KE4CAP

Knowledge Exchange between Climate Adaptation Platforms

Stepping up knowledge exchange between Climate Adaptation Platforms

Synthesis report from the KE4CAP project

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Detailed information on all KE4CAP project activities and outputs is available at:
www.weadapt.org/platforms

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Contents

Executive summary

Global recognition of the need to enhance climate change adaptation is growing. The increasingly evident ramifications of climate change – severe floods, prolonged droughts, and the spread of wildfires, for example – have made the need for effective adaptation evident to policymakers and the general public.

In the face of this, climate adaptation platforms (CAPs) have a vital role to play. Such platforms provide access to relevant, high-quality information that is essential for policymakers and practitioners to identify and implement actions to adapt to changes that are here and those changes that are on the horizon. These platforms can and do support the development of national and transnational plans and strategies. They promote *informed* decision-making and *meaningful* climate action.

Against this backdrop, the **Stepping-up knowledge exchange between Climate Adaptation Platforms (KE4CAP)** project[1] aimed to explore ways to enhance these critical platforms. The project sought to build capacity, to share lessons learned, and to explore challenges and various approaches that hold promise for such platforms so they could play a more effective role in the adaptation agenda.

To this end, the project initiated and facilitated a series of knowledge-exchange activities between 30 CAPs from around the world and at various stages of development. KE4CAP for the first time brought together a cadre of over 200 international CAP developers and operators and specialists from Europe and from other parts of the world. The aim was to provide those working on such platforms with mutual support – along with insights, ideas, and know-how to help meet current and emerging challenges, and to deliver the best support possible for their users.

This report synthesizes the undertakings and outcomes of the KE4CAP project. It provides a brief introduction to the project's mission, an overview of role of CAPs in supporting policy and practice, and information about the approaches that KE4CAP took through its events, activities and discussions. The document provides insights into the current state of development of such platforms and into the depth of relevant experience and innovation among CAPs. It incorporates participants' key messages on current practices, selected innovations, and shared challenges.

During the life of the project (November 2019 through January 2022), KE4CAP facilitated a series of knowledge-exchange initiatives co-designed by core KE4CAP team, members of the KE4CAP Consultative Group, and the participating platforms. The initiatives were designed to advance cooperation and learning, to share insights, and to promote the role and value of CAPs.

1 All information about the project is available on the KE4CAP workspace: www.weadapt.org/platforms. The workspace is a key central resource that contains all the material developed during the project, related reference materials, and links to parallel initiatives.

The resulting international CAP community of practice that grew out of the KE4CAP project thus facilitated peer-to-peer networking, and advanced collaboration to support continuous learning and improvement. Components of the initiative included:

- Three events (co-hosted by platforms in Australia, Canada and Japan) that focused on specific challenges platforms face.
- Five topic-focused workshops that focused on sharing lessons learned and exploring topics in more depth.
- A survey of project participants about good practices and innovations.
- Multi-lateral exchanges aimed at informing and engaging with the broader international community.
- A final synthesis workshop that brought the results of the project together and explored future directions.

Early on in the project, KE4CAP adopted a topic-based approach. This agreed set of overarching topics proved helpful in informing both individual CAP journeys and the collaborative KE4CAP pathway. The topics provided an effective framework for capturing learning and for focusing future activities on critical issues and challenges. Identified by the community of participants, these 12 topics reflect key issues platforms face. Listed in Figure 1 (and outlined in summaries in Key messages, with more details in Appendix 3) these topics, while not comprehensive, together capture major areas of interest and concern.

Figure 1: Twelve priority topics identified by member platforms involved in the KE4CAP project

The KE4CAP project identified challenges, many of them cross cutting in nature, that the platforms confront, and the associated implications for both future knowledge exchange across the community and for the platforms' use as a source of information for policymaking. The conclusions outlined in this report build on outcomes from the KE4CAP experience to provide insights on the value of knowledge exchange. The report outlines a vision for ongoing collaboration and suggests how platforms could evolve from inspiring and informing climate adaptation to supporting much broader climate action.

Overall, the KE4CAP project demonstrated and reinforced the value of knowledge exchange by creating and developing the following:

- **A highly engaged, enthusiastic, ambitious and collaborative community of practice** of CAP developers and operators around the world.
- **A network of platforms that cooperate, work and learn as peers and partners** to address challenges and realize opportunities to improve the effective provision of knowledge, information and evidence to support adaptation.
- **A 'safe space' for network members** to interact, learn from, and collaborate with each other – thereby supporting deeper and honest reflection and sharing amongst participants, and broader engagement from CAPs from across geographies and at all stages of development.
- **A shared repository of information and practices** including explanations of how platforms are informing and supporting climate adaptation strategies, and platform profiles detailing individual platforms' aims, funding structure, and management.

CAPs are increasingly expected to keep pace with the growing and evolving needs of their users and the ever-expanding wealth of knowledge, data and evidence on related subjects. Keeping up to date with user needs will require widening the focus to include issues such as well-being, climate risk, capacity building, equality and justice, and place-based and systemic development. To respond effectively, the KE4CAP community identified several operational areas CAPs should consider. These are:

- The role and design of platforms should be consistent with the ongoing drive towards climate action and development agendas both nationally and internationally. Shifting agendas have implications for platform content and design. Platforms themselves need to adapt – by taking into account the increased emphasis on solutions; growing interest in monitoring, reporting, and evaluation of actions taken; and greater interest in finding approaches to maximize the benefits that flow from the proliferation of knowledge providers and platforms.
- Technical capacity will need to grow to deliver the data and information consistent with evolving user requirements and capabilities, and with advances in science and communication. New innovations, such as interactive and immersive technologies, can be incorporated to enhance the accessibility of information, and to provide relevant and usable tools, maps, infographics and capacity-building experiences for users. Community knowledge-exchange activities are particularly useful when piloting and demonstrating such innovations.

- **Business models must evolve** to move away from project-based grants, and towards sustainable funding that can achieve this evolving agenda. A well-articulated value statement is essential to achieving such funding. Moreover, platforms should demonstrate their impact and added value if they are to continuously prove their relevance among the myriad knowledge providers and platforms out there. This means documenting the achievements of the platforms, particularly in building capacity, and in informing and supporting the delivery of tangible actions.

The KE4CAP project successfully demonstrates the benefits and value of facilitated coordination and knowledge exchange among those developing and operating CAPs. Indeed, the project led to an expressed interest within the community for the creation of a sustained knowledge-exchange initiative that builds on the KE4CAP experience and sets the stage for greater impact. Participants have expressed a desire to see an ongoing coordinated effort that serves as:

- **A knowledge-exchange driver** that provides a forum to share information and experience among CAPs and engages and works with them at different stages in their development.
- **An agenda setter** that serves as an intellectual centre that can shape agendas by developing and making information available through the publication of guiding principles, commentaries, briefings and research papers.
- **An enabler of collaboration and coordination** that provides the brokering experience and network connections to initiate, facilitate and accelerate the exchange of knowledge, research and innovation.
- **An innovation booster** that advances the emergence of new knowledge and research on CAPs as innovators to support and inspire society to act, and to make experiences and insights widely available.

The platforms that participated in the KE4CAP project see these options as being complementary; at the same time, the role of serving as a knowledge-exchange driver, is the foundational one that provides the basis for the other roles.

In a little over two years, the KE4CAP project has established and cultivated an enthusiastic and engaged community of practice with members representing platforms from across Europe and around the world. This community continues to work together to exchange information and expertise of value to inform ongoing development of platforms.

In the wake of the project, members of this new KE4CAP community have expressed considerable interest in carrying on with an appropriately designed and supported follow-up initiative. They are keen to continue working together to share innovations and tools, explore challenge and otherwise cooperate. In the absence of such an initiative, there are widespread concerns that the benefits and progress made today through KE4CAP will be lost. The challenge now is for this community to communicate this message and to work together with potential funding agencies to further develop a suitable approach focusing on realizing and enhancing benefits to the CAP community and to those users whose work it informs and supports – for the benefit of all.

Introduction

As the need for climate action gains in importance, it is increasingly recognised that decision-makers require access to relevant and high-quality knowledge and information capable of supporting their adaptation strategies and plans. These requirements are also recognised within, and seen as consistent with implementing, global initiatives such as the Paris Agreement, regional strategies such as the EU Adaptation Strategy, and a wide variety of national policies and programmes.

Web-based Climate Adaptation Platforms (CAPs) provide a vital means of helping to meet such requirements. These platforms share climate action-related knowledge, data and guidance to support adaptation action at all scales from local to transnational and are instrumental in helping to translate scientific evidence into information that is accessible and usable by a wide range of users.

Around the world, there are an increasing number of CAPs ranging from those that are long-established to those that are just being planned and launched. All are at different stages of development and capability and all face challenges that limit their effectiveness in supporting climate action. Yet, many of these challenges are similar in nature and scope and, as such, there are significant benefits to be gained from sharing knowledge and experiences, addressing common issues, and working together to advance innovations that can improve the relevance and quality of the information offered by CAPs.

Against this backdrop, the **Stepping-Up Knowledge Exchange between Climate Adaptation Platforms (KE4CAP)** project started in 2019 with the aim of bringing together developers and operators of CAPs within the EU and beyond to establish a community of practice with members working together to advance cooperation and learning on means to inform and support climate adaptation planning and action. This final project report synthesises the wide-ranging discussions held throughout the KE4CAP project on lessons learned and challenges being addressed by CAPs across the community. Hopefully, the information will help inform platform developers and operators as they move forward and continue to enhance their individual platforms.

Funded by the European Commission through the Strategic Partnerships for the Implementation of the Paris Agreement programme, the KE4CAP project focused primarily on promoting cooperation between platforms operating in EU countries and non-European major economies. During the two years of the project, the community expanded rapidly to include local, regional, national and international platforms in over 30 countries and regions, and KE4CAP facilitated a series of major knowledge exchange events and activities that brought the community together to address key topics identified of interest to CAPs worldwide. Details of all project activities can be found on the KE4CAP webspace at: www.weadapt.org/platforms.

As explained in the following sections, all KE4CAP activities focused on twelve key topics which were highlighted by the developers and operators of CAPs as of priority interest. The core of this Synthesis Report summarises the current state of the art for each topic, demonstrates the depth of relevant experience and innovation amongst CAPs, and looks at shared challenges. It also outlines key areas for future work, both for the CAP community, and for those in a position – national governments and funding agencies – to create enabling conditions to help CAPs realise their potential.

Throughout the project, KE4CAP benefitted greatly from the generosity and energy of those CAP teams participating, who readily shared their work, practices, innovations, lessons learned and ideas, and supported peers to do the same. This report aims to summarise, reflect and add value to those contributions, continuing the sharing of information between developers and operators of platforms and working towards a clearer understanding of the challenges involved and potential solutions.

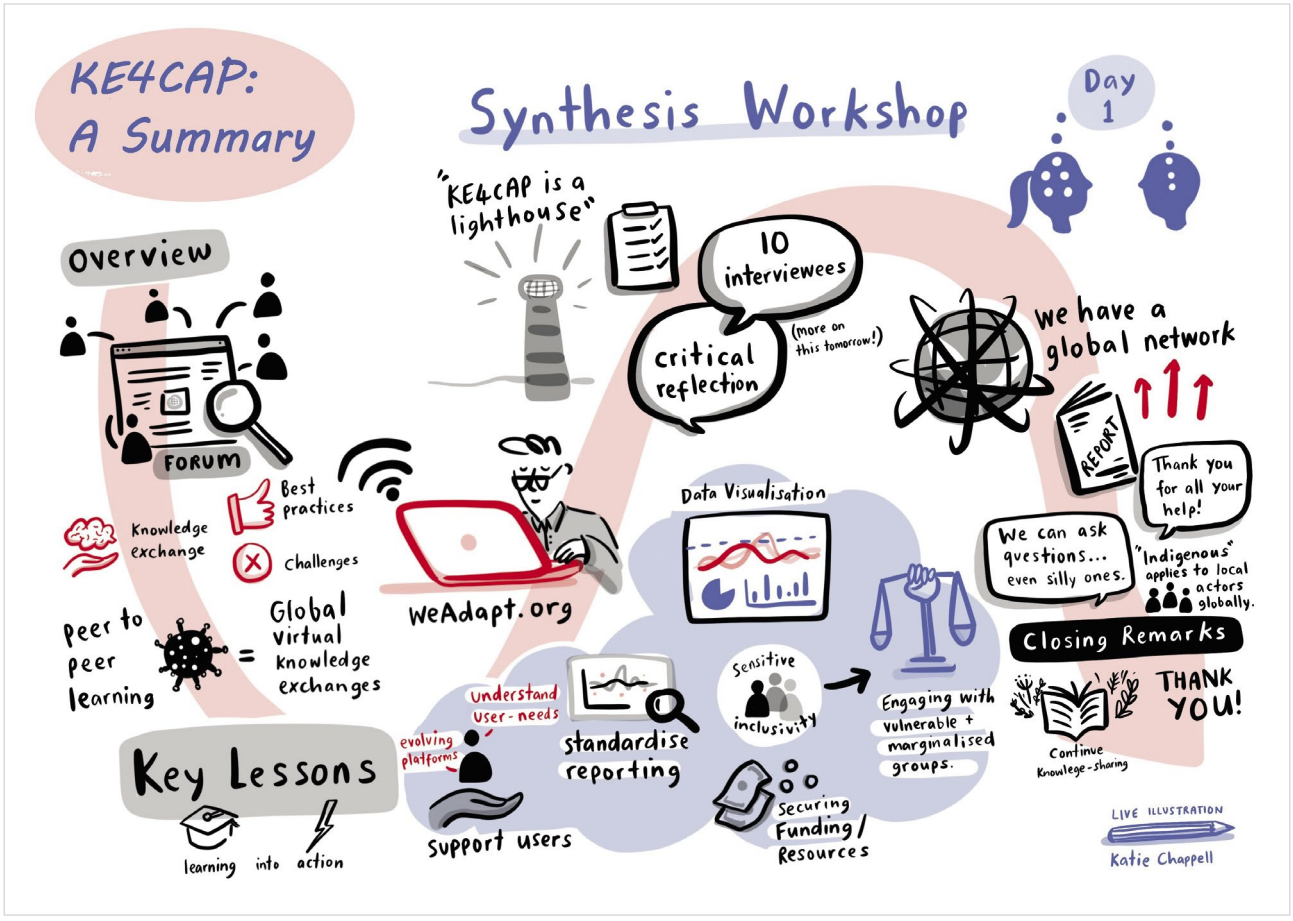

Figure 2: Summary of the KE4CAP journey

Supporting policy and practice

CAPs are recognised as being policy- and practice-driven with changes in such initiatives directly impacting their development. This recognition stems from the important roles CAPs already play in supporting, informing and inspiring adaptation action, and the emerging roles they are likely to play in the future including, for example, in monitoring, reporting and, in some cases, evaluating adaptation action.

Throughout all project activities, KE4CAP set out to better understand the multi-level policy and practice frameworks – the drivers – within which CAPs operate, how these are evolving and the potential implications in terms of effort needed by all parties (including decision-makers, funders, developers and operators of platforms) to continue to enhance the value of CAPs.

As examples, four scene-setting presentations given during the final KE4CAP Synthesis Workshop summarised policy and practice drivers that are likely to shape CAPs over the next five to ten years. They also provided illustrative examples of the nature and scope of these external drivers at various levels – global, transnational, national and local:

- At the global level, the Global Stocktake (GST) under the Paris Agreement provides both potential opportunities and challenges for CAPs, and platforms need to consider how best they can participate in the GST process and outputs. On the former, this could include acting as a knowledge and information resource for the GST by pooling information on adaptation progress and emerging challenges. On the latter, this could include repackaging and disseminating information from the GST such that it is more relevant and accessible for platform users.
- In Europe there are many policies supporting the EU climate policy objectives under the EU Green Deal that both provide opportunities for CAPs but also challenge them to deliver and demonstrate their added value in supporting adaptation across the region. EU Climate Law [Regulation (EU) 2021/1119] makes adaptation a legal requirement and requires EU member states to report on adaptation progress. The new EU Adaptation Strategy [COM(2021) 82] signals a move from a focus on the adaptation process to action and solutions and signals the need for joint interactions at the national, regional and international levels. From the perspectives of CAPs, these policy drivers challenge platforms to contribute by elaborating risk data and information, taking a more systemic and solution-oriented approach to platform content and functionality, supporting and informing action at multiple levels, using new technologies and methods to overcome data gaps, and striking a strategic balance as to what can be done more effectively by working with others.

- At the country level, national adaptation strategies and plans remain the main policy drivers providing direction and, in some cases, a role and support for CAPs. Recent updating of many plans and strategies to focus on improving the effectiveness and efficiency of adaptation measures, including a focus on vulnerable sectors and populations, has resulted in the need to develop and enhance the supportive CAPs. There has also been a move in some countries to broaden the remit of their CAP to include mitigation i.e., to address the broader range of climate action. This is an emerging driver and the implications for CAP content, functionality and engagement is an area where sharing lessons learnt and challenges involved are needed.
- At the local level, ambitions for addressing climate change are rising and local governments and communities are feeling the pressure to act. Supporting and informing action at this level necessitates having city and community leadership engaged in CAP co-development such that content and functionality of CAPs remains relevant, enabling and easy-to-use. Being fit-for-purpose means being consistent with the local context and situation, and guiding users to find solutions that address their needs and capacities. Enabling content and functionality means providing actionable knowledge and information, including sharing good practices, that support learning, are transferable and can be scaled accordingly. Appropriate accessibility and logical navigation and structure that allow users to access the required information are also critical to engaging those working at the local level.

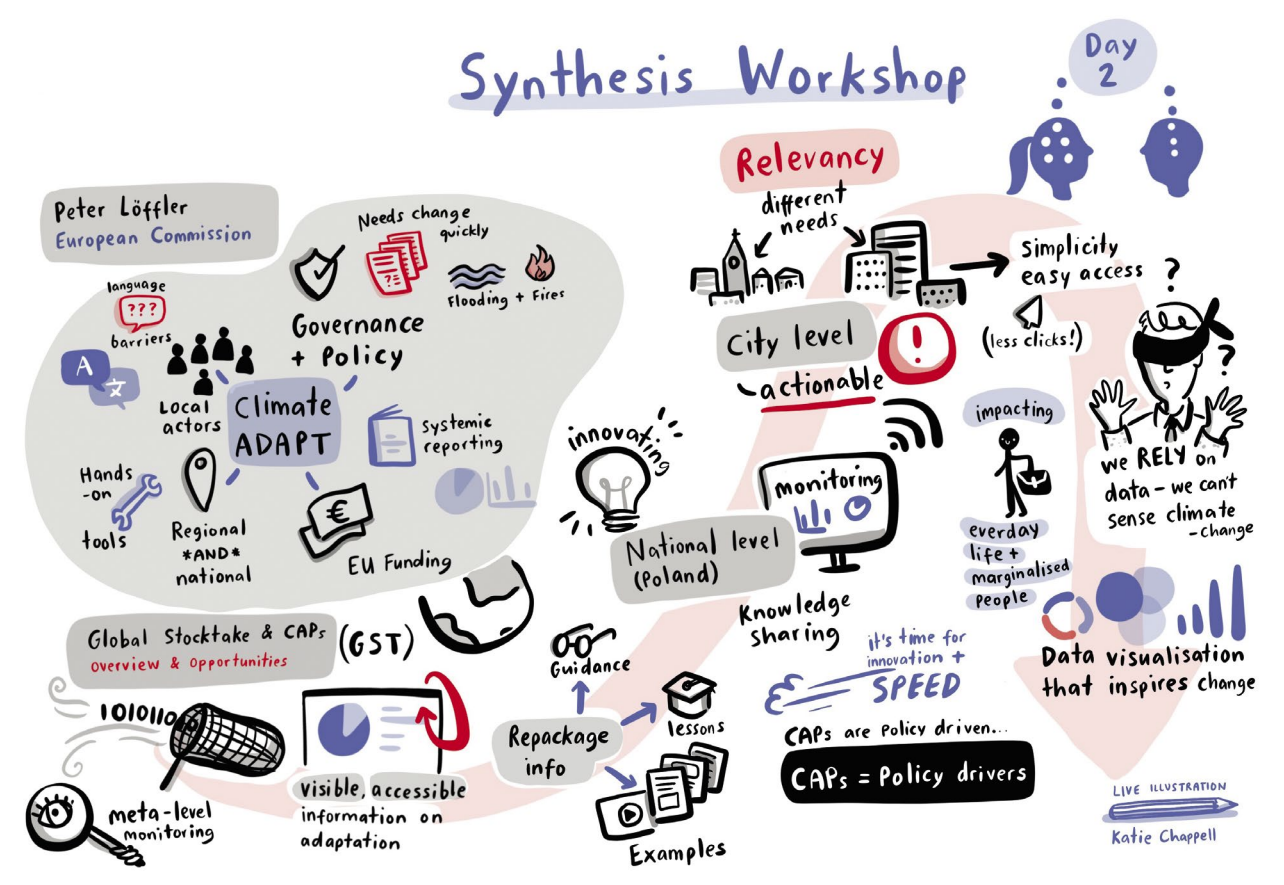

Figure 3: Policy and practice drivers likely to shape CAPs

Taken together (see Figure 3), these examples demonstrate how CAPs are operating at multiple levels, including working together in a complementary way as an international CAP community. They also highlight the complexity arising as CAPs strive to inform and assist a wide range of users with varying requirements whilst at the same time providing user-friendly, relevant and actionable information and data.

A particular challenge for CAPs illustrated by these examples is their position in an evolving landscape where policies and the interests and capacities of users are constantly changing. Increased media coverage along with policy and practice developments for climate action are bringing new and more diverse users to CAPs. Alongside this, the needs and capacities of existing users are changing as they progress from adaptation planning to implementation and action. CAPs must constantly evolve to meet this expanding range of user needs, preferences and capacities.

Recent experiences, particularly in Europe, have shown that it is increasingly important to strengthen the links between adaptation platforms at different governance levels and to clearly communicate to users these platform's respective roles, the information they present, and how they complement each other and associated operational services (such as early warning systems etc.). Strengthening these links can help ensure users gain maximum benefit from the range of information available.

While there are many challenges, the potential of CAPs to contribute to climate action globally is significant. During KE4CAP events, participating CAPs have shared the myriad ways in which they are effectively raising awareness, developing capacities, informing decisions and enabling adaptation across scales and sectors. CAPs are increasingly skilled brokers and translators of knowledge, and adept developers of tools to support adaptation. Discussions around the role of CAPs in supporting the monitoring, reporting, and evaluation of progress in adaptation, and thus contributing to initiatives such as the GST, have highlighted how the capacities of CAPs can be leveraged more strongly to expedite climate action around the world.

Approach

Since starting in November 2019, the KE4CAP project has worked to provide a forum which enables developers and operators of CAPs to come together to compare and learn from their individual approaches, to share knowledge and best practices, and to work together to address common and emerging challenges. The overall aim has been to stimulate knowledge exchange to advance cooperation and learning and to inspire the evolution of CAPs in terms of scope, governance, content coverage, functionality and management.

The KE4CAP community

During the project the KE4CAP community has expanded rapidly and now involves representatives working on local, national and regional platforms, or considering the development of a platform, in over 30 countries and areas (see Figure 4): Alps, Asia-Pacific, Argentina, Australia, Austria, Belgium, Canada, Denmark, Europe, Finland, Germany, Greece, Hungary, India, Ireland, Italy, Japan, Mexico, Netherlands, Northern Ireland, Philippines, Scotland, Slovenia, South Africa, South Korea, Spain, Sweden, Taiwan, Thailand, and UK.

