The affordances and use of green citizen engagement web tools

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Abstract—The purpose of this paper is to analyse if and how three different green citizen engagement web tools create the basis for different levels of environmental citizen participation. This is relevant in both an e-governance context and an environmental policy context, as it is normally assumed that ICT as such can be used to strengthen such participation, without looking neither at the special opportunity structure that the applications offer (their affordance) nor the actual use of the applications. Theoretically, the paper departs from Contextual New Medium Theory. This theory focuses on technological practices, and demonstrates how these are created in interplay between technology, policy ideas and actor skills. Empirically, the paper unfolds as a comparative case study of three different green citizen engagement web tools, chosen due to the differences in their affordance. It is then analyzed whether these differences result in differences in environmental participation. It is concluded that while differences in participation are indeed found, these differences seem to hinge at least as much on the activities of skilled actors such as involved civil servants, web- and game administrators than on the affordances of the web applications.

Keywords—green citizen engagement web tools, participation, affordances, contextual new medium theory, case study

I. INTRODUCTION

Man-made climate change constitutes a ‘super wicked’ global problem [1] and in recent decades, international governmental bodies have acknowledged the scale and intensity of the problem of climate change. Yet the primary international climate change mitigation agreement – the United Nations Framework Convention on Climate Change (UNFCCC) with 195 member states as signatories – has not been able to mitigate climate change effectively. In fact, contrary to the commitment by the international climate change mitigation governance system to reduce greenhouse gas emissions, the exact opposite has occurred [2]. As a consequence, the international multilateral governance system based on individual states meeting their obligation has been described as failing [3] [4].

Since the top-down initiated approach to climate change mitigation is not functioning effectively it may be worth considering an approach that involves local governments and citizens. There are empirical as well as theoretical arguments for pursuing this strategy. The proportion of energy consumption by individual citizens (including for domestic use and personal transport) accounts for approximately half of all energy being used, which provides an empirical argument for involving citizens individually or at the community level [5].

The theoretical argument for citizen involvement in relation to climate change mitigation can be found in various bodies of literature. Thus, the benefits of citizen participation in (environmental) policies have been dealt with both in the steering or management oriented governance literature, under such headings as co-production, collaborative innovation or co-creation [6] [7], and by the literature on democratic participation [8] [9]. However, it is important to notice that these two bodies of literature stress very different benefits of participation; the governance literature stressing the increased efficiency of public policies, and the democratic participation literature stressing the improvement of civic virtues and political capital [10].

Thus, a possible successful response to global climate change is to focus on individual citizen or local community behaviour and consumption patterns, which can be facilitated through internet- and communication technology (ICT). Green web applications are examples of such ICT solutions aimed at citizen driven climate change mitigation [11]. Green web applications are citizen engagement web tools that contain climate change information relevant to citizens interested in learning more about climate change mitigation in order to reduce their energy consumption.

The effects and functionality of such tools have been studied in connection with the enactment of local government climate change action plans. However, their affordances in connection with citizen participation have not yet been addressed [11]. There is a need to explore how citizen participation can be increased by employing low-cost scalable solutions such as green web applications under the slogan ‘think globally, act locally’ [10].
Research question: ‘Do the affordances of green web applications enable different levels of citizen participation in environmentally sustainable practices?’

II. LITERATURE REVIEW

This literature review will address green web applications and citizen participation in climate change mitigation. The purpose of doing this is to demonstrate that while both green web applications as well as citizen participation in climate change mitigation has been studied on their own, we have found no literature, which combines the two. We are therefore describing a new field of research in this article, making our inquiry rather explorative.

Green web applications are a relative new phenomenon within climate change mitigation e-governance literature [11], and in one of the few studies on these applications it has been examined whether green web applications can strengthen individual engagement in climate change mitigation based on a qualitative study of six respondents using two applications (ClimateAwareness, Mapmyclimate.dk). The study applied actor-network theory in combination with other concepts from ‘science, technology & society studies theory’. The study found that applications can be conceived of as ‘scaling instruments’ (according to actor-network theory) that can move participants from powerlessness to being empowered by changing or redefining the scale of the climate change [12].

