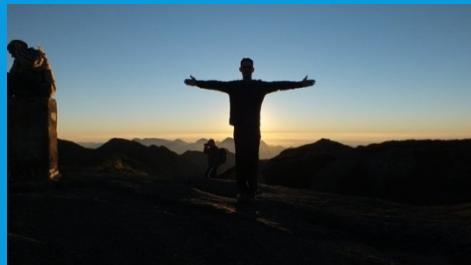


# Belmont Forum e-Infrastructures & Data Management Community Strategy and Implementation Plan (CSIP)

## A Place to Stand: e-Infrastructures and Data Management for Global Change Research

*“Give me a place to stand, and I will move the world”*  
- Archimedes



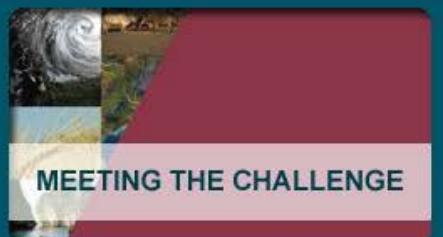
[About Us](#)[Challenge](#)[IOF](#)[Members](#)[Governance](#)[Activities](#)[Reports](#)[Events](#)[IGFA](#)

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Established to foster global environmental change research;

Initiated June 2009 by NSF and NERC, building on the work of the IGFA

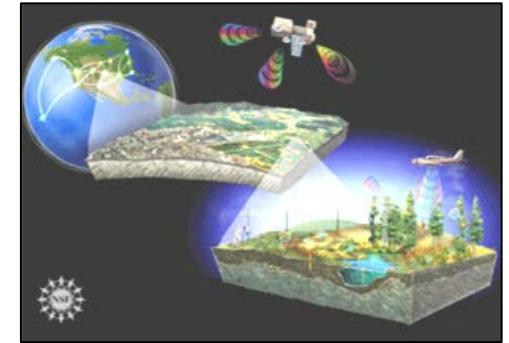
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[Update on IOF theme programs](#)[International Opportunities Fund for Global Change Research](#)[Transformative Cornerstones of Social Science Research for Global Change](#)



# The Belmont Challenge



*"...to deliver knowledge needed for action to avoid and adapt to detrimental environmental change, including extreme hazardous events."*

## This requires:

- **Assessments of risks, impacts and vulnerabilities**, through regional and decadal-scale analysis and prediction
- **Information on the state of the environment**, through advanced observing systems
- **Interaction of natural and social sciences**
- **Enhanced environmental information service providers to users**
- **Effective international coordination mechanisms**

# E-infrastructures and Data Management CRA

“....the need to address global environmental challenges requires a more coordinated approach to the planning, implementation, and management of data, analytics and E-Infrastructures” through international collaboration.

- Belmont Forum, New Delhi, February 2013



# “Big Data” problems in environmental science

## Volume

## Variety

Different data sources

Different formats

Different semantics

Complex grids

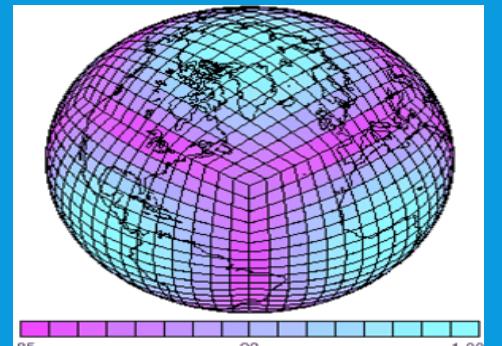
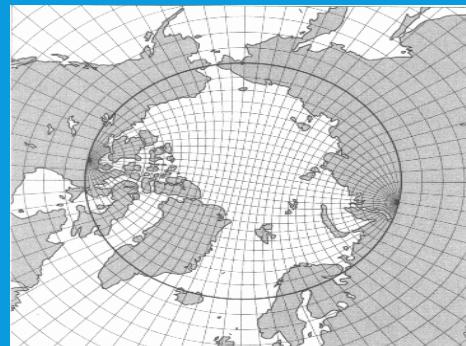
## Veracity

i.e. Data quality

## Velocity

EO datasets terabytes per day

Numerical simulations petabytes per day





# Why Manage Data?



Global change research increasingly requires integrating large amounts of diverse data across scientific disciplines to deliver the policy-relevant and decision-focused knowledge that societies must have

- to respond and adapt to global environmental change and extreme hazards,
- to manage natural resources responsibly,
- to grow our economies,
- and to limit or even escape the effects of poverty.



