CONSULTATION PAPER: BLUEPRINT FOR AN AWARENESS TOOL FOR NATURAL CATASTROPHE RISKS AND PREVENTION MEASURES

European Insurance and
Occupational Pensions Authority

CONSULTATION PAPER: BLUEPRINT FOR AN AWARENESS TOOL FOR NATURAL CATASTROPHES RISKS AND PREVENTION MEASURES

EIOPA REGULAR USE
EIOPA-24/467

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EIOPA welcomes comments on the blueprint paper.

Comments are most helpful if they:

- respond to the question stated, where applicable;
- contain a clear rationale; and
- describe any alternatives EIOPA should consider.

Please send your comments to EIOPA by 28 February 2025 by responding to the questions in the survey under the following link:

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[1] Regulation (EC) No 1049/2001 of the European Parliament and of the Council of 30 May 2001 regarding public access to European Parliament, Council and Commission documents (OJ L 145, 31.5.2001, p. 43).

[2] Public Access to Documents.

Regulation (EU) 2018/1725[3] on the protection of the individuals with regards to the processing of personal data by the Union institutions and bodies and on the free movement of such data. More information on data protection can be found at https://eiopa.europa.eu/ under the heading 'Legal

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[3] Regulation (EU) 2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of natural persons with regard to the processing of personal data by the Union institutions, bodies, offices and agencies and on the free movement of such data, and repealing Regulation (EC) No 45/2001 and Decision No 1247/2002/EC (OJ L 295, 21.11.2018, p. 39).

2. INTRODUCTION

Rising temperature levels due to climate change lead to more intense and frequent natural hazards such as heatwaves, storms, floods, and droughts in Europe, making citizens and particularly homeowners of private and commercial properties (and future homeowners) increasingly exposed to climate- and weather-related damages. Homeowners will likely face higher premium levels over time due to climate change, or will otherwise have to bear increasing costs related to potential damages on their own. Last year the German Insurance Association (GDV) has published a press release stating that property insurance premiums might double in the next ten years due to climate related increase in claims costs[4]. Additionally, property insurance coverage may even become unavailable in certain regions due to high exposure to natural hazards and subsequent exclusions by insurers, pushing the need for intervention measures such as raising risk awareness and developing innovative insurance solutions as to foster the adaptation of the society to climate change.

Raising the awareness among citizens about natural hazard and climate risks is crucial for both insurance companies and homeowners. It helps foster a proactive approach towards risk prevention, which is key to keep property insurance with coverage against natural catastrophes affordable and available in Europe.

In Europe, there are already several private and public tools on raising awareness, sometimes even multiple tools within a specific country, showing homeowners an estimation of their exposure to natural hazards. However, these tools typically differ materially regarding the scope of the natural hazards assessed, the level of geographic granularity implemented, the methodologies used to provide risk estimates as well as their user friendliness. In addition, most tools do not provide recommendations in terms of risk prevention against natural hazards, which is however key to strengthening the homeowners' resilience against an increasing frequency and intensity of natural hazards due to climate change.

However, the variety of tools in conjunction with the lack of information on risk prevention measures makes it challenging for homeowners in Europe to take informed decisions on the appropriate level of protection against natural hazards in terms of insurance coverage and risk prevention.

EIOPA considers that raising homeowners' and future homeowners' awareness on their risk exposures against natural hazards and providing proposals for suitable prevention measures could be decisive in closing the insurance protection gap for natural catastrophes in the EU and in fostering

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[4] https://www.gdv.de/gdv/medien/medieninformationen/klimaschaeden-koennten-zu-verdoppelung-der-praemien-in-der-wohngebaeudeversicherung-fuehren--136474

society's adaptation to climate change. It therefore introduces a blueprint for a digital risk and prevention awareness tool which is further outlined and discussed in this paper.

The blueprint proposes that the tool contains risk information on potential local hazards covering all EU Member states, to help homeowners better grasp their level of risk exposure and to describe prevention measures which could support them in reducing potential future losses. The idea would also be to allow all EU citizens to have similar access to such information (which is not achieved given current fragmentation of existing information through a myriad of tools).

In contrast to most currently available tools, the blueprint envisages that the tool captures specific layers of information as depicted below:

(i) the homeowner's level of risk exposure to various natural hazards based on their area of residence;

(ii) the available risk prevention measures which describe various (most common) hazard-related prevention measures per type of peril (before/during/after the event);

(iii) measures related to insurance coverage, providing information on the importance of being aware of exclusions, on potential national insurance schemes in place for natural catastrophes, etc.

(iv) and finally to raise awareness about risk-based benefits of prevention measures: provide information that such measures can be reflected in the risk-based premium.

These layers of information provided to homeowners should be presented in a user friendly way and will be based on transparent methodologies and data to build trust and credibility.

By understanding the potential impacts of climate change on their properties, policyholders are more likely to adopt measures that reduce their vulnerability to extreme weather events and other climate-related hazards. This not only reduces potential damages and financial losses but also contributes to the long-term resilience of the society against climate change. Furthermore, educated homeowners can make informed decisions about their insurance needs, leading to more appropriate insurance coverage. In this regard, raising the awareness of homeowners about their exposure to natural hazards and potential prevention measures will effectively help to reduce the insurance protection gap for natural catastrophes in the EU.

This study has been carried with the support of Verian[5],[6].

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[5] Verian - Germany

[6] Request for Service EIOPA/2024/07 under Framework Contract CHAFEA/2019/CP/01 Provision of Behavioural Studies – Third Wave to provide services for Behavioural Research

READING GUIDE

Section 3 of this paper analyses existing tools. Section 4 sets out how such a risk and prevention tool could look like. Section 5 analyses the risk scores. Section 6 presents the prevention recommendations the tool could provide. Section 7 discusses how to raise awareness on the impact of possible prevention measures on insurance premiums. Finally Section 8 presents ways to raise awareness on risks and prevention measures in the purchasing process.

This blueprint paper was written in close collaboration with the EU National Competent Authorities (NCAs) and EIOPA's Technical Expert Network on Catastrophe Risks[7].

EIOPA will consider the feedback received to this paper and shall publish a final report subsequently.

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[7] See Annex Section "Organisations which are members of the technical expert network"

3. OVERVIEW OF EXISTING TOOLS

A number of tools have been developed to raise awareness on natural catastrophes which have different national scopes, target audience, perils covered, messages… From the analysis of the existing tools (this chapter), we will come to discuss a blueprint to raise awareness on risks and prevention measures in the next chapters.

EXISTING RISK COMMUNICATION TOOLS AND IMPORTANT DESIGN VARIABLES

The policy context around the climate protection gap has given governmental bodies many avenues to address these issues, including by raising awareness through risk communication tools. As mentioned, risk awareness is a pre-condition for individuals to take action to mitigate against potential damage caused by Nat Cats, with low perception of risk being the main reason for inaction[8]. It is therefore important to find ways to raise overall levels of individual risk awareness and thereby increase action taken to mitigate the impact of Nat Cats.

Scientific studies have previously found that risk communication tools and strategies can increase individuals' risk awareness levels and their propensity to take action to mitigate NatCat damage[9]. However, there is disagreement as to which features and attributes of these risk communication measures will prove the most successful. A study by Maidl and Buchecker (2015) indicated that risk prevention and awareness tools were more effective if respondents trusted the public authorities issuing these materials and if they liked the risk awareness product, they were presented with[10]. Meanwhile, Haer et al. found that people-centred risk awareness campaigns yielded more positive results, with tailored information making individuals more likely to take protective action. Other studies have found that the promotion of risk prevention and awareness tools may be key to improve outcomes, with research from Kjellgren suggesting that public authorities producing these tools lack resources and are reluctant to worry residents, meaning that information is not spread effectively[11].

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[8] EIOPA (2024). Measures to Address Demand Side Aspects of the NatCat Protection Gap – Staff Paper. Link.

[9] Maidl and Buchecker (2015): Raising risk preparedness by flood risk communication. Available here.

[10] Haer et al. (2016): The effectiveness of flood risk communication strategies and the influence of social networks – Insights from an agent-based model. Available here.

[11] Kjellgren (2013) Exploring local risk managers' use of flood hazard maps for risk communication purposes in Baden Württemberg. Available here.

The broad range in scientific opinion as to what makes a good risk prevention and awareness tool is mirrored in the market, where a large number of varied tools exist. To gain an understanding of the different risk prevention and awareness tools on the market, this study includes the mapping of such tools (see Annex). This exercise has revealed a multitude of attributes included in these tools and a wide range in the scope covered. From this diverse range of tools, an initial typology of attributes can be identified, with six key impact criteria, where the tools differ.

The first area where there is considerable variety is in the tool ecosystem, or with the actors and organisations associated with the tool and its creation. The owners, developers, and creators of these tools are important in determining the objectives of the product and shaping its design. The actors associated with the tool can also have an impact on how effective it is. A study by Maidl and Buchecker found that trusting the provider of a tool increased its effectiveness in raising risk awareness levels and incentivising mitigation action[12]. Many of the existing tools are produced by public authorities to communicate local risk levels to their citizens. Both the Austrian and Irish governments have produced their own risk awareness tools for flood-levels, with the Irish National Flood Map[13] and the Austrian Natural Hazard Overview and Risk Assessment[14] allowing users to search for their address on a map to find more information about local flood risk.

Other tools are produced by academics and think tanks. These groups often produce more technical products like the satellite data-based land subsidence map Bodemdalingskaart 2.0 (see Figure)[15]. These tools may be trickier to search but they often offer detailed geographical data, useful for researchers and for scientific purposes. Alternatively, some civil society groups may produce more accessible tools, designed to help civilians prepare for emergencies and aid their survival. The Polish website Gotowi.org represents this kind of user-friendly and accessible tool, raising citizens risk awareness levels and advising them on how to make a plan in case of a disaster[16].

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[12] Maidl and Buchecker (2015): Raising risk preparedness by flood risk communication. Available here.

[13] Irish Office of Public Works "Flood Maps". Available here.

[14] Austrian Ministry for Agriculture, Forestry, Regions and Water Management "Natural Hazard Overview and Risk Assessment Austria". Available here.

[15] Netherlands Centre for Geodesy and Geo-Informatics and SkyGeo "Bodemdalingskaart 2.0". Available here.

[16] Gotowi.org "Get Ready". Available here.

Figure 1: A technical NatCat risk prevention and awareness tool created by academics, knowledge centres and geodetic companies. Source: Bodemdalingskaart 2.0[17]

Some tools are created by the insurance industry, with providers like Zurich Insurance and Generali producing their own tools, alongside associations of insurers like the German Insurance Association (GDV) or the General Insurance Association of Japan. These tools include information about potential insurance cover available as well as other mitigation measures individuals can take to protect their property from damage. The variety of actors designing, developing, and hosting tools means that diverse products are created, with different attributes to fulfil specific objectives.

