INSIST

Deliverable

D1.2.1 - System Requirements Specification

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Abstract

This document includes the system requirements jointly defined by the project partners.

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1. Introduction and Context

1.1. Introduction

In this document, system requirements defined by the partners are presented. System requirements are classified into two categories: funtional and non-functional system requirements.

Non-functional system requirements are classified into various categories: accessibility; accuracy; audit, control, and reporting; availability; backup and restore; capacity, current and forecast; certification; compliance; compatibility of software, tools, standards, platform, database; concurrency; configuration management; dependency on third parties; deployment; documentation; disaster recovery; efficiency (resource consumption for given load); effectiveness (resulting performance in relation to effort); error handling; exploitability; extensibility (adding features); failure management; interoperability; legal and regulatory; licensing; localizability; maintainability; modifiability; network topology; operability; performance/response time; privacy; portability; quality; recoverability; redundancy; reliability (mean time between failures); reporting; resource constraints (processor speed, memory, disk space, network bandwidth, etc.); response time; robustness; scalability (horizontal, vertical); security; stability; safety; supportability; testability; usability.

System requirements are defined taking into account the user requirements. Therefore "D1.1.2 - Use Case Scenarios and Requirements" is used during this task. This deliverable wil be used during system design phase.

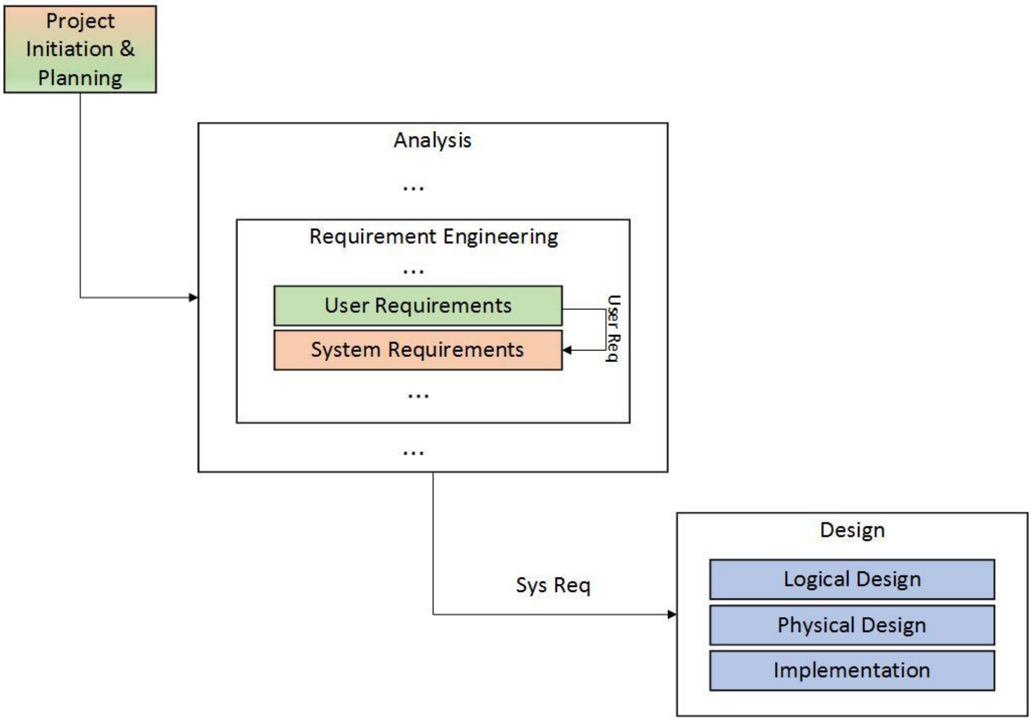

Figure 1 INSIST Project Phases

1.2. Project

The urban spaces are full of stand-alone sensor based installations of different services designed according to their own purpose and requirements. For example, the municipalities provide several services to the citizens: safety and security services of citizens in the streets, traffic management, etc. These services rely mostly on street-implemented infrastructures, such as cameras, sensors, induction loops. In addition, local businesses have their own illumination systems, advertising infrastructure including neon signs, public displays etc. They also monitor customer behavior using various sensor systems. The INSIST project proposes an integration of these sensor-based systems into a wider perspective. The INSIST project aims to develop a smart connected ecosystem for public spaces, where the sensor data provided by the different INSIST sensor systems can be efficiently used for not only the proprietary infrastructure services but also to offer value added services based on data fusion from multiple sensor systems in the business areas of:

