Call for Prototypes

Industry 4.0+ Technologies Applied in Agriculture and Education

Call ID: CARI-RUF/001/2024

Deadline: 20th April 2024 at 11:59pm Ugandan Time

1. **Name of lead applicant**
   Hakim Mulinde

2. **Gender**
   Male

3. **Affiliated university**

   Nkumba University

4. **Email of lead applicant**
   hmulinde@nkumbauniversity.ac.ug

5. **Telephone number of lead applicant:**

6. **City/Town of lead applicant: Entebbe**

7. **Prototype title:** Tracking and Monitoring Education Management

8. **Sector in which the prototype contributes to**

   a. Education

9. **Challenge being addressed by the prototype in the selected sector** (briefly describe how specify the challenge to be addressed in not more than 500 words)

monitoring the attendance of students. With TREDUMO you have the Many Higher Education Institutions (HEI) do not have effective and efficient

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educational management ystem that play very crutical roles in addressing the administrative, communication, learning, decision-making, and compliance issues. Such systems are meant to solve the so many challenges faced by educational institutions during the day-to-day business hence improving efficiency, effectiveness, and the quality of education provided. TREDUMO prototype has been developed to address the issues of administrative, communication, learning, decision-making, and compliance are limiting both students and staff in attaining their return on investments. TREDUMO will deal with issues that concern with effective communication among students, staff, administrators, and parents which are very important for the smooth functioning of an educational institution. It handles educational management across the different educational stakeholders through its centralized platform for communication, facilitating better collaboration and information sharing. Through the various tools and resources, the different stakeholders are offered a rich educational experience. Throughout the entire educational process HEIs generate vast amounts of data related to student and staff which supports decision making at different levels. Such information is important for determining performance, attendance, adherence to set education policies and behavior for different stakeholders. Therefore, the need for collection, analysis, and utilization of such data to inform decision-making processes, such as curriculum development, resource allocation, student intervention strategies and financial management is eminent. Also, HEIs need to adhere to various regulations and standards imposed by governing bodies such as National Council for Higher Education (NCHE). For example, any student who enrolls for a degree program is supposed to attend at least 75% class sessions before allowed to seat for an exam. In the current situation, no university has the capability of tracking and ability to ensure compliance through the automated student-centered class tracking and monitoring, reporting, auditing, and documentation smartly through a mobile based tool. Finally, overburdening with paperwork is no more with TREDUMO since automation of all educational process for both undergraduate and postgraduate has been ably done.

10. Technical/scientific basis and feasibility of the prototype's deployment to address the challenge (maximum 500 words)

The proposed prototype is within the education sector and has a scientific basis of supporting tracking and monitoring educational processes of which is grounded under the principles of educational psychology, learning theory, and data-driven decision making. Within the context of educational

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psychology, we note that individuals learn and retain information through a variety of things undertaken. Therefore, tracking and monitoring educational processes involves understanding how students acquire knowledge, skills, and competencies. It also looks at how teachers are able to pass on the necessary knowledge for students to generate knowledge. The learning theories depict that learners learn in their own way and are able to create their own knowledge through the different activities they do both physically and virtually. Therefore, students and staff have very diverging ways of how they do their things within an educational process in order for learning to happen. The active engagement, social interaction, meaningful context, and feedback in the learning process that happens between students and staff is very important for any improvements. The tracking and monitoring educational processes involve applying learning theories to design interventions such as policies and feedback mechanisms that promote learning and development. The tracking and monitoring the educational process dictates applying decision making theories through data analytics techniques hence supporting educators to identify patterns, trends, and areas for improvement, enabling them to make evidence-based decisions to support student learning and success. The identified strengths and weaknesses in educational process will lead to implement targeted interventions, and make adjustments to optimize teaching and learning experiences. Such scientifically generated decisions support a culture of continuous improvement within the HEIs. TREDUMO prototype brings the abilities of tracking and monitoring the HEI educational process and in real-time perform data analytics to support decision making. Therefore, TREDUMO prototype capabilities are scientifically grounded within the educational sector as demonstrated above.

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11. **Preliminary market assessment** (please provide a summary of proof of demand for the prototype by the end-users – maximum 500 words)

The need for TREDUMO prototype is supported by the current trend of HEI demand for ways that can easily transform their educational environments scientifically. On market, there are several educational systems that have been developed and in use. However, these systems were not developed in consideration of the underpinning theories of educational psychology, learning theories and decision making which are very pertinent for education. Several HEIs are grappling with authenticity of generated data from the current systems, un thought through educational business processes, incomplete educational lifecycle developed among others. There is a genuine cry from many HEIs to further develop a system that caters for a generic educational lifecycle and which has the capability to be used via both mobile and web. Through the concluded Quality Assurance Officers Training by Interuniversity Council for East Africa, the TREDUMO prototype was demonstrated and it was the wish of all participants that this is a system that is long overdue. Several institutions wanted to tap into its use as soon as it is launched. Nkumba University is currently using the prototype to track and monitor several of the activities within its education process (students and staff access to campus, monitoring teaching and learning, monitoring finances, postgraduate supervision, exam seating, students' elections among others).

