COMMUNICATION FOR CLIMATE CHANGE 2.0

Conference Technical Report

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CONNECT 4CLIMATE

I. BACKGROUND

While technical information about climate change and its impacts on human welfare has become increasingly available in the form of scientific observations and probabilistic forecasts, many individual decision makers and organizations are not using this information to take preventative action. Behavioral scientists are well aware of the difficulties that individuals and groups have in processing and responding effectively to the information available surrounding complex societal challenges, and this is no less true for the issue of climate change.

Recent conservation efforts have drawn upon lessons from the behavioral sciences to gain a deeper understanding of the psychology behind environmental decision-making, particularly regarding why individuals often fail to understand the risks associated with the issue, and fail to make pro-environmental decisions. As such, it may be particularly helpful to invoke the expertise of behavioral scientists that are specifically trained to understand how people actually make decisions under risk, uncertainty, and time delay.

Their insights show us the following: the *motivation* to act is needed just as much, if not more, than information about climate change. We need more information about effective and feasible response options, as well as their immediate and long-term costs and benefits. Merely being *aware* of climate change risks does not in and of itself predict that actions will be taken to reduce greenhouse gas emissions or support policies aimed at achieving a sustainable future. Other dimensions will need to be communicated using analytic and other media and channels.

Climate change can only be addressed by coupling factual information with improved methods of communication that take into account how the human mind (homo sapiens, not the rational homo economicus decision maker) thinks about climate risks.

Climate change poses a fundamental threat to medium and long-term social and economic well-being and social development. Without bold action to reduce the risks, climate change impacts are likely to undermine the fight against poverty, put prosperity out of reach for millions, and exacerbate inequality for decades to come.

The World Bank Group has been integrating climate change considerations into its investment and operations decisions over the past decade, from setting strategic climate priorities across its sectors to helping clients manage risk. The World Bank screens all country strategies and operations in the poorest countries for disaster and climate risk. It tracks the impact of its investments on climate mitigation and adaptation, and the World Bank is working with the other multilateral development banks to develop harmonized accounting methods for better analysis. In assessing new projects, it uses greenhouse gas accounting in a growing number of sectors and uses an internal carbon price. The result has been a shift in the World Bank Group's portfolio toward cleaner, more resilient activities.

The World Bank's Global Engagement team builds partnerships and manages relationships with the private sector, civil society, faith-based organizations, foundations, and parliamentarians

around the world. Global Engagement develops high-impact campaigns, events and advocacy initiatives to drive awareness of institutional priorities, foster debate and mobilize action, including End Poverty 2030 and Connect4Climate.

Connect4Climate is an interactive, open knowledge platform designed to galvanize global action around climate change. It was launched by the World Bank Group and the Italian Ministry of Environment Land and Sea, and is also supported by the German Ministry for Economic Cooperation and Development. Since its launch in 2011, Connect4Climate has built a strong network of hundreds of partners committed to climate change communication and action. Connect4Climate brings together an aggregate online community of more than one million users engaged in climate change dialogue, sharing climate knowledge, and advancing climate solutions.

Program Manager Lucia Grenna explains Connect4Climate by referencing the World Bank president: "*As Jim Yong Kim has said, 'to deliver bold solutions on climate change, we need to listen to and engage broader and more diverse audiences.' This is what the Connect4Climate team has set out to do. We have set up a number of creative initiatives that target audiences in the most diverse sectors, including film, sport, fashion, music, design, and education*."

Connect4Climate and the Center for Research on Environmental Decisions at the Earth Institute, Columbia University

The World Bank Group's Connect4Climate program has many academic partners, including Columbia University's Center for Research on Environmental Decisions (CRED). Columbia University and its Earth Institute (EI) have been leaders in developing physical and social science-based solutions to climate change that draw on a broad multidisciplinary expertise in climate science, ecology, engineering, psychology, anthropology, economics, and other key sustainable development areas.

Columbia University has been at the forefront of sustainability science, climate change research, and science-based solutions across a broad range of disciplines and dimensions. In 1995, Columbia created the Earth Institute, which brings together the physical and social sciences as well as engineering. The Institute studies the challenges facing our planet, and proposes integrative and systemic solutions. Its climate scientists study the effects of increased temperatures and atmospheric carbon dioxide on the world's oceans and weather patterns, while its engineers are seeking ways to produce cleaner energy and find ways to remove carbon from the air.

Its social scientists, policy experts and lawyers are studying human decision processes, motivations, and behavior in the face of environmental, social, economic, and technological change. They put this knowledge to use in the design of decision environments that allow decision makers to achieve long-term goals, and in the design of effective policies that can address and reduce climate change risks. Columbia's research activities and resulting strategies and interventions produce tools needed for regional, state, national, and international

adaptation and mitigation programs. Among many other innovative strategies, a senior cohort of Columbia faculty is studying the use of engagement with sports as a tool for social and sustainable development. This emerging field offers an opportunity for global impact on poverty alleviation and environmental sustainability by utilizing behavioral science theory and insights.

CRED is an interdisciplinary research center within the EI that studies individual and group decision making under climate uncertainty and decision making in the face of environmental risk. CRED's objectives are to address the human responses to climate change and climate variability as well as improve communication and increased use of scientific information on climate variability and change. In addition to advancing fundamental theory in psychology, behavioral economics, and other social science disciplines, CRED researchers work on integrated field projects around the world, where decision science is brought to bear on sustainable development challenges (e.g., agricultural decisions and water management).

CRED was established in 2005 as one of four centers under the National Science Foundation (NSF) Decision Making Under Uncertainty (DMUU) program. In collaboration with ecoAmerica, CRED has recently published "Connecting to Climate: A Guide to Effective Climate Change Communication," its second climate communication guide. CRED's first guide, "The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public," published in 2009, has been distributed to over 30,000 individuals and organizations and translated into three different languages.

CRED's Co-Director, Dr. Elke Weber, a Columbia University faculty member in the Business School, the Psychology Department, and the Earth Institute, explains that CRED has been creating a better understanding of the challenges that uncertainty places on human perception and action and has been using these insights to create social-science knowledge-based climate change communication designed to trigger action.

Prof. Weber and the Program Manager of Connect4Climate, Lucia Grenna, identified collaborative opportunities, centered in decision and behavioral science-based research and communication and a global network. Such efforts would multiply the effectiveness of existing communication and policy tools and direct development towards a more sustainable future in ways that will promote both environmental sustainability and economic development (e.g., social welfare, equality, and poverty reduction).

