

REACH OUT

shaping climate resilient cities



# Report on recommended support for toolkit tools

D3.11

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## Abbreviations

Abbreviation	Description
WP	Work Package
CS	Climate Service
C3S	Copernicus Climate Change Service
GEOSS	Global Earth Observation System of Systems
JRC	Joint Research Centre
API	Application Programming Interface
SW	Software
EC	European Commission
MB	Megabyte
GB	Gigabyte
TB	Terabyte
GCM	Global Circulation Model
RCM	Regional Circulation Model
NUTS	Nomenclature of territorial units for statistics

# 1 Introduction

The REACHOUT project is developing a Triple-A Toolkit to support the uptake of climate services for climate resilience and urban adaptation in Europe. Triple-A toolkit aims to enhance the resilience of European cities to climate change through a comprehensive and flexible set of resources tailored to local users. So, it brings together a range of tools and services that are being iteratively updated and tested through co-creation activities. Additionally, the Triple-A toolkit provides guidance on how to use the Triple-A Framework, which covers all steps of the adaptation cycle, as well as guidance on how to use each individual tool. This information will allow both urban planners and climate adaptation practitioners working in cities to better understand the risks and opportunities associated with climate change, prioritize adaptation measures, and develop effective adaptation strategies for cities.

It is important to state that the Triple-A toolkit has been developed based on the inputs from the 7 city hubs - along the project lifetime cities have selected different tools to be tested and applied in their specific context. As such, each tool has required different levels of customization to support different urban challenges and different city-hubs needs. This is why in the description of each tool a rating on its level of difficulty is specified, considering the level of customization required:

-  Level 1. Low difficulty: ready-to-use light approaches, or low level of customization.
-  Level 2: Medium difficulty: it requires medium level customisation.
-  Level 3: High it requires complex level customisation Complex customization.

Considering today's rapidly evolving technological landscape, the reliability, maintenance and support of REACHOUT tools within toolkit are paramount. This is why this report seeks to provide a comprehensive overview that will inform future decisions and strategies for tool management by describing which agreements are in place regarding the maintenance and support of the existing tools that are part of the toolkit. This is basically done by describing the commitments in place regarding the maintenance and support levels of the existing tools that are part of the toolkit, based on three assumptions:

- Maintenance and support levels commitments to be provided at the end of the project.
- Maintenance and support levels commitments will differ depending on the specific stage: tools piloting in current REACHOUT's cities and future commercialization of the tools.
- All the maintenance levels (if provided) are provided by the tool developer or a subcontracting party, but no dependence with third party proprietary libraries or tools are considered. We have based this assumption on the fact that at the REACHOUT's Grant Agreement it was agreed that all third party's libraries reused by REACHOUT's tools should be open-source licensed libraries, therefore no third party proprietary licensed libraries/tools are allowed.

Clarifying these commitments is crucial for:

- Operational Continuity: Ensuring that tools are well-maintained and supported minimizes downtime and disruptions, thereby maintaining smooth operations for REACHOUT cities and newcomers.
- Cost Efficiency: Proactive maintenance and robust support can prevent costly repairs and replacements, optimizing resource allocation.
- User Satisfaction: Reliable tools enhance user experience and satisfaction, fostering trust and productivity among users.

## 1.1 Structure of this report

This report is structured in the following sections:

- **Section 1** provides an introduction and overview of the aim of this document.
- **Section 2** elucidates maintenance and support levels concepts.
- **Section 3** provides the Tools' s commitments regarding maintenance and support.
- **Section 4** describes different third-party platforms used by different tools as commercialization means.
- **Section 5** provides the summary and next steps.

## 2 Maintenance and Support concepts

“Maintenance and Support” labours are often combined into a single line item. In the case of REACHOUT, it was decided to separate such concepts, facilitating establishment of specific agreements levels for each of the tools.

The following definitions have been established to distinguish between these two concepts:

- **Maintenance:** Labours for keeping the software updated to the latest version and applying necessary patches.
- **Support:** This generally includes labours to provide a helpline and comply with Service Level Agreements (SLAs), such as uptime guarantees and incident response times.

For both concepts, the following service levels are considered, so tools can set different levels of maintenance and support levels.

Table 1. Types of maintenance and support levels defined

<b>Maintenance</b>	<b>Corrective</b>	Own- or third-party staff dedication to bugs resolution. Such bugs are generally reported by the user
	<b>Preventive</b>	Own- or third-party staff dedication to fix problems that will arise, also known as latent faults, prior to detection by the user. For instance, to install security patches or code optimization due to low performance
	<b>Adaptive</b>	Own- or third-party staff dedication to adapt the tool to new versions and/or technologies (operative systems, databases, cloud providers, third party resources, ...) or regulations affecting the tool
	<b>Perfective</b>	Own- or third-party staff dedication to assure that the tool adapts to a changing environment by adding or removing features and/or making the user interface more intuitive.
<b>Support</b>	<b>Level 1</b>	<u>Basic incidences:</u> User and password management, software installation, software and hardware setup, online help

	<b>Level 2</b>	<u>Technical support</u> (more advance than level 1): Software, communication systems, databases
	<b>Level 3</b>	<u>Backend support</u> : Settings, servers, operative systems, network management
	<b>Level 4</b>	<u>Systems support</u> : Systems area of the company (or hosting provider support)
	<b>Level 5</b>	<u>Advanced support</u> : Programmers, equipment repair, social media configuration

### 3 Maintenance and support levels

This section provides the commitments for each REACHOUT tool by providing firstly an overview of all the tools commitments for both REACHOUT city-hubs and for external future customers. Secondly each tool commitment is described in a more detailed way.

