Review of Tsu and Nourbakhsh (2020) When Human-Computer Interaction Meets Community Citizen Science Empowering communities through citizen science.

A Review from the Point of View of the DAAI Paradigm

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Abstract

This review has been triggered by the application of the DAAI paradigm to a case study with cities and their citizens. In this context the paper of Hsu and Nourbakhsh (2020) [HN20] seems to be of interest. Although this paper is focusing on the special aspect of *citizen science* it brings to the mind the more wider aspects of *participatory democracy* of citizens as well as *community co-design*. This has clearly some impact for our epolitics4you project.

1 Sustainable HCI

The topics mentioned in Tsu and Nourbakhsh (2020) are within the realm of traditional HCI (Human Computer Interaction) rather unusual. But, as these authors make clear, one can observe a strong development within the field of HCI which has become labeled *Sustainable HCI*. A good overview of this field is provided in the review article of DiSalvo et al. (2010)[DSB10]. The review tries to structure a still rather divergent field, which has been graphically interpreted from the author of this text in figure 1. It points out the the field of HCI is a subfield of the DAAI paradigm and under the label of *sustainable HCI* it has attracted many topics which have not been part of HCI before. The general

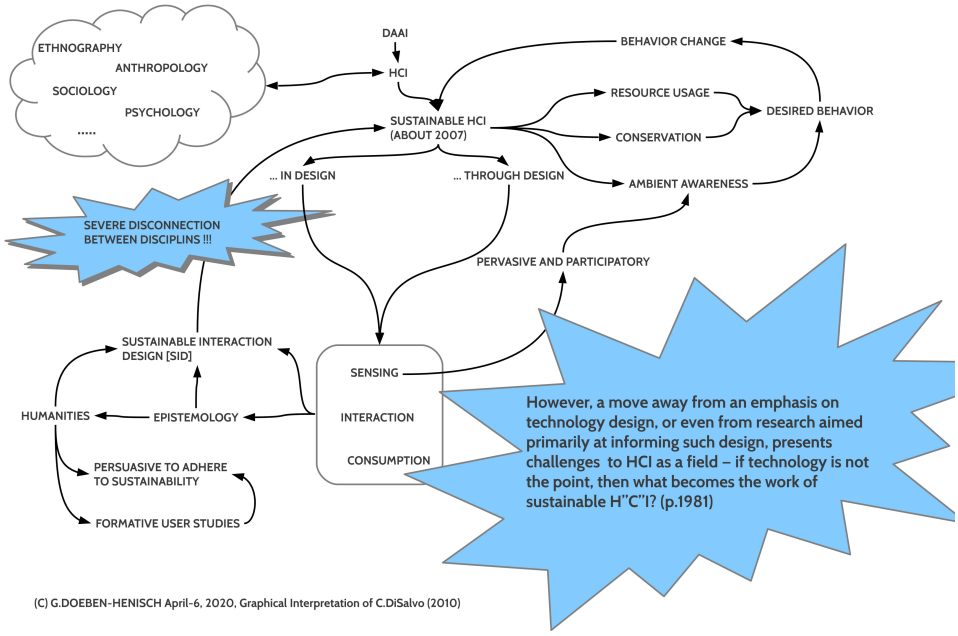

Figure 1: Sustainable HCI - A graphical interpretzation of a review article of DiSalvo et al. (2010)

aspect is that aspects of a *sustainable future* have been associated with the HCI design process without a clear systematic. Whether such an awareness for sustainable topics will be included into a HCI design process depends primarily from the HCI experts doing their job. And this awareness is until now very disparate; several kinds of disciplines will be consulted but there is no coherent schema active guiding the selection or the process as such.

2 A Splitted City Mind

Nevertheless this new openness of HCI for a broader scope of requirements including societal and ecological aspects allows Tsu and Nourbakhsh (2020) to follow this line and extend the discussion by further topics. They introduce the topic of "*Community Citizen Science (CCS)*" (p.31) where the citizens are directly cooperating with science to collect by themselves those data of their environment, of their city, which are important for their life.[1]

[1]There exist a very extensive article in the English Wikipedia with this topic, cf. `https://en.wikipedia.org/wiki/Citizen_science`(last visit April-6, 2020); there is a post too in the German Wikipedia `https://de.wikipedia.org/wiki/Citizen_Science`(last visit April-6,2020), but not quite as extensive and with different references. In the German Wikipedia post you can find a recent publication of a German Science Cluster with an overview of their activities `https://www.buergerschaffenwissen.de/sites/default/files/assets/`

