

Design and specification of TRUST methods and techniques to support management decision

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trust

D55.2



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TABLE OF CONTENTS

Table of contents	2
Table of figures	3
1. Introduction	4
2. Application goals	5
3. Implementation	7
4. Application Flow Chart.....	8
5. Interface	9
6. Future Developments.....	15

TABLE OF FIGURES

Figure 1– General flow chart	8
Figure 2– TRUST DT client login screen.	9
Figure 3– Waiting for the session to start. At this point, the mediator is already able to input the mission and vision.....	10
Figure 4– Table Screen with a set of objectives and criteria already inserted.....	11
Figure 5– In the Proposals Screen users are able to suggest alternatives to previously suggested items or to propose an entirely new item.....	12
Figure 6– Voting process.	12
Figure 7– Categorization Screen – assigning TRUST dimensions to each objective.....	13
Figure 8– Validation Screen – showing side by side the objectives defined by the users (left) and the objectives suggested by TRUST (right).	13
Figure 9– Weight Screen. This visualization allows the users to grasp the weight they are assigning to each dimension, objective, criterion and metric. If any part of the chart occupies a big space, the users should reconsider the weights they are assigning to each metric.....	14

1. INTRODUCTION

The TRUST Decision Theater Software is an immersive environment designed for collaboration among multiple decision-makers/stakeholders. It addresses the technological barriers often created by specialized tools in industry decision-makers, at the various levels. Improved human engagement is leveraged by Interface and usability concerns which improve decision-making and collect participant input and collaboration.

This environment will act as front-end for information and models developed in TRUST, bridging the gap between the information produced across the TRUST portfolio and the common manager and decision-maker.

This report intends to briefly summarize the proof of concept key features and to present implementation details. It starts by presenting the application goals and the interface philosophy. It goes on describing implementation details, which includes a general application flow chart and data model. It concludes with a brief analysis of the potential of this application.

2. APPLICATION GOALS

The major goal of Decision Theater is to support involvement of Stakeholders and Decision Makers in adopting the TRUST project. It provides the tool that could be very useful to initiate organizational change and specialization accordingly with TRUST findings.

This first Decision Theater proof-of-concept had been developed to guide a group through the task of collaboratively define and agree on Objectives, Criteria and Metric's of an Organization who intended to Manage Water Patrimony Infra-Structures.

Goals of the application: facilitate collective analysis and decision-making. The application has two major goals:

- Support collaboration among decision-makers and stakeholders, allowing multiple users, together and simultaneously, to explore and share information.
- Explore new paradigms of natural user interfaces in order to avoid the traditional human- computer interaction limitations in these types of scenarios.

Scientific goals: Explore the application of Proxemics in Human-Computer Interaction and Ubiquitous Computing. By having devices that are aware of their context and react according to it, we expect to motivate a more natural and intuitive interaction.

The work developed within TRUST intended to illustrate the use of technologies, such as Augmented

Reality and New Interfaces in the contexts identified in the user stories. The TRUST Decision Theater

Application is a proof-of-concept that can be used alone or integrated with any other application. It was designed to explore technological options to facilitate cooperation through digital devices giving tools to the participants to collaborate on the Big Screen but also to work by themselves and only share with the group specific information.

In summary, the TRUST Decision Theater application major goals where:

- Design a decision theatre to support collaboration among decision-makers and stakeholders, allowing multiple users, together and simultaneously, to explore and share information.
- Explore new paradigms of natural user interfaces in order to avoid the traditional human- computer interaction limitations in these types of scenarios.
- Explore new paradigms of Interface Design that supports collaboration among a group of persons present at the same room and working on the same application, but each using its own digital device.

- Explore new paradigms Augmented Reality and Natural User Interface in Tablets and Smart Phones.

The interface was designed to be simple to use and guide the group through the decision process providing them the orientation to adopt TRUST findings.