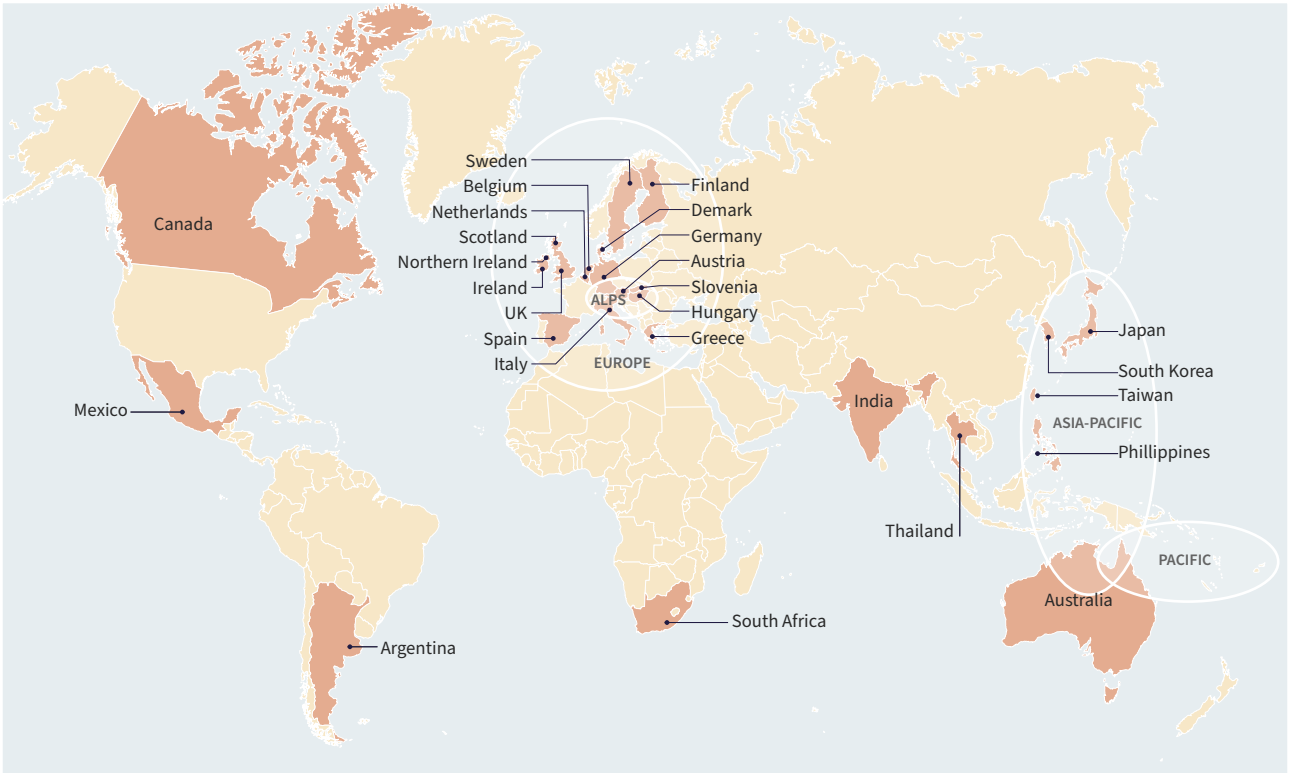

Figure 4: Geographical distribution of the KE4CAP community

The CAPs are all at different stages of maturity: some are being planned, others are under development, some have been operating for a few years, while others have been established for over a decade. They are also diverse in their set-up, funding, and levels of integration with government and policy. Some are the single go-to national platform, others are one of several platforms operating nationally, still others operate internationally. Some are integrated or otherwise connected with other CAPs, including those operating in-country at different levels (e.g., national and municipal), for others this is an ambition for the near future. The CAPs are also diverse in their mandates and target audiences, which range from supporting communities and local government to informing various sectors and national government. Despite these, there are far more commonalities than differences among the CAPs and all the CAPs involved in KE4CAP have relevant experience, knowledge, and insights that have been shared to benefit developers and operators of other CAPs.

Details on the CAPs that participated in the project are given in Appendix 1 including links to the individual platform profiles available on the KE4CAP workspace.

The KE4CAP framework

The overall approach taken by the KE4CAP project to facilitate knowledge exchange across the global CAP community is summarised in Figure 5. It includes reference to the framework of twelve key topics listed in Figure 1, identified and developed in consultation with the CAP community during the first phase of the project and which then provided a focus for all KE4CAP activities.

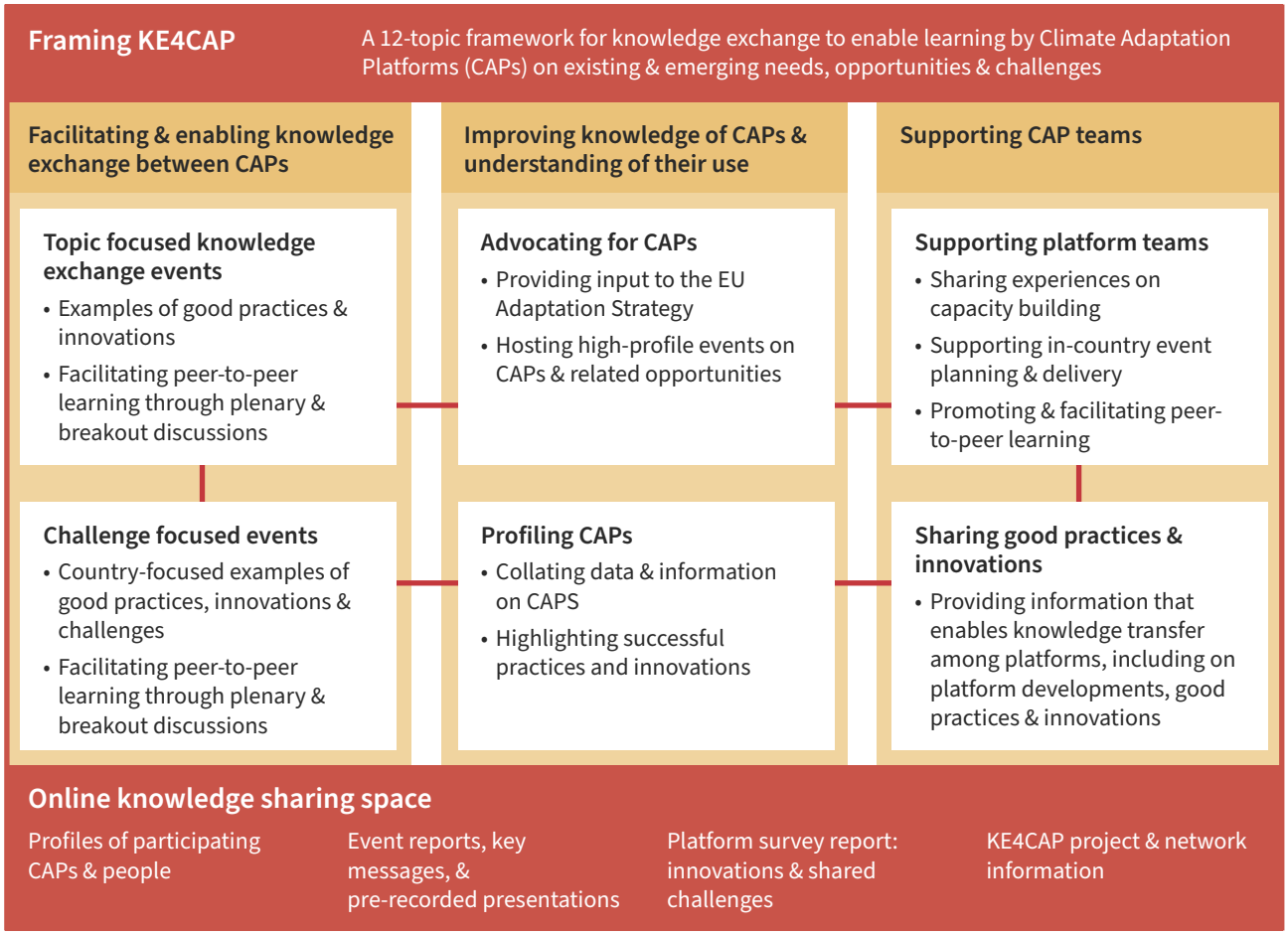

Figure 5: Schematic showing the overall approach adopted by the KE4CAP project

- Topic 1: Co-evaluation, learning and capacity development to drive platform improvement
- **Topic 2:** Supporting and working with local users
- Topic 3: Role of CAPs in supporting monitoring, reporting and evaluation of adaptation progress
- Topic 4: Communications, knowledge brokering and stewardship to stimulate and enable action
- Topic 5: Integration of cultural knowledge, capacities and needs into CAPs
- Topic 6: Retaining relevance of CAPs in a fast-moving world
- Topic 7: Integration and coherence across CAPs
- Topic 8: Business models and value propositions for financing CAPs
- Topic 9: Quality assurance, credibility and usability of CAPS
- Topic 10: Platform architecture and technical development
- Topic 11: Governance of CAPs
- Topic 12: Social justice and equity

These twelve topics provided an important framework and common baseline for all KE4CAP activities. They helped focus the knowledge exchange activities on areas of common interest and challenges where there was the most learning to share, and enabled KE4CAP participants to reflect on their own practices. By adopting a topic-based framework is was possible to (i) gather a snap-shot summary of the knowledge exchange contributions from the KE4CAP community and (ii) provide a means to view which and how these topics have been addressed and where there are other perspectives or gaps that need to be further explored.

It is important to note that the topics are not numbered in any particular order; rather, taken together, they reflect the priority issues and challenges that CAPs are currently facing and where enhanced knowledge exchange and greater sharing of information was likely to benefit the overall community.

As acknowledged and demonstrated throughout the KE4CAP project, the topics are strongly interlinked and interdependent. The understanding of each topic and its implications, and developments within and across these topics are all at different levels of maturity – both overall and for individual CAPs. Identifying and understanding such linkages can help better understand the nature and scope of the individual topics, and particularly how the development of platforms can take advantage of these linkages through synergies and interactions to more effectively address on-going challenges. Progress has been made within the KE4CAP project on identifying such linkages and details are given in individual event reports. However, constructing a comprehensive map of interdependencies was acknowledged to be beyond the scope of the project.

KE4CAP events and activities

To explore the twelve topics in more detail and to share lessons learnt and experiences, KE4CAP facilitated a series of knowledge exchange activities open to all the community:

- Three challenge-focused events co-hosted with Australia, Canada and Japan respectively:
  - Services and science supporting adaptation,
  - Enhancing connections across platforms,
  - Enhancing connections across international, national and local adaptation action.
- Five topic-focused workshops:
  1. KE4CAP: Introduction and topics,
  2. Supporting and working with local users,
  3. Ensuring CAPs agility in order to meet evolving user needs,
  4. Communications, knowledge brokering & stewardship to enable climate action,
  5. The role of CAPs in supporting MRE of progress in adaptation.
- A survey capturing good practices and innovations from individual CAPs.
- A final Synthesis Workshop (co-hosted with Climate-ADAPT).

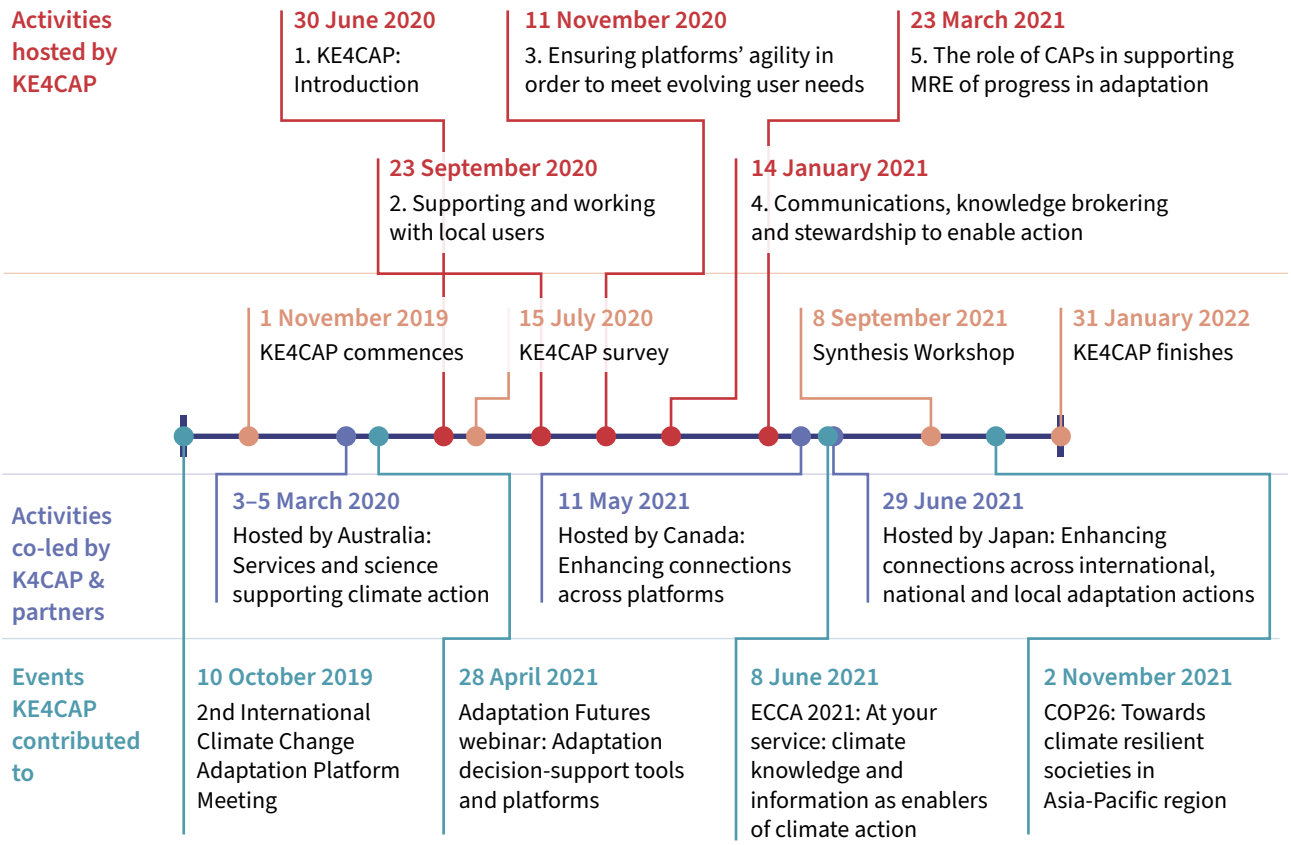

Figure 6: KE4CAP timeline

In addition, KE4CAP members also contributed to a number of major external events to broaden the global reach of the project including the Adaptation Futures conference 2020/21, the European Climate Change Adaptation conference 2021, and the recent UN Climate Change conference (COP26).

The nature and number of these events and activities evolved during the KE4CAP project. In particular, Covid-19 restrictions meant that the initial focus on in-person activities had to be replaced by virtual discussions from April 2020 onwards. This did pose some challenges in terms of the nature of engagement, but more importantly it provided the advantage of allowing much broader international participation than would otherwise have been possible thereby enhancing the breadth of expertise and knowledge that could be shared across the CAP community.

Figure 6 summarises all the KE4CAP events as a timeline. A full listing together with relevant links to presentations and outputs is given in Appendix 2.

KE4CAP community workspace

More details on specific KE4CAP events and activities, presentations, and all outputs from the project are available via the knowledge-sharing network workspace, Climate Change Adaptation Knowledge Platforms Community of Practice. The network and associated workspace provide a central focus for the CAP community and a repository for all KE4CAP information. As the deliberate decision was made to include the workspace within the broader weADAPT platform, the resources will remain available for the foreseeable future and all those involved in the development and operation of CAPs are invited to join and access the information.

The KE4CAP team

The KE4CAP project team was led by Roger Street, University of Oxford (UK) and included Julia Barrott, Stockholm Environment Institute, Jeremy Gault and Barry O'Dwyer, University College Cork (Ireland), Kim van Nieuwaal, Climate Adaptation Services (Netherlands) and Vicky Hayman, University of Oxford (UK).

This team was ably supported by a Consultative Group with members from the partner countries – Japan (National Institute for Environmental Studies), Canada (Canadian Centre for Climate Services within Environment and Climate Change Canada, and Natural Resources Canada), and Australia (Commonwealth Scientific and Industrial Research Organisation) – plus the European Commission Directorate-General for Climate Action, the European Environment Agency, the EU's Copernicus Programme, and GIZ.

Key messages by topic

Information from across all KE4CAP activities and events has been synthesised by topic. The following summaries highlight a selection of key messages, good practices and identified challenges for each topic. Considerably more detail on all topics, together with links to relevant KE4CAP resources, is given in Appendix 3.

These two sources of information are linked: at the top of each summary page are two icons:

 links through to more detailed information in Appendix 3.

 accesses a list of relevant resources and links to the KE4CAP workspace.

Many examples are included in this report for illustrative purposes, but we recognise that many other valuable and interesting examples exist across the community but could not be included for reasons of space. More information is available on the KE4CAP workspace.

Individual platforms are identified in the text by name/acronym and country. A full list of current platforms with links to their specific websites is given in Appendix 1.

Topic 1: Co-evaluation, learning and capacity development to drive platform improvement

Understanding how a CAP is performing, identifying successes and areas for improvement, and developing the capacity to undertake and act on evaluations are widely recognised as key to delivering effective CAPs. Web analytics are providing useful insights into how CAPs are being accessed and how users are exploring them, but platforms need user feedback to understand if and why the platforms and the services they provide are useful, how the information is being used, and what impact this ultimately has. Understanding this is crucial for improving CAPs, and also for making the business case for their financing, but it is often inhibited by a lack of resources.

Key messages

Current practices

- **Eliciting user feedback**: CAPs use various methods to gain feedback from users on the platform and its services. Most common are user surveys (online and in person) and user workshops (either dedicated to evaluation or as part of related meetings). The engagement of steering committees, networks and other user reference groups has been highly valuable in providing early and ongoing input into the design and development of CAPs.
- **Tracking interactions**: CAPs are using web analytics services and social media feeds to understand how many users are coming to and interacting with the platform and its tools, how users are entering the platform, and what journeys they take through the platform.
- **Monitoring, evaluation and reporting**: Though most undertake some form of monitoring, reporting and evaluation (MRE), few CAPs have formal MRE or learning procedures or frameworks in place. Formal MRE activities are typically linked to wider policy and planning initiatives such as evaluations of national adaptation plans and strategies.

Selected innovations

Several platforms, including T-PLAT (Thailand) and CCCS (Canada), have built representative user groups and user-driven governance structures that promote co-development, provide high-quality user feedback, enable user-testing, and generate buy-in and uptake of the CAP and its services.

CCiA (Australia) has used disaggregated user survey data to identify significant differences in capacities, barriers, and needs among more established users compared to newer users.

The Intact Centre (Canada) have tracking and feedback functions built into some of their web-based applications to make it easier to monitor, report on, and continuously improve these programs.

As part of formal MRE processes, both CCAP (Canada), through a funded third-party evaluation, and Climate-ADAPT (EU) have developed and shared use-cases demonstrating how the CAP has been used and the impact it has had.

Shared challenges

- Allocating funding (time) and capacity (expertise) for undertaking rigorous MRE, in particular for user engagement to elicit high-quality and broadly representative user feedback.
- Meeting the expectations and needs of increasingly numerous and diverse users.
- Understanding how to undertake useful MRE and learning for platforms, including what indicators, metrics, frameworks and approaches to use, and how to apply them transparently.

Topic 2: Supporting and working with local users

Climate adaptation ultimately takes place on the ground through tangible measures and behavioural changes, and CAPs can play a pivotal role in stimulating, supporting and enabling such action at the local level. This topic focuses on how to encourage and support local users, including how to engage with them, how to demonstrate the benefits of acting on climate change, and how to help build their capacity to implement adaptation. As the demand for climate-related information from a diverse range of local users increases, platforms are assessing how best to allocate their resources to support evolving and maturing user requirements.

Key messages

Current practices

- **Engagement**: Platforms are broadening their approach to engage with a wider range of audiences via stakeholder groups and advisory panels, working directly with community groups, speaking at local business events, implementing helpdesks, and working through local hubs.
- **Knowledge brokerage**: Local users often don't need detailed and complex scientific information to make decisions. Platforms play an important role in selecting relevant data and information to translate and share, and in ensuring user needs are communicated to data providers.
- **Capacity building**: Many platforms provide bespoke training to help local users understand, access and use the available information and tools. Peer-to-peer learning is encouraged as is the sharing of successful local action e.g., via users' journeys and case studies.

Selected innovations

Adaptation Scotland has a work package on 'Place-based adaptation' where they collaborate with city, regional and local partners to establish local adaptation initiatives across the country. Local buy-in helps ensure initiatives are self-sustaining and able to secure ongoing funding.

NIAdapts (Northern Ireland) works with the eleven local councils to provide an adaptation planning approach tailored to the local context, stripped back to essentials, and focusing on practical action to be delivered by non-specialists. As there is no legislative backing for local authority action in Northern Ireland, the approach has been kept simple to enable local officers to make a start.

CoastAdapt (Australia) and ICLEI (Canada) have developed effective peer-cohort models. CoastAdapt uses champions to represent groups of users in platform development and who also act as mentors within their own community. ICLEI works with local authorities grouped according to specific commonalities which then allows municipalities to support each other as they progress over time.

Shared challenges

- Balancing available resources with diverse requirements from across the range and increasing number of local actors, including the need to keep up to date in translating information and data to reflect the needs and capacities of local actors.
- Establishing and sustaining long-term collaborative relationships with local actors recognising that appropriate approaches can take time to gain traction and require effort to sustain.
- Measuring and demonstrating the success of platforms in terms that are meaningful to local users, including to help promote value and increase trust.

Topic 3: The role of CAPs in supporting monitoring, reporting, and evaluation of progress in adaptation

While perceived as important, monitoring, reporting and evaluation (MRE) of adaptation action by platforms is still an emerging role for CAPs, but one that is likely to become increasingly important. Current activities tend to be at an early stage and are both diverse and diffuse, reflecting the different remits, histories and positions of CAPs within the policy and practice space. At present, CAPs focus primarily on reporting and/or monitoring roles; the move to evaluation of adaptation action is seen as considerably more challenging and raises questions as to the legitimacy of this as a role for platforms.

Key messages

Current practices

- **Supporting MRE reporting**: CAPs are providing a range of information for policymakers and others preparing their respective MRE of adaptation reports, including links to adaptation strategies and plans, guidance, and reports to support vertical and horizontal coordination.
- **Engaging with Ministries**: CAPs are engaging with relevant ministries and those responsible for scrutiny related to progress on adaptation through regular exchanges that provide timely opportunities to share MRE information at the national and transnational levels. There is potential here to enhance the perceived value of platforms.
- **Case studies / users' journeys**: This is the primary means that CAPs are currently using to promote, inspire and inform adaptation action, and are recognised as providing snapshots of the type and state of adaptation action being taken.

Selected innovations

Sweden and TCCIP (Taiwan) have specific platforms and/or web-based tools to support MRE of adaptation progress that provide information related to national policy and act as means for authorities to report annually on progress. In Sweden, the KLIRA web tool has been developed to support local authorities who report on adaptation voluntarily. It is relatively simple to use, helps monitor adaptation progress, and can be used to identify risks and opportunities.

The Netherlands recognise that there is valuable qualitative information already available within the platform history that can inform MRE activities e.g., nuanced changes in demand due to changes in policies etc. have driven changes in engagement and uptake. Trends can be extrapolated and used to guide future platform developments, including those supporting MRE.

Adaptation Scotland has introduced a benchmarking tool for the Adaptation Capability Framework that seeks to assess how adaptation capability is maturing over time with potential utility in measuring adaptive capacity and preparedness.

