



# Collective intelligence for the common good: cultivating the seeds for an intentional collaborative enterprise

Douglas Schuler<sup>1</sup> · Anna De Liddo<sup>2</sup> · Justin Smith<sup>3</sup> · Fiorella De Cindio<sup>4</sup>

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## 1 Introduction

In the spring of 2014, several colleagues began discussing the idea of launching a community/network that focused on collective intelligence for the common good (CI4CG). The challenges and opportunities for such an endeavor were timely and compelling. Everyone in the group was interested in that theme, although all were engaged in different actions and strategies and, obviously, did not have identical perspectives on the theme. We hypothesized (and believed) that it was not only possible, but desirable, to increase the quantity and quality of the CI4CG enterprise. We see this as absolutely critical as we face a variety uncertain and threatening challenges going forward. The challenges are both big and small. Most have been with us for centuries—like inequality and poverty—some are brand new—like global climate change. They will not be solved via business as usual or accidentally. It will take intelligence.

Although CI4CG does not depend on computers for its existence, the papers in this special section are all concerned with how ICT can and should be employed. We do this for

several reasons including because the founders all were working in this field as well as most of the current participants. This is not a place for a comprehensive discussion but ICT provides opportunities—and no shortage of challenges or risks—to this effort. Its existence clearly changes the quantity and quality of much of our daily lives and helps shape the future, possibly in ways we cannot imagine at the moment. The idea of collective intelligence absolutely takes on a entire new form when ICT is involved. Although there is an urgency to this focus here, we do not assume that people and communities with little or no access to ICT are not part or should not be a part of the work for CI4CG.

Some of the aims of the initiative include encouraging the explicit focus on CI4CG, through hypothesizing, building, and testing of and with online test-beds and experiments, and developing a strong research agenda with an emphasis on integration of tools and projects generally, and with building the community/network. It is hoped that the wide diversity of areas of attention encompassing theory as well as the building and testing of actual environments and encounters in the lab and in the world will help provide the diversity that is necessary to effective collective intelligence (Woolley et al. 2010). We intend to use the work that our members are already engaged in as cases and use them to help develop and shape the nascent and evolving theory of civic intelligence (Schuler 2001). At the same time, we intend to use our theory to help inform the individual projects including developing them as standalone projects as well as integrating them with each other.

On September 29 and 30, 2014, the first workshop on Collective Intelligence for the Common Good was convened at the London offices of the Open University. The idea, presented in more detail below, was that it might be possible and useful to consciously develop an open community/network of researchers and activists (and anybody else) dedicated explicitly to supporting the common good. The “common good” is clearly an imprecise concept and possible ways to think about it and work towards it are incredibly

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✉ Douglas Schuler  
douglas@publicsphereproject.org

Anna De Liddo  
anna.deliddo@open.ac.uk

Justin Smith  
justingriffis@wsu.edu

Fiorella De Cindio  
fiorella.decindio@unimi.it

<sup>1</sup> Evergreen State College and Public Sphere Project, 2202N. 41st Street, Seattle, WA 98,103, USA

<sup>2</sup> Knowledge Media Institute, The Open University, Walton hall, MK76AA Milton Keynes, UK

<sup>3</sup> WSU Extension Mason County, 303N. 4th St., Shelton, WA 98,584, USA

<sup>4</sup> Civic Informatics Laboratory, Università degli Studi di Milano, Milan, Italy

numerous and are likely to contain dilemmas and contradictions (Lohmann 1992; Argandoña 1998; Etzioni 2014). At the same time, it seems possible to grow this effort into a more coherent and more synergistic complex or ensemble supporting the collective intelligence of the individual members and the civic intelligence of the group as a whole. And whether or not the “common good” can be precisely determined, this focus explicitly asserts that we are concerned about the relationship between theory and practice, and that this relationship has enough value and legitimacy that we can base our work around that, including that of establishing a plausible link between our theories (and the policies, institutionalizations, software, etc. that we build and propose) the “common good.”

The project is an evolving work-in-progress that will depend on the quantity and quality of the energy of the members (in terms of managerial overhead and work on “content”) and the ability of the individual efforts to support the efforts of other members. This is the critical issue of “emergence,” in which phenomena are created that were not necessarily predictable based on the actions of the individual efforts. As we expand, we need to take all of this into consideration as we attempt to build thoughtfully based on an understanding of the work that is happening thus far.

This introduction is an early effort to understand that work. It discusses (1) our initial outreach, (2) the London workshop, (3) the CI4CG website, (4) the conversation project, and (5) the papers that have been developed via this effort. Then, we conclude this introduction with some thoughts on next steps—including research issues.

## 2 Initial outreach

Although the planet we all inhabit is still the same size, it has always been shrinking in many ways. As we all know, it is now possible for a person to travel via a jet airplane to the opposite side of the globe in less than a day. News travels at lightning speeds and data, including financial transfers, much faster. This shrinkage means that challenges can spread quickly too. Infectious diseases also can travel as fast as air travel will allow, unfortunately making worldwide epidemics much more likely. And while their journeys are more harrowing (and comfort and convenience are rarely a factor), the world’s refugees are also on the move.

While we are still subject to the scourges of old—war, oppression, exploitation, disease, and the like—many aspects of these in terms of potential volatility, magnitude, unpredictability, and speed of transmission are qualitatively different now. And since intelligence is closely tied to environment, it follows that as the environment changes, our ability to deal with it must also change. Moreover, because these challenges (such as climate change) cannot

be addressed solely by government, new laws, market forces, or technological innovation, they must be addressed consciously and they must be addressed collectively. They will not be solved via unintended side-effects of other activities. One main concern of our era is how to slow down or reduce the various negative trajectories. Many of them, unfortunately, are being perpetrated by the people and institutions who have the putative responsibility of working on our behalf. The advent of the Internet and the immense—and sudden—consolidation of information and communications systems into global networks poses immense and unprecedented threats to civil society and democratic governance. At the same time, the Internet does offer civil society an opportunity to develop collaborative systems and to defensively stave off breaches by government and businesses.

It was these growing realizations that prompted us (Fiorella De Cindio, Anna De Liddo, Mark Klein, Douglas Schuler, and Simon Shum) to think about starting a loosely knit community/network dedicated to the study and practice of CI4CG. One of our first steps was to develop a principle document (<https://ci4cg.org/a-statement-of-principles/>), some of which is included below (note: references are not in the original):

The Internet has provided the infrastructure for a variety of new approaches for collective intelligence. We believe, in fact, that the new communication infrastructure provides the potential for radical changes in the ways that human beings communicate and work together to build a more peaceful, sustainable, and equitable future. At the same time, we acknowledge that collective intelligence is not a recent invention. It has existed for eons before the Internet came into being. While the expression “collective intelligence” is generally not used in this regard, the idea of democratic processes—especially when used to help govern societies via collective problem solving—is a common material manifestation of that concept. (De Souza Briggs 2008; Landemore 2013).