To facilitate the statement of the maintenance and support levels willing to be provided for each of the tools at the different stages, an Excel file was designed and shared at the SharePoint site of the project. The file was structured as follows:

- First tab: “**Tools4Reachout Cities**”: Indicates the maintenance and support levels for each of tools deployed at one or more cities taking part in REACHOUT’s pilots.
- Second tab: “**Tools4FutureCustomers**”: Indicates the maintenance and support levels for each of the tools having in mind future exploitation with customers.

Table 2 and Table 3 reflect the different agreements indicated by each of the different tool developers regarding maintenance and support levels. Table 2 depicts agreements for current REACHOUT cities, and Table 3 gathers the agreements for the future commercialization of tools.

Table 2. Maintenance and support for REACHOUT cities

Tool name	Partner	Maintenance Level				Support Level				
		Corrective	Preventive	Adaptive	Perfective	1	2	3	4	5
Pluvial Flood Tool	CMCC	Yes	No	No	No	Yes	Yes	No	No	No
Assessment of Risk management capabilities	CMCC	Yes	No	No	No	Yes	Yes	No	No	No
Climate Resilient City Tool (CRCTool)	Deltares	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
FloodAdapt Tool	Deltares	Yes	No	No	No	Yes	No	No	No	No
Social Vulnerability Tool	UCC	Yes	No	No	No	Yes	No	No	No	No

Thermal Assessment Tool	Tecnia	Yes	No	No	No	Yes	Yes	No	No	No
Adaptation pathway generator tool	Deltares	No	No	No	No	Yes	No	No	No	No
Dynamic Integrated Flood Insurance (DIFI) model	VU-IVM	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
REACT Tool (FLOPROS model)	VU-IVM	Yes	No	No	No	Yes	Yes	No	No	No
Climate impact diagrams	CAS	Yes	Yes	No	No	No	No	No	No	No
Climate stories	NGI / CAS	Yes	Yes	No	No	Yes	No	No	No	No
Windstorm damage assessment tool (WISC)	VU-IVM	Yes	No	No	No	Yes	Yes	No	No	No
RESIN AOL (Adaptation Options Library)	Tecnia	Yes	No	No	No	Yes	No	No	No	No
Climate Resilient Development Pathways (CRDPs).	Deltares	No	No	No	No	Yes	Yes	No	No	No
ARCH Resilience Pathway Visualization Tool (ARCH RPVT)	Tecnia	No	No	No	No	Yes	No	No	No	No
Theory of change (ToC): Navigating transformation towards a desired vision	Tecnia									
Adaptation pyramid	CAS	No	No	No	No	No	No	No	No	No



Table 3. Maintenance and support for new customers

Tool name	Partner	Maintenance Level				Support Level				
		Corrective	Preventive	Adaptative	Perfective	1	2	3	4	5
Pluvial Flood Tool	CMCC	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Assessment of Risk management capabilities	CMCC	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Climate Resilient City Tool (CRCTool)	Deltares	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
FloodAdapt Tool	Deltares	Yes	No	No	No	Yes	No	No	No	No
Social Vulnerability Tool	UCC	Yes	No	No	No	Yes	No	No	No	No
Thermal Assessment Tool	Tecnalia	Yes	Yes	Yes	Yes	Yes	Yes	Third-party	Third-party	Third-party
Adaptation pathway generator tool	Deltares	No	No	Yes	Yes	Yes	No	No	No	No
Dynamic Integrated Flood Insurance (DIFI) model	VU-IVM	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
REACT Tool (FLOPROS model)	VU-IVM	Yes	No	No	No	Yes	Yes	No	No	No
Climate impact diagrams	CAS	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Climate stories	NGI / CAS	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Windstorm damage assessment tool (WISC)	VU-IVM	Yes	No	No	No	Yes	Yes	No	No	No
RESIN AOL (Adaptation Options Library)	Tecnalia	Analising	No	No	No	Yes	No	No	No	No
Climate Resilient	Deltares	No	no	no	no	Yes	No	No	No	No

Development Pathways (CRDPs).										
ARCH Resilience Pathway Visualization Tool (ARCH RPVT)	Tecnalia	No	No	No	No	Yes	No	No	No	No
Theory of change (ToC): Navigating transformation towards a desired vision	Tecnalia	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Adaptation pyramid	CAS	Yes	Yes	Yes	Yes	Yes	No	No	No	No

