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Abstract

Running a hackathon has become more and more popular, especially for companies that provide an API to access their services. This is a great opportunity that third party developers using your data or infrastructure to come up with new innovative ideas your own employees never thought about. It is also an excellent opportunity to get in contact with highly motivated graduates that could work with or for you in the future. You are able to network with likeminded people and discuss ambitious ideas outside your daily work environment.

This document shares information about the participation of EMBERS as a partner of the Junction 2016 hackathon in Helsinki. Organizational aspects are briefly described as well as information about the event itself. Additionally, the winning teams and the projects applied for the EMBERS challenge are documented and selection process including the judging criteria and the jury members. Finally, it concludes with the lessons learned and gives an outlook of the upcoming activities.

Table of Contents

1 Introduction

With the purpose of achieving one of the project's primary objectives, to engage a European smart mobility ecosystem, the EMBERS project planned three major events to involve third party developers creating applications on top of the services and datasets from EMBERS. The first foreseen event occurred by the end of the first year of the project was a so-called "hackathon". Even though it is merely a combination of the words "hack" and "marathon", one of the most common definitions can be found below:

> "A hackathon (also known as a hack day, hack fest or code fest) is a design sprint-like event in which computer programmers and others involved in software development, including graphic designers, interface designers, project managers, and others, often including subject-matter-experts, collaborate intensively on software projects." [1]

A hackathon usually addresses particular usage areas, with companies providing access to their application programming interfaces, also known as APIs, to deliver specific data to be used by the participants to implement new and innovative applications. Typically, in order not to overlap with professional commitments, a hackathon should be organised during the weekend, starting on a Friday evening and lasting until Sunday afternoon, allowing for developers to meet like-minded people and have some time to prototype their creative ideas, outside the typical workplace.

The primary objective in organising this event was to open the EMBERS services to third-party developers and allow them to start interacting with the mobility information retrieved from real cities. Besides providing real-time information, the API also integrates data from several municipalities, such as Valencia or Recife. With open access to the data and services provided by EMBERS, the hackathon participants could either create new applications or test already developed ones with higher volumes of data.

The hackathon specifically addressed Future Mobility issues, providing the Mobility-Backend-as-a-Service as the data provision solution. Furthermore, it also allowed the team to retrieve feedback from the participants about desired features and datasets to improve the platform, and ultimately to achieve market readiness. Moreover, the organisation of such an event puts the project in the spotlight, enhancing the attention and visibility of its activities.

1.1 Collaboration with Junction

Without having done it before, organising a hackathon could become a massive challenge. Provided that Ubiwhere was the only organisation from the consortium that had had any experience with participating in such events, the team considered the cooperation with an established event. Some requirements that needed to be matched were the time and theme since, according to the project's work plan, the hackathon should happen in November and it should naturally cover mobility and transportation challenges.

After some research, Junction was identified as a potential candidate for collaboration. A first telephone call with the organisers immediately showed first sympathies and expectations. Junction is organised every year by students from the Aalto's University in Helsinki, having taken place for the first time in 2015 with approximately 500 international participants.

The highest purpose of the organisation is to attract the best developers worldwide. As they are a not-for-profit organisation, all costs need to be covered by the collaborating partners. Multiple partner packages are available that differ in the price and services included. It was possible to negotiate a reasonable partner's fee which included the following services:

- Partners' area: 40 seats for developers
- Lightning pitch at main stage (2min)
- Marketing
- Online and print materials
- 10 tickets to Junction
- Full access to participants' data
- Define challenge including price

The whole consortium agreed on the participation as a partner at Junction 2016 [1] in Helsinki, Finland, which took place on November 25-27, 2016.

2 General Information

2.1 Structure of the event

Aalto aimed at organising the biggest hackathon in Europe in 2016, providing several domains, called "tracks" (Virtual Reality, IoT, Fintech, Future Mobility, Healthtech, etc.), having EMBERS placed its challenge in the Future Mobility track. Any track could have multiple partners, whereas there were dedicated areas in place, appropriately marked with signs and logos of the partners providing their challenges.