Aristotle, writing in the *Politics*, states that people are political by nature. In the article on the common good in the *Encyclopedia Britannica*, this notion is expanded in ways that are relevant today.

From the era of the ancient Greek city-states through contemporary political philosophy, the idea of the common good has pointed toward the possibility that certain goods, such as security and justice, can be achieved only through citizenship, collective action, and active participation in the public realm of politics and public service. In effect, the notion of the common good is a denial that society is and should be composed of atomized individuals living in isolation from one another. Instead, its proponents have asserted that people can and should live their lives as citizens deeply embedded in social relationships. (Lee 2013).



which it exists/acts—particularly areas that present actual or potential challenges or opportunities.

This definition allows us to focus on four interrelated elements: agents; processes; goals; and environment, each of which takes different forms when considering CI4CG. Helping to make sense of the collective nature of intelligence that we wanted to pursue, an agent can be one or more people, any group, animal, computer program, hybrids of the above, and others as well as any artifacts, natural or otherwise, or system of artifacts that are useful in pursuit of the goals. Processes are the usually purposive actions (which include thinking, and cognitive actions) that are involved in the intelligent activity. Note that because intelligence can also be distributed over space and time, the results of the diverse processes can be stored in many ways—in human memories, libraries, online, or in tools, systems, or artifacts. Goals motivate the processes (and help coordinate) but they also include criteria for evaluating success of processes and changing the processes as necessary. Finally—because intelligence is context-dependent—the environment in which the intelligence operates is critical.

Collective intelligence (CI) is a major type of intelligence that is distinguished from individual intelligence (e.g. that of a single person), in that it emerges in collaborative environments and through the interaction of more than one agent. In the computer and information science fields, collective intelligence approaches can be classified on the base of the awareness level of the agents involved (De Liddo and Pluss 2017). Whereas, crowdsourcing and crowdfunding are CI processes in which collective intelligence emerges through the unaware aggregation of people's idea, actions and data; other CI approaches such as contested collective intelligence (De Liddo et al. 2012), collective deliberation and CI4CG require the conscious engagement of the agents in the facing of a common challenge, to the pursue of the common good and often through the cocreation of a collective artifact, policy or solution.

Conscious engagement is a key requirement for CI4CG because the pursue of the common good demands an active and aware commitment to collaboration and action. CI4CG is virtually synonymous with civic intelligence, the capacity of people to work together to address shared problems efficiently and equitably. It is an emergent property, the process that allows society or collective of people to evolve toward higher form of complexity and harmony (articulating insights, knowledge, and aspirations).

The workshop was also the first event in which we tested some collective intelligence tools for possible benefits to the emerging community/network. LiteMap, for example, that helps groups discuss and present complex issues visually, was used to capture the important points of one of the sessions. This session incorporated storytelling

in which participants shared a successful experience or story of CI4CG in action.

One participant who had never used the tool before volunteered to map the group stories and conversations and developed the (partial) map in the next figure (Fig. 2; full map: <https://litemap.net/map.php?id=1371081212540233995001412078134>).

The session helped identifying what characterizes a CI4CG story, who are the main beneficiaries of CI4CG, what were the main limiting and success factors for CI4CG initiatives.

The result of this exercise of collective intelligence in action helped us describe the impact of 10 successful CI4CG stories in Argentina, Italy, USA, South Africa, Kenya, and UK, by mapping their main limiting and success factors. The main beneficiaries of CI4CG were local neighborhood/communities, citizens at large, and students. While the main suggested factors characterizing a CI4CG story were: emergency nature (CI4CG emerges from grassroots initiatives, with no central organization); scale (it mobilizes big number of people/policy makers, it creates value for society at large, also beyond the community); a distinctive social impact (CI4CG promotes active citizenship, helps people to become agents of change, produces processes of collective learning, builds consensus).

The main limitations to the success of CI4CG initiatives that were identified were related to policy and governance factors (such as rigid organization settings, corruption and control, lack of institutional support, dependence on single provider and centralized services, top down management); organizational/project management factors (messy procedures, lack of communication, no record or memory of the process or decision rationale, no clear rules, no core team or facilitators); and contextual and economic factors (no replicability, lack of sustainability etc.).

Key success factors for CI4CG initiatives were also identified. These included opportunity (building on timely needs, available resources, a strong core of kick starters, preexisting local network; and small and local contexts); cultural appeal/spin (such as fun, indignation, or boycotting); sustainability (having internal resources for capacity building, compatibility with already existing governance, a supportive leadership, and university/institutional support).

This exercise improved our understanding of what makes CI4CG distinctive from other form of CI. It also helped build common ground across the group. Additionally, it showed how CI technologies can be used in blended settings to share group knowledge generated in face-to-face sessions online. This not only generated a tangible group artifact that can be shared and preserved, it also provides a visual summary of the thinking of this emerging community.

