D1.2 Database of Initial

CLARITY CSIS User Stories and Test Cases

WP1 –Co-Creation

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Figure 1: CLARITY Disclamer

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CLARITY Project Overview

Urban areas and traffic infrastructures that are linking such areas are highly vulnerable to climate change. Smart use of existing climate intelligence can increase urban resilience and generate benefits for businesses and society at large. Based on the results of FP7 climate change, future internet and crisis preparedness projects (SUDPLAN, ENVIROFI, CRISMA) with an average TRL of 4-5 and following an agile and user-centred design process, end-users, purveyors and providers of climate intelligence will co-create an integrated Climate Services Information System (CSIS) to integrate resilience into urban infrastructure.

As a result, CLARITY will provide an operational eco-system of cloud-based climate services to calculate and present the expected effects of CC-induced and -amplified hazards at the level of risk, vulnerability and impact functions. CLARITY will offer what-if decision support functions to investigate the effects of adaptation measures and risk reduction options in the specific project context and allow the comparison of alternative strategies. Four Demonstration Cases will showcase CLARITY climate services in different climatic, regional, infrastructure and hazard contexts in Italy, Sweden, Austria and Spain; focusing on the planning and implementation of urban infrastructure development projects.

CLARITY will provide the practical means to include the effects of CC hazards and possible adaptation and risk management strategies into planning and implementation of such projects, focusing on increasing CC resilience. Decision makers involved in these projects will be empowered to perform climate proof and adaptive planning of adaptation and risk reduction options.

Abbreviations and Glossary

A complete glossary of all CLARITY terms and abbreviations can be found in the public document "CLARITY Glossary" available at https://cat.clarity-h2020.eu/glossary/main. All the abbreviations that have been defined until 21/03/2018 are also shown in the Table 1.

Table 1: CLARITY abbreviations, status 21/03/2018.

Name	Term description
AAO	Appraisal of Adaptation Options
ADM	Architecture Development Method
AHF	Anthropogenic Heat Flux
AJAX	Asynchronous JavaScript and XML
AR	Assessment Report
AR4	Fourth Assessment Report
AR5	Fifth Assessment Report
BB	Building Block
BC	Bias Correction
C3S	Copernicus Climate Change Services
CA	Consortium Agreement
CBA	Cost-benefit-analysis
CC	Climate Change
CCA	Climate Change Adaptation
CCH	Climate Change Hazards
CDD	Consecutive Dry Days
CERN	Conseil Européen pour la Recherche Nucléaire
CFS	Climate Forecast System
CKAN	Comprehensive Kerbal Archive Network
CLARITY	Integrated Climate Adaptation Service Tools for Improving Resilience Measure
CLC	CORINE Land Cover
Climate-ADAPT	European Climate Adaptation Platform
CMIP	Coupled Model Intercomparison Project
COSMO-CLM	COnsortium for Small-scale MOdelling - Climate Local Model
COTS	Commercial Off-The-Shelf
CRISMA	Modelling crisis management for improved action and preparedness
CRM	Continuous Risk Management
CS	Climate Service
CSIS	CLARITY Climate Services Information System
CSS	Cascading Style Sheets
CSV	Comma Separated Values

CSW	Catalogue Service for the Web
CTA	Constructive Technology Assessment
DC	Demonstration Case
DC	Dublin Core
DEM	Digital Elevation Model
DFO	Dartmouth Flood Observatory
DHI	Danish Hydraulic Institute
DM	Decision Maker
DMP	Data Management Plan
DoA	Description of the Actions (Annex 1 to the Grant Agreement)
DOI	Digital Object Identifier
DOM	Document Object Model
DPA	Data Protection Agency
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DV	Dynamic Vulnerability
DWD	Deutscher Wetterdienst
EC	European Commission

Executive Summary

This document is deliverable D1.2 “Database of Initial CLARITY CSIS User Stories and Test Cases” of the CLARITY project (H2020, Contract number 730355). It presents a consolidated and detailed list of the User Stories and their related Test Cases based on the input received from the four Demonstration Cases and were preliminary presented in deliverable D1.1 “Initial workshops and the CLARITY development environment”.

CLARITY User Stories, representing the key project requirements are categorized into “generic” ones and the User Stories that are specific to four Demonstration Cases, showcasing the CLARITY climate services in different climatic, regional, infrastructure and hazard contexts in Italy, Sweden, Austria and Spain, focusing on the planning and implementation of urban infrastructure development as well as transport infrastructure projects.

CLARITY Test Cases, on the other hand, are the counterpart to the User Stories. They specify an “offer” for resolving the User Stories and link the requirements with the data, models and software that is produced or used in the project.

Both, CLARITY User Stories and Test Cases contained in this deliverable are intended to provide reference scenarios and requirements that support the implementation of the CLARITY Climate Service Information System (CSIS) and the validation activities.

In line with the agile CLARITY co-creation process, the User Stories and the Test Cases are considered “living documents” and maintained on the CLARITY catalogue platform (https://cat.clarity-h2020.eu). This document merely presents the status of the work in February 2018. While the User Stories can be considered rather mature and unlikely to significantly change in the future, the Test Cases are actively developed and will be enriched with mock-ups and improved based on feedback of the potential CSIS users and stakeholders.

1 Introduction

The introduction chapter defines the purpose and intended audience of the "CLARITY User Stories and Test Cases Database" and briefly explains the structure of the document.

1.1 Purpose of this document

The purpose of this report is to present in a consolidated manner the CLARITY User Stories and Test Cases compiled as part of task T1.2 "Climate Service Requirements" and stored in the online catalogue[1] established by the project[2]. These are based on the input received from the four Demonstration Cases, the EU-GL guideline, partners' ideas and workshops outcomes related to the envisioned and were preliminary presented in deliverable D1.1 "Initial workshops and the CLARITY development environment".

To make this report a self-contained document, it reuses/refines contents already provided in deliverable D1.1 (in particular, the contents referring to the User Stories and Test Cases in the introduction section as well as the User Stories summaries and full descriptions provided in section 4 and Annex 1 respectively) and extends them with the new User Stories and Test Cases derived from the latest discussions and inputs received in the project since deliverable D1.1 was finalized.

1.2 Intended audience

The target readers of this document are mainly the stakeholders of the four CLARITY Demonstration Cases in WP2 "Demonstration & Validation" that represent the Climate Service Customer perspective and the purveyors and climate data providers that represent the Climate Service Supplier perspective in the overall co-creation process; as well as CLARITY technical partners in charge of the Climate Service integration and development in WP1 "Co-Creation" and WP4 "Technology Support".

1.3 Document structure

The structure of the document and the relationships between the different chapters is as follows:

Chapter 1 (this chapter) introduces the document and explains the overall purpose of this document and its relation to other work packages and deliverables.

Chapter 2 gives details on the CLARITY User Stories described in a compact form (the full description is given in Annex 4), as provided by project partners, especially the end-users.

Chapter 3 gives details on the CLARITY User Test Cases described in a compact form (the full description is given in Annex 5), as provided by project partners, especially the end-users and technical partners involved in WP1 and WP4.

Chapter 4 provides the conclusions and a summary on follow-up activities in other work packages.

Chapter 5 lists the references and bibliography used in this document.

Annex 1 presents the User Story template and its fields for gathering all required information.

Annex 2 presents the Test Case template and its fields for gathering all required information.

Annex 3 presents the coverage of the various EU-GL methodology steps by the CLARITY User Stories.

Annexes 4 and 5 present the User Stories and the Test Cases in their unabridged version respectively, including the discussion on their implications for the CLARITY product.

[1] http://cat.clarity-h2020.eu
[2] This database will be maintained through the project as a part of its ongoing work.

2 CLARITY User Stories

CLARITY aims to implement four Demonstration Cases showcasing CLARITY climate services in different climatic, regional, infrastructure and hazard contexts in Italy, Sweden, Austria and Spain.

CLARITY User Stories represent the key requirements on the CLARITY product[3]. They are collected on the online CLARITY catalogue platform and separated in two main categories: the generic set of the User Stories representing the requirements that are inherent to EU-GL [1], the CLARITY project plan and to the four sets of the User Stories that are specific to each of the CLARITY Demonstration Cases.

The description of User Stories in CLARITY follows a simple pattern, i.e., logic. The author of a User Story states their role and writes up her/his wishes by expressing 1) what one wants to do, and 2) why. The basic User Story template is thus:

"I, as *<A ROLE>* want to *<GOAL>*, so that *<REASON>*"

The information content of such "core" User Story is intentionally kept very generic - rather a reminder than a fully-fledged requirement. To make the User Story implementable, the stories are discussed and the results of this discussion recorded as "implications".

As a result of this discussion between different types of stakeholders, the stories can be further refined, resulting in four hierarchic stacks of the stories: one for each of the Demonstration Cases and one for the generic stories.

- Level 1 User Story is typically a high-level description of a real-life challenge that needs a solution, often seen in a wider context.
- Level 2 User Stories are derived from the Level 1 User Stories, with more focused challenges and solutions.
- Additional levels can be added as necessary. With each level, User Stories get narrower and more focused, and provide very specific requirements for a very limited sub-context of the overarching level 1 User Story.

For practical reasons, each User Story also contains the following meta-information:

- status information;
- list of team members that are responsible for or interested in this US; and
- a "scope", or mapping to EU-GL design elements.

The collection of User Stories according to this defined methodology is performed online on the CLARITY catalogue web site[4].

US naming convention

The User Stories are designated by two parts: a code giving the User Story a scope, and a title. For example, "US-DC1-110 Climate adaptive planning" is simply a User Story (US) in Demonstration Case 1 (DC1) with the order number 110, and a title "Climate adaptive planning".

While describing the User Story, the end user is given an option to define the type of the User Story by selecting one or more categories related to the EU-GL methodology. Given the defined category and description of user requirements, it is possible for the technical expert to envisage the methodological scope

[3] In fact, they are complemented by the "Exploitation requirements". Exploitation requirements have been introduced by the CLARITY business development team separately from the User Stories. They are presented in the deliverable D5.1.
[4] http://cat.clarity-h2020.eu

needed to address the User Story. The methodological scope should not only relate to the prescribed category, but also consider consecutive execution of necessary pre-steps and possible feedbacks between interrelated fields.

2.1 User Stories Summary

In the following subsections, we provide details on the User Stories that are currently available in CLARITY catalogue. For orientation, Table 2 shows the relations between the User Stories that have been defined so far. Clearly, the granularity of the User Stories varies between the Demonstration Cases and only a small number of level 3 sub-stories have been defined so far.

For a full description of each User Story, please refer to Annex 4 – Full Description of CLARITY User Stories.

Table 2: CLARITY User Stories, levels and their relations for each Demonstration Case

Scope	User Story Title (Level 1)	Sub Stories (Level 2)	Sub-sub Stories (Level 3)
Project	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures	US-CSIS-110 CSIS planning sessions and project types US-CSIS-120 pre-feasibility study US-CSIS-130 Expert workflows US-CSIS-140 Matchmaking and ordering US-CSIS-150 Uploading the expert opinion and (sub-)study results: US-CSIS-160 Data Overview US-CSIS-170 Study analysis US-CSIS-180 Final report / Action Plan	US-CSIS-121 pre-feasibility study - risk analysis US-CSIS-122 pre-feasibility study - impact scenario analysis US-CSIS-123 pre-feasibility study - adaptation options US-CSIS-131 Assessment of air-pollution and greenhouse-gas-emissions
DC1-Italy	US-DC1-100 Climate adaptive planning	US-DC1-110 - Climate adaptive planning / Hazard US-DC1-120 - Climate adaptive planning / Impact US-DC1-130 - Climate adaptive planning / Comparison US-DC1-140- Climate adaptive planning / Adaptation US-DC1-150 - Climate adaptive planning / Display results 1 US-DC1-160 - Climate adaptive planning / Display results 2	
DC1-Italy	US-DC1-200 - Climate adaptive design guidelines and building regulations	US-DC1-210 - Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC1-220 - Climate adaptive design guidelines and building regulations / Benchmarking	
DC2 - Sweden	US-DC2-100 Water hazards and supply	US-DC2-110 Flooding of the city centre of Jonköping	

		US-DC2-120 Flooding of the city centre of Stockholm US-DC2-130 Hydrological buffers in the landscape as ecosystem service	
DC2 - Sweden	US-DC2-200 Health and environment	US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County)	
DC3 - Austria	US-DC3-100 Heat island adaptation measures-Linz-02	US-DC3-110 Microclimate/Indicators US-DC3-120 Microclimate/existing settlement area US-DC3-130 Microclimate/greening measures in existing settlement areas US-DC3-140 Microclimate/recommendations for urban development areas	
DC3 - Austria	US-DC3-200 Ventilation pattern adaptation measures-Linz-03	US-DC3-210 Ventilation/changes in settlement density and building heights	
DC4 - Spain	US-DC4-100 Influence of the temperature evolution in the infrastructure (road) design.		
DC4 - Spain	US-DC4-200 Influence of the temperature and related parameters evolution in the infrastructure (road) maintenance.		
DC4 - Spain	US-DC4-300 Influence of the temperature evolution in the infrastructure (road) construction.		
DC4 - Spain	US-DC4-400 Influence of precipitation in the infrastructure (road) design.		
DC4 - Spain	US-DC4-500 Influence of the precipitation in the infrastructure (road) maintenance.		
DC4 - Spain	US-DC4-600 Influence of the precipitation in the infrastructure (road) construction.		
DC4 - Spain	US-DC4-700 Influence of unusual growth of vegetation in the infrastructure (road) maintenance.		

