FINAL REPORT

Urban Mobility Information Services in Rio de Janeiro

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1 Project Background

Rio de Janeiro, with approximately 12 million people in the metropolitan area, is working towards its goal to be a modern high-technology city with an efficient transport system. The City of Rio de Janeiro and the State of Rio de Janeiro hence invest a lot in the expansion of the physical infrastructure such as the metro system, development of bus rapid transit, city trams, etc. The public transport system has thus in recent years been significantly improved for both the needs of everyday users in the city as well as temporary visitors that visited Rio de Janeiro during events such as the FIFA World Cup in 2014 and the 2016 Summer Olympic Games. Moreover, the Strategic Plan 2013-2016 of Rio de Janeiro’s City Council emphasized better integration between all modes of public transportation, as well as the implementation of traffic management technology such as intelligent control of traffic lights, real-time information to users, and monitoring of routes.

In addition, there was also a need to invest in corresponding digital infrastructure to enable more useful information services for everyday travel. With more accurate traffic information available and provided to travelers, it will help to align expectations with the overall performance of e.g. the public transport system. In other words, the frustration that typically follows from traffic disturbances can be mitigated if travelers are well-informed and promptly notified about delays.

However, as users acquire more devices and utilize ICT in personalized and less predictable contexts this development also faces organizations with a dilemma: how can information and services be supplied pervasively given the user diversity and the limited amount of resources available for service development? To this end, many cities open up their traffic data to enable outsiders to cater for end-user services. By cooperating with external third-parties who find financial or other incentives to pursue development, public authorities can then achieve a more pervasive distribution of traffic information, helping the citizens in their everyday travel as well as nurture new firms and other actors developing end-user applications.

To this end, the project should draw on knowledge and experiences from Sweden at Trafiklab.se – a national innovation platform for open transport data. Also, the project should create business opportunities for Swedish actors.
2 Purpose, structure and method

The purpose of this report is to account for the deliverables and learnings from the project “Urban Mobility Information Services in Rio De Janeiro” (UMIS)\(^1\). The project has run between 2014 and 2016 and has been sponsored by Vinnova – Sweden’s Innovation Agency. The funding was part of the call “Cooperation for Eco-Innovations with Actors in Brazil”\(^2\).

The report is structured as follows: First, a short background of the project is presented, followed by an account of the overall project objectives and the organization of the project. Next, each work package and its results are exhibited in the following order: technical platform, innovation contest, implementation of live services and finally reporting and dissemination and reporting\(^3\). The report ends with the perceptions of the project from key project stakeholders and recommendations for further work in Rio de Janeiro.

The basis of the report is two-fold. First, it is based on the data collected by the project team members at RISE Viktoria. Also, to triangulate and complement the perspectives from RISE Viktoria a series of interviews with additional key project stakeholders have been performed. The interviews had three themes: the overall perception of the project, the technology platform and tools and methods for stimulating open innovation in transport and traffic context. Each interview lasted for 45 to 60 minutes. The following interviewees have participated in sharing their views:

- Ahnis Fraga, Planning and Innovation Manager, IplanRio, Prefeitura do Rio de Janeiro
- Alexendre Cardeman, Executive Director Technology Department, Centro de Operações Rio (COR), Prefeitura do Rio de Janeiro
- Diego Blanc, Senior Advisor for Institutional Relations and Bilateral Cooperation, Mayor’s Office, Prefeitura do Rio de Janeiro

\(^1\)http://www.vinnova.se/sv/Resultat/Projekt/Effekta/2011-00500/Urban-Mobility-Information-Services-i-Rio-de-Janeiro/
\(^3\)As the absolute majority of the Vinnova funding concerned work package 1 and 2 and these are more extensively accounted for in this report.
• Erik Bohm, ModernAge AB
• Anton Fjällström, ModernAge AB
• Francisco Viniegra, Livrit
• Mariano Tucat, SkedGo
• José Luiz Barbosa, Creera Consultoria em Tecnologia e Inovação / RISE Viktoria
3 Overall Project Objectives and Organization

The overall project objective was to provide a third-party developer community and API platform that simplifies the launch of innovative mobile apps consuming open data published by the City of Rio de Janeiro. The APIs were to be hosted on ModernAge’s platform and enable a wide variety of business models by supporting both enterprise and consumer apps. The intention was to lower the barrier for software developers to bring new apps and services into the market by abstracting the complexity to access open transport data sources and making this data available directly on smartphones and tablets.

At the outset, the project was organized around four work packages and corresponding deliverables.

1. **A technical platform supporting distributed development of digital services.** In this work package, the foundation for third-party development was delivered through a platform, developed by a Swedish actor. The content was intended to be various data sources from different transport agencies in Rio de Janeiro. The data should include (semi)static and real-time information about different modes of transportation that is necessary to produce useful end-user services. The data should be published through a platform in such a way that the data were delivered in a secure, stable and developer-friendly way. The platform should cover aspects as privacy, access control and incentive models such as business models and facilitation of developer problem-solving. The basis for the platform was existing knowledge from the Swedish setting on how to design and establish developer communities and information hubs. The knowledge transferred and extended should come from both ongoing and previously conducted projects from primarily RISE Viktoria. This work package is described in more detail in Ch. 4.

