Trustworthy climate information for effective physical climate risk assessment

Challenges and solutions in re/insurance and finance

Event Report

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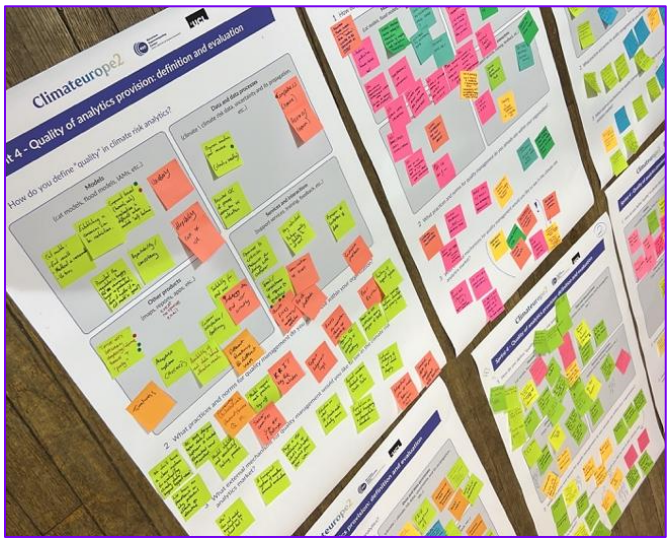
On 21 and 22 October 2025, a group of 35 climate analytics providers, asset managers, insurers, and regulators met to discuss questions about **the quality and trustworthiness of a growing market of analytics providers offering products ranging from raw climate data to tailored climate information services** for the re/insurance and finance sectors.

This meeting was hosted by researchers at the Department of Science, Technology, Engineering and Public Policy at UCL and the Horizon Europe Coordination and Support Action Climateurope2, with facilitation support of a team from the Barcelona Supercomputing Centre, the London School of Economics and Political Science, Maximum Information, Foresight Transitions Ltd, the UK Met Office, and Climate-KIC.



Executive Summary

Discussions highlighted a **fragmented and rapidly evolving market** characterised by diverse definitions, data sources, modelling approaches, and service offerings. While climate risk is increasingly recognised as important, its prioritisation varies significantly across institutions and remains shaped by regulatory pressures and leadership perspectives.

Participants identified **critical gaps in the current landscape**, including mismatches between available data and user needs (particularly at near-term and asset-level scales), ability to process large quantities of data, limited transparency and comparability of models, and insufficient treatment and communication of uncertainty—especially for complex risks and emerging AI tools.

There was broad agreement on core characteristics of "quality" in climate analytics, including fitness for purpose, scientific robustness, transparency, usability, and credibility. However, **current quality management practices remain inconsistent** and largely informal across the market.

Standardisation was widely recognised as a potential mechanism to improve trust, comparability, and market functioning. However, views diverged on its role and implementation. Participants emphasised the need for a flexible and layered approach, combining common baseline requirements with sector-specific practices, while avoiding constraints on innovation.

Key **enablers** of standard uptake include regulatory support, clear added value for users and providers, and credible certification mechanisms. **Barriers** include costs, lack of consensus, and concerns around competition and intellectual property.

Overall, the workshop highlighted both the **urgency and complexity** of strengthening governance in the climate analytics market, with standardisation representing a promising but contested pathway.

Key Recommendations

For Regulators:

- Set clear expectations for the use of climate risk analytics.
- Enable use of third-party providers through clear due diligence guidance.
- Improve transparency and comparability by requiring disclosure of sector specific definitions, assumptions, methods and limitations.
- Build capacity with supervisory bodies and regulated entities to independently assess analytics provision.
- Monitor unintended impacts of standardisation.

For Standard Setters:

- Adopt a principles-based, flexible approach to standardisation, avoiding prescriptive methods,
- Standardise core terminology and concepts to improve consistency across the market.
- Define minimum transparency and documentation requirements for data, processes, limitations and use cases.
- Provide guidance on uncertainty management and communication.
- Support quality assurance mechanisms (e.g. benchmarking, validation, certification).

Cross Cutting:

- Promote a fitness-for-purpose approach, avoiding one-size-fits-all requirements.
- Strengthen coordination and maintain dialogue between regulators, standards bodies, analytics providers and users.
- Balance trust and innovation
- Demonstrate clear value to drive uptake

Event context

There is a growing market of analytics providers offering products ranging from raw climate data to tailored climate analytics services for the re/insurance and financial sectors. The **rapid market growth raises important questions about the quality and** trustworthiness of what is being offered:

- Should this market be regulated, and if yes, how?
- Would the re/insurance and finance sectors benefit from data, information and service quality guidelines, and what would these look like?