12. **Business case for the prototype** (please provide a summary of your business model and expected revenues as micro-enterprise when your prototype goes commercial – maximum 500 words)

The business model to use will be that one that is affordable and Accessible by HEIs across the globe system higher educational processes are almost the same. However, the development team will be always available to perform some customization to whoever needs. TREDUMO will follow a software as service which allows users to connect to and use cloud-based apps over the Internet to perform different services that are needed. Therefore, subscription will be required for each institution that desires to use the software as a service. There are various business models which will be considered for TREDUMO to offer is as Software as a Service (SaaS). The first model business model to be considered is the Subscription-Based Model. This model allows users to pay a periodic fee which can either be monthly, quarterly or annually in order to access the software as a service. Therefore, the user will be able to access once subscribed or else they are

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unable to use the system. Also, subscription will be as per the number of users they want to add to the system or the ones who will be managed by the system at any time. These could be in the following categories; 1-100, 100-500, 500-1000, 1000-2000, 2000-5000, etc. Such categories will allow a user to determine the cap where they can fall and hence pay what they can afford. The Tiered Pricing Model is another one that could be deployed and this one allows TREDUMO to be offered in form of different tiers of service at different price points. TREDUMO has multiple modules and these could be offered per selection of what is needed to be used rather than the whole system. This means that the users will only select functionality that they need to use for specific tasks but again tap into the categories they would want to use it on. These could be in the following categories; 1-100, 100-500, 500-1000, 1000-2000, 2000-5000, etc. Such categories will allow a user to determine the cap where they can fall and hence pay what they can afford. Benchmarking on the prices that will be offered by the users will be done regularly to make sure TREDUMO stays in business. We are hoping that HEIs will tag a specific charge to each student under the ICT fees so that this can be used for paying the subscription. For example, each student could be charged 10,000/= per annum or semester. The number of students multiplied by the cost per use will mark the subscription fees for the HEI. In order to have successful business, the need to provide personalised support and assistance to clients will be very pertinent. Also, collecting feedback and suggestions and building long term relationships from users will encourage repeat of business.

13. Innovativeness of the proposed prototype (Describe what is unique about the prototype that distinguishes and makes it competitive compared to existing solutions in the market - maximum 500 words)

The prototype is unique in a way that it is scientifically well thought through as described in section 10. It considers the entire educational process within a HEI during the tracking and monitoring. The prototype has been built with latest technology within the software industry hence very scalable and secure. The software has been built using agile software methodology that the stakeholders have been tirelessly providing feedback during the development process. The software has been split into multiple component depending on a business process but all accessed under one access right through a dashboard. The ability for the system to have both web and mobile also brings in the uniqueness that modern system have as SaaS.

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14. **Description of work that will be done using the support from CARI** (provide a summary of technical and business work that you plan to accomplish with UGX 40 million in six months with the support from CARI – maximum 500 words)

The work to be undertaken during the 6 months will be completion of business process that are still underway and also feedback generated from the current users of the system. All existing software components will be tested and validated using different environments away from the current one. The team intends to further build some components and embed Artificial Intelligence within them. Also, new and secure servers will be identified and procured offshore in the cloud to allow effective 24-hour service to be delivered. We intend to acquire a gateway to allow financial transactions to be carried out too directly from the system into the banks ubiquitously. Interface between the TREDUMO software, banks and telecom companies will be established during this phase too. Also, the team will undertake marketing and awareness for the software amongst the different HEIs. The team intends to develop a support structure for the software that includes both video, audio and textual step by step manuals. The team tends to make follow ups on the patenting of the software and start its registration with the URSB as a company owned by shares between the University and developers.

15. **Partner organisations you are working with** (provide a summary of the names and roles of organisations that you worked with/working with to develop the prototype and their role in the CARI support – maximum 500 words)

The TREDUMO has been partnering with Nkumba University during the development of this prototype up to this level. Nkumba University has facilitated the developers with some subsistence to support them with living costs among others. Also, a software development mentor by the names of Prof. Jude T. Lubega who has vast experience in software development has supported the team very much. The mentor has regularly walked with the team through a requirement elicitation process, implementation, testing and validation. The mentor continues to guide the team on how to development a sustainable software development company based on tested business models.