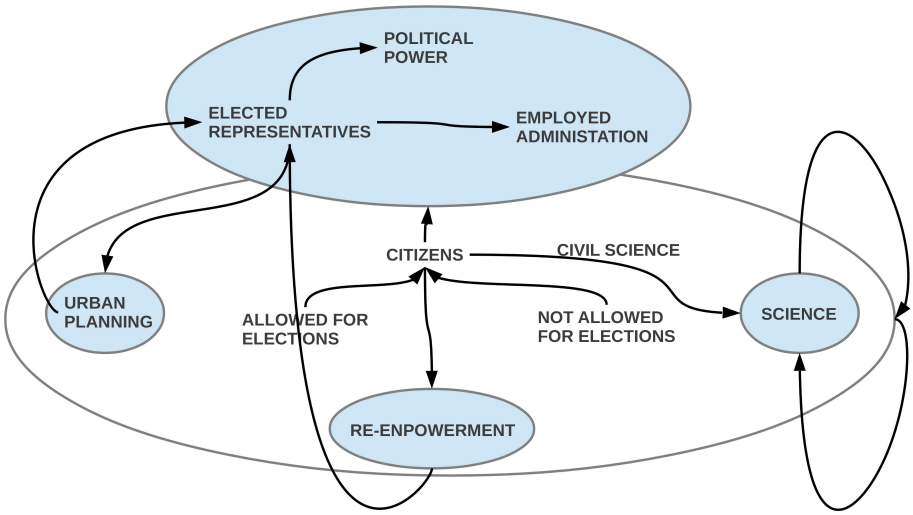

Figure 2: The city as splitted subject

The main idea of Community Citizen Science is more than only the extension of science to the field of cities. Including the citizens themselves enables the recognition of special needs hided in the reality of cities otherwise. Moreover exist many kinds of data which cannot be exploited without the direct cooperation with the citizens. And Tsu and Nourbakhsh (2020) mention explicitly the further goals "*participatory democracy, community co-design, and power rebalance*" (p.31) This goes clearly beyond the broad scope of sustainable HCI. It touches the political dimension as well as the urban planning dimension which is today too more and more under fire. The aspect of '*co-design*' addresses the development of *interactive systems* which allow the integration of diverse groups who are deeply *grounded in local cultures* and can bring *diverse expertise* not only to inform the design and use of computational tools but also by this interaction to enable new communications with the political parties and the city representatives. (cf. p.32) Enabling this leads to a true *re-balance of power* compared to the actual decision mechanisms in cities. By enabling a *bottom-up and multiparty structure*, where local communities play significant roles in initiating *grassroots movements*, providing *organizational networking*, and *disseminating critical findings* to influence policy-making. (cf. p.32)

Because the complexity of the subject does not allow complete sharp definitions of concepts, outcomes, success rates and types[2], they propose to install an ongoing technical infrastructure that sustains communities over time, even

dokumente/gewiss-gruenbuch_citizen_science_strategie.pdf

[2]What the authors associate with the concept of 'wicked problems'