3. IMPLEMENTATION

The TRUST Decision Theater application has been developed for Windows, Mac, iOS and Android devices. Since it is a proof-of-concept it was optimized to run on mobile devices with bigger screen sizes

- Tablets. The following is required to run the application:
- Internet connection;
- Big screen or a projector connected to a server running Windows or Mac;
- Client(s) running Windows, Mac, iOS or Android (maximum 6 clients).

The solution was developed using Unity3D and YVision and is comprised of three main components:

- Unity's Master Server – its location is known to every participant (server and clients). When a server comes online, it registers itself in the Master Server. When a client comes online, it requests the location of the server to the Master Server;
- TRUST DT Server – it runs on a Laptop or PC connected to a big screen or a projector. It will be used by the mediator application to show the shared information in the meeting and keeping all the info submitted by the different users consistent. What is shown on screen is controlled by a special client, the mediator;
- TRUST DT Client – it runs on a personal computer or tablet. It allows every user, after connected to the server, to freely navigate through all the info generated during the meeting. There are two types of client:
 - normal client, who is able to view all the info and participate in particular moments during the meeting;
 - mediator client, besides being able to do everything a normal client can do, the mediator controls the flow of the session. He is also able to load a previous session or export the current session to a file (which can be used in a following session or to proceed with the planning using AWARE-P).

The Decision Theater was designed to be used during the first stage of the planning phase of the implementation of a water distribution system – the definition of objectives, criteria and metrics. The results of this work can then be exported to an Excel file, which can be used as a use case for a workshop or learning activity or imported to the AWARE-P software.

A further connection between both systems is the possibility to import Performance Indicators libraries to the Decision Theater. These libraries are already used in the AWARE-P software and allow a faster and more complete method to suggest metrics.

4. APPLICATION FLOW CHART

The application flow chart of the TRUST Decision Theater application is presented. Through the flow chart it is possible to understand user actions step by step.