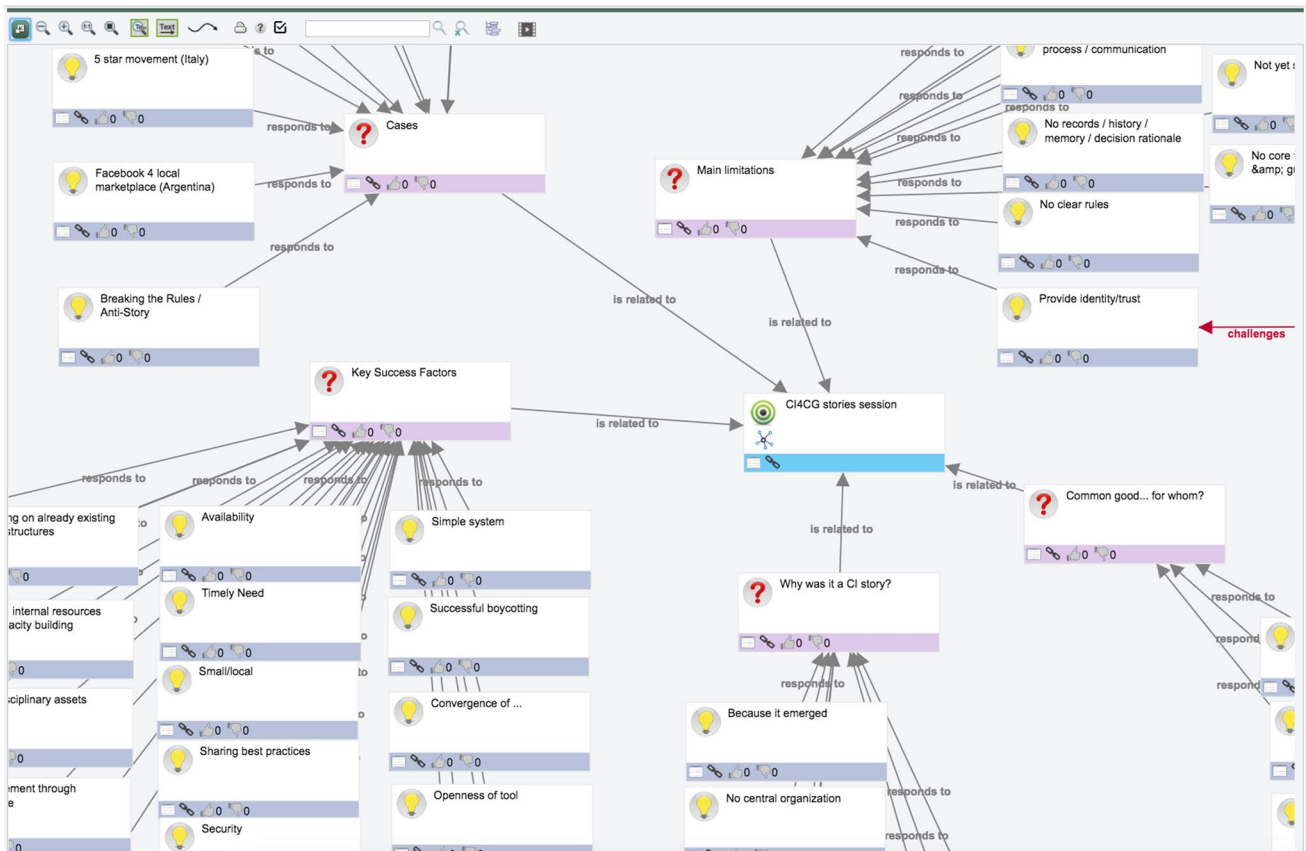


Fig. 2 LiteMap Results—Extract of the map developed around the storytelling connectives in CI4CG

### 4 The CI4CG website

The workshop concluded with the collective request to set up an online space to stay in touch and keep the collaboration flowing. This includes posting events of common interest for the community, disseminating the principles and objectives of the community, and gathering new members who could join in by subscribing to a mailing list. Our main intent was to build on the momentum generated by the face-to-face event and channel it into a virtual collaborative space. The website was setup a few months after the workshop (Fig. 3; ci4cg.org). A social media channel was added to the homepage and a hash tag (#ci4cg) was created to share tweets relevant to the community. The look and feel and logo for the community/network was collectively designed with the help of a graphic designer to represent the key ideas behind the network: inclusion, participation and civic engagement (see logo at the top left of the homepage in the image below). The website also worked as online aggregator and dissemination channel for four events and workshops which have been key to the development of the CI4CG concept and community. It is our ultimate objective to develop one or more web

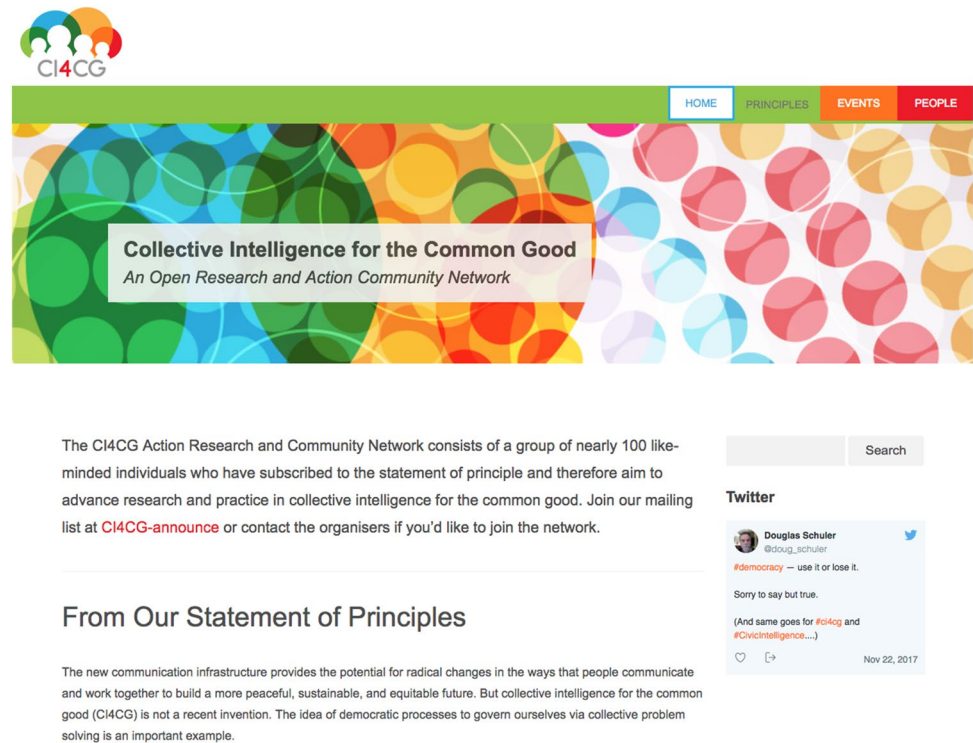
sites (portals?) that can serve as interactive test-beds and experiments in our continuing exploration of CI4CG.

### 5 The conversation project

Following the initial workshop, organizers launched the Conversation Project. The purpose of the project was to invite a broader group of colleagues and allow workshop participants an opportunity to stay engaged in moving the conversation forward. The project was organized around a list of short, open-ended questions meant to better understand, and identify: (1) the kinds of questions we (as a community) should be asking, (2) appropriate/useful definitions of collective intelligence, (3) barriers between intentional practice and desired outcomes, (4) most relevant topics related to CI4CG, (5) opportunities for extending and improving upon existing CI4CG work, and (6) types of events the group would like to participate. Participants were also asked to share some of their relevant writing.

