



# Planetary Skin

A Global Platform for a New Era of Collaboration

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## A Global Platform for a New Era of Collaboration

Complexity and uncertainty are hallmarks of the early 21<sup>st</sup> century, as recent developments in the global financial markets demonstrate all too vividly. Responses to the financial crisis have prominently featured demands for global coordination. Our economic woes, however, are dwarfed by the increasing threats of climate change and environmental degradation—and their attendant miseries, such as pandemics and poverty. Unprecedented global coordination and collaboration are the only ways to address these environmental dangers.

Actionable consensus on addressing climate change is now evident in public policy announcements from global leaders, and in the coalescing of private and public opinion that the world needs to address quickly and decisively the varied perils created by man-made climate change. At the World Economic Forum in 2009, public and private sector leaders outlined three basic requirements for mitigating and adapting to changing climate: (1) targets for countries that effectively put a price on carbon; (2) large-scale predictable and sustainable financing for mitigation and adaptation strategies, and, critically (3) the creation of a globally trusted mechanism for measurement, reporting, and verification (MRV).

While measurement is third on the list, it is the essential precondition to any creation of value, or to unlock financial flows. The simple axiom that “you can’t manage what you can’t measure” holds true—especially for the most complex challenges.

### “Flying Blind” in a Complex and Volatile World

Moving to a low-carbon economy and adapting to the large-scale risks associated with climate change (and the implied changes to production and consumption) requires a range of actors, including governments, corporations, research institutions, nongovernmental organizations (NGOs), and communities. Such a profound and far-reaching change requires literally billions of small and large decisions, taken one at a time. Currently, the players are forced to make these decisions with only partial knowledge of options, benefits, costs, and risks of their decisions in an environment of increasing complexity and uncertainty. The decision-makers are, in essence, “flying blind.” At global and local levels, they lack a “trusted MRV decision information infrastructure” for mitigation of, and adaptation to, climate change. This is particularly true in relation to:

- *Managing resources* (energy, biomass, food, water, land, waste, infrastructure) productively and effectively
- *Managing risks* (climate change-related risks from rising sea levels affecting coastal infrastructures, drought-related crop yield reductions, disease proliferation and pandemics, and so on)
- *Managing new environmental markets* (carbon, water, biodiversity)

*Planetary Skin* is an innovative platform that meets the need for “a trusted MRV decision information infrastructure.” A massive global system that monitors environmental conditions, *Planetary Skin* enables effective decision-making in the private / public sectors and in communities by providing data collected from a myriad of sources, including space,

airborne, maritime, terrestrial, and people-based sensor networks. This data is analyzed, verified, and reported over an intelligent Web 2.0 network platform.

## A Global Nervous System

The Planetary Skin platform can be thought of as a globally pervasive “nervous system,” assimilating disparate and siloed data sets held in public and private enterprise resource planning (ERP) systems. It also analyzes data originating from airborne and terrestrial sensor networks located around the world (*SensorFabric*). These, in turn, are connected to a Web 2.0 mashup of decision-support tools (*DecisionSpaces*). These tools facilitate proactive management of resources, risks, and new environmental markets, enabling innovation by private sector entrepreneurs, next-generation regulatory agencies, and social entrepreneurs (*CommonSpaces*).

Together, the three interlocking subsystems of Planetary Skin—*SensorFabric*, *DecisionSpaces*, and *CommonSpaces*—make up the platform for global environmental situational awareness, an early warning system, informed decision-making, and connection with new markets and sources of funding to transition to a low-carbon economy.

Today, a vast amount of data is collected daily from millions of sources across the globe, and then stored in millions of disparate silos. The proliferation of additional data created by the “Internet of things”—where all sensors and machines that *can* be IP-enabled *will be*—can only grow the amount of data exponentially. So the problem is not the amount of data; it is that the data is isolated from other data and inputs, and cannot provide meaningful insights for decision-making and action.

