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D5.6 – SIMPATICO Platform Validation Report v2

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WP: WP5 – Integration and Environment Setup

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Glossary

Acronym	Definition
AAC	Authentication and Authorization Control
API	Application Programming Interface
AST	Authoring Support Tool
CDV	Citizen Data Vault
CKB	Collective Knowledge Base
CORS	Cross-Origin Resource Sharing
COTS	Commercial Off-The-Shelf
CPD	Collaborative Procedure Design
CTZP	Citizenpedia
DA	Data Analysis
DB	Dashboard
EE	Enrichment Engine
EFF	Effort
ES	Spain
eSM	e-Service Monitor
EU	Europe
GE	Gamification Engine
HTML	HyperText Markup Language
IFE	Interactive Front-End
IT	Italy
IUC	Integration Use Cases
JSON	JavaScript Object Notation
KPI	Key Performance Indicator
PA	Public Administration
PH	Person Hour
QAD	Quality Assessment of Documentation
QAE	Question Answering Engine

QAI	Quality Assessment of Integration
QAR	Quality Assessment of Deployment
QAS	Quality Assessment of Security
QASCM	Quality Assessment of Source Code Management
QAT	Quality Assessment of Testing
QAU	Quality Assessment of Usability
REST	Representational State Transfer
RO	Research Objective
RPC	Remote Procedure Call
SCM	Source Code Management
SF	Session Feedback
SSO	Single Sign-On
STEP	Standard Technical Evaluation Process
TAE	Text Adaptation Engine
UI	User Interface
UK	United Kingdom
UP	User file
WAE	Workflow Adaptation Engine

Executive summary

This document corresponds to deliverable “D5.6 – SIMPATICO platform validation report v2” of the European H2020 project “SIMPATICO – SIMplifying the interaction with Public Administration Through Information technology for Citizens and cOmpanies” (hereinafter also referred to as “SIMPATICO”, project reference 692819).

The aim of this document is to present the evaluation of SIMPATICO platform for the second phase of experimentation. An updated definition of **uses-cases** regarding the **integration** among the components of the SIMPATICO platform was released and their evaluation is necessary to validate the platform. It is also necessary to evaluate the quality of all the components that are part of the SIMPATICO platform according to different criteria comparing them with the evaluation conducted in the first phase of experimentation; in particular, the **quality** of the **documentation**, **security** issues, **usability** issues and **source code** should be evaluated for each component. Finally, the **KPIs** proposed to evaluate the SIMPATICO technical platform are presented, together with their obtained values once a workable version of the platform has been made available for the second phase of evaluation. The results of the two phases will be compared and analysed. Please take into account the Sheffield pilot task force has not been able to measure the KPIs due to problems in the execution of the pilot. This is the reason why only Trento and Galicia will be analysed as use cases.

1 Introduction

This deliverable presents the outcomes of SIMPATICO project task T5.4 “*Technical validation of the SIMPATICO platform*” in the scope of WP5 “*Integration and environment setup*”.

During the second experimentation phase of SIMPATICO within the three use-cases, the SIMPATICO platform has been evaluated not only in technical sense but also the practical ability of the platform to support the general requirements coming from T5.1. This evaluation is presented in this document.

To better understand the aim and scope of this document, in this introductory section we provide an overview of the SIMPATICO project (Section 1.1) and a description of the structure of the rest of this deliverable (Section 1.2).

1.1 SIMPATICO project

SIMPATICO's goal is **to improve the experience of citizens and companies in their daily interactions with the public administration** by providing a personalized delivery of **e-services** based on advanced **cognitive system technologies** and by promoting an active engagement of people for the continuous improvement of the interaction with these services. The SIMPATICO approach is realized through a platform that can be deployed on top of an existing PA system and allows for a **personalized service delivery** without having to change or replace its internal systems: a process often too expensive for a public administration, especially considering the cuts in resources imposed by the current economic situation.

The goal of SIMPATICO is accomplished through a solution based on the **interplay of language processing, machine learning and the wisdom of the crowd** (represented by citizens, business organizations and civil servants) **to change for the better the way citizens interact with the PA. SIMPATICO adapts the interaction process** to the characteristics of each user; **simplifies** text and documents to make them understandable; **enables feedback for the users** on problems and difficulties in the interaction; **engages civil servants, citizens and professionals** so as to make use of their knowledge and integrate it in the system (Figure 1).

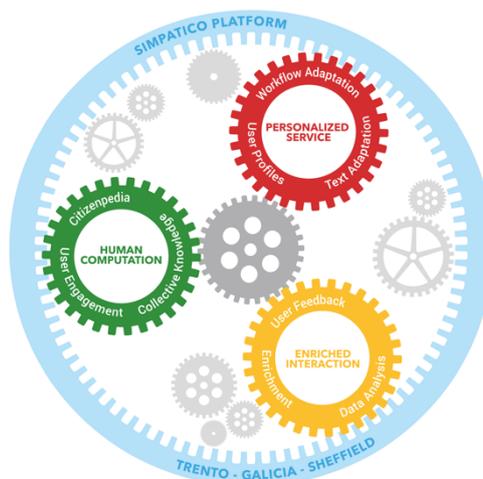


Figure 1: SIMPATICO concept as a glance

The project aims can be broken down into the following **smaller research objectives (ROs)**.

RO1. Adapt the interaction process with respect to the profile of each citizen and company (PA service consumer), in order to make it clear, understandable and easy to follow.

- A **text adaptation** framework, based on a **rich text information layer** and on machine learning algorithms capable of **inducing general text adaptation operations** from **few examples, and of customizing these adaptations to the user profiles**.
- A **workflow adaptation engine** that takes user characteristics and tailor the interaction according to the user's profile and needs.
- A feedback and annotation mechanism that **gives users the possibility to visualize, rate, comment, annotate, document the interaction process** (e.g., underlying the most difficult steps), so as to provide valuable feedback to the PA, further refine the adaptation process and enrich the interaction.

RO2. Exploit the wisdom of the crowd to enhance the entire e-service interaction process.

- An **advanced web-based social question answering engine (Citizenpedia)** where citizens, companies and civil servants **discuss and suggest potential solutions and interpretation for the most problematic procedures and concepts**.
- A **collective knowledge** database on e-services used to simplify these services and improve their understanding.
- An **award mechanism** that **engages users and incentivizes them to collaborate** by giving them **reputation** (a valuable asset for professionals and organizations) and **privileges** (for the government of Citizenpedia – a new public domain resource) according to their contributions.

RO3. Deliver the SIMPATICO Platform, an open software system that can interoperate with PA legacy systems.

- A platform that **combines consolidated e-government methodologies with innovative cognitive technologies** (language processing, machine learning) at different level of maturity, enabling their experimentation in more or less controlled operational settings.
- An interoperability platform that enables an **agile integration of SIMPATICO's solution with PA legacy systems** and that allows the exploitation of data and services from these systems with the SIMPATICO adaptation and personalization engines.

RO4. Evaluate and assess the impact of the SIMPATICO solution

- Customise, deploy, operate and evaluate the SIMPATICO solution on **three use-cases in two EU cities** – Trento (IT) and Sheffield (UK) – **and one EU region** – Galicia (ES).
- **Assess the impact** of the proposed solution in terms of **increase in competitiveness, efficiency of interaction and quality of experience**.

This deliverable focuses in particular on the RO4, covering the evaluation and assessment of the SIMPATICO effectiveness and impact by highlighting the pilots' point of view. Each pilot city presented its experience in using the tools available within the SIMPATICO environment.

In particular, each use-case presented strengths and weaknesses of each tool. Furthermore, pilots also proposed some enhancements for the future releases of the platform.

Before proceeding with the report, a recap about the tools offered by the SIMPATICO platform is presented. The latter is then followed by an introduction about the document's sections.

1.2 Structure of the deliverable

The remainder of the deliverable is organized as follows:

Section 2 recaps the results obtained during the first phase of evaluation and states the target to be achieved during the second phase.