The commitments for each REACHOUT tool are presented below:

### 3.1 Pluvial Flood Tool

Tool & responsible partner	Pluvial Flood Tool (CMCC)
Tool overview	<p><i>Assessment service:</i> The tool delineates the areas prone to flooding under different rainfall intensities and estimates the damage to physical assets such as buildings and contents.</p> <p><i>NBS/adaptation scenarios service:</i> The tool can be used to assess the benefits of adaptation measures such as green urban regeneration and natural water retention measures including green roofs and green urban areas.</p> <p>The application of the tool can help users identify existing green urban infrastructure and areas suitable for their implementation, while estimating their potential to reduce flood damage and population exposed.</p>
REACHOUT cities	Milan, Logroño, Athens, Gdynia.
Maintenance and support for applied REACHOUT cities	<p><i>Assessment service:</i> The Pluvial Hazard assessment side of the tool will be provided and maintained through the SaferPlaces platform.</p> <p><i>NBS/adaptation scenarios service:</i> Upon request and under specific agreements, CMCC could provide support (Level 1,2).</p> <p><i>Climate change scenarios and NBS impact assessment service:</i> (damage and population exposed reduction). Upon request and under specific agreements, CMCC could provide support (Level 1,2).</p> <p>Corrective maintenance will be provided for the cities.</p>

Foreseen customers	Urban planners, local citizen action groups, civil society organizations, businesses, and risk managers (insurers and insurance brokers) – that want to be better prepared for current and future flood events (pluvial)
Maintenance and support for future customers	The maintenance of NBS/adaptation scenarios and impacts assessment is performed by CMCC within research activities and projects, to possibly integrate it into the same platform of pluvial hazard (SaferPlaces) in the future. Corrective maintenance will be provided as well as level 1 and 2 of support.

### 3.2 Assessment of Risk management capabilities

Tool & responsible partner	Assessment of Risk management capabilities (CMCC)
Short description	<p>This tool is used to guide review and/or self-assessment of risk management capabilities. Originally developed for the purpose of the country peer review under the Union Civil Protection Mechanism (UCPM) and adapted to different scales such as regional and local ones, the tool can assist the authorities in assessing where they stand with adaptation and disaster risk reduction and identifying major gaps or opportunities for improvement.</p> <p>The tool addresses all climate-related hazards &amp; risk or a selection of thereof and is useful to assess progress made in risk governance, planning, coping capacity, and recovery from climate related shocks.</p>
REACHOUT cities	Milan and Gdynia
Maintenance and support for applied REACHOUT cities	<p>This is not a technical tool but a guide to support self-assessment of risk management capabilities. Therefore, the maintenance and support conditions that apply in this case will be based on the updates made by CMCC within the UCPM Peer Review Program 2025-2027.</p> <p>CMCC ensures that this guidance material will remain up to date by providing a link to a page on CMCC website or the <a href="#">UCPM Peer review programme</a></p>
Foreseen customers	<p>The tool is meant for local to national authorities, action groups, civil society organizations or other organized groups contributing to climate adaptation and disaster risk reduction strategies and plans.</p> <p>The tool has been tested in the context of 10 Italian cities. Its application in six major Italian cities is available <a href="#">here</a>.</p>

Maintenance and support for future customers	The Tool will be updated and maintained within UCPM Peer Review Program 2025-2027. Support from CMCC could be available upon request and under specific agreements (Level 1,2).
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### 3.3 Climate Resilient City Tool (CRCTool)

Tool & responsible partner	Climate Resilient City Tool (CRCTool)
Short description	The CRCTool explores the spatial planning of adaptation options (mainly nature-based solutions (NBS)) in an urban district. It uses a conceptual urban water balance model to calculate the hydrological effects of solutions that are drawn in by users.  The CRCTool can be used on a computer to explore and compare adaptation options, or on a touchscreen for the co-creation of urban designs with stakeholders. These results are shown on a map interface and in an accompanying table. The tool provides information on the hydrological effectiveness and an indication of the construction and maintenance costs.
REACHOUT cities	Athens, Gdynia and Lillestrom
Maintenance and support for applied REACHOUT cities	The CRCTool is a web-based tool for which no installable software is required and specific access point are provided: Lillestrom: <a href="https://lillestrom.crctool.org/en/">https://lillestrom.crctool.org/en/</a> Gdynia: <a href="https://gdynia.crctool.org/en/">https://gdynia.crctool.org/en/</a> Athens: <a href="https://athens.crctool.org/en/">https://athens.crctool.org/en/</a> Supporting all levels of maintenance and level 1 and 2 of support.
Foreseen customers	Stakeholders willing to explore the applicability of urban nature-based solutions in their cities to better address precipitation, drought and/or heat hazards.
Maintenance and support for future customers	The CRCTool is a web-based tool for which no installable software is required. Regarding the support, Deltares provides a <a href="#">public wiki</a> with information regarding the practical use of the tool and technical background documentation regarding the water balance model.