- Traffic management
- Advertising and atmosphere
- Business intelligence

1.3. Work Package

This deliverable is part of WP1. The role of WP1 is to investigate the state-of-the-art and gather the requirements on the smart systems targeted by the INSIST project, and their development flow. The main objective of the second activity (Activity 1.2: System requirements) of WP1 is the definition and the consistency evaluation of the generic INSIST system requirements, taking into account the use cases and user requirements which were determined in the first activity (Activity 1.1: Use case description and user requirements) of WP1 and were provided in the first deliverable (D1.1.2 - Use Case Scenarios and Requirements). To achieve this objective, a set of system requirements for INSIST platform are defined and presented in this document. These requirements will meet user requirements and platform’s general requirements.

2. System Requirements

2.1. Definition of terms

2.1.1. System Requirement

System requirement is a requirement at the system level that describes a function or the functions which the system as a whole should fullfill to satisfy the stakeholder needs and requirements. System requirements are expressed in an appropriate combination of textual statements, views, and non-functional requirements. System requirements express the levels of safety, security, reliability which will be necessary [1].

Based on this definition, a set of system requirements are defined in WP1, taking into account the user requirements.

System requirements describe what the system shall do whereas the user requirements (user needs) describe what the user does with the system.

2.1.1.1. Functional and Non-Functional Requirements

System requirements are classified as either functional or non-functional (supplemental) requirements in terms of functionality feature of the requirement.

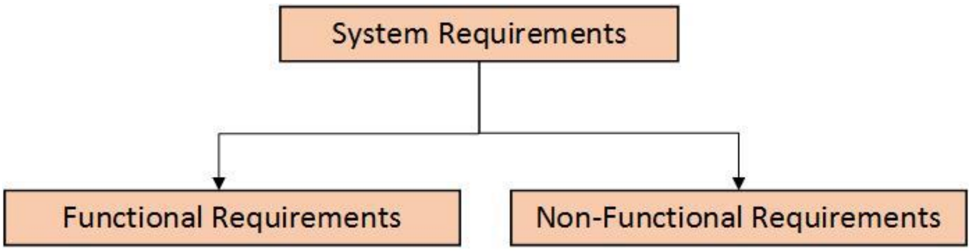

Figure 2 Types of System Requirements in terms of Functionality

A functional requirement specifies something that a user needs to perform their work. For example, collecting traffic – related data and processing them is a functional requirement for INSIST project. For example, a system may be required to enter and print cost estimates; this is a functional requirement. Non-functional requirements specify all the remaining requirements not covered by the functional requirements. The plan for implementing functional requirements will be detailed in the system design phase. The plan for implementing non-functional requirements will be detailed in the system architecture phase.

2.1.1.2. Classification of the Requirements Based on Functionality

System requirements are classified into three categories: (i) general system requirements, (ii) security requirements, (iii) initial capacity requirements.

General system requirements are composed of major capabilities, major system conditions, system interfaces, and system user characteristics.

- Major system capability means the availability, target deployment environment(s), device accessibility, and/or technical capability of the system.
- Major system conditions contain of assumptions and constraints. The conditions may limit the options available to the developers.
- System interfaces describe the dependency and relationship requirements of the system to other enterprise and/or external systems. System interfaces include any interface to a future system or one under development.
- System user characteristics identify each type of user of the system by function, location, and type of device. Aggregated number of users should be specified and the nature of their use of the system should be explained.

Security requirements are related to the security requirements for users of the system.