# Who has been involved so far?



- The International Steering Committee (14 people)
  - 1 member per country or international organization
  - Members led 6 Work Packages (WPs) and sub-groups
- The Secretariat
  - Led by Robert J. Gurney OBE (UoR, UK) & Lee Allison (AZGS, US)
  - Approx. 4 UK and 4 US technical & support staff



## The International Assembly

- **120 + Cross-disciplinary Experts**
- **~10 Experts per Country**
- **Divided into 6 Work Packages (WPs)**
- **End-user domain scientists**
- **Computer and information scientists**
- **Legal experts**
- **Social scientists**

# Our Vision

*Our vision involves high quality, reliable and multidisciplinary global change research enabled by a sustained human and technical, internationally coordinated and data-intensive e-infrastructure.*



## This e-infrastructure should:

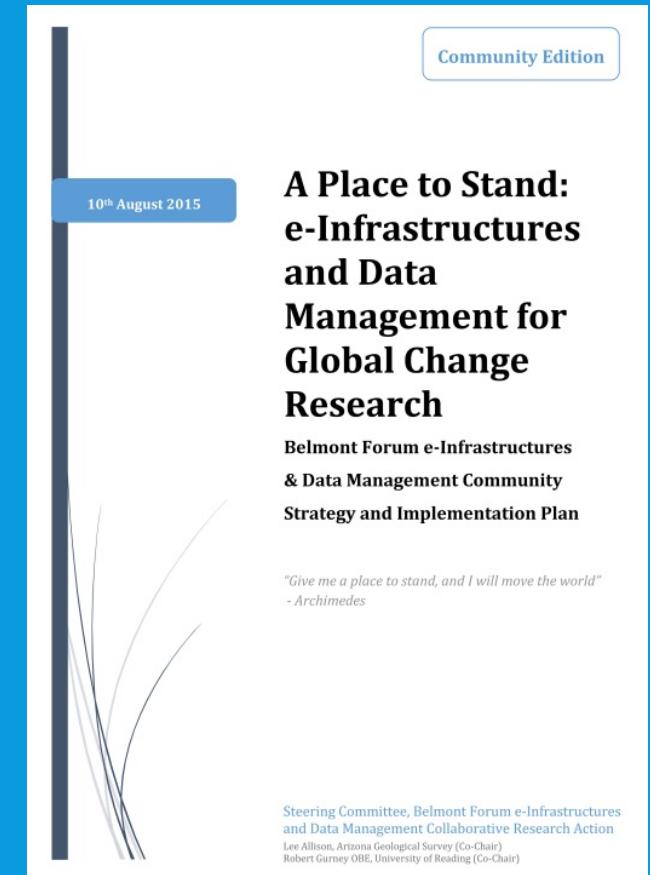
- Process a continuous increase in the diversity and volume of data generated
- Support data that are discoverable, reusable, open and accessible by default as far as possible
- Assess data using transparent metadata relating to trustworthiness and quality

# Community Strategy and Implementation Plan

Final Report (June 30, 2015) & Community Edition (August 8, 2015)

