

# LPI - Adaptive Mathematics Platform

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# 1. CALL AIM

Acquisition of an **adaptive platform for the teaching of mathematics** aimed at students and teachers of Basic Middle Education (ages 12 to 15) Product A and High School Education (ages 15 to 18) Product B.

A supplier may offer one product or both, the presentation of both products by the same supplier is not exclusive, since the products will be evaluated separately, and one or two platforms may be awarded to different suppliers.

The platform / s must be presented as a “finished product” in SaaS mode (content included).

The main objective of the tools is to make available to teachers and students resources and activities that enrich the teaching and learning processes of mathematics both within and outside the educational context, therefore the amount, adaptability and diversity of available materials (in topics and levels) is especially valued. It aims to acquire products that allow teaching to be personalized according to the students' own abilities.

Offers for customized developments will not be accepted.

Currently Plan Ceibal Uruguay has the Adaptive Mathematics platform (PAM) and Matific, provided by Bettermarks and Slate Science Operations PTY LTD, respectively. PAM focuses on 3rd to 6th grades of Primary Education and in Basic Middle Education, while Matific offers content from Initial Level 5th to 6th of Primary Education.

The minimum time horizon that Ceibal is able to guarantee for a contract is 3 years, provided that the project is successful in its first year of implementation. Each bidder must present its offer in accordance with the specifications of section 8.

## 2. INTRODUCTION

We are looking for a mathematics platform, including content, focused on learning and teaching the discipline for Basic Middle Education **Product A** (students aged between 12 and 15 years old) and High School Education (students aged between 15 and 18 years old) **Product B**.

It must ensure a meaningful learning experience, through relevant and appropriate proposals to the Uruguayan educational program. In the event that the Platform requires a mapping of its contents to reflect the Uruguayan program, it will be Centro Ceibal who will be in charge of making the curricular mapping. The bidder will be responsible for recording said classification on the platform. The content within the platform may include interactive content, audiovisual material, among others. They should be aimed at the target audience - not being mandatory, but valuable, having content for lower levels.

In parallel to the feedback that the student may receive from the teacher on the platform, it is mandatory for students to receive feedback and personalized work proposals on the platform through AI (artificial intelligence) / ML (machine learning) mechanisms.

It seeks to support the teaching work, providing a tool that allows them to accompany their students from their particular abilities and difficulties, serving as a source of relevant information for the efficient accompaniment of their students.

The aim is to acquire a tool focused on the user experience, being a priority its usability and ease of appropriation by the target audience.

## 3. FUNCTIONAL REQUIREMENTS

This section describes the target product requirements for A and B.

The items that apply to each product are detailed below.

### 3.1. MANDATORY REQUIREMENTS

#### 3.1.1. Usability (product A and B)

Friendly, intuitive and easily appropriated by users. The interface and user experience should be appropriate for the role (teachers) and the age range of the target audience. The platform must clearly and easily guide the route that the student must take on it.

#### 3.1.2. Contents

Subsections 1 and 2 of subsection Contents will be evaluated independently according to the present offer for Product A, for Product B or for both. The bidder must specify a classification of topics covered for each of the target audiences for the evaluation (see section 8.2).

##### 3.1.2.1. Levels and topics Basic Middle Education (product A)

Curricular contents of teaching Mathematics of Basic Middle Education, levels from 1st to 3rd year, with exercises that cover the dimensions of the discipline (calculus, algebra, geometry, probability and statistics). See Middle Education programs ( first year [https://www.ces.edu.uy/files/Planes%20y%20programas/ref%202006%20CB/1ero/Programa\\_1\\_CB\\_ajustes2010progrmat1cbref2006.pdf](https://www.ces.edu.uy/files/Planes%20y%20programas/ref%202006%20CB/1ero/Programa_1_CB_ajustes2010progrmat1cbref2006.pdf), second year <https://www.ces.edu.uy/files/Planes%20y%20programas/ref%202006%20CB/2do/matematica.pdf>, third year <https://www.ces.edu.uy/files/Planes%20y%20programas/ref%202006%20CB/3ero/matematica.pdf> and Basic Technological Cycle of Professional Technical Education (first year [https://planeamientoeducativo.utu.edu.uy/sites/planeamiento.utu.edu.uy/files/2017-08/MATEMATICA\\_1.PDF](https://planeamientoeducativo.utu.edu.uy/sites/planeamiento.utu.edu.uy/files/2017-08/MATEMATICA_1.PDF), second year [https://planeamientoeducativo.utu.edu.uy/sites/planeamiento.utu.edu.uy/files/2017-08/MATEMATICA2\\_0.pdf](https://planeamientoeducativo.utu.edu.uy/sites/planeamiento.utu.edu.uy/files/2017-08/MATEMATICA2_0.pdf), third year [https://planeamientoeducativo.utu.edu.uy/sites/planeamiento.utu.edu.uy/files/2017-08/MATEMATICA3\\_1.pdf](https://planeamientoeducativo.utu.edu.uy/sites/planeamiento.utu.edu.uy/files/2017-08/MATEMATICA3_1.pdf)

The materials must be suitable for Uruguayan students of both sexes, between the ages of



approximately 12 and 15 years old.

