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# **Software Requirements Specification**

**for**

**eKAA**

**Version 2.0**

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# 1. Introduction

## 1.1 Purpose of this document

This document presents a brief description of technical specifications for the eKAA systems which includes two system: eAkreditimi and website.

## 1.2 List of definitions and abbreviations

eKAA uses the following **acronyms**:

<b>Abbreviation</b>	<b>Description</b>
KAA	Kosovo Accreditation Agency
MESTI	Ministry of Education, Science, Technology, and Innovation
SVP	Site Visit Program
CRIS	Current Research Information System
HEI	Higher Education Institutions
KRIS	Kosovo Research Information System
TBD	To be determined (TBD in next version)
SRS	Software Requirements Specification
IC	Intuitions Coordinators
Administrative Instruction	AI
SC	Scientific Committee
E+	Erasmus +
Economic operator	The software company that will win the tender to proceed with the design and implementation of the eKAA system
API	Application Programming Interfaces
WG	Working group assigned for eKAA
AS	Academic Staff
CRUD	Create, Read, Update, Delete
HEI QC	Higher Education Quality Coordinator
AC	Appealing Committee
SCQ	State Council of Quality

## 1.3 Intended Audience and Reading Suggestions

This document is generated for all stakeholders, including project sponsors and the development team (developers, designers, testers).

### Section: Introduction

- This section offers a summary of the eKAA, including purpose, document conventions, project scope, and references.

### Section: Overall Description

- This section offers the product perspective, major product functions on a higher level, users characteristics, operating environment, design and implementation constraints, user documentations, and assumptions and dependencies which are intended to be understandable for all users.

### Section: External Interface Requirements

- This section discusses interfaces such as user interfaces, hardware, and software interfaces, communications interfaces.

### Section: System features

- This section is more technical. It breaks down the requirements of major components of eKAA

### Section: Other nonfunctional requirements

- This section is more intended for developers. It covers the non-functional requirements to help make suitable design choices.

### Section: Appendix A

- This section is fully technical and is more intended for engineers and developers. It provides a short version of the use case diagram, data flow diagrams, and swim lane diagrams due to visibility problems. The detailed UML diagrams will be generated from the economic operator and once generated the same will be approved by the sponsor of the project to proceed further with the design and implementation of eKAA.

### Section: Appendix B

- This section represents a possible structure of the content from an abstract level using the mind-mapping approach.

## 1.4 Project overview

The project aims to functionalize, enhance and modernize the KAA online services that will be used from all stakeholders, including: Higher Education Institutions (HEI), Academicians and Students. The goal of the project is to provide detail technicality for fully digitalizing the accreditation process, and furthermore the communication among KAA and the rest of the actors.

Therefore, this document will be offered as software specification system for eKAA including two subsystems, namely the (i) eAkreditimi version 2.0, (ii) eStudenti version 1.0.

## 1.5 Product vision

**For education system** community in Kosovo who needs to apply for ri/accreditation institutions and programs, search for existing ri/accreditation institutions and programs, **the eKAA** is a system that will serve as a national window for offering information regarding (i) accreditation process, (ii) professors engagement, (iii) and student services with respect to programs and institutions that are ri/accredited by Kosovo Accreditation Agency. **eKAA** will play an important role to centralize all the information related to education programs and education institutions that are offering teaching and learning services within Republic of Kosovo.

## 1.6 Product functions

As shown in Figure 1, initially the **eKAA** includes:

- KAA website
- KAA eAkreditimi 2.0

The KAA website will be open for all, and through this window all the stakeholders of Education System will be able:

- to search for accredited HEI and their rating profile,
- accredited Programs and the rating extracted from the evaluation process
- students will be able to search for specific program and the system will recommend a short list of programs based on student preference
- visualization and stats with respect to HEI and Programs
- The documents with respect to program and institutional accreditation, standards, regulation

should be allocated from all the stakeholders within 10 seconds (eKAA data architecture and usability of the application should be considered with the highest priority by the economical operator).

Further, eAkreditimi 2.0 will serve as a platform for Academic Staff, HEI, KAA, SCQ, IE and AC. Figure 1 shows in details all the features within each of the modules.

## eKAA

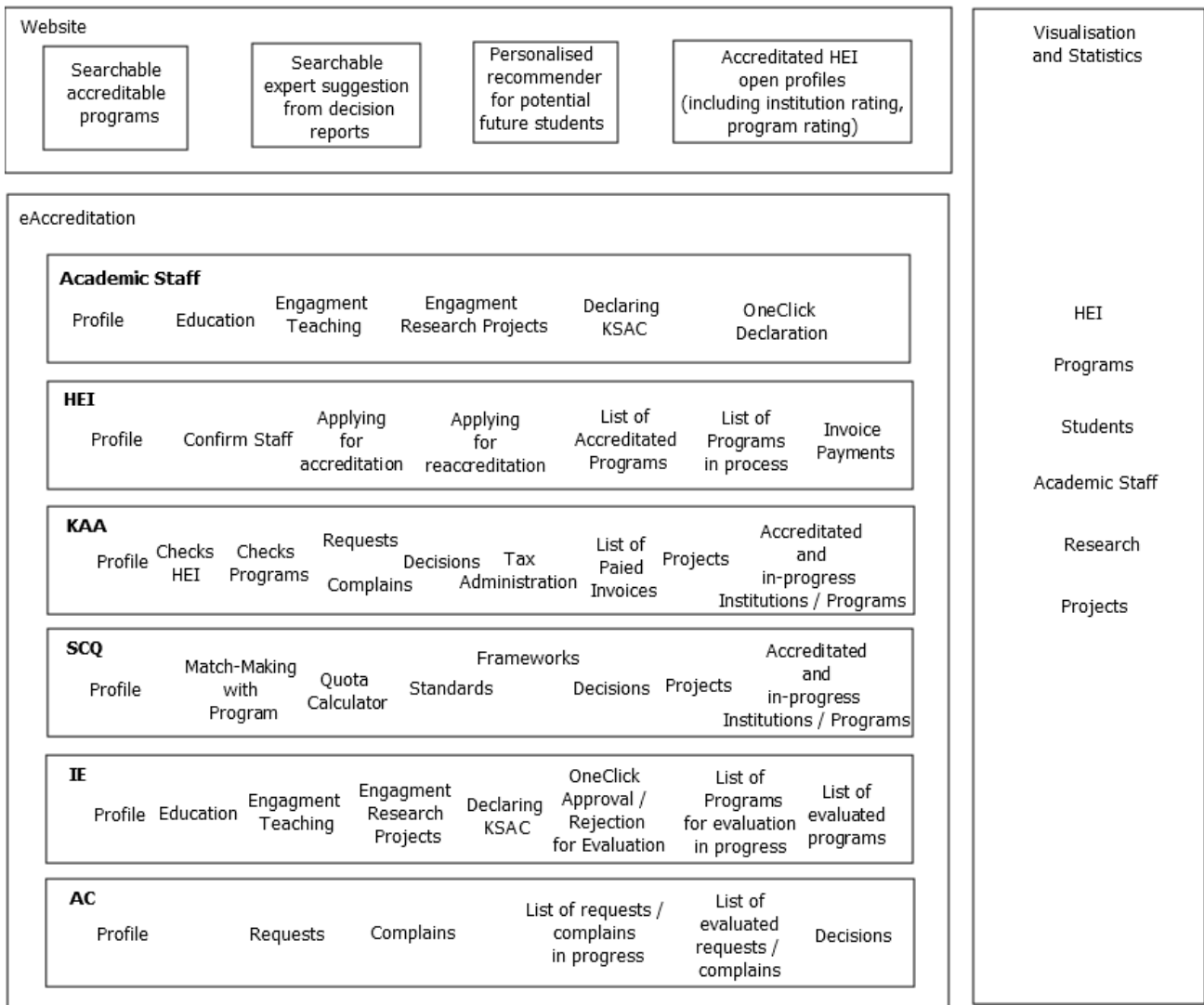


Figure 1. eKAA

And, additionally, the Content Management System will operate in the backend to facilitate the create, update, read and delete procedures for all actors that operate in different level of privileges.



## 1.7 User Classes and Characteristics

eAkreditimi 2.0 users will be classified into five different categories, depending on the privileges defined:

1. KAA,
2. SCQ,
3. APC,
4. International Expert,
5. HEI Quality Coordinators, and
6. Academic staff, and

### 1.7.1 KAA

**KAA:** KAA has full privileges of the eAkreditimi system and legally will be the owner of eAkreditimi. *KAA Coordinator* will have full access to code, database, and all related documentations that will be produced to use eKAA. KAA can **issue software code audit** at any time including security vulnerabilities analysis, code quality check, performance and scalability check, potential maintenance issues detection.

**KAA Login:** The *KAA Coordinator* shall be able to log in to the eAkreditimi by accessing the login page and providing their credentials with name and surname of staff officer (the KAA email **should** associate with the login name). Once logged in, the KAA coordinator can access eAkreditimi services.

**Password Recovery:** If the KAA has lost or forgotten the password, the KAA shall recover it by accessing the password recovery page from the login page. *The* KAA shall provide the institutional email linked with the institution domain and the system shall send a new password to the specified email. Since KAA is the owner of eAkreditimi, the KAA coordinator can also modify manually the password by accessing the main database.

**Dashboard Customization:** The *KAA Coordinator* should be able to customize the KAA dashboards according to their preferences. eAkreditimi should provide the customization capabilities for academic staff, institutions, applications, projects, events, and results in dashboards.

**Staff Management:** The *KAA Coordinator* shall be able to manage all KAA staff account by creating, updating, deleting accounts with specific name and surname related to any written procedures in their contracts. KAA coordinator can initiate manually a reset password for all user classes and facilitate password recovery for all categories of users by initiating the password reset with one click. KAA coordinator initiates an email to users to send a new password to a specified email. KAA coordinator shall be able to create a **case committee** with specific privileges, for specific HEI cases. KAA coordinator shall be able to create a **project committee** with specific privileges, for specific projects. **The** KAA coordinator shall be able to search and view all staff profiles, included all the requested documents that have been uploaded from them.

**HEI Management:** The *KAA Coordinator* shall be able to view all HEI profile, the ri/accreditation of institution and program history. The *KAA Coordinator* shall be able to view all HEI profile, the re/ accreditation of institution and program in progress. Further, it can view all HEI academic staff and through tax administration module, the KAA will be able to see the employment status of each academic staff.

