**Traffic management, reliability and economic transport on the Inland waterway Danube**

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**TOpics: 1. Inland Navigation**

 **1.1 Inland Navigation channels: safety and reliability**

**Abstract**

The analysis on goods transport in the Danube together with cost factors and infrastructure reliability revealed the strengths, weaknesses, risks and opportunities of the Inland Waterway Danube. According to the results waterway transport will stay competitive or may even regain market shares if continuous reliable fairway conditions with an available water depth of at least 2.5 m can be provided even in low-water periods. Improving transport logistics e.g. with fixed contracts using mixed modes of transport and optimal loading depending on actual conditions are necessary as well. For managing a dynamic river as transport infrastructure in a cost-efficient and environmentally friendly way viadonau has teamed up with Vienna University of Technology and Hoffmann Consulting in order to develop a holistic Waterway Asset Management System (WAMS). In a first phase from 2012 to 2015 the principal methodological availability approach and a dredging management have been developed (WAMS 1.0). In the second phase from 2016 to 2018 additional functionalities for sediment, waterway structures, and traffic management have been implemented (WAMS 2.0). The development and implementation in a software tool has been work in progress providing constant feedback between theoretical considerations and practical results as new functionalities become available. Thus, the WAMS software tool is becoming the central database providing viadonau with the means to move from empiric reactive maintenance approaches towards quantitative asset management strategies with fast semi-automated processing capabilities and pro-active maintenance in a user-friendly environment. The focus of this paper is traffic management connecting the physical availability and its optimization with an analysis of actual traffic flows and utilization of the vessel fleet in real time. To achieve this goal anonymized transponder data leaving only vessel type, position and draught loaded are imported for calculating encounters, traffic distributions and fairway utilization. Based on these data it is possible to generate traffic heatmaps and assess critical encounters in narrow sections at low water periods as a basis for aligning the fairway path and defined levels of service. Furthermore, the WAMS is capable of monitoring the progress of pro-active dredging measures allowing a fast implementation and communication of results to the transport industry. With historic and actual data from riverbed surveys, water levels and traffic it is already possible to calculate the availability of any defined level of service for any transport route on the Danube in Austria in a matter of minutes. The possible loading of any vessel type can also be derived from calibration curves linking utilization and static draught with dynamic squat depending on vessel speed and necessary underkeel clearance. With the Ministers of Transport on all riparian countries of the Danube endorsing a common Fairway Rehabilitation and Maintenance Master Plan in 2014 (FAIRway) the EU - project WAMOS will lead to one common database on fairway conditions of the entire Danube. Combining these information with available traffic analysis capabilities will allow both efficient investments in waterway availability as well as competitive pricing and efficient transport planning on 2.400 river kilometre on the entire Danube until 2020.

**Key words:**

Inland waterway Danube, availability, asset management & LCC, smart transport infrastructure

**PRESENTATION:**

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**RELEVANCE STATEMENT:**

The presentation will provide attendees with information on the latest developments in Waterway Asset Management with a developed Software Tool with focus on analysing traffic flows and traffic management. The main aspects will be

 - Transport development in the Danube corridor

 - Analysis of waterway transport conditions and distance related costs in Austria

 - Water depths, levels of service and fairway alignment

 - Vessel manoeuvring, trajectories and encounters

 - Traffic analysis, density and heatmaps

 - Tracking of dredging vessels and achieved results

 - Real-time availability and waterway route planning