



# RiskPACC

INTEGRATING RISK PERCEPTION AND ACTION TO ENHANCE CIVIL  
PROTECTION-CITIZEN INTERACTION

## REPORT TO WP3 ON PROTOTYPE CO-CREATION METHODOLOGY

**Deliverable 4.1**

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**RiskPACC**

Integrating Risk Perception and Action to enhance Civil Protection-Citizen interaction

## D4.1 Report to WP3 on Prototype Co-creation Methodology

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## ABOUT RISKPACC

Increasingly complex and interconnected risks globally highlight the need to enhance individual and collective disaster resilience. While there are initiatives to encourage citizen participation in creating a resilient society, these are typically fragmented, do not reach the most vulnerable members of the communities, and can result in unclear responsibilities for building disaster resilience.

New technologies can also support preparedness and response to disasters, however, there is limited understanding on how to implement them effectively. Awareness of risks and levels of preparedness across Europe remain low, with gaps between the risk perceptions and actions of citizens and between the risk perceptions of citizens and Civil Protection Authorities (CPAs).

The RiskPACC project seeks to further understand and close this Risk Perception Action Gap (RPAG). Through its dedicated co-creation approach, RiskPACC will facilitate interaction between citizens and CPAs to jointly identify their needs and develop potential procedural and technical solutions to build enhanced disaster resilience. RiskPACC will provide an understanding of disaster resilience from the perspective of citizens and CPAs, identifying resilience building initiatives and good practices led by both citizens (bottom-up) and CPAs (top-down). Based on this understanding, RiskPACC will facilitate collaboration between citizens, CPAs, Civil Society Organisations, researchers and developers through its seven (7) case studies, to jointly design and prototype novel solutions.

The “RiskPack” toolbox/package of solutions will include a framework and methodology to understand and close the RPAG; a repository of international best practice; and toolled solutions based on new forms of digital and community-centred data and associated training guidance. RiskPACC consortium comprised of CPAs, NGOs, associated organisations, researchers and technical experts will facilitate knowledge sharing and peer-learning to close the RPAG and build disaster resilience.

## TABLE OF CONTENTS

Executive Summary	7
Glossary and Acronyms	9
1 INTRODUCTION	10
1.1 Overview	10
1.2 Structure of the deliverable	11
1.3 Scope of this Report	12
2 PRELIMINARY GAP ANALYSIS	13
2.1 Risk Context	13
Resilience	13
Risk Governance	14
2.2 Social-political Context	15
Digital Divide	15
Context	15
2.3 Risk Perceptions & Actions	15
Understanding Citizens and CPAs	15
Active Citizenship	15
2.4 Risk Reduction Relationships (RRR)	16
Social Capital and Networks	16
Trust	16
2.5 Risk Communication Approaches	16
Joined-up Governance	16
Two-way Communication	16
Contributions From Psychology	17
Media Influence	17
Data Needs for Tailored Risk Management Plans	17
Linking VGI to Collaborative Governance	18
3 THE RISKPACC COLLABORATIVE FRAMEWORK	19
The Necessary Components	19
3.1 Risk Context	20
Hazard events	20
Policy, Legislation & Governance	22
Environment	24

3.2	Social-political Context	25
	Social-demographics	26
	Change & Disturbance	27
	Available resources	28
3.3	Risk Perceptions and Actions	28
	Citizens' Risk Perception	29
	CPA's Risk Perception	31
	Citizens' Actions	32
	CPA's Actions	34
3.4	Risk Reduction Relationships (RRR)	35
	Citizen-CPA and CPA-Citizen	36
	Citizen-Citizen	38
	CPA-CPA	39
	Non-Citizens	42
3.5	Risk Communication Approaches	43
	Attitudes and Values	44
	Form and Process	45
	Medium	46
	Reception & Effect	47
3.6	Strategies for Closing the RPAG (CPAs & Citizens)	49
3.7	Relating the RiskPACC Framework to the Co-Creation Labs	50
4	FRAMEWORKS FOR COLLABORATIVE GOVERNANCE	51
4.1	Understanding Through Sharing	54
4.2	Relating & Building	59
	Inclusion	59
	Roles	60
	Volunteers	61
	Building	62
	Information generation from geodata by remote volunteers	62
	Tasked local mapping by volunteers	63
	Opportunistic local mapping by volunteers	64
	Participatory Risk Mapping	67
5	CONCLUSIONS AND RECOMMENDATIONS	69
5.1	RECOMMENDATIONS	69
	UNDERSTANDING	69

SHARING	70
RELATING	70
BUILDING	70
CO-CREATION LAB PLANNING AND FACILITATION	70
6 REFERENCES	72
7 ANNEXES	84
7.1 Annex 1: Further reading on social media use	85

## List of Tables

Table 1: Glossary and Acronyms.	9
Table 2: Conceptual Tiers for Measuring Engagement (Johnston and Taylor 2018: 7)	47
Table 3: The Ladder of Citizen Participation (Arnstein 1969: 217)	55
Table 4: Annex 1 Further Reading on Social Media Use.	84

## List of Figures

Figure 1: RiskPACC Preliminary Draft Framework	19
Figure 2: RiskPACC Initial Draft Framework: Risk Context	20
Figure 3: The 7 Global Targets of the Sendai Framework for Disaster Risk Reduction	23
Figure 4: Wellington Emergency Management Office, Model of Community-Driven Emergency Management (Neely et al 2014: 17).	24
Figure 5: RiskPACC Initial Draft Framework: Social-Political Context	25
Figure 6: RiskPACC Initial Draft Framework: Social-Political Context.	29
Figure 7: The Visualisation of the “Hazard To Action-Chain” (Wachinger et al., 2013: 1054).	29
Figure 8: National Research Settings Relative to Three Risk Culture (RC) Ideal Types (Cornia Et al., 2016: 303).	31
Figure 9: Two Models Illustrating Interactions Between Key Stakeholders in Top-Down and People-Centred Approaches (Scholobig et al., 2015: 209).	34

Figure 10: RiskPACC First Draft Framework: Risk Reduction Relationships (RRR). CPA stands for Civil Protection Authority/ies.	35
Figure 11: Approaches to address risk awareness, perception, and action (classical and RiskPACC approach).	36
Figure 12: Principles for Joint Working (JESIP 2021: 11).	40
Figure 13: European Interoperability Framework (EIF) Interoperability Principles.	41
Figure 14: RiskPACC First Draft Framework: Risk Communication Approaches.	43
Figure 15: Strategies for Closing the Risk Perception-Action Gap (RPAG).	49
Figure 16: Planned Co-creation Lab Processes As They Relate To The Draft RiskPACC Collaborative Framework.	50
Figure 17: Benefits of Collaborative Governance (Conti et al 2019: 9).	52
Figure 18: The emBRACE Framework For Community Resilience To Natural Hazards (Kruse et al 2017: 2325).	53
Figure 19: Jisc Co-Design Playbook – Process (Jisc 2017: 5).	58
Figure 20: Four Key Roles People Can Play Within the Context of a Co-Design Project (Jisc 2017: 9).	61
Figure 21: Prototype User Story Solutions by RiskPACC Technical Partners (See RiskPACC D3.4 for detail).	66
Figure 22: Relating The Riskpacc Technological Components To The RiskPACC Draft Framework.	67

## Executive Summary

RiskPACC Task 4.1 Framework Development focuses on the initial development of the RiskPACC framework and collates, evaluates and builds upon existing theoretical frameworks for collaboration between Civil Protection Authorities (CPAs) and citizens in order to close the Risk Perception-Action Gap (RPAG).

The Risk Perception-Action Gap (RPAG) is sometimes understood as a lack of risk perception in citizens which results in a lack of appropriate response actions. However, in RiskPACC we unpack that notion and explore the different perceptions, attitudes and actions of *both* citizens and CPAs and seek ways to create an environment for better understanding through collaborative governance mechanisms. The vehicle for this is the RiskPACC co-creation labs (see RiskPACC Deliverable 3.4 Lab Methodology and Glossary).

Task 4.1 builds upon work explored in Work Packages 1 (Understanding good practices and challenges in Civil Protection policy and practice) and WP2 (Engaging citizens to expand understandings of risks, vulnerabilities and data collection opportunities) and works closely with WP3 Co-creation lab and stakeholder integration. Chapter 2 presents some of the findings from interviews with case study partners carried out for Work Packages 1 and 2 where we can see that both CPAs and citizens identify differences in how each understand risks and how they understand each other.

RiskPACC Deliverable 4.1 presents the first draft RiskPACC Collaborative Framework, reviews a range of frameworks on, and approaches to, collaborative governance, and sets out recommendations for the format and ways of working in the co-creation labs.

The Framework (discussed in Chapter 3) has synthesised from the academic and grey literature, plus the identified gaps from our case study partners, 5 key components to be considered in closing the RPAG. These comprise:

- Risk Context
- Social-political Context
- Risk Perceptions and Actions
- Risk Reduction Relationships
- Risk Communication Approaches

Each of these components has several sub-components and these are all discussed in more detail in the body of the report. The key components form a general structuring framework for the whole report. The framework will be constantly revised and updated as we engage more with our case study partners and their stakeholders. However, for wider use with citizens, we have also simplified this down as follows:



## UNDERSTANDING

- We all have some expertise
- We recognize diversity in ourselves and our ideas

## SHARING

- Try standing in another's shoes
- Be open to the constraints of others

## RELATING

- Start from a position of equality
- Everyone has an equal voice

## BUILDING

- What works for one person, doesn't necessarily work for another

We hope this conveys the core values of RiskPACC and how we hope to proceed in developing a collaborative governance process.

RiskPACC technical partners have also begun the process of designing the technological solutions to be offered to case study partners. This fits under the 'Building' component and the pros and cons of a range of types are discussed in Chapter 4. However, as the main gaps identified through the literature review are a mutual lack of understanding of CPA and citizen perspectives, and a need for relationship building, these form the major focus of this report.

Finally, there is a list of recommendations for the design and operation of the workshops and co-creation labs. These are organised under the, now familiar, headings: understanding, sharing, relating, building and co-creation lab planning and facilitation. These synthesise the main lessons learned which come out of the literature reviews and the discussions with case study partners.

## Glossary and Acronyms

**Table 1: Glossary and Acronyms.**

Acronym	Definition
<b>AI</b>	Artificial Intelligence
<b>AR</b>	Augmented Reality
<b>CPA</b>	Civil Protection Authority
<b>ICT</b>	Information and Communications Technology
<b>Resilience</b>	RiskPACC uses the following definition: The ability of an individual, community, region, or country to resist, adapt to, and recover from the impact of a hazard, either natural or anthropogenic. Enhanced resilience can be embedded in activities in all stages of the disaster cycle and includes positive transformation that strengthens the ability of current and future generations to adapt to future crises, and to survive and thrive as conditions change. (See RiskPACC D1.1).
<b>RPAG</b>	Risk Perception—Action Gap
<b>Social learning</b>	A 'process of collective and communicative learning, which may lead to a number of social outcomes, new skills and knowledge.' (Muro and Jeffrey 2008:330).
<b>VGI</b>	Volunteered Geographical Information
<b>VR</b>	Virtual Reality
<b>WP</b>	Work Package

# 1 INTRODUCTION

## 1.1 Overview

This report fits into the RiskPACC workplan as follows:

<b>Work Package:</b>	WP4 Framework Development
<b>Task:</b>	Task 4.1. Assessing Existing Models of Collaboration
<b>Deliverable:</b>	Deliverable 4.1: Report to WP3 on Prototype Co-creation Methodology

RiskPACC Task 4.1 focuses on the initial development of the RiskPACC framework (in collaboration with Task 4.3) and collates, evaluates and builds upon existing theoretical frameworks and heuristics for collaboration between CPAs and citizens in order to close the Risk Perception-Action Gap (RPAG) through collaborative governance.

The Risk Perception-Action Gap (RPAG) can be understood by many as referring to a lack of risk perception in citizens which results in a lack of appropriate response actions; this can be seen as the dominant view held by many CPAs and a number of researchers. However, in RiskPACC it means something specific. It can best be summarised as follows:

- a. The RPAG does not simply refer to a lack of risk perception by citizens which reduces the likelihood of them taking protective action against risks (although this does happen and is certainly a part of the RPAG).
- b. It does refer, additionally, to the possibility that Civil Protection Authorities (CPAs) themselves may not perceive certain risks (that perhaps some citizens do) or have an imperfect perception of risks and thus may not act accordingly or as citizens (or other CPAs) might wish.
- c. It also refers to a gap in Citizens' understanding of what actions are available to CPAs which may be due to technical, legal and resource constraints rather than a lack of, or imperfect perception of risk on the part of CPAs.
- d. Finally, it also refers to a more general gap in CPAs' understanding of what an appropriate solution to citizens' lack, or imperfect perception, of risk should be; this is often framed by CPAs as a requirement for more expert information but this is an interpretation that has been critiqued in the so-called Information Deficit Model (Rufat et al 2020) which will recur throughout this report.

The combination of these propositions points to a problem with existing forms of communication and the need to review current forms of civil protection/emergency management governance. This is the starting point for the present deliverable.

Task 4.1 builds upon work explored in Work Packages 1 (Understanding good practices and challenges in Civil Protection policy and practice) and WP2 (Engaging citizens to expand understandings of risks, vulnerabilities and data collection opportunities). Reference should be made to the deliverables from those two work packages for further detailed content which has informed the direction of the current

document. Task 4.1 also flags key aspects that have to be considered in the design and set-up of the RiskPACC co-creation labs (WP3).

The main objectives of this document are to present the first draft RiskPACC Collaborative Framework, to review a range of frameworks on and approaches to collaborative governance, and to set out recommendations for the format and ways of working in the co-creation labs. The deliverable has been completed most closely in collaboration with WP1, WP2 and WP3 co-creation labs and Stakeholder Integration, as well as in consultation with the other RiskPACC Work Packages and Consortium members.

## 1.2 Structure of the deliverable

After this initial orientation, this document includes the following chapters:

- Chapter 2: In this chapter we present a preliminary gap analysis based on the early work of WPs 1, 2 and 3 which draws together insights from the literature and from our RiskPACC Case Study partners from 6 countries. This section highlights some of the key themes which we will be working with that have collaborative governance at the core.
- Chapter 3: In this chapter we set out the preliminary RiskPACC Draft Collaborative Framework which has been based on some of the key findings from the academic and grey literature pointing to the need to address five major areas to close the Risk Perception-Action Gap. These areas collectively contribute to a need for more collaborative forms of governance between Civil Protection Authorities (CPAs) and citizens.
- Chapter 4: In this chapter we review a number of frameworks, rationales and approaches related to collaborative or deliberative governance, identifying those, or elements of those, with most utility for RiskPACC.
- Chapter 5: In this chapter we set out our conclusions and recommendations for the format and ways of working in the RiskPACC co-creation labs.
- Chapter 6: The Reference List.
- Annex1: Further Reading on Social Media Use.

Throughout this report, key points that need to be considered throughout the next phases of RiskPACC will be identified (in quote format) and collated as part of the recommendations in section 5.

## 1.3 Scope of this Report

Deliverable 4.1 draws on some of the completed RiskPACC deliverables with which it has been collaborating but will summarise and reference these rather than repeat work on the same topics. Readers are referred to WP3, Deliverable 3.4 Lab Methodology and Glossary which has already identified many procedural aspects of the planned co-creation labs. The current document aims to provide some of the underpinning rationale and philosophy for the Labs which have been derived from a set of related literatures around risk and hazard perception, collaborative or deliberative governance, and a selection of methods or tools from the Design Thinking environment. The final set of tools and applications will be developed through other work packages and through deliberative processes with RiskPACC Case Study partners and their stakeholders. This report does not duplicate that effort but rather focuses on some of the more positive and fruitful examples, as well as some of the critiques in order to provide some headline recommendations for how we should be going about our work.

## 2 PRELIMINARY GAP ANALYSIS

Building on findings from Work Packages 1, 2 and 3 we can identify some key gaps in risk perception and risk management processes<sup>1</sup> based on literature reviews (initially) and interviews with our case study partners. These gaps and issues have been retrospectively systematized to accord with the key components that relate to the core elements of the emerging RiskPACC Draft Collaborative Framework which is detailed in the next section but the components of which are listed here:

- Risk Context
- Social-political Context
- Risk Perceptions and Actions
- Risk Reduction Relationships
- Risk Communication Approaches

We are yet to fully engage with citizen stakeholders and so the issues below represent the initial gaps only. We will review the relevance of all these elements throughout the RiskPACC project in an ongoing iterative process.

### 2.1 Risk Context

#### RESILIENCE

'Resilience' and 'community resilience' – which are core concepts for RiskPACC – are contested terms which mean different things to different academic, practice and citizen communities. In some cases, resilience is not the terminology used to describe actions local communities take to prepare for, respond to and recover from a disaster event. In other cases, such as the UK and USA, the notion of resilience is hardwired into community action.

Most CPAs interviewed for RiskPACC provided different definitions of resilience. In some cases, resilience is not the terminology used to describe actions taken, with disaster management, emergency management, and hazard prevention are used instead.

'Resilience' sometimes refers to psychological resilience in certain research fields. Psychological resilience can be linked to a person's health and wellbeing and has links to social capital and social networks. As with resilience, psychological resilience is also influenced by a person's sense of belonging to a vulnerable, and/or minority social group.

