

## Report of TKI project

HTSM Roadmap	ICT - action line Big Data		
Project title	<i>Transient Apps</i>		
Project manager	Bineke Posthumus	SAP no	060.17366

Budget Sources		real 2015/2016	plan > 2015/2016	total
Funding TKI		100k	100k	100k
Funding KPN		75k	75k	75k
In kind funding KPN		12,5k	12,5k	12,5k
In kind funding Emansion		12.5k	12,5k	12,5k
<b>Total project Budget</b>		<b>200k</b>	<b>200k</b>	<b>200k</b>

### 1. Objectives:

Digital data and content knowledge are stored, in very large amounts. In line with this trend, more than 1,000,000+ apps are available in the different app stores, which creates challenges for users in selecting relevant apps and app suppliers in presenting relevant apps to users. TNO has a promising proof of principle of a technology, called Transient Apps, which has the potential to take a big step forward in solving this challenge. Transient apps is a new way of building and distributing apps for mobile devices. Transient Apps are lightweight apps that can come from anywhere and are automatically downloaded and executed on your mobile device whenever they are relevant for you. Further developing the Transient App platform introduces two major challenges: Determining which Transient Apps are currently relevant to the user, and installing and uninstalling Transient Apps on the users mobile device.

This TKI project focused on answering these research questions from a technical and deployment perspective. By making use of a living lab research approach real-life context have been taken into consideration throughout the development of Transient Apps.

The research questions were the following;

Research question 1: How to effectively collect and match relevant context information

Research question 2: What technology should be used to build Transient Apps and how to implement a microservice architecture?

Research question 3: What are market requirements regarding Transient Apps and what does this mean for the technical development of Transient Apps?

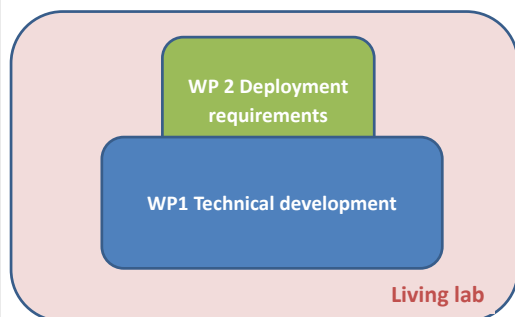
Research question 4: Which business intelligence needs to be generated for the Transient Apps platform?

### 2. Progress of the project:

#### A. Plan of Work:

Describe briefly the planned activities for the year under review.

In order to answer the research questions described above, we made use of a living lab approach, as also visualised in the figure below.



#### Visualisation work plan

The living lab approach means that the technical research questions and deployment research questions have constantly been challenged by real-life context and consequently been adapted. The concept is based on a systematic user co-creation approach integrating research and innovation processes. This approach allows all involved stakeholders to concurrently consider both the global performance of a product or service and its potential adoption by users. The involvement of stakeholders has been organized by the TNO, Emansion and KPN network.

The Living Lab phases can be identified as follows. In the exploration phase of the Transient App project, focus was on engaging stakeholders to discover the technical and deployment potential and requirements concerning Transient App journeys. During the experimentation phase, the developed technology was implemented to experience live scenarios on location and/or with users. At the end of the project the results have been evaluated and assessed. This both meant evaluating and assessing the experimented technical aspects as the market/customer requirements and the effect on the business model. Work package 1 focused on the technical research questions, work package 2 on the deployment research questions. Work package 3 consisted of project management activities.

#### **WP1: Technical development**

The first work packages focused on two research questions. The first research question was: How to effectively collect and match relevant context information has to be solved in order to determine relevant Transient Apps? In order to answer the first research question we started by defining, investigating and retrieving relevant context information based on market requirements, which was determined together with WP2. Consequently defined a formal language for describing specific context. In order to determine relevant Transient Apps based on the current context, algorithms have been developed for matching current context against context descriptions and translating this match into actions.