DC4 - Spain	US-DC4-800 Infrastructure planning and design	US-DC4-810 Development of climate indicators for road infrastructure US-DC4-820 Climate indicator and data monitoring US-DC4-830 Catalogue of adaptation measures	
DC4 - Spain	US-DC4-900 Infrastructure maintenance and construction	US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario	

2.2 Generic CSIS User Stories

The generic User Stories are directly reflecting the EU-GL and the CLARITY DoA requirements.

2.2.1 US-CSIS-100 Platform that supports users in defining and following standardized planning procedures

As a: Decision Maker

I want: a platform that will support and enforce the standardized workflows for each of the supported planning processes

So that: we can deliver added value to the users and other stakeholders in terms of simplifying and "industrializing" the planning process. In this way, we will improve the transferability of the CLARITY results to other sites, as required in O4 of the DoA.

2.2.1.1 US-CSIS-110 CSIS planning sessions and project types

As a: Climate Resilience Manager

I want: the possibility to set a new "planning session" and choose a "project type" before starting the actual CC adaptation planning

So that: the choices for data types, data generation, processing/analysis and report generation can be adjusted to the project type (and its exposure) and the whole planning session saved and re-opened at a later point.

2.2.1.2 US-CSIS-120 pre-feasibility study

As a: CLARITY coordinator

I want: a tool that will allow users with no in-depth modelling knowledge to perform the (ultra)high-level strategic pre-feasibility risk screening, impact analysis, identify and partially appraise the most relevant adaptation options.

So that: CLARITY CSIS can offer some tangible added value to the users in the pre-analysis phase, help them to better understand the problem at hand, decide if they need additional studies and formulate the requests for additional expert studies if needed.

2.2.1.2.1 US-CSIS-121 pre-feasibility study - risk analysis

As a: Climate Resilience Manager

I want: a tool that will allow users with no in-depth modelling knowledge to perform the (ultra)high-level strategic pre-feasibility risk screening

So that: CLARITY CSIS can offer some tangible added value to the users in the pre-analysis phase, help them to better understand the problem at hand, decide if they need additional studies and formulate the requests for additional expert studies if needed.

2.2.1.2.2 US-CSIS-122 pre-feasibility study - impact scenario analysis

As a: CLARITY coordinator

I want: a tool that will allow users with no in-depth modelling knowledge to perform the (ultra)high-level strategic pre-feasibility impact scenario analysis

So that: CLARITY CSIS can offer some tangible added value to the users in the pre-analysis phase, help them to better understand the problem at hand, decide if they need additional studies and formulate the requests for additional expert studies if needed.

2.2.1.2.3 US-CSIS-123 pre-feasibility study - adaptation options

As a: CLARITY coordinator

I want: a tool that will allow users with no in-depth modelling knowledge to perform the (ultra)high-level strategic pre-feasibility identification and appraisal of the adaptation options

So that: CLARITY CSIS can offer some tangible added value to the users in the pre-analysis phase, help them to better understand the problem at hand, decide if they need additional studies and formulate the requests for additional expert studies if needed.

2.2.1.3 US-CSIS-130 Expert workflows

As a: Service User

I want: I want to be guided through the expert workflow. I want to know what is expected from me and what I can expect to get from the expert(s).

So that: I can plan ahead: How long will it take to proceed to the next step? How much will it cost? What can be expected from the findings? I can prepare all the required information and documents upfront in order to smoothen the process. I can easily discuss the findings with others and have all the relevant information available in a (scenario-) report.

2.2.1.3.1 US-CSIS-131 Assessment of air-pollution and greenhouse-gas-emissions

As a: Service User

I want: I want to be able to address all relevant topics for my project, including air-pollution and greenhouse-gas-emissions.

So that: I can easily satisfy all requirements for my project when applying for funding/approval.

2.2.1.4 US-CSIS-140 Matchmaking and ordering

As a: Service User

I want: I want to have a clear overview of all the available experts and which topics they are able to cover for my specific type of project.

So that: I can easily compare, find and select the most suitable expert(s) for my specific type of project.

2.2.1.5 US-CSIS-150 Uploading the expert opinion and (sub-) study results

As a: Modeller

I want: to know upfront how my report should look like (I need to have a blueprint) and what parameters at least need to be addressed.

So that: I can easily upload my data and findings in a standardised way.

2.2.1.6 US-CSIS-160 Data Overview

As a: Service User

I want: to have an overview of all the data/information that is relevant for my project and that I already have or may yet order or produce using CSIS

So that: I can understand what I already have and which data could, should or must still be added to the set before proceeding to the final assessment and report generation

2.2.1.7 US-CSIS-170 Study analysis

As a: Service User

I want: to compare and assess the information generated in Risk Analysis and Impact Scenario Analysis steps

So that: I can make a decision what to do next, e.g. go back and generate more data/scenarios or proceed with generating a final report.

2.2.1.8 US-CSIS-180 Final report / Action Plan

As a: Service User

I want: to specify what parameters are most important for my specific type of project and get the relevant information based on that.

So that: I can easily compare different options/scenarios based on the Key Performance Indicators from different sectors like climate, air quality, financial, social, etc., which are most important to me and my type of project.

2.3 DC1: Adaption Scenarios for Metropolitan Resilience Planning (Naples, IT)

The main objective of Naples Demonstration Case is to support public administration at Metropolitan and Municipal level in developing the local adaptation plan based on EU Directives and the National Strategy for Climate Change Adaptation.

2.3.1 US-DC1-100 Climate adaptive planning

As a: Service User

I want: to evaluate the requirements needed for urban regeneration, new construction and building retrofitting in highly densely populated areas, by integrating the inevitable constraints (due to traditional building techniques, landscape preservation requirements, effective cost of retrofitting) with a new approach based on climate modelling, directing to the use of sustainable materials and technologies aimed at climate adaptation. The model, applied to potential transformation or if possible to real urban plans may help investigating the performances of different typologies of land use and alternative technological options.

So that: I can, in compliance with the standard building regulations, run the model for different alternatives to help the project manager to choose a project which maximizes the climate benefits, and to evaluate best

practices for public policies and address private investments that may represent a fast way for urban and social change.

2.3.1.1 US-DC1-110 - Climate adaptive planning / Hazard

As a: Service User

I want: to visualize heat wave, landslide and pluvial flood hazard maps in relation to climate change projections for the area of the Metropolitan City of Naples.

So that: I can identify the most exposed areas in terms of buildings and population density, considering the expected hazard exposure variation due to climate change.

2.3.1.2 US-DC1-120 - Climate adaptive planning / Impact

As a: Service User

I want: to quantify the impact of heat waves, landslides and pluvial floods (based on climate projections) in relation to the following elements at risk: population, residential buildings, strategic buildings, critical transport infrastructures, local economy for the area of the Metropolitan City of Naples

So that: I can understand the effect of extreme climate events in the area in relation to climate change projections considering the expected impact variation due to climate change

2.3.1.3 US-DC1-130 - Climate adaptive planning / Comparison

As a: Service User

I want: the results of CLARITY simulations and climate services to be applied to both existing conditions and design scenarios, with different levels of details in relation to the area object of the analysis (e.g. Metropolitan City vs. city neighbourhood), to the available datasets and to the scope of the analysis (e.g. preliminary planning vs. final planning)

So that: I can use the CLARITY system in different operational contexts, depending on the role of the Municipality of Napoli (e.g. direct design/planning activity, consultation, evaluation of projects presented by private entities or other public authorities).

2.3.1.4 US-DC1-140- Climate adaptive planning / Adaptation

As a: Spatial Planner

I want: to acquire detailed information on climate adaptation potential of alternative planning scenarios in specific areas (e.g. brownfield and redevelopment areas in East Napoli and Bagnoli-Coroglio), by applying the model to different proposed options which may include variations in the volumetric distribution of new buildings, the hydraulic and sewerage system, the urban surfaces and vegetation.

So that: I can prioritize the design scenarios and identify the benefits of climate adaptive solutions, and measure the cost-effectiveness of investments in relation to both short- and long-term benefits (current conditions and variation due to climate change).

2.3.1.5 US-DC1-150 - Climate adaptive planning / Display results 1

As a: Service User

I want: the results of CLARITY simulations and climate services to be visualized as Georeferenced maps

So that: I can use the maps as official planning documents for the redevelopment projects to be directly implemented by the Municipality of Naples (municipal planning obligations).

2.3.1.6 US-DC1-160 - Climate adaptive planning / Display results 2

As a: Service User

I want: the results of CLARITY simulations and climate services to be visualized as synthetic document (e.g. pdf with text and images)

So that: I can use the maps as consultation documents for the redevelopment projects to be implemented jointly with Regional or State level authorities (municipal planning obligations)

2.3.2 US-DC1-200 - Climate adaptive design guidelines and building regulations

As a: Service User

I want: to acquire a set of design guidelines applicable to the multi-risk conditions (climate, seismic, hydrogeological, and volcanic) of the Metropolitan area

So that: I can promote public policies and private investments aimed at integrating Climate Change Adaptation and Disaster Risk Reduction.

2.3.2.1 US-DC1-210 - Climate adaptive design guidelines and building regulations / Multi-risk integration

As a: Service User

I want: to acquire a set of design guidelines to integrate climate adaptive solutions within current building regulations (now in an update process to be adapted to the national standardized model), addressing at the same time the relevant set of existing constraints, such as 1) landscape protection, a third of the total area of Naples/city; 2) volcanic risk from Vesuvius and Campi Flegrei, east and west of Naples; 3) landslide floods and hydrogeological issues; 4) earthquakes.

So that: I can address ongoing structural retrofitting interventions, both in public policies (e.g. reinforcing of school buildings, 136M€ available to the metropolitan area of Naples from the 2015-2017 national financial programs) and private investments (75%-85% "Sismabonus" tax contribution available for private citizens for seismic improvements), to include climate adaptation within a multi-hazard resilience perspective and evaluate the opportunity of climate financial incentives (e.g. reflective or green facade materials following a seismic/landslide structural improvement).

2.3.2.2 US-DC1-220 - Climate adaptive design guidelines and building regulations / Benchmarking

As a: Service User

I want: to acquire a set of benchmarks and assessment tools for alternative DRR and CCA techniques.

So that: I can evaluate projects presented by private entities for new buildings and retrofitting actions (for permit release, incentives quantification, etc.).

2.4 DC2: Fostering Adaption of Large Scale Infrastructure in Sweden to Local Climate Change Effects (Stockholm, Jönköping, SE)

This Demonstration Case aims at assessing climate-induced risks to the success of selected large scale infrastructure projects in Sweden, and identifying and appraising effective adaptation measures to build climate resilience. By delivering user-tailored indicators that will run over existing climate services, we aim at assessing the usefulness, usability and performance of CLARITY climate services for generating user-customisable impact indicators focusing on selected large scale projects in Sweden.

2.4.1 US-DC2-100 Water hazards and supply

As a: Service User

I want: information on the future risk of flooding and droughts

So that: I can take measures to prevent incidents caused by flooding or droughts in my area

2.4.1.1 US-DC2-110 Flooding of the city centre of Jonköping

As a: Service User

I want: information on the future risk of flooding in Jönköping caused by intense precipitation, river flooding and rise in lake level.

So that: I can take measures and plan for future development of the city that minimizes future effects of flooding

2.4.1.2 US-DC2-120 Flooding of the city centre of Stockholm

As a: Service User

I want: a CSIS product that will allow me to do the adaptation planning for issues associated with precipitation and flooding

So that: I can minimize the effects of future flooding and plan for future infrastructure.

2.4.1.3 US-DC2-130 Hydrological buffers in the landscape as ecosystem service

As a: Service User

I want: to evaluate and increase the ecosystem services within the landscape to buffer both high and low water regimes be able to point out important/effective areas for geographical allocation of (intermittent) wetlands as hydrological buffers

So that I:

- can meet the governmental instruction of develop wetlands as hydrological buffers in the landscape to regulate water flows during both high and low water regimes (in addition to previous values : biodiversity and nutrient retention)
- secure areas of high societal importance from high flows
- secure water access for different important values (e.g. industry, water drinking supply, biological) in periods of low water regimes in a future climate
- get knowledge of the potential in wetlands as buffers in a drainage area

2.4.2 US-DC2-200 Health and environment

As a: Service User

I want: a set of indicators on future climate, air quality, hydrology and the expected impacts on human well-being, health and the environment.

So that: I can take measures and plan for the future development of the city that minimizes the future risks to human health and the environment.

2.4.2.1 US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool

As a: Service User

I want: to extend and validate the Green Area Factor (GAF) in Stockholm.

So that: I can optimize the role of urban vegetation in Stockholm as a climate adaptation tool.

2.4.2.2 US-DC2-220 Climate and health indicators for Stockholm

As a: Service User

I want: to be able to visualize and download climate and health-related indicators for Stockholm

So that: I can assess the importance of future land use change on the health of the population under the context of climate change.

2.4.2.3 US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County)

As a: Service User

I want:

- to model and visualize future water conditions (hydrological, chemical and ecological) with a system that enables to store and visualize climate indicators (e.g. SWICCA)
- to develop regionalized time series of selected climate indicators (including meteorological) to be used in environmental conservation/management
- to visualize and present future climate conditions to be met by actions to preserve natural values

So that I can:

- secure good knowledge in long-term planning and decision making for natural values
- explain observations made in the environmental monitoring process
- use the indicators to check modelled data (follow-up) on a regional level
- make long term predictions of critical metrological variables for specific natural values

2.5 DC3: Urban Heat Waves, Urban Heat Islands, Extreme Participation (Linz, AT)

The key objective of the Austrian Demonstration Case is to examine the climate related effects and the use of tools and measures for risk assessment, evaluation of climate-change adaptation strategies and integration of adaptation measures for sustainable urban development. The CLARITY solution will: (1) support information exchange and collaborative decision making; (2) provide overview information on key features relevant for climate-resilience of the city or region; (3) assess sensitivity to climate change and the most appropriate adaptation measures at the an urban and district planning level, and (4) Document the recommendations made.

