

The ITRACT project seeks to improve public transport in the regions by utilizing WIFI technologies including developing new APPS and shared database.



Improving Transport and Accessibility through new Communication Technologies

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Building Block issue

This issue and the table below focus on the Building blocks and apps that were priority from the WP3 work. This was settled in the meeting November 2012. First & second column marks the regional priority, and the X marks how these are intended to fit the Building Blocks. The Building Block developing partners are Hanze University for BB1, BB3, and BB4. Karlstad University are responsible for BB2, BB5, BB6, and BB7. The basic structure for APPS is that Hanse, Karlstad, and Jade universities develop APPS to be used in all regions depending on local priority. A core issue for the project is that WP4 develops a common database to be used for all APPS and BBs.

European Union  The European Regional Development Fund

no.	title of service idea (mobile application)	BB 1: Ride sharing	BB 2: Interactive map	BB 3: (multi-modal) planning	BB 4: Ticketing (financial)	BB 5: User profiles	BB 6: Dashboard	BB 7: Information
V1	Smart live travel map - for android phone	0	x	x	0	x	0	x
V2	Smart live travel map - for iphone	0	x	x	0	x	0	x
V3	Smart live travel map - for web	0	x	x	0	x	0	x
V4	Order on demand traffic - for android phone	0	0	x	0	x	0	x
V5	Order on demand traffic - for iphone	0	0	x	0	x	0	x
V6	Order on demand traffic - for web	0	0	x	0	x	0	x
V7	Business travel Apps - for android phone	0	0	x	x	x	0	x
V8	Business travel Apps - iphone	0	0	x	x	x	0	x
G1	Step by Step (formerly Pick me up)	0	x	x	0	0	0	x
G3	Get connected (formerly Dashboard)	0	0	0	0	0	x	0
G5	Tell us! (formerly Your voice)	0	0	0	0	0	0	x
G6	Shuttle Drive apps(s)	x	0	0	0	0	0	0
G7	P+R Groningen	0	0	0	0	0	0	0
R1	Smart Live Travel Map	0	x	0	0	0	0	x
R2	Active Bus Stops	0	x	0	0	0	0	x
R3	Price-Flex	0	0	0	x	0	0	x
R4	Ridesharing	x	0	x	0	0	0	x
R5	On demand	x	0	x	0	0	0	x
Y1	Transport Watch	0	x	0	0	x	x	x
Y2	The Hub Dashboard	0	x	x	0	0	x	x
Y3	Linking Demand Responsive Services with Journey	x	x	x	0	0	x	x
Y5	Car Links	x	0	x	0	0	0	0
Y8	Active Bus Stops	0	0	0	0	0	0	x
Y10	Operator Feedback	0	0	0	0	0	0	0
J1	Real time data - GPS low cost	0	x	0	0	0	0	0
J2	Check of monthly season tickets for pupils	0	0	0	x	0	0	0
J3.1	Online route network presenting bus lines	0	x	0	0	0	x	0
J3.2	Online route network - presenting stop information	0	x	0	0	0	x	0
J3.3	Online route network - presenting real time information	0	x	0	0	0	x	0
J4.1	Dynamic passenger information - Low cost - earp.	0	0	0	0	0	x	x
J4.2	Dynamic passenger information - Low cost - display 1	0	0	0	0	0	x	x
J4.3	Dynamic passenger information - Low cost - display 2	0	0	0	0	0	x	x
J6	Quality rating system	0	0	0	0	0	0	x
J16	Hardware GPS low cost	0	0	0	0	0	0	0
J17	Optimized Timetable	0	0	0	0	0	0	0

The APPS user survey

The ITRACT team in Stavanger conducted a survey from mid-August to mid-September to find out what users think of the mobile applications. As none APPS was available from ITRACT, the team focused on APPS developed by Kolumbus, the local transportation company in the Stavanger region. The survey's questionnaire focused on these three categories: user interface, functionality and suitability. The mobile applications that were being tested were Kolumbus Reiseplanlegger (travel planner Apps)



zvert av Kolumbus • Utviklet av Bouvet • Driftet av Datagrafikk

and Kolumbus Sanntid (real-time Apps).

Aside from the two mobile applications mentioned above, Kolumbus also has a payment app. However this was not included in the survey because it was launched on the last week of September.