Section 3 describes the update of integration use-cases of SIMPATICO platform. Each use-case will be evaluated within the technical platform provided by the three cities involved in the project.

Section 4 describes the quality assessment of the SIMPATICO platform for the second phase, taking into account seven different macro-areas. Moreover, the component issues are collected through the GitHub repository in order to be traced.

Section 5 shows the feedback on the installation, configuration and deployment of the SIMPATICO platform gathered through a survey given to the technical team responsible to install the platform in each city in the second phase, updating that one already installed in the first phase.

In the end, the **Conclusion** section summarizes all the evaluation results achieved.

2 Recap of SIMPATICO platform evaluation for 1st phase

The first experimentation phase took place from M16 (June 2017) to M20 (October 2017) and the related evaluation can be summarized for the each Use Case and for the whole SIMPATICO project, as follows:

Table 1: First phase of evaluation - measured KPIs for each Use Case

KPI name	KPI description	Target	Trento	Galicia	Sheffield
KPI_IUC_01	Percentage of the Integration Use-Cases achieved and operating	75%	100%	77%	60%
KPI_FoS_02	The average value of the answers provided by the interviewees	3,5	3,44	3,85	3,11
KPI_EFF_03	Efforts needed to install the SIMPATICO infrastructure	<50 PH	8 PH	60 PH	80 PH
KPI_EFF_04	Effort needed to connect the SIMPATICO infrastructure with repositories and/or legacy applications	<80 PH	40 PH	N/A	120 PH
KPI_EFF_05	Effort needed for daily operational tasks	<1 day	1 day	1 day	1 day
KPI_PRO_06	No. of incidents encountered	<10	0	10	5

The evaluation for the first phase of experimentation can consider passed, being each KPI (but only one) for the whole SIMPATICO project meets the target fixed in the planning phase, as shown in the Table 2.

Table 2: First phase of evaluation for the whole SIMPATICO project

KPI name	KPI description	Target	SIMPATICO
KPI_IUC_01	Percentage of the Integration Use-Cases achieved and operating	75%	79%
KPI_FoS_02	The average value of the answers provided by the interviewees	3,5	3,46
KPI_EFF_03	Efforts needed to install the SIMPATICO infrastructure	<50 PH	49 PH
KPI_EFF_04	Effort needed to connect the SIMPATICO infrastructure with repositories and/or legacy applications	<80 PH	80 PH
KPI_EFF_05	Effort needed for daily operational tasks	<1 day	1 day
KPI_PRO_06	No. of incidents encountered	<10	5

The new target to be met for the second phase of experimentation is stated in the Table 3:

Table 3: Target to be met for the second phase of experimentation

KPI name	KPI description	Target
KPI_IUC_01	Percentage of the Integration Use-Cases achieved and operating	100%
KPI_FoS_02	The average value of the answers provided by the interviewees	4
KPI_EFF_03	Efforts needed to install the SIMPATICO infrastructure	40 PH
KPI_EFF_04	Effort needed to connect the SIMPATICO infrastructure with repositories and/or legacy applications	60 PH
KPI_EFF_05	Effort needed for daily operational tasks	0.5 day
KPI_PRO_06	No. of incidents encountered	<5

Other specific KPIs on Quality Assessment and Issue Tracking will be analysed in Section 4.

3 Integration Use-cases updated for the 2nd phase

This section aims at updating the use-cases regarding the integration among the components belonging to the SIMPATICO platform, already defined before the first phase of experimentation in D5.5 [1].

The Table 4 describes all the use-cases component by component. In the table the following information are highlighted:

- Component: the component taken into account
- Use case: the short name of the use-case
- Synopsis: brief description of the use-case
- Components: the components involved in the use-case
- Dependencies: the dependencies of the current use-case from the other use-cases
- Pre Requisites: the requirements that the system has to satisfy before running the current use-case in order to be able to work
- Behaviour: the foreseen behaviour that the use-case has to perform
- Effect: what happens after the execution of the use-case

3.1 Integration Use-Cases description

The following table (Table 4) contains the use-cases valid for the second phase of experimentation.

Table 4: Integration Use-Cases

COMPONENT	USE CASE	SYNOPSIS	COMPONENTS	DEPENDENCIES	PRE-REQUISITES	BEHAVIOUR	EFFECT
IFE	IFE1	Login	IFE, AAC			Open a service page, press login button. A new window where AAC authentication takes place. Upon window closure, the toolbar is updated and user name is shown	User is authenticated, toolbar unlocked, user name is shown
	IFE2	Session execution	IFE, LOG			User starts/terminates the e-service session	Start/end session events are logged and appear in LOG
	IFE3	E-service form compilation	IFE, LOG			User starts/terminates compilation of the e-service module	Start/end form events are logged and appear in LOG component
	IFE4	Access to an annotated element	IFE, LOG			User access any annotated element (TAE, QAE, CDV)	Click event is logged and appears in LOG component

CDV	CDV1	Link Account to Service	IFE, CDV, AAC	IFE1	e-service is configured in CDV.	Click CDV button in toolbar, CDV popup is shown. Popup asks the user to create a new CDV account and link it to the service	A new account is registered in CDV. Account is linked to the current e-service
	CDV2	Save user data	IFE, CDV	IFE1, CDV1	e-service is configured in CDV. the user has created a CDV account	The user fills in the eservice form and clicks on the "Save Data" button shown in CDV popup	The user data are saved in CDV
	CDV3	Read/populate user data	IFE, CDV	IFE1, CDV1, CDV2	e-service is configured in CDV. the user has already created a CDV account	During the eservice form compiling, the user can use his/her own data already stored in the CDV selecting them by drop down menu in the requested field	The user can fill in the eservice form retrieving the data in the CDV, previously saved
	CDV4	Read/populate user data	IFE, CDV	IFE1, CDV1, CDV2	e-service is configured in CDV. the logged user has already created a CDV account	During the eservice form compiling, the user can use his/her own data already stored in the CDV selecting them by drop down menu in the requested field	The user can fill in the eservice form retrieving the data in the CDV, previously saved

TAE	TAE1	Free text simplification	IFE,TAE,LOG	IFE1		Select a phrase and click on "Free text simplification" toolbar button. A popup appears, tabs show enriched text.	Each tab shows content from TAE. Phrase simplification event is registered in LOG component
	TAE2	Free text simplification	IFE,TAE,LOG	IFE1		Select a phrase and click on "Free text simplification" toolbar button. A popup appears, tabs show enriched text.	Each tab shows content from TAE and asks for feedback. Sentence simplification event is registered in LOG component
	TAE3	Free word simplification	IFE,TAE,LOG	IFE1		Select a single word and click on "Free text simplification" toolbar button. A popup appears, tabs show enriched word.	Corresponding tab show content from TAE. Word simplification event is registered in LOG component
	TAE4	Annotated text simplification	IFE,TAE,LOG	IFE1	E-service elements are annotated with a specific CSS class	The e-service page text elements are annotated. The user clicks the "Text simplification button". The annotated texts are highlighted. Clicking on decoration the simplified versions of text appear.	Text is decorated with enrichment elements. Paragraph simplification event is registered in LOG component