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16. **Expected jobs to be created by the prototype when commercialised in a short run** (provide number and expertise of persons your prototype will employ when it goes commercial as a micro enterprise – maximum 500 words)

TREDUMO software company intends to create multiple jobs most especially for the youth of today. In the first place, TREDUMO will need further maintenance and upgrades in the future which can not only be done by the current team members. Further software developers will be employed to support the SaaS. TREDUMO has multiple modules within it and so each one of them will need a minimum of 2 people for the start to support it in terms of maintenance and upgrade. TREDUMO will need a team to handle marketing of the software both physically and virtually. Since it is SaaS, a need for a large team to spread out across the country and beyond in order to sell the product. A training team will also be required to build capacity on the use of the software since it will be living software that will continuously change over time. Since it is not an open-source software, TREDUMO will need personnel to handle the finances based on the deployed model. These people will handle all financial transactions across the globe. Also, TREDUMO will need a legal department which will need one or two people depending on the expansion that should have taken place.

17. **Sustainability plan for the post CARI support** (How do you intend the sustain the business after CARI support ends – maximum 500 words)

Since TREDUMO will be running a business model that requires payment, it is from such payment that expenditures will be made. In the first years of implementation, Nkumba University will house the TREDUMO company until that stage when it can sustain itself in an independent premise. Roll out will be gradual and to start from Uganda HEI before roll out to other countries. MOUs with organisations such Interuniversity Council for East Africa (IUCEA) will support in connecting TREDUMO to clients that matter within the East African countries. First years of TREDUMO, the company will rely of employing students but experts within the specific fields and by doing so, the company will reduce on salaries that will be paid hence sustaining the little funds that will have been acquired from the sales.

18. **Team composition and their expertise** (please list the names, email, telephone numbers, expertise, and role of your individual collaborators in developing prototypes)

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Team Leader: Hakim Mulinde who has a degree in <<>> and has expertise in software and enterprise development

Lead Developer: Darlington <<other names>> who is an experienced software developer in multiple programming languages. He has developed multiples system for organisations. He is well aligned to majority of the industry software frameworks. He has completed his Bachelor degree in Computer Science.

Developer: Musiitwa <<other names>> who is also a software developer with multiples skills set. He has completed his Bachelor degree in Computer Science.

Developer: Tasha <<other names>> who is also a software developer with multiples skills set. He has completed his Bachelor degree in Computer Science.

Business Development: Mary Nantumbwe is a postgraduate student with a background in Information Technology but currently pursuing a business-related degree. She has experience in business development and entrepreneurship which she brings onto the project.

19. **List of two referees** (provide names, expertise, and contacts of three senior researchers in the field of your work who have supported you or have knowledge about the prototype you have developed. Please attach referee letters from each of the referees)

Referee one: Prof. Jude T. Lubega – Mentor and Vice Chancellor of Nkumba University

Referee Two: Dr. John Kase – Dean School of Computing and Informatics, Nkumba University

Contact persons in case of inquiries.

For further inquiries, please contact the following persons;