There is very little academic literature, which focuses explicitly on citizen participation in climate change mitigation. Some of the few examples are [13] and [14]. While Whitmash et al. is a rather broad collection of articles dealing with ways to engage and motivate citizens/the public to engage in climate change mitigation, and the difficulties and barriers in relation to such engagement, Hoff & Gausset is more narrowly focused on the ways in which citizens and public authorities collaborate in order to tackle the climate change challenge. For this reason they define citizens participation in climate change mitigation as ‘The participation of citizens in any type of collaborative activities with public agencies to either formulate, decide on, and/or implement measures that have to do with climate change mitigation.’ [10:30]. The way these ‘collaborative activities’ are studied is through a series of ‘exemplary’ case studies covering (part of) the field of possible collaborative arrangements between local public agencies and citizens. Such interventions can be initiated either by government agents (which is what we see in the case studies below) or by citizens, but most often in a collaboration in which one of the two poles weighs more than the other. Interventions can target either individual change (which is what we see in the case of ClimateAwareness below) or collective changes (which is what we see in the cases of TheClimateParty and UrgentEvoke.com below). Since collective change requires the participation of a large number of individuals, and since individuals are influenced by collective behaviour, most interventions mix both aspects to various degrees.

One of the main results of this research is that in general the interventions targeting and involving collectives of different kinds (e.g. housing cooperatives, villages) are more successful than interventions targeting individuals, both in terms of producing bigger CO2-reductions (even though this can be difficult to measure accurately), but also in terms of other tangible and less tangible benefits such as creating jobs and local revenue, increasing citizens learning about climate change, creating ownership to projects, empowering citizens, creating spaces for deliberation, strengthening the community, etc. [15].

III. METHODOLOGY

This study examines the relationship between the affordances of green web applications and their use by citizens who wish to mitigate climate change. It unfolds within a framework that aims at technologically mediated innovations in political practices, and is based on an analysis of three green web applications that are selected because it is hypothesised that they enable different levels of participation. Technology (in casu green web applications) in combination with skilled actors (e.g. households, citizens or game players) and political discourse (e.g. climate change mitigation policies) constitute environmentally friendly social practices. These three elements make out the social practice, where it is the material (the green web applications) that has an important role in securing coherence within the social practice. The study is carried out as a text analysis of the green web applications in the form that they have on-line supplemented by secondary analyses of the web sites.

IV. THEORY

This study is based on a comparative analysis of three greenweb applications. Green web applications are understood as technologically mediated innovations in political practices (TMIPPs). This concept was originally introduced to replace the term ‘electronic democracy’, which was understood as denoting the complex relationship between computer, technology, and political processes in order to avoid the technological determinism present within e-governance literature at the time [16].

A. The Contextual New Medium Theory

The study examines how the applications enable environmental sustainable citizen participation practices, which motivates using the Contextual New Medium Theory (Contextual NeMT) [17]. The Contextual NeMT is specifically developed for analysing social practices involving TMIPPs. The model contains three elements – political discourse, skilled actors, and technology. The model has two key points.

First, the reason for selecting the three elements in the first place is related to the understanding of practice-as-entities according to social practice theory. Practice-as-entities are the
outcomes that emerge from practice as they appear in real life and are comprised of three elements: discourse, skills, and artefacts [18]. It is the relationship between and among these elements that constitutes the character of a social practice. The elements of practice may be examined individually, but cannot be analysed independently because the elements are always circulating around and among each other thereby providing the argument for selecting the elements.

Second, according to the double sided arrows in Figure 1 the model can be read from left to right or from right to left. The arrows pointing towards left mean ‘is constitutive of’ or ‘creates the basis for’. This means that technology (e.g. ICT) is constitutive of skilled actors. Following this the skilled actors are constitutive of political discourse (e.g. policy). However, the model might also be read from left to right. In that case, the arrows should be read as ‘affects’ or ‘places demands on’, i.e., political discourse affects, or places demands on the related skilled actors, who can be administrators responsible for implementing the policy. In turn they would place demands on technology.

