



**Personal Energy Administration Kiosk application:**  
an ICT-ecosystem for Energy Savings  
through Behavioural Change, Flexible Tariffs and Fun  
**Contract No 695945**

## **Deliverable D1.5**

# **List of KPIs for the evaluation of the ICT's impact**

Prepared by Johannes Reichl, Andrea Kollmann, Christopher Binder (EI-JKU)  
Version 3.0: 26<sup>th</sup> of October 2016

Document control information			
Title	D1.5 – List of KPIs for the evaluation of the ICT's impact		
Editor	Johannes Reichl, Andrea Kollmann, Christopher Binder (TECNALIA)		
Contributors	EI-JKU, IJS, GreenPocket, DTU		
Dissemination Level	<input type="checkbox"/> <b>CO</b> Confidential, only for members of the consortium (including the Commission Services) <input type="checkbox"/> <b>RE</b> Restricted to a group specified by the consortium (including the Commission Services) <input type="checkbox"/> <b>PP</b> Restricted to other programme participants (including the Commission Services) <input checked="" type="checkbox"/> <b>PU</b> Public		
Reviewers	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Baskent-Elek  <input type="checkbox"/> DTU  <input checked="" type="checkbox"/> EI-JKU  <input type="checkbox"/> ELDER  <input type="checkbox"/> ENAMO                 </td> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> GreenPocket  <input type="checkbox"/> IJsfontein  <input type="checkbox"/> RTDS  <input type="checkbox"/> Tecnalia  <input type="checkbox"/> 220 Energia                 </td> </tr> </table>	<input type="checkbox"/> Baskent-Elek <input type="checkbox"/> DTU <input checked="" type="checkbox"/> EI-JKU <input type="checkbox"/> ELDER <input type="checkbox"/> ENAMO	<input checked="" type="checkbox"/> GreenPocket <input type="checkbox"/> IJsfontein <input type="checkbox"/> RTDS <input type="checkbox"/> Tecnalia <input type="checkbox"/> 220 Energia
<input type="checkbox"/> Baskent-Elek <input type="checkbox"/> DTU <input checked="" type="checkbox"/> EI-JKU <input type="checkbox"/> ELDER <input type="checkbox"/> ENAMO	<input checked="" type="checkbox"/> GreenPocket <input type="checkbox"/> IJsfontein <input type="checkbox"/> RTDS <input type="checkbox"/> Tecnalia <input type="checkbox"/> 220 Energia		
Status	<input type="checkbox"/> Draft <input type="checkbox"/> WP Manager accepted <input checked="" type="checkbox"/> Co-ordinator accepted		
Action requested	<input type="checkbox"/> to be revised by Partners involved in the preparation of the deliverable <input type="checkbox"/> to be reviewed by applicable PEAKapp Partners <input type="checkbox"/> for approval of the WP Manager <input type="checkbox"/> for approval of the Project Coordinator		
Requested deadline for Action			



# Content

- 1 Introduction and Motivation..... 4**
- 2 Information requirements inventory..... 5**
  - 2.1 Glossar..... 5
  - 2.2 Indices..... 5
- 3 Key performance indicators..... 6**
  - 3.1 Customer satisfaction related key performance indicators..... 6
    - 3.1.1 Active Users ( $KPI_{AU1,m}$  and  $KPI_{AU2,t,m}$ )..... 6
    - 3.1.2 Average Session Duration ( $KPI_{ASD1,m}$  and  $KPI_{ASD2,t,m}$ ) ..... 8
    - 3.1.3 Average Numbers of Bets ( $KPI_{NB1,m}$  and  $KPI_{NB2,t,m}$ )..... 11
    - 3.1.4 Number of downloads ( $KPI_{DOW,m}$ )..... 13
    - 3.1.5 Call-Center Calls ( $KPI_{CCC}$ ) ..... 14
  - 3.2 Business related key performance indicators ..... 15
    - 3.2.1 Non-Recurring Costs ( $KPI_{NRC}$ ) and Recurring Costs ( $KPI_{RC}$ )..... 15
- 4 List of Tables ..... 17**
- 5 Annex ..... 18**
  - 5.1 Variable List..... 18

## 1 Introduction and Motivation

The PEAKapp project develops a software tool collecting load profiles of households' electricity consumption, transforms this rather technical data into user friendly aggregates, and feeds the gathered information back to the households in a way that is engaging and motivating for energy efficiency increases. The key questions related to the developed tool are therefore:

- [1] How do consumers interact with the tool and does it actually stimulate energy efficient behaviour and decisions?
- [2] Is the developed tool prepared to serve millions of customers without a disproportionate number of technical incidents and without causing an energy consumption for the operation of the system devouring the triggered energy savings of the households?

PEAKapp carries out field tests in four European countries to answer these questions and thereby provides important information for decision makers from energy companies, policy, consumer associations and regional or federal energy planners as well as other stakeholders.

Deliverable 1.5 of PEAKapp develops a set of indicators addressing the second of the aforementioned questions. These indicators are subsequently defined and the data required for their quantification is given. Considering the differing technical preconditions and national legal/regulatory frameworks of the test sites, not all indicators can be provided for all sites. For example, in Austria figures about households' electricity consumption are available in 15 minutes intervals, while Estonian regulation foresees metering of hourly values.

