

Issues in Developing a G/Local Knowledge Network for Transport Reform Utilising Appropedia

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Abstract: We discuss and reflect on various aspects of using an online, Wiki-based platform - Appropedia – as part of an Action Research project into transport informatics software in civil society organisations. We first present a brief history of and introduction to Appropedia, including a comparison with its much-larger 'cousin', Wikipedia – and a description of the way the site was used as part of the transport informatics Action Research project. We then reflect on and discuss several of the key issues and possible lessons arising from this work both from the perspective of the potential of online public knowledge-commons in Action Research, and also whether Appropedia could in future more explicitly cater for processes of deliberative democracy as well as socio-technical collaboration.

Keywords: Knowledge Commons, Civic Intelligence, Wikis, G/Local, Transport, Sustainability, Appropriate Technology, Knowledge Paradigms, Deliberative Democracy

Introduction

This paper is in the tradition of Schön's (1994) 'reflective practitioner' and also of Pragmatism-influenced research more generally such as Action Research (Baskerville & Myers, 2004), and 'practice stories' (Kane, 2010). That is, both authors of this paper are centrally involved in the case study discussed, Patrick through utilising and contributing to Appropedia as an “open knowledge-base” forming part of his PhD research, while Chris is actively involved with the Appropedia website and is one of the co-founders of the Appropedia Foundation. We are using the paper as an opportunity to reflect in a structured way on the lessons learnt from work thus far, and to also examine the implications for information technology's use in public education, co-operation, and supporting conscious, desired socio-technical change.

A Brief Introduction of the Appropedia Site and Project

Site History and Governance

The Appropedia website is a user-editable Wiki website utilising the Free & Open Source Software (FOSS) MediaWiki platform – the same platform that powers the Wikipedia website, amongst many others. The “Appro” in the name refers to “Appropriate Technology” - technology which is appropriate to the local social, financial and environmental context¹. Appropriate Technology was and remains a focus of the founders and many of the early contributors to the project – particularly in terms of a professional, academic and practical interest in the potential of such technology in developing world settings.

As of this writing in November 2013, the Appropedia website contained more than 5,500 separate user-contributed pages, as a result of over 251,176 user edits². While far smaller than

- 1 Popularised by Schumacher (1973), Appropriate Technology remains an influential framework in grassroots sustainable development work.
- 2 Automatically-tracked statistics from <http://www.appropedia.org/Special:Statistics> - also displayed on the Appropedia main page, at <http://www.appropedia.org/>

the English-language version of Wikipedia's over 4,300,000 pages, it nevertheless represents a significant amount of content on a diverse variety of topics. Many of the pages have attached multimedia in the form of images, schematics or video and sound recordings to augment the textual content.

Appropedia was founded in April 2006, and over time has merged with several other knowledge-based and project-oriented websites, and in the words of the site's About pages, the content has grown to include “broader issues of international development and sustainability”³. The project describes itself as⁴:

“... the site for collaborative solutions in sustainability, poverty reduction and international development through the use of sound principles and appropriate technology and the sharing of wisdom and project information.”

In terms of a Vision statement, the goal of the project motivating the website is⁵:

“Our vision is that all of humanity is able to work together developing and realizing rich, sustainable lives. We build the infrastructure, and help make the connections and populate free content to effect that vision. We provide the living resource library of individuals and organizations working towards a sustainable, healthier future, so that efforts can be spent evolving instead of duplicating past efforts.”

At a high level, the site is organised around a set of 'Portals' which attempt to group together important themes relevant to Appropriate Technology and Sustainable Development, such as 'Construction', 'Energy', 'Health', 'Food / Agriculture' and 'Water'. As with most Wikis, Appropedia uses a range of approaches to organise and link the individual pages into these higher-level thematic categories. The main organising method is the use of Category tags for each page that link together common topics and concepts, notably thematic (e.g. “Medical devices”), organisational (“Queens University, Kingston”), abstract (“Open source”) or geographic tags (“Humboldt County, California”).

Despite the 'pedia' in the title, Appropedia's goal and content is quite different to that of a reference encyclopaedia. Again from the website's “About” page, the self-described list of types of content on the site is as follows⁶:

- Project histories and project how-tos
- Textbook-style information, tables, and figures
- Best practice in sustainability, development and all related fields
- Designs
- Photographs and illustrations
- Information for finding supplies and help
- Links and information on other organizations
- Collaboration pages for co-creating solutions
- Discussion pages for commenting on work done and work that needs to be done
- More - whatever aids the causes of sustainability and overcoming poverty.