The second area where tools differ, is in the level of personalisation and tailoring offered in their risk assessments. Research from Haer et al. suggests that people-centred risk communication can be an effective way of raising risk perception levels, making it attractive to build tools that can tailor their message to an individual[18]. Existing tools vary in how much they personalise their risk calculations and the recommendation given. Most tools offer some degree of geographic personalisation, with this varying from country-specific risk assessments to regional recommendation, or even information on the situation at a specific address. Some tools ask for even more information to provide recommendation tailored to the end-user. The US National Flood Insurance Program offers a tool which allows users to personalise the recommendation they receive based on the foundation-type of their building, the height of their first floor and the placement of any valuable items like machinery and equipment[19]. The tool offered by Zurich Insurance goes into even greater detail by adding questions about modifications users may have made to their property and about particularly vulnerable features such as ventilation shafts and skylights[20]. While research suggests that personalised and people-centric communication can lead to greater risk awareness levels, the range

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[17] Netherlands Centre for Geodesy and Geo-Informatics and SkyGeo "Bodemdalingskaart 2.0". Available here.

[18] Haer et al. (2016): The effectiveness of flood risk communication strategies and the influence of social networks – Insights from an agent-based model. Available here.

19 FEMA National Flood Insurance Program "Flood Insurance Mitigation Discount tool". Available here.

20 Zurich Insurance "Zurich prevention of natural hazards". Available here.

in tailoring offered by these tools suggests that there are costs as well as benefits attached to gathering this detail, both for the end-user and for the actors in the tool ecosystem.
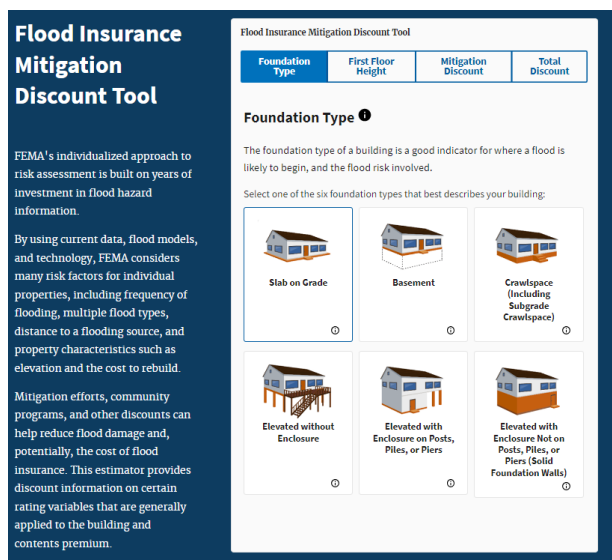

Figure 2: FEMA personalised risk awareness tool.Source: FEMA National Flood Insurance Program[21]

The third area where tools vary, is the recommendation and content included. Not only do tools differ in the number and type of peril covered, but also in whether and what type of recommendation they offer. Some choose to focus on one specific peril, with tools like flood maps lending themselves to clearly displaying localised risk for one NatCat, like high water levels. The Cypriot Government has put together maps to indicate areas of flood risk, focusing on this particular peril and therefore presenting a clean and clear interface[22]. Other tools include more perils, providing a broader overview of the risk levels for each hazard. Multiple perils are challenging to display on maps and are therefore usually listed or presented in a graphic form, such as in the tool provided by the Belgian Crisis Center, covering NatCats like drought and flooding as well as other dangers such as invasive exotic species and risks from outer space[23].

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21 FEMA National Flood Insurance Program "Flood Insurance Mitigation Discount tool". Available here.

22 Civil Defence Cyprus "Flood Maps of the Water Development Department". Available here.

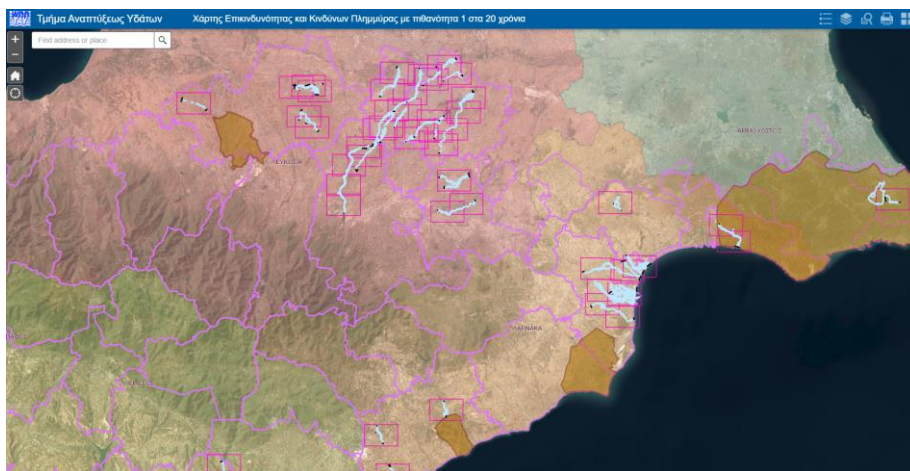23 Crisis Center Belgium "Natural Risks". Available here.

Figure 3: Cyprus flood maps. Source: Civil Defence Cyprus Flood Maps[24]

As well as varying in the perils covered, tools offer different recommendations. Some tools offer suggestions on how to prepare ahead of a crisis, while others give guidance for what to do to during a catastrophe, or information on how to stay safe after such an event. Recommendation on mitigation measures is also broad, ranging from information about insurance and premiums to practical recommendation on who to contact if you wish to modify your property to ensure greater protection. The variation in recommendation is linked to the range of actors behind these tools. Through this recommendation, tool owners and developers may reveal some of their objectives behind creating the tool, as insurance companies frequently include information about potential additional coverage, while public authorities, academics, and civil society organisations tend to give more general guidance.

The fourth area where tools differ is in the visual cues they use when displaying information. Design principles suggest that humans have instinctive responses to certain visual cues and research from Dallo et al. found that using different displays in risk awareness tools can alter the end-user's perception of danger[25]. Maps are a popular way to depict risk zones, along with graphics and colour scales. Red is frequently used to indicate higher risk exposure levels, despite limitations for colourblind end-users. Numeric scales are also used to indicate risk, as well as images of damaged property through graphics or photo-real pictures. The range of options in displaying risk has implications for engaging users with the tool as well as with altering their risk awareness levels and incentivising mitigation action.

Similarly, interactive features in tools may help engage users and project messages about risk awareness levels. Some tools are highly innovative with their interactive features, such as the tool from the General Insurance Association of Japan which allows the user to engage in a virtual reality

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[24] Ibid.

[25] Dallo et al. (2024) Designing bluederstandable, action-oriented, and well-perceived earthquake risk maps – The Swiss case study. Available here.

experience, viewing the inside of a high-rise flat at the moment an earthquake strikes[26]. Similarly, a tool from Koguakin University is designed for mobile phone users and encourages them shake their phone to simulate an earthquake, before showing the damage caused[27]. There is a broad spectrum of interactivity, with click-through quizzes and navigable maps proving to be popular features. Some tools, however, are also completely static, displaying information on fixed pages. Interactivity can force a user to engage with the tool and the information communicated, but it is unclear if these attributes ultimately alter risk awareness levels or incentivise users to take steps to mitigate the damage caused by NatCats.

Finally, tools differ in their accessibility, as they are available in different forms and provide different options to share or save information. Some have limited options to share or save the risk assessment or mitigation recommendation offered, but many more allow the user to print, save, or email their risk analysis and therefore revisit their results. Most tools are also available online, although some have an interface well-suited to mobile devices, and a few tools also have their own app. This is often in conjunction with a more technical programme which requires a fee-based subscription. This variation again represents an attribute where it is unclear as to how it contributes to heightened risk awareness levels and increased propensity to take preventative action.

MAPPING OF EXISTING TOOLS

In total, 66 existing tools from all over the world have been identified and mapped, using a bottom-up categorisation approach, with researchers opening and exploring existing tools and identifying key attributes within them that potentially impact end-users' experiences. This exercise collected data on a total of 24 variables (or attributes) for each of the mapped tools. The list expanded from the original 19 attributes mapped at proposal stage. Additional data has been collected, for example, on the kind of data gathered (predictions, projections or historical data), the methodology behind this data collection process, and the number of perils covered in a tool.
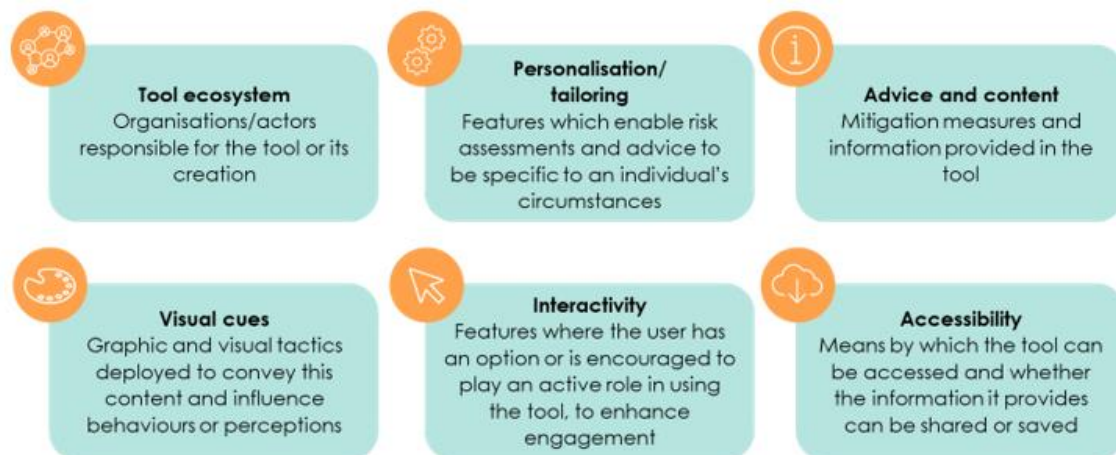
Despite the number of tools available, there are relatively few which overlap in the market, with most offering risk assessments for specific regions, perils, or audiences, as well as offering different kinds of analysis and recommendation. This variation means that each tool brings something unique to the table and potentially offers insight into the different outcomes that can be achieved through these risk communication devices. The diverse market of existing tools therefore represents an important resource in identifying best-practices in raising risk awareness and prevention, and to help shape the design of any future tools.

The tools' attributes are grouped under six categories or impact crietria:

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[26] General Insurance Association of Japan (2024) "Japanese Earthquake VR" Available here.

[27] Koguakin University (2024) "Earthquake Insurance Japan". Available here.