![Figure 1: The Contextual NeMT](image)

B. Citizen participation

While the academic literature on citizen participation in climate change mitigation activities is sparse, the literature on citizen participation in public policies in general has been booming in recent years. There are probably a number of reasons for this but a reason often cited is, that the solution of increasingly complex (‘wicked’ or even ‘super-wicked’) social problems demand a collaboration between public agencies and civil society. Public agencies do not have the resources nor the knowledge to solve a range of social problems, and are therefore ‘forced’ to seek the help of citizens/civil society/business in trying to establish well-considered solutions [19].

Seeing citizen participation in this perspective has lead to the development of such terms as co-creation and co-production of public policies and services [7] and collaborative (public sector) innovation [6]. While these frameworks all pay considerable attention to the needs and wishes of citizens and other civil society actors, the perspective is none the less a governance perspective, with the main aim of providing new and hopefully better public sector services or policies with the same or fewer resources. Citizen participation in collaborative arrangements can, however also be seen from a democratic perspective. In connection with environmental policies different authors have formulated what has been called ‘the pragmatic tradition’ within citizen participation theory [9] [20] [21]. This tradition has focused on how citizen participation contributes to the substance of the policy output through providing knowledge to policy development, and how it also reduces the uncertainty connected with scientific knowledge. Furthermore it has stressed how citizen participation can contribute to accept, confidence in and ownership to policies, but also how citizens can obstruct policy implementation if they feel excluded from the policy process.

A more normative theory also exists within citizen participation theory. This theory explicitly takes its point of departure in ideas about participatory democracy [8] [22]. The focus of writers within this tradition is on the development of the civic potential of the individual citizen through the process of participation, and thus also on citizen empowerment. Newer developments within this tradition put more emphasis on the potential of deliberation in developing the democratic capacities of citizens [23].

In considering the citizen participation dimension of the cases of green web applications presented below, it is well worth keeping these two views on citizen participation in mind. Thus, it is interesting to ask if and how these applications enhances the problem-solving capacity of the involved public agencies in terms of climate change mitigation, and if they can at the same time create citizen involvement in climate change mitigation, ownership to the process and be considered legitimate by citizens.

V. DATA

The study is based on three green web applications. A green web application is defined as ‘interactive application software that governments can use to motivate climate change mitigation behaviour or to enable environmentally sustainable social practices. They are free of charge for the end-user and may not function in a commercial context’ [11]. The analysed applications are ClimateAwareness, which is a web based energy reduction guide catalogue; TheClimateParty, which is a municipal web based climate change mitigation campaign; and urgent evoke.com, which is a social innovation network game.

VI. ANALYSIS

In the following the three green web applications will be analysed using the Contextual NeMT model. As should be clear from figure 1, this will entail dealing with three issues for each application: The technology on which they are based, the political discourse setting the course for their use, and the actors involved. The content of these elements and their
ClimateAwareness aims at reducing user’s energy consumption. It provides a catalogue of ‘energy reduction guides’ that individuals or families can use as recipes for energy reduction in different spheres of everyday life, such as lighting, transport, shopping and lifestyle habits. At the core of the application is an online catalogue which contains more than 200 ‘energy saving guides’ that tell the user about behaviour changes that can reduce costs by implementing environmentally friendly changes. These guides are sorted into different categories, e.g. lighting, food and transport. Each category contains guides in more specific sub-categories. Thus, the category ‘consumption and life style’ has instructions on climate friendly restaurants, washing laundry at low temperatures and environmentally friendly cleaning products.

The application motivates energy reduction behaviour by providing information about the potential savings that could be achieved by making the necessary changes. The potential savings are estimates. The economic indicators are followed by instructions on how to achieve the savings. Secondly, the application contains a ‘competition module’ in which individuals or groups can compete against each other on who can implement the most energy reduction guides. These groups can consist of teams of families or neighbours, who can share the experiences, knowledge, and know-how they have gleaned from using the website.