2. **Tools and methods for stimulating open innovation in transport and traffic context.** In this work package, the project was to arrange a digital innovation contest with the aim to develop the “Rio traffic digital service of the Olympics 2016”. By exposing data in

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4In the project application there was also a fifth, introductory activity: “Proof-of-concept and first viable service”. In the initial project design, this activity mainly included a replication of the Swedish traffic information solution trafiken.nu. The basis for including this activity was both interest from Brazilian project counterparts and that SAAB were the initially proposed platform provider. With SAAB leaving the project it was assessed that creating such a service by partners with no similar experiences would drain resources from the primary project goal and was hence canceled.
an open, yet stable environment, the objective is to attract service developers to participate in the co-creation of services and tools supporting travelers during everyday travel with a particular focus on the Olympics 2016. The contest was to be based on RISE Viktoria’s previous experiences from arranging such contests. This work package is described in more detail in Ch. 5.

3. Living Lab of Rio de Janeiro - Olympics 2016. In this work package, the services developed were to be tested in a realistic environment, used by real users during a longer period. The activity covers the maintaining of the services and platform, to carry out evaluations and demonstration for a longer time. This work package is described in more detail in Ch. 6.

4. Dissemination and reporting. This work package was to be responsible for the compilation of knowledge created in the project, and the dissemination of this into various publications and conferences. This work package is described in more detail in Ch. 7.

The project consisted of a consortium of four Swedish and Brazilian actors:

1. IplanRio - a technology company owned by the city and provides a wide range of provides IT services to all city-governed agencies in Rio de Janeiro. One of the responsibilities of IplanRio is to provide the technical and organizational infrastructure for open data in Rio de Janeiro.

2. COR - a center whose job is to integrate information from multiple government agencies and private sources to improve city safety and incident response. Incidents that it manages range from public utility problems and public transit issues to emergencies and disasters. As COR has a wealth useful information inside its systems, the main motive for COR participation was the opportunity to publish useful data to third-party developers in order to yield more useful services.

3. ModernAge - a Swedish startup and platform provider. The platform enables structuring and external publishing of data residing inside the all the data available on the city and its services in a safe, standardized and secure manner via the automatic creation of the Open APIs.

4. RISE Viktoria - performing research and development in applied information technology in collaboration with the industry, the
public sector and universities. The goal is to help Swedish automotive and transport industry achieve sustainable development and growth. In recent years RISE Viktoria has been intensely involved in studying and developing open transport data innovation in Sweden, experiences that sought to be transferred to Rio de Janeiro. Apart from doing research RISE Viktoria was project manager and coordinating partner for UMIS.

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At RISE Viktoria the project was led by Martin Gustavsson (2014-09 - 2015-07) and Johan Östling (2015-08 - 2016-12).
4 Results Technical Platform

4.1 Background

Open data allows governments to use their existing datasets as a foundation on which businesses and others can develop services and applications. On a global level, the transport sector has been particularly successful in delivering additional benefits from its open data. However, using the innovative power of third-party developers puts additional requirements on the transportation agencies opening up their data. Typically, three main challenges are encountered:

- **The complex organization of transportation.** To support travelers in their daily travel there is a need for information from a wide range of sources. Agencies from the city, state and country level, bus and train operators and taxi companies are but a few actors the sit on data that could be beneficial for the traveler. As a result, it often becomes tough for third-party developers to know where to find a particular dataset/API or what resources are available. Typically there is thus a need to lower this barrier by publishing the data in one outlet, as is done in trafiklab.se.

- **The transaction-intensity of open transport data.** Many times, useful open data can be delivered using basic formats and delivery mechanisms. E.g. data on school performance can typically be published as spreadsheets that are regularly updated. However, useful transport data (such as the current position of a train, the status of an accident or bus arrival delays) are real-time information that needs be consumed instantly and by potentially hundreds of thousands concurrent users. Moreover, the demand is often unevenly distributed, and agencies need to be able to handle a sudden dramatic increase in open transport data. For instance, if a significant disturbance of the traffic flow occurs many travelers need to find out what happened and whether to re-plan their route that can lead to a system breakdown. Such sudden increase in demand for transport data means that agencies that wish to draw on third-party developers and their apps need a scalable infrastructure that can handle large and unpredictable demand.

- **The need for a developer platform.** Given that transport data often is attractive to third-party developers, when it is published in a megacity like Rio de Janeiro (with a large prospective market) agencies can expect significant interest from third-party developers. Consequently, it is important for organizations to be able
to build relationships with third-party developers and handle issues such as troubleshooting, receive feedback on data sources and their quality and be able to deal with any other requests and interaction with third-party developers. These requirements go beyond what a typical open data initiative includes.

Rio de Janeiro has been progressive in publishing open data about the city. In March 2014 the city’s official open data catalog was inaugurated. The catalog included a wide range datasets, including transport data. However, the existing platform in Rio de Janeiro was data catalog for the city’s data. While this was an important first step towards establishing open innovation on open transport data, it did not meet the specific requirements that are required (see above). To this end, ModernAge has implemented their platform at IplanRio.

4.2 API Platform

To be able to address the challenges of open transport data, the UMIS project has drawn on several of the core platform capabilities in the ModernAge platform:

• **Data usage traceability.** Before UMIS, all data was served without the possibility for the city to monitor the usage of data (as no underlying API platform was used). Through ModernAge’s platform, Rio de Janeiro has the foundation to in the future see how much a developer is using the platform and what APIs that are most popular.

• **Managing continuity under high variety in demand.** One major pressing issue for open transport data in Rio de Janeiro concerned the continuity of the data delivery. The existing open real-time traffic data suffered from downtimes and hence a lack of credibility. Ensuring continuity requires that the platform can scale when there is high demand for transport data (e.g. when major incidents occur). The platform from ModernAge uses the Microsoft Azure platform⁶ and thereby enables the platform to deliver capacity under high demand but being a cloud service it does so more cost-efficiently. Also, the platform can cache data and thus avoid unnecessary requests to the underlying platform. During the project, the platform has been subjected to load testing by both ModernAge as well as IplanRio and platform has successfully handled the production load during phase 3 of the project (with up to 50

⁶[https://azure.microsoft.com/](https://azure.microsoft.com/)
concurrent requests per second and 15 000 concurrent users per node).