Shared challenges

- Most CAPs view the MRE of adaptation as beyond their current mandate and resource allocation, and that their role is limited by perceived legitimacy. There are also a lack of processes and capabilities required to contribute to MRE, a lack of access to relevant information, and limited ability to develop platform solutions that provide the technical features needed for MRE.
- Overcoming the complexity associated with developing such an MRE capability is a challenge, as well as difficulties associated with matching the scale of the existing and evolving risks with the proposed and implemented adaptation measures so as to inform the required evaluation.

Topic 4: Communications, knowledge brokering and stewardship to stimulate and enable action

CAPs do far more than just provide climate information; they are knowledge brokers and stewards providing a wealth of services such as tailored knowledge products, resources libraries, guidance and training materials, and various tools. Communications are universally seen as essential for promoting visibility, uptake and use of CAPs while knowledge brokering, through packaging, synthesising and otherwise tailoring knowledge to meet the needs of users, is seen as key to enabling adaptation. This brokering and stewardship role is being increasingly recognised and valued, both by CAPs and those using them. However, understanding evolving users' needs remains an on-going challenge.

Key messages

Current practices

- **Getting knowledge into use**: CAPs are working with users to co-develop fit-for-purpose knowledge products, enhancing users' capacities through developing guidance and learning resources, curating, synthesising and tailoring knowledge to make it accessible and useable, providing easy, structured access to relevant information and knowledge, and sharing use-cases showing how climate information and knowledge can be used in decision-making.
- **Promoting peer knowledge sharing**: CAPs are convening actors to share their knowledge, particularly at the local level. This is supporting the sharing of relatable and compelling stories and experiences, both of climate change and adaptation actions, and in some cases is informing regional and national policymaking.
- **Providing a centralised resource**: CAPs are working to provide a go-to resource for information and knowledge on adaptation, including on what adaptation actions are being taken and how.

Selected innovations

Several platforms have designed innovative knowledge resources for specific users. Examples include TCCIP's (Taiwan) 'Climate Change Atlas', NIAdapts' Service Area Factsheets, ClimateData.ca's (Canada) Sectoral Modules, South Korea's MOTIVE system, Adaptation Scotland's 'Climate Ready Places' tool and the 'Climate Crab' cartoons by PCCS (Pacific).

A-PLAT's (Japan) use of anime shows how art and culture can be integrated into platforms and their knowledge products to appeal to and engage users.

CAPA (Alps), AdapteCCa (Spain), and Climate-ADAPT (EU), among others, leverage established research networks and programmes to promote their CAP and to gain feedback on user needs.

CoastAdapt (Australia) and the Intact Centre (Canada) gather and share community and institutional case studies of adaptation activities to motivate others to act.

Shared challenges

- Understanding how best to continuously support and inspire different groups of users to move from knowledge to action, including building users' climate literacy, capacities, and confidence to undertake the different stages of the adaptation cycle.
- Identifying, engaging and understanding the needs of existing and new users, including from the private (especially finance) sectors, and tailoring content for these diverse users.
- Integrating creative and cultural practices into CAPs and their services to support uptake and action without being tokenistic.

Topic 5: Integration of cultural knowledge, capacities and needs into CAPs

There is increasing recognition of the value of integrating diversity in expertise and knowledge into platform design and delivery, as well as addressing specific users' needs, including those of indigenous communities and other cultural groups. This recognition reflects the requirement that adaptation strategies and plans, as well as their implementation, should be based on the best available information and practices. Integrating diversity presents challenges, especially when the aim is to stimulate and enable coherent and effective action across user groups, including building trust and relationships through appropriate and effective engagement.

Key messages

Current practices

- **Engagement**: Good practices revolve around inclusive and culturally and politically sensitive engagement aimed at co-designing and co-developing platform content and functionality and when showcasing content and capabilities. The aim is to build trust and embed knowledge exchange processes within a broad range of communities.
- **Region-specific information**: Providing region-specific information with relevant broad-based scientific information and integrating good practices into the platform through case studies, success stories, voice-overs and video-bytes from those working on the ground, especially on place-based adaptation initiatives tackling challenges of particular interest.
- **Decision-support resources**: Providing relevant and usable resources that enable indigenous communities to tackle challenges of particular interest, including risk management and risk communication approaches consistent with and drawing on cultural knowledge and expertise.

Selected innovations

PCCS (Pacific) use different and culturally appropriate media, including digital animation of scientific messages, and develop content that enhances train-the-trainer's capabilities enabling local practitioners to reach out to their respective communities. They are also establishing a series of satellite platforms linked to the parent website as repositories for specific information in local languages and recognise the ownership and value of all information.

South Africa and CCiA (Australia) are engaging and sharing dialogues around climate change and services with indigenous people including specific projects designed to incorporate their knowledge and understanding into the provision of climate intelligence.

Several Canadian platforms welcome indigenous organisations as members of the national plenary leading sessions on indigenous-led adaptation approaches and self-determined climate action.

Shared challenges

- Enhancing the ability of CAPs to understand and integrate culturally appropriate knowledge, capacities and needs including acknowledging that reaching out to and building and sustaining trusted relationships with numerous cultures is resource intensive.
- Improving engagement practices including consideration of appropriate digital/in-person balance and the nature of supportive technologies, mechanisms and capacities.
- Encouraging willingness to share cultural data and knowledge including issues around recognition of the ownership of traditional knowledge and its inclusion and integration in analytical tools etc.

Topic 6: Retaining relevance of CAPs in a fast-moving world

This topic focusses on sharing approaches being used and challenges being experienced by CAPs as they work to meet rapidly evolving user needs within an ever-changing world in terms of technology, data availability, policy requirements and knowledge provision. Retaining relevance is a key task for CAPs as users progress through their adaptation journeys from planning to development, implementation and monitoring of adaptation actions. CAPs must be sufficiently agile to be able to evolve in line with the needs of both existing and new users and in the context of evolving user capacity, increasing amounts of adaptation information and data, and advances in technology.

Key messages

Current practices

- **Maintaining users' willingness to engage**: Maintaining trust is important. CAPs are engaging with users on an ongoing basis and putting in place processes for regularly reviewing and updating platform content and functionality to ensure that users continue to have confidence in the products.
- **Understand evolving user requirements**: Platforms are prioritising engagement with users and investment in training and capacity building to help users understand and employ the information and tools available on the platform to meet their own specific requirements.
- **Reviewing content and functionality**: Systematic approaches, often involving expert evaluation panels and user feedback processes, are being adopted based on the changing validity of information. Users are increasingly expecting the use of latest industry-standard IT and interfaces to ensure they can find and access information easily.

Selected innovations

Climateguide.fi (Finland) is being redeveloped to provide a more flexible and efficient platform. All content has been systematically evaluated based on expert assessment, and feedback from users and providers is used to prioritise actions, including those needed to support future improvements.

Climate Ireland hosted a workshop for representatives from a range of CAPs and a user group consisting of local and sectoral adaptation practitioners. The user group identified their expectations from a CAP in terms of functionality, data and tools. These were then assessed against the information provided by each participating platform, and areas of improvement identified.

CAPA (Alps) transnational portal has installed an online editing tool to allow users to share their own resources as they become available. A set of criteria defining what is useful for the platform and a user guide are available, and a quality assurance process is implemented by experts prior to publication.

Shared challenges

- Resources are often limited and there remains a tension between the increasing pace of information generation and the need to provide content that remains up-to-date, relevant and continues to meet the needs of users.
- Given the diversity of users' needs, consistency across all aspects of the platform is important, but can be difficult to maintain as a platform evolves and elements are updated.
- Quality control is growing in complexity with the increasing use of interactive tools, greater integration across platforms, and the introduction of innovative ways of allowing platform users to contribute directly to information development.

Topic 7: Integration and coherence across CAPs

Increasing integration and coherence across CAPs can help achieve greater individual and collective impact as platforms can focus on activities and content that complement and enhance activities rather than duplicate effort. Integrating CAPs to link relevant knowledge and data helps users to find the various resources, services, and support they are looking for more easily which is especially important for enabling (peer) learning across boundaries and geographies. Working closely together also provides opportunities for consolidation, validation and innovation.

Key messages

Current practices

Enhancing integration and coherence is taking place in various directions:

- **Vertical integration**: There are a number of examples of connecting national platforms to sub-national platforms domestically, and an increasing awareness of the value of working together at the transnational level by connecting national CAPs to international platforms.
- **Horizontal integration** when integrating across societal sectors, for instance when connections are established with knowledge infrastructure for other sectors or, increasingly, when connecting with platforms in other domains, e.g., disaster risk reduction.
- **Content integration** through targeted sharing of specific data and tools.

Selected innovations

The Dutch platform exhibits vertical (alignment with regional and local platforms), horizontal (multi-sector, inter-ministerial approach,) and content integration (incorporation of the national climate impact atlas). The national climate impact atlas is also used as a common basis for developing subsidiary (connected) custom-made platforms for sector and government organisations.

A new feature of Climate-ADAPT (EU) is the European Climate Data Explorer which is an interface connecting to the EU Copernicus Climate Change Programme and allows users to select data based on relevant climate indices, time frames, regions etc.

The weADAPT team have developed a taxonomy for tagging knowledge on climate adaptation and a search and discovery tool – the Connectivity Hub – that demonstrates how such a tagging system can be used to connect related knowledge across multiple platforms.

Shared challenges

- Developing the networks of people critical to establishing platform connections. This is especially true for connections across regions and scales. Networks of people also underlie efforts to standardise information, further deepening connections across platforms.
- Recognising and working across the diversity of platforms in terms of the differing levels of development, national interests, politics, cultures, and languages e.g., in the Asia-Pacific region, in Europe, and even within the borders for some countries. New or enhanced governance arrangements may be needed.
- Improving data interoperability and taxonomy standardisation to support data sharing and integration.
- Enhancing integration and coherence in a coordinated way including establishing overarching coordination processes and allocating the resources required. Comprehensively evaluating datasets for instance takes skill and is time-consuming.

Topic 8: Business models and value propositions for financing CAPs

A sound business model is needed to support a platform and its associated services and products and to help facilitate access to core infrastructure and sciences on which a platform relies. Underpinning the business model is the need for a strong value proposition that communicates the added benefits of a platform in terms of informing and inspiring action. This topic focuses on how value propositions and business models can be developed, refined and communicated to gain buy-in from users and funders, and considers how to incorporate flexibility to enable future innovations.

Key messages

Current practices

- **Core funding and public-private partnerships**: Moving beyond project-based public funding, new business models are emerging where core funding is provided by national governments while public-private partnerships allow for the further development of tools and services.
- **Demonstrating value**: Many CAPs are working to embed themselves within the wider national adaptation process and are positioning themselves as key knowledge providers supporting adaptation decision-making at local, regional and sectoral levels.
- **Defining roles**: CAPs are refining their value proposition in the context of the existing climate services landscape. They are demonstrating their role as trusted knowledge brokers and communicating the effectiveness of adaptation platforms and underpinning research as part of the wider climate services agenda.

Selected innovations

CAPA (Alps) and Climate Ireland. Working at the transnational scale, CAPA is positioning itself within the wider EU Strategy for the Alpine Region by acting as a cross-sectoral knowledge broker while Climate Ireland has successfully positioned itself within Ireland's National Adaptation Framework as a key resource supporting adaptation action at all levels.

CCCS (Canada) and TCCIP (Taiwan). For CCCS, core funding is provided federally but through partnerships with public and private partners further development of tailored platform products and services is undertaken. The TCCIP is working with the private sector to develop specific products to support financial disclosures.

In Australia the active interest of the finance / investment sector in addressing its climate risks and reporting requirements has translated into a willingness within that sector to be engaged in future platform development. They could be a powerful partner by helping to articulate and demonstrate the value of investing in platform activities.

Shared challenges

- Identifying appropriate business models that value both public good and private benefit, including stimulating and enabling innovations in models consistent with the evolving needs and capabilities of users and the resources available to platforms.
- Overcoming the common short-term, project-based approach to supporting platforms including the need to incorporate flexibility in terms of e.g., incorporating public-private partnerships, considering the provision of consultancy services, etc.
- Co-developing and communicating value propositions that have legitimacy and weight within both the science and policy/practice communities, and which include recognition of the net benefits of both science-based evidence and practical action.

Topic 9: Quality assurance, credibility and usability of CAPs

As the need for robust climate action increases, interest by CAP users, providers, and funders in quality assurance processes and demonstrating such is increasing. This interest includes developing standardised procedures for quality assurance that ensure and demonstrate the relevance, usability, legitimacy and credibility of the content and user friendliness in accessing that content. Procedures of particular interest are those that allow for evaluating the quality of source data and knowledge (including standards and stewardship), those that ensure credibility, transparency and pedigree, and those that are based on an understanding of user needs and capacities.

Key messages

Adopted practices

- **Boards, advisory panels and user group**s: These bodies are seen as legitimate components of a platform governance structure, dedicated to quality assurance and helping to ensure the credibility and usability of the data and products hosted on the platform.
- **Internal routines and expertise**: For decisions on a daily basis some providers rely on internally established routines, either formally agreed or organically evolved, and the expertise of their team for quality assurance.
- **Dedicated quality assurance processes**: A few platforms have put in place dedicated quality assurance processes with associated criteria and indicators.

Selected innovations

CAPA (Alps) have established a standard operational procedure for reviewing and editing new content proposed for publication on the platform. This includes direct communication with the external authors / editors, comprehensive and clear criteria for the selection of relevant resources, and the provision of online, step-by-step guidance for external editors.

CCCS (Canada) have a process based on requiring users to register with their email address when downloading data that provides an opportunity to contact them if future changes or updates are provided.

Shared challenges

- Building capacity and resources to establish and sustain quality assurance processes and deliver ongoing improvements based on the results of those processes. A phased approach and integrating such within the governance structure has been suggested but can be challenging in terms of scope and timing. There are also difficulties associated with agreed benchmarks and understanding of appropriate metrics beyond just web statistics.
- Establishing and maintaining an effective level of user engagement, critical to defining and developing robust standards and QA/QC approaches. Included in this is the need to review the scope of engagement to include appropriate representation of users as the platform evolves.
- A further challenge relates to third party data and information on the platform. For such information there are often limits to the application of QA/AC procedures and the ability to update or address errors, with reliance on the good will and capabilities of third parties. This can be particularly challenging if the information was created by a project that is no longer active.
- Identifying the need to act when digital tags within content are no longer valid, have been changed or a new area of interest has been added. Dealing with these changes requires continuous monitoring to retain the confidence of the intended users.

Topic 10: Platform architecture and technical development

Platforms need to be user-friendly to ensure the wide range of users can navigate websites, access relevant information in an appropriate format and understand how they can apply it in their own decision-making context. Underpinning this is the technical design and development of CAPs including the platform architecture, the user interface and any integrated features and functionality. The availability of data and information is not a limitation, but streamlining access to it, including issues such as supporting dynamic integration and interoperability with other systems, is a key task.

Key messages

Current practices

- **User testing and co-design**: To be as user-friendly as possible, platforms commonly take an iterative approach to development typically employing a range of co-design and user testing approaches to ensure the technical architecture and features are fit for purpose.
- **Diverse content types**: Most platforms contain diverse types of data and information, and the use of innovative approaches to data visualisations is a particular focus for supporting knowledge brokering and translation.
- **Platform integration and interoperability**: The issues of integration and interoperability are becoming increasingly important. Such networking, underpinned by technical developments, adds value by consolidating and broadening access to information, avoiding duplication of effort and limiting any unnecessary proliferation of platforms.

Selected innovations

The Philippines has a new suite of platforms, and the issue of interoperability has been at the forefront of development. All three platforms (climate knowledge portal, the eCCET helper for risk-based approaches, Project Upturn for adaptation solutions) will be fully integrated and internally consistent, and such learning used to inform possible regional collaboration.

Intact Centre (Canada) uses ‘smart’ features – actively tailoring the content being provided to users according to their input to the platform – which are a valuable innovation and one that has really improved users’ experience and thus uptake of information.

A-PLAT (Japan) has designed multiple entry-points, including for citizens, local government and the private sector, to meet the specific needs of these disparate groups through providing tailored, user-friendly experiences, relevant knowledge and accessible resources.

CSIRO (Australia) built the INDRA-Pacific platform to meet a specific need, but the structure was kept deliberately flexible and versatile so open-source aspects of it can be developed further by other users, thus helping to leverage developments across platforms.

Shared challenges

- Keeping pace with technological advances is needed to ensure that users have access to the sophisticated level of interface and features they have come to expect from websites.
- User consultation and testing at all stages of platform development can take considerable time and resources, as does identifying representative cohorts of users and implementing the resulting platform updates. Such activities need to be planned and budgeted in advance.
- Developing and integrating greater interactive functionality and new social communication strategies can promote accessibility and contribute to finding a balance between digital and in-person engagement particularly in areas with poor IT infrastructure and connectivity.

Topic 11: Governance of CAPs

Governance supports the process of decision-making and involves different structures and mechanisms within CAPs that define the strategic and operational management of the platform. Critical elements include leadership and the active involvement of a range of stakeholders, including representatives from user groups, information providers and funders, and drawing on representatives from government, NGOs, industry, communities and the media. Lack of appropriate governance can lead to platform content with mixed credibility, quality assurance and utility, as well as to the potential proliferation of fragmented and uncoordinated information.

Key messages

Current practices

- **Advisory groups / steering committees / program boards**: Provide oversight, strategic direction and links to policy and user requirements, as well as advice and recommendations on the work programme and guidance on priority actions. Members can act as champions for the platform including in the context of increasing legitimacy and credibility.
- **Working groups**: Usually focus on specific areas of interest such as developing content, coordinating with users and networks, enhancing synergies across national, regional and local activities, advising on engagement and communication, increasing the platform reach, identifying gaps, innovations and new technologies, and considering new data and research.
- **Coordination units**: Provide a focus for the overall governance structure and outward-facing elements of a platform. Day-to-day management, implementation of updating processes, responding to information requests, communications, and monitoring use are all core activities.

Selected innovations

KLiVO (Germany) have a robust governance structure with the two responsible government agencies working with an inter-ministerial working group that coordinates work across government and provides additional legitimacy for the platform. Also supported by the Environment Agency, national Met. Office and a research and development project that generates new input and ideas.

AdapteCCa (Spain) and Adapt2Climate (Belgium) have developed effective working groups that maintain their own system of continual updating of tools and activities thus ensuring on-going provision of up-to-date information that responds directly to user needs.

Climateguide.fi (Finland) is using the opportunity of a major redevelopment of the platform to strengthen governance structures in specific areas e.g., addressing multilingualism and the ongoing challenge of providing platforms in two official languages (Finnish and Swedish) and in English.

Shared challenges

- Providing a governance framework that ensures continuity and sustainability in a rapidly evolving environment (e.g., abrupt changes to funding, ending of collaborative partnerships) and that can be augmented to take account of a new or evolving delivery models.
- Balancing available resources as audiences and expectations grow and the need to maintain existing and develop new relationships. Need to adapt and streamline governance structures without impeding the ability to provide relevant services.
- Securing resources across suitable timescales that allow platforms to develop.
- Encouraging recognition of platforms as an integral part of the wider knowledge base that supports climate adaptation policy and action.

Topic 12: Social justice and equity

Adaptation tools and solutions can be more effective, culturally sensitive, and sustainable when the social contexts and root causes of vulnerability are included in their design and implementation. To mainstream adaptation, social justice and equity must be brought to the fore and this topic focuses on how platforms can help identify and give a voice to those who are not well represented within the climate change adaptation arena. This includes identifying practices and challenges around how to use platforms to enhance inclusivity, how to understand the needs and capacities of under-represented groups and how to help overcome the barriers that inhibit their ability to act.

Key messages

Current practices

- **Outreach and engagement**: Targeted strategies to engage with and better understand the needs of under-represented and vulnerable groups are being developed and implemented by platforms leading to the co-production of tailored products to help drive action.
- **Improved content accessibility**: Providing case studies conducted by local experts, translation of scientific knowledge into appropriate languages, the use of infographics and videos that meet the needs of specific target groups and, crucially, making data open-access and freely available.
- **Balancing in-person and digital activities**: Building trust and relationships is seen as crucial in developing and sustaining strong engagement. This can take considerable time; in-person approaches are often key.

Selected innovations

NRCan (Canada) has partnered with Royal Roads University to better understand what a robust CAP requires in terms of delivery to improve social justice and equity. Critical to improving adaptation outcomes is a meaningful and sustained engagement that ultimately helps empower previously less-engaged communities to be part of the overall process.

Many platform teams are taking specific training in social justice and equity issues to help increase awareness and understanding, whilst others are introducing more flexible, inclusive and culturally sensitive governance and finance structures. Increasingly, platforms are attempting to find the space and time to explore societal and equity considerations and to integrate these into platform delivery.

Climate-ADAPT (EU) is a transnational platform and needs to address slightly different concerns related to inclusion and equity by ensuring all countries and relevant policy sectors are equally covered, and that all are represented in terms of available information.

Shared challenges

- Building capacity to address social justice and equity concerns within platforms is challenging and, whilst platforms are sensitive to the need, these issues are often not specific drivers for development and resources can be limited.
- In-person connections are crucial and combining digital and in-person elements within a platform is difficult but important as together they offer choice. In-person platform components tend to benefit under-represented and non-traditional user communities and are particularly valuable for users with less developed IT infrastructure and capability.
- Building networks with community organisations that have the knowledge and expertise to act as champions can help enhance and accelerate inclusivity.

Conclusions and way forward

The KE4CAP project has created a global knowledge exchange network which is helping to support platform developers and operators as they work to deliver the best support possible for climate adaptation action. The community has come together to share knowledge and best practices, to learn from new approaches and to begin to work together to clarify and address common challenges. As current CAPs evolve and new CAPs are established, platform developers are looking to enhance platform content and functionality in many areas to support new policy initiatives and to meet increasingly sophisticated and diverse user requirements, as well as to work within changing funding regimes.

Each platform is unique, but KE4CAP has shown that there are many areas where common challenges exist, and where shared learning and collaboration can support overall development and drive the generation and uptake of good practices. KE4CAP has also shown how connecting peers working on CAPs can lead to increased ambition, cooperation, and innovation.

Insights and reflections

Towards the end of the project, an analysis of the impacts of KE4CAP demonstrated that it has been very effective in establishing a diverse array of highly motivated CAP team members from around the globe, facilitating knowledge sharing and collaborative learning, including the generation of new ideas and thinking and the transfer of good practices, and bringing about new partnerships between CAPs nationally and internationally. These findings were drawn from recent surveys and semi-structured interviews with KE4CAP participants which captured impacts to date as well as points for improvement and thoughts on the future of a network. Full details can be found in the KE4CAP Impact, Learning and Ways Forward Report.

The report shows that the most significant impact of the KE4CAP project is the development of an engaged, collaborative, and supportive network of CAPs. Through connecting this global network of actors and giving them space to interact, participants say that KE4CAP has provided them with unprecedented and highly valued access to peer support. Their responses indicate that the knowledge exchange events have facilitated the sharing of experiences in ways that have enabled the transfer of good practices, have allowed participants to co-explore needs and possible approaches relating to different topics, and have raised awareness of emerging CAP-related issues. The interviews showed that the knowledge exchange and the learning KE4CAP has enabled has already resulted in changes in practice of individual CAPs, such as transferring specific platform techniques and learning practices and setting new goals and aspirations for platform development.

From the point of view of participants, there are three key factors that have contributed most strongly to the success of KE4CAP:

- KE4CAP's approach to shared learning and open discussion has actively cultivated and maintained a safe space for network members to interact, learn from, and collaborate with one another, and has invited, encouraged and built confidence amongst all participants to engage, be visible, and speak up. This in turn has supported deeper and honest reflection and sharing amongst participants and broader engagement from CAPs from across geographies and at all stages of development.
- The resources developed and curated by the KE4CAP project and the network, and shared on the KE4CAP workspace, have provided members with a rich repository of information and examples, including explanations of the ways in which platforms are informing and supporting climate adaptation strategies, and profiles detailing the development, aims, funding, structure, and management of individual CAPs. This use of the workspace has been crucial for allowing participants to revisit and reflect upon the exchanges and to share pertinent information with their colleagues.
- The twelve topics included in the KE4CAP framework provide a working blueprint for CAP development, have enabled CAPs to reflect more deeply on their own practices and experiences and have allowed for more focused and productive knowledge exchange.

