

SOCIAL MOBILIZATION FOR CLIMATE CHANGE USING DIGITAL TOOLS



A Vice President Research Cluster of Excellence at the University of British Columbia



COOL TOOLS FOR A WARMING WORLD

October 2016 Symposium and Workshop
Summary Report



Hosted by: COLLABORATIVE FOR ADVANCED LANDSCAPE PLANNING

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About the Research Cluster

- The “Social Mobilization on Climate Change using Digital Media” Research Cluster brings together an interdisciplinary team of scholars from around UBC and beyond to develop an emerging area of research excellence at UBC in sustainability education, climate change outreach, and behaviour change, using visual learning tools and online processes. UBC researchers include [Dr. Stephen Sheppard](#), [Dr. David Fracchia](#), [Dr. Stephen Petrina](#), [Dr. Maged Senbel](#), [Dr. Jiaying Zhao](#), [Dr. Rita Irwin](#), [Dr. Alan Kingstone](#), [Dr. Aleksandra Dulic](#), [Dr. Stephanie Chang](#). Other leading scholars include [Dr. Catherine Potvin](#) (McGill University), [Dr. Suzanne Moser](#) (Stanford University), [Dr. Sybil Seitzinger](#) (University of Victoria and Director of PICS), [Dr. Tzeporah Berman](#) (York University), [Dr. Kate Sherren](#) (Dalhousie University), [Dr. Robert Gifford](#) (U. Victoria), and [Dr. Sabine Pahl](#) (Plymouth University, UK). More information can be found at the Research Cluster website: www.cooltoolswarmworld.ubc.ca

About this Report

The purpose of this document is to provide a summary of dialogue and research findings shared during a series of collaborative knowledge exchange events focused on social mobilization for climate change with digital engagement tools. It is intended as a platform for advancing the research cluster towards the next phase of research and action, with specific implications for partners in government and education.

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1 BACKGROUND TO THE SYMPOSIUM

For more than a decade, UBC researchers and their partners have developed and tested various engagement tools and processes for visualizing and understanding the causes, impacts and potential solutions associated with climate change, to support the urgent need to accelerate action on energy and climate change.

Several of these studies, conducted by research teams representing multiple disciplines, faculties, and universities, are summarized in the Pacific Institute for Climate Solutions (PICS) [Special Report on Social Mobilization](#) (Sheppard et al., 2015). They demonstrate various innovative methods that can effectively engage citizens and in some cases lead to substantial energy savings and GHG reductions.

One such new engagement/educational tool is Future Delta 2.0 (FD2)¹, a place-based, educational videogame on climate change co-developed by UBC's Collaborative for Advanced Landscape Planning (CALP) and Centre for Culture and Technology, UBC Okanagan (CCT). It is a unique, first-person game set in the community of Delta, BC that encourages exploration of local climate change solutions through simulated future scenarios in an environment recognizable to local youth. The game draws on earlier research on community futures (e.g. Sheppard et al., 2011), principles for climate change engagement with visual media (Sheppard, 2012), and a co-design process with teachers and students in the Delta School District. This experiential videogame was evaluated with 160 students from two high schools, demonstrating its effectiveness in learning of climate change concepts, raising awareness of local climate change issues, and motivating behavioural change (Dulic et al., 2016). It has been greeted with much enthusiasm by students as a more “fun” way to learn, and by teachers/educators interested in using digital tools for place-based inquiry learning.



Carbon Vision to 'see' carbon and build awareness of low-carbon alternatives



Player interacting with a non-player character (NPC) to learn about renewable energy

¹ For more information about Future Delta 2.0, visit: <http://futuredelta2.ca/> & see References below

Through subsequent research forums, workshops, interviews with educators & youth groups, and a 2015 Round Table event at Science World (Telus World of Science) with teachers, NGO's and game developers, it became clear that compelling digital tools on their own are not enough. Teachers and others interested in climate change education/engagement need:

- to develop their own climate change literacy
- guidance on using digital tools within educational or outreach programs, and
- tools that integrate sustained evaluation of learning outcomes and behaviour change

Thus, researchers initiated efforts to bring together a broader team of research collaborators and partners across multiple sectors, to strengthen tool development and guidance on using digital tools to foster social change toward climate action. With support from a UBC Vice President Research Excellence Cluster grant and a SSHRC Connections grant, we were able to form a Research Cluster including leading educational and psychology researchers & partners in technology innovation, and host several productive events as summarized in this report.