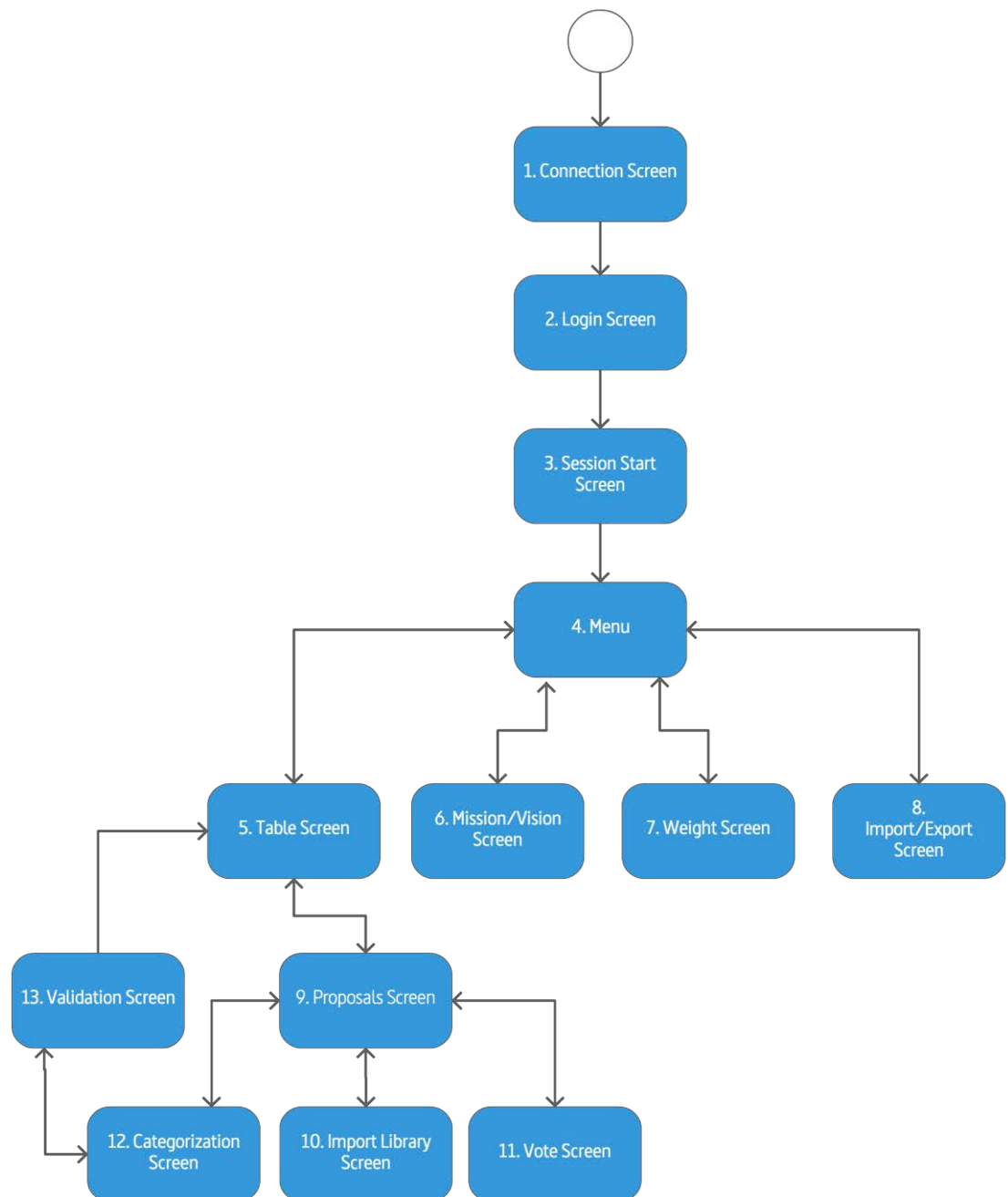


Figure 1– General flow chart

5. INTERFACE

Through a set of screenshots it is possible to illustrate the major characteristics of the application interface.

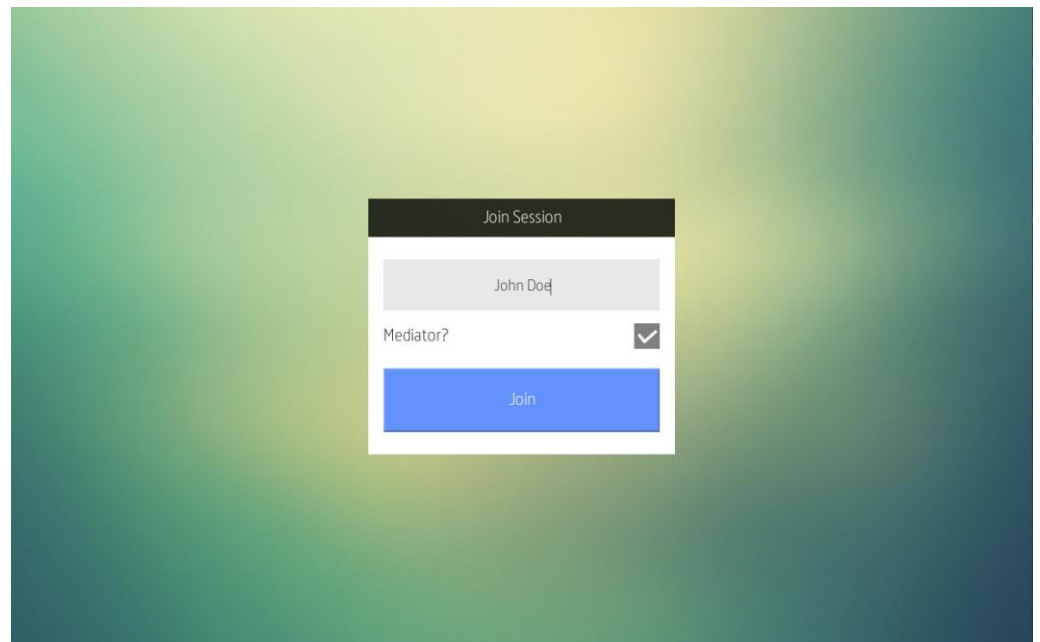


Figure 2– TRUST DT client login screen.