There is a critique of community resilience efforts which interprets the action expected of citizens as a form of 'responsibilisation' - a process which devolves responsibility from the state to civil society. This is often associated with a parallel

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<sup>1</sup> We include here a selection of findings with more to be found discussed at length in D1.1. Evaluation and SOTA Summary Report (CPAs); D2.1. Evaluation and SOTA Summary Report (Citizens); D2.2. Community Consultation Report; and D3.4. Lab Methodology and Glossary.

failure to delegate appropriate resources and therefore the ability to act effectively to local areas.

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*We should not assume everyone understands the resilience concept or shares the same definition but share the RiskPACC one as a starting point for dialogue.<sup>2</sup>*

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### RISK GOVERNANCE

Often attempts at enhancing broader frameworks of disaster resilience by CPAs have highly centralised and siloed governance structures and are operationally overly technical and legalistic (command and control). They may pay less attention to the ability of communities to adapt and embrace change and transformation - community resilience - or encouraging wide participation of stakeholders in decision-making. There needs to be a shift from passive to active citizenship with public engagement required to be sensitive to an array of different social contexts and be undertaken in a culturally appropriate manner. Issues were raised with engaging citizens in prevention activities, including the dissemination of risk communication. CPAs focused on this as a major gap in their activities

A lack of future vision has been noted concerning citizen engagement and communities' role in future resilience building efforts. Most of the discussion around future activities has been centred around better communication and collaboration with CPAs in the area, to both better understand the roles of the citizen groups and better incorporate those groups into the local CPA structures. Commonly work to engage communities in disaster response occurs after a disaster event, rather than in the preparedness and anticipatory phase. CPAs interviewed tended to focus more on response, whereas the RPAG is best addressed by prevention work

Communication channels between CPAs and citizen/community groups are non-existent in most of the case studies, ultimately depriving risk governance planners and decision-makers of the ability to adjust and tailor risk management to the fluctuating needs of different communities. Here social media offers a bi-directional communication platform whereby messages can be pushed to the public and feedback received. This however comes with ethical issues and concerns over possible digital exclusion.

Many interviewees stated that different parts of disaster risk management activities are the domain of different agencies, and not much communication exists between them. Better coordination will improve actions

Several citizen and community groups highlighted the importance of increasing the risk related information available to local communities, as they only have a superficial level of knowledge about the concept so far. In this context, educational programmes and information campaigns were mentioned as means of not only

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<sup>2</sup> See Glossary for definition and RiskPACC D1.1 Evaluation and SOTA Summary Report (CPAs) for more detail.

informing but also involving civil communities in the disaster risk management process

## 2.2 Social-political Context

### DIGITAL DIVIDE

Digital technologies, such as VGI solutions, are often technology-led, eventually marginalising the less technology-savvy and socio-economically disadvantaged populations, further broadening the digital divide and inevitably supporting the argument that VGI cannot represent every citizen and privileges those with money, access, and time to utilise the technology. The use of new technologies may be leaving behind some of the most vulnerable people that CPAs are trying to reach (i.e., elderly). It is important to include activities that will not exclude those who have limited access to tech.

Even when access to technological media is widespread, there are differences in digital literacy among different population groups. Therefore, the term digital inequality is suggested, highlighting different levels of digital literacy in different groups.

### CONTEXT

For some, where community engagement occurs in disaster management operations, this is seen as superficial. A perceived failure to deal with the consequences of crises and subsequent recovery efforts without meaningfully addressing underlying factors – such as marginalisation, environmental degradation, etc., that produced them – is a key factor in ineffective disaster risk reduction.

## 2.3 Risk Perceptions & Actions

### UNDERSTANDING CITIZENS AND CPAs

There is often misalignment between how CPAs and community perceive risk and how the multiple psychological, sociological, experiential and cultural factors that affect risk perception impact upon subsequent actions. Therefore, it is important to situate people in their socio-political/community context, instead of merely considering them as individuals. Better aligning such processes would allow us to better understand the attributes of communities that have greater potential for effectively engaging resiliency processes as well as and those groups where additional support will be required.

### ACTIVE CITIZENSHIP

Many CPAs have noted that citizens are waiting for CPAs to “come save them” while there may be actions that they can take themselves. There is a need to create citizens that rely more on themselves than passively waiting for the government to act – i.e. moving from passive to active citizens. However, tokenism is a term sometimes used when talking about citizen engagement and participation. When



deriving the co-creation methodology, formats of collaborative governance need to strive for meaningful inclusion of citizens, not only 'on paper'.

RiskPACC's approach to enable better disaster resilience is to include citizens in decision-making processes related to resilient actions. Therefore, a closer look at people's socio-demographic characteristics should be taken. As we consider decision-making processes, one way to establish equality within these processes is mainstreaming women and other traditionally marginalised groups in the decision-making processes, e. g. in collaborative governance actions. Disasters are experienced and responded to very differently by different social groups because of socially constructed roles and power structures.

## 2.4 Risk Reduction Relationships (RRR)

### SOCIAL CAPITAL AND NETWORKS

A traditional focus on infrastructure resilience is not sufficient for mitigating crisis, and more emphasis should be placed on enhancing social capital. Here, leveraging a network of professional and community groups in local disaster response requires the consolidation of 'trust ties' in order to form lasting relationships and improve communication between CPAs and the civil society so as to harness the power of social networking and advance community resilience to cope with crisis situations.

### TRUST

Trust is a vital component for citizen participation. In co-creation, trust needs to be established between the organisers and participants of a co-creational format, yet also between the participants themselves, e.g. CPA representatives, CSO representatives, and citizens. In co-creational formats, the social network built will enable the continuation of the format, which is one main component of the methodology. Team building is also based on trust, which sets the scene for collaboration or conflict during a co-creational event.

## 2.5 Risk Communication Approaches

### JOINED-UP GOVERNANCE

The building of disaster and community resilience is about new forms of joined-up governance which will be 'most effective when it involve[s] a mutual and accountable network of civic institutions, agencies and individual citizens working in partnership towards common goals within a common strategy'. Involving citizens, if done appropriately, can enhance capacities and capabilities of disaster resilience, potentially allowing for the empowerment and consideration of marginalised groups in the development and implementation of disaster resilience.

### TWO-WAY COMMUNICATION

In order to establish and legitimate such democratic agency, two-way communication is needed. Only with two-way communication, civic engagement can be collective, and true consensus be reached. There is no simple causal link between risk

perception and subsequent mitigation behaviours. Therefore, there is a pressing need to understand how risk is conceptualised by local communities, how risk adaptation and preparedness make sense contextually and how institutions which govern disaster resilience can better understand the nuances perceptions of risk. Here a key policy and risk governance question emerges about how to engage with risk perception when different CPA actors and the public have differential viewpoints regarding risk, different degrees of risk acceptance, and hence divergence with regard to the appropriateness of risk reduction actions to take.

### CONTRIBUTIONS FROM PSYCHOLOGY

Reasons for the RPAG and the mismatch between risk perception and action can also be explained with psychological theories: the Theory of Planned Behavior and Protection Motivation Theory. The intention to act can still differ from the actual behaviour taken. Only when people have a high perceived self-efficacy are they motivated to take preventive action in the face of a threat.

### MEDIA INFLUENCE

Linked to better understanding risk perception is the importance of media or CPA communications in amplifying or downplaying risk, in influencing risk awareness and, in the adoption and acceptance of safety measures, and the decisions the public made.

### DATA NEEDS FOR TAILORED RISK MANAGEMENT PLANS

Many CPAs have observed that citizens and CPAs have a very different understanding of risk. This can lead to conflict if citizens have a different idea of what CPAs should be doing in response. Datasets used for disaster risk preparedness, management and response may not utilise local knowledge. As a result, local disaster responses often fail to produce user-centred and tailored risk management plans, particularly at the smaller administrative and spatial scales.

The compartmentalisation of VGI solutions often restricts its usage to single stages of the disaster continuum, and for a single type of disaster event. Taking a multi-hazard and multi-dimensional approach showcases the magnitude-frequency relationship of multiple hazards and their interrelated effects on the community's vulnerability and could potentially encourage sustained citizen participation in monitoring and recording environmental changes. Data sharing across CPAs could be better, with more common databases needed

Although there is high potential of VGI and other citizen science tools in capturing community risk perception and enhancing disaster resilience a lack of updating or continuous engagement with such tools may limit their capacities to operate as a medium between local communities and CPAs. While some CPAs gather data on whether their risk communication efforts are working, many others do not know whether they are really being effective. Without this information, it is hard to know whether risk perception/action is increasing

### LINKING VGI TO COLLABORATIVE GOVERNANCE

The utility of VGI solutions for community resilience is undermined due to the exclusion (or inadequate inclusion) of important factors such as political and governance systems, institutional structures and unequal power distributions, when designing VGI solutions. This is especially relevant since governmental institutions hold the administrative power to encourage the standardisation and regularisation of VGI practices through the inclusion of VGI concepts in mainstream Spatial Data Infrastructure frameworks.

These early contributions from CPAs, and RiskPACC Case Study partners and researchers have highlighted a number of gaps and issues which are elaborated in the next section with a presentation of the preliminary RiskPACC Draft Collaborative Framework.

### 3 THE RISKPACC COLLABORATIVE FRAMEWORK

In this chapter we set out the preliminary RiskPACC Draft Collaborative Framework (which will be further developed under Task 4.3) and how the co-creation labs are planned to integrate with it.

This draft is the result of an iterative process of engagement across the various RiskPACC Work Packages to inform the structure of the first Draft RiskPACC Collaboration Framework for it to influence the progression of work across the other work packages. The Framework which emerges from these and an extensive, albeit preliminary, literature review is now presented below. This current iteration will be further developed as we learn more through practice in the RiskPACC project.

#### THE NECESSARY COMPONENTS

There has been a large body of work examining hazard and risk perception, a selection of which has formed the basis of the structure proposed below. A preliminary framework has been prepared to guide the RiskPACC activities and to provide a shared understanding of the initial agreed factors that deserve greater attention and inclusion. This is shown in outline in Figure 1. These components range across a vast potential literature (or sets of literature) and this report cannot provide a detailed analysis of all aspects. What is presented below is a selection of the evidence available that provides some important justifications for the individual component inclusion and the key parameters of interest for the development of the RiskPACC co-creation process (RiskPACC Deliverable 3.4). This limited selection is complemented elsewhere by the RiskPACC deliverables, many of which go into more detail in specific areas.

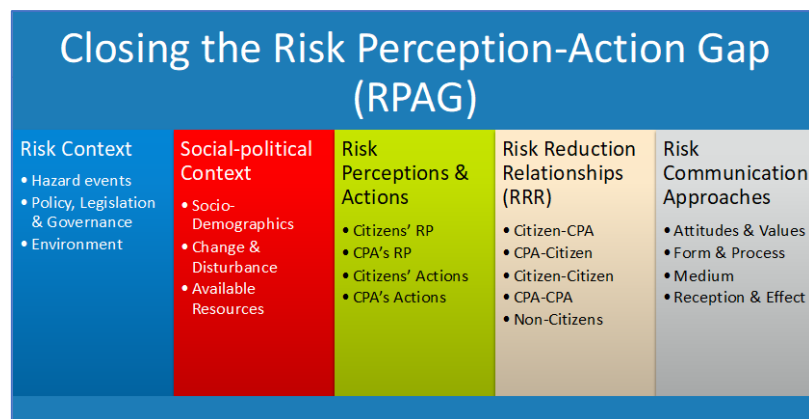


Figure 1: RiskPACC Preliminary Draft Framework

Each column identifies a major component of interest and each comprises a number of sub-components produced iteratively in collaboration with the RiskPACC team over several months. We fully expect this framework to change over the coming months in response to inputs from RiskPACC partners and the planned activities. Each of these components is presented and further explained below.

## 3.1 Risk Context



**Figure 2: RiskPACC Initial Draft Framework: Risk Context**

Establishing the context for risk reduction decision making is imperative. We have simplified the complexity of this domain by suggesting three main subcomponents to do with: the presence/absence/frequency of hazard events; the availability of risk reduction policy, legislation and governance structures and processes; and the environment in which this all takes place. These are discussed below.

It is worth considering that different hazards present different challenges in developing collaborative governance mechanisms. Much of the hazards research that is drawn upon in this report addresses, so-called, natural hazards (floods, earthquakes, etc). However, for RiskPACC we are also working with technological hazards (industrial accidents, CBRN), biological hazards (pandemics) and security hazards (terrorism). These have different authorities and organizations responsible for their management, are covered by different legislation, and include many other characteristics that vary according to type. Not least of these, in the RiskPACC context, is the different ways the risks are perceived and acted upon. This is a topic that is planned for further attention in RiskPACC during and after the first rounds of engagement with case studies and citizens and will be returned to in later work.

### HAZARD EVENTS

- Experience/ no experience of hazard events affect risk perception (likelihood, susceptibility, willingness to act)

As noted above, there is a long history of research (Kuhlicke et al 2020; Becker et al 2017) which links hazard experience to enhanced hazard perception. While this will not be reviewed in detail here, a recent review, largely in the North American context (Gotham et al 2018) provides an overview of the major social-demographic predictors of risk perception: age, home ownership, length of residence, income, education, gender, and race and ethnicity. However, as with many such reviews, there is variability in the findings with some of greater or lesser perception; and, secondly, there is an inbuilt assumption that enhanced hazard perception will lead to enhanced hazard adaptation or reduction behaviour and is therefore to be awarded considerable attention. The formative research of Gilbert White, since the 1940s, and

Ian Burton and Robert Kates since the 1960s (Burton et al 1978) emphasises the role of experience but also some of its nuances. For example, as early as 1962, Kates' work on choice perceptions in the flood plain management of Tennessee (Kates 1962: 140) concluded with coining the term 'the prison of experience', as his study determined that previous experiences of flooding proved to be a major limitation to individuals' willingness to use improved flood hazard information. The prison of experience phenomenon can refer not just to citizens but it can result in CPAs and emergency responders responding to (and planning for) the *last* flood rather than the *current* or possible future ones (Penning-Rowse and Fordham 1994).<sup>3</sup>

In Rana et al's (2020) study on flood risk perception in rural communities of Pakistan, the analysis determined that past experiences had a significant impact on the community's perception of risk. Households which had previously experienced floods were more likely to accept potential threats and were therefore more willing to make better decisions such as undertaking preventive strategies and hazard adjustments (Rana et al, 2020; Lindell and Hwang, 2008).

Becker et al (2017) discuss the various types of experience which may have different levels of influence on preparedness actions:

- *direct experience (i.e. physically feeling the event or being directly impacted by a disaster including experiencing injury or damage);*
- *indirect experience (i.e. being directly exposed to the real or potential impacts of a disaster, but not being personally affected. This included being indirectly impacted by an event (e.g. unable to travel to work because of transport disruptions); observing the effects of a local event but not being impacted in any way; preparing, planning or responding to an event (e.g. as a volunteer, or in an emergency management role); and assisting with relief efforts);*
- *vicarious experience (i.e. individuals interacting with others such as family members or friends who have had disaster experience; or tapping into experience via the media); and*
- *life experience (i.e. applying experience of potentially adverse event or situation to a disaster context e.g. experiencing a car accident and applying experiences from that event to a disaster scenario). Life experience in this context is distinct from disaster experience. (Becker et al 2017: 182-183).*

The authors note that direct experience may have the greatest influence on action but that any experience may also provide 'a prompt for interaction with the community, a known, and important, predictor of increased preparedness behaviour' (Becker et al 2017: 190) and is thus of value for the development of social networks and relationships. Their research found that experience had 7 different influences on the preparedness process:

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<sup>3</sup> In research in flooded parts of Perth Scotland, Fordham found that warnings had been issued only to those households which had flooded previously when the actual flood envelope was much larger this time. Penning-Rowse and Fordham 1994.



- prompting thinking and talking;
- raising awareness and knowledge;
- helping individuals understand the consequences of a disaster;
- developing beliefs;
- developing preparedness;
- influencing emotions and feelings; and prompting community interaction on disaster issues. (Becker et al 2017: 179).

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*Explore the best way to support CPAs and citizens in sharing knowledge of past disasters in their location and disaster information relevant to their hazard and risk profile.*

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### POLICY, LEGISLATION & GOVERNANCE

- These provide frameworks of expectations, possibilities and limitations

In any location there is likely to be a set of policies which provide the basis for organized action to plan for, mitigate, reduce and respond to risk. These will be dependent upon resource availability in the given location and political will to support professional and community-based activities and duties<sup>4</sup>. Understanding the nature of policy and legislation will go some way to explaining why certain actions may be possible and others impossible for service providers to carry out and may also define the style and nature of those actions.

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*Ensure participants in the co-creation labs understand the opportunities and constraints under which CPAs are authorized to act.*

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Local actions may be influenced by other governance levels and may be dependent upon National Level engagement with the Sendai Framework for Disaster Risk Reduction 2015-2030 (see Figure 3 below). Of particular relevance for RiskPACC are the following selected Guiding Principles of the Sendai Framework:

- Engagement from all of society
- Empowerment of local authorities and communities through resources, incentives and decisionmaking responsibilities as appropriate
- Decision-making to be inclusive and risk-informed while using a multi-hazard approach

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<sup>4</sup> This does not preclude community-based action which invariably takes place either alongside professional services, or in their absence.

Similarly with the 17 Sustainable Development Goals (SDGs)<sup>5</sup> of which Goals 5, 11 and 13 are perhaps most relevant:

- Goal 5: Achieve gender equality and empower all women and girls
- Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
- Goal 13: Take urgent action to combat climate change and its impacts

However, these global level targets, priorities and principles can seem remote from local service providers and for their stakeholders who may be wholly ignorant of such policies.



