



Future high precision navigation system for inland navigation

### Project Information

The research & development project study NAVWAT is carried out within the Austrian Space Application Programme (ASAP). NAVWAT is funded by the Austrian Government BMVIT and the Programme Management is under the responsibility of the Austrian Research Promotion Agency FFG. A full set of the public project documents is available on the NAVWAT webpage [www.navwat.at](http://www.navwat.at).

### PROJECT PARTNERS

**via donau - Österreichische Wasserstraßen-Gesellschaft mbH** (project lead) was founded in January 2005 by the Austrian Federal Ministry of Transport, Innovation and Technology for the preservation and development of the Danube waterway. via donau is a modern and efficiently run company that operates waterways and executes sovereign functions on behalf of the federal authorities with regard to waterways and waterway transport. Additionally, via donau is operating a navigation information system called Danube River Information Services (DoRIS). [www.via-donau.org](http://www.via-donau.org)

**TeleConsult Austria GmbH** was founded in 1999. The business activities cover the field of precise positioning and reliable navigation, particularly the areas of development and combination of navigation, telecommunication, and information technologies for applications in the context of transport and mobility. The major expertise includes general management support and technical consultancy, system design and analysis, software development, project preparation and management, business development as well as marketing and development strategies for new products. [www.teleconsult-austria.at](http://www.teleconsult-austria.at)



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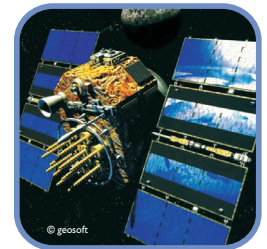


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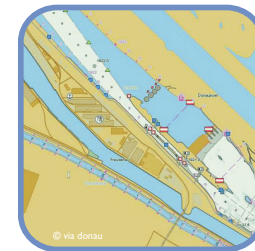
### Austrian Space Application Programme 6th Call



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### FUNDING

Austrian Ministry for Transport, Innovation and Technology

### PROGRAMME MANAGEMENT

Austrian Research Promotion Agency FFG



FFG



Bundesministerium für Verkehr, Innovation und Technologie

## Background & Introduction

The inland waterway sector experienced a substantial modernization in the past years through the introduction of River Information Services (RIS) in many European countries. The aim of RIS is to increase safety and efficiency in river transport through the introduction of innovative information and communication services to users on ships and on land. In particular, safety related services require accurate position information which is currently provided by local DGPS (Differential GPS) services. In Austria, the Danube River Information Service (DoRIS) is operated by via donau.

Considering the evolution of RIS Services over the next 10 to 15 years the main focus is on the reduction of accidents on European rivers. Past experience has shown that the most dangerous sections on rivers are those where the fairway is narrowed by or comes close to riverside infrastructure, e.g. river locks, bridges, berths and ports. The aim for the future will be to provide the boatmaster with accurate and reliable navigation information to support his/her decisions, in particular during periods with limited visibility.

In inland navigation the only certified navigation tool is radar which is in an ideal case combined with the information from ENC (Electronic Navigational Chart). In such case the radar image is overlaid onto the digital chart (radar overlay). The achievable accuracy in such case is in the range of meters, due to the limited accuracy of radar. Additionally, this system does not take into account the shape of the vessels or of a convoy and hence the provided information does not include accurate distance information to the surrounding infrastructures. The utilisation of such a system for the approach or passing of riverside infrastructures is hence not possible. At present, in such situations, visual navigation is the only feasible option.

## Project Goals

The proposed application shall utilize modern GNSS (Global Navigation Satellite System) and augmentation infrastructure to provide accurate position and heading information to the boatmaster. This information should be related to the information contained in the onboard ENC. Therefore, the system shall take into account the actual shape of the vessel / convoy and should relate the information provided to this vessel shape and not only to the GNSS antenna position. The aim is to provide the distance from characteristic points of the vessel / convoy to close riverside infrastructure on a real time basis. This shall provide the boatmaster with the information needed when entering a river lock, passing under a bridge or approaching ports and river-side berths.

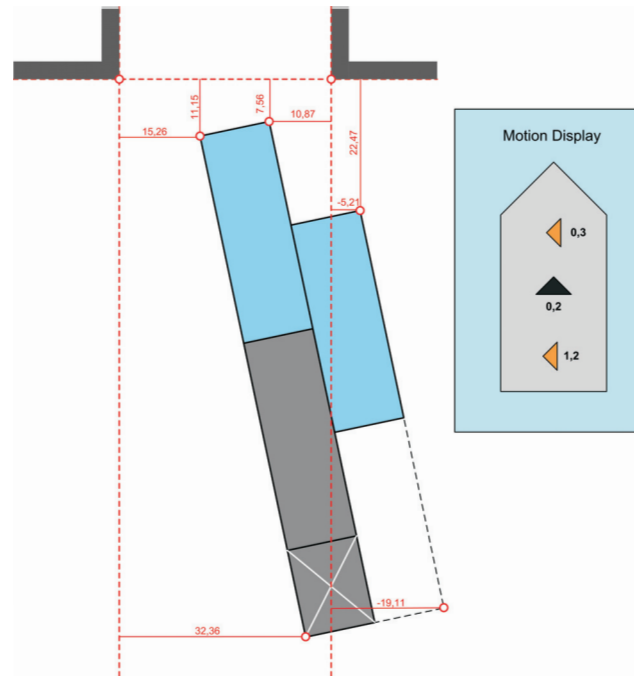


Figure: Lock approach visually supported (a convoy is displayed relatively to the lock entrance)

## Role of GNSS

The most feasible GNSS technology and a corresponding system design are investigated in order to fulfill the demanding requirements regarding positioning and heading accuracy as well as concerning system availability and integrity for the envisaged application. Therefore, a critical assessment of the required GNSS performance is carried out and the most suitable technology is identified by considering also the GNSS evolution up to 2015 and even beyond.

Furthermore, a strategy will be developed to provide the basis for a future introduction of such a system into the Austrian DoRIS.

## Innovation and Benefit

The innovation and benefit of the present application can be summarized as follows:

- Significant accident reduction
- Improvement of collision avoidance
- Enhancement of inland navigation systems
- Improvement of navigation support for the boatmaster
- Enhancement of navigation automation processes
- Provision of guidelines for RIS modernization