Appropedia Content License, Governance, and Key Stakeholders

In general, contributions to the website must be made under a Creative Commons Attribution-Share Alike 3.0 (CC-BY-SA-3.0) license, although some exceptions have been made for legacy material, and some projects have specified public domain (release of all

3 From http://www.appropedia.org/Appropedia:A_history_of_collaboration

4 See <http://www.appropedia.org/Appropedia:About>

5 See <http://www.appropedia.org/Appropedia:Mission>

6 http://www.appropedia.org/Appropedia:About#Content_on_Appropedia

copyright) as a condition of contributing⁷. The CC-BY-SA-3.0 license is a 'copyleft' license, meaning that while others are free to adapt and re-use the material in other contexts, it must be attributed and shared under the same conditions as the source. As further discussed in the final section, this reflects a philosophy of Appropedia as a 'knowledge commons', to be made perpetually available for diverse groups to make use of – particularly but not exclusively the developing world – but preventing re-use under proprietary intellectual property regimes, which in commons terminology would be regarded as enclosure.

In early 2007, in the first year of the Appropedia website's operation, three of the initial enthusiasts behind the site formed the Appropedia Foundation as a California-registered non-profit organization, in order to give the project an institutional base and facilitate managing the work and fundraising necessary to operate the site, and explore approaches to make it more effective in its mission. The Appropedia Foundation has an appointed board of directors⁸. Less-formal governance is supported by a Google Groups 'working group' mailing list, and by discussions on the site's "Village Pump", a special page for 'meta' discussions about the site⁹.

While anyone is able to edit pages and create relevant content, a strong underpinning and source of generated content has been through 'Service-learning' partnerships with particular university classes. For example, the site's founder, Lonny Grafman, is an academic at the Humboldt State University and has used Appropedia as an integral part of service-learning partnerships with community groups focused on Appropriate Technology, requiring students to share the results of their field-research projects on the wiki (Pearce, Grafman, Colledge, & Legg, 2008). Kathleen Sienko and her graduate students at the University of Michigan have developed a compendium of medical devices for resource-limited settings¹⁰ (Sienko, Sarvestani, & Grafman, 2013), and Joshua Pearce, at Michigan Technological University, uses Appropedia with his classes and as an ongoing publication and engagement platform for the Michigan Tech in Open Sustainability Technology (MOST) research group (Pearce, 2012).

Differences in Content Principles / Rules between Appropedia and Wikipedia

Returning to the issue of the type of content allowed and supported on Appropedia - given the nature of Appropedia's different goals to Wikipedia's web-encyclopaedia, there are some important differences in the allowable content 'rules' which have an important bearing on the relationship of the site to community groups. In the case of Appropedia, apart from avoiding defamation and personal attacks and respecting copyright requirements, most of the 'rules' are voluntary guidelines¹¹. Some of these guidelines have been suggested as policies, but not yet ratified by the community. The table below summarises some of the key differences between Wikipedia's policies and related guidelines in Appropedia.

7 See <http://www.appropedia.org/Appropedia:Copyrights>. For an example of a public domain project, see http://www.appropedia.org/Category:Hexayurt_project

8 See http://www.appropedia.org/Appropedia_Foundation

9 http://www.appropedia.org/Village_pump

10 See http://www.appropedia.org/Medical_devices for the actual live database.

11 http://www.appropedia.org/Appropedia:Appropedia_policy

Table 1: Comparing Several Key Wikipedia Content Principles to Appropedia

Wikipedia Content Principle	Appropedia Comment
<p>“Verifiability”¹²: 'verifiability means that people reading and editing the encyclopedia can check that the information comes from a reliable source' and 'even if something is true, it must be verifiable before you can add it.'</p>	<p>Since Appropedia allows original material, verifiability is “desirable and encouraged, but not required.”¹³ A partial equivalent on Appropedia is a proposed “Rigor” guideline that emphasises research, scientific method, and where appropriate, supporting claims made with good evidence¹⁴. See the following section for how this relates to original research on the site.</p>
<p>“No original research”¹⁵: A broader application of the 'Verifiability' requirement, this states that material in Wikipedia articles must refer to reliable, public sources, and not include the views or opinions of the authors.</p>	<p>Appropedia explicitly encourages original research towards useful information, technologies, designs, principles and projects related to sustainable development, with projects forming a large number of the pages to date. For pages about specific appropriate technology designs, Appropedia has a set of “status” templates that can be applied, such as “prototype”, which warn readers and potential users of this in-development status. There is also a special “verified” status, which allows a particular group (e.g. a research lab) to state they've verified the efficacy of the design¹⁶.</p>
<p>“Neutral Point of View”¹⁷ (NPOV): "means representing fairly, proportionately, and, as far as possible, without bias, all of the significant views that have been published by reliable sources on a topic”.</p>	<p>From the Appropedia policies page¹⁸: “Appropedia is supportive of Appropriate Technology and Sustainable Development. As such, Appropedia articles will usually be written from a point of view that is sympathetic to those concepts. Appropedia otherwise encourages a more or less NPOV depending on category.” In keeping with the emphasis on rigor, there is an aim to represent multiple viewpoints according to their value, coherence and impact.</p>