### 3.4 FloodAdapt tool

Tool & responsible partner	FloodAdapt Tool (Deltares)
Short description	FloodAdapt is a decision support tool intended to accelerate climate adaptation actions by making it easier for local and regional agencies to understand their flood risk under different future conditions and adaptation strategies.

	<p>It can be used to assess compound flooding, that means any combination of marine, rainfall and riverine flooding, with or without the added effects of future sea level rise, changes in rainfall patterns and storminess and socio-economic developments.</p> <p>It offers these services:</p> <ul style="list-style-type: none"> <li>• Impact assessments considering different future scenarios.</li> <li>• Prioritization of areas for adaptation.</li> <li>• Screening and exploring different flood adaptation options, this is prior to and not instead of detailed feasibility and design studies for adaptation.</li> </ul>
REACHOUT cities	Cork.
Maintenance and support for applied REACHOUT cities	<p>The FloodAdapt tool has been set up (customized) for Cork to support the city council in their long-term flood risk management planning.</p> <p>The generic FloodAdapt tool is maintained by Deltares but locally specific applications are not. Ongoing support beyond the project phase is feasible upon request and under specific agreements.</p>
Foreseen customers	<p>FloodAdapt empowers less technical users to harness the power of process-based flood models through an accessible graphical user interface. Foreseen customers are municipalities or national and state agencies who want to make these modelling services accessible to municipalities,</p> <p>Deltares is continuously working on the improvement of the user experience and regularly adds new functionalities, for example, adding more physical processes, more (indirect) impacts, equity indicators and adaptation options.</p>
Maintenance and support for future customers	<p>FloodAdapt applications need to be customised to the specific location. The <u><a href="#">user manuals</a></u> and <u><a href="#">FloodAdapt documentation</a></u> can guide users in the process of setting up their local FloodAdapt application.</p> <p>Upon request and under specific agreements, Deltares could provide support to end users in configuring and maintaining local applications of FloodAdapt.</p> <p>Deltares is releasing a freeware installer version of FloodAdapt that includes the backend and the graphical user interface in late 2024. The backend of FloodAdapt is open source (<u><a href="#">GitHub - Deltares-research/FloodAdapt</a></u>) and has an API that other applications can connect to. The backend of FloodAdapt leverages the open-source, state-of-the-art process-based compound flood model SFINCS (<u><a href="https://github.com/Deltares/SFINCS">https://github.com/Deltares/SFINCS</a></u>) and the damage model included in FloodAdapt is the Deltares-developed flood impact assessment tool Delft-FIAT (<u><a href="https://github.com/Deltares/Delft-FIAT">https://github.com/Deltares/Delft-FIAT</a></u>). It calculates the flood damages to individual buildings</p>

	and roads, and – when social vulnerability data is available – aggregates these damages over vulnerability classes.
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### 3.5 Social vulnerability Index

Tool & responsible partner	Social Vulnerability Index (UCC)
Tool description (overview)	<p>This tool is designed to help users to assess communities' vulnerability to climate hazards such as flooding, extreme heat, and drought.</p> <p>The tool compiles census data for indicators such as housing quality, unemployment rate, and average education levels (amongst others) to analyze the vulnerability of a given community to climate change.</p> <p>The tool also provides an index or score of socio-economic vulnerability for each census-defined small area within a region of interest. The data provided by this tool allows users to better understand climate change risks for a given community, and to compare risks across regions using an easy-to-use map interface.</p>
REACHOUT cities	Cork, Athens, Logroño, Milan.
Maintenance and support for applied REACHOUT cities	<p>The SVI tool has been adapted (contextualized) for each REACHOUT city to suit their own needs to provide the SVI at the latest available census data. So corrective maintenance (bugs reported by the REACHOUT cities) will be solved but no updates neither in the input data nor software will be provided.</p> <p>Some level of support (L1) and guidance will be available to REACHOUT cities as long UCC are using the SVI tool on other projects. User manuals and the open-source code are available at open access: <a href="https://GitHub.com/jamesfitton/ISVEHI">https://GitHub.com/jamesfitton/ISVEHI</a>, so that users can take full ownership of it.</p>
Foreseen customers	Practitioners and decision-makers in municipal government and in industry sectors such as transport, water, and agriculture, to assist both climate change adaptation and the transition to a carbon neutral economy
Maintenance and support for future customers	<p>The SVI tool will have detailed user manuals provided and is completely open source: <a href="https://GitHub.com/jamesfitton/ISVEHI">https://GitHub.com/jamesfitton/ISVEHI</a>.</p> <p>It is intended that the user will be able to fully adapt the tool to their own use, taking ownership of it. It is currently being used in other projects so updates to the overall methodology will be provided on the manual as a part of this and staff should be able to provide minor support and guidance to any queries as long as the SVI tool is actively being used in other projects.</p>