WAE	WAE1	Workflow simplification	IFE,WAE,LOG	IFE1	E-service workflow model is uploaded to WAE repository, form is annotated with the model URI value	Click "workflow adaptation" button. The simplified process starts (the page scrolls to the first workflow block, the block is highlighted, next/prev buttons are added). The user can execute the workflow	The workflow model is downloaded from the WAE repository, the engine starts the model execution. Workflow adaptation request event is registered in LOG component
QAE	QAE1	Login with AAC	QAE,AAC			User signs in using AAC	The user successfully logged in, the profile data is shown in QAE
	QAE2	See e-service questions	IFE,QAE,LOG	IFE1	e-service elements are annotated with a specific class corresponding to e-service paragraph	Click "QAE" toolbar button, the annotated page elements are highlighted. Clicking on the highlighted element shows the questions associated to the paragraph (if any) and a "add a question" link	The list of existing paragraph questions is associated to each annotated paragraph. Upon selecting a specific element, the 'Citizenpedia content request' event is registered in LOG component.
	QAE3	See specific question	IFE,QAE,LOG	IFE1,QAE2		User clicks on a specific question link. A Citizenpedia page with question details is opened in a new window.	Citizenpedia page is opened. The 'Citizenpedia question request' event is

							registered in the LOG component
	QAE4	Create new question	IFE,QAE,LOG	IFE1,QAE1, QAE2	e-service category is created	Within QAE2 scenario, user clicks the "add a question link". Another browser tab is opened with the precompiled Question form.	QAE is opened with the precompiled form for question creation. Once saved, the question appears in the corresponding paragraph section in IFE. The 'Citizenpedia new question' event is registered in LOG component
	QAE5	Create new answer	QAE,LOG	QAE1		Inside Citizenpedia, the user provides an answer to an existing question.	The number of answers associated to the question is incremented, the answer is saved in the DB. The 'new answer' event is registered in the LOG component
SF	SF1	SF is invoked	SF, IFE		A session is complete	The front-end side of the SF captures the appropriate event of the IFE and asks the back-end of the SF to display a feedback capture form.	The SF feedback form is presented in the front-end for the user to fill in their opinions.

	SF2	SF stores user feedback	SF, LOG	SF1	The user presses the 'Send' button in the SF UI.	The data that the user produces is compiled and stored as the current session's feedback in the LOG.	The LOG is updated with data from the last session.
	SF3	SF generates an appropriate feedback form	SF, LOG	SF1	The SF is invoked	The SF internal logic retrieves relevant data from the last session (e.g., was the text adaptation invoked at any stage) and designs an appropriate feedback form which is sent to the front-end part.	The SF front-end part receives the requested form.
CPD	CPD1	Login with AAC	CPD, AAC			User signs in using AAC	The user successfully logs in, the profile data is shown in CPD. Depending on the user role (citizen/civil servant) access to some functionality can be denied
	CPD2	Open an existing procedure diagram	CPD		The user has successfully logged in	The user opens a diagram from a list of available (previously created) administrative procedures	The user is presented with a graphical representation of the selected procedure

	CPD3	View existing questions	CPD, QAE		The user has opened an existing procedure diagram	The user selects to view the questions posted on a procedure's activity	The user gets re-directed to the QAE, where they are presented with all the questions related to that activity
	CPD4	Submit a new question	CPD, QAE		The user has opened an existing procedure diagram	The user selects to submit a new question on a procedure's activity	The user gets re-directed to the QAE, where they are provided with a text editor to write a new question related to that activity
	CPD5	Submit a feedback	CPD		The user has opened an existing procedure diagram	The user selects to submit a new feedback (suggestion, comment) on a procedure's activity	The user is presented with a pop-up editor to post a new feedback related to that activity
	CPD6	Start a collaborative process to design an administrative procedure	CPD		The Procedure owner has successfully logged in	The Procedure owner assigns participants to the collaborative process and instantiates it	A new collaborative process is instantiated and participants receive notifications

	CPD7	Execute a collaborative process	CPD		The collaborative process' participant has successfully logged in	The participant executes the task they have been assigned	The administrative procedure is published and available
DA	DA1	Data Analysis is invoked on schedule	DA		There exists some user interaction data in the LOG that can be processed.	The scheduling mechanism (e.g., cron) invokes the DA upon its required schedule (e.g., each minute, each hour). The DA executes its internal rules and data available in the LOG which hasn't been processed before is processed.	Aggregated processed data is stored in the LOG for further analysis by DA or representation in the EE
eSM	eSM1	eSM can access data	eSM, LOG, DA	eESM4	There is session data available		The eSM presents the available data statistics
	eSM2	CPD integration	eSM, CPD		The CPD API is available.	The eSM accesses the Collaborative Procedure Designer API to gather relevant data (e.g., e-service procedure SVG diagram).	The eSM back-end obtains the required data.
	eSM3	Citizenpedia integration	eSM, CTZP		The CTZP API is available.	The eSM accesses the Citizenpedia API to gather	The eSM obtains the required data.

						relevant data (e.g., statistics of usage per paragraph).	
	eSM4	Text for paragraphs is presented correctly	eSM		The text for e-services is adequately stored and accessible.	eSM is able to present text from the e-services so that the statistics, etc. can be referred to actual paragraphs.	The eSM obtains the required data which is presented in the tabs for QAE and TAE summaries.
AST	AST1	The text is analyzed and scores about it are provided	AST	TAE	The TAE must be running.	The AST accepts a text as input. It gives a list of information about text as output, such as difficulty measures, simplification suggestions and statistics on the text.	The data is shown in a web interface and can be used by the civil servant.
UPM	UPM1	Demographic data is sent to be stored in the UPM database	UPM, IFE	IFE		IFE requests demographic information from the user and send the data to be stored in the UPM	A request to add the demographic data is processed by the UPM database
	UPM2	Interaction data is sent to be stored in the UPM database (given a	UPM, DA	DA	There are interaction data in the LOG and such data has already been	DA processes the interaction data from the LOG and selects the interaction data requested by the UPM. This would happen in batches (every 24 hours for instance)	A request to add the interaction data is processed by the UPM database

		request from the UPM)			processed by the DA module		
	UPM3	TAE and WAE request user profile	UPM, TAE, WAE	TAE, WAE	There are data available in the UPM database	The TAE or WAE request data to the UPM. Such data maybe demographic data only, interaction data only or a mix o both. If UPM evolves and it is capable of learning profiles, a profile class could also be send	TAE and WAE obtain the required data

3.2 Integration Use-Case evaluation (2nd phase)

In this section the evaluation of Integration Use-Cases was carried out. The evaluation was performed in the three Use-Cases involved in the project. Both in Trento and Galicia the technical team has executed the use-case described in the Table 4 component by component. In the Table 5 the result of the integration use-case evaluation is reported, divided per component and city.

Three possible results are allowed:

- ✓ The use-case has been executed correctly
- ✗ The execution of use-case failed
- ≡ It was impossible to perform the use-case (e.g. some component was not deployed in this particular city). The KPI will be not affected by this possible result.

Table 5: Integration Use-Case evaluation

COMPONENT	USE CASE	TRENTO	GALICIA
IFE	IFE1	✓	✓
	IFE2	✓	✓
	IFE3	✓	✓
	IFE4	✓	✓
CDV	CDV1	✓	✓
	CDV2	✓	✓
	CDV3	✓	✓
	CDV4	✓	✓
TAE	TAE1	✓	≡
	TAE2	✓	✓
	TAE3	✓	≡
	TAE4	✓	✓
WAE	WAE1	✓	✓
QAE	QAE1	✓	✓
	QAE2	✓	✓
	QAE3	✓	✓
	QAE4	✓	✓

	QAE5	✓	✓
SF	SF1	✓	✓
	SF2	✓	✓
	SF3	✓	✓
CPD	CPD1	✓	✓
	CPD2	✓	✓
	CPD3	✓	✓
	CPD4	✓	✓
	CPD5	✓	✓
	CPD6	✓	≡
	CPD7	✓	≡
DA	DA1	✓	✓
eSM	eSM1	≡	✓
	eSM2	≡	✓
	eSM3	≡	✓
	eSM4	≡	✓
AST	AST1	✓	≡
UPM	UPM1	≡	≡
	UPM2	≡	≡
	UPM3	≡	≡

The evaluation for the second phase of experimentation has pointed out that the distribution of the percentage of the Integration Use-Cases achieved and operating for all the use-cases was **100% for Trento and Galicia**. In this way the target KPI was met.

4 Quality assessment (2nd phase)

In this version of the Validation Report we present the results of the quality assessment evaluation across components for the 2nd phase of the project. For the sake of readability, below we briefly present the descriptions of the quality assessment KPIs and the proposed targets. The results of the KPI evaluation is presented and discussed in Section 4.2.