The KE4CAP project has also helped raise the ambition of CAPs towards contributing to international climate goals. For example, the activities and discussions held around adaptation monitoring, reporting and evaluation triggered new thinking amongst CAPs of how they can position themselves to support such processes and how they can capture and use outputs and learning as a means to inform ongoing efforts.

Ultimately, KE4CAP has established a highly engaged, enthusiastic, and collaborative CAP community of practice that has seen significant benefits given its modest set of events and activities. Questions put to participants on the future of the network developed under KE4CAP revealed high levels of motivation, enthusiasm and commitment for not only continuing the current knowledge exchange activities, but also for expanding these activities to enable deeper learning and more extensive collaboration. Several CAPs have expressed keen interest in taking on more prominent roles in the network, including leading activities focused on specific regions and work areas. As for many communities of practice, a central support and coordination facility is needed to help maximise value and reach.

A vision for on-going collaboration

To address the challenges and opportunities that the future development of CAPs poses – and the implications therein for the community – four options for ongoing knowledge exchange and collaboration have been identified by the community. The first option features the foundation that KE4CAP was built on: a mechanism for knowledge exchange among CAPs. Yet, through the lifetime of the project, additional roles for the network have emerged, complementary to the current 'horizontal' knowledge exchange among CAPs. At times, the network has become an agenda setter (second option), has increasingly played a role as an enabler of collaboration and coordination (third option) and has looked for opportunities to act as an innovation booster (fourth option).

Although the four options outlined below and in Figure 6 can be considered as 'a la carte' options, discussions during the Synthesis Workshop suggested that each has a validity and relevance in its own right, and that it is the coalescence of options that will deliver the highest added value: a network that exchanges knowledge will be well positioned to develop an agenda for what is needed and to serve as a broker to form the right coalitions and help initiate and facilitate innovative and novel research.

Option 1: Knowledge exchange driver

Providing a forum to exchange knowledge and experience among CAP developers and operators, including engaging and working with CAPs at different stages in their development. This builds on the energy within the KE4CAP process and reflects the value of continuing that momentum

Possible approaches:

- Workshops, online and in person.
- Sessions at external conferences.
- Recognition of multiple communities, e.g., national, subnational, sectoral, regional, global. Working with smaller groupings with more closely aligned needs and challenges but also facilitating the derived benefits by bringing these communities together on specific topics of broader interest, e.g., platform performance, interoperability/connecting knowledge.

Option 2: Agenda setter

Contributing to agenda setting by providing network connections and knowledge that can be consulted to keep up with the latest developments, including those relevant for possible emerging roles and responsibilities for CAPs such as monitoring, evaluation and agenda-setting purposes.

Providing an intellectual centre for helping set the agenda by developing and making available thought pieces, white papers, guiding principles and commentaries on CAPs and their roles, thereby reaching a much broader audience and gaining prominence that could be leveraged for greater support and engagement.

Possible approaches:

- Informing and advising national policy / funders.
- Reaching out to, and engaging, targeted users and partners.
- Informing European and other national and regional strategies.
- Awareness raising (e.g., on emerging topics) / identifying ways forward.

Option 3: Collaboration and coordination enabler

Providing the brokering experience and network connections to initiate and accelerate proposals for bilateral and multilateral projects focused on knowledge exchange and capacity building including across and between different governance levels. This is particularly important where there is not an overarching policy framework leading to independent action in each country, and therefore by CAPs, and can help inform the governance and management of platforms.

Possible approaches:

- Enhancing regional coalitions and bilateral relationships.
- Honest broker / advocacy.

Option 4: Innovation booster

Boosting the emergence of knowledge and research on the use and value of CAPs as innovators supporting and inspiring society to further enhance progress and to make experiences and insights widely available.

This links to discussions on the need for knowledge and innovations to enhance platform content, functionality and capabilities and, ultimately, the science-implementation interface. It also recognises the evolving role of the private sector and the need for new tools and boundary-pushing exercises by providing opportunities to experiment with innovative work in a collaborative setting.

Possible approaches:

Working with research and innovation funding bodies to identify and initiate research and innovation calls.

- Exploring the potential of CAPs for e.g., MRE purposes.
- Exploring the potential of behavioural sciences to advance CAPs.
- Preparing and contributing to (scientific) publications and reports.

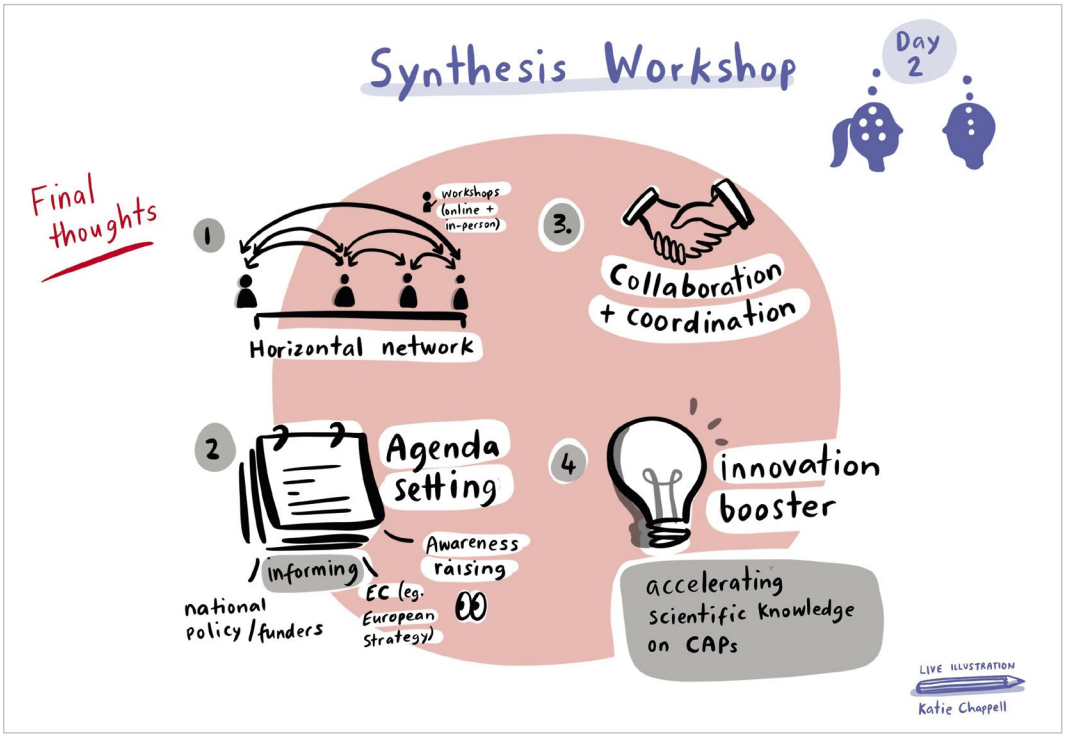

Figure 7: Options for on-going exchanges between CAPs

As a simple indicator of preference, participants at the final Synthesis Workshop were asked to vote for as many of the four options as they felt would be useful to them as they develop their CAP.

Results are given in Figure 8 and show that each option was considered important to a significant proportion of the CAP community. Comments suggested Option 1 can be thought of as necessary condition (core or foundation option) on which to build on previous experience to support and enable the other options. Exploring and combining these options and multiple directions in the future will be challenging, but experience gained from the KE4CAP project provides valuable insights into possible approaches to be used.

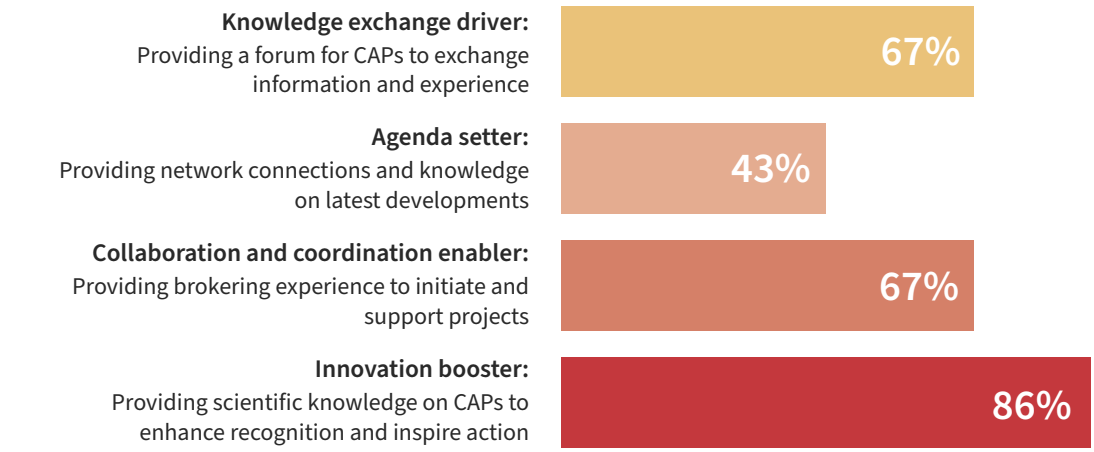

Figure 8: Support for options to enhance knowledge exchange across the CAP community

Future developments

The move from inspiring and informing climate adaptation to supporting climate action

The knowledge, information and evidence provided by CAPs in support of climate policy, and action more broadly, to some extent comprises that included under the umbrella of climate services. Like climate services, CAPs are also maturing as the market for CAPs' services is developing among both public and private actors. With levels of climate change increasing, impacts being experienced globally and a fast-moving policy landscape all calling for action, there is an increasing and urgent requirement for knowledge, information and evidence (climate intelligence) to advance from supporting awareness raising and planning to enabling the implementation and assessment. Within this context, climate adaptation (or knowledge) platforms are increasingly recognised as essential contributors to adaptation and climate action at all levels from local to transnational.

In Europe, adaptation policy is progressing with the publication of the new EU Adaptation Strategy [COM(2021) 82] and the EU Climate Law [Regulation (EU) 2021/1119] while the development of supportive platforms globally is advancing with platforms at transnational, national and regional scales being acknowledged at multiple policy levels. Recent developments are reflected in Europe with the development of new, state-of-the-art European-scale information services (e.g., the Copernicus Climate Change Service (C3S)) and integration of these services across the supply chain enhancing decision support across scales (e.g., the integration C3S into Climate-ADAPT with its Climate Data Explorer).

The KE4CAP project demonstrated the benefits of knowledge exchange among those developing and operating CAPs in Europe and internationally, and the potential value for future activities. This was achieved through a series of knowledge exchange events which engaged platforms from across the globe in exploring and exchanging knowledge and challenges associated with specific topics of operational and strategic importance. These events and the associated exchanges were open to all working on established, newly formed or planned platforms. They allowed platform developers and operators to share their experience, consider good practices and identify and address common and emerging challenges. As such, KE4CAP provided an invaluable forum to support the development of CAPs and to enable mutual understanding of how platforms can contribute to, and learn from, each other.

CAPs, however, must keep pace with the changing needs of their users as adaptation planning becomes mainstreamed and implementation and monitoring evolves with increasing experience and information. These changes, along with the improvement of data quality and availability, are creating an increased need for CAPs to both support and learn from actions being taken on the ground. To meet these needs, deliver on user expectation and realise opportunities to widen their focus requires a shift for CAPs from inspiring and informing adaptation to supporting action.

As such, in order to remain relevant and secure the funding required to sustain their operation in the increasingly busy climate policy and action arenas, CAPs will have to significantly evolve in terms of their role and design, technical capacity, and business models.

Role and design

Evolution of the role and design of CAPs will need to:

- consider the implications of the move away from a primary focus on providing data and top-down adaptation measures (i.e., away from science-first based on broad risk assessments), and the increased activity and demand (and learning) from the private sector,
- recognise the synergies not just between adaptation and mitigation supporting the drive towards a climate-resilient and carbon-neutral society and economy, but also with other areas e.g., biodiversity, given the parallel climate and biodiversity crises,
- identify, assess and promote the multiple benefits of climate action,
- take action to evaluate platform content, update where needed and archive that which is no longer appropriate,
- maintain and evolve core support for climate action and the capacity to deliver supportive knowledge and evidence,
- devise appropriate approaches to capture and share learning from the implementation and evaluation of actions to inform future strategies,
- play a more significant role in supporting monitoring and reporting, including in support of GST initiatives e.g., should CAPs be presenting or acting as a clearing house (monitoring and reporting) and to what extent should they position to focus on evaluation, and
- establish links with other providers and / or platforms in order to provide synergetic knowledge and evidence and avoid duplication.

Technical capacity

The evolution in role and design will need to be matched by technological advances in knowledge exchange and delivering science in order to adequately deal with rapid changes and to remain relevant, including by:

- gathering data and information to support tracking and monitoring of climate action,
- widening geographical coverage to support action from a systemic perspective (e.g., building on the work to date on cities by incorporating surrounding rural areas),
- assimilating new knowledge as soon as practical – have the agility to assess, process and deliver updated data and information in near real-time and add value to existing research and innovation outputs,
- increasing their scope and considering e.g., gradual climate change and variability in addition to extreme events,
- providing and integrating climate impact-based information and evidence and information from multiple sources (e.g., socio-economic data and information, deprivation data, etc.) as need to inform risk and vulnerability assessments and inform and track action,
- ensuring that data, including associated uncertainties, is relevant, easy to access and use,
- incorporating new innovation (interactive or immersive technologies) in addition to accessible information, GIS tools, maps and infographics,
- including relevant guidance and training for a range of target audiences ranging from national and local government to citizens,
- developing tailored sector-specific services – e.g., climate change and health, climate change and agriculture,
- including adaptation modelling and scenarios,
- incorporating data and information on potential funding sources and strategies for implementing adaptation action, and
- understanding complex and acute risks and interconnected hazards and disasters by linking with the disaster risk reduction community.

Business models

For the most part platforms tend to have been developed and continue to operate through specific projects either funded by local, regional or national government (as a research project or service), by a specific sector (e.g., banking and finance) or by a commercial enterprise (private sector identifying and realising a commercial opportunity). To realise the foreseen potential benefits, funding beyond such project-based activities will be essential. Realising such will require robust business plans, along with well-articulated value propositions. These include being able to demonstrate (and quantify) a CAP's impact and added value, and to continuously prove their relevance in terms of building capacity and supporting the delivery of tangible action.

A particularly challenging aspect in developing a business plan is identifying and rationalising a CAP's mandate and scope within the myriad of related platforms (i.e., those supporting specific sectors and governance levels, and others supporting related issues such as disaster risk reduction and biodiversity). Over time, the technologies and approaches involved will converge naturally but this can be accelerated if such platforms recognise that they don't need to operate in isolation. To succeed in the future (i.e., address the challenges and realise the opportunities associated with the provision of knowledge and evidence to support climate action), public, private sector and sector specific platforms will have to co-operate, work and learn as peers and partners.

Developing effective funding and business plans under such circumstance could benefit from related knowledge platforms coming together and agreeing on relationships and relative roles and responsibilities and demonstrating such within these plans. This could include identifying collaborative efforts and complementary and synergistic initiatives, as well as agreeing on standards and operational procedures. For example, nationally funded platforms could work with upstream data providers to deliver a first port of call for such data and oversight to support use in identifying and evaluating climate action. In reciprocation, such nationally funded platforms could facilitate a continuous learning environment including enhancing the user-relevance and impact of the different platforms and understanding of the metrics required to assess value and performance.

Looking to the future for knowledge exchange between CAPs

The KE4CAP project has demonstrated the benefits of knowledge exchange among CAPs and provided solid evidence of the need for perpetuating such a community of practice. It has indicated several preferred methods for sustaining such knowledge exchange and has identified the challenges and areas where CAPs will need to evolve in response to the needs of their key users.

With this in mind, the KE4CAP community has expressed concern that the benefits derived from the project and the progress made will stagnate and potentially be lost without an appropriately designed and supported follow-on initiative. The challenge now is for the community to communicate this message and to work together, along with potential funding agencies and other interested parties, to further develop a suitable approach focusing on realising and enhancing benefits to the CAP community and to all those user groups it ultimately supports.

Appendix 1: Participating CAPs

Country/region	Platform	KE4CAP resource
Alps	Climate Adaptation Platform for the Alps (CAPA) | www.capa-eusalp.eu	Summary
Asia-Pacific	Asia-Pacific (AP-PLAT) | ap-plat.nies.go.jp	Summary
Australia	Climate Change in Australia (CCiA) | climatechangeinaustralia.gov.au CoastAdapt | www.coastadapt.com.au	CCiA Summary CA Summary
Austria	National climate adaptation portal of Austria | www.klimawandelanpassung.at	
Belgium	Adapt2Climate | www.adapt2climate.be	Summary
Canada	Climate Change Adaptation Platform (CCAP), www.nrcan.gc.ca/climate-change/impacts-adaptations/adapting-our-changing-climate/10027 Canadian Centre for Climate Services (CCCS), www.canada.ca/en/environment-climate-change/services/climate-change/canadian-centre-climate-services.html Climate information portal, climatedata.ca Intact Centre on Climate Adaptation, www.intactcentreclimateadaptation.ca	CCAP Summary CCCS Summary Intact Summary
Denmark	Climate Change Adaptation | en.klimatilpasning.dk	
Europe	Climate-ADAPT | climate-adapt.eea.europa.eu	Summary
Finland	Climateguide.fi | ilmasto-opas.fi/en	
Germany	German Climate Preparedness Portal (KliVO) | www.klivoportal.de	Summary
Greece	Platform being developed | www.adaptivegreece.gr	
Hungary	National Adaptation Center | nakfo.mbfsz.gov.hu/en/	

Country/region	Platform	KE4CAP resource
India	Climate Finance Knowledge Portal (CFKP) | climatefinanceknowledge.nabard.org Climate Change Information Portal | climatevulnerability.in	CFKP Summary
Ireland	Climate Ireland | www.climateireland.ie	Summary
Japan	National (A-PLAT) | adaptation-platform.nies.go.jp	A-PLAT Summary
Mexico	Platform being planned	
Netherlands	Knowledge Portal for Climate Adaptation (KPCA) | klimaatadaptatienederland.nl Climate Adaptation Province Brabant (provincial) | www.klimaatadaptatiebrabant.nl Climate Buddy (local) | kli-maatje.nl	KPCA Summary
Northern Ireland	NIAdapts Planning Toolkit | www.climatenorthernireland.org.uk/NIAdapts	Summary
Pacific	Pacific Climate Change Science (PCCS) | www.pacificclimatechangescience.org/ Regional Climate Consortium for Asia and the Pacific (RCCAP) | www.rccap.org	RCCAP Summary
Philippines	eCCET planning tool | ccplanningtool.omlopezcenter.org/create-project-plan	Summary
Scotland	Adaptation Scotland | www.adaptationscotland.org.uk	
South Africa	National Climate Change Information System (NCCIS) | ccis.environment.gov.za	
South Korea	Model of integrated impact and vulnerability evaluation of climate change (MOTIVE), Korea Environment Institute	
Spain	Adaptation to Climate Change in Spain (AdapteCCa) | www.adaptecca.es	Summary
Sweden	Swedish portal for climate change adaptation | www.klimatanpassning.se/en	Summary
Taiwan	Taiwan Climate Change Projection Information and Adaptation Knowledge Platform (TCCIP) | tccip.ncdr.nat.gov.tw	Summary
Thailand	Thailand Adaptation Information Platform (T-PLAT) | t-plat.deqp.go.th/en/	
UK	UK Climate Resilience Programme (UK CRP) | www.ukclimateresilience.org	Summary

Appendix 2: KE4CAP Calendar

Date	Event
1 November 2019	KE4CAP project starts. Online community of practice established
3–5 March 2020	Country-hosted event, Australia: Services and science supporting climate action
30 June 2020	VKE1: KE4CAP: Introduction, engagement and next steps
Summer 2020	KE4CAP Survey
23 September 2020	VKE2: Supporting and working with local actors
11 November 2020	VKE3: Ensuring platforms' agility in order to meet evolving user needs
14 January 2021	VKE4: Communications, knowledge brokering and stewardship to stimulate and enable action
23 March 2021	VKE5: The role of CAPs in supporting monitoring, reporting, and evaluation of progress in adaptation
28 April 2021	Adaptation Futures webinar series: Adaptation decision-support tools and platforms
11–20 May 2021	Country-hosted event, Canada: Enhancing connections across platforms
8 June 2021	European Climate Change Adaptation conference session: At your service: climate knowledge and information as enablers of climate action
29–30 June, 2021	Country-hosted event, Japan: Enhancing connections across international, national and local adaptation actions
8–9 September 2021	Synthesis Workshop: Climate adaptation platforms – Realising the value of shared learning (co-hosted with Climate-ADAPT)
2 November 2021	COP26 seminar: Development and utilisation of information platform towards climate resilient societies in Asia-Pacific Region (hosted by Japan)
31 January 2022	KE4CAP project finishes

Appendix 3: Synthesised information by topic

Topic 1: Co-evaluation, learning and capacity development to drive platform improvement

This topic focuses on how we use monitoring and evaluation approaches to better understand platform strengths and weaknesses, including identifying and using metrics to measure the relative success of a platform over time. This includes how we elicit and use user feedback, use cases and peer-learning to inform platform development, and in turn how we use these insights to build the capacity of those developing, maintaining and using the platform to support continuous improvement.

Adopted practices

User engagement and involvement

Online surveys are the most common method used to elicit user feedback on a platform. Surveys are being used to collect various information including user testing and feedback on functionality, features, and tools; information on user needs; how the platform is being used; how satisfied users are; and how the platform is contributing to improved decision-making. All of this information is used to drive the ongoing and future development of platforms.

These surveys vary in openness, format and duration. Most surveys are conducted online, with some platforms also using offline surveys to reach certain user groups. Many of the surveys are 'open', allowing all users to provide responses. Other platforms have taken a more targeted approach to enable them to reach and disaggregate responses from specific groups of users, for example key reference groups and users with different levels of knowledge of the platform.

Steering committees, networks, and other reference and expert user groups play a central role in the initial and ongoing (co-)development of platforms and have dedicated resources allocated to them. Many platforms host regular meetings with reference and 'representative' user groups or networks to test and consult on the platform and its usefulness and to guide its development. Some platforms have also hosted ad hoc meetings and workshops with users, including provider-user engagements, as opportunities and resources allow. Other engagements with users (i.e., those not focused on evaluation) are also used as additional opportunities to gain user feedback.

These meetings have recognised benefits, including the ability to:

- gain more detailed user feedback to help improve the relevance and usability of the platform,
- further elicit and respond to user needs and input to help make the platform more user friendly and user-oriented,
- test specific platform features, functionality and tools,
- learn how users are using the platform, and
- increase user buy-in and uptake of the platform and its services by encouraging ownership and agency among the user community.

Overall, these engagements with users provide key opportunities for co-design, co-production and co-learning as a platform develops.

The formality of steering committees, networks and reference groups and their role in driving the development and improvement of the platform varies. In the most formalised example shared, a steering committee consisting of representatives from relevant organisations directs the overall implementation of the platform with the support of a working group, which acts as an intermediate body linking the steering committee and platform secretariat and helps to communicate needs for the development of content and the structure of the platform. A less formalised example is the use of research programmes collaborating with and using the platform to gather opinions and recommendations on the platform. Other platforms focus on engaging and operating in close collaboration with a specific network of stakeholders, and these interactions provide opportunities to elicit insights on specific user needs and feedback on how the platform is being used.