Figure 3: The 7 Global Targets of the Sendai Framework for Disaster Risk Reduction<sup>6</sup>

The culture and structure of lower governance levels can be defined by which organization is the lead authority and the extent to which there is effective interoperability between service providers (Davidson et al 2021). Coming down to a community level, Wellington Region Emergency Management Office (WREMO) developed a different way of working as they restructured into three functional areas: Community Resilience, Operational Readiness, and Business & Development. It is perhaps surprising that for an organisation with emergency response at its core, it recognises that for most of the time it is in a state of non-emergency. The reorganised and allocated one third of its resources to 'working with and empowering communities to build resilience to an emergency event.' (Neely et al 2014: 5). They have committed a large amount of resource to building social networks (social capital) which they see as fundamental to building community resilience. WREMO's organisational vision is, 'A Resilient Community, Ready and Capable'. While some of the activities that are organised or supported are clearly related to increasing risk perception (tsunami signage in Wellington), others have no obvious link to this but

<sup>5</sup> For more discussion, see RiskPACC Deliverable 1.1.

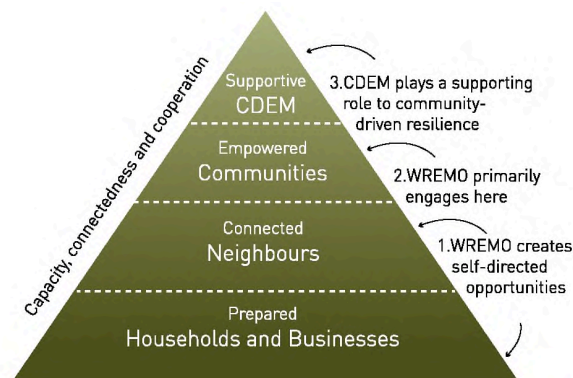
<sup>6</sup> The Sendai Framework outlines seven global targets to be achieved between 2015 and 2030. <https://www.preventionweb.net/sendai-framework/sendai-framework-at-a-glance>



are based on connecting people in a community setting. Dan Neely, the WREMO Community Resilience Manager, describes it in this way:

*'For the new Community Resilience team, the first step was to move past 'public awareness' and 'survival' towards increasing the connectedness of communities and enabling people to feel empowered to manage their households and neighbourhoods in the event of an emergency.'* (Neely 2014: 55).

Figure 4 shows the WREMO 'continuum of engagement' model which, while not a model for everyone, everywhere, does have some interesting lessons to share.



**Figure 4: Wellington Emergency Management Office, Model of Community-Driven Emergency Management (Neely et al 2014: 17).**

Please see D1.2 CPA Consultation Report and Repository of Best Practices for further details of the role and practices of CPAs in disaster risk management in Europe and internationally.

### ENVIRONMENT

- The physical/ biological contexts shape limitations
- Presence of physical mitigation influences risk attitudes

The physical environment in which hazards occur can determine some of the outcomes of any hazard event. For example, the kinds of flooding in low coastal plains will be different to those in steep sided ravines. Furthermore, previous and ongoing environmental management can exacerbate or mitigate the consequences of any hazard event (see the current interest in rewilding which has as one of its objectives the improved management of flood risk) (Rewilding Europe).

Geographical location 'remains a fundamental predictor of hazard exposure and, therefore, a vital factor in understanding how any population anticipates, prepares for, responds to and recovers from hazard events' (emBRACE 2012; Deeming et al 2019).

In some locations the presence of structural defences can influence people's perception of risk, believing a structure (a dam, a flood wall or embankment, for example) can remove the risk. However, all defences are constructed to a particular standard of protection related to cost, engineering safety rules, visual acceptability, as well as the probability of an event occurring. This level can be overwhelmed by a greater risk level, beyond that accounted for; this is called the exceedance probability and is rarely known or well understood by those at risk. Exceedance probability is a technical concept, but many people fail to perceive that events can be larger than (exceed) those of which they have either direct or indirect experience.

To tie these subcomponents together, it is possible to see how the occurrence of one or more hazard events (floods, fires, earthquakes, etc) could be expected to contribute to raising alertness levels in both CPAs and citizens. They are likely to be more sensitized to risk and to have expectations about what actions should occur to reduce present and ongoing risk. These may be influenced by the presence or absence of policy and legislation which assign responsibility and authority to some groups to carry out risk reduction actions. However, there may well be environmental conditions which limit the potential to act.

For example, the hazard event may occur in a location of scientific (ecological/ biological/ biophysical) interest. These scientific considerations may not be known to, or valued by, all. In the case of a flood, citizens may call for dredging of rivers but this may not be possible for CPAs and river management authorities because of likely damage to habitats and rare species. Conflict is likely to arise when citizens perceive authorities to be valuing fish, animals and other wildlife above human beings and their property. So, it is a complex mixture of risk perception and other considerations which determine the likelihood of damage reducing actions to occur.

On the other hand, CPAs and river management authorities may wish to see the construction of protective flood walls and embankments which will inevitably restrict the views and amenity of local residents. This may well set up conflict between CPAs and citizens, and between citizens and other citizens (those nearer to or further away from the river and its amenities). Ultimately, if a structure gets built, this may lead affected people to believe the risk has been removed.

## 3.2 Social-political Context

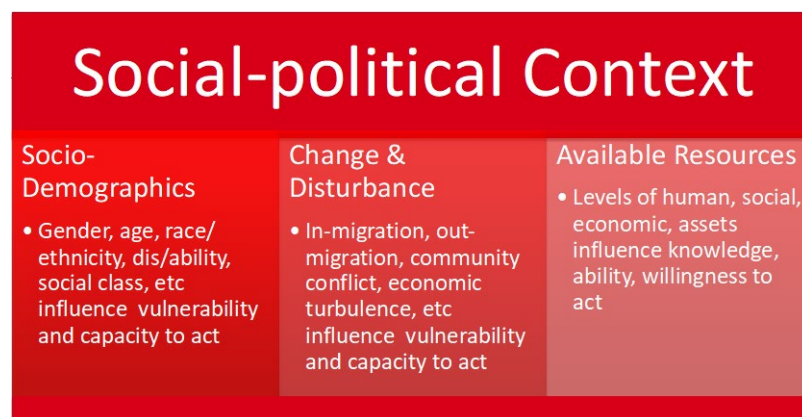


Figure 5: RiskPACC Initial Draft Framework: Social-Political Context

Understanding the social-political context in which hazard events occur provides indicators of increased vulnerabilities or capacities of those that live, work or move through the location. For example, high concentrations of frail elderly can signal greater response requirements from service providers; an area's general levels of social stability or turbulence can indicate greater resource need or the potential for community conflict; the general levels of resource availability (economic and health status, education levels, etc) can provide markers of greater or lesser need and capability. To have this intelligence in planning stages can provide a firm basis for need assessment. In terms of risk perception and the likelihood of taking risk reducing actions, research evidence tells us that different social groups are likely to respond differently.

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*Explore with CPAs how they do, or how they can, identify the diversity of needs and interests in their location.*

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### SOCIAL-DEMOGRAPHICS

- Gender, age, race/ethnicity, (dis)ability, social class, etc. influence vulnerability and capacity

We know from much research over several decades that perceptions of, and vulnerabilities and attitudes to disaster risk differ among social groups. A range of economic, social, cultural, institutional, political and psychological factors shape people's lives and the environment in which they live (PreventionWeb 2015). Social-demographic data play an essential role in the field of risk perception as this varies from an individual, community and wider level (Rana et al 2020).

Older populations have been found to be vulnerable to heatwaves (Zaidi and Pelling 2015) and were identified early on in the COVID-19 pandemic as more likely to suffer severe health consequences and even death; similarly with ethnic minorities and migrant workers. In many studies older populations died in greater numbers in earthquakes.

However, taking an intersectional approach, rather than focusing on a singular variable like age, is likely to be more informative (and see RiskPACC Deliverable 3.4 ppp. 26-28). For example, in the Great Hanshin earthquake in Kobe in 1995, Tanida (1996) reports that more than half of the fatalities were among those over 60 years old, and in this age group female fatalities were almost double those of men. However, in Osaki et al's (2001) analyses, which controlled for age and gender (among other variables), gender was not significant. In Klinenberg's (2002, 2015), study of the 1995 Chicago heatwave he found that African American males were more likely to die.

Apart from greater or lesser vulnerability, differences have been found in terms of risk perception with women seeming to have different risk perceptions and willingness to take protective action than men (Reckien and Petkova 2019), but it is

men who more often determine what type of protective action should happen (Villarreal and Meyer 2019). Age, gender and education are often, but not always, associated with differing levels of risk perception (Sullivan-Wiley & Gianotti, 2017; Wachinger et al., 2013; Terpstra & Lindell, 2013; Fordham M. 1999; Cutter et al 1992; Fothergill 1996).

In Europe, the gender of wildfire civilian fatalities is skewed (approximately 2/3 men to 1/3 women) (Molina-Terre), which further underlines the need to understand social demographics in attempting to close the RPAG. There is now a significant body of knowledge around gender issues and impacts in disaster experience and disaster risk reduction. The Gender and Disaster Network (GDN [www.gdnonline.org](http://www.gdnonline.org)) compiles online searchable reference guides (annotated bibliographies) which encompass a large range of topics and locations (GDN Resources <https://www.gdnonline.org/resources>)<sup>7</sup>. For those starting out to explore gender and intersectional issues and disaster, the GDN Reference Guides provide a solid grounding.

However, detailed knowledge of community characteristics is likely to require collaboration with service providers beyond CPAs and must be planned for.

### CHANGE & DISTURBANCE

- In-migration, out-migration, community conflict, economic turbulence, etc. influence vulnerability and willingness to act

The degree of change, disturbance or stability can influence levels of community cooperation and conditions under which service providers have to work. For example, increasing population growth rates or changes in population structure can exacerbate risk and threat in a multi-hazard environment (Sullivan-Wiley & Gianotti, 2017; Huppert & Sparks, 2006). The question arises, how well can emergency planning operate in a dynamic and changing environment?

A number of studies by Dan Aldrich and colleagues (Aldrich and Meyer 2015; Aldrich 2010, 2012) have demonstrated that social capital increases disaster resilience. In his 2011 paper on the role of social capital after the 1995 Kobe earthquake in Japan, he says: 'social capital proves to be the strongest and most robust predictor of population recovery after catastrophe' (Aldrich 2011: 595). Thus, awareness of the social and demographic context in which disasters and disaster planning occur, is vital for resilience and play a part in closing the Risk Perception-Action Gap.

However, newly arrived residents as well as those just passing through will struggle to benefit from the kinds of social ties which typically develop over time. Additionally, they may be members of social groups which are socially excluded and lack entitlements to resources available to others (see below the discussion around 'non-citizens'). While disasters can open up 'windows of opportunity' for some; for others, the window remains closed.

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<sup>7</sup> GDN Resources <https://www.gdnonline.org/resources>

### AVAILABLE RESOURCES

- Levels of human, social, economic, assets influence knowledge, ability, willingness to act

There is a long record of research which has highlighted that access to resources is a critical factor shaping communities' abilities to plan for and respond to the impacts of hazards and climate change (Thomas et al 2019; Alexander 2012; Shreve and Fordham 2019; Wisner et al 2004).

In a European context, the emBRACE project (emBRACE 2011) made a major focus on resources (along with capacities, social learning and disaster risk reduction action).

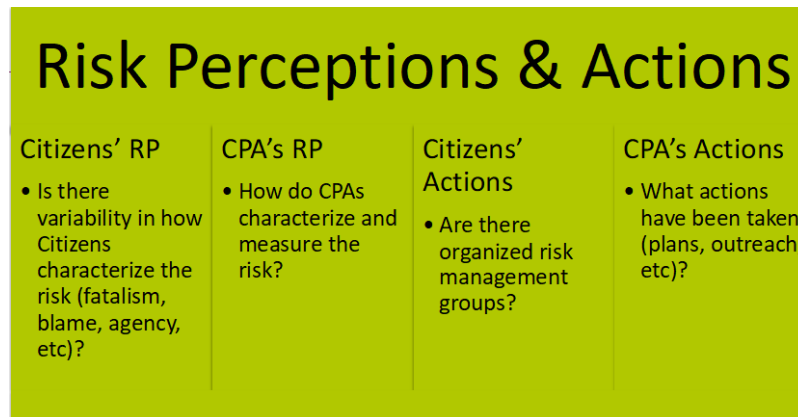
*'Vulnerability and exposure are dynamic, varying across temporal and spatial scales, and depend on economic, social, geographic, demographic, cultural, institutional, governance, and environmental factors (high confidence). [...] Individuals and communities are differentially exposed and vulnerable and this is based on factors such as wealth, education, race/ethnicity/religion, gender, age, class/caste, disability, and health status. [...] Lack of resilience and capacity to anticipate, cope with, and adapt to extremes and change are important causal factors of vulnerability.'* (Cardona et al 2012: 67).

By extremes and change, emBRACE refers to extreme hazard events ('disasters' such as floods, earthquakes, etc) but could also mean extremes and changes in social, political and economic conditions (changes in demographics perhaps because of in- or out-migration, community conflicts, changes in government at different levels, cost of living increases, etc). Communities and societies are not static but dynamic; they change over time – sometimes slowly and sometimes suddenly – and these changes may not be captured in 'snapshots' such as census data or other data sources that are used to inform risk reduction actions.

Human and social factors may influence the uptake and use of technologies and social media in hazard and disaster contexts (Dargin et al 2021). A better understanding of these factors provides an opportunity to reach groups which are traditionally hard to reach and who may be excluded by conventional practices.

## 3.3 Risk Perceptions and Actions

*'Assessing risk is one thing, acting on the basis of such assessments is another'* (Eiser et al 2012: 13).

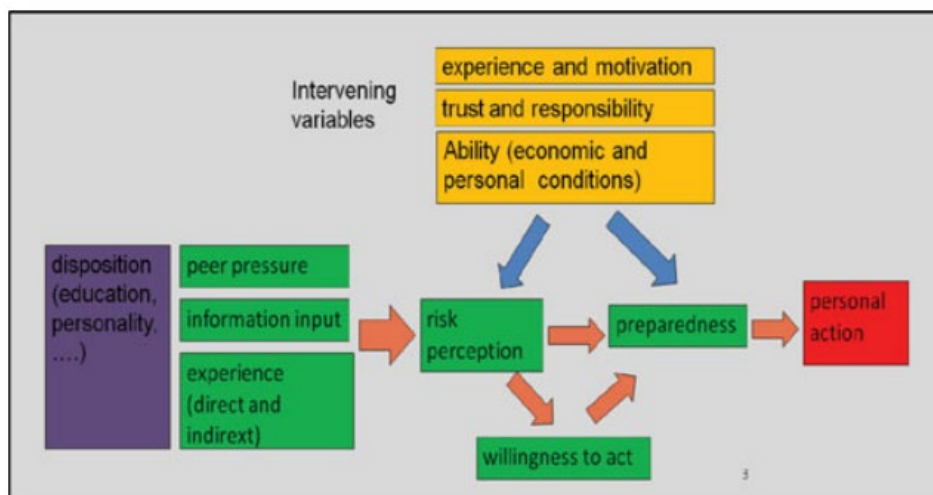


**Figure 6: RiskPACC Initial Draft Framework: Social-Political Context.**

### CITIZENS' RISK PERCEPTION

- Is there variability in how citizens characterize the risk (fatalism, blame, agency, etc)?

Risk perceptions play a significant role in motivating individuals to take the appropriate action to adapt, mitigate, or to avoid risks (Wachinger et al., 2013). Described as the 'Risk Perception Paradox', Wachinger et al (2013: 1051-2034) argue that there are three intervening variables that may suggest a weak relationship between citizens' risk perception and their personal actions. These are experience and motivation, trust and responsibility, and personal ability (economic and personal conditions). All three variables in the characterisation of risk have a direct impact on how citizens not only perceive risk, but also who they place their trust in, whose agency is recognised, and how all these transition into action. The framework in Figure 7 depicts this process.



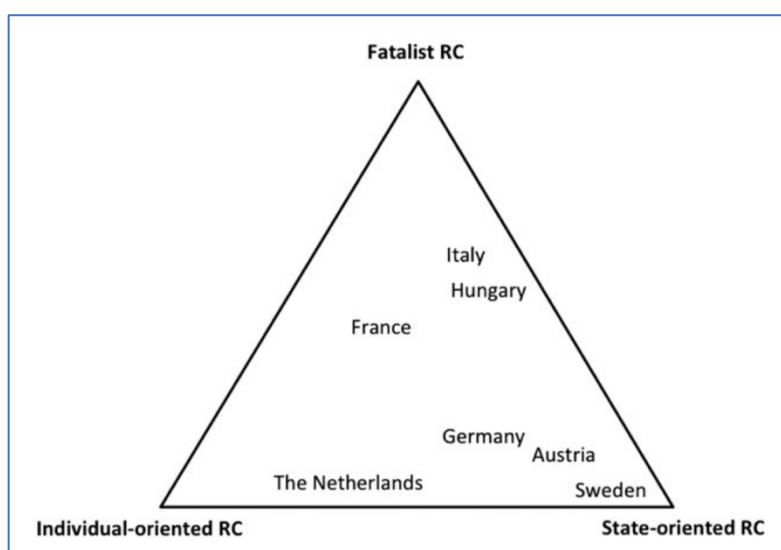
**Figure 7: The Visualisation of the “Hazard To Action-Chain” (Wachinger et al., 2013: 1054).**



While it can be assumed that citizens with a low risk perception are less likely to act in the face of a hazard, and vice versa, the literature in the risk perception field has generated many examples to suggest that this is not always the case (Wachinger et al., 2013; Ruin et al., 2007). For example, communities living with the threat of volcanic hazards in Southern Iceland had a high risk perception due to their cultural framework of social cohesion and strong oral traditions such as storytelling, as a reminder of the hazardous environment they live in. Although their risk perception of volcanic explosions was high, one study identified that the communities were less likely to take action due to them not having experienced a hazardous event in their lifetime (Jóhannesdóttir & Gísladóttir, 2010).