Tool ecosystem
Organisations/actors responsible for the tool or its creation

Personalisation/ tailoring
Features which enable risk assessments and advice to be specific to an individual's circumstances

Advice and content
Mitigation measures and information provided in the tool

Visual cues
Graphic and visual tactics deployed to convey this content and influence behaviours or perceptions

Interactivity
Features where the user has an option or is encouraged to play an active role in using the tool, to enhance engagement

Accessibility
Means by which the tool can be accessed and whether the information it provides can be shared or saved

An overview of the different attributes recorded during the mapping, their grouping for analytical purposes and illustrative examples of the variation observed in these attributes is shown in Annex 1.

The full mapping is included in on EIOPA's webpage.

and contains 66 currently operational tools. These tools span 26 nations or regions, and each tool covers at least one of the ten perils in scope (flood, storms, earthquakes, droughts, forest fires, heat waves, cold waves, frost, hail, tsunami). The analysis of the mapping results suggests certain trends and common features in available tools. Some key trends and findings are included below:

- Actors from the public sector are most often behind creation of the tools, although tools were also identified from research institutes and private sector companies.

- The majority of tools involve interactive features, using click-through quizzes or interactive maps.

- When mitigation recommendation was included, it frequently directed users to insurance cover or to modify their property.

- There is considerable variation in how risk scores and levels are presented.

- Mitigation recommendation tends to take the form of text or hyperlinks to (external) sources.

Looking at the tool ecosystem, the mapping reveals that these kinds of risk awareness products are predominantly created by public sector actors. Research organisations and non-profits as well as the private sector make up a smaller proportion of creators and developers of these tools. Within the private sector, insurance providers and associations of insurers created eight of the tools, with a further three created by companies selling intelligence solutions for the property and insurance sectors.
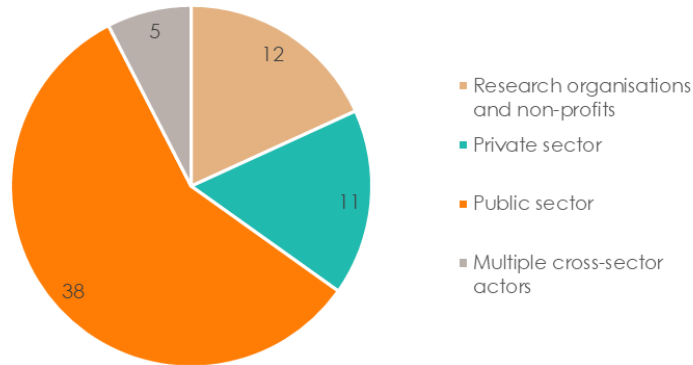
Figure 4: Number of tools created by each sector

The tools include different levels of personalisation to the individual user. They cover specific geographies, with 42 of the tools focussing on one specific national region. Seven tools have a global scope, with these built by a mix of international organisations and large actors from the insurance industry who have created paid-for tools to identify risk. Two tools were built by EU institutions and cover all Member States, with the EEA's Adaptation Dashboard and the JRC's Risk Estimation Dashboard covering Europe. Other personalisation features vary considerably. Tools use different degrees of personalisation to calculate a risk score, including the location, modifications already made to a property, river proximity and the height of any foundations or the level of a flat in an apartment block. Most common, was the inclusion of location to calculate a personalised risk score, although the precision of this varied widely. Some tools only use a region or state, while other ones allow a precise address.

There is also considerable variety within the market as to what content and recommendation is included in a tool. The type and number of perils covered varies. Many tools focussed on one specific peril, with 31 out of the 66 mapped tools having a singular focus. Among tools covering a range of perils, 4-5 different perils were the most frequent number covered in one tool.
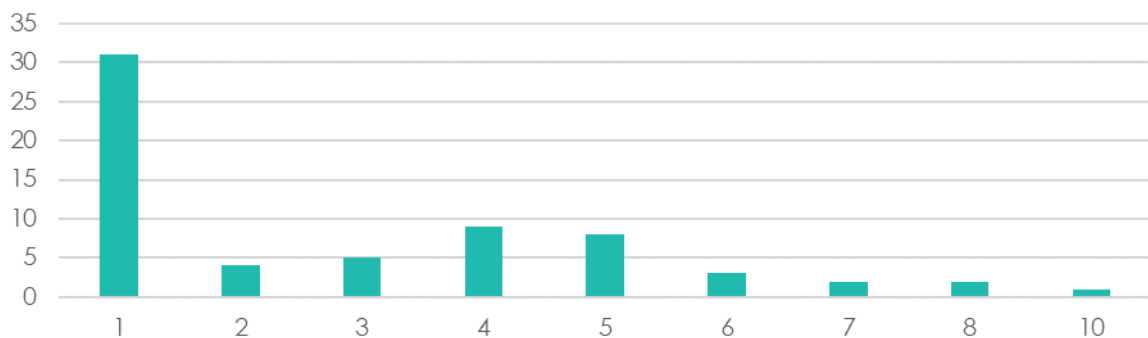

Figure 5: Number of tools covering set numbers of perils

The tools also focussed on different perils, including both those covered within the scope of this assignment and other perils not included, such as radon, ground swelling and cyberattacks. A particularly large number of the tools reported on flood perils, with 46 tools calculating risk for this peril. This could be due to flood data being more easily available, with risks of to a particular property being closely related to its location, or it could be due to interest in flood risk levels, on account of numerous recent and severe flood cases.
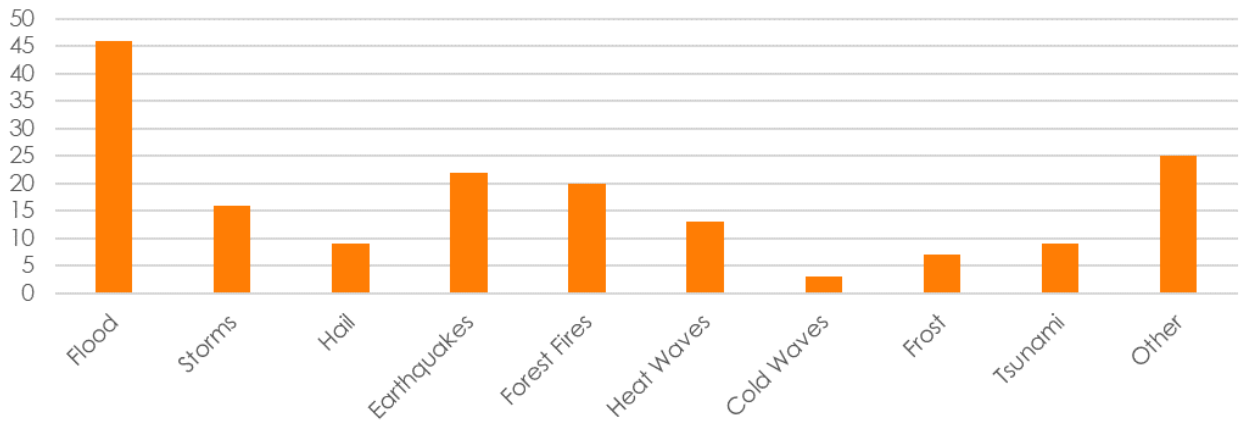
Figure 6: Numbers of tools including each peril (some tools included more than one of these perils)

There is also considerable variation in whether tools offer recommendation on how to mitigate the impact and damage caused by natural disasters. 37 tools do not include any recommendation on these kinds of mitigation measures. Where recommendation is offered, insurance cover is most frequently included as a recommended mitigation measure. The prevalence may be explained to some degree by the fact that eight tools stem from actors involved in the commercial insurance industry, with this sector representing over 12 percent of the total tools mapped. Recommendation to seek insurance may be also among the easiest to formulate. Aside from insurance cover, property modifications were frequently recommended, along with survival recommendation to keep people safe during the catastrophe. Some tools also recommended moving house to a less risky area, however this drastic mitigation measure was a rare recommendation.
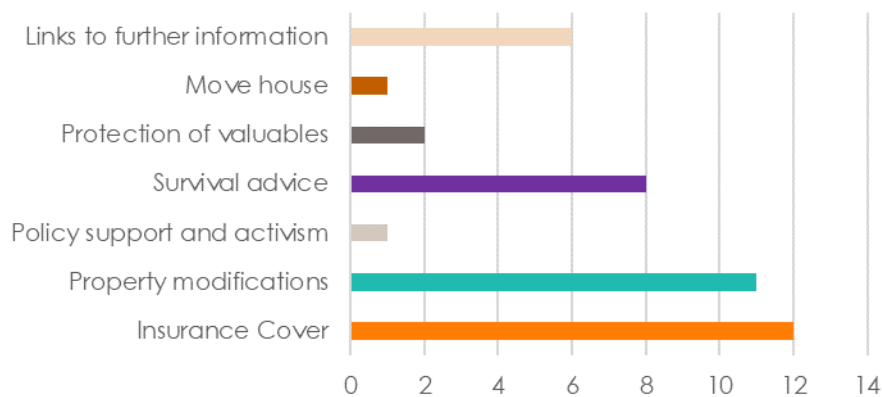
Figure 7: Number of tools including each type of mitigation advice

The mapping also recorded whether tools gave respondents an idea of how their insurance premiums could be impacted if they were to take additional mitigation steps, such as modifying their property. Just three tools included this kind of calculation, with one of these three redirecting the user away from the tool to conduct this final step. In 58 of the tools, no such calculation was given. The scoping interviews shed further light on why this step may be difficult to integrate into a tool. The creators behind the Climate Charted tool were keen that their tool would lead to discussions between insurers and potential policyholders. However, this can be difficult to implement as some insurers may not renegotiate their offers after individuals take mitigation measures.
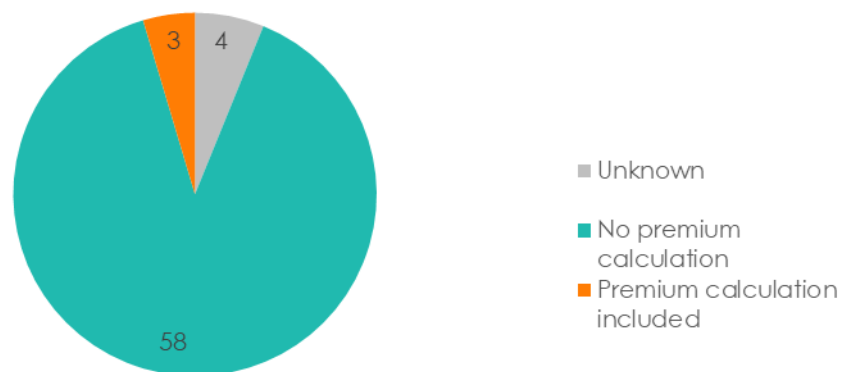

Figure 8: Number of tools which calculate the impact of mitigation measures on insurance premiums

The presentational aspects are also important, with visual cues able to prompt different behaviours. After answering questions, inputting their address, or choosing a location on a map, users were often presented with a calculation of their risk level. The format of this presentation is likely to affect users' reactions to change and their perception of their risk level. However, the mapping revealed that there is a degree of consistency in how risk is displayed. As shown in **Error! Reference source not found.**1, a colour scale to denote risk level was most frequently present in the tools, although the exact colours chosen to indicate higher and lower risk levels changed depending on the tool. Numeric scales and risk or hazard symbols were also popular. Other techniques included using simpler or more complex data to display a single risk score or to produce a more technical chart to characterise an individual's risk level. Finally, there were some methods which tried to show how others had been affected by NatCats, using historical data and stories on disaster damage, images of former catastrophes and information on how local insurance rates, to nudge the user to take action.