### 3.1.2.2. Levels and topics High School Education (product B)

Curricular contents of teaching Mathematics in High School Education, levels from 4th to 6th year, with exercises that cover the dimensions of the discipline. The contents on the platform must address the curricular proposals for teaching Mathematics in High School Education. See <https://www.ces.edu.uy/index.php/propuesta-educativa/20234>.

The materials must be suitable for Uruguayan students of both sexes, aged approximately 15 to 18 years old.

### 3.1.2.3. Order and sequencing (product A and B)

The materials must present various levels of difficulty, starting from basic levels and progressing to more complex levels that ensure that students master the topic (s) raised.

The platform should allow the reorganization of the content according to the national mathematics programs. Centro Ceibal will be in charge of mapping the available content and the bidder will be in charge of recording said classification on the platform.

### 3.1.2.4. Variety of formats and modalities (product A and B)

The contents can be presented as a combination of interactive materials, flat, visual and auditory readings, adapted to the needs of each grade or level of difficulty in which they are presented. Both content and activities that involve the development of knowledge and promote the analysis of the processes that allow the construction of knowledge will be preferred, as well as those that allow the student a high degree of interaction with the platform.

### 3.1.3. Adaptability (product A and B)

The platform must be able to guide and provide work proposals on the individual performance of each student automatically (based on artificial intelligence). Likewise, the platform must have personalized evaluation mechanisms where students must receive feedback on their performance.

### 3.1.4. Teaching involvement (product A and B)

The platform must include functionalities that allow the teacher to assign homework or content based on their class planning. Likewise, it must allow them to access information about the performance and learning processes of their students, both at group and individual level.

### 3.1.5. Autonomous student use (product A and B)

It should allow the student to make their own routes and set personal learning goals independently. In turn, each student should be able to monitor their progress throughout the school year.

### 3.1.6. Users and profiles (product A and B)

The tool must support the configuration of different user profiles and permissions. At a minimum, the following profiles are required:

- Student: For children who will use the platform.
- Teacher: For tutors in charge of classes with children.

The platform must function taking into account the following characteristics of the educational system:

- Teachers and students can be in more than one school and class.
- Teachers and students may change schools and classes repeatedly throughout the school year.
- A class can have more than one associate teacher.

### 3.1.7. Language (products A and B)

The platform must be available in Spanish at the time of the offer, preferably in *Riplatense* Spanish or neutral Spanish. It should also allow to adapt the texts or translations to local needs.



## 3.2. DESIRABLE REQUIREMENTS

### 3.2.1. Contents

#### 3.2.1.1. Other lower levels (product A and B)

It will be valued that the platform has content for lower levels (Primary) than those indicated as a mandatory requirement. See Initial and primary Education Program [https://www.dgeip.edu.uy/documentos/normativa/programaescolar/ProgramaEscolar\\_14-6.pdf](https://www.dgeip.edu.uy/documentos/normativa/programaescolar/ProgramaEscolar_14-6.pdf)

#### 3.2.1.2. Accessibility (product A and B)

The visual and auditory accessibility functions aimed at reducing barriers in the access and interaction of users with the proposed content will be valued.

### 3.2.2. Teacher Materials and Lesson Plans (Product A and B)

The proposal may include guides for the use of the platform in class, and available lessons, specifically intended for teaching users of the platform. In particular, it will be assessed whether Ceibal can modify these contents or reorganize them as it deems necessary.

Of particular interest is the availability of complementary materials based on Problem Solving and Computational Thinking.

### 3.2.3. Content distribution (product A and B)

The possibility for Plan Ceibal to customize content sent, individually or in batches, to groups of users will be valued. For example, send users of each grade a selected set of content from the platform.

### 3.2.4. Other users and profiles (product A and B)

#### 3.2.4.1. Administrator

The platform may offer users with an administrator profile to be used by Ceibal staff who will be in charge of providing support to end users, as well as for general administration. The ease and

independence for Centro Ceibal to access and operate, through users with this profile, will be

valued information about the users, students and teachers registered on the platform, as well as their enrollments, interactions and progress, without requiring the continuous intervention of the bidder.

In addition, it will be valued that the administrator role can access usage statistics at the user level, in the style of a blog of interactions with the site.

#### 3.2.4.2. Parents/Guardians

It is desirable that there is an additional profile of parent or guardian within the platform that allows parents or responsible adults to monitor the progress of students.

## 4. NON-FUNCTIONAL REQUIREMENTS

### 4.1. MANDATORY REQUIREMENTS

#### 4.1.1. User provisioning (product A and B)

The platform must provide a mechanism for loading users, profiles, classes and enrollments (that is, linking users in classes), considering that data updates are daily. This mechanism can be done through REST services or automatic processing of CSV files. Whatever the option, it must be able to process the daily news of users within the same 24 hours.

#### 4.1.2. Technology (product A and B)

##### 4.1.2.1. Web Platform

The platform and the contents must work correctly in the latest versions of Google Chrome.

##### 4.1.2.2. Components and add-ons

It is a requirement that the technologies used at the client level are current. As an example, products developed in Adobe Flash will not be supported.

It will be valued that the installation of applications or add-ons is not necessary for the operation of the platform.