**Applications Management:** *KAA Coordinator* will be able to approve the applications from HEI with comments and upload a decision. *KAA Coordinator* will be able to announce the decision of the application (accept/reject) from HEI with comments and upload the SCQ decision. The *KAA Coordinator* shall be able to request comments from SCQ with respect to specific HEI application. The *KAA Coordinator* shall be able to request comments from *International Experts* with respect to specific HEI application. The *KAA Coordinator* shall declare **the status:**

- Initial phase (application submitted and still no one dealing with it)
- in progress (under review at KAA),
- in progress (under review at SCQ),
- in progress (under review at Internatinal Expert),
- in progress (under review at AC),
- completed.

of the application **in all six checkpoint.**

**Project Management:** The *KAA Coordinator* shall be able to create, edit, update any project of KAA. *KAA Coordinator* shall be able to invite HEI to collaborate in specific projects. *KAA*

*Coordinator* shall be able to approve requests for collaboration in projects. *KAA Coordinator* shall be able to generate Mandate Letters for approved projects. *KAA Coordinator* shall be able to upload all documentation of the specific project. *KAA Coordinator* shall be able to add, delete, update project activities and events. *KAA Coordinator* shall be able to assign KAA staff resources for specific projects.

**Statistics and Visual Management:** *KAA Coordinators* should be able to visualize and generates results based on their templates. *KAA Coordinator* should be able to generate ad-hoc reports by combining variables that will be open for everyone. *KAA Coordinator* should be able to extract the visualization and results in different formats (including PDF, DOC, EXCEL, CSV, PNG, JPG – to name a few)

**Browsing Catalogs:** The *KAA Coordinator* shall be able to browse six types of catalogs. These include staff catalog, institution catalog, program catalog, project catalog, event catalog, application catalog.

**Match-Making with Program** – The KAA shall be able to to check the matching of the staff background with specific program.

**Quota Calculator** - The KAA shall be able to to check the potential student quota for each new program.

### 1.7.2 SCQ

**SCQ Login:** The *SCQ member* shall be able to log in to the eAkreditimi by accessing the login page and providing their credentials, personal name and password (the SQC email **should** associate with the login name).

**Password Recovery:** If the SCQ has lost or forgotten the password, the SCQ shall recover it by accessing the password recovery page from the login page. *The SCQ* shall provide the institutional email linked with the institution domain and the system shall send a new password to the specified email.

**Dashboard Customization:** The *SCQ member* should be able to customize the *SCQ* dashboards according to their preferences. eAkreditimi should provide the customization capabilities for academic staff, institutions, applications, projects, events and results in dashboards.

**Staff Management:** The *SCQ member* shall be able to search and view all staff profiles, included all the requested documents that have been uploaded from them.

**HEI Management:** The *SCQ member* shall be able to view all HEI profile, the ri/accreditation of institution and program history. The *SCQ member* shall be able to view all HEI profile, the ri/accreditation of institution and program in progress.

**Applications Management:** *SCQ member* will be able to view the applications submitted by HEI and approved publications. *SCQ member* will be able to view **the progress bar communication** for each of the applications. *SCQ member* will be able to announce the decision of the application (accept/reject) for HEI with comments and upload the *SCQ* decision. The *SCQ member* shall be able to request comments from KAA with respect to specific HEI application. The *SCQ member* shall be able to request comments from *International Experts* with respect to specific HEI application. The *SCQ member* shall declare **the status:**

- Initial phase (application submitted and still no one dealing with it)
- in progress (under review at KAA),
- in progress (under review at *SCQ*),
- in progress (under review at Internatinal Expert),
- in progress (under review at AC),
- completed.

of the application **in all six checkpoint.**

The *SCQ member* shall be able to announce the application as accomplished.

**Project Management:** The *SCQ member* shall be able to create, edit, update and view projects in KAA. *SCQ member* shall be able to invite HEI to collaborate in specific projects. *SCQ member* shall be able to approve requests for collaboration in projects. *SCQ member* shall be able to generate

Mandate Letters for approved projects. *SCQ member* shall be able to upload all documentation of the specific project. *SCQ member* shall be able to add, delete, update project activities and events. *SCQ member* shall be able to assign KAA and SCQ staff resources for specific projects.

**Statistics and Visual Management:** *SCQ member* should be able to visualize and generates results based on their templates. *SCQ member* should be able to generate ad-hoc reports by combining variables that will be open for everyone. *KAA Coordinator* should be able to extract the visualization and results in different formats (including PDF, DOC, EXCEL, CSV, PNG, JPG – to name a few)

**Browsing Catalogs:** The *SCQ member* shall be able to browse six types of catalogs. These include staff catalog, institution catalog, program catalog, project catalog, event catalog, application catalog.

**Browsing Catalogs:** The *SCQ member* shall be able to browse six types of catalogs. These include staff catalog, institution catalog, program catalog, project catalog, event catalog, application catalog.

**Match-Making with Program** – The *SCQ member* shall be able to to check the matching of the staff background with specific program.

**Match-making Research:** The *SCQ member* shall be able to check the compatibility of his/her academic staff research domain with specific program.

**Quota Calculator** - The *SCQ member* shall be able to to check the potential student quota for each new program.

### 1.7.3 ACP

**ACP Login:** The *ACP members* shall be able to log in to the eAkreditimi by accessing the login page and providing their credentials, personal name and password (the APC email **should** associate with the login name).

**Password Recovery:** If the ACP member has lost or forgotten the password, the HEI QC shall recover it by accessing the password recovery page from the login page. *The APC* shall provide the institutional email linked with the institution domain and the system shall send a new password to the specified email.

**Dashboard Customization:** The *APC member* should be able to customize the *APC* dashboards according to their preferences. eAkreditimi should provide the customization capabilities for appealing cases, treated applications and results in dashboards.

**Staff Management:** The *APC member* shall be able to search and view all staff profiles, included all the requested documents that have been uploaded from them.

**HEI Management:** The *APC member* shall be able to view all HEI profile, the ri/accreditation of institution and program history.

**Appealing Application:** The APC should be able to approve or reject the institutions appealing applications. The APC should be able to add comments and upload additional documents and generate the decision for each cases. The APC should be able to see the previous cases, including the comments and decisions. The APC should be able to add extra explanation in case the appealing institution, KAA and/or SCQ are requesting such details.

#### 1.7.4 International Expert

**IE Registration:** *The IE shall create an account in eAkreditimi by accessing the registration page and providing the necessary information details as specified in the IE entity (see Appendix D). The registration request should be approved by KAA staff.*

**IE Login:** *The IE shall be able to log in to the eAkreditimi by accessing the login page and providing their credentials. Once logged in, the IE can access eAkreditimi services.*

**Password Recovery:** *If the IE member has lost or forgotten the password, the IE member shall recover it by accessing the password recovery page from the login page*

**Dashboard Customization:** *The IE should be able to customize the dashboard according to their preferences. eAkredimi should provide the customization capabilities for profiles, institutions evaluation explanation and documentation, program evaluation explanation and documentation, list of ri/accredited institutions and programs, history of accredited program in his domain, history of evaluation reports.*

**Program re/Application:** *The IE should be able to approve or reject the program application under re/accreditation process that is suggested for evaluation. The IE should be able to upload the evaluation of the program. The IE should be able to see the previous evaluation comments with respect to the program that is evaluating. The IE should be able to add extra explanation in case KAA and/or SCQ are requesting such details.*

**Institution re/Application:** *The IE should be able to approve or reject the institution application under re/accreditation process that is suggested for evaluation. The IE should be able to upload the evaluation for the insitution. The IE should be able to see the previous evaluation comments with respect to the institution that is evaluating. The IE should be able to add extra explanation in case KAA and/or SCQ are requesting such details.*

**Browsing Catalogs:** *The IE member shall be able to browse three types of catalogs. These include staff catalog, institution catalog, program catalog,.*

**Match-Making with Program** – The *IE member* shall be able to to check the matching of the staff background with specific program.

**Match-making Research:** The *IE member* shall be able to check the compatibility of his/her academic staff research domain with specific program.

**Quota Calculator** - The *IE member* shall be able to to check the potential student quota for each new program.

### **1.7.5 HEI Quality Coordinators**

**Institution Registration:** *The HEI QC* shall create the institution account in eAkreditimi by accessing the registration page and providing the necessary information details as specified in the Intitution entity (see Appendix D).

**HEI QC Login:** *The HEI QC* shall log in to the eAkreditimi by accessing the login page and providing their credentials. Once logged in, the HEI QC can access eAkreditimi services. If the HEI QC logs in for the first time, the system shall ask to take a few quick pieces of info to be familiarized with the system before being directed to the system’s portal.

**Password Recovery:** If the HEI QC has lost or forgotten the password, the HEI QC shall recover it by accessing the password recovery page from the login page. *The HEI QC* shall provide the institutional email linked with the institution domain and the system shall send a new password to the specified email.

**Dashboard Customization:** *The HEI QC* should be able to customize the institution's dashboards according to its preferences. eAkreditimi should provide the customization capabilities for HEI, staff, programs, number of students, project, events, and results in the dashboard.

**Staff Management:** *The HEI QC* shall be able to view their academic staff profile. The institution Coordinator shall assign academic staff for re/accreditation of a specific program.



**Applications Management:** *The HEI QC shall be able to apply for institutional, program re/accreditation by opening a new application in eAkreditimi system. The HEI QC shall be able to see the progress of the application in all six checkpoints. The HEI QC shall be able to see the comments/feedback to each checkpoint within the progress bar of the application. The HEI QC shall be able to download the comments/feedback to each checkpoint within the progress bar of the application. The HEI QC shall be able to write/upload documents (example: SER) in checkpoints within the progress bar of the application. The HEI QC shall be able to add extra information or upload extra documents in case this is requested by KAA, SCQ or International Experts.*

**Project Management:** *The HEI QC shall be able to manage its institution projects. Project management includes creation, modification, deletion, and viewing of projects at the institutional level that is coordinating and/or are contributing as members of the projects at the national and international project level. The HEI QC can create and assign the results to a specific project. The HEI QC can modify projects details. The HEI QC should be able to view their institution's projects and search through them.*

**Event Management:** *The HEI QC should be able to add, delete and modify any event wrt education. The HEI QC shall be able to define the visibility of the event, only internally or public to all HEI in Kosovo. The HEI QC should be able to see other institutions events in case they are fully public.*

**Browsing Catalogs:** *The HEI QC shall be able to browse four types of catalogs. These include staff catalog, program catalog, project catalog, event catalog.*

**Match-making Education:** *The HEI QC shall be able to check the compatibility of his/her academic staff education with specific program.*

**Match-making Research:** *The HEI QC shall be able to check the compatibility of his/her academic staff research domain with specific program.*

**Quota calculator:** *The HEI QC shall be able to self-evaluate the quotes for each program.*

### 1.7.6 Academic staff (AS)

**AS Registration:** The AS shall be able to create his/her account by accessing the registration page and providing the necessary information details *as specified in the Staff entity (see Appendix D)*. Once the AS registers an automatic request to the HEI Quality Coordinators is sent to verify the account.