During the first hours of the event, the representatives had to help developers solidifying their ideas by providing support and answering their questions. Some of the teams had already been formed before the event and started working immodestly as soon as they found free tables in the track areas. Other developers discussed their ideas with other people to arrange teams and work on a consolidated project. From a challenge provider perspective, the first day of the event is the most important one, since one needs to engage developers in working with the provided APIs and selling them the added value of the platform for their project.

Additionally, one needs to publicise the technical documentation and help the developers getting comfortable with his APIs and datasets. Participants of the hackathon were allowed to work on multiple tracks and challenges in parallel, although they needed to indicate which challenges they applied for before submitting their project. In general, the three-day event was structured as follows:

First day (Friday 25th November):

- Partners' pitch - introducing their challenges
- Team building
- Matchmaking

Second day (Saturday 26th November):

- Hacking
- Workshops

Third day (Sunday 27th November):

- Submission of projects
- Pitching concept to Judges
- Awarding ceremony

The detailed schedule of Junction 2016 can be found at [1].

2.2 EMBERS challenge

The challenge provided by EMBERS targeted developers with the purpose of engaging them to build innovative applications by using the mobility APIs available on the EMBERS middleware. These services consisted of:

- A parking API, which allowed people to get the real-time occupancy of parking spots in a city;
- A traffic API, which allows developers to understand the amount of traffic in the streets during the day;
- An environment API, which has information about the air quality of multiple areas in a city;

- A routing service which allows developers to obtain the best itineraries throughout the city at any given time;

- A Public Transit journey planner, providing the information needed to plan a trip using public transportation;

- A Context Broker, which offers real-time publish-subscribe mechanisms.

With the challenge, the consortium was willing to understand if there were new ideas on cities and datasets to incorporate, APIs and their specification, along with data models. Thanks to the middleware offerings, developers would not need to worry about technology stacks and focus on the challenge and how to solve the problem.
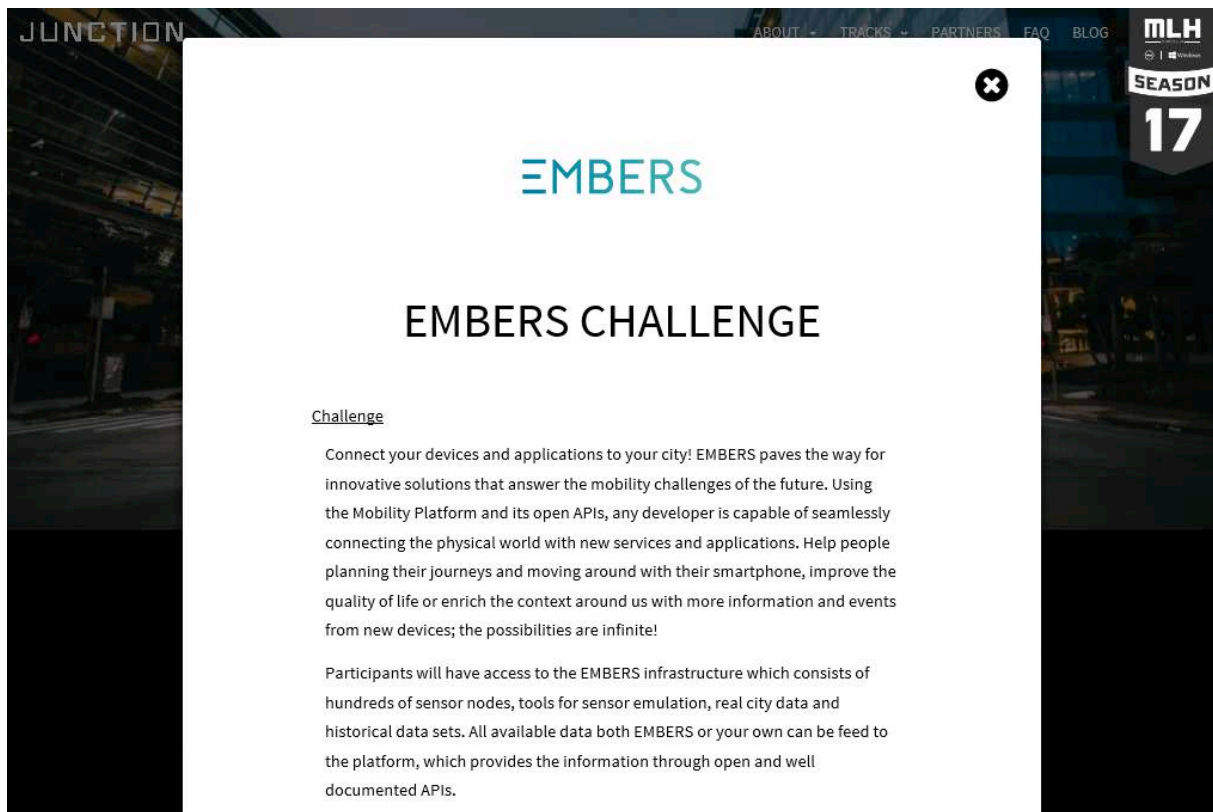