To address these questions, the two-day workshop hosted 35 attendees evenly representing the target groups discussed questions aiming at mapping the climate analytics landscape, defining "quality" in climate risk analytics and harvesting key insights for developing appropriate regulation of the climate risk analytics market. Each day started with presentations from important contributors to the information landscape: the chair of the **CEN** working group on climate adaptation presented the ongoing work on standardising climate services, the **European Centre for Medium Range Forecast** presented their joint work with the **European Investment Bank**, **EIOPA** provided a perspective on the importance of a trustworthy climate analytics market, **GARP** presented their work carried out for the UK Climate Financial Risk Forum on benchmarking climate risk model vendors.

In this report

Key insights for supporting standardisation of good practice within climate risk analytics in the context of the financial and insurance sector are analysed across the following workshop themes:

⇒ Mapping the climate analytics landscape
  > The importance of climate risk within the overall risk landscape
  > Climate analytics market: current landscape
  > Climate analytics market: gaps
  > Expected changes in the analytics market
  > Current quality management practices
⇒ Defining quality of climate risk analytics
⇒ Effectively managing the quality of climate analytics
⇒ Standardisation as a tool for governance of the climate analytics market
⇒ Principles for climate analytics standards
⇒ Drivers and barriers to standardisation of climate analytics in re/insurance and finance

Mapping the climate analytics landscape

The importance of climate risk within the overall risk landscape

The invited participants came from a select group of industry professionals who were known to the organizers to have expert knowledge and interest in climate risk. Nevertheless, when asked about the importance about climate risk within the overall risk landscape of the industries that they are part of, responses were very varied. For example, some banks suggested that climate risk is currently not a priority, but its importance is increasing. Insurers suggested that climate risk has equal standing with other risks, and while they recognize that climate risk is important operationally, its consideration from a strategical point of view is dependent on the perspective of individual decision makers.

Those service providers who cater to insurers similarly said that climate is not currently more important than other risks covered. Service providers for which climate risk is the main focus suggested that the market is not ready for upscaling their services. There was also some variation between the opinion of the individuals and the institutions they represented, showing that heterogeneity is not only present across institutions, but also between individuals and the institutions they work for.

Current market landscape

The climate analytics landscape is extremely varied: from general climate data to emission scenarios, to regulatory requirement aligned hazard information, to sector specific impact data and indicators.

There is also a varied model development landscape, from catastrophe models to specific hazard-only models and climate adjustments thereof. It was noted that the current analytics market requires near term and asset level data.

However, the resolution available is currently hazard dependent. For insurance, it was noted that the timing of interannual data delivery is very important, as well as the distinction between chronic and acute risks.

Market Gaps

- *Climate-related data availability and needs.*
  There is a **mismatch between data availability and capacity** of industry to deal with large amounts of complex information. Climatic information is often provided on longer temporal and larger spatial scales when near-term, asset level information about climate change signals is more useful for current needs. This results in the **use of data at inappropriate scales**. However, current and near-term climate change signals in hazard data and related impacts come with **high uncertainty**.
- *Tools and methods used for delivering forward looking information are not always fit-for-purpose.*
  For example, cat models may be used to assess future risk, but only the hazard component is adjusted while exposure and vulnerability are left unchanged, providing **inconsistent output**. In addition, the **resolution of models is often insufficient** for evaluating changes in extreme events.
- *Insufficient exploration and communication of uncertainty.*
  The current information landscape **lacks nuance in the assessment and communication of uncertainty**, especially with regards to new tools like AI, as well as the exploration of systemic, compound and complex risks.
- *Insufficient transparency.* There is a lack of transparency in the identification and assessment of appropriate expertise. Some **models are considered "black boxes"** by users of information.
- Limited effectiveness of financial stability and solvency regulation to encourage impactful use of climate analytics.

Expected changes in the climate analytics market

From providers:

- Climate risk to be integrated with nature risk, as well as consideration of systemic, compound and cascading risks.
- A diversification of provision of information types, such as storylines for highly uncertain information (e.g. tipping points), tools, and knowledge translation.
- Need to integrate rapid rise of AI, the entry of big tech, and climate-related liabilities.
- Improvement of connectedness of the market through confidence measures, quality control and consistent coordination across scales.