Risk visual	Present in number of tools
Colour scale	40
Numeric scale	6

Risk symbols	5
Risk zone maps	3
Risk chart	3
Risk score	2
Images of damage	2
Similar historical events	2
Local norms	1
Unknown or no risk visual	13

Table 1: Number of tools using each type of risk visual

There was more consistency in how mitigation measures were presented. Visual cues were less frequently deployed, with mitigation measures frequently presented through text. Where images were used, illustrations and graphics were deployed rather than photos, suggesting that tool creators do not try to trigger the same emotions and behavioural reactions when informing the user about potential mitigation measures. Instead, material is frequently presented in a factual and text-based format, with links to further information or suppliers of modification material also proving popular in existing tools.
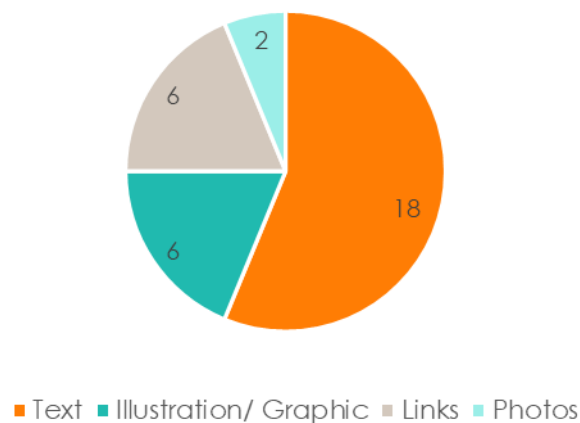

Figure 9: Number of tools using each means of displaying mitigation **recommendation**

Over 70 percent of the mapped tools use an interactive interface. This included click-through quizzes and moveable maps where the user could add their own personal details. Static tools were visibly less popular, with webpages and PDFs offering information rather than the option to personalise responses for the user.
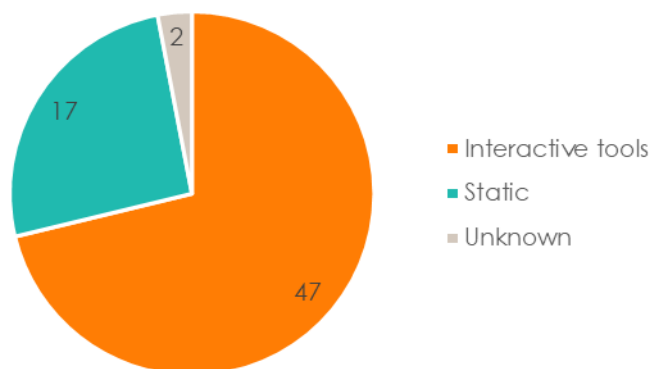
Figure 10: Number of tools which using static or interactive interfaces

Finally, the accessibility of the tools varied considerably. Most tools appeared as webpages, with just nine available in more complex and paid formats like computer programmes. Four were also available via an App or used webpages that were clearly designed and oriented for mobile users. 22 tools did not offer any option to print, download or save risk calculations or advice. However, as some tools provided information rather than a highly personalised risk calculation, this result is unsurprising. Most tools offered some means to save the analysis, e.g. in a PDF format, downloading the analysis, the entire dataset, or maps with risk zones highlighted.

The full mapping contains far more detail about individual tools and captures the extent of variation between these products. It must be noted that as the tools are created by different actors and with different goals in mind, the features selected in each tool and the combination of features is likely tailored towards the specific objectives of the tool.

KEY FINDINGS

The tool mapping reveals certain trends in the market and common points across the tools. A good understanding of the features present in other tools is important in designing new ones. This is because intuitiveness of the tools is of paramount importance for its potential impact and mirroring solutions well established in other tools solution can improve intuitiveness.

The mapping exercise highlighted common trends amongst NatCat risk awareness tools and norms surrounding their design. Firstly, the idea that tools should be tailored to individual situations and that they should be relatable to the user was reflected in the mapping. Findings suggested that relatable and localised risk awareness content could prove more persuasive for the end user, encouraging behavioural change. In line with this, the findings point to most tools opting for a limited

geographic scope and relatively few perils. This means that the content included in the tool is likely to be more relevant to specific users, highlighting the perils they have searched for or which are more likely to impact their region and showing their local area. Location was the most popular means for tools to tailor their risk assessment, with several of the mapped tools asking users for or allowing them to provide some degree of information on their property's location.

Similarly, the use of intuitive and widespread colour scales, with users expecting colours to indicate whether something was good or bad is of importance. These expectations around colour usage were reflected in the widespread use of colour scales across the tools. However, it must be noted that while colour scales were common features, they often appeared alongside a variety of other attributes. This can imply an attempt to cater for diversity of presentation formats, echoing findings from the literature review which suggested this diverse presentation styles could be needed to spur a heterogenous population of users into action.

The mapping also revealed that it was rare for tools to include information on how property modifications could lead to lower insurance premiums. This aspect appears very difficult in tools not managed by the representatives of the insurance sector but even in the case of tools designed be insurers, there are likely important challenges in providing such information.

Most analysed tools have a specific target audience in mind and more clarity with the target appears to be associated with design features with higher chances of attracting and engaging users. This would appear consistent with the lessons stemming from the literature on tailoring messages and relatability. Related to this, more detailed localisation, and personalisation can help tailoring the messages.

Several of the analysed tools used attractive and compelling visual means with a potential for engaging users. The tools that were developed more recently typically had an opportunity to incorporate formats and styles that may be better suited for users accustomed to the formats available in on-line communication (on websites and in apps), possibly also tailored to formats and styles popular in specific countries. An example includes game-like features in an interactive Japanese tool from Earthquake Insurance Japan.

When behavioural nudges referring to local community experience are included in the tools, these appear to be potentially powerful. Examples include presentation of statistics on local losses in the German GDV Flood Check tool or testimonials from representatives of local communities affected by bushfires included in the Australian Resilience Ratings tool.

Inclusion of mitigation advice and provision of practicable solutions and actions is generally not very common in the whole population of existing tools. Still, the examples from some of the case studies show the potential of such information if it is well designed and adapted to the needs and capacities of target users. Examples of tools providing mitigation advice include The Resilient House, Home Disaster Guides, Generali's tool, Earthquake Insurance Japan tool and the Australian Resilience Ratings.

The current reach of the analysed tools for which meaningful data was available appears to be limited with a relatively low number of users. There have been no evidence of any of the tools gaining a wide

popularity. This may suggest that reflection on the groups that could be targeted by advertising and timing of such actions (e.g. at specific points in the home purchase or rental processes).

Finally, there appears to be limited practical experience with testing the effectiveness of specific tools, possibly beyond their design stage (e.g. some 1200 households were involved in the trials and co-designing the Bushfire Resilience Home Assessment app in Australia in 2024). In most cases the tool owners are not tracking who their users are and do not know to what extent they take any action as a result of interactions.

However, the US government's agency for emergency management has provided some insights on how they conduct testing with citizens once the tool is ready and before it goes live. FEMA has a moderator guide through which the interviewer walks the user through the tool during a videoconference call. FEMA observes the users going through the tool, also using heatmapping, noting where users tend to click, hover their mouse over, etc. For specific tools/elements, FEMA also does A/B testing, where the user gets to see two versions and choose which version they prefer, later taking aggregate preferences (gathering preferred elements of both versions) to build the final version of the tool. While users are navigating through the tool, the moderator asks them to think out loud and to justify all their actions (e.g. "I am clicking here because I am trying to understand X."). Users are also asked to read everything they see out loud so that FEMA can understand areas where there is too much text, where it is difficult to understand or where it takes the user too long to go through the information. After the testing call, FEMA sends a follow-up survey to the interviewees to explore whether they have learnt about the topic after using the tool and what its impact would be on their actions. After testing the tool with users, FEMA starts a month-long period during which the tool is live and industry experts review it and report back any issues (e.g. incorrect calculations, unclear words, etc.).

4. PROPOSAL FOR A BLUEPRINT

SCOPE OF THE BLUEPRINT

The tool will focus on the Nat Cat exposure of buildings across the EU and relevant prevention measures. Therefore, the tool will reference to property insurance. The scope of natural hazards will comprise:

- Earthquake
- River flood
- Windstorm
- Wildfire
- Potentially coastal flood

Additional perils such as hail or subsidence which are also considered under Solvency II for example could also be considered by the tool. However, there could be an issue to find sufficient data to derive potential scores. Finally depending on the regions, additional perils such as freeze, avalanche... could be relevant. Here we propose to focus on main perils which occur in Europe and produce significant damages. The same approach was also obersved in the 62 tools analysed for the purpose of this study.

OUTCOME OF THE TOOL

The online tool could produce a summary/check list view which contains main messages such as:

1. **Understand your risk**: view your risk score for the specific location of the property against natural hazards such as earthquakes, floods, windstorms and wildfire
2. **Reduce your risk**: Recommendation of potential prevention measures -> Which different prevention measures could reduce your risk?
3. **Check your insurance contract**: Recommendation for the user to check certain key aspects related to insurance coverage. Does my contract cover the risks? What are the limits and deductibles? Learn more on exclusions...
4. **Discuss with your insurance broker/ provider:** Recommendation to get in touch with your insurance provider to discuss contract conditions and if/how prevention measures could be reflected.

The digital tool design should aim to provide an online choice environment that contains tailored and relevant information aimed at supporting users' decision making in the process of Nat Cat uptake so their final choice would suit their individual situation and preferences.

DEFINE THE LOCATION TO PERFORM THE ANALYSIS

The first step to run the analysis is to define the location where the analysis should be performed. This could for example be useful for homeowners to better understand the risks of their property as well as related prevention measures.

DISCUSSION ON POSSIBLE METHODOLOGIES

In order to engage users, the tool could ask users to:

- Option1: enter the address of the location where the user wants to analyse the risk. This address would then need to be geocoded[28].