**AS Login:** The AS shall be able to log in to the eAkreditimi by accessing the login page and providing their credentials (the institutional email should be the username). Once logged in, the user can access eAkreditimi services. If the **AS** logs in for the first time, the system shall ask the user to take a few quick pieces of info to be familiarized with the system before being directed to the system's portal.

**Password Recovery:** If the AS has lost or forgotten his/her password, s/he should be able to recover it by accessing the password recovery page from the login page. The AS should provide his/her email linked with her/his research institution domain that is associated with the account and the system shall send a new password to the specified email.

**Dashboard Customization:** AS should be able to customize their dashboards according to their preferences. AS should provide the customization capabilities for HEI, program, courses and and education projects dashboard.

**Profile Management:** The AS shall manage their profile. Profile management includes creation, modification, deletion, and viewing of the information as specified in the Staff entity (see Appendix D). The AS, shall be able to upload all the documentation as requested by KAA administrative instruction with respect to program and or institutional re/accreditation process. The AS shall be able to specify the domain of his/her Doctorate, the doctorate thesis. The AS shall be able to declare his/her research interests. The AS shall be able to suggest with which programs can he/she match (max 3 domain selection)

**Declaration Management:** The AS shall declare his/her engagement **only once** per year within the time period as specified in administrative instruction. Declaration management includes

updating/uploading necessary documentation as specified in administrative instruction. The AS shall declare the compatibility of his/her education with specific program (KSAC selection option and upload proof). The AS shall declare the compatibility of his/her research domain with specific program (KSAC selection option and upload proof).

## 1.8 Operating Environment

**OE-1:** The eKAA System must operate correctly with the following web browsers: Internet Explorer versions 7 and above; Microsoft Edge all versions; Firefox versions 12 and above (latest version); Google Chrome all versions; Apple Safari versions 4.0 and above (latest version).

**OE-2:** The eKAA System's software must run on the Ministry of Public Administration (MAP) in the Data Center.

**OE-3:** Application Load Balancing services must be included to help with the distribution of incoming HTTP and TCP traffic across web and app servers.

**OE-4:** Caching shall be used for caching services to remove load from the app and databases and lower latency for frequent requests.

### 1.8.1 Technical requirements of the 2 servers<sup>1</sup>:

Processor	4 x Intel Xeon W-11955M 8-Core processor, 16 Threads, 3.30/5.0 GHz, 24MB cache
Memory	128 GB TruDDR4 PC4-1700 2133 MHz RAM, support for up to 1.5TB RAM
RAID controller	12Gb SAS/SATA controller, supported RAID levels 0, 1, 10, 5, 50,
Installed drives	8x16 TB 7,200 rpm 12 Gb SAS NL, expandable to 12 drives frontside
Network adapter	up to 2.5GbE
Power supply	2 x 850 Watt, 80+ Platinum Certified
Fans	Hot-swap, redundant
Ports	VGA (1 front, 1 rear) USB RJ-45 (system management) 3 x RJ-45 (1 Gb ethernet)
Case	2U, for 19" rack, with sliding rails

<sup>1</sup> Adopted from eAkreditimi template

Systems management	LED panel with fault indication of components, front-accessible Adapter for remote server management with a dedicated ethernet port, support for KVM graphical remote console, support for virtual media, and blue screen capture PFA (Predictive Failure Analysis) on processor, memory, disks, power supplies, fans, VRMs
Supported operating systems	Microsoft Windows Server 2019R2 Standard 64 bit, VMWare vSphere 6, Red Hat Enterprise Linux 8, SUSE Enterprise Server 15
Warranty	36 months

The technology used for developing eKAA, but not only:

1. Client/server system
2. Database: SQL
3. On-the-fly JSX to JavaScript compilation via Babel
4. JSX to JavaScript compilation via popular minification/combination libraries:
  - a. ASP.NET Bundling and Minification
  - b. Cassette
  - c. Webpack
  - d. MSBuild
5. Server-side component rendering to make your initial render super-fast, including support for:
  - a. CSS-in-JS libraries
  - b. React Router
  - c. React Helmet
  - d. Custom JS logic via implementing IRenderFunctions and passing to Html.React
6. Runs on Windows, OS X, and Linux via .NET Core and ChakraCore
7. Developing using ASP.NET Core 6

## **1.9 Design and Implementation Constraints**

Constraints that will limit the options of design and implementations are:

- CO-1. The system shall operate in such a way that avoids insufficient resources to execute complex queries
- CO-2. The eKAA shall operate instantly in two different locations as master and slave model to avoid downtime (requirements for the two servers are specified in 1.8.1)
- CO-3. eAkreditimi 2.0 informations should be accessed by the HEI institutional domain emails.

### **3. Interface with other applications**

The eKAA platform shall exchange information with the following institutions (see Section 5.6):

- Ministry of Science Education, Technology and Innovation (MESTI) - SMIAL
- Kosovo Research Information System
- Tax Administration of Kosovo

The format of data exchange will be done through web services and will be determined during the application development phase. The collaboration with SMIAL, KRIS and TAK will be facilitated by KAA officers, the latter one is already implemented in the old version of eAkreditimi 2.0.

## 4. System Features

### 4.1 Registration feature (KAA, SCQ, International Expert, APC Expert, HEI Quality Coordinators, Academic staff)

#### 4.1.1 Description and Priority

User classes create a profile (with standard metadata specified in Appendix D) when they are registered in eAkreditimi. These users are classified based on the privileges as ‘**super admin**’, ‘**admin**’, ‘**coordinator**’, ‘**staff**’. ‘**Super admin**’ include: KAA and SCQ, ‘**admin**’ include APC, International Expert, ‘**coordinator**’ include HEI Quality Coordinators, and ‘**staff**’ include Academic staff.

All the accounts will be created based on metadata standards (See Appendix D). All registration forms must go through the checkpoints based on the level of privileges it has (see Appendix B). KAA verifies the HEI QC for those institutions licenced by MESTI and re/accredited by KAA. HEI QC verify the academic staff accounts, and the same can be verified by KA. Each of the HEI QC in the respective institutions needs to have an account with a name and surname so in the future, any action toward the systems needs to be trackable. In case the employees are changed, a request to reflect those changes is made to KAA. And finally, all registered Academic staff have a profile with an overview of their personal information and their yearly declaration, including the engagement in HEI, engagement in Programs, engagement in Courses.

#### 4.1.2 Stimulus/Response Sequences concerning **registering the profiles**

**Stimulus:** The **academic staff** fills the registration form to get registered in the system.

**Response:** The system sends an email with the estimated time of profile verification to HEI Quality Coordinator, and once the account is verified the system sends an email to the user and suggests updating their profiles with extra attributes requested by profile metadata standard.

**Stimulus:** **HEI Quality office coordinator** registers the institution.

**Response:** The system sends an email with the estimated time of institution verification by KAA (as a super admin account). If the user gets verified successfully, an email will be sent



with a username and password and a short message that lets the institution know that they are part of eAkreditimi and that they can continue to update their institutional profile. If it is not completed successfully, the HEI Quality coordinator gets an email with a rejection message.

**Stimulus:** **International Expert** registers the profile.

**Response:** The system sends an email with the estimated time of expert profile verification by KAA (as a super admin account) who checks if the Expert is listed in the expert list. If the IE gets verified successfully, an email will be sent with a username and password and a short message that lets the IE know that they are part of eAkreditimi and that they can continue to update their profile. If it is not completed successfully, the state institution coordinator gets an email with a rejection message.

**Stimulus:** The **APC member** registers the profile.

**Response:** The system sends an automatic email with the estimated time of the researcher's profile verification by the specific researchers. If the user approves that s/he is part of appealing committee, the KAA send an email that notifies that the APC member is registered successfully. The APC gets an email with username and password and a short message that lets the APC know that they are part of eAkreditimi and suggests updating their profiles with extra attributes as specified in Appendix D.

**Stimulus:** **State Council Quality** member registers the profile.

**Response:** The system shows the registration form that was filled by the user. The KAA Coordinator verifies and validates the SCQ member profile. If verified successfully, the system shows a button to send an automatic email with the new username and a randomly generated password. If not, the system shows another button to send an automatic email with a rejection message.

#### 4.1.3 Functional Requirements

Registration Requirements are represented uniquely with a RRX tag, where RR stands for Registration Requirement and X represents the serial number.

**RR1:** The system must send a confirmation email whenever a user's profile has been verified successfully.

**RR2:** The system must not allow submission of the registration form if the user has not filled all required fields for the form that they are filling (including self-registration form, institution form, user profile).

**RR3:** The system must send an email whenever a verified user account is created containing the username and the temporary password.

**RR4:** The system must redirect users to change their password after they log in for the first time.

**RR5:** The system must send an email with a specific code to verify the user's email.

**RR6:** The system must send a rejection email whenever a user's profile has not been verified successfully.

**RR7:** The system must allow users to reset their password by clicking on "I forgot my password" and receiving a link to their verified email address.

**RR8:** The system must send an email that requests user profile verification to HEI QC, or KAA when a user submits a registration form.

**RR9:** The system should send a reminder email to KAA if no specific user profile has been verified 48 hours after application for registration.

**RR10:** The system should update the queue list once the HEI QC verifies an academic staff.

**RR11:** The system must allow users to log into their account by entering their email and password.

**RR12:** The system must allow the user to upload all documents as required with KAA standards.

**RR13:** The system must allow the user once a year to confirm the yearly engagement by one click confirmation if no status has changed.

**RR14:** The system must allow the user once a year to upload additional document confirming the engagement once in a year if a status has changed.

**RR15:** The system must provide four different views where KAA can create/read/update/delete users.

**RR16:** The system must provide four different views where KAA can create/read/update/delete HEI QC.

**RR17:** The system must provide four different views where KAA can create/read/update/delete applications.

**RR18:** The system must provide four different views where KAA can create/read/update/delete cases.

**RR19:** The system must provide four different views where KAA can create/read/update/delete projects.

## **4.2 User Login (KAA, SCQ, International Expert, APC Expert, HEI Quality Coordinators, Academic staff)**

### 4.2.1 Description and Priority

Registered users must be able to log into their accounts with the affiliation domain and sign out at any time that they want.

### 4.2.2 Stimulus/Response Sequences

**Stimulus:** The user accesses the login page and provides the required credentials to log into the system.

**Response:** The system verifies the user's credentials and approves the login request if the user has provided the correct credentials. If not, the system shows information to let the user know that the email or(and) password is incorrect.