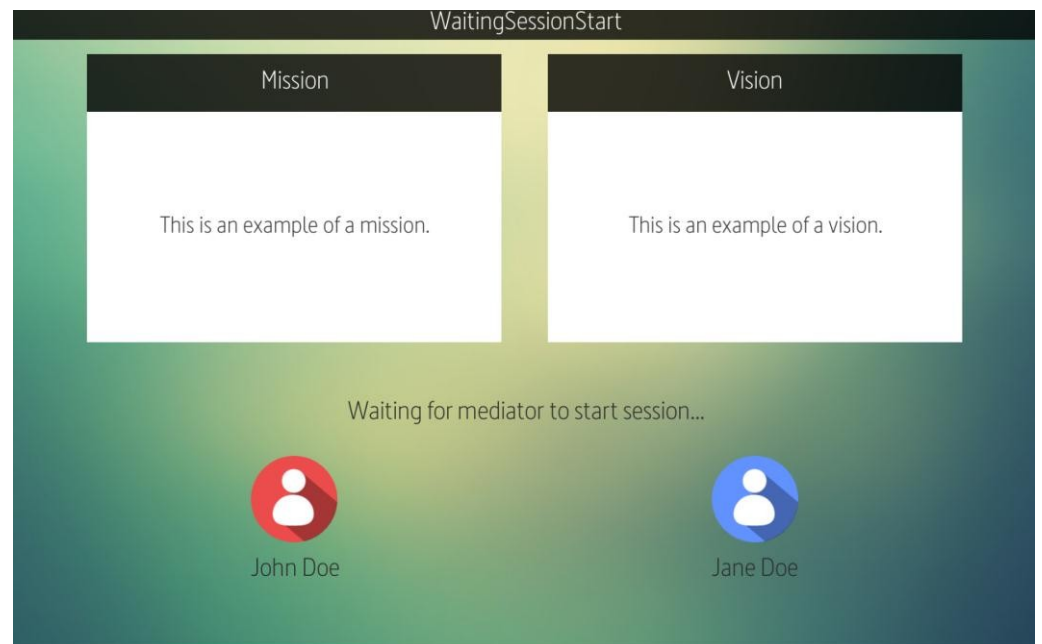
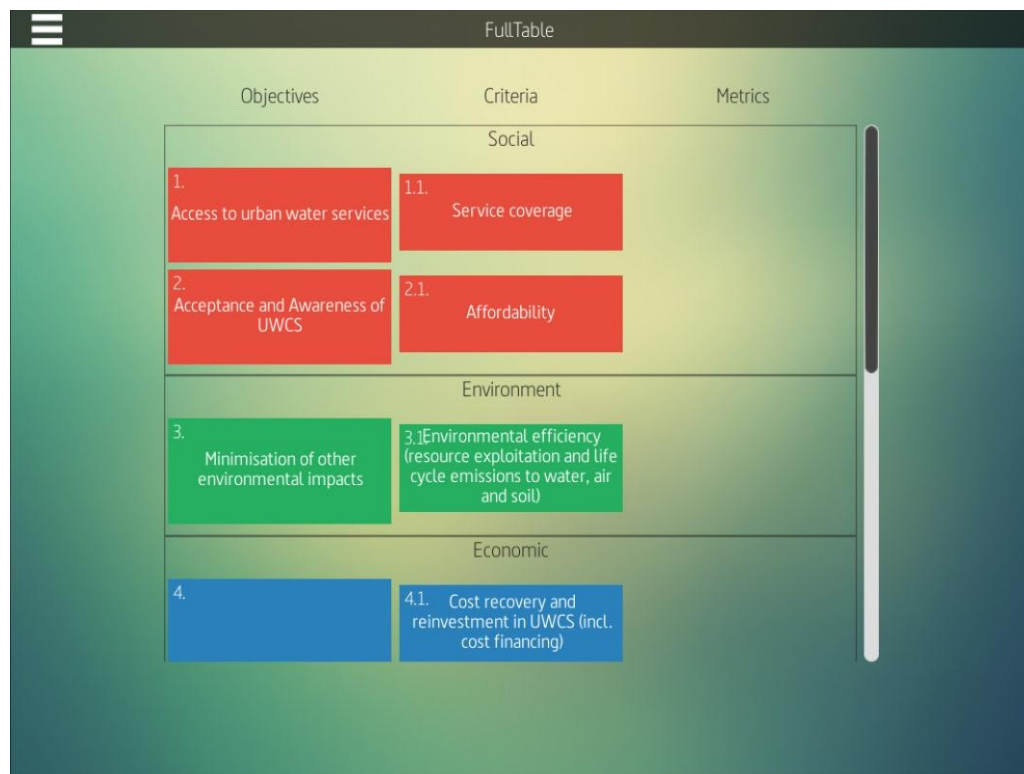