The applications tested

The travel planner application provides travel information from Kolumbus'



static data and uses GPS to find the nearest bus stop. It gives the user four options, depending on what the user needs. "Nearby" shows a list of the bus



stops near the user. "Map" shows where the user is and can be used to map out the route. "Recents" shows routes that were planned recently and lastly "Route planner" allows users to plan a trip from point A to point B. In the survey, 83.3% have heard of the Kolumbus travel planner but only 29.9% uses it.

The real-time application is less known than the travel planner and is designed to be a complement to the latter. It provides up-to-date information on bus departures from a certain bus stop and can also check where the nearest bus stop is located. However, unlike the travel planner, one can't plan a trip from point A to point B using this application. Real-time has three features: "favourite", "bus stops" and "map". The "favourite" option shows a list of the bus stops one has saved and added to the list. "Bus stops" is mainly about all bus stops within the Stavanger region and thus gives the user more options to help simplify the list, whether through "recents", "nearby" or "all". It also gives the user an option to search for the name of the bus stop. Lastly, "map" shows the user's location and nearby bus stops. The downside of this application is that bus stops in opposite direction have the same name, so it takes time to find the right stop. Based on the survey only 19,1% of the respondents used both the travel planner and the real time application.

For the point of interest, we have included the beta version of the payment application in this article. It is, as mentioned before, not a part of the survey but it should be of interest to the ITRACT-project. The application makes it possible to pay one's bus travel using a smart phone. Right now, one can only buy one ticket and travel within one zone. The ticket is valid only for 90 minutes after the purchase was made.

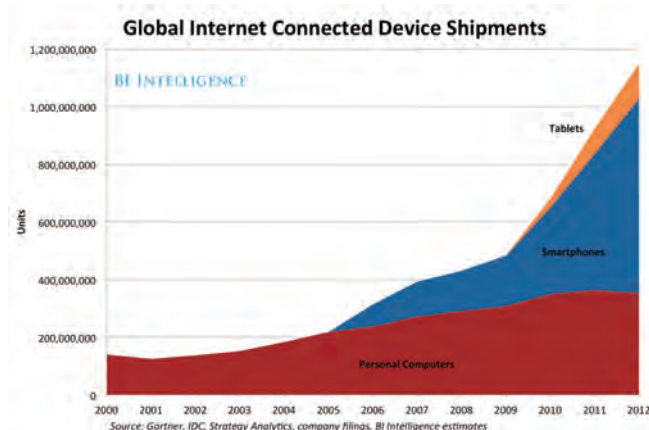
Summary of survey
The survey was con-



ducted in mid-August and mid-September, right when students were starting their classes at the university. The sample consists of 78.4% students from the Stavanger area while 25% are working. A total of 100 students were represented in the survey, which questions the strength of our results. Females are also overrepresented at 57%. 37.1% of the respon-



dents travel using public transportation on a daily basis and 38.5% travels during rush hours. 61.5% of the respondents stated that they would use public transportation more if the travel information is updated and easy to access.





Generally people are happy with the travel planner application as it is today. On the other hand, the real-time application has some technical issues and does not always provide valid information. This in turn affects customer satisfaction.

The survey points out some paths for further development. First, 58% of the respondents said that they would enjoy a payment application. Kolumbus has recently made it possible to display on a screen and tell through recorded voice real-time information on bus stops where many customers frequently use. If real-time data is not available, then information from static data is shown and announced. Customers regard the new developments as important. Bus-on-demand was also positively regarded, but since most of our respondents travel within the city centre, the probability that the option would be used is a little lower than expected.

The result from the survey shows that there is a need for more improvement in delivering travel information. The Kolumbus mobile applications today give both static and real-time data, with a clear need for better delivery of real-time data. Issues with the technology used inside the buses make it complicated to get continuous data. Because of relatively low participation we find it hard to draw a concrete conclusion from the survey.



WP4 Database architecture

Itract Central Platform

The Itract Central Platform will be a one way stop for transit information. This platform is responsible for providing convenient routes and information from many possible combinations.

Architecture

The platform is built in three layers or tiers.

- Integration
- Transformation
- Event oriented platform

The integration layer is responsible for gathering data from different sources such as bus and taxi companies, traffic information and more. This is the lowest layer in the system. Data is gathered in different formats and delivered to the transformation layer.