Questions were administered through the CI4CG email listserve, targeting approximately 105 researchers, academics and practitioners in the fields of community informatics, collective intelligence, HCI, and ICT4D. We received

Fig. 3 CI4CG Website



23 responses, which were encoded using a concept-phrase extraction method to isolate topical themes in each response. Themes were manually reviewed to ensure accuracy, and the relevance of retained results. Thematic topics were clustered and analyzed using a multilevel q-analysis (MLQA) based on hypernetwork theory (Atkin 1974; Atkin 1977; Atkin and Castin 1977; Johnson 2014); the MLQA cluster method provides a useful approach for investigating topical convergence between responses, as well as co-expressions of themes. We applied the method to identify convergent topics, practices, barriers, and definitions among respondents.

Figure 4 highlights the concept or topic occurrences for the entire response set, revealing several emergent themes. In particular, common ‘values’ emerge signified by concepts such as community, collaboration, engagement, action, design, data access, openness, and knowledge.

Question 1: If you were going to ask the entire CI4CG group one (or more) questions, what would it/they be? Q1 was analyzed using the MLQA method; the resulting heatmap (Fig. 5a) depicts the number of features shared between responses based on both a single-link and agglomeration clustering. The X and Y axis represent respondent ids, and the color scale represents the relative intensity of common features (as different dimensions of q) in a given response, and that are also shared with other responses.

Results reveal topical convergence between Q1 responses <3, 4, 5>, and a weaker connection between <3, 4, 5> and <7>. For example, we find that response #3 is characterized by six dimensions (or seven features) that are

also shared among 75% of the response set in the data. Figure 5b shows the feature co-occurrence, with numbers representing feature ids. Responses <3, 4, 5, 7> relate specifically to questions that look to better understand the ways CI4CG is different from—existing fields of practice, such as Collective Impact, Community Informatics, HCI, etc. We can also see broader convergence between <3, 4, 5, 7, 8, 10, 11, 12> (Fig. 5a) around methods, strategies, and engagement (Fig. 5b) ids—indicating interest among the group in identifying tools, methods, and strategies to sustain engagement and grow collective intelligence.

In addition to sharing a common set of question topics, the group also appears to share similar definitions of “collective intelligence” (Q2), with some distinct differences. Figure 6a highlights the feature-convergence between responses, while Fig. 6b shows the most significant co-occurrence of features among all responses. Results indicate that participants’ definitions of collective intelligence share a common set of attributes. Approximately half of the respondents defined CI by listing attributes such as “community, decision making, awareness, locality.” Others provided more formal definitions, e.g. “Building community efficacy through open and collaborative processes for knowledge and ideas creation.”

However, Fig. 6a also reveals several clusters within the data, and in particular, two significant clusters <0, 1, 3, 4> and <5, 6, 7> emerge. Community, awareness, action, and learning were terms most often used to define collective intelligence. Similarly, common attributes were identified