Pro	Con
Nice way to engage with user Tailored information Most precise risk assessment possible (depending on data availability)	Need to consider any legal consequences (GDPR) if address is entered (need to clarify how the information is stored).[29] Potential Users could be reluctant to enter personal address due to concerns with respect to data security. This behavior could limit the reachable group of people.[30]

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[28] Geocoding is the process of translating a physical address into a geographical location typically involving latitude and longitude.

[29] A solution could be to delete the data after the analysis is performed

[30] A solution could be to inform the users that the data will not be stored after the analysis is performed.
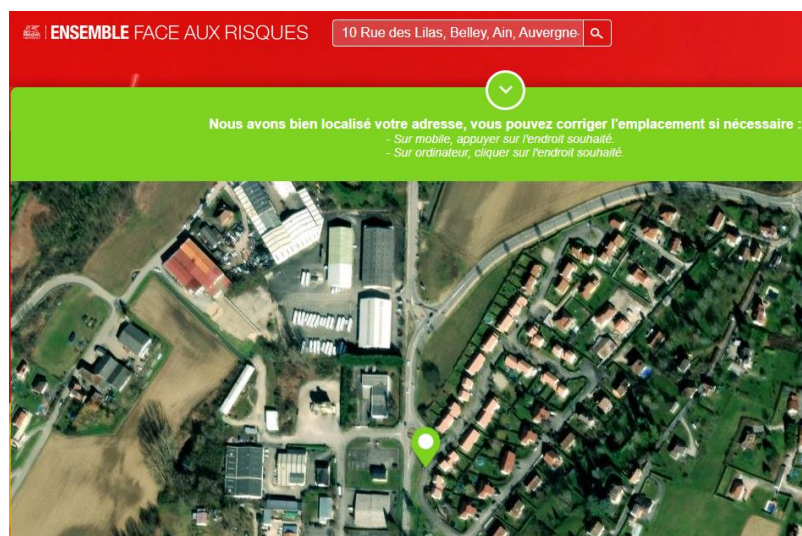
Figure 11: Example on how the user could enter the location of interest.[31]

- Option 2: enter the street name and postalcode of the location where the user want to analyse the risk. This would then need to be geocoded[32].

Pro	Con
No street number is provided, i.e. less data privacy concerns.	Less personal/engaging than option 1 Risk exposure less precise as it can vary within a street.

- Option 3: enter less granular information such as a postal code. This would also need to be geocoded for the rest of the analysis.

Pro	Con
No personal address is provided, i.e. less data privacy concerns.	Less personal/engaging than option1, Risk exposure less precise as it can vary within postal code areas.

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[31] Ensemble Face aux risques : le diagnostic d'exposition de votre domicile aux risques (generali.fr)

[32] Geocoding is the process of translating a physical address into a geographical location typically involving latitude and longitude.

- Option 4: The tool would not ask the user to enter any address, but the user could scroll on a map to see its risk view.

Pro	Con
No geocoding is needed, no personal address is provided (data privacy). Further engagement with the user Such an approach would open up the tool for a broader interested parties (for example when a person does not yet own property in a certain area but is willing to buy in the future).	More time investment is needed from the user

Questions to stakeholders:

Q1a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q1b: Do you have other arguments that could support or invalidate any of the options proposed?

Q1c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

5. RISK SCORE

A risk score reflects the level of risk in the presence of some risk factors (e.g. risk of earthquakes, floods etc.). Risk scores are mainly designed to be:

- Simple to calculate: In simple cases, manual computing can be used to calculate a basic score (although some scores use rely on more sophisticated or less transparent calculations that require a computer program).

- Easily interpreted: The result of the calculation is a single number, with a higher score usually means higher risk.

DISCUSSION ON THE TIME HORIZON OF THE RISK ASSESSMENT

When citizens make decisions, historical losses may often be used as a reference point or a benchmark to highlight the proeminence and likelihood of certain risks occurring in particular areas of interest. However, risks are changing, using the past might not explain coming events. It might therefore be needed to consider other time horizons.

The tool could provide:

- Option 1: a score for the current risk exposure. This would provide a view of today's risk.

Pro	Con
Provides a view of the current risk level which is relevant for the user to take immediate action	Need to perform modelling and get access to data which can be challenging for some perils/regions.

- Option 2: a score for the future risk view. In light of climate change, frequencies and intensities of natural catastrophes are changing. It might therefore be needed to consider a forward-looking view.

Pro	Con

Since the past is not an ideal predictor of the future as regards climate change, it is important for the user to also better understand how the risk might change.	Adds uncertainties in the estimation due to necessary technical assumptions about the future trajectory of climate change

- Option 3: a view of historical losses (economic and insured losses). Historical data provide a view of events which occurred in the past.

So groß ist die Gefahr in Ihrer Region

201.508 € kostete der teuerste Schaden
durch Starkregen oder Hochwasser in der Region Darmstadt an einem Einfamilienhaus.

Nur 54%
der Gebäude in Hessen sind gegen Hochwasser versichert.

Figure 12: Example based on a historical loss perspective[33]

Pro	Con
It is easy for the user to refer to historical losses as this is something that was mentioned in the media for example. Seems reasonable to assume that data for this option should be available.	Historical losses are available only for events which took place but a risk could still exist which would not have materialized in the historical losses (unprecedented events) Historical losses will likely be composed of insured losses. This will leave aside, that for a certain event there will probably also be uninsured losses which where covered by state aid or by the property owner alone. It seems that if users are to use the tool to make investment decisions on future protection, then it doesn't seem helpful to include historic and perhaps current.

- Option 4: A combination of different perspectives (past, present, future).

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[33] Hochwasser-Check fürs Haus: Jetzt Risiko online ermitteln (dieversicherer.de)

EIOPA REGULAR USE
EIOPA-24/467

Pro	Con
Comprehensive information	High technical complexity (risk assessment) Could lead to confusion for the user, e.g., if level of risk differs materially (or event not at all) across the different time horizons assessed

Questions to stakeholders:

Q2a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q2b: Do you have other arguments that could support or invalidate any of the options proposed?

Q2c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

DISCUSSION ON POSSIBLE METHODOLOGIES TO DERIVE THE SCORES

- Option 1: A score based on hazard information only where the intensity is not considered but only the frequency.

Pro	Con
Open-source hazard data are available for different perils/countries. Easy to understand (as shown in Figures 13 and 14). Allows comparison with other perils. Seems to be a frequent way to assign a hazard score.	Does not account for different intensity which also would impact the potential impact. Does not account for specific vulnerabilities of buildings which utlimetaly will influence the damage on a house.
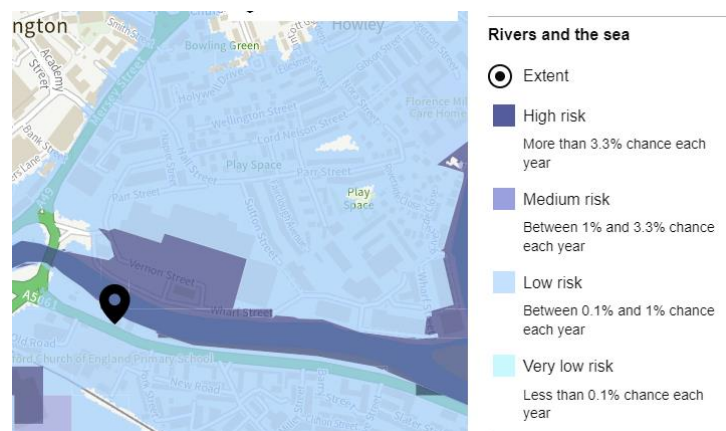
Figure 13: Example of a view on flood risk which uses the frequency to define the score.[34]

Figure 14: Second example of a view on flood risk which uses the frequency of events to define the score.[35]

- Option 2: A score based on hazard information where the hazard intensity and frequency are considered.

Pro	Con
Challengin to compare with other perils as need to assign score based on intensity.	Need to choose one specific return period or the aggregate them together.
Not straight-forward to assign a score based on intensity.	

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[34] Where do you want to check? - Check your long term flood risk - GOV.UK (check-long-term-flood-risk.service.gov.uk)

[35] HORA - Natural Hazard Overview & Risk Assessment Austria
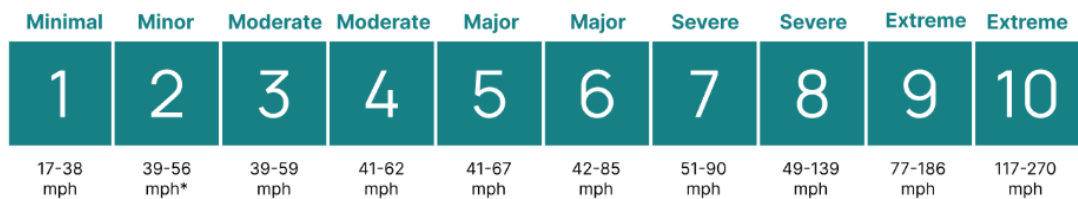
Figure 15: Example of a score for windstorm based on the hazard. One specific return period was chosen.[36]

- Option 3: A risk score. For Nat Cat the risk is defined as a combination of hazard[37], exposure[38] and vulnerability[39].

Pro	Con
The offers the full view of risks and accounts for the way houses are built.	Very difficult to get data for each house on construction type, year built… which would influence the vulnerability. The Data from the risk data hub for example do not yet include a view on the building type.

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[36] Wind Factor™ Hurricane Wind Model Methodology | Risk Factor

[37] hazard: what are is the intensity and frequency of the nat cat events?

[38] exposure: which objects will be impacted by the nat cat events?

[39] vulnerability: if the object are impacted by the nat cat event what will be the damage?