Political discourse

The citizen-centered version of ClimateAwareness is developed in collaboration between the small software company IngenCO2 (‘No CO₂’) and the municipalities of Skanderborg, Herning, Aalborg and the research project CIDEA at the University of Copenhagen. The reason for the municipalities to get involved in the construction of the website is, that it was considered an integral part of their work on mitigating climate change. Thus, all three municipalities are frontrunners in local climate mitigation efforts, and have elaborate climate change mitigation action plans. Their plans cover the municipality as a geographical area (compared to municipalities that only have a climate plan for the municipality’s own units) [24]. This means that citizens as well as small and medium sized enterprises are seen as important players in the municipality’s CO₂-reduction efforts, which is why they have a special interest in ClimateAwareness.

Skilled actors

According to the Contextual NeMT there may be two groups of relevant actors. The explanation for this has to do with the double sided asymmetrical double arrow between the actors on one hand and the political discourse and technology on the other as illustrated in Figure 2 below:

Figure 2: Contextual NeMT – ClimateAwareness

Reading the figure from left to right the political discourse place demands on skilled actors who can be municipal climate change administrators. These administrators choose to implement ClimateAwareness as part of a climate change plan in order to promote energy reductions among citizens (ibid.). Alternatively, the figure may be read from right to left beginning with the technology – in casu ClimateAwareness – which creates the basis for skilled actors who are energy consumers that use the green web application, which in turn creates the basis for realising targets in a municipal climate change action plan.

ClimateAwareness and citizen participation

ClimateAwareness enable citizen participation in climate change mitigation through their implementation of energy saving guides. Secondly, the ‘climate battle’ encourages participation at the community level. The size of the community can range from two families competing against each other up to larger communities e.g. two groups of multiple households or many groups with multiple households. Alternatively, a local or possible even a regional government can organise climate battles. As the manager of a climate battle the administrator can monitor progress and encourage action within the teams.

Even though the application’s participation affordances enable households implementing energy reduction guides it does not offer any possibilities concerning environmental or democratic deliberative dialogue between citizens and government. The participation is a ‘one way street’ where the government can encourage citizens to change behaviour in order to meet policy goals. Because of that ClimateAwareness
is considered to have limited affordances for environmental citizen participation.

Danish municipalities can use ClimateAwareness free of charge, and the application has been implemented on Local Government Denmark’s website. In general, the municipalities that use the application do not follow up on the use of the application by other measures e.g. contacting citizens or businesses that use the application in order to increase their engagement [11]. As a consequence there is no other citizen engagement in connection with the application other than users implementing the energy reductions guides [24].

ClimateAwareness enables a basic level of citizen participation. The application supports one-way communication from the municipality to citizens and businesses based on information databases that citizens can access through ClimateAwareness.

B. TheClimateParty

Below we will analyse TheClimateParty according to the same logic as in the analysis of ClimateAwareness:

Technology

TheClimateParty is a climate change mitigation information campaign that the municipality of Skanderborg in Denmark implemented in 2011-2012. The campaign was based on citizen participation. The starting point for the campaign was to avoid lecturing the public and turn energy reduction into a task that can be entertaining as well as challenging to work with. Citizens were considered key agents as up to half of all energy consumption occurs in the private home thereby legally speaking being out of municipal reach. The information campaign ‘aimed to turn the energy reduction task into to a mutual challenge for every citizen and business and not a problem, which can be solved by exclusively placing the responsibility on the municipal administration.’

The campaign consists of three parts. First, there was a competition where the citizens can show what they have done in order to mitigate climate change. The citizens would mail descriptions of specific initiatives to a review committee within the municipality that would evaluate the effort based on its mitigation effect, the extent to which it was carried out collaboratively as well as the level of attention that it could publicly generate. Second, there were activities arranged by the municipality with the purpose of inspiring and informing citizens of what they can do by themselves in order to live environmentally friendly. The content of these activities would subsequently be described on ClimateAwareness as part of the campaign’s dissemination. Third, TheClimateParty contained an information campaign based on the cases that the citizens had sent to the municipality as well as knowledge and know-how concerning environmentally friendly living transmitted through local media and the website TheClimateParty.

Political discourse

Politically, the campaign was connected to the municipal goal of making Skanderborg Municipality CO2-neutral with respect to electricity and heat by year 2020. TheClimateParty can therefore be seen as a result of the administration’s implementation of Skanderborg Municipality’s climate change action plan. According to the climate action plan the municipality intends to increase citizen’s energy consumption awareness as a starting point for reductions. The action plan emphasises collaboration with citizens in order to reduce private energy consumption, which accounts for 40 % of the total energy consumption within the municipality. Furthermore, the action plan specifically emphasises the possibility that new technology, in casu TheClimateParty can offer in connection with energy reductions.