User workshops (including evaluation workshops), provider-user meetings and broader consortia meetings have been used to inform the early development of several platforms, to test prototypes prior to launch, and in some cases to co-develop the vision of the platform. In many cases these groups have subsequently become a reference group used to inform the ongoing development of platform. This continuing engagement has been particularly important for maintaining user buy-in.

Another source of user feedback comes from user enquiries about the platform, for example via platform support desks. These requests, in particular requests for help, can be tracked to better understand why and how users are accessing the platform / tool, what they are doing with the platform / tool and where possible gaps remain.

Tracking user interactions with the platform

Analytics, in particular the Google Analytics web analytics service and social media feeds, are commonly monitored by platforms and used to inform development. They are analysed to understand how many users are accessing the platform and how they are interacting with the information and tools. The approach to tracking and analysis of analytics varies in formality, with some platforms consistently monitoring these metrics and producing regular summary reports. Yet, the limitations of these metrics for capturing user behaviour and platform performance are well recognised and this data is considered subsidiary to more direct user feedback.

Platform monitoring, evaluation and reporting/learning

Few platforms have formal or thorough monitoring, reporting and evaluation (MRE) or learning (MLE) procedures or frameworks in place. Many platforms have ad-hoc approaches that can be considered as MRE, including regular consultations with users through the engagements described above. These have largely focused on platform development and on eliciting user feedback and needs as opposed to more detailed evaluations of platform impact. The lack of formal process is typically due to limited resources for full MRE and the prioritisation of resources for platform development over evaluation. Some platforms are also too new for MRE to be immediately useful, but early planning for such a process is important.

Of those few platforms with a formal MRE / MLE process, the framework is usually linked to wider local, sectoral, national and international policy and planning initiatives. For example, platforms have been evaluated as part of the evaluation of National Adaptation Plans, and in terms of their impact on shaping local and sectoral adaptation plans and activities. A thorough evaluation of Climate-ADAPT has been recently conducted in line with the EU planning and strategy cycle and as such will be repeated at regular intervals. Another platform has a MRE framework defined according to broader national objectives for climate policy and the role of scientific research within it. These MRE efforts have typically utilised surveys and interviews and, in the case of Climate-ADAPT, have facilitated the development of use-cases to demonstrate how people are using platform.

Selected innovations

Regarding surveys, the ability to disaggregate responses has yielded important insights. For example, one platform (CCiA, Australia) used a separate process for surveying 'registered users' and 'existing and potential users' on the usefulness and ease of use of tools available on the platform. While the more established and advanced registered users found these tools useful and easy to use, the existing and potential users had lower levels of expertise and found the platform hard to navigate and the tools too complicated to use.

Regarding **user engagement**, many platforms have built strong relationships with user groups and their representatives and engage them on a regular basis. These have proven hugely valuable for gaining regular, high-quality user feedback, enabling user-testing, and generating buy-in and uptake of the CAP and its services.

Regarding **analytics**, some platforms are systematically using analytics to analyse the impacts of promotional campaigns, and one (Intact Centre, Canada) reports using analytics to track users' initial and follow-up actions relating to a particular web-based application (with users' permission) to inform the development of effective outreach materials and campaigns, and to help residents overcome identified barriers to participation.

Regarding **MRE / MEL**, the connection of the evaluation of the platform to the evaluation of the adaptation plans they inform enables accurate assessment of the relevance of the services offered by the platform. For example, the evaluation of one National Adaptation Plan included an evaluation of the national CAP (AdapteCCa, Spain) which enabled valuable co-analyses of compliance between the services provided on the platform and adaptation actions contemplated in the plan and its associated work programmes.

Shared challenges

Resources (time, capacity, funding)

By far the most commonly mentioned challenge is access to time and resources for undertaking rigorous MRE. There is often no dedicated funding for this, or funding that is available is linked to specific projects or stages of development of the platform thus limiting continuity to support ongoing MRE processes. Restricted resources typically mean that platform development is prioritised over formal MRE activities, which are perceived as playing an ancillary role. Even where large-scale evaluations have been successfully undertaken there are still lessons to be learned about what works with regard to eliciting user feedback.

Limited resources are also cited as a key challenge inhibiting user engagement and the understanding of user needs. A common challenge is having sufficient capacity, expertise and resources for undertaking regular and effective user engagement and for co-development approaches with users. Designing and facilitating beneficial engagements requires considerable skill and financial resources. This includes the related challenge of how to decide who to engage and when to engage.

Meeting expectations and needs of diverse users

Linked to this last point is the common challenge of delivering a quality service for all audiences. Many CAPs have diverse audiences, and so have multiple user groups that they need to engage with. The difficulty here is understanding and managing the needs and expectations of diverse users, including new users and evolving user groups (e.g., new sectors and industries). This includes:

- Understanding who the users are and what their needs and capacities are.
- Understanding how users use the services provided.
- Understanding how satisfied users are and why.
- Identifying new users and their needs.
- Identifying and responding to evolving user needs.

With regards to responding to users' needs, the key challenges are:

- Deciphering between 'expressed' needs and 'real' needs.
- Clustering user feedback across user groups to address it in effective ways.
- Prioritising what user needs to respond to and in what order.
- Developing capacities and systems to consistently integrate user feedback into platform development.

How to undertake useful MRE/MEL

Another often cited challenge is how to measure and evaluate platform performance (which broadly entails uptake, impact on decision-making, and user satisfaction). There are key knowledge gaps around the development of appropriate metrics and criteria, evaluation frameworks, and monitoring schemes, and applying them transparently. The evolving nature of CAPs' users and their varying needs and capacities over time further complicates the development of metrics and their use and comparison between evaluations.

KE4CAP resources: Topic 1

> Topic 1 is seen as an overarching topic to which all KE4CAP events and activities contributed.
>
> Full details of project activities and outputs can be found listed by event by following links from the KE4CAP Summary page.

Topic 2: Supporting and working with local actors

Description of topic

Climate adaptation ultimately takes place on the ground, through tangible measures and behavioural changes, and CAPs are expected to play a pivotal role in stimulating, supporting and enabling action at the local level. This topic focuses on how platforms connect and engage with local actors, in particular local authorities, both online and face-to-face, and how these two approaches can be linked. This includes how to encourage and support these users, including how to demonstrate the benefits of acting on climate change, and how to help build their capacity to undertake adaptation assessments, planning and implementation of interventions. Central to this topic is how CAPs understand and respond to the needs of users, their capacities and decision-making contexts, and taking a view on how far CAPs can go in supporting the diverse and growing requirements from local users

Adopted practices

Demand for climate-related information at the local level is increasing rapidly and platforms are working hard to meet these needs. But responding to this rising demand must take place within the context of the resources available to platforms, and, in some cases, the limited capacity of local users, especially where adaptation is not driven by national policy requirements.

Local users working with platforms are diverse and include local authorities and municipalities, city-wide organisations, local NGOs, community groups, individual users, and sectors with specific users at the local level (e.g., farmers). Also important in this context are the boundary groups such as consultancies and professional membership bodies that have an important role to play in enabling and facilitating connections with local users, and in promoting the use of CAPs to help inform local action. Many platforms are primarily national in scope but recognise the rapidly increasing demand for information at the local scale. A few are already more focused at the local level usually working within a specific sector or by virtue of working with specific stakeholder groups, while several countries have developed a suite of linked platforms, including ones dedicated to meeting the needs of local users.

In the context of supporting and working with local actors, scale is a real issue. For those countries with many different climatic regions, cultural differences, and / or native languages etc., working with local users can be highly complex and very resource intensive. In Canada, the decision has been made by CCAP to focus on the national level, but to adopt a ‘network of networks’ approach and link with regional or sectoral organisations that then have responsibility for providing connections to local users. In Australia, a similar approach is being adopted by CCiA of partnering with others to help meet the rising demand for information and capacity building. Other platforms work in part through local climate centres (e.g., the Local Climate Change Adaptation Centres in Japan and the Climate Action Regional Offices in Ireland) or local government organisations (e.g., the Federation of Canadian Municipalities in Canada and the Local Government Climate Action Network in Northern Ireland).

Many platforms are working increasingly closely with local users in developing and improving their platform's content and functionality. Approaches to engagement being adopted include the addition of local users in stakeholder groups and advisory panels, working directly with local groups, seeking on-going feedback through questionnaires, and responding directly to proactive requests from local users e.g., via helpdesks. User testing of information and tools developed for local users, and the resulting feedback, are also seen as valuable. Germany encapsulates many of these approaches in their KlimAdapt User-Provider Network which includes national, regional and local authorities, businesses and NGOs. It supports the development of the KLiVO platform and has been instrumental in creating commitment from users through regular exchange and feedback.

Often, the information and resources being provided by platforms have been developed for other uses and are often too detailed and technical for local actors to use within their own decision-making processes. To address this, platforms play an important role in selecting and making available information of value to local users based on an understanding of their needs; platforms provide regional and local-scale scientific information and data and various tools e.g., municipal vulnerability mapping, community risk assessments etc.

Some countries have established separate regional and local platforms (or related initiatives) that are compatible with the national platform but focus specifically on local user needs and are developed in consultation with them (e.g., Netherlands, Sweden and Finland). In all cases, platforms act as valuable knowledge brokers, aiming to both select relevant information to translate and share, and to work with the providers of data and information to help ensure the needs of local users are incorporated into research design.

Capacity building at the local level is a common theme. Many platforms run bespoke training, workshops and events to help local users engage with the information, to introduce new information and to explain the value of improved platform features. Peer-to-peer learning is often encouraged and, in some cases, facilitated e.g., by inviting speakers from the user community to share experiences, and by providing mechanisms for knowledge exchange and partnership work across the community. To overcome the issue of the 'churn' of local authority officials, 'training the trainers' is an approach adopted by some CAPs (e.g., Ireland) to ensure a core level of expertise remains available within a local jurisdiction.

Platforms also help local users by highlighting adaptation actions that have been carried out successfully at the local level elsewhere and explaining how such action has built on the information available (users' journeys, case studies, published examples etc.); this can both inspire confidence and highlight likely progress and pitfalls to others. Some platforms provide briefing materials for use by local officials when talking with elected officers about adaptation. These focus specifically on local solutions-based approaches and attempt to bypass the need for everyone to understand the details of adaptation. Other platforms have been active in attending external conferences targeting municipal planners, local officials, municipalities and communities both to explain the value of CAPs and to seek feedback and local expertise to enhance delivery. An additional focus on capacity building is that identified by CCiA (Australia) which has worked directly with local authorities to help write tender documents soliciting consultancy support and to then evaluate the work of the consultants the local authorities subsequently engage.

Given the complexity of working with local users, shared learning between CAPs is important. Climate-ADAPT, with their European-wide focus, has taken a lead in organising and facilitating a number of international conference sessions designed to facilitate knowledge exchange across the CAP community, including working at the local level. Several CAPs are also working with web-based information services in other areas (e.g., disaster risk reduction) to exchange knowledge and expertise on meeting local user needs. In addition, research projects underpinning the development of CAPs, often include engagement with local users as an integral part of the research. Going further, embedding researchers within local stakeholder organisations for a period of time helps to understand the local decision-making context such that the results can be better focused to meet user needs (e.g., UK CRP).

Selected innovations

Some platforms have focused resources allocated to enhancing local use which allow them to work particularly closely with local stakeholders. Adaptation Scotland has a specific work package on 'place-based adaptation' where they collaborate with city, regional and local partners to establish local initiatives across Scotland. Within this work, it is important to understand local context, develop detailed business cases, be clear on purpose, and ensure that there is local buy-in as any initiative must be self-sustaining and able to secure ongoing funding to succeed.

When looking to develop effective peer-cohort models among local actors, CoastAdapt (Australia) has used champions to represent groups of likely users as part of a Tool Development and Implementation Partnership. This works as a two-way exchange with the platform testing ideas and delivery formats with these partners who then also work as mentors to their peers within the community.

Similarly, the Local Governments for Sustainability network (ICLEI, Canada) work with local authorities by grouping them into peer-cohorts depending on specific commonalities. e.g., geography, demography, common climate impacts, stage of adaptation action etc. This allows municipalities to work both with the platform and also collaboratively, supporting each other as they progress over a period of time. Such peer-cohort models can make it easier for people to communicate online as conversations tend to be more tailored and focused.

In Northern Ireland, NIAdapts is not a stand-alone platform but works through the more general Climate NI website. Working with the Local Government Climate Action Network (LGCAN) – a support group for the eleven local councils – NIAdapts provides an adaptation planning approach tailored to the specific local context, stripped back to essentials, and focusing on practical action to be delivered by non-specialists. As there is no legislative backing for local authority action in Northern Ireland, the approach has been kept simple to enable local officers to make a start. NIAdapts was developed in consultation with Derry Council and volunteers from other local authorities, and the aim is for LGCAN to continue the shared learning moving forward, cementing the use of the platform as a consistent framework for adaptation across the region. Crucial to achieving this progress was the fact that Climate NI is a trusted independent organisation and that the climate manager in Derry Council is an enthusiastic champion of the work.

The Intact Centre platform (Canada) specialises in working with homeowners and communities (and others) to identify and reduce the impacts of extreme weather and climate change, for example helping homeowners reduce the risk of flooding.

They work with a wide variety of stakeholders to complete community-based research projects and to develop peer-reviewed best practice guidelines and standards related to local climate resilience (flood, urban interface wildfire, urban heat, financial). A particular strength is their focus on working with local collaborators to promote the work publicly through the media, presentations, webinars, keynote addresses and op-eds.

The PCCS (Pacific) platform was developed with CSIRO Australia and fourteen partner countries in the Pacific. A key feature that contributed to its success was the upfront appreciation of local differences; including the formal recognition of the sovereignty of the Pacific Island partners to ensure that all engagements were undertaken in an inclusive and culturally and politically sensitive manner which respected intellectual property rights to scientific data and traditional local knowledge. Another key feature was the delivery of scientific products in multiple local languages to facilitate outreach to stakeholders at all levels.

To help local users deal with the continuous flow of scientific information, CCiA (Austria) have introduced 'climate change adaptation model regions', in which a number of municipalities work together on a priority topic e.g., forestry, erosion, river flooding etc. The platform then works with the national met. office to support the projects by providing dedicated climate scenarios and involving local universities and other institutions as necessary. With this support, the municipalities have shared resources to develop common adaptation measures and the program has now evolved to go beyond capacity building towards supporting implementation.

Similar to the approach taken in Ireland of working with Climate Adaptation Regional Offices (CAROs), Japanese municipalities have established Local Climate Change Adaptation Centers (LCCACs) to strengthen adaptation at the sub-national level. A-PLAT (Japan) supports this work by providing advice, guidance and training, including on the collection, organisation and provision of information and by coordinating collaborative research projects to collect and share data on local climate change impacts etc. through a web-based GIS system. Working via such regional hubs has considerable benefits as they better understand local contexts and situations, can facilitate the two-way flow of information, and can also support the merging of adaptation requirements with other areas of local government responsibilities e.g., water management, flooding etc. National CAPs add value by strengthening this partnership work.

Shared challenges

Particularly in those countries with little political support and limited policy requirements for climate adaptation at the local level, establishing and sustaining long-term collaborative relationships with local users can be difficult. Active communication, connecting local and practical needs with national policy and providing examples of successful action can all help, but it can take time to gain traction.

There is always a need to balance available resources with the diverse requirements from across the range of local users. Many CAPs are run by small core teams and there is a direct trade-off in resources between working with an increasing number of (local) users and, for example, broader platform development.

Keeping platforms up to date is another common challenge. But it is particularly relevant here given the increasing pace of climate-related information and data generation and the need to reflect this in a manner suitable for local use.

This effort is also linked to the increasing need for on-going capacity building initiatives by CAPs to help local users at all stages of the adaptation cycle understand and use the information provided appropriately. Capacity building within local governments can be particularly difficult due to their uneven capacity, frequent staff changes and general unfamiliarity with adaptation.

Language can be a barrier in those countries with multiple local languages and also for transnational platforms. To reach local users, platforms are considering or implementing the delivery of information in local languages to facilitate outreach to local and community stakeholders in a manner that also recognises the specific cultural contexts in which the information will be used. For transnational platforms, English is often used as a common interface but may not be appealing to all. Where countries have platforms at multiple levels (national, regional, local, sectoral) improving the interlinkages (e.g., interoperability, consistent use of information), including to help ensure local action reflects national policy, is an ongoing issue.

There are also challenges associated with measuring the success of a platform and demonstrating value with respect to enabling action at the local level. Often there is a need to go beyond the quantitative metrics available from the website and look at offline metrics that better reflect what local users have done with the information. These metrics can be hard to collect but do give a much better sense of what has been accomplished.

All these issues listed raise the question of how far can or should individual CAPs go with respect to supporting and working with local users. The context (funding, resources, demand from local users) within which each platform operates is different, but some are taking the deliberate decision to limit the extent of their potential offer and to seek to partner more formally with others to facilitate the flow of information to local users.

KE4CAP resources: Topic 2

VKE2: CAPs: Supporting and working with local authorities and other local users.

Examples from an individual platform perspective:

- CoastADAPT, Australia: Working with local actors in Australia.
- ICLEI Canada: Empowering local governments to take climate action through capacity building.
- KLiVO, Germany: German Climate Preparedness Portal and networking approach.
- Climate Adaptation Services, Netherlands: Kli-maatje, 'Climate Buddy'.
- Climate-ADAPT, EU: The European Climate Adaptation platform.

Country-hosted event, Japan: Enhancing Connections across National and Local Platforms to Support Adaptation Action (Day 1).

Examples from an individual platform perspective:

- Climate Adaptation Services, Netherlands: The role of CAS in enhancing the links between national and local adaptation in the Netherlands: some practical examples.
- Climate Ireland: Climate Ireland's support in linking local authority actions with national adaptation objectives.
- A-PLAT, Japan: Questions from Local Climate Change Adaptation Centres in Japan.

Topic 3: The role of CAPs in supporting monitoring, reporting, and evaluation of progress in adaptation

Description of topic

This topic focuses on the role of platforms in contributing to national and international monitoring, reporting and evaluation (MRE) of adaptation actions. While this topic is perceived as being important, it has not been a specific objective for many platforms to date as their primary functions are related to providing data, knowledge and supportive resources and tools that can enhance awareness and inform climate adaptation. As such, CAP contributions to MRE are emerging and are seen as likely to become more important in the future.

Also included in this topic is the perceived legitimacy of such a role for platforms – whether it is a role that has been anticipated and to which platforms are able to contribute. An understanding of the implications in terms of the required data, information, functionality and resources is needed, as well as the technological systems and capabilities needed to carry out this role and the enabling governance structures and institutional arrangements required.

Adopted practices

MRE is seen as encompassing a wide range of activities and resources. Current work by CAPs in this space tends to be at an early stage and is both diverse and diffuse, reflecting their different remits, histories and positions within the policy and practice space. Early-stage functions include CAPs supporting the **reporting** and/or **monitoring** of action by providing access to adaptation strategies and plans, and compiling case studies and users' journeys. This links to the understanding that MRE has different purposes and requirements at different stages of the adaptation cycle e.g., case studies can be particularly useful at the start when identifying adaptation options and learning from peers.

The move to **evaluation** of adaptation action – a continuous learning and improvement process – is seen as a considerably more challenging and an uncertain role for CAPs. This perspective arises from the many associated challenges (resources, capabilities, metrics for measuring success that are context specific) and concerns related to the implications and legitimacy of undertaking such a role particularly as it could conflict with the primary remit of sharing knowledge. As a result, evaluation is often seen either as a later-stage or a separate but linked function.

Although most platforms do not have a primary role in MRE of action, many do play a critical role within their respective adaptation landscapes, particularly as a means to promote, inspire and support adaptation action and involvement in discussions related to the development of adaptation indicators (A-PLAT, Japan). This includes both vertical and horizontal coordination and the provision of information for policymakers preparing their respective MRE reports (CCAP, Canada; AdapteCCa, Spain; NIAdapts). Most platforms provide case studies and/or examples of users' journeys as the primary means of promoting, inspiring and supporting adaptation action.

In some cases (Austria; CCiA, Australia; Adapt2Climate, Belgium), information such as links to national progress reports and to related information is gathered and synthesised to facilitate reporting while others (KliVO, Germany; Climate Ireland; Climate-ADAPT; KPSA, Netherlands) also provide links to their respective adaptation strategies. Engagement through regular meetings with relevant ministries and those responsible for scrutiny related to progress (e.g., links between the UK CRP and the UK Government's Climate Change Committee) also provides timely opportunities to inform MRE at the national level.

Climate-ADAPT works across the EU with member states providing official government reports on adaptation under Article 15 of the EU Monitoring Mechanism Regulation. National ministries manage the content of the reports and member countries may provide additional submissions on a voluntary basis. The European Commission has then developed specific guidelines to enable the use of this information for multiple purposes, including for updating the country-specific information pages on Climate-ADAPT.

Evidence from many platforms (PCCS, Pacific; RCCAP, Asia-Pacific; CCCS, Canada; CCiA, Australia) indicate that enabling key climate service providers to work together strategically to advance products and services can also inspire and promote progress on adaptation. There appears to be considerable potential to use the same platforms to enhance the capacity of users to measure, report and evaluate progress as they are using to access information and supporting resources, and to track what they are doing with those resources and what gaps remain.

Deliberately or not, CAPs do have a role to play in developing and delivering an MRE capability. They have data and information that are essential to understanding current status and trends on adaptation and they have convening powers including structured processes for engaging, advising and brokering. Recognition of these contributions is seen as being beneficial, and a better understanding of their nature and scope would help enhance benefits.

In terms of the whether playing and demonstrating MRE capabilities could be seen as enhancing the perceived value of the platform, shared experiences suggested that there is a strong potential, particularly by establishing and sustaining communications with those who have responsibility for MRE of adaptation action nationally and internationally. Identified benefits of CAPs supporting MRE include:

- Possible efficiencies. Making use of existing information, resources and infrastructures.
- Increased transparency. MRE can be a 'black box' so linking with knowledge and information platforms can contribute to transparency via public-facing interfaces.
- Being able to provide reporting information e.g., indicators, in the language of the country will help adaptation.
- Promoting adaptation. Indicators and assessments being provided for MRE via a platform can also be used to inform and promote other adaptation action, put actions in a transnational context, etc.
- Informing and influencing policy. MRE is an important component of the adaptation cycle, and reporting progress is a powerful mechanism for informing the next policy round.
- Indirect benefits from feedback on the MRE process. This can be used to inform the design and development of the platform to enhance use and attract resources

Selected innovations

A new benchmarking tool for the Adaptation Capability Framework introduced by Adaptation Scotland seeks to assess how adaptation capability is maturing over time with potential utility in measuring adaptive capacity and preparedness.

Within the CCCS (Canada), the climate service organisations have worked together to develop and oversee a new climate information portal: ClimateData.ca. The development process brought together key actors to develop a tool that has national coverage and to reach consensus on the best available resources and tools.

Two countries have developed specific platforms and web-based tools to support MRE of adaptation progress. In Taiwan, the Taiwan Environmental Protection Agency has established a separate Taiwan Adaptation Platform that provides information on the national adaptation policy and its outcomes, and that also acts as a reporting system for authorities to submit their annual adaptation progress reports.

Sweden (led by SMHI) has developed a specific MRE web-based tool, KLIRA, which enables the various National Authorities and County Administrative Boards to report annually on their adaptation activities – a statutory requirement in the country. SMHI supports the authorities in their work and prepares an annual analysis of the reporting for government. This analysis establishes to what degree the authorities have completed expected tasks but also provides the means to understand to what degree the authorities are able to work according to the priorities and principles in the Swedish National Adaptation Strategy, and what risks, opportunities and measures can be identified.

In the Netherlands, CAS manages the suite of national and local platforms. They have recognised that there is valuable qualitative information already available within the platform history that can be used to inform MRE activities e.g., changes in demand have driven changes in levels of engagement and uptake of specific information and data. These trends can be extrapolated and used to guide future developments, including those supporting MRE.