Figure 1: EMBERS Challenge at Junction

2.3 Technical requirements

For the hackathon, the technical requirements consisted on the deployment of a cloud instance with all the services and the documentation for developers to use. To allow developers to be the closest to real-world scenarios, the APIs included real datasets from cities, allowing for the development of applications that would solve actual urban mobility issues.

Additionally, for developers who just wanted to showcase their ideas using real-time data, the EMBERS middleware offered integration with two testbeds, the FUSECO Playground and the FIT IoT-LAB. These two testbeds were integrated into the EMBERS middleware and can be accessed via a single web interface, the Developer Dashboard. The Developer Dashboard allowed hackathon participants to register "experiments" into the FUSECO Playground Load Generator, which enabled them to receive real-time data based on their needs. The Developer Dashboard also allowed developers to see the devices available on the FIT IoT-LAB, which was then available via the API. At this point, it is important to refer that the middleware was also made available via a Context-Broker which enabled subscription-based communication for real-time events.

3 Results

3.1 Judging criteria

Partners that provided a challenge were responsible for organising the judging of their challenges by themselves. As we planned to award the first three winning teams, we needed to arrange a jury and define some judging criteria. To increase the credibility of the judging procedure, we decided to involve external experts that have no affiliation with the EMBERS project. We were able to win two external experts as a jury member.

EMBERS jury members:

- Isakki Kosonen - D.Sc. Staff Scientist Aalto University
    - Research activities:
        - Intelligent Transportation System (ITS)
        - Traffic modelling and simulation
        - Traffic and mobility management
        - Electric and ecological mobility
- Sebastian Nemeth - freelance software developer and student at Aalto University
- Timur Friedman – UPMC, Assistant professor of computer science, specialising in computer networking, and systems for monitoring the internet; also active in the area of smart city mobility.
- Ricardo Vitorino – Ubiwhere, R&I Manager

Until Sunday noon all teams needed to submit their projects to https://devpost.com. They needed to indicate which challenges have been addressed by their applications. Shortly afterwards the organisers informed the partners which teams applied for the challenge and at which table they were sitting. Each of the teams had to give a short pitch (3-5 minutes presentation) of their idea to the EMBERS judges.

The following teams applied for the EMBERS challenge:

- Boxy
- Travel online
- ParkTimeAnalyzer (ParKello)
- Suju
- ParkMyCar
- Navicce
- CarBuddy

To support the judges during the procedure, we prepared a judging form that included the criteria which needed to be scored 1 – 5 points for each team. The team with the highest score was the winning team of the EMBERS challenge. The judging could be found in the appendix. Here the list of the judging criteria from the EMBERS challenge:

- Data integration
- Closeness to the theme

- Creativity
- Technical complexity
- Functionality
- Presentation

To guarantee transparency the jury members and judging criteria's have been published on the EMBERS website previous to the hackathon.

