



## WP2A3 Integrated Report on the Pilot Actions (App Development)

### INTRODUCTION

The Numericanal project specifically aimed to: Develop and pilot the provision for **ICT based information for users**, based on mobile technology

WP2: Develop / pilot use of mobile technology information for users (Smartphones / lock operating etc)

Partners worked as a group and in their pilots to deliver the 'common model' for a European App. Pilot activities and the exchanges through these helped to deliver;

- The PoGo App for boaters in France and replicated in Netherlands, England & Wales (WP2A5)
- The Safeguarder App for waterway intersections in the Netherlands, France and UK (WP3 A7)
- A navigational App which has mooring availability and promotes the Eijsden-Margraten region to tourists for the Maastricht to Visé canal. The App is available in Dutch, French, German and English (WP2A4)
- A mobile working App for canal maintenance staff in England and Wales and use at the Control Centre at Hatton, UK and to remotely control / open bridges on the Gloucester & Sharpness Canal, UK (WP4A11)
- A 3G/ Wi-Fi/ Cloud-based control system for the Beatrix Canal – Eindhoven (WP4A12)

A number of key events, workshops as well as continued exchanges of information between partners and stakeholders ensured the, architecture and software of the proposed App met the overall needs of boaters and users. These are summarised below;

### MILESTONES

- **Steering Group Meetings Various**  
These took place throughout the lifetime of the project. They allowed partners to set out the requirements for the App(s) in their Pilots
- **CETIC's individual technical evaluations of the App architecture and software configuration**  
These took place early on in the project as and when information was supplied by partners. CETIC's evaluation of partners software presented the results of a quality evaluation (called "Archicheck") of the partners Application architecture. This process ensured a standard assessment methodology

across the whole project. It is based on a set of questions asked of one or more designer and developers of the application.

(see TECHNICAL EVALUATION)

- **Partner Workshop in Brussels 4<sup>th</sup> April 2014**

This facilitated face to face discussions about the specification of the different mobiles/Web applications, the ICT platform for information gathering and dissemination, and agreement about the document management system of the project.

The objective of the workshop was to discuss the requirements and the functionalities that the different mobiles / Web Applications should support. The idea was to identify the common functionalities between all Apps and define the data that can be exchanged between the Apps. The working sessions drew out from partners the 'base' information such as;

1. Objective
2. Description:
3. Context/environment
4. Description of the existing functionalities
5. Functionalities for the future system
6. Users of the Application
7. Other technical aspects

At the meeting CETIC proposed partners use the CETIC Forge (project management / document management system) as a means of sharing documents and references of the App development work in the project. This was accepted and used by partners.

- **Mid Term Event in Eijsden-Margraten 3<sup>rd</sup> September 2014**

This was the opportunity for partners to present to stakeholders their proposed and developing Apps, the need for them and to gather up input and advice from these attendees. Individual workshop sessions then allowed more in-depth discussions to focus more specifically on the 'make-up' of the Apps.

- **Steering Group Meeting in Amsterdam 4<sup>th</sup> September 2014**

This meeting was the stage where partners agreed to base the Numerical App (to be trialled in the UK) should be based on the VNF PoGo App.

A series of actions was agreed and worked on by partners. This outputs review was used in the next SG meeting (see below – Eindhoven 26/27 March 2015)

- **Steering Group Meeting in Eindhoven 26/27<sup>th</sup> March 2015**

This meeting was key and saw agreement on the tasks still outstanding regarding the App. Relevant issues were;

1. How to incorporate boat safety data (WP3) into the App. E-M had worked up a concept design for an App, focusing on boat safety and communications, using Eijsden-Margraten as the context and there were discussions about using the VNF / PoGo App for this particular area.
2. VNF needed to seek internal approval to use global (rather than French) map by the end of September 2014. If not, they were asked to pass source codes to E-M and CETIC for development
3. VNF needed to seek internal approval with regard to sharing the source code. The LP clarified that this indeed was an absolute necessity and was not 'optional' (This was duly

accepted and CETIC to work on the specification of the interface via VNF ICT Department by mid-October)