In the final section we will consider the philosophical implications of these different approaches, as well as the challenges with Appropedia's more flexible approach to content in the light of the complexities of human socio-technical systems that environmental issues

12 <https://en.wikipedia.org/wiki/Wikipedia:Verifiability>

13 See [http://www.appropedia.org/Appropedia:Policies#Variations from Wikipedia](http://www.appropedia.org/Appropedia:Policies#Variations_from_Wikipedia)

14 See <http://www.appropedia.org/Appropedia:Rigor>

15 https://en.wikipedia.org/wiki/Wikipedia:No_original_research

16 See <http://www.appropedia.org/Category:Status> .

17 https://en.wikipedia.org/wiki/Wikipedia:Neutral_point_of_view

18 See [http://www.appropedia.org/Appropedia:Policies#Voluntary Guidelines](http://www.appropedia.org/Appropedia:Policies#Voluntary_Guidelines)

raise, after first discussing, in the following section, the case-study usage of Appropedia as part of a transport informatics project.

The Open Source Sustainable Transport Informatics Platform (OSSTIP) Action-Research Project

Contextual Background and Precipitous of Relevant Motivating Ideas of Patrick's PhD

Patrick's work is based at the Australasian Center for the Governance and Management of Urban Transportation (GAMUT¹⁹), and is an interdisciplinary study at the intersection between transport knowledge, policy, institutions, technical methods, and actors seeking to bring about change. One of the driving theoretical ideas behind the PhD is the concept that for large societies, transport systems are driven by broad 'policy paradigms', and so reforming transport policy and practice in a desired direction (for example, to reduce the environmental impact of transport) necessarily involves challenging and replacing one policy paradigm with another based on different premises, methods, and components (Curtis & Low, 2012). However, such change is difficult, as once paradigms become entrenched, they are supported by expert institutions, economic interests, and a set of well-supported technical methods and tools.

Reflecting on the need to *change* policy paradigms in the light of environmental and other concerns, the GAMUT research group takes the view that this needs both alternative expertise and viable solutions, but also public engagement and democratic pressure for change. Some example 'models' of this type are Mees's (2010, p129-132) account of the referenda process in Zurich that in the 1960-70s rejected plans for an expensive new dual system of upgraded motorways and underground metros, and led instead to a world's best-practice integrated tram and bus network with rights-of-way at intersections. Several other examples of this nature, involving other cities around the world, are discussed by Stone & Legacy (2012).

Within this broader theme, Patrick's research is focusing on the potential for new approaches to information technologies to increase the capability of actors within civil society to understand key transport policy paradigms, and be part of meaningfully proposing alternative approaches. The development of modern computer Geographic Information Systems (GIS) and models now gives people great potential to understand and communicate understandings about complex urban systems, including transport networks. From an information systems point of view, reflexive studies of such technologies have made a useful case that they represent not just instrumental tools for assessing policies – but as a 'knowledge technology' (Gudmundsson, 2011) that can play a heuristic, communicative and relational role in how a group understands a spatial system (Sterk et al., 2009).

A 'knowledge technology' framing suggests both that (a) there is an important potential link between the aforementioned framing around 'policy paradigms' in transport and the GIS systems or computer models used to represent such systems, and (b) that whether diverse groups in society have access to such technology and can make it responsive to their own views and concerns is an important aspect of democratic decision-making around such policy (King & Kraemer, 1993). More broadly, it also connects with Schuler's concern for whether advanced information technologies can be deliberately employed to cultivate a stronger 'Civic Intelligence' (Schuler, 2001) that is both effective, and democratically responsive.

