

# Societal Relevance and Understanding



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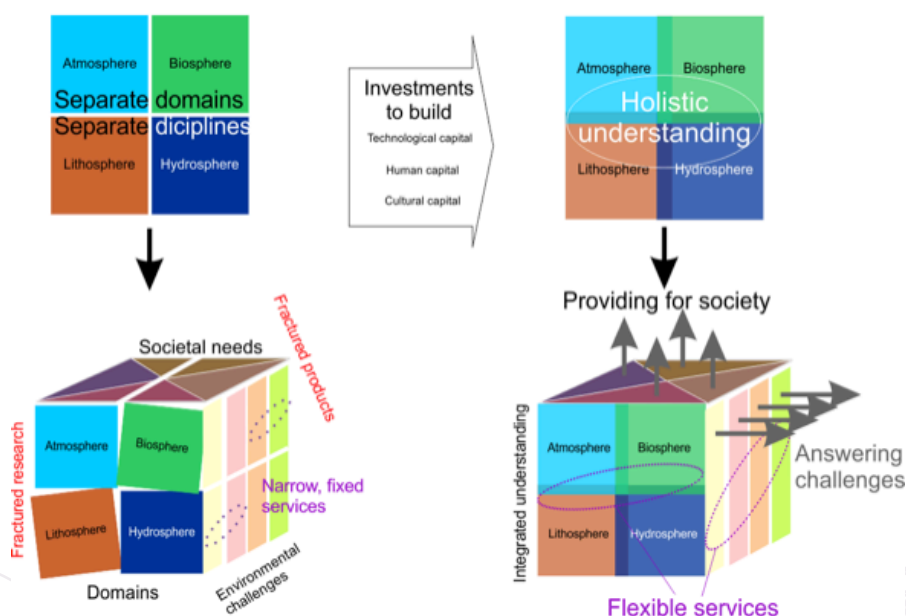
**Societal Relevance and Understanding is the overarching purpose of Theme 4, accomplished through work on environmental literacy, ethical frameworks and citizen science.**

The theme addresses the explicit need for all environmental research infrastructures (RI) to clearly and constantly understand the grand challenges of society. RIs have to capture and communicate the elements they can contribute to societal understanding of the drivers and implications of these challenges, and engage ethically and openly as part of society in the development of policy to address these challenges. Theme 4 therefore requires three components (WP's): Environmental Literacy, an Ethical Framework, and Citizen Science.

*Environmental Literacy* addresses and optimizes the flow of data and information collected and produced by environmental RIs between the environmental system and the human system (Scholz 2011).

Clarifying these interactions between the two systems will help assess the capacity of environmental RI data to be used to meet the grand challenges, and the degree to which grand challenges are informed by environmental research. This will feed into best practices of environmental RI development and operation to assist RI operators, and facilitate informed decision-making by programme managers, policy makers, and other stakehold-

ers. Ethical questions concern all RIs and it is important to raise awareness about ethics during their development. In fact, institutional RIs (i.e., ERICs, European Research Infrastructure Consortium) have to appoint an ethical advisory board. Cross-fertilization by establishing a shared ethical reference framework contributes to the development of a consistent European RIs ecosystem.



**Figure 1:** The traditional RIs are built according to scientific disciplines and Earth System domains. However, many of the societal and environmental problems are cross-disciplinary and orthogonal to these domains, making the system highly interlinked. Interoperability makes it possible to answer to Grand Challenges and generate flexible services. (Figures adapted from the ERIS strategy, 2014)



A common *Ethical Framework* will increase awareness of the importance of ethical aspects in environmental sciences as a whole, by both the scientists and the public. The theme aims to establish a shared ethical reference framework to be adopted by RI governing bodies; to increase awareness of RI management, operators, and individual scientists of their social role in conducting research; and to assess the ethical and social aspects related to project results achieved and deliverables released.

A necessary component of environmental RIs is and will increasingly become participative or “citizen” science. This is for two key reasons. Firstly, it raises societal awareness and engagement about envi-

ronmental change. Secondly, it provides data that is otherwise logistically inaccessible for monitoring change on our planet. *The Citizen Science* toolkit develops and summarizes resources for environmental RIs to engage with the public in citizen science, an area providing innovative solutions for data or sample collection, management, processing, curation, annotation, and deposition. In particular it will move beyond a review of the status quo to targeted test cases in leading areas of citizen science. It will develop

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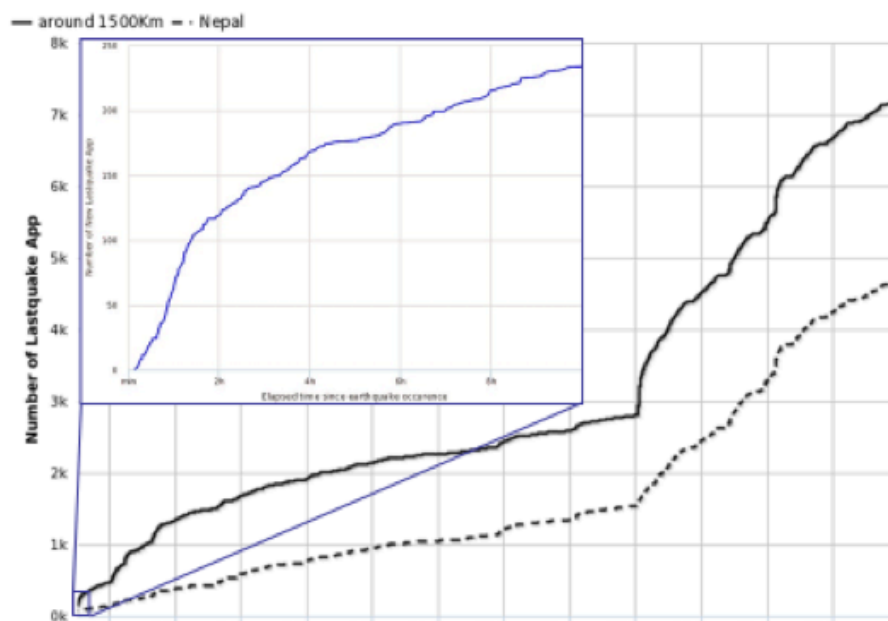
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resources and best practices for public contributions to the annotation of imagery (a charismatic form of scientific information with which to engage the public, while also being a resource-intensive information source for RIs). It will also develop a framework for distributed networks of observers and sensors who collect data and can perform response actions. In all cases, engaging, training, and maintaining active citizen scientists is required; as are data systems for the acquisition, assessment, access, and analysis of distributed data sources.

Throughout this effort, tools for environmental RIs to guide the uptake and impact of their essential efforts will be developed.



## Number of LastQuake App in Operation



**Figure 2** shows how fast the EMSC LastQuake app was downloaded after the mainshock (the zoom is in hours after the mainshock) in Nepal 2015. The second bump was caused by the main aftershock. An online survey early June of users in the region confirmed the absence of media coverage about the app and that its dissemination was due to viral propagation.