- **Security** As open data grows in importance and popularity so does the necessity for open data publishers to mitigate security threats. Indeed, in a recent interview Tim Berners-Lee pointed out that hacking open transport data could cause major societal chaos. To this end, the ModernAge platform has been designed from the ground up to be secure and during the project the platform successfully underwent a series of penetration and other security tests.

- **User management** In a scenario of anticipated high demand for APIs and open data it is paramount for the platform to be able to quickly both add new users to the platform and authenticate incoming API requests. User management then lays the groundwork for managing issues like API quotas (the number calls that each developer is allowed to make during a given period) and data traceability. Such user management is included in the API platform used by the UMIS project.

- **API monitoring** Being able to know whether an API is operational or not is of utmost importance for an API publisher as any downtime might hurt the credibility of the data owner. However, it is also important to able to be transparent towards third-party developers about system status. To this end, the ModernAge platform includes an API monitoring module that also is viewable by developers for them to more quickly troubleshoot their application and be transparent about downtimes.

- **Ease of publication.** The platform accepts many types of data sources including static files like spreadsheets or text files to SQL databases and real-time systems. The platform then transforms the data source into an API that uses core platform functionalities (such as user management and security). This way, data owners within the city need not perform any conversion or other activity to be able to publish a particular dataset through the platform. Currently, however, the API platform is only used for real-time APIs.

- **Testing capabilities.** During the project, ModernAge extended platform capabilities to include the possibility for the platform owner to test all APIs in a user-friendly way.

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• **Automated documentation capabilities.** The platform supports reverse-engineered documentation of published APIs. Such documentation can be converted into industry standards such as WSDL, WADL among others. This module was developed through the project.

• **Support ticket management.** Often, platform owners need to find a cost-efficient way of managing support issues. To this end, ModernAge extended their platform with a support ticket module during the course of the project.

### 4.3 Laboratório de Inovação Colaborativa IplanRio

In addition to the underlying API platform from ModernAge, the UMIS project (through ModernAge) has developed a web-based community platform that serves as a front-end towards the underlying APIs. The platform is called *Laboratório de Inovação Colaborativa IplanRio* (LINC)\(^8\).

During the project, the scope of LINC was substantially enlarged. This expansion was due to a need for IplanRio strengthen their organizational interface towards third-party developers beyond what the project initially planned. ModernAge has covered the overhead for this additional project delivery. The LINC platform draws on the following functionalities to address the project objectives:

• **Documentation and onboarding instructions.** One key to managing a surge of new third-party developers is to provide appropriate self-guidance. Through standardized documentation capabilities and instructions for developers on how to access APIs the LINC platform both minimizes the need for manual assistance and administrative overhead. Also, the platform supports multiple languages, as third-party development indeed is an international phenomenon.

• **Third-party developer relationship management.** When an organization engages in third-party development it is important to establish appropriate channels and forums where third-party developers and the platform owner can interact. In the LINC platform, developers can submit queries and provide feedback on existing datasets. Also, IplanRio may communicate with third-party developers on upcoming changes (such as new or altered datasets) through the platform.

\(^{8}\)http://linc.prefeitura.rio/
• **One-stop-shop for open transport data.** As described at the beginning of this chapter, given the complex organization of transportation of people, it is often a demanding task for third-party developers to identify and negotiate access to comprehensive open transport data for a city or region. With LINC, all available transport data is assembled under one portal. Also, other datasets such as various types points-of-interests (that often is the purpose for a journey) can be found within LINC.

• **Developer Project Management and Future Visibility.** In the LINC platform developers register the projects that they are working on and associate necessary API keys with these projects. This both enables IplanRio to have a sense of what third-party developers are currently working with and provides potential future visibility of future projects for developers.
4.4 Available APIs

4.4.1 Transport APIs

The major category of APIs delivered data related to transportation. The following APIs are currently available for third-party developers seeking to develop transport-related services.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCTCBUSGETALLPOSITIONS</td>
<td>Lists the position of all buses</td>
</tr>
<tr>
<td>OCTCBRTRealTimeGPS</td>
<td>List the position of BRT (Bus Rapid Transit) buses</td>
</tr>
<tr>
<td>OCTCgpstobusesServiceV2</td>
<td>List the position of BRT buses</td>
</tr>
<tr>
<td>OCTCBRTtransoesteEstacoes</td>
<td>BRT information related to stations such as georeferenced positions, address, time and tickets</td>
</tr>
<tr>
<td>VLTEstacoesLinha1</td>
<td>VLT (Light Rail) Line 1 stations</td>
</tr>
<tr>
<td>OCTCVLTEstacoes</td>
<td>All VLT Stations</td>
</tr>
<tr>
<td>OCTCBarcasEstacoes</td>
<td>Ferry stations</td>
</tr>
<tr>
<td>OCTCEstacoesMetro</td>
<td>Metro Rio information related to stations such as georeferenced positions, address, time and tickets sellers working time</td>
</tr>
<tr>
<td>OCTCEstacoesSupervia</td>
<td>Train information related to stations such as georeferenced positions, address, time and tickets sellers working time as well as line information and if station has bike</td>
</tr>
<tr>
<td>OCTCEstacoesTransoesteservice</td>
<td>BRT information related to stations such as georeferenced positions, address, time and tickets sellers working time</td>
</tr>
<tr>
<td>octcgpsConectaService</td>
<td>Real-time bus position information from SafeConect datasource</td>
</tr>
<tr>
<td>OCTCgpstobusesService</td>
<td>Real-time bus position information</td>
</tr>
</tbody>
</table>

