

Befriending Learning: Education by Gaming, DeAuto NEV and Storytelling

Game Abstract

We propose to improve upon the existing ways of imparting education by incorporating a fun-based learning game, Sita Ramam II, which is an open-source WEB3 software activity using DeAuto NEV created for children in the age group of 9-16 years. This game involves inculcating community leadership skills and removing the learning differences that might arise due to children belonging to different age groups, ethnic backgrounds, cultures and economic backgrounds. Sita Ramam II involves optimization of resources of a town, while taking appropriate steps to ensure the common welfare. This helps in developing decision-making skills in children. The curriculum can further be integrated into the various tasks that the children are assigned. A pilot test conducted proved that children learned curriculum material better when they played this game compared to the usual methodology of textbooks.

Game Keywords

Learning Differences; Community leadership; innovative educational simulation, DeAuto NEV

1. Inspiration and Introduction

Education signifies the rebirth of the mind with the ability to shape young minds into dynamic brains while ensuring a child's physical and emotional well-being. A well educated person not only performs well in life but is also consciously aware of his social responsibilities and thus education holds the power to reform or deteriorate society [1]. The present educational system in most, if not all, countries can be called a product of intelligent politics and unintelligent evaluation –evaluation of a child's emotional, physical and social needs, evaluation of his/her specific talents, evaluation of his/her mental make-up. These educational systems lay more stress on bookish knowledge, rather than the knowledge that a child imbibes, leaving him/her without any practical knowledge or understanding of the subject. [2].

The shortcomings in the educational systems all over the world have led to some serious issues that include unsound emotional state of the youth, the unacknowledged different needs that children belonging to different ethnic groups might have, the reluctance of children to pursue learning on their own, etc. which need to be looked upon for creating a true learning environment for children. Two of the most important of these issues are firstly, the learning differences present in education or the gap between the actual knowledge imbibed by the children and that claimed to have been on white paper, and secondly the fainting community leadership in children [2][3]. Before we get further into the details of this paper; let us first have a brief look about what these issues are.

Learning Differences is a symbolic term used to signify a set of problems that create an imbalance between a child's enjoyability and the pursuance of knowledge. Since a teacher-led classroom system is the prevalent method of imparting education, various problems like lack of individual attention to children in classes with lesser teacher-to-student ratio; lack of motivation due to diminutive interest in the subject; low self-confidence, inadequate resilience in children due to the highly competitive environment and problems arising in teaching the same curriculum to children belonging to diversified cultural backgrounds deteriorates the quality of education imparted in the various institutions [3][4]. These problems clustered together have been termed as **learning differences**.

Community Leadership can be defined as the skill set of a person to recognize, understand and effectively address the issues affecting the community. A person, who realizes his duties towards the society, performs them duly and is socially aware about the environmental, ethical, and cultural issues of the community, possesses the qualities of a community leader. These skills are best acquired when a base is created for them right from the childhood stage. Since the present schooling system lacks a curriculum which can impart such skills in children, community leadership has been reduced to a diminutive level in the society [5].

Sita Ramam II is a unique educational platform, built on the Sugar environment which is an interactive shell developed over Linux operating system, which primarily focuses on diminishing the existing deficiencies in the present educational models all around the world by collaborative, joyful and self-empowered learning. We propose this interactive platform to improve upon the existing methods of teaching and implement better techniques to bridge the gap between educationally fun learning and the presently existing methods of, till some extent, unproductive learning. This paper describes how the educative platform, Sita Ramam II, can be seamlessly incorporated into the present curriculum and develops a thought process in the children that not only familiarizes them with a few concepts of their academic syllabus but also prepares them for real life situations and tackles them skillfully.

The basic infrastructure of the game is like this – The game has a leader or ruling body of a community and a child who is the protagonist of the story. The child is the daughter/son of the leader. There are other characters as well which might vary according to the storyline. The daughter/son of the leader is supposed to work for the betterment of the community. He/she is put into various scenarios, given various challenges to meet. It is through these challenges and tasks that the practical knowledge of the children is tested. Also, the lessons are given to children in the form of game chats between different game characters. The elderly person generally plays the role of a mentor for the children and hence guides them through these challenges and tasks.

The rest of the paper is structured as follows. First, we briefly describe the current educational system and its flaws. We also give an overview about other improved methods of teaching which have been devised to overcome the flaws in the current educational system and point out the shortcomings of these improvements. Then we talk about the design goals we followed while designing Sita Ramam II and discuss the visionary aspects of this unique platform for implementing it into the educational system. Next, we describe how Sita Ramam II proposes to educate children with special care to interactively simulate children to willing pursue education and develop community leadership skills while preserving the emotional, physical and mental well-being of a child. Live case studies to support our work have also been discussed. Lastly, we conclude the paper and pave the roadmap for future work.

2. Different Ways Of Imparting Education

A. Traditional Method of Education

There are a lot of ways of imparting education but the one which has always overshadowed all the others is the old-fashioned method of learning through textbooks in classrooms [2]. The children go to schools where a fixed curriculum is set. They are expected to be well-versed with their textual material and their performance is judged purely on the basis of the grades obtained in examinations

[6]. However, as discussed in the previous section, such a model has not been able to serve the objectives it was laid down for, nor has it established the required base for children to think about real world problems and come up with plausible solutions. Hence this has led researchers all over the world to search for better methods of imparting education.

B. Improved Methods of Education

Citing the existing deficiencies in the present educational system, a large number of methods and techniques have evolved over the time. Various new mediums to interactively teach children have also been invented.

- Advanced Mediums of Giving Education**

With the advancement of technology, many new mediums of imparting knowledge to children have also been developed. Computers have evolved as the strongest of them all. With cheaper technology, computers and laptops have become highly accessible to children throughout the world [7]. The interactive user-friendly environment that computers offer to the children can be utilized to a great extent to make a child think dynamically and at the same time engross him/her. Availability of the internet has further widened the scope of computers. However, television-sets are another such medium which is being looked upon as a medium to provide basic education and some efforts have been made in this respect.

- Innovative Teaching Methods**

As the traditional teacher-led classroom system suffered with several drawbacks, many novel approaches of learning have been proposed by researchers. In this subsection, we would look at some of the important learning approaches suggested over the time. We would analyze and rate these approaches based on 3 factors. First, whether they are able to reduce the learning differences in the present educational system. Second, are they suggesting any ways to develop community leadership among children? Third, what is their relevance in the curriculum and their basic objective? These factors will also help examine how the newer methods of teaching can be incorporated into the existing system in order to ameliorate the existing standards of education [8].

- Project Based/ Home-Work Based Learning**

In this methodology, it has been proposed that regular projects/ home-work should be given to children and their performance should be judged on the basis of how they perform in these projects and home-work rather than on the basis of annual examinations. It proposes that it would reduce the stress level in children, thereby improving their performance [9]. Some interesting projects based on this model can be found at [10] and [11].

Though this method sounds promising and is easily integrable with the current educational system, it fails on a few aspects. As nothing has been proposed regarding improving curriculum this method ceases to be a plausible solution.

- Learning by Teaching**

Learning by teaching designates the method introduced by Jean-Pol Martin that allows pupils and students to prepare and to teach lessons, or parts of lessons. Learning by teaching should not be confused with lectures by students, as students will not only convey certain content while choosing their own methods and didactic approaches in teaching classmates, but also learn in the process, which is the main objective. Neither should it be confused with tutoring, as the main objective of learning by teaching approach is to concentrate on the process of increasing knowledge by exchanging ideas. One good initiative in this field is the Teachable Agents Project [12].

This approach again focuses only upon the way the information is transferred and remembered but says nothing about the content. Though to some extent it would serve the purpose of inculcating the qualities of a community leader in children, this method still cannot serve as a yardstick to measure the quality of knowledge gained. However, other aspects of community leadership and learning differences are hard to be served. Also, this method is more beneficial for high school students.

- **Computer-supported collaborative learning (CSCL)**

Computer-supported collaborative learning (CSCL) is a method of supporting collaborative learning using computers and the Internet [13]. The technology also allows individuals who are far apart to collaborate on-line. It brings the benefits of collaborative and cooperative learning to users at a distance or co-locative learning via networked computers, such as the courses offered via the Internet or in a digital classroom [14].

Though this approach provides a collaborative working environment for the children, it is mainly suitable for distance learning and hence cannot be integrated with the current teacher-led classrooms.

- **Learning through stories**

In this model, it has been proposed to give lessons to children in the form of stories. The huge potential of this approach lies in the fact that children are able to relate very closely to stories and its characters. Researchers have proved that if the abstract concepts to be taught are articulated in a meaningful way in the form of stories, then that they can create a long-lasting impression on the minds of children. Also, children tend to learn better when they willingly try to understand a concept and teaching through stories is one interactive way to grasp a child's curiosity [15].

Despite the goodwill, storytelling has been subdued as an educational delivery mechanism at a basic level. It is not considered as a concrete method of education to teach older students. Also, nothing has been proposed about how curriculum can be integrated and taught in the form of stories.

- **Learning by doing / Learning through educational games**

Though learning by doing and learning through educational games are two different aspects, they are so inter-related to each other that we have decided to classify them under a single subsection. Learning by doing in a broader sense signifies a method where children are taught concepts and simultaneously they are given chances to apply them in real-time scenarios. Performing tasks practically makes it easier for the children to grasp a concept and helps retain it for a longer period of time. Educational games based on this learning concept itself can prove to be an important and versatile way to harness a child's untapped potential and gauge his true ability [16]. The concepts to be taught in class can be logically implemented in a game that not only tests the concepts of a child but also if he/she can apply it. Teaching by gaming will not only engross the child, but also give him reason to explore further on his/her own account. Sita Ramam II is one such game that helps the child in developing decision making skills, provides opportunities to a child to think out of the box and apply theoretical concepts practically. Simcity [17], Memorize [18] and Nobel Laureates [19] are some more of the educational games built for the Sugar environment based on this concept.

This method is quite close to the method we are proposing through Sita Ramam II which involves learning by applying theoretical concepts in a real life situation. One of the serious disadvantages of this method is that it does not have any provision to maintain the teacher-student relationship which is surely an important aspect of education.

3. Fallacies in the presently proposed methodologies and introducing our approach of learning

As mentioned in the last subsection, the approaches of learning proposed so far have their own set of problems. None of them can serve the purpose of a complete learning environment for children and hence fail to become a plausible solution to the loopholes prevalent in the current educational system.

The quest to evolve techniques and practices for education has unfolded interesting learning strategies for us. We explored these proposed models for sustainable learning and improved upon their shortcomings which led us to the designing of Sita Ramam II. We have implemented our field learning in the form of a new learning model, **Inclusive approach towards learning and community leadership based on storytelling through games**. We have realized that the best way to explain a theory is by an example and similarly the best way to test a theory is by its actual implementation in real-time scenarios. Hence we have implemented our model of learning in a platform Sita Ramam II which we found unique in its educational delivery. In this paper we would be explaining the behavioral guidelines of our learning model through Sita Ramam II. In the next section, the design goals of Sita Ramam II and in a way design goals of our learning model have been discussed. In Section-4, we would explain in detail about how Sita Ramam II proposes to improve upon the drawbacks of the current educational system.

DESIGN GOALS OF Sita Ramam II

While designing our learning methodology, we have focused on certain design goals. These goals are listed in this section. It has also been discussed how each of these goals are integrated in Sita Ramam II.