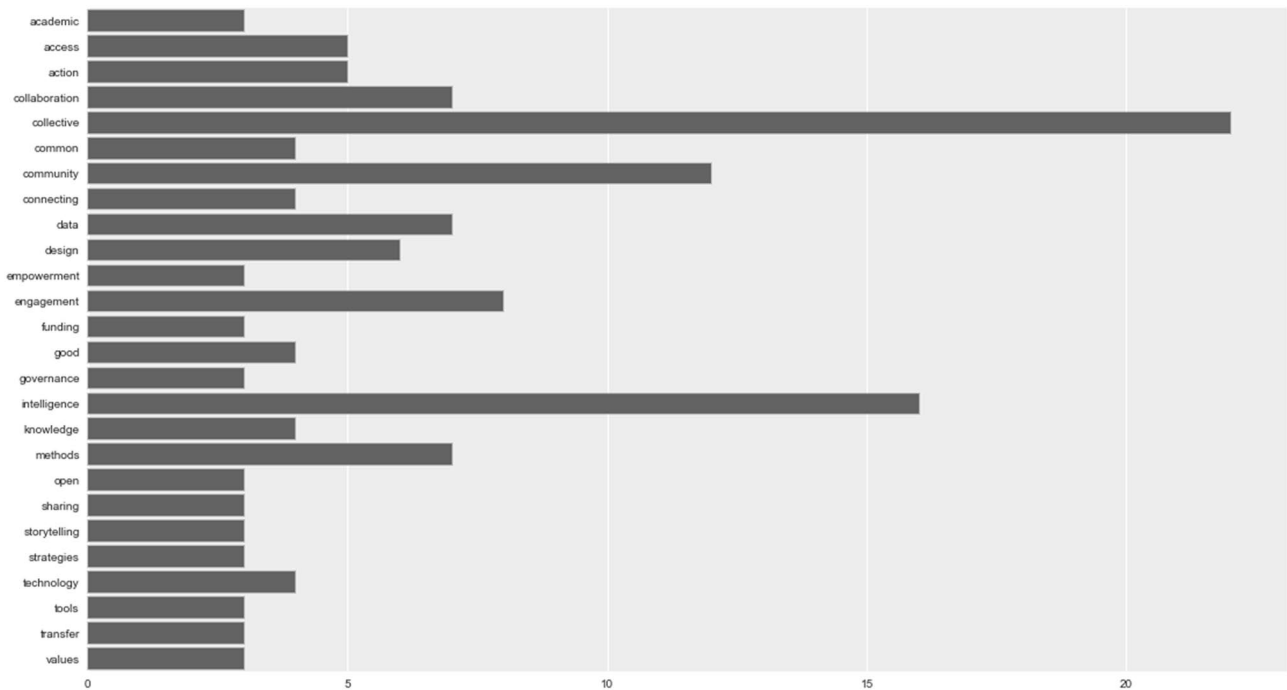


Fig. 4 Important CI4CG themes

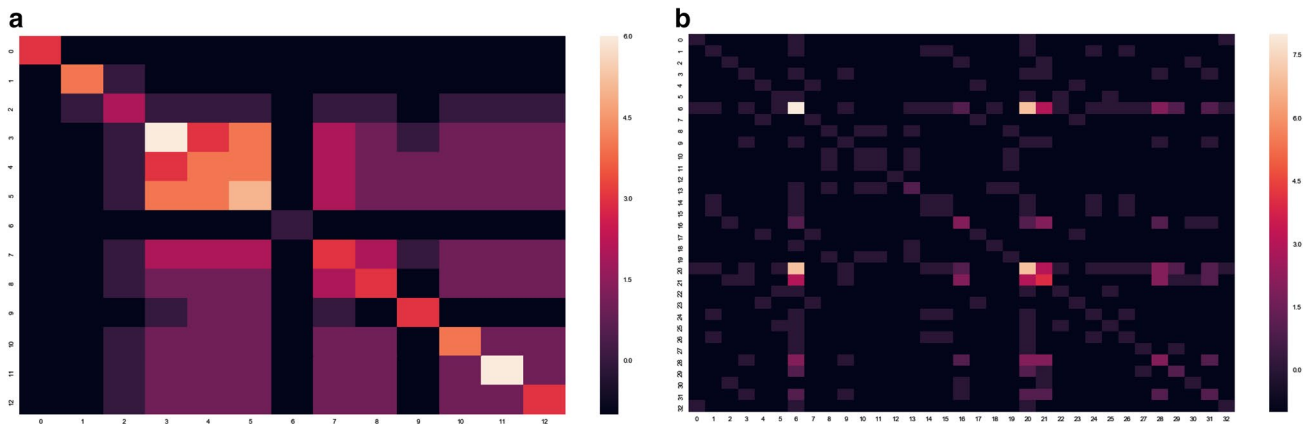


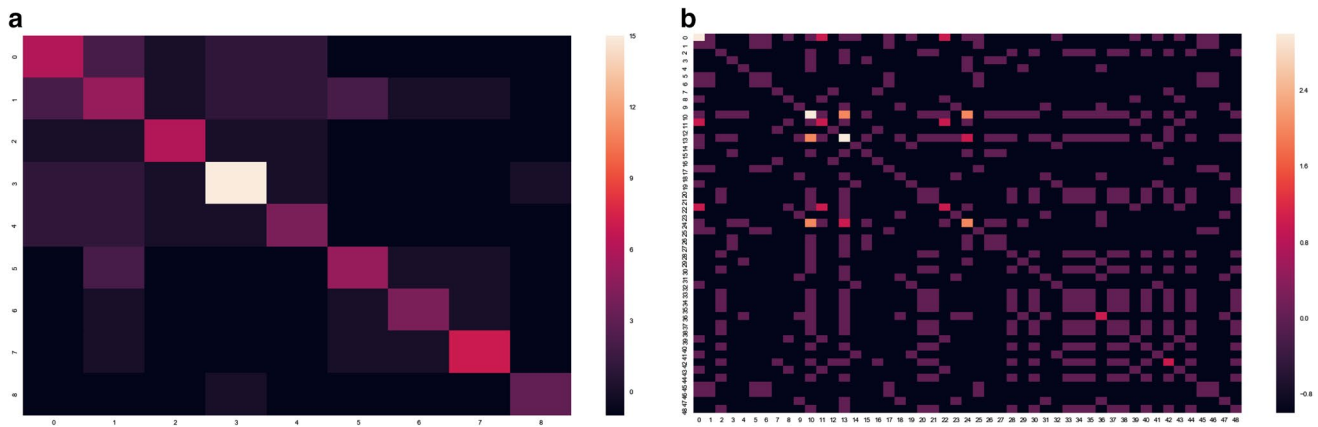
Fig. 5 a, b Q1 Response Clusters and Topic Clusters

around “barriers” (Q4), particularly in terms of sustained engagement, data access, and usability of technologies. Two of the most commonly communicated barriers were time, and the ability to link action and outcomes.

Participants also shared their perspectives on the most important topics that ‘should’ be explored within the CI4CG community (Q7); as well as the opportunities for extending, or building on existing work in the community (Q5). The group identified a series of topics including, designing new CI tools, public education and skills transfer, improving methods of engagement, and the application of CI and

technology to empower marginalized and impoverished communities. Other relevant topics included new algorithm design, CI research methods, and sociotechnical systems/platforms to community empowerment and decisionmaking. Suggestions for platforms included sensemaking tools, community data collection and analysis tools, as well as technologies to facilitate open governance, deliberation and that simplify legal language.

Finally, the participants shared a number of events, or structures around which to organize and conduct CI4CG meetings (Q3). Common among nearly all respondents was



**Fig. 6** a, b Q2 Response Clusters and Topic Clusters

a preference for practical outcomes or products, that could be created as part of an event. Thirtypercent of responses focused on workshop group events centered around the production of scholarship, developing a technology, or solving a design challenge. Overall, event suggestions emphasize joint peertopeer interactions, but diverge with respect to the target audience. The group splits between a more academic oriented event, while the majority of participants would like to see the group include practitioners of social change, with more of an emphasis on ‘fun,’ interactive events focused on building community, and developing practical applications, technologies and strategies that address the sustainability of engaged practice, and growing public participation.

Overall, the CI4CG community exhibit a diverse set of perspectives, concerns and ideas for advancing CI4CG. Yet, there are clear overlap and shared perspectives among the majority of participants with respect to definitions of collective intelligence, barriers, tools, events and topics to be explored. Further, there was a recurring narrative that focused on including people and groups outside the traditional academic circles.

## 6 The articles

Articles in this volume reflect the vision and topical focus of the participants at the London Workshop, and the larger group of participants within the CI4CG community sharing the listserv. The articles in this volume present perspectives, research, conceptual models that speak directly to strategies, technologies and structures of social interaction in techno-mediated environments-contexts. The articles went through a process that increased the delay before publication but (we believe) helped build a better collective case. All authors were required to submit a statement of interest which was reviewed for quality

and suitability. In addition to several fields such as keywords and stakeholders that were included to help with possible future analyses, potential authors were required to (1) make a plausible case that the paper could actually advance CI4CG and (2) make recommendations that would further help cultivate beneficial uses of their work. In each article, the authors addressed one vantage point for looking at CI4CG. Taken together, it is clear that common themes emerge among the articles in this collection, and reflect a type of collective intelligence in which the authors share their inquiry and insights into the theory and practice of CI4CG. This includes evidence of common themes, values and perspectives in which authors converge around a diverse, but common definition of CI4CG, and narrative about the directions of CI4CG as a theory of social change.

Marco Avvenuti, Stefano Cresci, Fabio Del Vigna, and Maurizio Tessonni in their article “On the Need of Opening up Crowdsourced Emergency Management Systems” take on the important job of exploring how best to link citizens and decision-makers with intelligent systems. They describe the diverse, rich and plentiful amount of data that is often now available during emergencies and the difficulties encountered while attempting to put this data to effective and efficient use. They point out the opportunities and challenges due to the “rather big divide between volunteer citizens, analysis systems, and emergency stakeholders”. While they focus on emergency management specifically in regards to earthquakes, the broad question they explore is becoming almost universal. The authors discuss the many challenges in involving citizens in these systems, such as mass surveillance, rumors, vulnerability to attacks and so on. Certainly these issues also pertain to slower-moving and more distributed emergencies related to, for example, environmental degradation and climate change. In what ways should human decisions be turned over to machines and who decides?