The subsequent chapters describe the indicators in detail as well as the required data for their quantification, and how to interpret them.

## 2 Information requirements inventory

The key performance indicators (*KPI*) presented in this deliverable shall support decision makers to assess whether the tool developed in PEAKapp meets their requirements with respect to technical readiness, consumer comprehensibility, and the expected effort for the provision of the services to households.

This chapter therefore lists the information that is required by decision makers for the judgment whether an ICT tool - like the one developed in PEAKapp - meets the aforementioned criteria or not.

### 2.1 Glossar

Term	Description
<b>User</b>	<i>The PEAKapp <b>user</b> references one account to the PEAKapp system where one account is presenting one household.</i>
<b>Active User</b>	<i>An user is called active when he has logged in into the app at least once in a month.</i>
<b>Account</b>	<i>One representative household in the PEAKapp system, which can consist out of one person or more.</i>
<b>Cohort</b>	<i>The term <b>cohort</b> refers to a group of people which can be restricted geographically and/or demographically. An example for a cohort is: All Austrian citizens, younger than 50 years living in a flat.</i>

### 2.2 Indices

Index	Symbol	Unit	Description
<b>User identifier</b>	<i>i</i>	a user	The index of a user, i.e. $i=1$ refers to the user number 1
<b>Months after release</b>	<i>m</i>	number of months	Counts the months since the release of the app, with $m = 1$ as the starting point.
<b>Months, after the download of the app</b>	<i>t</i>	number of months	$t$ gives the time in months after the download of the app. Example: User has downloaded the app in January (month of download = January), than for this user, January $t = 1$ , February is $t = 2$ , ...

## 3 Key performance indicators

### 3.1 Customer satisfaction related key performance indicators

In the following chapter, key performance indicators which are related to the customer satisfaction with the app are defined. The number and the activity level of users will be measured to get a clear picture about the attractiveness of the app to the customers over time.

For a consistent understanding of the KPIs following definitions for the term user and cohort are necessary:

*The PEAKapp **user** references one account to the PEAKapp system where one account is presenting one household.*

*The term **cohort** refers to a group of people which can be restricted geographically and/or demographically. An example for a cohort is: All Austrian citizens, younger than 50 years living in a flat.*

#### 3.1.1 Active Users ( $KPI_{AU1,m}$ and $KPI_{AU2,t,m}$ )

The key performance indicator  $KPI_{AU1,m}$  gives the number of users who have opened the app at least once in month  $m$  compared to the total number of users.

$KPI_{AU1,m}$  depicts how the app is performing over a certain time period since the app release. This indicator gives an overview of the usage trends of the app over the time horizon of the app. An increase in  $KPI_{AU1,m}$  over time indicates increased customer satisfaction with the app. Moreover  $KPI_{AU1,m}$  is more informative about growing demand for the app than the accumulation of new users because it gives information about the activity of the customers.

$KPI_{AU2,t,m}$  compares active users in relation to non-active users since the download of the app.

This indicator shows how many users are using the app in month  $t$  after the download of the app. This key figure is important to highlight the development of customer behaviour and satisfaction with the app. A very low  $KPI_{AU2,t,m}$  can serve as a warning signal, that measures have to be made to increase customer satisfaction.

For calculating  $KPI_{AU1,m}$  and  $KPI_{AU2,t,m}$  the cohort (geographically, demographically) and all further input variables need to be defined. The definition of the input variables is found in Table 1.

$$KPI_{AU1,m} = \frac{A_m}{D_m} \quad \text{Eq. 1}$$

$$KPI_{AU2,t,m} = \frac{A_t}{D_{t,m}} \quad \text{Eq. 2}$$

**Table 1: Variables for the calculation of Active User key performance indicators**

Variable	Symbol	Units	Description
Active users in month $t$	$A_t$	# of users	Number of users who have logged in into the app at least once in month $t$ .
Number of users in month $t$ after the month of the download	$D_{t,m}$	# of users	Number of users that have had the app at least for $t$ months within $m$ months since the app release. Example: In May (see Table 2) $D_{3,5}=3$ , since in May ( $m=5$ ) 3 users have had the app for at least 3 months. Likewise $D_{3,4}=2$ .
Number of users in month $m$	$D_m$	# of users	Number of all users which downloaded the app until month $m$ .
Active users in month $m$	$A_m$	# of users	Number of users which have logged in into the app at least once in month $m$ .

In the following example the  $KPI_{AU1,m}$  was calculated for  $m = 3$ . In month  $m = 3$ , there are 3 users which have logged in into the app at least one time. All 3 users have been active in month 3 which gives a  $KPI_{AU1,m}$  of 100 %. Furthermore Table 2 provides an example for the calculation of the  $KPI_{AU2,t,m}$  for  $t = 3$ . To calculate the  $KPI_{AU2,t,m}$  for  $t = 3$  and  $m = 5$ , the number of all users whose app download happened at least 3 months ago in the month  $m = 5$  is divided by the number of those users which have been active in  $t = 3$ . The interpretation of the  $KPI_{AU2,t,m}$  in this example is the following: 67 % of all users are using the app 3 months after of the app download.

