Resilient Cities 2018

Standardised support tools for urban resilience

A session by the RESIN project

Peter Bosch
TNO, 27-04-2018

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The RESIN project

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City issues:

Getting a better overview of vulnerabilities and risks

Choosing the best (climate effective, cost effective) adaptation options

One-stop-shop for all you need in creating an adaptation strategy

The issues:

- Weak connection between infrastructure and city adaptation (DRR vs CCA, involving infrastructure operators, silos in the administration)
- No standardization and hence little comparison between vulnerability and risk maps of cities; and between adaptation options
- Many tools around but little guidance on their use and usefulness

RESIN project outcomes

Practical, applicable, do-able applications from theory

- a common conceptual framework (risk –vulnerability)
- a city typology

- a standardised approach to impact, risk and vulnerability assessment

- a catalogue of adaptation options, with specific work on increasing comparability

- decision support system

- steps towards formal standardisation

.....In Co-creation

Session overview:

Input: Bratislava and Risk assesment (Fraunhofer)

Discussion on standardising vulnerability and risk assessments

Input: Greater Manchester and adaptation planning (TNO)

Discussion on co-creation and standardising climate adaptation strategy making (introduced by Tecnalia)

Conclusion

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Integrating climate adaptation in the City of Bratislava

Eva Streberova
Office of the Chief City Architect
Bratislava, Capital City of the Slovak Republic
27 April 2018

Presentation outline

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- Climate change hazards in Bratislava
- Adaptation journey of Bratislava City
- From Strategy to Action plan
- Challenges in integrating climate change adaptation
- Using RESIN´s standardised tools for urban resilience – examples from Bratislava

Climate change hazards in Bratislava

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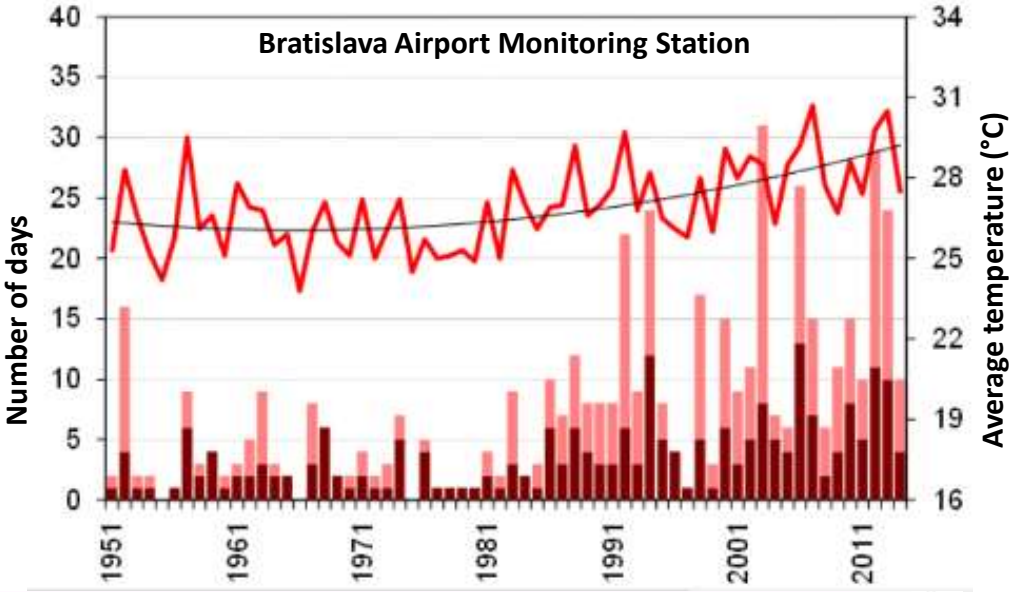
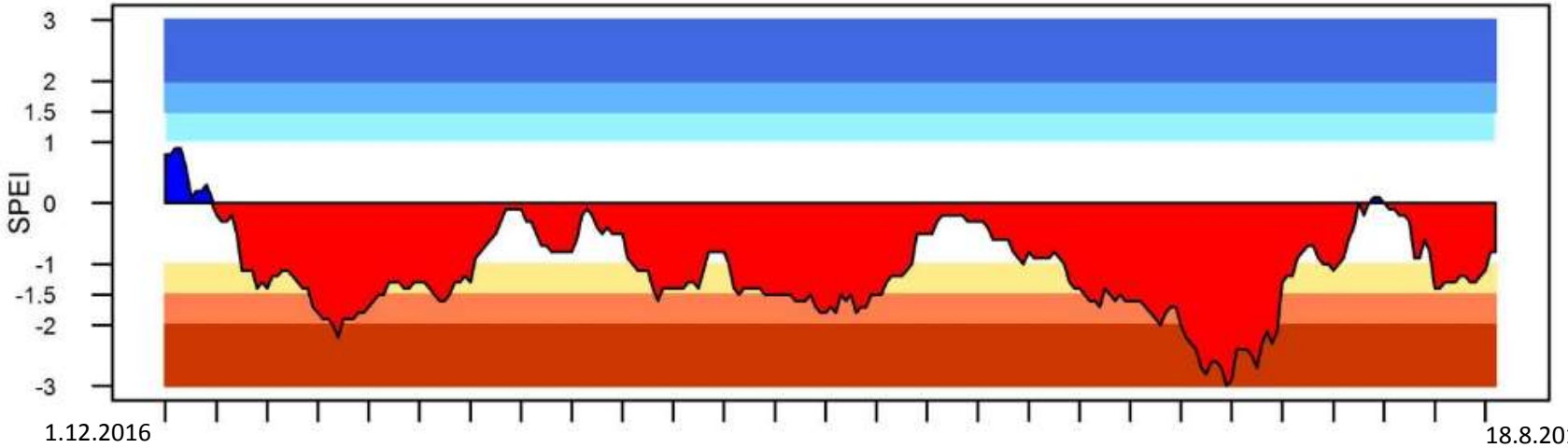
Rise in average temperature, more frequent heat waves ...

- in 2017 there were 4 heatwaves and a new record for a total number of tropical nights in Bratislava (31 in total)



... and periods of droughts

- *2017 was longest since 1981*



Source: up - Slovak Hydrometeorological Institute, Changes in occurence of hot and tropical days (press release) 1ž/7/2015, http://www.shmu.sk/sk/?page=2049&id=632, below – The longest period of drought since 1981 measured in Bratislava Airport Monitoring Station. Source: Slovak Hydrometeorological institute report http://www.shmu.sk/sk/?page=2049&id=858

Climate change hazards in Bratislava

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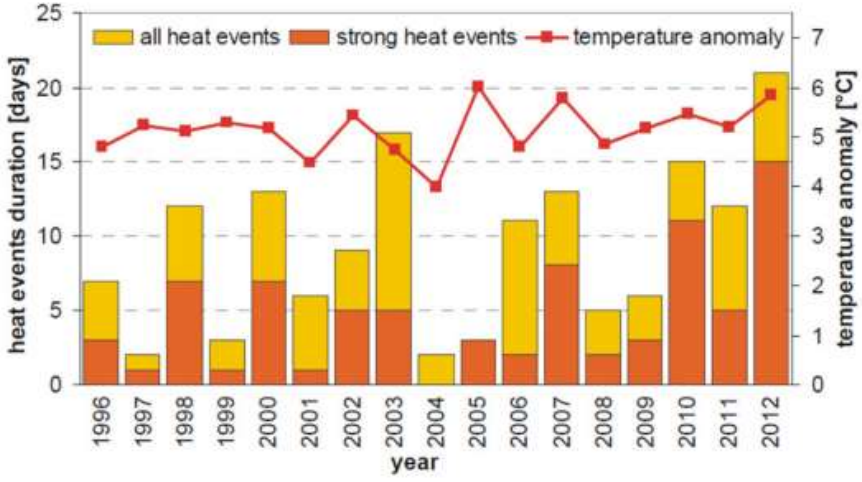
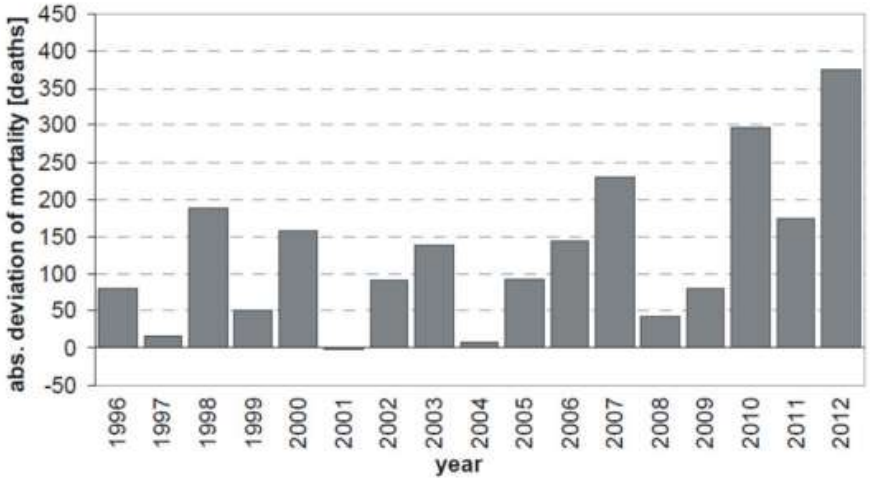
... and flash floods from torrential rainfall ...

- tendency to occur after heatwaves, causing damage in lower areas, areas with higher share of impermeable surfaces.

... temperature extremes.

- *impacts on human health.*





Source: flash floods in Bratislava after heavy rainfall in 2014 http://www.pluska.sk/regiony/bratislava/zatopena-bratislava-cesty-su-neprejazdne-voda-nakupnom-centre.html below – Duration of heat events, average value of daily mean temperature anomaly (left chart) and total mortality deviations (right chart) during 1996–2012 summer heat events in Slovakia (Source: Vyberci et al. 2015)

EU Cities adapt (2012-2013)

Signing of Covenant of Mayors (2012)

Covenant of Mayors
Committed to local sustainable energy

SEAP 2013

Akčný plán udržateľného energetického rozvoja Hlavného mesta SR Bratislavy

Signing of Mayors Adapt (2014)

MAYORS ADAPT
THE COVENANT OF MAYORS INITIATIVE ON ADAPTATION TO CLIMATE CHANGE

Strategy for CCA (approved in 2014)

Bratislava is preparing for CC project (2014-2017)

bratislava
zelenaj sa

Action plan for CCA 2017-2020 (04/2017)

H.2020 RESIN (2015-2018)

RESIN

From Strategy to Action plan

Strategy for adaptation to negative effects of climate change for Bratislava City – adopted in 6/2014

Action plan for adaptation to negative effects of climate change for Bratislava City – adopted in 4/2017

Adaptation measures according to sectors

- From 83 adaptation options to 27 adaptation measures,
- From vision and goals to tasks and milestones,
- 28 municipal, governmental and other stakeholders

Challenges in integrating climate change adaptation

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- **Governance structure & competencies** - among different governance bodies and authorities (the city, its boroughs, its organisations, local authorities)
- **Stakeholders & participation**
- **Design and co-create the new** – monitoring and communication framework
- **Report back** – Mayors Adapt and Covenant of Mayors
- **Update the outdated** – vulnerability assessment, the sectors and other areas of special attention

Using RESIN´s standardised tools for urban resilience

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- **Design and co-create the new**

  Communication and monitoring framework

  - *by using the learning centre of the* **eGuide**
  - *in English speaking countries the options of the eGuide can be explored towards developing a such a strategy using the online environment of the tool*

- **Report back** – Mayors Adapt and Covenant of Mayors

  Bratislava is using the **IVAVIA tool and the Adaptation library** to:

  – *define indicators for the vulnerability assessment that are reported externally,*
  – *carry out assessments for the implemented adaptation options and report these (internally and externally)*

Using RESIN´s standardised tools for urban resilience

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- **Update the outdated – *sectors and areas of competence***

  By using the **Adaptation library** to:

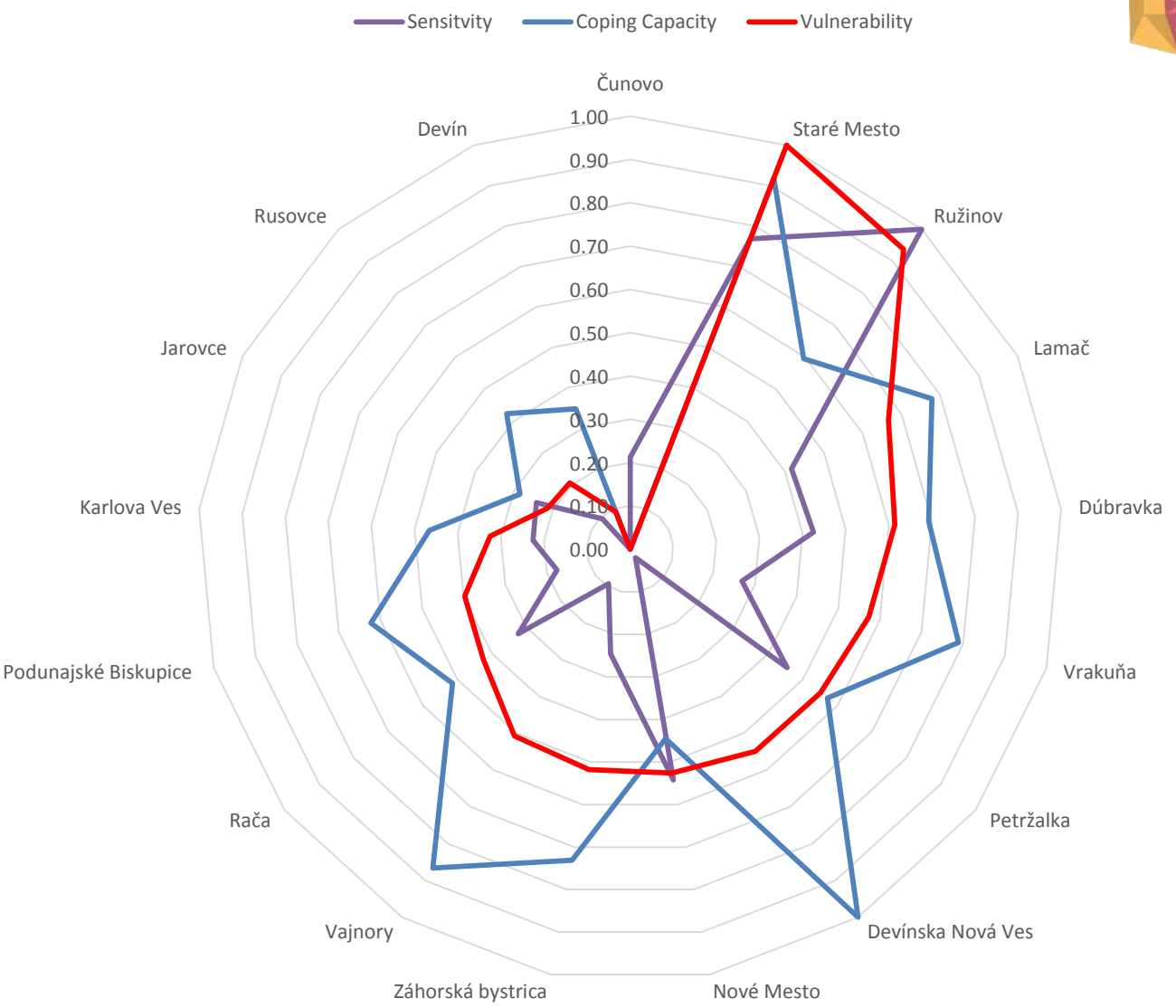
  – *to **choose** among different adaptation options in specific locations, depending on different criteria*
  – *as a **tool for the expert public***

- **Update the outdated – *vulnerability assessment***

  By is using the **IVAVIA tool:**

  - *to increase the city´s resilience during heatwaves, droughts and torrential rainfalls*
  - *to support the **participation** of the City´s **stakeholders***
  - ***logical approach** to defining the different elements along a chain (hazard – stressor - impacts - vulnerability – risk)*
  - *Its design respects the **limited resources** of a resilience officer (time, certain skills)*
  - *IVAVIA´s **supportive tools** to help with the calculations and producing other outcomes such as spatial visualisations (maps, impact chain diagrams, etc.).*

Examples of visualization of results – IVAVIA tool



Examples of visualization of results – IVAVIA tool

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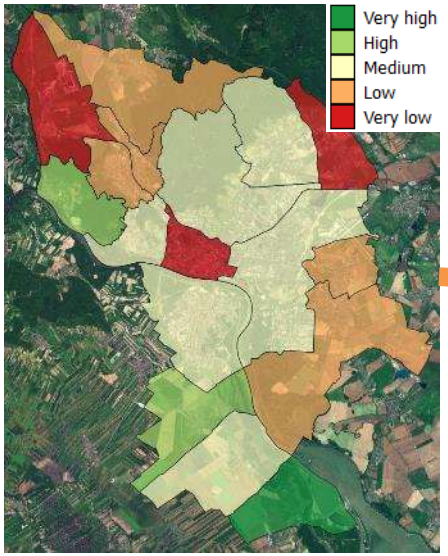
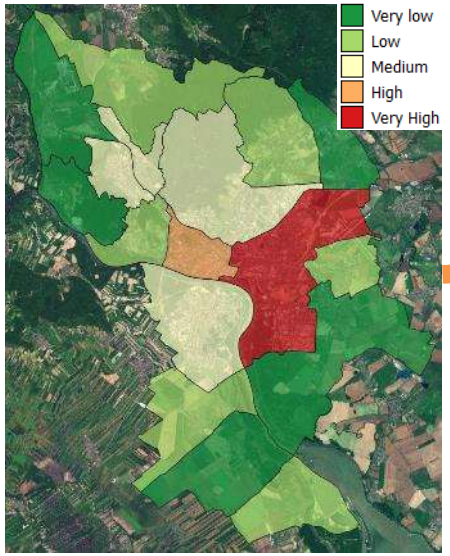
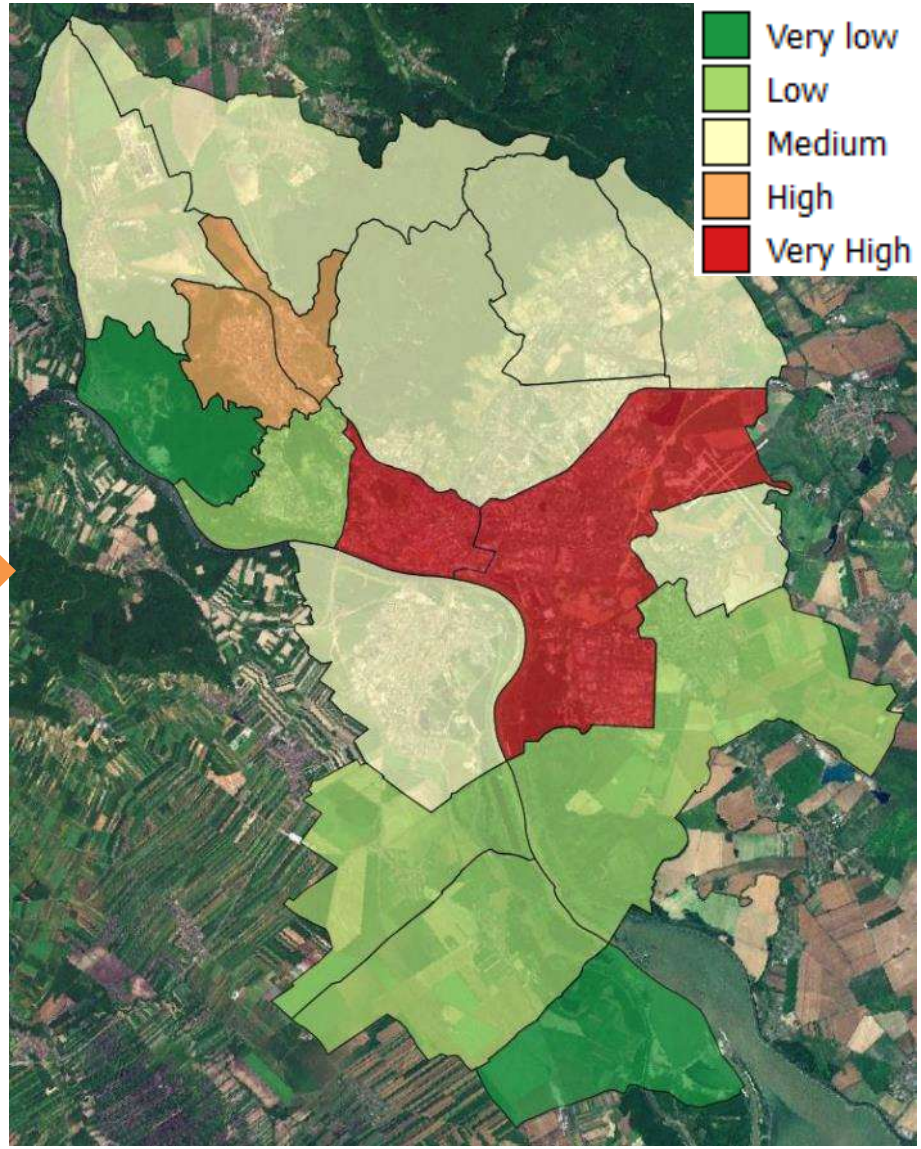
Coping Capacity



Sensitivity





Vulnerability

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Thank you for your attention!

Office of the Chief City Architect

architekt@bratislava.sk

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Risk-oriented vulnerability assessment for climate change

A standardised, modular approach for cities and infrastructures

Dr. Daniel Lückerath
Researcher, Fraunhofer IAIS
2018-04-27

Motivation

- Provide a standardised process
  - for conducting a risk-oriented assessment of climate change impacts and vulnerabilities
  - for urban areas and infrastructures
  - that can be adapted to local conditions
  - is supported by guidance and tools

IVAVIA

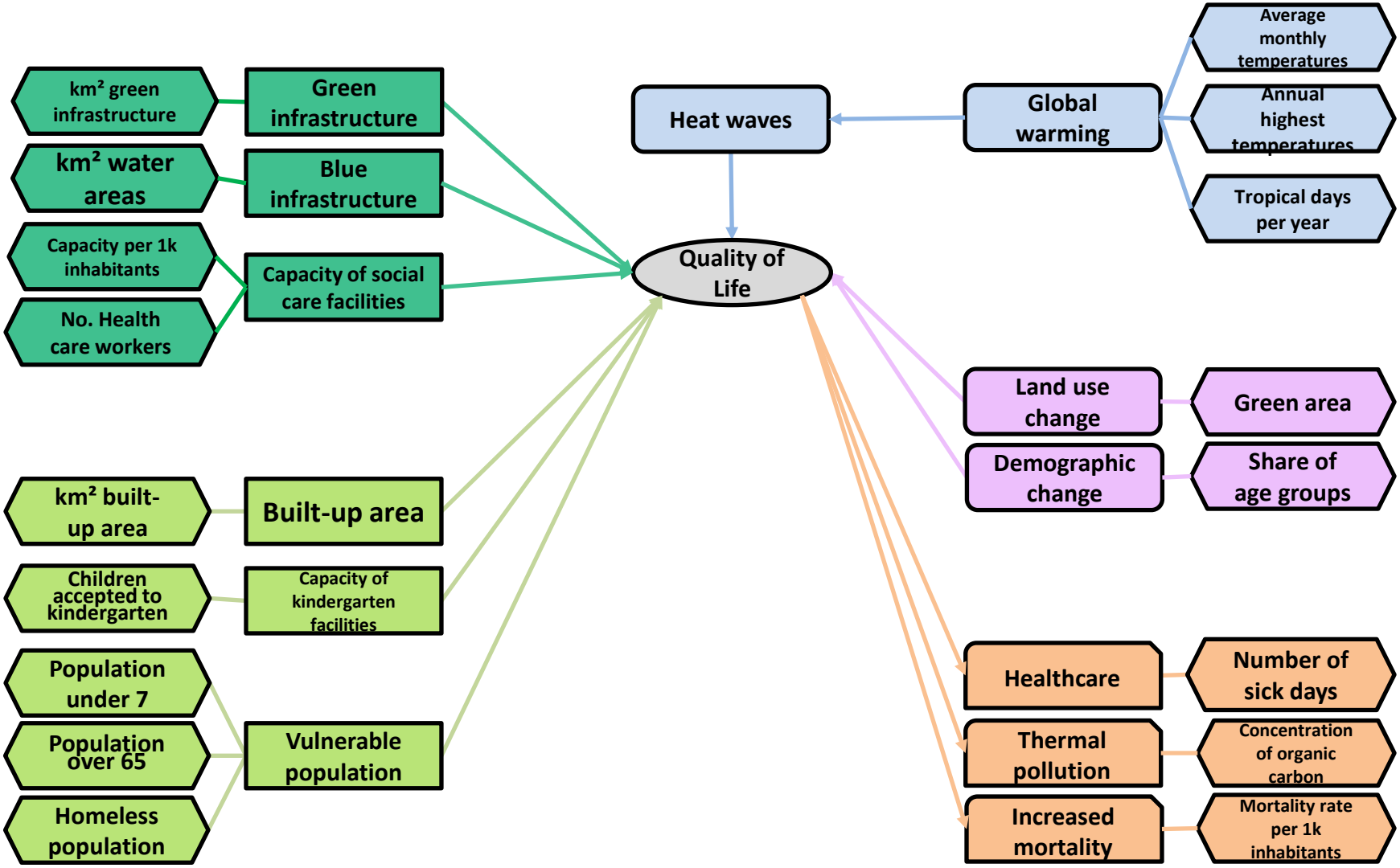
Source: BMZ, 2014. The vulnerability sourcebook. Concept and guidelines for standardised vulnerability assessments. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn and Eschborn, Germany, 2014.