Skilled actors

According to the double sided arrows in the Contextual NeMT there are two relevant groups of skilled actors that make up the environmentally sustainable participatory practice involving TheClimateParty as illustrated below in Figure 3.

Reading the figure from left to right, the political discourse places demands on skilled actors, who are Local Government Skanderborg’s climate change administrators. These administrators chose to develop TheClimateParty in order to promote energy reductions among citizens [25]. Alternatively, the figure may be read from right to left beginning with the technology – in casu TheClimateParty – which creates the basis for skilled actors who in this case are citizens that are interested in climate change. Their engagement in the campaign creates the basis for realising the targets in a municipal climate change action plan (ibid.).

TheClimateParty and citizen participation

TheClimateParty, which was a municipal climate change mitigation information campaign, contained three core elements that provided affordances for citizen participation in this area. The campaign encouraged citizens to enter descriptions of climate change mitigation initiatives thereby encouraging participation. The best of these initiatives were gathered by the local government who disseminated them to the citizens through the campaign’s website thereby creating a form of dialogue. In order to facilitate and encourage citizen
participation the municipality arranged activities aimed at inspiring the citizens to live environmentally friendly. The local government climate change manager would use the citizen dialogue in the continuous development of Skanderborg’s environmental policy development.\textsuperscript{3} Thus, the citizen participation had two purposes: First, it should function as an instrument to help the municipality reach its goals concerning CO2-neutrality with respect to electricity and heat by year 2020. Second, it should provide material for the continuous development of the municipality’s climate change policies.

TheClimateParty’s participation affordances aim at motivating citizens to become environmentally friendly in order to help the municipality to meet its goals concerning carbon neutrality thereby in principle matching the affordances of ClimateAwareness. However, on top of this, the campaign also function as a feeding mechanism which should inspire the local climate change manager to continuously develop the local climate change action plan, thereby enabling two-way communication. This strengthens the problem-solving capacity of the municipality, and due to this feature TheClimateParty’s participation affordances are considered to be more extensive than ClimateAwareness’s.

TheClimateParty has also functioned effectively concerning citizen participation. There were many inputs sent from citizens to TheClimateParty containing novel and creative climate change mitigation suggestions.\textsuperscript{10} These inputs were reviewed by (among others) administrators facilitating activities in relation to TheClimateParty in order to cross-fertilize on-line and off-line activities. Thus, compared to ClimateAwareness, the administrators behind TheClimateParty have been more active, which has increased the levels of citizen participation. Although TheClimateParty technologically speaking is a relatively unsophisticated website developed for a single campaign the administrators behind it have been able to involve citizens through other activities coordinated with the help of the application (Møllenbach & Hornbæk 2015).

TheClimateParty is more advanced than ClimateAwareness. The application enables citizen participation at a larger scale thereby expanding the scope of governmental action. This would have been difficult to achieve without the website. This means that the governmental administrator’s function becomes one of providing knowledge-based services and service-oriented tasks that address citizens’ as well as governmental needs directly.

C. UrgentEvoke

Technology

Citing [26] UrgentEvoke is “a social network game developed by the World Bank. The purpose of UrgentEvoke is to engage ordinary citizens in the fight against global wicked problems, e.g. climate change. The intention of the game is to transform the initial game motivation of the players into a post-game social participation in the form of social innovations in the physical world.”

The narrative of the game is the story of a secret social network of international agents with innovative superpowers capable of solving some of the most complex problems facing the international community in case climate change. As a player you are a member of a network, and together with other players you are expected to help find solutions to the missions connected to the ten chapters in the graphic novel. The size and the complexity of the missions makes it difficult for players to tackle them alone and they are compelled to start co-operating and share their knowledge, experiences and ideas with other players. The last mission that players are asked to complete is writing a detailed and innovative plan of how the player will tackle a self-chosen socio-political challenge – e.g. in relation to climate change - in the physical world after the game has ended. This plan is called an Evokation.”