2.5.1 US-DC3-100 Heat island adaptation measures-Linz-02

As a: Spatial Planner

I want: information on measures for reducing heat exposure

So that: I can support decisions for future action during future heat waves which may accelerate in magnitude and frequency. The reason is to make the population suffering less from heat exposure. This requires adaptation to provoke local cooling by local measures.

2.5.1.1 US-DC3-110 Microclimate/Indicators

As a: Spatial Planner

I want: indicators/maps showing the general microclimatic patterns in the city, especially revealing microclimatic sensitive areas

So that: I can do climate sensitive city planning based on thoroughly analysed indicators which are commonly accepted and comparable among cities.

2.5.1.2 US-DC3-120 Microclimate/existing settlement area

As a: Spatial Planner

I want: to know about the effects of changes in the building heights and density on the microclimate in existing settlement areas – exemplary for hot spot areas in Linz

So that: I can consider the microclimatic effects of building changes in urban regeneration or densification measures.

2.5.1.3 US-DC3-130 Microclimate/greening measures in existing settlement areas

As a: Spatial Planner

I want: to know about the effects of unsealing and greening measures on the microclimate in existing settlement areas – exemplary for hot spot areas in Linz

So that: I can plan/set optimal (from a microclimatic perspective) greening measures in order to make existing settlement areas climate-resilient for the future.

2.5.1.4 US-DC3-140 Microclimate/recommendations for urban development areas

As a: Spatial Planner

I want: to get recommendations on how to plan climate resilient new settlement areas

So that: I can provide guidelines and give clear instructions to developers to build settlement areas which are high quality and liveable even in 50 years.

2.5.2 US-DC3-200 Ventilation pattern adaptation measures-Linz-03

As a: Spatial Planner

I want: information on the ventilation pattern in Linz based on the current urban fabric and the expected changes over time through density increase

So that: I can adapt the masterplan to cope better with the air conditions in the city under future climate conditions. The reason is to increase ambient air quality. This requires adaptation of urban fabric.

2.5.2.1 US-DC3-210 Ventilation/changes in settlement density and building heights

As a: Spatial Planner

I want: to know about the effects of changes in the building heights and density on ventilation patterns in the City of Linz

So that: to know about the effects of changes in the building heights and density on ventilation patterns in the City of Linz

2.6 DC4: Spanish Transport Infrastructure (ES)

The objective of this Demonstration Case is to improve the resilience of existing transport infrastructure, through the development of climate-proofing infrastructure and facilitate the planning and management of maintenance tasks on the Spanish ground transport networks thanks to the development of indicators that contribute to their operation safety, profitability and sustainability in both the short and long term. The results of this Demonstration Case will help managers, whether they are public administration or licensed companies, to the efficient and cost-effective planning of resources and budget for the design and implementation of climate-driven impacts adaptation measures in the Spanish railway and highway networks.

2.6.1 US-DC4-100 Influence of the temperature evolution in the infrastructure (road) design.

As a: Service User

I want: to know the long-term evolution of the temperature in a specific area. To be able to adjust the design options to this evolution by means of an economic and environmental assessment (e.g.: Material resilience, Expansion coefficient of materials, Structural layer thickness, Drainage system capacity, Embankment characteristics.)

So that: infrastructure design could be optimized and its operational life extended.

2.6.2 US-DC4-200 Influence of the temperature and related parameters evolution in the infrastructure (road) maintenance.

As a: Service User

I want:

- to know the mid - long term evolution of the temperature in a specific area
- to be able to model the air, pavement temperature, humidity and the dew point temperature in non-monitored areas
- to know the property of conductivity in the wearing course and as a result the excess of spread salt
- to forecast the thawing periods and the expected volume of water to be drained
- to estimate the fire risk and to provide alternative routes
- to be able to adjust the design options to this evolution when deep maintenance or refurbishment works are needed, by means of an economic and environmental assessment

So that:

- maintenance planning could be improved, reducing general costs and bidding budget
- adjusting frequency and resources of the spreading salt process
- controlling the maintenance of the sealing gaskets
- optimizing the safety and traffic management tasks
- organization of the staff work shifts can be attained

2.6.3 US-DC4-300 Influence of the temperature evolution in the infrastructure (road) construction.

As a: Service User

I want:

- to know the short term evolution of the temperature in a specific area.
- to estimate the adequacy of the technical solutions in the project according to the climate conditions from an economic and environmental point of view.
- to know the required composition of the asphalt mixture in accordance to the climate conditions.
- to establish the moments when the work conditions are favourable

So that:

- construction time periods can be optimized.
- staff work shift could be planned according to the temperature.

2.6.4 US-DC4-400 Influence of precipitation in the infrastructure (road) design.

As a: Service User

I want:

- to know the probability of the increase of the volume and frequency of precipitations in the long term.
- to know the density and frequency of fog events.
- to be able to propose constructive solutions according to climate conditions (e.g. porous asphalt, appropriate vegetation, soil stabilization solutions, drainage systems design, etc.)

So that:

- an optimized design of the infrastructure can be obtained.
- the determination of an optimal road layout and the embankments.
- deforestation can be avoided.

2.6.5 US-DC4-500 Influence of the precipitation in the infrastructure (road) maintenance.

As a: Service User

I want:

- to know the probability of the increase of the volume and frequency of precipitations in the mid-long term. -To know the density and frequency of fog events.
- to be able to provide alternative routes when necessary (fog, floods, etc.).
- to be able to estimate the frequency of maintenance interventions according to climate conditions.

So that:

- an optimal management of traffic could be achieved.
- an optimal management of maintenance tasks could be achieved (frequency of drainage systems cleaning, vegetation growth supervision in embankments, etc.)
- to improve the maintenance planning in order to be competitive in the bidding processes.

2.6.6 US-DC4-600 Influence of the precipitation in the infrastructure (road) construction.

As a: Service User

I want:

- to know the probability of the increase of the volume and frequency of precipitations in the short term.
- to be able to propose construction process according to precipitation conditions.

So that:

- the costs of the construction process could be reduced (specific digging systems, particular retention systems, hydric resources economy, etc.)
- works planning could be improved.

2.6.7 US-DC4-700 Influence of unusual growth of vegetation in the infrastructure (road) maintenance.

As a: Service User

I want:

- to know the progression of vegetation growth in the mid-long term
- to know the frequency of the intervention related to vegetation
- to be able to propose alternative roads when there is a potential fire risk

So that:

- reducing fire risks.
- improving maintenance costs (controlling the use of herbicides, adjusting the pruning frequency, etc.)

2.6.8 US-DC4-800 Infrastructure planning and design

As a: Service User

I want: information on the future climate to planning and design new infrastructure

So that: I can take measures to prevent incidents caused by future climate in the roads

2.6.8.1 US-DC4-810 Development of climate indicators for road infrastructure

As a: Service User

I want: relevant climate indicators (T, rainfall, humidity, snow and frost)

So that: I can plan, design and develop construction and maintenance techniques taking into account climate change.

2.6.8.2 US-DC4-820 Climate indicator and data monitoring

As a: Service User

I want: to develop a system to store and visualize climate indicators and data

So that: I can have an early alert system; also have a systematic control of different road elements that may help me to analyse and assess climate effects on the different infrastructures. This information can be very interested to decide which elements are more resilient and should be used in future planning.

2.6.8.3 US-DC4-830 Catalogue of adaptation measures

As a: Service User

I want: develop adaptation measures for adaptation to the future climate

So that: I can have a catalogue that relates one or more weather events to different adaptation measures. This catalogue must be able to establish relationships in a systematic way.

2.6.9 US-DC4-900 Infrastructure maintenance and construction

As a: Service User

I want: information on the future (long, medium and short-term) climate to maintain current roads and built new roads.

So that: I can schedule maintenance activities, better adjust bidding conditions in tendering and plan for more resilient infrastructure in the construction of new roads.

2.6.9.1 US-DC4-910 Winter road/driving scenario

As a: Service User

I want: relevant climate winter indicators (T, rainfall, humidity, snow and frost)

So that: I can plan, design and develop construction and maintenance techniques taking into account climate change.

2.6.9.2 US-DC4-920 Hydric risk scenario

As a: Service User

I want: relevant hydric indicators (precipitation, river data, and wetness and aridity)

So that: I can plan, design and develop construction and maintenance techniques taking into account climate change.

2.6.9.3 US-DC4-930 Heat waves scenario

As a: Service User

I want: relevant climate winter indicators (T and thermal amplitude)

So that: I can plan, design and develop construction and maintenance techniques taking into account climate change.

2.6.9.4 US-DC4-940 Growth of vegetation scenario

As a: Service User

I want: relevant climate indicators with growth vegetation

So that: I can plan, design and develop construction and maintenance techniques taking into account climate change.

3 CLARITY Test Cases

CLARITY Test Cases (TC) are the counterpart to the User Stories (US). They specify an "offer" for resolving the User Stories and link the requirements with the data, models and software that is actually produced or used in the project. In short, the Test Case consists of the following parts:

1) Summary page, including the:
    a. TC objective: Overarching "business" objective of the Test Case
    b. TC context: relation to other TCs and to the overall CSIS functionality
    c. Workflow summary: short description of the workflow supported by this TC
    d. Addressed User Stories: links to addressed USs and explanations
    e. Addressed Exploitation requirements: links to addressed exploitation requirements and explanations
2) Elements used page, including the:
    a. Links to CLARITY building blocks (BBs) and explanations on how these BBs are used in the TC
    b. Links to input data sets and explanations on how these data sets are used in the TC
    c. Links to output data sets and explanations on how these data sets are produced in the TC
3) Test Actions page, including the:
    a. Actions: List of the actual steps in the TC workflow, with expected results, mock-ups and evaluation results of the latest test run
    b. Test log: results of the test runs
4) Status page, including the:
    a. List of the TC team members and their responsibilities
    b. Status of the TC implementation

Next section provides short descriptions of the four Demonstration Cases and their related Test Cases. In addition, it also provides the generic test related to the generic CSIS User Stories.

3.1 Test Cases Summary

In the following subsections, we provide details on the User Stories that are currently available in CLARITY catalogue. For orientation, Table 3 shows the relations between the Test Cases that have been defined so far. Clearly, the number and granularity of the Test Cases varies between the Demonstration Cases. Only sub Test Cases have been defined for the CSIS Generic User Stories so far.

For a full description of each Test Case, please refer to Annex 5 – Full Description of CLARITY Test Cases.

Table 3: CLARITY User Test Cases, levels and their relations for each Demonstration Case

Scope	Test Case Title (Level 1)	Sub Test Case Title (Level 2)
Project	TC-CSIS-0000 ICT CS for the CSIS Infrastructure	TC-CSIS-0010 Registration TC-CSIS-0020 General User Profile Management TC-CSIS-0030 CS Provider Profile Management TC-CSIS-0031 CS Create provider service

		TC-CSIS-0050 Infrastructure Project Management TC-CSIS-0051 Create new Infrastructure Project TC-CSIS-0052 Edit Basic Project Properties TC-CSIS-0053 Specify Project Location TC-CSIS-0055 Share Project Type TC-CSIS-0060 Project Options Management (Elements as Risk) TC-CSIS-0065 Project Options Descriptions TC-CSIS-0900 Data Package Export/Download/Forward To
Project	TC-CSIS-1000 ICT CS for "Characterize Hazard" Step	
Project	TC-CSIS-2000 ICT CS for "Evaluate Exposure" Step	
Project	TC-CSIS-3000 ICT CS for "Vulnerability Analysis" Step	
Project	TC-CSIS-4000 ICT CS for "Assess Risks and Impact" Step	
Project	TC-CSIS-5000 ICT CS for "Identify Adaptation Options" Step	
Project	TC-CSIS-6000 ICT CS for "Appraise Adaptation Options" Step	
Project	TC-CSIS-7000 ICT CS for "Integration of Adaptation Actions" Step	
DCx[5]	TC DCx Evaluating the impact of building characteristics on ventilation within urban areas.	
DCx	TC DCx Evaluating the impact of greening measures on the heat load of urban areas.	
DCx	TC DCx Preparing climate maps for heat hazard analysis on city scale	
Project	TC RA Hazards maps on EU scale	
Project	TC-AIT-01 Support pre-feasibility study - risk analysis	
Project	TC-AIT-02 Climate Twins Test Case	
DC1	TC DC1 Enabling comparison of alternative adaptation scenarios	
DC1	TC DC1 Evaluating the impact of building characteristics on ventilation within urban areas.	
DC1	TC DC1 Evaluating the impact of greening measures on the heat load of urban areas.	
DC1	TC DC1 Preparing climate maps for heat hazard analysis on city scale	
DC2	TC DC2 P1 Water Hazards and supply	
DC3	TC DC3 Evaluating the impact of building characteristics on ventilation within urban areas.	

[5] Generic or independent Test Case, suitable for several Demonstration Cases

DC3	TC DC3 Evaluating the impact of greening measures on the heat load of urban areas.	
DC3	TC DC3 Preparing climate maps for heat hazard analysis on city scale	
DC4	TC DC4 010 Climate Broker for road elements	
DC4	TC DC4 020 Climate variables and indices atlas for road elements	
DC4	TC DC4 030 Hazard assessment for road elements	
DC4	TC DC4 040 Catalogue of road elements at risk	
DC4	TC DC4 050 Atlas of road elements at risk	
DC4	TC DC4 060 Risk assessment for road elements	
DC4	TC DC4 070 Good practices and adaptation measures catalogue for road elements	
DC4	TC DC4 080 Decision support tool for road element	
DC4	TC DC4 090 Implementation of the adaptation plan for road elements	
DC4	TC DC4 Evaluating the impact of greening measures on the heat load of urban areas	

3.2 Generic CSIS Test Cases

3.2.1 TC-CSIS-0000 ICT CS for the CSIS Infrastructure

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") can use several generic ICT CS ("tools") integrated into an overall CLARITY CSIS for collaboratively ("co-creation") performing Climate Change Adaption Studies following a structured and methodological approach (CLARITY EU-GL Methodology).