Figure 3– Waiting for the session to start. At this point, the mediator is already able to input the mission and vision.



Objectives	Criteria	Metrics
Social		
1. Access to urban water services	1.1. Service coverage	
2. Acceptance and Awareness of UWCS	2.1. Affordability	
Environment		
3. Minimisation of other environmental impacts	3.1 Environmental efficiency (resource exploitation and life cycle emissions to water, air and soil)	
Economic		
4.	4.1. Cost recovery and reinvestment in UWCS (incl. cost financing)	

Figure 4– Table Screen with a set of objectives and criteria already inserted.

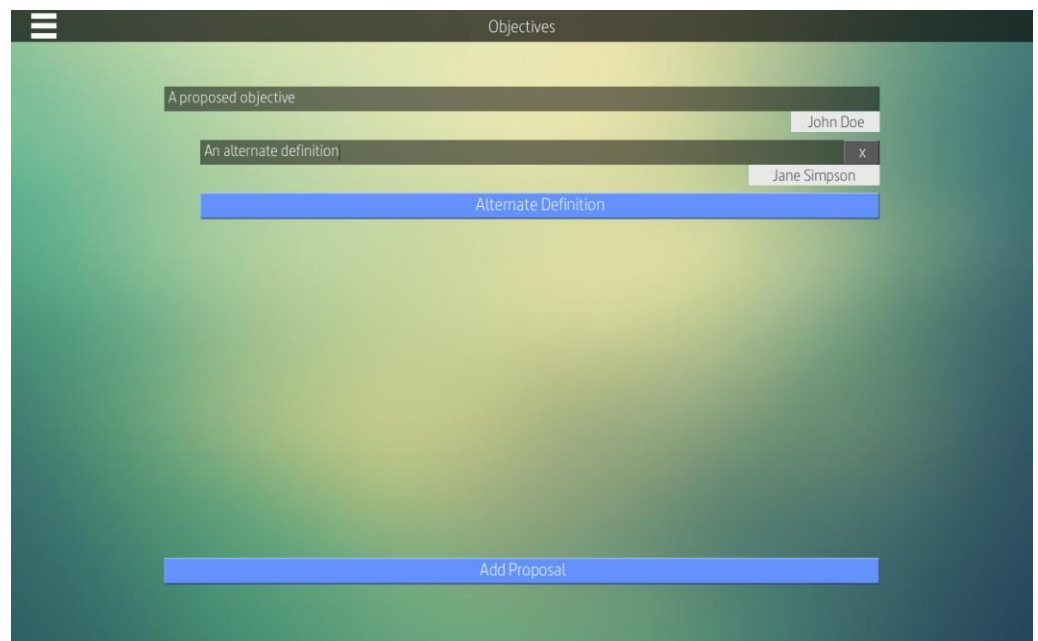


Figure 5– In the Proposals Screen users are able to suggest alternatives to previously suggested items or to propose an entirely new item.