Additionally, the residents also expressed their lack of confidence in evacuation and mitigation plans established by their CPA, which led to a further unwillingness to act. Residents complained that the district commissioner was not collaborating with all concerned and lacked a holistic view of disaster management. Furthermore, citizens felt scientists and the CPA had not effectively communicated the risk to the general public in an appropriate and relatable way (Jóhannesdóttir & Gísladóttir, 2010: 418). To combat this, they argued for the agency and indigenous knowledge of the communities to be recognised in future emergency management plans.

Similarly, Cornia et al., (2016) also established a model to understand risk cultures in society through analysing both differences and similarities in how citizens perceive and interpret disasters, as well as those responsible for risk prevention and management. Cornia and colleagues identified three specific risk cultures evident across seven European countries: state-oriented risk culture, individual-oriented risk culture, and fatalistic risk culture. To explain these, they focused on three interrelated dimensions: disaster framing, trust in authorities, and blaming. The authors argued that it was typical of industrial societies to direct blame towards public authorities who, rightly or wrongly, are often held responsible for inefficiency in risk prevention and crisis management (ibid., page 296). While on one hand, citizens tend to hold political leaders and CPAs responsible for hazard mitigation and management failures, several scholars continue to stress how responsibility is beginning to shift from the state to the citizen as a result of the increasing spread of individualism and neoliberalist ideologies (Cornia et al., 2016; Tulloch, 2008). Cornia et al.'s (2016) study concluded that a fatalist approach appeared when the other two risk cultures (individual-oriented risk culture, and fatalistic risk culture) no longer proved effective and this was often associated with widespread mistrust in authorities and little confidence in the citizens. See Figure 8 for an assessment of where certain European countries sit within this three risk culture space.



**Figure 8: National Research Settings Relative to Three Risk Culture (RC) Ideal Types (Cornia Et al., 2016: 303).**

The extent to which citizens perceive or prioritise the risks that CPAs are traditionally concerned with, and the presumed relationship to their propensity to act, is a complex and contextualised problem space that rarely enjoys critical analysis in practice. However, Rufat et al (2020), (drawing on Eriksen & Gill, 2010; Wachinger et al., 2013; and Fünfgeld, Lonsdale, & Bosomworth, 2019) argue that the 'deficit model' is simplistic and does not take account of the many reasons which determine the extent to which citizens' take risk reducing actions. These might include challenges for CPAs to communicate unambiguous messages out of conflicting or contradictory evidence. This, they argue, necessitates the bridging of knowledge-making and decision-making, which is central to the collaborative approach discussed further below.

### CPA's RISK PERCEPTION

- How do CPAs characterize and measure the risk?

Consideration of CPAs' risk perception varies according to geographic or administrative level (national, regional, local) and whether it is the authority/ organization itself or the individual CPA officer. At a general level it is assumed that CPAs work with 'objective' data, much of which is probabilistic in nature and based on historic record. Overlaying that is the extent to which the CPA entity or individual has overseen or experienced a hazard event. As discussed above, CPAs may be at risk of defining their risk landscape according to the 'prison of experience' (Kates 1962: 140). in which they may be influenced by what happened previously and what the probabilistic data suggest. The extent to which CPAs can draw upon the most up to date and sophisticated technology and knowledge will (partly) determine the extent to which the prison of experience may operate.



In the UK for example, CPAs characterise risk according to the National Risk Register (NRR) and can draw upon considerable scientific resources to identify priority areas. The National Risk Register 2020 'outlines key malicious and non-malicious risks that could affect the UK in the next years and provides resilience guidance for the public (Gov.UK, 2020). The NRR measures risk according to a risk matrix which represents reasonable worst-case scenarios and are assessed in terms of scale of impact and likelihood. These risks were identified by consulting stakeholders and experts across UK government departments, the government scientific community, and outside of the government (Gov.UK, 2020). For national security reasons, there is a National Security Risk Assessment (NSRA) which is the classified version of the NRR, which addresses the most serious risks to the UK or to its overseas interests. The Civil Contingencies Secretariat (part of the Cabinet Office) is responsible for co-ordinating the production of both.

While the NRR is set out at the national level, there are also mechanisms in place at the local level through Local Resilience Forums (Civil Contingencies Secretariat 2013). Arguably, both the National Risk Register and the National Security Risk Assessment fail to consider vulnerability adequately. For more detail on the roles and practices of CPA in disaster risk management across Europe and internationally, see RiskPACC Deliverable 1.2 CPA Consultation Report and Repository of Best Practices.

### CITIZENS' ACTIONS

- Are there organized risk management groups?

While organized interest groups may have considerable knowledge of how CPAs operate, the general citizen often knows little and may not even be aware of such bodies until they experience a disaster themselves. This may result in an unrealistic expectation of what CPAs can or should do.

Throughout disaster risk reduction literature, there is robust evidence to suggest that citizens' knowledge, adaptation strategies and resilience methods are often not acknowledged in risk governance (Rauken et al., 2015; Gausset & Hoff, 2013). As this observation has gained traction, distributed risk governance systems and citizen collaborations have gained increasing interest (Wamsler, 2016; UNISDR, 2015; IPCC, 2014). Thaler et al., (2022) suggested that at the core of these innovative changes in risk governance is a social movement by citizens through the development of multi-functional protection schemes and interaction with local stakeholders (Seyfang & Smith, 2007).

Focusing on local level engagement in Portugal, Burnside-Lawry & Carvalho (2015) discovered public engagement initiatives for DRR exercises which have contributed towards an enhanced community resilience. This is evident in Reichel and Frömming's (2014) study which focused on participatory mapping of DRR knowledge in Switzerland. The research identified social networks of citizens who contribute to DRR practices such as the systematic mapping of sustainable environmental knowledge, which Reichel and Frömming (2014) identified implementing as 'cultural memory' practices. The visualised forms of local knowledge proved to have contributed to sustainable environmental management and allows for citizen-led

groups to effectively communicate, cooperate and participate in the process of risk management (Reichel and Frömming, 2014).

Another example of citizen led DRR is the Community On Ground Assistance (COGA) initiative which arose after the 2009 Black Saturday bushfires in Australia (Whittaker, 2016). The citizen-initiated project provides assistance to people by providing technical advice, psychological and emotional support to bushfire victims, as well as contributing to risk perception increase and awareness (Whittaker, 2016).

In the UK, the National Flood Forum<sup>8</sup> is a charity which supports communities to organise themselves to protect against flooding in the following ways:

- *Helping Communities:* Helping people to prepare for flooding by facilitating community flood action groups in England & Wales. Providing advice and support to individuals and communities.
- *Community Involvement:* Supporting those at risk of floods to be part of the solution through community involvement.
- *Helping People Recover:* Helping people who have been flooded to recover.
- *Raising Awareness:* Hosting flood surgeries and exhibitions to help people with their problems and raise awareness.
- *Representing People:* Representing those at flood risk so that decision-makers take account of local knowledge, common concerns and grassroots expertise.
- *Policy Making:* Working to put flooding issues at the centre of policy making.
- *Supporting Professionals:* Providing training and consultancy services to professionals to help them develop a community perspective.
- *Providing Advice:* Remaining independent in order to provide honest, unbiased advice via a helpline, website, and staff, etc.<sup>9</sup>

These kinds of organized groups have developed enormous levels of expertise and deep local knowledge, and many have a collaborative and mutually respectful working relationship with local CPAs. There is a risk that the individual flood groups may not be fully inclusive or representative of all local interests (Forrest et al 2018) but this tends to be difficult to achieve in voluntary groups.

However, the propensity to act by citizens outside of organized groups (many of which groups are led by retirees and relative newcomers to some locations) (Deeming et al 2019) represents a particularly challenging problem which might be addressed through more widespread use of social media and other technological means (see Risk Communication Approaches below). It may be that those most at risk are those outside of the formalised, organized groups and are those that are hardest to reach.

While some citizen-led risk management efforts have contributed greatly to increase risk perceptions to enhance DRR and management, some citizen led actions can have a detrimental impact. For instance, citizens were complicit in false information sharing regarding the MMR vaccine in the UK which significantly influenced the low uptake of the vaccine due to a suggested link between the vaccine and autism and

<sup>8</sup> National Flood Forum <https://nationalfloodforum.org.uk/>.

<sup>9</sup> National Flood Forum – What We Do <https://nationalfloodforum.org.uk/how-we-help/what-we-do/>.

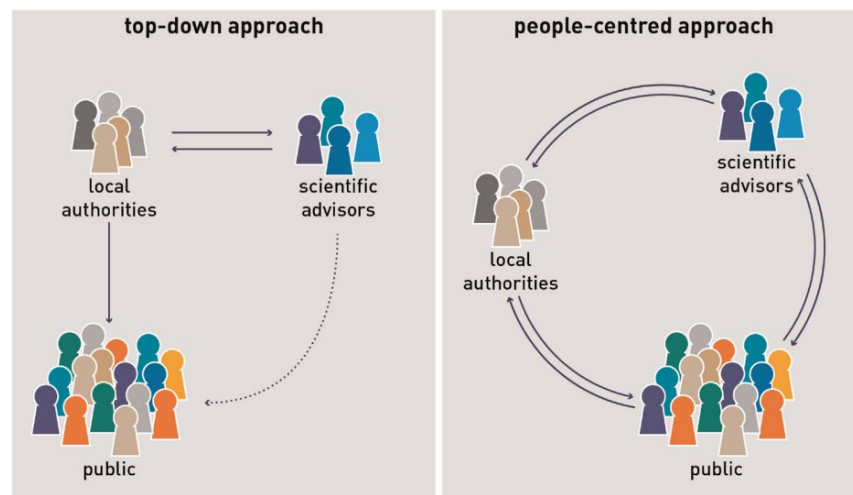
bowel cancer in 1998 (Rogers et al., 2007). This link was scientifically dismissed six years later, despite the damage having already been done and vaccination levels much reduced – a phenomenon seen most acutely during the COVID-19 pandemic.

### CPA's ACTIONS

- What actions have been taken (plans, outreach, etc)?

While CPAs are used to working with emergency plans and many have reached out to their local communities, citizens generally know little of emergency planning and CPA activities. Thus, CPA actions may be in conflict with citizen preferences and without a foregoing period of trust and relationship building, citizens may act in seemingly inappropriate, and even dangerous, ways. Finding common ground in this CPA-citizen space is imperative.

Thaler et al., (2022) argue that institutional frameworks for hazard risk management have made significant progress in framing the interactions and actions of citizens at the heart of innovative adjustments (Thaler et al., 2022; Raffaelli & Glynn, 2015; Hodgson, 2006). This innovative change is referred to as 'bottom up' or 'people-centred' management or innovations, which provide local solutions to the management of hazards and risk based on the knowledge, interest, and capacities of the community's citizens (Thaler et al., 2019; Seyfang & Smith, 2007). Using the example of Austria, Thaler et al's, (2022) study identified that local bottom-up innovations can develop into mainstream solutions at both the national and regional level only through strong involvement of the citizens at a local level.



**Figure 9: Two Models Illustrating Interactions Between Key Stakeholders in Top-Down and People-Centred Approaches (Scholobig et al., 2015: 209).**

While a people-centred approach is becoming increasingly popular, Scholobig et al., (2015: 209) argue that 'changing interactions between stakeholders are at the forefront of the 'hurdles' to achieving people-centred outcomes'. For instance, interactions between stakeholders can lead to conflicts of interest, responsibility and perspectives; however, with the right conditions i.e. adequate financial and personnel

resources, a multitude of stakeholders and perspectives can generate a more flexible, dynamic and a more resilient hazard management structure (Scholobig et al., 2015).

On the other hand, Sou (2019) argues that participatory spaces do not always guarantee spaces for democratic deliberation between CPAs and citizens regarding DRR management, which in turn contradicts a bottom-up approach. As previous research suggests that a positive correlation between low-risk perception and poor state-society relations, a people-centred approach relies on more accountability and responsibility being placed on citizens (Sou, 2019). To contribute towards DRR plans and more enhanced risk perception, and to promote a people-centred approach, citizens must actively engage with local government's roles and responsibilities (Sou, 2019). However, Sou (2019) argues that while participatory risk governance may provide a framework and space for CPAs and citizens to come together and articulate their concerns, the productivity of these discussions can be undermined if local governments are not perceived as responsible providers of safety from hazards.

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*The co-creation labs should communicate to citizens and stakeholders the actions that have been taken (at various government levels), those that might be planned, and any constraints that limit the CPA's ability to act. Citizens and stakeholders should have the same opportunity to share their past and planned actions and any constraints under which they can act.*

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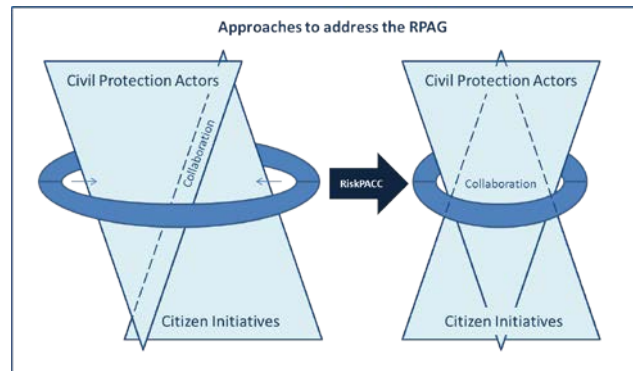
### 3.4 Risk Reduction Relationships (RRR)

Risk Reduction Relationships (RRR)				
Citizen-CPA	CPA-Citizen	Citizen-Citizen	CPA-CPA	Non-Citizens
<ul style="list-style-type: none"> <li>• How do citizens regard CPAs?</li> <li>• Is there a history of collaboration or conflict?</li> <li>• What is the level of trust?</li> </ul>	<ul style="list-style-type: none"> <li>• How do CPAs regard citizens?</li> <li>• Is there a history of collaboration or conflict?</li> <li>• What is the level of trust?</li> </ul>	<ul style="list-style-type: none"> <li>• Presence/absence of social capital</li> <li>• Is there a history of collaboration or conflict?</li> <li>• What is the level of trust?</li> </ul>	<ul style="list-style-type: none"> <li>• explain</li> <li>• Is there a history of collaboration/cooperation or conflict/difference?</li> <li>• What is the level of trust?</li> </ul>	<ul style="list-style-type: none"> <li>• E.g migrants, victims of trafficking, temporary visitors, etc</li> <li>• Are they visible/hard to reach/ at greater risk?</li> <li>• What is the level of trust?</li> </ul>

**Figure 10: RiskPACC First Draft Framework: Risk Reduction Relationships (RRR). CPA stands for Civil Protection Authority/ies.**

As we have been highlighting throughout, for the most part, hazard risk management systems, including CPAs, have taken a more 'traditional' top-down approach, meaning that decision-making powers, responsibility, and resources remain in, and directed by, the governmental/federal sphere (Thaler et al., 2022). However, as societies have developed economically, there is more property and people potentially in harm's way and, frequently, without a sufficient increase in budget to

address the enhanced levels of risk. One way that CPAs have addressed this challenge is to increase their community-based work but CPAs may not have the resources, background or skills to do this work most effectively. However, much can be done with little if a cooperative working relationship is built up between CPAs and community development professionals or social services (see below) as well as citizens. Twigg and Bottomley (2011) argue that appropriate processes and relationships are fundamental to DRR and yet basic questions about what makes them work are rarely asked.



**Figure 11: Approaches to address risk awareness, perception, and action (classical and RiskPACC approach).**

We have argued in RiskPACC that addressing the RPAG requires initiatives to bring together existing bottom-up and top-down approaches and develop appropriate tools to enhance resilience (Figure 11). We have further argued that the pathway to that synchronisation is through a co-creation approach (discussed below) which requires reflection on existing relationships between CPAs and Citizens. When we refer to citizens, we are most often (but not always) referring to organised groups rather than individual citizens (or non-citizens), the latter, more diffuse, group present a much harder task. We address some of these issues in the next section and introduce the less considered category of the non-citizen (OHCHR 2006).<sup>10</sup>

### CITIZEN-CPA AND CPA-CITIZEN

- How do citizens regard CPAs? How do CPAs regard citizens?
- Is there a history of collaboration or conflict?
- What is the level of trust?

Reflecting on current and past collaborations or exchanges between CPAs and citizens is the first step to understanding the basis on which, for example, warning and other risk reduction messages are communicated, received, acted upon or dismissed. RiskPACC has chosen a co-creation approach, activated through co-creation labs, to explore preferences and opportunities in our Case Study locations. Understanding how both groups come to the collaboration space is necessary to clear up any unspoken misunderstandings or latent conflicts. CPAs and citizens may be new to the area or be longstanding residents and professionals; these factors are

<sup>10</sup> See: Office of the United Nations High Commissioner for Human Rights 2006 The Rights of Non-citizens <https://www.ohchr.org/documents/publications/noncitizensen.pdf>



likely to influence how they perceive the risk and the options available to deal with it. However, if neither side takes the time to learn about the past history, it is possible that both sides will talk past each other. Part of this exploration includes analysing past and present relationships of trust.