#### 4.2.3 Functional Requirements

User Login Requirements are represented uniquely with a ULRX tag, where ULR stands for User Login Requirements and X represents the serial number.

**RLR1:** System must let the user know about the limit of login attempts. If the limit is reached then the user has to re-try to log in after a certain time.

**RLR2:** System must now show the original password while the user is providing credentials.

**RLR3:** System must ask the user to take a few quick pieces of information to be familiarized with the system if the user logs in for the first time.

**RLR3:** The system must redirect users to change their password after they log in for the first time.

**RLR4:** The system must allow the user to log in using his/her username and password.

**RLR5:** The system must allow users to reset their password by clicking on "I forgot my password" and receiving a link to their verified email address.

### **4.3 Password Recovery (KAA, SCQ, International Expert, APC Expert, HEI Quality Coordinators, Academic staff)**

#### 4.3.1 Description and Priority

Registered users must be able to recover his/her password in case the user has forgotten it.

#### 4.3.2 Stimulus/Response Sequences

**Stimulus:** The user accesses the password recovery page from the login page and provides the personal email that is linked to his/her account.

**Response:** The system sends a new generated password to the specified email (personal email for researchers, institutional email for institution coordinator).

#### 4.3.3 Functional Requirements

Researcher Password Recovery Requirements are represented uniquely with a RPRRX tag, where RPRR stands for Researcher Password Recovery Requirements and X represents the serial number.

**PR1:** System must provide the option to recover the password and redirect the user to the recovery page through the login page.

**PR2:** System must send a new generated password to the specified email address that the user has provided.

### **4.4 Dashboard Customization (KAA, SCQ, International Expert, APC Expert, HEI Quality Coordinators, Academic staff)**

#### 4.4.1 Description and Priority

eAkreditimi is designed to show information using dashboards. Users can personalize the

dashboards by customizing all the features that are used to improve the efficiency of the system. Dashboards that are offered in eAkreditimi are profiles, applications, projects, programs, courses and results dashboards.

#### 4.4.2 Stimulus/Response Sequences

**Stimulus:** The user accesses the customize dashboards page and clicks the customize button.

**Response:** The system provides options to drag or resize the dashboards.

#### 4.4.3 Functional Requirements

Dashboard Customization Requirements are represented uniquely with a DCRX tag, where DCR stands for Dashboard Customization Requirements and X represents the serial number.

**DCR1:** System must provide the option to customize dashboards.

**DCR2:** System must take the approval of the user to submit the changes that have been provided.

**DCR3:** System must ask the user if s/he is sure to leave the page without submitting the new changes if the user requires to change the page.

## 4.5 Application Management feature

### 4.5.1 Description and Priority

All HEI apply for re/accreditation of their institutions and programs under KAA requirements with respective standards and regulations. Through eAkreditimi 2.0, the institutions should be able to create a case to apply for the re/accreditation processes in institutional and program level, by filling the data as specified in Appendix E (institutional data entry) or F (program data entry). Each time HEI QC creates a case, the same will be reflected with a notification email to KAA and SCQ, as well as be listed in queue of cases.

### 4.5.2 Stimulus/Response Sequences

**Stimulus:** HEI QC creates a case to apply for institutional re/accreditation.

**Response:** System stores the cases into the database and sends an email to KAA and SCQ members.

**Stimulus:** HEI QC checks the progress bar of the open cases for the institutional re/accreditation.

**Response:** System shows the cases progress bar in the Application Management module.

**Stimulus:** HEI QC withdraw the institutional re/accreditation applications.

**Response:** System closes the cases and shows the progress bar as finished with the status withdrawal in the Application Management module.

**Stimulus:** HEI QC updates the institutional re/accreditation applications.

**Response:** System shows a notification that the application has changed the status and the HEI QC can edit/upload/submit new requested information/documents.

**Stimulus:** HEI QC creates a case to apply for program re/accreditation.

**Response:** System stores the cases into the database and sends an email to KAA and SCQ members.

**Stimulus:** HEI QC checks the progress bar of the open cases for the program re/accreditation.

**Response:** System shows the cases progress bar in the Application Management module.

**Stimulus:** HEI QC withdraw the program re/accreditation applications.

**Response:** System closes the cases and shows the progress bar as finished with the status withdrawal in the Application Management module.

**Stimulus:** HEI QC updates the program re/accreditation applications.

**Response:** System shows a notification that the application has changed the status and the HEI QC can edit/upload/submit new requested information/documents.

### 4.5.3 Functional Requirements

Application Management Requirements are represented uniquely with a AMRX tag, where AMR stands for Application Management Requirements and X represents the serial number.

**AMR1:** The system must validate data if the HEI QC has filled all required fields for the new institutional re/accreditation.

**AMR2:** The system must validate data if the HEI QC has filled all required fields for the new program re/accreditation.

**AMR3:** The system must send a confirmation email to all applicants letting them know that the new application has been created successfully.

**AMR4:** The system must send a notification to KAA and SQC for a new successful created application.

**AMR5:** The system shall define the initial status for a new applications in Application management module.



**AMR6:** The system must list all new applications as cases in Application management module.

**AMR7:** The system must provide an edit button if there are changes related to the applications.

**AMR8:** The system must provide an updated button for changing the status of each application.

**AMR9:** The system must list all the comments/feedback to each checkpoint within the progress bar of the application.

**AMR10:** The system must send a notification email to all applicants letting them know that new data are requested for an open application.

**AMR11:** The system must send a confirmation email to all applicants letting them know that the application has completed.

**AMR12:** The system must send a decision to all applicants with the final board decision.

**AMR13:** The system shall list the application as completed with all the information exchanged during the whole six checkpoints.

## 4.6 Project Management feature

### 4.6.1 Description and Priority

All user classes shall be able to manage its respective projects. Project management includes creation, modification, deletion, and viewing of projects at the institutional level that is coordinating and/or contributing as members of the projects at the national and international project level. *The respective user classes modify project details, can create and assign the results to each specific project. The respective user classes should be able to view their institution's projects and search through them..*

### 4.6.2 Stimulus/Response Sequences

**Stimulus:** Each User CRUD a project collaboration request.

**Response:** The system provides the user the ability to create, read, update or delete projects collaboration request.

**Stimulus:** Each User downloads a mandate letter for approved collaboration in respective project.

**Response:** The system provides the user to download the Mandate Letter for those projects that are accepted for collaboration.

**Stimulus:** Each User views or modifies a project.

**Response:** The system suggests the user the list of projects added by Kosovo Research Information System platform. The systems enables the user to edit/modify and claim/disclaim the listed projects under their profiles.

**Stimulus:** User views the list of individual projects

**Response:** System reads the list of individual projects from Kosovo Research Information systems and lists all individual projects in Project Management module.

**Stimulus:** User views the list of their institutional projects with her/his respective role

**Response:** System reads the list of institutional projects from Kosovo Research Information systems and lists all institutional projects in Project Management module.

**Stimulus:** User claims the suggested project.

**Response:** System suggests individual/institutional project that matches with his/her personal information details and once it is claimed from the user the system lists the project in Project Management module.

**Stimulus:** User disclaims the suggested project.

**Response:** System suggests individual/institutional project that matches with his/her personal information details and once it is disclaimed from the user the system dismiss the respective project in Project Management module.

#### 4.6.3 Functional Requirements

Project Management Requirements are represented uniquely with a PMRX tag, where PMR stands for Project Management Requirements and X represents the serial number.

**PMR1:** The system must validate data if the user has requested to collaborate in a project.

**PMR2:** The system must list the suggested individual project claimed by the user.

**PMR3:** The system must list the suggested institutional project claimed by the user.

**PMR4:** The system must dismiss the suggested individual project disclaimed by the user.

**PMR5:** The system must dismiss the suggested institutional project disclaimed by the user.

**PMR6:** The systems enables the user to edit/modify the listed projects under their profiles.

## 4.7 Browsing catalog module

### 4.7.1 Description and Priority

KAA and SCQ can view all HEI staff, program, project and course catalogs. They can search through them based on title, staff name, institution name, program name, course name, - to name a few.

HEI QC shall be able to browse its institution staff catalog, program catalog, project catalog and course catalog.

### 4.7.2 Stimulus/Response Sequences

**Stimulus:** KAA and SCQ views the staff profile, programs, courses or searches through them.

**Response:** The system allows the KAA and SCQ to view all HEI staff members, accredited institutions, accredited programs, comments and feedbacks to each accredited programs, courses related to specific programs, the matrix of staff and courses and the schedule.

**Stimulus:** HEI QC views their respective staff profile, programs, courses or searches through them.

**Response:** The system allows the HEI QC to view all their staff members, accredited programs, comments and feedbacks to the respective programs, courses related to specific programs, the matrix of staff and courses and the schedule.

**Stimulus:** HEI QC CRUD the matrix academic staff vs courses for specific program in each semester.

**Response:** The system allows the HEI QC to CRUD the matrix academic staff vs courses for specific programs in semester bases.

**Stimulus:** HEI QC CRUD the schedule for specific program in each semester.

**Response:** The system allows the HEI QC to CRUD the schedule for specific programs in semester bases.

### 4.7.3 Functional Requirements

Browsing Catalog Requirements are represented uniquely with a BCRX tag, where BCR stands for Browsing Catalog Requirements and X represents the serial number.

**BCR1:** The system must provide all existing staff members to the KAA and SCQ.

**BCR2:** System must allow the KAA and SCQ to search through the staff members based on name, surname, institution name, personal ID.

**BCR3:** The system must provide all information details of staff members to the KAA and SCQ with respect to their engagement in semester bases.

**BCR4:** The system must provide all accredited institutions to the KAA and SCQ.

**BCR5:** System must allow the KAA and SCQ to search through the accredited institutions based on name, acronym, licence ID.

**BCR6:** The system must provide all accredited programs to the KAA and SCQ.

**BCR7:** System must allow the KAA and SCQ to search through the accredited programs based on name, acronym, licence ID.

**BCR8:** The system must provide all organised courses of respective programs to the KAA and SCQ.

**BCR9:** System must allow the KAA and SCQ to search through the courses of accredited programs based on name, acronym.

## 4.8 Match-Making with Program

### 4.8.1 Description and Priority

KAA will provide a Kosovo Subject Area Code to the economical operator which will translate into online calculator. Each time an institution shows interest to apply for new programs, the HEI QC shall be able to check the matching of the staff background with specific program.

#### 4.8.2 Stimulus/Response Sequences

**Stimulus:** HEI QC checks the matching possibilities of a program holder staff with a specific program with respect to his/her doctorate.