Context: This is a Meta-TC for all TCs related to the general IT infrastructure tasks of the CSIS (user account creation, project management, information exchange,....). Currently, there are no DC-level TC that addresses those rather technical topics. DC-level TCs focus on actual risk assessment and adaptation planning rather than general IT support functionalities.

Workflow Summary: The users perform common tasks that are needed for the creation of a Climate Change Adaption Studies and that are supported by generic ICT CS.

3.2.1.1 TC-CSIS-0010 Registration

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") create a user profile on myclimateservice.eu for personalized user experience and to be able to perform adaptation planning, create inquiries, create offers, post comments, etc.

Context: This is one of the general and generic CSIS TCs.

Workflow Summary: Users visits myclimateservice.eu. The website advertises the benefits of creating a personal user profile for different types for users. The highlights for end users are for example:

- perform a (free) pre-screening for climate risks of (infrastructure) projects and get some generic proposal for adaptation measures

- perform a detailed adaptation planning of (infrastructure) projects with help of (verified) experts: The Adaptation Planning Support Tool
- create inquiries and interact with experts online and offline (on-site)
- get a PDF report of the planning

The highlights for providers are for example:

- create a detailed service provider profile and portfolio
- offer your services in the CLARITY marketplace
- view end user inquiries and create offers

The user can click on a "register" button to create a new profile.

3.2.1.2 TC-CSIS-0020 General User Profile Management

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and CS Service Providers ("Experts") can log-in on myclimateservice.eu and manage their user profile information to enhance personalized user experience.

Context: This is one of the general and generic CSIS TCs.

Workflow Summary: The User visits myclimateservice.eu and clicks on the "Login" button to access and manage its personalized profile. The personalised profiles holds some information that enhance user experience and can be used for matchmaking, etc. Among others, the profile (data model) contains the following properties:

- full user name
- picture or avatar
- location (country or geo coordinates) -> used for spatial matchmaking
- sector -> used for sectoral matchmaking
- links to social network profiles (linked-in,...)
- other common user profile information to be defined by TC implementer

The user can change this information and adjust also several privacy and communication settings, e.g.

- make profile public or private
- show only certain properties (picture, full name) to other (registered) users
- receive emails from other users / site administrators
- receive newsletters
- other common user profile privacy settings to be defined by TC implementer

3.2.1.3 TC-CSIS-0030 CS Provider Profile Management

TC Objective: Climate Service Providers ("Experts", data providers, purveyors, etc.) can log-in on myclimateservice.eu[6] and manage their CS Provider profile information as well as their Climate Service Portfolio.

Context: This is one of the general and generic CSIS TCs.

Workflow Summary: The Climate Service Provider visits myclimateservice.eu and clicks on the "Login" button to access and manage its personalized provider profile and service portfolio. The Provider profile is used for advertising tailored Climate Services. Main element of this profile is a detailed service portfolio that describes in detail the activities of the provider. The provider can manage and update the portfolio, e.g. be adding and describing individual service provision options. Moreover, the provider can chose from different (predefined)

[6] This url will point to CLARITY marketplace as envisioned from the DoA description (task 5.4 Climate Service Marketplace) and feedback collected from User Stories and Test Cases.

categories that are used to classify the provider itself or one of its services. This information is used for "matchmaking", e.g. to propose a suitable Climate Service to potential end users.

3.2.1.4 TC-CSIS-0031 CS Create provider service

TC Objective: Climate Service Providers ("Experts", data providers, providers, etc.) can log-in on myclimateservice.eu, access his personal profile and create a new climate service.

Context: This is one of the general and generic CSIS TCs and is related to the Providers Profile Management.

Workflow Summary: The Provider within his service portfolio can add a service. To describe a new service it needs to be assigned a category (from predefined) to classify the service depending on its nature and theme. There could be different products or services to offer like consultancy, remote climate service or data. Also specific service meta-data has to be fulfilled, like its specific climate variables (wind, rain, temperature, etc.), in order to be used for "matchmaking" purposes. Then the provider can describe other relevant service meta-data like any related access policy, data accuracy, time range, etc. Finally a remote location of the data should be provided (URL) or specific contact details for consultancy services (where and when to contact, expertise and response times, etc.).

3.2.1.5 TC-CSIS-0050 Infrastructure Project Management

TC Objective: End Users can manage their (infrastructure) projects that they want to asses by pre-feasibility screening or a full Climate Change Adaptation Study.

Context: This is one of the general and generic CSIS TCs.

Workflow Summary: The End User visits his personal project workspace on myclimateservice.eu. The project workspace allows the user to create, update or delete the infrastructure projects that can be assessed by pre-feasibility screening or a full Climate Change Adaptation Study. For each project, the user can provide detailed information like economic sectors, description, spatial location, etc. This information is directly used by the CSIS and the different ICT Climate Services, respectively, to provide basic project assessment and matchmaking functionality. The geospatial project location in conjunction with the project-sector information is for example used for Hazard Characterisation to pre-select relevant hazards based on sector and location. Moreover, the sectoral information and project type are used to propose a set of relevant Element at Risk Types. At this level, no distinction between pre-feasibility and detailed assessment is made.

3.2.1.6 TC-CSIS-0051 Create new Infrastructure Project

TC Objective: End Users can create new (infrastructure) projects on basis of predefined project templates or an empty default template provided by the CSIS.

Context: This is one of the general and generic CSIS TCs and is related to the management of projects.

Workflow Summary: The user chooses either a predefined project template from a list of predefined project types available in the CSIS Database of Project Types or an empty default template, if none of the available template fits his needs. The template is used to preconfigure a project instance so that the type specific properties of the project according to the EU-GL project themes like project options (elements at risk, protect options, transport links, input, output,...) and economic sectors are set to their default values for this particular project type. The empty or pre-configured project information has to be changed later by the users to suit his particular needs. If there is no fit-for-purpose project template available, the user can start from an empty project but then has to provide all detailed project information on his own, including information on the four EU-GL project themes. Furthermore, the user has the ability to publish parts of his individual project configuration as new public template and thus to make this specific project type available to others users that want to assess similar projects (specified in a separate TC).

3.2.1.7 TC-CSIS-0052 Edit Basic Project Properties

TC Objective: End Users can change the individual properties of their projects and override default properties from predefined project templates.

Context: This is one of the general and generic CSIS TCs and is related to the management of projects.

Workflow Summary: After the user (Climate Resilience Manager) has created a new empty or preconfigured infrastructure project or at any time wants to update the project information, he can edit the basic project properties. The user will input basic information about the project like

- project title
- type (urban development, road infrastructure,...)
- country and region
- sub project
- company name
- detailed description
- project lifecycle stage (strategy, planning, etc.)
- planning horizon
- keywords
- economic sector code(s)
- Typology of investment / project types (EU-GL)
- sub sector code(s)
- thematic code(s)
- keywords
- etc.

If the project is based on a predefined project type, most of the properties are already set to project type specific default values. Some of the properties like economic sectors, country, etc. are mandatory since they are used later as input for other functionalities like matchmaking or pre-selection of hazards (based on country) and vulnerabilities (based on sectors). The project instance is stored as part of the users' workspace in the user workspace database.

3.2.1.8 TC-CSIS-0053 Specify Project Location

TC Objective: End Users can specify the spatial project location to benefit from "matchmaking" functionality provided by Scenario Transferability.

Context: This is one of the general and generic CSIS TCs and is related to the management of projects.

Workflow Summary: The user will be able to specific the initial project location by interactively defining either a point, bounding box or polygon on a map component. Note: Finer grained spatial extents can be defined later at the level of elements at risk. The map component features common features like searching location by name or switching between different background layers (topographic, aerial,...) search. The country information from the project instance is used to initially centre the map on the project country. The spatial location information is stored together with the general project properties of the project instance in the user workspace database.

3.2.1.9 TC-CSIS-0055 Share Project Type

TC Objective: End Users can publish new project types as templates for other users.

Context: This is one of the general and generic CSIS TCs and is related to the management of projects.

Workflow Summary: Once a project is properly set-up and described, including basic specification of project options (projects physical and non-physical assets, input and output,...) topics, the user has the ability to publish parts of the project configuration as new project type (project template). This encompasses mainly

non-project-instance specific information (name, description,...) like - keywords - economic sector code(s) - sub sector code(s) - thematic code(s) - keywords - element as risk. The new project template is stored in the in Database of Project Types along with the information that is a user-contributed template not (yet) officially authorised by CLARITY and a comment from the user that published the template. CLARITY Administrators may review the template and reject or authorise it.

3.2.1.10 TC-CSIS-0060 Project Options Management (Elements as Risk)

TC Objective: The user selects the relevant options (inputs, outputs, elements at risk,...) of the project.

Context: This is one of the general and generic CSIS TCs and is related to the management of project options.

Workflow Summary: The user selects the Project Option types that are relevant for his particular project in relation to at least the four key themes from the Database of Project Option Types:

- On-site assets and processes (physical + functional impact);
- Transport links (physical + functional impact);
- Inputs (water, energy, others) (functional impact);
- Outputs (products, markets, customer demand) (functional impact).

If the project is based on a predefined project type, matching Project Options and their classification according to the four themes are already preselected. The user may change the automatically selected Project Options and publish the static part of the project configuration as new project template in the Database of Project Types. The user-specific individual project configuration is stored as project instance in the user workspace database. If no matching Project Option in the Database of Project Option Types (Project Master Data) is available, the user can either chose a generic Project Option or create a new Project Option Types.

At this point, the user does not yet provide information on concrete project type instances (concrete sets of elements a risk like building distribution Shapefile, etc.).

3.2.1.11 TC-CSIS-0065 Project Options Descriptions

TC Objective: The user is presented with a description of the relevant options of the project.

Context: This is one of the general and generic CSIS TCs and is related to the project options' descriptions

Workflow Summary: The user can optionally provide additional information to describe distinct options like the building inventory etc.

Such information could include a link to the actual data (e.g. at Eurostat etc.) or the visualisation of the data

3.2.1.12 TC-CSIS-0900 Data Package Export/Download/Forward To

TC Objective: Enable CSIS users (e.g., project planners) to create a CLARITY "standard" data package that can afterwards be used in other steps of the assessment process and exported out of CSIS platform (i.e., download it in a zip file) so it can be integrated in more advanced study carried out by an external CS expert.

Context: Pre-requisite for this TC is that our security sub-system works so that the data can be handed out from one user to another and licensing conditions are respected. This is one of the general and generic CSIS TCs.

Workflow Summary: The CSIS end-user has already carried out the pre-feasibility study for his project and needs to prepare a data package containing all data required by the CS expert to further continue a more in detail assessment of the climate-proofing of the project. To that end, the CSIS tool provides an export wizard that will prepare the "standard" CLARITY data package and download/forward it to the CS expert (if already chosen). This CLARITY data package is automatically pre-compiled by the CSIS tool by attaching all

information that has been used so far in the current pre-feasibility study, such as (the various datasets to be included in the package will vary depending on step where the analysis stopped): - project type - List of hazards affecting the project - Risk Analysis maps (Hazards, Exposure, Vulnerabiltiy, HxExV) - Impact Scenario Analysis maps (Hazards, Exposure, Vulnerabiltiy, HxExV) - Indicators - etc.

In addition to the aforementioned information, the tool enables the end-user to attach additional information to the package by uploading it to his user space or by providing external references (links) to the datasets. Finally, the wizard allows the user to download the package in a zip file or send a link to the data package (stored in CLARITY CSIS repository) to the CS Expert for later download.

3.2.2 TC-CSIS-1000 ICT CS for "Characterize Hazard" Step

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") can use several generic ICT CS ("tools") integrated into an overall CLARITY CSIS for collaboratively performing the "Characterise Hazard" Step of a Climate Change Adaption Study that follows the structured and methodological approach of the CLARITY EU-GL Methodology.

Context: This is a Meta-TC for all generic TCs related to the first step "Characterise Hazard" step of the CLARITY EU-GL Methodology to build an adaptation strategy. It covers mainly generic TCs to identify hazard conditions in the project area, in relation to a range of climate variables and climate-related hazards, and determining which one might affect the response of project options to climate variables in relation to each of four key themes (elements at risk).

3.2.3 TC-CSIS-2000 ICT CS for "Evaluate Exposure" Step

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") can use several generic ICT CS ("tools") integrated into an overall CLARITY CSIS for collaboratively performing the "Evaluate Exposure" Step of a Climate Change Adaption Study that follows the structured and methodological approach of the CLARITY EU-GL Methodology.

Context: This is a Meta-TC for all generic TCs related to the second step "Evaluate Exposure" of the CLARITY EU-GL Methodology to build an adaptation strategy. It covers mainly generic TCs to evaluate exposure to climate hazards of the elements at risk considered as relevant in the location(s) where the project will be implemented (e.g. population, buildings, infrastructures, economy, environment, etc.).

Workflow Summary: The users perform tasks related to the "Evaluate Exposure" step of the overall process of performing Climate Change Adaption Studies according to CLARITY EU-GL Methodology and that are supported by generic ICT CS.

- For the start: Exposure == position on a map.** - just one step "show exposure" is basically just "show hazard"?
- Intermediate: choose "less/more exposed" plus add some explanation
- Extended version: Exposure can be changed by choosing some adaptation options. (implementation tbd. in a few months)

3.2.4 TC-CSIS-3000 ICT CS for "Vulnerability Analysis" Step

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") can use several generic ICT CS ("tools") integrated into a overall CLARITY CSIS for collaboratively performing the "Vulnerability Analysis" Step of a Climate Change Adaption Study that follows the structured and methodological approach of the CLARITY EU-GL Methodology.

