BonVoyage

From Bilbao to Oslo, intermodal mobility solutions, interfaces and applications for people and goods, supported by an innovative communication network.

Bonvoyage

The **BONVOYAGE** project aims at designing, developing and testing a platform optimizing **multimodal** door-to-door transport of passengers and goods. The platform integrates travel information, planning and ticketing services, by automatically analysing non-real-time data from heterogeneous databases; real-time measured data (traffic, weather forecasts); user profiles; user feedback.

Network

A pivotal feature in BONVOYAGE consists of an Information-Centric Network (ICN) aiming at providing:

1. **seamless connectivity across different existing network realms** (that may be administered by distinct transport operators or authorities);
2. **native support of mobility and security issues**;
3. **travel-centric primitives for push/pull based services**;
4. **high efficiency in communication and processing operations**;
5. **graceful deployability and interoperability with existing and upcoming networking systems** (i.e., 5G and beyond).

The highly heterogeneous, distributed and mobile nature of the data of interest, coming from data-centers, sensors, vehicles, goods and people on the move, calls for a network that is able to go beyond current paradigms.

Motivation

The platform is supported by an innovative "information-centric" communication network that collects and distributes all the data required. The highly heterogeneous, distributed and mobile nature of data, coming from data-centers, sensors, vehicles, goods and people on the move, calls for an innovative networking paradigm. Current networks are restricted to provide communication channels between hosts only. Our paradigm, called **Internames**, allows communications among entities identified by names, without the constraint of a static binding to a particular location.

Main Areas of Research

- Multi-objectives optimization
- Personalization
- Tariff schemes
- Interoperability
- Internames Communication System
- Security and privacy mechanisms

www.bonvoyage2020.eu

Project Coordinator
Prof. Nicola Blefari Melazzi
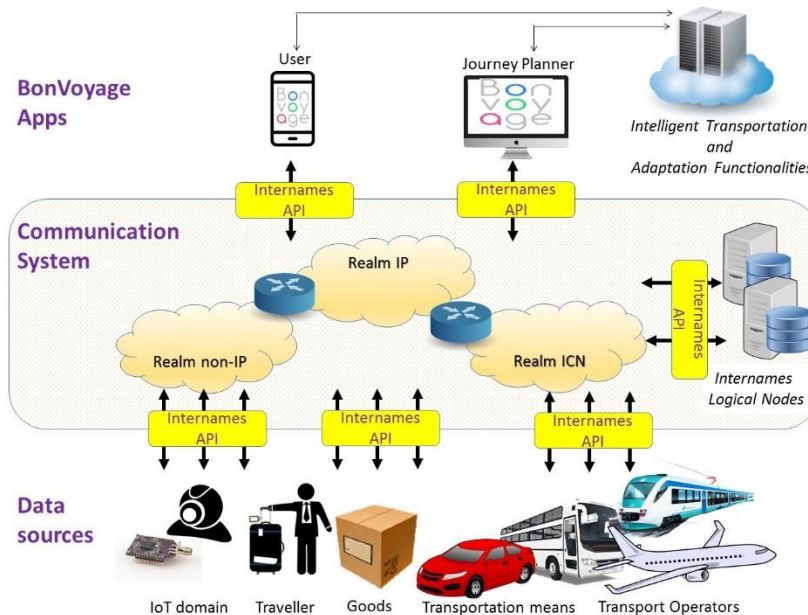*CNIT - University of Rome, Tor Vergata*
Duration:
May 2015 – April 2018
Project funding (EC/total):
4 M€

In particular, CRAT is in charge of the development of the User Profiler and of part of the Multi-Objective Optimizer foreseen by the BONVOYAGE platform

Partners

Consorzio Nazionale Interuniversitario per le Telecomunicazioni, (www.cnit.it) Italy
ATOS Spain SA, (http://atos.net) Spain
Azkar-Dachser Trasportes SA, (www.azkar.com) Spain
CEA – LETI, (ww.leti.cea.fr) France
City of Bilbao, (www.bilbao.net) Spain
Clúster de Movilidad y Logística, MLC ITS Euskadi, (www.mlcluster.com) Spain
CRAT, Consorzio per la Ricerca nell'Automatica e nelle Telecomunicazioni (www.crat.eu) Italy
Fluidtime GmbH, (www.fluidtime.com) Austria
Norwegian Public Roads Administration, (www.vegvesen.no) Norway
Stiftelsen SINTEF, (www.sintef.no) Norway
Trenitalia Spa, (www.trenitalia.com) Italy

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Service concept

The BONVOYAGE system entails a pervasive degree of interactions among travellers, tools, databases, multi-modal transportation systems, sensor networks and forecasting models.

All these actors can be physically placed and/or logically belong to various organizations that enforce different and not necessarily interoperable policies on data access and management.

In addition, the provisioning of a sophisticated door-to-door journey planner system is highly likely to require a high-level service orchestration of simpler services provided by entities and organizations that were not initially designed to interoperate with each other.

Also, the traveller, along the trip, can migrate from one access network and Internet Service Provider (ISP) to the next, all the time needing to maintain a consistent status and connectivity with the networking infrastructure.

The **BONVOYAGE client mobile application** will search for the entire multimodal network data model, together with timetable databases, then combine the possible travel solutions based on all operators serving the destination.
Travel solutions are presented to the customer on the mobile user interface, listed in the requested order.
All solutions indicate:

- Fares restrictions and rules;
- Suggested Origin;
- Total travel time from Origin to Destination;
- Different mode of transport and changes;
- Walking distance on changes and departure/arrival, if required;
- Environment impact;
- Other information related to travel.

Technical Approach

BONVOYAGE has a three-level architecture: Intelligent Transport and Adaptation Functionalities access resources distributed across BONVOYAGE Internames Communication System. The Multimodal integrated interfaces and Apps provide information from and to users.

Impact

Better modal integration: services integrating multi-modal information, user preferences, planning, tariff design and ticketing services, easing interoperation between all involved players

Increased travel time reliability: capabilities to account for travel time reliability and provide decisions tailored on the requesting user

More efficient use of the existing transport infrastructure: the system can enforce efficient usage of infrastructures, thanks to orchestration of available transportation means

More inclusive transport services: personalization includes information related to special needs and implementation of consequent decisions

Better informed and more efficient policies for ITS deployment: experience of project partners and availability of vast network to collect requirements and feedbacks from a wide range of players and test project solutions

BONVOYAGE Architecture components

The request of a "user" (be it a person or a parcel) to travel from source to destination is managed with several tools:

- *Metadata Handler* collects and elaborates data related to the request and generates a corresponding Context
- *User Profiler* creates a personalized profile, conveying requirements including Quality of Experience parameters and special needs
- *Multi-Objective Optimizer* develops personalized travel instructions, optimal for the Context and User Profile. The user may give feedback, before accepting the travel itinerary.
- *Actuator* triggers the necessary services
- *Tariff Scheme Designer* exploits platform data to define multi-part tariff schemes.