II. COMMUNICATION FOR CLIMATE CHANGE 2.0

In our pursuit of sustainable growth and well-being, we—members of the human species—continuously make decisions (big and small, about transportation, energy, land use, etc.) that affect the climate on planet Earth. Anthropogenic emissions of greenhouse gases are changing the heat balance of the Earth, and resulting changes in precipitation patterns, temperature extremes, rising sea levels and storm surges will impact future well-being and development. The dynamic interaction between humans and climate is not new, but the scale of the interaction has reached unprecedented proportions, and many scientists have even started referring to our current geological epoch as the Anthropocene.[1]

The need for the effective communication of meaningful solutions that address anthropogenic climate change is more urgent than ever. Climate researchers, communicators, political and thought leaders are still grappling with how to help citizens find actionable paths forward and overcome the social, political, psychological and emotional barriers that have hindered progress on climate solutions. To connect with audiences and unlock success, climate change communicators need to shift their approach beyond simply providing people with facts about the issue. Instead, they need to connect with people's values and worldviews and put solutions at the forefront to make climate change personally relevant.[2]

Thus, Connect4Climate and CRED organized the **"Communication for Climate Change 2.0"** Conference on April 15, 2015, bringing together a multidisciplinary group of scholars and thought leaders from different sectors to present information to a broad audience. CRED's contributions were based on the expertise of its researchers present at the event, as well as its two published climate change communication guides. The insight discussed at the conference involved strategies to boost engagement, common communication mistakes to avoid, and best practices that organizations have used to meaningfully engage individuals and groups on climate change.

Experts in the field of climate and sustainability communications were identified from Connect4Climate and CRED's networks and beyond. The interdisciplinary, global representation of participants was recruited from the private sector, civil society, international organizations and academia.

This report provides a summary of the conference content and sidebar examples are included to make connections to specific research insights. The report will also guide the kickoff of the establishment of a "Knowledge Network for Climate Change Action," promoting educational activities and fostering research-based engagement and action initiatives on climate change communication.

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[1] Earth Institute, Columbia University. Retrieved from http://www.earth.columbia.edu/articles/view/2124

[2] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C.

III. INTRODUCTIONS

Max Edkins, Climate Expert – Connect4Climate, World Bank Group

Edkins acted as Master of Ceremony for the Communication for Climate Change 2.0 event at the World Bank Group. He introduced the structure of the discussions, welcomed participants, discussion lead Prof. Elke Weber, moderator Dr. Adam Bumpus and special guests. He explained that the event was supporting Connect4Climate's work to create a diverse international committee to advance research and best practices on climate change communications and part of the World Bank Group's Spring Meetings program. The program would feature knowledge sharing and engagement methods, knowledge management and communications experiences, and strategies to measure impact.

Rachel Kyte, Vice President and Special Envoy for Climate Change, World Bank Group

After introducing the World Bank's work on poverty alleviation and climate change, Kyte focused on the kind of messages we need to communicate, both in content and in format. She also posed some critical questions: How do we communicate when climate change is still a difficult issue for people to understand? How do we communicate trends, particularly as we have not internalized the size of the struggle? Through the appropriate communication strategy (i.e. one promoting urgency and humility), the World Bank can advance the work on poverty and climate change while fostering appropriate global partnerships.

In order to solve the challenges that climate change creates, as well as other critical issues the world is facing, we need multiple sectors to collaborate. We need an "all-hands-on-deck" approach since climate change touches everything we do. Through innovative partnerships that are effective and efficient, people from all backgrounds and disciplines can help address climate change.

Sidebar 1: Climate Change & Global Perception of Risk

Climate change is a threat to human societies and natural ecosystems, yet public opinion research finds that public awareness and concern vary greatly. Using a global survey of 119 countries, researchers determined the relative influence of socio-demographic characteristics, geography, perceived well-being, and beliefs on the degree of climate change awareness and risk perceptions. Globally, educational attainment is the single strongest predictor of climate change awareness. Understanding the anthropogenic cause of climate change is the strongest predictor of climate change risk perceptions, particularly in Latin America and Europe, whereas perception of local temperature change is the strongest predictor in many African and Asian countries. However, other key factors associated with public awareness and risk perceptions highlight the need to develop tailored climate communication strategies for individual nations. The findings suggest that improving basic education, climate literacy, and public understanding of the local dimensions of climate change are crucial to public engagement and support for climate action. These findings are a useful tool for international practitioners because they will help better inform country-specific communication.[3]

Lucia Grenna, Program Manager – Connect4Climate, World Bank Group

Grenna began by stating how "*we are faced by this generation's challenge, to take on climate change. If we do not, we will not be able to end poverty and promote shared prosperity, the twin goals of the World Bank… We know the science is true, we know climate change is real and we know what we have to do, but how do we get people to act? We need to shift behavior, and for me the most effective tool for that is communication*." Grenna highlighted that "*industries base their choices on consumers, politicians respond to their voters; it boils down to individual action. Now is the time to create social currency and political capital for climate action… We can harness a level of global intelligence, particularly with young people who have a fresh look and*

[3] Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C. Y., & Leiserowitz, A. A. (2015). Predictors of public climate change awareness and risk perception around the world. *Nature Climate Change*, *5*(11), 1014-1020.

are driven to make changes. They will influence their parents and help them become sustainable."

Sidebar 2: **Simple Individual and Collective Efforts Add Up**

Climate change is a global challenge that impacts every sector of life. Understanding what is successful or unsuccessful in communicating about the issue is essential to motivating action. Research shows that motivating people to act by focusing on positive solutions and opportunities can make it easier for people to accept that climate change exists.[4] For example, emphasizing the impact that people can have – their personal and collective efficacy – determines how they respond to climate change. People often feel daunted by the size of solutions required to address climate change and think that the contribution of any one group or sector is too small to make a real difference.[5] But small efforts on an individual basis can add up. There is no silver bullet for addressing climate change. Even with large-scale solutions like a carbon tax or international agreement to reduce greenhouse gas emissions, action across many different fronts is still needed.[6] For example, household behavior can make a substantial difference in reducing greenhouse gas emissions. In the United States' household sector, researchers estimate a Reasonably Achievable Emissions Reduction (RAER) of 123 million tons of carbon. This is equivalent to the annual emissions of France, or the total emissions of the petroleum refining, iron, steel, and aluminum industries combined in the United States. The majority of this potential emission reduction would come from adoption of energy efficient technologies.[7] Reduced energy usage also matters, but does not have as much of an impact as the use of energy efficient technologies.[8] Policy support that corrects the frequent misperceptions that people have about what uses or saves the most energy is essential to encouraging individual change. Communication should focus on the effective and credible solutions that do accumulate and scale up.[9]

Kathleen Rogers, President, Earth Day Network President (EDN)

Rogers announced EDN's 2015 event, on the 45th Anniversary of Earth Day, to take place at the National Mall in Washington D.C. Since 1970, EDN has been engaged in climate activism and environmental protection as a key force in the establishment of critical environmental laws such as the Clean Air Act, Clean Water Act and Endangered Species Act. The 2015 Earth Day event combined efforts on poverty and development as well as climate change. Bringing these diverse issues together is not easy, as they are often at odds. Therefore, the commitment and engagement of all is needed on the Earth Day stage, including environmental experts, financial

[4] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C.

[5] Ibid

[6] Bell, R.G., Weber, E.U. (2015, April 22). Opinion: Earth Day, climate change, and the god of small things. *Environmental Health News.*

[7] Dietz, T., Gardner, G. T., Gilligan, J., Stern, P. C., & Vandenbergh, M. P. (2009). Household actions can provide a behavioral wedge to rapidly reduce US carbon emissions. *Proceedings of the National Academy of Sciences*, *106* (44), 18452-18456.