In their paper, “Community Digital Story-Telling for Collective Intelligence”, Sarah Copeland and Aldo De Moor consider how to extend the use of digital story-telling as a “personal journey” into an important facilitative element of community building and social change. They do this by examining the basic Community Digital Story Telling Workshop method and extending it to create a Storytelling Cycle of Trust model which they apply in the Dutch city of Tilburg. They demonstrate how four critical elements—commons, legitimacy, authenticity, and synergy—can be strengthened through the extended approach. In their thoughtful and purposeful work, the authors give considerable attention to all phases of their approach from story development to publishing to sustainable institutionalization that promotes individual, community, and social understanding and positive change. The paper provides important links from the academic community to other communities via collective learning, group processes, informal education, and story-telling as a key element in the development of CI4CG.

Peter Day’s contribution on Community Media 4 Kenya presents his work integrating theory and practice over time with an evolving and participatory orientation. He first discusses some of the context and intent of his work. He makes the important point that ICT is often seen as immune to social (rather than economic) shaping although other institutions (educational, for example) apparently do not share that degree of presumed autonomy. He also points out that focusing on economic perspectives and more-or-less entrenched formal institutions suggests that the collective intelligence of communities is somehow less significant or less deserving of attention. Day presents a partnership between university students in the UK and community members in rural Kenya who work together incrementally to build community and community media in an intentional, thoughtful, and deliberative way. The aim is to build approaches that are grounded and well-suited for community life without imposing “first world” dictates. As part of his focus on “learning ecologies” he calls for “mutual recognition and enrichment of individuals.” Day stresses the point that while the Kenyan partners are the ultimate arbiters, every person associated with the project (mostly students) are legitimate and valued participants, a point that seems to be indispensable for CI4CG.

Similar themes are considered in the article, “Rat Running the G20: Collective Intelligence for Navigating the Disrupted City”. For example, Estrada et al. examine the strategies, and technologies urban residents used to ‘get around’ during the 2014 G20 summit in Brisbane, Australia. Their inquiry focused on an examination of the spaces and experiences of residents or local commuters as they navigated through the ‘restricted’ urban landscape. The research objective of their study was to better understand the patterns of sociality as they unfolded in relation to the spatial experience of a ‘disrupted’ landscape. Moreover, by understanding

these patterns, they seek to better understand aspects of collective intelligence. The research employed a novel method based on “walkshops” (Korn & Zander, 2010). Residents used their mobile phone to record images, text, locations and navigation patterns using a mobile app called “MapMyWalk” (MMW; mapmywalk.com).

Results revealed a number of commonly shared patterns of sociality, particularly in terms of information access and communication. They found, in both cases, information and communication appear to be differentiated by face-to-face vs. more technology-mediated interactions. The same patterns could also be interpreted as two aspects of a more complete strategy, and that allow for a type of collective intelligence to emerge as the product of an active-communicative relationship among the constellation of people acting individually and collectively. Overall, the study appears to show a variety of personal and connected strategies (and technologies) that people use to adapt and manage behavior in disrupted spaces.

In his article, “It Takes a Village to Raise a Child”, Alexander Fink interrogates the roles of data and, more recently, computing in the social work field. After a brief but very informative history on data and social welfare, he turns his attention to the way that the Collective Impact methodology (Kania et al. 2011) which is becoming very popular in the United States and elsewhere is actually deployed. Developed as an approach to help disparate groups with common goals collaborate more effectively as a virtual larger organization of organizations, the methodology has been criticized in many ways and is likely to be adapted in different ways by different players. In the instantiation of that process in the Promise Neighborhood program, Fink has noted a variety of tendencies that seem to replay several historical forms of oppression and marginalization of the poor. One of these, Fink contends, is a model of child development that we have in our heads and consequently in our policies and in the data we believe represents an accurate picture of reality. One of the consequences of this is that communities especially the youth within are deprived of their voice. According to Fink, “Given that young people and their families have very little role to play in either the definition of the shared outcomes/metrics of these initiatives or the choices they make about what they do within the offerings available to them, we might start to wonder about exactly who the “village” is that is raising our children. The village may in fact be more a computer and its makers than the neighborhood and its young people.” He proposes adapting community-based, anti-ageist perspective that builds on the “democratic stance that believes that individuals and communities ought to have a voice in issues that impact their lives.”

In their article “Design for Collective Intelligence: Pop-up Communities in MOOCs”, Garreta-Domingo et al. address the issue of designing learning environments for

Massive Open Online Courses (MOOC) that go beyond networked individualism and provide a strong social context. The authors associate the concept of collective intelligence to the concept of networked individualism and contrapose it to traditionally conceived communities of practice. Their assumption is that participants join MOOCs with a networked individualism approach, that is to say each one pursuing personal goals and with no interest to necessarily build a community. They then designed two MOOC experiences in which they tested strategies of community building and peer-feedback interactions to investigate if and what type of communities emerged in the MOOCs; specifically, if a sense of community developed over time and how it was perceived by participants.

The authors argue that the case studies presented in the paper show that collective intelligence does not necessarily require the formation of communities of practices as traditionally intended. They go on to suggest that more ephemeral type of communities (that the authors call pop-up communities) can meet the socialization needs of the participants in MOOCs. These communities are purposeful (they emerge for a specific need, e.g. getting feedback on course material) and temporary (they disappear when the purpose has been achieved). These findings confirm previous CSCW research that suggests that ‘intensional networks’ or ‘episodic communities on demand’ are often behind successful online interaction experiences. This paper sheds some light on the definition of the type of communities that are needed to promote successful CI4CG, at least in the context of pure online interaction.

In the next article, “Feel the Bern on /r/SandersForPresident: dynamics of a pop-up political advocacy community on reddit.com,” the importance of design as an enabler of collective intelligence is echoed. Mills presents research on another type of episodic community. Mills’s study goes into the 2016 Democratic Presidential primary, and the use of Reddit and sub-reddit groups as a platform for advocacy and political campaigning. Mills reports specifically on posts submitted to the /r/SFP sub-reddit between June 2014 and January 2016, a sub-reddit dedicated to 2016 Sanders campaign for the Democratic Party’s nomination. The study looks to better understand the formation of sub-groups, and the ways participants communicate and work together (or do not) to expand public engagement in the political processes.

In particular, Mills explores the strategies used by reporters and campaign staff to modify and manage the messaging on the Reddit sub-groups; this included identifying the ways sub-reddit participants used Reddit features to promote a given news item, or message. The resulting space of exchange is: Mills suggests a type of emergent commons where a community of participants engage in a relatively open process of voting on messages or topics. The process of promoting topics serves to “regulate” the influence of

messages based on what everyone else collectively decide is important or worth attention. Overall, Mills finds evidence that the sub-reddit (community’s) ‘sensing’ and ‘reasoning’ at the collective level, as mediated through the post-comment-voting system enabled by the technology.