Table 1: Currently available Transport APIs

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9In addition to these APIs, the API platform two more APIs that are not available to the public but only the winners of OCTC.
4.4.2 Olympic APIs

Given the project’s focus on the Olympic games this category of APIs delivered data related to the games (such as relevant places and events). The following APIs are currently available for third-party developers.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCTCBoulevardOlimpico</td>
<td>Information about the events that took place at the Olympic Boulevard</td>
</tr>
<tr>
<td>OCTLcalendarioOlimpiadasServiceV2</td>
<td>Calendar of Olympic events</td>
</tr>
<tr>
<td>OCTCcalendarioParaOlimpiadas</td>
<td>Calendar of Paralympic events</td>
</tr>
<tr>
<td>OCTLCEquipamentosOlimpicosService</td>
<td>Olympic Places such as hospitals, accommodation etc</td>
</tr>
</tbody>
</table>

Table 2: Currently available Olympic APIs

4.4.3 Tourism APIs

Another focus area of the project concerned facilitating tourists coming into Rio de Janeiro. This category of APIs delivered data that often is relevant for visitors.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poigetdetails</td>
<td>This service returns details for POI (Points of interest), such as open hours, contact mail etc.</td>
</tr>
<tr>
<td>poicategorylist</td>
<td>List of POI categories</td>
</tr>
<tr>
<td>poifromcategory</td>
<td>Points of interests for the city of Rio</td>
</tr>
<tr>
<td>octctouristicandculturalpointsservice</td>
<td>Tourist and cultural attractions of the city, museums, beaches, gardens, exhibition centers, etc.</td>
</tr>
<tr>
<td>OCTCcitybeachesofrjodejaneiroservice</td>
<td>City beaches</td>
</tr>
<tr>
<td>OCTCEPontosCulturaisMunicipaisService</td>
<td>List and georeferenced municipal theaters, museums, arenas etc.</td>
</tr>
<tr>
<td>OCTCMuseumsService</td>
<td>List of museums</td>
</tr>
</tbody>
</table>

Table 3: Currently available Tourist APIs
4.5 Usage Statistics

The API platform and LINC is beginning to gain traction among developers seeking to build solutions on top of Rio’s open transport data. Below is a summary of current usage.

<table>
<thead>
<tr>
<th>Usage</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of users</td>
<td>42</td>
</tr>
<tr>
<td>Number of projects</td>
<td>32</td>
</tr>
<tr>
<td>Number of requests/month (avg.)</td>
<td>Approx. 100 000</td>
</tr>
</tbody>
</table>

Table 4: Usage statistics

4.6 Stakeholder perceptions of the platform

During the preparation of this report, we asked our interviewees about their conceptions on the API and LINC platform. The overall perception of the platform that was developed through the UMIS project was highly favorable. The city representatives summarized their impressions as follows:

- **ModernAge’s API platform is a major leap forward.** Previously, a lot effort was spent to attract third-party developers. However, once they started to develop services, the quality and delivery of the underlying data did not meet the necessary standards and development stopped. After the introduction the platform, the conception of representatives from the city of Rio de Janeiro is that they after the project can start act as a credible partner to third-party developers. As one of the respondents summarized: “Before we had nothing, now we have something really, really good.”

- **Enabling developer relationships.** Before the project, third-party developers had difficulties that were seeking to contact data providers had to send emails which rarely was handled in a professional way.

- **Responsive and knowledgeable supplier.** IplanRio also stressed the importance of the vendor, ModernAge. They found the platform provider both attentive to client needs and possessing substantial knowledge on both technology and the innovation ecosystem. Also, given the project’s design IplanRio and COR were able to make an extensive test of the platform through a mega event like the Olympic games without excessive overhead.
The LINC platform should be expanded to include citizens. While the LINC platform has been a leap forward in connecting data owners and third-party developers it has become apparent that one additional group of stakeholders should be included into LINC – the citizens. While citizens’ involvement in the innovation process has fallen outside the scope of the project deliverables, representing their needs and wishes through direct involvement would add significant value to the platform.
5 Results Stimulating Open Innovation

5.1 Background

One of the main deliverables of the project concerned stimulating the innovation activities on top of open transport data from Rio de Janeiro. RISE Viktoria has been working with and researching Digital Innovation Contests - “an event in which third-party developers compete to design and implement the most firm and satisfying digital service prototype, for a specific purpose, based on open data”[2]. This work has included aspects such as design elements of a contest[2], barriers facing participants in the post-contest phase [1, 3] and motivations of third-party developers [4].

In order to increase the uptake of open transport data in Rio de Janeiro the project thus organized an innovation contest the Olympic City Transport Challenge (OCTC). The contest took place from November 2015 through March 2016 and had as overarching purpose to help inform visitors during the Olympic Games in Rio de Janeiro 2016 regarding transportation issues. However, in line with all investments for the Olympics, the winning services should also be able to form a legacy for usage after the games were finished.