[8] Dietz, T., Stern, P., & Weber, E. U. (2013). Reducing carbon-based energy consumption through changes in household behavior. *Daedalus, 142*, 1-12

[9] Shahzeen Z. Attari, Michael L. DeKay, Cliff I. Davidson, and Wändi Bruine de Bruin (2010) Public perceptions of energy consumption and savings. *Proceedings of the National Academy of Sciences, 107*(37), 16504–16059

officials, celebrities, and the international public. To tie into one of the most downloaded games in the world "Angry Birds," Rogers announced EDN's "Angry Birds Climate Change" game, a fun, knowledge-based platform that can engage many segments of the population.

Sidebar 3: Games & Climate Change Education

Games are natural tools for scientists, educators and policymakers to use in educating and engaging the public on climate change. Games can engross players and place them in climate-centered scenarios by providing 'designed experiences' where people can learn through doing and being, rather than absorbing information from traditional lecture formats. Decision science has demonstrated that first-hand experience is a better teacher than exposure to information because it triggers affective responses. New technologies are creating opportunities for civic engagement and gameplay, in particular, which may be uniquely positioned to foster trust and empathy during community planning and development meetings. Future research is needed to determine whether game play can result in long-term, observable behavioral changes, and if they may affect players' attitudes regarding environmental policy or scientific explanations of climate processes (e.g. moving beyond political ideologies and distrust of scientific information), which can promote civic engagement around climate change.[10]

Elke Weber, Co-Director – CRED, Columbia University

There is a narrow window of opportunity to address climate change and prevent widespread catastrophic impacts. Our earth will get warmer, but we can determine whether that will remain at levels that are somewhat manageable or at levels that have deleterious and irreversible consequences. If we don't act now to dramatically change our behavior, present and future generations will suffer from our actions. Why then, are we failing at protecting the world from global warming?

The answer, Prof. Elke Weber argued, can be found within ourselves. Climate change, as she sees it, is the "perfect storm" of human decision-making challenges. A wealth of prior research has investigated numerous factors that impede individuals from following through with their intentions. For climate change, many of these psychological obstacles collectively constrain engagement. As an example, addressing climate change requires investing money now for long-term benefits. Theories of choices that differ in time horizons (e.g., being immediately available or only available in the future) predict that we should discount future consequences consistently and moderately.

Instead, behavioral science confirms that we disproportionally discount future benefits, such that investments that may pay off in the future are discouraged. This is especially pertinent in the case of global warming, where necessary investments must be made up front, but the pay-offs stretch far into the future. Climate change poses an additional challenge: the size and degree of the pay-off is uncertain, as we can neither adequately calculate nor comprehend the

[10] Wu, J. S., & Lee, J. J. (2015). Climate change games as tools for education and engagement. *Nature Climate Change*, *5*(5), 413-418.

extent of the damages we will be incurring in the future if we do not make immediately necessary investments. Hence, individuals deciding to invest in climate change mitigation may be discouraged to do so because the expected benefit of their decision is unknown, whereas the investments are concrete and certain.

The solutions to motivate action on climate change apply equally to other social problems, such as insufficient pension savings or the obesity epidemic. The challenges of cognitive myopia and wishful thinking, though far from unique to climate change, are especially forceful in this domain. The potential damage from business as usual can be catastrophically large. We have an obligation to do what we can to overcome our human decision challenges and protect ourselves and future generations against irreversible climate disasters.

IV. MAIN CONFERENCE DISCUSSIONS

The conference then pursued three critical issues connected to Climate Change Communication, with contributions from the distinguished set of participants. Group discussion of each issue was prompted by a guiding question. The sections below provide introductory context for each topic and summarize the various contributions by speakers.

1. Knowledge Sharing & Engagement Methods

How can practitioners make climate science meaningful and how can they better communicate this information to the general public, a global and diverse audience? How can practitioners motivate engagement?

People around the world have very different responses to climate change information, partly due to their worldviews and the identities and values that they hold. Most of the time, people seek out information that supports their existing beliefs and values, and reject information that contradicts those beliefs. Communicators can boost engagement by tailoring their communication strategies to the worldviews, identities, and values of their audiences. For example, someone who holds an individualistic worldview and favors self-reliance might react positively to a message that focuses on the capacity to take action on one's own.[11]

Practitioners must also recognize that climate science can be very challenging for a lay audience to understand, because many people are not familiar with the scientific terms used to describe climate processes and events. Various techniques can be employed to help practitioners motivate engagement, such as connecting climate change to issues that matter to audiences,[12] emphasizing solutions and benefits of acting on climate,[13] translating scientific data into concrete experience,[14] and encouraging group participation.[15] The speakers in this section highlight beneficial techniques used to motivate engagement, such as encouraging group participation in decision-making processes, fostering effective engagement, and tailoring communication to individual differences.

[11] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C., p.9
[12] Ibid, p. 35
[13] Ibid, p. 22
[14] Center for Research on Environmental Decisions. (2009). *The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public*. New York. Available from guide.cred.columbia.edu, p. 14
[15] Ibid, p. 33; Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication.* New York and Washington, D.C., p.16

Joelle Auffray and Adam Geoffrey Bumpus, Apidae Development Innovations Pty Ltd.

Apidae's mission is to help organizations showcase the value and impact of their sustainable development investments, covering a wide range of issues, stakeholders and initiatives.[16] Auffray stressed the power of participatory processes. She presented a community program for students from the Pacific, which involved students communicating the issue of climate change into a human issue through creative means: video, radio, and print. Students from Fiji, Samoa, Vanuatu, and other islands created 21 pieces of media to depict their views on climate change to policy makers. We need to create more such bottom-up, grass-roots communication messages that show that people can connect and take action on climate change.

Sidebar 4: Participatory Process in Developing Regions to Communicate Climate Information

Over the last decade, CRED researchers have been studying participatory, group processes in a variety of settings to understand how they affect the processing of climate information. For example, in Uganda, discussion within farmers' groups facilitated the understanding of probabilistic seasonal rainfall forecasts by allowing members to pool their ideas and to plan appropriate responses. This resulted in greater use of forecasts in agricultural decisions by group members, compared with farmers who did not participate in the group discussions. Farmers in Argentina also found value in group discussions of forecasts and other topics to improve their farming. Participatory processes have an important impact on decision making and can be valuable for sharing information or preferences, particularly in settings that have traditionally lacked equal access to information and that are often shaped by the strategic use of uncertainty. In all of these cases, group context eased the problems commonly found in understanding and using uncertainty.[17]

[16] Apidae | Sustainable Development Experts. (2015). Retrieved November 2, 2015, from http://www.apidae.com.au/

[17] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C., p.57

Teddy Ruge, TerrAfrica

Ruge commended the COMMUNICATION FOR CLIMATE CHANGE 2.0 event for covering developing angles and regions of the globe, as we urgently need effective engagement, communication and solutions for the developing world. Present in 24 Sub-Saharan countries, TerrAfrica's focuses on solutions to sustain landscapes, address land and water degradation and adapt to a changing climate. The work program focuses on country-level activities that improve investment programming and implementation, while reinforcing country leadership on the land agenda. This sustainable land management agenda is defined by TerrAfrica as "*the adoption of land use systems that, through appropriate management practices, enables land users to maximize the economic and social benefits from the land while maintaining or enhancing the ecological support functions of the land resources*."[18] The work of organizations like the World Bank, Apidae, and TerrAfrica must be supported and expanded upon through a communication of long-term vision to involve communities and foster local engagement.