3.2 Winning team and prizes

We decided to award the first three winning teams. Each team member received a prize according to their award category.

1st prize: Parrot AR Drone 2.0 Power Edition Quadcopter

2nd prize: Star Wars Sphere BB-8

3rd prize: Earebel Street Beanie Hat with removable AKG headphones

Figure 2: EMBERS challenge awarding ceremony

The following sections shortly describe the winning projects of the EMBERS challenge starting from winning team to third place.

3.2.1 Suju

Suju is an on demand self-driving bus service using multi-parameter route optimising. The project aims to solve the transportation problem by using self-driving buses to organise dynamic and cost controlled custom trips. If the surroundings of a location from potential customers are pre-scanned, the bus can plan and drive routes that are optimised on-the-go. Suju makes the necessary optimisations to the path, chooses a smart way to transport people from their desired pick-up location and tells Sohjoa which route and schedule to follow during the transportation. Potential use cases are the transport of participants of events that are distributed among different accommodations and want to make use of the self-driving bus transportation service that could bring them to the event. Another potential scenario addresses commuters that are looking for a convenient way to get to their closest railway or metro station. The project used a Telegram Bot as an example end-user UI to indicate the transportation request. Suju is using the EMBERS Routing API, to calculate the most efficient route for the bus to pick up the customers at their locations to transport them to the final destination e.g. event location.

The Suju project has not only won the EMBERS challenge, but they have also been granted to win the main prize of the Junction 2016 hackathon.

Additional information about the project can be found at:

https://devpost.com/software/suju

https://suju.online/#/map

3.2.2 ParKello

Second place of the EMBERS challenge went on the Park Time Analyzer (ParKello) project. The idea of the project was to replace the need for a mechanical parking disc, which is typically used to indicate when the car was parked. A parking application which runs on a mobile device was developed to set the parking status of a car. Thus the application provides a convenient way for parking cars, with additional features like a reminder about parking time-out, and a navigation to the closest available parking spot. Furthermore, the service provider is able to collect and analyse the event statistics, which can be used for online information about their capacity, forecasting available parking slots and other patterns.

ParKello used the EMBERS parking API to set the status of parking slots for their project.

Further information about ParKello can be found at:

https://devpost.com/software/parktimeanalyzer-dcli7b

3.2.3 CarBuddy

CarBuddy is a car sharing service between private persons. It involves a mobile application and hardware solution to control the keyless access to the shared car. This project addressed the fact that most of the time privately owned cars are not used. Car owners can list their vehicle for a short-term rent by other CarBuddy users. CarBuddy users can select / lock-unlock / drive and, finally, pay-as-you-drive using CarBuddy mobile app. Each rent starts and stops on dedicated municipal parking bays, equipped with parking sensors. Instant checkout is performed via P2P money transfer system upon the rent end. Communication between car owners and renters is carried out using in-app messenger.

CarBuddy used the EMBERS parking API in combination with the GPS information of the hardware dongle to locate the parked car and the status.

Further information can be found at:

