Zagreb, 27th May 2019

Subject: Notification to economic operators before the formal start of the public procurement procedure with the aim of prior market research

The Croatian Academic and Research Network - CARNET plans to start the public procurement procedure for designing, implementing and maintaining a high-performance and scalable Moodle system as well as Moodle system interface redesign and user experience optimisation in the 2nd phase of the programme: “e-Schools – a comprehensive informatization of school operation processes and teaching processes aimed at the creation of digitally mature schools for the 21st century”.

Accordingly, complying to the Public Procurement Act (NN 120/16), before the formal start of the public procurement procedure with the purpose of market research (in order to prepare the procurement and inform economic operators of its plans and procurement requirements), CARNET will publish requirements related to intended public procurement of:
i) design, implementation and maintenance of a high-performance and scalable Moodle system,
ii) Moodle system interface redesign and user experience.

CARNET offers hosting service and deliver online courses in the Moodle system. The system is divided in two instances - Loomen and Mooc. During this contract it will get divided in four production instances:
● **Instance 1** is intended for primary and secondary schools. This instance will allow user registration via AAI @ EduHr * user identity.optimisation
● **Instance 2** is intended for higher education institutions. This instance will allow user registration via the AAI @ EduHr user identity.
● **Instance 3** is intended for adult learners. This instance will allow user registration via AAI @ EduHr's user identity, but also in other ways (for example, using an email, Facebook account, Google account, etc.).
● **Instance 4** is intended for competitions, primarily for pupils. This instance will allow user login through AAI @ EduHr user accounts, but also in other ways.

At the time of writing this documentation, Loomen courses are organized in different categories, with 4022 courses in the category of ‘higher education institutions’, 1901 in the category of ‘primary schools’, and 2961 in the ‘secondary schools’ category, while the remaining 1541 courses fall under the ‘other institutions’ category.

Application, database and data are located on one server. The database is 97,5 GB and increases by about 10 GB every month. User data is 1 TB, and the Moodle application is currently on version 3.6.3. The current database is Maria, version 10.1.

Currently the system supports 1200 concurrent users.

As we expect a steady increase in the number of users and user activity, there is a need (1) to make the current system highly available and scalable, and (2) to improve the design and user experience.

For further planning and preparation of procurement documentation, we kindly ask all interested parties to submit comments and suggestions together with the estimated value of all cost items using the enclosed cost statements in accordance with the listed requirements, by June 4, 2019 at the latest, to the e-mail address: e-skole-nabava@carnet.hr.

The contractor's requirements are listed below.

CARNET will carefully analyze the information collected through this market research and, taking into account all the data obtained, compile procurement documentation.
When conducting market research, CARNET will act in a manner that does not distort competition or violate the principles of prohibition of discrimination and transparency.
The results of the research undertaken are not binding on CARNET nor do they create any legal business / relationship with the economic operators involved in the research.

Context of this procurement procedure

The e-School project is part of a comprehensive programme of modernizing the Croatian school system called "e-Schools: Complete informatization of business and education processes in the schools with a goal of creating digitally mature schools for the 21st century".

The overall objective of the e- Schools programme is to contribute to empowerment of the capacities of the primary and secondary education system with the goal of enabling pupils to become active participants of the labour market, pursue further education and engage in lifelong learning.

The e-School programme is implemented through the following:

1. Pilot project "e- Schools: Establishment of the system for the development of digitally mature schools (pilot project)" in the period from March 1, 2015 to August 31, 2018, involving 151 schools throughout Croatia,

2. The major project, which will last from September 1, 2018 to December 31, 2022.

The project coordinating body is the Croatian Academic and Research Network - CARNet. The competent authority for CARNet is the Ministry of Science and Education, while the Government of the Republic of Croatia is the competent authority for the Ministry. The project is funded by the European Regional Development Fund (ERDF) under the Operational Programme "Competitiveness and Cohesion" (OPCC) and the European Social Fund (ESF) under the Operational Programme "Effective Human Resources" (EHR) and for this reason, the project is divided into Project A (co-financed by ERDF) and Project B (co-financed by ESF).