Rita Ricobelli, Sabine Marx, and Jon Jachimowicz, Columbia University

Ricobelli, Marx, and others at CRED have been working on innovative and engaging methods of sustainability communication. The wide availability of scientific information on climate change is not always sufficient for action. It is critical to consider the cognitive, affective, and social aspects that influence if and how people use information on climate change and other key environmental issues. We need to improve community relations and decision-making processes while leveraging the power of social affiliations, such as those generated by sports and art.

Sports have a unique capacity to communicate to massive audiences. But, we need to understand how to better leverage this capacity. One important way that sports engage people

[18] TerrAfrica. (2013, June 16). TerrAfrica - Regional Sustainable Land and Water Management. Retrieved November 2, 2015, from http://terrafrica.org/about/

is through the social identities and social networks that emerge through their team affiliations, through which fans gain a sense of belonging and community. Moreover, sports' networks can promote and strengthen connections among members of a group, and can provide entry points for tapping into group identity. People often think and behave differently when they're physically part of a group or reminded of their membership in a group. When people make decisions or process information as part of a group, goals that promote outcomes that are good for the collective, rather than the individual, are activated. These effects are driven by a number of mechanisms unique to group settings, including an enhanced sense of connection with other people, an increased tendency to follow the group's norms, a weakened focus on personal identities and goals, and the desire to conform to social norms and to avoid exclusion.[19]

Sidebar 5: Sports and Arts for Climate Change Awareness and Action

The social dimension of sports engagement stands out as one promising way that sports and sustainability can be interrelated, but research is needed to provide empirical evidence of these hypothesized processes and results. The same applies to leveraging art in addressing climate change. Peer-reviewed literature on these issues is needed to document and communicate art's effectiveness for engaging people on climate issues. CRED hopes to help fill this salient gap in the literature. An empirical investigation of the mechanism by which art and sports contribute to increased knowledge and behavior change relating to climate change is important because it will demonstrate how to use these platforms as tools to successfully engage people.[20] [21] [22]

Jachimowicz presented ongoing research at Columbia Business School examining individual differences as well as situational determinants that predict whether or not people engage in behaviors that support pro-environmental goals. Even if individuals have intentions to behave in ways that support the environment, they may not always engage in behaviors that support these goals. For example, pro-environmental behaviors like paying a fee to offset the carbon emissions of a flight often require a long-term mind-set: the costs for engaging in pro-environmental behaviors are often immediate, whereas the payoffs are in the long-term, and uncertain in their pay-off value. Individuals who discount future rewards less heavily are more likely to engage in pro-environmental behaviors, in part because the pain of immediate payments stands in better comparison to the value of future payoffs.

Similarly, levels of community trust that individuals have can provide greater value for future payoffs, because the investments into the future benefit the community as a whole. The more an individual trusts his or her community, the more he or she may value investments to the environment, and therefore, the more likely they are to follow through with their pro-

[19] Ibid, p.16

[20] Weber, E., Bauman, I., & Eliasson, O. (2014, October 23). Can art inspire climate change action? An ice installation aims to do just that. Retrieved October 28, 2015, from http://www.theguardian.com/sustainable-business/2014/oct/23/climate-change-ice-watch-installation-art-greenland-copenhagen-ipcc

[21] Bilodeau, C. (2015, February 1). American Theatre – February 2015. Retrieved October 28, 2015, from http://www.tcg.org/publications/at/issue/featuredstory.cfm?story=9&indexID=29

[22] Chameides, B. (2014, January 24). Art Makes Environmental Change Real - Conservation. Retrieved October 28, 2015, from http://conservationmagazine.org/2014/01/art-makes-environmental-change-real/

environmental intentions.[23] The question is whether there are ways to increase the level of trust in some way. One method currently being investigated is through community-level sports programs, which introduce continuity and predictability into the lives of inner city youth and adults, and in the process build trust and, in turn, influence the extent to which they discount future rewards.

Sidebar 6: The Future & the Role of Uncertainty in Climate Change Communication

At its core, human decision-making deals with uncertainty. While people may be uncomfortable when confronted with uncertain situations or information, they are also experts at taking action under such conditions. Take the example of the daily weather forecast. Despite the fact that people tend to misinterpret probabilities and percentages, many people have little trouble translating a 60 percent chance of rain into concrete action (such as taking an umbrella outside). As a result, communicators may need to recognize these uncertainties. In fact, research suggests that acknowledging uncertainty at the beginning of a climate communication message can increase people's willingness to engage with the issue. Uncertainty on its own is not necessarily a barrier to engagement or action. Rather, it is the implied and perceived implications of uncertainties that can make engagement challenging.[24]

Donaldo Ranvaud, Creative Producer – Connect4Climate, World Bank Group

Ranvaud highlighted the film industry's important role in educating and changing opinions on climate change, at least as a first step. Filmmakers and actors have a great opportunity to deliver sensitive key messages to a broad audience. Ranvaud is currently supporting Connect4Climate's "Film4Climate" global initiative to develop a concrete plan to mitigate the environmental impact of film production as well as raise awareness about climate change, in an effort to lead by example.

[23] Jachimowicz, J.M., Prabhu, J., Chafik, S. & Weber, E.U. "Community Trust and Temporal Discounting". *Working Paper*.

[24] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C., p.56

He reinforced the key role of filmmakers on climate change communication, even though some filmmakers are unaware that they have contributed to the discourse on environmental issues. He referred to the preview and discussion of the climate action movie "Chloe & Theo," happening at the conclusion of Communication for Climate 2.0, including the film's producer Monica Ord and Martin Katz, President of Prospero Pictures and producer of the film "Hotel Rwanda."

Sidebar 7: Film4Climate

The Harmony Institute has researched and studied the impact of films on various issues, and has launched a free interactive web application, "StoryPilot," which helps filmmakers and change-makers explore the social impact of documentary films, through innovative data analysis and visualization. It provides a holistic view of social issue documentaries through innovative data analysis and visualization; offering an understanding of industry trends, effective impact strategies, and where to find opportunities for innovation. StoryPilot helps to magnify impact by examining how films and outreach campaigns, combined with media, news landscape and events, create various kinds of impact over time and across issues.[25] Connect4Climate has been engaging with the Film Industry to message for climate action and help make the industry low-carbon and sustainable through the Film4Climate initiative.

