CEF Action n° 2014-IT-TM-0319-S

Study for standard enhancement and interconnection of national systems of RIS-Italy

L'evoluzione dei sistemi informatici a supporto della navigazione: il progetto RIS

Luca Crose – AIPo Navigazione – General Technical Manager

Forwarding&Logistics meet Industry

Milan, 1th February 2018

Study for standard enhancement and interconnection of national system of RIS – Italy

I partners

SISTEMI TERRITORIALI Spa - società *inhouse* della Regione del Veneto;

AIPO Agenzia Interregionale per il fiume PO - ente strumentale delle quattro Regioni rivierasche (Lombardia, Emilia-Romagna, Veneto, Piemonte);
RAM Spa
MINISTERO DELLE INFRASTRUTTURE E TRASPORTI Direzione Generale per la vigilanza sulle Autorità Portuali, le infrastrutture portuali ed il trasporto marittimo e per vie d'acqua interne
RAM Spa – Rete Autostrade Mediteranee Spa in qualità di *soggetto attuatore* del Ministero;

PROVINCIA DI MANTOVA;

ASPO – Azienda Speciale per il Porto di Chioggia.

Reference standards

EU Directive 2005/44/EC on harmonised river information services (RIS)

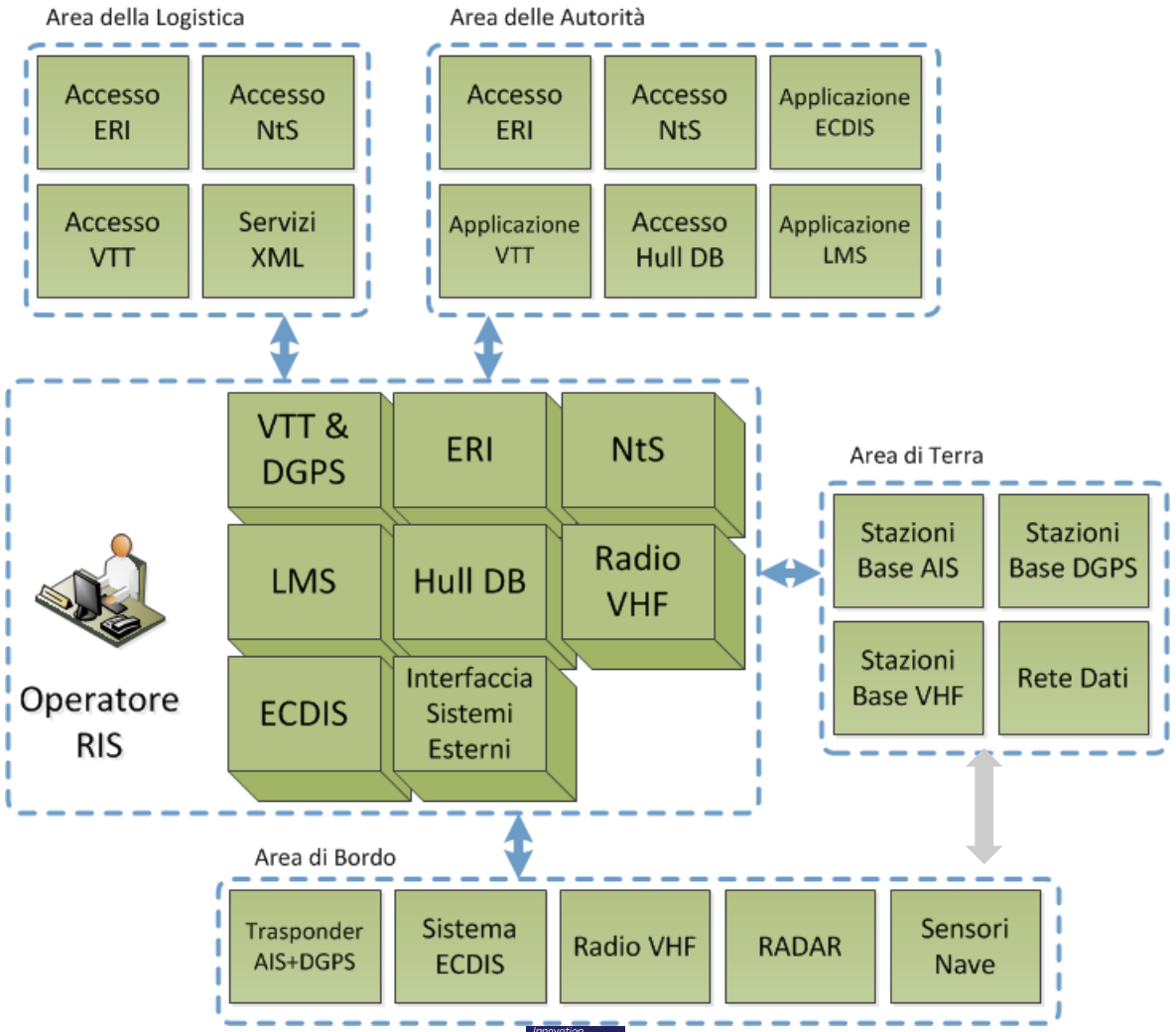
- **Commission Regulation (EC) No 414/2007 concerning technical guidelines for the planning, implementation and operational use of RIS**
- **Commission Regulation (EC) No 415/2007 - technical specifications for VTT**
- **Commission Regulation (EC) No 416/2007 - technical specifications for NtS**
- **Commission Regulation (EU) No 164/2010 - technical specifications for ERI**

EU Directive 2005/44/EC not yet adopted by Italy

Other standards (e.g. CCNR documents, PIANC Guidelines)

European Commission

Components of RIS Italy



Innovation and Networks Executive Agency

Components of RIS Italy

RIS Centres (hypothesis)	Coordinates		Altitude (asl)
Boretto	44° 54' 22.97"N	10° 33' 28.48"E	26 m
Cavanella D'Adige	45° 6' 36.65"N	12° 14' 36.28"E	0 m

AIS/VHF Base Stations	Coordinates		Altitude (asl)
Bosco Chiesanuova	45°38'1.71"N	11° 2'16.90"E	1245 m
Canneto Pavese	45° 3'32.10"N	9°17'1.47"E	280 m
Monte Cassio	44°35'46.50"N	10° 3'44.17"E	899 m
Monte Catone	44°20'39.62"N	11°37'39.59"E	280 m
Monte Ricco	45°15'15.23"N	11°44'32.52"E	324 m
Pedrosa	46° 9'32.00"N	13°24'6.00"E	777 m
Col Visentin	46° 3'16.19"N	12°16'56.60"E	1736 m

Ports	Coordinates	
Cremona	45° 8'19.28"N	9°59'2.45"E
Boretto	44°54'22.58"N	10°33'26.19"E
Mantova	45° 7'48.72"N	10°51'33.99"E
Rovigo	45° 2'4.04"N	11°48'37.45"E

Locks	Coordinates	
Isola Serafini	45° 5'29.86"N	9°54'23.49"E
Acquanegra	45° 9'17.71"N	9°53'29.77"E
Cremona	45° 8'19.28"N	9°59'2.45"E
San Leone	45° 4'42.14"N	10°58'41.03"E
Governolo	45° 5'4.83"N	10°57'16.32"
Trevenzuolo	45° 5'48.76"N	11° 6'23.48"E
Torretta	45° 5'29.24"N	11°18'37.72"E
Canda	45° 1'51.57"N	11°29'46.75"E
Bussari	44°59'47.04"N	11°43'41.82"E
Baricetta	45° 3'16.54"N	12° 0'7.08"E
Volta Grimana	45° 1'43.30"N	12°11'20.96"E
Cavanella d'Adige (sud)	45° 6'18.13"N	12°14'34.49"E
Cavanella d'Adige (nord)	45° 6'36.48"N	12°14'36.26"E
Brondolo	45°11'3.17"N	12°16'16.98"E
Pontelagoscuro	44°53'7.14"N	11°36'14.79"E
Valpagliaro	44°49'2.58"N	11°51'21.64"E
Valle lepri	44°42'26.43"N	12° 5'36.28"E

Components of the Prototype

Centri RIS	Coordinate		Altitude (asl)
Boretto	44° 54' 22.97"N	10° 33' 28.48"E	26 m
Cavanella D'Adige	45° 6' 36.65"N	12° 14' 36.28"E	0 m

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Rovigo	45° 2'4.04"N	11°48'37.45"E