Context: This is a Meta-TC for all generic TCs related to the 3rd step "Vulnerability Analysis" of the CLARITY EU-GL Methodology to build an adaptation strategy. It covers mainly generic TCs to assess the vulnerability of elements at risk to baseline/ observed climate and the future climate vulnerability. .

Workflow Summary: The users perform tasks related to the "Vulnerability Analysis" step of the overall process of performing Climate Change Adaption Studies according to CLARITY EU-GL Methodology and that are supported by generic ICT CS.

Initial process:

- Step 1: the system shows the vulnerabilities of all elements at risk types in the project to all hazards that we are aware of
- Step 1.1: hide the hazards that are irrelevant

Later prototypes (note: this may be part of the impact analysis - to be clarified):

- Take into account the quantity of elements at risk (types) in the project and form some kind of a summary vulnerability for the WHOLE PROJECT view?
- Take into account the positions (and exposures) of all elements at risk (from inventory) and form some kind of a summary view?

3.2.5 TC-CSIS-4000 ICT CS for "Assess Risks and Impact" Step

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") can use several generic ICT CS ("tools") integrated into an overall CLARITY CSIS for collaboratively performing the "Assess Risks and Impact" Step of a Climate Change Adaption Study that follows the structured and methodological approach of the CLARITY EU-GL Methodology.

Context: This is a Meta-TC for all generic TCs related to the 4th step "Assess Risks and Impact" of the CLARITY EU-GL Methodology to build an adaptation strategy. It covers mainly generic TCs to analyse climate hazards and their impacts to provide information for decision-making.

Workflow Summary: The users perform tasks related to the "Assess Risks and Impact" step of the overall process of performing Climate Change Adaption Studies according to CLARITY EU-GL Methodology and that are supported by generic ICT CS.

3.2.6 TC-CSIS-5000 ICT CS for "Identify Adaptation Options" Step

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") can use several generic ICT CS ("tools") integrated into an overall CLARITY CSIS for collaboratively performing the "Identify Adaptation Options" Step of a Climate Change Adaption Study that follows the structured and methodological approach of the CLARITY EU-GL Methodology.

Context: This is a Meta-TC for all generic TCs related to the 5th step "Identify Adaptation Options" of the CLARITY EU-GL Methodology to build an adaptation strategy. It covers mainly generic TCs to help to identify adaptation options, followed by detailed qualitative and quantitative assessment of the options.

Workflow Summary: The users perform tasks related to the "Identify Adaptation Options" step of the overall process of performing Climate Change Adaption Studies according to CLARITY EU-GL Methodology and that are supported by generic ICT CS.

3.2.7 TC-CSIS-6000 ICT CS for "Appraise Adaptation Options" Step

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") can use several generic ICT CS ("tools") integrated into an overall CLARITY CSIS for collaboratively performing the "Appraise Adaptation Options" Step of a Climate Change Adaption Study that follows the structured and methodological approach of the CLARITY EU-GL Methodology.

Context: This is a Meta-TC for all generic TCs related to the 6th step "Appraise Adaptation Options" of the CLARITY EU-GL Methodology to build an adaptation strategy. It covers mainly generic TCs to perform a cost-benefit-analysis (CBA) in the context of climate change.

Workflow Summary: The users perform tasks related to the "Appraise Adaptation Options" step of the overall process of performing Climate Change Adaption Studies according to CLARITY EU-GL Methodology and that are supported by generic ICT CS.

3.2.8 TC-CSIS-7000 ICT CS for "Integration of Adaptation Actions" Step

TC Objective: End Users (Project Planner, Climate Resilience Manager,...) and Climate Service Providers ("Experts") can use several generic ICT CS ("tools") integrated into an overall CLARITY CSIS for collaboratively performing the "Integration of Adaptation Actions" Step of a Climate Change Adaption Study that follows the structured and methodological approach of the CLARITY EU-GL Methodology.

Context: This is a Meta-TC for all generic TCs related to the 7th and last step "Integration of Adaptation Actions" of the CLARITY EU-GL Methodology to build an adaptation strategy. It covers mainly generic TCs to help integrating the adaptation action plan into the project development cycle.

Workflow Summary: The users perform tasks related to the "Integration of Adaptation Actions" step of the overall process of performing Climate Change Adaption Studies according to CLARITY EU-GL Methodology and that are supported by generic ICT CS.

3.2.9 TC DCx Evaluating the impact of building characteristics on ventilation within urban areas.

TC Objective: TC provides a wind maps showing the impact of building characteristics within urban areas.

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enables a wind field map to be generated showing the impact of building characteristics (height, density) generated from an expert for detailed study.

- user specifies location and requirements, e.g. what aspects of the buildings are to be investigating (height, density)
- user orders expert study
- user is asked to upload input for the modelling (e.g. before and after maps of the planned building changes)
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.2.10 TC DCx Evaluating the impact of greening measures on the heat load of urban areas.

TC Objective: TC provides a heat load map showing the impact of greening measures on urban areas.

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enables a heat load map to be generated showing the impact of greening measures generated from an expert for detailed study.

- user specifies location and requirements, e.g. what changes are to be made to the green areas
- user orders expert study
- user is asked to upload input for the modelling (e.g. before and after maps of the planned green areas)
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.2.11 TC DCx Preparing climate maps for heat hazard analysis on city scale

TC Objective: TC provides high resolution climate maps for heat load on city scale

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enables to order a heat load map from expert for detailed study.

- user inserts location, requirements
- user orders expert study
- user is asked to upload input for the modelling
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.2.12 TC RA Hazards maps on EU scale

TC Objective: The objective of this TC is to provide hazard maps for the risk analysis in the pre-feasibility study.

Workflow Summary: The CSIS should provide main CC hazards for the whole Europe to be used as input in risk analysis for an arbitrary pre-feasibility study.

3.2.13 TC-AIT-01 Support pre-feasibility study - risk analysis

TC Objective: The objective of this TC is to specify the CSIS support for risk analysis at the pre-feasibility level.

Context: The user has just entered CSIS and wants to start the in initial pre-study.

Workflow Summary: User starts a new project (pre-) assessment task, defines some meta-data, chooses the element at risk, positions it on a map and receives a pre-assessment on the risks (HxExV).

3.2.14 TC-AIT-02 Climate Twins Test Case

TC Objective: The user is analysing the situation at a specific area, e.g. http://cat.clarity-h2020.eu/content/tcxx-support-pre-feasibility-study-r.... (S)he has already chosen the project type, the element(s) at risk, etc. and received some information back from the database of elements at risk & co.

This TC explains how the CSIS will allow the users to discover the information about projects that are similar to one (s)he is currently planning/interested in and that are in the areas similar (in terms of the relevant hazards) to the one (s)he is interested in.

Workflow Summary: User asks the CSIS system to provide information on "similar projects in similar locations".

- The similarity of locations is defined as a metrics that is based on HxExV for the given elements at risk in our original location. That is, we are looking for the areas with similar hazards and the weighting of the hazards is according to vulnerability of the chosen elements at risk to these hazards.
- The similarity of projects is defined as a metrics that can be calculated based on the characteristics of the elements at risk as defined in the database of the elements at risk & co. CSIS returns a list of similar areas & similar projects and visualizes this in some nice way
- colour coded maps representing similar areas
- points at the maps, representing similar projects
- Tables with similar projects at similar locations, sorted by both criteria (tbd: how to sort?)
- possibility to get details for each project

3.3 DC1: Adaption Scenarios for Metropolitan Resilience Planning (Naples, IT)

3.3.1 TC DC1 Enabling comparison of alternative adaptation scenarios

TC Objective: Enabling comparison of alternative adaptation scenarios

Workflow Summary: This Test Case enable to set up the simulation of alternative adaptation scenarios through the expert workflow, including the "no adaptation" option(s) (in turn referred to different climate projections and RCP scenarios). The "adaptation" scenarios to be simulated are discussed by users and experts in a preparatory stage, and made available through the Scenario Management BB. Additional adaptation scenarios simulation can be requested if not available, thus entailing a new (offline) modelling workflow based on user request. Dynamic visualization of simulation results is an essential feature, enabled by the Map Component. MCDA analyses should be available to run online, based on different weighting criteria and performing the needed calculations by using the simulation results. A final report include all the relevant output of the Test Case (including map/table simulation scenarios and MCDA results).

3.3.2 TC DC1 Evaluating the impact of building characteristics on ventilation within urban areas.

TC Objective: TC provides a wind maps showing the impact of building characteristics within urban areas.

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enables a wind field map to be generated showing the impact of building characteristics (height, density) generated from an expert for detailed study.

- user specifies location and requirements, e.g. what aspects of the buildings are to be investigating (height, density)
- user orders expert study
- user is asked to upload input for the modelling (e.g. before and after maps of the planned building changes)
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.3.3 TC DC1 Evaluating the impact of greening measures on the heat load of urban areas.

TC Objective: TC provides a heat load map showing the impact of greening measures on urban areas.

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enables a heat load map to be generated showing the impact of greening measures generated from an expert for detailed study.

- user specifies location and requirements, e.g. what changes are to be made to the green areas
- user orders expert study
- user is asked to upload input for the modelling (e.g. before and after maps of the planned green areas)
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.3.4 TC DC1 Preparing climate maps for heat hazard analysis on city scale

TC Objective: TC provides high resolution climate maps for heat load on city scale

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enable to order a heat load map from expert for detailed study.

- user inserts location, requirements
- user orders expert study
- user is asked to upload input for the modelling
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.4 DC2: Fostering Adaption of Large Scale Infrastructure in Sweden to Local Climate Change Effects (Stockholm, Jönköping, SE)

3.4.1 TC DC2 P1 Water Hazards and supply

TC Objective: The objective of this TC is to specify a Test Cases for the US DC2 P1 Water Hazards and Supply.

Workflow Summary: US DC2 P1 is a parent story for a number of water related User Stories for Sweden. As such the User Story intends to capture a common pre-feasibility study for the three child-User Stories.

3.5 DC3: Urban Heat Waves, Urban Heat Islands, Extreme Participation (Linz, AT)

3.5.1 TC DC3 Evaluating the impact of building characteristics on ventilation within urban areas.

TC Objective: TC provides a wind maps showing the impact of building characteristics within urban areas.

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enables a wind field map to be generated showing the impact of building characteristics (height, density) generated from an expert for detailed study.

- user specifies location and requirements, e.g. what aspects of the buildings are to be investigating (height, density)
- user orders expert study
- user is asked to upload input for the modelling (e.g. before and after maps of the planned building changes)
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.5.2 TC DC3 Evaluating the impact of greening measures on the heat load of urban areas.

TC Objective: TC provides a heat load map showing the impact of greening measures on urban areas.

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enables a heat load map to be generated showing the impact of greening measures generated from an expert for detailed study.

- user specifies location and requirements, e.g. what changes are to be made to the green areas
- user orders expert study
- user is asked to upload input for the modelling (e.g. before and after maps of the planned green areas)
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.5.3 TC DC3 Preparing climate maps for heat hazard analysis on city scale

TC Objective: TC provides high resolution climate maps for heat load on city scale

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enable to order a heat load map from expert for detailed study.

- user inserts location, requirements
- user orders expert study
- user is asked to upload input for the modelling
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

3.6 DC4: Spanish Transport Infrastructure (ES)

3.6.1 TC DC4 010 Climate Broker for road elements

TC Objective: The objective is to gain access to baseline climate information in order to later assess the variables and indices that define the hazard. The starting weather information can be available in the system for the user through a catalogue of "climate models" or the user can request its download through other web portals.

Context: For application in the design, construction, maintenance and operation phases, on roads and/or railways.

The study of climate risks and impacts should be based on information on adverse phenomena for further treatment. Therefore, the user must select which information he wants to analyse. The process of selecting scenarios from a model is tedious and complex due to several facts:

- Each model have different spatial and temporal resolutions.
- The formats in which the original data is stored are not standard.
- Collection methods for the data need to be adapted in each case.

Workflow Summary:

- Identify the climate model needed for the hazard assessment.
- Define spatial and temporal horizons.

- Identify the needed variables from the model.
- Obtain the data from the source.
- Process the data as required.
- Produce the output data in the appropriate format.

3.6.2 TC DC4 020 Climate variables and indices atlas for road elements

TC Objective: The objective is to identify or define climate indices necessary for the pre-analysis of hazards related to road design, maintenance and management. For each threat, one or more indices can be used to describe and analyse its characteristics, such as intensity, frequency, duration or possible levels of damage. The user can find indices already defined by each threat or define new indices through the studied climatic variables. The resulting climate indices are used in the feasibility study but can also serve as a basis for a further detailed study (hazard assessment)

Context: The user can find an atlas of climate variables and indices to address a simplified hazard analysis through the baseline information generated from climate models. To this end, work modules are implemented that serve as tools to execute the analysis. It is also possible that the user can define more complex indices from these variables. Finally, the information is processed to generate qualitative or quantitative maps on the indicators associated with a hazard in the chosen area and during the study period.

Workflow Summary:

1- Selection of the threat to be analysed
2- Loading of data generated from climate models
3- Selection of the study area
4- Selection of climatic variables and indices that describe the threat
5- Definition of new indices or combination of variables to evaluate complex hazards
6- Generation of simplified indicators and variable maps
7- Generation of a report of results obtained from the pre-analysis

3.6.3 TC DC4 030 Hazard assessment for road elements

TC Objective: Identify hazard conditions based on climatic variables and their occurrence

Context: For application in the design, construction, maintenance and operation phases, on roads and/or railways

Workflow Summary:

1- Identify/define which phenomena have produced damage to the physical and/or human environment
2- analyse which variables determine this phenomenon
3- define the temporal and spatial horizon
4- quantify the occurrence of such climatic events and their intensity
5- relate hazard parameters and climatic variability
6- model the danger according to climatic variables for the different horizons
7- Obtain maps that characterize the intensity and occurrence of the hazard studied
8- Incorporation of future climate scenarios into threat estimation and
9- consideration of uncertainty statistics

3.6.4 TC DC4 040 Catalogue of road elements at risk

TC Objective: The aim is to create a catalogue of road elements. Elements must be defined with sufficient attributes to define their climate risk.