While Mills discusses the /r/SFP sub-reddit as a type of self-regulated collective commons, Morano et al. explore a simulated commons, but they research a different kind of “community” altogether. In their paper, “Can Collective Intelligence Avoid Tragedy of the Commons”, using an agent-based model based on the Tragedy of the Commons and group behavior. In their article, the authors investigate the parameters and values associated with the Tragedy of the Commons, and properties common to smaller group coordination. One of the central questions driving their study was whether the type of social identity developed in small groups can effectively help avoid the Tragedy of the Commons.

The research team looked to uncover properties of small group coordination for common benefit using agent-based simulation models. The model results revealed the influence of initial scarcity on the likelihood that a group could adapt and survive, say from the depletion of critical natural resources. On the other hand, results show that in cases where there is an initial abundance, groups have a higher likelihood of adapting in time to avoid extinction. Morano et al. suggest that the efficacy and strength of institutions was a significant determinant of group survival. The model, according to the authors also reveals that group survival is also more likely when the proportion of elites in a group is higher; this contrasts with increased rate of failure among groups and scenarios where resources are limited and the agents within the group are non-elites. Overall, the researchers suggest that group structure, rules as in formal and informal rules, and existing state of resource availability are important determinants of likely coordination to protect resources vs. group extinction.

The paper by Leonardo Parra-Agudelo, Jaz Choi, Marcus Foth, and Carlos Estrada, “Articulating Difference through Creativity and Design in a Post Conflict Situation” explores, without downplaying the difficulties, how CI4CG can arise in unlikely situations. Specifically they look within the city of Bogota in Colombia, a country that has been involved in a civil war for over 50 years. The authors focus on “design as an area to negotiate and articulate social change between the individual, social contexts, and the built environment (Gerrard and Sosa 2014),” outside of the usual focus on experiences in the context of developed countries, basically by working with grassroots organizers and community groups. Specifically the authors focus on two grassroots organizations that engage the urban (Bogota) community. Both groups employ a wide variety of artistic/creative approaches empowering people and communities to successfully embrace conflict as to “transform threats and difficulties into

fruitful grounds for addressing civic issues through creativity.” The work reminds us that civic intelligence is always latent, a point that does not claim that it is easily cultivated or employed, and it is not limited to privileged groups with money, power, or educational attainment.

In their article “From Awareness to Behaviour Change: Collective Intelligence Applied to Promote Energy Conservation” Piccolo and al. tackle a key issue in the CI4CG agenda which is the issue of raising collective awareness of energy consumption to trigger behavior change toward eco-friendly lifestyle. The paper presents lessons learned from a case study which aimed at raising energy awareness collectively in the workplace, and from that draws a list of key characteristics for collective intelligence technologies for the common good. Results of the study show that narratives and personal stories are often more powerful than data and facts to trigger debate around behavior change; because they provide useful tips and recommendations that are built on concrete personal experiences that are easier for people to relate to. The paper also suggests that one key challenge for CI4CG technologies is how to blend online and offline interactions. Personal experiences are usually better shared in informal face-to-face contexts, so CI4CG initiatives that want to really affect people everyday lifestyle need mechanism to capture and support non virtual interactions and narratives.

In their article “DoGood: A Gamified Mobile App Promoting Civic Engagement”, Rehm et al. focus on the role of motivation in building effective CI4CG initiatives. They take a gamification approach to motivate citizen engagement in civic activities, and present a prototype mobile app called DoGood with which users can submit civic activities, promote them to others and take part in other people’s civic activities.

Results of the study show that after using the app participants changed their understanding and awareness of civic activities. Participants also reported that during the study they have engaged more in civic activities than before, which shows how the app positively affected their motivation to participate. There was not a single gameful design element that worked for all types of users but a variety of elements, such as logging of personal achievements and notifications, which were considered particularly motivating by the users. Finally, this paper support the existing definition of civic activity (Adler AND Goggin2005), as an opportunity for a citizen to become involved and improve life in his local community.

Rosenschein and Davies in their article, “Coordination Technology for Active Support Networks,” explore what they call ‘active support networks’ (ASN), and the integration of ASNs in personal task management. The team looked to analyze a process of ‘empirically-driven tool development’ that may reveal ways individuals and

groups can extend self-efficacy and goal achievement. For Rosenschein and Davies, a special type of network often goes unstudied, compared to organizational or team networks. These networks are ‘looser,’ structurally speaking, but offer a window into the self-directed efforts that people take, and including their use of technologies that have been specifically designed to facilitate less-structured forms of coordination among people linked through an ASN.

Their study presents an interesting technology that integrates a personal task management solution, and one’s ‘active support network.’ The results of their work include a new technology that provides a ‘social prompting’ feature as part of the task management tool. Central to their work, Rosenschein and Davies delve into the connection between ASNs and their mobilization through technology as a kind of communicative space for leveraging the wisdom or capacity of a network to enable individuals to solve multiple tasks at once, reduce cognitive load, and support task–goal memory. Overall, Rosenschein and Davies present an interesting compelling model for creating technologies that can be used to promote communicative action, and enable a collective intelligence. The framework and research into this space is just the beginning,

It is also interesting to note that Rosenschein and Davies do not necessarily take the stance that technology is always positive or emancipatory, rather they emphasize the role of design, and the negotiated space that come to characterize socio-technical systems; indeed, some systems are not designed for the common good.

In their article “On Affect in Public Nourishing the Common”, Teli et al. reflect on the importance for CI4CG practitioners to position themselves theoretically and methodologically in the ongoing societal transformation to better connect with people’s existing practices and aspirations. The paper explores a theoretical perspective and a methodological contribution to design digital technology promoting CI4CG, by responding to the desires and aspiration of the constituency of people that the technology wants to mobilize. Teli et al. propose a narrative-based method to order the ways in which the CI4CG target audience would like to participate. The ordering can then be used to prioritize or rule out specific affordances from the technology design. The method uses “positioning cards”, each representing a narrative emerging from focus groups and in depth interviews; and it allows to grasp the general political options available to a project. The power of the method is, therefore, twofold: it informs participatory design of CI4CG technologies by engaging with users “desires” and existing practice; and it provides a framework for CI4CG projects to position themselves in the landscape of existing socio-political theories.