2 EVENTS OVERVIEW

In October of 2016, the Research Cluster hosted 4 collaborative knowledge exchange events focused on social mobilization using digital tools in addressing climate change:

- October 13th all-day *Symposium: Cool Tools for a Warming World*
- October 13th evening *Seminar: Cool Tools for a Warming World (open to public)*
- October 14th all-day *Workshop: Climate Change, Digital Tools & Schools*
- October 21st BC Social Studies Teachers Assoc. Conference workshop: *Future Delta Videogame Teacher Handbook - Digital Tools for Inquiry Learning on Climate Change*

Almost 100 experts and stakeholders from many disciplines and sectors came together for the first time at these events to discuss shared goals including:

- demonstrating and identifying examples of best practices
- identifying knowledge gaps
- strategic planning towards building literacy & capacity on climate and energy, and scaling up collective action

Invited presenters and participants at the UBC knowledge exchange events on 13th and 14th October represented local, national & international academics, educators, tech industries, non-profits and youth groups. See *Appendix A* for description of attendees and full list of

speakers. Online video conferencing was provided to those in remote locations, reducing cost & carbon footprint for presenters and participants. Sign-up for the Teacher Session on Oct 21st was through subscription organized by the BC Social Studies Teachers' Association.

3 EVENT HIGHLIGHTS & OUTCOMES

For brevity, the following section contains only selected highlights; *all presentation files* from UBC events are publicly available on the Research Cluster website (<http://cooltoolswarmworld.ubc.ca/events/>).

Symposium: Cool Tools for a Warming World

October 13, 2016 at UBC Centre for Interactive Research on Sustainability (CIRS)

The goal of the Symposium was to showcase digital media tools shown by research to be effective in engaging citizens on climate change, and explore their potential in wider social mobilization for climate action. See Appendix A for the list of speakers. Forty-two people attended in person, with another 14 people attending online through web conferencing.

After opening by Dr. Stephen Sheppard (Director of CALP), Dr. Sybil Seitzinger, Director of Pacific Institute for Climate Solutions (PICS), outlined salient climate change issues in the BC context, emphasizing the role of regulation, innovation, public awareness, capacity building, and behaviour change needs in order to meet 2050 target of 80% reduction in GHG emissions (below 2007 levels).



The morning's keynote speaker was Jonathan Wilkinson, Member of Parliament for North Vancouver, and Parliamentary Secretary to the Federal Minister of Environment & Climate Change. He described the federal government's process for working towards a Pan-Canadian framework for clean growth and climate change, as well as the goals and reporting process for the 4 Climate Change working groups (Clean Technology, Jobs and Innovation, Mitigation/Adaptation, and Carbon Pricing). He reported on public engagement activities at the federal level from the previous year, including roundtables and stakeholder meetings across the country, MP-hosted Town Halls, and a web portal for ideas on climate change action. He confirmed the importance of social mobilization in addressing climate

"The objective of this government should very much be to make the commitment to addressing climate change a 'sticky issue'... striving to ensure a future in which real actions aimed at addressing climate change will continue irrespective of whether the colour of a particular government changes."

— Jonathan Wilkinson

change, stating that *“A major challenge for this government lies in finding ways to effectively engage the broader Canadian population in a discussion of and in support of climate action”*.

Tzeporah Berman shared her experiences and lessons learned as author (*This Crazy Time*), strategic advisor to First Nations, environmental organizations and philanthropic foundations on climate and energy issues, and designer of environmental campaigns. She emphasized, *“Education does not lead to engagement, social action or mobilization”* and offered the following principles for designing an engagement plan:

- (1) Have purpose – In communicating desired actions to others, people need to know what the plan is, as often they doubt their actions are meaningful; emphasize tangible outcomes, help them understand what they can contribute.
- (2) Sense of us – People want to feel part of a community, that they belong to something greater, and that others are in this too; see how they fit into the overall process.
- (3) Sense of urgency – You need to be able to answer the question ‘Why now?’. People need to understand why it is important for them to act now.
- (4) Compelling & relatable narrative – Engagement represents a journey that should include multiple points of contact & many ways to participate; show people that they are making a difference; recognize success moments when people can claim victory.

Other speakers demonstrated & reported on successful visual learning tools and motivational techniques including: the Future Delta educational videogame; the CLIVE visualization environment on sea level rise; the Do It In The Dark campaign on collective energy savings; the Owl project on visualizing coastal flooding solutions; the Cool Neighbourhoods process encouraging home energy retrofits; and Quest Upon augmented reality educational tools.



