



## TRA Visions 2018

**Final Project Template** – This template is to be used for submitting the final version of the project. The final deliverable should be submitted by the 31<sup>st</sup> of October 2017

Idea Number: **L1-17**

| PILLAR / TRANSPORT MODE                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <b>ROAD</b> <input type="checkbox"/>                  | <b>RAIL</b> <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>WATERBORNE</b> <input checked="" type="checkbox"/> | <b>CROSS MODAL</b> <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Project Related to:</b>                            | <ul style="list-style-type: none"><li><input type="checkbox"/> RA1: Environment and Energy Efficiency</li><li><input type="checkbox"/> RA2: Vehicles &amp; Vessels – Design, Development and Production</li><li><input type="checkbox"/> RA3: Advanced Propulsion Systems</li><li><input type="checkbox"/> RA4: Smart Urban Mobility &amp; Logistics</li><li><input checked="" type="checkbox"/> RA5: People Mobility – Systems and Services</li><li><input type="checkbox"/> RA6: Freight Transport and Logistics</li><li><input type="checkbox"/> RA7: Transport Infrastructure</li><li><input type="checkbox"/> RA8: Connected and Automated Transport</li><li><input type="checkbox"/> RA9: Digital Technologies for Transport</li><li><input type="checkbox"/> RA10: Safe, Secure and Resilient Transport Systems</li><li><input type="checkbox"/> RA11: Human Dimension in Transport</li><li><input type="checkbox"/> RA12: Socio-Economics, Innovation and Policy</li></ul> |