**Response:** The system allows the HEI QC to check the matching of program holders doctorate with programs prior to application of program accreditation.

**Stimulus:** HEI QC checks the matching possibilities of a program holder staff with a specific program with respect to his/her research.

**Response:** The system allows the HEI QC to check the matching of program holders research publications with programs prior to application of program accreditation.

**Stimulus:** HEI QC checks the matching possibilities of a program holder staff with a specific program with respect to his/her mater education.

**Response:** The system allows the HEI QC to check the matching of program holders master education with programs prior to application of program accreditation.

#### 4.8.3 Functional Requirements

Match-Making Requirements are represented uniquely with a MMRX tag, where MMR stands for Match-Making Requirements and X represents the serial number.

**MMR1:** The system allows HEI QC to check the compatibility of staff doctorate with respective programs.

**MMR1:** The system allows HEI QC to check the compatibility of staff master degree with respective programs.

**MMR2:** The system allows HEI QC to check the compatibility of staff research publications with respective programs.

## **4.9 Quota Calculator**

### 4.9.1 Description and Priority

KAA will provide a Quota Calculator Formula to the economical operator which will translate into online calculator. Each time an institution shows interest to apply for new programs, the HEI QC shall be able to check the potential student quota for each new program.

### 4.9.2 Stimulus/Response Sequences

**Stimulus:** HEI QC checks the potential student quota for the new program.

**Response:** The system allows the HEI QC to check the student quota for the new potential program based on the KAA formula (including ratio student-staff, student-infrastructure, investment on research, labour market demands etc)

### 4.9.3 Functional Requirements

Quota-Calculator Requirements are represented uniquely with a QCRX tag, where QCR stands for Quota Calculator Requirements and X represents the serial number.

**QCR1:** The system allows HEI QC to check the potential student quota for the new application program.

## 4.10 Results Publication feature

### 4.10.1 Description and Priority

The following features will be open and publicly accessible unless differently is requested by KAA: (i) Institutional Profiles and accredited programs, (ii) staff engagement in respective institutions, (iii) staff background and research capacities, (iv) the number of students enrolled in each program, (v) all decisions with respect to institution and program accreditation process.

The International Expert evaluation comments should be translated into rating and possibly ranking of accredited institutions and programs.

### 4.10.2 Stimulus/Response Sequences

**Stimulus:** End user searches for accredited institutions.

**Response:** System lists the institution profiles associated by the latest international expert feedback.

**Stimulus:** End user searches for accredited programs.

**Response:** System lists the accredited program associated by their institution profiles and students enrollment quota.

**Stimulus:** End user searches for academic staff.

**Response:** System lists the academic staff associated with the accredited program associated by their institution profiles.

### 4.10.3 Functional Requirements

Results Requirements are represented uniquely with a RRX tag, where RR stands for Results Requirements and X represents the serial number.

**RR1:** The system must show a list of accredited institutions.



**RR2:** The system must show a list of accredited programs.

**RR3:** The system must show a list of staff wrt accredited programs.

**RR4:** The system must show a list of staff wrt accredited programs.

**RR4:** The system must show the student enrollemnt quota for each accredited programs.

## 4.11 Generation of reports

### 4.11.1 Description

Generation of results is a very important module within eAkreditimi, and all actors of this system have their appropriate variables that are both feasible to collect, and that can provide the relevant indicators for management.

Since the application will communicate with:

- Ministry of Science Education, Technology and Innovation (MESTI)
- Kosovo Agency of Statistics
- Kosovo Research Information Systems
- And other states institutions / Ministries

Initially, from eAkreditimi there will be generated standard reports for each of the actors, such as:

- Number of accredited HEI
- Number of public accredited HEI
- Number of private accredited HEI
- Number of academic staff in the HEI
- Number of full time academic staff in the HEI
- Number of academic staff in HEI according to education level classification
- Number of academic staff in HEI according to education domain classification
- Number of academic staff in HEIs in total according to the Age and Gender Group
- Number of academic staff engaged in one HEI
- Number of academic staff engaged in more then one HEI
- Number of academic staff engaged in public HEI
- Number of academic staff engaged in private HEI
- Number of academic staff in public and private HEI wrt education level
- Number of employees for research and development in public and private HEI concerning the Age and Gender Group
- Employees involved in activities for research on a service contract or author's contract expressed in physical number of persons and full-time equivalent;

- Expenditures for each HEI research activity
- Sources of funds for each HEI research activity
- Classification of all funds spent annually (from January 1st to December 31st), for projects realized and unfinished for research and development, according to the fields of science and socio-economic objectives.
- Expenditures on buying services for each HEI research.

Templates as requested by administrative instruction (MEST) No. 17 /2017 on enrolment and licensing of scientific research institutions

- Total number of researchers according to gender
- Number of academic staff with Ph.D. or higher degree
- Number of academic staff with MA and Master
- Number of academic staff under 35 years
- Number of academic staff above 35 years
- Innovations in the last 5 years per HEI
- Number of registered patents in the last 5 years per HEI
- Ph.D. who has been supervising in the last five years
- Local and international Ph.D. publications in the three years after receiving the call
- Connection of research institutions to industry and the nature of cooperation
- Research projects that institution coordinates and their financial value
- Projects where the institution participates as a partner and their financial value
- Project at the national level and their financial value
- International projects and their financial value
- List of academic staff who meet the criteria for receiving the academic title of assistant professor (see criteria for academic titles)
- List of academic staff who meet the criteria for receiving the academic title associate professor (see criteria for academic titles)
- List of academic staff who meet the criteria for receiving the academic title full professor (see criteria for the academic title)

However, during the development of the application, the economic operator will have to

contact all stakeholders and create a mapping module with all relevant variables to establish a customized process for generating statistical reports (based on their specific templates) and visualization of them on the fly.

In this respect, the stakeholders (the working group in this project) will be able to customize their variables (on-the-fly) based on their needs and will be able instantly to generate statistical and visual reports similar to the open-source platform <https://app.rawgraphs.io/> . For additional generation of reports, the same open-source platform shall be integrated for the visualisation module in eKAA system.

All generated reports need to be exported in various formats, such as PDF, PNG, JPG, CSV, XLSX– to name a few.

#### **4.12 End-to-End Case-based application (see Appendix C providing a set of screenshots )**

The overall accreditation process should behave like case based system, where:

- Initially the institutions create a case for accrediting or reaccrediting the institution
- Initially the institutions create a case for accrediting or reaccrediting the program (see the paper template which needs to be digitalised)
- List of under accreditation cases can be allocated by KAA/SCQ
- Decision for going under the review process will be initiated (green cases)
- Decision for rejecting the cases to go under review (red cases)
- KAA will assign for each green cases a number of international expert
- Institutions can accept or reject the proposals
- International Expert will see the list of accreditation program associated with his/her account
- International Expert can accept or reject the recommended programs for re/accreditation based on his/her expertise
- International Expert will submit a draft evaluation report to KAA and Institutions
- Institutions will send additional documents if needed to KAA and International Expert
- International Expert will submit the final evaluation report associated with final evaluation rating
- SCQ should see a list of programs/institutions that have gone through evaluation process
- Director should initiate a SCQ meeting
- Director should present through this system the list of programs that are under accreditation process
- SCQ chairman/chairwoman should initiate a voting process (anonymous/unanonymoys)
- SCQ members should provide a voting for each program/institution associated by comments
- SCQ should see the results for each voting process
- The voting system should gather all comments from each of the SCQ member and generate a draft decision report
- SCQ chairman/chairwoman should go through the draft decision and edit/modify/update text system errors but not the final decision result and produce a final readable decision document
- All decision documents are acceable by institutions/KAA/SCQ/International Expert
- Institution may intiate appealing case

- Appealing Committee will check each case through procedure oriented approach and realse a decision
- All decision from Appealing committee will be served in the upcoming SCQ committee meeting.
- Director should submit the meeting minutes for each SCQ meeting
- SCQ should have access to all documents through eAkreditimi 2.0

#### **4.13 Implementation of end-to-end case-based application**

- Once the end-to-end case based application is established no email/paper circulation of information should be accepted with respect to program and/or institution accreditation and/or reaccreditation.

## **5. Other Nonfunctional Requirements**

### **5.1 Performance Requirements**

The platform must be interactive and the delays that might happen must be fewer. In every action-response process, there are no immediate delays. In the case of submitting forms, uploading files, and saving settings there lower than 2 seconds delay. In the case of searching for information, there are no delays, and the operation should be performed in less than 2 seconds, including searching, sorting, and computing information. When the user opens the platform on the browser the platform should be opened in less than 1 second.

### **5.2 Security Requirements**

The system must provide high data security. Two-Factor Authentication must be an option when users log in and their passwords must be stored encrypted. Once a year users will be redirected to generate a new OAuth for their account to continue using the system. Users should be managed according to their roles, where users who are not authorized to run specific functions then these functions are not displayed in their UI. A network where eAkreditimi will operate should be secure and the whole system including the database should be defended from external attacks (in our case in ASHI). To be a platform that provides secure and accurate data, the system needs to have implemented the validation and sanitization of data before storing them into the database. The users could access the eAkreditimi platform only from their respective institutions' domains.

### **5.3 Software Quality Attributes**

Additional system's quality characteristics that are important to the users and developers are:

#### **Functional suitability:**

- Represents the degree to which eAkreditimi provides functions that meet stated and implied needs when used under specified conditions. It is composed of three sub-characteristics that are important for the quality of our platform:
  - ❖ functional completeness
  - ❖ correctness

- ❖ appropriateness.

**Reliability attribute:**

- Represents the availability and recoverability of the system. eAkreditimi is a system that should not crash or go down, but even when it does it should have a quick recovery. Availability is the ratio of the available system time to the total working time or said in other words uptime. eAkreditimi availability ratio should be higher (99% in yearly bases) than the normal period and the downtime should be as low as possible.

**Performance efficiency:**

- eAkreditimi must offer efficient performance by using resources rationally and having a large capacity for processing information. Delays in eAkreditimi should be as rare as possible.

**Usability and utility:**

- These attributes guarantee the success of eAkreditimi because if a platform does not have high usability, high utilization, and is not easy to learn then using the platform will not be easy and correct and people will not use it. For eAkreditimi to fulfill the utility attribute, it must provide the features that users need, and to fulfill the usability attribute its functions must be easy and pleasant to use (see Gestalt principles in UI, UX). So, eAkreditimi is required to be useful, where useful = usability + utility. This will play an important role once evaluating the economic operator.