Major e-Schools project - 2nd phase of the programme

The major e-Schools project and the activities envisaged therein are based on the results of the pilot project “e- Schools: Establishment of the system for the development of digitally mature schools (pilot project)”. 151 schools participated in the pilot project and it was implemented on March 1, 2015, with a planned duration until August 31, 2018. The planned duration of the implementation of the major project is from 1 September 2018 to the end of 2022. The value of the major project is estimated at approximately EUR 177,500,000.00.

e-Schools are digitally mature schools, connected with high speed Internet connection, equipped with adequate ICT tools and a high level of business and education processes automation. Employees in such schools are digitally competent, and students are encouraged and taught to become themselves digitally competent. Employees and learners use ICT equipment on a daily basis for the purpose of education, including, but not limited to, the use of educational applications and digital educational content, ensuring that students become competitive on the labour market.

Furthermore, in digitally mature schools, adequate use of information and communication technology (ICT) contributes to the following important aspects: effective and transparent school management, the development of digitally competent teachers more willing to apply innovations in their own pedagogical practices, and the development of digitally competent students more willing to continue their education and become more competitive in the labour market (indirect target).

The design, implementation and maintenance of a high-availability and scalable Moodle system

1. Object

The object of procurement is the design, implementation and maintenance of a high-availability and scalable Moodle system in the existing CARNET infrastructure.

These items include:
- System architecture design
- Implementation of the system
    - Establishing a new system
    - Migration of existing data from the old to the new system
    - Testing and optimization of the new system
    - Commissioning with users
    - Development of the project and technical documentation
    - Training for the contracting authority
- System maintenance

a. System architecture design

The system architecture design is developed for a system that can provide the service for at least 30,000 concurrent users * with the possibility of upgrading up to a possible 50,000 concurrent users.

The system is designed to allow the automatic addition / removal of new servers* (nodes) to increase / decrease system performance.

Each production instance* will have its own test instance* on a separate server. The selected tenderer is obliged to first set up a test instance with which the system functionality will be tested and, upon approval by the contracting authority, transfer the settings to the production instance during the commissioning phase.

Moodle instance will have multiple plugins that allow additional system functionality. Some of the plugins will be linked to other systems in CARNET, such as BigBlueButton and Virtual Programing Lab, which are separate servers on the CARNET network. The instance will have a few plug-ins, the list of which will be submitted by the contracting authority later.

The system architecture design should include a text description, a schematic representation of the system, as well as a system implementation calendar indicating the implementation phases with the appropriate duration and the dates of implementation.

b. System implementation

Establishing a new system

System implementation comprises installation of OSs on the contracting authority's available infrastructure. The contracting authority features a highly available infrastructure based on Linux Debian Xen technologies.

Using the required infrastructure, the selected tenderer will provide:
- a high-availability cluster with shared storage (SANs)
- scalable Moodle PHP application.

It is necessary to install several (3 or more, as required) physical Blade servers in the HA cluster environment, in such a way that the failure of one server does not jeopardize the availability of the service. There will be virtual servers on the same operating system with the installed components that make up the Moodle cluster:

● Load balancer - at least two servers or the use of the existing BIG-IP F5
● Web + application server - at least two servers and, if required, more
● Email server used to send email notifications from a Moodle application
● Shared storage server (NAS) – contains a Moodle app (and moodledata) served by web and app servers
● Session server – Moodle and AAI sessions available to web and app servers
● Database server – the Moodle application data

The selected tenderer is required to install the latest stable version of the Moodle application with the associated database and the corresponding Moodle application supported cache systems.

Migration of existing data from the old to the new system

After the new Moodle system implementation, data migration will be performed from two existing to four new Moodle instances.

The new system testing and optimization

After initial setup, specific orders will be made in agreement with the contracting authority, enabling the contracting authority to inspect the system's performance, including the application, database, cache, and all other components. For each system plugin and functionality, it is necessary to perform functional testing and performance testing.

The selected tenderer will set the system settings that ensure fast and unobtrusive work of a demanding number of users in accordance with Moodle's producers' recommendations and the testing results.