5.2 Planning

The major bulk of the planning activities took place starting June 2015 throughout September 2015. The planning resulted in the following components of the contest:

- **Overall contest design** - one important aspect of Digital Innovation Contests concerns the overall organization. Often such contests are constrained to a very limited timespan (such as 24 or 48 hours) and typically held at one physical location. However, while such an event may summon great interest from developers and create a useful publicity platform it is often less suitable for producing live, market-ready applications (given its limited timespan). It was hence decided that the contest were to be held over a greater period of time to allow for third-party developers to reach more mature applications. Moreover, the contest were to be held virtually (rather than physical location). Given that innovation beneficial for the contest purpose would be available from across the globe, this approach would not constrain to get contest entrants from either Rio de Janeiro or Sweden.
• Contest categories - an important aspect of a Digital Innovation Contest is that real user needs are represented in a proper way. After discussions within the project team along with research from Viktoria the project identified three important user needs where innovation on open transport data could be beneficial. First, there are the broad needs of the general public. Citizens of Rio de Janeiro (but also temporary visitors such as tourists) have a need to plan their trips using public transport and to be notified about any delays or disturbances. There currently exists quite a few internationally acclaimed travel planners that provides excellent functionalities in this vein and that should be encouraged to be implemented in Rio de Janeiro. Second, Rio de Janeiro was expecting a surge of tourists to visit and watch the 2016 Summer Olympics. Given that many of sport events of the games primarily took place in Barra, some 30 km from the city center, the success of the games were contingent on good spectator mobility. Hence it was decided to propel innovation for the needs of temporary visitors. Lastly, while public transport is an increasingly important mobility backbone in Rio de Janeiro travellers with various types of disabilities often experience difficulties in using public transportation. Issues such as signage, threshold heights and walking distance between transport mode exchanges may be crucial for the 24% of Brazilian citizens with disabilities\textsuperscript{10}. To this end, it was decided to include making public transport more accessible into the contest.

• Prize - every contest needs a prize, as this typically is the motivation for entrants to participate in a contest. The price may range from less tangible rewards such as publicity or association with a brand to cash prizes. While cash prizes often resonate well with contestant preferences it was not possible to fund a substantial monetary remuneration for the winners (although travel grants would be possible to sponsor the project). However, given that Rio de Janeiro in conjunction with its Olympic Games carries significant publicity value (especially for commercial actors) the project team expected sufficient interest to participate in the contest although. In the project team it was hence decided that the prize were to be made up by allowing the winners to associate with City’s brand Cidade Olímpica\textsuperscript{11}.


\textsuperscript{11}\url{http://www.cidadeolimpica.rio/en/}
• **Recruitment** - getting the right contestants to enroll is often challenging as the contest organizer typically is unaware of which innovators that may solve the contest challenges. The organizers used social media, conference presentations, networking and approaching specific and capable innovators.

• **Jury** - typically the winner is appointment by a jury with particular knowledge in the field that the contest is addressing. It is beneficial that jury members cover different aspects such as user needs, innovation, technology and business potential to make a comprehensive overall assessment of contest submissions. The project team appointed Diego Blanc (Senior Advisor for Institutional Relations and Bilateral Cooperation at the Mayor’s Office) as the chairman of the jury. The following people was part of the jury:
  
  – Joaquim Monteiro de Carvalho (Empresa Olímpica Municipal)
  – Alexender Cardeman, (COR Rio Prefeitura)
  – Márcio Muniz (SETRANS)
  – Simone Costa (SMTR)
  – Ahnis Fraga (IplanRio)
  – Luiz Milfont (IplanRio)
  – Newton Werneck (MetrôRio)
  – Andherson Ojeda (FETRANSPOR)
  – Dario Bizzo Marques (COR Rio Prefeitura)
  – Elias Arnestrand (Samtrafiken, Sweden)
  – Daniel Rudmark (RISE Viktoria)

5.3 **Olympic City Transport Challenge**

On November 3, 2015, the contest was officially opened for enrollment. The basis for the contest was the website - [http://transportchallenge.rio/](http://transportchallenge.rio/). The web site contained the necessary information for contestants including rules, prizes, available data and the what and when of submission. Drawing on the user needs identified in the planning phase three categories were also offered to contestants:

• **Travelplanner** - this category aimed importing existing solutions (prefererrably smartphone apps) from leading software vendors
around the globe. The scope of this category was broad and included supporting “regular and occasional users go from A to B in the most convenient and reliable way using open data and smart technologies”. Key criteria for this category included a proven track record in megacities like Rio de Janeiro.

- **Comfort and Accessibility** - this category had a two-fold purpose. First, it aimed at supporting a particular yet often overlooked user group for digital services – travelers with disabilities. However, depending on the particular disability, the support that is needed will vary significantly. Second, often public transport is seen as a less attractive and comfortable than e.g. going by car. Consequently, this category would also encourage developers to develop services that would increase the attractiveness of choosing public transportation.

- **Experience the Olympics** – this category clearly geared towards the Olympic games and to facilitate the mobility needs of the games’ spectators. The expected result was apps that combined sports event information with local information useful to the visitor. The victorious service should primarily be available during the Olympics but should also improve future tourist information for Rio de Janeiro.

5.4 First phase – Concept Phase

In the concept phase contestants were to submit a description of both the team, what category their service was participating in and a description of the envisioned service. The actual formatting of the service description could take many forms such as text, pictures or other media but should include:

- A description of the app
- User benefits – how the app addresses the challenge
- Feasibility and potential stoppers

After the initial submissions the jury member made an assessment of whether the concept had sufficient potential. The jury used a predefined measurement scale defined by RISE Viktoria. A selected number of participants were then to be invited to continue into the implementation phase. In total, 15 submissions were sent in by participants and of these 12 were assessed as qualified.
5.5 Second phase – Implementation Phase

In the next step of the competition, the contestants developed their envisioned concepts into live, runnable services. To overcome technical barriers for the new APIs, three technical webinars were held where ModernAge and IplanRio explained how the APIs worked and were able to answer any question from the contestants. During the implementation, RISE Viktoria arranged two webinars/contestant. In these webinars each contestant would present their work, the issues they were facing and were able to ask for feedback from the Jury. Each session contained a 45-minute section with the contestant and was followed by a 15-minute jury-exclusive discussion. These webinars were held for two reasons:

1. In order for the participants to receive feedback from the jury members regarding the current about the service and what was important for the final assessment.