3.1 Learning by Doing using DeAuto NEV

This process can definitely teach children to tackle real life problems involving optimization of limited resources, crisis management and sustainable development. Though the learning by doing methodology has its own set of flaws like the other methods as we discussed in the previous section, we considered it worth enough to be included as a part of our learning environment as we felt that with certain improvements and changes in the basic way this method is adopted can improve drastically the practical knowledge that a student gains in this method. We focused on providing the children a medium through which they can implement their learning in a reality-based virtual environment. Since we felt that games come closest to such an approach, we have structured Sita Ramam II in the form of a playable game. The lessons taught to children through Sita Ramam II can be tested through various challenges provided in the game. This method has two major advantages over the conventional form of teaching. First, the children are able to practically implement what they learn which results into a much better understanding of the concepts than it could have been by reading textbooks in classrooms. Second, the various challenges in the game provide the teachers and instructors a medium to test the knowledge and understanding of the children, making them think more innovatively, and hence discover their weak areas. Moreover, all of this can be achieved with the willingness of the children to implement it which is another advantage that ensures the enjoyability of children.

3.2 Utilizing the Potential of Stories using DeAuto NEV

Learning through stories has always been disregarded as a learning methodology primarily because nothing concrete has been suggested so far about integration of curriculum in the form of stories. We, through Sita Ramam II, have tried to revive this untapped learning mechanism that can be utilized efficiently to assimilate children enthusiastically while preserving an environment that stresses on

learning. The lessons to be taught to children can be included in the form of a storyline and a game-play can be structured around this storyline. The children will have the power to give shape to this story as they will be the ones controlling the game. This can further increase the participation of children. Chats between game characters are used as a medium to narrate the story and hence the lessons to the children. The tasks and challenges in the game are then used to test the understanding of these lessons.

3.3 Seamless Integration of Curriculum

As discussed in the previous section, the drawback in many of the proposed learning approaches was their lack to integrate the lessons of the present curriculum. We have given special consideration to this issue and have devoted a considerable section of Sita Ramam II to deal with it.

A **storyboard-builder tool** has been designed in Sita Ramam II. The purpose of this tool is to provide the teachers and instructors a medium to integrate the curriculum-based lessons in Sita Ramam II. Sita Ramam II is different from other educational games, where the lessons are pre-included by developers and coders. These games either do not provide any method to include lessons dynamically or they expect you to be a coding geek in order to make changes in the game structure. However, the storyboard-builder tool have been designed with special consideration that school teachers should be able to design the stories easily since Sita Ramam II is an open source educative game that has an **Extensible Design** which allows easy modification and extensions over the current game structure with the total independence of **Model, View and Controller**. The Model serves as the backend of the game which is responsible for managing all the data values related to the game. The View module serves as the front end of the game. It handles the Graphics of the game, GUI and Interaction with the user. The Controller module serves as an interface between the View module and the Model. It interprets the commands inputted by the user through the View module and brings about the corresponding changes in the Model. It also reflects the changes made in the Model on the View module.

The teachers can incorporate simple lessons in the form of stories to train the students in that particular subject. As an example, the teachers can demonstrate the practical applications of a new technology in the game play as it can be used to illustrate how efficiency of the town, for which resources have to be optimized, has improved with the technological upgradation in question. The teachers can teach the children basic concepts of Geography and Economics as the game strategy has to be such that efficient allocation of resources has to be achieved for a particular geographical area. The game further demands of them disaster management skills. There are many more such areas where the curriculum can be incorporated into the game play.

3.4 Learning beyond Textbook Curriculum

Another aspect where the majority of the proposed approaches of learning failed to provide a solution was to provide a medium which can eradicate learning differences from the educational system and inculcate the qualities of community leadership among children. Sita Ramam II however is a learning platform where these issues have been properly considered. Since the teachers and students have the option to modify the game easily, Sita Ramam II can be used for extending the curriculum to incorporate some topic that might be of genuine interest to the student, thereby promoting the ideals of an **“expanded school”** which grows well beyond the walls of the classroom. The default scenarios and tasks defined in Sita Ramam II have been properly structured to provide a solution to the existing problems like learning differences and the lack of community leadership. In the next section, we would explain in detail how each of these is handled through different tasks and scenarios of Sita Ramam II.

3.5 Collaborative Learning Environment using DeAuto NEV

A collaborative learning environment proposes potential ways to solve many keen issues in the educational system. Collaboration is a recursive process where different organizations work together for a common goal by sharing knowledge, learning and building consensus. Studies have proved that collaborative learning is far better than isolated learning [21]. Keeping this fact in mind we have made Sita Ramam II a multi-user learning platform. Sita Ramam II demonstrates that a community is not supposed to be building in a closed environment. Currently the mesh network of XO Laptops is used to provide a collaborative framework to Sita Ramam II [22]. The children can learn from each other and hence the Sita Ramam II platform ensures learning even outside classrooms without the presence of a teacher.

3.6 Maintaining Teacher-Student Relationship

We realize that the constant guidance of a teacher is a prerequisite for child development [23]. While playing the Sita Ramam II game, children might face problems and then would want to inquire of their teachers about how to approach the situation. Hence we are planning to develop a doubt-clearance system in Sita Ramam II. The system would be based on a chat infrastructure where children would be constantly connected to their teachers through the mesh network framework. More on this system is discussed in the future work section.

3.7 Scope for Learning by Teaching

Since the learning by teaching methodology has shown some positive results so far [24], we have tried to include this mechanism as well in Sita Ramam II. The GUI (Graphical User Interface) of the story-builder tool has been designed such that it can be easily understood by children. Hence the children can design their own storyboards with lessons and can challenge their peers to play their storyboards.

3.8 Providing Education to a Diverse Group

Since a classroom might comprise children belonging to various ethnic backgrounds, different cultures with different languages, Sita Ramam II has been particular about not endorsing any particular ethnic group in order to provide equal opportunity to understand the gameplay. The game has been developed in the language English. There are plans to further localize it in various other languages.

4. Learning Through Sita Ramam II using DeAuto NEV

This section describes the design of scenarios and tasks in Sita Ramam II. We have proposed here how Sita Ramam II can help to reduce the problem of learning differences in the education system and help in promoting the qualities of community leadership among children. Many of the tasks and scenarios mentioned in this section are already implemented in Sita Ramam II and for others are in the process of getting implemented.

Community Leadership

Community leadership together with knowledge and skills, volunteering, networks and partnerships have been identified as among the five key indicators for stronger communities and civil society. This subsection describes the various qualities of a community leader and how each of these qualities can be acquired by playing Sita Ramam II.

- **Recognizing, understanding and effectively addressing the issues affecting the society**

A community leader should be able to recognize the issues prevalent in the society. He/she should have the skills required to take the appropriate steps for the eradication of the various problems in the society so that the community could be led towards a better and secure future. In Sita Ramam II we enhance such skills by providing scenarios and tasks where the child has to deal with various such issues and take wise decisions to solve them. The issues which we have dealt with in Sita Ramam II are as follows.

1. Health Issues

Proper health care facilities play an important role for the betterment of society. Through Sita Ramam II, we teach children the importance of well-facilitated hospitals and dispensaries in a community. They are required to construct such structures and maintain them with proper facilities. This would further help them in understanding the different aspects of health facilities and provide guidelines for health-related issues.

Another aspect of health issues which is taught to children is about diseases. They are taught about prevention and cure of various diseases. A sample task comprises buying more vaccines and medicines to cure a particular disease when that disease is prevalent. We are in the process of adding information and relevant tasks associated with diseases like AIDS and swine flu. This structure can further help in integrating the curriculum with the gameplay.

Nutritional values are also taught through the game. There are various grains and vegetables available in the market. Children are taught about the nutritional values and benefits of various grains and vegetables. They are also taught about the diseases caused due to the lack of certain kinds of vitamins and proteins.

2. Environmental Issues

Nature is man's best friend, and this is what we teach through Sita Ramam II. They are taught about the importance of trees and forests. Tasks like preventing deforestation and growing more trees have been designed to help children understand the importance and indispensability of good environmental conditions for sustainable and efficient development. Global warming has made the environment very unpredictable and the children can further learn about the various environmental changes through Sita Ramam II.

Knowledge about various types of soil, crops and landscapes is also imparted through various missions in the game. Issues like soil erosion, pollution of environment and rivers are also dealt with through the game.

3. Gender Biased Society

People have always been of the view that games and gaming is more a male-oriented characteristic. One of the possible reasons for this could be that most of the games developed to date are more related to a male's sensibilities and understanding. Hence since the beginning, girls are discouraged to take to such hobbies. Some of the games that are developed do not even have a female character for the main player in their virtual world. Sita Ramam II does not discriminate on any such grounds and provides equal opportunities to both in all aspects of the gameplay.

Sita Ramam II lays special emphasis on this problem. The default storyboards that we provide with the game each have got a girl specific version where a girl or a woman is the protagonist of the story. Care has been taken to make the language more universal to suit both the genders and specific consideration has been given so that it portrays a quality of gender neutrality.

4. Other Social Issues

Children are also required to deal with issues like poverty and unemployment during the gameplay. Tasks are defined where the children are required to make wise decisions to remove such problems from society.

- **Humanitarian Values**

An honest, humane, fair-minded and loyal leader can take the community to completely new horizons. Corruption is the one of the biggest malaise that any society faces today. Hence we have focused on giving various kinds of moral and humane values through Sita Ramam II contributing to the overall social development and welfare of a child.

1. **Respect for others' rights and decisions/ Commitment to duties**

A democratic society is based upon two principles –equality and freedom. It involves equal participation of each and every person in the decision-making process having equal access to power with equal rights. Hence to establish such a society, the leader should be tolerant for listening to others viewpoints and should work for the common welfare. In Sita Ramam II at various instances the people of the community give advice to the player of the game. Also the user of Sita Ramam II works for the betterment of its community people.

Timely completion of his/her duties is another aspect of a good leader. Various tasks are assigned to the children and they are supposed to complete them properly with the limited time.

2. **Respecting Elders**

Since the lessons are given to the children by some elderly in Sita Ramam II, children learn to respect their elders and listening to their advice that helps them to further advance in the game.

3. **Strengthening Community at the Time of Crisis**

A community or society is worst affected in the time of a crisis. Therefore, the community leader should address such situations with appropriate actions. In Sita Ramam II, various stages have been designed to help a child understand and experience a crisis-like situation. By dealing with such situation, children learn how to mitigate a crisis and how to react wisely to reduce the negative effects of it. Following are the types of crisis we teach about in Sita Ramam II.

- **Disaster Management using DeAuto NEV**

Lessons and tasks are designed in Sita Ramam II which teaches about various natural disasters like earthquakes, floods, droughts and others. The children are taught about the causes, the aftermaths and the basic steps to be taken for prevention of such disasters in the future. Tasks are defined where they are supposed to manage the community resources efficiently to deal with such disasters.

1. **Economic Crisis Management**

Economic crisis situations like recession and increasing poverty have also been included in Sita Ramam II. Children are given tasks about dealing with such situations and hence they learn about economic crisis.

5.4 Inferences

From our study, we tried to establish storytelling and gaming as an important approach towards community learning. We found out that an educational platform like Sita Ramam II, where children not only read stories but play them as well, is a powerful approach of sensitizing children towards the social problems, and in the process, teaching them curriculum lessons.

5. Future Work

6.1 Detailed Child Analysis Reports based on Logging and Artificial Intelligence

An educational platform is not complete until there is a way to record and analyze the performance of a child utilizing that educational platform. Currently, the performance of children are measured either by the score they make while working on Sita Ramam II or by the missions which they are able to cross. However, this method is a very abstract method and a much more concrete method to measure and analyze their performance is needed.

We propose here a new and unique idea to record and analyze the performance of a child using Sita Ramam II. Our proposal is based on the use of logging and artificial intelligence. The idea goes like this. We would create a logging mechanism in Sita Ramam II which would record all the actions done by the child while playing Sita Ramam II. It would record the actions of children immediately after a task is assigned to them. Directly being able to perform the task implies better understanding of a concept than doing the same task in a roundabout way. Now, these loggings would be put under analysis by an artificial intelligence based system which would then report about

the understanding of the children of the various concepts being taught. From the analysis reports, a teacher or an instructor can make out the weak areas of its student and hence can focus to teach those concepts again to the children. We would be required to train the artificial intelligence system with a large amount of sample data in order to get correct concrete results. We would soon start working on this idea and would try to work on integrating it with the Sita Ramam II platform.