## Goals of the Final Report/CSIP :

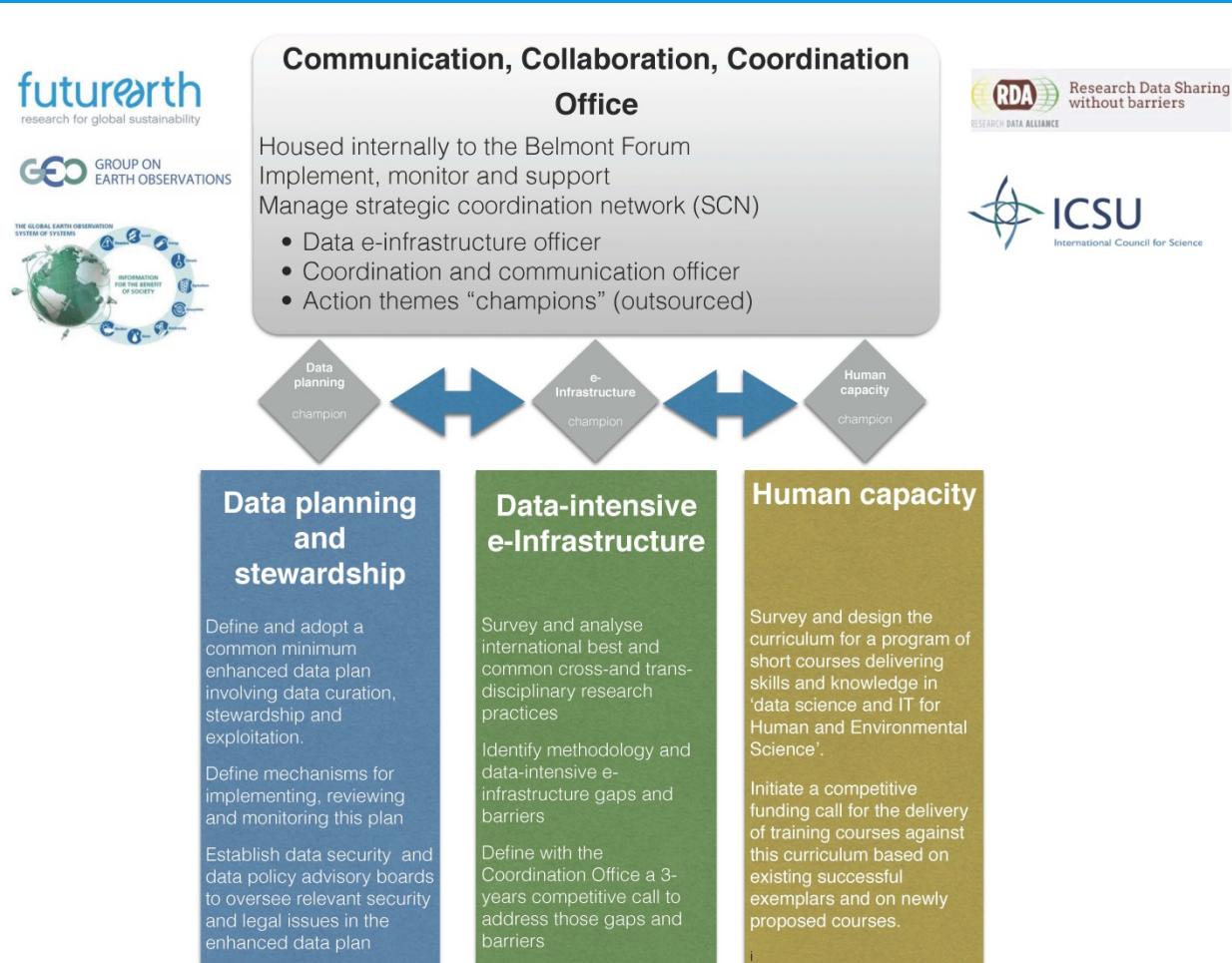
- Provide a **unified vision** that clearly expresses global e-infrastructure **needs, barriers and gaps**
- Identify **strategic research policies**, outlining **what can be done better, in a multilateral way**, to support global change research
- **Integrate existing international research** to inform stakeholders and prioritize action to promote a holistic environmental support system



*The Belmont Forum can blaze a path towards achieving this vision by implementing the recommendations laid out in the Community Strategy and Implementation Plan (CSIP).*



# How Conclusions Fit Together



Whole-path implementation of the CSIP report

*The report generated five Recommendations for effective data preservation in the 21<sup>st</sup> century.*

**Four Action Themes** create a blueprint for holistic implementation of the Recommendations through a Communication, Collaboration, and Coordination Office supported on an international level by the Belmont Forum.