Conche	Coordinate	
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Cremona	45° 8'19.28"N	9°59'2.45"E
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Governolo	45° 5'4.83"N	10°57'16.32"
Trevenzuolo	45° 5'48.76"N	11° 6'23.48"E
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Canda	45° 1'51.57"N	11°29'46.75"E
Bussari	44°59'47.04"N	11°43'41.82"E
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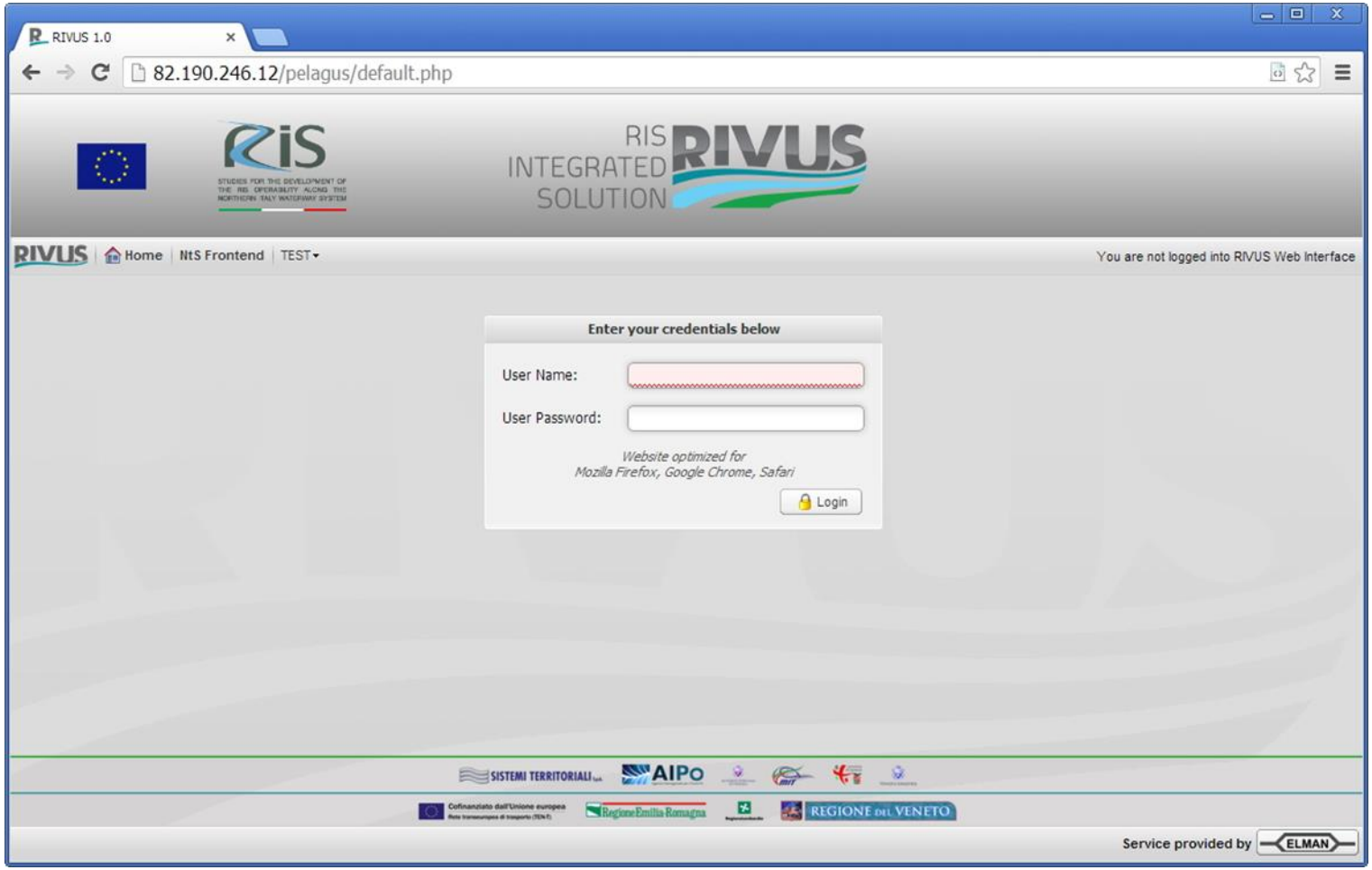
Valpagliaro	44°49'2.58"N	11°51'21.64"E
Valle Iepri	44°42'26.43"N	12° 5'36.28"E