### 3.6 Thermal Assessment Tool

Tool & responsible partner	Thermal Assessment Tool (TECNALIA)
Tool description (overview)	<p>The Thermal Assessment Tool is designed to provide a user-friendly visualization of past, present, and future extreme heat episodes (heatwaves) in European regions and cities to raise awareness and better support heat risk assessment.</p> <p>The tool offers two main services:</p> <ul style="list-style-type: none"> <li>• Heatwaves Service: This service provides customized visualizations to show the magnitude of extreme heatwave events in Europe based on different risk levels “warning”, “alert”, “alarm” that are based on the severity of the potential impacts. The information is provided at various regional scales, including municipality, province, and region levels.</li> <li>• Heatmaps Service: This service provides high resolution (30m) summer mean surface temperature maps at city level to better visualize areas of higher surface heat concentration which is of great use for urban and sustainable managers to plan future building retrofitting or city scale interventions.</li> </ul>
REACHOUT cities	Logroño, Milan, Athens Cork, Gdynia and Lillestrøm.
Maintenance and support for applied REACHOUT cities	<ul style="list-style-type: none"> <li>• The Heatwave service was produced for all REACHOUT regions (Lombardia, La Rioja, Pomorskie, Oslo og Viken, Southern Irland and Attica) and their respective provinces and municipalities covering the last 43 years (1981-2023) and how these specific characteristics of heat waves will evolve in the coming decades. An online version of <a href="#">Thermal Assessment Tool</a> is freely available to visualize past and future heatwave plots.</li> <li>• The Heatmap service was produced for Milan, Athens and Logroño, providing 30 meters resolution maps containing the peak Land Surface temperature for the last 5 years.</li> </ul> <p>For both services, Tecnalía will provide corrective maintenance (bugs reported by the REACHOUT cities) but not updates as it requires the gathering and processing of a big amount of data.</p> <p>Upon request and under specific agreements, Tecnalía will support in updating and/or maintaining these outcomes.</p>
Foreseen customers	Public health users, urban planning managers, climate change researchers and other stakeholders.
Maintenance and support for future customers	This tool is intended to be deployed at a cloud provider in order to supply professional service to customers. So, Levels 3, 4 & 5 will be subcontracted to the cloud provider.

	For future customers is planned to deploy the tool in a professional cloud provider, that by default supplies at least level 3, 4 and 5 of support. Regarding maintenance levels it will be offered all the maintenance levels to our customers to have a stronger and evolutive commercial offer sustained by payment for use under specific agreements.
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### 3.7 Adaptation pathway generator tool

Tool & responsible partner	Adaptation pathway generator tool (Deltares)
Tool description (overview)	<p>The Pathways Generator Tool develops pathways maps to define the solution for space and allow comparison of alternative pathways into the future, via evaluations of costs, benefits, and co-benefits.</p> <p>It allows decision makers to consider longer-term implications and path dependency of near-term decisions to avoid investment regret and lock-in as the uncertain future unfolds. It uses 'tipping points' based on bottom-up vulnerability assessments and defined with stakeholders to ensure that system performance is maintained under a variety of future</p>
REACHOUT cities	Cork
Maintenance and support for applied REACHOUT cities	Only level 1 of support is provided, as the tool can be freely used, once downloaded.
Foreseen customers	Practitioners and decision makers
Maintenance and support for future customers	<p>The adaptation pathways generator tool can be downloaded and used freely, no need for specific support.</p> <p>The tool is supported by several on-line documentation <a href="#">here</a> and by a <a href="#">brief manual</a> to help to navigate the Pathways Generator.</p> <p>The Pathways Generator is developed by and remains the copyright of Deltares, Delft and Carthago Consultancy.</p>

### 3.8 Dynamic Integrated Flood Insurance (DIFI) model

Tool & responsible partner	Dynamic Integrated Flood Insurance (VU-IVM)
Tool description (overview)	This model offers insight into flood insurance premiums, unaffordability and demand for coverage under different flood insurance systems.
REACHOUT cities	N/A
Maintenance and support for applied REACHOUT cities	All levels of maintenance will be provided by one person devoted to this maintenance. Only, first level of support will be provided.
Foreseen customers	CC researchers and practitioners.



Maintenance and support for future customers	All maintenance levels will be provided as well as the first two levels of support.
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### 3.9 REACT Tool (Real Estate Asset Climate Testing)