The lunchtime keynote speaker was Joyce Murray, Member of Parliament for Vancouver Quadra, and Parliamentary Secretary to the President of the Treasury Board. She reviewed the evolution of climate change awareness: from no public interest in 1992 (when she did her MBA thesis on global warming), to 2005’s One Tonne Challenge when people didn’t really understand what they were supposed to do or why, to the wake-up call of “An Inconvenient Truth, debate over a carbon tax, and a possible “climate spring” in 2016. Nationally, 79% of Canadians now believe that the Earth is getting warmer (Mildenberger et al., 2016). She described the Treasury’s plans for Greening Government, as a key symbol to the public of what is possible and a major influence on the supply chain for service providers and behaviour of staff. She called for more effort on how to “reach the uninvolved”, and concluded with a short video of her son Baba rapping on climate change at the COP21 talks, as an example of innovative use of media to reach a wider audience.



Outcomes from the Symposium breakout discussions

Breakout discussions were held in the afternoon in small groups with facilitators, using targeted questions framed by the symposium goals:

Q1: WHAT should we be working on to best engage citizens on climate change action? Which of these priorities are the most important?

Priorities (by theme)	Response Frequency ²
PRINCIPLE: Tell stories <ul style="list-style-type: none"> ○ Use meaningful narratives; use data with stories ○ Link past, present and future 	22
PRINCIPLE: Approach should be more personally relevant to here and now <ul style="list-style-type: none"> ○ Real-world and experiential: Make it personal. ○ Use/need tools to make climate change communications feel more “real” ○ Place-based grassroots, current and interactive solutions 	18
PRINCIPLE: Clear messaging and communication <ul style="list-style-type: none"> ○ Defined mission, connected to what people care about, improved framing ○ Clear consequences; celebration of successes (goals/win!) ○ Fun, shareable, mobile, 	17
PRINCIPLE: Impart sense of agency & civic engagement <ul style="list-style-type: none"> ○ Focus on citizens’ role, engagement for action ○ Link between citizens and policy change/regulation/pricing ○ Support for agency/empowerment, media training 	16
BEST PRACTICES: Invoke social aspects <ul style="list-style-type: none"> ○ Collaborative problem solving, creation of places for sharing & experiences ○ Ripple effect: engage students to teach/involve parents ○ Use digital tools & social media (shareable), open and accessible ○ Citizen science and citizen stewardship 	16
BEST PRACTICES: Platforms for delivery of engagement <ul style="list-style-type: none"> ○ Augmented Reality, Virtual Reality, Visualization ○ Games, mass media (Public Service Announcements) ○ Education-focused 	10
TARGET AUDIENCES: Focus on youth as the most affected and our best hope <ul style="list-style-type: none"> ○ Across Canada ○ Tools designed for them ○ Work with educators, provide educators with tools & guidance 	12
TARGET AUDIENCES: Other audiences, especially those ‘beyond the choir’: <ul style="list-style-type: none"> ○ Professionals: Journalists, planners/managers, educators, etc. 	7

² Responses were compiled into themes, and participants asked to award points to those they prioritized most. Response frequency = total number of points attributed to each theme by participants.

Q2: Using the above priorities, sketch out components of an engagement plan moving forward. If the goal is to engage more people on climate action, HOW can we get there? The second discussion was a small group activity where participants were asked to sketch out new ideas, approaches and alternate ways of thinking on climate change engagement. This led to discussion of knowledge gaps that need to be addressed through research, and next steps in fostering effective social action aided by digital media:

Knowledge gaps were identified in 4 distinct areas:

1. Psychology & Behaviour Change
 - Ripple Effect – How, when, where and in what circumstances does engaging people lead to them engaging others? How can people be directly and indirectly influenced through a chain of communication? What are those impacts?
 - What are the mechanisms/messages that lead to widespread behaviour change?
2. Communications & Marketing
 - Viral Reach – What information goes viral? How and why? How do we create truly engaging content that can inform and become mainstream? What tools then sustain this engagement?
 - What tools are the most effective? E.g. Digital, ‘click’ democracy, video etc.
3. Advocacy & linkages between the academic and activist communities
 - How to consolidate & promote best practices based on research evidence, for those involved in engagement, and inform research on social mobilization needs.
 - Integrating engagement theory & engagement in-practice
 - Why do the 2 social groups of actors seldom collaborate?
4. Education
 - How are youth learning to be good citizens and leaders? How should activism and citizen responsibility be taught/learned, and to what depth?
 - What tools are needed to for educators aiming to teach climate change literacy and facilitate action?