The role of trust is a key variable in positive relationship-building between CPAs and citizens and has been found to be a factor that strongly influences risk perception. Trust in the government agencies or the relevant organization with responsibility for regulating a hazard, means the technology may be perceived more positively and be more acceptable compared to where trust is lacking (Siegrist 2000: 482).

In instances where complete information is not available, trust is often used as a proxy, thus allowing a simplified message to be received, believed, and acted upon by individuals (Paton 2008; Siegrist, 2021; Tumilson et al., 2017). In other words, if citizens have trust in the CPAs and other governmental organisations responsible for disseminating information and warnings regarding a hazard, they may receive and act on the information more positively.

Siegrist (2021) argues that there are three different types of trust highlighted in risk communication literature: general trust, social trust, and confidence. In many hazard-related situations, citizens are asked to rely on others whom they do not personally know (this is central to Beck's thesis in *Risk Society* (1992). Johnson-George and Swap (1982) argue that it is not general trust or interpersonal trust that is important in this context, but instead social trust and confidence, as a person must rely on cues to determine whether to place trust in the actors responsible (CPAs in this context) when no information is available. The trust, confidence, and cooperation (TCC) model (Earle et al 2007) was based on the assumption that trust and confidence simultaneously influence one's willingness to cooperate and act on information for certain hazards. The TCC model postulates that trust has an impact on confidence; it indicates that trust is based on judgment of intentions and values, whereas confidence is based on past experiences.

Effective government/CPA communication with the public in the event of a hazard is essential in reducing morbidity and mortality (Vonderford, 2004; Wray and Jupka, 2004). For instance, Rogers et al's., (2007) paper focused on the role of risk perception and communication during terror attacks, and determined that government failures to appropriately communicate about a crisis situation can negatively alter public perceptions of risk which may result in public reactions straining already limited resources and thus increasing the overall risk. An example of this is highlighted in the research surrounding the responses to the September 11<sup>th</sup> 2001 terror attacks in the United States of America. The effect of the communications delivered during and after the attack by the government increased fears of potential future terror attacks, particularly on planes (Rogers et al., 2007). This became a health risk in itself as the general public changed their travel behaviour by driving instead of flying, for example, and as a result, individuals were exposed to greater potential risks (Gigerenzer, 2006).

Similarly, the lack of trust displayed by some members of the public in the UK regarding the disorganized dissemination of COVID-19 information and warnings has dramatically impacted the public's risk perception of the pandemic (Hyland-Wood et

al 2021). Of concern here is that trust once lost may not be recoverable and may result in impacts on citizens' mental health (Thoresen et al 2018) or ineffective future risk reduction processes.

Little attention is paid to cases in which trust increases. This may require a change of leadership, but people can change their allegiances and their view of things, so there is scope to increase trust. Lack of trust may be culturally embedded, in which case much effort is required to replace it, but that is not an impossible task.

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*The co-creation labs planners and facilitators should consider how best to address the trust issue.*

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### CITIZEN-CITIZEN

- Presence/ absence of social capital
- Is there a history of collaboration or conflict?
- What is the level of trust?

Part of the journey to build good risk reduction relationships is understanding the social relationships within local communities. The same arguments apply between citizens and citizens as were discussed above in terms of citizens and CPAs. Degrees of collaboration, conflict and trust will signal opportunities or challenges ahead in disaster risk reduction initiatives and interventions, and in disaster events themselves. One fruitful approach is to work with notions of social capital. This is not the place to discuss the very large, critical evidence base analysing the many highly contested aspects of the social capital concept but, as the concept has been shown to be useful in the present context, we will describe it simply and argue for its value in understanding community dynamics. Aldrich (2010) argues that social capital is 'the engine for recovery':

*'[R]eservoirs of social capital and the trust (or lack thereof) between citizens in disaster-affected communities can help us understand why some neighborhoods in cities like Kobe, Japan, Tamil Nadu, India, and New Orleans, Louisiana displayed resilience while others stagnated' (Aldrich 2010: 1).*

Aldrich's research (among others') has provided enough examples of the benefits of social networks in community recovery and community action that it is worth our focus here. Put simply, by social capital we are referring to the social relations between individuals and groups that result in networks of reciprocity in particular locations and which can lead to opportunities to work together and achieve common purposes. However, it is worth noting that there are different types of social capital which function in different ways; these are bonding, bridging and linking social capital.

Bonding social capital usually refers to close social bonds within a social group such as connections between family, friends or neighbours. Bridging social capital refers

to connections that bridge different social groups, maybe across class or race/ethnicity differences or between different communities, or organisations. Linking social capital involves links with those in authority or with resources or power (Claridge 2018).

Aldrich has provided research evidence that social capital is part of the social infrastructure upon which resilience is built (Aldrich and Meyer 2015) (an argument also made by Eric Klinenberg in the North American context) (Klinenberg 2018). Understanding these kinds of relationships within the location of interest is part of understanding the social context and can provide insight into successful or less successful collaborative initiatives. It is worth pointing out that while social capital is often presented in a positive sense, it can lead to negative outcomes as well (Villalonga-Olives and Kawachi 2017). Furthermore, there are substantial critiques of the concept such as by Haynes (2009) who does not dismiss the concept but sets a number of challenges for those 'wishing to invoke it as a solution to a specific problem' (Haynes 2009: 2).

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*There are many standardised and verified scales used in psychology which address the social capital concept. Co-creation labs planners and facilitators could request help and guidance on searching for the most useful which can be used in a simple way as sample questions.*

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### CPA-CPA

- Is there a history of collaboration/ cooperation or conflict/ difference?
- What is the level of trust?

Aldrich (2019) argues that 'failures in coordination and communication (what he terms 'friction') during disaster response have become so common that they are expected' (Boin and Richardson 2015).

*"While idealized crisis response involves smooth coordination between relevant actors, friction between levels of government and between the state and civil society in responding to catastrophe may be more common". (Aldrich 2019 Page 306).*

Typically, there are technological and procedural factors that support or hinder interorganizational collaboration. Resource competition across different levels of government plays a part. For example, a lack of electronic information-sharing tools and a lack of collaboration frameworks specifying roles and responsibilities in response settings have been identified as limiting factors on good interorganizational working. On the other hand, collaboration frameworks, shared physical organizational structures (where possible) and generic planning approaches have been identified as facilitators (Berchtold et al 2020).

In the UK, the Joint Emergency Services Interoperability Principles (JESIP) provides the joint doctrine for the principles of joint working (JESIP 2021).





**Figure 12: Principles for Joint Working (JESIP 2021: 11).**

This structure (Figure 12) is aimed at ‘major incident’ response but, of course, depends upon prior communication, discussion and collaboration frameworks to have been agreed in order for it to operate successfully (Davidson et al 2021). This is precisely what underpins RiskPACC’s aim to develop a collaboration framework through a co-creation approach. Although RiskPACC is focused on CPA-citizen relationships, responsible agencies may differ according to hazard type and scale of threat and so it is important to understand any history of collaboration or conflict between such agencies which may influence service delivery.

In a wider European context, the European Interoperability Framework<sup>11</sup> provides ‘a commonly agreed approach to the delivery of European public services in an interoperable manner. It defines basic interoperability guidelines in the form of common principles, models and recommendations.’ (EIF page 15). It lists twelve underlying principles which are set out in Figure 13 but does not provide a roadmap sufficient to achieve them.

<sup>11</sup> European Interoperability Framework <https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/european-interoperability-framework-detail>



**Figure 13: European Interoperability Framework (EIF) Interoperability Principles.**

Data interoperability issues present an ongoing concern as new software and hardware develops at a fast pace bringing both opportunity and challenge:

*'Incompatible data structures, formats, resolutions, software, user-interfaces and technical requirements give rise to barriers connected to the technological domain. Technological development fosters and unwraps both new opportunities and new barriers to data interoperability (Migliorini et al 2019).'*

In the context of healthcare, and specifically, eHealth, Kouroubali and Katehakis (2019) have claimed that the EIF can be 'a facilitator of digital transformation for citizen empowerment' (ibid page 1). Flores et al 2021 recommend co-creation 'to develop innovative solutions to complex problems and to provide better and more democratic public services' whilst also recognising co-creation's challenges (ibid page 539). In evaluating the potential usefulness of new tools and technological solutions, the issue of interoperability must be addressed. However, a greater

problem may be that digital development is a profit-intensive process that many local authorities cannot afford to keep up with.

Lastly, it is worth considering access to and relationships with other service delivery agencies and departments, especially social services or community development, to provide valuable, up to date information on the nature of the social context in which the activities take place.

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*CPAs should be asked to what extent they wish to explore options for collaborative working with other (government) organizations and whether they would see a value in including this in the RiskPACC repository (Risk Pack).*

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### Non-CITIZENS

- E.g migrants, victims of trafficking, temporary visitors, etc
- Are they visible/ hard to reach/ at greater risk?
- What is the level of trust?

According to the United Nations Office of the United Nations High Commissioner for Human Rights (OCHCR 2006), while citizens are persons who have been recognized by a State as having an effective link with it, a 'non-citizen' is a person not recognized as having these links to the country where he or she is located. The OCHCR identifies different groups of non-citizens, including:

*'permanent residents, migrants, refugees, asylum-seekers, victims of trafficking, foreign students, temporary visitors, other kinds of non-immigrants and stateless people.'* (ibid page 5).

These groups may be hard (or impossible) to reach and engage with, less likely to receive or understand warning and other disaster-related messages, and yet more vulnerable due to a mix of social, cultural, and legal factors (Kelman et al 2008; Dutta 2020; Guadagno 2020; Kuran et al 2020; Pongponrat and Ishii 2018; Arora and Majumder 2021; Teo et al 2019; Gares and Montz 2014; Pardikar 2021). They may also lack easy opportunities to connect with other community members. Guadagno et al (2017) list the following as factors which might affect the lives and security of migrants in disaster contexts but also in the everyday:

- limited language proficiency;
- limited knowledge of their destination's hazards, laws, institutions and markets;
- limited social networks;
- a lack of trust in authorities;
- restrictions on mobility; and
- discrimination, hostility and xenophobia. (ibid page 9)

If these are not adequately addressed, then migrants can be disproportionately affected. While the Sendai Framework for Disaster Risk Reduction 2015-2030 emphasises an all of society/ leave no one behind philosophy, the logistical issues of doing so must also be considered and planned for. Schönefeld (2017) describes a training course in Germany which targeted both civil protection professionals (CPAs) and volunteers, and migrants, both of which groups were initially hard to reach. The targeting of civil protection professionals had to overcome the suspicion of perceived 'soft' topics such as this. The approach to interest migrants in civil protection matters was to integrate it into the mandatory language courses for migrants to Germany. Ultimately, the participants demonstrated interest but clearly, time and effort have to be invested in getting the approach right.

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*For the co-creation labs and the RiskPack, planners and facilitators should consider introducing material and discussion points around this varied group. Also to consider whether there are mechanisms to identify 'non-citizens' and further mechanisms and approaches to serve their needs in the particular case study locations?*

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While this section has addressed citizenship status it shares technical difficulties with any hard to reach or excluded group. Standard data sources may not adequately identify people from these groups as they are often seeking to avoid identification. Remote sensing and other technological supports might open one way to map or locate such groups (Netzband and Rahman 2009; Kohli et al 2012).

### 3.5 Risk Communication Approaches

Risk Communication Approaches			
<b>Attitudes &amp; Values</b> <ul style="list-style-type: none"> <li>• What are citizens' expectations of CPAs?</li> <li>• What are CPAs' expectations of citizens?</li> </ul>	<b>Form &amp; Process</b> <ul style="list-style-type: none"> <li>• Technological/ non technological?</li> <li>• Centralised or decentralised?</li> <li>• Interpersonal communication?</li> </ul>	<b>Medium</b> <ul style="list-style-type: none"> <li>• Social Media?</li> <li>• Face To Face?</li> <li>• Provision of Materials?</li> <li>• Provision of appropriate tools</li> </ul>	<b>Reception &amp; Effect</b> <ul style="list-style-type: none"> <li>• Have messages been received as intended?</li> <li>• Evaluation of Outcomes?</li> <li>• Are the solutions adequate for CPAs?</li> <li>• Are the tools adequate for Citizens?</li> </ul>

**Figure 14: RiskPACC First Draft Framework: Risk Communication Approaches.**

An example from the Czech Republic provides a useful introduction to this section which fits perfectly with the RiskPACC approach:

*'A high level of engagement during emergencies is not a new thing, but thanks to information technology, the roles are far more transparent and there are many more opportunities for citizen [sic] to*

*be put into action [...], including active management. Modern technologies allow for more active engagement of citizens if there is better access to the Internet and with incorporating mobile technologies, mobile phones, text and multimedia messages especially when combined with GPS [...]. A hopeful solution would be an avoidance of hierarchical and pseudo military structures and not using incident command systems and incident command management. Better employing of NGOs could be one solution, too.'* (Rehacek et al 2015).

RiskPACC Risk Communication Processes seek to understand the key criteria for successful two-way communication which include learning about the needs and expectations of both CPAs and citizen groups. RiskPACC aims to develop the most appropriate forms, processes and tools of communication through dialogue with its Case Study partners and their citizen groups and to avoid mere tokenism (Arnstein 1969) by which is meant simplistic, one-way, top-down, information flows from authorities to citizens which are devoid of real participation and two-way communication. The value of two-way communication processes is discussed in detail in RiskPACC deliverable D3.4 Lab Methodology and Glossary. Aldrich (2019) summarises the problem as follows:

*'Societies that have unbalanced the interaction between top-down and bottom-up policies have paid the price. As societies face extreme weather events and climate change, they must recognize the need to integrate local residents and governments into response and recovery plans.'* (ibid page 315).

How to do that in different contexts should be subject to discussion and debate. At time of writing, RiskPACC is still in its earliest stages and engagement with citizens has yet to begin. Thus, the discussion here is very much a generalised view of likely ways forward which focus more on the underlying values and philosophy rather than the more procedural aspects (see D3.4 Lab Methodology and Glossary for more procedural features).

### ATTITUDES AND VALUES

- What are citizens' expectations of CPAs?
- What are CPAs' expectations of citizens?

If citizens expect CPAs to carry out planning, rescue and response activities while CPA's believe citizens should take more responsibility to manage their risk themselves (as was mentioned in the early exploration of CPAs' and citizens' views in D1.2), then this mismatch will invariably lead to disappointment or even conflict. Without an opportunity to exchange understandings, preferences and constraints, it is likely that expectations will not be managed on either side. All the foregoing components of the draft RiskPACC Framework have paved the way to manage such expectations and will not be reproduced here. Suffice to say, it is important that the context for action is understood and that options for collaborative/co-creational frameworks have been discussed.

## FORM AND PROCESS

- Technological/ non technological?
- Centralised or decentralised?
- Interpersonal communication?

In terms of form and process of communications, the key initial questions are around the use (or not) of technology, how centralised is the process and direction of messaging, and whether it allows for interpersonal dialogue. In the last few decades there has been an increasing movement towards more technological means to transmit messages. However, there remains a digital divide for certain social groups with less access to, or less aptitude for, technology use. Dargin et al's (2021) research in the USA provide some nuance to the, sometimes simplistic, generalisation that 'different people have different needs and capabilities (often limited to older and younger citizens' technological capabilities). They found:

- (1) Socioeconomic factors plus locational and regional effects played a role in determining, not only platform uptake, but motivations for information seeking and information sharing on social media;
- (2) The type of social media platform influenced the type of information people seek;
- (3) Households from lower socioeconomic and minority backgrounds were more likely to use social media platforms to seek *different kinds of information* on social media than their peers;
- (4) Perceptions of information reliability also showed variability, with rural households, lower income groups, and racial minorities more likely to report greater perceived unreliability in social media information (ibid page 11).

Thus, there was evidence of a relationship between levels of educational attainment and other human, social and economic resource availability and levels of perceived reliability of information which was also strongly associated to trust in the information provider. Because different platforms and applications have different features, these affect the type of information that is provided or shared and how it is received. This could mean that a cultural preference for one type of platform over another (as discussed in Dargin et al 2021) leads to more or less adequate information for the reduction of risk.

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*In the early stages of co-creation lab participation, it is recommended to find out from participants what social media they use and why.*

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Centralized systems typically refer to national-level organizations which operate official disaster warning systems. In decentralised systems these tasks may be carried out by other organizations, by municipal workers or by volunteers at the more local level (Villagran de León et al 2007). Measuring effectiveness of these different approaches is not simple; while national level systems may appear more effective and efficient, if the full chain of warning, informing and response is considered, the



lack of the desired action may render it ultimately ineffective. While decentralised systems may appear less efficient, they may be more effective in the long run through increasing inclusion in, and engagement with, the disaster reducing activity and by increasing laypersons' knowledge and confidence in taking action.

Centralisation versus decentralisation is closely linked to whether or not information systems offer the space for interpersonal exchanges and whether trust relationships operate.