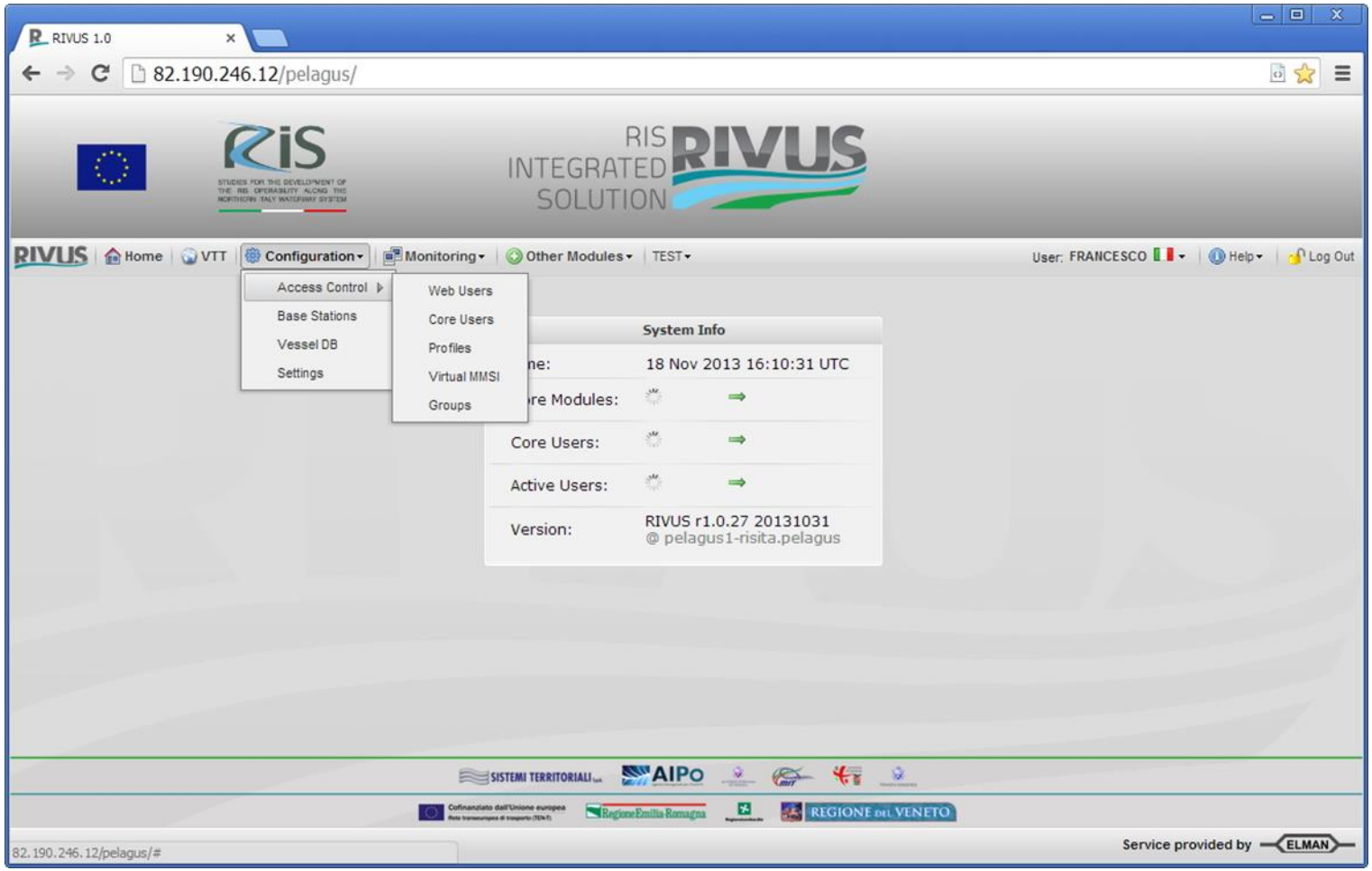
European Commission

Accesso portale web

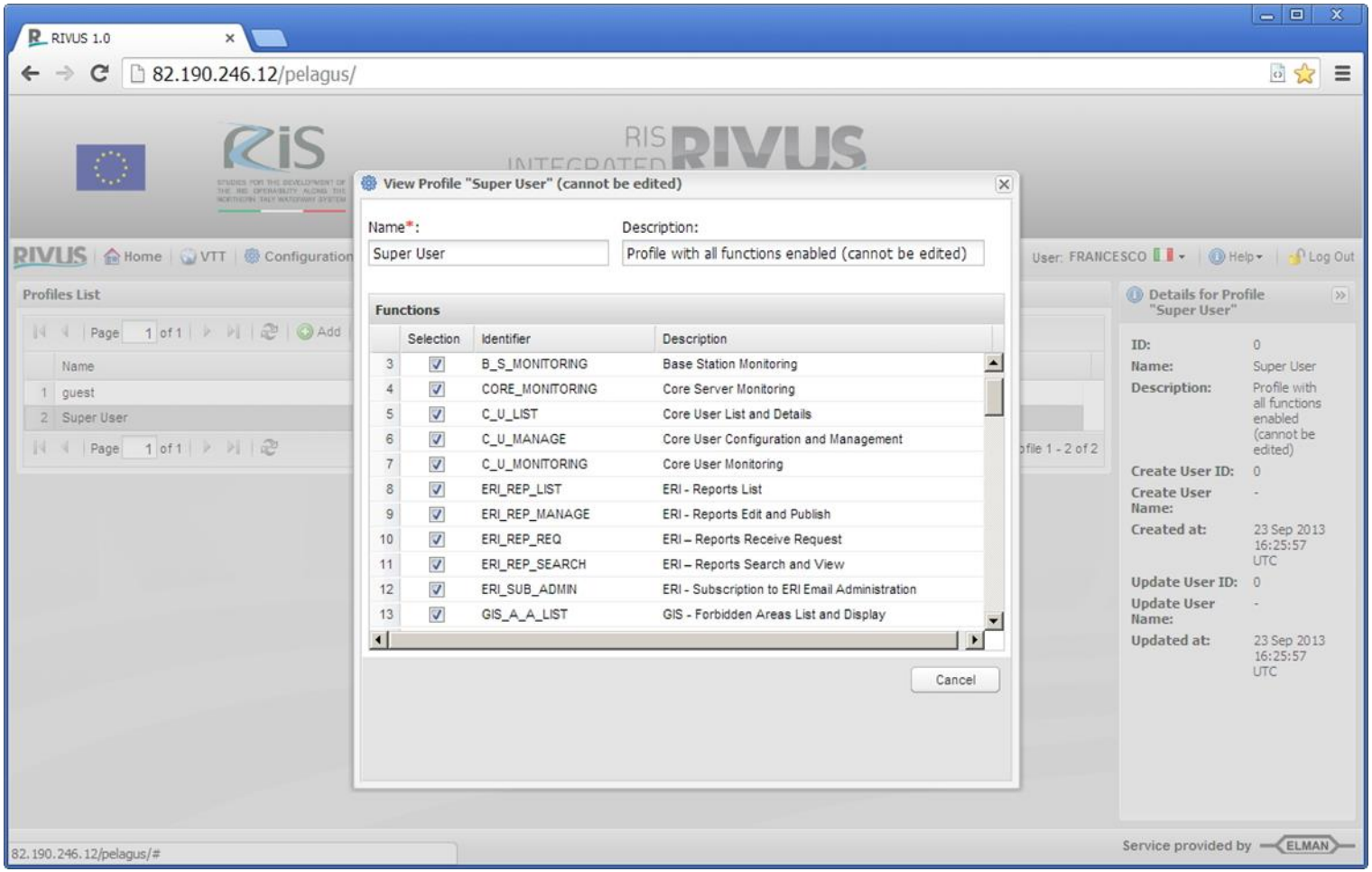


European Commission

Menu controllo d'accesso

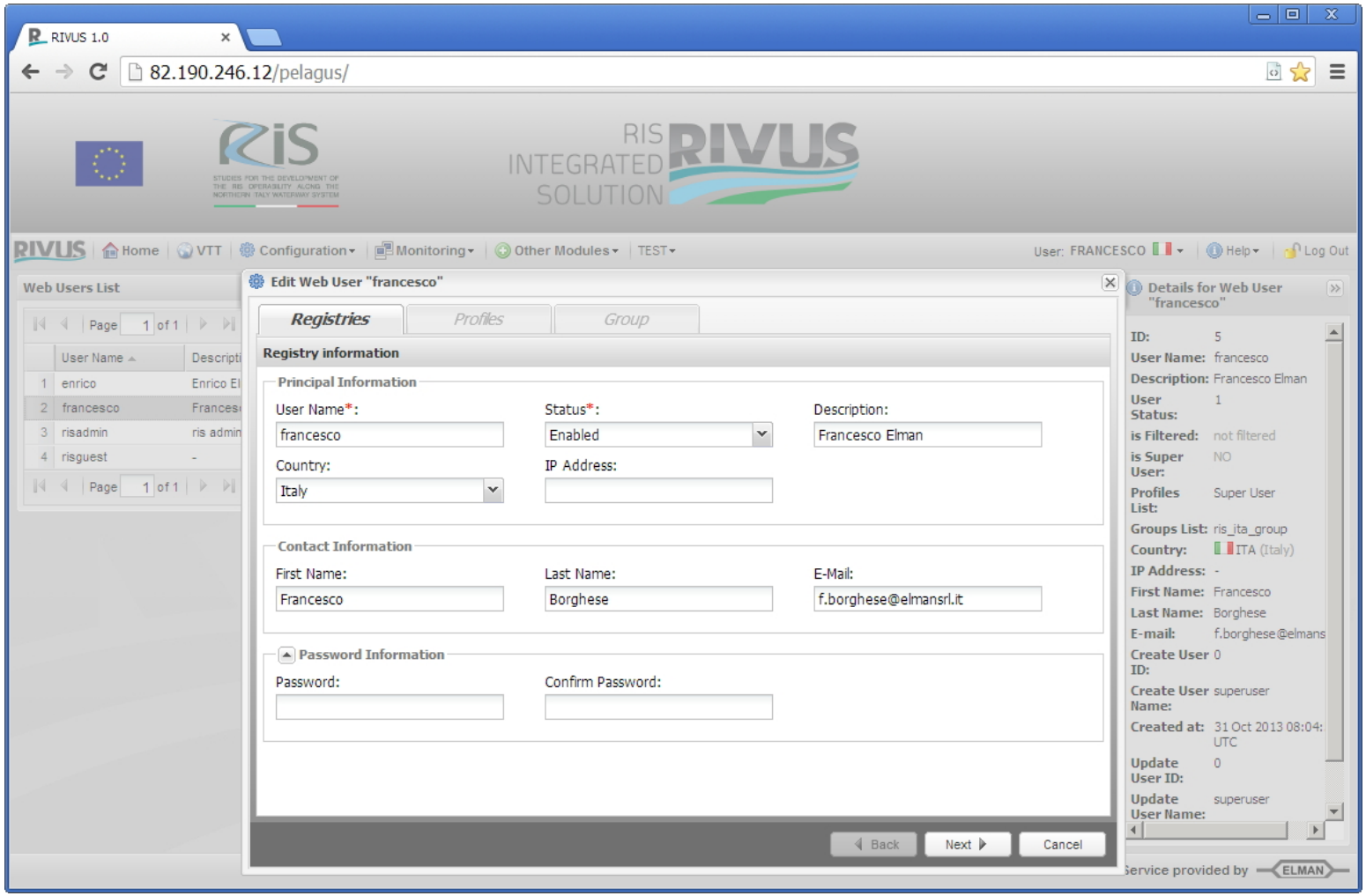


Profili utente



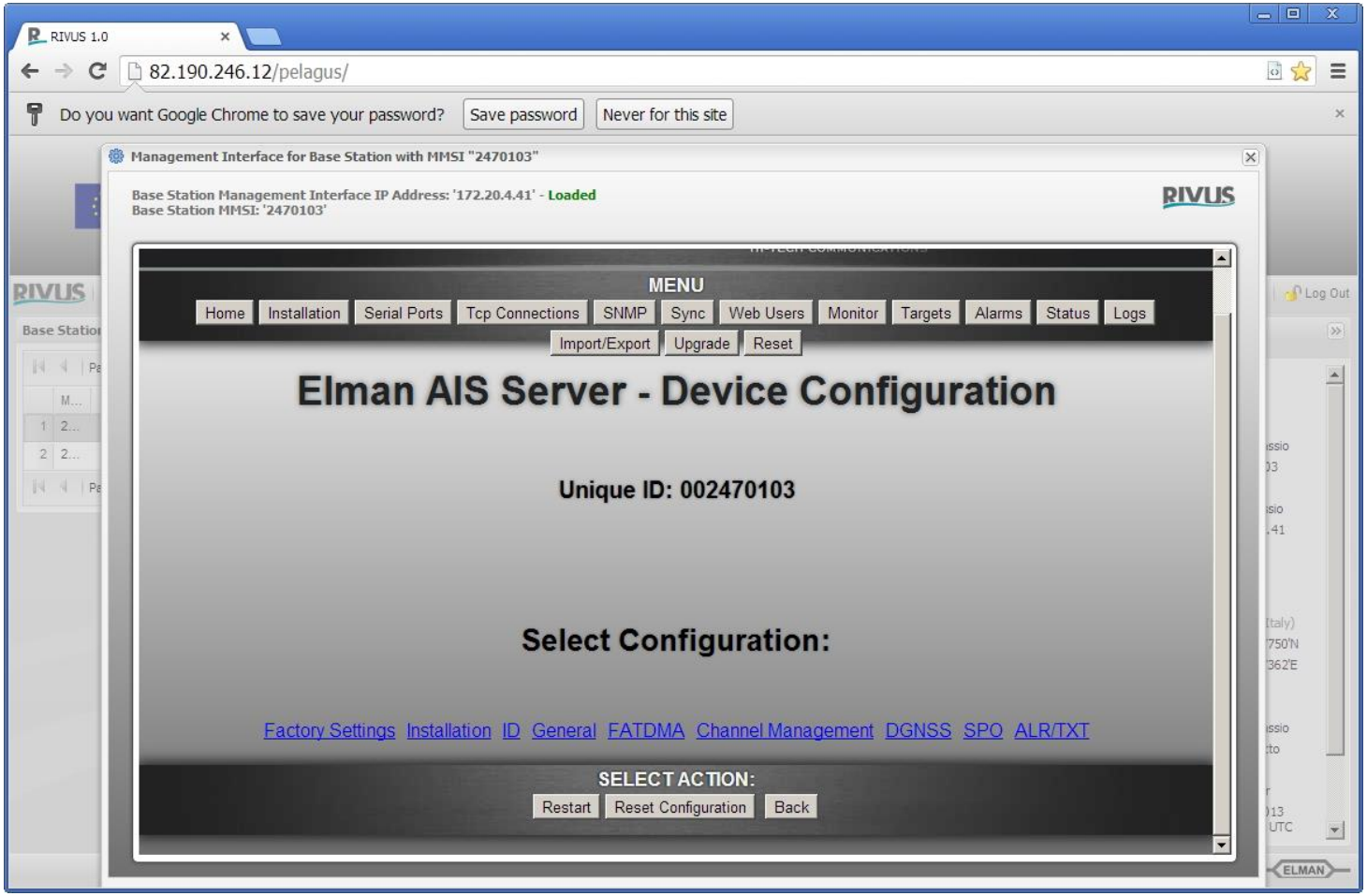
European Commission

Definizione utenti WEB

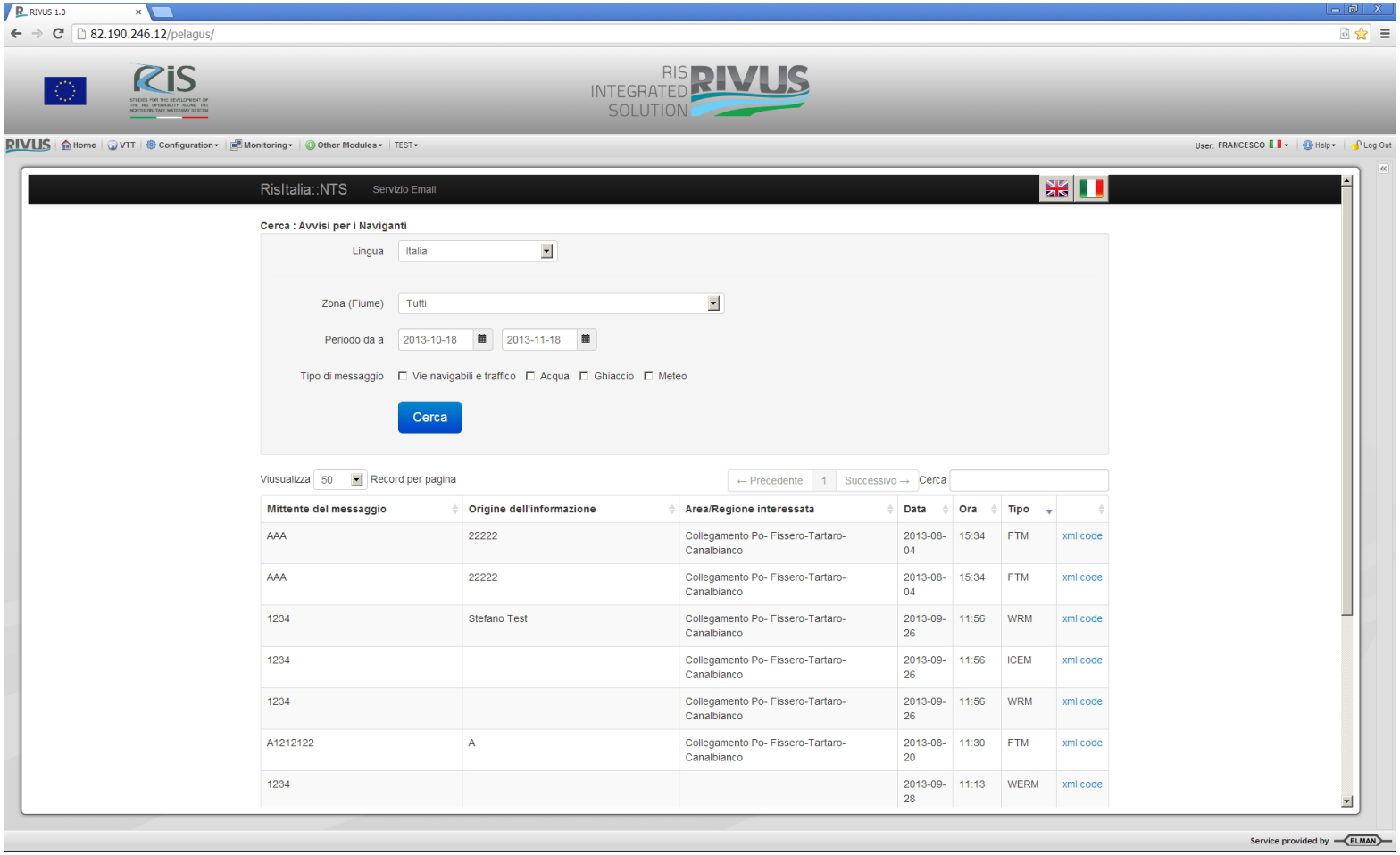


Innovation and Networks Executive Agency

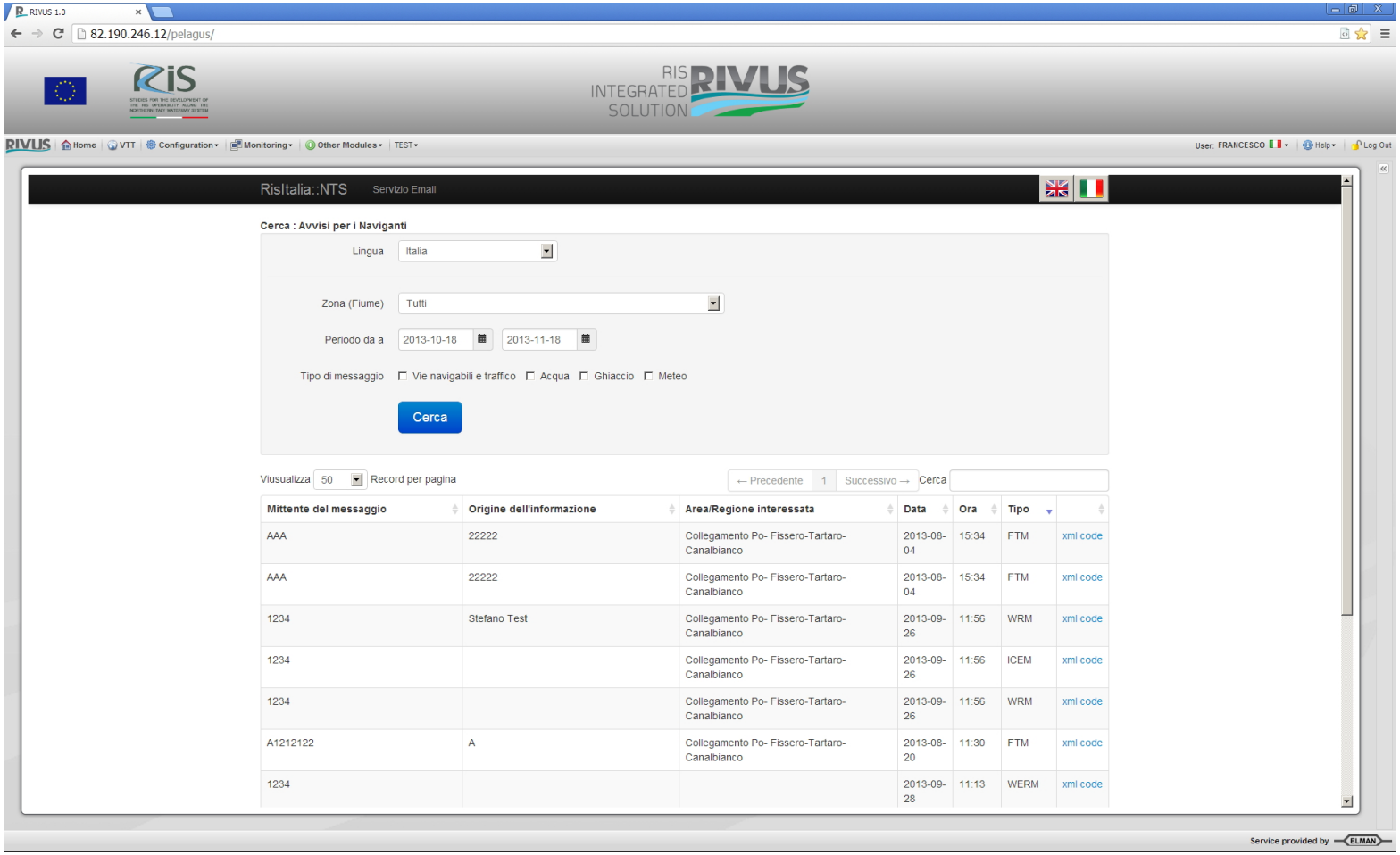
VTT- Configurazione Stazioni base AIS



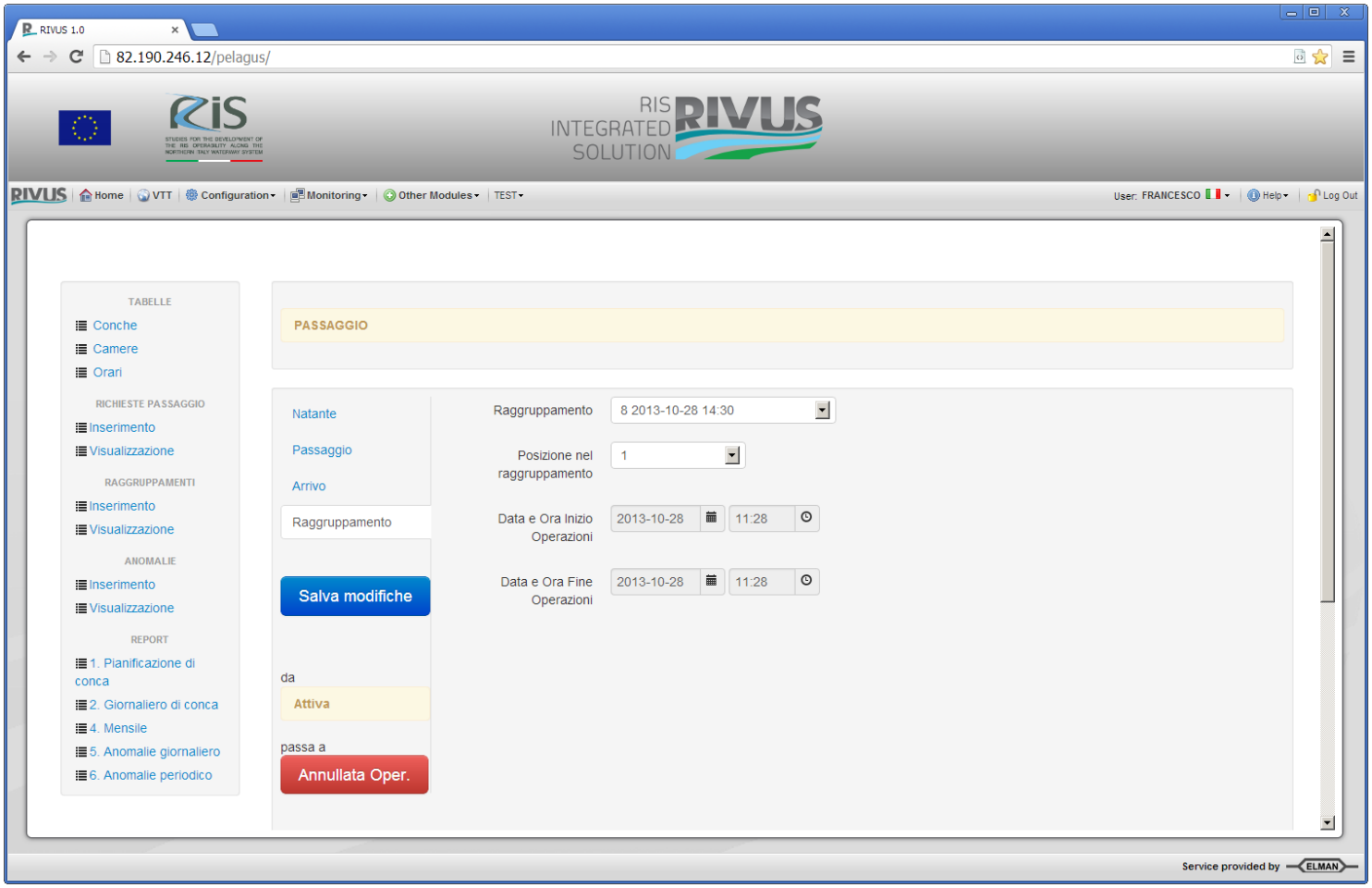
NtS – Interfaccia pubblica



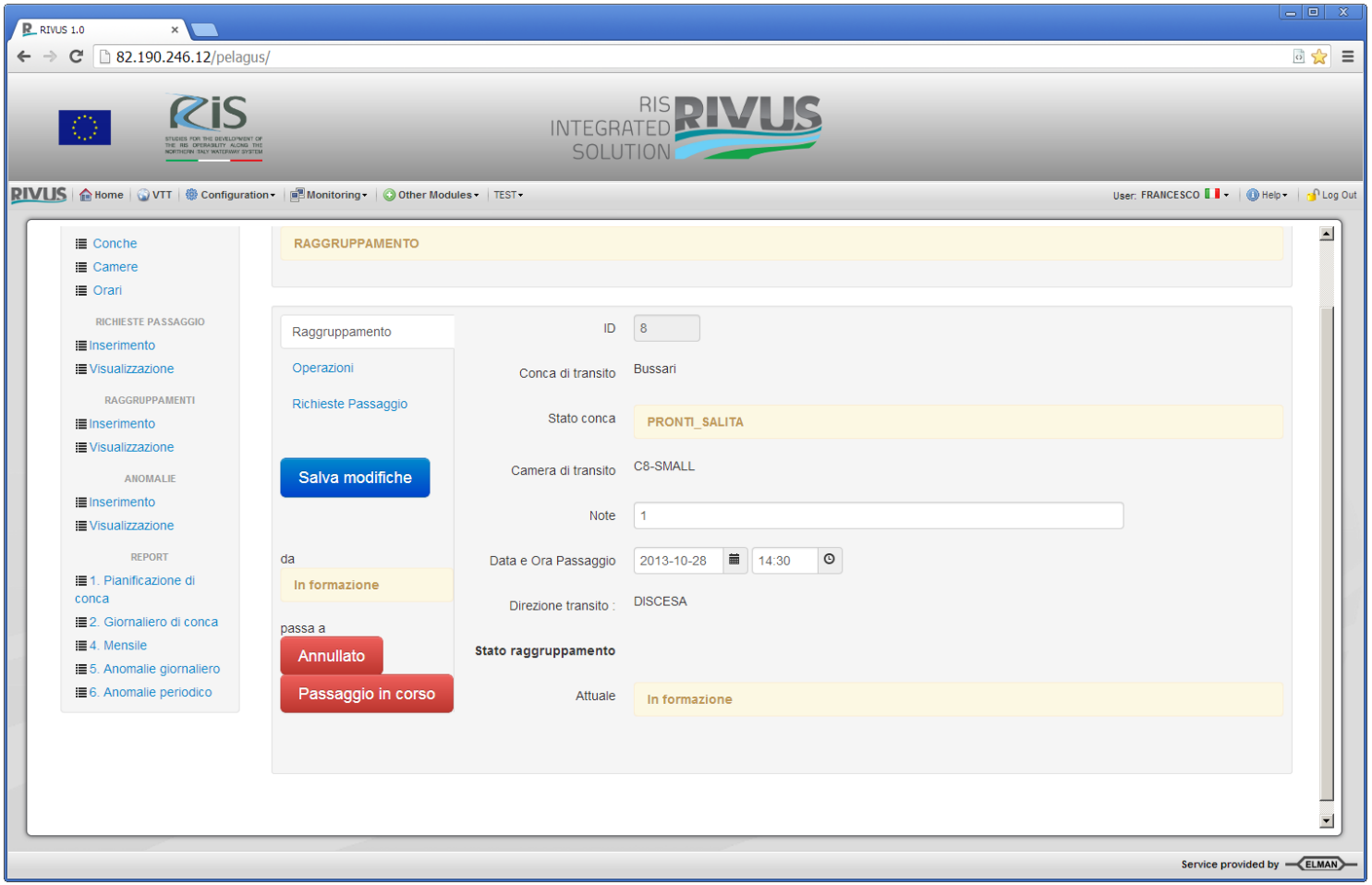
NtS – Interfaccia pubblica



LMS – Dettagli richiesta



LMS – Gestione raggruppamenti



ACTIVITY 1: Project management communication and dissemination – Coordinator: *Sistemi Territoriali*

Act. 1.1 Project management
Act. 1.2 Communication and Dissemination

ACTIVITIES / TIMELINE	Sept. 2015	Oct. 2015	Nov. 2015	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May. 2016	Jun. 2016	Jul. 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016	Dec. 2016	Jan. 2017	Feb. 2017	Mar. 2017	Apr. 2017	May. 2017	Jun. 2017	Jul. 2017	Aug. 2017	Sept. 2017	Oct. 2017	Nov. 2017	Dec. 2017
ACTIVITY 1 PROJECT MANAGEMENT, COMMUNICATION AND DISSEMINATION																											
1.1 Project management		*1*				*4*																					*2*
1.2 Communication and Dissemination																								*3*			

Attività	Descrizione	Costo	ST	AIPO	MN	RAM	ASPO Chioggia
A100	**ACTIVITY 1 PROJECT MANAGEMENT, COMMUNICATION AND DISSEMINATION**	**310 000.00**					