Context: CSIS must be able to create, incorporate or modify catalogues of roadway elements that may be damaged by climate

Workflow Summary:

1- selection of the type of elements
2- definition of the technical characteristics of each element
3- vulnerability functions of each element and
4- quantification of the acquisition cost for each element

3.6.5 TC DC4 050 Atlas of road elements at risk

TC Objective: The objective is to obtain the geographic location of the possible elements affected by climatic risks.

Context: The CSIS should be able to provide / upload / store the vulnerable element to generate geographical information at a national or local scale

Workflow Summary:

1- selection of catalogue of vulnerable elements to be used
2- selection of geographical context
3- selection of the register of elements to work with, and
4- updating of element typology

3.6.6 TC DC4 060 Risk assessment for road elements

TC Objective: To analyse the probability of damage associated with climatic hazards in economic terms and loss of human life through the results obtained in the study of hazard, exposure and vulnerability.

Context: The CSIS should be able to provide / upload / store / compute / maps at a regional o local scale to allow to evaluate the climate risks related to road design and management.

Workflow Summary:

1- establish numerical modelling procedures for input variables
2- probabilistic integration of hazard, exposure and vulnerability
3- analysis of impact scenarios
4- valuation of the associated losses in economic and human terms

3.6.7 TC DC4 070 Good practices and adaptation measures catalogue for road elements

TC Objective: The objective is to collect and propose practices and measures that minimize the impact of climate change on road elements

Context: The CSIS should be able to provide / upload / store a catalogue with measures and good practices that minimize the impact of climate change on road elements

Workflow Summary:

1- revision of adaptation measures and good management practices
2- selection of means and practices to be incorporated in the catalogue
3- defining the characteristics and properties of the selected measures and practices

3.6.8 TC DC4 080 Decision support tool for road element

TC Objective: The aim is to create a tool that helps decision making. This tool should suggest the best measures or practices (economic, social and environmental) to reduce the impact of climate change.

Context: The CSIS should incorporate a decision tool for the management of road elements at risk

Workflow Summary:

1- recollection of adaptation measures and good practices included in the catalogue carried out

2- Analysis of the benefit and cost (environmental, social and economic) of each measure
3- monitoring and follow up of this of elements at risk, and
4- multi-criteria analysis for the selection of measures and practices in decision support

3.6.9 TC DC4 090 Implementation of the adaptation plan for road elements

TC Objective: The objective is to monitor and control the measures and actions proposed in the adaptation plan.

Context: The CSIS shows a preliminary report with the results obtained in the project and allows the inclusion of new information for the generation of the final report.

Workflow Summary:

1- development of an action plan for adaptation
2- identification of the roles and responsibilities of the stakeholders involved
3- evaluation of methods of financing
4- monitoring and follow-up of the measures

3.6.10 TC DC4 Evaluating the impact of greening measures on the heat load of urban areas

TC Objective: TC provides a heat load map showing the impact of greening measures on urban areas.

Context: This TC covers preparation of input data for risk assessment required by several DC.

Workflow Summary: This Test Case enables a heat load map to be generated showing the impact of greening measures generated from an expert for detailed study.

- user specifies location and requirements, e.g. what changes are to be made to the green areas
- user orders expert study
- user is asked to upload input for the modelling (e.g. before and after maps of the planned green areas)
- expert gets input data and order
- expert conducts urban model simulations
- expert uploads data to the server
- the data are visualized
- user is informed

4 Conclusions

This document presents a consolidated and detailed list of the User Stories and their related Test Cases based on the input received from the four Demonstration Cases that were preliminary presented in deliverable D1.1 “Initial workshops and the CLARITY development environment”.

CLARITY User Stories, representing the key project requirements, are categorized into “generic” ones and the User Stories that are specific to four Demonstration Cases, showcasing the CLARITY climate services in different climatic, regional, infrastructure and hazard contexts in Italy, Sweden, Austria and Spain, focusing on the planning and implementation of urban infrastructure development as well as transport infrastructure projects.

Each User Story has a well-defined structure, which allows the CLARITY CSIS providers with enough information for a quick categorization and implementation potential. At the time of writing this document, we have identified and defined many 1st level, some derived 2nd level and only a few detailed 3rd level user stories. These USs, initially presented in deliverable D1.1, were further refined as a result of i) the feedback collected from the planned workshops with external stakeholders and ii) the process of resolving the User Stories by Test Cases (presented also in this deliverable) and producing the initial CSIS mock-ups and prototypes, which supported the discovery and resolution of many issues, discrepancies and misunderstandings that were inherent to first version of the User Stories descriptions. All this resulted in the:

- update of existing User Stories, especially through improved “implications” section
- provision of new User Stories, especially additional 2nd and 3rd level User Stories as a result of discussions on implementation
- obsolescence and rejection of some User Stories, as a result of prioritization and experiences with the development.

This was already expected in an agile development cycle, where the (technical) possibilities and end-user requirements are constantly considered as the project matures. In that regard, the project will continue using the CLARITY online catalogue (http://cat.clarity-h2020.eu) as a live and public document where the existing User Stories and Test Cases are maintained and refined and new ones are added through the project.

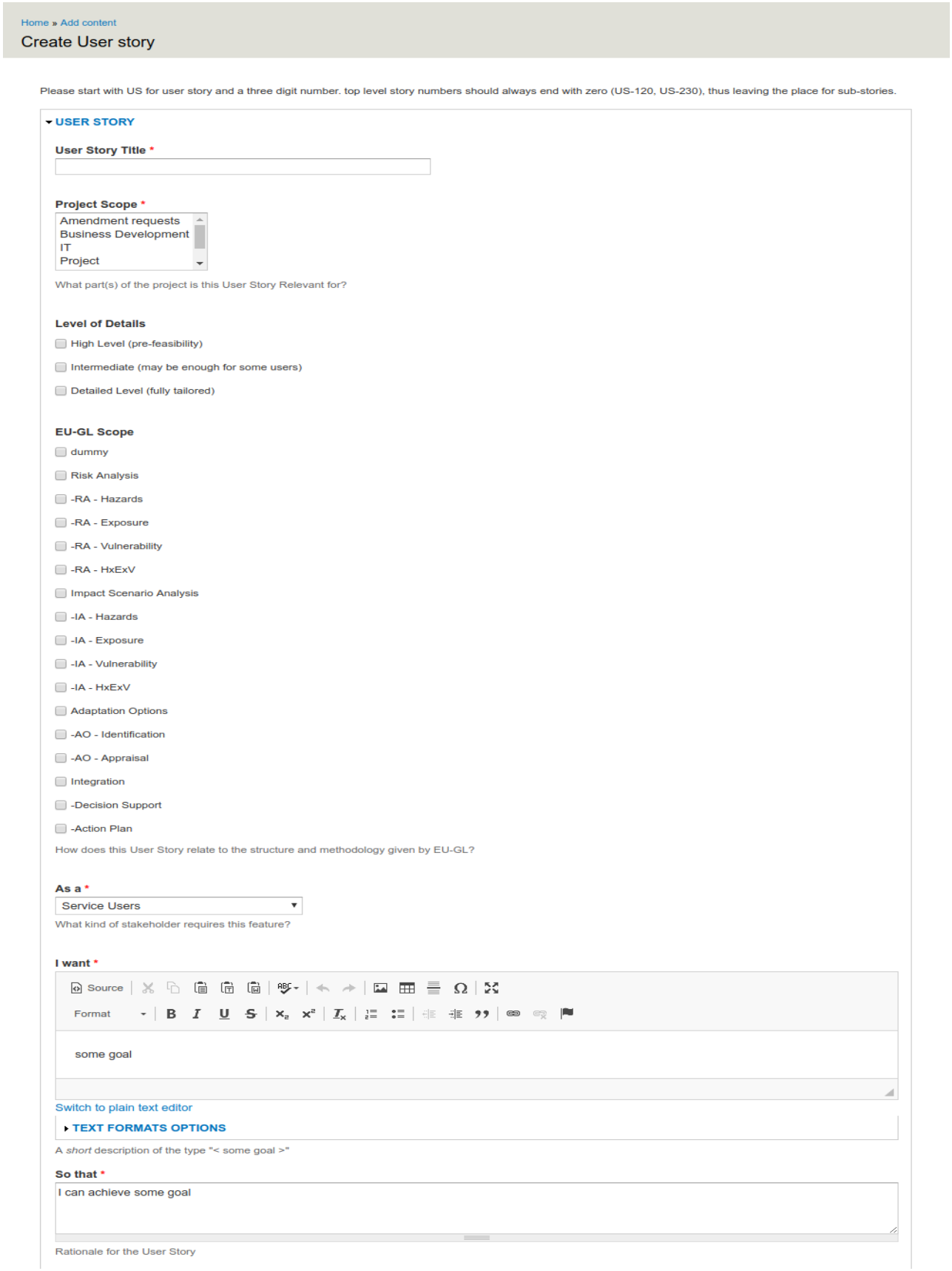
Finally, both, CLARITY User Stories and Test Cases contained in this deliverable are intended to provide reference scenarios and requirements that support the implementation of the CLARITY Climate Service Information System (CSIS) and the validation activities.

References

[1] Directorate-General Climate Action, “Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient,” European Commission, 16 April 2013. [Online]. Available: http://climate-adapt.eea.europa.eu/metadata/guidances/non-paper-guidelines-for-project-managers-making-vulnerable-investments-climate-resilient/guidelines-for-project-managers.pdf. [Accessed 6 November 2017].

[2] R. Duro and D. Havlik, “D1.1 Initial workshops and the CLARITY development environment,” Deliverable D1.1 of the European Project H2020-730355 Integrated Climate Adaptation Service Tools for Improving Resilience Measure Efficiency (CLARITY), 5 January 2018. [Online].