How does it work?

	Which hazards and drivers are relevant to my city?	M0	Selecting Hazards and Drivers
	How do I start the assessment process?	M1	Preparing for Vulnerability Assessment (VA)
Qualitative stages	What are the cause-effect relationships relevant to my city?	M2	Developing Impact Chains
Quantitative stages	How do I want to measure influencing factors and what data do I have available?	M3	Identifying Indicators and Data Acquisition
	How do I combine the gathered data?	M4	Normalisation, Weighting, and Aggregation of Indicators
	How do I assess vulnerability/risk?	M5	Aggregating Vulnerability Components to Risk
Presentation	How do I present the results?	M6	Presenting the Outcome of Your VA to the Stakeholders

Developing Impact Chains

Developing Impact Chains



Developing Impact Chains

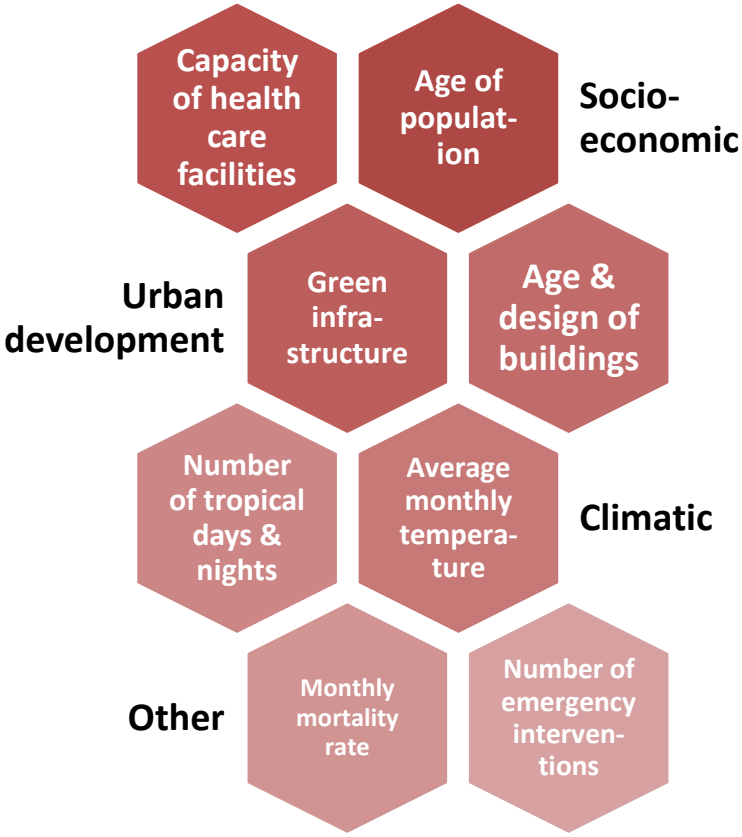
→Qualitative, structured assessment of alleviating / intensifying factors and potential impacts

- Highly valuable for
  - building a common understanding
  - communicating cause-effect relationships
  - identifying relevant areas where actions could be taken
  - identifying further stakeholders that might be helpful during the assessment

Data acquisition

- Data for all identified indicators has to be acquired. Requires
  - interaction with multiple departments, external institutions, open source frameworks
  - analysis and clean-up of data

→ Easily the most resource intensive / time consuming step

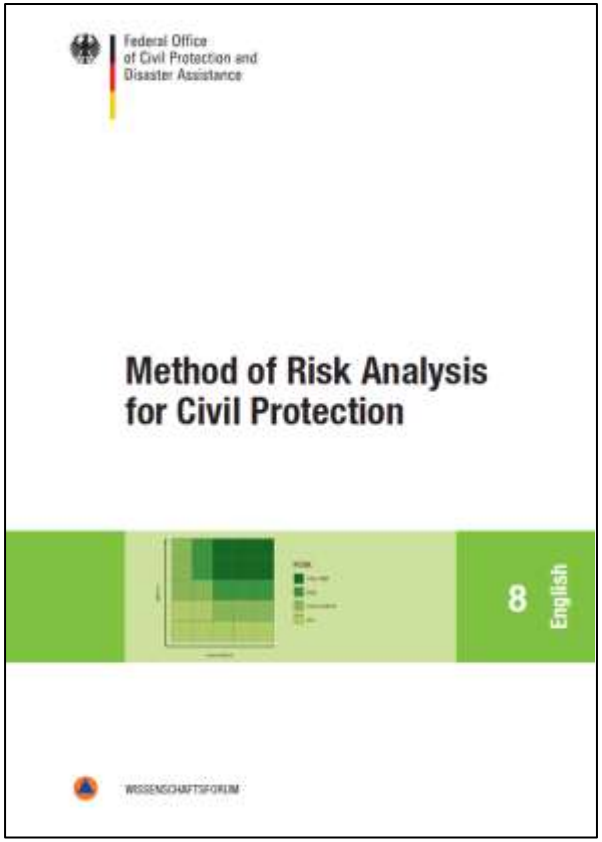


Vulnerability / Risk

- Indicator data is aggregated to composite scores for sensitivity, coping capacity, and vulnerability
- Impacts and probabilities are estimated using historical data of indicators and/or damage functions, combined with vulnerability score

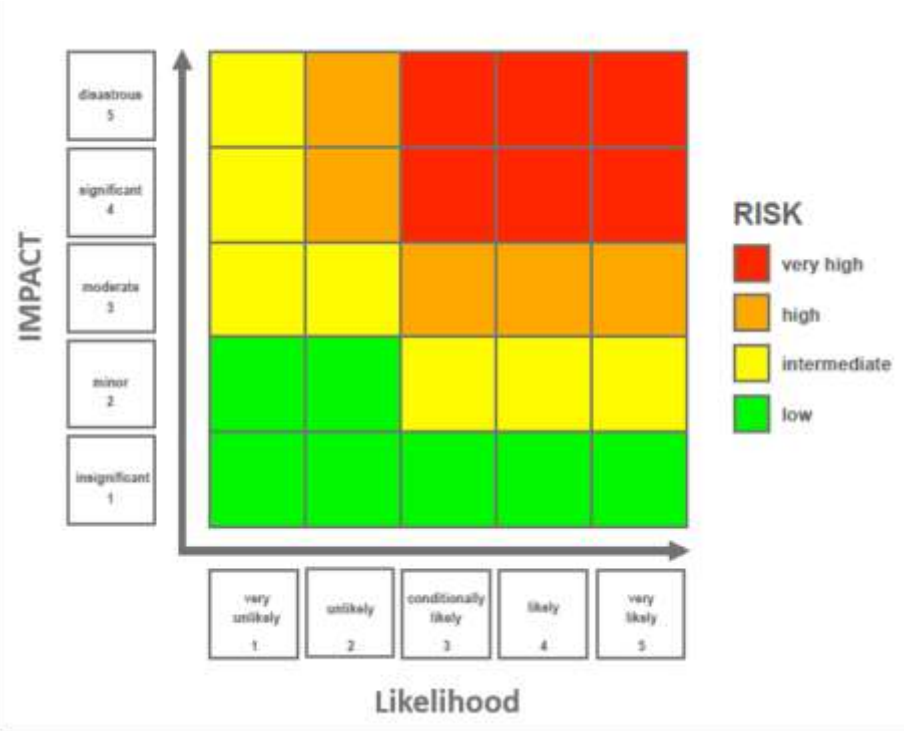
Vulnerability / Risk

- Classify impacts and probabilities using discrete, ordinal classes
- Impact/probability pairs are assigned to risk classes using a risk matrix
- National/regional standards or guidelines exist

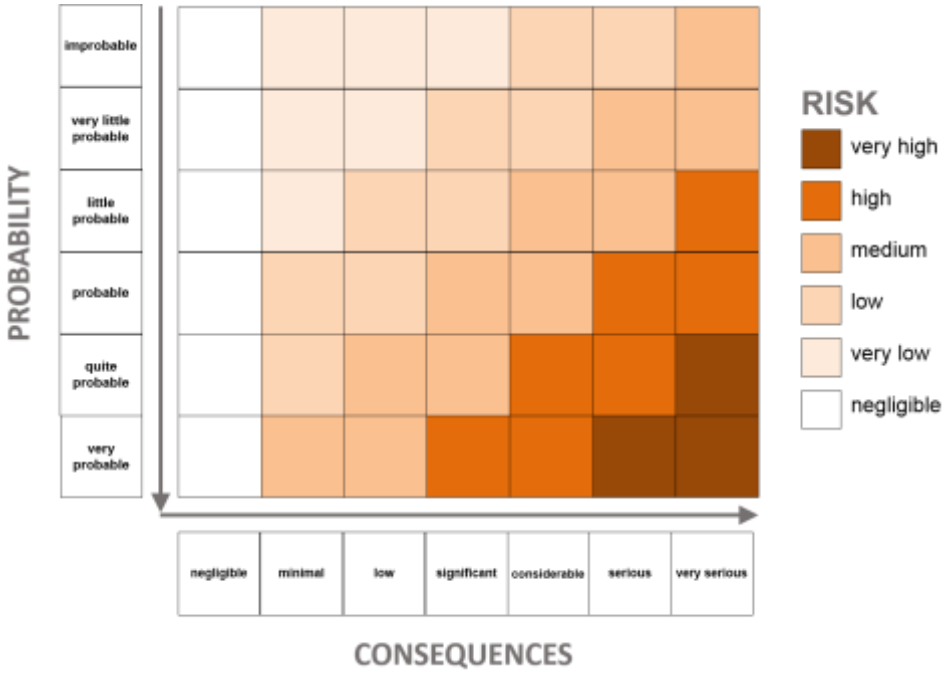


Source: German Federal Office of Civil Protection and Disaster Assistance: method of Risk Analysis for Civil Protection. Wissenschaftsforum, Volume 8. 2011.