**Example for the Key Performance indicators: Active User ( $KPI_{AU1,m}$  and  $KPI_{AU2,t,m}$ )**

**Table 2: Example Active User ( $KPI_{AU1,m}$  and  $KPI_{AU2,t,m}$ )**

Assumption: App release 1 <sup>st</sup> January		m = 1		m = 2		m = 3		m = 4		m = 5	
		January		February		March		April		May	
ID	Date of download	t	Active	t	Active	t	Active	t	Active	t	Active
1	20 <sup>th</sup> January	1	1	2	0	3	1	4	0	5	0
3	30 <sup>th</sup> March					1	1	2	1	3	1
4	4 <sup>th</sup> February			1	1	2	1	3	0	4	1
Number of Users in month $m$ ( $D_m$ )		1		2		3		3		3	
Active users in month $m$ ( $A_m$ )		1		1		3		1		2	
Number of users in $t$ months after the month of the download ( $D_{t,m}$ ) for $t = 3$ and $m = 5$		0		0		0		0		3	
Active Users for $t = 3$ ( $A_t$ )		0		0		1		0		1	

**Table 3: Example for calculation of  $KPI_{AU1,m}$  and  $KPI_{AU2,t,m}$**

Time specification	Variables and KPI	Indication
<b>m = 3</b>	Number of users ( $D_m$ )	3 user
	Active users ( $A_m$ )	3 user
	<b><math>KPI_{AU1,m}</math></b>	<b>100 %</b>
<b>t = 3 &amp; m = 5</b>	Number of users ( $D_{t,m}$ )	3 user
	Active users ( $A_t$ )	2 user
	<b><math>KPI_{AU2,t,m}</math></b>	<b>67 %</b>

To give the  $KPI_{AU1,m}$  the right interpretation, it is important to understand the composition of  $A_m$ . The number of active users within a month depends on new users which have opened the app in month  $m$ , users which have been inactive before but have been active in month  $m$  and retained users.  $KPI_{AU1,m}$  therefore increases if the number of new users, re-activated users and retained users is larger than the number of lost/inactive users.  $KPI_{AU1,m}$  has to be calculated over several months to be able to make comparisons and interpretations.

Because the key performance indicators are very volatile over time and difficult to forecast it was decided to give a range for the indicators to check if the project is a success, promising or if it missed the target. Table 4 provides the indication for the  $KPI_{AU1,m}$ .

**Table 4: Success indication for the  $KPI_{AU1,m}$**

Month $m$ after release	Success	Promising	Missed the Target
<b>1</b>	> 0.30	0.30 to 0.15	< 0.15
<b>2</b>	> 0.30	0.30 to 0.15	< 0.15
<b>3</b>	> 0.15	0.30 to 0.07	< 0.07
<b>12</b>	> 0.07	0.07 to 0.04	< 0.04

Because this app will be tested in a field test, it is assumed that most users will start using the app as soon as it is released and therefore special emphasis is put on the usage within the first months. After the first months, the activity level will decrease which is shown by the  $KPI_{AU2,t,m}$ . Table 5 gives an overview of the range of  $KPI_{AU2,t,m}$  to check if the project is successful, promising or if it missed the target.

**Table 5: Success indication for the  $KPI_{AU2,t,m}$**

Month $t$ after the download of the app	Success	Promising	Missed the Target
<b>1</b>	> 0.30	0.30 to 0.15	< 0.15
<b>2</b>	> 0.15	0.15 to 0.07	< 0.07
<b>3</b>	> 0.07	0.07 to 0.04	< 0.04
<b>12</b>	> 0.07	0.07 to 0.04	< 0.04

### 3.1.2 Average Session Duration ( $KPI_{ASD1,m}$ and $KPI_{ASD2,t,m}$ )

Another important metric to measure the activity level of the users is the average time spent with the app. To calculate the  $KPI_{ASD}$  information about the total time which users spend in the app is needed.



In the next step the total time spend in the app will be set into relation to the total number of app users. The session duration is defined as the time between session start and session end. The session starts when the user logs in into the app and ends when the user logs out of the app. The  $KPI_{ASD}$  is divided into two indicators.

$KPI_{ASD1,m}$  gives the average session duration of the users in month m.

The first indicator shows how the average session duration has changed since the app release.

$KPI_{ASD2,t,m}$  gives the average session duration of the users in month t after the download of the app.

It therewith shows the development of the average session duration of the users since their download.