4. CETIC asked to advise Waterrecreatie Nederland (WN) on how to send data so that it can be incorporated into the PoGo App
5. WN to send list of Danger Zones to VNF with pictures to incorporate into mobile app
6. CETIC to work with Eindhoven and link to VNF. E-M and Eindhoven to supply info to CETIC or send files direct to VNF
7. Working application to be completed by end of February 2015
8. Agreed codes exchange so that CRT can look at how they could incorporate UK information on to a trial version of the App for roll –out in the UK (WP2A6)

- **Promotional Event EU Parliament in Brussels 15<sup>th</sup> July 2015**

This event features presentations about the Numerical project work - including an explanation to attendees about the requirements, functionalities and features of the PoGo / Numerical App

## **SUMMARY / DEVELOPMENT WORK IN PILOTS**

Agreement from the Amsterdam SG Meeting was to use the VNF App effectively completed this action. The App being developed in WP2A3 and WP2A4 was extended by VNF so that it includes the information for boat skippers to cover the requirements of WP2A5. This took longer as the requirements, data, translations etc. are provided by the other partners In WP2A3 and WP2A4

- VNF developed the mobile App that partners agreed suitable for universal development and application as the common model.
- E-M worked up a concept design for an App with Eindhoven (to be incorporated into the Numerical model), focusing on boat safety and communications. (see also WP2A3)
- E-M worked with CETIC to supply info / send files direct to VNF for incorporation.
- E-M worked jointly to develop the same or very similar application.
- CETIC worked on the specification of the interface with the VNF App and advised how to send data so that their safety information can be incorporated into the common App.
- Sent their list of Danger Zones to VNF with pictures to incorporate into mobile app.
- CETIC worked with Eindhoven to link their App/Control Centre system to the common App.
- A German perspective was added through the involvement of representatives from the Finow Canal at the Mid Term Event and the Amsterdam SG Meeting.

The partners' research or evaluation tasks were either completed or are developed enough to enable the Common model App to be delivered by partners. VNF provided the build-up information they have used in developing the App. This included documents showing the project organisation, the market research and the technical studies which led to the POGO mobile app development.

The general public are becoming more adept at using mobile technology and even existing long-term boaters who may have resisted the onset of such devices have begun to embrace their use. Capitalising on the increased mastery of such technologies allowed partners to trial with confidence the Apps that boaters can use to help ensure safer passages and avoid clashes with much larger craft as busy intersections and search for information as trialled by the VNF POGO App. The range of items that are included on the App such as the facility to add warnings (updated in real time) are deemed very important for boaters. Real time updates and information have existed for a while in e.g. in River Information Systems (RIS) but smaller boater can now get the same or similar type of information at the press of a key on a smartphone.

A similar situation arises with the App developed by WN. The Safeguarder App complements hard copy materials with on-line information. Boaters are more likely to consult an App in more pressured situations (for example if they're approaching a busy crossing where there may be a number of boats travelling in different directions) The advice set out on the App will aid a safer crossing. In Eijsden-Margraten, boaters connect to AIS and obtain information on the whereabouts of commercial vessels nearby. Aided by this information a leisure boater decides whether to boat directly or wait until the commercial vessel has passed. This will improve the safety on the narrow Maas.

All the developments were based on consultations with users and analyses of user needs and their requirements for information to be provided by new technologies.