4.1 Quality assessment of the SIMPATICO components platform

The quality of the platform components is evaluated across seven dimensions, namely:

- Integration and interoperability
- Documentation
- Security
- Usability
- Source Code Management
- Testing
- Deployment

We remark that the properties associated to these dimensions are in line with the guidelines defined for the components of the FIWARE platform [2]. That is, the SIMPATICO components that respect the metrics associated to the specified dimensions are FIWARE-compatible enablers.

Each of the dimensions defines (a set of) metric(s) that are used as quality assessment KPIs for the component.

Below the list of KPIs briefly described:

- **KPI_QAI_01: Exposure of APIs as JSON-based REST/RPC.** The functionality of the components is exposed via JSON REST/RPC APIs for the integration with other platform modules. The functionality in this way is made available for the server-side components and for the UI components (e.g., IFE).
- **KPI_QAI_02: Support for SSO.** For the hyperlink integration and for better user experience, different Web applications of the platform should support Single Sign-On to allow for using single credentials across different applications.
- **KPI_QAI_03: Support for CORS.** The services that expose APIs accessible on the client side should provide adequate support for Cross-Origin Resource Sharing (CORS) in order to access the component functionality across different domains (e.g., the one of the pilot platform deployment and the one, where the e-service is deployed).
- **KPI_QAD_01: Installation, configuration, and integration documentation in README.** Component README file providing i) the component installation instructions; ii) the component configuration instructions; and iii) component integration instructions defining the necessary steps to set up the integration with other components.
- **KPI_QAD_02: Swagger specification for the APIs.** For the components that expose REST API, these latter should be well defined and documented. Specifically, it is required that all APIs are provided with the Swagger specification describing the available API calls, parameters, and data types

- **KPI_QAD_03: Additional documentation (examples, tutorials, etc).** the documentation should provide the description of the usage scenarios of the component, examples (e.g., API call inputs and outputs, testing instructions, tutorials, howto, etc).
- **KPI_QAS_01: API-based components exposing sensitive operations are protected using AAC OAuth2.0 implementation.** OAuth2.0 allows for wide range of scenarios and is the protocol of reference for the API-based systems exposed also versus 3rd party deployments and federations.
- **KPI_QAS_02: Web-based components provide access to the sensitive functionality to authenticated users only.** Some of the SIMPATICO components deal with the personal data and therefore should guarantee secure and authenticated access to that data.
- **KPI_QAS_03: Centralized role management and access control.** Given the integrated nature of the component interactions and data exchange, the management of the user roles and access control should be centralized in order to avoid discrepancies in the role and authority interpretation.
- **KPI_QAU_01: Minimal browser support.** The component user interface should provide support for the wide range of widely used browsers, including IE10+, Chrome 47+, Firefox 38+, Safari 9+.
- **KPI_QAU_02: Multi-platform support and responsiveness.** The component UI should be properly visualized regardless the underlying platform. This also amounts to the responsive design¹ requirements. The platforms supported include, apart from desktop computers, mobile devices on Android 4.3+, iOS 8.3+, Windows 8.1.
- **KPI_QAU_03: Internationalization.** The UI of the component should support and should be adaptable to different user languages. This is also crucial for adoption of the components to the pilots in different countries.
- **KPI_QASCM_01: Use GitHub for SCM and issue tracking.** For the development, issue tracking, and documentation of the SIMPATICO platform component, GitHub has been selected as a source code management repository
- **KPI_QASCM_02: Adhere to FIWARE SCM guidelines.** This includes the guidelines for the source code branching, tagging, pull requests, etc [2].
- **KPI_QAT_01: Unit test coverage.** Apart from end-to-end integration test defined above, the components should provide a series of unit test with appropriate coverage regarding the APIs used by other components. The presence of unit tests is also fundamental for the adoption of Continuous Integration environment.
- **KPI_QAR_01: Docker containers provided.** To further improve the deployment procedure allowing for targeting different Cloud environments, it is required that the components provide the corresponding Docker container specification.
- **KPI_IT_01: Percentage of issues resolved.** The issues reported during the process of the component development, integration, evaluation should be appropriately managed and resolved by the component owners.

¹ https://en.wikipedia.org/wiki/Responsive_web_design

4.2 Results of the quality assessment KPIs evaluation

In the Table 6 the values of the quality KPIs are reported. These figures contribute to the average value used for the measurement of the "Component Quality KPIs", which turns out to be equal to 93%. The value of this KPI is just below the target value and it can be consider a good result since the whole KPI includes 18 single KPIs, listed below.

Table 6: Quality Component Evaluation

KPI name	KPI description	Target	IFE	CDV	TAE	WAE	QAE	SF	CPD	DA	eSM	AST	UPM
KPI_QAI_01	Exposure of APIs as JSON-based REST/RPC	YES	-	YES	-	-	YES						
KPI_QAI_02	Support for SSO	YES	YES	YES	-	-	YES	-	YES	-	NO	-	-
KPI_QAI_03	Support for CORS	YES	-	YES	-	-	YES						
KPI_QAD_01	Installation, configuration, and integration documentation in README	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
KPI_QAD_02	Swagger specification for the APIs	YES	-	YES	-	-	NO						
KPI_QAD_03	Additional documentation (examples, tutorials, etc)	YES	YES	YES	YES	YES	YES	YES	YES	NO	NO	YES	NO

Table 7: Quality Component Evaluation

KPI name	KPI description	Target	IFE	CDV	TAE	WAE	QAE	SF	CPD	DA	eSM	AST	UPM
----------	-----------------	--------	-----	-----	-----	-----	-----	----	-----	----	-----	-----	-----



KPI_QAS_01	API-based components exposing sensitive operations are protected using AAC OAuth2.0 implementation	YES	-	YES	-	-	YES	YES	YES	YES	-	-	YES
KPI_QAS_02	Web-based components provide access to the sensitive functionality to authenticated users only.	YES	YES	YES	-	-	YES	-	YES	-	YES	-	-
KPI_QAS_03	Centralized role management and access control	YES	YES	YES	-	-	YES	-	YES	-	NO	-	-
KPI_QAU_01	Minimal browser support.	YES	YES	YES	YES	YES	YES	YES	YES	-	YES	YES	-
KPI_QAU_02	Multi-platform support and responsiveness	YES	YES	YES	YES	Partial	YES	YES	YES	-	YES	YES	-

Table 8: Quality Component Evaluation

KPI name	KPI description	Target	IFE	CDV	TAE	WAE	QAE	SF	CPD	DA	eSM	AST	UPM
KPI_QAU_03	Internationalization	YES	YES	YES	YES	YES	YES	YES	YES	-	Partial	-	-
KPI_QASCM_01	Use GitHub for SCM and issue tracking	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
KPI_QASCM_02	Adhere to FIWARE SCM guidelines	70%	65%	83%	83%	83%	77%	73%	70%	73%	64%	70%	60%
KPI_QAT_01	Unit test coverage	80%	-	81%	82%	82%	93%	N/A ²	65%	N/A ²	-	-	-
KPI_QAR_01	Docker containers provided	YES	-	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

² The technical team in charge of the Session Feedback and Data Analysis components is not able to provide the values for the Unit Test Coverage KPIs.



KPI_IT_01	Percentage of issues resolved	100%	83%	100%	70%	100%	66%	83%	100%	100%	80%	100%	100%
KPI_UHE_01	Usability Heuristic	15%	57%	5%	-	-	52%	15%	16%	-	-	-	-

It is important to note that not all the KPIS are equally applicable, given the nature of various SIMPATICO components. Specifically, some components are essentially Web apps or client-side components for which the KPIS KPI_QAI_01 and KPI_QAI_03 do not apply. Instead, for instance, the API-only components do not address the problem of SSO. In these cases the KPI value intentionally left empty (with '-' sign).