A110	1.1 Project management	270 000.00	150 000.00	50 000.00	30 000.00	30 000.00	10 000.00
A120	1.2 Communication and Dissemination	40 000.00			20 000.00		20 000.00

ACTIVITY 1.1 Project Management

The project management activities include:

1. The **Project management and coordination**;
2. **Kick-off event** organisation and implementation;
3. The **administration of the financial resources** of the project and timely execution of all payments to partners, in line with the project budget and contractual obligations;
4. The continuous **monitoring and evaluation of the progress** of the planned activities of the project, workplan and tasks;
5. The continuous **monitoring of information flows**;
6. The preparation and submission of all **administrative and financial reporting** in compliance with the contractual rules and obligations;
7. The organisation and enforcement of **quality control procedures**;
8. The adoption of **risk management measures** as appropriate.

ACTIVITY 1.2 Communication and Dissemination

The communication and the dissemination activities will be articulated in the following measures:

1. Set up and publishing of a **website**;
2. **Local stakeholder** communication strategy;
3. Transnational cross fertilisation with **similar projects** in the EU;
4. Effective communication interfaces and dissemination channels, with events, publications, **participation to seminars and events** at local, national and EU level;
5. **Non media dissemination materials** (leaflets) describing the project objectives, the pilot activities and expected outcomes in a concise way;