https://devpost.com/software/carbuddy-p2p-carsharing

https://youtu.be/rDG-Ca2WWhQ

3.3 Visibility

One of the main achievements by participating at the Junction 2016 hackathon was the visibility we gained. EMBERS logo was prominently visible on the Junction partner website next to major brands like Twitter, Skype, GE and Zalando see figure 3. Other than that we had the chance to introduce our challenge on the main stage to hundreds of developers at the venue and around the world, as the pitches were streamed on the internet. From a marketing point of view, the publicity and visibility gained with participating at Junction is outstanding and could not be achieved by a self-organized event. Additionally, we were able to get in contact with developers sharing the passion about urban mobility which are potential candidates for our upcoming events, namely app challenge and open call.
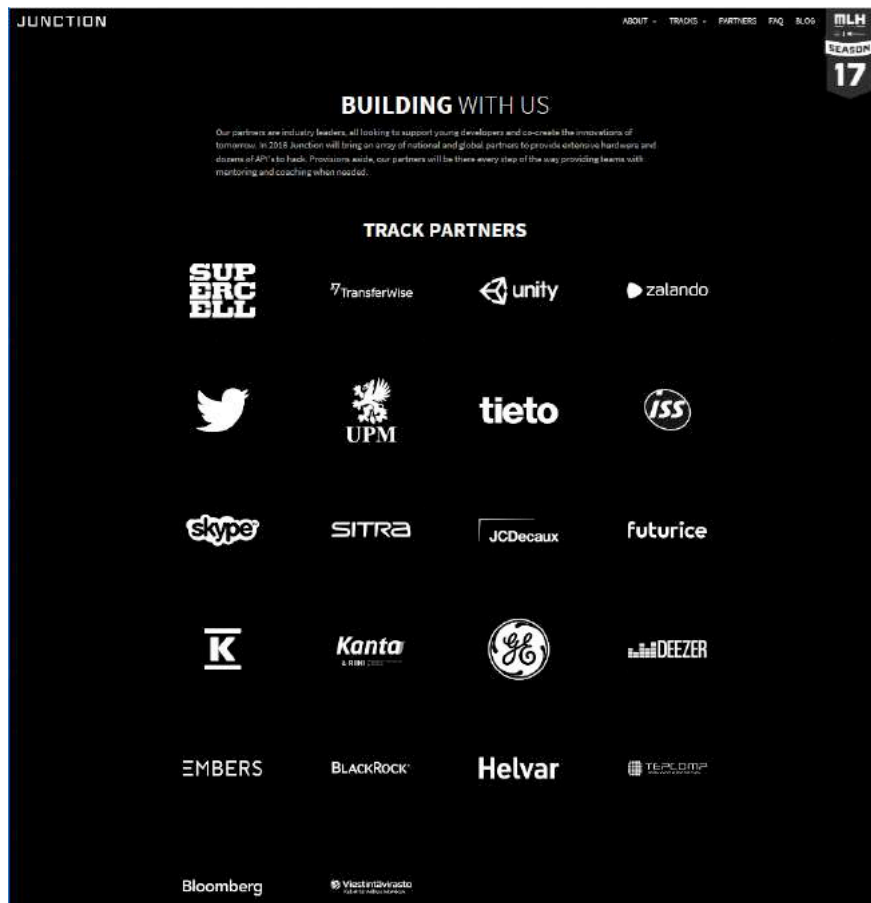