For some of the components the KPI targets are not yet satisfied in certain situations. More specifically, the following exceptions currently have place:

- eSM component does not satisfy the KPI_QAI_02 (SSO support) and KPI_QAI_03 (centralized access control). The eSM component is accessible by the civil servants only, which normally use dedicated credentials separately from the authentication systems exploited for the citizen access control. For major flexibility at the evaluation phase a simple username/password-based access has been engaged.
- While some of the components have provided some descriptions of usage, tutorials, and examples, this is not the case for all of them. The issue will be addressed after the end of the component evaluation given the feedback obtained during the final evaluation with the end users.
- Some of the components with the user interfaces do not provide the reasonable support for responsive design and platform support. In particular, the components, where the interactions are not suitable for the mobile devices (e.g., some of the TAE interactions, e-service form workflow adaptation, etc) are left out from this requirement. The support of these features should be considered only for some of the components and for specific deployments, where the UI of the components should also follow the guidelines of the underlying city portal, where the services are deployed.

The support for the FI-WARE development guidelines adopted by the SIMPATICO components is partial. While the main principles for the source code management, release management, documentation, and API are captured by all the platform components, some of the MUST requirements regarding documentation content, FI-WARE GE publication, life-cycle, support, are not taken into consideration.

Regarding to the Usability Heuristic, an iterative usability and inclusiveness evaluation methodology have been used. Using this methodology, the usability issues are detected, and **importance score** is assigned to each of them. This methodology is used only with the components with User Interface. The objective of this methodology is to reduce the issues and the critical score in each iteration. The **Usability Heuristic** KPI shows the improvement in the importance score of the components. eSM and AST do not have values because they were not analysed in the first iteration due to they were not implemented yet. The methodology is deeply explained in D4.4 [3].

4.3 Component issue tracking

As explained in previous section, the management of software issues is performed with GitHub issue management. The process of issue management consists of defining the issue by reported (specifying the description and type, ways to reproduce, etc.), the discussion, and the resolution of the issue by the component owner (closing, won't fix, duplicate, etc.).

With respect to the issue management, the KPI measures the percentage of the issues addressed starting from 75% at the 1st phase of the project and arriving to 100% after the 2nd phase. In the current



state, the GitHub issue management system reports the following information for each of the SIMPATICO components:

Table 9: Issue tracking information for the platform components

COMPONENT	Open Issues	Closed Issues	KPI_IT_01
IFE	1	5	83%
CDV	0	11	100%
TAE	4	9	70%
WAE	0	4	100%
QAE	3	15	66%
SF	0	5	83%
CPD	0	9	100%
DA	0	2	100%
eSM	2	3	80%
AST	0	0	100%
AAC	0	4	100%
UPM	0	0	100%

5 Feedback on platform installation and deployment (2nd phase)

As for the first phase, in order to evaluate the ease to deploy and install the SIMPATICO platform in the three different use-cases, each city technical team has answered to a survey.

The questionnaire was focused on the activities to be undertaken to deploy, install and in case customize the SIMPATICO platform for the second phase of experimentation. The most of questions foresee a closed answer selecting one of the following values:

1. strongly disagree
2. disagree
3. neutral
4. agree
5. strongly agree

One question gives the possibility to insert free text to describe briefly the experience and give more feedback and suggestions in order to improve the platform. For this reason, a field Note was added to each question, if the survey editor wants to add some important issue.

Last four questions focus on the effort needed to complete all the actions needed to make the platform operating and maintain it.

In the following three sub-sections all questions and answers were reported use-cases per use-cases.

5.1 Trento use-case

In Trento use case SIMPATICO platform and tools are going to be used in a production environment. More precisely, as part of its “smart city” strategy, Trento is working on the deployment of e-service portal. The portal serves as a “one-stop shop” or unique access point that offers integrated and facilitated access to all the various services. With this portal, it is possible for citizens and businesses to authenticate using smart service cards or one-time password devices, and to complete the interaction online. Trento adopts also a municipality web portal providing information and e-service description. In phase two, the municipality web portal has been extended with SIMPATICO features supporting the final user in the comprehension of the service description.

SIMPATICO platform extends Trento e-service portal providing digital module compilation support; in particular the e-service HTML template structure has been modified in order to inject the integration with SIMPATICO IFE component. The phase 2 architecture deploys CDV on a machine in the Trento data center meanwhile all other SIMPATICO components are deployed on a cloud infrastructure managed by FBK. As far as citizen and professional authentication, both Trento e-service portal and AAC SIMPATICO component are based on the Provincia Autonoma di Trento Citizen Authentication Service.

For Trento the integration of the SIMPATICO platform and tools in both the e-service portal and in the municipality web portal was straight forward.

Table 10: Trento Use-Case questionnaire

n.	Question	Possible Answer	Your Answer	Please add some notes
1	The provided documentation to guide the installation and deployment of the platform and its related components was helpful	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	4	The documentation is helpful for what concerns the nominal scenarios. In some pilot-specific situations the documentation may still be improved and further configurability is required
2	Every single component was easy to install and deploy	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	3	Had issues with some setup of some components (eSM).
3	The installation and set-up of every single component was quick	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	4	
4	The integration of all components was simple to be performed	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	4	
5	The SWAGGER APIs helped me to test the component functionalities and facilitated to carry out the integration	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	5	Not all the components provide the Swagger specifications
6	The problems occurred during the platform installation and deployment were already well documented and easy to solve	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	4	The documentation is helpful for what concerns the nominal scenarios. In some pilot-specific situations the documentation may still be improved and further configurability is required
6.a	Referring to the previous question, the intervention of a specialized responsible for a specific component	5. strongly agree 4. agree 3. neutral	3	Had issues with some setup of some components (eSM).

	due to an occurred error was prompt and professional	2. disagree 1. strongly disagree		
7	The integration to connect the SIMPATICO infrastructure with repositories and/or legacy applications was simple	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	4	
8	Have you had to customize the APIs of your repositories and/or legacy applications for the connection with SIMPATICO?	1. No, I've used existing APIs without any changes 2. Yes, I had to adjust the APIs (please provide more details)	4	
9	Please provide us with some sentences describing your experience with the SIMPATICO Platform installation and deployment. Describe briefly the occurred problems and some hints to improve the platform installation and deployment	free text		Not all the components provide the Swagger specifications
10	Efforts needed to install the SIMPATICO infrastructure	person/hours	4	The documentation is helpful for what concerns the nominal scenarios. In some pilot-specific situations the documentation may still be improved and further configurability is required
11	Effort needed to connect the SIMPATICO infrastructure with repositories and/or legacy applications	person/hours	3	Had issues with some setup of some components (eSM).
12	Effort needed for daily operational tasks related to the technical maintenance of the SIMPATICO infrastructure	days		
13	No. of incidents encountered	number		

5.2 Galicia use-case

The deployment in Galicia was done on a parallel replica environment to the one used in production by Xunta de Galicia. This is done because the criticality of the components there deployed and the complexity of the overall platform don't allow for a full deployment in the production services. However, this has left us more flexibility for experimentation with less finished components: experiments in deploying the components from the earliest versions have been performed to gather feedback in the whole project.

The final deployment for Galicia is hosted by HI Iberia in its data center which hosted not only the replica e-services (mostly composed of simple HTML and Javascript files) but also the whole SIMPATICO platform with the majority of components deployed and connected to the e-services. The deployment process (installation, configuration and maintenance) has been done the majority of times by HI Iberia personnel with some external help used for certain components such as QAE/Citizenpedia (help provided by Deusto), CPD (help provided by BENG) and CDV (support by ENG). These requests for help followed various methods, from opening a secure shell so that actions were taken remotely by the support team over SSH to interactive hands-on sessions using screen sharing software such as Skype. This was done for some difficult steps that were done in moments of urgency, but in general the experience installing and maintaining the components has been manageable for the HIB team.