## **THE PILOTS IN MORE DETAIL**

### **VNF – PoGo App for boaters in France and replicated in Netherlands, England & Wales (WP2A5/6)**

PoGo is named from the French Petites Ondes, Grandes Ondes (short waves, long waves) and allows boaters to communicate with each other through the App. It also provides vital information for boaters such as lock timetables, notices for skippers and safety information. As well as being available in French there are Dutch, English and German versions reflecting the transnational nature of French waterways. This App is being replicated for use in the Netherlands, on the Monmouthshire and Brecon Canal in Wales Canal using the VNF source code. It also incorporates safety information and "near miss" reporting developed through WP3A7. The range of items that are included on the PoGo App such as the facility to add warnings (updated in real time) and information have existed for a while in e.g. in River Information Systems (RIS) but smaller boaters can now get the same or similar type of information at the press of a key on a Smartphone.

This App is expected to improve boater safety and enhance appreciation of the waterway environment.

VNF provided the build-up information they have used in developing the App and this was placed on the Website. VNF delivered their 'Business plan' which shows the project organisation, the market research and the technical studies which led to the POGO mobile app development

VNF set out their co-operation with partners and stakeholders;

- 2-3 April 2014, Maastricht Workshop: suggestions of information to be included in the mobile app
- 17 April 2014, Conference call Lille-Brussels: CETIC recommendations for the development of the mobile app common model "WP2A5 - Workgroup 2014-04-17.pdf"
- 23 July 2014, Lille: Workgroup meeting with WN; information on dangerous zones to include in the mobile app
- 3-4 September 2014, Maastricht, Amsterdam: Steering group meetings; dangerous zones information input from WN, to be included in the mobile app; translation of the Safe Boating leaflets into French, and adaptation to the French waterway regulations
- 12 November 2014, Gambenheim: visit of the traffic control centre; information on the dangers of waterways and calamity abatement procedures
- 15 July 2015, Brussels: presentation of the mobile app"

This list sets out specific meeting and does not include individual exchanges between them and partners

## **–Safeguarder - App for waterway intersections in the Netherlands, France and UK (WP3 A7)**

In developing this App for Smartphone and mobile devices used by boaters, data has been provided by the Dutch, French and UK partners about dangerous junctions/crossings on the waterway networks. The App shows boaters how to approach these junctions and navigate in the correct manner to reduce the likelihood of accidents. Boaters can also report near misses through the App. This will result in much improved waterway safety.

Completed the exercise to gather partners' data on danger zones and other bottlenecks in the period and added this information to the 'Safeguarder' App. The ICT platform was added to the Numerical website. Organisations and boaters can get information from the website and put their ideas on there and ask questions on the helpdesk. The Safeguarder (including the danger zones) can be found in the App store and Google play.

## **Eijsden Margraten - A navigational safety and tourism promotional App for the Eijsden-Margraten region Maastricht to Visé canal. (WP2A4 & WP4A13)**

For this pilot Wi-Fi hotspots were installed along the waterway so that boaters can use the Smartphone App. E-M used the overall project period to develop – in close cooperation with the partners (particularly Eindhoven, WN and VNF) – a safety App to be used by mobile platforms, such as mobile phones or tablets. Cooperation of regional and cross border stakeholders ensured a platform would be built in compliance with the demands of their waterway users. In Summer 2015 the first operational draft was presented and tested. Maps used in the App needed too much data and as this would lead to long download times, the developer installed vector maps to resolve this issue.

Based around the premise that communication improves safety, the App provides real time information on the location of freight vessels (by linking to AIS) making the canal safer for leisure users in smaller craft as well as providing the rules for navigating locks and weirs.

The municipal authorities in the area are keen to promote the region to tourists and the App also provides information for boaters on marinas, attractions, restaurants to encourage them to visit along with information on local history and points of interest. It is also available in French, English and German as well as Dutch. Introduction of this technology improves the safety of leisure boaters on a stretch of waterway which is increasingly being used by commercial craft.

In WP2A4 as explained in the previous progress report,

The App connects to the Automatic Identification System (AIS). App-users obtain information on the whereabouts of commercial vessels are in the vicinity of their boat. Leisure boaters can then decide to boat directly or wait until the commercial vessel has passed. This will improve the safety on the narrow Maas.