EIOPA REGULAR USE

EIOPA-24/467
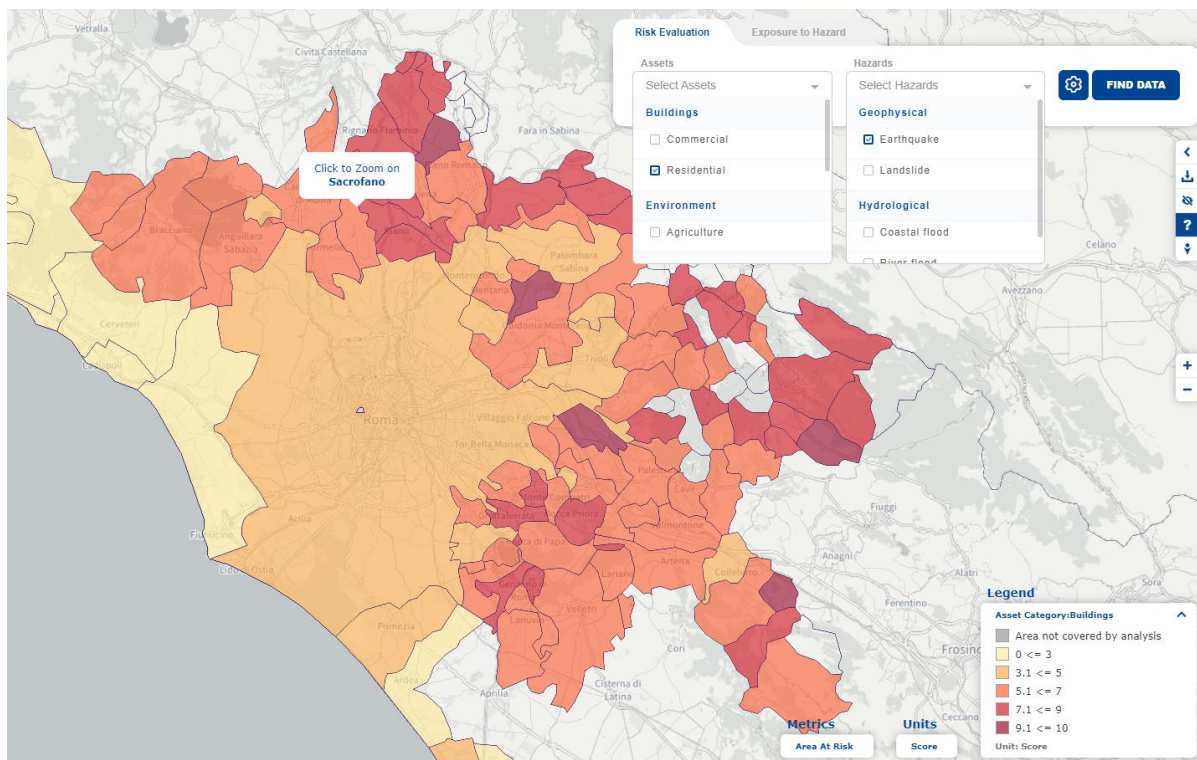
Figure 16: Example from risk scores from the risk data hub[40]

Questions to stakeholders:

Q3a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q3b: Do you have other arguments that could support or invalidate any of the options proposed?

Q3c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

DISCUSSION ON POSSIBLE WAYS TO DISCLOSURE THE SCORE

Different levels of risk exposures could be structured and sorted in different ways. The risks can indicate comparable scores between different types of Nat Cat perils. The score could be a numerical and/or alphabetical ranging from 0 to X, or from A to X alternatively, with higher scores indicating a higher risk of natural disasters. The score could also be color-coded or graded for ease of use and

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[40] DRMKC Risk Data Hub (europa.eu)

understanding. How the risks scores are presented to the homeowners, will directly affect the type of choice the user makes.

Below we have present a number of existing examples of tools wich disclose risk scores and could be relevant for EIOPA's tool.

Option 1: a first example (Figure 17) shows a score within a certain range (e.g., from 0 to 10) in conjunction with a colour coding.
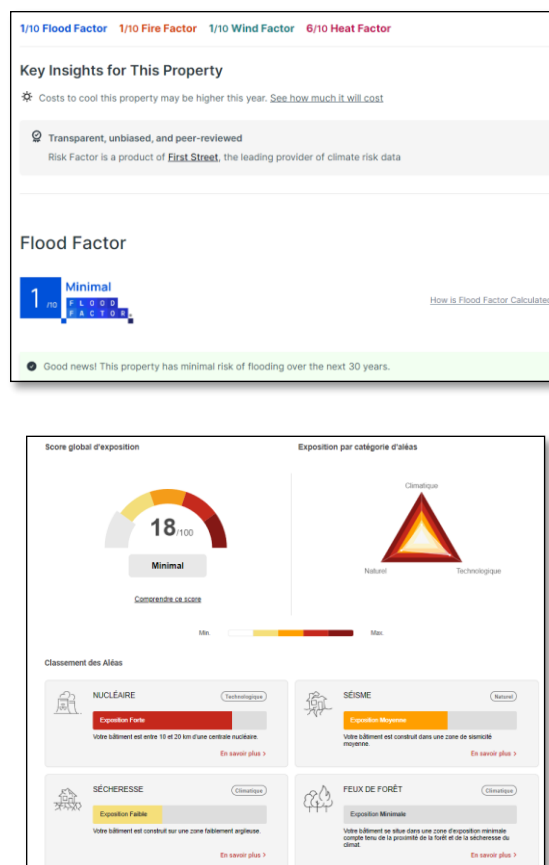
Figure 17: Option 1 of risk scores.[41]

Pro	Con
Figure and color (e.g., traffic lights) are easy to grasp	Number and color could be confusing, also mapping between number and color needs to be developed (discretionary task)

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41 Ensemble Face aux risques : le diagnostic d'exposition de votre domicile aux risques (generali.fr)

Continuous scaling allows granular distinction of risk levels	

- Option 2: Second example: Visualization risk levels on a map.

Pro	Con
Helps user to understand the spatial dimension of the risk exposure (e.g., that entire regions could be affected and should be avoided in times of heavy rain)	Less granular depiction of the risk exposure possible, potentially providing false impression of the true risk
Would be a good way to visualize exposure in case the tool does not ask for a specific address.	
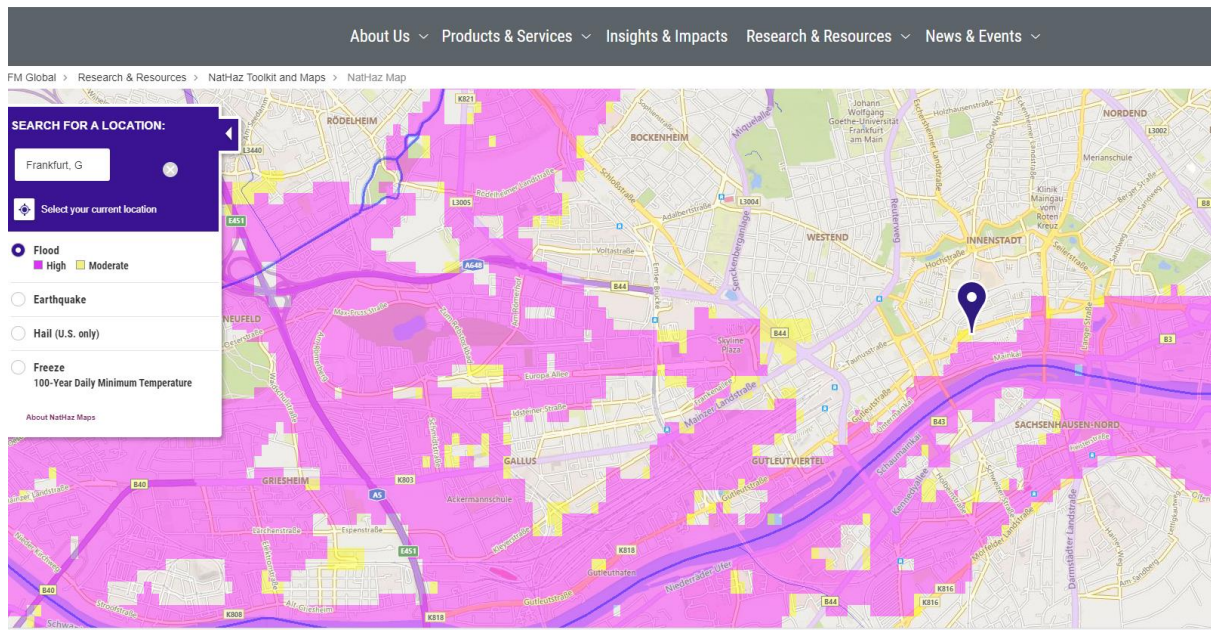
Figure 18: Option 2 of risk scores[42].

- Option 3: another example (Figure 19) shows a visualization of the risk level along a bar with high-level scaling (low vs. high risk)

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[42] NatHaz Toolkit: Manage Threat of Natural Hazards – FM Global

Pro	Con
Visualization easy to grasp	Could provide false impression about the materiality of the risk exposure (distance to the extreme levels "high" / "low" difficult to interpret)
Continuous scaling of risk levels possible (allows for higher granularity)	
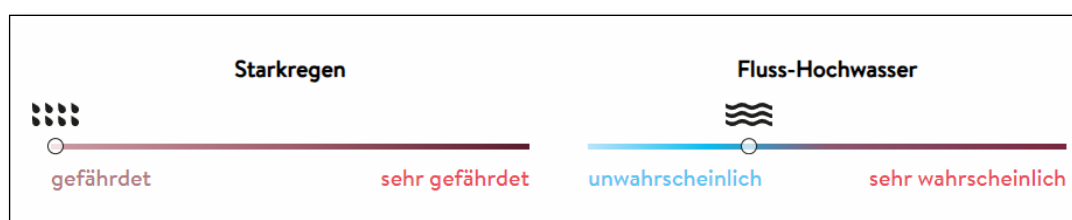
Figure 19: Option 3 of risk scores[43].

- Option 4: a fourth example (Figure 20) shows risk categories alike the energy efficiency system

Pro	Con
Certain level of users have already experiences with such a system (beneficial for credibility, trust)	Granularity of the scoring limited

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[43] Hochwasser-Check: Wie groß ist das Risiko an Ihrem Wohnort? (dieversicherer.de)
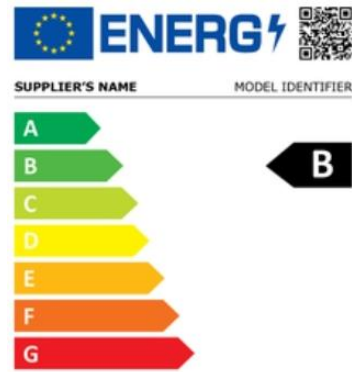
Figure 20: Option 4 of risk scores.

Questions to stakeholders:

Q4a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q4b: Do you have other arguments that could support or invalidate any of the options proposed?

Q4c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

6. PREVENTION MEASURES

In addition to the view on the risk scores (discussed in the previous section), the tool would also offer
a view on which possible prevention measures can be taken to reduce the risks.

GENERAL INFORMATION

Option 1: the tool could provide a number of general recommendation (see example in Table 2)
below.

Create a plan for your family and home

Compile a list of emergency contacts, including fire, police, family, neighbours, friends, tree
services, utility companies, and your insurance agent.

Create a communications plan for your family before and after an event.

Identify ahead of time the best place to shelter in your home so you can act quickly when needed.

Decide on locations where you will meet in case a disaster strikes

Prepare an emergency supply kit that includes important documents. Be ready to live without power
and running water for a period of time.

Practice the plan with your family.

Learn first aid.

Stay informed / sign-up for alerts

You can also sign up for Met Office Weather Warnings. https://www.befloodready.uk/before-a-
flood/flood-warnings

Find a reliable source for severe weather information. Follow your local National Weather Service
(NWS) office on social media and the NWS Storm Prediction Center (SPC) on Facebook or X. Tune in
to local news often when severe weather is forecast.

