on Member State level the MIS follows a rather **centralized approach**. The MIS is the Greek Monitoring System that all national/regional and a multitude of Interreg programmes make use of. The e-Cohesion module, which was mainly considered in this study, forms a fully integrated part of the MIS portal-like architecture. The MIS does not only support e-Cohesion related transactional processes, it also provides functionality for financial management, monitoring, programme evaluation, and audit. All project related information exchange processes during the application and implementation phases and all relevant user roles are supported. Information exchange between beneficiaries and programme authorities is **completely paper-**

free. Also, verification documents are uploaded and taken as copies. Originals are only considered during on-the-spot-checks.

MIS is connected to other systems using a wide range of interfaces which are implemented as web services. An important role is played by the collaboration with the national public investment programme (e-PIP) that processes payments. **Only once encoding** is realised on a programme-crossing level: available information on beneficiaries is reused in projects from different programmes. Authentication is based on a simple level e-signature. **Finally, the MIS provides a wide range of features to support error-reduction, acceleration of processes, transparency, user-friendliness, privacy and information security.** The Greek MIS offers plenty of good practice example, most notably its **interoperability** and wide range of covered programmes, which requires good collaboration and coordination during process analysis, requirements management and specification.

Annex

List of interviewees

NO.	NAME AND SURNAME OF THE INTERVIEWEE	INSTITUTION	POSITION OF THE INTERVIEWEE	TYPE OF INTERVIEW	DATE OF THE INTERVIEW
1	Ilias Spanos	Monitoring Information System (MIS) Office National Coordination Authority Ministry of Development and Competitiveness	IT-Coordinator	Policy Perspective / Technical	10.03.2021 Additional email communication Participated in various interviews with beneficiaries and institutional users
2	Ioanna Kalaitzoglou	Monitoring Information System (MIS) Office National Coordination Authority Ministry of Development and Competitiveness	Project Coordinator	Technical	Additional email communication Participated in various interviews with beneficiaries and institutional users
3	Aspasia Zotou	Monitoring Information System (MIS) Office National Coordination Authority Ministry of Development and Competitiveness	Business Analyst	Technical	Additional email communication Participated in various interviews with beneficiaries and institutional users
4	Alexandra Ananika	MUNICIPALITY OF PILEA-HORTIATIS	Head of the Dpt. of Development Planning and Programmes	Beneficiary	01.04.2021
5	Irene Simitlioti	PKM.gov.gr	Project Management	Beneficiary	06.04.2021
6	Zinovia Papatheodorou	Central Administration Foundation for Research and Technology- Hellas	Project Management	Beneficiary	08.04.2021
7	Efi Gounela	Hellenic Agency for Local Development & Local Government (EETAA) SA	Project Officer	Beneficiary	14.04.2021
8	Konstantinos Bebonis	Managing Authority of Operational Programme "Transport Infrastructure, Environment	Managing Authority	Institutional user perspective	16.04.2021

NO.	NAME AND SURNAME OF THE INTERVIEWEE	INSTITUTION	POSITION OF THE INTERVIEWEE	TYPE OF INTERVIEW	DATE OF THE INTERVIEW
		& Sustainable Development”			
9	Catherine Voulodimou	Managing Authority of Operational Programme “Transport Infrastructure, Environment & Sustainable Development”	Managing Authority	Institutional user perspective	16.04.2021
10	Karavatos Dimitris	Managing Authority of European Territorial Cooperation Programmes Unit C’ Management Verifications	Programm Manager	Institutional user perspective	21.04.2021
11	Chrysa Kallitsari	Interreg IPA Cross-Border Cooperation Programme “Greece-Albania 2014-2020” Joint Secretariat	Project Officer	Institutional user perspective	21.04.2021
12	George Feloukas	Managing Authority Region of Ionian Islands Member of Unit A (Programming and Evaluation Unit)	Member of Unit A (Programming and Evaluation Unit)	Institutional user perspective	23.04.2021
13	Foteini Akinosoglou	Ministry of Development & Investments General Secretariat of Public Investments & NSRF	Certifying and Verifying Authority	Institutional user perspective	26.04.2021
14	Alexandra Sopaki	Ministry of Development & Investments General Secretariat of Public Investments & NSRF	Certifying and Verifying Authority	Institutional user perspective	26.04.2021

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