5 Annex 1 – CLARITY User Story Template



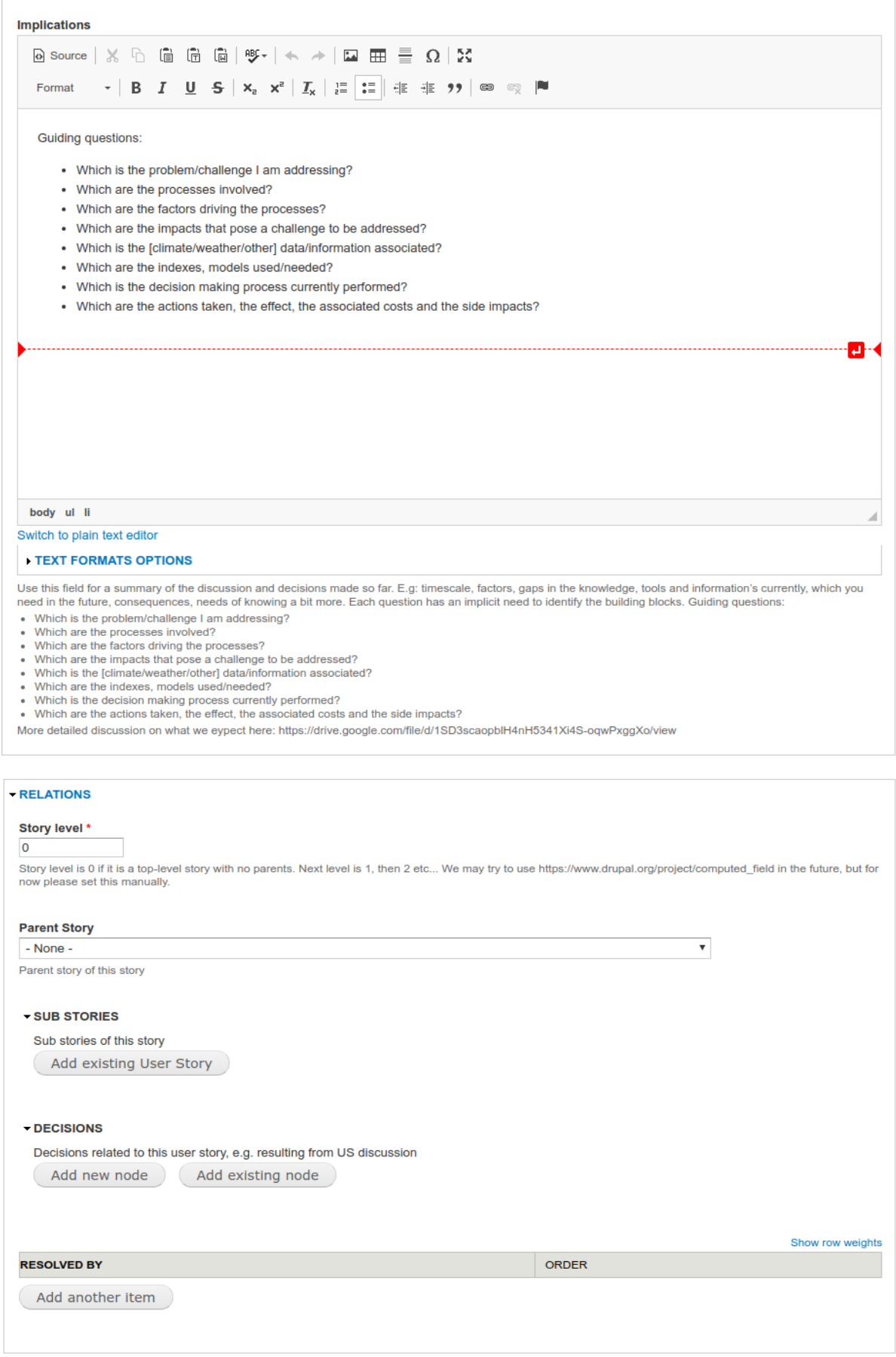


Figure 2: User Story template form as defined in CLARITY Catalogue

6 Annex 2 – CLARITY Test Case Template

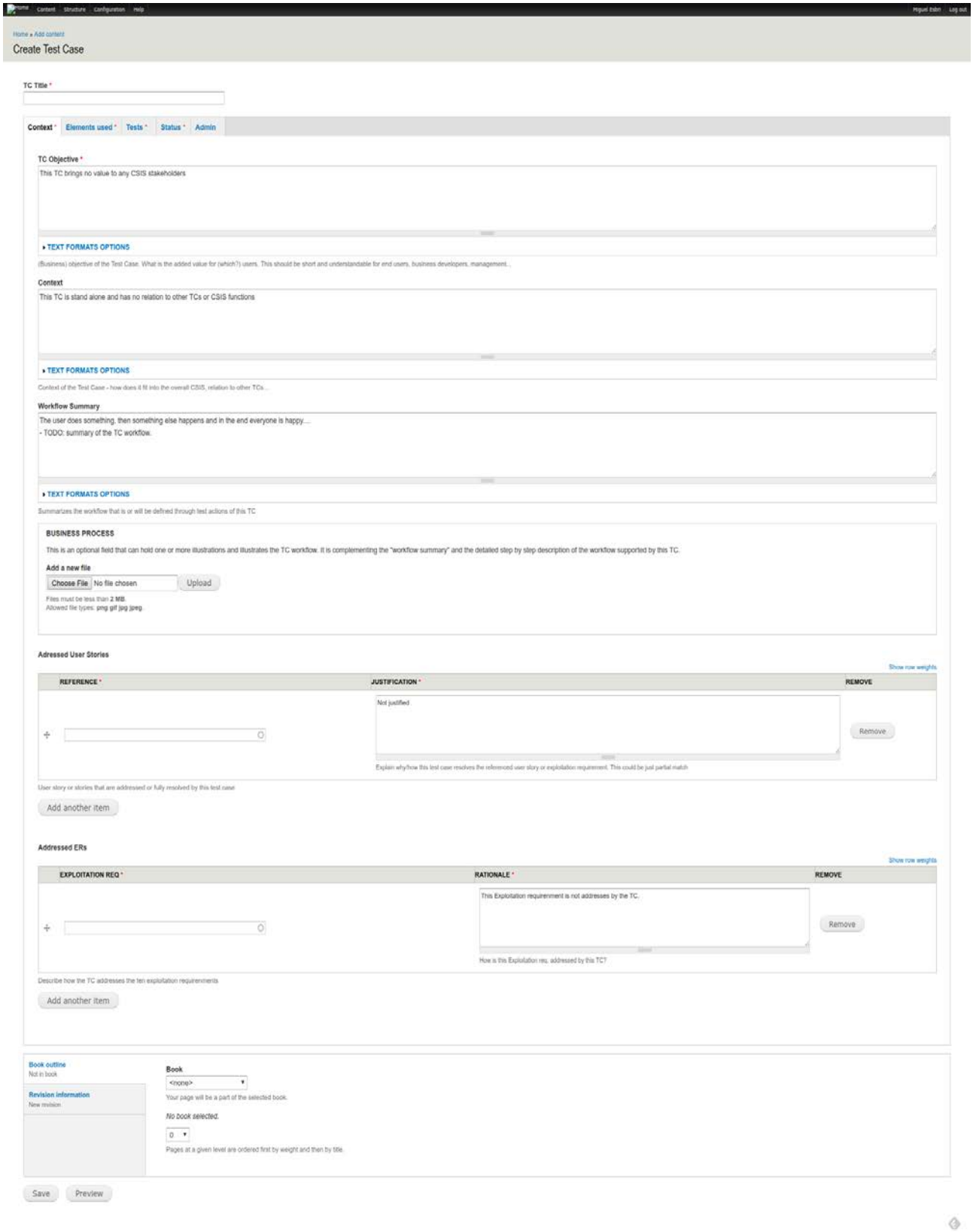


Figure 3: Test Case template form as defined in CLARITY Catalogue: General information

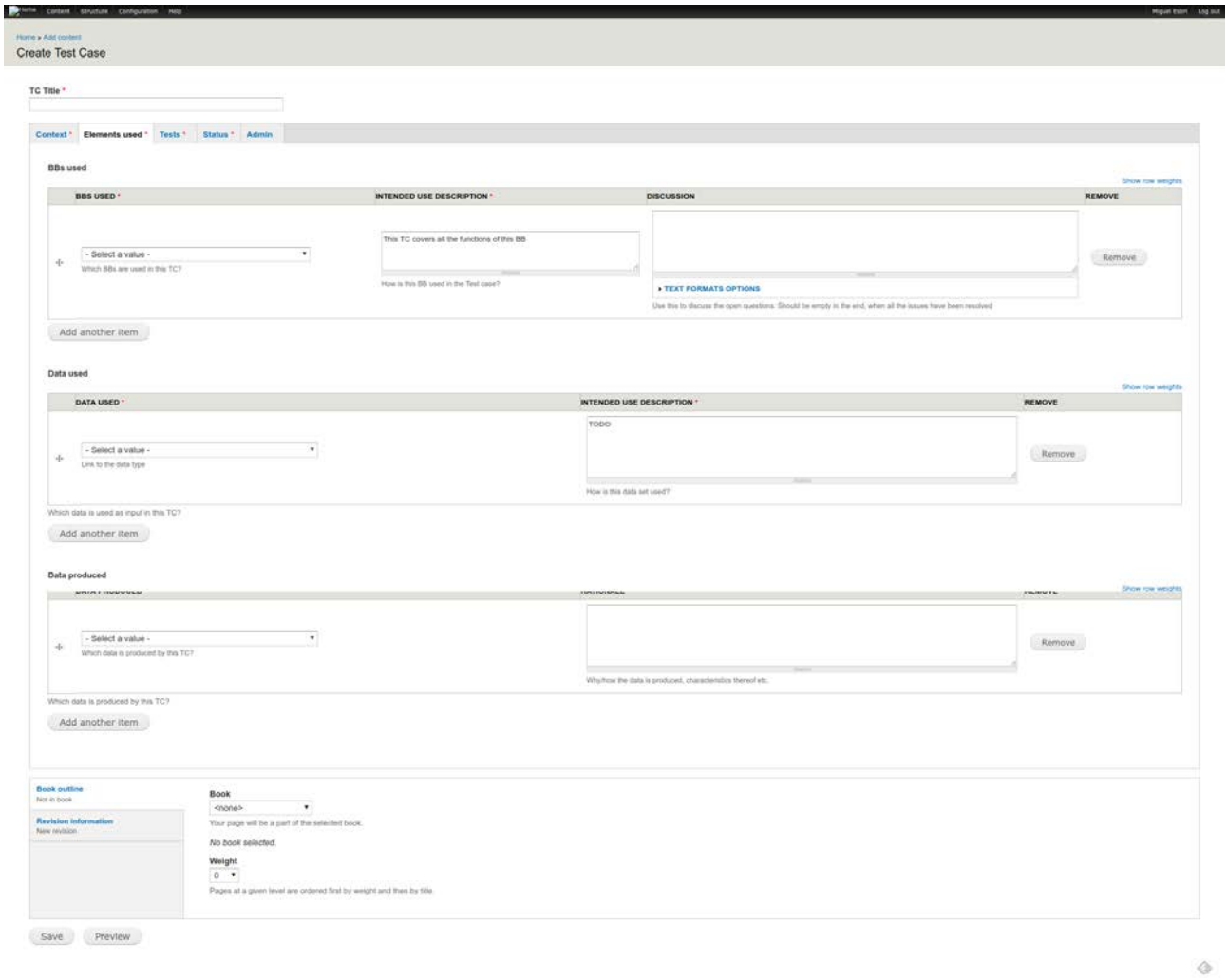


Figure 4: Test Case template form as defined in CLARITY Catalogue: Building Blocks used section

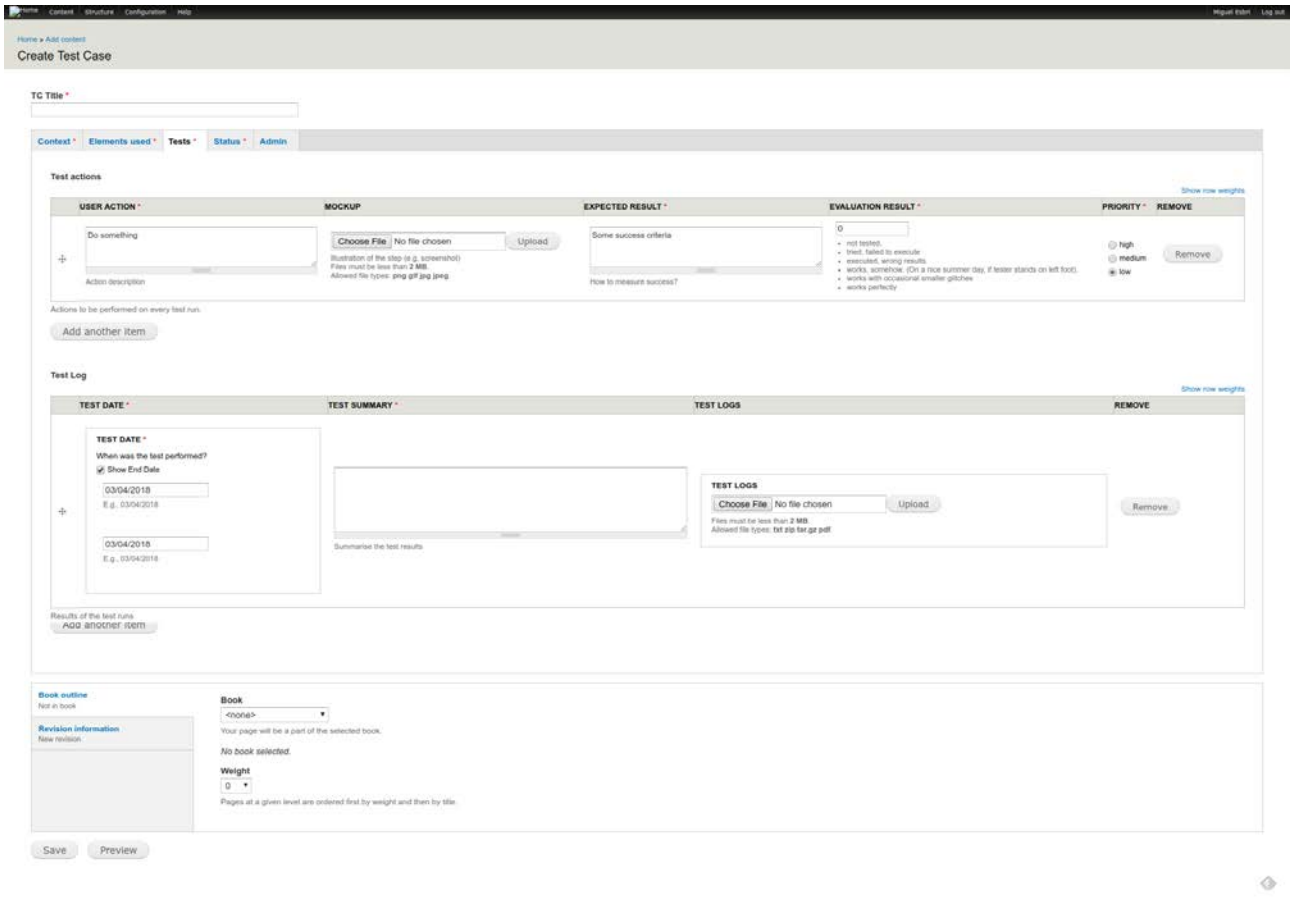


Figure 5: Test Case template form as defined in CLARITY Catalogue: Test Actions section

7 Annex 3 – EU-GL Methodology coverage by CLARITY User Stories

This annex presents the coverage of the various EU-GL methodology steps by the CLARITY User Stories.