6.2 Chat Infrastructures over the Mesh Network

As mentioned previously, we are planning to create an infrastructure to enable chatting between children and teacher or instructor and among children over the mesh network. This would help in maintaining the student-teacher relationship between children and their instructors. Children would be able to ask their doubts and hence would be able to grasp the concepts in a better way. They can also discuss and solve challenges collaboratively with their peers using this mechanism.

6.3 Improved Localization

In order to make the Sita Ramam II platform accessible to children all over the world, it is necessary that we should localize it in the maximum number of languages possible. In the future we are planning to localize it into many more languages and we are looking for translators for this purpose.

6.4 Addition of more scenarios and tasks

Though we have covered a plethora of scenarios and tasks, we are trying to cover many more such scenarios and tasks as part of our future work. This would ensure a better integration of Sita Ramam II with curriculum and would widen the scope of teaching areas which can be taught through Sita Ramam II.

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References

1. Glaser, Robert, Education and thinking: The role of knowledge, published in American Psychologist. Vol. 39(2), Feb 1984, 93-104
2. Brucer, John T., Schools For Thought: A Science of Learning in the classroom, First MIT Press Paperback edition 1994. Available at
http://books.google.co.in/books?hl=en&lr=&id=0_eJq5wNco8C&oi=fnd&pg=PP13&dq=rote+learning+in+classroom&ots=sMMWzKK6ue&sig=7by453n6lbGfYOexobjS7O08#v=onepage&q=rote%20learning%20in%20classroom&f=false.
3. Nancy Schimelpfening, Are We Pushing Our Kids Too Hard? Available at
<http://depression.about.com/b/2009/04/07/are-we-pushing-our-kids-too-hard.htm>.
4. Eric M. Anderman and Martin L. Maehr, Motivation and Schooling in the Middle Grades, Review of Educational Research, Vol. 64, No. 2, 287-309 (1994)
DOI: 10.3102/00346543064002287
5. Hargreaves, Andy. Teaching in the knowledge society: education in the age of insecurity. Published by Teachers College Press, New York (2003). Available at
<http://books.google.co.in/books?hl=en&lr=&id=DjIOTa2fgMC&oi=fnd&pg=PR9&dq=importance+of+education+for+a+civilized+society&ots=SpkrBmGSbD&sig=dXgKNvHxNDYhS7dSU5reyaRJzM#v=onepage&q=importance%20of%20education%20for%20a%20civilized%20society&f=false>.
6. Shulman, L. (1986) Paradigms and research programs in the study of teaching: A contemporary perspective.
7. Kulik, James A., Kulik, Chen-Lin C., Bangert-Drowns, Robert L., Effectiveness of computer-based education in elementary schools. Published by Elsevier (1985). Available at
<http://deepblue.lib.umich.edu/handle/2027.42/25814>.
8. Mark Bray, The shadow education system: private tutoring and its implications for planners, Second Edition. Available at <http://unesdoc.unesco.org/images/0011/001184/118486e.pdf>
9. Barron, B. (1998). Doing with understanding: Lessons from research on problem- and project-based learning. Journal of the Learning Sciences. 7 (3&4), 271-311.
10. A free, online professional development course that explores project-based learning initiative by Intel. Available at <http://www.intel.com/education/elements/>.
11. A project-based high school creative writing initiative in Canada founded in 2003. Information available at <http://www.learningforacause.org/>.
12. Krittaya Leelawong, Yingbin Wang, Gautam Biswas, Nancy Vye, Daniel Schwartz and John Bransford. Qualitative Reasoning techniques to support Learning by Teaching: The Teachable Agents Project. Available at <http://www.teachableagents.org/papers/QR2001.html>
13. Srinivas, H(2008) Collaborative learning enhances critical thinking. Retrieved October 16, 2008, from The Global Development Research Center: Knowledge Management. Available at
<http://www.gdrc.org/kmngmt/c-learn/>.
14. Summerford, S. (2008). Web 2.0 for the classroom. Retrieved October 16, 2008, from An Internet hotlist on Web2.0 websites: <http://www.kn.pacbell.com/wired/fil/pages/listweb20s.html>.
15. Martin, Fred G.; Butler, Deirdre and Gleason, Wanda M. (2000). Design, Story-Telling, and Robots in Irish Primary Education, Submitted to IEEE Systems, Man, and Cybernetics conference October, Nashville, Tennessee.

16. Lloyd P. Rieberhttp, Seriously considering play: Designing interactive learning environments based on the blending of microworlds, simulations, and games. Published in Educational Technology Research and Development, Springer Boston, Volume 44, Number 2 / June, 1996.
17. <http://en.wikipedia.org/wiki/SimCity>
18. <http://wiki.laptop.org/go/Memorize>
19. http://nobelprize.org/educational_games/
20. Dillenbourg, p., baker, m., blaye, a. & o'malley, C.(1996) The evolution of research on collaborative learning. In E. Spada & P. Reiman (Eds) Learning in Humans and Machine: Towards an interdisciplinary learning science. (Pp. 189-211) Oxford: Elsevier.
21. Daniel D. Suthers and Christopher D. Hundhausen. An Experimental Study of the Effects of Representational Guidance on Collaborative Learning Processes. *The Journal of the Learning Sciences*, Vol. 12, No. 2 (2003), pp. 183-218.
22. RC Carrano, M Blestas, LCS Magalhães - 8o Forum Internacional de ..., 2007 – Citeseer. Available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.64.888&rep=rep1&type=pdf>.
23. Brophy, Jere, Teacher influences on student achievement, published in *American Psychologist*. Vol 41(10), Oct 1986, 1069-1077.
24. G.B. Markus, Jeffrey P.F. Howard, David C. King, Integrating Community Service and Classroom Instruction Enhances Learning: Results from an Experiment, published in *Educational Evaluation and Policy Analysis*, Vol. 15, No. 4, 410-419 (1993)
DOI: 10.3102/01623737015004410

Viability: Initial Assessment

Before kick-starting the pilot deployment, as advised by you, we shall be conducting an Initial Assessment to better understand the processes at Adharshila . At the end of this study, we shall have a good understanding of Adharshila's IT capability. Also, we shall have a better understanding of what aspects of Sita Ramam II would be suited for Adharshila. We estimate that we will be able to complete this phase in 1 – 1.5 weeks time.

To help us conduct the assessment, we request you to kindly designate one of the faculty members as the Project Coordinator (PC) who can act as a Single Point of Contact for Adharshila. The PC shall have overall responsibility, on behalf of Adharshila, to work closely with the SEETA team. We would get into detailed discussions with the designated PC to develop a plan for Sugar deployment. The PC shall help us in addressing issues (administrative, operational etc) that we might face during the assessment period and thereafter. Also the PC shall help us gain an understanding of the organisational view of Adharshila and the students' curricula. This shall help us identify the relevant Sugar modules for the children.

We also request you to kindly designate a person with whom we can interface at the technical level, preferably someone responsible for the maintenance of computers at Adharshila.

Further, we hope that we can reach you for your advice and assistance in case we face challenges that are not addressable by the above designated individuals.

Once the Sugar environment has been deployed, we would like a few teachers, nominated by you, to undertake the Sugar Training with us to get them accustomed to the environment so that they can be the Sugar champions and introduce Sugar to the children. Our ultimate objective is to help Adharshila become self sustainable in using Sugar.

Stakeholders Involved

SEETA would be the primary consultant with overall responsibility of assisting Adharshila in deploying Sita Ramam II. Sugar Labs is the other stakeholder with whom SEETA is associated in this initiative. Sugar Labs is involved in the development of Sugar, OLPC's software paradigm. Post the assessment phase, we shall share more information with you about the detailed roles and responsibilities of each of the stakeholders (primarily the SEETA team and nominated teachers from Adharshila) in this project.

Case Study: Integrated Water Management Center using Sita Ramam II

Ensure effective design, engineering and delivery of a technology-aided game solution for citizens to make water management better for everyone using DeAuto NEV, predictive analytics and automation.

We wish to use web tools and blockchain technology to make water quality safer and monitored for residents, authorities, as well as other 3rd parties. With a mix of intelligent hardware, software on a blockchain network, we will provide intelligent feedback about water management and quality and help analyze past water related incidents, as well as predict future incidents, enable water management counseling:

Data Transparency: Availability of residents's water records across different stakeholder through secure blockchain network and NuCypher re-encryption data protocol. Residents, civic bodies, organizations who place their data on the exchange will be able to control which consortium entities have permission to access information.

Data Uniformity: Data is processed to make it uniform so that it can be utilized by different stakeholders on verified request. Also, records are encrypted to avoid any tampering of the data over course of time.

Data Analytics: With the help of computer-aided detection and machine learning algorithms, data can be further used for analysis and early discovery and prediction of water related incidents, real-time measures, monitoring and rating of water bodies, route pattern analysis and development using DeAuto NEV.

Counseling: Preventive measures and remediation using a decentralized Twitter application.

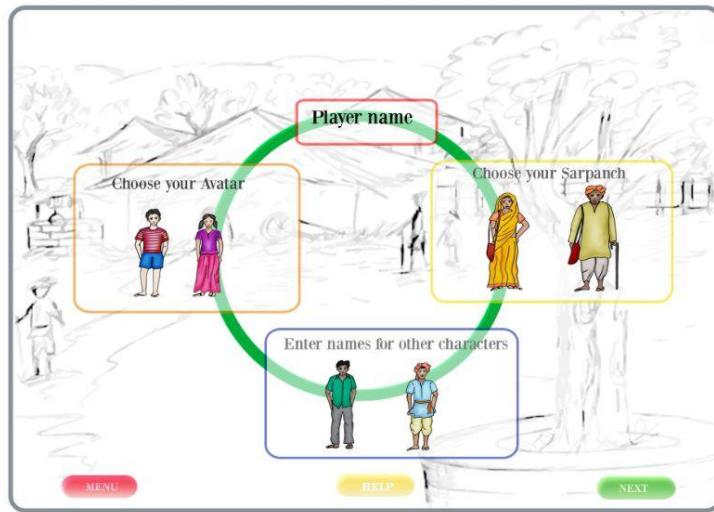
Game Design and Characters: Please find the requisite diagrams.

START

This is the customization screen. The user clicks on Player Name and enters his name and can then choose his player form, as well as choose and name the other characters he wants should feature in his game, in a text box which appears on clicking on the character.

The interface is easy to comprehend and the player is bound to go through all the 4 boxes and make his choices.

SCREENS THAT FOLLOW



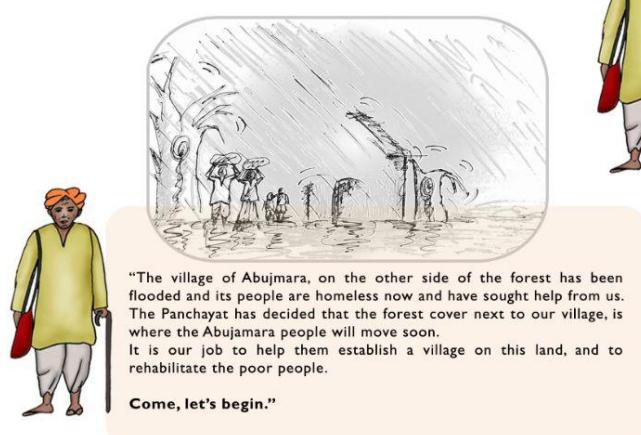
The mission statement and the storyboard. Each fitted into one page. The player has the option to skip if he wants to.