The transformation layer focuses on the processing of large volume of collected data and aligns it into a common format to allow useful operations to be performed on it. An Example of its usefulness could be a user trying to get from Karlstad in Sweden to Oslo in Norway in the least possible time. The system would have to collect information from buss companies, traffic systems and so on. This information is delivered in different formats. The transformation layer would then convert the different formats into one common format which the system understands, making it easier for the layers above to deduce information of importance to the users. Event-Oriented Service Platform aims to provide loose coupling among service providers and customers to ensure flexible interaction among different components. It allows mobile customers to receive events they are inter-

ested in such as “Inform me when the bus 1 arrives at the bus stop of Karlstad University.

There are different reasons to build such a system in layers. Responsibilities are separated in the different layers.

This separation makes it easier to implement parts of the system separately, provided that there is a common document describing how the different layers will communicate. It creates less complex dependencies between the layers. It also makes it easier to find and fix problems if they were to occur.

Technology

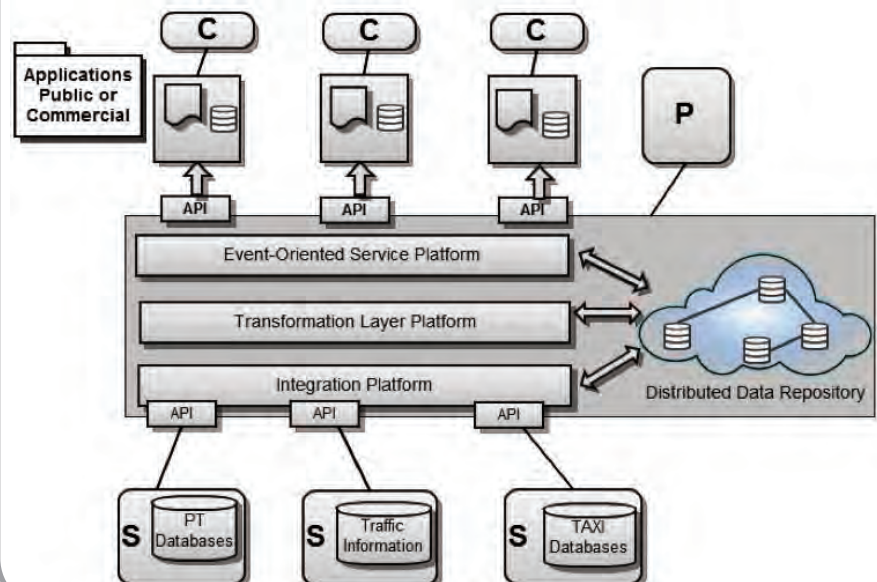
The platform is built in the cloud on top of open stack which is an open source project aimed at providing infrastructure as a service making it easy to build a private cloud. This gives the developers a lot of advantages, a few are mentioned below:

- Instead of focusing on the infrastructure the focus goes to developing and improving the system.
- This allows the system to scale as its use increases.

A distributed database is used as the main storage. This means that parts of this storage might be in different geographical locations while synchronizing data between themselves. The advantages of such a database are that it is highly available and scalable without compromising performance.

Conclusion

The goal of the platform is to make it convenient for people to be able to travel conveniently from one place to another using whichever means they want.



Kolumbus Applications

Kolumbus reiseplanlegger (Route planner)

Main Function:

-As the name suggests, this App is mainly used to plan a trip from point A to point B within Rogaland county. The App also features an interactive map.

To use:

-GPS must be enabled to use the app. A warning shows up at the App's start-up if GPS is not enabled, which then gives the user an option to access the phone's settings to enable it.

-Smart phone must be connected to the Internet via WiFi or mobile connection

-Specific Functions:

Nearby: Uses GPS data from the mobile phone to pinpoint where the user is and then gives a list of bus stops with the approximate distance near the user.

Map: Shows a map of the Stavanger area which the user can zoom in or out of using two fingers. Bus stops are indicated by the blue bus stop symbol. Tapping on a bus stop shows its name and a button which the user has to tap to show the departures from the bus stop

Recents: Shows a list of the last 15 activities the user did while using the three other functions: "Nearby", "Map", and "Route planner"

Routeplanner: Gives the user an option to plan a trip from point A to point B.