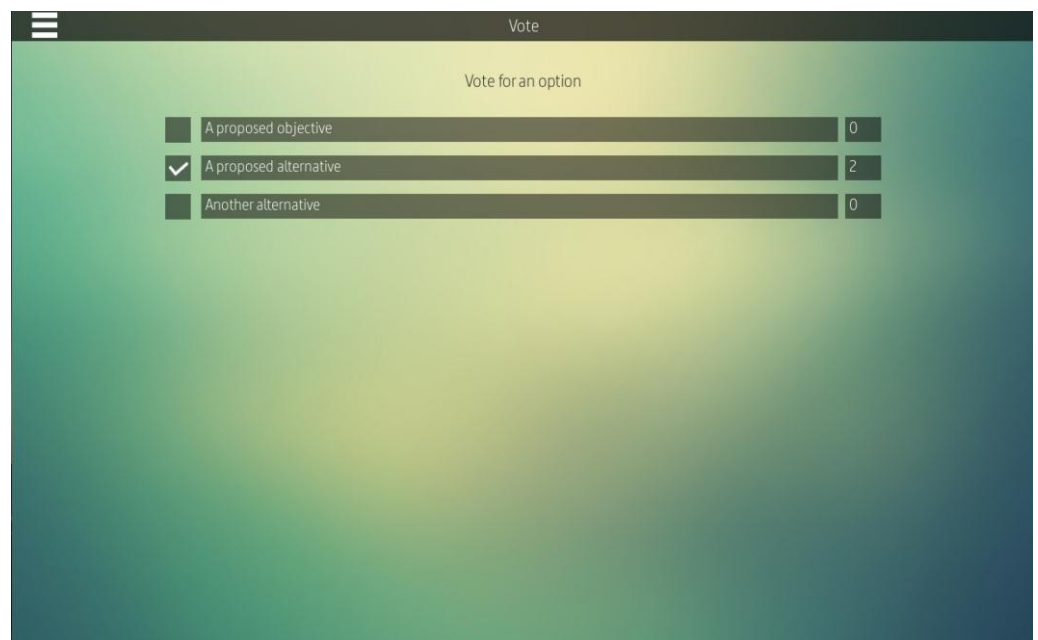
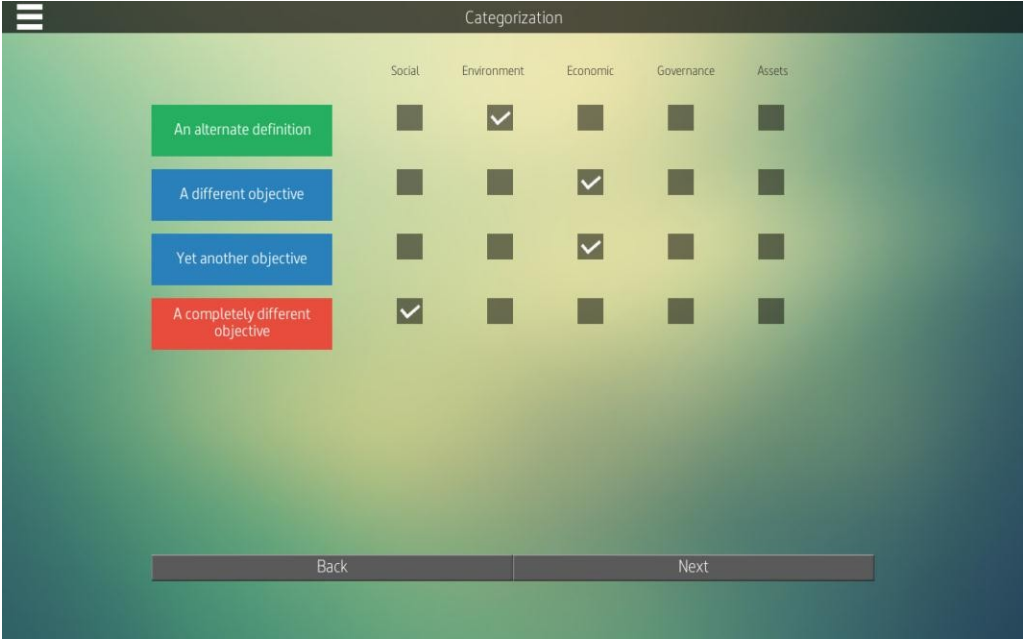