More cross-disciplinary approaches to address knowledge gaps and accelerate constructive social responses were identified as needed. While the Symposium demonstrated many successful examples of tools and techniques that shifted attitudes and influenced behaviour change, few if any of these have been scaled-up. Next steps should include:

- Greater researcher/designer/outreach practitioner collaboration
- **Scaling up** the use of existing tools, and/or modifying their application with supplemental toolkits/handbooks etc.
- Clear targeting & evaluation of techniques with distinct audiences, using personally relevant, story-based approaches with clear messages on specific outcomes of civic engagement to increase a sense of agency.
- Prioritizing applications within emerging technologies and/or social mobilization platforms that focus on collaborative and shared audience experiences (e.g. augmented reality, mixed reality, social media, citizen science)

Public Seminar: Cool Tools for a Warming World

October 13, 2016 at UBC Robson Square, downtown Vancouver

An evening seminar was held in partnership with the Pacific Institute for Climate Solutions (PICS). This event included a panel of speakers demonstrating innovative digital media and success stories for climate change education, planning, and action.

Moderator: [Sara Muir Owen](#), UBC Program Manager, Pacific Institute for Climate Solutions

Speakers:

[Adam Fenech](#) - *Coastal Impact Visualization Environment (CLIVE) on sea level rise*. Director: Climate Lab, University of Prince Edward Island

[Maged Senbel](#) - "Do it in the Dark" - Energy challenge using visual and social media. Associate Professor in Urban Design: School of Community and Regional Planning, University of British Columbia

[Stephen Sheppard](#) - Future Delta 2.0 - Climate change videogame for schools. Director: Collaborative for Advanced Landscape Planning, University of British Columbia

Expert Panelist response: [Robert Gifford](#) - Internationally recognized Environmental Psychologist, University of Victoria

During the Q & A period, two themes emerged of particular interest to the audience:

- 1) Interest in the technology applications themselves (e.g. LIDAR, drone imagery, facebook/app data collection, place-based game development) and questions how each could be scaled-up to for other communities etc.
- 2) Questions on the outcomes of the case studies in terms of resulting behaviour or policy changes and next steps of users/audiences.

Workshop: Climate Change, Digital Tools & Schools

October 14, 2016 at UBC Centre for Interactive Research on Sustainability (CIRS)

The goal of the Workshop was to share perspectives, experience, and specific research findings in youth education/engagement, and explore various teaching and learning tools for climate change education. See Appendix A for the full Agenda, including the list of speakers, panelists, and discussion questions. Forty people attended in person throughout the day, and one speaker joined online through web conferencing.

The morning keynote speaker was Susan Gold, founder of the Global Game Jam, and Professor of the Practice of Game Design at Northeastern University. Her presentation on games, gamers, and game development identified four types of fun: hard fun = triumph over adversity; easy fun = curiosity/exploration; serious fun = relaxation/excitement; & people fun = amusement. She addressed the latest citizen science games, recommending they be

accessible, actionable, appealing, interactive, with clear and compelling content that encourages learning.

The CALP research team shared more findings from co-design and evaluation of Future Delta 2.0 videogame with secondary schools. Delta School Board partners (teachers, administrators and students) were invited as panelists to share their experiences. Comments on the game from teachers included “powerful to see” “fantastic trial.” According to Delta BC Seaquam Secondary teacher Michael Iachetta, the game provides an “instant connection [for students to] my school, my neighborhood” and it “embeds a call for action”. Another teacher Favian Yee - Science Department Head at North Delta, said he was skeptical at first but after seeing the beta game tested at another school, he saw that students were “very engaged” and that “problem solving increased, critical thinking increased”. Students discussed how their involvement in the *process* of co-designing the game was important and insightful, and for some it played a role in influencing their career paths. Former Delta Secondary student Taranveer Haver noted that for him the experience with Future Delta 2.0 “personalizes climate change” and showed him “how to fix your actions to be in line with your values”

Several experts shared their perspectives and lessons learned about digital tools for education (See Appendix A). New and existing partners introduced themselves and their work, discussing lessons learned, best practice recommendations, research and educational gaps, and interests moving forward.

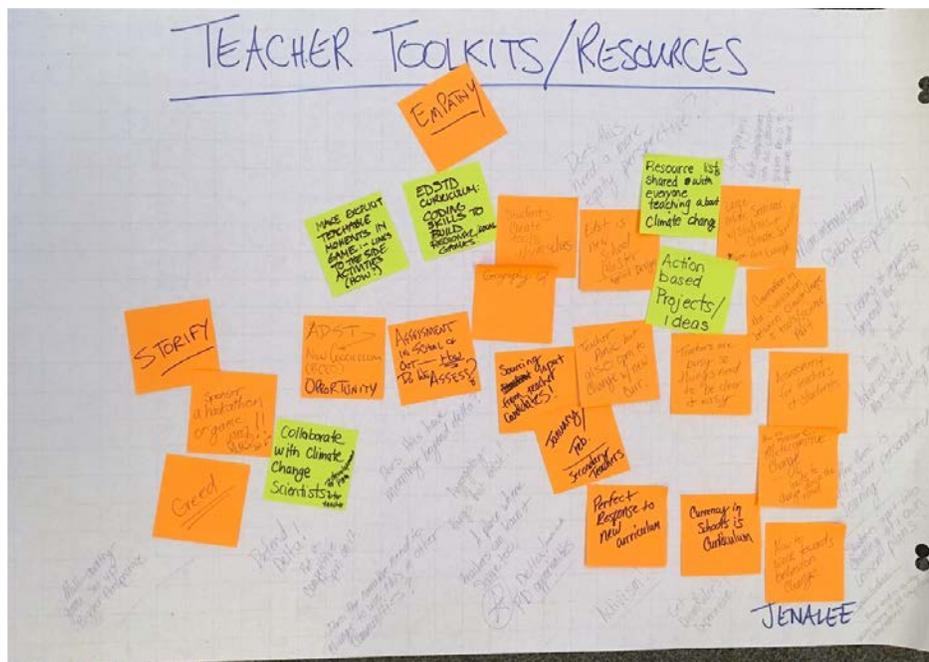
Outcomes from the Workshop breakout discussions