Initial capacity requirements should be specified for the system. An initial estimation can be established using current data amounts, planned number of users, and estimated number of services.

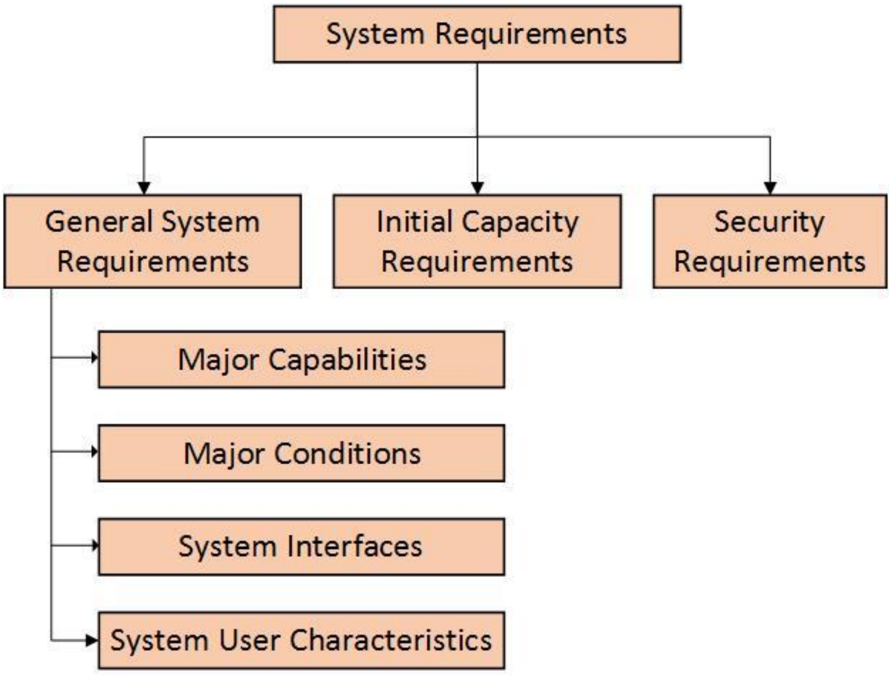

Figure 3 Types of System Requirements in terms of Subjects

General system acceptance criteria should be specified and agreed upon by the project partners and the potential customers who will be used to accept the final end product.

2.2. Templates

2.2.1. Template for the System Requirements

For documenting the sustem requirements the following template can been used:

Requirement: <Name>	
ID	**<Requirement ID>**
Description	<Description of the requirement>
Partners	<Involved Partners>
Priority	<mandatory vs. optional>
Refers to	<please link to use cases or user requirements>
Rationale	<justification of requirement>
Tags	<classification tags for the requirement: functionality – subject – context>

2.3. List of Requirements

Requirement: Performance requirements should be defined.	
ID	**Req 1**
Description	Performance requirements should be specified and defined to measure the performance of the INSIST Platform.
Partners	All
Priority	mandatory
Refers to	<please link to use cases or user requirements>
Rationale	A list of performance criteria of the platform should be defined. These performance criteria will be used during the acceptance of the project output. The performance of the platform will be measured by using simulation and instrumentation tools. Obtained results will be included into performance analysis report of the platform. Example: *The elapsed time between the request of traffic density at a specific location and the calculation of the value. The elapsed time shall be less than 10 seconds.*
Tags	Non-functional, Acceptance Criteria

Requirement: Quality criteria should be defined.	
ID	**Req 2**
Description	Quality criteria of the UIs of the INSIST Platform should be defined and quality of the UIs should be measured.
Partners	All
Priority	mandatory
Refers to	<please link to use cases or user requirements>
Rationale	Quality of the UIs of the INSIST Platform should be measured and should meet required quality level. Documentation, complexity, integration, and usability criteria will be considered during the measurement of the UIs.
Tags	Non-functional, Acceptance Criteria