Elke Weber, Section 1 Conclusion

In combination with many concrete examples, the contributions in this section on knowledge sharing and engagement made several important points. First, we need to empower the broad range of more pedestrian everyday decisions as well as less frequent but more impactful decisions that can lead to a sustainable future by sending positive and optimistic messages, ideally in the form of narratives rather than statistics. Second, we need to engage people in settings that give them space for positive reflection, i.e., through sports, movies, the arts, or other recreational activities. Third, we need to communicate feasible and effective pro-environmental actions. Fourth, reminding people of a long, important, and proud past helps to establish belief in a future worth preserving, and thus the motivation to invest in it through sustainable action now.

[25] Harmony Institute. (2015). StoryPilot - Stories drive change. We show you how. Retrieved November 2, 2015, from http://storypilot.org/home

2. Knowledge Management & Communication

What are the biggest challenges and opportunities in collecting and using accurate knowledge on climate change, particularly knowledge about the psychological, as well as economic, technological, or political barriers to action? What are the opportunities and solutions that exist to help create action?

There are a number of potential barriers that can make it difficult to engage people on climate change. These include how to communicate science and statistics, how to communicate uncertainty, and how to confront climate change denial. Climate change is a complicated phenomenon that involves scientific jargon and statistics that are difficult to understand among lay audiences. In order to successfully engage people on climate issues, complicated concepts need to be translated and made relevant to peoples' everyday lives. An emotional or "affective" response is crucial for engaging with climate change for many people.[26]

The speakers in this session show that there are many opportunities to overcome barriers and create action, including (1) companies business and public entities leading the way to address climate issues, (2) behavioral scientists sharing research insights, and (3) media experts emphasizing the important role that collaborative communications play in addressing climate change.

Based on their recommendations, it is clear that practitioners can create opportunities for action. For example, Laur Fisher from the Massachusetts Institute of Technology Center for Collective Intelligence promoted a platform (www.climatecolab.org) that provides "accessible" information to address problem solving on critical challenges such as climate change. MIT's Climate CoLab provides opportunity for global participation and interaction, including contests

[26] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C.

on a broad range of topics, so that individuals and groups can help communities cope with climate change in their own ways.[27]

Andrea Boragno, Alcantara S.p.A.

Boragno, Alcantara's Chairman and CEO, provided another case of leading by example, in the form of an overview of the textile company Alcantara. Alcantara is an Italian pioneer that became carbon neutral in 2009. Andrea highlighted the firm's success on economic, social, and environmental sustainability. He emphasized the need of the textile (and other) industries in being transparent and overcoming the idea that sustainability is a cost. He proposed that sustainable development is consistent with the long-term goal of increasing a company's value and thus, it should be factored directly into the decision-making process.

Andrew Revkin, New York Times

Journalist Andrew Revkin discussed the need for new ways of communicating climate issues, as he also explains in his New York Time blog post "Exploring the Challenges and Opportunities in the New Communication Climate."[28] This blog discusses the challenges and benefits that come as environmental communication moves to social networks and the Web. He promoted new ways to take data and give it new and fresh meaning to stimulate engagement on critical issues (e.g. online videos and blogs, imagery, and social media networks on twitter and Facebook for certain interest groups. As Revkin stated, "we have an unparalleled opportunity to foster a culture of collaborative communication that can help sustain a thriving, human-populated planet for many, many generations to come."

[27] MIT Center for Collective Intelligence. (2015). Climate Colab. Retrieved November 2, 2015, from http://climatecolab.org/web/guest/about

[28] Revkin, A. (2013, October 3). Exploring the Challenges and Opportunities in the New Communication Climate. Retrieved from http://dotearth.blogs.nytimes.com/2013/10/03/exploring-the-challenges-and-opportunities-in-the-new-communication-climate/?_r=0

Sidebar 8: **Can Images Make Climate Change Tangible?**
Early research shows that imagery can be an effective tool to communicate climate change. There are several types of images that can resonate with audiences. For example, images with people and familiar activities are generally more memorable. Images that show fear or dramatic climate change impacts grab people's attention further, images of people doing everyday things like installing solar panels can promote a sense of personal agency but may not grab people's attention. Communicators can focus on striking a balance between these types of images to grab people's attention and invoke a sense of personal connection without promoting fear. Overall, it is probably best to use images that show how climate change is impacting people and what people can do to address it in their lives.[29]

Maxwell Boykoff, University of Colorado

After providing an introduction on the conditions of engagement and knowledge management that have political and economic ties, Boykoff emphasized the need for active and sustained behavioral engagement. One of Boykoff's projects presented at the event included a summary of 2004-2015 world newspaper coverage of climate change or global warming in six continents, where the resonant themes are "ecological/meteorological – scientific – cultural – political EVENTS and ISSUES."[30] He highlighted a gap between formal sources of science and policy, such as peer reviewed literature and forms of media consumed on a daily basis (e.g., TV, radio, and the Internet). We are missing opportunities to smarten up our communications. Creative climate communications are as important as scientific pursuits.

Courtney St. John and Tien Ming Lee, Columbia University

St. John provided a detailed overview of CRED's latest climate change communication guide, *Connecting on Climate.* This guide was published in 2014 in partnership between CRED and ecoAmerica. It is designed as a follow up to CRED's 2009 guide, *The Psychology of Climate*

[29] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C.,p.42-44
[30] International Collective on Environment, Culture & Politics. (2014). Inside the Greenhouse. Retrieved November 2, 2015, from http://sciencepolicy.colorado.edu/icecaps/research/media_coverage/index.html

Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public. It includes new research and new sections on values, identities, and climate solutions and blends CRED's expertise in psychological and anthropological research with ecoAmerica's research on American values related to climate change and best practices for climate communication. The intended audience is experienced and novice communicators alike and it explains how anyone, from religious leaders, to healthcare professionals, community leaders, businesspeople, journalists, scientists, educators, policymakers, and other interested parties, can better communicate with and engage the American public on the issue.

This guide covers a range of climate communication topics including many topics discussed during the conference, such as information about how to talk about climate solutions, climate impacts, and climate science. It also includes a special focus on how to talk to different audiences about climate change based on their values, worldviews, and identities. The resource is unique in that it is based on scientific research from a range of disciplines and that it bridges research and practice. It both explains what research indicates about people's responses to climate change and provides recommendations about how to best communicate on climate change, based on that research.