Figure 3: Junction website partner's page

3.4 Event statistics

Junction 2016 was the biggest hackathon in Europe. The organizers of the event shared some general information with us about the events statics. 1258 developers participated at Junction and where working on more than 350 projects. The total number of participants including partners and mentors where almost 1700 people. See figure 4 for additional information.
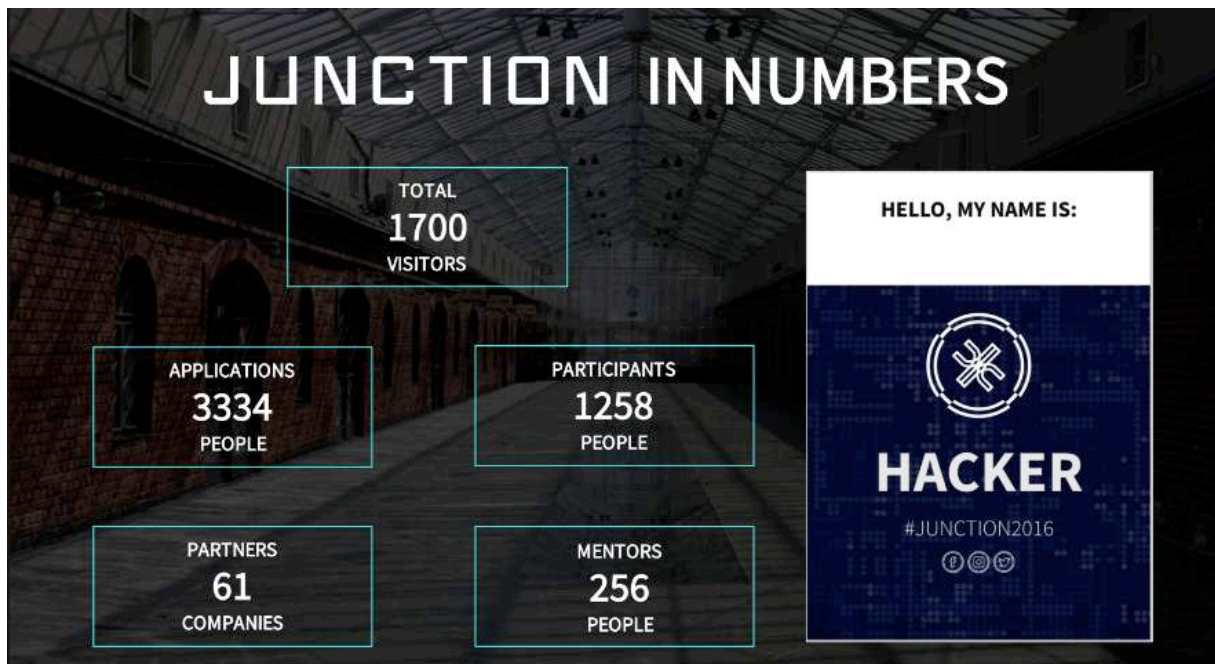

Figure 4: Junction participation figures

Application to the event was open to everyone, the selection of developers was done by the organizing team without any influence of the partners. With developers from 57 different countries it was an international crowd. The majority of the developers where males and students. Also a lot of professional Web developers where present. A detailed overview about the participant statistics can be seen in figure 5.
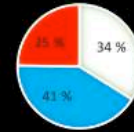
Figure 5: Junction participation statistics

4 Communication

4.1 Engagement and Promotion

The engagement and advertising strategy related to the EMBERS track was conceived taking into account the opportunities and constraints inherent to the partnership with the Junction 2016 Hackathon – this situation makes the approach very particular and different from one that could have been deemed for a Hackathon designed from scratch by EMBERS.

For the purpose of this Hackathon, three main phases were identified with specific goals:

- Phase 1 (Pre-hackathon): cities involvement and developers' engagement;

- Phase 2 (Hackathon): engagement with Junction´s participants - ideation, networking and learning;

- Phase 3 (post-hackathon): projects follow-up and building of the related community.

In the context of Phase 1, several meetings and contacts were established to ensure the engagement of the cities in providing data for hackathons. A total of eight cities are engaged within the context of EMBERS to make their data available. For Junction 2016 hackathon developers had access to data from four cities – New York, Recife, Olinda and Valencia. With the purpose of engaging developers in the EMBERS track, a brochure, a digital presentation and a digital flyer were shared by Junction´s team amongst all 1258 participants of the event. A Slack channel was created to address developers' questions and information needs and Hackathon documentation made available on EMBERS and Junctions websites.