Tool & responsible partner	REACT Tool (VU-IVM)
Tool description (overview)	<p>This tool is designed to estimate the risk (in euro/year) for individual assets making use of a simplified risk calculation.</p> <p>The tool can be used to guide investments in flood adaptation by showing the economic benefits of several adaptation options, such as flood protection or risk-reducing strategies on the building level.</p> <p>The goal of the tool is to offer simple, open, and transparent way to assess different types of flood risks (coastal, riverine, pluvial) for their assets.</p>
REACHOUT cities	Amsterdam city hub (APG) and real estate investor AEW.
Maintenance and support for applied REACHOUT cities	<p>Corrective maintenance level is provided as well as the two first levels of support.</p> <p>The tool is currently being integrated in a financial sector executive course and may receive some updates from that.</p>
Foreseen customers	Real estate managers and policymakers.
Maintenance and support for future customers	<p>This tool is public available at Zenodo together with the guidance to use it: <a href="#">A quick, simple, and transparent assessment of real estate flood risk - Technical Documentation</a></p> <p>There is a basic calculation where a generic estimate of the value of an asset is used, whereas the advanced calculation allows for a more detailed approach where the user can specify the value of the asset, and, when applicable, include the elevation of the asset above surface level, presence of floodproofing measures, and changes in flood probability due to climate change. Only corrective maintenance will be provided along with the first two levels of support.</p>

### 3.10 Climate Impact diagrams

Tool & responsible partner	Climate Impact Diagrams (CAS)
Tool description (overview)	<p>The impact diagrams are a support tool - developed based on a workshop - that offer a visual summary of the climate change impacts by sector (economic, social and natural) in order to contribute to the development of adaptation plans.</p> <p>Impact diagrams workshops can help cities and city staff to gain insight into the opportunities and risks of climate change</p>

	for their own field of work and can enable focussed discussion between stakeholders about adaptation options and priorities.
REACHOUT cities	Logroño
Maintenance and support for applied REACHOUT cities	<p>The tool (workshop) was applied in Logroño and outcomes were synthesis in an interactive platform supported by CAS: <a href="https://cas-platform.com">Interactive network (cas-platform.com)</a>.</p> <p>Cas will maintain any corrective and preventive bug reported by the user in this interactive platform.</p> <p>Cas will provide full maintenance for the guidance material.</p>
Foreseen customers	Climate adaptation practitioners working with cities.
Maintenance and support for future customers	<p>CAS will provide full maintenance for the guidance material by ensuring it remains up to date by linking from the toolkit to a page on our website.</p> <p>CAS use these materials by ourselves, so it is in our own interest to keep them high quality.</p> <p>Upon request and under specific agreements, CAS is available for questions and enquiries to organize future workshops.</p>

### 3.11 Climate Stories

Tool & responsible partner	Climate stories
Tool description (overview)	<p>Climate stories are a form of structured communication designed to share information, experiences, and targeted messages about climate change/adaptation. In REACHOUT the climate stories were offered as a service to the city hubs.</p> <p>Stories should ideally be compelling and entertaining and may combine text with supporting media or scientific data.</p> <p>Stories have the potential to increase the impact of the climate message you want to communicate; from making people feel what climate risks entail in real life setting to calling for action.</p>
REACHOUT cities	Logroño, Milan, Athens Cork, Gdynia and Lillestrøm.
Maintenance and support for applied REACHOUT cities	<p>For the climate stories of REACHOUT, city staff is capable to make minor adjustments in text or images if required. In addition, a manual on how to make a climate story is being developed. Therefore, different maintenance and supply conditions apply. The guidance material will be remained up to date by linking from the toolkit to a page on our website. In addition, it is provided availability for questions and enquiries to develop climate stories or assistance.</p> <p>This is not a technical tool but a manual about how to build a climate story. In the development of a climate story, different</p>

	tools can be used such as ArcGIS story maps (which is licensed software), but there are also open alternatives, such as geostories. We will ensure that the manual will remain up-to-date by linking from the toolkit to a page on our website. We use these materials ourselves as well, so it is in our own interest to keep them high quality. In addition, we are available for questions and enquiries to develop climate stories or provide assistance.
Foreseen customers	Climate researcher and adaptation practitioners
Maintenance and support for future customers	This is not a technical tool but a manual. Therefore, different maintenance and supply conditions apply. It will be ensured that the manual will remain up to date by linking from the toolkit to a page on our website. CAS uses these materials in other projects and research activities as well, so it is in the interest of the organization to keep them high quality. CAS is available for questions and enquiries to develop climate stories or to provide assistance.

### 3.12 Windstorm damage assessment tool (WISC)

Tool & responsible partner	Windstorm damage assessment tool (VU-IVM)
Tool description (overview)	<p>This tool estimates of damages mostly rely on post-disaster insurance data, which is often not publicly available.</p> <p>The tool provides damages based on a high-resolution and open-source damage model for extratropical windstorms in Europe.</p> <p>Damage estimates show that the western part of Europe is greatly impacted by wind extremes.</p>
REACHOUT cities	Tested by Milan, but not applied because the model covers extratropical windstorms. These windstorms typically only affect the North Sea and Atlantic Ocean in Europe. Hence, the WISC model does not predict any risk from extratropical windstorms in Milan.
Maintenance and support for applied REACHOUT cities	Staff will be devoted to make further updates of the model, such staff can provide guidance in using the tool if requested.
Foreseen customers	Insurance companies, real estate investors or climate change researchers.
Maintenance and support for future customers	<p>Maintenance and support will depend on specific agreements and own staff availability.</p> <p>Support is made through publicly available paper: <a href="#">Koks, E. E., &amp; Haer, T. (2020). A high-resolution wind damage model for Europe. Scientific reports, 10(1), 6866.</a></p> <p>The full code of the model is available through <a href="https://wisc.readthedocs.io/en/latest/">https://wisc.readthedocs.io/en/latest/</a> . All building footprints can be extracted from OpenStreetMap. The date of extraction for this study is July 1, 2018. All hazard data can</p>

	be obtained through the Copernicus WISC Windstorm Information Service: <a href="https://wisc.climate.copernicus.eu/wisc/">https://wisc.climate.copernicus.eu/wisc/</a>
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### 3.13 RESIN AOL (Adaptation Options Library)