## **5 Requirements for project management**

### **5.1 Implementation requirements**

As explained in the Tender Dossier for this specific application the project should be implemented only according to the requirements in this document. The whole system should be provided in three different languages: Albanian, English and Serbian. The same document will be used to verify the final eAkreditimi system version, before the economic operator's hands over the eKAA system to the KAA. Any deviation from these requirements should be done only with the written approval from the Director and KAA board. The economic operator must also provide the dynamic plan for realization of the complete project as well as other specified documentation in Dossier of Tender.



## **5.2 Subcontracting**

It can be done following the contract and only after informing the project manager.

## **5.3 Admission conditions**

The eKAA system will be considered accepted only after the successful completion of all test scenarios as an additional activity to V Model software testing that will be performed after each stage of the system development lifecycle (including Unit testing, Integration testing, System testing and Acceptance testing). Each test will be recorded in the protocol book associated with the test case and the results achieved. The protocol book will be signed by the project manager.

## **5.4 Delivery conditions**

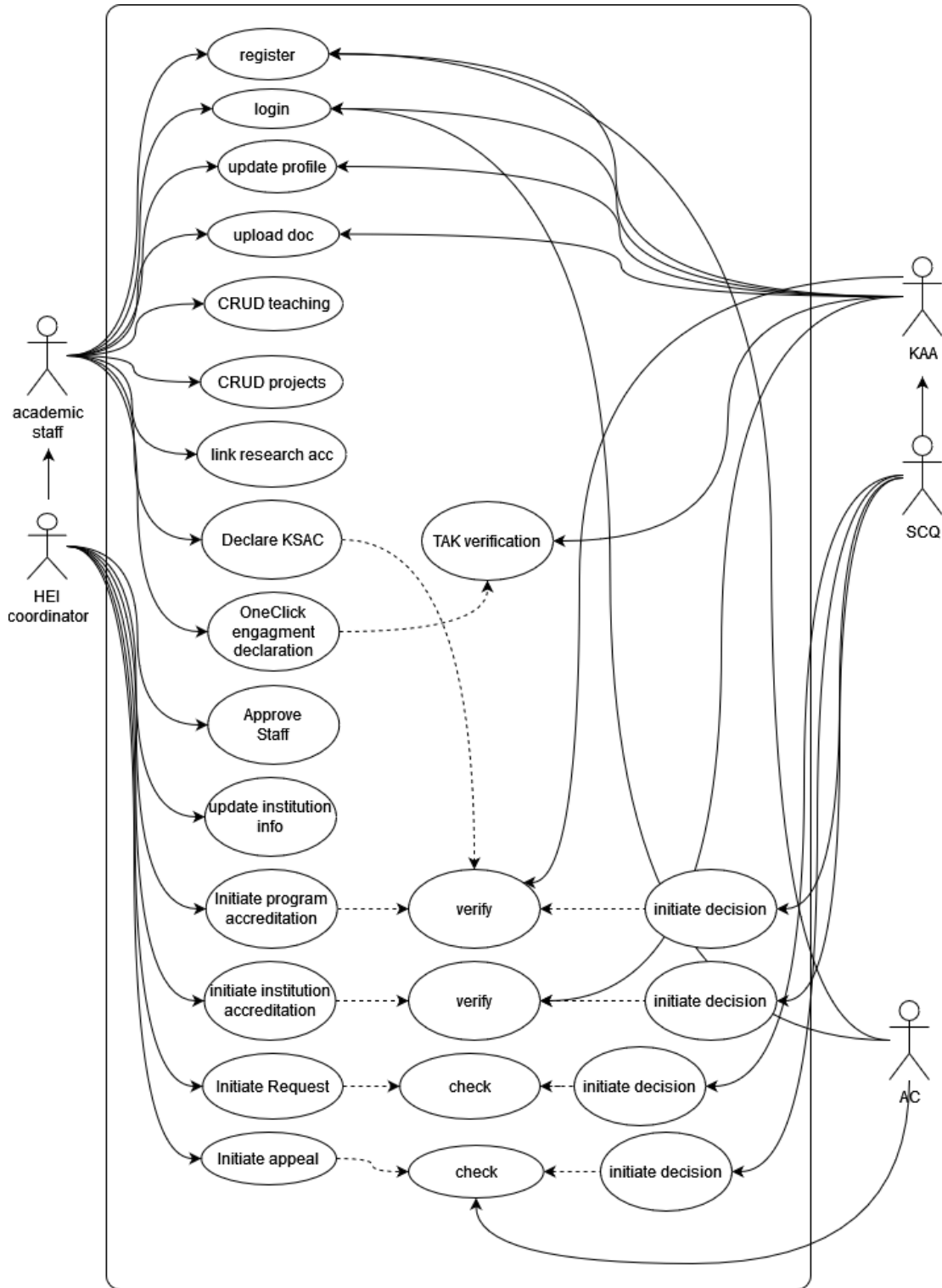
The system must be ready after 180 working days after signing the contract and the maintains shall continue from the economic operator in the next 2 years. Until that time, the economic operator shall train a local officer from KAA who will be fully known to continue the maintains of the system. Additionally, the economic operator is required to provide warranty for the additional period of 36 months, that the software will operate substantially according to the specifications. The warranty services include: resolving design problems, adding of the new features, creation of the additional necessary reports, make necessary changes/adjustments to enable data exchange with other systems.

## **5.5 Software Ownership**

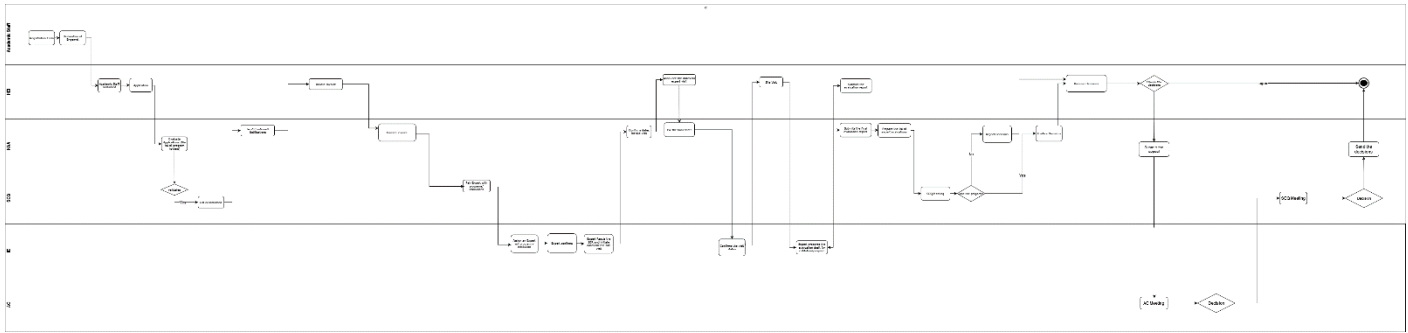
The KAA will be the owner of the developed system and the source code implying full availability of independent maintenance and subsequent development of the software. The economic operator is obliged to draw up and submit to the KAA complete technical documentation about the system with the source code of all software applications comprised by the handover process.

# Appendix A: UML Diagrams

## eAkreditimi Use Case Diagram



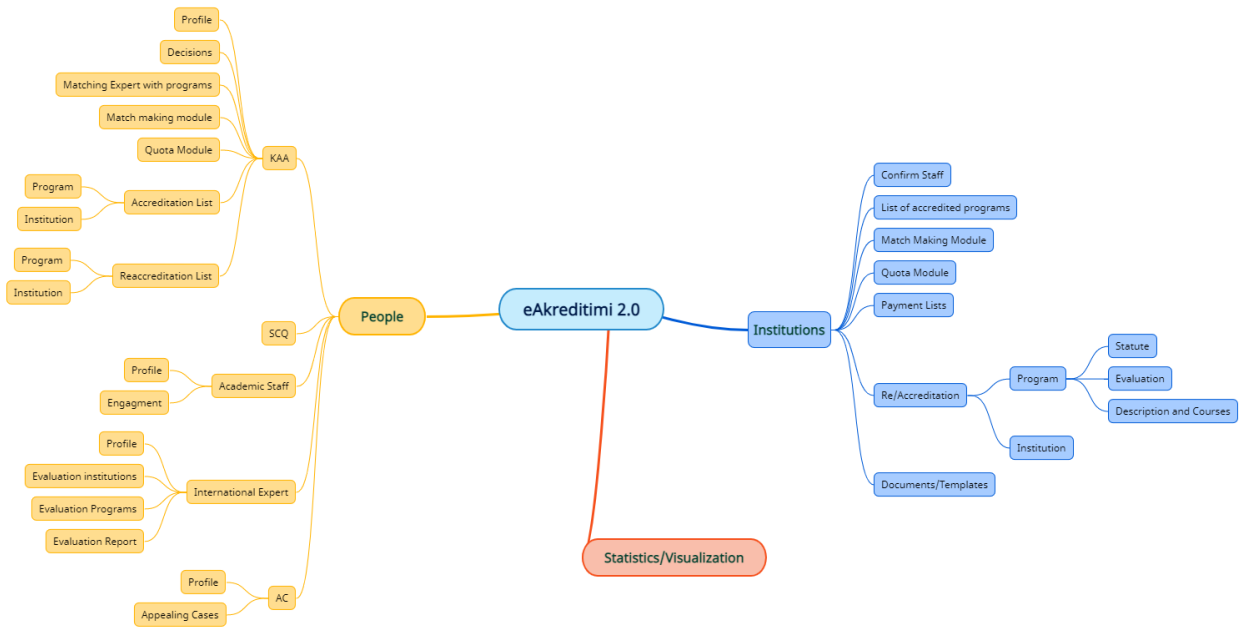
## Swimlane Diagrams



The accreditation process following all activities in five user classes:

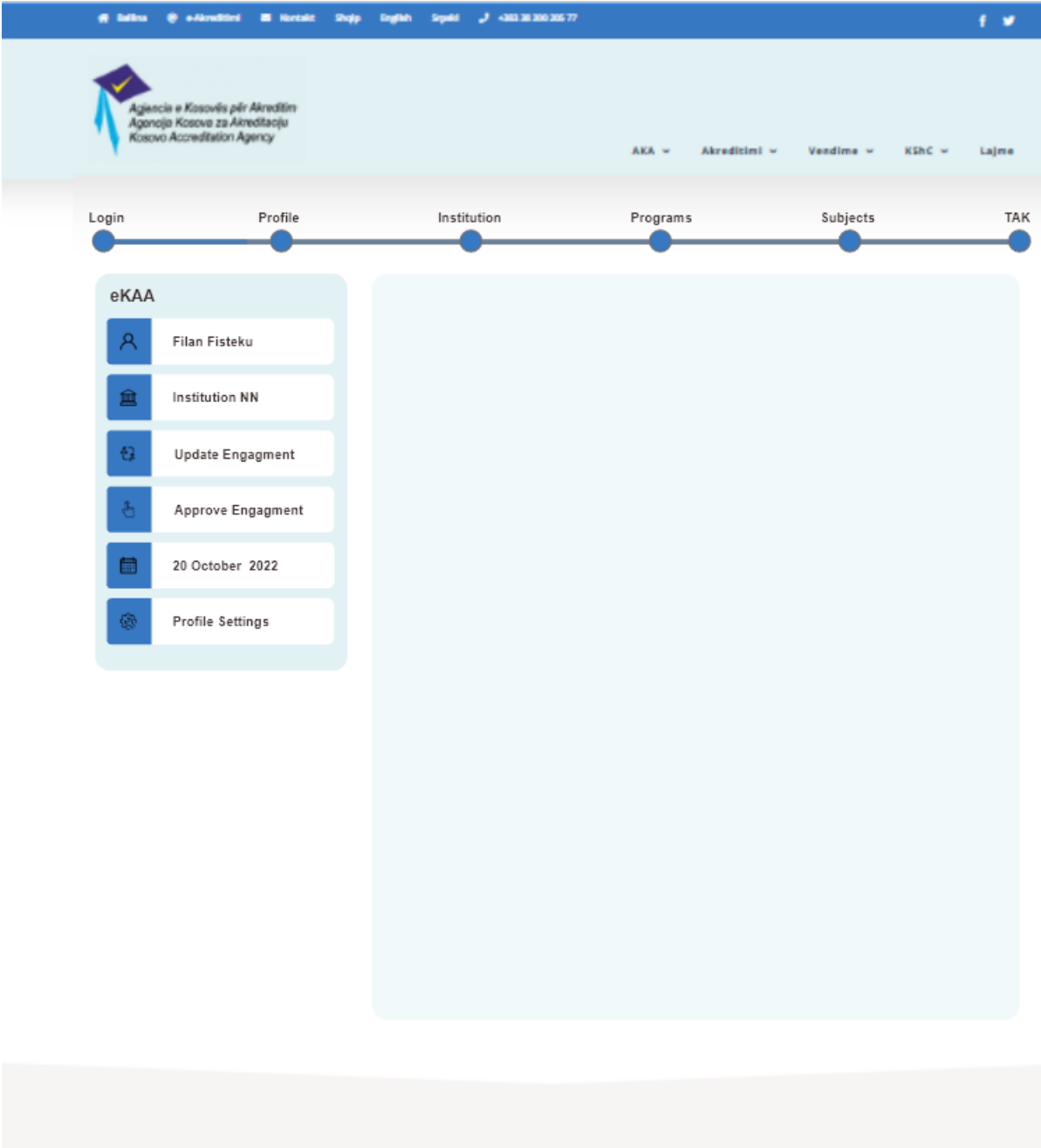
- Institutions
- KAA
- SCQ
- International Experts and
- Appealing Committee

# Appendix B: Mind Mapping



# Appendix C: User Interfaces

## Login Page



# Program accreditation Submission

The screenshot displays the user interface of the eKAA (Kosovo Accreditation Agency) web application. At the top, there is a navigation bar with links for 'Bashkia', 'e-Akreditimi', 'Kontakt', 'Shqip', 'English', 'Sipër', and a phone number '+383 36 200 355 77'. The main header features the agency's logo and name in Albanian and English, along with a menu containing 'AKA', 'Akreditimi', 'Vendime', 'KShC', and 'Lajme'. A progress bar below the header shows the current stage: 'NN Program Accreditation' (highlighted in blue), followed by 'Decision 1', 'Payment', 'SER', 'Evaluation', and 'Decision :'. The main content area is divided into two panels. The left panel, titled 'eKAA', contains a user profile for 'Filan Fisteku' at 'Institution NN', with buttons for 'Update Engagment', 'Approve Engagment', a date '20 October 2022', and 'Profile Settings'. The right panel, titled 'Computer Science Program', includes sections for 'Program Holders' (listing 'Krenare Pireva Nuci, KSAC: 6.4.2'), 'Program Description' (with a paragraph of Lorem Ipsum text), and 'Subjects' (with two columns of '» Lorem ipsum dolor sit amet' entries). A 'next »' button is located at the bottom right of the right panel.

# Submitting SER

The screenshot displays the eKAA (Kosovo Accreditation Agency) web application interface. At the top, there is a navigation bar with links for 'Bashka', 'e-Akreditimi', 'Hortaret', 'Shqip', 'English', 'Sipëri', and a phone number '+383 38 200 205 77'. The main header features the agency's logo and name: 'Agjencia e Kosovës për Akreditim Agencija Kosova za Akreditaciju Kosovo Accreditation Agency'. Below the header is a navigation menu with 'AKA', 'Akreditimi', 'Vendime', 'KShC', and 'Lajme'. A progress timeline at the top shows six stages: 'NN Program Accreditation', 'Decision 1', 'Payment', 'SER' (the current stage), 'Evaluation', and 'Decision 2'. The 'SER' stage is highlighted with a blue circle.

**eKAA**

- Filan Fisteku
- Institution NN
- Update Engagement
- Approve Engagement
- 20 October 2022
- Profile Settings

### Computer Science Program

**Program Holders**

Krenare Pireva Nuci, KSAC: 6.4.2  
Krenare Pireva Nuci, KSAC: 6.4.2  
Krenare Pireva Nuci, KSAC: 6.4.2

**Program Description**

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed turpis leo, porta in arcu non, faucibus egestas tellus. Ut diam eros, consectetur eget tortor vitae, blandit interdum velit. Aenean luctus erat ultrices pharetra rhoncus. Mauris nisl augue, fringilla quis facilisis id, blandit nec dolor. Donec porta, augue a gravida consectetur, nunc tellus gravida orci, vel volutpat dolor ipsum non ligula. Suspendisse porttitor orci eget mi pulvinar tincidunt. In hac habitasse platea dictumst. Nam a ligula tempor, maximus ligula ut, aliquet elit. Cras fringilla nulla felis, eu venenatis mauris scelerisque et. Nunc scelerisque

**Self Evaluation Report upload**

Choose File SER v1.0.pdf Submit

- » Self Evaluation Report v1.0 Date: 20 Dec 2021
- » Self Evaluation Report v 2.0 Date: 20 Jan 2021

« previous | next »

# Recommend International Expert

The screenshot displays the user interface of the eKAA (e-Kosovo Accreditation Agency) system. At the top, there is a navigation bar with the agency's logo and name in Albanian and English, along with menu items for 'AKA', 'Akreditimi', 'Vendime', 'KShC', and 'Lajme'. A progress bar below the navigation indicates the current stage: 'Evaluation', with other stages being 'NN Program Accreditation', 'Decision 1', 'Payment', 'BER', and 'Decision 2'. The main content area is divided into two columns. The left column, titled 'eKAA', contains a list of user actions: 'Filan Fisteku' (with a person icon), 'Institution NN' (with a building icon), 'Update Engagement' (with a refresh icon), 'Approve Engagement' (with a hand icon), '20 October 2022' (with a calendar icon), and 'Profile Settings' (with a gear icon). The right column, titled 'Computer Science Program', provides details about the program, including 'Program Holders' (three entries for 'Krenare Pireva Nuol, K SAC: 8.4.2') and a 'Program Description' (a block of placeholder text). Below this, the 'Recommended International Expert' section features three candidate profiles, each with a name, 'K SAC Competibility' status, and a corresponding icon (checkmark, approved, or rejected). At the bottom right of this section, there are navigation arrows labeled '« previous | next »'.



# Draft Evaluation Report from International Experts

The screenshot displays the eKAA (Kosovo Accreditation Agency) web application. At the top, there is a navigation bar with links for 'e-Akreditimi', 'Kontakt', 'Shqip', 'English', 'Sipëri', and a phone number '+383 38 300 305 77'. The main header includes the agency's logo and name in Albanian and English, along with a menu for 'AKA', 'Akreditimi', 'Veprimet', 'KSHC', and 'Lajme'.

A progress bar at the top of the main content area shows the following steps: 'NN Program Accreditation', 'Decision 1', 'Payment', 'SER', 'Evaluation', and 'Decision 2'. The 'Evaluation' step is currently active.

The left sidebar, titled 'eKAA', contains several menu items: 'Filan Fisteku' (with a user icon), 'Institution NN' (with a building icon), 'Update Engagment' (with a refresh icon), 'Approve Engagment' (with a hand icon), '20 October 2022' (with a calendar icon), and 'Profile Settings' (with a gear icon).

The main content area is titled 'Computer Science Program'. It includes a 'Program Holders' section with three entries, each listing 'Krenare Pireva Nuol, KBAC: 8.4.2'. Below this is a 'Program Description' section with a paragraph of placeholder text. The 'Evaluation Documents' section features a document icon and the title 'Draft Evaluation Report', with subtext 'Submitted by: Filan Fisteku' and 'Submitted on: 1st of April 2022'. Three buttons are provided: 'Read', 'Download', and 'Add additional info'. At the bottom right of the main content area, there are navigation arrows labeled '« previous | next »'.

## Final Evaluation Report from International Experts

The screenshot displays the eKAA (Electronic Kosovo Accreditation Agency) web application. At the top, there is a navigation bar with the agency's logo and name in Albanian and English, along with menu items for AKA, Akreditimi, Vendime, KShC, and Lajme. A progress bar below the navigation bar shows the stages: NN Program Accreditation, Decision 1, Payment, BER, Evaluation, and Decision 2. The 'Evaluation' stage is currently active.