*This office would coordinate and oversee key positions to guide data planning, management, and training.*

Image produced by Agence Nationale de la Recherche



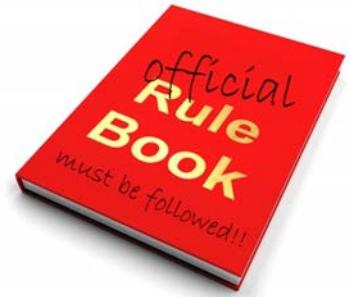
# 5

# Final Report Recommendations

1. **Adopt Data Principles** that establish a global, interoperable e-infrastructure with cost-effective solutions
2. **Foster communication, collaboration and coordination** through a Data and e-Infrastructure Coordination Office established within a Belmont Forum Secretariat.
3. **Promote effective data planning and stewardship** in all Belmont Forum agency-funded research
4. **Determine international and community best practice** through identification and analysis of cross-disciplinary research case studies.
5. **Support the development of a cross-disciplinary training curriculum** to expand human capacity in technology and data-intensive analysis methods



# 1. Adopt Data Principles



***GOAL: Adopt data principles to establish a global, interoperable e-infrastructure with cost-effective solutions to widen access to data and ensure its proper management and long-term preservation. Researchers should be aware of, and plan for, the costs of data intensive research.***

**Data should be:**

1. Discoverable through catalogues and search engines
2. Accessible by default, and made available with minimum time delay
3. Understandable in a way that allows researchers—including those outside the discipline of origin—to use them
4. Manageable and protected from loss for future use in sustainable, trustworthy repositories
5. Professional: the implementation of the above principles requires a highly skilled workforce and broad-based training and education as an integral part of research programs





## 2. Foster Communication, Collaboration and Coordination

***GOAL: Establish a Data and e-Infrastructure Coordination Office within a Belmont Forum Secretariat to foster communication, collaboration, and coordination between the wider research community and the Belmont Forum, and across Belmont Forum projects.***



Long term tasks of such an office include:

- Resolving barriers and gaps in global data sharing and interoperability
- Building relationships
- Distilling information from data
- Aligning incentives for effective and collaborative data management

*The Belmont Forum can and must champion the organizational, community building and technical framework needed to facilitate the international and interdisciplinary exchange of global change information through its member organizations, both individually and collectively.*





## 3. Promote Effective Data Planning and Stewardship



*GOAL: Enable harmonization of the e-infrastructure data layer through enhanced project data planning, monitoring, review and sharing in all Belmont Forum agency-funded research.*

Effective data planning and stewardship involves:

- Paying attention to the full lifecycle of data use and the rates at which information is gleaned from data
- Adopting policies that promote better and more effective data planning
- Implementing incentives for adoption of data stewardship principles



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## 4. Determine International and Community Best Practice to Inform Belmont Forum Research e-Infrastructure Policy



*GOAL: Inform Belmont Forum research e-infrastructure policy through identification and analysis of cross-disciplinary research case studies.*



*Though individual research domains successfully exchange best practice in beacons of good stewardship, there are inconsistencies in the exchange of information, and in the shaping and sharing data intensive e-infrastructure between nations and across domains and users.*