The interface has four buttons:

1. From – tapping this button gives the



Rute	Til	Avgang
1	Stavanger Sentrum - Ulsberget - Godeset	Nå
4	SUS - Tjensvoll - Madlakrossen	1 min
1	Stavanger Sentrum - Ulsberget - Godeset	11:18
4	SUS - Madlamark - Madlakrossen	11:19
4	SUS - Tjensvoll - Madlakrossen	11:34
1	Stavanger Sentrum - Ulsberget - Godeset	11:49
4	SUS - Madlamark - Madlakrossen	11:49
4	SUS - Tjensvoll - Madlakrossen	12:03
1	Stavanger Sentrum - Ulsberget - Godeset	ca 12:05

user four options to find the departure point

a. Search – the user can key in the name of the bus stop or the address. Suggestions of places show up as the user keys in the name.

b. Map – a map of the Stavanger area shows up which the user can use to search for the bus stop by swiping, pinching or stretching on the screen and then tapping on the right bus stop

c. Nearby – shows a list of bus stops near the user

d. Recents – last bus stops or routes planned

2. To – same as the "from button"

Partners' Applications

Värmland:

Smart live travel map

- This application is currently at 60% completion and uses data from the backend developed for the ITRACT project. It is available for iPhone, Android and the web. It features a function similar to the "route planner" as well as "map"

On demand traffic

Aim:

- 1) Build mobile Apps
- 2) Integrate the information to Mobitime, Värmlandstrafik's travel planning Apps
- 3) Feature on Värmlandstrafik's website

Features:

- Possibility to order on demand trips
- Users will be able to click to order
- Värmlandstrafik can respond to confirm the order via SMS or email

Current status of development:

- Student groups demand responsive transit service module
- Värmlandstrafik is contacting an Apps developer to develop the Apps
- They aim to conduct pilot tests around September-October 2013

Groningen: Step by Step

- The application serves as a guide to new travellers and thus gives information on how to travel with the bus and the train in Groningen.

Jade Ems: Online route-network

- The developers have developed a web application to show data of departures and arrivals and will undergo further testing. The application shows the different routes of every bus.

ITRACT EXTENDED.

The ITRACT partners in Groningen and Karlstad have got funding for an "extension." This involves the Värmland, Friesland, and Scotland regions with a focus on smarter algorithm for transport of goods and people within the healthcare. It will be independent in parallel with original ITRACT and both will thus have a deadline late Mars 2015.

Results from both project are available for all partners.

Lead partner for both projects are Hanse University.



Bus stop real time information

Both Jade and Rogaland have started tests of equipment to provide information to bus users at the stop on when to expect arrival. These tests are priorities R2, J4, J16, J17.

In both regions various types of low cost equipment have been implemented. Public response to this is very good in Rogaland, but a major problem is vandalism.



<http://ittract-project.eu>

Kolumbus sanntid (Real-time)

Main Function:

- This App focuses mainly on delivering real-time data on bus arrivals and departures from a specific bus stop. Like the route planner, this App also features an interactive map. This is primarily considered as a complementary App to the route planner.

To use:

- Unlike the Route planner, this application doesn't require GPS to be enabled first in order to use the App's functions. However, GPS must be enabled to have the most accurate information, especially when using the "nearby" button under the "bus stops" function.

- Smart phone must be connected to the Internet via WiFi or data connection

Functions:

Favourites: Shows a list of saved bus stops. The user can save a bus stop to this list by choosing the right bus stop and then tapping on the silver star found on the upper right of its page until it turns into a gold star.

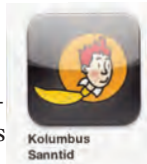
Bus stops: This function has three buttons which the user can tap to see the information he/she wants to get:

a) Recents – shows 15 of the last bus stops seen by the user

b) Nearby – shows the nearest bus stops according to the user's location. GPS must be enabled to have the most accurate information, otherwise data is still displayed based on the location information provided by the WiFi network or mobile carrier

c) All – shows all the bus stops in Rogaland

Map: Similar to the "Map" function of the route planner app. However, instead of blue bus stop signs, green dots indicate a specific bus stop.



Jade-Ems: GPS low cost

- The developers are currently working on a low-cost GPS system which uses cellular data to triangulate the exact location of the bus and which then transmits the location to the nearest bus stop.

Värmland: Smart Map

Aim: To have display screens at bus station in Karlstad. They also are looking to develop a mobile and web App

Features: Lines, vehicle's positions, stops and stations in Värmland

Current status of development: Questionable



The real time APPS are under development in Rogaland and Jade (priority J1). In Rogaland the APPS is out for public use. It is very popular BUT after 1/2 years of public use it still is functioning only on some of the core bus routes with an acceptable accuracy. Why more remote areas have a huge variation and deviation from what should have been announced as real time arrival, is still unknown and under investigation.