### 4.1.3. Device Compatibility (product A and B)

#### 4.1.3.1. General compatibility (Android laptops and tablets)

The platform must guarantee a good user experience, both on laptops and tablets, whether in a responsive web format or a specific application.

In case of offering a mobile application, the provider must allow Ceibal to distribute it through its application repository and include it in the software images developed for its devices, providing Ceibal with the corresponding application (apk).

The offer must include the minimum specifications that must be met, both at the device level (processor, RAM, etc.) and Internet access (upload / download bandwidth, delay, jitter, etc.), to obtain a good experience in using the platform.

#### 4.1.3.2. Compatibility with devices delivered by Ceibal

The web platform and the contents must work correctly on the devices delivered by Plan Ceibal, in Google Chrome versions 76 and higher.

The behavior of the tool will be evaluated in the Ceibal devices delivered to the target audience of the platform, taking into account, among other aspects, the adaptation to the size of the screen and their performance. The list of equipment is as follows (for more information, consult <https://www.ceibal.edu.uy/es/dispositivos>)

- Laptop JPCouto-SF20BA-N3160-32G-2G
- Laptop ClamShell SF20PA2

- Laptop HP - Stream
- Laptop Positivo-BGH-11Cle2Plus-N3150-16G-2G
- Tablet T10\_A102\_B\_A (Acrux)
- Tablet T10\_H133\_A\_A (Betacruz)
- L11\_SF20GM7\_A\_W\_WEZEN (Wezen)

#### 4.1.4. Automated export of usage data (product A and B)

Centro Ceibal, as Responsible for the database of the platform to be acquired, requires automated access to all the data of said platform corresponding to the beneficiary users of Plan Ceibal (not other clients of the provider).

Considering that the platform to be acquired will manage personal data, the definition of data that is considered for this section is the one established in the REQ. 4.1.6.2. Confidentiality and data protection.

It will be required:

- Access to daily information on the activities carried out by users on the platform, maintaining the temporary identification of date and time (raw records without transformation or with an aggregation level, according to the use foreseen by Plan Ceibal).
- Maintenance of historical data at the source, for a period of no less than two months (60 days).
- Integration of data through user identification (country, type and document number).
- That the supported storage volume of the base, as well as for sending the information, is in accordance with Plan Ceibal's needs.
- Plan Ceibal requires independence in terms of availability and access to data, so this aspect will be especially valued in the evaluation.

In addition, the bidder is required to submit a proposal that includes the following items:

- Standard and secure methods of accessing data, such as:
  - Access to the database directly.
  - APIS
  - WS
  - SFTP
- Documentation with the Design of Data Models and Relationship Diagrams.

It must be specified if there are impediments to share some of the data that is registered on the platform. Given that it is not possible for Ceibal to evaluate the completeness of all the existing data, in this instance, the commitment will be assumed to provide all the data, with the exception of those that are expressly excluded with the corresponding justification.

If data storage in the cloud and its transfer implies an additional cost for Ceibal, it must be specified in the implementation cost (section 8.1.2). This point will be considered in the evaluation.

#### 4.1.5. SLA - Service Level Agreement (Product A and B)

The offer must include a description of the level of service proposed, including:

- A description of the service being provided: which areas are included in the service and which are the responsibility of Ceibal.
- UpTime: Percentage of uptime, and maximum limits for service interruptions. Centro Ceibal requires an uptime of at least 99%.
- Problem notification procedure: who can be contacted, how problems will be reported, procedure for escalation and what other measures are taken to solve the problem efficiently

- Incident response time: average response time, resolution and recovery from failures; distinguishing different levels of criticality to be agreed with Ceibal.
- Monitoring and reporting: who is monitoring performance, what data is collected and how often, and how Ceibal accesses performance statistics (preferably in real time).

Ceibal may negotiate with the successful bidder the characteristics of this agreement, including penalties for non-compliance.

It is also requested to describe the work methodology to inform and validate the management of changes (functional and technical) in the platform that may affect Ceibal's operations, for example at the level of compatibility with devices or integration with other systems.

#### 4.1.6. Information security, confidentiality and data protection (product A and B)

##### 4.1.6.1. User authentication

The solution must comply with secure authentication methods that allow verifying the identity of the users and protect the confidentiality of the information.

It must incorporate the following requirements:

- The platform must be integrated with Ceibal's centralized login system using the CAS protocol (version 6.2.2 and higher). For more information, consult <https://wiki.jasig.org/display/CAS/Home>
- In the case of offering administrator users (REQ. 3.2.4.1), authentication with username and password must comply with the password policies of Centro Ceibal.