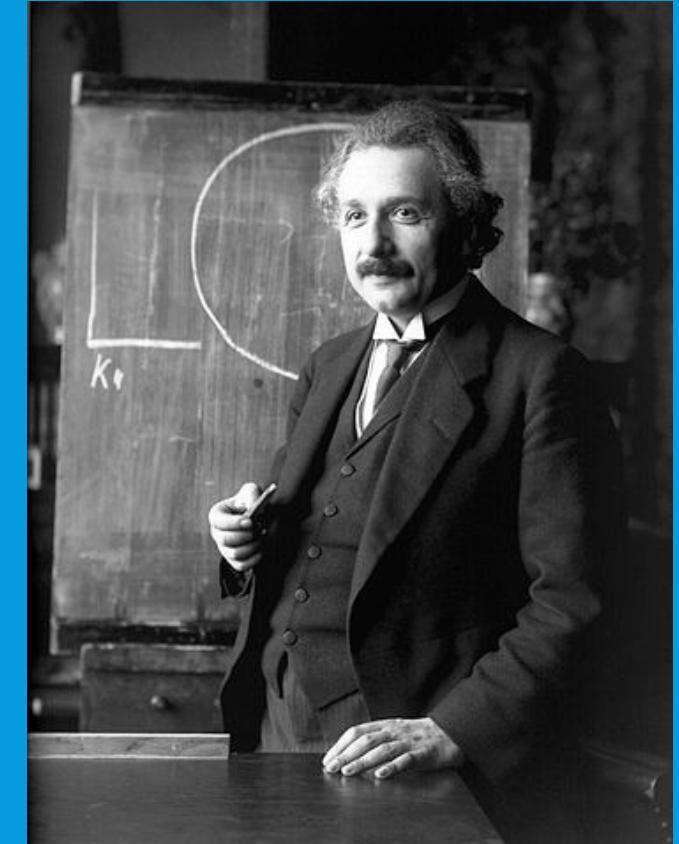
**Establishing good practice is fundamental to improving data availability and interoperability, enabling co-evolution of research needs with e-infrastructure, increasing data usefulness, building trust among stakeholders, and reducing overall costs resulting from ineffective data management.**



## 5. Support the Development of a Cross-Disciplinary Training Curriculum to Build Capability

***GOAL:** A cross disciplinary training curriculum can help to expand human capacity in technology and data-intensive analysis methods, and increase the number of scientists with cross-cutting skills and experience in best practice.*

*e-Infrastructures globally lack enough skilled people who understand data management and data intensive methods in environmental, social and health sciences, and engineering to effectively drive this area forward.*



*The Belmont Forum E-infrastructures and Data Management CRA describes ways to move forward in achieving these recommendations by convergence in four Action Themes.*



Coordination Office

Data Planning

E-infrastructure

Human Dimensions

# Action Theme 1: Coordination Office

Foster coordination through the establishment of a Data and e-Infrastructure Communication, Collaboration and Coordination Office (CCCO)

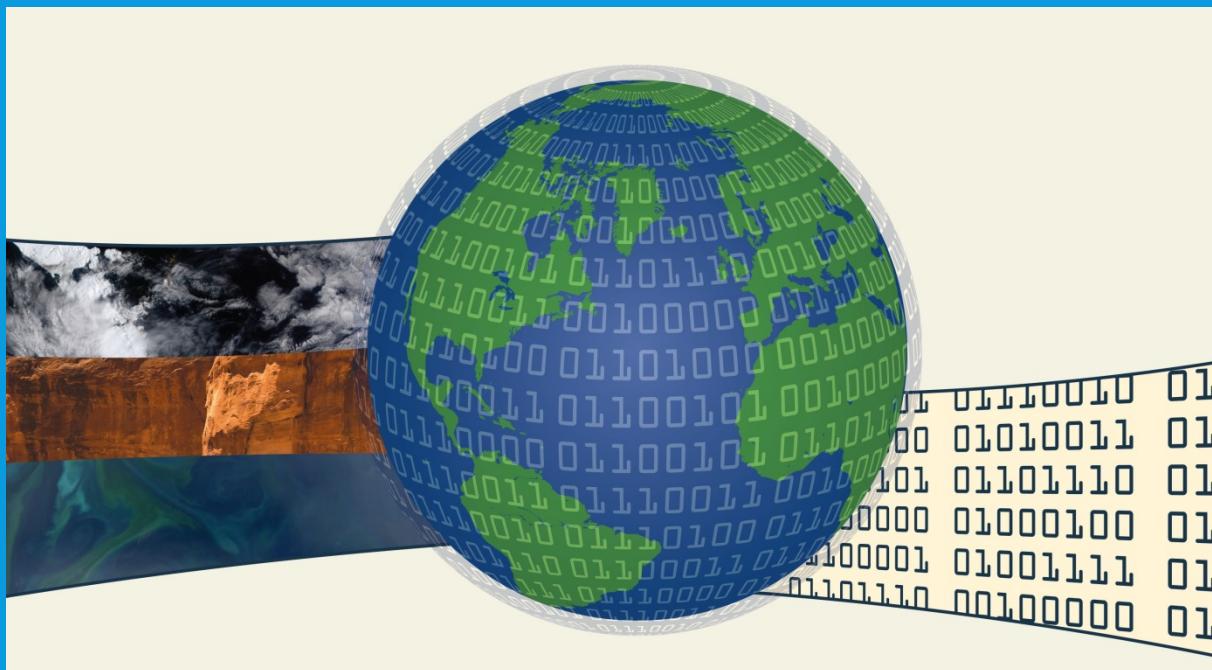
Duties of the CCCO:

- Select key figures to guide planning and implementation of e-infrastructure architecture
- Oversee mapping of organizations and best practice activities
- Establish a Strategic Coordination Network of organizations
- Align Belmont Forum e-infrastructure activities and funding with the CRA's recommendations



# Action Theme 2: Data Planning

Promote effective data planning and stewardship in all Belmont Forum Agency-funded research



## Item 1: Enhanced Data Template

- Belmont Forum to adopt a common minimum **Enhanced Data Plan (EDP)** template and align budget allocations to ensure its adoption
- Establish mechanisms and metrics for **regular review and monitoring** of Enhanced Data Plan in all BF projects

***Data Planning activities will be executed by the Communication, Coordination, and Collaboration Office (CCCO) in conjunction with the Belmont Forum Secretariat.***

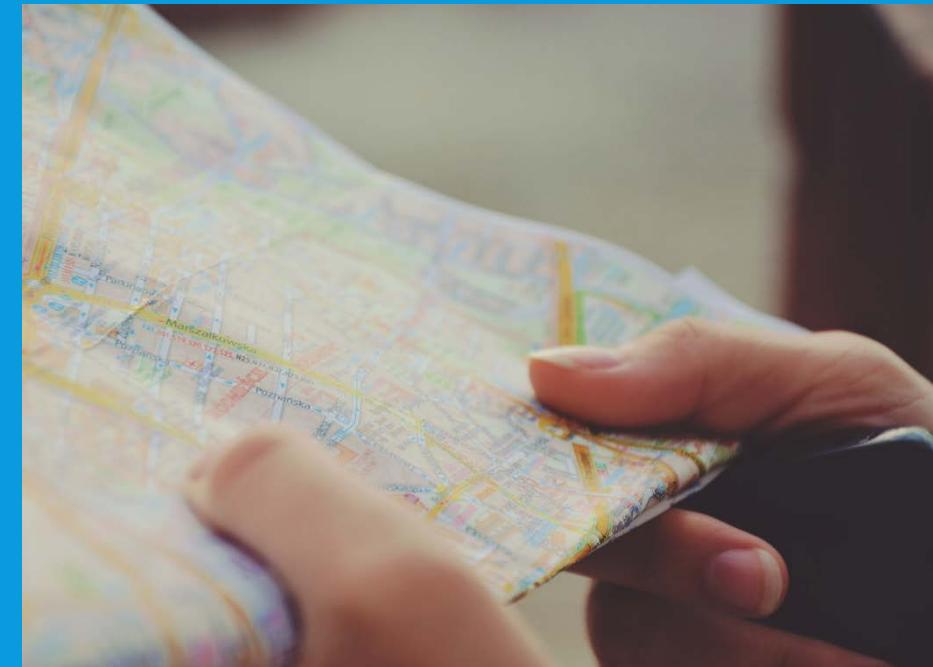


Activities will be supported through funding and in-kind donations by participating Belmont Forum member countries.