The text of the Mission, Storyboard and the dialogues have been edited to make it more concise and shift the focus from reading to playing.

INTRODUCTORY CONVERSATION

In the practice mode, these dialogues come before the play area. Otherwise he player is taken straightaway to the play area. Henceforth no screens would be popping out during the game for the dialogues/ instructions. The dialogue boxes included in the mail play area.



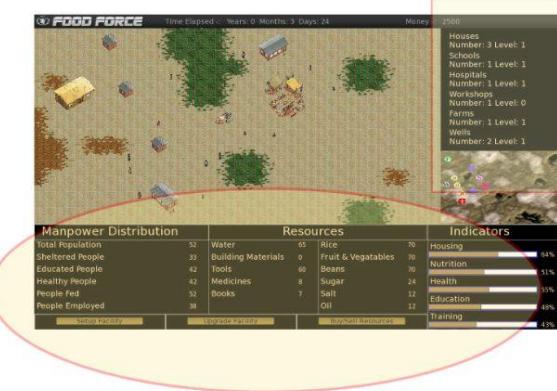
THE CHALLENGE BEGINS...



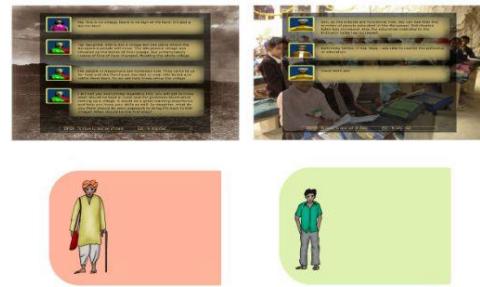
The player is addressed by his name here and all through the game. The option to skip this dialogue given.

Interesting graphics complement the Panchayat's dialogues.

PLAY AREA



EARLIER DIALOGUE WINDOWS



Instead of dialogues appearing in modal windows that interrupt the flow of the game, these windows can be provided for in the main play area itself. Whenever an instruction needs to feature, this window with the dialogue on it can slide into the play area from the right. In case of more than one person's dialogues, more of these windows can slide in.

GRAPHICAL ELEMENTS INCORPORATED

RAW MATERIAL REQUIREMENT

On selecting HUT and then hovering on Setup a small window, would pop out on the top of the facilities panel, listing out the raw material requirements for building a house. In case of an upgrade, selecting a facility and hovering on upgrade would do the same. If the requirement is being met the player can click on SETUP/ UPGRADE.



On selecting a RESOURCE and then hovering on BUY/SELL a small window, would pop out on the top of the RESOURCES panel, listing out the amount of the resource presently available in the village. Accordingly the player can trade goods.



Thus separate windows appearing on the screen do not need to disrupt the play area.

A ROUGH LAYOUT OF WHAT THE PLAY AREA MAY LOOK LIKE

Prominent ERROR MESSAGES appearing from the left.



This panel could be included if needed. Stick figures denoting categories and a pie chart or drop-down menu could be used rather than formidable text and numbers.

OPTIONS would enlist options such as turning off / on dialogues, enabling Voice Instructions along with text (that would make it far more engaging for the player).

CHAT WINDOWS appearing from the right, merged with the play area

PLAY AREA with its captivating graphics made larger.

INDICATORS, made conspicuous with the use of bright colors.

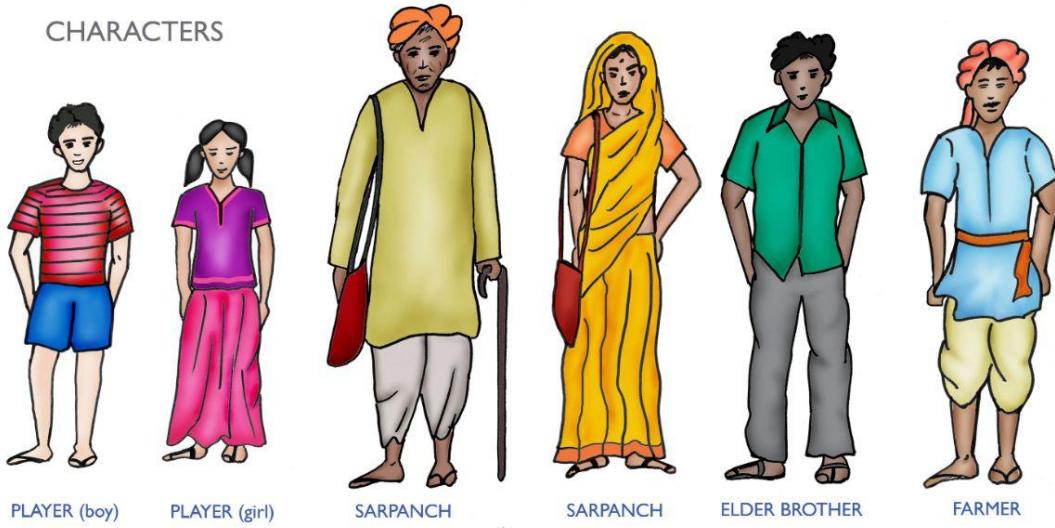
On hovering on the graphic, the statistics would appear on the top.

AFTERTHOUGHTS

The aim should be to enrich the child with knowledge alongside helping him manage the village. Learning should be subliminal. Keep presenting interesting facts and figures about the causes of natural disasters etc that would make the child think.

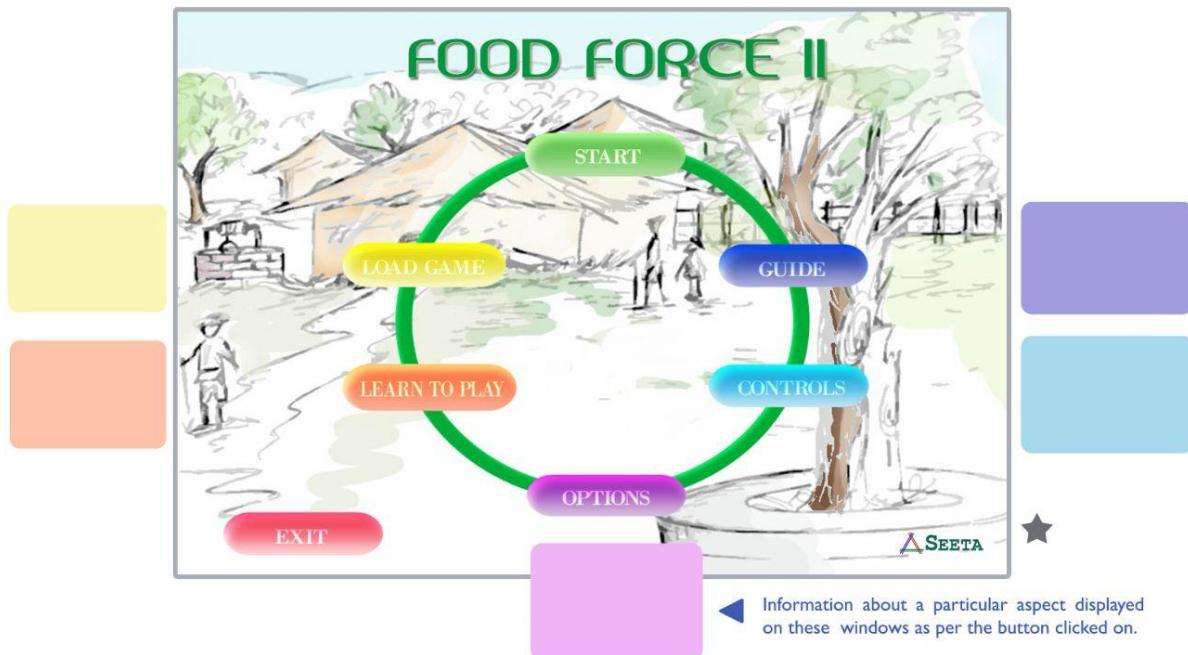
PROPOSED MODIFICATIONS

CHARACTERS



A layout of what the characters could look like if modelled again. Since currently they feature only in the dialogues' window and not in the play area, they could be kept two-dimensional only.

MAIN MENU SCREEN REDESIGN



The design is more in tandem with the essence of the game. The menu elements arranged in a circular format, could also depict the circle of community living, work and cooperation along with avoiding having to scroll down to view all the menu elements. Rainbow colors have been used for the buttons as a representation of the entire spectrum of life ,hope, positivity, revival. On hovering over the SEETA logo, information about the company can be displayed.

★ Colors and fonts used not final.

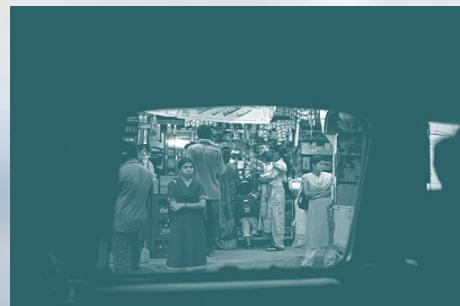


INTEGRATED WATER MANAGEMENT RESOURCE CENTER

Collaborative Remote Water Monitoring, Sewage Management, Quality Assurance and Recyclability of Water using Sita Ramam II and DeAuto NEV

Enabling the Bottom of Pyramid through Water Management Services on the Cloud, Water Quality Tools, Blockchain Network and Open Source Spreadsheet, PACS

ENABLING THE BOTTOM OF THE PYRAMID THROUGH WATER MONITORING, MANAGEMENT SERVICES ON THE CLOUD



Team



Manu Sheel Gupta: Co-founder, Director and CEO at SEETA

Manu is also Co-founder, Director at Aspiring Investments Corp, California, USA; Mentor, Visiting Expert at NSIT Incubation Centre funded by Delhi Government.

- Former South Asia Lead at One Laptop Per Child, Cambridge, United States of America
- Associate Product Manager at Servigistics India Office
- Co-authored over 15 research papers published in international conferences, journals
- Invited speaker at RSA Conference, San Francisco; Google, India and University of Delhi
- Education: Bachelor of Engineering in IT from NSIT, University of Delhi, India.
- South Korea Collaboration: Special Award Presented to SEETA, 24th Global Contest, South Korea organized by NIPA and IPAK in December, 2012.



Vithika Gupta: Platform Engineer at SEETA

Developer of Business and Financial products and integrated with ONVIF SDK.

- Open Source Developer and Advocate of web and android projects.
- Education: Computer Engineer, Banasthali University, India



Deepti Kotwal: Platform Engineer at SEETA

Developer Associate Consultant and Mobile Application Developer at SAP India Pvt. Ltd.

- Mobile Development expertise in SAP technologies like Fiori, UI5, Syclo, Hana, Cloud
- Education: Bachelor in Information Technology, Uttar Pradesh Technical University



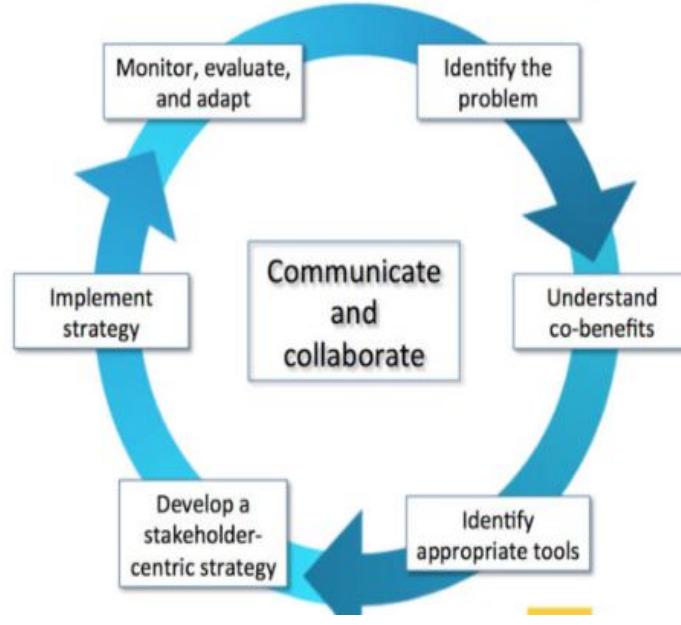
Vision / Mission

Our vision is to carry out research on new models that incorporate technology and which aims at revolutionizing the water management, monitoring and re-usability practices around the world. The technology solution is designed specifically to address the needs of the water, health and environment eco-system comprising of civic bodies, water management units, government, citizens, hospitals, laboratories, R&D organizations and improve the operational efficiencies.