RESIN ISO 31000: Risk matrices



Source: German Federal Office of Civil Protection and Disaster Assistance: Method of Risk Analysis for Civil Protection. Wissenschaftsforum, Volume 8. 2011



Source: Solaun, K., Gómez, I., Urban, J., Liaño, F., Genovês, A., 2014: Integración de la adaptación al cambio climático en la estrategia empresarial. Guía metodológica para la evaluación de los impactos y la vulnerabilidad en el sector privado. Oficina Española de Cambio Climático, Ministerio de Agricultura, Alimentación y Medio Ambiente. Madrid, 78 pg

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Results

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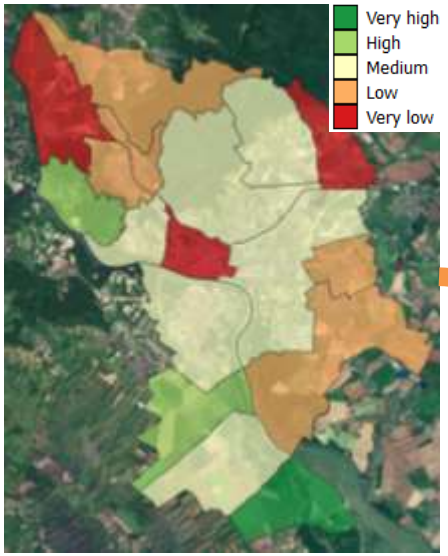
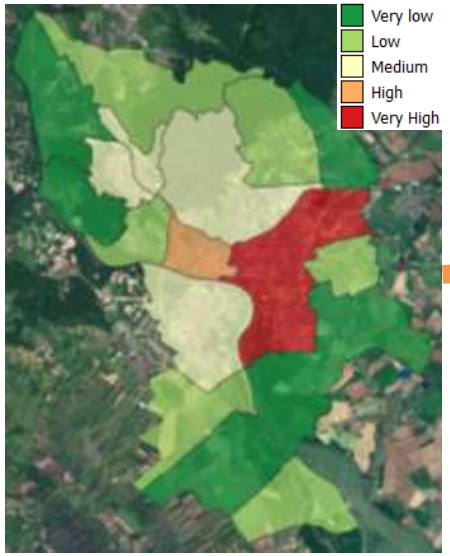
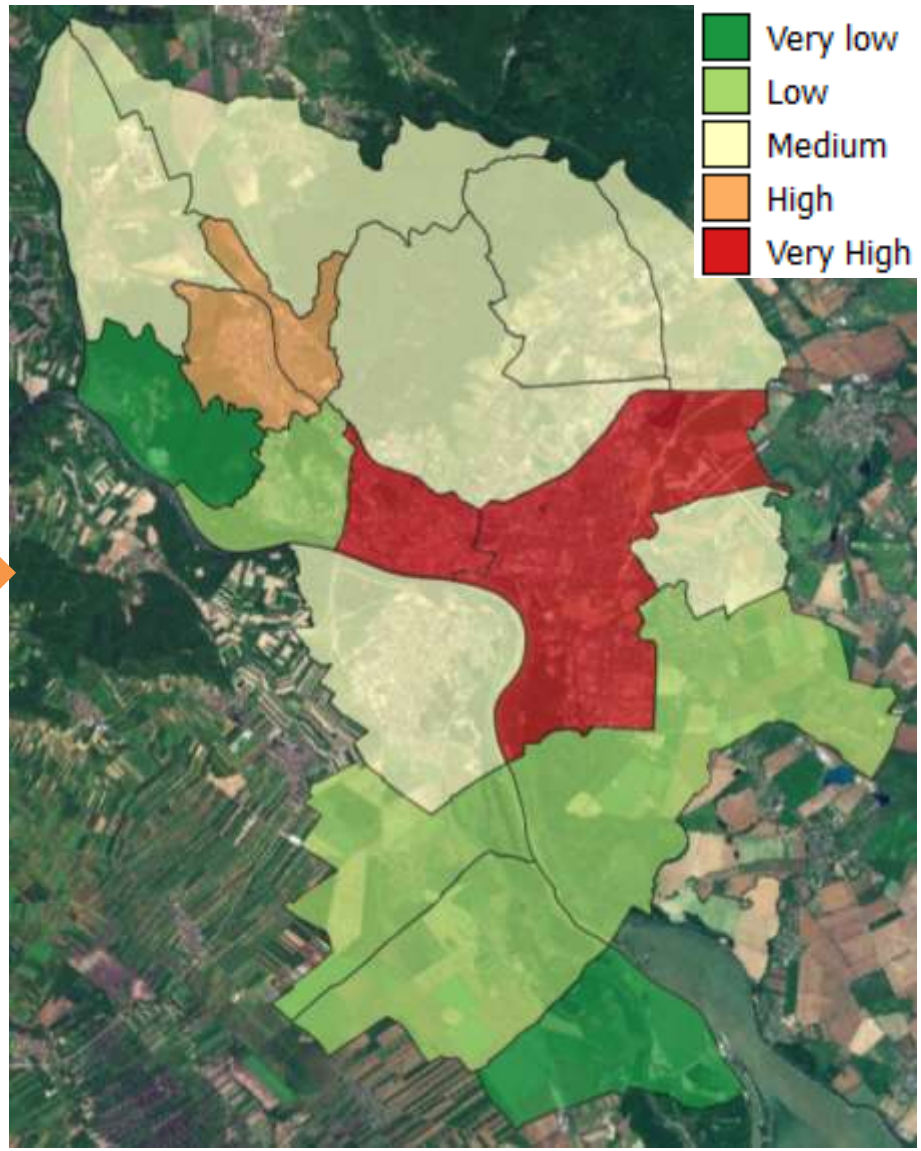
Coping Capacity



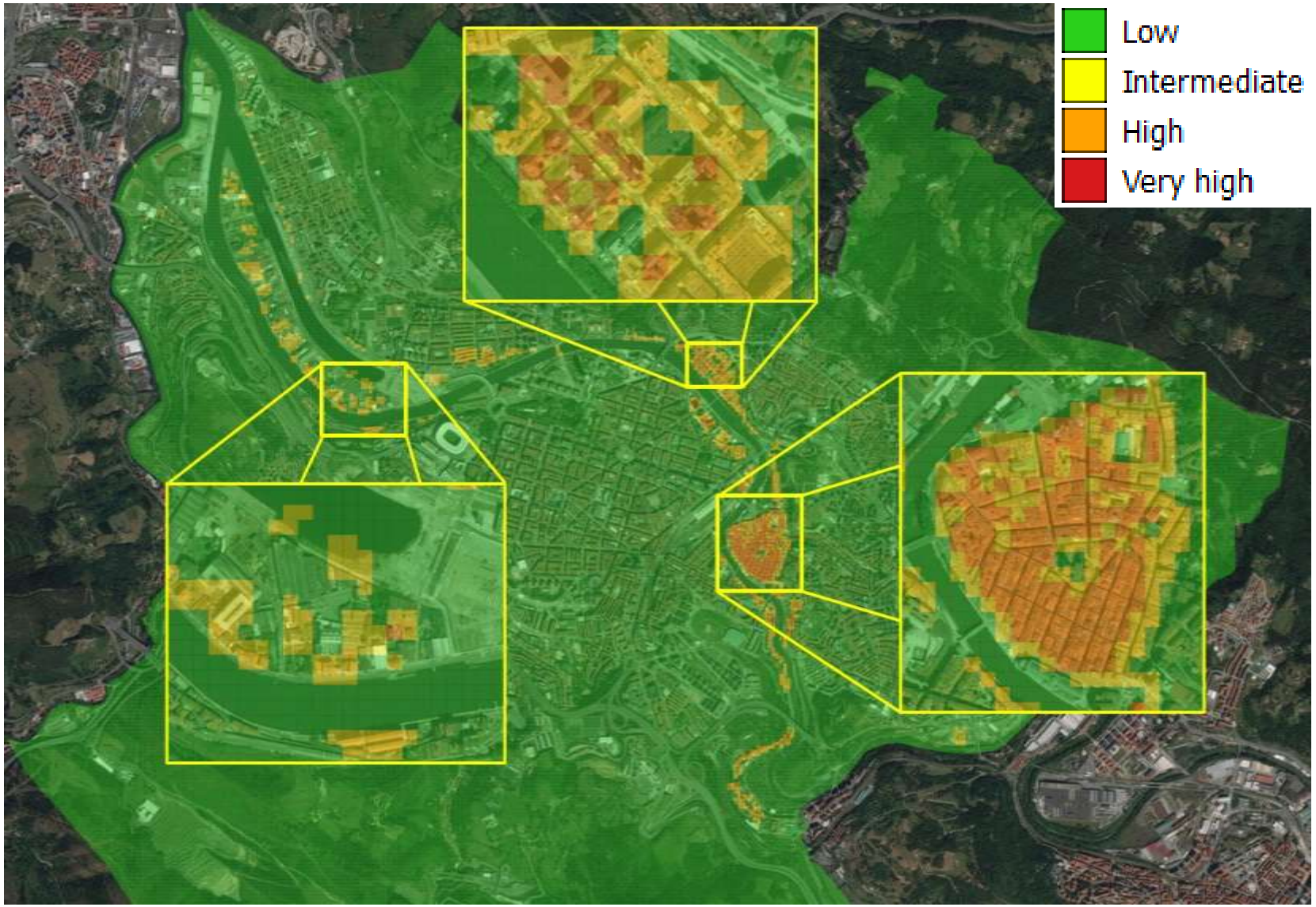
Sensitivity





Vulnerability

Results



Conclusions

- Standardized, modular process for conducting a risk-oriented assessment of impacts and vulnerabilities
- Qualitative stage: Only limited resources available or quantitative assessment previously conducted

  → Impact Chains for qualitative, structured assessment of alleviating / intensifying factors and potential impacts
- Quantitative stage: Resources available or no quantitative assessment previously conducted

  → Maps to identify areas most at risk for further adaptation planning
- Presenting the results: Objective and target audience are key!

Thank you!

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Discussion questions 1th round

- Why is it important to standardize vulnerability and risk assessments?
- What are your experiences in using standardised guidelines/tools for vulnerability and risk assessments?
- What do you think of the RESIN approach? Useful? Replicable in other continents?

Standardising City Adaptation Strategies – an impossible dream?

9th Global Forum on Urban Resilience and Adaptation:

Standardised support tools for urban resilience, integrating resilience planning into local decision-making

Matt Ellis (Climate Resilience Officer, GMCA)

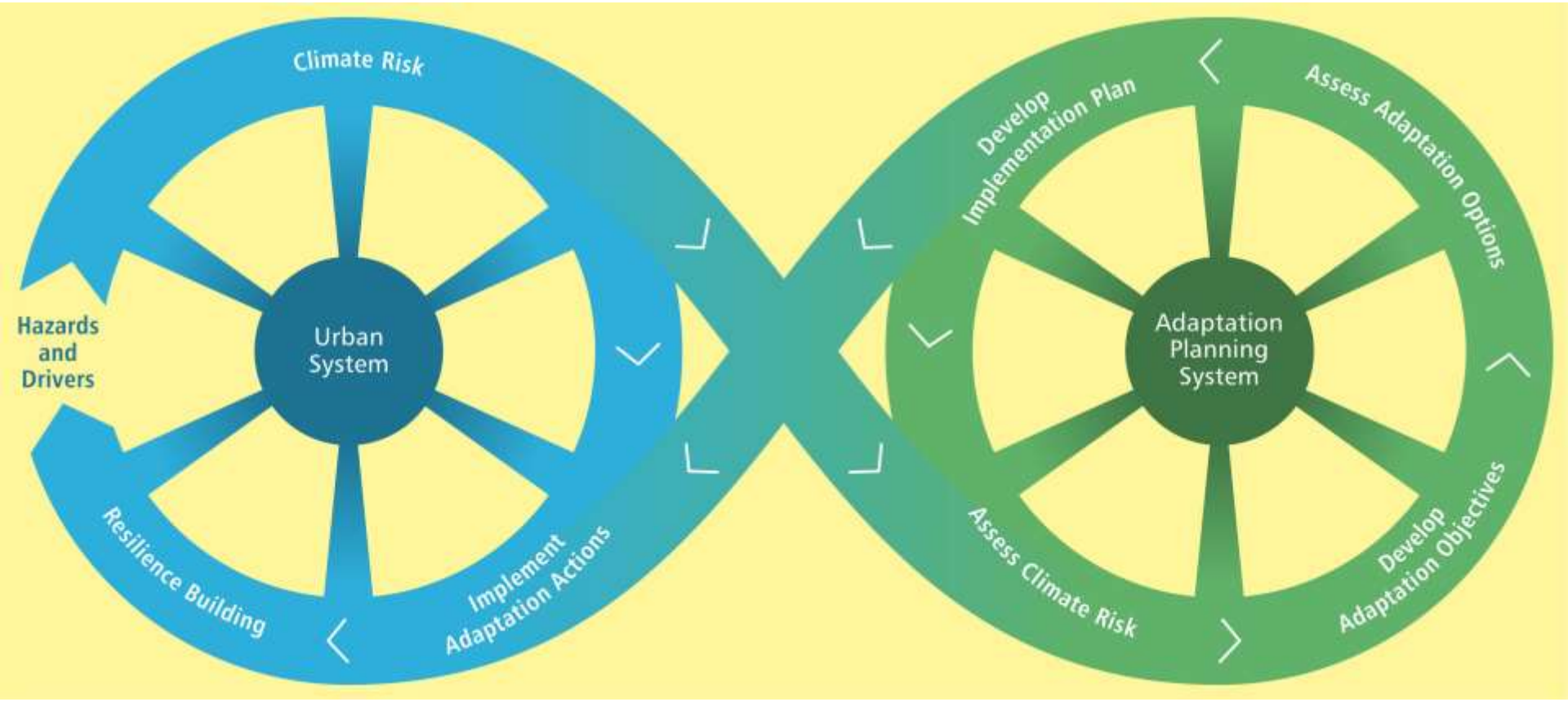
GMCA BOLTON BURY MANCHESTER OLDHAM ROCHDALE SALFORD STOCKPORT TAMESIDE TRAFFORD WIGAN