Tool & responsible partner	RESIN AOL (Tecnalia)
Tool description (overview)	The RESIN AOL is a searchable public on-line database of all kinds of adaptation measures to address climate risks. Search filters allow to find and compare measures, with environmental effectiveness and cost efficiency among the criteria available for benchmarking. Additionally selected measures can be exported into a csv format.
REACHOUT cities	Logroño
Maintenance and support for applied REACHOUT cities	Logroño used this database to look for the best possible measures to prevent flooding. The current version of the database will remain available for Logroño or any other REACHOUT city to search for available measures, but update of measures is not included.  The provided support assures basic incidences solving and corrective maintenance.
Foreseen customers	Urban planning decision makers or practitioners.  The database is also available to be integrated in other research projects or tools.
Maintenance and support for future customers	Maintenance and support levels will be established under specific agreements as well as measures updates.

### 3.14 Climate Resilient Development Pathways (CRDPs)

Tool & responsible partner	Climate Resilient Development Pathways (Deltares)
Tool description (overview)	This tool supports integrated planning and implementation of climate action by integrating adaptation, mitigation and sustainable development objectives into flexible pathways over time.  The Climate Resilient Development Pathways tool is not a software tool but an approach/methodological tool aiming to integrate adaptation, mitigation and sustainable development objectives into flexible pathways over time, while considering deep uncertainties regarding climate change.
REACHOUT cities	Cork and Logroño

Maintenance and support for applied REACHOUT cities	Those cities that are currently using the approach may be further supported, if there is any need. This would need to be agreed upon between Deltares and the individual cities/parties.
Foreseen customers	This planning support approach can be extended to interested parties: such as decision makers and/or urban planners.
Maintenance and support for future customers	Maintenance and support will depend on specific agreements and own staff availability.

### 3.15 ARCH Resilience Pathway Visualization Tool (ARCH RPVT)

Tool & responsible partner	ARCH RPVT (TECNALIA)
Tool description (overview)	<p>The RPVT provides a user-friendly graphical interface to create and visualize resilience pathways, allowing users to select, prioritize, and sequence different possible measures over time.</p> <p>Measures can be selected and prioritized according to various performance metrics, primarily addressing floods and heatwaves, but also earthquakes and drought/water scarcity.</p>
REACHOUT cities	Not yet applied. (Logroño tested it)
Maintenance and support for applied REACHOUT cities	<p>This a previous tool developed in ARCH European project, so it has not been updated/modified in this project. The current version of the tool will remain available for all REACHOUT cities to allow them to design resilience pathways.</p> <p>No further maintenance or support is expected.</p>
Foreseen customers	Climate adaptation practitioners supporting cities in building resilient pathways.
Maintenance and support for future customers	<p>It is a freely accessible on-line tool: <a href="http://arch.tecnalia.com/index">http://arch.tecnalia.com/index</a> that only require to get a user and password. The tool is supported by online documentation <a href="#">here</a> about how to design resilience pathways and by a <a href="#">brief user guide</a> to help to navigate through the Pathway Visualization Tool.</p> <p>No further maintenance or support is expected. However, the RPVT is intended to be further developed in future research projects.</p>

### 3.16 Theory of change (ToC): Navigating transformation towards a desired vision

Tool & responsible partner	Theory of change (TECNALIA)
Tool description (overview)	<p>The aim of a tool is to guide and support on the development of a Theory of Change (ToC) participatory workshop.</p> <p>The tool provides materials and guidelines for a collaborative work that constructs a ToC based on a shared vision considering the views from different stakeholders. It guides participants in understanding current conditions, strategically planning activities, and identifying outputs and outcomes. The tool promotes inclusivity, ownership, and commitment among stakeholders, ensuring a logical and measurable framework that accommodates flexibility and iteration. It ultimately supports the documentation and communication of the developed theory of change.</p>
REACHOUT cities	It has not been applied to any REACHOUT city
Maintenance and support for applied REACHOUT cities	<p>This is not a technical tool but a workshop tool.</p> <p>Tecnalia has already explained the goals and approach of this tool to REACHOUT cities, and the user guide will remain up-to-date in the REACHOUT webpage.</p> <p>Furhter, Tecnalia is available for questions and enquiries to organize workshops in REACHOUT cities.</p>
Foreseen customers	Climate adaptation practitioners working with cities
Maintenance and support for future customers	<p>This is not a technical tool but a workshop tool.</p> <p>The <u>User's guide</u> "Navigating transformation towards a desired vision" provides the support to design and implement this workshop in any city.</p> <p>Tecnalia will ensure that the user guide will remain up to date. In addition, we are available for questions and enquiries to develop this type of workshop or provide assistance upon specific agreements.</p>