2. In order for the jury members to get a better sense of the details and thinking of each participant. These webinars also offered an opportunity for jury members to ask specific questions they had about the services.

After the sessions each jury member were to take notes to follow-up on the next webinar and for the overall assessment when appointing the winner.

The deadline for the contest submissions was 2016-03-15 when the submissions were handed over to the jury. In order to assess the completed submissions in a time-efficient manner each jury member was given a web-based ranking tool. Each submission was then assessed on a predefined scale according to key dimensions. This included to what extent the service would support travellers both during but also after the Olympic games. In addition it was assessed in terms of innovation compared to existing services as well as the team’s ability to finalize the service before the Olympic games. For the Travel Planner category, the jury was also to assess the contestant’s track record from other countries and cities.

After the jury members finalized their assessment the team from RISE Viktoria assembled the results. This summary was then used for the final, on-site discussions among all jury members at COR that took place on 2016-03-30 and 2016-03-31.
5.6 The Winners

The winners were publically congratulated at the final ceremony held at COR 2016-06-07\textsuperscript{12}. For each category, one winner was appointed.

5.6.1 Trafi - Travel Planner

The focus for this category was the transfer of existing and innovative services into Rio de Janeiro and important aspects in addition to previous track record concerned issues such as accuracy, additional modes of transport on top of public transport. The Travel Planner category was won by the Lithuanian company Trafi through their app with the same name (see Figure 1 for more information). The jury motivation for selecting Trafi as winner read:

"TRAFI has a history of helping Travelers all over the world. During the challenge, TRAFI proved very skillful in presenting many urban transport options for Rio including relevant posts by travellers in different social media."

\textsuperscript{12}https://www.viktoria.se/media/news/prize-ceremony-for-the-olympic-city-transport-challenge
Trafi

Why we are different

Accurate realtime data processing

Our combination of scientific algorithms, real time processing of traffic situations and crowd-sourced reports allows us to predict journey durations and arrival times more accurately than our competitors and local transit authorities. Data quality and accuracy is the critical component in this business and we’re not compromising on it whatsoever.

Local patterns in route search A self-learning algorithm helps us to understand the local commuting experience. Machine learning works by understanding local patterns and provides unique results and preferences for different cities and different users without the need for manual data tuning.

User generated content
The beauty here is not only that we allow users to create any public transport related content, but also that our search algorithm filters and takes into account what’s important to them, so we can notify other fellow commuters and dynamically adjust routing. Crowd-sourcing at its best!

Offline mode availability
Offline mode enables us to make transit better without an internet connection. Because we’re no longer dependent on a data connection, the app is faster than ever and takes barely any space. Everybody who lives with poor or expensive data connections can rely on the most accessible TRAFIs advice.

http://www.trafi.com/

Figure 1: Trafi’s description of their service
5.6.2 RioGo - Experience the Olympics

In this category the Australian company Skedgo won, with their app RioGo (see Figure 2 for more information). Besides the announced criteria the jury discussions came down to the ability to deliver a live service in time for the Olympic games and the possibility for the app to work after the games. The jury presented the following motivation for appointing RioGo to win the category:

"RioGo will make mobility planning a lot easier during the Olympics and other events, as it seeks convenient travel options and facilitates the arrival of the public to competition venues. The application will also serve as a legacy for the tourists after the Olympic Games."
With RioGo you have the games in your pocket. Never be late to events or get lost in Rio de Janeiro. With this award-winning app, you’ll always know where to go and when to leave.

- Easily find games, events, and activities around Rio
- Select what you want to see and do
- Have all your transport planned for each day in Rio

Simply enter your hotel, games, events and other attractions you’d like to see. RioGo will create the perfect itinerary for you each day. Set your transport preferences so RioGo knows how you’d like to get around.

Choose between public transit, BikeRio or walking. RioGo will let you know exactly when to leave and which transport to catch. So go ahead, kick back and live your passion while RioGo organises your trips.

RioGo is an Olympic City App for the City of Rio de Janeiro.

RioGo uses the same trip planning platform as our popular and established TripGo app. It lets users choose from all available public & private transport modes to pick the fastest, cheapest or environmentally friendliest (least carbon).

We’ve also partnered with the cool kids at what3words so you can use three word addresses for your trips.

Winner of the Olympic City Transport Challenge - Cidade Olimpica Rio Prefeitura, Category 2 “Experience the Olympics”.

Supported transit authorities: Fetranspor, Metro Rio, CCR Barcas, Trem do Corcovado

https://skedgo.com/home/riogo/

Figure 2: RioGo’s description of their service
5.6.3 Livrit - Comfort and accessibility

This category’s aim was to invite developers to either make public transport more comfortable for everyday user or to increase accessibility of public transport for people with disabilities. The winner of this category was Livrit, an app from a Brazilian company with the same name (see Figure 3 for more information). The jury provided the following motivation for selecting Livrit as the winner:

"Livrit focuses on social inclusion and urban mobility for persons with disabilities. In a user-friendly platform, Livrit gathers information on both accessible areas and those that need improvement. Besides, Livrit helps authorities to better understand public needs."
Livrit

With Livrit, citizens can cooperate to improvement of sidewalks throughout sending location and pictures from any obstacle or wheelchair ramp absence. Users can find and mark partially accessible or accessible public places directly on the map, and know which path or which side of the street has obstacles that hinder or prevent the passage of wheelchair users and people with reduced mobility. This increases their autonomy, as well as help you decide on a safer path to a bank, market, clinic or sports and leisure venues.