Presentation Outline

- **City Adaptation Strategies** – standardised processes, not standard products / documents
- **Greater Manchester's experience** – co-creating its adaptation planning process
- **Critical challenges** - the 3 linked C's: complexity, capacity and consistency
- **The opportunity for cities** - using standardised approaches (and co-creation/collaboration) more widely

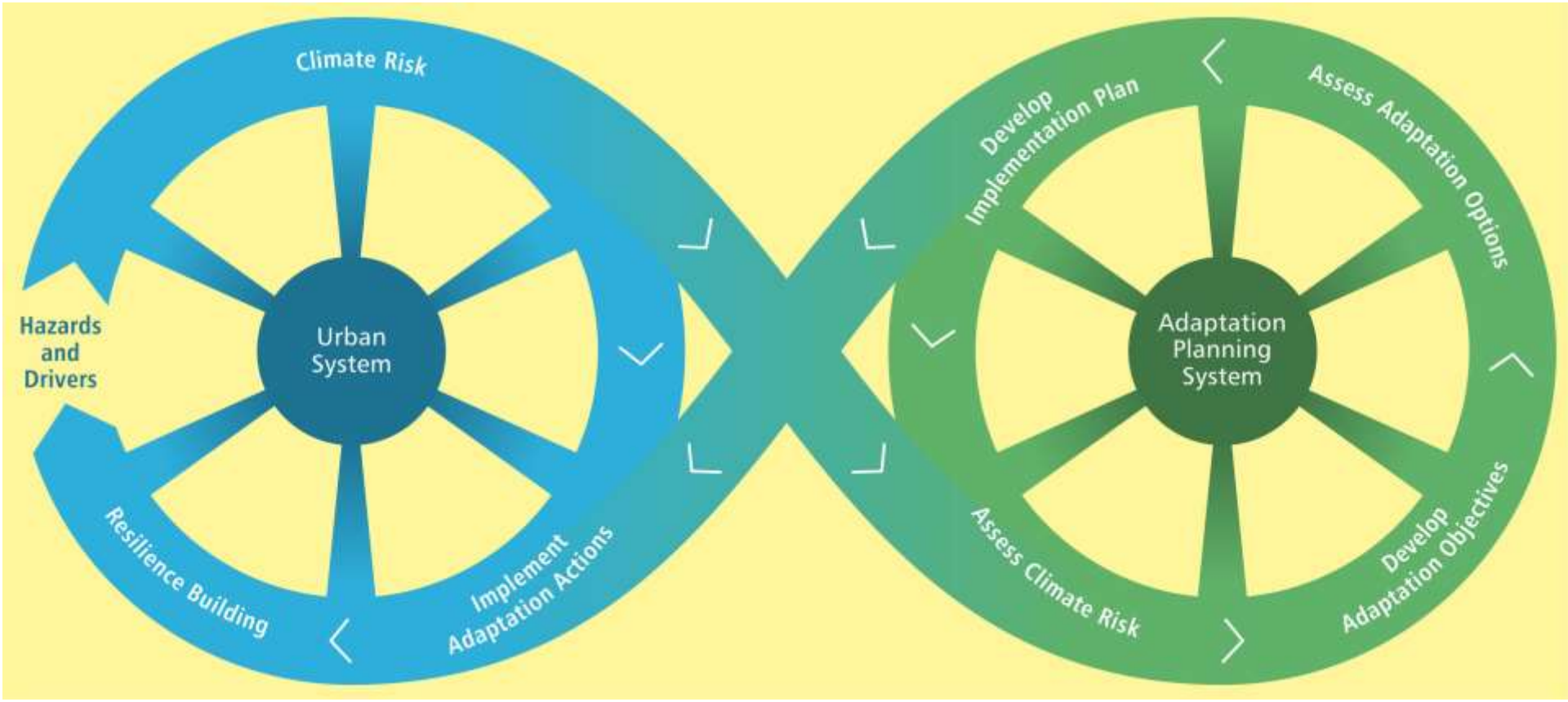
Climate Adaptation Strategies

Standardised processes not standard products



Greater Manchester's experience

co-creating our adaptation planning process



Know your strengths/priorities

Working with Transport for Greater Manchester (TfGM)

Specific Actions from GM's Climate Change and Low Emissions Strategy (2017) :

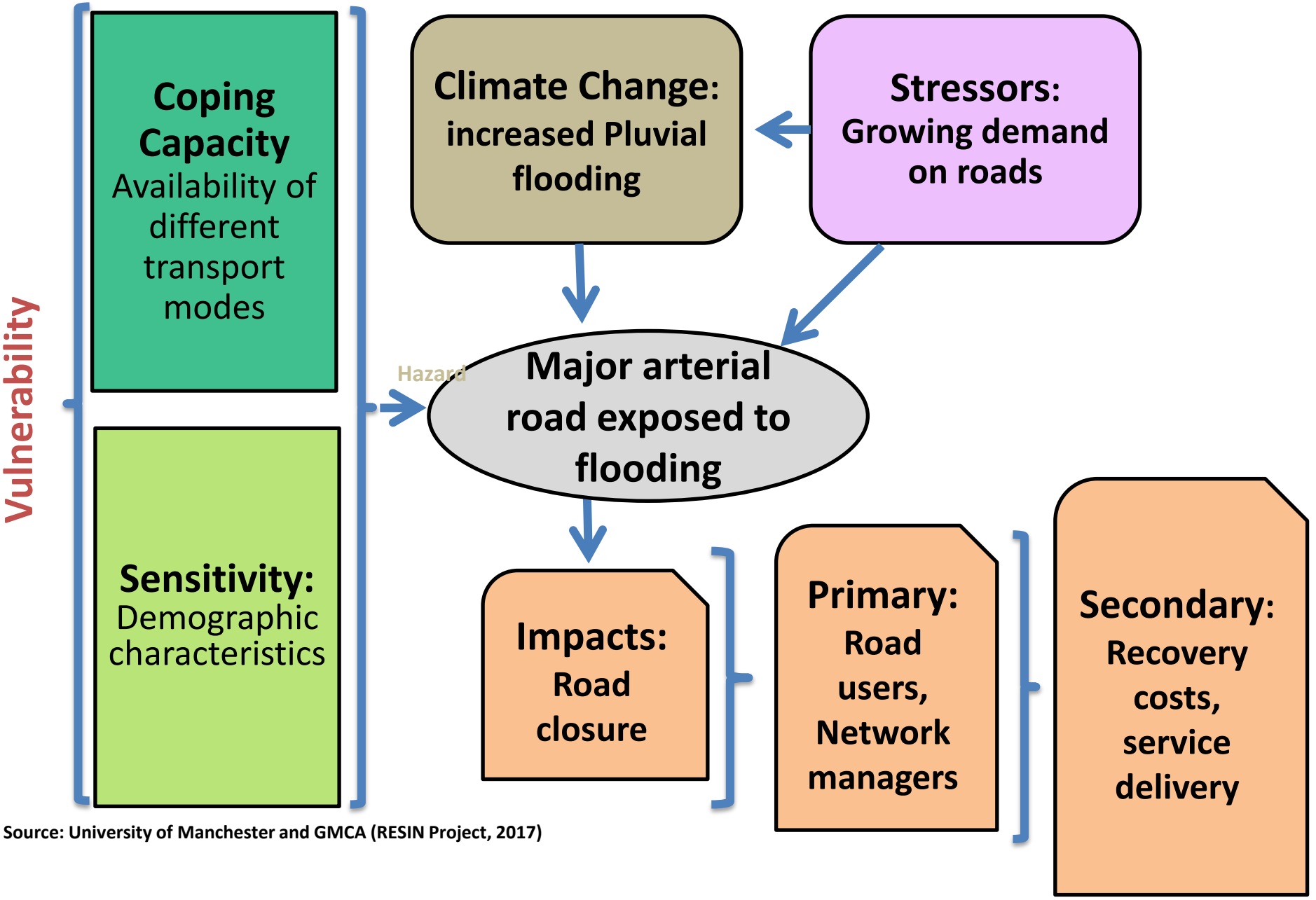
- A12: **Identify key risks to transport infrastructure** posed by increased incidence of flooding and heat as part of Transport Strategy and Planning.
- A13: **Integrate requirements for shelter from extreme weather and heat** into building design and transport systems as part of a sustainable design guide.


Courtesy of tagishsimon via wikicommons


Courtesy of Bob Harvey via geography.org.uk


Courtesy of David Dixon via geography.org.uk

Impact chain: Pluvial flooding to major arterial roads in Greater Manchester



Source: University of Manchester and GMCA (RESIN Project, 2017)

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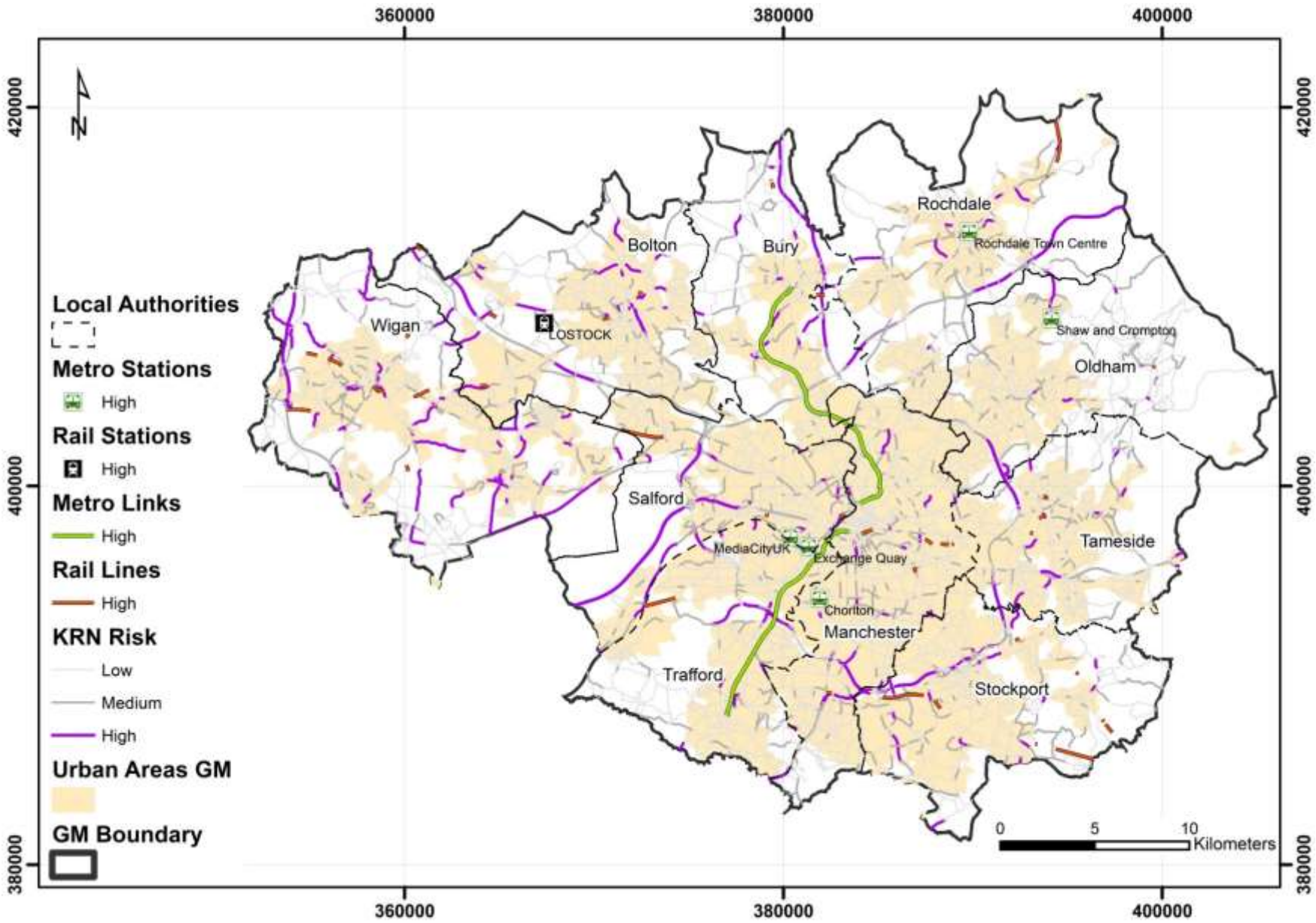
A GM transport flood risk assessment