E-M had hoped to also jointly tender the actual development of the App, but given each of the partners had different items they wanted to include or User needs for their App, such development was deemed not feasible. VNF were further advanced in their PoGo App development, and E-M felt their learning curve was very interesting for them and their work. At some point the technical specifications were jointly draw up with Eindhoven, who had similar demands for their app

E-M involved regional stakeholders such as water sport clubs, marinas, the water police as well as the national waterway authorities (Rijkswaterstaat, MET Wallone) and municipalities

Building the App was carried out with the cooperation of regional and cross border stakeholders to ensure that a platform would be built in compliance with the demands of waterway users. In Summer 2015 the

first operational draft was presented and tested. It appeared that the maps which were used in the App needed too much data. As this would lead to long download times, TRAPPS has developed and installed so-called vector maps.

The App also comprises a typical function: the connection to the AIS system. App-users obtain information on the whereabouts of commercial vessels are in the vicinity of their boat. With this information a leisure boater can decide to boat directly or wait until the commercial vessel has passed. This will improve the safety on the narrow Maas.

### **Eindhoven - delivery of the Control Centre with APP (WP4I2) (WP4A12)**

Eindhoven completed delivery of the Control Centre as a cloud service on a dedicated server – using App in most areas – but this was linked to the wider App development in Numerical so a brief update is included within this report.

The mobile applications for Android and iOS, functioning as the mobile user interface for end-users, was added, containing the same elements as above for the kiosk but plus an introduction explaining objective and use of the mobile Application

They installed the webserver running the area manager application, linked to the Open Remote messaging service. The kiosk user interface and mobile Applications will be linked with the back-end controller to enable notifications to the persons registered in the area manager dashboard.

Implementation of their pilot Eindhoven worked directly with APP users – Waterway related companies, discussing issues such as harbour-tax and future reservation places for ships. They talked to Freight skippers regarding use of the APP for safety matters, harbour-tax collection, and other information. The Marina, Canoe Club, and Scouting groups were involved / consulted about the building and use of a kiosk, and uses they have for the APP. Indirectly involved were the Dutch Water Ministry, Rijkswaterstaat, MCA , Vereniging van havenbedrijven , City of Best , Waterschap de Dommel and Schuttevaer. They consulted VNF regarding their APP development looking at a number of substantive example to improve functionality.

Eindhoven provided a good overview of the support they had received from other Numerical partners (throughout the whole period of the project) in both WP4A12 and this Investment

### **A 3G/ Wi-Fi/ Cloud-based control system for the Beatrix Canal – Eindhoven (WP4A12)**

The Beatrix canal at Eindhoven is heavily used by freight traffic and is the gateway to several smaller canals. A priority here was to develop a system that could help with efficient harbour administration as well as delivering a safer environment for all vessels and water users. A useful overview can be seen on the video at <http://numerical.eu/beatrix-canal-safety>.

Using a Cloud service on a dedicated server at City of Eindhoven, the control system shows all users on the canal at any one time from canoeists to freight. From the data captured they now have fuller reporting on canal usage by pleasure boating, canoes and freighters. Canoeists can enter details of their trip on to the system via a kiosk so that large vessels are aware. Lasers on the canal relay messages to the control centre regarding vessels on the waterway. The Smartphone App also allows captains to inform the harbour of their arrival, taxes to be collected and messages regarding maintenance or safety to be passed to the control centre. There is an Area Manager Dashboard for management and monitoring by the authority.

This development will improve safety for leisure users of the waterway and bring administrative efficiencies for the local authority

## **CRT Roll out of Pogo / Numerical App WP2A6**

CRT were tasked with leading on the delivery of the replication task. VNF were successful in producing and the PoGo App and their 'source code' was provided to CRT early in the summer. From this point they appointed a UK based consultant to test, translate, and produce an application for the Monmouthshire and Brecon Canal in Wales. The Consultants, MX Data, were very complimentary about the work that VNF had undertaken, with few errors being found in their software. This made the replication very straightforward and efficient, with limited contact being required between VNF and MX Data

CRT like Eindhoven are using an App as part of their Control Centre. This was not considered part of the build-up work to the Numerical Common App – but is referred to in this report for completeness.