Bus on Demand and Ride sharing

This are important innovations regarding how public transport have been organized in most regions. Värmland priority V4, V5, V6, Groningen G1, Rogaland R4, R5, and Yorkshire Y3 all tells that new ways of delivering public services have high priority.

A partly working Bus On Demand prototype was demonstrated at Hanse University before the summer 2013. It was limited to only a small area, but passengers could call and tell from where to where they wanted transport, get a confirmation, and then within agreed upon time be collected at their location and delivered at the goal for their travel. This APPS could in principle deliver both Bus on Demand and Ride sharing depending on how a region would use it. But it needed to be finalized and extended for a larger area including other regions.

Regarding innovations from the project, these functions together with the database might be the most promising.

Cloud Computing

Cloud computing provides an efficient way of utilizing geographically distributed resources through virtualization and distributed computing techniques. The main idea behind this technology is to reduce operational cost, to increase sharing of resources, and to enable easy access to the resources through different client platforms.



Kolumbus billet (Ticket)

Main Function:

- The Apps allows a user to buy a simple bus ticket that is valid for 90 minutes or a day pass which is valid for 24 hours. Right now the ticket purchase is only limited to destinations within one zone. Kolumbus has announced on their website that multi-zonal tickets will be made available starting in November.

To use:

- Smart phone must be connected to the Internet via WiFi or data connection
- User must create a user account first and log in to get the full functionality of the Apps

Functions:

Purchase: This allows the user to buy one or more simple ticket(s) for an adult, child, senior, bicycle or night bus or a day pass for an adult, child or senior.

Tickets: This is where the user can view all the tickets purchased via the Apps

Profile: This is where the user can log in or register in order to be able to fully use the app.

Andreas Kassler: Within ITRACT WorkPackage 4, "Information Architecture and exchange mechanisms", we aim to develop a generic distributed platform that ensures flexibility to support a wide variety of existing and new ITS applications, and allows interoperability with external systems. This is important as we want to support scenarios, where mobile users roam around and need to use different services from different transport providers in a transparent way. Our goal is to design an architecture based on the observation that traffic data comes from different transport authorities with different interfaces and format which is a big challenge when a trip includes multiple transport providers.



Värmland: Business Travel Apps

- A professional Apps-developer is currently working on the application and is expected to be ready for pilot testing by September/October.

Aim:

- Develop service for business travel
- Integrate in Värmlandstrafik's mobile Apps for travel planning
- They are wondering if they should have this as a separate mobile Apps

Features:

- Allows an employee of a company to search for a trip, log in and get ticket
- Invoices will be sent to employer
Current status of development:

- An Apps developer has been contracted
- It is already ready for pilot test in September 2013
- The target for the pilot test are the employees of County Council in Värmland

Jade-Ems: iPhone season ticket check

- The iPhone only application has already been tested and bus conductors have already been trained to use the application. The application uses the iPhone's back camera to check the validity of a season ticket.

Intelligent Transport System

Transportation systems are an essential part of people's daily life. The increasing dependence of society on an efficient and functioning transportation system motivates the concept of ITS. In order to improve the operational performance of transportation systems it is necessary to increase the use of IT in order to make it intelligent.

Therefore, ITS has been defined as the application of advanced sensor, computer, electronics, and communication technologies and management strategies-in an integrated manner-to improve the safety and efficiency of the surface transportation system.

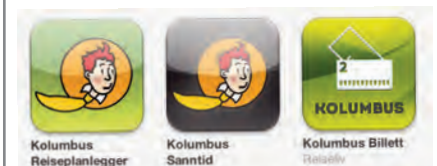


The MAP and Routeplanner here described covers the priorities (on first page) V1, V2, V3, V7, V8 from Värmland, R1 from Rogaland, and J3.1 from Jade.

Basically these are applications that are available in many regions or towns already, but what is new in ITRACT is that we aim to integrate all APPS with a common shared database.

However, the Rogaland / Kolumbus version is most described here as it is most available regarding functionality and have been running with public use for almost 2 years in both android and iPhone versions. That includes more than 70 000 downloads in a region with approximate 300 000 possible users.

But, the Kolumbus version even if we use it to get feedback on functionality



does not use the ITRACT common database, but users the Google Map standard. Google has also been a partner in the development. The Kolumbus routeplanner is working in public use for the area from Stavanger to Oslo. And Kolumbus collaborate with the new Norwegian initiative dit.no that aims to include all Norway into their routeplanner solutions.

Gottfried Heizerling at Stavanger meeting.

Student group from Stavanger meeting development team at Karlstad University