#### 4.1.6.2. Confidentiality and data protection

The solution must ensure the confidentiality, integrity and availability of information and personal data. To implement adequate data protection, the solution must ensure: legality, veracity, purpose, prior informed consent, data security, reservation, and responsibility. For this the solution must:

- Comply with current Uruguayan regulations on personal data (Law No. 18,331, of August 11, 2008 and Decree No. 414/2009, of August 31, 2009). Information of any kind referring to specific or determinable natural or legal persons, by way of example, any numerical, alphabetical, graphic, photographic, voice and image, acoustic or any other type of information that refers directly to them is considered personal data or indirectly, in accordance with the provisions of Article 4 of Law No. 18,331 and Articles 1 and 4 of Decree No. 414/009.
- Adopt the necessary security measures to guarantee the security and confidentiality of the data and avoid its adulteration, loss, consultation or unauthorized treatment, as well as detecting deviations of information.
- Protect information and data created, edited, deleted or accessed without the corresponding authorizations, particularly in massive amounts of data.
- Take the necessary precautions and controls so that information and personal data are not available in browsers, load balancers, temporary copies, cookies and other structures where it is not necessary.
- Ensure the confidentiality of all information that is processed or used. Confidential Information includes, among others, by way of example, the following information: all commercial strategy, plan and procedure, proprietary information, software, tool, process, images, personal data, methodology, information and trade secret, and other information and Ceibal material, as well as the students, beneficiaries, teachers, study centers, which could be obtained from any source or could be developed.
- Host the data in Uruguayan territory, or in the case of international transfer, ensure that



the server is located in countries considered with adequate levels in accordance with Directive 95/46 / CE. Otherwise, have the consent of the owner of the data for the transfer to an inappropriate territory, or that the importer has signed standard contractual clauses with the exporter or has a registered Code of Conduct, with the consequent authorization of international data transfer processed before the Regulatory and Control Unit of Personal Data, in the last two cases.

- Not to use the information / data for a purpose other than the one contracted, nor for their own benefit, be it free or onerous, nor assign, communicate or transfer them to third parties.
- Centro Ceibal will be responsible for the database and the treatment, being the awarded Company and its subcontracted companies, in charge of treatment, in accordance with the provisions of literals H) and K) of article 4 of Law No. 18,331.
- Allow the publication of the privacy policies and terms and conditions of use of Centro Ceibal in development.
- Allow the right of access, rectification, updating, inclusion or deletion of personal data.
- Return or delete from all its physical and logical systems and files, whether owned or contracted to third parties, the personal data accessed, obtained or processed, as well as the associated metadata, at the request of Ceibal.

If Ceibal requires it, material that demonstrates compliance must be presented.

## 4.2. DESIRABLE REQUIREMENTS

### 4.2.1. User provisioning (product A and B)

It will be valued that the mechanism for loading users, profiles, classes and enrollments referred to in point 4.1.1 is through the REST API provided by Ceibal, which returns the information of the users (names, surnames, etc.), profile, and enrollment in classes.

## 4.2.2. Device Compatibility (Product A and B)

### 4.2.2.1. Compatibility with Android cell phones and iOS cell phones and tablets

The correct functioning at the level of usability and user experience on Android cell phones and devices with iOS operating system (cell phones and tablets) will be valued.

In the case of offering an application, it will be appreciated that you remember the user's credentials once they log in and do not ask them to authenticate again unless the user has closed the session. Likewise, it will be valued that the application is available in the Google Play and App Store stores for download on personal devices.

### 4.2.2.2. Compatibility with devices delivered by Ceibal in optional levels

In the event that content is offered for levels higher or lower than the mandatory ones (more developed in the point "Other levels"), Centro Ceibal considers it valuable that the product is compatible with the devices delivered to the beneficiaries of said levels.

The behavior of the tool will be evaluated on Ceibal devices delivered to the public to whom the contents of the platform are directed at optional levels, taking into account, among other aspects: adaptation to the size of the screen and their performance. The list of equipment delivered to Primary beneficiaries is as follows (for more information, consult <https://www.ceibal.edu.uy/es/dispositivos>):

- Tablet T8\_U800\_B
- Tablet T8\_TAB82\_B
- Tablet T8\_TAB82\_C\_A (Betelgeuse)
- Tablet T8\_H800\_A\_A (Rigel)

- Laptop L11\_SF20GM3\_A\_WU (Sirio)
- Laptop L11\_H7141A\_A\_WU (Murzim)
- Laptop L11\_SF20PA3
- Laptop ClamShell SF20PA2
- Laptop HP - Stream

Good performance will be valued on devices with Android operating system 7 onwards and on different tablet screen resolutions (8 'onwards).

#### 4.2.3. Offline content for web and app solution (product A and B)

The possibility of accessing a part of the contents and functionalities of the platform remotely and without the need for an Internet connection will be valued. Rural schools in Uruguay have various connectivity solutions that in some cases do not allow continuous and sustained work online. To serve this population it requires a tool that allows access and offline work to some extent. In case of including this functionality in web mode, it must work in the Google Chrome browser.

#### 4.2.4. Hosting from fixed IPs for data exoneration (product A and B)

From the context of the suspension of face-to-face classes due to COVID-19, Centro Ceibal (in conjunction with Uruguayan telecommunications companies) has made efforts to exonerate the data traffic generated by browsing platforms for the end user. In this context, it will be especially valued that the service is hosted from a finite number of fixed public IPs since this condition is essential to ensure the total exoneration of the costs associated with Internet traffic for users who are in Uruguay.

#### 4.2.5. Availability of environment for testing (product A and B)

It will be especially valued that the platform has an environment or instance of tests or sandbox,

which allows to carry out complete tests of the system and interoperability with Ceibal applications, without any impact on the productive instance.