System compliance with safety standards and recommendations

The selected tenderer is obliged to enable the contracting authority to perform security testing:*

- Provide the contracting authority a test version identical to the production version,
- Provide the contracting authority with user accounts for all roles that exist in the system
- Provide the contracting authority with access to the production system
- Provide the contracting authority with updated technical documentation of the system.

The contracting authority will conduct the security testing periodically (at most once a year during the term of the contract) and exceptionally (upon request, in the event of system adaptation or in the event of security incident). The selected tenderer is obliged to remove any possible security faults according to the test results.

Commissioning with users

After the test mode optimization and testing, the selected tenderers are required to copy the test system settings and commission the production system instance in accordance with the agreement with the contracting authority.

Development of project documentation

The selected tenderer is required to develop the project documentation on all project components, from the operating system installation (OS), server connectivity, application settings, database settings, and cache settings with instructions on how to correct any possible error that occurs during the implementation of the design. The project documentation of the system will contain a text description and a schematic drawing of the system.

Training for contracting authority

The selected tenderers are obliged to deliver training for employees and / or co-ordinators of the contracting authority for a minimum of 5 working hours to maintain, optimize and operate the OS system and 5 hours to work in the Moodle application demonstrating upgrading procedures and attachment settings.

c. System maintenance

The maintenance of the system will last until the end of the e-School project. The selected tenderer is obliged to upgrade the system to the new version of Moodle for all instances separately at least once a year, and, if necessary, multiple times in accordance with the requirements of the system and agreement with the contracting authority. Prior to the upgrade, the selected tenderer is obliged to upgrade the test instances first, and then, after testing and optimization, do the same with the production instance.

The selected tenderer is required to run programmes in the system that will enable the system load monitoring and display on the contracting authority's internal pages. Likewise, the selected tenderer is required to run programmes that will enable system monitoring with alerts on critical events, such as processor overload and/or lack of memory or disk space, namely, events that could cause unavailability of the service.

In the case of system failure or congestion, the selected tenderer is obliged to respond promptly in order to eliminate all system defects and enable it to run smoothly.

2. Communication

Communication between the contracting authority and the contractor will be conducted via e-mail and telephone, and regular meetings will also be organized as well as those when the circumstances require it, in the contracting authority’s premises if necessary, or via a videoconferencing system.

3. Extended warranty for the sustainability of the supplied service functionality

Within the object of the procurement, during the period of at least 1 year after the completion of the contractual obligation, the selected tenderer is obliged to ensure the sustainability of the functionality of the supplied service at least at the same level at which the service was at the time of the handover, until the moment of upgrading the system to the new version of Moodle or until setting up new functional plugins on instances. The extended warranty encompasses the setting of all the parameters of the delivered service in order to ensure continuous functionality of the service during the warranty period.

4. Glossary

The AAI@EduHr system is the authentication and authorization infrastructure system used in science and higher education in the Republic of Croatia. Each institution in the system of the Ministry of Science and Education included in the AAI@EduHr system has its own database (the so-called LDAP directory) in which the electronic identities of users from that institution are stored. When assigning an electronic identity, each user receives a unique user ID and password that must be entered when using network access services, as well as when registering for various web applications using the AAI@EduHr infrastructure for authentication and authorization of users. Users have the right to an electronic identity in the AAI@EduHr system as long as they are in the system of the institution in which the electronic identity was received.

Automatic adding or removing of servers – The term automatic refers to adding or removing new servers (nodes) according to the system load, and everything has to run without losing connection to the server of existing users. Increase in the number of available servers (nodes) has to remain disclosed to the existing users.

Concurrent users – the concept of concurrent users refers to the total number of people simultaneously accessing the system (for example, simultaneously working on an activity such as a test, a forum, or viewing content).

Production instance – refers to the instance of Moodle that is accessed by real external users.

Security system testing - the security testing procedure involves detection of possible security vulnerabilities in automated analysis by using specialized tools and manual security checks.

Test instance – refers to a copy of the production instance, with no access outside CARNET's local network.