6. **Media coverage** of the project;
7. **Raise awareness campaign** towards inland and sea ports, relevant public authorities and policy makers in the programme area;
8. Prepare a **Final public event**;
9. **Final multimedia dissemination** output.

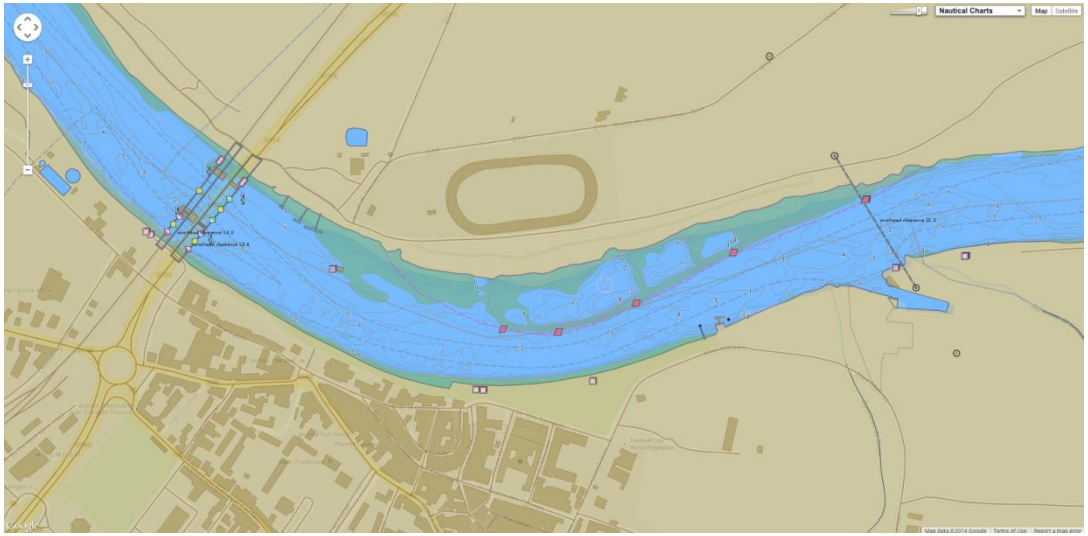
ACTIVITY 2 Inland ECDIS and NTS Upgrade
Coordinator: *AIPo*

Act. 2.1 bIENC Implementation inside existing IENC
Act. 2.2 Integration between bIENC and RIVUS
Act. 2.3 NtS evolution by means of web services

ACTIVITIES / TIMELINE	Sept. 2015	Oct. 2015	Nov. 2015	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May. 2016	Jun. 2016	Jul. 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016	Dec. 2016	Jan. 2017	Feb. 2017	Mar. 2017	Apr. 2017	May. 2017	Jun. 2017	Jul. 2017	Aug. 2017	Sept. 2017	Oct. 2017	Nov. 2017	Dec. 2017
ACTIVITY 2: INLAND ECDIS AND NTS UPGRADE																											
2.1 bIENC implementation inside existing IENC				*5*		*6*																					
2.2 Integration between RIVUS and bIENC													*7*														
2.3 NtS evolution by means of web services						*8*													*9*			*10*					

Attività	Descrizione	Costo	ST	AIPO	MN	RAM	ASPO Chioggia
B100	**ACTIVITY 2: INLAND ECDIS AND NTS UPGRADE**	**685 000.00**					
B110	2.1 bIENC implementation inside existing IENC	250 000.00	90 000.00	160 000.00			
B120	2.2 Integration between RIVUS and bIENC	245 000.00		245 000.00			
B130	2.3 NtS evolution by means of web services	190 000.00	60 000.00	100 000.00		30 000.00	