Planetary Skin will directly address this situation by providing a common platform for integrating data; scientific, economic and risk models; data processing and communication networks; and visualization and collaboration tools. This is a global first: a unique public/private research and development collaboration led by the Cisco Internet Business Solutions Group (IBSG) and NASA that harnesses the power of existing technology and capabilities to create the MRV “information infrastructure” needed to successfully address the many challenges of climate change.

## A “System of Systems”

Planetary Skin is a global, collaborative platform. The plug-and-play nature of the platform will allow other players in the public, private, and NGO sectors, and in the research community, to contribute their expertise at different layers of the architecture.

Planetary Skin takes a “system of systems” approach with common architectural components geared toward creating maximum reuse and effectiveness. This approach enables a combination of regional, national, and local “skins” focused on different capabilities and themes. For example, “Rainforest Skin” will focus on tropical rainforest deforestation, while “Urban Skin” will focus on enabling citywide aggregation of energy service companies (ESCOs), integrated renewable energy supply chain risk management, and seamless connection to—and integration with—carbon markets.

Planetary Skin can also be seen as an essential global public good “utility,” providing the key MRV capabilities required to successfully implement a global deal on mitigation of, and adaptation to, climate change. It creates the trusted decision information infrastructure to *enable* large financial flows to decarbonize the global economy, capture the massive energy efficiency opportunity, expand and conserve global carbon sinks, and adapt to potential catastrophic climate change risks.

Multiple Planetary Skin deployments will take advantage of collaboration environments for dynamic, distributed decision-making approaches. These will provide a common fabric that connects people, processes, and knowledge to enable faster and better decision-making. It will connect all nodes on the network—sensors, data, machines, objects, and people—in an intuitive environment that harnesses the collective intelligence of multiple disciplines and sectors to achieve its mission. It will focus on distributed capabilities for improving communities’ decision-making through techniques that connect decision-makers to a rich, distributed, complex, immersive, and real-time flow of ideas, information, interactions, and feedback. This is required to provide a huge deployment of trusted and reputable open standards-based capabilities with transparent access, auditability, and low transaction costs.

## Prototyping Rainforest Skin

The first prototype of the Planetary Skin concept will focus on tropical rainforests. The reason for this is simply that arresting deforestation is the best opportunity to halt—and perhaps even reverse—the growth of greenhouse gas emissions.

Maintaining and expanding global rural carbon sinks (e.g., related to forestry and agriculture) would contribute more than half of the total cost-effective mitigation of carbon emissions required to reach 2020 targets. In other words, cost-effective carbon sink management would contribute more to lowering greenhouse gas levels than the combined impact of current global decarbonization of energy supplies and energy efficiency measures. The problem today is that, measured solely in terms of monetary value, trees in the rainforests are worth more dead than alive. Reversing that requires capturing the true value of the carbon sink that rainforests provide.

It’s estimated that the economic value of eliminating deforestation is in excess of US\$400 billion per year<sup>1</sup>. In contrast, funding the associated opportunity, monitoring, protection, and transaction costs are likely to be in the range of US\$40 billion per year. This opportunity for high returns is ripe for innovation through the creation of a “Rainforest Skin.” This will take the form of an open network platform for real-time, highly distributed mass remote sensing, authentication, risk-profiling, certification, and monitoring of carbon stocks and flows that generates trust and enables collaboration among the players in all sectors. This platform will use a mashup of geo-referenced satellite, unmanned aerial vehicle, and multiple ground-based sensor networks to estimate the forest’s carbon stock and flow dynamics, and then allow for trading in—and risk management of—this new commodity.

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<sup>1</sup>“Cambridge/Cisco Policy Assessment for Deforestation (CCPAD) Integrated Assessment Model,” Chris Hope and Juan Carlos Castilla-Rubio, Sept. 2008; “Climate Change: Financing Global Forests,” Johan Eliasch, Report to the Prime Minister of the United Kingdom, Oct. 14, 2008, UK.