## **A mobile working App for canal maintenance staff in England and Wales (WP4A11)**

CRT's mobile working App enabled handheld devices to be given to maintenance staff. This has replaced a paper system of recording maintenance work and the new system gives CRT far more accurate information on how long particular maintenance tasks take, which is useful for planning. Information on which tasks have been carried out can now be gathered within 1 week whereas before this development it took almost 3 months. It also provides the maintenance staff with more information while out on site which helps in diagnosing problems and also pre-empting problems such as flooding. This will bring cost and efficiency improvements.

## **A remote canals control centre at Hatton, UK (WP4A11)**

The Control Centre houses equipment and staff to be able to remotely operate structures such as bridges and locks. It is also the base for the team who manage the work scheduling for the mobile working App system. Development work carried out for the pilot meant that CRT found more flexible ways of monitoring structures and activities such as by, Wi-Fi, their hand held devices, infrared laser technology, etc. and some of these could be operated remotely by users on boats.

## **A remotely controlled, laser guided bridge on Gloucester & Sharpness Canal, UK (WP4A11)**

The Gloucester & Sharpness Canal has 14 bridges, all with bridge keepers. In the winter very few boats passed through and the canal has been closed to boaters so resource can be used more efficiently. This pilot scheme on one bridge on the canal, at Sandfields, differs from those new or existing systems in the Netherlands and France as here the bridge will be **user** operated by boaters who have downloaded an App to their Smartphone. Only those with a boat licence will be able to download the App. A Wi-Fi network has been installed at the site to ensure that Smartphones can work even if no 3G or 4G signal is available.

# **TECHNICAL EVALUATION**

## **Architecture Analyses**

Six technical evaluation reports were completed examining the design and development elements of the Numerical project. CETIC carried out technical evaluations of the system architecture of four Apps as part of WP5 Actions A14-16.

Archicheck helps to quickly provide a quality evaluation report by relying on the software quality standard: ISO25000 [1]. The result of the evaluations allows identifying the strengths and weaknesses of the

application architecture. In addition, the evaluation report helps to identify recommendations to improve the architecture as well as further analysis tracks. Archicheck assessed a standard set of following criteria:

- **Functional Suitability:** The capability of the software product to provide functions, which meet stated and implied needs when the software is used under specified conditions (what the software does to fulfil needs).
- **Reliability:** The capability of the software product to maintain its level of performance under stated conditions for a stated period of time.
- **Performance Efficiency:** The capability of the software product to provide appropriate performance, relative to the amount of resources used, under stated conditions.
- **Usability:** The capability of the software product to be understood learned, used and attractive to the user, when used under specified conditions (the effort needed for use).
- **Security:** The capability of the software product to protect system components from accidental or malicious use: access, modification, destruction or disclosure.
- **Compatibility:** The capacity of two or more software components to exchange information and / or perform their functions by sharing the same hardware or software environment.
- **Maintainability:** The capability of the software product to be modified. Modifications may include corrections, improvements or adaptations of the software to changes in the environment and in the requirements and functional specifications (the effort needed to be modified).
- **Transferability:** The capability of the software product to be transferred from one environment to another. The environment may include organizational, hardware or software environment.

CETIC found that Quality profiles range from 77% to 96% with risks mainly in the low and medium categories although the Waterrecreatie Nederland App has two high risk criteria, one in functional stability and the other in performance efficiency. The reports provided recommendations on how all these risks can be mitigated.