ACTIVITY 2.1 bIENC implementation in IENC

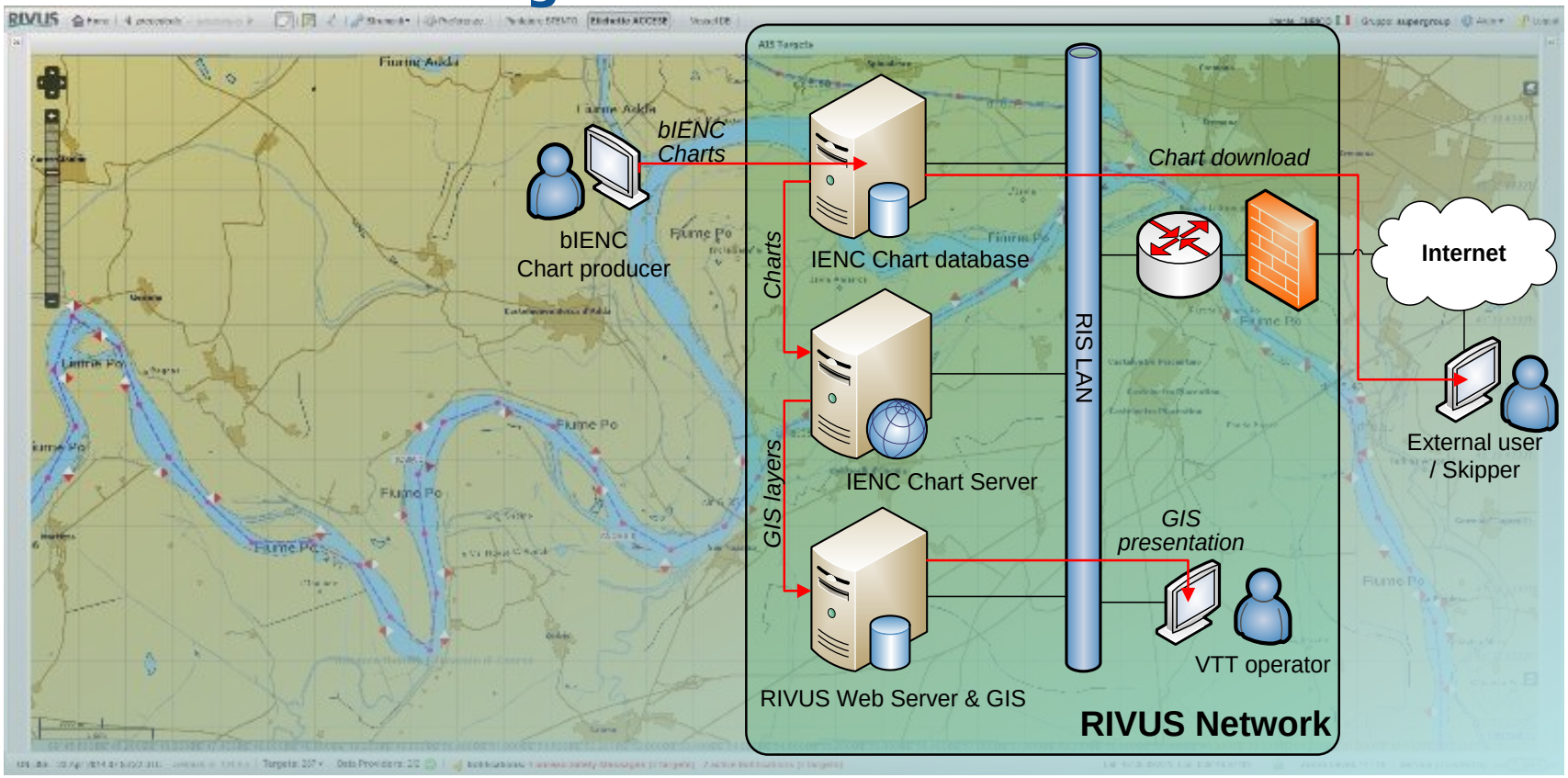


This project has to improve the existing data set with new elements and contents. According to the publication of the Inland ENC Harmonization Group "The European R&D IRIS Europe 3" of 27th November 2014, in which the use of bathymetric data inside IENCs has been successfully tested, AIPo decided to implement this kind of data inside the NIWS IENC.

This kind of information is fundamental during low discharge periods or after important flood events which may lead to strong variations of the channel morphology. The bathymetric data will be produced directly by AIPo by means of *multibeam* technology surveys, and will be used to produce bathymetric IENC (bIENC) cells.

The use of bathymetric ENCs is considered optional. Applications using this approach should have the capability to switch on/off the bathymetric ENCs. The application should indicate when the function is turned on. The content of bathymetric ENCs is limited to the bathymetry data only

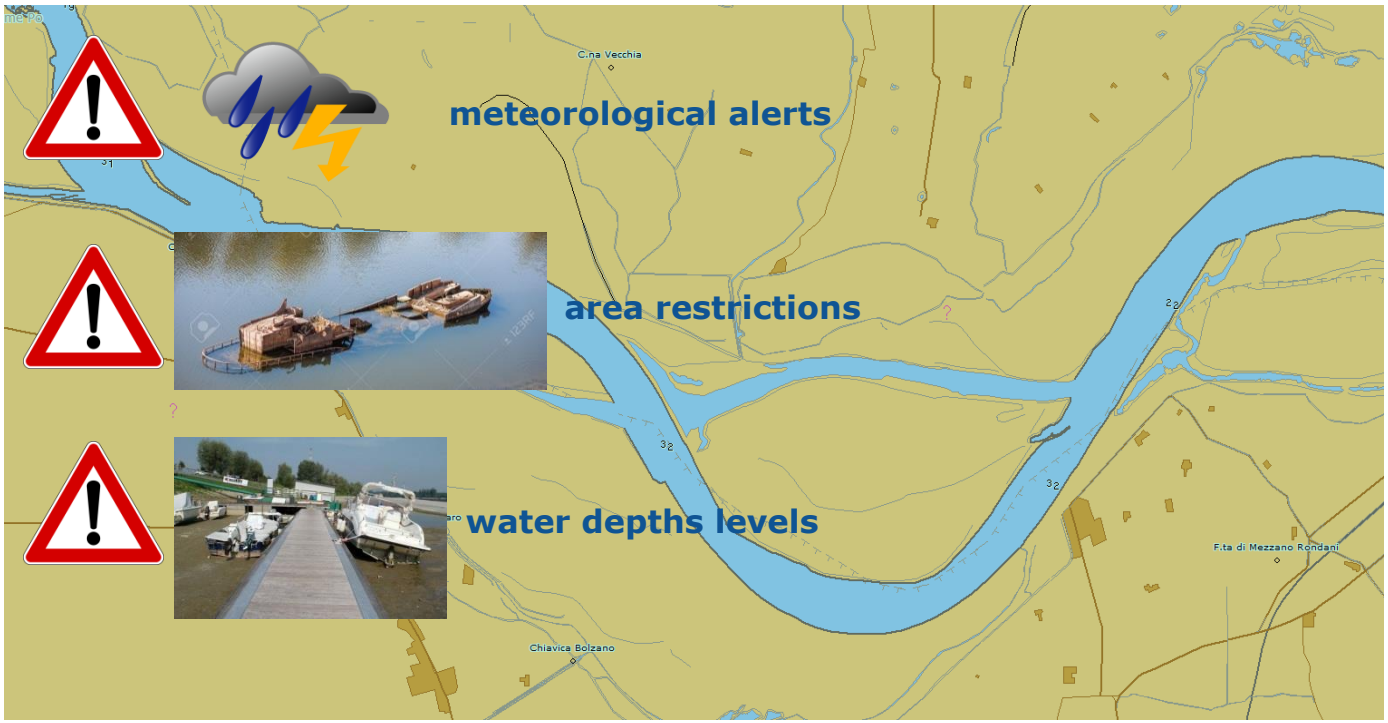
ACTIVITY 2.2 Integration between RIVUS and bIENC



The diagram displays the relations between these RIVUS modules and operators/users, where black lines show the physical connections and red lines represent logical flow of data.

ACTIVITY 2.3 NtS evolution by means of web service

The web-service interface should be adopted as the new NtS standard. This kind of innovation allows the completely autonomous information flux between RIS provider and users, creating a **"two way" communication system** instead of the present "one way".



The NtS web-service feature will comply with the specification emitted by the Federal Waterways Engineering Service Centre Information Technology of the BMVBS (DLZ-IT BMVBS), version 1.0.3.0, or as amended in future version of the standard.

The NtS web services will be seamlessly integrated with the RIVUS application

Such as, **all the NtS messages published by the RIS operators using the RIVUS web user interface, will be available for distribution through the web service**

ACTIVITY 3 Safety Improvement for the NIWS
Coordinator: *AIPo*

Act. 3.1 RIVUS Mobile Development
Act. 3.2 RIVUS Mobile web services

ACTIVITIES / TIMELINE	Sept. 2015	Oct. 2015	Nov. 2015	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May. 2016	Jun. 2016	Jul. 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016	Dec. 2016	Jan. 2017	Feb. 2017	Mar. 2017	Apr. 2017	May. 2017	Jun. 2017	Jul. 2017	Aug. 2017	Sept. 2017	Oct. 2017	Nov. 2017	Dec. 2017
ACTIVITY 3: SAFETY IMPROVEMENT FOR THE NORTHERN ITALY WATERWAY SYSTEM																												
3.1 RIVUS Mobile Development																						11						
3.2 RIVUS Mobile web services																			9									

Attività	Descrizione	Costo	ST	AIPO	MN	RAM	ASPO Chioggia
C100	**ACTIVITY 3: SAFETY IMPROVEMENT FOR THE NORTHERN ITALY WATERWAY SYSTEM**	**240 000.00**					
C110	3.1 RIVUS Mobile Development	140 000.00		100 000.00	40 000.00		
C120	3.2 RIVUS Mobile web services	100 000.00	50 000.00	50 000.00			

ACTIVITY 3.1 RIVUS Mobile Development

The inland navigation safety can be improved by a mobile application (commonly called "App") which will make available on smartphones or tablets all the functionalities of the RIVUS System. The RIVUS App will be developed for Android mobile platforms and, starting from the locationing device of smartphones or tablets, will provide the following features and information:

1. Real time water levels information coming from the NIWS gauges network.

ACTIVITY 3.1 RIVUS Mobile Development

The inland navigation safety can be improved by a mobile application (commonly called "App") which will make available on smartphones or tablets all the functionalities of the RIVUS System. The RIVUS App will be developed for Android mobile platforms and, starting from the locationing device of smartphones or tablets, will provide the following features and information:

2. Navigation locks status, together with the possibility to book the ship passage and knowing the wait time.

ACTIVITY 3.1 RIVUS Mobile Development

The inland navigation safety can be improved by a mobile application (commonly called "App") which will make available on smartphones or tablets all the functionalities of the RIVUS System. The RIVUS App will be developed for Android mobile platforms and, starting from the locationing device of smartphones or tablets, will provide the following features and information:

3. Fairway condition, for example dredging areas, presence of hydraulic works areas or limited navigation conditions.

ACTIVITY 3.1 RIVUS Mobile Development

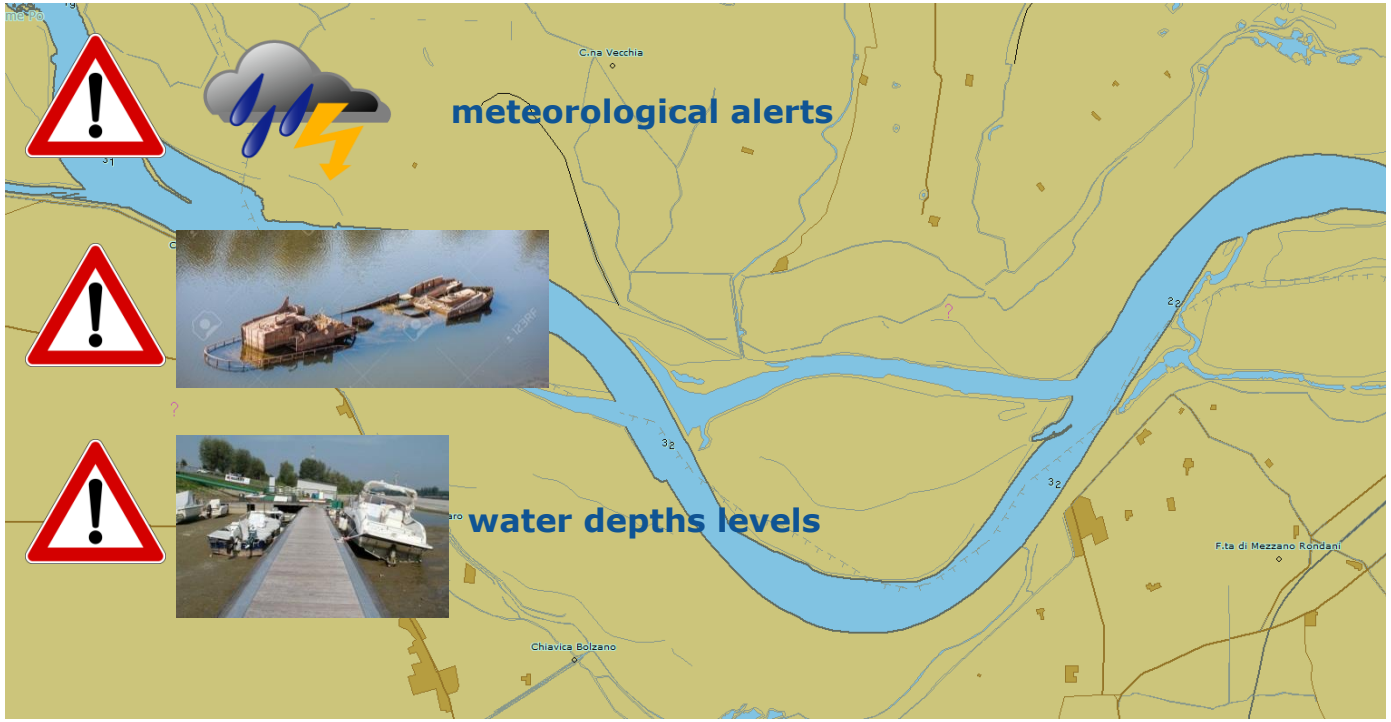
The inland navigation safety can be improved by a mobile application (commonly called "App") which will make available on smartphones or tablets all the functionalities of the RIVUS System. The RIVUS App will be developed for Android mobile platforms and, starting from the locationing device of smartphones or tablets, will provide the following features and information:

4. Shallow water cross sections or reaches along the navigation channel.

ACTIVITY 3.1 RIVUS Mobile Development

The inland navigation safety can be improved by a mobile application (commonly called "App") which will make available on smartphones or tablets all the functionalities of the RIVUS System. The RIVUS App will be developed for Android mobile platforms and, starting from the locationing device of smartphones or tablets, will provide the following features and information:

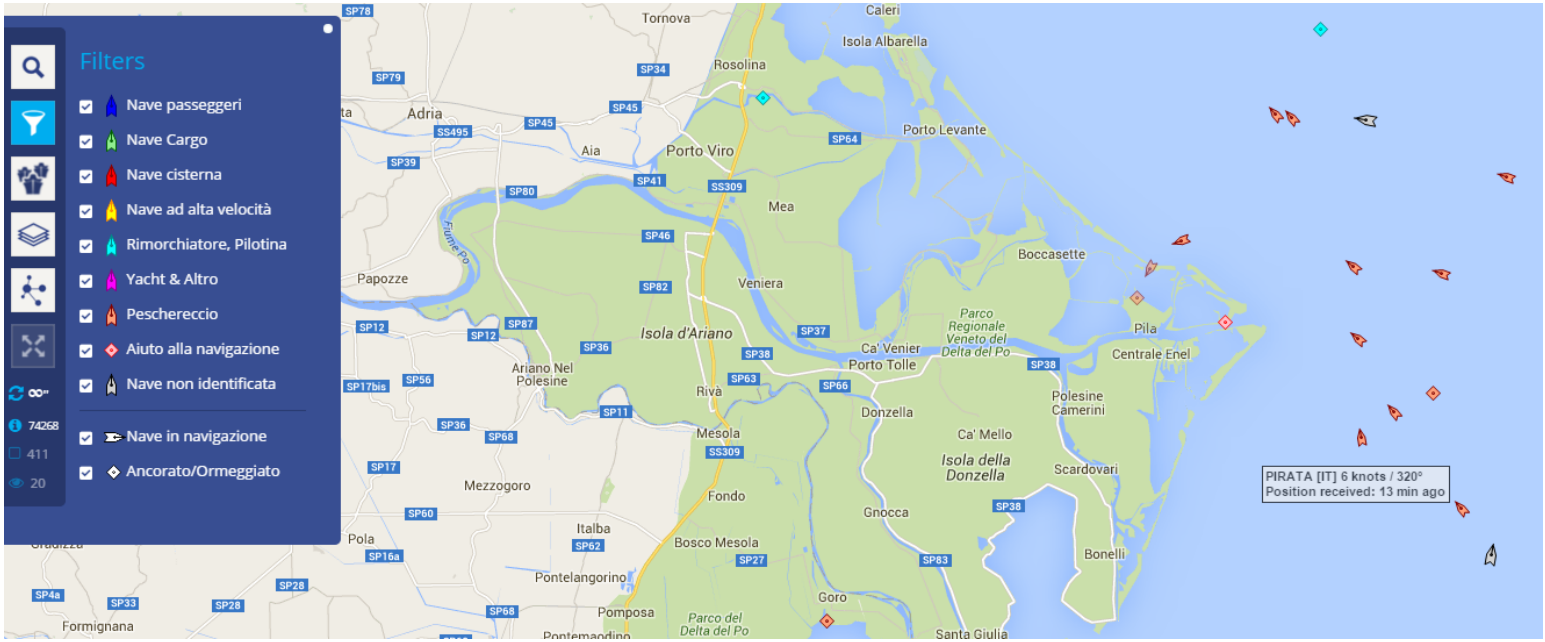
5. Notice to Skippers.



ACTIVITY 3.1 RIVUS Mobile Development

The inland navigation safety can be improved by a mobile application (commonly called "App") which will make available on smartphones or tablets all the functionalities of the RIVUS System. The RIVUS App will be developed for Android mobile platforms and, starting from the locationing device of smartphones or tablets, will provide the following features and information:

6. Your own position, and the position of all the skippers using the same application, on a suitable cartographic layer.

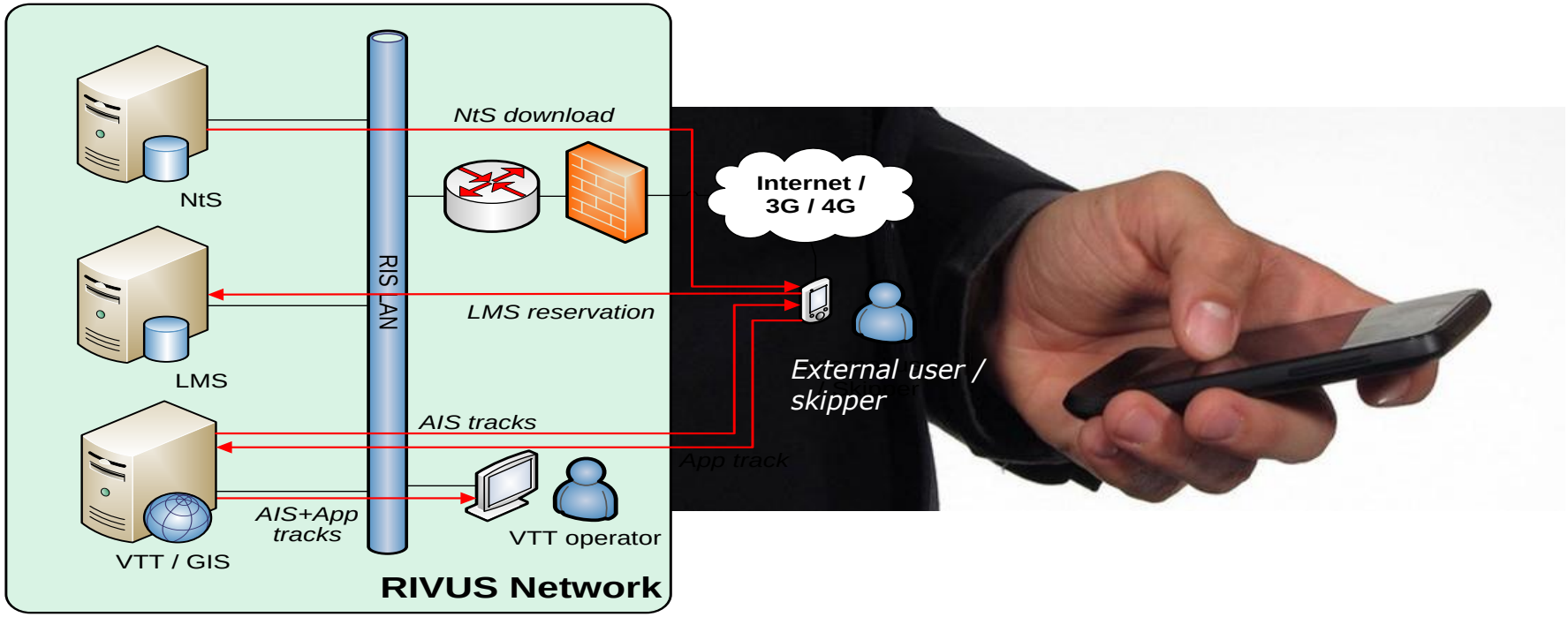


ACTIVITY 3.1 RIVUS Mobile Development

The inland navigation safety can be improved by a mobile application (commonly called "App") which will make available on smartphones or tablets all the functionalities of the RIVUS System. The RIVUS App will be developed for Android mobile platforms and, starting from the locationing device of smartphones or tablets, will provide the following features and information:

7. The position, the navigation track and the velocity of commercial ships equipped with AIS.

ACTIVITY 3.2 RIVUS Mobile web service



The diagram displays the relations between the enhanced RIVUS modules and external users exchanging data with the RIS centres using the mobile App, where black lines show the physical connections and red lines represent logical flow of data.