**Table 6: Variables for the calculation of Average Session Duration key performance indicators**

Variable	Symbol	Units	Description
<b>Number of users in month m</b>	$D_m$	# of users	Number of all users which downloaded the app until month m.
<b>Session duration of users in month m</b>	$SD_m$	time in minutes	Total time spend in the app of all users in month m
<b>Number of users in month t after the month of the download</b>	$D_{t,m}$	# of users	Number of users that have had the app at least for t months. Example: In May (see Table 7) $D_{3,5}=3$ , since in May (m=5) 3 users have had the app for 3 months. Likewise, $D_{3,4}=2$ .
<b>Session duration of users in month t after the month of the download</b>	$SD_t$	time in Minutes	Total time spend in the app of all users who have used the app at least once in month t.

$$KPI_{ASD1,m} = \frac{SD_m}{D_m} \quad \text{Eq. 3}$$

$$KPI_{ASD2,t,m} = \frac{SD_t}{D_{t,m}} \quad \text{Eq. 4}$$

Table 7 provides an example for the calculation of the  $KPI_{ASD1,m}$  and  $KPI_{ASD2,t,m}$ . The  $KPI_{ASD1,m}$  with  $m = 3$ , is calculated by dividing the number of all users which have downloaded the app until month m by the session duration of these users in month m. In the example, 3 users have downloaded the app until month  $m = 3$  and they spent 45 minutes in the app in month  $m = 3$ , which gives an  $KPI_{ASD1,m}$  of 15 minutes per user. The  $KPI_{ASD2,t,m}$  for  $t = 3$  and  $m = 5$ , is calculated by dividing the number of all users whose app download is at least 3 months ago in month  $m = 5$  by the session duration of these users in month  $t = 3$ . According to the following example, 3 users have downloaded the app at least 3 months ago until month  $m = 5$  and spent 30 minutes in  $t = 3$ , which gives an  $KPI_{ASD2,t,m}$  of 10 minutes per user.

### Example Average session duration ( $KPI_{ASD1,m}$ and $KPI_{ASD2,t,m}$ )

Table 7: Example Average session duration ( $KPI_{ASD1,m}$  and  $KPI_{ASD2,t,m}$ )

Assumption: App release 1 <sup>st</sup> January		m = 1		m = 2		m = 3		m = 4		m = 5	
		January		February		March		April		May	
ID	Date of first opening	t	Active in min	t	Active in min	t	Active in min	t	Active in min	t	Active in min
1	20 <sup>th</sup> January	1	10	2	0	3	15	4	0	5	0
3	30 <sup>th</sup> March					1	20	2	10	3	15
4	4 <sup>th</sup> February			1	10	2	10	3	0	4	10
<b>Number of Users in month <math>m</math> (<math>D_m</math>)</b>		<b>1</b>		<b>2</b>		<b>3</b>		<b>3</b>		<b>3</b>	
<b>Active Minutes in <math>m</math> (<math>SD_m</math>)</b>		<b>10</b>		<b>10</b>		<b>45</b>		<b>10</b>		<b>25</b>	
<b>Number of users in <math>t</math> months after the month of the download (<math>D_{t,m}</math>) for <math>t = 3</math> and <math>m = 5</math></b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>3</b>	
<b>Active Minutes for <math>t = 3</math> (<math>SD_t</math>)</b>		<b>0</b>		<b>0</b>		<b>15</b>		<b>0</b>		<b>15</b>	

Table 8: Example for calculation for  $KPI_{ASD1,m}$  and  $KPI_{ASD2,t,m}$

Time specification	Variables and KPI	Indication
<b>m = 3</b>	Number of users ( $D_m$ )	3 user
	Minutes spend ( $SD_m$ )	45 minutes
	<b><math>KPI_{ASD1,m}</math></b>	<b>15 minutes/user</b>
<b>t = 3 &amp; m = 5</b>	Number of users ( $D_{t,m}$ )	3 user
	Minutes spend ( $SD_t$ )	30 minutes
	<b><math>KPI_{ASD2,t,m}</math></b>	<b>10 minutes/user</b>

The interpretation for both  $KPI$ s is the following. The  $KPI_{ASD}$  is increasing if the session duration is increasing or the number of downloads are decreasing. An increase of the  $KPI_{ASD}$  is a sign for more activity in the app. The  $KPI_{ASD1,m}$  shows the activity level of the users since the release of the app and the  $KPI_{ASD2,t,m}$  gives the activity level of the users since their download of the app. The combination of both indicators depicts a clear picture of the activity development in minutes per user over time.

Because this project is based on a field experiment and therefore the suggestions for a success indication are very similar for  $KPI_{ASD1,m}$  and  $KPI_{ASD2,t,m}$ . Table 9 gives an overview of  $KPI_{ASD1,m}$  measured in minutes, to check whether the project was a success, promising or missed the target:

**Table 9: Success indication for the  $KPI_{ASD1,m}$**

Month m after release	Success	Promising	Missed the Target
m=1	> 30 minutes per user	30 to 10 minutes per user	< 10 minutes per user
m=2	> 30 minutes per user	30 to 10 minutes per user	< 10 minutes per user
m=3	> 15 minutes per user	15 to 5 minutes per user	< 5 minutes per user
m=12	> 15 minutes per user	15 to 3 minutes per user	< 3 minutes per user

Table 10 gives an overview of  $KPI_{ASD2,t,m}$  measured in minutes, to check whether the project was a success, promising or missed the target:

**Table 10: Success indication for the  $KPI_{ASD2,t,m}$**

Month t after the download of the app	Success	Promising	Missed the Target
t=1	> 30 minutes per user	30 to 10 minutes per user	< 10 minutes per user
t=2	> 30 minutes per user	30 to 10 minutes per user	< 10 minutes per user
t=3	> 15 minutes per user	15 to 5 minutes per user	< 5 minutes per user
t=12	> 15 minutes per user	15 to 3 minutes per user	< 3 minutes per user

### 3.1.3 Average Numbers of Bets ( $KPI_{NB1,m}$ and $KPI_{NB2,t,m}$ )

In the game the players have to make everyday a bet about their energy consumption. The  $KPI_{NB}$  measures the average number of bets of the users within a certain time period. The  $KPI_{NB}$  is divided into two indicators:

The  $KPI_{NB1,m}$  is an indicator which measures the average numbers of bets of the users in month m.

The first indicator shows the development of the average number of bets of the users in month m since the app release.

The  $KPI_{NB1,t,m}$  is an indicator which measures the average numbers of bets of the users in month t after the app download.

It therewith shows the development of the average number of bets of the users since their app download.

Like the indicators before, the number of bets is also an indicator for the activity level of the customers. To calculate this indicator the number of bets per user, within a cohort, within a certain month is needed. The difference to the number of active users, is that the users have to participate in the game with giving a bet on their consumption. It is not sufficient just to be logged in into the app. Furthermore the numbers of bets per user are restricted by one bet a day.

**Table 11: Variables for the calculation of Average Numbers of Bets key performance indicator**

Variable	Symbol	Units	Description
<b>Bets in month m</b>	$B_m$	# of bets	Total number of bets in month m
<b>Number of users in month m</b>	$D_m$	# of users	Number of all users which downloaded the app until month m
<b>Number of users in month t after the month of the download</b>	$D_{t,m}$	# of users	Number of users that have the app at least since t month. Example: In May (see Table 12) $D_{3,5}=3$ , since in May (m=5) 3 users have had the app since at least 3 months. Likewise is $D_{3,4}=2$ .
<b>Bets in t months after the month of the download</b>	$B_t$	# of bets	Total number of bets of all users who set a bet at least once in month t.

$$KPI_{NB1,m} = \frac{B_m}{D_m} \quad \text{Eq. 5}$$

$$KPI_{NB2,t,m} = \frac{B_t}{D_{t,m}} \quad \text{Eq. 6}$$

Table 12 provides an example for the calculation of the  $KPI_{NB1,m}$  and  $KPI_{NB2,t,m}$ . The  $KPI_{NB1,m}$  with  $m=3$ , is calculated by dividing the number of all users which have downloaded the app until month  $m = 3$  by the numbers of bets in month  $m = 3$ . In the example 3 users have downloaded the app until month  $m = 3$  and they placed 45 bets in month  $m = 3$ , which gives an  $KPI_{NB1,m}$  of 15 bets per user. The  $KPI_{NB2,t,m}$  for  $t = 3$  and  $m=5$ , is calculated by dividing the number of all users whose app download is at least 3 months ago in month  $m = 5$  by the session duration of these users in month  $t = 3$ . According to the example 3 users have downloaded the app at least 3 months ago in month  $m = 5$  and placed 30 bets in  $t = 3$ , which gives an  $KPI_{NB2,t,m}$  of 10 bets per user.

### Example Average Bets ( $KPI_{NB1,m}$ and $KPI_{NB2,t,m}$ )

**Table 12: Example Average Bets ( $KPI_{NB1,m}$  and  $KPI_{NB2,t,m}$ )**

Assumption: App release 1 <sup>st</sup> January		m = 1		m = 2		m = 3		m = 4		m = 5	
		January		February		March		April		May	
ID	Date of download	t	# of bets	t	# of bets	t	# of bets	t	# of bets	t	# of bets
1	20 <sup>th</sup> January	1	10	2	0	3	15	4	0	5	0
3	30 <sup>th</sup> March					1	20	2	10	3	15
4	4 <sup>th</sup> February			1	10	2	10	3	0	4	10
<b>Number of Users in month m (<math>D_{i,m}</math>)</b>		1		2		3		3		3	
<b>Number of bets in m (<math>B_{i,m}</math>)</b>		10		10		45		10		25	
<b>Number of users in month t after the month of the download (<math>D_{t,m}</math>) for t=3 and m = 5</b>		0		0		0		0		3	
<b>Number of bets (<math>B_t</math>) in t = 3</b>		0		0		15		0		15	

**Table 13: Example for calculation of  $KPI_{NB1,i,m}$  and  $KPI_{NB2,t,m}$**

Time specification	Variables and KPI	Indication
<b>m = 3</b>	Number of users ( $D_m$ )	3 user
	Number of bets ( $B_m$ )	45 bets
	<b><math>KPI_{NB1,m}</math></b>	<b>15 bets/user</b>
<b>t = 3 &amp; m = 5</b>	Number of users ( $D_{t,m}$ )	3 user
	Number of bets ( $B_t$ )	30 bets
	<b><math>KPI_{NB2,t,m}</math></b>	<b>10 bets/user</b>

The  $KPI_{NB}$  increases if the numbers of bets over a month are increasing or if total users over a month are decreasing. The  $KPI_{NB1,m}$  shows the average number of bets per user since the release of the app and the  $KPI_{NB2,t,m}$  gives the average number of bets per users since their download of the app. The combination of both indicators depicts a clear picture of the placement of bet development in bets per user over time.