Enable wireless emergency alerts on your cell phone. Check your wireless service provider's
website to find out how to do this for your specific phone type.

Purchase a weather alert radio that broadcasts emergency alerts from your local National Weather
Service office, preferably one with a hand crank.

Table 2: Example of general recommendations[44]

Pro	Con

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[44] Thunderstorm Ready Home – Insurance Institute for Business & Home Safety (ibhs.org)

Straight forward to apply	Need to not overwhelm the user

Questions to stakeholders:

Q5a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q5b: Do you have other arguments that could support or invalidate any of the options proposed?

INSURANCE RELATED INFORMATION

An adequate insurance coverage is key to protection citizens against potential losses arising from natural catastrophes. Different type of information could be disclosed to the user of the tool.

Some NCAs have already started investigating the quality of information disclosed by natural catastrophes insurance policies. For example, the Italian supervisor IVASS recently published the results of a survey conducted to assess the clarity of the policies covering natural catastrophes in Italy[45]. The results highlighted important shortcomings in the offering of such policies. Namely, policy conditions are not always clear and easy to understand, there are specific exclusions for each cover in addition to those common in the basic cover, the definition of the different natural catashrophe is not consistent between the different policies. Moreover, in order to gather information on the characteristics of buildings, the policyholder is often required to fill in complex questionnaires, with technical information of which he/she may be unaware, such as the stability of the building or the compliance of roofs and canopies with current regulations. Such supervisory activities suggest that ad-hoc tools for helping consumers are needed.

DISCUSSION ON POSSIBLE ELEMENTS TO COVER IN THE TOOL

- Option 1: Provide information about country specific aspects of Nat Cat insurance (from example PPPs in place…).

Pro	Con
Each country has specificities so important to mention them	Can become a lot of information, need to be well presented.

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[45] IVASS (2024): Survey on policies covering natural catastrophes. Available here.

- Option 2: Provide basic information regarding insurance such as "know what your insurance covers", create a home inventory…

Before	During	After
Know your Nat Cat insurance Know what your insurance covers and what it doesn't Do an annual check-up with your agent to make sure you have the right coverage		Contact your insurer
Take a household inventory Create a home inventory video https://www.iii.org/article/how-create-home-inventor Use your cell phone to video belongings in each room of your house. Be sure to open cabinets and closets!		
Store your home inventory in the cloud.		Take picture of the damages and document them
Know your insurer Keep your insurance agent's contact information in your phone and accessible offsite.		

Das sollten Sie jetzt tun

In Hessen sind nur 54% der Gebäude gegen Hochwasser versichert. Wir empfehlen Ihnen:

1 Verträge prüfen
Prüfen Sie Ihre bestehenden Verträge. Erweitern Sie Wohngebäude- und Hausratversicherung für alle Naturgefahren.

2 Beratung vereinbaren
Vereinbaren Sie einen Termin bei Ihrem Versicherer, Vermittler oder Berater. Bei Fragen können Sie sich auch an unseren Verbraucherservice wenden.

3 Prävention
Sorgen Sie privat vor und schützen Sie Ihr Haus vor Hochwasser und Starkregen. Weitere Informationen und Vorsorgetipps finden Sie hier.

Table 3: Example of insurance related measures[46]

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[46] Thunderstorm Ready Home – Insurance Institute for Business & Home Safety (ibhs.org) and Hochwasser-Check fürs Haus: Jetzt Risiko online ermitteln (dieversicherer.de)

Pro	Con
Very straight forward to put in place.	Provides very basic information which might not be sufficient for the user to take adequate decision.

- Option 2: Insurance literacy explain deductibles, exclusions, limits

Pro	Con
Very important aspect to consider in insurance coverage.	Could be overloading.

Questions to stakeholders:

Q6a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q6b: Do you have other arguments that could support or invalidate any of the options proposed?

Q6c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

DISCUSSION ON POSSIBLE WAYS TO DISCLOSE THE INFORMATION

- Option 1: together with a list of prevention measures (see section "Prevention measure" above), a list of measures to take regarding insurance related actions could also be provided.
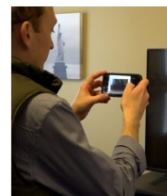
Figure 21: Option 1 to show insurance related actions[47]

Questions to stakeholders:

Q7a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q7b: Do you have other arguments that could support or invalidate any of the options proposed?

Q7c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

PREVENTION MEASURES ON BUILDINGS

A number of measures can be taken on properties to minimize the risks and potential damages araising from Nat Cat events (see examples in Annex 1).

DISCUSSION ON POSSIBLE DATA

Ideally, data on potential prevention measures would be open-source to raise the credibility of the tool. However, a comprehensive open-source database in this regard appears to be very difficult to obtain. Getting private data, e.g., through a data collection with the insurance sector in the EU, could provide suitable data but may be challenging as well. EIOPA's pilot exercise on impact underwriting in 2022 showed that the EU insurance sector was at early stages in this regard.

Potential sources of data for a prevention measure database could be based on:

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[47] Thunderstorm Ready Home – Insurance Institute for Business & Home Safety (ibhs.org)

- European Climate Adaptation Platform Climate-ADAPT / EEA
- EIOPA data collection with insurers in the EU
- EIOPA data collection with loss modellers, e.g., through EIOPA's Nat Cat expert network
- Literature review/existing web-based sources

Data	Pro	Con
European Climate Adaptation Platform Climate-ADAPT / EEA	• Open-source (partly)	• No risk-based / insurance-based database • No quantification of effects of measures
EIOPA data collection with insurers in the EU	• Measures that work in practice • Insurers / national association could have an interest in participating in the project. So they might be incentivized to provide data.	• Effort for undertakings • Limited data available (sector at early stage) • Risk-based effects difficult to assess / generalize
EIOPA data collection with loss modellers, e.g., through EIOPA's Nat Cat expert network	• Measures that work in practice • Risk-based effects can be estimated	• Effort for loss modellers
Literature/existing web-based sources	• Open-source	• Limited data / high-level information or more US based • Not insurance-related

Questions to stakeholders:

Q8: Are you aware of any open-source database regarding risk prevention measures in the context of natural catastrophes?

In addition, a categorization of measures, e.g., with regard to costs and effectiveness, could be useful to further guide homeowners. See "surging seas" example: Small-scale measures matter as they can reduce certain risks ("better than nothing"). However, data to categorize measures will be difficult to get, and should be high-level for indicative purposes.

Category	Pro	Con
Cost	• Financial dimension important for decision making process in the context of personal budgets	• Cost estimates difficult to get • Might nudge users to take up rather less expensive, and less effective, measures
Effectiveness	• Important for decision making process in the context of personal risk aversion	• Risk estimates difficult to get

Questions to stakeholders:

Q9: Would you categorize risk prevention measures, and if so, along which dimensions? Please explain.

DISCUSSION ON POSSIBLE WAYS TO DISCLOSE THE INFORMATION

- It is important to carefully consider which instruments, information, choice sets and online choice environment, can be used to ensure that policyholders can form an opinion, better understand and grasp the risk awareness for undertake any prevention and/or mitigation measures, and make a good comparison for Nat Cat uptake, all leading to an outcome which is useful to their personal situations. User friendliness is key to help homeowners to better understand their risks and how they can mitigate them. The information provided should not be too technical as this might be counterproductive i.e. users get shocked and might not take up risk prevention measures. It is also important to use behavioural insights to make the online choice environment more effective for policyholders. Option 1: Interactive Visualization (e.g., see "the resilient house")

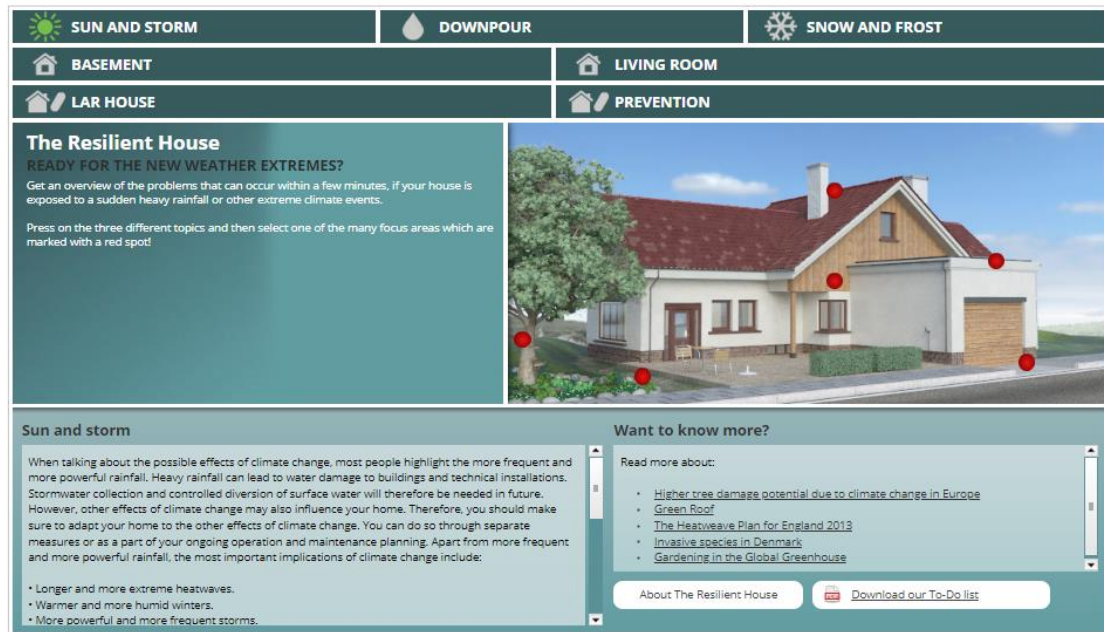Figure 22: Source: The resilient house - Ministry of Environment of Denmark and Enviromental Protection Agency

Pro	Con
Interactive visualization / gamification helpful to raise awareness and understanding Users might be already familiar with such visualizations from energy related renovation and modernisation programs (such visualizations do exist in this area).	IT work For lots of adaptation measures, risk may be that some get overlooked

- Option 2: List (e.g., see the IBHS example on wildfire)

Pro	Con
Easy to go through	Not very attractive i.e. could be cumbersome

Figure 23: Source: IBHS

Questions to stakeholders:

Q10a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q10b: Do you have other arguments that could support or invalidate any of the options proposed?

Q10c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

7. IMPACT OF PREVENTION MEASURES VIEW

Another important message that the tool could provide is that prevention measures can have a positive impact on the availability and affordability of insurance, by affecting risk-based insurance premiums .

DISCUSSION ON POSSIBLE METHODOLOGIES

- Option 1: provide some high-level messages on how prevention measures can impact vailability and affordability of insurance.