Table 4: EU-GL Methodology coverage by CLARITY User Stories

EU-GL Scope	Level of Detail	User Story Title
		US-CSIS-131 Assessment of air-pollution and greenhouse-gas-emissions US-CSIS-140 Matchmaking and ordering US-CSIS-150 Uploading the expert opinion and (sub-)study results: US-DC3-100 Heat island adaptation measures-Linz-02 US-DC3-200 Ventilation pattern adaptation measures-Linz-03 US-DC4-100 Influence of the temperature evolution in the infrastructure (road) design. US-DC4-200 Influence of the temperature and related parameters evolution in the infrastructure (road) maintenance. US-DC4-300 Influence of the temperature evolution in the infrastructure (road) construction. US-DC4-400 Influence of precipitation in the infrastructure (road) design. US-DC4-500 Influence of the precipitation in the infrastructure (road) maintenance. US-DC4-600 Influence of the precipitation in the infrastructure (road) construction. US-DC4-700 Influence of unusual growth of vegetation in the infrastructure (road) maintenance.
Risk Analysis	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-110 CSIS planning sessions and project types US-CSIS-120 Pre-feasibility study US-CSIS-121 Pre-feasibility study - Risk analysis US-CSIS-130 Expert workflows US-DC1-100 Climate adaptive planning US-DC1-130 - Climate adaptive planning / Comparison US-DC1-150 - Climate adaptive planning / Display results 1 US-DC1-160 - Climate adaptive planning / Display results 2 US-DC1-200 Climate adaptive design guidelines and building regulations US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure US-DC4-900 Infrastructure maintenance and construction
Risk Analysis	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-110 CSIS planning sessions and project types US-CSIS-130 Expert workflows

		US-DC1-100 Climate adaptive planning US-DC1-130 - Climate adaptive planning / Comparison US-DC1-150 - Climate adaptive planning / Display results 1 US-DC1-160 - Climate adaptive planning / Display results 2 US-DC1-200 Climate adaptive design guidelines and building regulations US-DC2-110 Flooding of the city centre of Jonköping US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
Risk Analysis	Intermediate (may be enough for some users)	US-CSIS-110 CSIS planning sessions and project types US-CSIS-130 Expert workflows
Impact Scenario Analysis	-	US-DC1-120 - Climate adaptive planning / Impact
Impact Scenario Analysis	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-110 CSIS planning sessions and project types US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows US-DC1-100 Climate adaptive planning US-DC1-130 - Climate adaptive planning / Comparison US-DC1-150 - Climate adaptive planning / Display results 1 US-DC1-160 - Climate adaptive planning / Display results 2 US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction
Impact Scenario Analysis	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-110 CSIS planning sessions and project types US-CSIS-130 Expert workflows US-DC1-100 Climate adaptive planning US-DC1-130 - Climate adaptive planning / Comparison US-DC1-140- Climate adaptive planning / Adaptation US-DC1-150 - Climate adaptive planning / Display results 1 US-DC1-160 - Climate adaptive planning / Display results 2

		US-DC2-120 Flooding of the city centre of Stockholm US-DC2-130 Hydrological buffers in the landscape as ecosystem service US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
Impact Scenario Analysis	Intermediate (may be enough for some users)	US-CSIS-110 CSIS planning sessions and project types US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows
Adaptation Options	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-110 CSIS planning sessions and project types US-CSIS-120 Pre-feasibility study US-CSIS-123 Pre-feasibility study - Adaptation options US-CSIS-130 Expert workflows US-DC1-100 Climate adaptive planning US-DC1-130 - Climate adaptive planning / Comparison US-DC1-160 - Climate adaptive planning / Display results 2 US-DC1-200 Climate adaptive design guidelines and building regulations US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC1-220 Climate adaptive design guidelines and building regulations / Benchmarking US-DC4-800 Infrastructure planning and design US-DC4-830 Catalogue of adaptation measures US-DC4-900 Infrastructure maintenance and construction
Adaptation Options	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-110 CSIS planning sessions and project types US-CSIS-130 Expert workflows US-DC1-100 Climate adaptive planning US-DC1-130 - Climate adaptive planning / Comparison US-DC1-140- Climate adaptive planning / Adaptation US-DC1-160 - Climate adaptive planning / Display results 2 US-DC1-200 Climate adaptive design guidelines and building regulations US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration

		US-DC1-220 Climate adaptive design guidelines and building regulations / Benchmarking US-DC4-800 Infrastructure planning and design US-DC4-830 Catalogue of adaptation measures US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
Adaptation Options	Intermediate (may be enough for some users)	US-CSIS-110 CSIS planning sessions and project types US-CSIS-123 Pre-feasibility study - Adaptation options US-CSIS-130 Expert workflows
Integration	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-110 CSIS planning sessions and project types US-CSIS-130 Expert workflows US-CSIS-160 Data Overview US-CSIS-170 Study analysis US-DC1-100 Climate adaptive planning US-DC1-130 - Climate adaptive planning / Comparison US-DC1-150 - Climate adaptive planning / Display results 1 US-DC1-160 - Climate adaptive planning / Display results 2 US-DC1-200 Climate adaptive design guidelines and building regulations US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC4-800 Infrastructure planning and design US-DC4-820 Climate indicator and data monitoring US-DC4-830 Catalogue of adaptation measures US-DC4-900 Infrastructure maintenance and construction
Integration	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-110 CSIS planning sessions and project types US-CSIS-130 Expert workflows US-CSIS-160 Data Overview US-CSIS-170 Study analysis US-DC1-100 Climate adaptive planning US-DC1-130 - Climate adaptive planning / Comparison US-DC1-150 - Climate adaptive planning / Display results 1 US-DC1-160 - Climate adaptive planning / Display results 2

		US-DC1-200 Climate adaptive design guidelines and building regulations US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC4-800 Infrastructure planning and design US-DC4-820 Climate indicator and data monitoring US-DC4-830 Catalogue of adaptation measures US-DC4-900 Infrastructure maintenance and construction
Integration	Intermediate (may be enough for some users)	US-CSIS-110 CSIS planning sessions and project types US-CSIS-130 Expert workflows
RA - Hazards	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-120 Pre-feasibility study US-CSIS-121 Pre-feasibility study - Risk analysis US-CSIS-130 Expert workflows US-DC1-110 - Climate adaptive planning / Hazard US-DC1-130 - Climate adaptive planning / Comparison US-DC2-100 Water hazards and supply US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure US-DC4-900 Infrastructure maintenance and construction
RA - Hazards	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-110 - Climate adaptive planning / Hazard US-DC1-130 - Climate adaptive planning / Comparison US-DC2-110 Flooding of the city centre of Jonköping US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
RA - Hazards	Intermediate (may be enough for some users)	US-CSIS-130 Expert workflows

RA - Exposure	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-120 Pre-feasibility study US-CSIS-121 Pre-feasibility study - Risk analysis US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-100 Water hazards and supply US-DC2-200 Health and environment US-DC2-220 Climate and health indicators for Stockholm US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County) US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure US-DC4-900 Infrastructure maintenance and construction
RA - Exposure	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-110 Flooding of the city centre of Jonköping US-DC2-220 Climate and health indicators for Stockholm US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County) US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
RA - Exposure	Intermediate (may be enough for some users)	US-CSIS-130 Expert workflows US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County)
RA - HxExV	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-120 Pre-feasibility study US-CSIS-121 Pre-feasibility study - Risk analysis US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure

		US-DC4-900 Infrastructure maintenance and construction
RA - HxExV	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-110 Flooding of the city centre of Jonköping US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
RA - HxExV	Intermediate (may be enough for some users)	US-CSIS-130 Expert workflows
IA - Hazards	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows US-DC1-110 - Climate adaptive planning / Hazard US-DC1-130 - Climate adaptive planning / Comparison US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction
IA - Hazards	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-110 - Climate adaptive planning / Hazard US-DC1-130 - Climate adaptive planning / Comparison US-DC2-120 Flooding of the city centre of Stockholm US-DC2-130 Hydrological buffers in the landscape as ecosystem service US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
IA - Hazards	Intermediate (may be	US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows

	enough for some users)	
IA - Exposure	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction
IA - Exposure	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-120 Flooding of the city centre of Stockholm US-DC2-130 Hydrological buffers in the landscape as ecosystem service US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
IA - Exposure	Intermediate (may be enough for some users)	US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows
IA - Vulnerability	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction
IA - Vulnerability	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures

		US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-120 Flooding of the city centre of Stockholm US-DC2-130 Hydrological buffers in the landscape as ecosystem service US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
IA - Vulnerability	Intermediate (may be enough for some users)	US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows
RA - Vulnerability	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-120 Pre-feasibility study US-CSIS-121 Pre-feasibility study - Risk analysis US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-100 Water hazards and supply US-DC2-200 Health and environment US-DC2-220 Climate and health indicators for Stockholm US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County) US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure US-DC4-900 Infrastructure maintenance and construction
RA - Vulnerability	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC2-110 Flooding of the city centre of Jonköping US-DC2-220 Climate and health indicators for Stockholm US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County) US-DC4-800 Infrastructure planning and design US-DC4-810 Development of climate indicators for road infrastructure

		US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
RA - Vulnerability	Intermediate (may be enough for some users)	US-CSIS-130 Expert workflows US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County)
IA - HxExV		US-DC1-120 - Climate adaptive planning / Impact
IA - HxExV	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction
IA - HxExV	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC1-140- Climate adaptive planning / Adaptation US-DC2-120 Flooding of the city centre of Stockholm US-DC2-130 Hydrological buffers in the landscape as ecosystem service US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
IA - HxExV	Intermediate (may be enough for some users)	US-CSIS-122 Pre-feasibility study - Impact scenario analysis US-CSIS-130 Expert workflows
AO - Identification	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-120 Pre-feasibility study US-CSIS-123 Pre-feasibility study - Adaptation options US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC1-200 Climate adaptive design guidelines and building regulations

		US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC1-220 Climate adaptive design guidelines and building regulations / Benchmarking US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC4-800 Infrastructure planning and design US-DC4-830 Catalogue of adaptation measures US-DC4-900 Infrastructure maintenance and construction
AO - Identification	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC1-140- Climate adaptive planning / Adaptation US-DC1-200 Climate adaptive design guidelines and building regulations US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC1-220 Climate adaptive design guidelines and building regulations / Benchmarking US-DC2-130 Hydrological buffers in the landscape as ecosystem service US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC4-800 Infrastructure planning and design US-DC4-830 Catalogue of adaptation measures US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
AO - Identification	Intermediate (may be enough for some users)	US-CSIS-123 Pre-feasibility study - Adaptation options US-CSIS-130 Expert workflows
AO - Appraisal	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-123 Pre-feasibility study - Adaptation options US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC1-200 Climate adaptive design guidelines and building regulations US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration

		US-DC1-220 Climate adaptive design guidelines and building regulations / Benchmarking US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC4-800 Infrastructure planning and design US-DC4-830 Catalogue of adaptation measures US-DC4-900 Infrastructure maintenance and construction
AO - Appraisal	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-DC1-130 - Climate adaptive planning / Comparison US-DC1-140- Climate adaptive planning / Adaptation US-DC1-200 Climate adaptive design guidelines and building regulations US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC1-220 Climate adaptive design guidelines and building regulations / Benchmarking US-DC2-130 Hydrological buffers in the landscape as ecosystem service US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-220 Climate and health indicators for Stockholm US-DC4-800 Infrastructure planning and design US-DC4-830 Catalog of adaptation measures US-DC4-900 Infrastructure maintenance and construction US-DC4-910 Winter road/driving scenario US-DC4-920 Hydric risk scenario US-DC4-930 Heat waves scenario US-DC4-940 Growth of vegetation scenario
AO - Appraisal	Intermediate (may be enough for some users)	US-CSIS-123 Pre-feasibility study - Adaptation options US-CSIS-130 Expert workflows
Decision Support	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-CSIS-160 Data Overview US-CSIS-170 Study analysis US-DC1-110 - Climate adaptive planning / Hazard US-DC1-130 - Climate adaptive planning / Comparison US-DC1-160 - Climate adaptive planning / Display results 2 US-DC1-200 Climate adaptive design guidelines and building regulations

		US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC1-220 Climate adaptive design guidelines and building regulations / Benchmarking US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County) US-DC3-110 Microclimate/Indicators US-DC4-800 Infrastructure planning and design US-DC4-820 Climate indicator and data monitoring US-DC4-830 Catalog of adaptation measures US-DC4-900 Infrastructure maintenance and construction
Decision Support	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-CSIS-160 Data Overview US-CSIS-170 Study analysis US-DC1-110 - Climate adaptive planning / Hazard US-DC1-130 - Climate adaptive planning / Comparison US-DC1-160 - Climate adaptive planning / Display results 2 US-DC1-200 Climate adaptive design guidelines and building regulations US-DC1-210 Climate adaptive design guidelines and building regulations / Multi-risk integration US-DC1-220 Climate adaptive design guidelines and building regulations / Benchmarking US-DC2-110 Flooding of the city centre of Jonköping US-DC2-120 Flooding of the city centre of Stockholm US-DC2-210 Urban vegetation in Stockholm as a climate adaptation tool US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County) US-DC3-120 Microclimate/existing settlement area US-DC3-130 Microclimate/greening measures in existing settlement areas US-DC3-140 Microclimate/recommendations for urban development areas US-DC3-210 Ventilation/changes in settlement density and building heights US-DC4-800 Infrastructure planning and design US-DC4-820 Climate indicator and data monitoring US-DC4-830 Catalog of adaptation measures US-DC4-900 Infrastructure maintenance and construction
Decision Support	Intermediate (may be	US-CSIS-130 Expert workflows US-DC2-230 Climate and environmental indicators on a regional level (Jönköping County)

	enough for some users)	
Action Plan	High Level (pre-feasibility)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-CSIS-180 Final report / Action Plan US-DC1-130 - Climate adaptive planning / Comparison US-DC1-160 - Climate adaptive planning / Display results 2 US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction
Action Plan	Detailed Level (fully tailored)	US-CSIS-100 Platform that supports users in defining and following standardized planning procedures US-CSIS-130 Expert workflows US-CSIS-180 Final report / Action Plan US-DC1-130 - Climate adaptive planning / Comparison US-DC1-160 - Climate adaptive planning / Display results 2 US-DC2-110 Flooding of the city centre of Jonköping US-DC4-800 Infrastructure planning and design US-DC4-900 Infrastructure maintenance and construction
Action Plan	Intermediate (may be enough for some users)	US-CSIS-130 Expert workflows

8 Annexes 4 and 5 – Full Description of CLARITY User Stories and Test Cases

Annexes 4 and 5, which provide the full description of CLARITY User Stories and Test Cases respectively, have been generated automatically as pdf (and appended at the end of this deliverable) out of the contents in CLARITY online catalogue: http://cat.clarity-h2020.eu

In particular, CLARITY User Stories and Test Cases descriptions can be accessed online here:

- User Stories: http://cat.clarity-h2020.eu/csis/USs
- Test Cases: http://cat.clarity-h2020.eu/csis/test-cases