#### 4.2.6. Security, confidentiality and data protection (product A and B)

The bidder must complete the table in Annex III: SECURITY, CONFIDENTIALITY AND DATA PROTECTION based on the desirable requirements described therein.

If Ceibal requires it, material that proves what has been declared must be available and presented. As an example, some documents that could be requested are detailed:

- 
- Backup test set and disaster recovery plan for cases in which the solution is provided in SaaS mode.
- Architectures and protocols used.
- Privacy policy and terms of use of the platform.

## 5. INTELLECTUAL PROPERTY

The Company that is awarded is obliged to grant Centro Ceibal a non-territorial, non-exclusive authorization of use, and for the duration of the contract, for access to the platform, developments, materials, etc., in the terms provided in subsection 8.1., as well as to reproduce, distribute, publish, communicate to the public, modify them, and create derivative works from it and the materials and pre-existing work, for the sole purpose of complying with the requirements of the agreement that celebrate the parties.

The successful bidder assures Centro Ceibal that the platform, developments, materials, etc. acquired will be original and do not infringe any right of Intellectual or Industrial Property of third parties, including but not limited to copyrights, trademarks and other distinctive signs, invention patents, utility models, industrial designs, trade names, names of Internet domain,

trade secret, or undisclosed information, image rights or similar legal assets, and that are not encumbered, subject to inhibition or affected in any way that affects their free availability by Centro Ceibal. Likewise, the Company assumes full responsibility for legal actions and / or claims of any nature – including, but not limited to, extrajudicial, judicial, civil, criminal or administrative claims - that may arise as a result of the use of the software and content offered, and will be liable for damages, fines, penalties, costs, attorney's fees, expenses, and any other losses that may affect Centro Ceibal for such reason.

## 6. IMPLEMENTATION PROJECT

### 6.1. PROJECT PLAN

The offer must include a project plan for the commissioning of the platform, as well as training in its administration and operation, including the following points:

- Work methodology
- Testing plan
- Content adaptation or organization plan
- Implementation plan, must include at least the authentication requirements (REQ. 4.1.6.1), user provisioning (REQ. 4.1.1) and the automated export of usage data (REQ. 4.1.4).
- Detailed schedule (must include milestones from previous plans)

The platform must be implemented and available no later than 90 days after the award. In case of not meeting the previous deadline, the parties will agree on a new implementation schedule.

## 6.2. TRAINING

A training plan must be proposed to the administrators, technicians and officials that Ceibal considers, in order to acquire the knowledge for the correct operation of the platform. A maximum of 10 people are contemplated who will receive the training, among the different profiles. Training can be face-to-face or remote. The cost of the same will be paid by the provider.

# 7. EVALUATION

## 7.1. TEST USERS

Test users (at all levels and profiles) are required so that Centro Ceibal can evaluate the tool, verify its benefits and compliance with the requested requirements, prior to the award. Centro Ceibal may request the bidder technical assistance during this process.

## 7.2. DEMO

Centro Ceibal may request a demonstration of the solution, in person or remotely, after the opening of bids and to coordinate with the bidder. The demonstration will evaluate, among other aspects, all the functionalities presented by the platform and the user experience in Ceibaldevices.

## 7.3. EVALUATION CRITERIA

Without prejudice to what is established in the General Specifications regarding the evaluation of the offers, these will be evaluated taking into account the fulfillment of the mandatory and desirable requirements for each product.

A technical-economic evaluation of each product offered (A and B) will be carried out, independently, where the technical requirements (mandatory and desirable) will have a weighting of 70% and the economic offer of 30%. The final score of each product, considering both the Technical Evaluation and the Economic Evaluation (Licenses and Implementation Cost), will be given by the following formula:  $(POME / PO) * 30 + (PTO / PTOMC) * 70$ . In this scheme evaluation “POME” is the price of the most economical offer, “PO” is the price of the offer being evaluated, “PTO” is the technical score of the offer being evaluated and “PTOMC” is the technical score of the highest rated offer.

The technical evaluation will have a total of 100 points (80 points for the mandatory requirements and 20 for the desirable requirements).

Ceibal estimates a use of the first year being located in the band of # 1, a second year in the band of # 2 and the third in the band # 3 (see item 8.1.1), for which it will take that range of users + the implementation cost to do a sensitivity analysis to apply in the economic formula. This may vary depending on the universe of users covered by the provider.

## 8. OFFER

### 8.1. ITEMS TO BE QUOTED

#### 8.1.1. Annual flat fee licenses

The objective of Ceibal is that the products and services it provides are used by all the beneficiaries (students, teachers, etc.). Therefore, all Ceibal users will be loaded into the system, regardless of their use of the platform.

However, Ceibal will only count **ACTIVE LICENSES**, which are licenses associated with users who exceed a certain level of use. An active license is considered to be a user (student profile) who

enters and records activity on the platform for at least 10 days during a calendar year. The mode of payment is an annual flat fee for each of the bands and not the individual license. The supplier must quote all the bands for each product offered.

The minimum time horizon that Ceibal is able to guarantee for a contract is 3 years, provided that the project is successful in its first year of implementation.