Political discourse

In the case of UrgentEvoke World Bank’s political aim was to engage ordinary citizens in the fight against the wicked problems that the World Bank is dealing with such as e.g. poverty, hunger and climate change. The World Bank’s goal for the players was to ‘investigate the most pressing challenges around the world, collaborate to generate innovative and creative solutions, and act to turn ideas into reality within their own communities and beyond’\textsuperscript{34}. Thus, their policy operates at the global level compared to the national or local level embodied within ClimateAwareness and TheClimateParty.

Skilled actors

As described previously there are different groups of skilled actors according to the Contextual NeMT depending on which way the arrows in the figure is followed according to Figure 4 below.
UrgentEvoke empowers citizens by giving them ‘innovation super powers’ through a serious social web application. It is a highly advanced application that operates at multiple citizen participation levels. At the highest level there are citizens who, by completing the ‘Evokation’ become certified social innovators. However, their achievement would not have been possible without the other 19,000 players and 80,000 repeat visitors. All of these participators constitute a co-creation network that would not have been possible without the web technology.

VII. CONCLUSION

This paper has studied how the affordances of green web applications enable different levels of citizen participation in environmentally sustainable practices.

The affordances of ClimateAwareness was translated into one-way participation. Users can implement energy saving guides as well as enter into climate battles at the community level. We characterized this as participation at a basic level.

The affordances of TheClimateParty enabled dialogue with citizens who could send suggestions for climate change mitigation initiatives to the municipality. These suggestions were reviewed, and the best were disseminated to citizens through the website. Skilled administrators would, using the website, arrange other form of activities. Thus, the website and the activities surrounding the website would work synergistically concerning citizen participation thereby demonstrating the importance of skilled actors in the shape of municipal administrators.

The affordances of UrgentEvoke were translated into relative few full bodied participation processes (‘Evokation’s). Instead there were many micro-contributions, which are important for the Evokations, and therefore also deserve acknowledgement according to [26]. The primary explanation for these micro contributions were the graphic novel embodied within UrgentEvoke, which attracted a large volume of passive users. These users were important because they played a variety of active roles in different stages of the game, and even though the micro-contributors did not intend to become players or creators in the game their mini contributions had an impact on the results of the game and on the process of the creators.

Concerning the research question we set forth in the introduction we can answer it in the affirmative. Yes, the affordances of the green web applications we have analyzed do enable different levels of citizen participation in environmentally sustainable practices. However, we also saw, that there is not necessarily a 1:1 correspondence between the affordances and the level of participation. Thus, a real increase in participation demands an active involvement of skilled actors. Our theoretical model (the CNeMT) served to highlight this point, and also made us aware that there are different types of skilled actors; namely citizens themselves and web-or game administrators. Not least the last category is important if participation is to really take off.
REFERENCES


1 The web address for this application is www.klimabevidst.dk. ‘Klimabevidst’ translates into ClimateAwareness.

2 In Danish the website was named www.klimafesten.dk ‘Klimafesten’ translates into TheClimateParty.

3 There is a play on words involved here, as NeMT (nemt) means ‘easy’ in Danish. The connotation is that this is an easy-to-use model.

4 Quote from Klimafesten: http://voresomstilling.dk/projekt/klimafesten/107

5 Quote from Klimafesten: http://voresomstilling.dk/projekt/klimafesten/107

6 From: http://voresomstilling.dk/projekt/klimafesten/107

7 Local Government Skanderborg’s climate change action plan: https://www.skanderborg.dk/files/Billeder/PlanErhverv/klimaplan/Politik/Klimapolitik_net.pdf


9 Local Government Skanderborg’s climate change action plan page 9:

https://www.skanderborg.dk/files/Billeder/PlanErhverv/klimaplan/Politik/Klimapolitik_net.pdf

10 Based on interview with Climate Change Manager Susanne Skårup from Local Government Skanderborg, 20 September 2012.

11 Climate change mitigation examples sent from children to klimafesten. https://www.skanderborg.dk/Borger/Natur-og-miljoe/Klima-og-bAeredygtighed/Fotos-Jeg-vil.aspx


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