The Intact Centre (Canada) has built-in tracking and feedback functions which makes it easy to monitor and report on adaptation progress. This capability also provides a means of continuously improving programmes and has supported the development of an online college-level Home Flood Risk Assessment Training Programme.

Shared challenges

In general, the majority of platforms see their primary role as sharing knowledge, data and other resources, and view MRE of progress on adaptation as being beyond their current mandate and resource allocation. For some, their role in such a process is limited by perceived legitimacy or not having processes and capabilities to track and validate such action, including access to required information. Challenges are also linked to the complexity associated with developing such a capability, as well as difficulties associated with matching the scale of the existing and evolving risk with the proposed and implemented adaptation measures.

The potential for supporting MRE also tends to depend on the history of the CAP involved. Newer platforms see a direct role in supporting MRE whilst more mature platforms often do not have MRE within their mandate, and so are now considering how to adapt and re-orient accordingly.

One or two countries are developing tools specifically designed for this MRE purpose. Others see the potential for such but doing so would require formal recognition of such a role within their work programme (and finances) and the development of new platform solutions to provide the technical features and properties needed.

Undertaking such an MRE role is seen as particularly challenging for transnational platforms. Many of the same reasons as for national platforms apply, amplified by the number of countries, departments and agencies involved.

KE4CAP resources: Topic 3

VKE5: The role of CAPs in supporting monitoring, reporting, and evaluation of progress in adaptation.

Examples from an individual platform perspective:

- Climate-ADAPT: Supporting MRE on adaptation.
- NIES, Japan: Recent discussion and activities related to monitoring, reporting, and evaluation of adaptation in Japan.
- Adaptation Scotland: The Benchmarking Tool – Supporting and Assessing Progress against the Adaptation Capability Framework.
- Swedish National Knowledge Centre for Adaptation: Creating KLIRA – a system for monitoring Adaptation.
- Climate Adaptation Services, Netherlands: The Dutch platform and its (aspired) role with regard to monitoring and evaluation.

Also available is a presentation by SEI, The Global Stocktake: Overview and Opportunities, which identifies opportunities for CAPs to engage with and contribute to the global stocktake process within the Paris Agreement.

Topic 4: Communications, knowledge brokering and stewardship to stimulate and enable action

Description of topic

This topic focuses on how we use communications to increase the visibility, uptake and use of platforms including, for example through promotional and motivational activities. This includes how we use knowledge synthesis, translation, and packaging to promote actionable learning, and how content and knowledge stewardship can support transparency, legacy (ensuring insights and learning continue to be accessible), and line-of-sight between related content. This topic also includes efforts to support communications in different languages and to promote understanding of complex scientific issues.

Adopted practices

Knowledge sharing

Platforms provide numerous knowledge brokering activities including:

- Taking a standardised approach to content that focuses on key aspects for readers, e.g., through following a specific template.
- Focusing on packaging comprehensive details in a brief, concise way.
- Including relevant links to other content and services.
- Providing contact details, e.g., authors, organisations involved.
- Using clear, plain, uncomplicated language and avoiding scientific jargon and abbreviations.
- Keeping the site up to date, e.g., by sharing frequent news updates and publishing new content.
- Hosting content in ways that support openness and accessibility, e.g., not using paywalls and ensuring the platform can be accessed through widely used devices and browsers.
- Being transparent about how the knowledge was developed and by whom.

Several platforms actively link and drive their users to other websites and platforms. Examples include e-learning platforms and an RSS feed on current affairs in the field of climate change (CFKP, India) and links to work in adjacent countries to ensure users are supplied with relevant additional knowledge generated elsewhere in the wider region (NIAdapts).

The importance of convening actors to share knowledge was emphasised by multiple platforms. Different models are used and the options and entry-points for users to contribute content (e.g., directly or via platform administrators) vary between platforms.

For example, CoastAdapt (Australia) approaches and advertises for candidates to provide case studies of their activities and offers payment and a 'mentor' to guide the case study development. Similarly, the Intact Centre (Canada) gathers and shares personal and institutional case studies to illustrate the practical applicability of using good practices, and to motivate others to do so. Many others, including the Swedish platform, work directly with national government agencies to provide specific content linked to national policies. In addition, platforms such as KLiVO (Germany), CCCS (Canada) and Climate-ADAPT (EU) all showcase how climate information and knowledge, including from the platform itself, are being used in decision-making. These case studies provide inspiration and help build capacity and expertise to enable the effective use of information to support action.

To further enable the (offline) sharing of content and knowledge between users some platforms have developed discussion forums (CFKP, India) and other similar facilities to connect across users with specific requirements.

Most platforms undertake targeted knowledge curation and sharing to meet the knowledge needs and preferences of users. This includes the collation of selected reports, news, and videos (TCCIP, Taiwan) and information on relevant policy initiatives, e.g., NIAdapts which charts and shares information on the progress of adaptation plans across Northern Ireland.

Knowledge translation, synthesis & tailoring

Several platforms provide multiple language translations of the entire platform (Adapt2Climate, Belgium; climateguide.fi, Finland; CCCS, Canada) or of key content for users (e.g., TCCIP, Taiwan, translates selected international resources into the national language) and specific groups (e.g., CCCS, Canada translates key presentations from workshops and information sessions into the audience's language, including indigenous dialects).

Some platforms actively co-develop knowledge products and resources with experts and users. This model, which is used by CCCS (Canada) among others, "supports strong knowledge brokering and stewardship and empowers users, over the long-term, to consider climate change in their decisions".

Most, if not all, platforms have developed a range of communication and knowledge products for, and tailored to, different audiences. Examples include:

- PCCS (Pacific) provides:
  - technical and non-technical summaries for all science outputs,
  - local language translations for many outputs,
  - delivery of novel communication products using different media including digital animations of scientifically informed key messaging (e.g., Climate Crab, Cloud Nasara) for local communities, schools, church groups etc., and
  - content to enhance 'train the trainer' capabilities, to enable local practitioners to reach out to their local stakeholders at a sectoral or local community level to communicate and raise awareness of climate change issues.
- Adaptation Scotland has produced 'Climate Ready Places', an interactive resource that highlights the difference between adapting and not adapting across six typical Scottish landscapes.

- TCCIP (Taiwan) has provided translated climate projections in a recent report on climate change in Taiwan and the most important graphs from this report have been reorganised into a 'Climate Change Atlas of Taiwan'.
- Climate-ADAPT (EU) provides a synthesis of knowledge on the main topics and sectors.
- NIAdapts provides:
  - guides for specific user groups with knowledge synthesised from a wide range of sources such as the met. office and outputs from research projects to provide professionals with a clear guide to follow on adaptation, and
  - service area factsheets, which aim to empower non-specialists to feel supported with background knowledge when engaging with colleagues in local councils.
- Many platforms translate and transform climate information, products and tools into user-friendly and accessible resources, tailor key presentations to include examples, information and scenarios that relate to the audience (making the content relatable and inspiring) and develop resources with guidance from scientific experts but simplified for a general audience.
- ClimateData.ca (Canada) packages relevant climate information, data and products into Sectorial Modules in order to support targeted and actionable learning. These modules are built in collaboration with experts and users and are linked to case studies / use cases. A training working group from across levels of government, climate service providers and academia are working together to develop 'plug and play' material on topics such as climate science, projections, uncertainty, and extremes. In the future, CCCS will adapt the services, products and tools for an indigenous audience, including translation into appropriate languages.

This tailored online knowledge is often used alongside face-to-face engagement with stakeholders, including with respect to training and capacity building.

User support

Supporting users to get the most out of accessing the platforms and the services and knowledge they provide is key to enabling action. To this end most platforms provide user support. This includes specific guides on how to use the platform (e.g., AdapteCCa, Spain) and reference guides on using specific tools etc.

Many platforms also provide specific guidance on how to adapt to climate change. For example, NIAdapts provides a highly practical 'How To' guide that includes, for example, sections on 'What do you need to know' and 'What do you need to do', plus information sheets on climate change, current policies etc. CCiA (Australia) provides a Projections Help Desk and CCCS (Canada) provides key resources designed to help users' understanding of technical terminology.

Communications for visibility and knowledge dissemination

All platforms take a multifaceted approach to communications for disseminating knowledge, increasing the visibility of the platform and for engaging with existing and new users. Compelling storytelling and relatability have proven important for gaining traction amongst users.

For example, collaborations with residents to share stories of their climate-related challenges and what they have done to overcome these have proven effective for engaging stakeholders with the Intact Centre (Canada) platform.

Centralising the platform as a go-to repository has proven successful for increasing uptake. For example, CCAP's (Canada) communication strategy requires users to go to the Adaptation Platform workspace in order to retrieve information and documents for meetings, webinar information etc. thereby driving users to the platform. Similarly, Climate-ADAPT (EU) benefits from a protocol where projects funded by the EU must disseminate their outputs via the platform.

'Multipliers', 'champions', and networks have played important roles in platform visibility and uptake. KliVO (Germany) encourages climate service providers and network members to incorporate the platform logo and link on their website whilst other platforms encourage relevant national government agencies to link through to the platform. Similarly, T-PLAT (Thailand) is featured on and was launched via Thai government websites. With regards to networks, CAPA (Alps) leverages the EU Strategy for the Alpine Region network of actors and transnational bodies and is developing a package of dissemination materials that members can use to promote CAPA in their home organisations, regions and countries. AdapteCCa (Spain) is building on the networks and activities of the several major research projects, which are also being used to link to platform outputs and informally to gather opinions and recommendations.

Social media (Twitter, Facebook, LinkedIn etc.) plays a prominent role in platforms' outreach.

Platform newsletters, typically released every 2-3 months, are commonly used to share news, forthcoming events, calls for proposals, and new content with readers. Mainstream media can also play an important role in giving platforms visibility, particularly when they are first launched. The Intact Centre (Canada) uses various analytics to track the uptake of different communications products and services and uses the results to improve the outputs.

Participation and exhibitions at conferences, seminars, webinars, meetings and other fora play a significant role in platforms' outreach. For some this takes place in the context of networks supporting the platform (AdapteCCa, Spain). Several platforms host their own events, for example seminars for different focus groups to promote content and knowledge on the platform (TCCIP, Taiwan), regional information seminars (AdapteCCa, Spain), and full conferences (KLiVO, Germany). In-person meetings or, more recently, online presentations, face-to-face training and capacity building, and open days all play a role in increasing the visibility of platforms and engagement with users.

Outreach materials cited include flyers, brochures, postcards, pens, posters, and digital multimedia including videos (KLiVO, Germany), animated features (PCCS, Pacific), and media stories (CCiA, Australia).

Selected innovations

Regarding knowledge sharing, the approach taken by CoastAdapt (Australia) to approach, pay and mentor candidates to provide case studies of their activities is unique.

Regarding knowledge translation, several platforms have produced innovative knowledge products that translate climate change adaptation for specific audiences.

Examples includes TCCIP's 'Climate Change Atlas of Taiwan' and novel communication products developed by PCCS (Pacific) e.g., Climate Crab, Cloud Nasara).

Regarding outreach, key success factors include the telling of real, relatable stories (Intact Centre, Canada), and the leveraging of multipliers, champions and networks as active agents for promoting the platform.

Regarding communications in general, A-PLAT's (Japan) use of anime shows how art and culture can be integrated into platforms and their knowledge products to appeal to and engage specific groups of users. Adaptation Scotland also recognises the fact that arts and creative practitioners can be hugely beneficial to projects and platforms and are increasingly viewing creative and cultural practices as an integral part of their work.

Shared challenges

Technical:

- For aiding navigation of the platform and discovery of content: Search Engine Optimisation, optimise keywords, search and filter functions.
- Managing and linking across multiple portals and supporting users to understand and navigate multiple portals that have different purposes without confusing them.

Connecting knowledge:

- Linking more effectively to other initiatives.
- For end-of-life platforms, facilitating an effective transition for current users to new / other more contemporary websites and portals.

Uptake / attracting users:

- Tailoring and translating content for different users; in particular how to increase the relevance and usability including how to reduce technicality without losing important details and credibility, and how to best communicate with various actors with appropriate language and infographics.
- Engaging existing and new users and increasing uptake across all audiences; this includes how to develop and implement marketing and communication strategies.
- Building relationships with users where activities are solely or mostly online, or where closer engagement with users is undertaken by another actor / organisation.
- Parallel communication of the platform between traditional media and social media.
- Encouraging engagement and contributions from users.

Overcoming resource limitations for:

- Promoting constant engagement and inspiration; reminding key persons to take action.
- Providing professional communication services.
- Language translation of content or entire platform.

- Keeping up with demand and being able to maximise opportunities (e.g., attending events).
- Matchmaking and linking stakeholders.
- Tailoring communication approaches and products to meet specific user needs.

Moving from knowledge to action:

- How to inspire users to turn ideas into actions.
- How to build users' capacity to take action including how to support climate champions who can synthesise information for their own organisations and how to increase the climate literacy of the public and to mainstream climate change and adaptation decision-making.

Innovating:

- How to integrate creative and cultural practice into adaptation projects, platforms and services.
- How to avoid dissemination and knowledge exchange being tokenistic, an afterthought and poorly resourced.

KE4CAP resources: Topic 4

VKE4: Communications, knowledge brokering and stewardship to stimulate and enable action

Examples from an individual platform perspective:

- Adaptation Scotland: Enabling organisations, businesses and communities to increase resilience and adapt.
- Climate-ADAPT, EU: Knowledge brokering on Climate-ADAPT.
- CCCS, Canada: The Canadian Centre for Climate Services: Connecting Canadians with Climate Information.
- TCCIP, Taiwan: Knowledge brokering and knowledge products on the TCCIP platform.

A presentation from the National Adaptation Planning Global Network is also available sharing insights from this network on the factors that help national adaptation planners and stakeholders make use of knowledge and data (i.e., peer learning, targeted technical support, co-creation of knowledge).

Country-hosted event, Japan: Enhancing Connections across National and Local Platforms to Support Adaptation Action (Day 1).

Examples from an individual platform perspective:

- Climate Adaptation Services, Netherlands: The role of CAS in enhancing the links between national and local adaptation in the Netherlands: some practical examples.
- Climate Ireland: Climate Ireland's support in linking local authority actions with national adaptation objectives.
- A-PLAT, Japan: Questions from Local Climate Change Adaptation Centres in Japan.

Topic 5: Integration of cultural, including indigenous, knowledge, capacities and needs into CAPs

Description of topic

This topic focuses on understanding the needs and values of different cultural groups and indigenous communities and integrating these into platform design and delivery. It is a topic that needs particular attention considering the nature of cultural and societal differences that exist within and across countries, the potential value of that diversity in determining adaptation actions, and the challenges the diversity presents when helping to stimulate and enable coherent and effective responses. This topic includes how we integrate cultural knowledge in ways that recognise the ownership of that knowledge, and how we use the extended nature of platforms (i.e., beyond just web-based) to support the inclusion and representation of all groups in adaptation decision-making.

Adopted practices

Adaptation strategies and plans, as well as their implementation, should be based on the best available science and practice. Towards this aim, engaging new and emerging users such as indigenous communities can offer huge advantages in broadening the diversity of expertise and knowledge as well as contributing to demonstrating respect and engendering trust. For example, academic science and indigenous stories are often complementary and need to be brought together to enrich the overall offer. It is recognised that doing so means accepting a broader definition of authoritative.

Common practices established by CAPs revolve around inclusive and culturally and politically sensitive engagement (CCiA, Australia; NCCIS, South Africa; RCCAP, Asia-Pacific), targeting cultures and indigenous communities in the co-development and co-design of content (PCCS, Pacific) and when showcasing content and capabilities (CoastAdapt, Australia; T-PLAT Thailand). This level of engagement is particularly important when including local knowledge from indigenous communities and different cultural groups within the platform. To further enhance impact, it is suggested that such engagement should aim to build trusted relationships such that the knowledge exchange processes become valued and embedded within the different communities.

Other approaches being taken include the provision of region-specific information and the deliberate integration of relevant good adaptation practices on the platform (CFKP, India; Climate Ireland) through case studies, success stories, voice-overs and videos from those working on the ground, especially with place-based adaptation initiatives (Adaptation Scotland). The availability of online templates to support users who supply this type of information can be useful (Climate Ireland; Climate-ADAPT). Additional supportive initiatives include information and resources that tackle challenges of particular interest (e.g., impacts information of interest to Arctic indigenous people and their livelihoods (climateguide.fi, Finland) and risk communication and disaster risk management information targeting immigrant communities (Austria).

Selected innovations

Innovative measures can enhance a platform's ability to meet the knowledge and knowledge-sharing needs of different users with positive impacts on cross-border and cross-cultural engagement and action. Highlights include using different and culturally appropriate media, including digital animation of scientific messages (PCCS, Pacific) and developing content that enhances train-the-trainer's capabilities enabling local practitioners to reach out to their respective communities (A-PLAT, Japan; Climate Ireland).

CCiA (Australia) is supporting the active engagement of Traditional Owners in developing information and knowledge to support climate action. Benefits include enriching scientific information by embedding traditional knowledge, and better focusing local to international initiatives by engaging these communities at an early stage.

The CCCS (Canada) is currently looking at issuing a contract for an indigenous organisation to help the platform adapt its services, products and tools for an indigenous audience, including translation. Within the CCAP (Canada), three indigenous organisations are members of the national plenary and have led sessions on indigenous-led adaptation approaches.

Establishing a series of satellite platforms linked to the parent website as repositories for specific information (PCCS, Pacific) can be a workable option, including to address the language issue. It has been noted that in this case data and information are password protected in recognition of their national ownership and value.

Shared challenges

Commonly identified challenges relate to being better equipped, resourced and knowledgeable to integrate cultural knowledge, capacities and needs into CAPs. It is recognised that reaching out to, and building and sustaining relationships with and across, the diverse cultures in many countries to appropriately reflect that diversity in the products and services available on platforms is resource intensive and therefore challenging in terms of the availability of human and financial resources.

Understanding the most useful type of engagement requires further development, including through the sharing of experiences and lessons learnt. Currently, engagement is mainly done by actively participating in workshops and climate-related meetings that target or to some extent engage these communities. Further development requires consideration of how 'best' to engage particularly when that diversity is real (in terms of different world views), large and evolving (in terms of perception and action) and may need to be scaled up from an individual community to a regional or national level effort.

Using a CAP for engagement, particularly a web-based platform, raises further challenges linked to supportive technologies, mechanisms and capacity building. Among these are issues related to:

- Identifying which organisations to include and how to prioritise different organisations.
- Introducing and supporting these organisations and communities in linking to adaptation and resilience, and sustaining these relationships.
- Integrating socio-cultural considerations in a way that is equitable and respectful.
- Considering how CAPs can promote greater representation of these communities in related national and international fora.
- Considering options outside of the conventional online platform that can effectively engage and deliver especially when technology is a limiting factor.

In-person engagement activities have a key role to play in building relationships and trust within indigenous communities, non-traditional users and under-represented actors. As such, a virtual environment may not be suited for all relationships, groups, or communities but in-person engagement needs to be balanced with the recognition that we live in a digital age where technological innovations can assist relationship-building with other communities.

Other challenges relate to the possible lack of willingness to share data and knowledge, including issues related to recognition of the ownership of traditional knowledge, obtaining continual consent, IPR and improving traceability of information to increase overall value. The fact that many indigenous (and other) communities see disaster risk reduction as a priority whereas climate change is not an immediate threat can be a barrier to climate action.

Although information and data are being used by indigenous users and different cultures, it is still lacking in terms of the inclusion of traditional knowledge. The lack of a database of local wisdom and/or adaptation actions already being taken by indigenous communities is noted as a particular barrier.

Faced with these challenges, many platforms rely on others (platform champions, knowledge brokers and intermediaries) to reach out to the different cultural and indigenous communities. This approach can be challenging as it depends on the capacities of others and the effectiveness of those relationships.

More work is also needed to better understand the extent to which cultural differences are playing a role in determining adaptation action, the degree to which both formal and informal social networks, power dynamics and levers of change come into play, and how to use these and other means to improve inclusion. All these challenges point to the need for further capacity building both within culturally diverse and indigenous communities and also with those responsible for providing the products and services.

KE4CAP resources: Topic 5

Country-hosted event, Australia: Knowledge exchange: services and science supporting climate action.

Country-hosted event, Canada Session 3: Enhancing Platform Impact: The power of in-person connections and diversification.

Country-hosted event, Canada Session 2: A Diversity of Needs, A Diversity of Platforms: Linking Platforms to Facilitate Users' Adaptation Journeys.

Includes examples (ppt slides) from an individual platform/organisation perspective:

- CCCS/OURANOS (Canada): The Canadian Approach to Climate & Adaptation Services
- KPSA (Netherlands): Linking platforms to facilitate users' adaptation journeys. Experiences from operating the Dutch platform.
- SEI: The PLACARD Connectivity Hub.
- Royal Roads University (Canada): Resilience by Design Lab.

Country-hosted event, Japan Day 2: Exploring the Value of Linking International and National Platforms to Enhance Action, Including in the Asia-Pacific Region.

Topic 6: Retaining relevance of CAPs in a fast-moving world

Description of topic

This topic focuses on how platforms continuously renew their content and functionality to meet evolving user needs and capabilities within an ever-changing world in terms of technology, data availability, policy requirements and knowledge provision. This includes establishing processes and mechanisms that allow for, prioritise, and enable the tailoring and updating of tools, resources and content in response to evolving policy, practice and science. Also important is how to leverage and build on the work of others to introduce improvements and innovations that continue to meet user needs and that facilitate the provision of new and updated data and information.

Adopted practices

CAPs are adopting a wide range of approaches to understanding changing requirements and capabilities as users progress through the adaptation cycle – from understanding to planning, implementation and monitoring. They are also working hard to ensure that information contained on platforms is up-to-date and in accordance with the latest advances in science and policy. CAPs must be sufficiently agile to be able to respond to the needs of both existing and new users, assimilate the increasing amounts of information and data available, and adapt to take advantage of rapid advances in technology.

People want to trust and have confidence in using CAPs so platform teams must be able to demonstrate to users that they offer credible and up-to-date data and information and that the platforms are evolving appropriately. There are many approaches being adopted including a move by some platforms towards a more service-oriented approach to better meet the increasing diversity of users, the greater use of integrated links to other sources of specialist information and recognising the value of the flow of information as a means of helping users understand its development, limitations and potential applications.

Adapting to evolving user requirements

To better understand and meet changing users' requirements and capabilities and to inform the updating of information and tools contained on platforms, CAPs are taking a range of actions:

- Engaging directly with users at meetings, workshops and forums and through surveys to understand evolving user requirements. For example, Climate Ireland hosted an International Climate Adaptation Platforms Meeting which have involved representatives from a wide range of CAPs and a user group consisting of local and sectoral adaptation practitioners. The user group listed their expectations of what a CAP should provide in terms of functionality, data and tools which were then assessed against the information provided by each participating platform and areas of improvement identified.

- CAPs are working directly with adaptation practitioners and users, through training workshops and capacity building events, to understand how information and tools contained on CAPs are being used, and to obtain feedback and recommendations to inform further development. Increasingly, users are looking for additional information to support risk assessments, for example, the social, environmental and economic consequences of climate change. To meet this challenge, CAPs can potentially link to additional sources of information, but this also raises the more general issue of clarifying the scope of a platform and the boundaries to information provision.
- Participation in national and international research projects and networks is another way CAPs are developing a more comprehensive understanding of the range of information and tools available that can be provided through CAPs and a better appreciation of evolving user requirements.