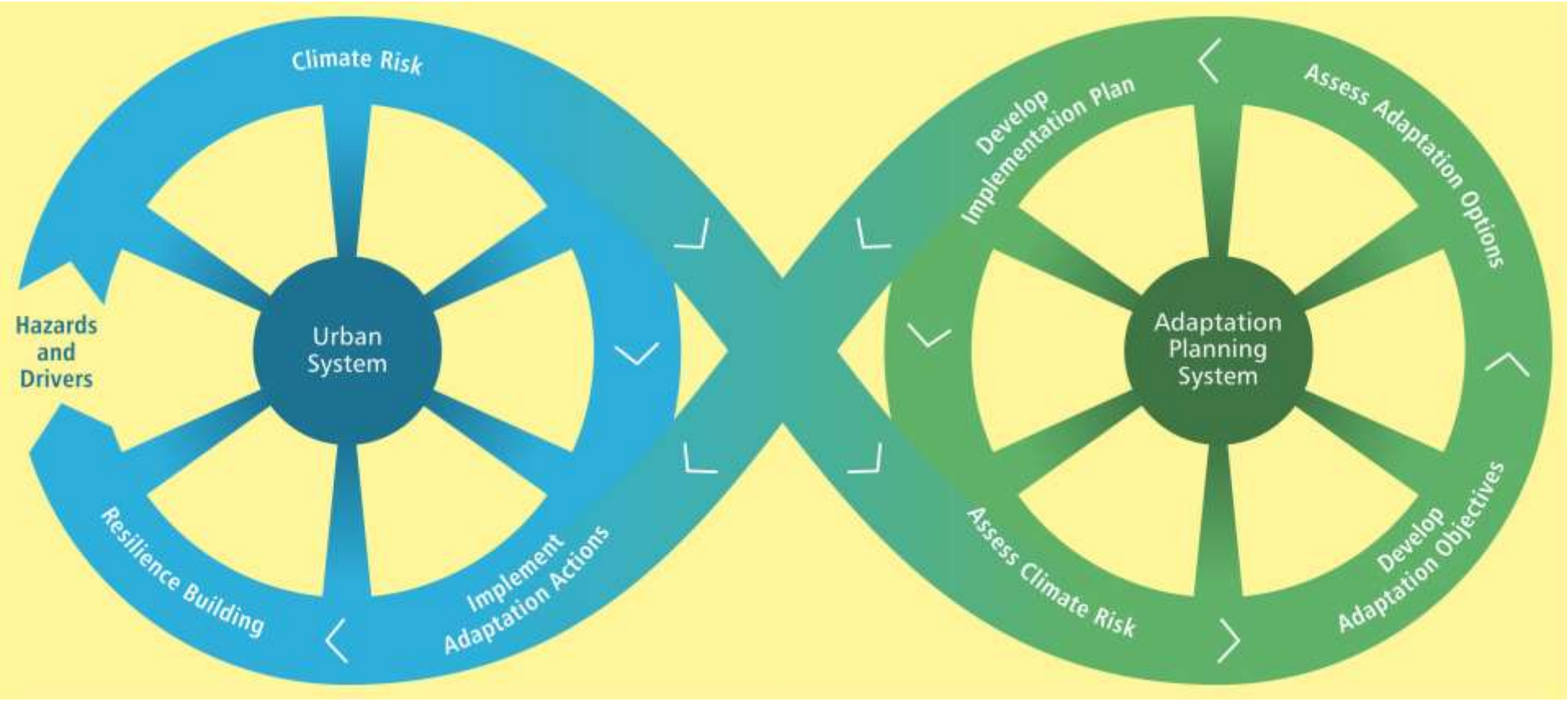
Implementing adaptation options

© Mike McNiven via Flickr

Critical challenges and opportunities

3 linked C's: complexity, capacity and consistency….

But a real opportunity for cities



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Standardisation of the development of a climate adaptation strategy

Possibilities, limitations and practical example

Albert Nieuwenhuijs
Senior Researcher at TNO
27/04/2018

Contents

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- Standardisation of the adaptation process
  - Aim
  - Context
  - Practical limitations
- RESIN e-Guide
  - Offered support
  - Approach to limitations in standardization
- Relation to other platforms

Standardisation aim

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- Uniformity in:
  - Quality of decision process and results (walking the right path, doing the right things)
  - Considered aspects (looking at the right things)
  - Level of detail considered (zooming in to the right level)

Standardisation limitations

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- Process:
  - One complete process iteration is long and complex
  - By nature iterative, therefore any step within process is likely to be visited more than once
  - Urban, multi-stakeholder, political context and due to long throughput time: changing opportunities and circumstances ➔ limited control over sequence of steps
  - Usually combined effort of multiple people focusing on various topics related to climate adaptation ➔ several tracks of climate adaptation in parallel, hard to keep efforts aligned
- Conclusion: strict sequential process unpractical or impossible

Standardisation limitations

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- Outcomes:
  - Various ways (tools, methods) to complete any step in process, not always compatible, not always same quality / level of detail
  - Not every approach suited for every situation
  - Interdependency on choices for approaches ==> choose approach x in early step ==> no longer possible to choose approach y in later step
  - Need for guidance to produce consistent results, fitting the requirements of the city <> not always most detailed is best
- Conclusion: flexibility is needed, but comes at the cost of strict compatibility of results

RESIN e-Guide
Support for uniform process

Resilient Cities 2018

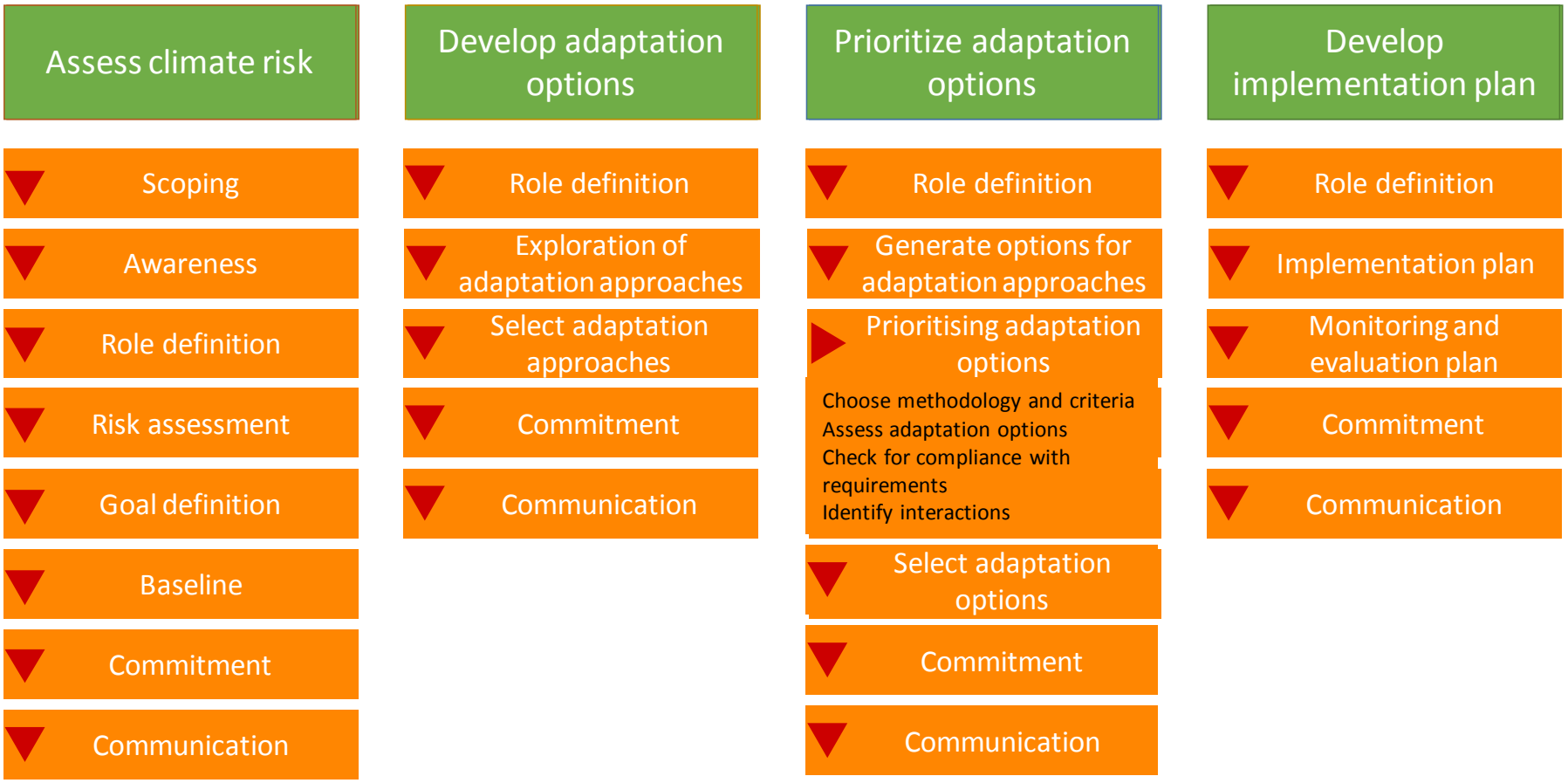
Flexibility in sequence process requires good overview and collaboration tools.

- Overview all steps ➔ know what's coming
- Structure allows for starting and stopping at any step, but with informed consequences: prerequisites to finish each step successfully, consequences for following steps*
- Functionality to:
  - Coordinate activities between various employees
  - Store results of adaptation process and make them available centrally
  - Monitor progress over the entire adaptation process

*optional: Restrict progress to allowing only starting steps for which all preconditions have been fulfilled

RESIN e-Guide
Support for uniform process

- Example overview steps



RESIN e-Guide
Support for uniform process

- Example step description preconditions

Climate Threat.

Edit

Goal of this aspect

Having identified a problem in Problem definition, this aspect concerns the exploration of the underlying causes of this problem and gaining preliminary insight in their severity. With regards to climate change in Europe, five climate threats can be distinguished:

- heat waves/stress,
- pluvial flooding,
- fluvial flooding,
- coastal flooding and
- drought.

Preconditions

Having a clear Problem definition is essential for this step, as this determines what climate changes relate to the problem. Climate changes can be labeled a threat or not, depending on the defined problem at hand. Identifying the climate threats that might impact the city or asset requires an understanding of local circumstances such as geography, past extreme events and local/regional climate projections. This information needs to be available to successfully finish this step.