### 3.17 Adaptation pyramid

Tool & responsible partner	Adaptation pyramid (CAS)
Tool description (overview)	<p>The Adaptation Pyramid is a workshop approach. It is a structured approach to help cities in setting ambitions on a balanced set of adaptation measures. The pyramid is a metaphor that resembles a climate-proof system which consists of reactive, incremental and transformative types of measures. It is a workshop approach where city representatives together</p>

	discuss how to set a balanced ambition for the adaptation strategy for the city.
REACHOUT cities	Not applied yet
Maintenance and support for applied REACHOUT cities	The Adaptation Pyramid has been applied in various cities and regions in the Netherlands. It has not yet been applied within REACHOUT. It is a workshop method rather than a technical tool. CAS will ensure that guidance material and workshops materials will remain up to date.
Foreseen customers	Climate adaptation practitioners working with cities
Maintenance and support for future customers	CAS are currently developing a workshop method and a manual. This is not a technical tool but a workshop tool. CAS will ensure that guidance material and workshops materials will remain up to date by linking from the toolkit to a page on our website. In addition, CAS is available for questions and enquiries to organize workshops.

## 4 Platforms for commercialization

Different REACHOUT partners will make use of different platforms as a means for commercialization. Such platforms give visibility to the tools, addressing direct commercial exploitation, and/or open innovation.

Three platforms have been identified:

- SaferPlaces
- Github
- Zenodo

Each of them are described below.

### 4.1 SaferPlaces

SaferPlaces (<https://saferplaces.co/saferplaces-solution-platform-api/>) is an innovative, AI-based digital twin solution designed to provide **comprehensive flood risk intelligence**. It integrates geospatial, satellite, and climate data with advanced AI models to offer real-time insights into flood hazards and risks. SaferPlaces is supported by the Italian company GECOSistema S.r.l. Organizations can arrive to specific agreements with GECOSistema to promote their tools at the platform.

The key features provided by this platform are:

- **Digital Twin Technology:** It creates a digital replica of urban environments, allowing users to simulate and assess flood risks under various scenarios.
- **Real-Time Flood Mapping:** The platform delivers real-time flood maps, helping cities plan and adapt to climate-related challenges effectively.
- **Scalability and Cloud Computing:** Leveraging cloud infrastructure, SaferPlaces can run high-resolution simulations quickly and cost-effectively.
- **User-Friendly:** Designed to be accessible to users with varying levels of expertise, it democratizes high-resolution flood risk information.

Overall, SaferPlaces aims to enhance urban resilience by providing detailed, actionable flood risk data to support informed decision-making and effective climate adaptation strategies.

### 4.2 Github

Github (<https://github.com/>) is an open-source community where individual developers, research teams and companies can publish open-source software. The members of the community can contribute to the evolution of the published software and reuse such software in own developments, complying with the licenses under which software is published, increasing productivity thanks to software reuse.

Currently, over 100 million developers are part of the Github community (<https://github.blog/news-insights/company-news/100-million-developers-and-counting/>), and it hosts more than 85 million software public repositories (<https://github.com/search?q=is%3Apublic&type=repositories>).



## 4.3 Zenodo

Zenodo is a general-purpose open repository developed under the European OpenAIRE project and operated by CERN (European Organization for Nuclear Research). OpenAIRE (<https://explore.openaire.eu/>) project, resulted in an open dataset of research information supported by the EC (European Commission).

Data, software and other artefacts in support of publications may be the core of Zenodo, but materials associated with the conferences, projects or the institutions themselves, all of which are necessary to understand the scholarly process are also included (<https://about.zenodo.org/>).

## 5 Summary and next steps

The different maintenance and support levels for the tools making up the Triple-A Toolkit have been extensively described. The maintenance and support levels are differentiated in two layers: the ones being offered to REACHOUT cities and those to be provided to the foreseen customers.

Two tables are provided, one for quick consultation of the maintenance and support levels for each tool and another for a description of each tool.

In parallel, three platforms used as commercialization means by different tool developers have been described, highlighting the capacities of each platform for the purposes for which they are to be used.

These results are of paramount importance for the tools exploitation plans and marketability aspects (introduced in report D4.3). As part of the work developed in WP4, the City Hub Business Model, was introduced and presented as a novel conceptual framework for identifying the benefits of climate services and effectively channeling them given the complexity of factors that shape cities. Following a similar approach, the next activity, to be further analyzed as part of WP4, will be the tools' business models together with the REACHOUT Triple A toolkit business model and marketplace for climate services uptake.