**Project Title:**

Water shortcut



TRA VISIONS 2016  
is funded by  
the European Union



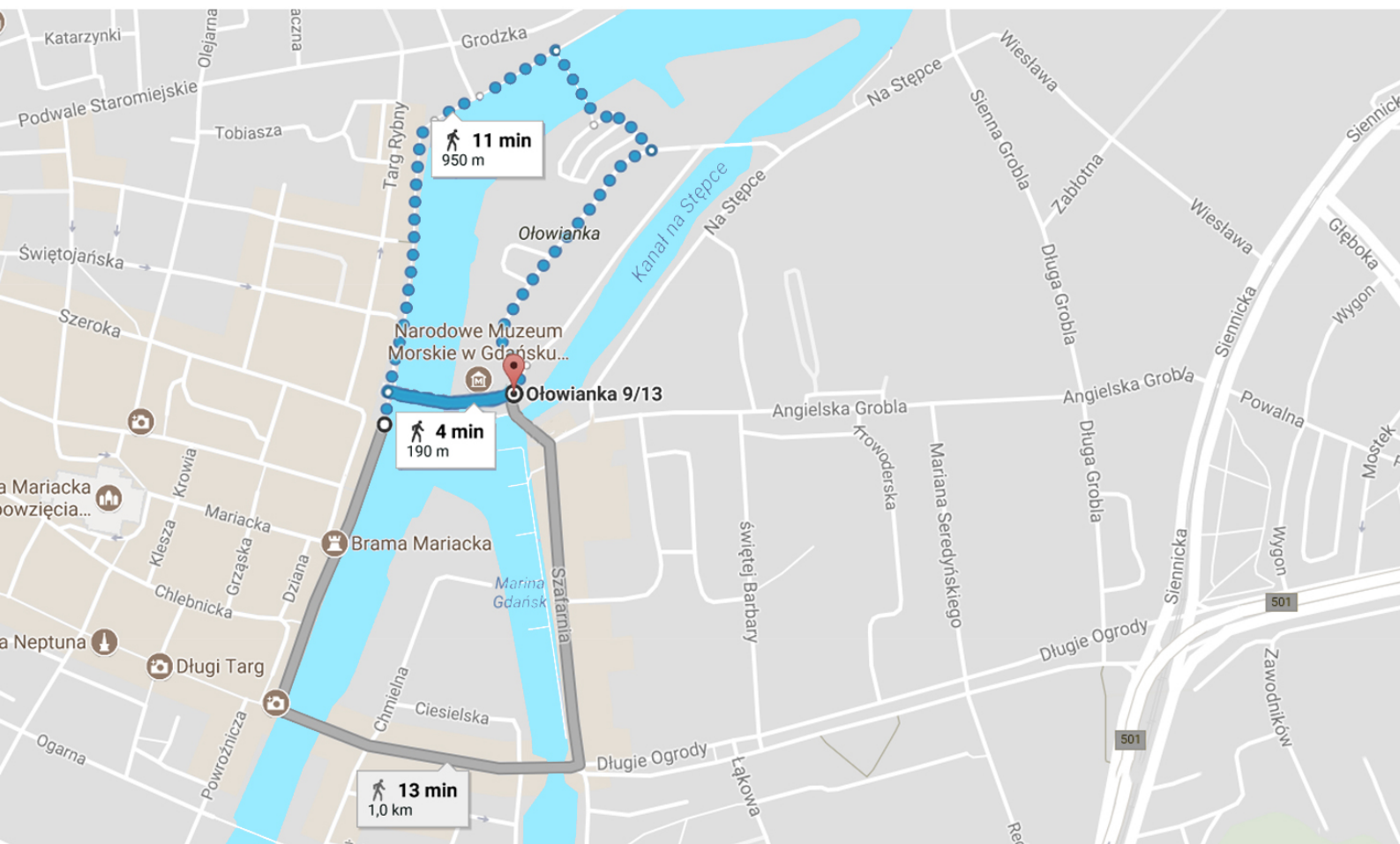
## 1. Introduction

Many European cities are cut by rivers. This generates communication problems that can be resolved in many ways. In my opinion, the best solution of the problem of transport across the river would be a creation of facility that should be some kind of extension of the pedestrian's or cyclist's route, which would allow make the time of journey shorter. In addition, it would be available on request and adapted to the needs of the place. It would use the energy of the river to and move independently and safely.

## 2. Selection of research area

I live in the city through which many rivers flow, and that creates problems with the fast getting into some places in the city. Potentially nearby locations are available after taking long distances, because you have to reach the nearest bridge, which makes the road longer. Of course, the problems of getting to the other side of the river are solved by tunnels, bridges and footbridges and much less with ferries. In addition, the problem is complicated when there is the standard

### Time to move from one riverbank to another, an example from Gdansk in Poland



movement of boats and ships on the river and available transport such as ferry or water tram, run rarely or only seasonally.

Permanently solutions are very expensive and the process of their construction often takes several years. In addition, new buildings may negatively affect the character of the historic parts of the city. Sometimes it is not possible to build a new bridge or footbridge because of the very dense buildings.

Looking for a new solution to the problem of passenger water transport, I decided to explore the subject of small vessels that would help quickly and easily get to the other shore.

### 3. Methodology

Work started with seeing a local problem in city transport and checking if similar problems exist elsewhere in Europe. I researched of topic passenger water transport in Europe and in the world. I searched for existing solutions and published ideas. In the reports published by the European Union on Transport, I sought information and knowledge about the direction of which sustainable transport should be. I also looked at the state of technologies that could be used for the project develop. The result of all the gathered knowledge was the creation of the assumptions for the new idea of water transport in the city.

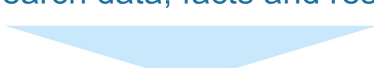
#### Noticing the local problem



Search where else this problem exists



Search data, facts and research on transport development



Study existing solutions  
and ideas

Study existing technology and  
developing technologies for the project.



**Work on ideas and assumptions**

## 4. Literature Survey

Of course, the problem of water transport in the city is solved by bridges and water trams and ferries for longer distances, and in some cities by bus-amphibian. However, all these objects are moving according to the schedule and the passengers have to adapt to it.

There are not many existing solutions for public transport on demand. The closest example of such a transport is the Seabubbles water taxi concept, showing small electric hydrofoil boats containing up to 4 persons. Objects can be rented and flowed to another designated docking site. The main aim of the project is to make the navigation the water in the city easy.

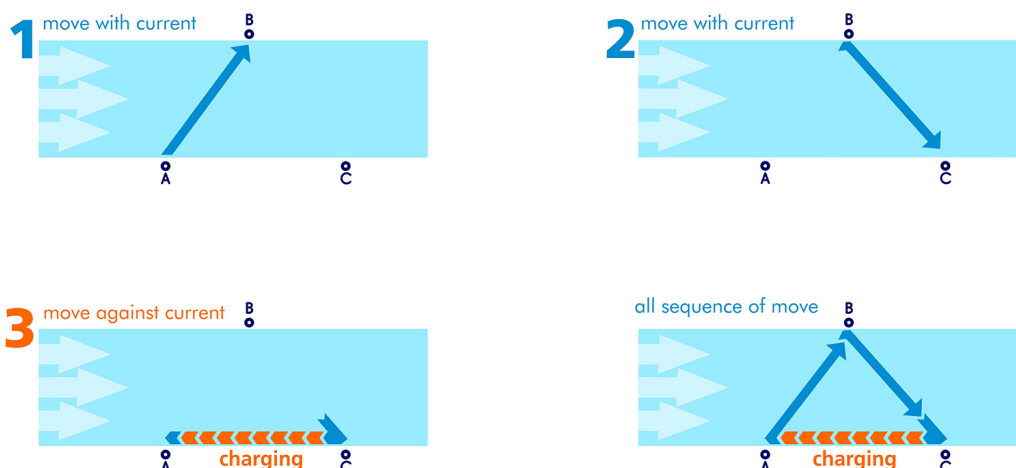
## 5. Proposed Solution-Description of Idea