Focusing on rainforests as an initial test bed for Planetary Skin research and development offers two major opportunities for valuable lessons that will help inform and accelerate subsequent developments:

- The first opportunity arises from the ability to learn about the numerous optimal approaches and tools to drive replication and scaling of the program. Inaugurating Rainforest Skin will involve prototyping the “system of systems” approach, co-developing the three tiers of the architecture, and thereby expanding and enriching understanding of the likely gaps and associated challenges.
- The second opportunity springs from the number of subsystems that must be analyzed and modeled (biomass, water, carbon, land use, and so on) in a rainforest test bed. Experience gained from each of these will help direct subsequent approaches to specific issues such as integrated water management (“Water Skin”), food productivity management (“Food Skin”), and so on, accelerating the development of work in each of these areas.

## Governance and Funding to Scale and Replicate Globally

Replication and scaling of the Planetary Skin platform will critically require co-developing the open, trusted, multi-stakeholder, auditable international governance models that are required, with all the relevant stakeholders.

Large public, private, and not-for-profit investment flows are required to replicate and scale Planetary Skin, and each of the three layers of Planetary Skin lends itself to different approaches to funding and governance. As a global public good, the first layer—the *SensorFabric*—requires public investment on a large scale in science, applied R&D, and earth observation capabilities. The second layer, *DecisionSpaces*, requires a wide array of skills, assets, and capabilities that suggest public-private partnerships. The third layer, *CommonSpaces*, encourages entrepreneurial activity; this will come from emerging social and private sector entrepreneurs, as well as from next-generation regulatory agencies.

## The Prize

As part of economic stimulus packages, global public investments to adopt mitigation and adaptation strategies to address climate change are estimated at US\$430 billion to date.

The success or failure of those investments rests on the decision-making capabilities that will underpin how and where they are deployed. Planetary Skin offers the promise of maximizing the impact and returns available from those investments.

Estimates suggest that if Planetary Skin is enacted globally, it will generate billions of dollars of wealth for the world’s population—crucially, much of it in the poorest nations likely to endure the harshest impacts from climate change. Roughly speaking, the value of the low-carbon infrastructure CapEx unlocked by Planetary Skin capabilities would increase global GDP by 1 percent (US\$450 billion) in the period of 2010-2020. The potential 1 percent global GDP boost should have the potential to decrease unemployment by 1 percent during a slack labor market.

## Call to Action: Global Collaboration Imperative

For many years, world-class research institutions, public sector organizations, NGOs, scientific organizations, space agencies, think tanks, universities and corporations from around the world, and multiple international organizations have been developing specific data sets, cross-disciplinary research, models, components, tools, applications, and technologies that are required to develop, replicate, and scale the Planetary Skin platform.

For the last year or so, Cisco IBSG and NASA have been collaborating to conceptualize, research, and co-develop the strategy and plans underpinning the Planetary Skin initiative. NASA and Cisco IBSG are now embarking on a multiyear R&D public-private partnership to develop pilot programs in preparation for rapid replication and global scaling of Planetary Skin's capabilities.

The plug-and-play nature of the Planetary Skin network platform will allow other players in the public and private sectors and in the research and NGO communities to contribute at different layers of the architecture. This process relies on end-to-end transparency, mutual trust, and an unimpeded flow of information across all sectors and institutional borders, on a scale and at a speed that the world has not yet seen.

The Planetary Skin program is just one step in a global "call to action" to which we all must respond. Global, cross-sectoral, multi-disciplinary collaborations are required to develop, replicate, and scale Planetary Skin capabilities. To achieve this at the required speed, we must be able to develop the appropriate governance, regulatory, business, and funding models. Global collaborations are the DNA of the Planetary Skin program. No single enterprise, government, research institution, NGO, or university holds the key to progress. It is only in combination that the tremendous promise of addressing the climate change challenge will be realized.

For more information on Planetary Skin, please contact:

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### More Information

The Cisco Internet Business Solutions Group (IBSG), the global strategic consulting arm of Cisco, helps CXOs and public sector leaders transform their organizations—first by designing innovative business processes, and then by integrating advanced technologies into visionary roadmaps that address key CXO concerns.

For further information about IBSG, visit <http://www.cisco.com/go/ibsg>.

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