Furthermore WP1 focussed on research question 2: What technology should be used to build Transient Apps and how to implement a microservice architecture? In order answer this research question, three main aspects have been explored, namely the runtime, discovery and the platform. The runtime is dependent on the chosen technology, therefore, we firstly potential architectures have been explored, based on the technologies that could be used (e.g. web technology). Consequently, the runtime was implemented on the native platform. In order to create a Microservice framework for Transient apps, security requirements, service aspects and the integration of software component (or App Fragments) with context triggers has been explored. As part of the runtime environment technical development has taken place along the (temporary) storage of Transient Apps on mobile devices. Regarding the discovery of apps focus was on building a registry for Transient App metadata. Also a hosting service for distribution has been implemented. Lastly the user interface for the platform was created.

#### **WP2: Deployment**

Work package 2 focussed on research question 3 (What are market requirements regarding Transient Apps and what does this mean for the technical development of Transient Apps?) and research question 4 (Which business intelligence needs to be generated for the Transient Apps platform?). Research question 3 focused on identifying customer requirements for Transient Apps. Furthermore, it set requirements for WP1 regarding the technical context match and app fragments. To answer research question 3, basic desk research have been performed on app development in emerging categories (e.g. retail, health) and interactive sessions and tests with key target market stakeholders (e.g. customers, app developers) in these emerging categories. Consequently we translated these results into potential Transient App market requirements. Research question 4 built further on research question 3, but took a broader perspective towards the business model of Transient Apps. Therefore, firstly a basic value network analysis has been performed to get insights into the drivers and barriers of key stakeholders of Transient Apps. Consequently, potential business models have been developed based on research on revenue models.

#### **WP3: Project Management**

WP3 concerned project management. To answer technical challenges in combination with the deployment challenges in living lab format we worked with a project manager who is able to switch between technology and market & business experts and stakeholders. Furthermore, the project manager took responsibility for the successful planning, execution, monitoring, control and closure of the project.

#### B. Progress realized

### 3. Results realised

#### A. Results planned:

##### WP1: Technical development

- D1.1: Description of the context description language
- D1.2: Transient App Platform architecture document
- D1.3: Transient App development guide
- D1.4: Transient App Platform Android App

##### WP2: Deployment

- D2.1: Transient App Platform PoC accepted by users and producers within the living lab environment
- D2.2 Transient Apps deployment architecture

#### B. Results realized

Describe the results in the year under review and for the whole project per WP.

##### WP1: Technical development

- D1.1: Description of the context description language
- D1.2: Transient App Platform architecture document
- D1.3: Transient App development guide
- D1.4: Transient App Platform Android App

##### WP2: Deployment

- D2.1: Transient App Platform PoC accepted by users and producers within the living lab environment
- D2.2 Transient Apps deployment architecture

### 4. Realized contribution to new knowledge and technology:

#### A. Describe which new knowledge and technology has been acquainted.

We have refined our concept of Transient Apps. Transient Apps are made of software components which exchange information in order to be able to provide the user with relevant functionality on his mobile device. We have looked at ways to implement this on popular Operating Systems for mobile devices using Apache Cordova.

We have also developed technology for automatically selecting functionality which is relevant to the user on mobile devices, based on information available on the device about location (inside buildings and outside). To be able to do this, the developer of the software component has to specify in a context description language in which context the software component is relevant. This description, together with other information about the software component, is automatically sent to mobile devices from a central repository.

#### B. To what extent does this contribute to the improvement of the technology position of TNO?

Software on mobile devices becomes increasingly more aware of the surroundings of the device, in order to provide the user with a better experience. With this technology, TNO has generic tools for making services context aware. The topic is very related to existing TNO technology such as Transient Services and Flexible Compute Infrastructures.

### 5. Continuation next years:

Describe in case of a multi-year project briefly the activities for the next years, taking into account the progress and results realized so far. Explain deviations with respect to the original project proposal.

n.a.

### 6. Publicity:

Publications (reports, books, papers, presentations, websites etc.):

- TNO Lab Opendag: 1 September 2015
- Demo Arena Smart city Event 7-10 June 2015
- Demo KPN Netco 17 August 2015
- Presentation Transient apps to service providers: Transient App Poc Presentatie
- Several website/social media publications (via Zuidoost Partners, Villa ArenA, twitter) before the Eastern event in April 2016

Further: patent descriptions, premier depots.