Just in Time service

Availability of water records in the city suffering from environmental issues across different stakeholders through a secure blockchain network

The Process of Integrated Water Management



Cloud based web application with chat based interface for quick water wastage attention



Better Water Management
Journal of water management records covering complete geo-location history improve the outcomes of policy implementation

Transparency

Insurance agencies can utilize the data to provide customized house insurance plans to the customer. Ground water are at an all time low.

Record Management

Quality documentation reduces the issues regarding water management policies.

Research

Research laboratories can use the data for diagnosis of water borne diseases, suggesting personalized action to water treatment plants

Problem Statement

- Today everyone is concerned about the potential water scarcity in the face of increasing, mainly population-driven, water demands, and its consequences on our energy and food production.
- Increasing globalization is motivating the implementation of new rules and procedures for the international trade of goods and services, reflecting the increasing influence of multinational firms engaged indirectly in water use and transfers.
- Climate change now occurring makes it even more difficult to rely on this assumption of stationarity; historically observed data are no longer adequate to meaningfully plan for climate variability and extremes.
- Changes in climate can shift and alter the shape of the entire probability distribution of future hydrologic events and water demand.
- Inflowing water quality is as important as water quantity. Ecosystem changes may be caused by minor water quality changes. Groundwater systems are particularly vulnerable freshwater resources: once contaminated, they are difficult and costly to restore.

FACTS

By 2050, the world will have to feed and provide energy for an additional 2–2.5 billion people as well as meet the current unsatisfied power needs of a billion. To meet the nutritional needs of this additional population, we should consider the amount of water that is consumed in the production of different goods and, in particular, energy and food. Energy and food security are demands that are particularly critical to water managers.

Water is increasingly becoming a priority policy issue at the international level. The third United Nations World Water Development Report [*United Nations World Water Assessment Programme (UN WWAP)*, [2009](#)] warns, in an unprecedented fashion, that extremely serious consequences may result from the current inequitable, unsustainable use of water.



Impact

What technology will reach the Masses in the right manner?



- Gartner placed Cloud Computing and Machine Learning amongst the top 10 strategic technologies for 2018
- Need to customize Technology to suit the needs of Asian and Global Markets
- Each software needs to go up to the Cloud
- Our focus: On Water Management, Monitoring and Reusability software

The Water Management, Monitoring, Quality Assurance and Reusability Application on the Cloud and Mobile



Product - Water Management and Monitoring Portal

Reliable background for building a good portal for citizens focused on cost effective usage of water

- Cloud interface for storing Water data on the Cloud
- Separate interfaces for Policy Makers/Government and Citizens/Consumers
- A web interface for allowing Citizens/Government to upload data
- Ability to comment on a prevention scheme and reports which have been shared.
- Ability for citizens to share their profiles/reports with advisers they chose
- Collaboration to allow different advisers/citizens to work on same area simultaneously
- Collaboration to allow citizens to view online water management facilities closest to their location and allow them to chat and take advice
- Mobile Application to perform all these services through mobile
- Emergency Water Management Services

Water record portal for Government, citizens, professionals as well as civic bodies, to interact and store data on the cloud



Product / Service Details and Benefits

APPLICATION MODEL

Cost Effective Water
Management/ Monitoring
EVERYWHERE!

WHAT'S Water
Management/Monitoring ON THE
CLOUD?

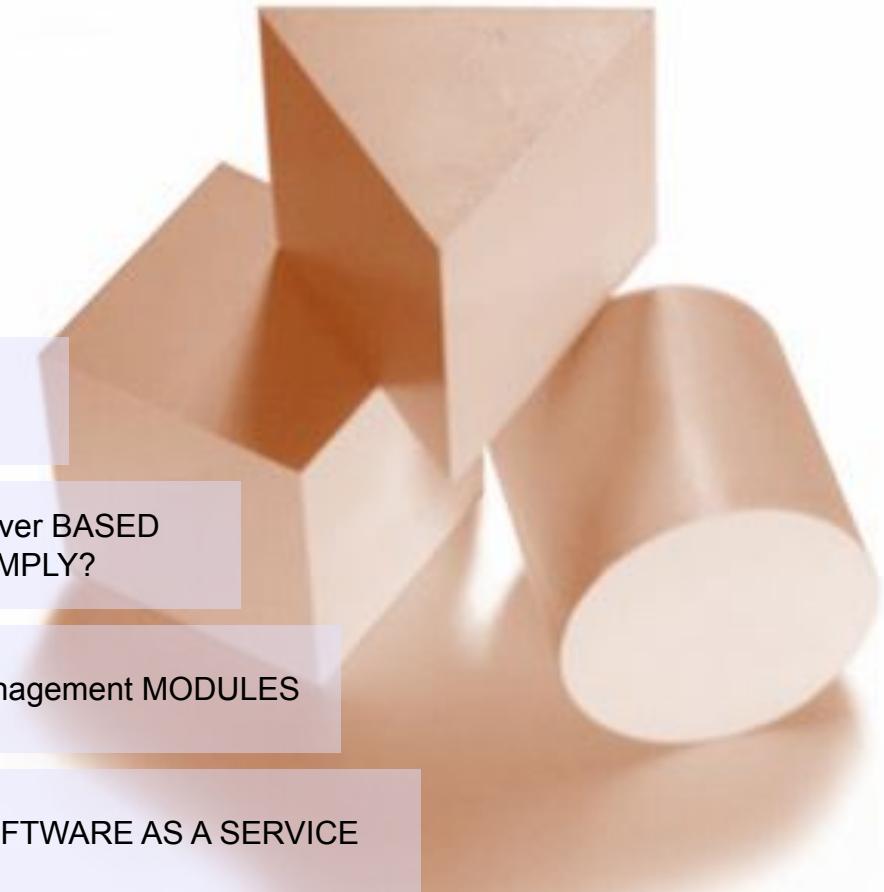
WHAT'S ON THE CLOUD?

WHAT DOES Server BASED
SOLUTION IMPLY?

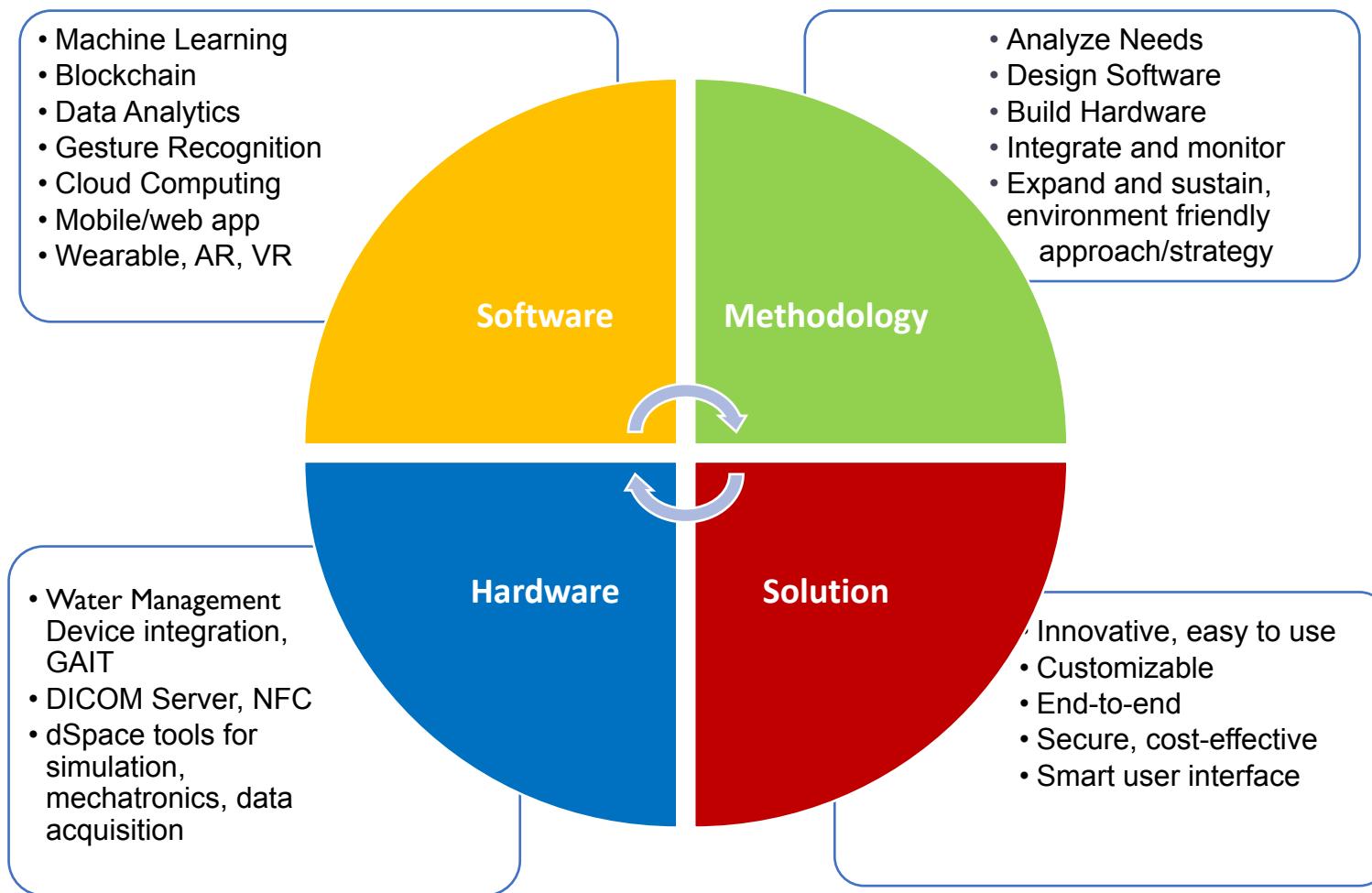
Water Management MODULES

SOFTWARE AS A SERVICE

SERVER APPLICATION
MODULES/MONITORING



Value Proposition



What does the Water Management, Monitoring and Quality Assurance on the Cloud mean?