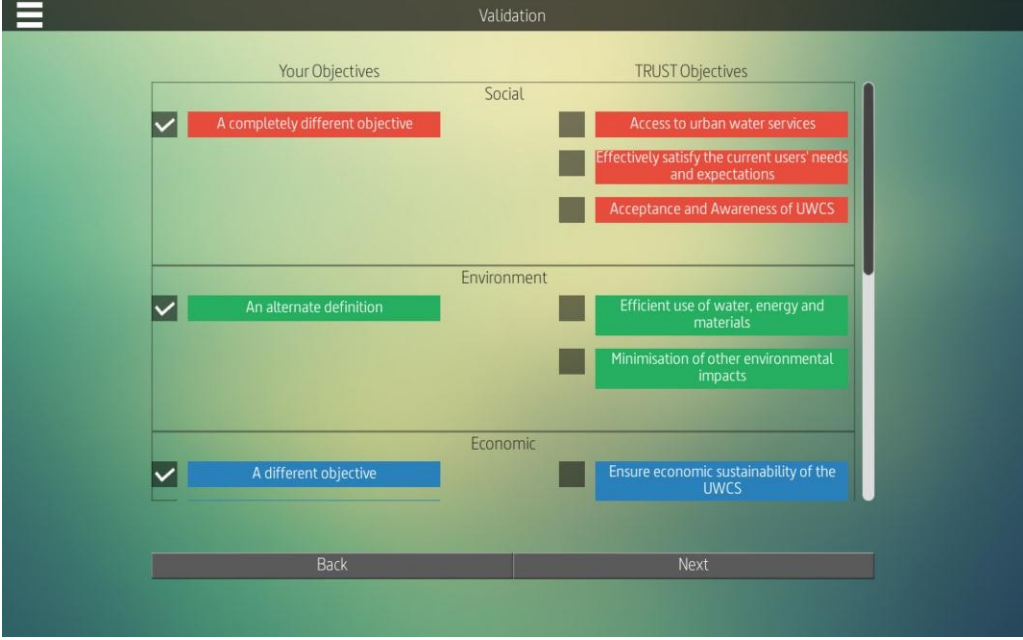
Figure 6– Voting process.



	Social	Environment	Economic	Governance	Assets
An alternate definition	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A different objective	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Yet another objective	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A completely different objective	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Back Next

Figure 7– Categorization Screen – assigning TRUST dimensions to each objective.



Your Objectives		TRUST Objectives	
<input checked="" type="checkbox"/>	A completely different objective	<input type="checkbox"/>	Access to urban water services
		<input type="checkbox"/>	Effectively satisfy the current users' needs and expectations
		<input type="checkbox"/>	Acceptance and Awareness of UWCS
<input checked="" type="checkbox"/>	An alternate definition	<input type="checkbox"/>	Efficient use of water, energy and materials
		<input type="checkbox"/>	Minimisation of other environmental impacts
<input checked="" type="checkbox"/>	A different objective	<input type="checkbox"/>	Ensure economic sustainability of the UWCS

Back Next

Figure 8– Validation Screen – showing side by side the objectives defined by the users (left) and the objectives suggested by TRUST (right).