We understand accessibility as part of the quality of life for all, because in addition to people with disabilities and the elderly, lack of sidewalks and appropriate ramps also affects citizens using any apparatus on wheels, such as baby stroller, cyclists, skateboarders and individual electric vehicles as motorized wheelchairs and Segways.

We work for improvement of public space focusing on mobility at last mile, held in non-motorized transport, on bikes, on foot or with assistive technology for people with disabilities. A suitable pavement improves the quality of life, increase perception of quality of the public space, benefiting the pedestrian, the street trade and property owners.

The user’s cooperation is an exercise of citizenship. Livrit need to know the problems of sidewalks, ramps and bike paths in order to show more accessible routes. It’s simple and easy to cooperate from the map. Just tap the + button to select the type of PIN, add a picture from camera or gallery and locate the PIN on map.

Now citizens, especially people with reduced mobility, can decide where and how to go with autonomy and safety. We seek to democratize access to the city because we believe that it can only be smart if it is built for all.

http://livrit.com.br/

Figure 3: Livrit’s description of their service
5.7 Stakeholder perceptions of the contest

In addition to the winning services we asked our interviewees about their conceptions about the contest and the results. The overall perceptions of the contest was highly positive. From the city representatives the perceptions can be summarized as follows:

- **The categories were described as very useful to the city of Rio de Janeiro.** The city is working hard to increase accessibility to the city – and transportation is a major subtheme in that work. By using digital services to both describe current accessibility and enable reports back to the city (like Livrit does) opened up new avenues for increasing accessibility. The Travel Planner category showed the jury members how different transportation modes could be made integrated into one app and black-box the complex organization of public transportation. The Experience the Olympics category offered the city an innovative way of guiding event visitors not only for the Olympic games but also for other future mega-events (as evidenced by the re-use of the RioGo-app for the Paralympics).

- **The contest offered fresh and unforeseen uses of open data.** During the competition, the jury members saw how open transport data could be used from quite disparate applications ranging from accessibility, ride-sharing, social media and even dating.

- **More app developers to cooperate with than just the winners.** After the contest there was six highly useful apps that was available in the city.

- **Engaging initially skeptical jury members to show the usefulness of open data.** Some members of the jury were at the outset having doubts whether transport should be released openly to the public. However, throughout the contest they became favorable towards sharing data with external third-party developers.

- **It offered city representatives insights on the need for more open data.** While the services from contest were beyond expectations, it was evident to city officials that the services could’ve been even more useful had there been additional data.

- **Spend more resources on marketing.** While the outcomes of the contest were seen as beyond expectations the interviewees saw a need to spend more resources on marketing of the contest. This concerns both attracting more contest participants and the results of the contest. Interestingly, the marketing should also include
stakeholders within the city. The city of Rio de Janeiro is a large organization and to push the innovation agenda around open data it is important to ensure that more actors within the city are aware of innovation activities the benefits from it.

• **Make jury member responsibilities more explicit.** This point has several dimensions. First, before accepting to be jury member it is important to understand what is required in terms of time from each member and that each jury member sets aside the necessary time. Second, while the interviewed jury members agreed that they found the work rewarding and inspiring, they would have liked to see more information on what their responsibilities were besides picking the winner.

The contest participants gave the following comments regarding their perception about the contest:

• **The contest offered a fast lane to establishing the app in Rio de Janeiro.** Establishing an existing app in a new city can be a risky and lengthy venture but this was mitigated by the contest as the contest offered both data and publicity.

• **The two-phased approach was appreciated.** The contestants expressed appreciation for how the contest allowed for the participants to gradually refine their apps and that way followed their own development process. Starting with a concept and then get feedback on the apps throughout the implementation phase’s webinars helped the contestants to shape the submissions in a beneficial way.

• **Using a central platform as the heart of the contest was beneficial.** This is not common is many other cities but proved useful for contestants when it came to develop services in a quick manner.

• **The official prize was beneficial as the Cidade Olímpica brand supplied a platform for marketing.** The brand was used in press releases, web sites, applications marketplaces etc. to associate the winning app with the Olympic games. However, cash prizes for further development efforts were seen as an additional incentive that would have helped to develop the services even further.

• **Being a winner in Olympic City Transport Challenge offered substantial spill-over effects.** By winning the contest the contestants were seen as credible cooperation partners and this has opened the door for new projects in Rio de Janeiro. Without the contest interviewees stated that they were just “another developer with an
idea” but by showing they that they are contest winners the conversation takes a whole new direction. For instance, by winning the Olympic City Transport Challenge Livrit has started cooperation with COR to increase accessibility in the city and the app also was heavily used during the Paralympics. This way, contestants stated that these indirect benefits of participating in the contest outweighed the value of the official prize.
6 Living Lab of Rio de Janeiro