Sidebar 9: Mental Models and Public Perception of Climate Change

Scientists rely on quantification because numbers, even when uncertain, provide a consistent language for discussing the changes they are observing in our climate system. Yet most of the public has a hard time understanding and interpreting these numbers.[31] One way to understand how an audience understands scientific phenomena is through their mental models. Mental models are informed by people's understanding of climate change that is often based on things other than scientific fact. For example, a person's mental model may be influenced by past associations with the phrase "global warming," memories of phenomena related to climate change, salient analogies they've heard, intuitive perceptions. Mental models influence what people pay attention to, how they approach problems, and ultimately what actions they take. People update their mental models (usually unconsciously) by correcting misinformation, incorporating new information, and making new connections with existing knowledge. Climate change practitioners can help people to create new models using facts and practices to refine or replace existing ones, and employ strategic messaging to correct wrong information and help people update their assumptions.[32]

Meighen Speiser and Cindy Frei, ecoAmerica

Speiser and Frei discussed climate change communication from ecoAmerica's perspective, which is to grow the base of popular support for climate solutions in America with research-driven marketing, partnerships, and national programs that connect with Americans' core values to bring about and support change. Speiser talked about how the narrative can be changed to be more effective, using as an example the progression of the gay rights narrative in

[31] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C.,p.46

[32] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C., p.47

America to one of marriage equality. She emphasized several lessons learned that communicators can apply to climate change: (1) use storytelling as a way to give people permission to change their minds, (2) offer easy steps on platforms that people use regularly (like Facebook), and (3) stop avoiding key issues associated with climate change.[33]

Vore Gana Seck, Economic, Social and Environmental Council, Senegal

Seck explained how people are locally affected by climate change in Senegal, with houses being inundated due to sea level rise and the lands' yields being negatively impacted by droughts. Therefore, the government in Senegal decided to implement knowledge management mainly from the ground-up, working with journalists and training over four thousand people on how to understand and address climate issues. With examples from success stories in other countries, they are also working on a "law of climate change." Seck suggested that we must learn how to inform, empower and involve local communities. To do so, we need multi-sector collaborations.

Sidebar 10: Index Insurance & Managing Climate Risk in Developing Countries

Scaling up Index Insurance to manage climate risk in the developing world provides lessons about engaging and empowering local communities. Index insurance is an important tool that can allow poor smallholder farmers to better manage climate risk, enabling investment and growth in the agricultural sector. Index insurance differs from traditional indemnity insurance, where payouts are explicitly based on measured loss for a specific client. Instead, in index insurance, farmers can purchase coverage based on an index that is correlated with those losses, such as wind speed, the amount of rain during a certain window of time (weather-based indices) or average yield losses over a larger region (area yield indices).

Financial mechanisms like index insurance are sometimes unfamiliar and may cause confusion or resistance among farmers and other stakeholders. Researchers increase familiarity through interactive exercises and participatory discussion, which also allows financial products to be tailored to the needs of those who will use them. These tools help new social and economic institutions take root, building resilience to climate extremes that can last long after the researchers' involvement. This work can be

[33] EcoAmerica. Retrieved November 2, 2015, from http://ecoamerica.org/

especially effective in communities where adaptation to seasonal and interannual climate variability and longer-term climate change is necessary but unfamiliar.[34]

Examples of countries or regions that have successfully implement index insurance include India, where national index insurance programs have reached over 30 million farmers through a mandatory link with agricultural credit and strong government support. In East Africa (Kenya, Rwanda and Tanzania), the Agriculture and Climate Risk Enterprise (ACRE) has recently scaled up to reach nearly 200,000 farmers, bundling index insurance with agricultural credit and farm inputs. The rapid progress observed in recent years suggests that index insurance has the potential to benefit smallholder farmers at a meaningful scale, and suggests the need to reassess arguments that lack of demand and practical implementation challenges that prevent index-based insurance from being a useful tool to reduce rural poverty.[35]

Elke Weber, Section 2 Conclusion

Several important points were made by the contributions to this section on knowledge management and communication. First, effective communication starts with getting people's attention and holding it. Negative messaging gets attention, but discourages sustained engagement. Second, metrics (like that of a carbon footprint) or readily tracked indicators of progress towards a goal (like the dial on the dashboard of a Prius car) help in keeping people's attention on sustainability goals. Third, more abstract data need to be translated into information that can lead to action. Data on global temperature increases do not help a farmer in Ethiopia or Argentina decide on new types of more drought resistant seed corn, but downscaled and sector-specific forecasts for crucial local temperature or precipitation for the next few growing seasons can be useful. Both the public and private sector should see opportunities to provide such information.

[34] International Research Institute for Climate and Society. Earth Institute, Columbia University. Retrieved November 5, 2015, from http://iri.columbia.edu/our-expertise/financial-instruments/

[35] Creatrex, H., Hansen, J., Garvin, S., Diro, R., Blakeley, S., Le Guen, M., Rao, K. & Osgood, D. (2015). Scaling up index insurance for smallholder farmers: Recent evidence and insights. Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/53101/CCAFS_Report14.pdf

3. Measuring Impact

What are some recent developments in measuring the results of communication, i.e., resulting climate action? How can improvement in strategies to measure impact drive the focus of climate communication to produce climate action over the next 50 years?

Improving climate change communication is ultimately a means to an end for a much larger goal: shifting worldwide behavior and policy to ensure that humans are adapting to and mitigating climate change as effectively as possible. Improving communication in the ways addressed earlier in this report can help people better understand and address the impacts of climate change in their daily lives. In order for practitioners to evaluate these successes, it is crucial to develop measures that track impact and demonstrate effectiveness. The speakers in this section emphasize the importance of a local focus for climate change, which helps to make impacts more visible and can thus be more easily tracked. They also share ideas on how "big data" might help us to measure the effectiveness of our communication strategies.

Andrea Braccialarghe, Building Energy SpA; Max Thabiso Edkins, Connect4Climate

Braccialarghe, Building Energy's Managing Director, emphasized that climate change solutions are local and that we must think outside the box. In order to succeed on companies' accountability, we need strong government guidance and to establish strong multi-sector efforts towards common goals on environmental sustainability. This is illustrated by a Building Energy SpA project and inspirational case study in South Africa: Renewable Energy Independent Power Procurement Programme (REIPPP) looks to compensate not only the power shortage but also unemployment. Building Energy SpA works on climate change and climate wealth, creating jobs and economic development sustainably. It also showcases environmental models in collaboration with Connect4Climate.

Sidebar 11: Climate Change as a Local Threat

Focusing on local impact is key: People are locally and personally affected by climate change, and coping with this phenomenon can create local economic opportunities. However, people have a hard time thinking about—or acting on—things and events that are perceived as far in the future, physically distant, happening to other people, or involving uncertainty. Psychologists refer to these as dimensions of psychological distance. Climate change is a prime example of a psychologically distant phenomenon. Because of this psychological distance, our minds have a hard time engaging with climate change, which can weaken motivation to take action. To overcome these challenges, communicators can use vivid imagery and messages to help people identify the locally relevant, personally experienced consequences and impacts that climate change is already causing. For example, the concept of rising sea levels may feel distant or abstract to many people, even those who live on or near the coast. To make this impact more concrete, communicators can describe future water levels in terms of recent flood events that are vivid and easily imagined.[36]

Helping people identify the local and personally relevant impacts of climate change—including loss of property from intensified extreme weather events and the greater spread of infectious diseases—may go a long way in making the problem salient and urgent for more people. In addition, highlighting people's personal experience with current, local impacts of climate change in general is likely to increase audiences' engagement with the issue more so than communicating additional abstract facts and figures. However, making the issue "too real and too scary" repeatedly can lead to denial of the problem.[37] Also, communicators may wish to emphasize local impacts first, before scaling up to show climate change is affecting other parts of the country and the world.[38]

[36] Center for Research on Environmental Decisions and ecoAmerica. (2014). *Connecting on Climate: A Guide to Effective Climate Change Communication*. New York and Washington, D.C., p.29