As already mentioned this project is based on a field experiment and therefore the suggestions for a success indication are very similar for  $KPI_{NB1,m}$  and  $KPI_{NB2,t,m}$ . Table 14 gives an overview of  $KPI_{NB1,m}$  measured in placed bets, to check whether the project was a success, promising or missed the target:

**Table 14: Success indication for the  $KPI_{NB1,m}$**

Month m after release	Success	Promising	Missed the Target
<b>m=1</b>	> 15 bets per user	15 to 5 bets per user	< 5 bets per user
<b>m=2</b>	> 15 bets per user	15 to 5 bets per user	< 5 bets per user
<b>m=3</b>	> 10 bets per user	10 to 5 bets per user	< 5 bets per user
<b>m=12</b>	> 5 bets per user	5 to 3 bets per user	< 3 bets per user

Table 15 gives an overview of  $KPI_{NB2,t,m}$  measured in placed bets, to check whether the project was a success, promising or missed the target:

**Table 15: Success indication for the  $KPI_{NB2,t,m}$**

Month t after the download of the app	Success	Promising	Missed the Target
<b>t=1</b>	> 15 bets per user	15 to 5 bets per user	< 5 bets per user
<b>t=2</b>	> 15 bets per user	15 to 5 bets per user	< 5 bets per user
<b>t=3</b>	> 10 bets per user	10 to 5 bets per user	< 5 bets per user
<b>t=12</b>	> 5 bets per user	5 to 3 bets per user	< 3 bets per user

### 3.1.4 Number of downloads ( $KPI_{DOW,m}$ )

The number of downloads indicates the popularity of the app. A large number of downloads shows high popularity for the app but it don't gives information about the usage of the app. Therefore the number of downloads should

be combined with the other *KPIs* which have been defined before to get an clearer view about customer satisfaction with the app.

The  $KPI_{DOW,m}$  shows the number of downloads compared to the number of customers to whom the app was offered.

**Table 16: Variables for the calculation of Number of downloads key performance indicator**

Variable	Symbol	Units	Description
<b>Total Target Group</b>	$N$	# of people	Number of customers of the energy supplier to whom the app was offered
<b>Number of users in month m</b>	$D_m$	# of users	Number of all users which downloaded the app until month m.

$$KPI_{DOW,m} = \frac{D_m}{N} \quad \text{Eq. 7}$$

To answer the question what is a good number of downloads is difficult because it is depending on the target of a project. Because in this project a field experiment is started with special circumstances following range for the  $KPI_{DOW,m}$  after 12 months is suggested to check whether the project is a success, promising or missed the target:

**Table 17: Success indication for the  $KPI_{DOW,m}$**

Month m after release	Success	Promising	Missed the Target
$KPI_{DOW,m}$	> 80%	80 % to 60 %	< 60 %

### 3.1.5 Call-Center Calls ( $KPI_{CCC}$ )

$KPI_{CCC}$  depicts the total number of call-center calls and gives also an overview about the topics which have been discussed with the customers.

On the one hand it is important for the energy supplier to know how intensive the call-center is used by the customers, to be able to react with additional personal if necessary. On the other hand the customers are giving feedback about the app through call-center calls. Problems can be detected which have not been clear before by the support of the customers which are calling the call-center. Many complaints are a strong sign for problems which have to be repaired. The  $KPI_{CCC}$  can be measured in two ways:

**Quantitative:** total number of call-center calls and total time of calls in minutes

**Qualitative:** reasons for calling. Following list is a suggestion for the division of reasons for calling:

- Questions
- Complaints
- Improvement suggestions

## 3.2 Business related key performance indicators

In case that the energy supplier offers an app to his final customers, which was developed by a software company, different types of costs arise. This section focuses on *KPIs* which are related with the costs for an app on the Energy supplier side level, which is offering the app to his final customers. The software firm provides the app and its maintenance for the Energy supplier and charges fees for the app. Furthermore costs arise on the energy supplier's side to keep the app running and to fulfil the end customer's needs. The Energy supplier will be confronted with non-recurring costs and recurring-costs which can be divided into external and internal costs.

### 3.2.1 Non-Recurring Costs ( $KPI_{NRC}$ ) and Recurring Costs ( $KPI_{RC}$ )

Term	Description
<b>Non-Recurring Costs</b>	Are expenses which arise once and are related to investments for the implementation of the app.
<b>Recurring Costs</b>	Are expenses which arise periodically and are related to the maintenance of the app.
<b>Internal Costs</b>	Costs which are related to the app and arise for the Energy supplier within its business processes. Examples: Software infrastructure, customer support.
<b>External Costs</b>	The Energy supplier has to pay for the usage of the app. The contracting partner, the software company, is charging fees from the Energy supplier. Examples: Licence fees, maintenance costs.