Four table topics were offered by facilitators based on the morning’s presentation. Each table was asked to consider priorities, strategies, partners/allies and research gaps. The following are the table topics, with examples images of some of the notes generated.

TOPIC 1: Visioning the next build – What digital tool should we be developing next?

- a) Priorities/Strategies: Focus on success stories. Example: co-design where outcomes come from the process effect individuals and communities as well as the tools themselves. Focus on ripple-effect and measurements and impacts on social networks, parents and/or school to school learning/behaviour/policy change. Integrate youth as co-creators (e.g. citizen science).
- b) Knowledge/Research Gaps identified: Should we focus on building new tools or enhancing, incorporating or better marketing existing ones? Participants brainstormed a variety of outreach venues and mechanism for increased knowledge sharing with teachers/educators, which have been documented and incorporated into next steps. Focused on need for a better subdivision of both primary and secondary audiences’ needs/abilities towards ripple effect. Who are the most effective vectors towards change?

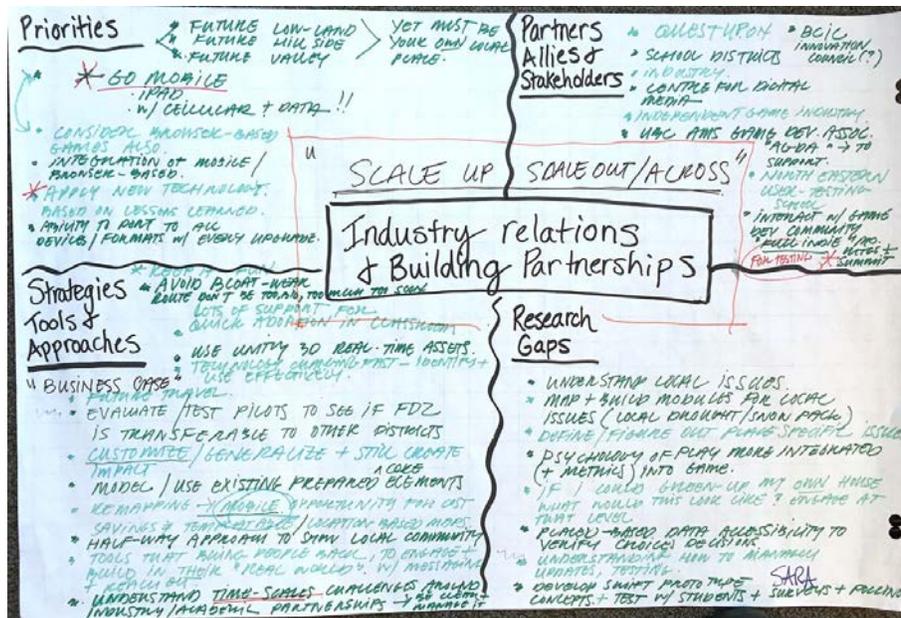
teach everything about climate change, but carefully designed lessons around them could help.



TOPIC 3 & 4 (combined): Expanding place-based experiential games across districts – How do we scale up, out, and across? How do we build relationships with industry, and stronger partnerships? What is the business case?

Conclusions follow:

- a) **Priorities:** Go mobile (iPad, with cellular and data), but also consider browser-based games and Integration of mobile and browser-based tools. It is important to have the ability to port to all devices/formats with every upgrade.
- b) **Partners/Allies/Stakeholders:** There is a need to tap into the professional gaming community, use platforms such as the Global Game Jam, and others that this arena can provide. Make closer ties with industry, school districts, the Centre for Digital Media, Quest Upon, UBC student game developers, and others.
- c) **Strategies/Tools/Approaches:** It is important that the cluster does not try to tackle more than they are capable of doing. There needs to be a good full-time project manager for each tool developed. Use the latest technology. Be mindful of timelines and work flow that can create challenges for industry/academic partnerships.
- d) **Knowledge Gaps:** In order to make place-based tools, there is a need to better define and understanding local issues. Place-based data accessibility is also important to verify choices/decisions when people use digital tools. Psychology of play also needs to be better integrated into games.