The final result was used in more than 300 sessions throughout the second iteration evaluation period. In addition to the citizen evaluations, also PA oriented evaluation of the eSM component was carried out with the same environment as well as a vertical CPD-focused session in late November 2018. What follows is a summary of the deployment questionnaire for the Galicia Pilot.

Table 11: Galicia Use-Case questionnaire

n.	Question	Possible Answer	Your Answer	Please add some notes
1	The provided documentation to guide the installation and deployment of the platform and its related components was helpful	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	3	Some components still required dedicated sessions (e.g., CPD).
2	Every single component was easy to install and deploy	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	3	Same as above
3	The installation and set-up of every single component was quick	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	4	When everything worked the process was very smooth. The Docker integration is very beneficial.

4	The integration of all components was simple to be performed	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	4	No major issues in integrating components once correctly configured.
5	The SWAGGER APIs helped me to test the component functionalities and facilitated to carry out the integration	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	5	This has been very good throughout the project.
6	The problems occurred during the platform installation and deployment were already well documented and easy to solve	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	3	There were some major problems for a couple of components and the documentation alone wasn't enough.
6.a	Referring to the previous question, the intervention of a specialized responsible for a specific component due to an occurred error was prompt and professional	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	5	Developers were diligent and quick to help.
7	The integration to connect the SIMPATICO infrastructure with repositories and/or legacy applications was simple	5. strongly agree 4. agree 3. neutral 2. disagree 1. strongly disagree	5	Integration is usually very smooth and integrating with the legacy e-service infrastructure was straightforward.
8	Have you had to customize the APIs of your repositories and/or legacy applications for the connection with SIMPATICO?	1. No, I've used existing APIs without any changes 2. Yes, I had to adjust the APIs (please provide more details)	N/A	
9	Please provide us with some sentences describing your experience with the SIMPATICO Platform installation and deployment. Describe briefly the occurred problems and some hints	free text		The SIMPATICO platform feels more featured during the second evaluation phase. The extra functionalities come with extra work to keep

	to improve the platform installation and deployment			everything correctly configured.
10	Efforts needed to install the SIMPATICO infrastructure	person/hours	60	
11	Effort needed to connect the SIMPATICO infrastructure with repositories and/or legacy applications	person/hours	N/A	
12	Effort needed for daily operational tasks related to the technical maintenance of the SIMPATICO infrastructure	days	2	
13	No. of incidents encountered	number	2	2 strong incidents: CPD arrived with some issue that made configuration impossible without extra help and CDV needed changes during the execution of the pilots that were not accomplished.

6 Analysis and Conclusion

This document aims at firstly defining the technical KPIs to evaluate the SIMPATICO technical platform, and secondly measuring those KPIs to understand the evolution of the whole platform in the three different use-cases (Trento, Galicia, Sheffield) and produce the related improvements starting from the feedback received from technical teams.

The SIMPATICO platform was evaluated basing on quantity and quality evaluation. The first one deals with how the platform is robust and how much it is easy to manage, monitor and solve the problems that could occur. The second one implies the quality of the development of components.

Below, the Table 12 shows the whole results of evaluation KPI by KPI.

It is important to highlight that the conditions during the evaluation in the second phase of experimentation were slight different from the first phase. For example, both the evaluation phases in Trento have been done in production environment. In the first phase the access to the e-service was supervised by the civil servant, meanwhile in the second phase the user accessed to the e-service without any help.

In the middle of the second phase evaluation Trento was moving from Sportello Telematico v2 to Sportello Telematico v3. The delays in the definition of the system target ended up in the requirement of managing a complex evaluation scenario.

This should justify for Trento the increase of the time required to set up the environment. In fact, Trento actually integrated IFE on two different systems. Finally, in order to improve the tools usability in the open environment (where the user uses the e-services without being supported by civil servant) a new IFE version was developed integrating both in Sportello Telematico V3 and in Trento Web Site.

Table 12: Measured KPIs

KPI name	KPI description	Target	Trento	Galicia
KPI_IUC_01	Percentage of the Integration Use-Cases achieved and operating	100%	100%	100%
KPI_FoS_02	The average value of the answers provided by the interviewees	4	3.9	4
KPI_EFF_03	Efforts needed to install the SIMPATICO infrastructure	<40 PH	24	60
KPI_EFF_04	Effort needed to connect the SIMPATICO infrastructure with repositories and/or legacy applications	<60 PH	16	N/A
KPI_EFF_05	Effort needed for daily operational tasks	0,5 days	0.5	2
KPI_PRO_06	No. of incidents encountered	<5	1	2

In the Table 12 for Galicia appear in red as 'not accomplished' for two KPIs. This is significant but it can be explained for both of them:

- KPI_EFF_03: This is 60 person/hours needed to install the SIMPATICO system and it is above of the value reported for iteration 1. This was due to the increased complexity of the deployment, which included this time the WAE module for the three services. Although this module was ultimately useful, its installation and correct configuration for the pilot was longer than expected (each of the services required a dedicated model that had to be programmed and debug separately) and so it reflected it the total effort for the deployment.
- KPI_EFF_05: this was reported as 2 days' effort required for maintenance tasks. Again this is related to the increased complexity of the deployment, as well as the testing required so that the large number of users envisaged (>270) did not result in issues. This may also have been impacted by the unfortunate worse than expected outcome of the unit testing capabilities of modules as SF (see KPI-QAT-01).

6.1 Analysis of KPI measurement

In this section the comparison between the first and second phase of evaluation will be analysed. In particular the quality and quantity KPIs will be compared and discussed.

6.1.1 KPI_IUC_01 - Percentage of the Integration Use-Cases achieved and operating

The actual value for this KPI was perfectly met the target for both use cases.

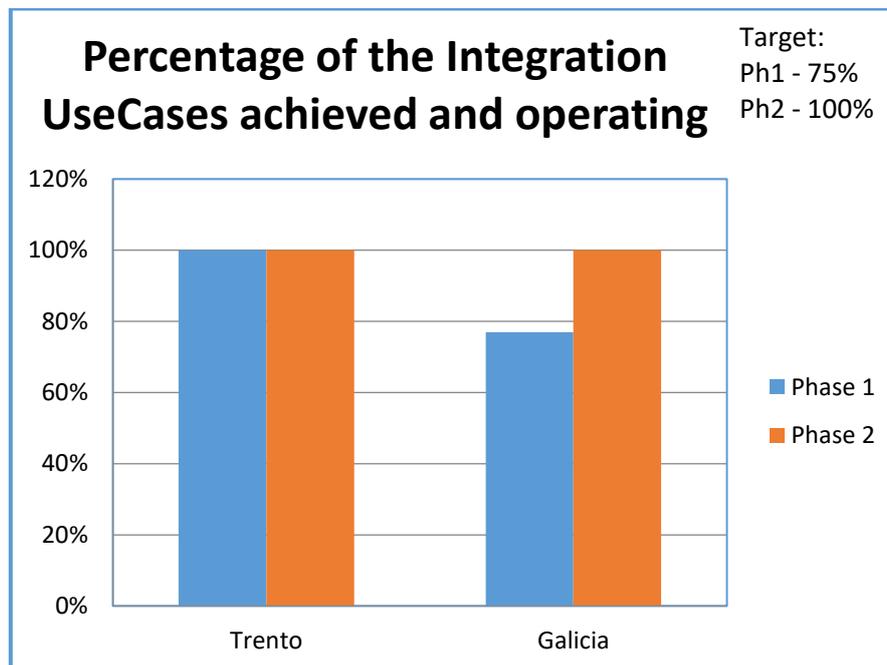


Figure 2: Percentage of the integration use-cases achieved and operating

6.1.2 KPI_FoS_02 - The average value of the answers provided by the interviewees

The actual value for this KPI was perfectly met the target for Galicia use case, while Trento use case achieved 3.9 out of 4, a value just below the target but improved compared with that one of the first phase.