Updating functionality and content

Up-to-date information and efficient user interfaces are key to maintaining users' trust and their ability to use a platform effectively. In order to ensure that information and tools contained on platforms are updated according to advances in science and in line with user requirements and capabilities, CAPs are undertaking a range of actions:

- A number of CAPs are putting in place review processes and procedures to ensure regular and systematic updating of materials. These include establishing working groups, steering groups and committees to support the prioritisation of the work including decisions on whether information should be archived, renewed or maintained. Updating functionality is equally as important as users are increasingly expecting the implementation of latest industry-standard IT and interfaces to ensure they can find and access information easily.
- CAPs are integrating flexibility in platform design and architecture which allows for information to be updated quickly and routinely, and out-of-date information to be removed.
- Maintaining the flow of information is important; deleting information can sever links and risk losing the story behind the development. This links with the issue of transparency and the need to communicate details of the updates being planned and completed, how and why. Many CAPs invite contributions from external partners to develop articles and contribute to discussion forums. Platforms also integrate news feeds to help disseminate latest information.

Updating information meet differing and changing user requirements and capacities

CAPs are working to disaggregate and manage the wide range of user requirements in a way that allows them to understand, address and update the information required:

- Many platforms use sector and / or target groups to keep in contact with users and to co-develop new information. Nearly all have targeted newsletters and help desks to maintain links with users whilst others have developed different entry points or linked platforms to help meet the specific needs of users at different stages of the adaptation cycle and with differing capabilities.

- Quality control is an issue especially when adopting interactive approaches (e.g., online editing tools which allow users to upload new information and edit existing information (which also enhances the ownership and usability of platforms)). There is a need to define and adopt criteria to maintain the quality of information available on a platform, and to seek a balance between allowing many users to contribute whilst ensuring an appropriate level of quality is achieved. Lessons are being learnt from the work of data portals which tend to be more advanced with respect to formal quality control procedures.
- As users need to know what is available and when, updating and tailoring of information links to the value of investing in appropriate and timely communications with users with a focus on appropriate (plain) language and including explanations of how and why changes are being implemented.

Selected Innovations

CAPs are taking a number of actions including:

- Establishing dedicated working groups. To support the redevelopment of the climateguide.fi (Finland), a renewal working group has been established with representatives from research institutions and government ministries. This working group plays a key role in helping to systematically evaluate and update content and to advise on priority actions. To support the development of the CCAP (Canada), an intricate governance structure has been established to support the development and renewal of the content and functionality of the platform. As part of this governance structure, dedicated committees have been established to oversee and develop the various components of the platform. They include a data working group, a product working group, sectoral module working groups, a project management working group, an outreach working group, an agreement advisory group, and a training sub-group.
- Establishing quality assurance processes. CAPs are establishing updating mechanisms to guarantee the regular and systematic updating of information and data. For example, all information contained on Climate-ADAPT (EU) is detailed in a database which reflects the main structure of the platform and the Climate-ADAPT webpages. In this matrix, each webpage has associated parameters: frequency of updating, estimation of effort needed, experts responsible of the webpage contents, and workflow (from inception to review and the adoption of the webpages text, contents and other elements). This approach supports the on-going prioritisation and updating of information.
- Engaging with the wider discourse on CAPs. By engaging with international policy and practice, CAS (Netherlands) is developing an understanding of the full range of support being made available through CAPs to inform adaptation planning. On this basis, they are anticipating the needs of their users and working proactively to ensure their ability to meet potential future requirements.
- AdapteCCa (Spain) enables users to establish their own user profile on the platform. From such a profile, users can incorporate additional resources and information into the platform and interact with the wider community.

- By working directly with users in the development of adaptation plans and strategies, CAPs including Climate Ireland, A-PLAT (Japan) and the Intact Centre (Canada) are gaining an operational understanding of user needs and capacities for adaptation planning which supports the prioritisation and development of content and functionality.
- By expanding its network to include private sectors and academics from diverse research backgrounds, TCCIP (Taiwan) has provided a forum that enables these engaged experts to share their innovative adaptation experience and research insights. The aim is to enhance the opportunities to inspire more actions by their target audiences.

Shared challenges

Retaining relevance is challenging for CAPs and particularly as users progress along their adaptation journeys. Resources available within CAPs are often limited and there remains a tension between the increasing pace of information generation and the need to provide content that remains up-to-date and relevant. Many CAPs focus on a wide range of users and keeping platforms relevant with content suitable for a broad range of users is challenging.

Co-design and co-development are concepts that are not well understood and differentially applied across existing platforms. Particularly challenging is enhancing the willingness and ability of both users and platform teams to invest time and effort throughout the product and service development process and in the broader development of the associated platform (e.g., governance), considering the various operational constraints for users, developers and funders.

Understanding user requirements and updating information contained on platforms to reflect evolving user needs are challenging in terms of financial and IT resourcing. For the latter, resources are required for both updating the platform according to information requirements but also in relation to technological development and needs (e.g., the provision of responsive platforms accessible both on desktop and mobile devices).

Keeping platform teams up to date with new approaches, technologies and methods to present information coherently, robustly and in a user-friendly format is challenging.

Overall, there is a clear recognition that user engagement is critical in terms of retaining relevance, particularly in terms of considering, reflecting on and communicating users' journey when designing, developing, and subsequently evaluating platform content and functionalities. Such engagement stimulates 'user pull' for such platforms and the products and services they provide. Growing this pull through targeted engagement helps develop demand and build user capability and trust, but also provides opportunities to better articulate and demonstrate the value of any investment in the platform.

KE4CAP resources: Topic 6

VKE3: Ensuring platforms' agility in order to meet evolving user needs.

Including examples from an individual platform perspective: Climate Ireland: Ensuring platforms' agility in order to meet evolving user needs.

Country-hosted event, Canada Session 4: From knowledge to action: Exploring approaches to integrating identified user needs into platform offerings.

Including examples (ppt) from an individual platform/organisation perspective:

- Climate Ireland: User Orientated Adaptation Platforms.
- KLiVO (Germany): German Climate Preparedness Portal and networking approach.
- Copernicus: How the Copernicus Climate Change Service Addresses User Needs.
- Swiss National Centre for Climate: A network agent and knowledge broker for climate services.
- CCCS (Canada): Fostering user-driven climate services: An agile approach to addressing user needs.

KE4CAP contributed to an Adaptation Futures 2020 pre-conference webinar on 'Adaptation decision-support tools and platforms'. Hosted by Roger Street and Jean Palutikof, the webinar (see the recording) included relevant presentations from:

- Australia: Knowledge provision for adaptation - matching delivery to need: some examples from Australia (starts at 22.55 mins).
- Philippines: eCCET Helper: Bridging the gap between knowledge production and use (starts at 42.24 mins).
- India: Building bridges for knowledge and action on climate change adaptation in India: Insights from national & sub-national levels (starts at 1.15.20 mins).

Topic 7: Integration and coherence across CAPs

Description of topic

This topic focuses on how platforms can realise and enhance inter-platform, transnational and trans-regional cooperation. This includes advancing content coherence, data and information sharing, and technical interoperability (operational models, standards, technology) across platforms supporting similar users. It also includes defining relative roles and means for cooperating and interfacing between e.g., different government bodies and sectoral platforms, and what governance structures and arrangements are needed to support coherence across platforms.

Within KE4CAP, integration across regional networks was often discussed in depth, as both the EU and Asia-Pacific regions were well represented and regarded as inspiring cases.

Integration across platforms is appealing to those managing CAPs for several reasons:

- Increasing impact. Joint efforts, jointly developed bodies of knowledge, joint publications etc. can have significantly more impact than working individually.
- Transcending boundaries. Partnerships at the regional level are an opportunity to transcend boundaries to more effectively address common climate change adaptation challenges. Climate change does not respect borders.
- Mutual learning. Linking platforms within a region enables new developers and those with less mature platforms to advance rapidly based on shared experiences and lessons learnt from other more mature or experienced platforms, including understanding possible pitfalls.
- Economies of scale. By leveraging capacities within a network, new platforms do not need to invest in resources already developed by other platforms. Linking across platforms can also enhance technical capacity such as downscaling, which is especially important for e.g., smaller and island countries in the Asia-Pacific region. Innovative approaches introduced by new developers can also accelerate adaptation action within a region. Overall, joint efforts and strengthened connections can help to avoid unnecessary duplication and reduce transactional costs.
- Consolidation, validation and innovation. Networking of platforms can provide opportunities to consolidate and integrate existing data, information, and approaches. Experiences, data and findings can also be validated between platforms. By doing so, new agenda for research and innovation can emerge against a background of a growing body of joint knowledge, for instance towards more robust standardisation. Integrative platforms can also help to overcome the challenges of continuity and sustainability of information in a world of projects that come and go.
- Building an identity. In regions, working together, both formally and informally, to build a network of platforms can help address regionally specific issues. It also helps enhance internal capacity and skills and can extend the use of platforms to those countries in the region without a dedicated CAP of their own.

Networks of people are critical to establishing platform connections. This is especially true for connections between regions and scales. Networks of people also underlie efforts to standardise information, further deepening connections across platforms.

Adopted practices

Enhancing integration and coherence takes place in various directions. Firstly, there is the vertical integration, for instance through connecting national platforms to international platforms, such as Climate-ADAPT (EU), AP-PLAT (Asia-Pacific), and CAPA (Alps). There are also examples of connecting national platforms to local platforms domestically (e.g., within the Netherlands).

Secondly, there is horizontal integration, when integration across societal sectors takes place, for instance when a connection is established with knowledge infrastructure for health (CCCA, Canada). Similarly, Climate-ADAPT has also worked with a variety of sectors to provide specific information and links to inform policy with the EU. Canada has established an adaptation platform which brings together the Canadian adaptation community in a broad sense, but also connects to the local level. In the Asia-Pacific region, the INDRA-Pacific platform has been established, building on current work in Australia and aiming at connections with the private sector across the region, particularly the financial sector.

Thirdly, we see examples of deliberate content integration across data and tools which is at the heart of many CAPs. This integration can take shape through incorporating certain data and tools into the platform (RCCAP, Asia-Pacific; KPSA, Netherlands) or by providing a directory for links to various external libraries and datasets. The latter, with the platform having the ambition of being a single-entry point or hub (Adapt2Climate, Belgium; climateguide.fi, Finland; Intact Centre, Canada; Sweden) appears to be a common denominator for many CAPs.

These various forms of integration and coherence are often established through personal and organisational connections and alliances within and between platforms.

Selected innovations

Innovation in enhancing integration and coherence is not an easy thing to do. KPSA (Netherlands), provides an example of how to establish both vertical (national, regional and local platform) and horizontal (multisector approach, inter-ministerial) alignment and content integration (incorporation of the national climate impact atlas). This integration has been enhanced as CAS manages the national platform, the atlas and some regional and local platforms so has been able to synchronise data across levels, offer similar entry levels and apply consistent use of language and idiom, etc.

In addition to A-PLAT (Japan), NIES also manages A-PLAT Lab, which is a closed online platform to communicate with local officials and for information and knowledge sharing using well-known tools such as ArcGIS which allow for the sharing of data with the internal systems of the local policymakers.

A new feature on the Climate-ADAPT (EU) platform is the European Climate Data Explorer; a graphical user interface that provides interactive access to many climate indices from the Climate Data Store of the EU Copernicus Climate Change Service.

By doing so, it makes a broad range of relevant climate data and information freely available to policymakers and other stakeholders without the need for technical expertise required to navigate the data store. Climate-ADAPT also has links to projects within the large EU Interreg programme which promotes cross-border and transnational cooperation, and incorporates features to encourage the exchange of information across the region e.g., newsletters, online events etc.

In the Philippines, a new suite of platforms is being developed and the issue of interoperability has been at the forefront of development. All three platforms (climate knowledge portal, the eCCET helper for risk-based approaches, and Project Upturn for adaptation solutions) will be fully integrated and internally consistent, and such learning is being used to inform possible regional collaborations.

Various projects on WeADAPT (a collaborative platform on climate change adaptation issues run by SEI) have experimented with standardisation of data in order to enable data sharing across websites, building on recent advances in using artificial intelligence (e.g., chat bots) to help users find what they need.

CCCS (Canada) has a Regional Coordinating Committee which convenes the five regional platforms in Canada on a monthly basis to share good practices, coordinate and align efforts, help standardise outputs, share resources and avoid duplication.

In the Netherlands the national climate impact atlas is used to develop subsidiary custom-made platforms, such as for the government task organisation for maintenance of the national rail network. By building on the central impact atlas, the information remains internally consistent with that used in other Dutch platforms.

Shared challenges

The need for enhancing integration and coherence across CAPs is expected to increase as our world becomes a world of digital platforms. Looking forward, the capacity and resources needed to keep up with all the latest technological developments and, above all, to establish effective connections is generally acknowledged to be a major challenge.

The overarching coordination of the integration process can be easily overlooked in terms of importance and required capacity. Comprehensively evaluating datasets for instance is very time consuming. Most platforms are managed by different institutions and agencies, and the value of integration and coherence may not be equal between parties. A coordinated and collaborative approach to ensuring everyone receives maximum benefit is needed. An associated challenge relates to defining the roles: the crossover of roles is intrinsic and agreeing a robust framework to support this crossover whilst maintaining individual responsibilities is not easy.

One of the major barriers to integrating platforms is the diversity in the levels of development, national interests, policies, cultures, and languages e.g., in the Asia-Pacific region, in Europe and even within some countries such as Canada. Within the knowledge domain network, relationships are generally easily established, but new governance arrangements are often required to facilitate the integration of platforms. This imposes formal burdens that need to be overcome, putting aside political, cultural and geographical differences.

When integrating platforms, the diverse range of users must remain at the forefront. There should always be a need to ensure that all participants are engaged and are benefiting from the proposed integrative efforts, such as a regional-level knowledge-sharing process.

On specifics, data interoperability is currently a barrier to enhanced platform connections but also presents enormous opportunities to maximise outcomes given the quantity data currently available. Similarly, taxonomy standardisation and the lack thereof is a barrier to platform connectivity. In addition, the different uses of key terms across platforms, for example, in tagging content, can prevent users from accessing relevant information.

Integrating platforms for the sake of it needs to be avoided. At the same time the sustainability of platforms is pivotal, with time-limited project-based platforms often turning into 'storage systems' with the loss of the information involved. Integration requires ongoing management to ensure services remain fit-for-purpose and that tools and databases can be supported for a reasonable duration.

Integration with platforms in other domains is being considered particularly by linking to climate mitigation resources and working toward holistic 'climate action' platforms.

KE4CAP resources: Topic 7

Country-hosted event, Japan (Day 2): Exploring the value of linking international and national platforms to enhance action, including in the Asia-Pacific Region.

Includes examples from an individual platform/organisation perspective:

- A-PLAT/AP-PLAT (Japan): Introduction to A-PLAT and AP-PLAT.
- PCCC (Pacific): Introducing the Pacific Climate Change Portal.
- TCCIP (Taiwan): Taiwan climate change projection information and adaptation platform: An integrated climate change platform.
- Philippines: Sites for co-production and collective climate action: CAPs for regional adaptation.
- CSIRO (Australia): A platform-based approach to delivering climate intelligence at scale for informing risk & resilience in the western tropical Pacific.
- South Korea: Model of integrated impact and vulnerability evaluation of climate change (MOTIVE).

Country-hosted event, Canada Session 2: A diversity of needs, a diversity of platforms: linking platforms to facilitate users' adaptation journeys.

Includes examples (ppt slides) from an individual platform/organisation perspective:

- CCCS/OURANOS (Canada): The Canadian Approach to Climate & Adaptation Services
- KPSA (Netherlands): Linking platforms to facilitate users' adaptation journeys. Experiences from operating the Dutch platform.
- SEI: The PLACARD Connectivity Hub.
- Royal Roads University (Canada): Resilience by Design Lab.

Topic 8: Business models and value propositions for financing CAPs

Description of topic

This topic focuses on how an agreed value proposition and business model for a platform is developed and refined to gain buy-in and funding. This includes how to establish, communicate and evaluate a business model, how to enable innovations in the model, including adapting it for different stages of platform development, and what alternative models exist and how their use could benefit the platform. It also includes how to manage intellectual property and other commercial and vested interests versus enhancing public value, and how to build an understanding of the market for a platform including identifying the target audiences and other, potentially competing, providers.

Adopted practices

An effective value proposition needs to be appropriately framed to both inform and drive action. Such a framing should reflect the value arising from linking and consolidating existing initiatives and investments and enabling the integration of improvements at all levels across multiple sectors. It is also recognised that who puts forward the value proposition can be critical to its success due to implications for its legitimacy and credibility. The ideal situation would be one in which those making the case for CAPs and the products and services they provide should be the intended users.

In making the case, value often includes on-going and trusted decision support through ready access to appropriate information and knowledge needed to inform climate action. A key point relates to the scope of the effort and resources required to achieve the desired value proposition. However, it is possible even with limited resources to make progress towards a vision through a strategically targeted and phased approach and by nurturing, building and demonstrating support for these initial efforts by engaging early and working with intended users.

CAPs are currently taking a number of approaches with respect to business models and funding:

- Securing core funding and public-private partnerships: Traditionally, CAPs have been funded through project-based public funding. New business models are emerging where core funding is provided by national governments and relates to the update and maintenance of CAPs while public private partnerships allow for the further development of tools and services. For example, core funding of the CCCS (Canada) is provided federally and on an eleven-year basis. Through partnerships with public and private partners, further development of CCCS products and services is undertaken. Similarly, TCCIP (Taiwan) and others are also working actively with the private sector to develop tailored products e.g., to support financial disclosures.
- CAPs are demonstrating their value by embedding themselves within the wider adaptation process. At the transnational scale, CAPA (Alps) aims to better position itself within the wider EU Strategy for the Alpine Region by acting as a cross-sectoral knowledge broker.

At the national scale, the National Climate Change Adaptation Platform for Austria has explicitly linked to the national adaptation policy process and ensured funding from federal bodies. Climate Ireland has successfully positioned itself within Ireland's National Adaptation Framework as a key resource supporting adaptation decision-making at local and sectoral levels. And platforms across Australia are developing a coherent value proposition aimed at providing a streamlined and sustainable national climate service capability with the emphasis on service provision to support users on their journey towards achieving a well-adapting and climate resilient country.

- CAPs are defining and refining their value proposition in the context of the existing climate services landscape. The UK CRP aims to position itself within the national climate services landscape to demonstrate the role and effectiveness of adaptation platforms and underpinning research as part of the wider climate services agenda.

In understanding the various approaches currently being taken, successful business models should consider:

- The need to be flexible so that the business model can enable the development of strategic alliances with critical sector organisations and consultancies that can offer intelligence, capabilities and capacity from their respective sectors to scope and create new opportunities. Such an approach recognises that the landscape is constantly evolving but provides an opportunity to start with something achievable.
- The need to consider what a model should look like to support evolving expectations and associated transitions, and how it might evolve towards improving efficiency and enhancing capacity across engaged and targeted user communities.

Selected innovations

A number of success stories have been highlighted particularly in relation to embedding CAPs within the wider adaptation process to help secure core funding arrangements.

Through a variety of public-private partnerships, CAPs are expanding their reach and engaging in co-development of information and tools with specific end user groups. An example of such a value proposition is that by the CCCS (Canada). Regional hubs that work with the Canadian provinces have been created, that provide their own resources and work to increase local capacity. In order to develop an appropriate platform, the CCCS entered into a partnership with a private organisation that is the main 'host' and operator of the climate information portal, resulting in an effective private-public partnership model.

In Australia, there has been considerable interest from the finance and investment sector in addressing its climate risks and reporting requirements and this has translated into a willingness within that sector to be engaged in future platform development. Possible public-private business models are being considered along with partnership work to enhance the value of collaborative platform activities.

Shared challenges

Key challenges include identifying the most appropriate business models and considering how best to stimulate and enable innovations in these models consistent with the existing and evolving needs and capabilities of users and the platform.

The expressed need is for business models that support a platform and its associated services and products, and that facilitate access to funds to support the core infrastructure and sciences on which it relies.

In addition, despite its recognised importance, most CAPs do not have an agreed value proposition that communicates its added value in terms of benefits towards informing and inspiring actions. Such a proposition could include identifying the costs and benefits of climate risk with and without adaptation and more generally without the knowledge, information and supportive resources available within the platform.

Defining a value proposition and associated business models for CAPs is tricky particularly for the long term where there is a requirement to not only ensure the maintenance and upkeep of the platform but also to anticipate future trends and activities in relation to evolving user requirements, available information, changing policies and technology development. For the most part, CAPs are funded publicly and on a project basis, so the short-term nature of the funding is a significant challenge in terms of ensuring continuity and developing longer term business models. Moreover, the short-term nature of funding means that significant efforts need to be repeatedly targeted at securing the next round of funding rather than focusing on, for example, platform development. In the absence of a long-term development strategy, garnering stakeholder buy-in and support is difficult while resource constraints often mean that platforms must prioritise specific areas of development in the context of short-term achievements rather than as part of a longer-term strategic plan – project funders often prefer to fund new features and tools rather than update the basic operation and maintenance of the platform.

It is also clear that what is needed is a double-sided value proposition that has legitimacy and weight within both the science and user communities, and which includes recognition of the net benefits of both science-based evidence and of policy and practical actions. This double-sided nature suggests that an effective value proposition should be co-established between providers and the targeted users. This could potentially lead to multiple but interlinked versions of the value proposition each targeting different user communities.

A related aspect is that of CAPs potentially providing a consultancy service. Many local authorities and other businesses and organisations hire consultants to help develop and inform their adaptation strategies and plans, often using data and information available on CAPs. This can be problematic if consultancy firms do not have the depth of knowledge to provide high quality advice and can cause tension if consultants are using information freely available on a platform, and then charging for their services, but without adding any value to the product being used. One financial model could be the development of a consultancy service as part of the platform, with fees for services provided going towards supporting the platform.

KE4CAP resources: Topic 8

> Country-hosted event, Australia: Services and science supporting climate action.
>
> A full report from this event from a knowledge exchange and learning perspective is available.

Topic 9: Quality assurance, credibility and usability of CAPs

Description of topic

This topic focuses on the development of standardised procedures for quality assurance that help ensure the relevance, usability, and legitimacy of the content hosted on a platform. This includes how to evaluate the quality of source data and knowledge, how to ensure credibility, transparency, legitimacy and pedigree, and understanding user needs, capacities, use journeys, values and perceptions. It also includes the development and adoption of shared and high-level standards for knowledge management and data stewardship (for example those developed by the International Organization for Standardization, and for FAIR – findable, accessible, interoperable, and reusable – data).

Adopted practices

As CAPs develop, the issue of quality assurance is of increasing interest to both developers and users, as well as to existing and potential funders. The more mature and complex the platform, the more important it is to ensure the continued relevance, usability, and legitimacy of all the content and the user-friendliness and accessibility of that content. This does not suggest that QA/QC regarding credibility and usability is not a concern for those developing new platforms; addressing these issues from the beginning is critical and will help grow capacity within the team to deal with the evolving complexity as the platform and its users mature.

In the context of QA/QC, most platform providers make use of steering groups (Climate Ireland), advisory panels, user groups (KPSA, Netherlands), and experts or peers (climateguide.fi, Finland; T-PLAT, Thailand). These bodies are seen as legitimate components of the platform governance structure. In addition, CCCS (Canada) has established a specific sub-committee within their governance structure dedicated to quality assurance, helping to ensure the credibility and usability of the data and products hosted on the platform.

For decisions on a more daily basis some platform providers rely explicitly on their own internal routines and expertise (KPSA, Netherlands; CCCS, Canada; Climate-ADAPT, EU). Only a few seem to have a dedicated quality assurance process with criteria in place (KLiVO, Germany; CAPA, Alps; CCCS, Canada), although others mention the ambition to develop such. Working with climate data also implies that platform providers place a certain trust in data providers.

Selected innovations

CAPA (Alps) has established a standard operational procedure for reviewing and editing new content proposed for publication on the platform. This includes direct communication with the external authors, comprehensive and clear criteria for the selection of relevant resources, and the provision of online, step-by-step guidance for external editors.