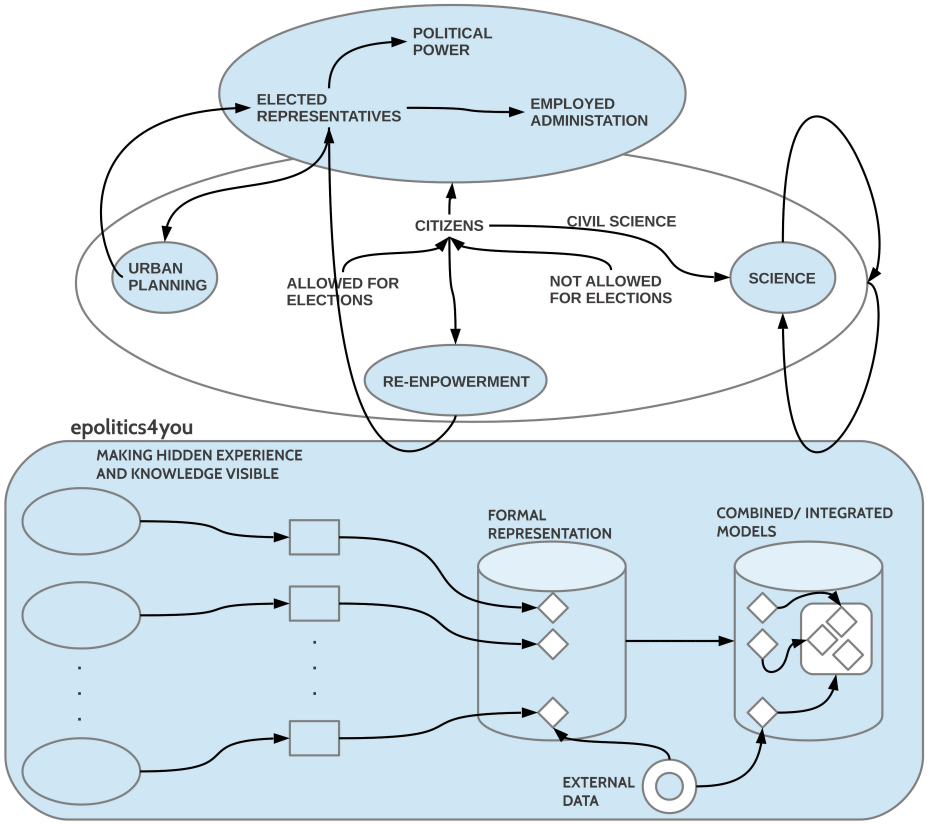

Figure 3: Unifying the City MInd

when the *researchers are no longer present*. (cf. p.33)

Another important point is the question of possible and reasonable evaluation. With such an extended scope including political, planning and ecological aspects the classical usability tests focusing on the usage by an individual person appears to be to narrow. There must be included further *new criteria* which allow the inclusion of other types of effects which are typically connected to the broader (non-functional) requirements.(cf.p.33)

3 Unifying the City Mind

The authors Tsu and Nourbakhsh (2020) extend the classical HCI paradigm with important new aspects which all together pop up in our actual society. And the question has here to be raised whether and how these ideas can be related to the DAAI paradigm.

In the preface of the 15.06.07 version of the DAAI theory[3] the acronym *HCI* is located in the history of the field leading to a more 'modern' view called DAAI. Nevertheless the interpretation of HCI as *sustainable HCI* and additionally including *Community Citizen Science (CCS)* goes far beyond the old HCI paradigm and it opens the question to the relationship between HCI and DDAI again.

In chapter 1 of the DAAI theory titled *The 'All in One View'* you can see a figure providing an overview of all main parts of the DAAI paradigm. In this figure you will not find terms like 'sustainable' or 'city science'. But if you consider that the main factor for the extension of topics within the HCI design process is given by the HCI experts themselves then you can imagine, that the stakeholder and DAAI experts of the DAAI paradigm can be those factors where you can introduce the topics 'sustainable' and 'city science' easily, but you can even introduce much more terms if necessary. Therefore the DAAI paradigm is prepared to include all these hot topics.

Besides this does the DAAI paradigm provide something which you – until now – not can find in these other paradigms (cf. for the following the figure 3). A basic idea of the DAAI paradigm is the un-hiding of the experience and knowledge of all participating actors during the DAAI process (officially the stakeholders and the DAAI experts, but these can be extended to everybody who can offer some interesting experience, and this everybody can be every citizen) in a way which leads from everyday communication formats to a formalized representation which allows the processing with a computer. This formalized knowledge can be used for interactive simulations as well as for many other mathematical procedures. But the most important point is the possibility to combine single, individual models generated by independent groups of experts (citizens) to a *new integrated model*, which allows the demonstration and simulation of much more complexity. With such a technical tool it ill become possible to *unit a splitted mind* into a more *coherent mind* as a *unified mind*. These terms can be misleading if one would think that now all problems are nicely solved. No, in no case. The 'wicked problems' mentioned by Tsu and Nourbakhsh (2020) are real and no formalization and simulation can get rid of this wickedness present in the reality and in our limited understanding. But the formalization and unifying procedures can nevertheless help to make wrong assumptions visible in a more powerful way. As clearer as a human brain can 'see' the structure of some *modeled reality* as sooner it can detect the differences to the *experienced reality*. Furthermore it is known that the process of an explicit analysis and modeling of reality sharpens the mind a lot to become more aware

[3]See `https://www.uffmm.org/wp-content/uploads/2019/05/aaicourse-15-06-07.pdf`

about those factors, properties, relations, and dynamics which set up the game of reality.

4 Conclusion for the epolitics4you Project

For the epolitics4you case study[4] it follows from this a further encouragement to be aware of the assumptions of the *general environment* which should be considered in the following analysis and modeling.

References

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[4] See `https://www.uffmm.org/2020/04/02/case-studies/`