European Commission

ACTIVITY 4 Inland Maritime Integration
Coordinator: *MIT*

Act. 4.1 AIS involved Authorities armonization
Act. 4.2 Functional requirement for RIS and NMSW Interface
Act. 4.3 Functional requirement for RIS and SafeSeaNet Interface

ACTIVITIES / TIMELINE	Sept. 2015	Oct. 2015	Nov. 2015	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May. 2016	Jun. 2016	Jul. 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016	Dec. 2016	Jan. 2017	Feb. 2017	Mar. 2017	Apr. 2017	May. 2017	Jun. 2017	Jul. 2017	Aug. 2017	Sept. 2017	Oct. 2017	Nov. 2017	Dec. 2017
ACTIVITY 4 INLAND – MARITIME INTEGRATION																											
4.1 AIS involved authorities harmonization							*12*			*13*			*14*															
4.2 Functional requirement for RIS and NMSW interface																								*15*				
issues and Safety systems on the River																								*16*				

Attività	Descrizione	Costo	ST	AIPO	MN	RAM	ASPO Chioggia
D100	**ACTIVITY 4 INLAND – MARITIME INTEGRATION**	**495 000.00**					
D110	4.1 AIS involved authorities harmonization	255 000.00	65 000.00		120 000.00	70 000.00	
D120	4.2 Functional requirement for RIS and NMSW interface	120 000.00	20 000.00	20 000.00	20 000.00	60 000.00	
D130	4.3 Functional requirement for RIS and SafeSeaNet interface	120 000.00	20 000.00	20 000.00	20 000.00	60 000.00	

ACTIVITY 4.1 AIS involved Authorities armonization

This sub activity will consist in the review of the organization of the reporting in the inland waterway, to standardize the format and structure as by Directive 2010/65. The Directive 2010/40 on Intelligent Transport Systems (ITS) will also be taken into account referring to road/rail systems and their interfaces with the other mode of transport (e.g. inland waterways).

In inland ports different type of ICT tools exist but they are often not connected with each other and more often not harmonised with River Information Services. In order to increase effectiveness and competiveness in this task the Integrated between Inland Port Information Management System, Logistics Data Systems will be studied. Close cooperation will be realised with all inland port stakeholders of multimodal logistic chain in the considered area. Conclusion on the useful RIS services for the benefit of operations in inland ports will be drawn and recommendations and best practices will be elaborated

ACTIVITY 4.2 Functional Requirement for RIS and NMSW Interface

This sub activity will study the interdependence between RIS and the National Maritime Single Window (NMSW) and the necessary actions.

Any connections between RIS and the information system of the Customs and Monopolies (AIDA) will be evaluated.

The sub activity will analyse the structures of these two systems and elaborate an Action Plan of the activities necessary to match them and will define the functional requirements for RIS and NMSW interface

In particular, the required formalities related to ship arriving in or departing from ports and their relevant data contents will be examined to identify which sets of data may be exchanged between the systems through an interface, properly implemented to adopt the principles set at EU level by the relevant directives and by EMSA's NSW prototype.

ACTIVITY 4.3 Functional Requirement for RIS and SafeSeaNet Interface

This sub-activity will study the interdependence between RIS and the SafeSeaNet system and all the necessary actions to harmonize these two system. The SafeSeaNet is a vessel traffic monitoring and information system, established in order to enhance:

1. Maritime safety
2. Port and maritime security
3. Marine environment protection
4. Efficiency of maritime traffic and maritime transport

The sub activity will analyse the structure of these two systems and elaborate an Action Plan of the activities necessary to match them and will define the functional requirements for RIS and SafeSeaNet interface.

ACTIVITY 5 System Test for Inland-Maritime Integration

Coordinator: *Sistemi Territoriali*

Act. 5.1 Automatic Switching of Inland Maritime mode on-board AIS
Act. 5.2 Trasmission of DGNSS Corrections Using AIS base stations
Act. 5.3 Exploiting Redundancy of Maritime and Inland AIS Network
Act. 5.4 Testing of Integration Benefits from the on-board prospectives

ACTIVITIES / TIMELINE	Sept. 2015	Oct. 2015	Nov. 2015	Dec. 2015	Jan. 2016	Feb. 2016	Mar. 2016	Apr. 2016	May. 2016	Jun. 2016	Jul. 2016	Aug. 2016	Sept. 2016	Oct. 2016	Nov. 2016	Dec. 2016	Jan. 2017	Feb. 2017	Mar. 2017	Apr. 2017	May. 2017	Jun. 2017	Jul. 2017	Aug. 2017	Sept. 2017	Oct. 2017	Nov. 2017	Dec. 2017
ACTIVITY 5: SYSTEM TEST FOR INLAND - MARITIME INTEGRATION																												
5.1 Automatic switching of inland/maritime mode of on-board AIS																												
5.2 Transmission of DGNSS corrections using AIS base stations																							17					
5.3 Exploiting redundancy of maritime and inland AIS network								18																				
5.4 Testing of integration benefits from the on board perspective																										19	20	

Attività	Descrizione	Costo	ST	AIPO	MN	RAM	ASPO Chioggia
E100	**ACTIVITY 5: SYSTEM TEST FOR INLAND - MARITIME INTEGRATION**	**660 000.00**					
E110	5.1 Automatic switching of inland/maritime mode of on-board AIS	50 000.00	25 000.00	25 000.00			
E120	5.2 Transmission of DGNSS corrections using AIS base stations	100 000.00	50 000.00	50 000.00			
E130	5.3 Exploiting redundancy of maritime and inland AIS network	350 000.00	300 000.00				50 000.00
E140	5.4 Testing of integration benefits from the on board perspective	160 000.00	10 000.00	20 000.00	20 000.00	50 000.00	60 000.00

ACTIVITY 5.1 Automatic switching of inland/maritime mode of on-board AIS

The objective of this sub-activity is to complement the functionality of the on-board inland ECDIS software with the following features:

1. Detection of events related to vessel entrance in areas under the jurisdiction of the maritime authority or in areas covered by RIS;
2. Notification of event occurrence to the skipper through information displayed on the ECDIS;
3. Automatic switching of AIS device to maritime or inland mode, depending on the area entered.

The sub-activity will include the following tasks:

1. Definition of the areas where inland and maritime modes are required for the on-board AIS;
2. Design and implementation of the software module which detects access to the above defined areas and interacts with the ECDIS and the AIS device to display the entrance events and to switch the AIS mode as relevant.

ACTIVITY 5.2 Transmission of DGNSS corrections using AIS base stations

The sub-activity will include the following tasks:

1. Study to optimize the placement of DGNSS reference stations in order to minimize costs and grant the 1 meter accuracy in all the identified areas where this is needed;
2. Study to identify the AIS base stations (inland and maritime) for the DGNSS transmissions to cover all the above identified areas;
3. Definition of intervals of DGNSS transmissions from AIS base stations to avoid accuracy degradation without impacting on AIS channel loading;
4. Implementation of DGNSS transmissions using the AIS stations of the VTT

ACTIVITY 5.3 Exploiting redundancy of maritime and inland AIS network

Given the relevant geographical overlapping of the areas of interest of maritime and inland services, and the use of standard and compatible AIS technology in both systems, it is practical to implement a communication link between the two systems, with the following advantages:

1. the AIS networks may complement each other whereas Base Stations of one system provide additional or better coverage than the Base Stations of the other one;
2. the AIS networks may act as mutual failover systems whereas Base Stations from one system provide coverage which overlaps that of the Base Stations of the other one.
3. reliability and coverage of both inland and maritime AIS network may be enhanced while saving on cost and number of installations at the same time.

ACTIVITY 5.3 Exploiting redundancy of maritime and inland AIS network

The sub-activity will include the following tasks:

1. Design and implementation of the communication link between the maritime and inland systems to grant a mutual exchange of AIS data in areas of interest.
2. Study of the coverage obtained with the Base Stations already installed in the two networks, identifying gaps and the best sites to install new devices with a view to enhance the coverage for both systems. Areas where AIS coverage should be improved include the western leg of the river Po, the Ferrara waterway and the great lakes of northern Italy. New installations covering these areas would provide benefits to both the administrations.
3. Deployment of new AIS Base stations identified as described above and other required infrastructure like data links and connections to the RIS centres.

ACTIVITY 5.4 Testing of integration benefits from the on board perspective

The sub-activity will include the following tasks:

1. testing of on board AIS and ECDIS behaviour, as designed in sub-activity 5.1, when transiting from inland waterways to maritime navigation and vice versa.
2. testing of improvement of positioning quality on board when DGNSS signals, implemented as per sub-activity 5.2, are received.
3. testing of enhancement of coverage of AIS signals as expected from the improvement of coverage and redundancy brought in by sub-activity 5.3.

Thanks for your attention

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