[37] Ibid, p.31

[38] Ibid, p.40

Arno Scharl, University of Vienna

Scharl introduced a Media Intelligence Platform (WebLyzard)[39] and a case study with the National Oceanic and Atmospheric Administration on how to manage environmental knowledge and how to measure the success of communication, including the Climate Resilience Toolkit[40]. Scharl also presented the Media Watch on Climate Change[41], which (1) identifies major topics associated with climate change by different stakeholders (non-governmental organizations, companies, and citizens), (2) analyzes framing strategies, (3) measures the impact of environmental campaigns and (4) tracks opinion leaders as well as emerging trends.[42]

Sidebar 12: Framing Climate Change as a Public Health Issue
Framing is the setting of an issue within an appropriate context to achieve a desired interpretation or perspective. The intention is not to deceive people, but to make credible climate science more accessible to the public in ways that they already relate to.[43] Some common framing strategies include using a 'local frame' or a 'now versus the future frame.' One other successful frame is the human health frame. Research has shown that in the U.S. people who identify as conservatives are more likely to support fossil fuel reduction if it is framed as a public health issue rather than a climate change issue, whereas climate change is a stronger motivator for liberals than public health.[44]

Lisa Zaval and Matthew Sisco, Columbia University

Zaval highlighted that her take-away from this conference is the need for further integration between behavioral scientists and practitioners. As discussed, reaching new, broad audiences requires diverse, creative communication strategies. However, many of these communication strategies have not been empirically tested and assessed in order to confirm their effectiveness in driving pro-environmental behavior change. Behavioral scientists should work with practitioners in designing effective climate change communication projects, as well as testing these messages empirically and evaluating their impact.

Further, a concerted and integrated effort should be made by researchers, policy-makers, and businesses to translate insights from the behavioral sciences into scaled interventions, moving from the laboratory to field research to practice. Such an effort would yield high returns, for although developing basic theory and understanding underlying psychological mechanisms are

[39] Web Intelligence and Visual Analytics - WebLyzard technology. (2015). Retrieved November 2, 2015, from http://www.weblyzard.com
[40] NOAA. (2015). U.S. Climate Resilience Toolkit. Retrieved November 2, 2015, from http://toolkit.climate.gov/
[41] ECOresearch | Media Watch on Climate Change. (2015). Retrieved November 2, 2015, from http://www.ecoresearch.net/climate
[42] New Media Technology. (2015). Retrieved November 2, 2015, from http://www.modul.ac.at/nmt
[43] Center for Research on Environmental Decisions. (2009). *The Psychology of Climate Change Communication: A Guide for Scientists, Journalists, Educators, Political Aides, and the Interested Public*. New York. Available from guide.cred.columbia.edu/, p. 6
[44] Petrovic, N., Madrigano, J., & Zaval, L. (2014). Motivating mitigation: when health matters more than climate change. *Climatic Change*, *126*(1-2), 245-254.

critical to advancing knowledge, such knowledge must be applied and scaled to large consumer populations to bring the desired results. We should continue to explore potentially high impact behavioral strategies, and incorporate them for broader support of energy conservation, communication, and climate-change education.

Sisco brought up the point that when we think about big data, we often imagine new data sources emerging from other organizations. In many cases, our own organizations are generating potentially useful data as well. For example, any organization with a website that is used to communicate about climate change likely has server data which could be used to identify the frequency with which people from different areas are accessing this information at different points in time. Google Analytics is sometimes used to get a general sense of this information, but the raw data can allow one to understand how individual users are utilizing information, with higher geographic and temporal resolution. Any organization that partakes in social media communication could use these platforms' application programming interfaces (APIs) to track in detail how its messages have spread through the social network.

These and other examples require some skill in data processing and analysis, so Sisco recommended reaching out to a social scientist for any organization that does not have the skill sets available. Social scientists interested in climate communication are often looking for rich data sets that they can analyze in order to produce generalizable knowledge about this topic. Therefore, mutually beneficial partnerships can be formed. In addition to helping analyze big data, social scientists can help make simple design changes to future campaigns based on scientific methodology (e.g. randomizing different messages to different sets of people) to produce data sets usable for causal inference.

Elke Weber, Section 3 Conclusion

Measuring the successes and failures of our climate communication strategies is essential to making progress in this endeavor. Data from outside and in-house sources can be useful for climate organizations of all types to improve their practices. Utilizing the findings produced by

social scientists and organizations (working separately or in collaboration) will ensure that our climate communication strategies are as effective as possible. We need to form more integrated networks among researchers, NGOs, and other organizations that try to promote sustainability goals and behavior change, to avoid duplication of efforts and optimal learning from feedback.

We know that sustainable behavior requires future focus and group identity, which facilitate patience, trust and common goals. There are a variety of ways to acquire stronger group identities, such as through engagement with sports. The impact of group identity on sustainable living still needs to be measured in real time and in an unobtrusive manner (e.g., through social media data).

V. OUTCOMES AND CONCLUSION

In order to guide future initiatives on climate change communication, we have outlined 15 outcomes and lessons learned from the conference:

1. Create climate change communication tools to better connect science and decision makers in order to promote action

2. Develop long-term vision for communication of challenges and local engagement in solutions in developing regions of the world

3. Apply social science to guide people to engage on climate change, including engaging activities like sports and the arts

4. Identify psychological, political and technological barriers to improve communication and foster action on climate change

5. Translate research on climate change impacts and solutions for various audiences. Facilitate "accessible" academic knowledge to the general public (e.g., an initiative presented at the Communication for Climate Change 2.0 event climatecolab.org)

6. Guide companies to factor climate change and sustainability into their decision-making process

7. Communicate through engaging, smart, creative, fresh and stimulating content, based on science and a positive approach (no fear-mongering); target specific segments of the general public, such as youth and the "moveable middle" of Yale/George Mason's Project on Climate Change Communication: *Six Americas)*

8. Build partnerships with mass media to share scientific findings on the key role of behavior change to adapting and mitigating climate change

9. Use participatory processes to inform, engage and empower local communities; while fostering multi-sector collaborations, using both top-down and bottom-up approaches

10. Develop collaborations between social scientists and practitioners to allow them to empirically assess communication strategies to encourage pro-environmental behavior change

11. Create place-based climate change solutions, thinking outside the box

12. Measure the success of environmental campaigns and other climate change communications; track opinion leaders and emerging trends in the conversation about climate

change (e.g., utilizing a platform presented at the CCC 2.0 event: www.ecoresearch.net/climate)

13. Measure behavior unobtrusively on a large scale, such as by using social media data; leverage social science in order to understand patterns and decision making on climate change

14. Understand, research, and implement "low-hanging fruit" opportunities for behavioral scientists to change the choice environment to make pro-environmental decisions easier and more likely

15. Increase research into climate change messaging strategies linked to individual differences; support the development of randomized controlled trials to bring about change in the field

These 15 key items and other conference discussions serve as the kickoff for the "Knowledge Network for Climate Change Action." This Network looks to promote educational activities and foster the design and evaluation of evidence-based research and outreach initiatives that translate scientific solutions to multiple stakeholders, from decision makers to the general public.