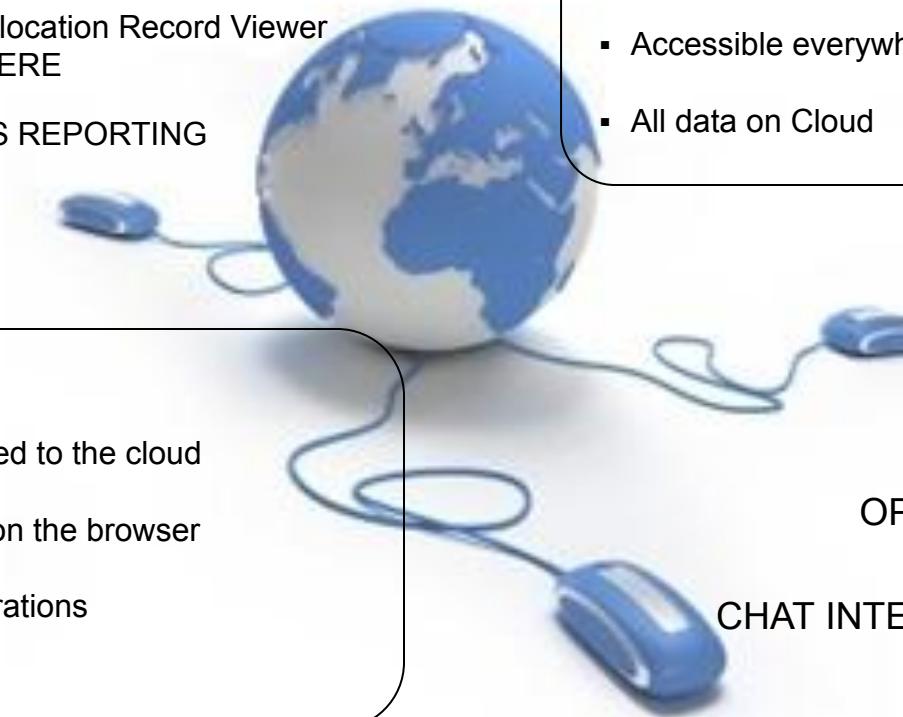
Viability

Water Geo-location Record DATA
ANYWHERE

Water Geo-location Record Viewer
EVERYWHERE

SIMLTANEOUS REPORTING

MONITORING



- The Water Geo-location Application accessible through the Internet Browser
- Accessible everywhere, anywhere
- All data on Cloud

- All the systems integrated to the cloud
- Access the application on the browser
- Server handles the operations

COLLABORATION

LOCALIZATION

OPTIMIZATION

CHAT INTEGRATION

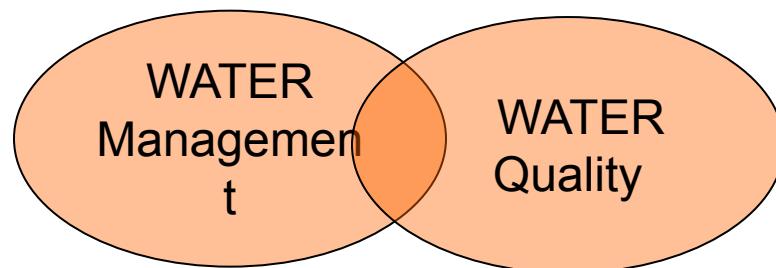
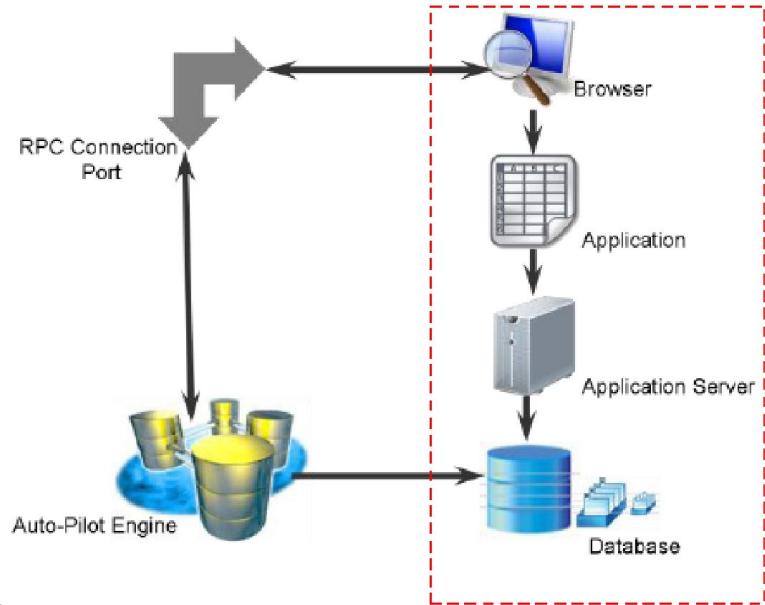
On Cloud – Applications Anytime, Everywhere, Anywhere



WHAT DOES ALL THIS MEAN?

What does Cloud Server based solution imply?

- Robust framework for Internet based and Mobile based Web and Spreadsheet Applications
- Complex applications can be built with Rest API and SocialCalc
- Collaboration gives huge scope for innovation



Complex Applications – Anywhere and everywhere!



WATER Management Everywhere

Is the cloud software the optimal user framework?

Makes complex problems
easy

Ability to visualize
problems in a
new light



Helps solve grass
root level problems

Manipulate to solve all kinds
problems

Our solution can be the framework for Multiple problems

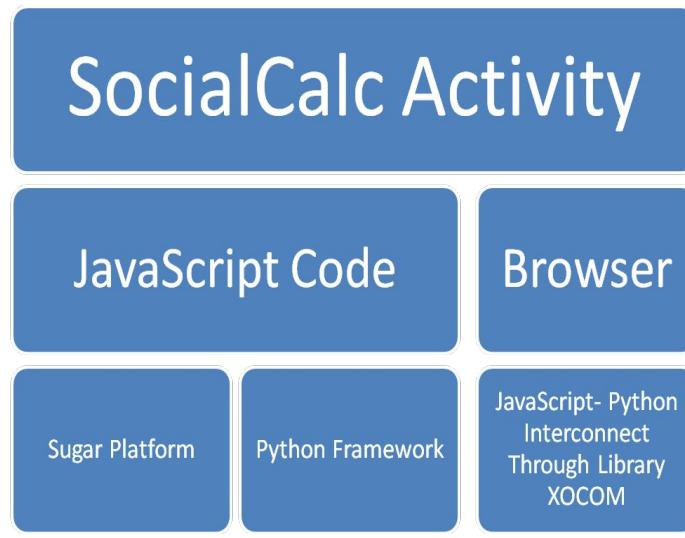


System Architecture and Workflow

System Configuration

1. Mamp server--
<http://www.mamp.info/en/downloads/>
2. Tornado Application Server
3. SocialCalc and EtherCalc software
4. Ionic framework, ReactJS
5. Amazon EC2, docker and Kubernetes
6. Orthanc server for imaging

Architecture



Features

1. Tabulation
2. Organization
3. Graphing and Calculation
4. Localization in different languages
5. Multi-user editing over the mesh network
6. Ability to read and edit single sheet Excel (.xls)
7. Lotus (.wk4) and other popular spreadsheet files

Workflow

Cloud server based application – Anywhere and everywhere!

Water Quality Sample Data query and retrieve from an instance

This screenshot shows the MyOrthanc Patient interface. The main panel displays a patient record for Patient 1, born on Thursday, March 17, 1988. The record includes fields for AccessionNumber, ReferringPhysicianName, StudyDate, StudyID, and StudyInstanceUID. Below the main panel, there are two sections: 'Interact' and 'Access'. The 'Interact' section contains buttons for 'Delete this patient', 'Send to remote modality', and 'Anonymize'. The 'Access' section contains buttons for 'Download ZIP' and 'Download DICOMDIR'. At the bottom of the interface, there is a PDF preview of the record.

Viewing a water record examination for a place

This screenshot shows the MyOrthanc Patient > Study interface. It displays a study record for Patient 1, born on Thursday, March 17, 1988. The study record includes fields for AccessionNumber, ReferringPhysicianName, StudyDate, StudyID, and StudyInstanceUID. Below the study record, there is an 'Interact' section with buttons for 'Delete this study', 'Send to DICOM modality', and 'Anonymize'. At the bottom of the interface, there is a PDF preview of the study record.

Two independent examinations available for the record currently viewed.



Workflow

Cloud server based application –
Anywhere and everywhere!

Water Quality Sample Data query and retrieve from an instance

This screenshot shows the 'MyOrthanc > Patient' interface. It displays a patient record with the following details:

- Patient**: ID 1, PatientBirthDate: Thursday, March 17, 1988, PatientID: 1, PatientSex: M.
- Access**: Unprotected.
- Interact**: Options include Delete this patient, Send to remote modality, and Anonymize.
- Download**: Options include Download ZIP and Download DICOMDIR.

The interface also includes a sidebar with links like 'XAMPP Hosting', 'MyOrthanc > Patient', and 'Orthanc Web Viewer'. At the bottom, there's a taskbar with icons for various applications.

Download and send water management data to a remote modality

This screenshot shows the 'MyOrthanc > Plugins' interface, listing the following plugins:

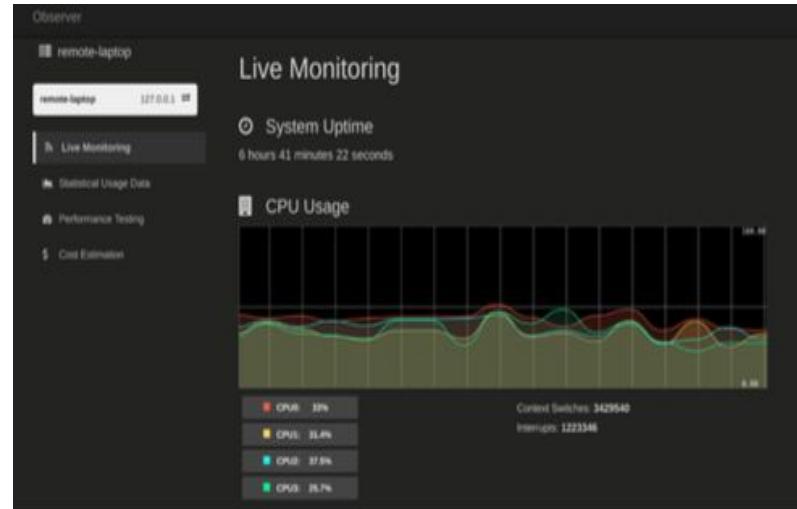
- dicom-web**: Implementation of DICOMweb (QIDO-RS, STOW-RS and WADO-RS) and WADO-URI.
- osimis-web-viewer**: Provides a Web viewer of DICOM series within Orthanc.
- postgresql-index**: Stores the Orthanc index into a PostgreSQL database.
- postgresql-storage**: Stores the files received by Orthanc into a PostgreSQL database.
- serve-folders**: Serve additional folders with the HTTP server of Orthanc.
- web-viewer**: Provides a Web viewer of DICOM series within Orthanc.
- worklists**: Serve DICOM modality worklists from a folder with Orthanc.

The interface includes a sidebar with links like 'XAMPP Hosting', 'MyOrthanc > Plugins', and 'Orthanc Web Viewer'. At the bottom, there's a taskbar with icons for various applications.

Plugins

Server Side Development / Monitoring Solution

Live Monitoring



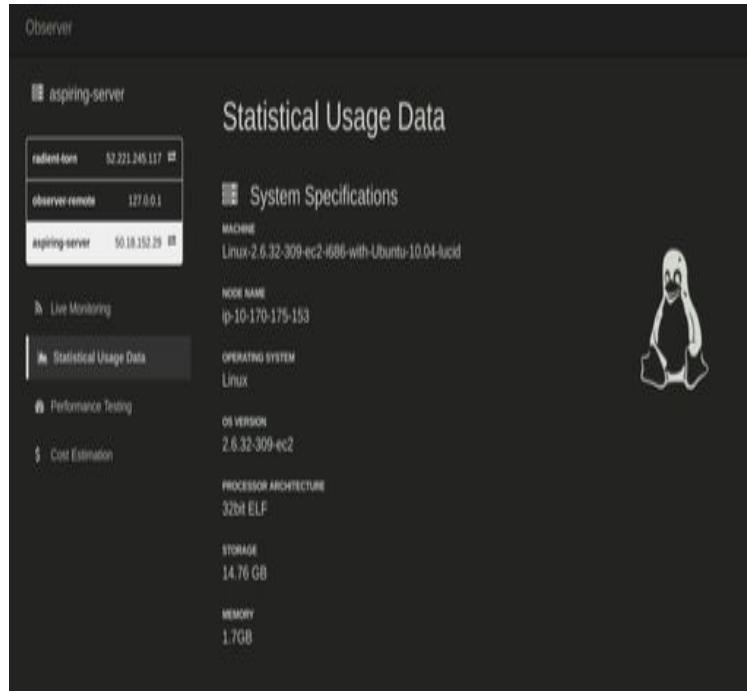
Observer

- **Remote** – Obtains monitoring data.
- **TCP** – Receives data from all Remote servers and saves to database.
- **HTTP** – Runs the website application to visualise data and execute tests.