The bidder must quote in SaaS (Software as a Service) mode, which implies that the cost must include, in addition to the license of use, hosting and backup, update, maintenance and support services. If the bidder handles several levels of support, any level of service not included in the cost of the licenses must be detailed, described and priced separately. The same applies if the platform contains additional modules or by-products that are not included.

The use of the mathematics platform in the period 2019 and 2020 is detailed below. The table refers to users who entered 10 or more days only to the 1st, 2nd and 3rd grades of Basic Middle School.

<b>Year</b>	<b>Universe</b>	<b>Users with 10 or more days (active user)</b>	<b>Active users in% terms</b>
2019	137.109	8.417	6 %
2020	136.258	11.304	8%

Active license bands will be priced according to the following volume bands for each product:



**Product A:**

Band #1	Band #2	Band #3	Band #4	Band #5	Band #6
Up to 5.000	More than 5.000, up to 10.000	More than 10.000, up to 15.000.	More than 15.000, up to 30.000	More than 30.000 up to 50.000	More than 50.000

**Product B:**

Band #1	Band #2	Band #3	Band #4	Band #5	Band #6
Up to 5.000	More than 5.000, up to 10.000	More than 10.000, up to 15.000.	More than 15.000, up to 30.000	More than 30.000 up to 50.000	More than 50.000

The bidders must independently quote for each of the products offered the price of the active user license following the criteria of bands established in the previous table.

There should be a price quote for each of the active license bands. The teacher, guest teacher, administrator or parent profile licenses must be provided free of charge and will not be counted in the active user bands.

The provider must quote each of the bands in its entirety, the first band of users ensures the minimum income of the provider regardless of the number of licenses consumed. As an example, if the provider quotes USD 20,000 for the first strip and USD 30,000 for the second and

at the end of the year 4,000 licenses are consumed the amount to pay is USD 20,000, on the other hand if 5,500 licenses are consumed the amount to pay is USD 30,000.

In the event that the implementation is done once the year has begun, the cost of the licenses may be prorated according to the time lost.

**The bands refer to the total number of active users accumulated during a year (January-December).**

### 8.1.2. Implementation cost

The bidder shall indicate whether there is a deployment or parameterization cost as part of the one-time deployment process in the first year. The implementation cost should include authentication (REQ. 4.1.6.1), user provisioning (REQ. 4.1.1) and automated export of usage data (REQ. 4.1.4).

### 8.1.3. Development Hours

The item hours of web development and time of development / adaptation of didactic content must be quoted, which may be requested in case Centro Ceibal requires adjustments for adaptation and integration with external services or customization of the Platform.

## 8.2. PRESENTATION

The bidder must present his offer segmented in folders according to the following guidelines:

1. Folder with Annex I: COMPLIANCE TABLE, and Annex II: PRICE TABLE, complete.
2. Folder with functional description and technical specifications of each product. It must include the detail of the topics covered by the platform, the user manual for each of the profiles offered, the detail of the operating conditions and the documentation corresponding to the

non-functional requirements, including the SLA, compliance table referred to information Security, Confidentiality and Data Protection (ANNEX III: SECURITY, CONFIDENTIALITY AND DATA PROTECTION) and detailed proposal in the section Automated export of usage data.

3. Folder with project plan as specified in section IMPLEMENTATION PROJECT
4. Folder with complementary technical information that the bidder considers pertinent to provide.
5. Folder with a description of the bidder's background that you consider pertinent to provide.

Note: if product A and product B are offered and they are technically different, a folder must be submitted for each product (for folders 2, 3 and 4).

## ANNEX I: COMPLIANCE TABLE

The bidder must complete the compliance table for all the requested requirements. For the evaluation team's reference, it must also indicate in which part of the submitted offer the information corresponding to the requirement is found.

The **COMPLIANCE** column will be completed with the options Yes / No / Partial. In the event that compliance is partial or requires development, it should be indicated and briefly described in the **OBSERVATIONS** column.

MANDATORY FUNCTIONAL REQUIREMENTS				
SECTION	CATEGORY	COMPLIANCE PRODUCT A	COMPLIANCE PRODUCT B	COMMENTS
3.1.1	Usability			
3.1.2	3.1.2.1 (A) Contents / Levels and topics Basic Middle Ed.			
	3.1.2.2 (B) Contents / Levels and topics High Schools			
	3.1.2.3 Contents / Order and sequencing			
	3.1.2.4 Variety of formats and modalities			
3.1.3	Adaptability			
3.1.4	Teaching involvement			
3.1.5	Autonomous student use			



<b>3.1.6</b>	<b>Users and profiles</b>			
<b>3.1.7</b>	<b>Language</b>			

<b>DESIRABLE FUNCTIONAL REQUIREMENTS</b>				
<b>SECTION</b>	<b>CATEGORY</b>	<b>COMPLIANCE PRODUCT A</b>	<b>COMPLIANCE PRODUCT B</b>	<b>COMMENTS</b>
<b>3.2.1</b>	<b>3.2.1.1</b>	<b>Contents / Other lower levels</b>		
	<b>3.2.1.2</b>	<b>Contents / Accessibility</b>		
<b>3.2.2</b>	<b>Teacher materials and class lessons</b>			
<b>3.2.3</b>	<b>Content distribution</b>			
<b>3.2.4</b>	<b>3.2.4.1</b>	<b>Other users and profiles / Administrator</b>		
	<b>3.2.4.2</b>	<b>Other users and profiles / Parents / Guardians</b>		