From users:

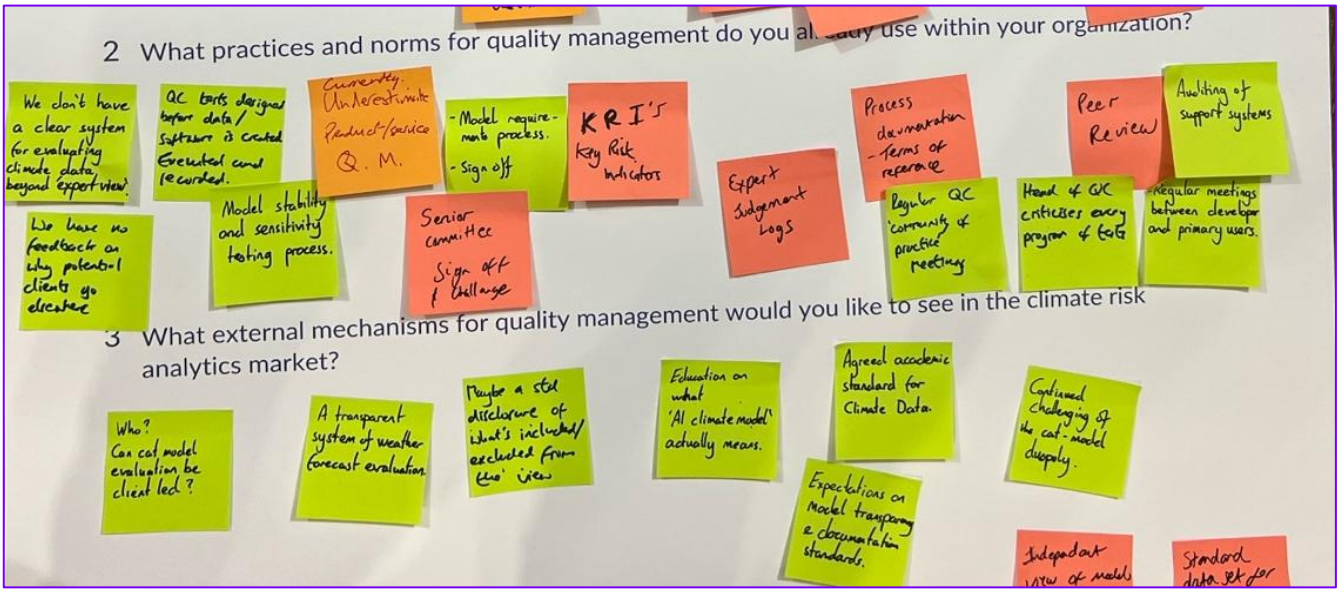
- A more dynamic and transparent market driven both by competition and collaboration and supported by open-source data, shared platforms and a better-defined value change.
- A common, standardized language to facilitate knowledge sharing.
- Integration of rise of AI with other information types, such as storylines.

Current market quality management practices

The market quality management landscape is far from uniform and systematic.

Key quality management practices mentioned focussed on the science-based processes underlying climate risk analytics, but **practices varied a lot across participants**.

For example, some participants mentioned sensitivity analysis, stress tests, analysis of assumptions and model validation as key model-based quality management practices. Some participants mentioned the importance of considering data provenance, while others mentioned (over-)reliance on expert judgement and dialogue amongst experts to understand error propagation. Analytics providers who also license models mentioned version control and evaluating model pre-release phases, as well as user engagement as quality management mechanisms.



Participants converged on **key defining characteristics** of "quality" of information in climate risk analytics. While quality needs to be defined from the bottom up, there was some scepticism in the audience about whether quality defining characteristics would be taken up by key market actors unless they are necessary for meeting financial regulatory demands.

Fitness for purpose: good information is information that is targeted to the intended use. To achieve this, the community suggested to develop use cases, explain the appropriate scope, use and limitations of the information/service, and clearly articulate the uncertainty metrics.

Adequate scientific and technical robustness: the information/service needs to be backed and justified by established and peer-reviewed science, with a particular focus on the assumptions and physical processes that underlie the information. Moreover, methodological aspects should also be taken into consideration, such as how uncertainty is assessed, whether sensitivity analysis is performed, whether there is any validation and calibration against well-defined skill metrics, whether data is compared to historical data, whether the information is co-produced with relevant stakeholders and whether and how feedback from the broader community is integrated. Some participants suggested the development of independent benchmarks for models and data underpinning climate analytics.

Documentation and compliance for replicability: climate analytics needs to be supported by appropriate documentation of metadata, workflow integration, data security and provenance. Furthermore, methods and data should be transparent and align with current best practices and standards (such as FAIR principles).

Responsible communication and support: information and services need to be usable, timely and employ clear and accessible visualization as well as clear nomenclature for key scientific and sectoral terminology. The user experience needs to be integrated and ongoing support and contact with the data provider must be maintained. User training should be considered especially when specialised skills are needed to access and/or interpret the information/service.