### MEDIUM

- Social Media?
- Face To Face?
- Provision of Materials?
- Provision of appropriate tools

The different communications media to be adopted by RiskPACC case studies are expected to emerge through discussion and debate, and will form a key consideration for Task 4.2 Repository of Good Practices – Creating the Knowledgebase. The pros and cons of top-down versus bottom-up methods and the opportunities for citizens to voice their own knowledge, preferences and concerns, is a core concern for RiskPACC. What are the benefits, opportunities and challenges of each? These issues will be explored with citizen groups and CPAs as part of the co-creation workshops.

Face to face interactions may be the traditional preference for social interaction (Taylor-Jackson et al 2021) (e.g. greater potential to develop trust relationships, improvements in understanding and empathy) but they also present a number of challenges. The COVID-19 pandemic has made most people aware of the risks attached to physical contact in such a context but there are other difficulties also. For some people, face to face interaction may create intense social anxiety (Grieve et al 2013) for which social media may represent a safer way to stay socially connected. Face to face interactions may also be limited by time, distance, availability and resources. Thus, the expansion in social media provides a viable, and for some, preferential, alternative but should be selected with due awareness of the possible challenges.

Social media applications are now a prominent means for real-time communications, interaction and collaboration in disaster situations (Yunis et al 2019: 72). Much work on knowledge sharing has been focused at the individual level with less attention to organizational levels (Ahmed et al 2019: 86) or family and community interaction.

The RiskPACC co-creation labs and the RiskPACC technical teams will contribute to devising a suite of possible solutions for a range of hazard types and geographical locations in our case study areas. RiskPACC will explore the use of, inter alia:

- Crowd-sourcing tools;
- Volunteered Geographical Information (VGI) solutions;
- User stories for e.g. pre-disaster exposure and vulnerability mapping;
- Gamified apps;



- Augmented reality (AR) apps; and
- PUBLICSONAR monitoring of open data and social media.

These are to be assessed for appropriateness in different disaster phases and to allow enhanced two-way communication between CPAs and citizens. The selection of final types of technological support and their potential for addressing the Case Studies' identified hazards and issues, will emerge through collaboration and discussion. A fuller discussion of the proposed approaches of RiskPACC technical partners is presented in D3.4. Lab Methodology and Glossary.

### RECEPTION & EFFECT

- Have messages been received as intended?
- Evaluation of Outcomes?
- Are the solutions adequate for CPAs?
- Are the tools adequate for Citizens?

The co-creation labs and associated methodology are just one method of risk communication detailed and it will be important to understand the extent to which the planned outcomes have been met.

One of the issues of concern in evaluation processes is to confuse 'output' with 'outcome'; a focus on outputs will just reveal, for example, how many people turned up to an event, how many and what types of communication were used, but a focus on outcomes will tell you whether your communications achieved what was intended, whether there has been any observable impact or change from any intervention or engagement. Johnston and Taylor (2018) suggest three tiers of engagement from very basic 'counts' on social media, to more significant forms that make an impact in the broader social context.

**Table 2: Conceptual Tiers for Measuring Engagement (Johnston and Taylor 2018: 7)**

<i>Tier</i>		<i>Possible measurements</i>
1	Low level	Indicator of activity
	• Presence	Counts and measures of interactivity
	• Occurrence	Social media likes, page visits, click-through
	• Manifestation	Monitoring – social media and traditional
		Reading/ viewing/ visiting/ impression/ awareness
2	Mid-level	Indicators of relationship qualities
	• Understanding	Trust, reciprocity, credibility, legitimacy, openness, satisfaction, understanding
	• Connecting	Interaction quality
		Diffusion – patterns and networks
		Dialogue

		Voice
		Indicators of engagement dimensions at individual level measuring affective/ cognitive/ or behavioural outcomes, e.g. user-generated effects or neuroscience/ unobtrusive/ implicit measures
3	Higher level	Antecedent and outcome
	• Action	Indicators of social embeddedness
	• Impact	Of self and others
		Social awareness and civic (greater good) indicator
		Acknowledgement of other (diversity/ empowerment)
		Indicators of action, change, and outcomes at social level
		Engagement in ecological system
		Recognition of diverse perspectives
		Social capital
		Agency and coordinated action

An Australian study (Taylor et al 2019) of 30 community engagement practitioners in emergency management, applied the Johnston and Taylor (2018) three tiers of engagement model and found most were adopting Tier 1 activities with far fewer Tier 2 and 3. It became clear that the study participants were often lacking skills and confidence in carrying out such evaluations. Without qualifications or training it can seem that this level of evaluation is an unaffordable luxury. Clearly there is more work to be done in devising appropriate measures of effectiveness and impact across the sector and within the RiskPACC co-creation approach.

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*In seeking to determine whether the solutions are adequate for CPAs and the tools adequate for Citizens, it will first be necessary to clearly identify the problem which each (separately and combined through consensus) wishes to resolve and the capacity to achieve them with available resources. This is necessary first step for co-creation lab planners and facilitators.*

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### 3.6 Strategies for Closing the RPAG (CPAs & Citizens)

Strategies for Closing the Risk Perception-Action Gap RPAG			
Consider wider context for decision making	Plan for what people actually do - not what you want people to do	Equalize dialogue space	Exploit diverse approaches
<ul style="list-style-type: none"> <li>• <b>Improve</b> understanding of risk &amp; socio-political context</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Explore</b> diversity of risk perceptions &amp; actions</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Reset</b> Risk Reduction Relationships (RRR)</li> <li>• <b>Reduce</b> dependence on the information deficit model</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Rethink</b> risk communication processes and tools (tech and non tech)</li> </ul>

**Figure 15: Strategies for Closing the Risk Perception-Action Gap (RPAG).**

The foregoing discussion suggests some key markers for more successful engagement between CPAs and citizens.

Considering the wider context for decision making will help improve communications about possibly different understandings of risk and about the social-political context in which such communications take place.

CPAs may have worked for many weeks, months or years on developing emergency plans and can be frustrated when citizens do not do what CPAs' think is the right course of action. Research by American disaster sociologists identified this problem and put forward their recommendation for its solution: plan for what people actually do – not what you want people to do (Auf der Heide 2004). This means getting to know the community context and collaboratively exploring the diversity of risk perceptions and actions of citizens and citizen groups. As we understand collaboration in RiskPACC, this means equalizing the dialogue space through more two-way communication. It may also mean resetting risk reduction relationships (RRR) if they are not being productive and reducing dependence on the information deficit model (believing citizens just need more information and education to raise their risk perception) and create the conditions for them to act in pre-identified ways).

Techniques and methods to achieve all that will need to exploit diverse approaches and reflect critically upon (and possibly rethink) current risk communication processes and tools. They may require technology-based tools, more traditional face-to-face or paper-based approaches, or – more probably – a mixture of the two. As an indicator of collaborative governance, whatever is selected should be arrived at by consensus where possible and tailored to the specific social, cultural, political and economic context: what seems effective elsewhere may simply not work in a specific context (maybe because of resource constraints, educational attainment levels, or cultural appropriateness).

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*co-creation labs planners and facilitators should consider beforehand how to report back on decision outcomes that might not satisfy all participants.*

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### 3.7 Relating the RiskPACC Framework to the Co-Creation Labs

Precisely what mix of the above is used will depend on context but all our preliminary work reinforces the notion that working collaboratively is the most important component in RiskPACC. Lember et al (2019) warn that there is still little systematic evidence on how digital technologies affect co-production and co-creation in practice (ibid page 1680). The authors refer to some of the challenges which arise due to 'techno-optimism' (ibid page 1666) which may give citizens a voice and encourage co-production and co-creation but could equally sidestep interaction and productive relationship-building.

We have distilled the RiskPACC Draft Framework components into the following processes: Understanding Through Sharing; and Relating & Building. Figure 16 shows how the framework components match to these processes and the next section describes the two main processes in more detail.

CO-CREATION LAB PROCESSES:	UNDERSTANDING THROUGH SHARING			RELATING & BUILDING	
Co-design elements	Getting to know the context		Identifying viewpoints & knowledges	Productive relationship building	Agreeing & selecting methods and tools
RiskPACC Draft Framework Components:	Risk Context	Social-political Context	Risk Perceptions & Actions	Risk Reduction Relationships (RRR)	Risk Communication Approaches
Co-design activities (tech-based):	Insight on RPAG		Proposed tools & functionalities	User requirements	Matching of tools with case studies

**Figure 16: Planned Co-creation Lab Processes As They Relate To The Draft RiskPACC Collaborative Framework.**

## 4 FRAMEWORKS FOR COLLABORATIVE GOVERNANCE

In this chapter we build on the foregoing discussion and synthesise findings from a number of frameworks related to collaborative or deliberative governance, by which we mean bringing ‘multiple stakeholders together in common forums with public agencies to engage in consensus-oriented decision-making’ Ansell and Gash 2008). We identify those, or more correctly, elements of those, with most utility for RiskPACC. We organise this according to the planned co-creation labs processes:

- **Understanding Through Sharing**
  - *Risk and Social-political Contexts - Getting to know the context;*
  - *Risk Perceptions & Action - Identifying and aligning viewpoints & knowledges;*
- **Relating & Building**
  - *Risk Reduction Relationships (RRR) - Productive relationship building;*
  - *Risk Communication Approaches - Agreeing and selecting methods and tools.*

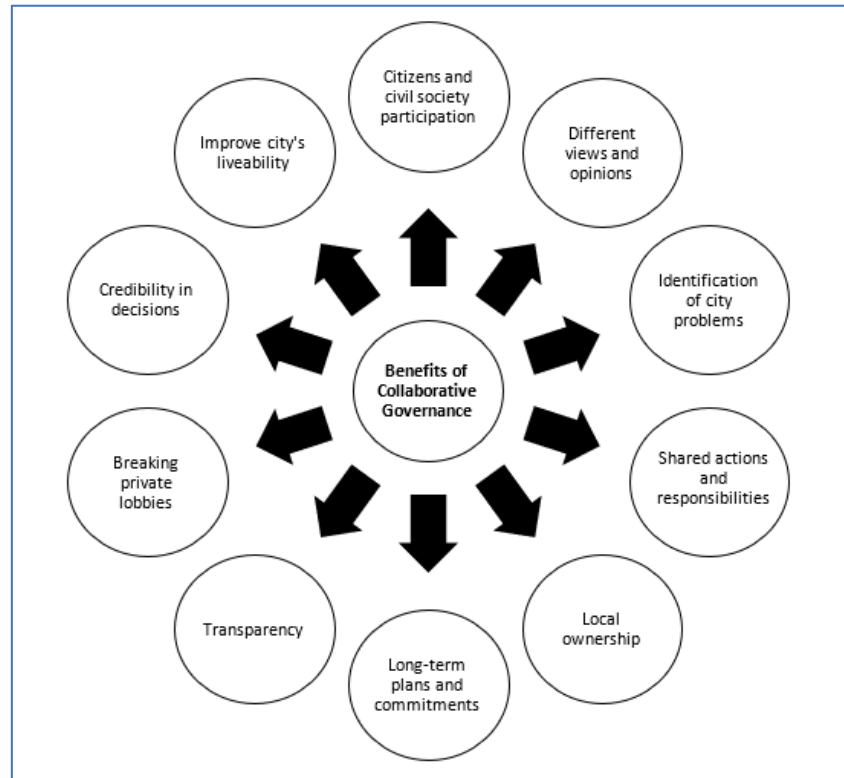
It is also worth considering how our hazard-focused collaborative work interfaces with the larger picture presented by the Sustainable Development Goals (SDGs) (UNISDR 2015). It was the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil, in 1992<sup>12</sup> which institutionalised participatory processes that were then developed further at the local level through Local Agenda 21 and ultimately created a policy framework to encourage Local Authority service providers to develop public consultation and participation processes.

This is picked up in a study by Conti et al (2019) in Copenhagen (Denmark), Amsterdam (Netherlands), London (England), Hamburg (Germany) and Barcelona (Spain) which used qualitative methods to interview 30 representatives from public administration, politicians, industry and commerce, and the third sector. Out of this empirical research they have created a number of benefits of collaborative governance (Figure 17). In the management of sustainable cities, they consider collaborative governance to be fundamental to sustainable development, arguing that it enhances democratic processes beyond representative democracy. They go as far as saying that a city can only be sustainable if the governance process allows citizen participation.

While that article and a considerable amount of SDG activity addresses city issues, the benefits identified are easily transferable to smaller settlement types although it is unlikely that any individual initiative would be able to claim all of these.

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<sup>12</sup> The 1992 ‘Rio Conference’ <https://sustainabledevelopment.un.org/outcomedocuments/agenda21>



**Figure 17: Benefits of Collaborative Governance (Conti et al 2019: 9).**

Collaborative governance fits into the wider goal of community disaster resilience. The emBRACE framework (emBRACE 2011) (see Figure 18) conceptualizes the key aspects of community resilience as an intertwined space of three domains: resources and capacities; actions; and [social] learning. These are situated within two sets of extra-community processes and structures: laws, policies and responsibilities which support regional, national and international civil protection practices and disaster risk management organizations; factors influenced by broader social, economic, political and environmental context factors, including socioeconomic changes over time, and by levels of disturbance (or stasis) affecting the community of interest.



**Figure 18: The emBRACE Framework For Community Resilience To Natural Hazards (Kruse et al 2017: 2325).**

emBRACE attaches considerable importance to access to resources such as social capital and [social] learning, and the, sometimes critical, role played by ‘community champions’ who can leverage community resources from influential actors and agencies through bridging and linking social capital. Identifying these individuals is important when considering who should participate in the collaborative governance. However, some of these individuals may emerge at a later date as they develop their skills and community role.

The emBRACE project found trust in authority/ies and other active stakeholders, plays a significant role in achieving effective and participatory disaster risk reduction practices. Clearly, sustained and effective communication is essential but is likely to be custom-made for different demographic fractions with different needs, requirements, and personal circumstances.

If the process works then social learning is created. Bandura’s (1977) social learning is a cognitive process involving thinking, knowing, remembering, judging, and problem-solving. Importantly for our consideration of collaborative governance, this takes place in a social context rather than at the level of the individual. Collins and Ison (2009) go as far as to propose that social learning is the highest level of participation (Page 5).

We will adopt a working definition of collaborative governance following Ansell and Gash (2007):

*“A governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative*



*and that aims to make or implement public policy or manage public programs or assets” (ibid page 544).*

Their definition emphasises six important criteria:

- the meeting, workshop or other setting for collaboration is initiated by public agencies or institutions (but consider the critique presented by Schauppenlehner-Kloyber and Penker (2016));
- participants include nonstate actors (citizens and citizen groups);
- participants are engaged directly in decision making and are not merely ‘consulted’;
- there is formal collective organization;
- the aim is to make decisions by consensus (although consensus may not be achieved in practice), and
- the focus of collaboration is on public policy or public management. (Ansell and Gash 2007: 544-545).

This is not a particularly radical definition and will not suit all parties, neither does it address the risk of elite capture which can derail democratizing interventions (Imperiale and Vanclay 2020: 236). However, keeping that warning in mind, it is a practical starting point that is feasible within RiskPACC project timeline and other constraints.

After this short, general introduction to collaborative governance, we now turn to exploring ideas related to our two processes: understanding through sharing; and relating and building.

## 4.1 Understanding Through Sharing

The first of our overarching processes – **Understanding Through Sharing** – is an important first step to enable CPAs and citizens to get to know the context in which the discussions are taking place, and, in the process, to begin to understand the situation as others see it. The inclusion of ‘local knowledge’ has been identified as a factor influencing community disaster resilience (Haworth et al. 2016; Birkmann and von Teichman 2010). Without appropriate, context-specific, communication between CPAs and citizens, each group may be unaware of important qualifications to how each understand the situation and may lead each to devalue the knowledge of the other (Usón et al. 2016). This section considers both the ‘why’ questions and the ‘how’ questions.

Klonner et al (2021) provide an example from Germany of where understanding the context for citizens’ perceptions and actions regarding flood risk can provide insight. This study, which adopted a participatory mapping technique, found that citizens living in an area of flood risk had lower risk perception than those citizens living outside the risk area. This could appear to be a paradoxical finding (although not unique) (Penning-Rowsell and Fordham 1994) until more is known of the context:

*The citizens not living directly in the area at risk seem to have a higher risk perception of this area. In contrast, the people who face the flooding evaluate their flood risk as lower. Due to the experience they have, for example, in their own houses [...] they know what to do in the case of flooding and they have prepared themselves. They have pumps to get rid of the water in their cellars or they rearrange the stored items so that no valuable belongings are in flooded parts of the house; some also use measures like tiling the cellar walls or painting them with special oil paint [...] In this way, residents reduce their vulnerability and do not see their surroundings at such a high flood risk. (Klonner et al 2021: 67).*

Thus, what might seem a case of low risk perception by citizens in a particular flood-prone location, can be seen to be the result of a rational process of risk estimation and mitigating actions.

An alternative explanation which must also be considered might see this response as a product of cognitive dissonance (Festinger 1957) in which people who are faced with a risky situation – such as living in a flood prone location – which creates psychological discomfort (dissonance), try to reduce it by avoiding information which might reinforce it. So, paradoxically, providing such citizens with more flood (or other hazard) risk communications may cause the opposite effect to that which was intended.