The challenges and opportunities posed by climate change must be effectively conveyed to society and decision makers. Through a key network of academic partners worldwide, the Knowledge Network looks to advance innovative climate change action at multiple and parallel levels. The core mission is to integrate and put to use research on barriers to and drivers of climate change action from the disciplines needed to address it, including: climatology, economics, psychology, anthropology, public health, engineering, political science, ecology, environmental biology, law, and information science. This research will support educational, advocacy, and decision-making processes around the world, from developed to developing countries.

The Knowledge Network for Climate Change Action plans to:

- Integrate climate change action goals with other goals of the World Bank and other groups fostering environmental sustainability and economic development/social welfare
    - Contest unsustainable production and consumption while promoting other sources and measurements of happiness/well-being
- Identify, collect and evaluate effective and feasible climate change actions available to different constituents
    - Start with ten 'action' initiatives, including both top-down and bottom-up approaches
- Increase the cross-cultural reach and effectiveness of communication about climate change challenges and solutions of multilateral organizations, starting with the World Bank, academia, and other stakeholders
    - Foster, initially, three collaborations, including representatives from developed and developing regions
- Promote innovative engaging methods, like the arts and sports, to inform, motivate, and empower segments of the general public
    - Identify new possible mediums of communication that make climate change more concrete to the general public
- Identify gaps in basic and applied research on fostering climate change action and to foster the creation of multidisciplinary projects that will close such gaps, including the identification of research partners and funding as well as other necessary resources
    - Start by promoting three research projects in the use of the arts to develop evidence-based engaging opportunities on climate change action
- Use technology to deliver effective communication on climate change action and measure the impact of such communication and other interventions
    - Develop three projects incorporating and measuring social media data

As the work of the Knowledge Network progresses, its members will specify other concrete outcomes for these and new goals. The outcomes will respond to the climate communication needs identified during the reported Communication for Climate Change 2.0 event as well as others.

The year in which this event took place, concluded with the United Nations Climate Conference "COP21" during December of 2015, in Paris. The first COP (Conference of Parties) was in Berlin in 1995, based on the 1992 international treaty "United Nations Framework Convention on Climate Change" (UNFCCC), joined by countries to cope with climate change. Twenty years later, COP21 succeeded in uniting a group of 195 nations to set out a path to keep temperatures rise below 2 degrees Celsius through the Paris Agreement on Climate Change. After this historical COP21 event, UN Secretary General Ban Ki-moon said: "We have entered a new era of global cooperation on one of the most complex issues ever to confront humanity." The event outcomes and the Paris Agreement covered crucial areas, including mitigation and adaptation to climate change, greater support to cope with this challenge and the ability to

recover from its impacts, as well as a transparency system and global stock-take, promoting accounting and empowerment for climate action.[45]

Article 12 of the Paris Agreement highlights the need for "climate change education, training, public awareness, public participation and public access to information,"[46] otherwise known as "Empowerment for Climate Action," as defined by the UNFCCC. The Communication for Climate Change 2.0 event reported here, the proposed Knowledge Network for Climate Change Action, and the many initiatives that Connect4Climate and CRED have been implementing provide an example of the opportunities we have to empower people to engage on climate action.

It is important to stress the role of youth in combating climate change. More than a billion young people live on the globe today and they are the first generation to come of age amid climate change. Based upon this, Connect4Climate launched “Youth4Climate” to facilitate the necessary information and platforms to support youth in understanding and tackling the complex issue of climate change. For example, the #Youth4Climate coalition supported them all the way on the road to and through COP21. The #Youth4Climate social media campaign was an effort led by the National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of Energy, the Association of Science-Technology Centers (ASTC), the CLEAN Network, The Wild Center, the World Bank Group’s global partnership program Connect4Climate, Climate Generation: A Will Steger Legacy, Alliance for Climate Education, Earth Day Network, Climate Interactive, and other organizations.[47]

At COP21, hundreds of young people gathered on December 3, 2015, to join leaders and share their voices on climate change. The day, opened by UNFCC Executive Secretary Christiana Figueres, was marked as the Young and Future Generations Day (YFGD). Connect4Climate was part of the YFGD debate on the role the creative industries can take to communicate climate change and climate action. Previously to this event, Connect4Climate also launched the “Film a Day4Climate Action Challenge” to give young people around the world more chances of having a collective voice at COP21.[48] We all have a responsibility on this global challenge; youth in particular have a significant opportunity with more time to act. But, they need to be given the appropriate local and global platforms to do so. As human-rights advocate Bianca Jagger said at the YFGD debate, “We must listen to the powerful, eloquent voices of young people, not just today, but everyday… It is they who have most at stake.”

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[45] United Nations Framework Convention on Climate Change, Historic Paris Agreement on Climate Change 195 Nations Set Path to Keep Temperature Rise Well Below 2 Degrees Celsius. (December 2015). Retrieved from http://newsroom.unfccc.int/unfccc-newsroom/finale-cop21

[46] United Nations Framework Convention on Climate Change, Conference of the Parties, Twenty-first session, Adoption of the Paris Agreement, FCC/CP/2015/L.9/Rev.1 (December 15, 2015). Retrieved from http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf

[47] Connect4Climate. Youth4Climate. Retrieved January 27, 2016, from http://connect4climate.org/resources/youth4climate

[48] Thabisco Edkins, M. (2015, December 4). What do young people think about climate change? Retrieved from http://blogs.worldbank.org/climatechange/what-do-young-people-think-about-climate-change

We must also find groundbreaking and creative ways to raise awareness and action on climate change. For instance, an imaginative and avant-garde initiative like the "Fiat Lux: Illuminating our Common Home" contemporary public art projection, a clear example of thinking outside of the box. (Elke: I tried to connect this with item #11 on page 21) This event was programmed to coincide with the opening day of the Extraordinary Jubilee of Mercy, on December 8th 2015, and COP21. Lightening the St. Peter's Basilica, this unprecedented event took place thanks to a powerful coalition of innovative partners that included Connect4Climate and organizations across continents. It was inspired by the themes of climate change, human dignity and the earth's living creatures in the Encyclical "Laudato Si'" of Pope Francis. The projection described with stunning images the "interdependency of humans and life on earth with the planet, to educate and inspire change around the climate crisis globally."[49]

Change will come, with or without us. We have it in our hands to address climate change, but the window of opportunity is closing fast. The problem, as well as the solution, to addressing climate change, may lie within ourselves. Indeed, it is our own cognitive, psychological and emotional limitations that create the barriers to effective action on climate change – yet, at the same time, our psychological responses can potentially be redirected to promote, rather than inhibit sustainable action. For climate change, an unprecedented amount of fallacies and psychological biases come together to create a "perfect storm" of inaction. Understanding these barriers and learning to work with them, rather than against them, can help to address the formidable problem of climate change, and also will help us in addressing a wide variety of sustainable challenges.

[49] Fiat Lux: Illuminating Our Common Home. (2015, December 29). Retrieved January 26, 2016, from http://www.connect4climate.org/blog/fiat-lux-illuminating-our-common-home-full-show

APPENDIX I: Climate Change Communication Literature Review

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