All four reports recommend that the documentation of the architecture could be improved by describing the “4+1” views of the architecture which encompasses Logical, Development, Process and Physical views plus Scenarios. A Functional Test Scenario report was also produced with templates for the pilots for VNF and Eijsden-Margraten. The recommendations made in this set of reports were used by the partners when their Apps were being updated.

In addition a Quality Audit of the PoGo system (Audit Qualité Système PoGo) was completed for the VNF. This examined the source code and analysed any connected risks to the system’s stability operating on both the Android and iOS platforms. Although some recommendations were made regarding the positioning of rules this was essentially about system maintenance and the analysis concluded that the system met the expected quality norms.

The additional checks and validation by MX Data verified the good quality of the architecture and functionalities developed and incorporated in the App. (see below)

## **WP2A6 – Preparation for roll-out**

MX Data were appointed by CRT to facilitate a UK version of the PoGo App that would deliver a meaningful trial of the issues encountered by UK Boaters when using the App.

This high level report outlined the actions taken to localise the App (turning the PoGo / Numerivcanal App from French to English). It also described some of the issues found, improvements that they felt would help others do this task and gave some general observations of the code base;

They felt that localising the App was a fairly simplistic task. “Both iOS and Android provide mechanisms for using different languages in an application. To localise an iOS app, every user visible word or sentence needs to be wrapped in a simple macro, and then included in a single localised strings file. A similar approach is taken in Android, where the strings are defined in a localised file, and then given an ID to use when developing the app. In both cases, the developer who initially created the Numerical app followed these approaches. This meant that including English translations for both applications was very simple i.e. the following steps:

- a. Create a new localised strings file for the specified language
- b. Copy the strings from the original strings file
- c. Translate the string values into the specified language

They encountered no problems when following these steps, and both apps were localised without any complications.

**They offered some observations;** (both good and bad points that were found in the iOS app)

- a. Minimum OS is 7.1 - ability can reach 96% of users
  - b. Universal – ability to run on iPhones and iPad’s
  - c. No Swift use – Fully written in ObjC, ideally would be written in the more modern Swift language
  - d. Storyboards – Interface visually created, no code interface creation; this is good
  - e. Constraints – Size and position of user interface elements defined by constraints
  - f. Core Data – Persistent storage was Core Data, this is overkill and a simpler approach could be suggested
- The only problem encountered with the iOS app was location management, in which it hasn’t been updated to use iOS 8’s location permissions.

In the Android Client they observed:

- g. Minimum OS is 4.0 – ability to reach 95% of users
- h. Third part code – Uses some third party code to manage server responses which was outdated
- i. Custom Controls – Use of many custom user interface controls. This is a concern, and we would suggest removing them and opting for a more standard interface
- j. Location Management – Correct use of location services as defined in the Android docs
- k. Support Library – The support library in use was out of date

The good news was that they confirmed that the code base for both applications was very respectable. Constructive comments / criticism was that;

In some cases, such as persistent storage and JSON parsing, the code looks to have been over complicated to a point at which it’s very hard to manipulate and change how it works. Simplifying the code e.g. moving from Core Data to NS User Defaults, and moving to a more standard approach of JSON parsing could improve these areas.

In terms of improving the code, it would be beneficial for both the end user and the developer to remove all code that relates to the user interface. In its current state the apps include third party code to display non-standard interface components, and complex code to manage the transition animations. Removing these libraries, and moving to standard components and transitions would make development easier and result in a more pleasant interface for the user

**Given the positive feedback the App was prepared for roll-out on the Monmouthshire and Brecon Canal.**

# CONCLUSION / AGREEMENT ON COMMON APP

Comprehensive joint working and testing took place and the Common App can be considered a useful addition to the range of tools available to boaters. Though the PoGo App is this Common Model the work carried out by partners to realise more bespoke Apps for their own use needs were very worthy additions however and are helping to deliver a range of services and benefits

The following extracts are taken from the Evaluation Report (WP5A16) produced by Roundberry Projects. These assess the benefits and outcomes expected. Those directly related to the App development are shown in **BOLD**