Table 18 gives an overview about the type of costs for the energy supplier buying an app:

**Table 18: Examples for Single and Periodic Payments**

	Type of payment	Examples
<b>Non-Recurring Costs</b>	Internal	Hardware expenditures
	External	Individual surface of the app
<b>Recurring Costs</b>	Internal	Customer support, personal costs, administration
	External	Licence fee, Maintenance cost

The  $KPI_{NRC}$  and  $KPI_{RC}$  are defined as follows:

**Table 19: Variables for the calculation of Single and Periodic Payments key performance indicators**

Variable	Symbol	Units	Description
<b>Total Target Group</b>	$N$	Number of People	Number of customers of the energy supplier to whom the app was offered
<b>Non-Recurring Costs</b>	$NRC$	€	Sum of all Non-Recurring Costs
<b>Recurring Costs</b>	$RC$	€	Sum of all Recurring Costs

$$KPI_{NRC} = \frac{NRC}{N} \quad \text{Eq. 8}$$

$$KPI_{RC} = \frac{RC}{N}$$

Eq. 9

$KPI_{NRC}$  and  $KPI_{RC}$  are set into relation with the total number of the target group within a cohort. It is assumed that Non-Recurring Costs and Recurring Costs are increasing in certain steps with the number of people of the target group. If the number of people is exceeding a certain step, where new investments have to be made,  $KPI_{NRC}$  and  $KPI_{RC}$  are increasing. Therefore it is interesting to make comparisons for small, middle and a large size of target group. Furthermore both indicators are decreasing if single and periodic payments are decreasing. To judge whether the costs are too high has to be specified by the management of the energy supplier.





## 4 List of Tables

Table 1: Variables for the calculation of Active User key performance indicators ..... 7

Table 2: Example Active User ( $KPI_{AU1,m}$  and  $KPI_{AU2,t,m}$ )..... 7

Table 3: Example for calculation of  $KPI_{AU1,m}$  and  $KPI_{AU2,t,m}$  ..... 8

Table 4: Success indication for the  $KPI_{AU1,m}$ ..... 8

Table 5: Success indication for the  $KPI_{AU2,t,m}$ ..... 8

Table 6: Variables for the calculation of Average Session Duration key performance indicators ..... 9

Table 7: Example Average session duration ( $KPI_{ASD1,m}$  and  $KPI_{ASD2,t,m}$ ) ..... 10

Table 8: Example for calculation for  $KPI_{ASD1,m}$  and  $KPI_{ASD2,t,m}$ ..... 10

Table 9: Success indication for the  $KPI_{ASD1,m}$  ..... 11

Table 10: Success indication for the  $KPI_{ASD2,t,m}$  ..... 11

Table 11: Variables for the calculation of Average Numbers of Bets key performance indicator ..... 12

Table 12: Example Average Bets ( $KPI_{NB1,m}$  and  $KPI_{NB2,t,m}$ ) ..... 12

Table 13: Example for calculation of  $KPI_{NB1,i,m}$  and  $KPI_{NB2,t,m}$  ..... 13

Table 14: Success indication for the  $KPI_{NB1,m}$ ..... 13

Table 15: Success indication for the  $KPI_{NB2,t,m}$ ..... 13

Table 16: Variables for the calculation of Number of downloads key performance indicator..... 14

Table 17: Success indication for the  $KPI_{DOW,m}$ ..... 14

Table 18: Examples for Single and Periodic Payments..... 15

Table 19: Variables for the calculation of Single and Periodic Payments key performance indicators..... 15

## 5 Annex

### 5.1 Variable List

The following table contains the variables which will be generated in the PEAKapp project. The term user is defined as follows:

The PEAKapp **user** references one account to the PEAKapp system where one account is presenting one household.

Variable Name	Var ID	Unit of measurement	Unit of observation	Description
<b>Installation</b>				
Number of downloads at month m	$D_m$	# in M1, # in M2, ...	# of users	This variable contains the number of downloads per month.
Number of users in month t after the month of the download	$D_{t,m}$	# in M1, #in M2, ...	# of users	This variable contains the number of downloads in month t after the month of the download
Dates of the downloads per user	$DD_i$	Date	per download per user	This variable contains the date of download.
Number of electronic appliances connected	$NA_i$	# of appliances	# of appliances per user	This variable contains the number of appliances per user i.
OS Type	$OS_i$	Type, e.g. Android	per download per user	This variable contains the Type of Software per user i with the download date
App Version	$AV_i$	Version, e.g. PEAKapp v1.05	per update per user	This variable contains the new versions/updates per user i.
<b>App usage in general</b>				
Active users in month m (m=months since app release, m=1: month off app release)	$A_m$	# in M1, #in M2, ...	# of users	This variable contains the number of active users in month m
Number of log-ins per user per /month	$NL_i$	# in M1, #in M2, ...	per user	This variable contains the number of log-ins per user i in month m.
Active users in month t after the month of the download	$A_t$	# in M1, #in M2, ...	# of users	This variable contains the number of active users in the app in month t after the month of the download of the app.