Triggering Phase 2, a promotional pitch was done on the first day of the event by the EMBERS team, represented by Timur Friedman, aiming at disseminating both the project and the goals of the track. As a result, seven teams were involved in the EMBERS track. T-shirts were distributed to the participants to foster team spirit while the motivational prizes (as described above) were given to the top three teams.
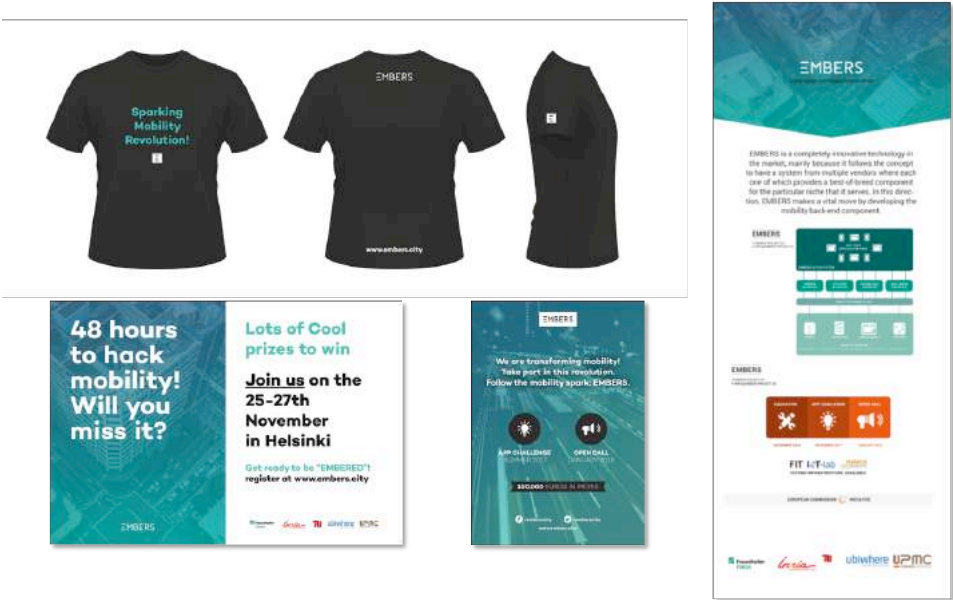

Figure 6 – promotional material

The success of EMBERS track was very visible and recognised at Junction 2016 Hackathon, as demonstrated by the attribution of the global first prize to the winner of EMBERS track (Suju project).

Such prize (20.000 €) is a firm basis for further work, in line with Phase 3 objectives. In line with the practice of the Junction initiative, it should be noted that it is only in this phase that a direct contact with the participants is allowed. The EMBERS team is working on maintaining contact with the hackers to identify opportunities for developers and clients to exploit the work done.

4.2 Media

The dissemination strategy of EMBERS track at Junction mainly consisted of the distribution through social media, Facebook and LinkedIn. In addition to these two networks, blog posts were developed and shared with the Hackathon´s organisation, according to the practice manuals of the organiser, which require conventional channels of communication.

The impact of EMBERS participation at Junction is evident in the social media. The activity during the days of the event shows the engagement of new users and the active role they played. A continuous reporting of EMBERS initiatives was made, and promotional material was produced such as interviews and short videos.
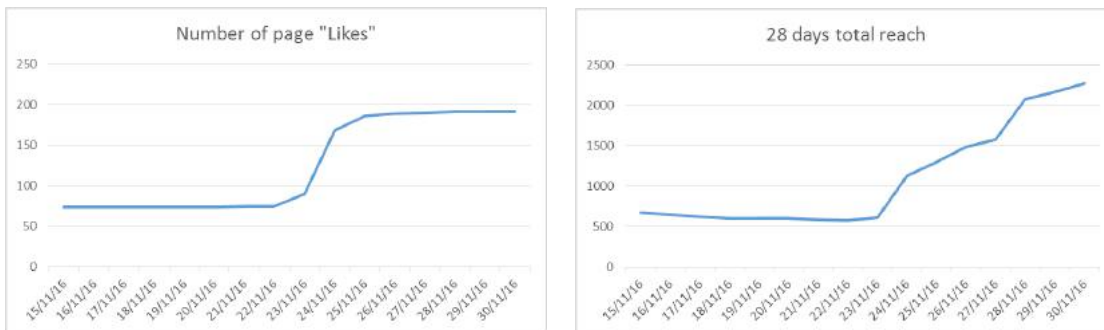