The project's outputs have been able to deliver better safety in several ways:

- a) **The App for Eindhoven which has improved communication on the water between all users by ICT means to increase safety and efficiency**
- b) **Has taken up the CRT's use of reporting of near misses. The PoGo App enables reporting of near misses in France, Netherlands and UK and the partners now plan to compare figures for near misses and accidents annually based on the data collected.**
- c) **Partners agree that using App technology makes it more likely to be able to communicate safety messages to young people who will be less experienced on the water and may be less wary.**
- d) Discussions about safety zones has helped look at safety in a wider perspective. These are to be extended into Germany and France by the European Boating Association once the Numerical project has finished. There is also a potential Belgian partner organisation.
- e) Has been able to provide bi-lingual information for Dutch boaters travelling to France or the UK and also provide information in French, English and German for boaters travelling into the Netherlands.
- f) **The Safeguarder App developed through Numerical allows boaters to access on mobile devices instructions on how to safely navigate dangerous junctions in the UK, Netherlands and France.**
- g) **Eijsden-Margraten's App which provides information on the locations of all waterways users specifically aims to increase safety. It has been done due to the construction of the new super-lock which will increase the amount of freight traffic. Communication between waterway users is essential to safety.**
- h) **Eindhoven's App also enables waterways users to be able to locate other users, as well as assessing the navigation conditions and reporting hazards.**

Within the context of continued pressure on finances partners must always seek efficiency improvements and these have been possible through the Numerical project.

- a) **The PoGo App was based on a model initiated by the VNF and partners benefitted from being able to "piggy back" on this to replicate the App in the Netherlands and UK. VNF also found it useful to have partner input and feedback on the development.**
- b) Eindhoven partners stated that they benefitted from the exchange of ideas regarding ICT possibilities such as the laser guided bridge
- c) **Partners reported that it was useful to have CETIC's additional technical audit of their Apps so they could be sure that they were commissioning a quality product.**
- d) **Eindhoven's App means that the administration of the harbour tax will be easier to administer.**
- e) **The App also makes it easier for Beatrix canal users and staff in Eindhoven to report hazards and maintenance problems as well as tourist information related to the canal. This should lead to efficiency improvements in management and maintenance of the canal.**

- f) Partners have also felt more enabled by exchange of knowledge between the partners “this exchange goes beyond Numerical it is also about how you manage your organisation, how you communicate and how to get the most out of your stakeholders”.
- g) VNF will continue to work with CRT regarding remote operation by smart phone app versus dedicated remote control devices to assess whether more efficient processes can be put in place. They will also investigate the SCADA system.
- h) CRT’s mobile working App brings efficiencies for staff who can now go straight to a site at the start of a working day, negating the need to report into a base, and make reports on the work carried out during the day, again without physically having to go back to a base.**
- i) As a result of CRT’s remote controlled bridge opening pilot at Sandfield bridge the organisation could make cost savings of around £500,000 a year<sup>1</sup>. In addition it also means that the waterway can be open to boaters for longer periods when formerly it was not economically viable to have a bridge keeper on site all year round and so the canal was closed.
- j) In Eijsden-Margraten, the new App will enable boaters to reserve times for passing through the lock to reduce waiting times.**

## REFERENCE DOCS / APPENDICES

Minutes of Numerical Workshop 4<sup>th</sup> April 2014 Brussels, Belgium

Numerical App for iOS and Android Code and Development Report

WP2A3 Diagnostic and model for the development of the Wi-Fi based app system – The POGO App

(WP2A3,5,6) MX DATA POGO App eval for UK Rollout

Numerical\_Evaluation\_Eindhoven\_App\_Design-v1.0

Numerical\_Evaluation\_WN\_App\_Design-v1.0

Numerical\_Evaluation\_Margraten\_App\_Design-v1.0

Numerical\_Evaluation\_VNF\_App\_Design-v1.0

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