Another example concerning attitudes to nuclear energy in France and the Netherlands (Wiegman et al 1995) explains it in this way:

*'The cognitive dissonance that occurs by not migrating from the risk area, and therefore by accepting the risks of nuclear power, is reduced by estimating the risks less highly.' (ibid page 514).*

So, this raises a question about how we estimate risk and decide between two very different methods: estimations based on historic records and mathematical modelling, or estimations based on lived experience. While there might not be a simple answer to this, the important point is the opportunity to share these different estimations and make an informed judgement through a form of collaborative governance. Furthermore, it is not a simple split between CPAs using the first and citizens using the second. Both groups use a mixture of these in practice.

Everyone will come to collaborative governance with their own interpretation of what it means. The extent to which power is transferred from CPA to citizen will vary in each case and so the above discussion cannot be seen as a set of rules but is only a guide with which to start a conversation. Sherry Arnstein's 'ladder of citizen participation' (1969) (Table 3) is often a starting point for discussions on collaborative working and is a useful check on the extent of citizen power is desired, has been enabled or mere tokenism has been affirmed.

**Table 3: The Ladder of Citizen Participation (Arnstein 1969: 217)**

Rung on the Ladder	Degree of Citizen Participation	Degree of Citizen Power
8	Citizen control	Degrees of citizen power
7	Delegated power	
6	Partnership	
5	Placation	Degrees of tokenism
4	Consultation	
3	Informing	
2	Therapy	Nonparticipation
1	Manipulation	

In the RiskPACC context, it will be important for CPAs and citizens to understand the borderline between tokenism and citizen power. In our use of the term 'co-creation' we lean towards giving more power and agency to citizens from the start (the design stage) of the collaborative governance process. Bringing in citizens simply to approve already designed solutions would be to locate the activity in the tokenistic sphere. Finding consensus on the most appropriate rung of the ladder will be a challenging task for the co-creation labs.

A post-September 11, 2001 (9-11) example from Memphis, Tennessee, USA (Norris-Tirrell and Clay 2014) acknowledges many of the components discussed above but perhaps lies on a lower rung of 'degrees of citizen power'. This example reinforces the need for authority and that an essential characteristic of what they term, 'integrative emergency management collaboration', requires a 'basic understanding that the command and control structure will take over in the time of emergency requiring all actors to be trained to play their role within the "official response" structure.' (ibid page 40). Perhaps the point which needs stressing here is that a necessary prior step is to ensure everyone is aware of why this is the best course of action and makes a joint agreement and commitment, rather than an assumption of authority.

Schauppenlehner-Kloyber and Penker (2016), in their study in the Austrian city of Korneuburg, identify several shortcomings of some participatory processes:

- Problems are usually pre-defined by political and administrative representatives;
- Citizens are not usually enabled to initiate the participatory processes or the problem definition;
- Processes usually remain controlled by political and administrative representatives and are not open and adaptive to initiatives that emerge directly from citizens. (ibid page 2).

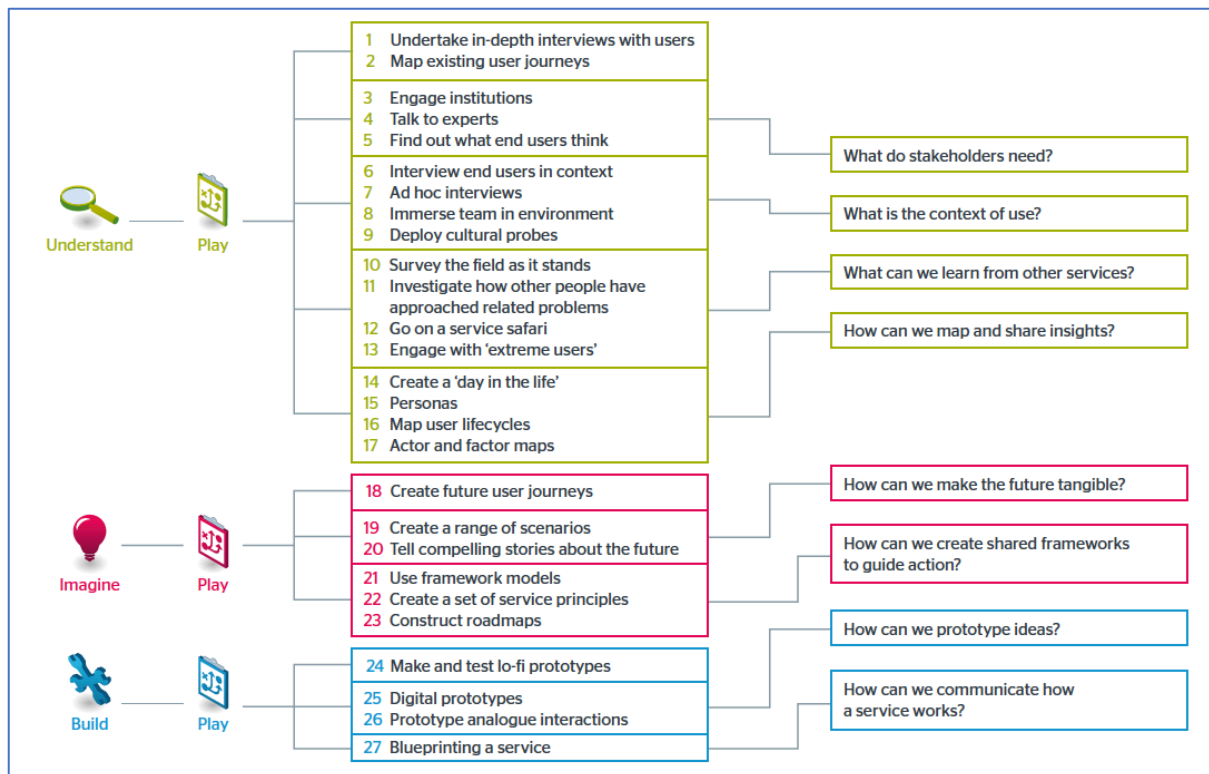
They propose a model which moves towards self-organizing citizen initiatives which would place them at a higher rung of the participation ladder. Again however, it is the development of understanding which will allow consensus to emerge, or at least a shared understanding of differing positions.

Ansell and Gash's prediction from 2007 would appear to be borne out by the intervening years:

*'Whether collaborative governance is a passing fancy, we do not know. We confidently predict, however, that the demand for better cooperation and coordination between government and stakeholders is unlikely to wane in the near future.'* (ibid Page 563).

If understanding is the first step, then sharing ideas and viewpoints is the next.

Our identification of two overarching processes (Understanding Through Sharing, and Relating & Building) owes much to the Co-design Playbook (Jisc 2017) which, although operating in a different context, has much to teach about co-design processes and activities. The Playbook uses *Understanding* the problem or opportunity in more depth; *Imagining* what might be done with these insights; and *Building* products and services. They also use the term 'plays' to mean 'ways of answering questions and developing new ideas' in the same way as we might use the terms 'activities', 'approaches' or 'methods'. These plays or approaches are not meant to be prescriptive and the Playbook acknowledge that there is no 'right way' to undertake them. They can be adapted to the needs of an individual setting. (Page 26). Their process, with ideas for specific types of activities, is reproduced in Figure 19:



**Figure 19: Jisc Co-Design Playbook – Process (Jisc 2017: 5).**

The Playbook contains a number of activity types to provide inspiration for the RiskPACC co-creation labs.

A number of studies have approached sharing and identifying different viewpoints and knowledges through the use of participatory mapping. An example from Brazil (Ardaya et al 2019) aimed to close the communication gap between citizens living in flood risk areas and the responsible authorities. They explored perceived risk areas, evacuation routes, and shelters and compared these to official risk maps and information.

The CPAs had created a single evacuation point for every neighbourhood but through the participatory mapping, an average of five evacuation points were identified for each neighbourhood (ibid page 9). The authors argue that the participatory mapping process generated discussion and detail on the best evacuation routes but also revealed the underlying reasoning for the routes and evacuation points and through this clarified existing conflicts. (ibid page 9). They suggest that the use of participatory mapping may be used to create reliable, quantitative, and easy-to-use material as well as contributing to social learning.

A range of participatory maps are described by Gaillard et al. (2015) and identify the strengths and weaknesses of each. They cover the full technological span from creating maps with found objects (e.g. stones and sticks) to Web-based & interoperable GIS mapping. Examples include: Ground mapping, Stone mapping, Sketch mapping, GPS Mapping, Balloon & kite mapping, Drone mapping, Web-based & interoperable GIS mapping, Scaled 2D mapping, Aerial photograph or satellite image mapping, participatory 3-D mapping (P3DM). (ibid Pp. 33-34).

What you see clearly from many participatory mapping activities is the level of engagement that can be achieved from citizens who want to contribute their local knowledge. However, as the authors conclude, the objective is not to just have a nice map but to ‘foster a dialogue amongst actors of DRR, facilitate disaster risk assessment and, eventually, to plan for disaster risk reduction’ (ibid page 37). The approaches and tools that are used are a means to an end and not an end in themselves.

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*Co-creation lab planners and facilitators should consider using a participatory mapping activity early on in the lab to allow CPAs and citizens to share their own understandings of where risks lie and start the process of discussing actions to deal with them.*

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## 4.2 Relating & Building

The foregoing material has provided evidence for the rationale for collaborative governance (the ‘why?’ question). Now we turn to considering the development of productive relationships between CPAs and citizens and the building period where options for tools and processes are explored (the ‘who?’ and the ‘how?’ questions).

### INCLUSION

Ansell et al (2020) discuss the issue of inclusion and draw on a large number of cases located in the Collaborative Governance Case Databank (CGSD),<sup>13</sup> an open databank of collaborative governance cases, systematically coded using a standardized survey instrument to facilitate systematic cross-case comparison and analysis. The database is also a useful database of questions which can be used as a stimulus for dialogue in collaborative activities or as prompts for subsequent evaluations.

They found a range of factors affecting decisions to participate: trust (in the organizer and in the other participants not to engage in opportunistic behaviour), weighing incentives versus disincentives (people from marginalised groups are only likely to engage with the process if the perceived benefits outweigh the perceived costs), interdependence with other stakeholders, available resources and capacities (which may be related to education level or other resources), and power differentials (between small voluntary groups versus large NGOs and other bodies).

Who is leading the initiative can also influence who gets invited or who is enabled to join and this is often tied to the pre-set objectives of the activity. The process of relationship building through facilitative leadership will also affect the likelihood of successful outcomes (‘inclusion will be less successful if conveners and facilitators of collaborative processes do not take the time to build commitment and trust and if

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<sup>13</sup> Collaborative Governance Case Databank (CGSD)  
<https://collaborativegovernancecasedatabase.sites.uu.nl/>; and see Douglas et al 2020.



they are not strategic about including actors who are committed' (Ansell et al 2020: 574). They observe:

*'creating an inclusive community of participation involves doing informational and relational work that brings people together from different perspectives in ways that allow them to appreciate one another's perspectives and potentially work together to address problems'. (ibid page 574 citing Feldman and Khademian (2007: 320)).*

Which sounds very much like the RiskPACC rationale and recommended process for collaborative governance. However, while wide inclusion is a democratic ideal, there are drawbacks to large groups in collaborative governance interactions:

*'wide inclusion of actors in the networks that lie at the heart of collaborative governance processes may increase transaction costs, reduce the quality of deliberation, muddy negotiations or produce 'least common denominator' bargaining outcomes.' (Ansell et al 2020: 571).*

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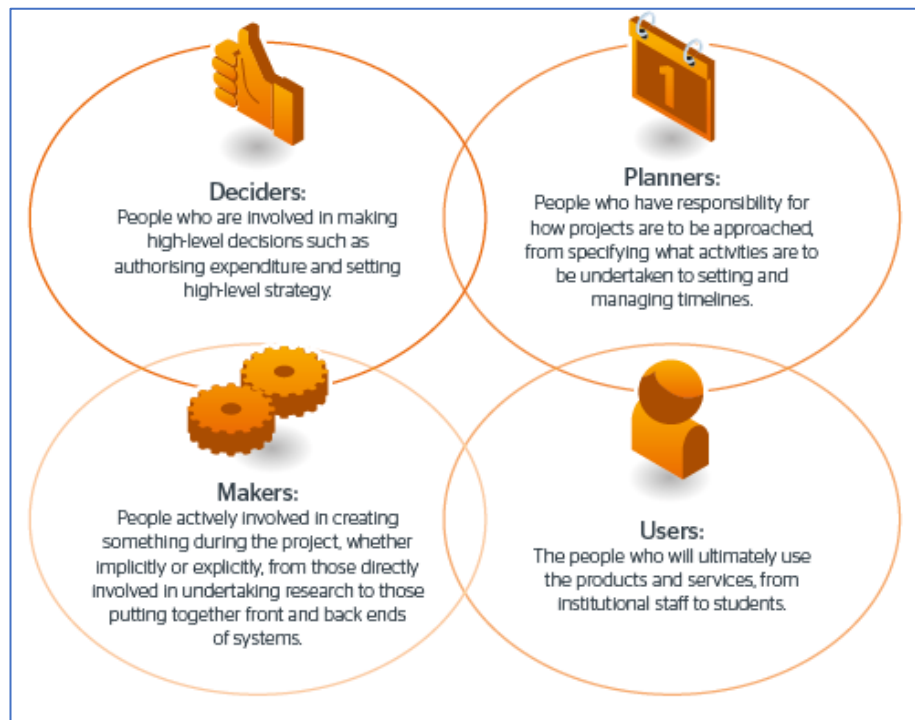
*Co-creation lab planners and facilitators should consider what will be the optimum number and social mix of lab participants to effectively achieve meeting objectives.*

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## ROLES

Continuing the consideration of 'how?' questions, the Co-design Playbook (Jisc 2017: 9) offers suggestions for participants to have different roles beyond CPA/organizer and citizen/user. The Playbook identifies four key roles: Deciders, Planners, Makers and Users (see Figure 20). While the Playbook is addressing a different subject focus, RiskPACC could use this framing to consider who does what in the co-creation labs. It might seem to be a foregone conclusion that CPAs would be Deciders and Planners while the RiskPACC technical partners would be Makers and citizens would be primarily Users, however, depending on the backgrounds and interests of the participants, and through consensus decision-making, these presumed boundaries might be shifted and that 'who does what' is part of the initial dialogue.





**Figure 20: Four Key Roles People Can Play Within the Context of a Co-Design Project (Jisc 2017: 9).**

### VOLUNTEERS

In discussing roles, it is worth giving a little consideration to the role of volunteer. Whittaker et al's (2015) review of volunteerism is a useful collation of examples, issues and recommendations. It identifies the traditional concern of emergency managers/CPAs that volunteers are, or can be, a disruptive force and a drain on resources in periods of crisis but balances this with a recognition that increasing disaster risk and increasing population size are likely to make traditional 'command and control' practices of CPAs harder to maintain (indeed, the 'responsibilisation' debate around community resilience is an indicator that there is already considerable change in that regard. Responsibility without power - a method to devolve responsibility from the state to civil society, in an attempt to relocate responsibility for disaster response, is often associated with parallel failure to delegate appropriate resources and the ability to act effectively to local areas. (See RiskPACC D2.1).

*'Ordinary citizens who volunteer their time, knowledge, skills and resources to help others in times of crisis represent an immense resource for emergency and disaster management. Research reviewed in this paper suggests that unsolicited volunteers will be active in times of crisis, so it is vital that emergency services and other organisations are prepared to cooperate with them and coordinate their activities... Attempts to 'integrate' informal volunteers into formal systems may prove counterproductive by quashing the adaptability, innovativeness and responsiveness that informal volunteers bring to emergency and disaster management.'* (Whittaker et al 2015: 366).

The authors discuss the general lack of clarity on definitions of volunteer but make a major distinction between ‘informal volunteerism’ and volunteerism involving individuals and groups without a formal affiliation. CPAs typically opt to work with formally affiliated or, at least, recognized and organized groups. Such groups are normally focused on particular areas, issues or social group interests and can be more easily incorporated into CPA plans.

Also discussed are the pros and cons of ‘digital volunteerism’ as a new but growing mode at the time (the article is from 2015).<sup>14</sup> While Whittaker et al speak of digital volunteers, Kostoska and Kocarev (2019) take this further and refer to ‘digital democracy’ by which they mean practising democracy with digital tool. Linders (2012) goes further again to describe an evolutionary process of citizen co-production in the age of social media which is described as ‘from e-government (citizen as customer) to we-government’ (citizen as partner) (Linders 2012: 446 and 452). This, it is argued, signals the potential for a new kind of social contract through the use of use of the Internet of Things, cloud computing, big data, machine learning and artificial intelligence, for example.

This has all co-evolved into ‘smart governance’ forms which tend to make a distinction between ‘smart government’ and ‘smart governance’. The former is ‘prone to a predominantly technological approach that may not always pay proper attention to the governance aspects of (lacking) collaboration between smart governments, smart citizens, and other stakeholders.’ (Pereira et al 2018: 156) RiskPACC is aiming for smart collaborative governance forms in its Co-creation labs and other initiatives.

## BUILDING

It is not yet possible to provide detailed ICT requirements and technical specifications of the VGI solutions to be developed in RiskPACC, since specific needs by the end users first need to be clarified<sup>15</sup>. Different hazard types, coupled with the different phases in disaster risk management, result in a variety of different georeferenced information types that can be – fully or in part – sourced by volunteers. There are three broad generic categories outlined below, using either contributors distributed globally (remote volunteers), or those with direct access to the hazard or disaster site (in situ volunteers).