During 2016-04-01 through 2016-12-31, the services developed through the contest were being finalized to be working during the Olympic games. The major bulk of the work performed in this work package was carried out by involved third-party developers. However, during this phase, IplanRio and ModernAge supported developers in their efforts. The following apps from the contest were finalized and available for download in time for the Olympics. Note that the number of downloads accounted for here concerns official data from the Google Play platform (https://play.google.com/store). The figures below indicate worldwide downloads, not only Rio de Janeiro.
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>No of Downloads (Android)</th>
<th>Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trafi</td>
<td>See above</td>
<td>1 000 000–500 0000</td>
<td>Android: 4.4/5 iOS: 4/5</td>
</tr>
<tr>
<td>SkedGo</td>
<td>The only app that lets you compare and even combine any (really any!) transport mode like train, bus, taxi, subway, metro, cab, tram, your own or share car &amp; bike, motorcycle or ride share. TripGo makes it super easy to get from A to B on time with any transport mix.</td>
<td>100000–500000</td>
<td>Android: 4.1/5 iOS: 4/5</td>
</tr>
<tr>
<td>RioGo</td>
<td>See above</td>
<td>1 000-5 000</td>
<td>Android: 4.2/5 iOS: N/A</td>
</tr>
<tr>
<td>Livrit</td>
<td>See above</td>
<td>100-500</td>
<td>Android: 4.6/5 iOS: N/A</td>
</tr>
<tr>
<td>Ally</td>
<td>Ally brings together all your transport options in one app, allowing you to compare price and time of car sharing, bike sharing, public transport, taxi, Uber, ferry, minibus, Daladala and many others. We give you a clear and easy to use overview of all transport options to get you to your destination as smoothly and smartly as possible!</td>
<td>100 000–500 000</td>
<td>Android: 4.2/5 iOS: 4/5</td>
</tr>
<tr>
<td>MobQI</td>
<td>Find out which buses there are, where you are going and share your Best Routes with your friends. Find out how many calories you will lose to the point and how much CO² that is consumed to your destination</td>
<td>100–500</td>
<td>Android: 4.1/5 iOS: N/A</td>
</tr>
</tbody>
</table>

Table 5: Summary of installed services during the Olympic Games
To disseminate the results members of the project team have presented the results of the UMIS project in the following outlets:


In addition to the above presentations, experiences from Olympic City Transport Challenge will be included in book on Digital Innovation Contests accepted for publication on Springer Verlag.
8 Summary of Results

8.1 Stakeholder perceptions of the project results

In addition to the stakeholders’ perceptions on work package 1 and 2, interviewees were asked to comment their opinions on the project as a whole. All respondents stated that the final result was more satisfying than they initially anticipated.

- For IplanRio the most significant result was the formation of an innovation strategy concerning third-party development that is realized through LINC and the API platform. In particular, the LINC platform has enabled IplanRio to communicate with third-party developers in unprecedented ways. For example, functionalities like support tickets have significantly improved the reliability of open transport data in Rio de Janeiro.

- The city hall ranked the innovative use of open transport as the primary benefit.

- COR emphasized how the UMIS project has facilitated cooperation between different agencies in a whole new way.

- ModernAge pointed to how the project had provided the opportunity to strengthen their platform offering, supplying them with an excellent showcase that has led to several new business leads.

- RISE Viktoria concurs with the view that project has delivered desired results. One important key to this outcome was having a local representative (José Luiz Barbosa) that were able to mitigate the physical and cultural distance between Sweden and Brazil, do extensive networking and navigate in the institutional landscape of Rio de Janeiro.

8.2 Institutional learning

One of the key objectives of the project has been to both to transfer knowledge from the Swedish setting as well as develop new knowledge given specific characteristics present in Rio de Janeiro. In summary, the city Rio de Janeiro have presented three main learnings from the project:

1. Delivering DaaS (Data-as-a-Service). Through the project the city has gained knowledge about the process both to collect (to assure that data is of sufficient quality) and distribute data (in a continuous manner without interruptions). This way, the city can build
confidence around its open transport data (both internally and externally) through the support of a suitable platform. Also, the project has led to a working process where data is categorized into static data and real-time data. This process is critical as the update of static and real-time data requires very different approaches.

2. Feedback from and information to third-party developers. Another important learning is that to be able to provide citizens with useful applications; the city must provide the data content, quality and formats that match third-party developers’ demand. The reverse, however, is as important: to inform third-party developers of any upcoming changes in the data delivery. For instance, if a new data source is added it is important that third-party developers receive this information for innovation to take place. In Rio de Janeiro, such feedback collection has been by using Linc, which have offered whole new possibilities in this vein, compared to the capabilities found in the data catalog powering data.rio.

3. Organizing innovation events. This learning includes raising awareness about a wider array of activities that organizations can use to spark open innovation and the benefits of the respective type of event (generating applications/prototypes, receiving feedback on existing open data, etc.). Moreover, the learning also includes important aspects when designing such events (how to theme and categorize the contest, perform evaluation of submissions, etc.)

4. Open transport data can strengthen inter-agency cooperation. As aforementioned in this report, a major challenge when opening transport data is the complex organization of transportation. Hence, for the project to deliver results, it was necessary to build relationships between different agencies on both city and state level, where previously none existed. The UMIS project has exhibited how to work on open transport data can be used to boost such relationship building.

8.3 Suggestions for future work

While the project has met the objectives in the application, the work done in Rio de Janeiro has surfaced additional issues that need to be addressed for Rio de Janeiro to gain even more leverage of its open data:

- A need to develop and institutionalize innovation processes that include third-party developers. In a world of increasing digitalization and more fluid boundaries between actors, it is of utmost
importance that outside actors are incorporated into the city’s innovation processes. This work, however, should not only take place at the operational level as its strategic importance is requires commitment also from city hall. UMIS has moved substantially in this direction, but there is a need to implement this type of work throughout the organization.

- **A need to develop, refine and institutionalize processes concerning new datasets.** While this project has been an important step towards world-class open data further work is required. This process includes activities such as maintaining a data repository, assure data quality and identifying responsible persons. Also, it will require working towards closer cooperation between transport agencies in Rio and third-party developers. Finally, further work concerning how to make data more consumable is necessary. There are additional datasets within transportation agencies that would provide significant provide value to third-party developers and travelers, however, the lack of proper documentation and standardization of this data makes it unamenable for open publication.

- **Expand Linc to include citizens.** While the LINC platform has been a leap forward in connecting data owners and third-party developers it has become apparent that one additional group of stakeholders should be included into LINC – the citizens. While citizen involvement in the innovation process has fallen outside the scope of the project deliverables, representing their needs and wishes through direct involvement would add significant value to the platform.
References