Session Duration of users in month m	$SD_m$	Minutes	# of users	This variable contains the session duration of the app users in month m.
Session Duration of users in month t after the month of the download	$SD_t$	Minutes	# of users	This variable contains the session duration of the app users in month t after the month of the download.
Date, Daytime of each app use	$DU_i$ $DTU_i$	Date, daytime	per access of the app	This variable contains the Date/Daytime of the log-in into the app per user i.
<b>Consumption information</b>				
Number of accessing the normal consumption information per month (i.e. all pages related to Cluster 1 as in the GA)	$NNC_{i,m}$	# in M1, # in M2, ...	per user	This variable contains the number of accesses into the normal consumption information per user i in month m.
Date, Daytime of accessing Cluster 1 pages	$DNC_i$ $DTNC_i$	Date, daytime	per access of Cluster 1 pages	This variable contains the Date, Daytime of accessing Cluster 1 pages per user i.
Duration of accessing Cluster 1 pages	$SDNC_i$	Minutes	per access of Cluster 1 pages	This variable contains the session duration of accessing Cluster 1 pages per user i in month m in minutes.
Number of accessing a Benchmark per month (i.e. all pages related to Cluster 2 as in the GA)	$NBM_{i,m}$	# in M1, # in M2, ...	per user	This variable contains the number of accesses in the Benchmark per user I month m.
Date, Daytime and Type of requesting a benchmark.	$DBM_i$ $DTBM_i$ $TBM_i$	Date, day time, type	Date, daytime, type	This variable contains the Date, Day time and type of requesting a benchmark per user i. The Type of a benchmark is its respective timeframe, i.e. whether a monthly benchmark was requested, or a weekly benchmark, or....
Duration of requesting a benchmark	$SDBM_i$	Minutes	per request of a Benchmark	This variable contains the session duration of requesting a benchmark per user i in month m in minutes.

Price-related information				
Widget for retrieving price information	$P_i$	1 / 0	per user	This variable contains the number of users who use a widget for retrieving price information with 1 = user uses widget and 0 = user don't uses widget.
The finally applied prices/discounts	$FP_i$	user price per hour during the field test (around 8600 values)	one file for the Austrian field test	This variable contains the end-user price/discount per hour during the field test.
Serious Gaming				
Number of accessing the serious game per month (i.e. all pages related to Cluster 4 as in the GA)	$NSG_{i,m}$	# in M1, # in M2, ...	per user	This variable contains the number of accesses into the serious game per user i in month m.
Number of total points scored per user, per month	$NTP_{i,m}$	# in M1, # in M2, ...	per user	This variable contains the number of total points scored per user i in month m.
Number of total points scored by tweaking per user, per month	$TTP_{i,m}$	# in M1, #in M2, ...	per user	This variable contains the number of total points scored by tweaking per user i in month m.
Number of accessing the hints	$NH_{i,m}$	# in M1, #in M2, ...	per user	This variable contains the number of accesses of the hints per user i in month m.
Date, Daytime of using the serious game	$DSG_i$	Date, daytime	Date, daytime	This variable contains the Date/Daytime of using the serious game.
Duration of using the serious game	$SDSG_i$	Minutes	per user	This variable contains the duration session of using the serious game per user i in month m.
All stats earned/achieved/... ? in the serious game	$ST_i$	? tbd	per user	This variable contains all stats earned/achieved/... in the serious game per user i in month m.
Date of setting a bet	$DB_i$	Date, daytime	per user	This variable contains the date when a bet was placed per user i.
Bets in month m	$B_m$	# in M1, # in m2, ...	# of users	This variable contains the number of bets in month m.



Bets in month t after the month of the download	$B_t$	# in M1, # in M2, ...	# of users	This variable contains the number of bets in t month after the month of the download.
<b>Social Networking</b>				
Monthly number of facebook posts done from PEAKapp	$FP_{i,m}$ $FP_{i,t}$	# in M1, # in M2, ...	per user	This variable contains the monthly number of facebook posts done from PEAKapp
Date and Type of facebook post	$DFP_i$ $TFP_i$	Date and type	per facebook post	This variable contains the Date and Type per facebook posts. Type can be a consumption information, a benchmark, money saved through dynamic prices over a certain time period, a game score, etc
<b>Push messages</b>				
The sent push messages	$PM_i$	text	per message per user	This variable contains the sent push messages per message/user i
The date and time of the sent push messages	$DPM_i$ $DTPM_i$	Date and time	per message per user	This variable contains the date and time of the sent push messages per message/user i
<b>Others</b>				
Total Target Group	$N$	Number of People	Customer of Energy supplier with Smart Meters within a certain cohort	This variable contains the total number of the target group of the energy supplier.
Call Center calls	$CC$	Quantitative: Amount of calls Qualitative: Type of calls (complains, questions, improvement suggestions,...)	# of call center call	This variable contains the total number of call center calls which are related to the PEAKapp project.
Meter Data	$SMD_i$	Load profile	per user	This variable contains the smart meter data per user i.