# Data Planning and Coordination

## Item 2: Data Planning Activities in Conjunction with CCCO

- Belmont Forum members appoint a **Data e-Infrastructure Officer ("Champion")** as part of the CCCO to oversee Data Plan activities
- CCCO to establish a **Security Advisory Board SAB** to address relevant security issues and a **Data Policy Advisory Board (DPAB)** to address relevant legal issues
- CCCO to **feed inputs from the DPAB and SAB to Enhanced Data Plan template**
- CCCO to initiate a **gap analysis**
- CCCO to **identify key repositories - preferably certified, trusted repositories** - to serve as exemplars of Enhanced Data Plans



# Action Theme 3: e-Infrastructure

Determine international and community best practice in order to inform Belmont Forum research e-infrastructure policy

An **e-Infrastructure Champion** appointed by the CCCO will oversee the following activities through a series of scoping workshops:

- Develop an **Evaluation Matrix** to analyze, score, and identify cross-disciplinary case studies, and map the broader relationship between environmental science, data and e-infrastructure
- Apply the Matrix to **identify critical gaps and barriers** and define **funding calls** and priorities for case studies and exemplars
- Review and analyse existing and future research from exemplars to inform best practice

*The Evaluation Matrix will also help map the broader scope of the relationship between environmental science, data, and e-infrastructure.*

# Action Theme 4: Human Dimensions

**Support the development of a cross-disciplinary training curriculum to build capability**



A **Human Dimensions Champion** appointed by the CCCO will help coordinate activities occurring within other Action Themes and liaise with the Belmont Forum Secretariat.

Additional duties include:

- Create and maintain a **database of Belmont Forum member and other training initiatives**
- Organise scoping workshops **to design the overall curriculum** for a program of short courses
- Organise calls for training and encourage international attendance at **relevant and recognised** short courses

*The Belmont Forum will be encouraged to initiate a competitive funding call for the delivery of training courses.*



*The Belmont Forum is well placed to stimulate new ways of thinking and working amongst distributed and diverse researchers, data and information scientists and data-enabled domain scientists, enabling them to better address global change research challenges.*