The solution I propose is a transport system addressed specifically for the historic parts of the city, but only for pedestrians and cyclists. This kind of transport will make that the water space will be no longer a barrier and will make it easier to move around the city, and will become a natural part of the journey. Autonomous electric boats will move on demand of the user, which will eliminate waiting for transport

The system does not require a fixed infrastructure, so it remains mobile. May be occasionally, seasonally used in places where there is heavy traffic. The final result of the project is to complement and diversify the urban transport network.

The operation of the system is based on the usage of cyclic movement of boats between the edges. A characteristic feature of the system is the way in which the autonomous transport boats will cross the river. The idea of this movement is to use the natural energy of the river to partially drive the boats that cross diagonally through the water. This allow to significantly reduce the energy used for the crossing

### Object movement



Boats will be powered by electricity and (re-)charging during stops in the harbor and extra energy will be given from the solar panels mounted on the them.

The size and number of the boat units will be tailored to the city's transport needs, to best serve all potential users. The aesthetics of the units should also be adapted to the character of the city's architecture, but the invariable feature will be the functional layout of the passenger deck.

This kind of system will allow to easily get in and out of the boat. Entrance to the object will take place on one side and the exit from the opposite. Traveling by this object is intended to be the extension of the user's road.

The Reduction of travel time and elimination of waiting for transport mobilize to walking or cycling. Another advantage is the use of nature forces to reduce energy consumption. Additionally, the object may become a recognizable element of cities.

## Example of application on the river in Portugal, Porto



## 6. Address potential technology gaps

Prior to realization of the project, it is necessary to improve the reliability of autonomous movement, select appropriate motors and accumulators to the size and frequency with which the object will move. Also test and select the right solution for the best use of the river's power to drive the boats.

There are some car ferries in Polish rivers, which do not use the river current to navigate. One of them is Optowiec or Gniew. However, the solutions using the natural power of the river have been known and have been used by mankind for a long time before. In favor of this project, should be chosen the most effective system tested previously to use the river to drive.

At present, the still imperfect autonomous transport technology is rapidly developing and probably in a few years a completely safe autonomous transport system will be established. For a few years, Tesla has been testing its autonomous cars and the results they have achieved allow to assume that in the near future, people will not have to worry about driving vehicles.

The potentially problems of moving across the waterway should be eliminated by using a sensor system spaced in sensitive locations away from the boat. Transferring data to the boat with the current situation on the water, would allow to get to the other shore safely.

Storing and collecting electricity has become increasingly effective over the years. Increasingly better solar panels and electric motors are created and they try to use the most productive ways of using energy. The Torqeedo electric motors which drive boats are small but very strong and quiet. Tesla solar panels are getting a lot of energy and their batteries are small and can store a lot of energy. Also Torqeedo batteries are relatively small for the amount of energy they contain.

Boat making should be carried out in the yards as close as possible to the destination also should be making of locally available products. This will create a unique object not only in appearance but also in performance.

Of course, this mode of transport should also meet all safety requirements to which it is bound by the overriding law of inland waterway transport and has an unsinkable construction.

## **7. Benefits from the project**

The proposed solution can significantly influence the way of thinking about moving around the city for pedestrians and cyclists.

The cost of building a bridge usually requires effort of several millions and a few years of construction, and the construction of a ferry and its outposts closes in a few to several millions and can also be put into use much faster. The time and cost involved in implementing such solution is one of the greatest advantage of using water transport.

In addition, the use of natural river current power will cause the object will consume little energy. It will be also able to get the energy from the solar panels.

A significant benefit for travelers is the shortening of travel time and the elimination of waiting for a transport. In addition, this kind of transport mobilize to walking or cycling. The object (boat's system) also can take different forms depending on the aesthetics surrounding the city, still based on the same technologies and constitute a recognizable element of cities.

## 8. Source of additional information used & Appendices

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