Requirement: Software quality attributes should be defined.	
ID	**Req 3**
Description	Software quality attributes should be specified and defined to measure the quality of the INSIST Platform.
Partners	All
Priority	Mandatory
Refers to	<please link to use cases or user requirements>
Rationale	The quality charactreistics of the INSIST Platform should be specified. These characteristics are the items which can be important to either platform customers or platform developers. The important characteristics include adaptability, availability, correctness, flexibility, interoperability, maintainability, portability, reliability, reusability, robustness, testability, and usability.
Tags	Non-functional, Acceptance Criteria

Requirement: Operating environment should be described.	
ID	Req 4
Description	Operating environment in which the software will operate should be described.
Partners	All
Priority	Mandatory
Refers to	<please link to use cases or user requirements>
Rationale	Operating environment in which the software will operate should be described. Operating environment requirements include the hardware platform, operating system and versions, and any other software components or applications.
Tags	Non-functional, Initial Capacity Requirement

Requirement: Limitations and contraints should be defined.	
ID	Req 5
Description	Limitations and contraints should be defined and the platform developers should be informed.
Partners	All
Priority	Mandatory
Refers to	<please link to use cases or user requirements>
Rationale	Any items or issues which will limit the options available to the platform developers should be described. These contraints and limitations include • hardware limitations (timing requirements, memory requirements) • interfaces to other applications • specific technologies, tools, and databases to be used • programming language requirements • communications protocols
Tags	Non-functional, General System Requirement → Major Capability, Major Condition, System Interfaces

Requirement: User documentation should be prepared.	
ID	**Req 6**
Description	User documentation should be prepared for all types of the platform users.
Partners	All
Priority	Mandatory
Refers to	<please link to use cases or user requirements>
Rationale	User documentations include user manuals, on-line help, and tutorials should be prepared. All documents should be delivered along with the platform or applications.
Tags	Non-functional

Requirement: User types should be defined.	
ID	**Req 7**
Description	User types of the INSIST Platform and the main characteristics of the users should be defined.
Partners	All
Priority	Mandatory
Refers to	<please link to use cases or user requirements>
Rationale	
Tags	Non-functionality, General System Requirement → System User Characteristics

Requirement: Assumptions and dependencies should be defined.	
ID	Req 8
Description	Assumptions and dependencies can affect the development process. Platform developers and users should be informed about them.
Partners	All
Priority	Mandatory
Refers to	<please link to use cases or user requirements>
Rationale	Assumptions and dependencies which could affect the development of the system should be defined. These could include third-party or commercial components, issues around the development or operating environment, and constraints.
Tags	Non-functional, General System Requirement → Major Conditions

Requirement: External interface requirements should be defined.	
ID	**Req 9**
Description	All interface requirements should be specified and defined.
Partners	All
Priority	Mandatory
Refers to	<please link to use cases or user requirements>
Rationale	External interface requirements include user interfaces, hardware interfaces, software interfaces, and communication interfaces. • User interface requirements such as sample screens, and GUI standards are the logical characteristics of each interface between the platform and the users. • The logical and physical characteristics of each interface between the platform and the hardware components should be defined. Hardware components include the supported device types. Requirements of the hardware interfaces contain required data and control interactions between platform and the hardware, and the communication protocols to be used. • The connections between the platform and the other used software components should be described. The used software components include databases, operating systems, tools, libraries, and commercial components. Name and the versions should be identified in the requirement document. • The requirements associated with any communications functions required by the INSIST Platform should be described. These communication functions include web browser, network server communications protocols, and so on. The communication standards (such as ftp, http) that will be used should be identified.
Tags	Non-functional, General System Requirement → System Interfaces

Requirement: The initial capacity requirements should be specified.	
ID	**Req 10**
Description	The initial capacity requirements of the INSIST Platform should be specified.
Partners	All
Priority	Mandatory
Refers to	<please link to use cases or user requirements>
Rationale	The initial capacity requirements of the INSIST Platform should be specified. The initial estimation will be established using current test data amounts, planned number of users, and estimated number of transactions. The highest and lowest numbers of the transactions, and processing frequency expected usage will be estimated. These will be used for capacity planning for storage and memory requirements for INSIST Platform.
Tags	Non-functional, Initial Capacity Requirement

3. User Characteristics of INSIST Platform

Two different main user types are defined in INSIST platform. Each type has its own sub categories. Any kind of user type can be chose when setting up your users in the INSIST system.