## 7 Conclusions and next steps

We are pleased with our first set of 15 articles (which includes this introduction) and we are planning to continue the momentum. We feel that they do a good job providing important insights as well as showing many of the challenges and opportunities for CI4CG. Taken together, the papers constitute a good introduction to CI4CG (especially as it relates to ICT) and provide important ideas for future research and action. Moreover, careful reflection of the workshop outcomes the Conversation Project results and the articles in this volume hint at an emerging social ontology with respect to the characteristics (e.g. practices, theories, identities) of a collective intelligence for the common good. The characteristics include (but are not limited to) narratives of risk, and the processes employed by people to shape meaning about risk such as climate change, or the erosion of people power in the political process. This of course includes narratives of the common good that point to solutions to the experiences of risk—where the technologies, ideas, theories, practices and values are embedded in the social existence of human individuals and groups, and unfold through a tension between a collective negotiation of risk and the elimination of that risk to achieve an ideal of the ‘good.’

The papers in every case connect computer systems of some sort to actual “real world” situations. Many of them (e.g. Day, Copeland and De Moor, and Parra-Agudelo) involve working directly with “users” as varieties of participative research. Others, such as Morano et al., used abstract models to extrapolate about communities. Some of the other notable dimensions include issues, communities, approach, and artifacts. Issues include: post-violence reconciliation, emergency management, community self-management, energy conservation, among many others. Some communities that focused on were rural, some urban, and some virtual. Some were long-term (the Kenyan communities in Peter Day’s paper) but many were more transient (the MOOCs in Garreta-Domingo et al., or the rat-running situation in Estrada et al.). Some developed new apps such as DoGood or MapMyWalk but some employed pre-digital artifacts such as the “positioning cards” in (Teli et al.).

One thread running through these papers is that CI4CG depends on context. This generally means that people who are affected by something (and in turn can also affect things) must be non-trivially engaged in these affairs. This presents conceptual challenges for researchers because of the necessity of being co-researchers with people who are less likely to be academics. There is also the necessity (at least to some degree) of abandoning the quest for the universal and simple elegant explanations that suffice without

modification in all settings. While the aim of creating useful and utterly pristine theories remains, among the criteria for CI4CG, work along these lines is more likely to call for what is useful in the specific contexts in which the knowledge is intended to be used. It is also more likely to be considered as provisional, subject to modification or rejection.

This focus on the local, contextual, introduces other problems and opportunities. For one thing, problems are not confined solely to local areas; they are often replicated in one form or another throughout the world. Moreover, causes of them do not necessarily have local origins. One of our goals of course is better understanding the challenges we are faced with which are both local and translocal. This should help us think better about what we think our next steps ought to be. While the problems that humankind faces seem to become more grave, our ability to address them may actually be diminishing. Many people in the world, for example, seem to be eschewing democracy (Foa and Mounk 2016) and embracing failed approaches that include racism and war, and are selecting leaders for their perceived strength and their professed ability to solve these problems easily and effectively; often these aims are to be achieved by “getting tough” on targeted groups.

The idea of integrating various tools and systems is also still central to our vision. The logic as well as the actual implementation of these integrative experiments could lead to more meaningful development of systems that promote civic intelligence and CI4CG. One core idea involves developing a framework of coordination that would allow for planned and unplanned cooperation among people who may or may not be explicitly cooperating. The latest incarnation of this work is developing a broad cognitive map of civic intelligence which was initiated at our workshop at the Community and Technology 2015 conference in Troyes, France. Ideally, this will be used for characterizing, comparing, and cultivating CI4CG efforts. As mentioned, one of our main chores is helping to uncover and encourage synergy and to help nudge “individual” projects into broader, more integrated and mutually supporting hyper-projects. The following list of various “sharables” provides a fairly extensive list of ways to coordinate and support this mutual work:

- shared themes or challenge focus (not necessarily determined via specific grant programs);
- shared methodology, vocabulary, models;
- shared aspirations, goals, manifestos;
- shared code of ethics;
- shared plan;
- data interchange, APIs, taxonomy, ontology;
- shared projects;
- shared research agendas;
- shared project members;

- shared awareness;
- shared communicative venues (structured and unstructured; virtual, in-person, and hybrid);
- shared commitments;
- shared online repositories, portals, test-beds;
- shared services; and
- shared knowledge of community roles.

We expect to pursue a variety of activities in the future. These include events such as workshops at appropriate venues. We hope to continue with more research and action projects including special sections such as this. We plan to continue to raise the visibility of issues realizing that this broader “project” is already underway worldwide and will undoubtedly continue. We will expand and publicize opportunities and lobby for more. Generally, we will help with connections—tools, venues, framework, methodologies and the like.

These steps include developing and improving our community/network, pursuing and refining our research agenda, carrying out various experiments, documenting our work and ensuring ready access to the results, understanding challenges and opportunities, cultivating fruitful community partnerships, and generally construing this enterprise as an ongoing and perpetual project. At the highest level our research agenda should help illuminate what is necessary to cultivate CI4CG. When the community/network (and others beyond) focuses on this as a learning community, the agenda will mature. Because the enterprise is so broad, a continuing learning cycle based on the enterprise as a whole—its effectiveness, reach, and influence—should be embedded in our processes in what could be called collaborative metacognition. This means explicitly looking at the work as a whole in addition to looking at its original constituents.

The work that falls into the heading of CI4CG is extremely broad: it includes research and action; products include (for example) deliberative systems, research enterprises and case studies, think tanks, model policy documents, curricula, ruminations and epistles, thought experiments, art works, and many others. We also hope to ultimately open up this work, possibly through networks of networks, enabling a multiplicity of systems, resources, events, experiments, etc.—but, still, with the intent of integrating the work into the whole. While this work continues to promote rigorous research, it consciously seeks to integrate and build upon other perspectives. We hope to transcend the constraints of many dominant habits, institutions, and norms, especially when their strict obedience compels us to work in ways that are likely to be ineffective in addressing the common good of the planet and its inhabitants.

Unfortunately, the forces that are working towards civic ignorance are also motivated. The ability to impede progress on CI4CG is well-documented (Proctor and Schiebinger 2008) but not always well-recognized: the origins of campaigns of

civic ignorance are often intentionally hidden, while civic intelligence is generally best accomplished in the light of day. With CI4CG, the means align with the ends. In other words, practicing CI4CG will be required if CI4CG is our ultimate aim. We hope that by modeling the world we would like to see we can obtain insights that would be difficult to acquire through other means. Beyond conducting research and developing tools, services, policy, and the like, we are hoping to build the circumstances that help promote this work and the orientation in the world. To these ends, we are especially eager to work with the people worldwide who share this vision and with those who are already conducting this critical work.

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