<b>MANDATORY NON-FUNCTIONAL REQUIREMENTS</b>				
<b>SECTION</b>	<b>CATEGORY</b>	<b>COMPLIANCE PRODUCT A</b>	<b>COMPLIANCE PRODUCT B</b>	<b>COMMENTS</b>
<b>4.1.1</b>	<b>User provisioning</b>			
<b>4.1.2</b>	<b>4.1.2.1</b>	<b>Technology / Web Platform</b>		
	<b>4.1.2.2</b>	<b>Technology /</b>		





		components and accessories			
4.1.3	4.1.3.1	Device Compatibility / General Compatibility (Android Laptops and Tablets)			
	4.1.3.2	Compatibility with devices / Compatibility with devices delivered by Ceibal			
4.1.4		Automated export of usage data			
4.1.5		SLA - Service Level Agreement			
4.1.6	4.1.6.1	Information security, confidentiality and data protection / User authentication			
	4.1.6.2	Information security, confidentiality and data protection / Confidentiality and data protection			
<b>DESIRABLE NON-FUNCTIONAL REQUIREMENTS</b>					
<b>SECTION</b>	<b>CATEGORY</b>	<b>COMPLIANCE PRODUCT A</b>	<b>COMPLIANCE PRODUCT B</b>	<b>COMMENTS</b>	



<b>4.2.1</b>	<b>User provisioning</b>			
<b>4.2.2</b>	<b>4.2.2.2</b>	<b>Device compatibility / Compatibility with Android cell phones and iOS cell phones and tablets</b>		
	<b>4.2.2.3</b>	<b>Compatibility with devices / Compatibility with devices delivered by Ceibal in optional levels</b>		
<b>4.2.3</b>	<b>Offline content for web &amp; app solution</b>			
<b>4.2.4</b>	<b>Hosting from fixed IP for data exoneration</b>			
<b>4.2.5</b>	<b>Environment availability for testing</b>			



## ANNEX II: PRICE TABLES

The quote must include:

- Flat fee: it must be quoted per year according to the following detail:

### Product A:

	Band #1	Band #2	Band #3	Band #4	Band #5	Band #6
	Up to 5.000	More than 5.000, up to 10.000	More than 10.000, up to 15.000.	More than 15.000, up to 30.000	More than 30.000 up to 50.000	More than 50.000
2022						
2023						
2024						

### Product B:

	Band #1	Band #2	Band #3	Band #4	Band #5	Band #6
	Up to 5.000	More than 5.000, up to 10.000	More than 10.000, up to 15.000.	More than 15.000, up to 30.000	More than 30.000 up to 50.000	More than 50.000
2022						
2023						
2024						

- Cost of implementation
- Hours of development and adaptation of content (outside the implementation plan).



Quote the unit price of the hour.

**All prices must be quoted in dollars, including taxes, otherwise they will be included. If there are no taxes, the supplier must declare it in the offer and indicate the justification or accompany the documentation that proves the declaration.**

# ANNEX III: SECURITY, CONFIDENTIALITY AND DATA PROTECTION

## List of requirements

### Design and architecture

Incorporate security into your design by using best practices and incorporating security by design as part of the entire solution development cycle process. The following aspects are of interest:

- Layered development (presentation, business logic and data).
- Modular solution with separation and grouping of functionalities by categories or modules that allows the scalability of the solution and facilitates integration and compatibility with other solutions.
- Reliable architecture that incorporates a comprehensive security vision covering the aspects of confidentiality, availability, integrity, non-repudiation and privacy through qualitative and quantitative metrics and indicators.

### Session management

Provide adequate management of user sessions allowing to know the current status of the user or the connected device. This implies:

- Maintain unique sessions for each user that cannot be guessed or shared.
- Sessions can be disconnected when they are no longer needed or during a period of inactivity (where possible, parameterizable).

## Access control

Provide adequate management of access control in order to authorize access to functionalities and data in accordance with the profiles and roles that are defined. This implies fulfilling that:

- Users who want to access certain resources have the correct credentials.
- Users are associated with an adequate set of roles and privileges according to the functionalities provided by the solution and the accessible resources.
- The metadata of the roles and permissions must be protected from manipulation and reuse.
- Assignment of access control follows the principle of least privilege.

## Coding and validation

The most common weaknesses in modern web applications are the failures to correctly validate the data inputs that come from the users and the environment, prior to the use of this information. These weaknesses generate most of the known vulnerabilities and attacks such as Cross-Site Scripting (XSS), SQL Injection, file system attacks, Unicode attacks and buffer overflows. It will be valued that the solution complies with:

- Ensure the validation of inputs and outputs through a coding architecture and secure information flows that prevent injection.
- The input data is robustly entered and validated or in the worst case filtered and refined.
- Ensure robust output encoding that takes into account the context of the information and is as close to the external interpreter as possible.