# Time Line of Upcoming Events



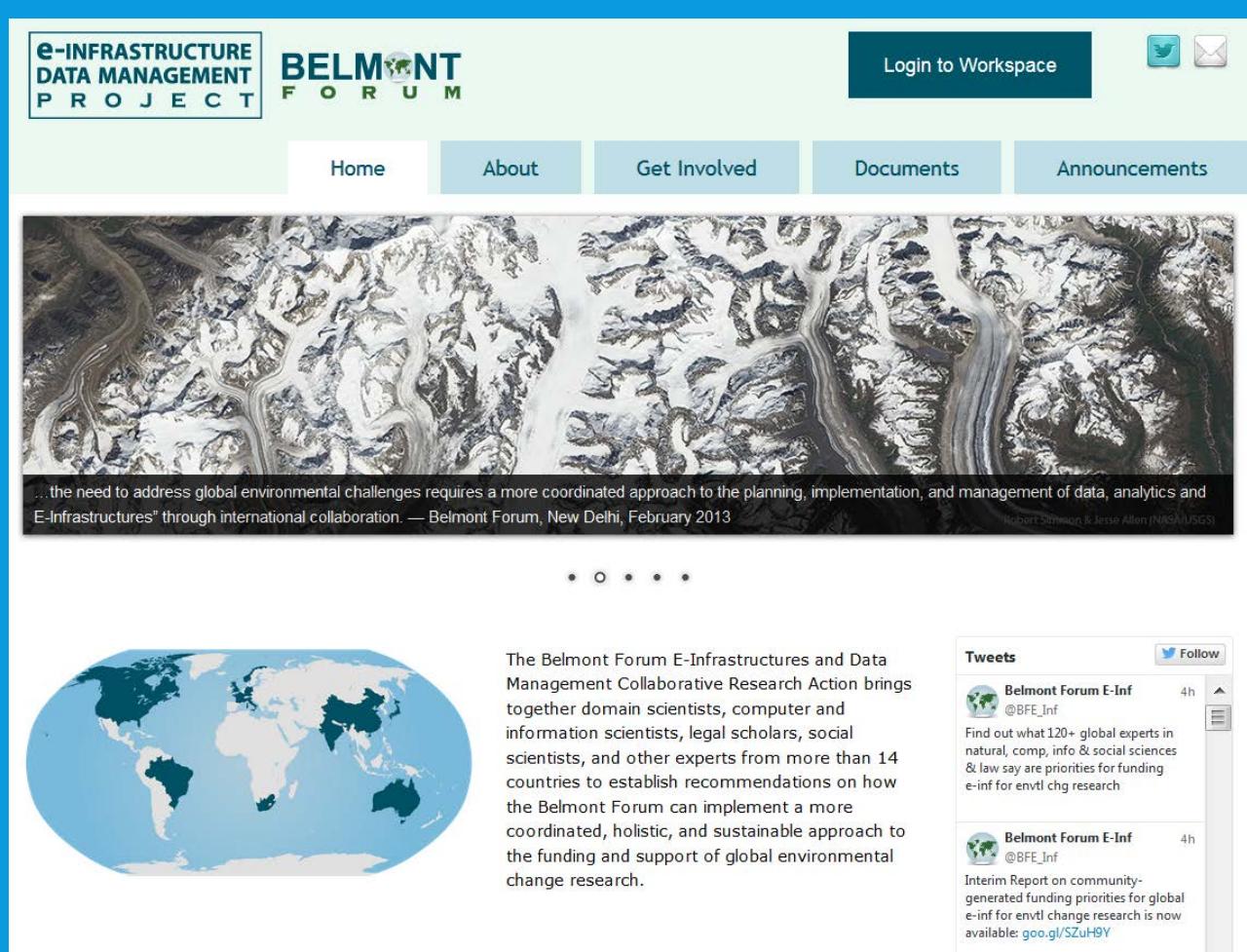
APR 2015	Final Meeting of SC & Final Writing Session	COMPLETE
MAY-JUN 2015	Re-drafting, SC editing & Consensus	COMPLETE
JUN 2015	CSIP published to CRA stakeholders	COMPLETE
JUL 2015	NERC/NSF Secretariat extended until December	COMPLETE
JUL-SEP 2015	Proposals and Implementation plans elicited for SC in collaboration with GPC members	INITIATED...
OCT 2015	Oslo Belmont Forum Principals Meeting	
NOV-DEC 2015	Interim Secretariat to continue with transition activities informed by decisions made at the Oslo meeting	
JAN-MAR 2016	SC, Secretariat, Coordination Office and associated Roles, and approved recommendations implementation activities initiated	
MAR-JUN 2016	Advisory Board(s) set up, Case Studies activities, Data Plans, Network building, Training programme design, etc. initiated	

# Knowledge Hub

**[www.bfe-inf.org](http://www.bfe-inf.org)**

Final Report and the Community Edition are freely available online.

Please explore the site to learn more about the people, processes,  
*and how to get involved.*



The screenshot shows the homepage of the Belmont Forum Knowledge Hub. At the top, there's a header with the 'e-INFRASTRUCTURE DATA MANAGEMENT PROJECT' logo, the 'BELMONT FORUM' logo, a 'Login to Workspace' button, and social media icons for Twitter and Email. Below the header is a navigation bar with tabs: Home (selected), About, Get Involved, Documents, and Announcements. The main content area features a large satellite image of a mountainous region with snow and ice. Below the image is a quote: "...the need to address global environmental challenges requires a more coordinated approach to the planning, implementation, and management of data, analytics and E-Infrastructures" through international collaboration. — Belmont Forum, New Delhi, February 2013. To the right of the quote is a small photo credit: Robert Simmon & Jesse Allen (NASA/USGS). Below the quote, there are four small circular dots. In the bottom right corner, there's a sidebar titled 'Tweets' showing two recent tweets from @BFE\_Inf. The first tweet discusses global experts in natural, comp, info & social sciences & law for funding e-inf for envtl chg research. The second tweet links to an interim report on funding priorities for global e-inf for envtl chg research.

# Ways to Get Involved

Methods for implementation of the recommendations proposed by the Belmont Forum e-Infrastructures & Data Management CRA will be determined over the next several months.

*Please contact Lee Allison (US) or Robert Gurney (UK) to discuss options for support.*

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Robert Gurney  
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