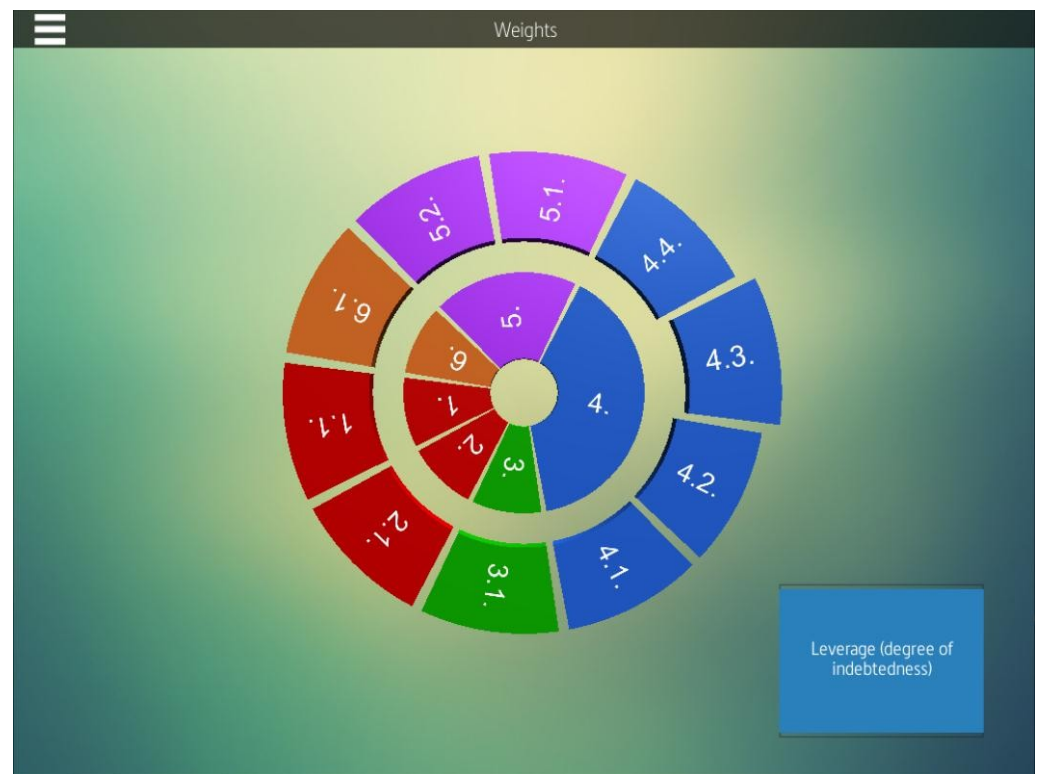


Figure 9– Weight Screen. This visualization allows the users to grasp the weight they are assigning to each dimension, objective, criterion and metric. If any part of the chart occupies a big space, the users should reconsider the weights they are assigning to each metric.

6. FUTURE DEVELOPMENTS

Within the TRUST scope the goal has been to explore technologies that will increase the tools available to water professionals. Natural User Interfaces and collaborative environments are two technologies that have strong potential to support the TRUST mission.

After this Proof-of-concept, the Decision Theater will continually be developed under YDreams Vision team in close relation to TRUST project so that it can contribute to a wide dissemination and impact on Europe.

The further development will rely on:

- Explore the use of Natural User Interfaces, and taking advantage of depth sensors (i.e. Kinect, by Microsoft).

The main use of this type of sensor would be to dynamically adapt the visualization of the shared screen according to the users' position in the room:

- When users are proposing objectives, criteria or metrics, each user's proposals would be highlighted according to his distance to the screen. This would allow a natural way to present and defend one's suggestion;
 - Using the same principle, when users are assigning weights to metrics, the shared screen would show the alternative proposed by the user closer to the screen. If two users are close to the screen, the visualization would adapt to a side-by-side view;
 - In the current version the mediator is static and defined in the beginning of the session. However, with depth detection we could dynamically assign the role of mediator to the user standing closer to the screen who, in principle, would be the person leading the session.
- Incorporate more pre-decision functionalities that help users to prepare their interventions in a collaborative meeting, such as:
 - Individual pie chart – user can use the mediator pie chart and transform it in his own device, changing the weights, and after this present it to the group, if he decides to. This new pie chart will be assumed by the group only through the mediator interface.
 - Teaching Facilitators – new examples / use cases, that trainers and disseminators can use in their public presentations.



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TRANSITIONS TO THE URBAN WATER SERVICES OF TOMORROW