BC Social Studies Teacher Session: Future Delta 2.0 Teacher Handbook

October 21, 2016 at Vancouver Technical Secondary School

Teachers from the Lower Mainland attended this session that showcased a draft version of the Future Delta 2.0 Teacher Handbook. A focus group discussion was held as part of the session. Following are the outcomes from the discussion.

Q1: With respect to the use of games in the classroom, what do you find works best?

- Kids love games
- Kids love competition & potentially winning
- Kids prefer to use their phones when they can
- Example: Cahoot, which is a Q&A phone activity that is reflected on a classroom screen. Students can see real-time feedback of their answers.
- It helps when students can see that their actions lead to different outcomes

Q2: What doesn't work? How can educator resources be improved?

- Too much information being presented at once IE. CIMA (Causes, Impacts, Mitigation, Adaptation) as a concept for explaining climate change needs to be broken into 4-6 lessons instead.
- Access to digital technology
 - Maybe 1 out of 2 students will have a phone
 - Students don't always have access to computers at home
 - While students are moving towards phone use (over computers), not everyone has one. Not everyone that has a phone has access to data.
 - Some schools have access to classroom iPads/Chromebooks
- Sharing of technology through group/team work could solve the access problem

- Having different versions of the lesson for different levels/grades would be helpful
- Introduce glossary words (E.g. Crossword puzzle) as an introductory/separate lesson
- Translation of complex words through relatable metaphors E.g. Pokémon, Minecraft, Mario Brothers etc.

Q3: What would an ideal educator resource include/look like?

- Mixed medium: some technology, some conventional presentation available
- A range of activities where some could be fun, and others serious
- Ideas for metacognition to occur, or ways for students to internalize learning E.g. Journaling
- Assessment should be included or built-in. There could be a self-administered assessment built in at the end of the game visible to the teacher. Assessment should be summative.
- One idea for assessment mentioned was for students to complete a self-recorded video playing the game/doing the activity. This could be for self-assessment and reflection, while also being visible to the teacher.
- The educator resource package should include everything a teacher would need. An example mentioned was the package used for delivering mock trials in class.

4 SYNTHESIS OF NEXT STEPS

1. *Consolidation & expansion of key partnerships for research & funding applications:*

Confirmed Partners & Collaborators	<ul style="list-style-type: none"> • Vancouver Board of Education (Ronald Macdonald) • Pacific Institute for Climate Solutions (Sara Muir-Owen) • Science World (Samsara Marriott) • Centre for Digital Media • Quest Upon (Augmented Reality) • Be the Change Earth Alliance
Confirmed Contributors	<ul style="list-style-type: none"> • AMS Game Development Association • DreamRider
Potential Contributors	<ul style="list-style-type: none"> • Microsoft Hololens (contacted) • Telus • Google Earth (Contacted) • BC Teachers Federation (Contacted) • BC Ministry of Education • Real Estate Foundation (Contacted) • Canada Ministry of Environment & Climate Change (Contacted) • Natural Resources Canada (Contacted)

2. Applications to **grant programs** such as:

- Private donor for Citizen Engagement research/ Co-op program
- SSHRC Partnership Development Grant

- Environment Canada EcoAction Community Funding grant (with Be the Change)
 - Telus Community Grant
 - Peter Wall Institute Solutions Grant
 - Vancouver Foundation Environment Grant
 - NSERC Engage Grant (with Quest Upon)
3. Semester long game development project with Masters of Digital Media students at Centre for Digital Media (Phase 1 completed). The Research Cluster sponsored tool development and provided resources/assets/data/staff and partner time towards a student project to develop a **prototype replicable educational Alternative Reality game**, building on learning from Future Delta 2.0 videogame results & priorities defined from Symposium knowledge exchange events.
 4. With support from UBC VPR office and UBC Studio, we are exploring a **Microsoft HoloLens collaboration** for a Mixed-Reality, immersive educational experience. The goal is to create an initial proof of concept place-based holographic experience with 'alternative climate change futures' as a compelling educational tool.
 5. Sponsorship of the 1st student organized "**BC Game Jam**" a collaboration of UBC, BCIT and SFU university student clubs to host 48 hours of game design. CALP offered prizes for student teams taking on a climate change challenge theme. Over 300 students and professionals attended the event: 5 distinct climate change games were developed by 5 teams, guided by CALP resources and development toolkit suggestions. These teams were enthusiastic and are interested in continuing such work and collaborating with the Cluster.
 6. Involvement in the **Sustainable Canada Dialogues (SCD) report 'Re-energizing Canada'** on the Low-Carbon Energy Transition, commissioned by Natural Resources Canada. The report will support the Canadian Government's new national dialogue on Canada's future energy policy. Dr. Stephen Sheppard is one of the report's lead-authors, addressing issues including social mobilization, drawing on research cluster outcomes and products to date.
 7. Continue development, testing, and knowledge mobilization through **new and continuing funded projects** that build on learning from Cluster events, and prioritize.
 - Story/narrative/personal climate change communication
 - Place-based learning for any locale
 - Clearly defined consequences and focus on solutions
 - Ripple Effect across communities - Social and Measureable
 - Partly school-focused as community hubs for experimentation, consistent with classroom/curriculum needs
 8. Contribute to a **national strategy on social mobilization** for climate change.