1) David Martin Amitu at d.amitu@ruforum.org

2) Emmanuel Okalany at e.okalany@ruforum.org

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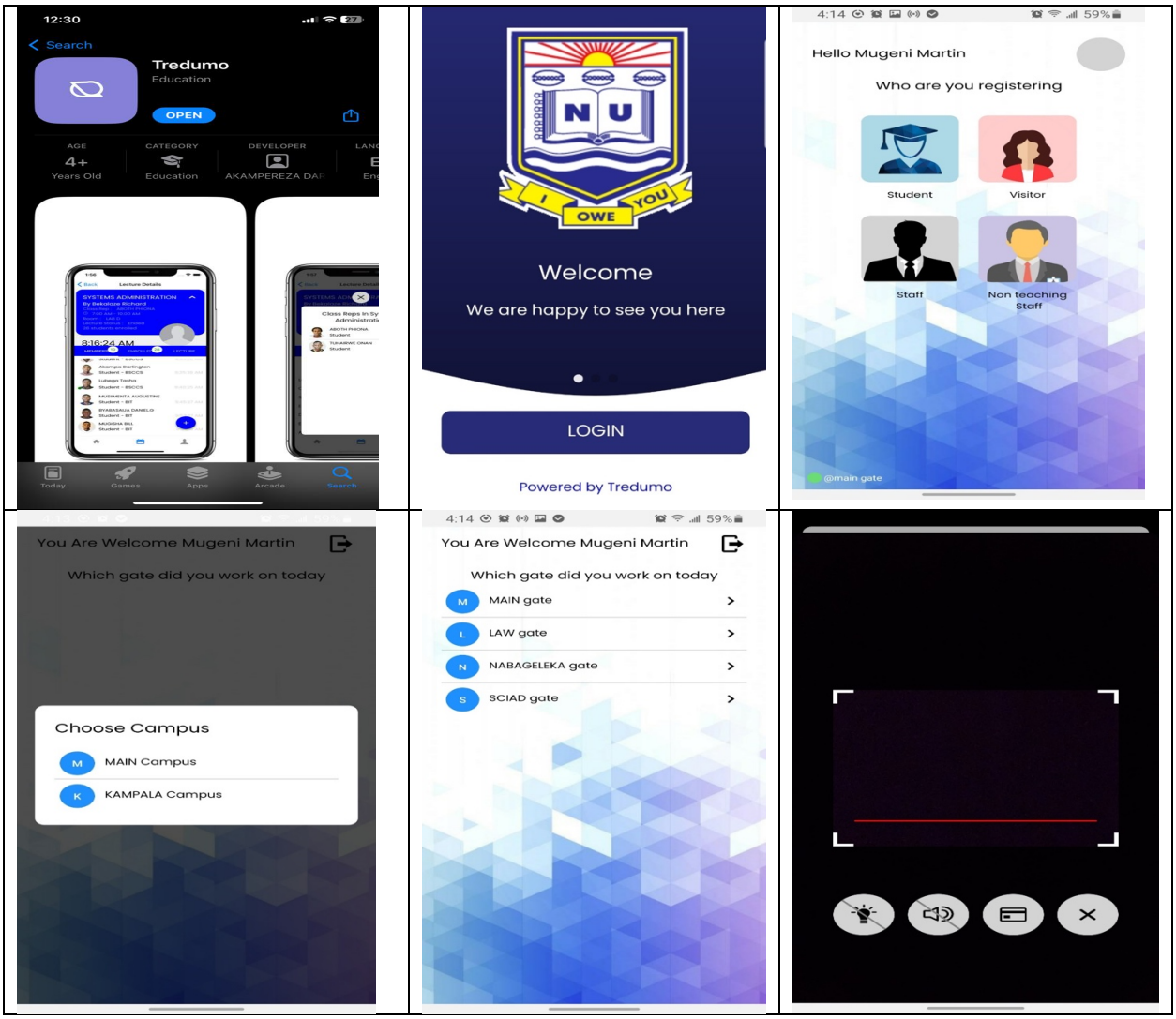
All inquiries should be submitted by 10th of April 2024.

Appendix: Screen Shots of TREDUMO Software



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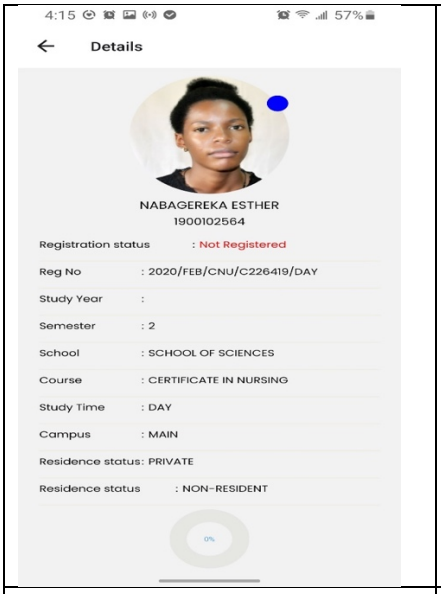	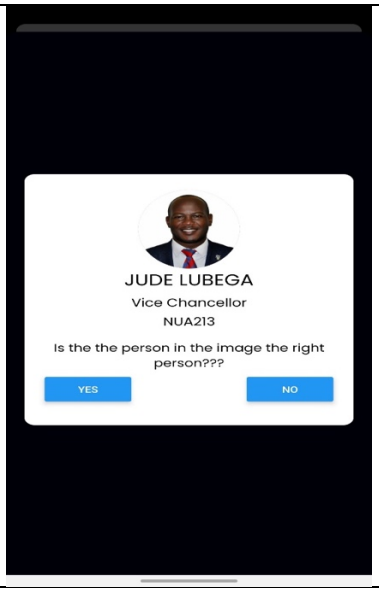	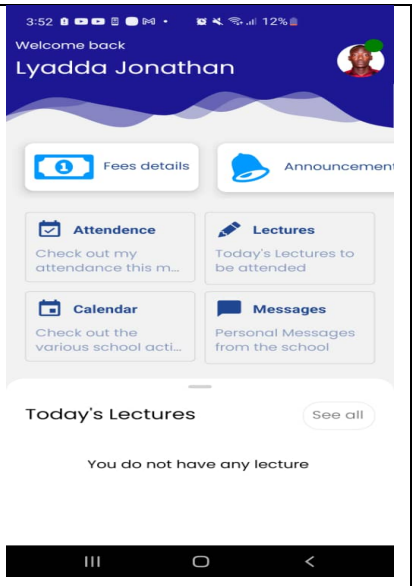

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