**eKAA**

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### Computer Science Program

**Program Holders**  
Krenare Pireva Nuol, KBAC: 8.4.2  
Krenare Pireva Nuol, KBAC: 8.4.2  
Krenare Pireva Nuol, KBAC: 8.4.2

**Program Description**  
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed turpis leo, porta in orou non, feulibus egectas tellus. Ut diam eros, consoletur eget tortor vitae, blandit interdum velit. Aenean luctus erat ultrices pharetra rhonous. Mauris nisi augue, fringilla quis feollitid id, blandit neo dolor. Donec porta, augue a gravida consoletur, nuno tellus gravida orol, vel volutpat dolor ipsum non ligula. Suspendisse portitor orol eget mi pulvinar finolund. In hac habitasse platea dictumct. Nam a ligula tempor, maximus ligula ut, aliquet elit. Cras fringilla nulla felle, eu venenatis mauris coelerisque et. Nuno coelerisque

**Evaluation Documents**

- Draft Evaluation Report**  
Submitted by: Filan Fisteku  
Submitted on: 1st of April 2022  
[Read](#) [Download](#) [Add additional info](#)
- Filan Fisteku replicated on 20th of April 2022
- Final Evaluation Report**  
Submitted by: Filan Fisteku  
Submitted on: 1st of May 2022  
[Read](#) [Download](#)

« previous | next »

List of accredited Programs (including the list of programs that are under accreditation process)

The screenshot displays the eKAA web application interface. At the top, there is a navigation bar with links for 'Ballina', 'e-Akreditimi', 'Nivoli', 'Shfaq', 'English', 'Gjendje', and a phone number '+383 38 300 305 77'. The main header features the logo of the Kosovo Accreditation Agency (Agjencia e Kosovës për Akreditim) and the text 'Agjencia e Kosovës për Akreditim' and 'Agjenca Kosovo za Akreditaciju'. Below the header, there are navigation tabs for 'AKA', 'Akreditimi', 'Vendime', 'KShC', and 'Lajme'. The main content area is titled 'Institution Programs' and is divided into two columns. The left column contains a sidebar with the 'eKAA' logo and several navigation buttons: 'Filan Fisteku', 'Institution NN', 'Update Engagement', 'Approve Engagement', '20 October 2022', and 'Profile Settings'. The right column is titled 'Institution NN' and contains a list of programs. The first section is 'Program under re/accreditation process', which includes two entries for 'Computer Science, by Filan Fisteku; Issued Date: 20 April 2019 until Date: 20 April 2022'. Each entry has a 'Under Reaccreditation' button. The second section is 'Program soon under reaccreditation process', which includes one entry for 'Information System, by Filan Fisteku; Issued Date: 20 April 2022 until Date: 20 April 2025' with an 'Initiate accreditation' button. The third section is 'Accredited Programs', which includes five entries for 'Information System, by Filan Fisteku; Issued Date: 20 April 2022 until Date: 20 April 2025', each with a 'Read Evaluation' button. At the bottom of the right column, there is a navigation link '« previous | next »'.

Customized Results based on ad-hoc needs (using open-source API for RawGraphs)

The screenshot displays the eKAA (Electronic Kosovo Accreditation Agency) web application. At the top, there is a navigation bar with links for 'Bashkë', 'e-Akreditimi', 'Horse', 'Shoqë', 'English', 'Sipërd', and a phone number '+383 30 200 205 77'. The logo of the Agency is on the left, and a menu with 'AKA', 'Akreditimi', 'Vendime', 'RSBC', and 'Lajme' is on the right. Below the navigation bar, the page title 'Institution / Programme' is visible. The main content area is divided into two sections: 'eKAA' on the left and 'Visualization Graphs' on the right. The 'eKAA' sidebar contains buttons for 'Fidan Fleteku', 'Institution NN', 'Update Engagement', 'Approve Engagement', '20 October 2022', and 'Profile Settings'. The 'Visualization Graphs' section features a title 'Labor Market skills linked with accredited programs' and a list of skills: 'Data Science', 'Software Engineering', 'Network Engineer', and 'Database Administrator'. Below this, there are three empty input fields labeled 'Program Reputation', 'Staff competences', and 'Research reputation'. At the bottom right of the graph area, there are navigation arrows: '« previous | next »'.



Agjencia e Kosovës për Akreditim  
Agencija Kosovo za Akreditaciju  
Kosovo Accreditation Agency

### Matching Programs with labor market skills

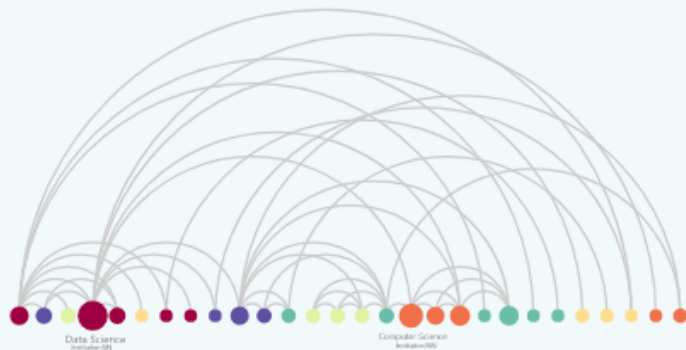
#### eKAA

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#### Visualization Graphs

##### Labor Market skills linked with accredited programs

- Data Science
- Software Engineering
- Network Engineer
- Database Administrator



« previous | next »



## Appendix D: CERIF – CRIS metadata

### eAkreditimi could use the CERIF standards for data entry

Accademic staff (similar to this should for all user classes)

accademicStaff

personName

familyName

OtherNames

Gender

Education

researchAccountinKRIS

experiences

docsRelated

ORCID

AlternativeORCID

ResearcherID

AlternativeResearcherID

ScopusAuthorID

AlternativeScopusAuthorID

ISNI

AlternativeISNI

DAI

AlternativeDAI

ElectronicAddress

Affiliation

Country

Accreditation

AccreditationFrom

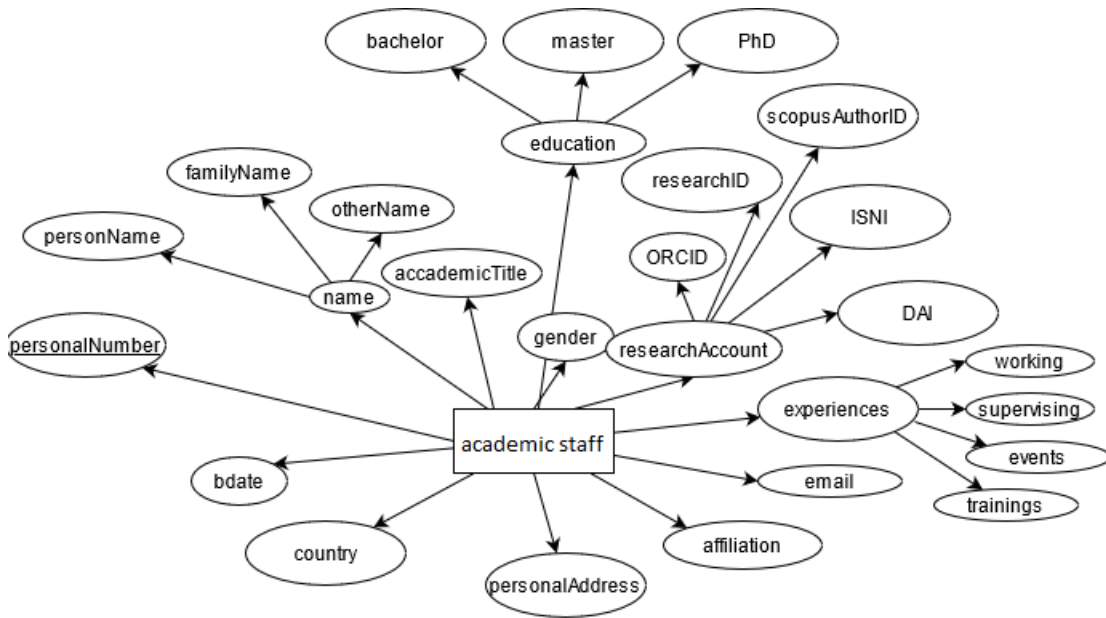
AccreditationTo

---

expertEvaluation

accreditationDecision

---





## Institution - HEI

Internal Identifier

Type

Acronym

Name

RORID

AlternativeRORID

GRID

AlternativeGRID

ISNI

AlternativeISNI

FundRefID

AlternativeFundRefID

Identifier

ElectronicAddress

Accreditation

AccreditationFrom

AccreditationTo

expertEvaluation

StartDate

EndDate

Keyword (matching  
with labour market)

Status

accreditationDecison

Rating

## researchEquipment

Internal Identifier

Type

Acronym

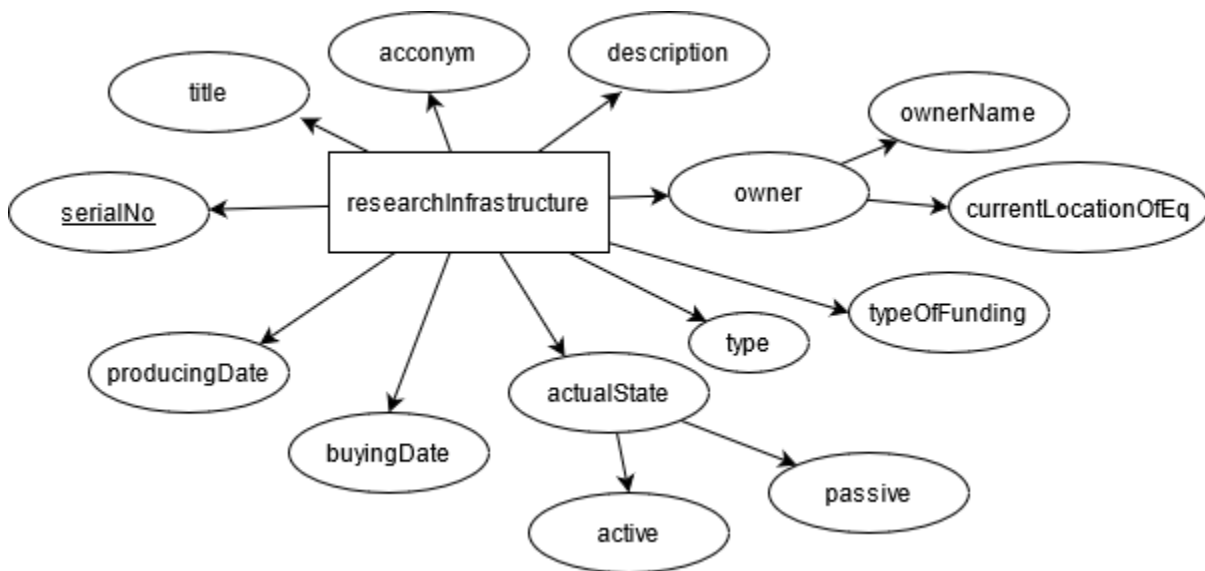
Name

Identifier

Description

Owner

---



## Program

Internal Identifier

Type

Acronym

Title

Decsirption

Subjects

Program Holders

StartDate

EndDate

Keyword (matching with labour market)

Status

accreditationDecison

Rating

---

## Project

Internal Identifier

Type

Acronym

Title

Identifier

StartDate

EndDate

Consortium (Coordinator, Partner, Contractor, InkindContributor, Member)

Team (PrincipalInvestigator, Contact, Member)

Funded (By, AS)

Subject

Keyword

Abstract

Status

Uses

OAMandate (mandated, uri)

## Event

### Internal Identifier

Type

Acronym

Name

Place

Country

StartDate

EndDate

Description

Subject

Keyword

Organizer

Sponsor

Partner