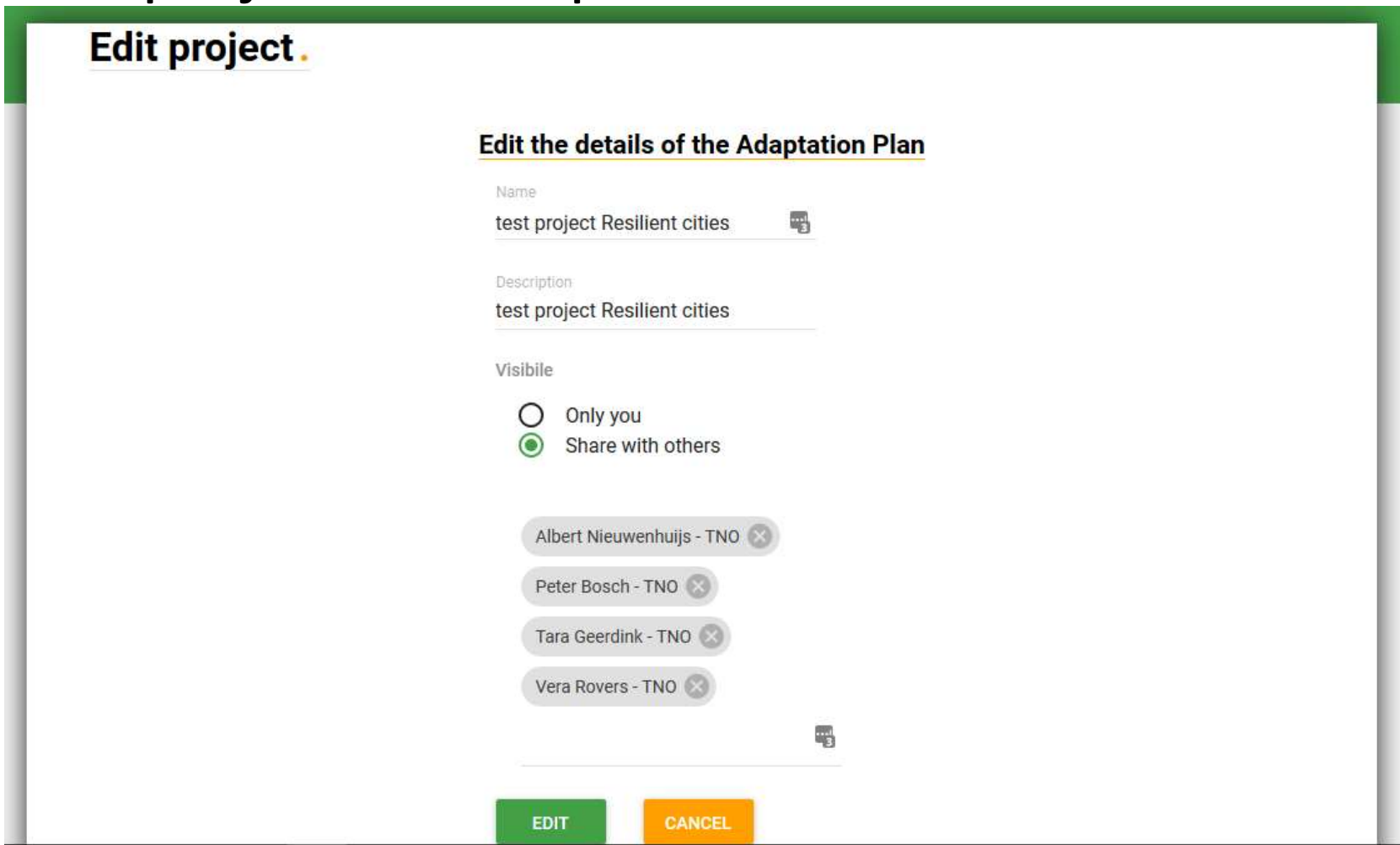
Results

The outcome is a list of climate threats that could potentially affect the city or asset, including a description of local historical events (frequency and severity) and a first insight in future occurrences (likelihood and potential impact), resulting in a first indication of the risk of a threat.

Guidance on performing this aspect

RESIN e-Guide
Support for uniform process

- Use of projects: Multiple users



RESIN e-Guide
Support for uniform process

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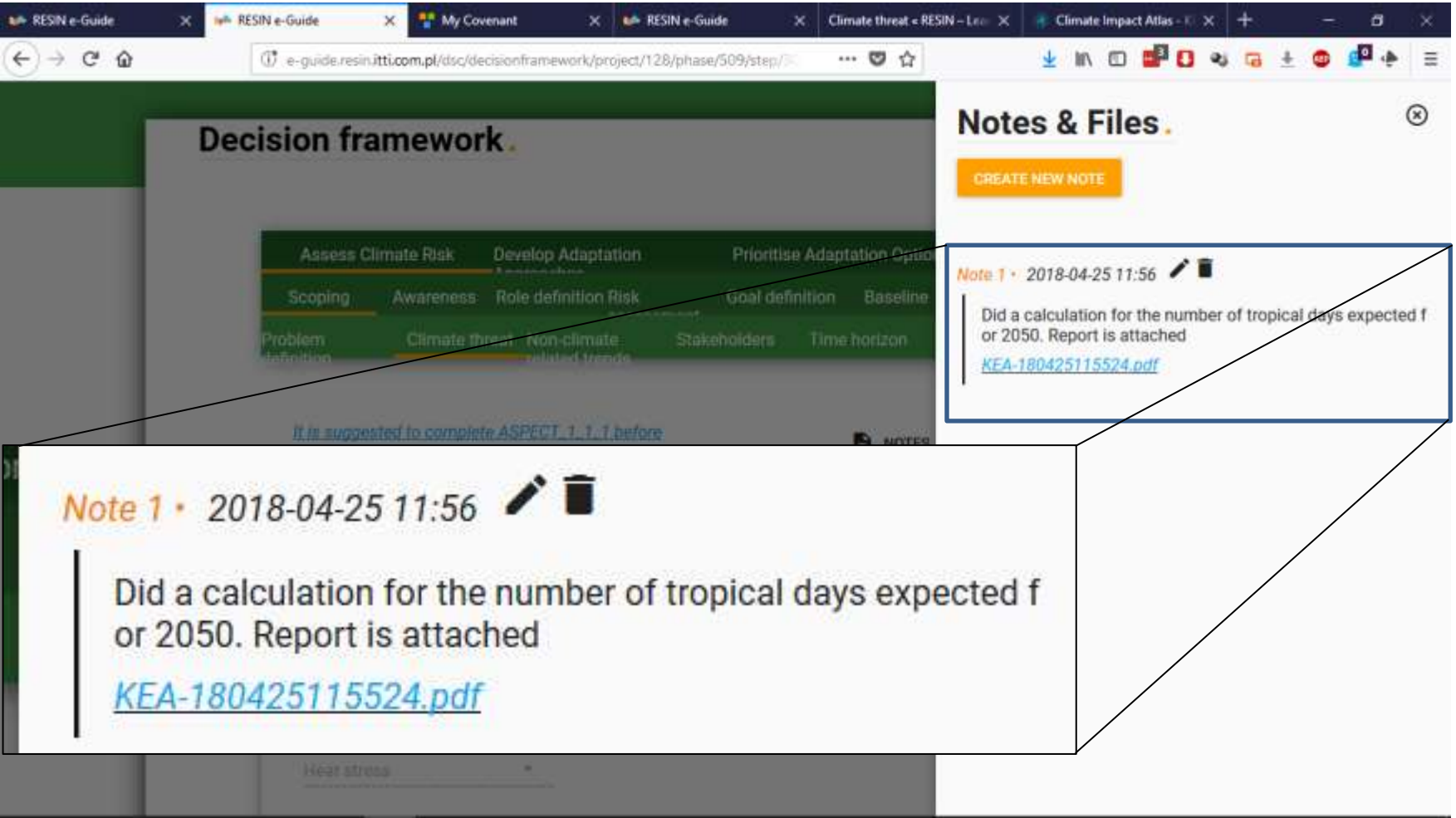
- Use of projects: Store information

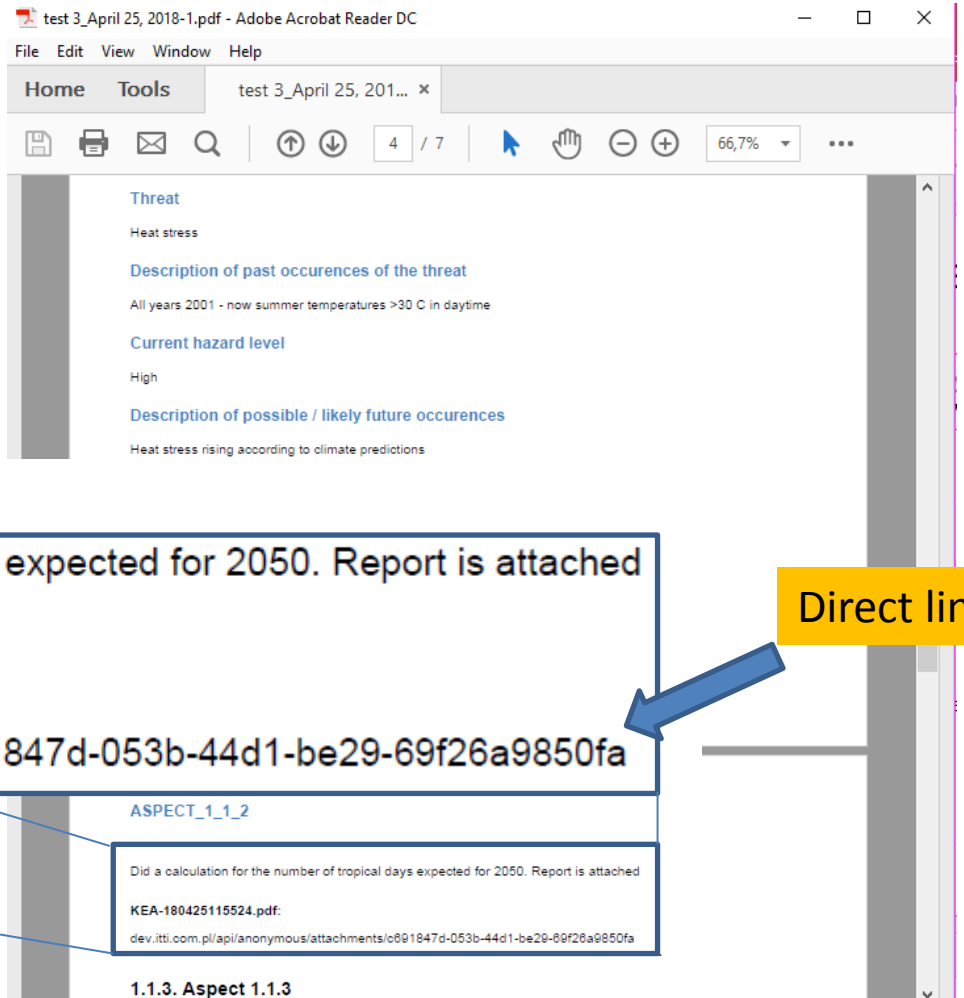


RESIN e-Guide
Support for uniform process

- Use of projects: Status overview

RESIN e-Guide
Support for uniform process

- Use of projects: complete status report in pdf



Did a calculation for the number of tropical days expected for 2050. Report is attached

KEA-180425115524.pdf:

dev.itti.com.pl/api/anonymous/attachments/c691847d-053b-44d1-be29-69f26a9850fa

Direct link

RESIN e-Guide

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Support for uniform outcomes

- Overview available methods and tools, both RESIN and external, when to apply, where to apply
- In each step, we provide general guidance how to perform the step and what tools might be suited to what situations (including heads-up for consequences down the line)
- Also each step, list of existing and new (RESIN) available tools **and concrete instructions how to use them to get relevant and good results for finishing the step**
- Forms for each step provide details and uniform structure to answers independently use used tools
- Use of uniform framework / terminology

RESIN e-Guide
Support for uniform outcomes

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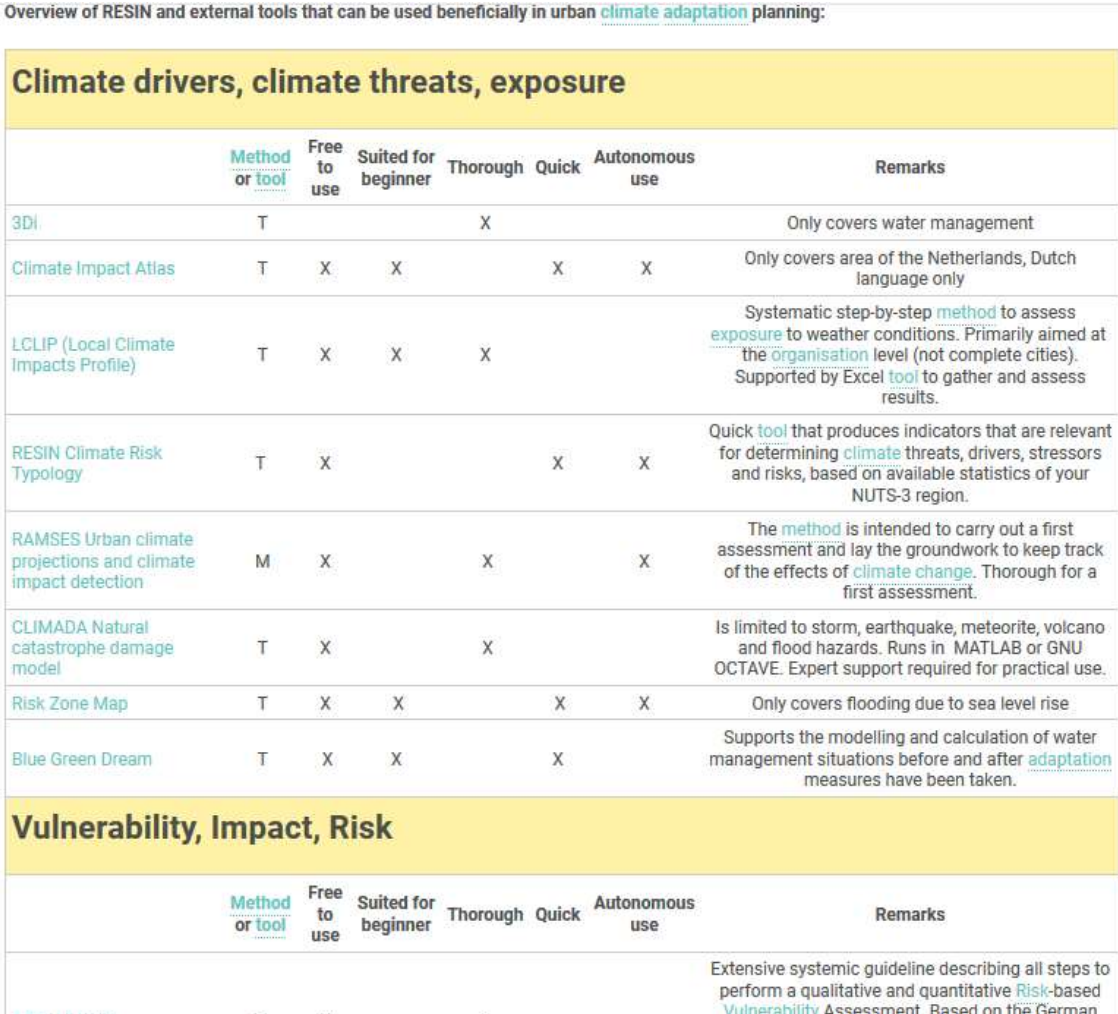
- Overview of tools
  - Categorised in topics
  - Indexed on practical indicators
  - Short textual remarks with practical pointers