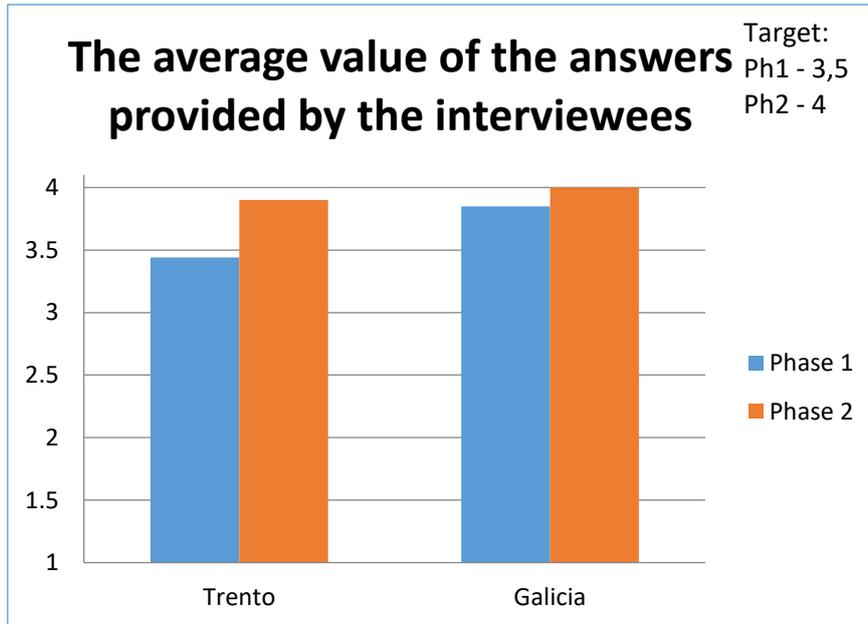


Figure 3: Average value of the answers provided by the interviews

6.1.3 KPI_EFF_03 - Efforts needed to install the SIMPATICO infrastructure

The actual value for this KPI was perfectly met the target for Trento use case. The value for Galicia was due to the increased complexity of the deployment.

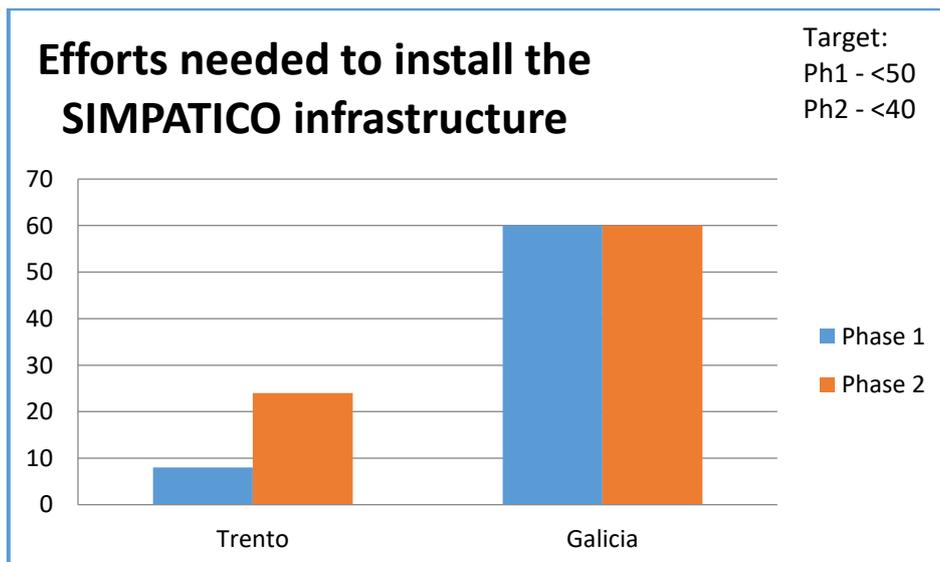


Figure 4 Effort needed to install the SIMPATICO infrastructure

6.1.4 KPI_EFF_04 - Effort needed to connect the SIMPATICO infrastructure with repositories and/or legacy applications

The actual value for this KPI was perfectly met the target for Trento use case. It was not measured for Galicia since no legacy applications were integrated to the SIMPATICO components deployed in Galicia environment.

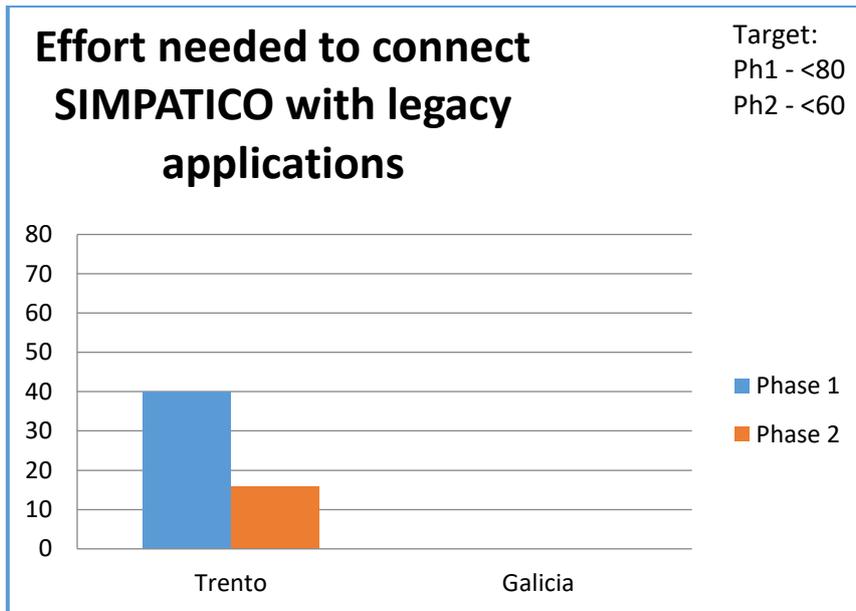


Figure 5: Effort needed to connect SIMPATICO with legacy applications

6.1.5 KPI_EFF_05 - Effort needed for daily operational tasks

The actual value for this KPI was perfectly met the target for Trento use case. The explanation for Galicia is the same of that one described in section 6.1.3

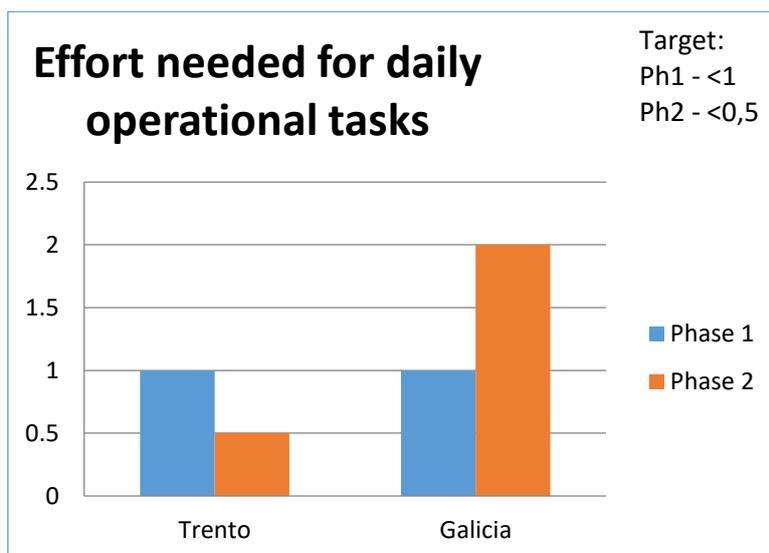


Figure 6: Effort needed for daily operational tasks

6.1.6 KPI_PRO_06 - No. of incidents encountered

The actual value for this KPI was perfectly met the target for both use cases and significantly decreased compared with first phase.