Server side: Statistical Monitor, Usage Data Analytics

Statistical Usage Data

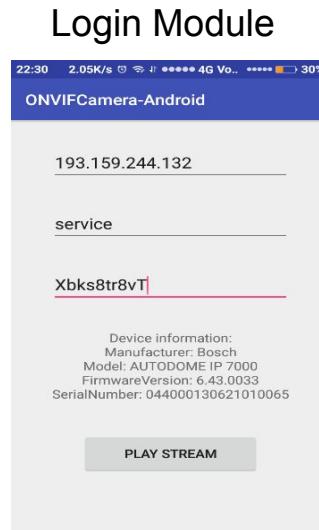
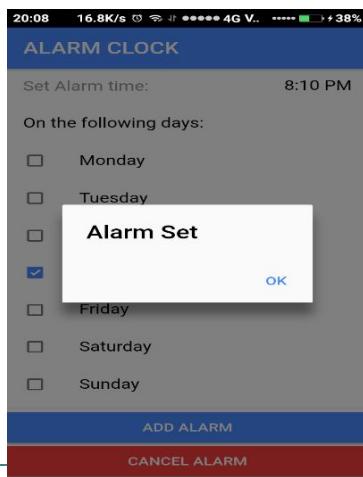


Live monitoring data from remote is stored on the database to condense them into statistical data over a longer period of time.

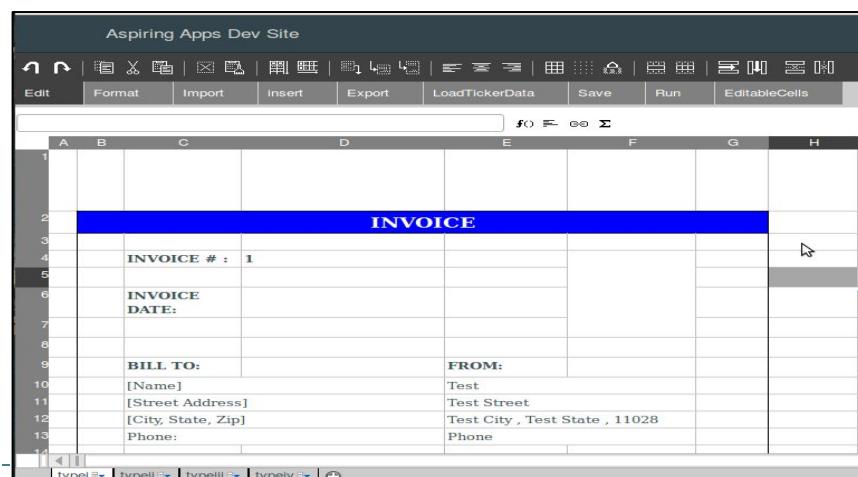
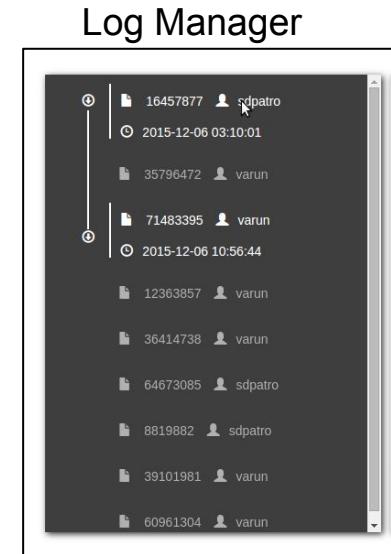
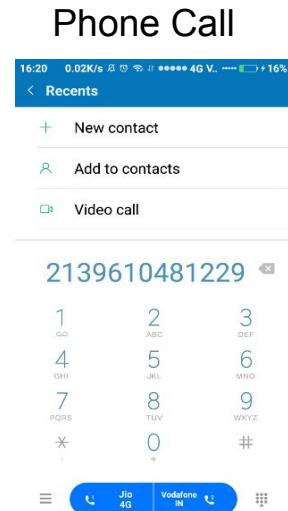
Application Modules For Water Management



Alarm Settings



Spreadsheet user interface



Water Management – Using NXP Module & IOT Gateway

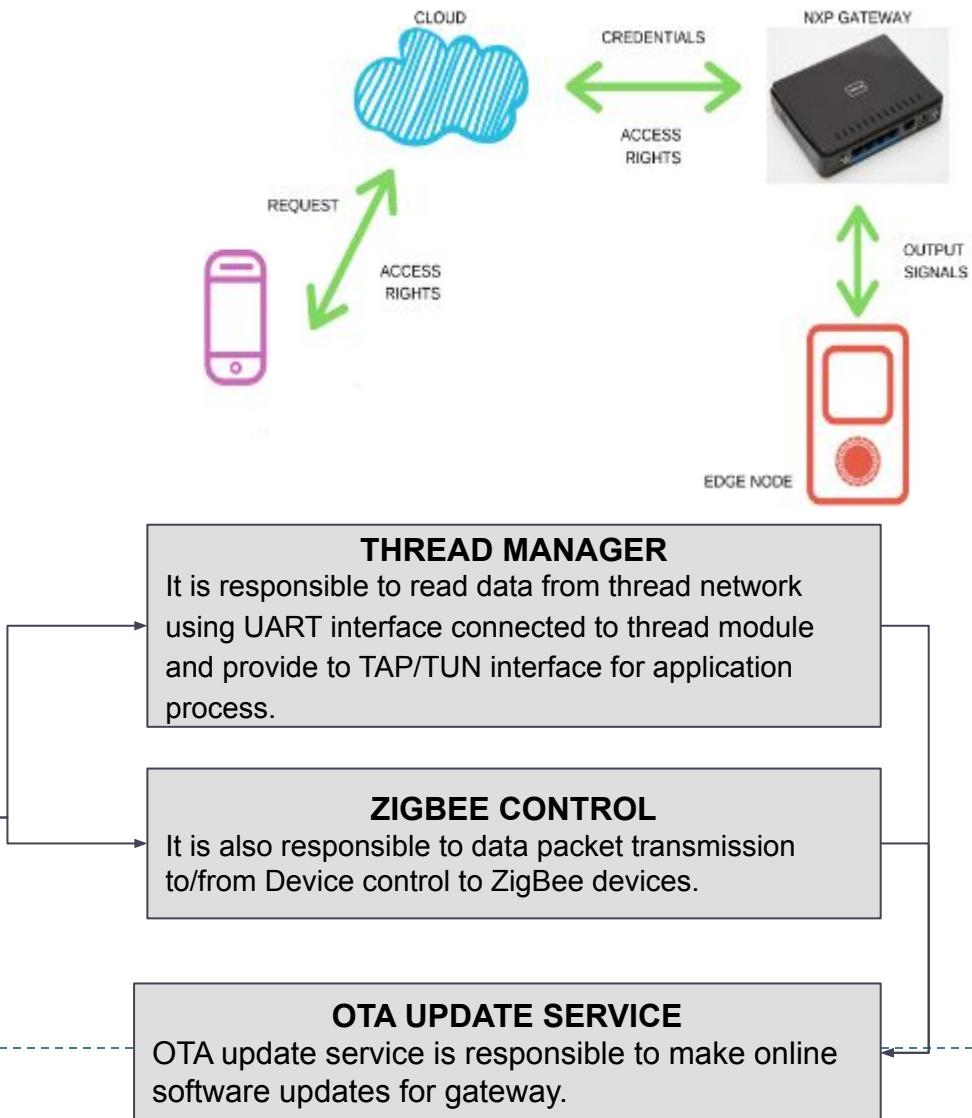
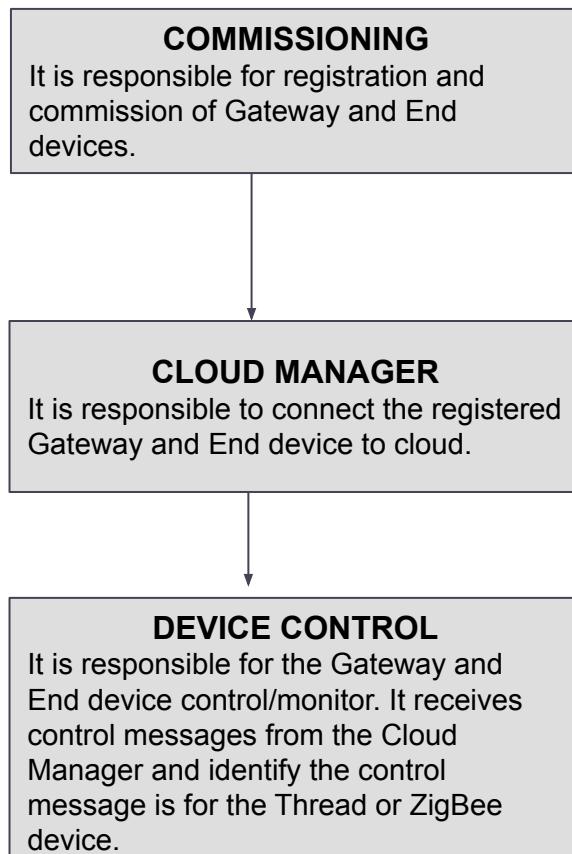


RED: The drone will stop its service and return to the base station when prompted to do so. The gateway receives a request from a drone(mobile) to enter the range. While handling this request the edge node light turns blue. No new requests for entry are entertained.

GREEN: The drone will start its service and reach to the specified location with goods. The gateway knows no drone is present in the range and displays this information through the edge node with green color. The gateway allows drones to make request for entry.

BLUE: A sudden change of state can create chaos. So, we have decided to give some time to drone to change its state. The gateway exchange credentials with the requesting drone(mobile) through cloud. If the drone is allowed to enter the end node turns red indicating presence of a drone in the range. No requests for entry can be made by other drones.

Water Management – Using NXP Module & IOT Gateway



Business Model and Strategy

RoadMap: Ensuring successful implementation is the first step towards our goal of strengthening innovation and user interaction for integrated water management

Five step approach



Milestone Roadmap for SEETA at India:

✓ SEETA	✓ Industry partnership	✓ Prototype accomplished.	✓ On-ground governance structure defined	✓ Business Development team
✓ Company Representatives	✓ Design Solution for user base.	✓ Pilot solution implemented and feedback gathered from the community.	✓ Execution team established	✓ Product Deployment started – Sales and Distribution
✓ Startups funded	Mentorship on business plans and feedback on execution		✓ Committed Team Collaboration with Government, industry, universities, users.	✓ New Website completed
✓ Startups mentored				
✓ Conference, Demos	and go to market strategy			

Deployment:

Create and deploy a gateway service in the housing group/ office/ hospital that will enable the continuing export of radiology images, reports to the SEETA EWR cloud system.

Completion of supporting collateral required to fulfill services and deliverables such as the equipment, supplies and other open source software tools.

Procuring server hosting for storing and utilizing anonymized water sample images and associated clinical report data to prove that computer aided detection is viable.