## Error handling and log verification

Generate quality information in the logs and properly manage error messages, avoiding as much as possible the publication of sensitive information. The solution is expected to:

- Not collect sensitive information in the logs unless it is necessary or specifically required.
- Ensure that the information contained in the logs is managed according to its classification level (for example, taking into account the information life cycle and its expiration).
- Include useful information for auditing and troubleshooting, including at least date, time and details of events, configuration changes, attempts to access the system (successful and rejected),

## Communications

Provide a secure communication of the information managed in order to ensure its confidentiality. This implies:

- Publish services through secure protocols (TLS or strong encryption) for all users and regardless of the sensitivity of the information transmitted.
- Protocols and algorithms considered safe by the industry and good practices will be used, leaving as a last resort or for compatibility issues that are expressly authorized by Centro Ceibal the use of other less secure protocols.
- The solution must be entirely compatible with the certificates used by Centro Ceibal and in case of using internally generated certificates, they must be validated by the certification authorities that Centro Ceibal establishes.
- All communications outside the HTTP protocol, such as remote access, communication between layers of the solution, middleware, databases, external data sources, monitoring, communication tools, etc. They must be secure communications and, if possible, encrypted.

## Use of files and resources

Provide controls over file management in order to guarantee information security. This implies that:

- Insecure files must be properly managed in order to guarantee the confidentiality, integrity and availability of the information.
- Controls should be implemented for uploading, executing, downloading and hosting files that shield the solution from malicious attacks and inappropriate configurations such as: zip bombs, incorrect file types, pass traversal attack, hosting with permissions or in wrong directories, SSRF attack.

## API and Web services

The solution that makes use of APIs (commonly through the use of JSON, XML, GraphQL or other formats) must comply with:

- Maintain adequate authentication, session management and authorizations for all web services.
- Input validation for all parameters that are entered.
- Effective security controls over all types of APIs, including cloud and serverless APIs.

## Backups and contingency

That the solution is compatible with an adequate data backup and recovery policy in order to ensure the integrity and availability of the information in the event of incidents. This implies:

- Comply with a business continuity plan, which offers the necessary contingency to ensure the availability, integrity and confidentiality of the information in the face of different types of incidents.
- Provide the necessary technological solutions (eg backups and disaster recovery plan) in order to ensure the levels of availability and integrity stipulated in the corresponding servicelevel agreement (SLA).

## Cryptography

It involves the following requirements at the level of cryptographic controls:

- Allow the use of cryptographic modules to protect the solution's sensitive information such as financial information, personal data, and role and permission data, whether at rest, in use and in transit.
- Use robust encryption algorithms (such as AES and RSA) with keys of adequate length to protect against attacks.
- Generate suitable random numbers.
- Access to the encryption keys is managed securely.

## Malicious code

Not contain malicious code of any kind. To accomplish this the solution should:

- Use malicious code detection tools in the development process.
- not include time bombs or other similar types of attack.
- not transmit information or contact to malicious or unauthorized destinations.
- not contain back doors, rootkits, "salami" attacks, easter eggs and other types of malicious code or that do not follow good practices.
- Take the necessary measures so that the solution does not incorporate malicious code through controls such as code signing, use of secure libraries and frameworks, expiration control over DNS, etc.

## Business logic

The solution must provide a business layer developed in a secure way and that allows to avoid the most frequent cyber attacks. This implies fulfilling that:

- The flow of business logic must be sequential, consistent and cannot be altered.
- The business logic includes controls and limits to detect and prevent automated attacks.
- The business logic must take into account use cases that include malicious actors, abuse cases and must also contain protections against spoofing, manipulation, repudiation, information disclosure and privilege elevation, among others.

## Configuration

Comply with the requirements and configuration controls that guarantee a secure application.

They may include:

- 
- An environment that is as secure, repetitive and automatable as possible through the incorporation of good practices (eg DevSecOps model) with tools, processes and technologies that \* implement it properly (eg containers, automated deployments, etc.).
- Up-to-date and properly maintained development tools and environments.
- Development tools and environments correctly configured and verified for their security (hardening) such as eg. disable debug mode in production environments.

Default security in user settings and permissions.

## Certifications

Certifications and compliance with standards related to secure development, information security and privacy will be valued, such as:

- Common criteria certification (ISO IEC 15408)
- CPA Build Standard
- OWASP ASVS
- ISO 27001
- FIPS 140
- SCAMP
- CIS Benchmarks
- AICPA SOC2-3
- NIST CSF / 800
- ISACA Cobit
- PCI DSS
- GDPR

## Methodology

Proposals that incorporate software design and development methodologies with a comprehensive view of security in the development process will be valued.

## Vulnerability scan

Solutions that have undergone standardized vulnerability checks and / or penetration tests will be evaluated. Proof of the same must be provided by means of a summary report or corresponding certificate.

Report detailing threat coverage on the latest OWASP Top Ten in force will be valued.



### Security compliance table

To be completed by Ceibal		To be completed by the bidder	
No. Req.	Requirement	Compliance	Observations
1	Design and architecture		
2	Session management		
3	Access control		
4	Coding and validation		
5	Error and log handling		
6	Communications		
7	Use of files and resources		
8	API and Web Services		
9	Backups and contingency		
10	Cryptography		
11	Malicious code		
12	Business logic		
13	Setting		
14	Certifications		
15	Methodologies		
16	Vulnerability scan		