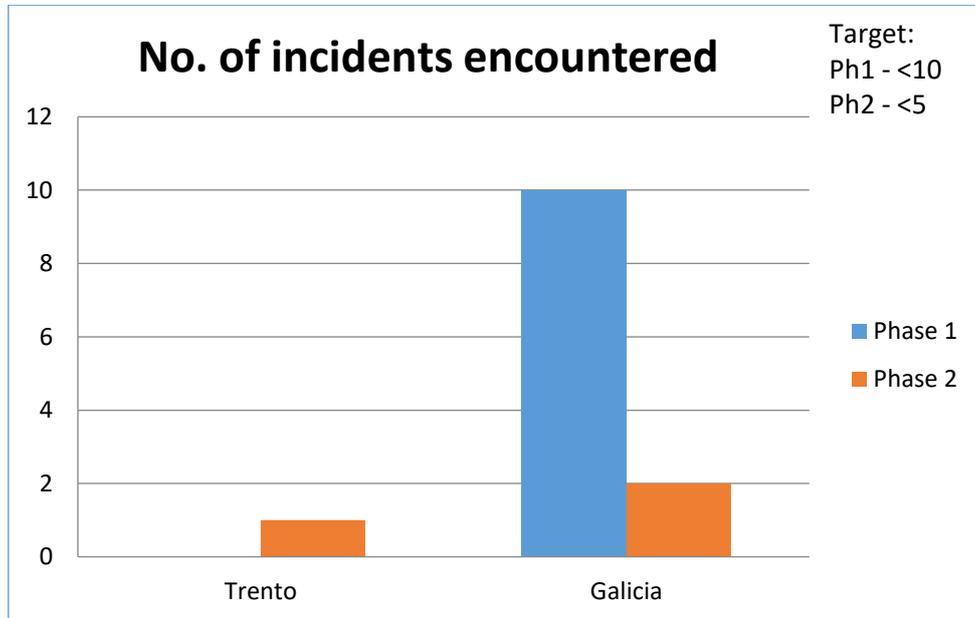


Figure 7: No of incidents encountered

In the second phase, three new KPIs were added in the SIMPATICO Platform Evaluation, as follows.

6.1.7 KPI_QAT_01 - Unit test coverage

The actual value for this KPI was perfectly met the target

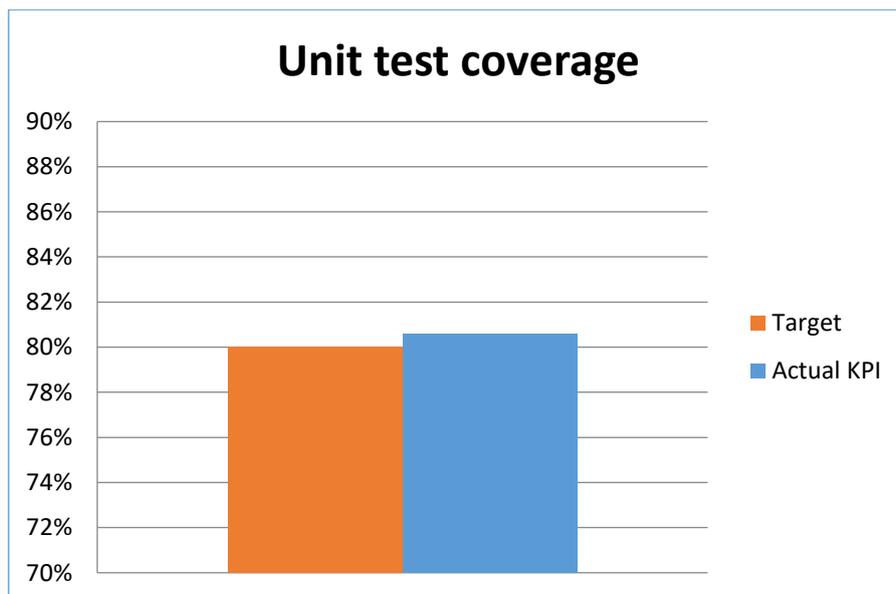


Figure 8: Unit test coverage

6.1.8 KPI_UHE_01 - Usability Heuristic

The actual value for this KPI was perfectly met the target

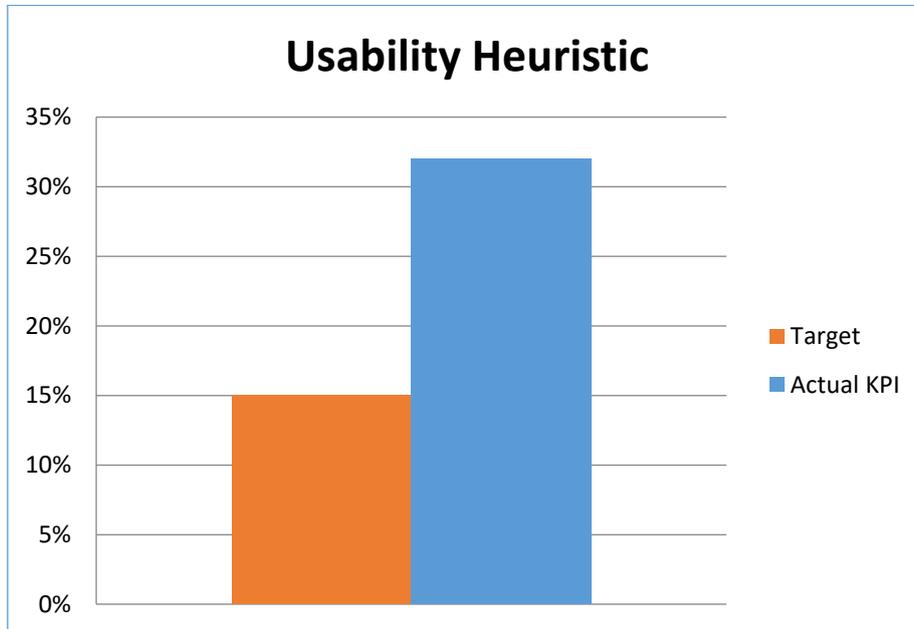


Figure 9: Usability heuristics

6.1.9 Quality KPIs

The Quality Assessment KPIs, defined and analysed in Section 4 (Table 6, Table 7, Table 8), state the quality of each component belonging to the SIMPATICO Architecture. The result shown below is the average value achieved summing all the KPIs measured for each SIMPATICO component. The total KPI has a value of 93%, with a target value of 100%.

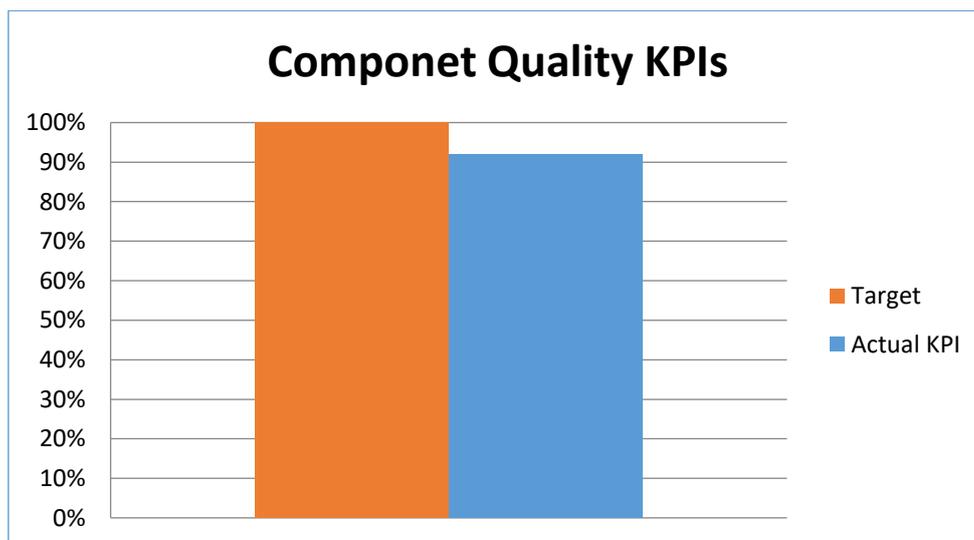


Figure 10: Component quality KPIs

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