Moodle system interface redesign and user experience optimisation

1. Object

The object of procurement is the redesign and optimization of user experience of the Moodle system, which includes:

- Users' habits and needs study
- development of the wireframe and Moodle interface design for the system frontpage,
- development of the system's frontpage and Moodle plugin,
- infographics, and promotional educational videos for end-users.

a) Research into users' habits and needs

The selected tenderer will produce a research plan, complete the research and produce a report and recommendations.

Researching habits and user needs involves exploring user experience on the existing two Moodle instances, as well as users' and contracting authority's needs. In this study, the selected tenderer should include at least five end-users from each of the following six target user groups: (1) school teachers, (2) school students, (3) teachers at higher education institutions, (4) students at higher education institutions, (5) organizers of professional training and (6) adult trainees. At least five representatives of the contracting authority should be involved in the study.

b) Wireframe and design development

On the basis of research results – report and recommendations, the selected tenderer will develop wireframe and design of the system homepage as well as twenty-eight (28) different pages across 4 Moodle instances.

The wireframe should clearly demonstrate how the information on the related page will be organized, structured and presented to users, including their categorization, element names, system navigation and information search.

Site design should foster simple and logical navigation so that all elements are easily searched and accessible to users. The design of all four Moodle instances should be in line with CARNET's graphic standards. The design of all four instances should have a similar concept with the distinguishing features being: different colours of the title and background, transparency, font size, border colour and size, angle curves and similar properties.

Wireframe and design are submitted in digital format as files with jpg or png extensions.

The selected contracting authority will conduct Usability Evaluation of the wireframe and design concepts focusing on the solutions that will enable users to achieve their goals using the system and their satisfaction with the system. At least two representative end users from each of the six target user groups, and two representatives of the contracting authority should be included in usability evaluation.

c) System frontpage and plugin theme development

Based on the approved wireframe and design, the selected tenderer will make the system frontpage as an html page and the Moodle theme plugin for the other 28 pages. The plugin will be made in accordance with the technical specification for creating the standard Moodle plugins that can be found at: https://docs.moodle.org/dev/Plugin_files and compatible with the latest stable version of Moodle and all the plugins on Moodle instances of the contracting authority.

All interface elements in a theme have to be manageable in the administrator view, for example, changing colours, displaying or hiding various elements etc.

The theme should enable:
- a responsive layout
- each category and each course can choose their header and background
- multilingualism, or an option to translate all parts of the network visible to users in multiple languages by selecting a desired language in the menu available on the interface

The selected tenderer will make the design and the plugin adhering to accessibility guidelines for people with disabilities available at the following link: http://www.carnet.hr/preuzimanja in the document "Accessibility standards for network-accessible content and applications, original applications for mobile devices and desktops, e-books and content in learning management systems and other digital content".

All procurement solutions must be approved by the contracting authority. For each procurement decision, the contracting authority has the right to ask for modifications and adjustments for the duration of the contract.

The selected tenderer is obliged to provide the source code to the contracting authority. After delivery, the contracting authority becomes the owner of the source code and can manage it as desired. The selected tenderer will guarantee that the object of the procurement is an original work and that the copyright for all the external parts of the design has been regulated. The selected tenderer will transfer the right of use to the contracting body.

Testing and revision of the plugin

The contracting authority will add the plugin to the Moodle test instance provided by the contracting authority.

The selected tenderer will conduct separate testing of the plugin for each test instance involving at least five end-users from the user target group for that instance and at least three representatives of the contracting authority. Two user representatives for each instance must be persons with a different type of disability (motor difficulties, blind and partially sighted, dyslexia).

After testing, the selected tenderer will correct any detected irregularities and deviations from the approved wireframe and design, as well as technical specifications, and carry out additional testing of the new version of the plugin.

d) Creation of User tours, infographics and promotional/educational videos

The selected tenderer will create a special plugin – User tours, which will contain description of the interface elements on My homepage, course start page and activities on the system.

The selected tenderer will create 9 infographics in total and 8 promotional/educational video editions adapted to end-users from the user target groups.

Attached to this Notification, CARNET encloses a cost statement to be filled, in .xlsx form.

Interested economic operators can submit additional questions to e-skole-nabava@carnet.hr. CARNET will publish all relevant information based on additional questions on its web pages in the same way as this Notification.