Reputational characteristics both within the climate analytics community and across the provider/user interface: the trustworthiness of data source and model developer pedigree (e.g. qualifications/expertise) are considered important, as well as endorsement from peers.

Effectively managing the quality of climate analytics

There was considerable debate about how to effectively manage the quality of the climate analytics market.

In insurance, **model intercomparison** – especially for catastrophe models on open access platforms – was seen as an important step towards improved model quality. It was noted that there is **over-reliance on single models** and an adequate assessment of uncertainty in provision and use of climate analytics, e.g. through standardized tests, would ultimately improve the resilience of the re/insurance market.

There was a recognition that **standardized tests** imposed by governmental bodies can be politicized and bring about a tension between affordability of premiums and underpricing risks, ultimately harming profitability of re/insurance companies. The possibly damaging political nature of standardization based on a selective group of stakeholders was also mentioned.

However, standards and **quality assurance** could possibly allow access to private providers of climate information for regional and national banks, as they are currently mandated only to use information from institutions such as research bodies, NHMS, and other public entities.

Suggested mechanisms for effective quality management

Standardisation of key sectoral and cross-sectoral terminology (e.g. key hazards, metrics, industry specific terms such as "average annual loss", uncertainty) as well as baselines, benchmarks and (economic) loss criteria.

It was also suggested that **communication and feedback channels** could be standardised.

Quality assessment through mechanisms such as:

- external and independent quality assessment bodies,
- a quality ombudsman,
- user forums,
- quality management guidance documents, and/or
- a model validation database.

Standardisation as a tool for governance of the climate analytics market

What is standardisation?

The process of standardisation involves **agreeing on minimum principles, requirements, and recommendations for a viable climate service market**. These can be set by standardisation bodies, or industry and organizations adhering to standards are certified by independent third-party certification bodies.

At the workshop, participants recognized that **different communities might need different principles,** and that the re/insurance and broader finance industry have different maturity in using physical risk analytics. However, discussions clustered around 7 key principles, each with a suite of related requirements.

While there was consensus among participants about the **principles** that should guide climate analytics standards, there was **disagreement about the benefits and barriers** of standardisation, and whether standardisation is needed altogether.

Suggested principles and requirements for climate analytics standards

Principles	Requirements
Transparency	• open datasets/methodology • interoperable models • documentation of data sources, methodology and assumptions • auditability
Accessibility	• models need to run on open platform like OASIS • easy to access datasets • user training and engagement • different explanations for different levels of users/depth of information needed
Simplicity	• allows for model accessibility and transparency
Integrity	• compliance with regulatory requirements • acknowledgement and explanation of limitations
Credibility	• model validation • based on peer reviewed academic research • model intercomparison against benchmarks • robustness analysis • provision of uncertainty information
Independence	• reference to external oversight • method evaluated independently
Relevance ("actually solves real problem")	• user engagement • co-production
Confidentiality/ data governance	• data governance agreements

Drivers and barriers to standardising climate analytics in re/insurance and finance

There was agreement that **some aspects of the climate risk analytics market should or can be standardised while others should not** - and that some aspects might be more straightforward (e.g. accessibility, documentation that would not disrupt IP or business models) than others (e.g. model fitness for purpose).

There is currently **no consensus about who should oversee standards governance - and whether this should be industry led**. It was stressed that regulators should not be the one setting standards but rather support their uptake.

Some participants saw standardisation as an important tool to ensure the reputability of the analytics market, regulate the inappropriate use of AI, and reduce the number of inappropriate investments in risk management, ultimately reducing the risk of maladaptation.

However, some analytics providers mentioned that there is no need for standards, while others were concerned about the impact of standards on innovation, market growth, and the value of diversity of approaches to producing and delivering climate risk analytics.

Drivers of standard adoption

- regulatory endorsement or mandates,
- demand from major users (e.g. financial institutions),
- credible certification and assurance mechanisms, and
- clear value propositions (e.g. improved efficiency, trust, and market access).

Barriers to standard adoption

- implementation costs,
- lack of consensus across stakeholders,
- limited understanding of benefits,
- concerns about impacts on competition and innovation, and
- intellectual property constraints.

Overall, successful uptake of standards will depend on demonstrating tangible value, ensuring inclusive development processes, and maintaining flexibility to accommodate sectoral differences.

The lead author of this event report would like to thank all the facilitators and participants of the event, which was run under Chatham House Rules. All participants were given the opportunity to review the report, and many did. Signatories are event participants and reviewers who decided to add their name to the report, making their participation public and endorsing this report as an accurate reflection of the discussions had at the event.

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