APPENDIX A: CLASSIFICATION OF ATTENDEES

Sectors represented	Disciplines represented	Social groups represented
Government <ul style="list-style-type: none"> Members of Parliament Regional Local 	Climate Change <ul style="list-style-type: none"> Scientific Analysis Science Communication Visualization Adaptation & Resilience Education Engagement 	Academic (professors & students)
K-12 Education <ul style="list-style-type: none"> School District Sustainability Information Technology Social Studies Science Art 	Psychology <ul style="list-style-type: none"> Environment Behaviour 	Youth <ul style="list-style-type: none"> Secondary school University (e.g. UBC Game Development Association) Gap Year/Career dev.
Academia <ul style="list-style-type: none"> Professors Undergraduate students Graduate students Post-Doctoral Fellows Local (UBC-based) International 	Education <ul style="list-style-type: none"> K-12 Curriculum & Pedagogy Media & Technology 	Artists
Industry <ul style="list-style-type: none"> Gaming Augmented Reality Software Development 	Policy & Planning <ul style="list-style-type: none"> Participatory planning Environment Urban & Regional Landscape planning Architecture 	Citizen scientists
Environment <ul style="list-style-type: none"> Sustainability professionals Climate change specialists Advocacy and Campaign Development advisor 	Computer Science <ul style="list-style-type: none"> Digital Media & Technology Programming Game development 	Activists/climate change leaders
Non-profit <ul style="list-style-type: none"> Environmental education Civic education/training 	Natural Resource & Env. Studies	Professional Associations
Philanthropic	Climate change communication	Government <ul style="list-style-type: none"> Elected officials Staff
	Psychology	

APPENDIX B: LIST OF SPEAKERS

FULL LIST OF SPEAKERS IN CHRONOLOGICAL ORDER AT THE SYMPOSIUM:

- **Dr. Stephen Sheppard** - Director Collaborative for Advanced Landscape Planning (CALP) at University of British Columbia.
- **Dr. Sybil Seitzinger** - Director of Pacific Institute for Climate Solutions (PICS)
- **KEYNOTE: Jonathan Wilkinson** - Parliamentary Secretary to the Minister of Environment and Climate Change, and MP for North Vancouver
- **Daniel Kreeger** - Executive Director, Association of Climate Change Officers
- **Dr. Tzaporah Berman** - Author, Env. Studies Professor and Environmental Activist
- **Dr. Stephen Petrina** - University of British Columbia Faculty of Education, Media and Technology Studies
- **Dr. Jiaying Zhao** - University of British Columbia Department of Psychology, climate change perceptions & behaviour change
- **Dr. Aleksandra Dulic** - University of British Columbia Okanagan, Centre for Culture and Technology, arts and social engagement
- **Samsara Marriott** - Science World, Youth Program Specialist
- **Alicia LaValle** - University of British Columbia - CALP Research Scientist
- **Dr. Adam Fenech** - University of PEI - Coastal Impact Visualization Environment (CLIVE)
- **Dr. Maged Senbel** - University of British Columbia, School of Community and Regional Planning.
- **Leslie Alden** - County of Marin Government, "The OWL Project" on sea level rise
- **Tarah Stafford** - West Vancouver 'Cool Neighbourhoods'
- **Tammy Meyers and Miles Marziani** - QuestUpon Augmented Reality
- **LUNCH KEYNOTE: Joyce Murray** - Member of Parliament for Vancouver Quadra, and Parliamentary Secretary to the President of the Treasury Board.
- **Dr. David Fracchia** - Centre for Digital Media.
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FULL LIST OF SPEAKERS/EVENTS IN CHRONOLOGICAL ORDER AT SCHOOL WORKSHOP:

- **Dr. Stephen Sheppard** - Director of CALP: Opening Remarks
- **KEYNOTE: Susan Gold** - Professor of the Practice, Associate Director of Games at Northeastern University. Founder of the Annual Global Game Jam (GGJ)
- **Alicia LaValle** - Research Scientist, CALP, UBC Forestry
- **Jeannette Angel Fox** - PhD candidate, Centre for Culture & Technology

Group 1: Discussion Panel

- **Taranveer Hayer, Felix He, Colin Leitner** - Co-design Students
- **Neil Stephenson** - Director of Learning Services, Delta School District
- **Favian Yee** - Science Teacher, North Delta Secondary School
- **Michael Iachetta** - Social Studies Teacher, Seaquam Secondary School

Group 2: Key Partners and their Work

- Kirsten Dallimore, Sierra Club, Environmental Educator
- Jeanie Suparman and Gowtham Mohan, UBC AMS Game Development Association
- Abnash Bassi, AbhayJeet Sachal, Parvin Malhi, Khushi Bimbrahw, Seaquam Secondary Operation Green Leaders

Group 3: Cool Tools Experts and Lessons Learned

- Dr. David Fracchia - Center for Digital Media (UBC, SFU, Emily Carr, BCIT)
- Dr. Kate Sherren - Dalhousie University - School for Resource and Environmental Studies
- Dr. Dargan Frierson, University Washington - Earth Games, climate science and game development
- Dr. Sandrine Han, UBC Faculty of Education - 3D gaming for both academic and vocational education
- Sion Lanini, DreamRider Productions
- Dr. Cynthia Girling, UBC School of Architecture and Landscape Architecture elementsLab
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Group 4: (during lunch): Interactive Tools Display Booths

- Tammy Meyers and Miles Marziani - QuestUpon Augmented Reality
- Sion Lanini - DreamRider Productions
- Seaquam Secondary School current Operation Green current club students - experiences with climate change learning and leadership
- Dr. Jon Salter - UBC School of Architecture and Landscape Architecture

Group 5: Teachers with Games

- Dr. Jordan Shapiro - Associate Director for Digital Innovation, Temple University
- Emme Lee - Collaborative for Advanced Landscape Planning, UBC School of Community and Regional Planning
- Jenalee Kluttz - Collaborative for Advanced Landscape Planning, Faculty of Education

APPENDIX C: REFERENCES & RELEVANT PUBLICATIONS

1. Angel, J., A. LaValle, D. Mathew Iype, S. Sheppard & A. Dulic (2015). Future Delta 2.0 – An experiential learning context for a serious game about local climate change. Paper submitted to the SIGGRAPH Conference in Kobe, Japan (November 2-5, 2015).
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3. Mildemberger, M., P.D. Howe, E. Lachapelle, L.C. Stokes, J. Marlon & T. Gravelle (2016). The Distribution of Climate Change Public Opinion in Canada. *Plos One* 11(8), e0159774.
4. Shapiro, J. (2014). *Mindshift: Guide to Digital Games + Learning*. Retrieved April 2016 from Mind Shift How we will learn: <https://a.s.kqed.net/pdf/news/MindShift-GuidetoDigitalGamesandLearning.pdf>
5. Sheppard, S.R.J. (2012). *Visualizing Climate Change: A Guide to Visual Communication of Climate Change and Developing Local Solutions*. Abingdon, UK: Earthscan/Routledge.
6. Sheppard, S. (2014). Co-design of a place-based educational videogame on climate change: Future Delta royal 2.0. Paper presented at the Royal Geographical Society-IBG Annual International Conference in London, UK (April 26-29, 2014).
7. Sheppard, S., A. Shaw, D. Flanders, S. Burch, A. Wiek, J. Carmichael, J. Robinson & S. Cohen (2011). Future visioning of local climate change: A framework for community engagement and planning with scenarios and visualization. *Futures* 43(4), 400-412.
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9. Sheppard et al., (2015) What works - and what doesn't for engaging people on climate change - A Synthesis of PICS-Funded Social Mobilization Research PICS Special Report: https://pics.uvic.ca/sites/default/files/Soc.%20Mob.%20Report%20_0.pdf
10. Sussman, Gifford, and Abrahamse (2016) Social Mobilization: How to Encourage Action on Climate Change. PICS White Paper. <http://pics.uvic.ca/sites/default/files/uploads/publications/FINAL%20Social%20mobilization-Sussman%20Gifford.pdf>
11. Wu, J.S. & Lee, J.J. (2015, May). Climate change games as tools for education and engagement. *Nature Climate Change*, 5 (Online).