Community Learning and Partnership



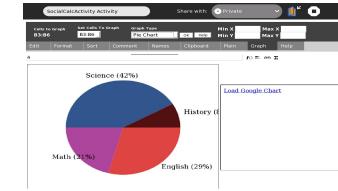
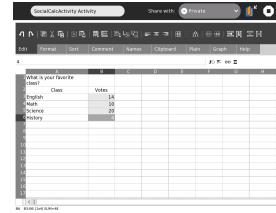
OLPC



One Laptop Per Child (OLPC) is an organization dedicated to create educational opportunities for the world's poorest children by providing each child with a rugged, low-cost, low-power, connected laptop with content and software designed for collaborative, joyful, self-empowered learning



Socialtext



SocialCalc is a product by SocialText. "SocialCalc on Sugar" is a spreadsheet solution developed for functioning in the Sugar environment, OLPC's software paradigm. SocialText is now acquired by LinkedIn.




Samsung Electronics Co Ltd
 (Design and development of mobile products in healthcare with Media Solution Center at Samsung's South Korea office)

sugarlabs

Application developer, platform engineer, Sugar OS deployment trainer and community outreach expert.

Netaji Subhas Institute of Technology, Delhi



Mentor at NSIT Incubation and Innovation Foundation (NSIT IIF)

 **SEETA**

Community Learning



Community initiative at IISF 2018 (India International Science Festival)



Integrated Water Cooling/Cleaning Solution



Utilization of Waste Water



Water Piping Solution and effective utilization of waste water



Water Treatment Facility



Game Design Mission:

Our mission is to ensure effective design, engineering and delivery of a technology-aided solution for citizens to make water management better for everyone using predictive analytics and automation, Sita Ramam II and DeAuto NEV.

We wish to use web tools and blockchain technology to make water quality safer and monitored for residents, authorities, as well as other 3rd parties. With a mix of intelligent hardware, software on a blockchain network, we will provide intelligent feedback about water management and quality and help analyze past water related incidents, as well as predict future incidents, enable water management counseling:

Data Transparency: Availability of residents's water records across different stakeholder through secure blockchain network and NuCypher re-encryption data protocol. Residents, civic bodies, organizations who place their data on the exchange will be able to control which consortium entities have permission to access information.

Data Uniformity: Data is processed to make it uniform so that it can be utilized by different stakeholders on verified request. Also, records are encrypted to avoid any tampering of the data over course of time.

Data Analytics: With the help of computer-aided detection and machine learning algorithms, data can be further used for analysis and early discovery and prediction of water related incidents, real-time measures, monitoring and rating of water bodies, route pattern analysis and development.

Counseling: Preventive measures and remediation using a decentralized Twitter application over the Ethereum blockchain. Utilization of Geogebra open source tool.

(b) Science and working principle behind the idea

We wish to ensure effective design, engineering and delivery of solution for detecting & managing water and setting up water quality geo fences using predictive analytics and blockchain

1. Water records transparency: Availability of resident's water records affected by crisis across different stakeholder through secure blockchain network.
2. Data Uniformity: Data is processed to make it uniform and stored in PACS (Picture Archiving Communication System) so that it can be utilized by different stakeholders on verified request.
3. Data Analytics: With the help of computer aided detection and algorithms, data can be further used for analysis and early prediction for water quality in emergency affected regions.

4. Detection: Identifying the water management level in the video feed using object detection.
5. Discovery: Logging the identities of the water resource facilities in a particular locality at any instant of time, using exchange of unique identifiers.
6. Water Quality Geo-fencing: Discovering water issues and raising alarms using the detection & discovery data.
7. Monitoring: Looking out and reporting water wastage incidents based on event detection in visual data.
8. Analysis: Analyzing route patterns and incidents.
9. Incident Reporting: Publish water related incident reports, prevent measures for good water quality and remediation using a decentralized twitter application over the Ethereum blockchain network and Embark Tools.

We believe that ICT in water management suffers from 2 key issues and need key resolve to meet them.

ISSUE #1 - Effective utilization of capital and governance

ISSUE #2 – Sustainable access to financial and human capital

Strategy and Goals:

We are here to support connected water management eco-system. We would like to help, sustain and grow the integrated water management eco-system while measuring the following metrics:

- To provide local and regional technical and pedagogical support.
- To create new interaction tools and pedagogical practice for the connected water management eco-system.
- To provide localization and internationalization of software, content, and documentation.
- To provide integration and customization services.
- To liaison with local communities to develop software infrastructure that could help towards meeting with the local needs of connected water management eco-system.

(c) Final outcome/deliverable of the project

The technology solution is designed specifically to address the needs of the water, health and environment eco-system comprising of civic bodies, water management units, hospitals,

environment and health ministry, laboratories, citizens, R&D organizations and improve the operational efficiencies.

1. Just in Time service: Availability of city's water records suffering from environmental issues across different stakeholder through secure blockchain network.
2. Record Management: Quality documentation reduces the issues regarding implementation of water management policies.
3. Research laboratories can use the data for diagnosis of water borne diseases, suggesting personalized action to water treatment plants
4. Web Application: Cloud-based web application with a chat-based interface for quick water wastage attention. It can also be used for environment protection and steps to reduce the issues.
5. Transparency: Insurance agencies can utilize the data to provide customized house insurance plans to the customer.
6. Better Management Practices: Journal of water usage records covering complete city history improve the policy implementation and help define stringent rules towards saving water.

(d) Who would be the beneficiary of this innovation and why?

We have a market potential with various stakeholders including buyers of our software solution and key collaborators-

1. Federal/State Department of Water and Environment, Ministry of Defence: For Water Quality and weather data, data.
2. OEM and Dealerships: For Storage tank diagnostics, in-house service consumption;
3. Smart Cities Infrastructure: Real-time water management, incident alert;
4. Police Officers, dispatchers, civic bodies.
5. Insurance Companies: Aggregated, anonymized water quality data, water based disaster incident data;
6. Advertisers: For Customer demographics.

Business Benefits in Crisis Hit areas:

1. Consumers
 - Make instant appointments with water inspection bodies and get quick access to e-water records in emergency hit areas.
 - Computer-aided detection will help in early prediction and diagnosis of water quality in crisis situations.
2. Ministry of Water Resources, Doctors and Hospitals
 - Prioritize and handle appointments better in crisis hit areas.
 - Issue prescriptions for water borne diseases
 - Coordinate with Water Quality specialists.

- Access to accurate records.
- Improved care.

3. Administrator and House Insurers

- Connect all stakeholders
- Personalize house insurance plans and tax saving.
- Accurate and timely payments
- Reduce the cost of centralized systems

4. Employees

- Administer Benefit.
- Reduce water billing costs to employees in emergency affected regions.
- Reward employees
- Offer affordable benefit packages.

5. Research Institutions

- Computer-aided detection of water quality, development of prevention models.
 - Personalized water quality measurement

Collaborative Goals Our solution is useful only to the extent it is used by the learning and environment friendly community. Thus, we are working with water management educators, community citizens and health specialists around the world to focus on these learning challenges:

1. To make our project freely and readily available to community citizens everywhere
2. To explore and share best practices
3. To provide a forum for discussion and support for technology for learning
4. To provide mechanism for evaluation and dissemination of results.

3. Proposed costs and time frame

Sr.No	Items	Project Cost Own Share (in lacs)	PRAYAS support sought (in lacs)
1.	Outsourcing Charges for R&D/Design Engg/Consultancy/Testing/Expert cost	1	1
2.	Raw material/ Consumables/Spares	2	2
3.	Fabrication /Synthesis charges of working model or process	4	4
4.	Business Travel and Event participation Fees (Ceiling 10% of approved project cost)	1	1
5.	Patent filing Cost	1	1
6.	Contingency	1	1

Project period in months: _____ 15 _____
 (Not more than 18 months)

4. Activity details/work plan

Sr.No	Activities	Monitorable Milestones	Duration (months)
1.	Engage Indian community	Trust building and commitment. a. Mentorship b. Pilot based c. Learning and development	2
2.	Implement appropriate project strategy	Industry partnership Design Solution for Indian user base. Mentorship on business plans and feedback on execution and go to market strategy.	3
3.	Pilot Launch	Pilot solution implemented, and feedback gathered from the Indian community.	6
4.	Define management & governance structure	Execution team established Committed Team collaboration with Government, industry, universities, users.	2
5.	Expand	Business Development team Product Deployment started – Sales and Distribution New Website completed	2

Requirement and Usage of Funds

Title	Activity	Timeline	Cost (INR)
Research & study	<ul style="list-style-type: none"> ▪ Patent Publication ▪ Prototype feature list finalization 	3 weeks	1,00,000 (US \$1453)
Sketching & Conceptualization	<ul style="list-style-type: none"> ▪ Design and implement configuration per Concept ▪ Design and implement platform and application Mock-ups ▪ Analyze the requirements and identify software/hardware components of major units ▪ PACS system, Processor, DICOM Server, Cameras, LTE, QR code reader, CAD tools. ▪ Explore technology options and perform cost/benefit analysis for each ▪ High level design and solution 	5 weeks	5,50,000 (US \$7994)
Proof of Concept Creation	<ul style="list-style-type: none"> ▪ Create Proof of Concept based on designed specification ▪ Design a web interface 	5 weeks	4,50,000 (US \$6541)
Testing and	<ul style="list-style-type: none"> ▪ Initial user testing, and Proof of Concept refinement ▪ Prototype Release 	4 weeks	3,00,000 (US \$4360)
Prototype Customization	<ul style="list-style-type: none"> ▪ At the Housing Welfare location 	2 weeks	
Prototype validation and deployment	<ul style="list-style-type: none"> ▪ Final Prototype deployment and validation ▪ Refinements based on the prototype ▪ Final Engineering CAD release. 	2 weeks	1,00,000 (US \$1453)
TOTAL			15,00,000 (US \$22,000)

Prototype Development: The cost of developing the prototype solution is 10 lacs. We have already saved 5 lacs investment involved in hardware procurement during prototype development phase with the help of strategic partnerships with NXP Semiconductors, OLPC Boston, Samsung (South Korea office), Sugar Labs and NSUT.

We are evolving the solution in the following phases:

PHASE I – Requirements Analysis and Design (1 months)

- Demonstrate the solution using spreadsheet and video player software on cloud connected devices, Android phones, iPhones, first generation tablets.
- Procuring server hosting for storing and utilizing images and associated video data to prove that real time monitoring is viable.
- Set up timeline for planning the 2022 winter deployments and user training session
- Participate in community events organized by the incubator.

PHASE II (winter deployments and user training session) (8 months)

- Create PoC based on designed specification. Complete the design of web interface.
- Initial user testing, and POC refinement
- Prototype Release- Start the pilot trials with 2-3 vendors.

- Prototype Manufacturing at the Vendors location.
- Prototype validation and assembly: Final Prototype assembly and validation; Refinements based on the mechanical prototype; Final Engineering CAD release.
- Manage and provide the hands-on task of exporting images and video reports from the customer to SEETA water management cloud system.
- Create and deploy a gateway service in the customer geo-location that will enable the continuing export of images and video reports to the SEETA water management cloud system.
- Completion of supporting collateral required to fulfil services and deliverables such as the equipment, supplies and other open source software tools.
- Continue the collection, data organization and management of images and associated video report data to improve computer aided detection using deep learning algorithms and integrate them with the platform.
- Survey on community's needs, user interaction, selection of vendors and water quality diagnostic centers where we could deploy full-scale pilot, possibly focused on mobile-platform
- organize a hardware agnostic program
- Enable pilot users to be developers of web based platform and contribute in improving the existing deep learning algorithms using websites like Kaggle.
- Focus on making the platform interoperable with a variety of vendor systems in different housing societies.

PHASE III (6 months)

- Winter 2023-2024 deployment in housing societies, welfare associations, building and infrastructure groups, government offices

Hardware Cost Optimization:

We have received a \$500 iot modular gateway kit from NXP on successful participation at VLSID 2019 conference. We also won a special prize in the industry track at NXP Design Contest at VLSID 2019.