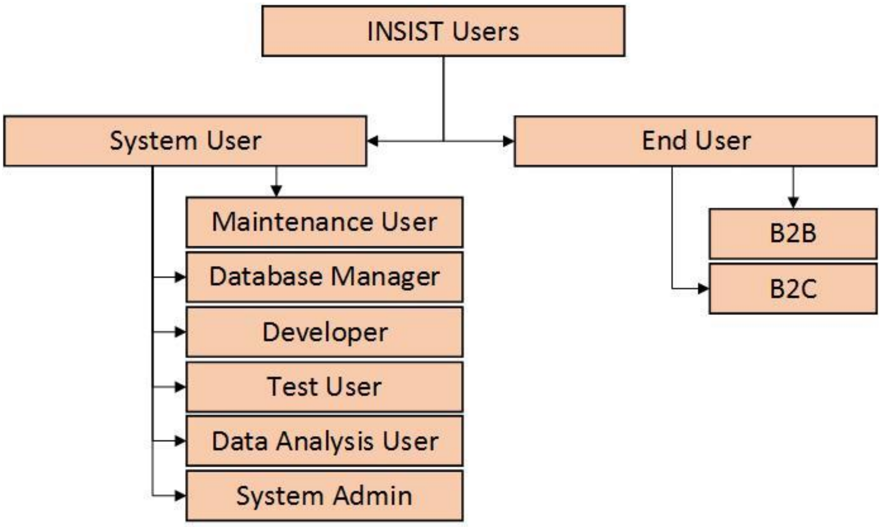

Figure 4 User Types in INSIST Platform

3.1. System Users

A system user is a person who interacts with the INSIST system, through an interface to define the behaviour of the system and how the end users would interact with the system.

3.1.1. Maintenance User

A maintenance user who has the role of Administrator can access the maintenance console of the INSIST project. A maintenance user can develop applications on th INSIST platform, create / update the database and test the system.

3.1.1.1. Database Manager

A database manager performs the management functionalities, such as creation and maintenance of the database. A database manager has also abilities to back up and restore, attach and detach, create and clone the database.

3.1.1.2. Developer

A developer can develop new applications or services for the INSIST platform.

3.1.1.3. Test User

A test user can run the test scenarios on the INSIST platform.

3.1.1.4. Data Analysis User

A data analysis user can access to the INSIST platform to analyze platform data and obtain results.

3.1.1.5. System Admin

System admin user can access to all areas of the INSIST platform.

3.2. End Users

3.2.1. B2B Users

B2B users are commercial transaction users. B2B users use INSIST Platform for their production and/or service process. They need INSIST Platform's functionalities for their operational reasons. The overall volume of B2B user's transactions is much higher than the volume of B2C user's transactions.

3.2.2. B2C Users

B2C users in INSIST Platform are all road users such as pedestrians and drivers. ---

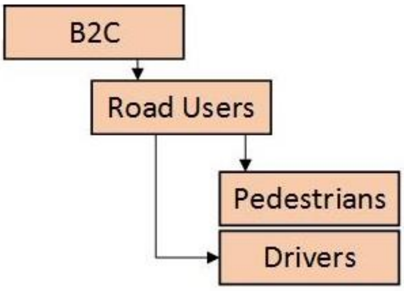

Figure 5 B2C User Types of INSIST Platform

4. Abbreviations

A list of abbreviations used in this document is presented below.

Table 1 List of Abbreviations

Abbreviation	Definition
B2B	Business to business
B2C	Business to consumer
INSIST	Integrated service delivery for citizens' safety and comfort
WP	Work package

5. References

[1] http://sebokwiki.org/wiki/System_Requirements