Overview of RESIN and external tools that can be used beneficially in urban climate adaptation planning:

Climate drivers, climate threats, exposure

	Method or tool	Free to use	Suited for beginner	Thorough	Quick	Autonomous use	Remarks
3Di	T			X			Only covers water management
Climate Impact Atlas	T	X	X		X	X	Only covers area of the Netherlands, Dutch language only
LCLIP (Local Climate Impacts Profile)	T	X	X	X			Systematic step-by-step method to assess exposure to weather conditions. Primarily aimed at the organisation level (not complete cities). Supported by Excel tool to gather and assess results.
RESIN Climate Risk Typology	T	X			X	X	Quick tool that produces indicators that are relevant for determining climate threats, drivers, stressors and risks, based on available statistics of your NUTS-3 region.
RAMSES Urban climate projections and climate impact detection	M	X		X		X	The method is intended to carry out a first assessment and lay the groundwork to keep track of the effects of climate change. Thorough for a first assessment.
CLIMADA Natural catastrophe damage model	T	X		X			Is limited to storm, earthquake, meteorite, volcano and flood hazards. Runs in MATLAB or GNU OCTAVE. Expert support required for practical use.
Risk Zone Map	T	X	X		X	X	Only covers flooding due to sea level rise
Blue Green Dream	T	X	X		X		Supports the modelling and calculation of water management situations before and after adaptation measures have been taken.

Vulnerability, Impact, Risk

	Method or tool	Free to use	Suited for beginner	Thorough	Quick	Autonomous use	Remarks
							Extensive systemic guideline describing all steps to perform a qualitative and quantitative Risk-based Vulnerability Assessment. Based on the German

RESIN e-Guide
Support for uniform outcomes

- Concrete instruction when and how to use tool for any step in process

HOME / ASSESS CLIMATE RISK / SCOPING / CLIMATE THREAT

Climate Threat.

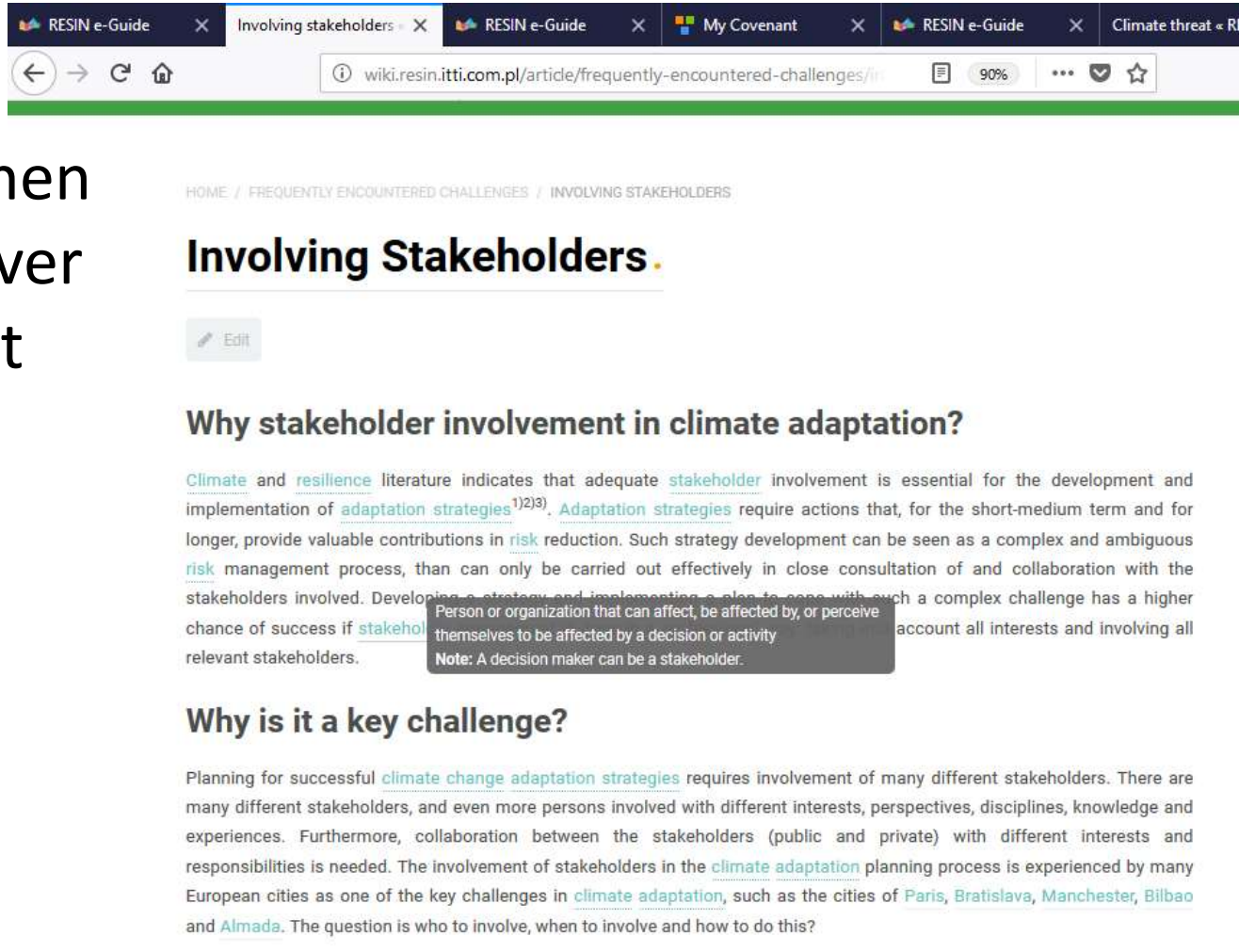
Goal of this aspect

Having identified a problem in Problem definition, this aspect concerns the exploration of the underlying causes of this problem and gaining preliminary insight in their severity. With regards to climate change in Europe, five climate threats can be distinguished:

- heat stress / heat waves,
- pluvial flooding,

RESIN e-Guide
Support for uniform outcomes

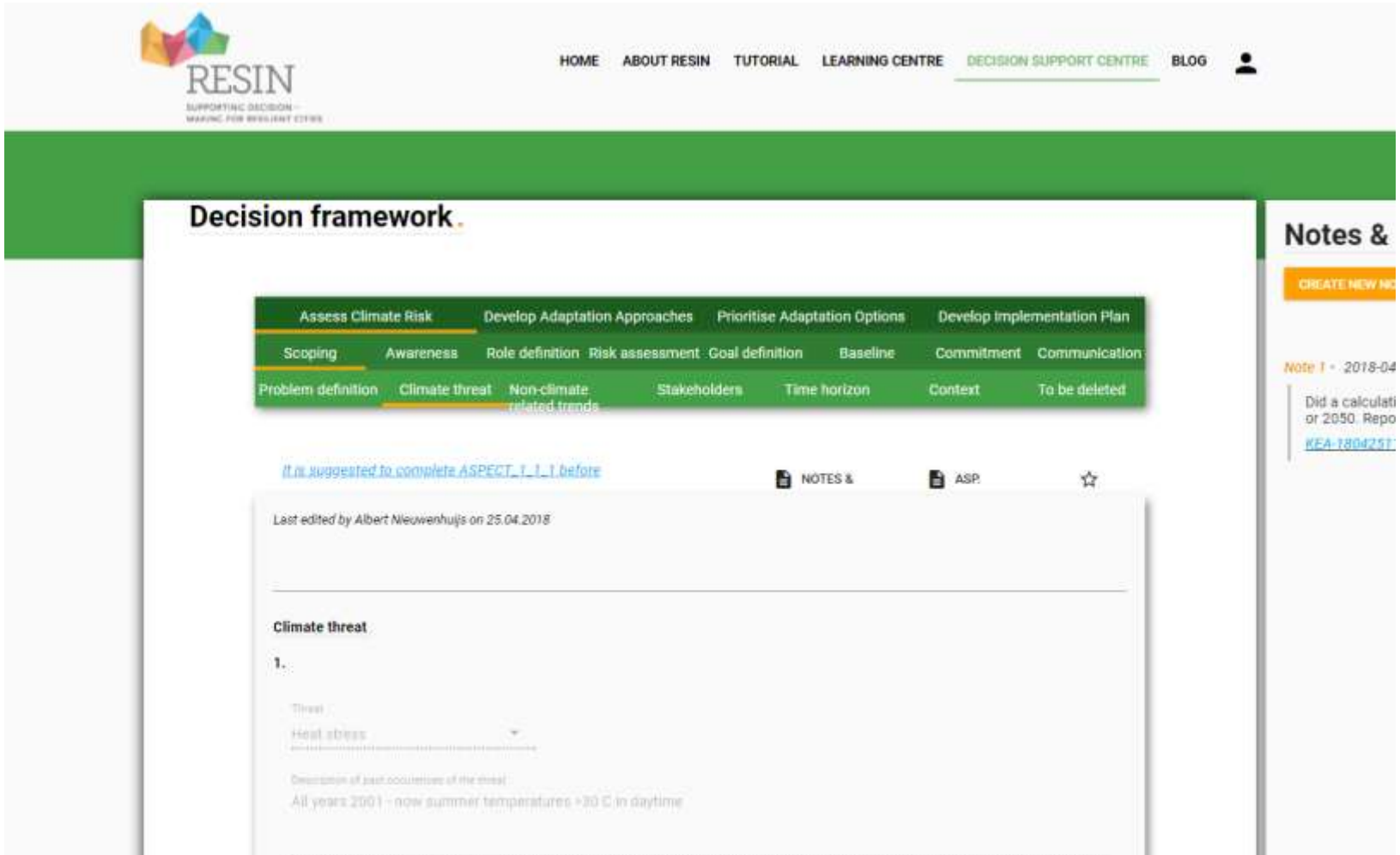
- Consistent framework of terms
  - Definition appears when hovering over term in text



RESIN e-Guide
Support for uniform outcomes

Resilient Cities 2018

- Guidance in required information by use forms



RESIN e-Guide
relation to existing platforms

Resilient Cities 2018

- Results lined up with UAST and Mayors Adapt reporting tool
- Looking for possibilities for further integration of our solutions on existing platforms (EU-ClimateAdapt, Covenant of Mayors)

Questions?

RESIN
SUPPORTING DECISION-MAKING FOR RESILIENT CITIES

Resilient Cities 2018

Discussion questions 2nd round

- How can cities set-up a co-creation process and who should they involve?
- Why would you want to use standardized approaches for climate adaptation planning?
- An impossible dream--Any experiences?
- What are limitations of such standardized approaches?
- What do you think of the RESIN approach? Useful? Replicable in other continents?

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