Pro	Con
Help users to better understand the effects of different measures on their risks and to bring them into a position to discuss these effects with their insurer/broker.	Does not provide an exact quantification of each measure on the impact on the premium.

- Option 2: provide some illustrative examples on how prevention measures can impact premiums.

Pro	Con
Help users to better understand the effects of different measures on their risks and to bring them into a position to discuss these effects with their insurer/broker.	Does not provide an exact quantification of each measure on the impact on the premium.

Questions to stakeholders:

Q11a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

> Q11b: Do you have other arguments that could support or invalidate any of the options proposed?
>
> Q11c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

DISCUSSION ON POSSIBLE WAYS TO DISCLOSURE THE INFORMATION

- Option1: Interactive tool to play with different options[48]

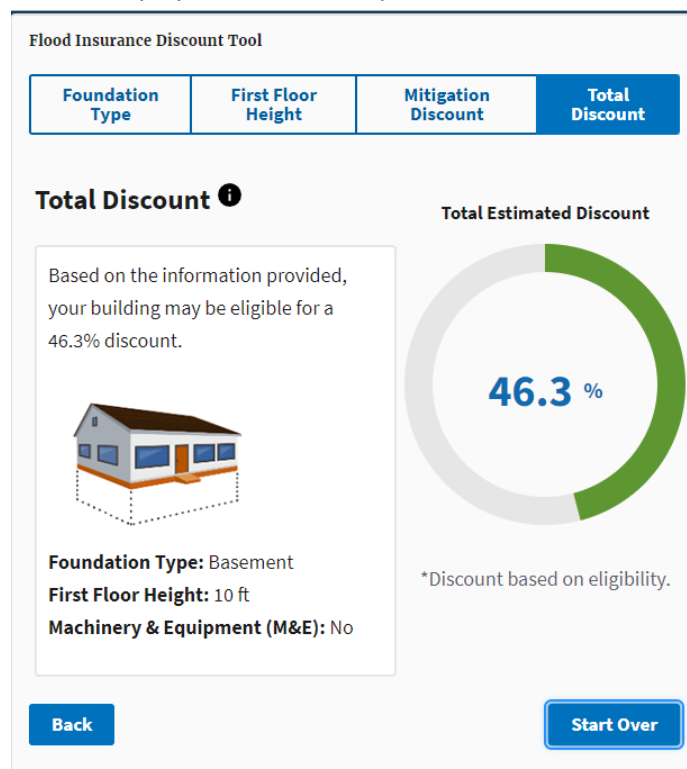Figure 24: Example of an interactive tool from FEMA

Pro	Con

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[48] Note that the idea would not necessarily to show the exat amount of how much the premium is reduced but rather to visulaize the decrease in an interctaive way.

Very clear steps to understand where the premium discount comes from and how high it would be.	Needs very detailed calulcation to get a correct estimation on premium discount.

- Option 2: A simplified illustrative example

Pro	Con
Provides information is a friendly way	Might not be providing sufficient incentive to take action.

Questions to stakeholders:

Q12a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q12b: Do you have other arguments that could support or invalidate any of the options proposed?

Q12c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

8. RAISING AWARENESS IN THE PURCHASING PROCESS, TAKING ACTIONS AND MEASURING THE IMPACT

In order to ensure that citizens are properly aware of the risks and prevention measures, it would be important to also consider how this information could be shared at relevant steps. Bringing this information to the consumer at a certain moment in a more mandatory way could lead to a greater increase in awareness. As described at the beginning of this paper, many tools exists but do not seem to be contributing materially for inverting the situation on protection gaps. For example, this information could be relevant when buying a house or an insurance product. In addition, it is also important to consider how to increase the chance that the tool will lead to desired action/behavior and how the tool could measure its impact.

RAISING AWARENESS IN THE PURCHASING PROCESS

- Option 1: A link could be added in the IPID for the policyholder to check its Nat Cat risks and related prevention measures

Property and casualty insurers have to provide consumers with an insurance product information document (IPID). The IPID provides information about the most important features of an insurance product. It serves to ensure that insurance products are transparent, clear and comparable. The requirements regarding the form and content of IPIDs are set out in Commission Implementing Regulation (EU) 2017/1469 in conjunction with the Insurance Distribution Directive.

- Option 2: the insurer should provide the risk scores as well as the list of recommendation obtained from the tool with any insurance contracts.
- Option 3: the risk scores as well as the list of recommendation obtained from the tool should be published on any web portal selling houses.

Questions to stakeholders:

Q13a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q13b: Which arguments could support or invalidate any of the options proposed?

Q13c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

TAKING ACTIONS

As mentioned before, it is also important to consider how to increase the chance that the tool will lead to desired action/behavior.

- Option 1: the tool could propose easy recommendation such as contact your insurer or make sure you have an emergency kit ready.
- Option 2: add link to national insurance associations.
- Option 3 add links to insurance providers.

Questions to stakeholders:

Q14a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q14b: Which arguments could support or invalidate any of the options proposed?

Q14c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

MEASURE THE IMPACT OF THE TOOL

Finally considerations also need to be taken to understand the impact of such a tool.

- Option 1: monitor the insurance penetration.
- Option 2: monitor the uptake of prevention measures on private houses.
- Option 3: monitor the number of people using the tool.
- Option 4: conducting regular surveys with users.

Questions to stakeholders:

Q15a: Do you have other suggestions in addition to the ones already proposed? Please explain futher.

Q15b: Which arguments could support or invalidate any of the options proposed?

Q15c: In your experience, which option do you consider will bring more benefits for the outcome of the tool?

9. ANNEX - ORGANISATIONS WHICH ARE MEMBERS OF THE TECHNICAL EXPERT NETWORK ON CATASTROPHE RISKS

Please see below the list of organisations with whom the members of the Technical Expert Network on Catastrophe Risks are affiliated. The inputs provided in the discussion paper is based on each individual members' expertise and contribution.

Allianz

Achmea

AON

AVIVA

CMCC

Consorcio de Compensacion de Seguros

CoreLogic

Deloitte

EEA (European Environment Agency)

Gallagher Re

Generali

Guy Carpenter

Hannover Re

HDI

Impact Forecasting

JBA

Liberty Mutual

MSK Meyerthole Siems Kohlruss

Munich Re

ORTEC

PERILS

RMS

Siriuspoint

SwissRe

Verisk

10. ANNEX: DESCRIPTION OF MAPPED ATTRIBUTES OF EXISTING TOOLS

Impact criteria	Attribute	Example of mapped variation in attribute
Tool ecosystem	Tool developer/ owner	*FEMA (US Government), Zurich insurance, the World Bank Group*
	Sector of developer/ owner	*Public authority, think tank, insurance/ reinsurance provider*
Personalisation	Geographic scope	*Global, national, regional (sub-national)*
	Specific geography	*Global, Austria, City of Amsterdam*
	Target audience of tool	*Homeowners, commercial business owners, renters*
	Risk assessment criteria	*Location, level of floor in property, severity of peril*
Content and recommendation included	Number of perils covered	*1-12*
	Perils covered	*Flood, storms, earthquakes, droughts, forest fires, heat waves, cold waves, frost, hail, tsunami, other*
	NatCat mitigation recommendations	*Property modifications, insurance cover, placement of valuables in property*
	Timing of mitigation	*Before, after, or during the NatCat event*
	Insurance premium discount calculation	*Included in tool, not included, unknown*
	National relevant scheme/ relevant exclusions in jurisdiction	*National relevant scheme exists (e.g. FEMA – USA; assurance catastrophe naturelle – France); No known national scheme*
	National relevant scheme/ relevant exclusions highlighted	*Not mentioned in tool, mentioned in tool, tool hosted on website of national scheme*
	Type of information presented in tool	*Projections, predictions, historical data, current geographical data*

	Description of methodology	*Open text description*
Visual cues	Categorisation of risk calculation visuals	*Colour scale, numeric scale, risk chart*
	Risk calculation visuals (full description)	*Open text description*
	Categorisation of mitigation recommendation visuals	*Text, illustration/ graphic, links*
	Mitigation recommendation visuals (full description)	*Open text description*
Interactivity	Interactive/ static page	*Static, semi-interactive (clickable risk icons), interactive (shake phone to simulate earthquake)*
	User-friendliness (1-3 scale)	*1: Clear instructions, easy to find information (few clicks required), simple text/ images to highlight where to focus.* *2: Call to action on the site but not intuitive/ easy-to-follow; links are there but need to look for them; info is easy to read but hard to find* *3: No real navigation system, dense information, hard to read, not sure what to focus on, dead links*
	Links to further resources	*Past flood events and groundwater probability map, links from international and relevant sources, alternative tools*
Accessibility	Interface for tool	*Webpage, app, designed for mobile, programme/ service (behind paywall)*
	Options to save analysis	*PDF, share online, print*

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11. ANNEX: EXAMPLE OF PREVENTION MEASURES

Peril	Before
Windstorm	**Inspect and repair your roof** Have your roof inspected by a trusted and licensed roofing company who will look for the following: Roof cover condition Asphalt shingles: look for curling, loose (unsealed), missing and/or torn shingles. Clay, concrete, and slate tiles: look for cracked, missing, and/or unattached tiles. Metal panels: look for dents/divots, loose screws, deteriorated rubber washers, discolored or worn off paint (which acts as an anti-rust layer), and/or signs of rusting. Vents, skylights & chimneys Vents: look for loose seals. Skylights: look for leaking, loose, or wavy flashing, cracks, and/or damage to the window around the skylights. Chimneys: look for leaking around the flashing and/or missing mortar. Roof valleys/seams: look for leaking from roof valleys or seams that are under your roof cover material.
Windstorm	**Trim trees and tidy your yard**. Keep all tree limbs trimmed and away from your house. Hire an arborist to remove branches that overhang the house and remove any dead, dying, or diseased trees. Anchor any outdoor play equipment to the ground. Keep ladders and other large items that are not used daily into a shed or garage.
Windstorm	**Service & organize your garage.** Service your garage door annually. If a new door is recommended when you have it serviced, check out the home upgrades page to know what to look for in purchasing a new wind-rated garage door. Organize your garage so you can easily park your vehicle under cover when severe weather, especially hail, is in the forecast.
Windstorm	**Seal gaps and cracks on your home's exterior.** Caulk and seal any cracks or gaps on your home's exterior using a tube of silicone caulk. Add weather stripping as needed to seal around doors and windows, making sure you cannot see any daylight from inside your home.
Windstorm	**Check & clear your gutters and downspouts** Inspect gutters and downspouts to ensure they're secured to the house by gutter straps. Clean all gutters, downspouts, and drains so they are free of tree debris and vegetation that may restrict proper flow. Check downspouts to ensure they divert water at least 3 to 4 feet away from the foundation.

Thunderstorm Ready Home – Insurance Institute for Business & Home Safety (ibhs.org)