Figure 7 – Evolution of the Facebook page

More than 10 tweets per day, 700 people reached and 575actions per day are some of the numbers obtained in Twitter during the days of the hackathon, as shown in the figure below.
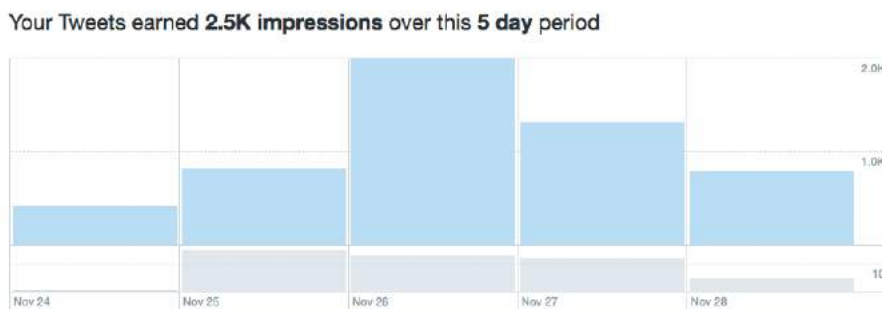

Figure 8 – Twitter evolution during the days of the event

5 Conclusions

Running the hackathon as a partner at Junction was the first major milestone of the work package 3. This was the first time we gave access to the EMBERS infrastructure consisting of the Mobility Backend from Ubiwhere, the FIT IoT-Lab from Inria and the FUSECO Playground from Fraunhofer FOKUS, to third party developers. In order to make it a successful event a lot of effort was required in the preparation phase. We managed to collaborate with the biggest hackathon in Europe, to provide our EMBERS challenge in the Future Mobility track with the initial planned available budget. It turned out, that through the co-sponsorship EMBERS was able to reach an outstanding visibility that would not be possible with a self-organized hackathon.

Ubiwhere was able to integrate real-time and historical data from multiple cities into the platform, which could be used by the developers. Additionally, a developer dashboard was implemented to provide a unified interface towards the developers which hides the complexity of different EMBERS infrastructure components. To achieve the integration of the FIT IoT-Lab and the FUSECO Playground, implementation of an API for each testbed was required that supports configuration of real and virtual sensors. Furthermore, the available data sets, parking information, routing engine and testbed experimentation capabilities are documented on APIary.

Running a hackathon is a big challenge, especially if you do it the first time. Luckily Ubiwhere had already experiences in multiple hackathons. If you organize on yourself you have to compete with other events and attract people participating at your hackathon. Collaborating with an existing well recognized event, you don't have to care to get the word out about the event itself. Instead you have to deal with the competition, which are big companies that are offering their challenges and prizes. Therefore, we were present on site with six people from the project consortium to promote EMBERS, talk to the developers face to face and tried to help them how EMBERS could be of added value to the mobility related project they were working on.

It was a great experience to participate at the Junction hackathon and to see so many highly motivated and innovative young developers. Talking to them gave us valuable feedback that was missing in terms of documentation to get started or what kind of features they were missing. However, to make the mobility backend business ready we need to work together with companies that are already familiar with the challenges of providing mobility services to cities or municipalities. This would help us to better understand what is missing and how EMBERS could fill the gap. The upcoming app challenge and open call should be targeted to solve real world problems and to get in contact with appropriate stakeholders that are willing to improve the mobility of their cities.

6 References

[1] "Wikipedia," [Online]. Available: https://en.wikipedia.org/wiki/Hackathon.

[2] Aaltos, "Junction," [Online]. Available: https://hackjunction.com/.

[3] Aaltos, "Junction schedule," [Online]. Available: https://hackjunction.com/schedule/.

7 Appendix

EMBERS @ Junction Hackathon

Judging template

Friday 25. - Sunday 27 November 2016

Wanha Satama, Pikku Satamakatu 3-5, 00160 Helsinki, Finland

Name of the judge:

Name of the team	

Criteria	Comment	Points ranging from 1 - 5
Data integration		
Closeness to the theme		
Creativity		
Technical complexity		
Functionality		
Presentation		
	Total:	

Free comments:

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