## INFORMATION GENERATION FROM GEODATA BY REMOTE VOLUNTEERS

Purpose: geographically distributed volunteers derive information from remote sensing imagery or other forms of image data of a hazardous area or disaster site. This ranges from rapid post-disaster response and damage assessment (time-limited action) to long-term mapping campaigns. Either lay or professional volunteers with regular computing equipment can be involved. Any necessary qualifications depend on the task (such as a remote sensing degree for satellite image analysis). Some existing examples include: post-disaster damage assessment based on satellite

<sup>14</sup> See Meier 2015 for an updated view.

<sup>15</sup> The first part of this section is based on an internal RiskPACC paper by Norman Kerle, University of Twente (Kerle pers. comm. 3 February 2022).

imagery, such as through GEOCAN or Humanitarian OpenStreetMap Team (HOT), including PicturePile (Danylo et al., 2018), or openly accessible platforms similar to Tomnod; base-map generation through regular OpenStreetMap, or targeted mapping through Missing Maps (de Albuquerque et al., 2016; Scholz et al., 2018) to fill critical data gaps; and analysis by volunteers in a globally distributed network of photos taken in a disaster area (Loor et al., 2022)

Using these and similar approaches could contribute improved (more coordinated, more accurate, more efficient) post-disaster image-based damage assessment through VGI, also optimised by using AI to support volunteers mappers (through pre-screening, automated detection and mapping of simpler features, etc.). Also, Embedding of Missing Maps or PicturePile approaches in risk map updating, through identification of relevant changes in landcover/landuse, elements at risk, or hazard features (Olteanu-Raimond et al., 2020).

These approaches create both research opportunities but also challenges for RiskPACC such as the identification of an ideal platform (including extension of existing one or prototyping a new one) for both ad hoc disaster response mapping and long-term image-based mapping, including pipelines for image sourcing and serving. Another challenge is that the GEOCAN and Tomnod platforms mentioned above are no longer alive, also illustrating the challenge of creating lasting VGI solutions. Also, improvement of mapping contributions by better volunteer recruiting (and qualification verification), training and monitoring of volunteers, task-assignment as a function of ability, and facilitation of inter-volunteer communication could all have positive results but come with a labour cost. Adopting gamification approaches can improve attraction and retention of volunteers, especially for long-term mapping.

Another potential challenge is in terms of ICT requirements including: an appropriate platform for image serving for distributed mapping (similar to Google Earth or OSM functionality), task allocation, training material integration and provision, communication; database infrastructure for processing and storing of mapping responses.

It is important to remember that the primary focus is on addressing the research challenges and gaining improved understanding, rather than building operational tools (target TRL5).

#### TASKED LOCAL MAPPING BY VOLUNTEERS

In this example, volunteers living in or with access to a hazardous or disaster-affected area are asked to provide information on specific target sites. Potentially anyone living in the area in question with access to a smartphone can be involved. Some examples of this approach include: landcover/ landuse information acquisition at specific locations, for such as through the FotoQuest app (Bayas et al., 2020), or specifically for map updating or validation (Antonioni et al., 2016); hazard-specific information collection in select pre-determined places, such as forest fuel loading to assess wildfire hazard (Ferster and Coops, 2014); locally-sourced information by volunteers is coupled with remote sensing information, or volunteers' (lay)

contributions are coupled with those of experts (Waldner et al., 2019); targeted post-disaster damage assessment (Chaves et al., 2019; Vahidnia et al., 2020).

A related but distinct methodological approach is Participatory GIS (PPGIS) that focuses on sourcing local knowledge or best practices through citizen science/VGI approaches (Haworth et al., 2016; Klöner et al., 2021).

These approaches could contribute to RiskPACC end users in various ways. For example: for hazard assessment/monitoring, volunteer contributions can be included, such as to support wildfire hazard monitoring, or to identified clogged drainage infrastructure, or vegetation encroaching on power lines, all in previously identified specific locations, hence also supporting repeat observations at fixed intervals. Also through monitoring/identification of relevant landcover/ landuse with relevance for hazard (e.g., water slow), vulnerability of elements at risk (degradation in quality/ integrity of building stock or infrastructure), or exposure (such as new buildings encroaching on flood plains or potential wildfire zones). Finally, following a disaster event volunteers can be tasked to visit specific critical locations to help determine the damage and other consequences (damage, water or gas outage, blocked or damaged bridges, etc.), facilitating improved response.

In terms of research opportunities and challenges for RiskPACC, there are several. given the focus on image-based VGI, research on augmenting a hazard assessment or monitoring process used by a given CPA with information sourced by volunteers is meaningful. Another option is to test AI-driven processing and interpreting of images taken by volunteers. Also optimising the contributions by volunteers in an expert-driven risk assessment or management process is promising, increasing efficiency of the process, reducing time investment by CPS and increasing update frequencies. For post-disaster response situations appropriate protocols for coordinated use of volunteers, coupled with suitable databases for the uploaded contributions, and their linking to CPA decision making procedures are needed.

In all cases the question of training of the volunteers for the given task needs to be addressed. The solutions listed above all initially require a mobile phone app and related backend database. Also adequate server infrastructure is needed to generate, assign and monitor tasks.

#### OPPORTUNISTIC LOCAL MAPPING BY VOLUNTEERS

An opportunistic mapping approach facilitates contributions from in situ volunteers, but of unstructured/ opportunistic nature, i.e. where volunteers can generate and upload risk- or disaster-related information in pre-defined categories from any location within the hazardous or disaster-affected area. Volunteers living in or with access to a hazardous or disaster-affected area, and who are asked to provide information on what they perceive to be relevant features or situations can all be involved.

There are many examples modelled around the FixMyStreet idea, where citizens upload information on problem in public spaces, thereby interacting with relevant community services for mutual benefit (less maintenance effort for the community, quicker fixing of issues). Also, methods have been developed to record and upload

information (text or images) of hazardous features for hazard mapping or map updating, such as of landslides encountered by volunteers (Sellers et al., 2021). To optimise the processing of the often large amount of submitted information, automated processes have been developed, for example to interpret photos for road damage types via deep learning (Maeda et al., 2016). Gamification approaches have been developed to stimulate contributions (Crowley et al., 2012).

Possible contributions to RiskPACC end users include: end user needs can be stratified into information from either known or unknown locations. For the latter, volunteers can provide incidental reports and their value and contribution within existing CPA procedures can be explored. For different hazard types of RiskPACC end users, in particular wildfires and flooding, the provision of incidental information by volunteers appears to be of value, though this requires additional dialogue with the end users.

In terms of research opportunities and challenges, there is a possibility to use machine learning approaches, such as those developed by RiskPACC partner University of Twente in earlier projects, to process images uploaded by volunteers, such as of road or building damage. Coordination of the many possible VGI contributions remains a challenge, starting from meaningful task identification and definition, passing those to properly instructed volunteers, data quality assessment, and appropriate use of the information in CPA procedures. Once again, use of gamification approaches can encourage VGI contributions.

As we conclude this section with some of the 'what?' questions, it is worth referencing once again the work already undertaken in Deliverable 3.4 Lab Methodology and Glossary which already sets out some of the technological solutions suggested by RiskPACC's technology partners (pp. 41-42) and the storytelling approach that has been adopted ('user stories') to communicate the ideas in an accessible way. The D3.4 Annex describes the initial ideas for an AR (Augmented Reality) Mobile App, a crowdsourcing tool, a PublicSonar for monitoring publicly available information, and a VGI application. Thumbnail extracts are shown in Figure 21. There is an additional conceptual user story idea for a contact tracking app (University of Stuttgart) but it is not included here as it will not be developed as part of the contributions by the technical partners but has been suggested as a way to stimulate thinking.

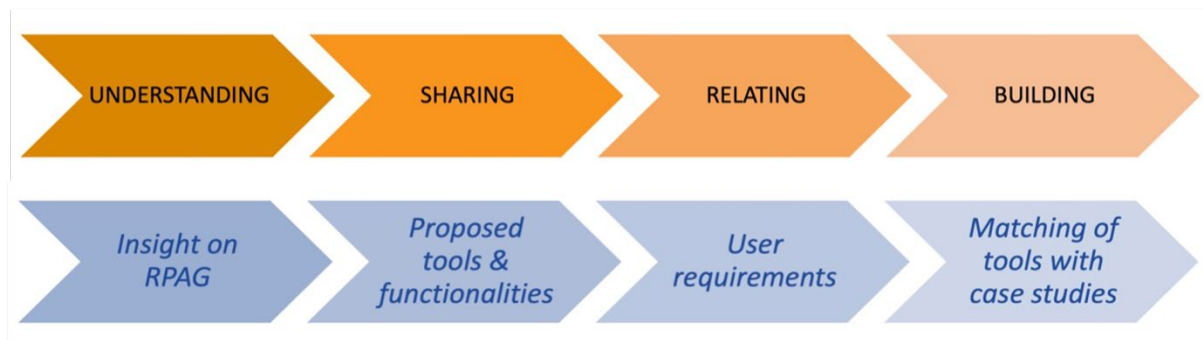
These represent the technological component of RiskPACC's collaborative governance/co-creation process.





**Figure 21: Prototype User Story Solutions by RiskPACC Technical Partners**  
(See RiskPACC D3.4 for detail).

According to our Draft RiskPACC Framework and co-creation process (Understanding through Sharing, Relating & Building), the technological component would fit as shown in Figure 22. Where the process begins with a plan to move through the following stages: Insight on RPAG, Proposed tools and functionalities, User requirements, and Matching tools with case studies. While all these are set out graphically in a linear fashion suggesting a degree of causality, this is by no means an expectation of the actual process which is inevitably going to be 'messier'.



**Figure 22: Relating The Riskpacc Technological Components To The RiskPACC Draft Framework.**

However, what the suggested tools have not yet fully focused on is the relationship building through sharing and understanding processes. The final part of this section will briefly address this through a consideration of participatory risk mapping.

### PARTICIPATORY RISK MAPPING

We referred above to the study in Eberbach, Germany by Klonner et al (2021) in which insight was gained into citizens' perceptions and actions regarding flood risk. What is also interesting about this example is the use of technology in a hybrid fashion using paper maps, albeit integrated within a technology platform. The authors explain their process as follows:

*'In our study in Eberbach, we investigated a participatory approach that allows the inclusion of citizens in the DRR process, regardless of whether they have access to specific digital devices such as smartphones, knowledge about the usage of specific disaster-related systems, or the ability to access the Internet. We chose a paper-based approach, and local knowledge of the citizens was captured by drawings on these papers...the sketches in our approach were made on OpenStreetMap Field Papers, which makes fast data processing possible because there is a base map and the drawings are already spatially correct. Moreover, the maps are georeferenced automatically, which saves time and error-prone manual data handling is not necessary' (ibid page 69).*

In this way, the authors avoided excluding people because of a lack of technological experience, expertise or access to the equipment (e.g. smartphones etc.) and yet the information could still be captured digitally with all the benefits that arise from this. This reinforces the importance of understanding not just the risk context but the social-demographic context of the location in which CPAs may be working. It is likely, if adopting an inclusive model of collaborative governance, that a range of expertise and preference will be demonstrated by participants. Therefore, it is worth considering both lower and higher technology solutions and a hybrid mix of both.



Gaillard et al (2015 and 2010) and Haworth et al (2016) explore low to high tech solutions through participatory mapping methods which were considered to potentially contribute, in different ways, to dialogue between DRR actors and also community disaster resilience. It is important to emphasise the wider social role of participatory mapping in providing a focus for dialogue, exchange and, hopefully, greater understanding:

*‘This study has demonstrated the role of participatory mapping, facilitated through VGI, in providing opportunities for community connectedness, local knowledge exchange, and individuals’ engagement and responsibility in DRR.’ (Haworth et al 2016: 125).*

These are essential components of collaborative governance through co-creation that must be included in any suite of solutions that might be offered in citizen-CPA exchanges.

## 5 CONCLUSIONS AND RECOMMENDATIONS

In this chapter we summarise some of the main conclusions arising from the foregoing material by outlining recommendations for the development of the RiskPACC Prototype co-creation approach relevant to the co-creation labs.

The risk perception, disaster risk reduction and resilience research literature (just some of which is reviewed above) identifies gaps between the two major constituencies of interest identified by RiskPACC: CPAs and citizens. As an admitted generalisation, much of the evidence above reflects a dominant approach to risk reduction which assumes the need to educate the public without fully understanding the process by which citizens reach their own conclusions about risk. Citizens and citizen groups span a spectrum of knowledge, experience, expertise and interest, and it will be important to ensure opportunities for engagement (or not) to create a sustainable partnership (if that is what is jointly decided upon as an objective). However, not all citizens will want, or be able, to engage in risk reduction processes and so the development of collaborative governance is an aspiration that may not always be achievable.

For RiskPACC, there is a commitment to exploring how building such a collaborative governance process might work in our case study locations and, through reflective evaluations, to produce some more generalisable options. This report reflects an early stage of RiskPACC development and its findings will be reviewed and refined in later stages of the project.

### 5.1 RECOMMENDATIONS

In order to make some actionable recommendations for the Co-creation Labs that relate most closely to the current draft RiskPACC Framework, they will be presented below under the four separate components: Understanding; Sharing; Relating; Building. There are 21 recommendations which emerge from the report findings.

#### UNDERSTANDING

1. CPAs must seek the best way to determine the social diversity within their location of interest and ensure sufficient balance across the participant list. This list may change as the citizen participants themselves identify particular social groups which should be represented.
2. We should not assume everyone understands the resilience concept or shares the same definition but share the RiskPACC one as a starting point for dialogue.
3. Ensure participants in the co-creation labs understand the opportunities and constraints under which CPAs are authorized to act.

4. Explore with CPAs how they do, or how they can, identify the diversity of needs and interests in their location.

### SHARING

5. Ensure early on in the co-creation process that both RiskPACC constituencies (CPAs and citizens) understand the capacities and constraints which both bring to their perception of the social-political context as well as the risk context. This is a matter of managing expectations on both sides.
6. Explore the best way to support CPAs and citizens in sharing knowledge of past disasters in their location and disaster information relevant to their hazard and risk profile.

### RELATING

7. One or more of the tools which are selected need to have some capacity to support meaningful two-way communication in order to avoid a tokenistic and merely consultative approach which sidesteps the core process of co-creating.
8. Co-creation lab planners and facilitators should consider where on the 'ladder of citizen participation' (Arnstein 1969 and see Table 3) they believe their version of collaborative governance should lie and be prepared for discussion, and perhaps, dissent, around this during the labs themselves.

### BUILDING

9. Methods, approaches and tools must work for both RiskPACC constituencies (CPAs and citizens). Decisions must be arrived at by consensus if at all possible.
10. The tools need to cover all the major components of the framework and thus there remains a gap to be filled concerning the best tools to clearly address the relationship-building aspects of RiskPACC.
11. Although RiskPACC has a major commitment towards the development of technological tools, these must communicate with the RiskPACC Framework which makes a major emphasis on relationship-building. Current technical iterations are predominantly hazard focused and could be further developed to seek appropriate contributions which support meaningful two-way communication and co-design elements.
12. In seeking to determine whether the solutions are adequate for CPAs and the tools adequate for Citizens, it will first be necessary to clearly identify the problem which each (separately and combined through consensus) wishes to resolve and the capacity to achieve them with available resources. This is necessary first step for co-creation lab planners and facilitators.
13. There needs to be an evaluation process agreed to review the collaborative processes. This will require some thought to find appropriate indicators to measure success.

### CO-CREATION LAB PLANNING AND FACILITATION

14. The co-creation labs should communicate to citizens and stakeholders the actions that have been taken (at various government levels), those that might be planned, and any constraints that limit the CPA's ability to act. Citizens and stakeholders should have the same opportunity to share their past and planned actions and any constraints under which they can act.

15. The co-creation labs planners and facilitators should consider how best to address the trust issue. This could include some questions in the evaluation process and review and refine processes in the second lab phases.
16. There are many standardised and verified scales used in psychology which address the social capital concept. co-creation labs planners and facilitators could request help and guidance on searching for the most useful which can be used in a simple way as sample questions to determine levels of networking and connection at the community level.
17. CPAs should be asked to what extent they wish to explore options for collaborative working with other (government) organizations and whether they would see a value in including this in the RiskPACC repository (Risk Pack).
18. For the co-creation labs and the RiskPack, planners and facilitators should consider introducing material and discussion points around the varied group of 'non-citizens'. Also, to consider whether there are mechanisms to identify 'non-citizens' and further mechanisms and approaches to serve their needs in the particular case study locations.
19. In the early stages of co-creation lab participation, it is recommended to find out from participants what social media they use and why.
20. Co-creation lab planners and facilitators should consider beforehand how to report back on decision outcomes that might not satisfy all participants.
21. Co-creation lab planners and facilitators should consider using a participatory mapping activity early on in the lab to allow CPAs and citizens to share their own understandings of where risks lie and start the process of discussing actions to deal with them.
22. Co-creation lab planners and facilitators should consider what will be the optimum number and social mix of lab participants to effectively achieve meeting objectives.

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## 7 ANNEXES

**Table 4: Annex 1 Further Reading on Social Media Use.**

<b>Annex No.</b>	<b>Description</b>	<b>No. of pages</b>
1	Further Reading on Social Media Use	2

## 7.1 Annex 1: Further reading on social media use

Aisha, T.S., Wok, S., Manaf, A.M.A., & Ismail, R., (2015). Exploring the use of social media during the 2014 flood in Malaysia. *Procedia – Social and Behavioral Sciences*, 211, 931–937. <https://doi.org/10.1016/j.sbspro.2015.11.123>

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