Requiring users to register with their email address when downloading data provides an opportunity to contact them if data is updated or there appears to be an error in the data set (CCCS, Canada).

Shared challenges

Evaluating and improving quality assurance processes requires investing up-front and establishing and sustaining the capacity and capability to deliver on-going improvements based on the results of those processes. Sufficient capacity is a key issue as considerable expertise and engagement of an agreed explicit stream within the governance structure are critical to establish the basis for, and to respond to the results of, an evaluation of QA/QC processes. Such processes are also essential to developing an effective business model but can be challenged due to the lack of an agreed set of benchmarks and an understanding of the required metrics (beyond web statistics).

There is a clear recognition that user engagement is critical, particularly in terms of defining and developing standards and QA/QC approaches as lack of such standards and approaches can limit acceptance of outputs by industry and regulators. Such engagement promotes transparency, comparability, traceability, and credibility thereby building trust and stimulating 'user pull' for the products and services being provided. It has also been suggested that evaluation could be user-led and independent and may also need to be sector-specific. Maintaining an effective level of engagement at all stages of platform development can be a further challenge, including appropriate representation that engages both existing and new users.

A further challenge is related to making available data and information that is owned by others. This can pose restrictions as to the extent quality checks can be applied and often requires reliance on the providers for quality assurance. Another challenge related to quality assurance being beyond the control of the platform provider is in dealing with updates in an external product developed with project-based (research) funding after that original funding has ceased.

One practical challenge is the need to act when certain digital tags are no longer valid, have been changed or do not include a new sector or area of interest that has been added. These create gaps and inconsistencies within content and can lead to reduced user confidence. In such cases, effort is needed to ensure that all content and database items are up-to-date and coherently described.

Topic 10: Platform architecture and technical development

Description of topic

This topic focuses on how CAP teams approach the design and development of their respective CAP, including possible modular development, co-development approaches, and adopting user friendly design and information architecture. It also includes consideration of technology for integrating and visualising different types of data and information, technology for dynamic integration with other platforms, managing heterogeneous and incomplete data, developing interactive and 'smart' features to support users, and assessing the advantages and disadvantages of different operating systems.

Adopted practices

User testing and co-design/co-production approaches

Platforms commonly take a user-centric, iterative approach to platform design to make the platform as user-friendly to use as possible. User-friendly design "ensures that users can intuitively navigate the platform, easily explore and find the information they are looking for, quickly understand the information they find, and apply the information in decision-making" (ClimateData.ca, Canada). This includes employing case studies to guide development and user testing to ensure the technical architecture and features are fit for purpose and acceptable to users. For example, the new version of CCiA (Australia) is using iterative user acceptance testing of menus, information flow, tools, pages and content to direct the design of the platform. For ClimateData.ca, users have been brought in at various stages to gather feedback and make improvements. This includes for early gathering and analysis of user needs following targeted user engagement, testing and validation of the initial web design, and periodic / opportunistic focused consultations to inform enhancements. The user testing is carried out in different ways, for example in user workshops and via online surveys.

As well as testing for usability, Climate Ireland has employed user testing to assess the value of improvements by applying the same user testing methodology to existing and new versions of the platform to allow for comparative analysis.

As for other topics, collaborative development and co-design / co-development approaches are widely considered as highly valuable for developing platforms that are both useful and used. For example, TCCIP (Taiwan) utilises a co-development mechanism with users and technical experts to develop optimal data display layout and web interfaces while the PCCS (Asia-Pacific) platform cites trusted, highly interactive and collaborative partnerships as central to achieving a high volume of users.

Technical design features

Platforms contain various functionality and features to meet the needs of their audience.

The ability to perform quick and accurate (and in some cases faceted and 'smart') searches is widely considered important to ensure users find what they need quickly. In the Intact Centre (Canada) platform, 'smart' features, based on the user's input into programs, are utilised "to ensure all outputs from online tools, courses and feedback forms deliver results that are relevant, to the point and not redundant".

In addition to straight searches most platforms allow users to browse content by characteristics such as theme or sector, enabling users to take different pathways through the content. Many platforms also use map-based visualisations to allow users to search content by geographical location. Some platforms allow users to earmark content for later reference, for example CAPA (Alps) allows registered users "to compile, edit and manage their own individual collections of items in their personalised workspace".

The CCCS (Canada) employs a modular design based on "the development of separate and individual entities (tools, functions, information / data) that, once all combined, provides a wholesome experience and comprehensive information to users to help them adapt". An example of this is the integration of sectorial modules within the platform, each of which is designed to meet the needs of particular users with specific data, information and knowledge products.

Some platforms contain entry points tailored for different needs. For example, A-PLAT (Japan) has different entry-points for different audiences (e.g., local government, school children) to ensure that the information and experience provided are tailored to meet their needs.

Most platforms are purpose-built but some use existing software and customise it to meet their needs. For example, CCAP (Canada) uses IGLOO and has worked with the company to customise the platform to suit the needs of the CCAP secretariat and platform members.

Compatibility with operating systems, widely used internet browsers and various devices ensure that users can access the platforms smoothly regardless of their choice of device.

Diverse content types

Most platforms contain diverse types of data and information, and diverse ways of visualising this information. CCCS (Canada) contains content including observations, projections, climate variables and indices, and employs different visualisation methods including maps, graphs / charts, analysis tools and data layering to visualise this data. Others contain large datasets of visual information. For example, AdapteCCa (Spain) hosts an image bank of adaptation to climate change with more than 300 photographs on impacts, vulnerability and adaptation to climate change in Spain.

The use of data visualisations is a particular focus for several platforms to help support knowledge brokering and translation.

Platform integration and interoperability

The issues of integration and interoperability are becoming increasingly important as they can add significant value. For example, a collaboration between AdapteCCa (Spain) and Climate-ADAPT (EU) has enabled AdapteCCa to share a module of practical cases containing more than 30 real experiences of adaptation to climate change implemented in different places in Spain alongside practical cases developed in Europe. Platforms such as TCCIP (Taiwan) are also developing and sharing APIs to enable the dynamic incorporation of their services within other technical programs.

Looking at integrating across regions, platforms within the Asia-Pacific region are currently considering possible approaches to future networking, underpinned by common technical developments, with the aim of consolidating and integrating existing data, information and approaches to make them more widely accessible and understandable while avoiding duplication.

Digital versus in-person knowledge exchange

There is also an emerging issue for the technical development of platforms which relates to approaches being taken to help balance in-person and digital offerings. Digital platforms can act as barriers for communities with poor (or expensive) IT infrastructure and connectivity or for those users not used to working with such online portals, yet teams are now looking at ways to better design their platforms to incorporate new and diverse method of communications and to support hybrid approaches to delivering knowledge. Examples include promoting safe online spaces for small group discussions, focusing digital discussions via social media using messaging, tweets, etc. and working closely with communities to understand how their capacity to engage with digital information can be better met through directed platform development.

Selected innovations

The ‘smart’ features used by the Intact Centre (Canada) to actively tailor the content being provided to the user according to their input to the platform is a valuable innovation and one that can really improve users’ experience and thus uptake of information from the platform.

CSIRO Australia have recently worked with partners across the western tropical Pacific to develop INDRA Pacific, a digital platform which aims to deliver climate intelligence at scale across the region. Its regional approach has required complex technological approaches to accessing and visualising geospatial climate data. The platform developers have also spent a lot of time talking to users as to what they need in terms of functionality and utility in tailored applications for their diverse needs. With respect to platform architecture, a modular approach with open-source elements was deliberately adopted to allow aspects of it to be customised and used by others when developing their own applications, and also to potentially foster efficient integration across platforms.

The Philippines is developing a new suite of three interconnected platforms, and advancing the technical functionality required to ensure interoperability has been a priority throughout. All three platforms will be fully integrated and internally consistent so users can move seamlessly from one to the other.

Technical development is also supporting integration with data and tools available elsewhere. The new European Climate Data Explorer within the Climate-ADAPT (EU) platform is a graphical user interface that provides interactive access to climate data from the EU Copernicus Climate Change Service, thus linking directly to resources available beyond the CAP.

Shared challenges

In terms of understanding and meeting user needs, a key challenge is allowing sufficient time and resources at suitable stages in the development of platforms to carry out a useful level of user consultation and testing, including identifying representative cohorts of users, and identifying and implementing revisions and updates. Understanding what developments and information are useful, understandable and effective is crucial as is ensuring that all relevant content is easily findable by users. Increasingly, there is also a need to take account of diverse user needs and, in particular, specialised needs that are maybe not central to the core platform offering.

On technical developments, platforms are becoming increasingly sophisticated, but challenges remain in terms of:

- Maintaining easy to navigate architecture while increasing content.
- Developing and integrating interactive functionality such as comments sections that help support two-way knowledge sharing.
- Using technology to retain relevance and enhance engagement (e.g., new viewers and scripts).
- Enhancing accessibility (video captioning, screen readers, news feed etc.).
- Developing built-in capacity for data visualisation and data analytics.
- Agreeing on the scope and framing for the development of different sections of the platform to help ensure maximum accessibility for as much of the target audience(s) as possible.
- Keeping pace and learning from technical design and technologies used on other platforms, and which users have come to expect.
- Finding better ways of linking across platforms with different technical capabilities and functionality.
- Innovating in new areas, such as AI, Big Data, machine learning.

It was also noted that building staff capacity and employing IT experts to maintain, improve and modify the technical aspects of a platform as they become increasingly complex must remain a priority.

Topic 11: Governance of CAPs

Description of topic

Governance is the process of decision-making and implementation. For CAPs, it normally involves a range of actors including government, non-governmental organisations, industry, communities and academia. As such, this topic focuses on how to use different structures, mechanisms and relationships to ensure that governance reflects the prevailing and evolving environment (policy, practice and science) and thereby supports the strategic and operational management of a platform. This includes how to make decisions on, and prioritise, content, technologies and related innovations, how to develop relationships with other entities, how to go about resourcing and financing a platform, and how to engage with users, research and policy communities (including what roles they play in the operation and development of the platform). This has ramifications for who decides how and why a platform is impactful, how it is updated and maintained, and what influence it has on what processes.

Adopted practices

Many platforms are managed by government department or agencies supported by working groups which focus on specific aspects of the platform and a coordination team responsible for day-to-day delivery.

'Advisory groups / steering committees / program boards' provide oversight, strategic direction and, in many cases, links to policy and user requirements. They also provide advice and recommendations on the work programme and guidance on priority actions related to further development of the platform. Their value is greatly enhanced if members are able to act as champions for the platform, including in the context of increasing the legitimacy and credibility.

Supporting 'working groups / committees' tend to be focused on specific areas of interest to the platform and are usually responsible for developing content, coordinating with respective users and networks, enhancing synergies across national, regional and local activities, advising on engagement and communication, identifying gaps, innovations and new technologies, and considering new data and research. For larger, more complex platforms, there can be a number of working groups focused on different areas. As such, members provide a considerable breadth of experience and expertise when contributing to platform development and content and networking via such groups is seen as contributing to increasing the reach of a platform.

Day-to-day implementation of platforms in terms of content, IT, dissemination and reporting is usually carried out by a small, dedicated 'core team / coordination unit / secretariat'. Such teams (usually 2-5 people) are responsible for the regular management and maintenance of platforms, the updating of content and functionality, responding to requests for information, monitoring use and reporting on progress. They provide a core focus and stability for the overall governance structure and support the outward-facing elements of a platform.

Within this generic, top-down approach, there are many variations specifically tailored to deliver individual platform requirements, remit, functioning and relationships. The governance structure may also vary somewhat depending on the financing arrangement (private, research-led, government-led). Within Europe, there are several platforms (Climate-ADAPT, EU; CAPA, Alps; UK CRP) that are supported, at least in part, by research funding from the European Commission and other funding agencies which bring additional governance and reporting requirements but also opportunities for wider engagement. But in all cases, an essential element of governance is leadership, both organisational leadership and overarching convening leadership that reflects the need to drive agreement on the development of the platform within the related policy, research and practice ecosystem.

The complexity of governance systems varies widely from, for example, a multilevel governance system used by the national platform in Austria (where the federal state system means the federal government, state governments and local authorities all have their own competences as regards legislation and execution), to a deliberately simple 2-tier approach adopted, for example, by T-PLAT (Thailand) as they seek to establish their new platform.

These governance structures have developed over time and need to be sufficiently flexible to allow for gradual changes as platforms and their roles evolve. Several of the more established platforms are now considering updating their governance structures. For example, climateguide.fi (Finland) are planning a renewal process which will include reviewing the governance and finance models as the platform moves towards more decentralised content production and greater engagement across organisations. They are also taking the opportunity to strengthen specific areas e.g., addressing multilingualism and the ongoing challenge of providing platforms in two official languages (Finnish and Swedish) and in English.

More broadly, in Australia work is on-going to scope the requirements for a coherent national climate service capability that brings together a supply side that is fragmented and uncoordinated (with a proliferation of platforms delivered by a variety of sources that have mixed credibility, relevance, quality assurance and utility) and a demand side that is seeking an increasingly broad range of products and services tailored to specific user needs. In terms of governance, a network approach is being explored that is more than a transactional activity but based on wider framing that considers the associated social architecture and is designed to be based on a participatory governance system involving users, providers and funders.

There is a need for governance structures to help drive engagement by enabling the development of closer ties with relevant players. This includes seeing these players having a role to play with respect to expectation management. The majority of platforms have particularly strong links with the research community, for example via membership on working groups, provision of funding for specific research projects tasked with generating new input and ideas, and through requirements for newly contracted research to make the outputs and datasets available on the platform.

Also, as platforms develop there is a recognised need for governance structures to facilitate the periodic review of content and use of the platform to ensure on-going performance meets stated aims and objectives. This aspect of governance includes issues related to establishing quality control, ensuring the flow of information, adopting criteria for updating information, etc.

Selected innovations

KLiVO (Germany) has developed a robust governance structure with the two responsible government agencies each bringing different expertise to the table (climate information and adaptation services). They work with an inter-ministerial working group which helps coordinate work across government and provides additional legitimacy for the platform. Both the German Environment Agency and the national Met. Office work with networks that support the platform, and the platform is also strengthened by a research and development project that generates new input and ideas.

A similar approach is used by AdapteCCa (Spain) for their climate change scenario viewer which has its own system of permanent updating and communication with users through a specific working group. This group involves the Spanish Climate Change Office, the Biodiversity Foundation, the State Meteorology Agency and the Spanish National Research Council who jointly make decisions on its development and respond to user queries. This approach ensures the viewer is a living tool that responds quickly to user needs.

To address the challenges to information architecture and information flow from the addition of new content, the CCiA (Australia) platform is adopting a modular approach that has the objective of making the site easily 'growable' within the overall framework. This approach will be strengthened by designating a production manager who will have editorial and content control for each module.

Both CCAP (Canada) and Adapt2Climate (Belgium) have stressed the added value achieved by giving ownership of activities to specific working groups that are part of the overall governance structure. The adoption of online approaches has facilitated this approach by allowing all members to contribute as appropriate to documents and discussion thus helping to ensure the on-going provision of up-to-date information.

Shared challenges

Good governance can be characterised as being participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable, and inclusive as well as being responsive to the present and future needs of society. Lack of appropriate governance can lead to platform content with mixed credibility, relevance, quality assurance and utility, as well as to the potential proliferation of fragmented and uncoordinated platforms delivered by a variety of sources. Governance may need to be periodically revisited as a result of the rapidly emerging demand for access to products and services tailored to an increasing variety of user needs and capabilities.

Addressing these challenges requires active and agile governance that supports and enables governance arrangements to evolve and recognises the need to deliberately and in a timely fashion elevate users within the governance structure. To inform this, mapping and engaging the diverse range of stakeholders (providers, purveyors, funders and users) would provide multiple benefits such as a clear and comprehensive understanding of current capabilities and activities at e.g., the national level. This understanding could then provide the basis for exploring how existing capabilities are, and could be better, linked. In addition, as new initiatives are considered, existing mapping would increase the likelihood of greater coherence, encourage synergy and avoid duplication of effort, thereby maximising the return on investment for such efforts.

Most governance structures are flexible to some degree, but the major on-going challenge for most platforms is how to develop a governance framework that ensures continuity and sustainability in a rapidly evolving world. Potentially disruptive transitions include abrupt changes to funding arrangements, the ending of collaborative partnerships, and the need to significantly augment governance structures to take account of a new or evolving delivery model (e.g., moving from a single portal to a network of platforms).

A lack of available resources (time, money, expertise) is also a common issue. As the audience for a platform grows, maintaining existing and developing new relationships requires considerable effort and resources. Expectations and demands from users are also increasing. Operationally, many platforms are run as projects with constraints in terms of project duration and available resources so the challenge is how to find an approach for securing resources across suitable timescales that allows platforms to continually develop and meet evolving needs.

In aiming to meet these user requirements several of the more established platforms in particular are now questioning how best to streamline increasingly complex governance structures. All the structures have a genuine purpose but administering and coordinating their work requires increasing administrative effort, and there is a need to balance input by members and participating organisations without impeding their ability to actually provide relevant services.

This links with the issue of how best to effectively expand governance structures when an ecosystem of linked platforms is being developed to help inform practitioners and decision-makers. This is happening in a number of countries and across regions as new platforms are being established e.g., at different geographic scales, to address particular sectoral concerns or to link adaptation action with related issues such as disaster risk reduction.

More broadly, several platforms are reflecting on the need to integrate and embed the knowledge, information and data they provide into the wider decision-making process. Whilst government departments and agencies are often involved in the governance of platforms and can bring much to the table, they need to be encouraged to recognise platforms as an integral part of the wider knowledge base to support adaptation policy development and action.

KE4CAP resources: Topic 11

> Country-hosted event, Australia: Services and science supporting climate action.
>
> A report from this event from a knowledge exchange and learning perspective is available.

Topic 12: Social justice and equity

Description of topic

This topic focuses on how to identify and give a voice to those who are not well heard or represented within the climate change adaptation arena, and how to work with those who are less engaged. This includes how to use platforms to enhance inclusivity and how to understand the needs and capacities of under-represented groups and the barriers that inhibit their ability to act. In particular, it includes facilitating access to knowledge for different and potentially overlooked user groups and promoting action to strengthen engagement recognising their values and shared and differentiated priorities.

Adopted practices

Adaptation tools and solutions tend to be more effective, culturally sensitive, and useful in the long-term when the social contexts and root causes of vulnerability are included in their design and implementation. To mainstream adaptation, social justice and equity must be brought to the fore with collaboration, communication and coordination between platform teams, policymakers, climate experts, indigenous partners and vulnerable communities all helping to ensure effective CAPs are developed. Yet expanding the integration of social equity in adaptation, including in CAPs, is challenging not least because of the lack of research highlighting the often-disproportionate impact of climate change on under-represented groups.

Social justice and equity are recognised by CAPs as aspects that need to be considered when designing and developing platforms, and when delivering and updating content and functionality. For some, these aspects are emerging as critical to their success (e.g., following government requirements on improving social inclusion) and major efforts are under way to develop them further. For others, this is a new area now being considered.

Engagement is crucial and in-person connections are seen as essential in building trust and for creating spaces for honest, confidential and safe conversations. In-person platform components play a central role in complementing the digital aspects when engaging with under-represented and non-traditional communities. In-person meetings also tend to be particularly useful in building shared understanding and developing trust with new users.

Targeted outreach activities are used to better understand all users' needs, including those who are not well heard or represented in the field of adaptation, as well as a means for starting the process of co-developing and tailoring products appropriately. Broad ranging communication strategies are being implemented as well as the engagement of experts with a specific mandate to enhance broader social engagement with a platform.

In terms of content, addressing local needs and issues is being tackled by providing case studies conducted by local experts, translating scientific knowledge and climate data into appropriate languages, using infographics that meet the needs of specific target groups, and, very importantly, by offering open and free access to data and information to non-commercial users. Including consideration of social justice and equity in underpinning research projects and reflecting this in the flow of information via platforms is important in raising awareness of concerns and identifying potential solutions.

Social justice and equity are also being considered when developing the functionality of platforms. For example, providing alternative pathways to planning for those with limited technical capacity and enhancing accessibility by offering resources in several different ways are seen as contributing to addressing equity and inclusion concerns.

Offering training sessions and contributing to local and national events are also proving useful in increasing the awareness of the existence, content, functionality and benefits of accessing and using platforms with less engaged and under-represented communities.

Selected innovations

A potential way forward in terms of addressing social justice and equity concerns is to apply an 'equity lens' when developing all content and functionality i.e., taking a human-centred approach to platform development to support all stages of adaptation planning and implementation.

NRCan (Canada) have partnered with Royal Roads University to better understand what a robust CAP requires in terms of new services, engagement etc. to improve social justice and equity. Critical to improving adaptation outcomes is a meaningful and sustained engagement that builds relationships and trust and ultimately helps empowers previously less-engaged communities to be part of the overall process.

Climate-ADAPT (EU) is a transnational platform and needs to address slightly different concerns related to inclusion and equity. It works hard to ensure that all relevant policy sectors and geographical areas and countries are equally well covered, and that they are all represented in terms of available knowledge and information.

Other platforms are training CAP teams in equity and inclusion issues and are deliberately building diverse teams to incorporate e.g., social scientists who can contribute to broadening engagement. Many are engaging with organisations that serve marginalised and at-risk populations and collaborating with other climate service providers who hold in-depth expert knowledge of these users' needs and existing gaps. Still others are working to develop more inclusive and culturally sensitive governance structures.

Increasingly, platforms are attempting to find the space and time to fully explore social and equity considerations, including in the context of informing the content and functionality of platforms.

Shared challenges

Barriers arising from inequity and injustice must be addressed if adaptation is to be mainstreamed, which includes consideration of how CAPs are designed and delivered.

Common challenges centre around capacity and resources to address social justice and equity concerns within platforms. Platform teams are aware of, and sensitive to, the need, but these issues are often not specific drivers at the time of platform development, there can be a lack of capacity within teams to engage specifically on these issues, and often platform content is technically focused. As a result, platform content, architecture and functionality do not tend to include specific achievements or innovations in this space.

On engagement, reaching out to and engaging those that are not yet well represented is challenging and often needs a different approach than solely via a web-based platform, at least in the beginning. Face-to-face interaction is recognised as being particularly valuable in initiating sustainable engagement, while multiple channels of communication, including the use of social media, increase options for engagement and accessibility. Contributing to this challenge is that socially driven organisations that could help with developing links typically have limited capacity and other priorities limiting their potential to contribute or support.

Another key challenge is understanding how to make a web-based platform barrier-free such that under-represented groups and communities can access the information they need to engage in decision-making and the implementation of adaptation measures. There is a major technical aspect to this of course with respect to connectivity, availability of suitable hardware / software, and costs involved in data packages etc. And addressing these aspects raises again the challenge of available capacity, including consideration of the size, expertise and capacity of the platform team, and including the opportunity to step back, consider how to improve the platform to address these concerns, and then to work with communities to co-develop and deliver appropriately tailored products and services.

Although now moving in the right direction, addressing social justice and equity is seen as being far more than just an issue of language translation, but also needs to be reflected in the platform's governance, architecture, functionality, and content to ensure use by the intended audiences. Platforms are looking to learn more about how to address these concerns and value on-going opportunities to share lessons learnt and to explore approaches to enhancing inclusivity.

KE4CAP resources: Topic 12

> Country-hosted event, Canada, session 3: Enhancing Platform Impact: The Power of In-Person Connection and Diversification.
>
> Includes slides from NRCan on: Enhancing platform impact - the in-person connection and diversifying our platforms.

KE4CAP

Knowledge Exchange between
Climate Adaptation Platforms

Stepping up knowledge exchange between Climate Adaptation Platforms

Synthesis report from the KE4CAP project

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