Patrick's particular contribution to this research is undertaking an Action-Research case study into the potential of using Free and Open Source Software (FOSS) within two Civil Society Organisations (CSOs) engaged in policy debates in Melbourne, Australia. Through becoming a participant-observer in two CSOs, he is participating in the development of maps, tools and platforms that illustrate a 'different way forward' for transport systems in line with

19 See <http://www.abp.unimelb.edu.au/gamut>

the organisation's views, using GIS tools such as OpenTripPlanner. The research side of the process uses multiple qualitative methods such as interviews, focus group discussions and field journals to better grasp the complex issues involved in this process. This supports understanding both the potential of the technologies as a heuristic and communicative tool, but also the organisational challenges and processes experienced by civil society groups making a new use of information technology – what Sadoway (2012) termed a process of moving from civic associations to 'info-sociations'.

Identifying Appropedia as a Platform to support the Knowledge-Base Aspect of the Research

Patrick became aware of Appropedia when he met co-author Chris at an 'un-conference' organised by the City of Melbourne called 'CoM:Connect' in October 2012, and discussions led to an invitation to explore using Appropedia as part of his PhD. The CoM:Connect conference aimed to bring together for discussions diverse groups in government, civil society, research and business communities interested in the power and potential of new information technologies in supporting and catalysing potential for co-operative action.

Patrick was able to assess the appropriateness of Appropedia's potential to assist the project in line with a pre-existing intention to develop some form of knowledge-base to support the research. As well as having a chance to discuss this with Chris personally at the conference, an important factor was probably that Patrick already had fairly significant experience with and a positive attitude towards Wikis as part of supporting collaboration and knowledge-management in previous projects (Sunter, 2006, p5).

In line with Appropedia's dual goals of developing knowledge but also facilitating on-the-ground projects, the site includes pre-existing templates for new Projects as well as encyclopaedia-style pages²⁰. Patrick was able to use the Project template to create a new "OSSTIP" project page – short for an 'Open Source Sustainable Transport Informatics Platform'²¹ project. The OSSTIP page fairly quickly evolved into both a communicational knowledge-base role, as well as including sub-pages for describing key medium level goals of the project with each partner organisation (as 'work packages'), and recording progress and knowledge gained towards these goals. Later, he also added more reflective pages that complement the Action-Research process – such as a 'Project Blog' to reflect on progress, issues and interesting results suitable for public dissemination.

Patrick also engaged with creating and improving community-knowledge more generally on Appropedia where it over-lapped with the OSSTIP project work. This included contributing to and editing several of Appropedia's existing more encyclopaedia-like articles on topics such as Free and Open Source GIS software packages, and environmentally sustainable transport. It also involved creating several new reference pages on specific subjects like the General Transit Feed Specification (GTFS), and key public transport planning concepts such as 'Integrated multimodal network planning'.

20 http://www.appropedia.org/Help:Creating_a_page#Project_page

21 See <http://www.appropedia.org/OSSTIP>

Reflections on Key Issues Raised at the intersection of Action Research, Community Deliberation, and Open Knowledge Commons

Reflections about the choice and efficacy of Appropedia for civil society based Action-Research

This section begins with some of Patrick's reflections on the efficacy of using a platform like Appropedia as part of a university-based, but community-oriented Action Research project.

In hindsight, the very creation of an 'OSSTIP' project page late in 2012 at the stage of further developing the Action-Research collaborative parts of a PhD was helpful in getting this aspect of the PhD off the ground. The abstract idea of the project, which had previously only existed in internal documents, was now embodied in a public, share-able form. Having a home for the project on the web certainly complemented the process of creating physical media about the project (handouts, plain language statements) that are an important aspect of communicating and shaping the project with potential collaborators in any Action-Research project.

The abilities of Wikis to change and be restructured as the project develops also well suits the dynamic nature of community-based AR. Appropedia supports this well by allowing each project to have sub-pages, and so effectively the content can live in a separate 'subwiki' and conceptual domain to the rest of the site's content, differentiating it where this is necessary. Also, an upgrade of Appropedia currently underway will enable a 'Book' feature allowing offline archiving of a selected set of pages, which suggests an effective potential for both research archiving or even community publishing of the content developed at the conclusion of the project.

An important question to ask at this stage is the benefits of choosing Appropedia for the role of supporting a knowledge-base for community AR projects, versus other potential alternatives. Alternatives would include at the least (a) using a commercial fee-for-service platform, (b) using a free but advertisement-supported platform such as Wikia, (c) setting up a new website for the project based on a pre-existing content-management system, and possibly (d) negotiating to use space on another institutions platform, such as a participating University. The landscape of available information technologies and approaches on the web for such work is ever-changing, as evidenced by the once rich functionality of the free versions of Google Sites and Google Groups being reduced over time (Hall, Nousala, Best, & Nair, 2012, p241).

While it is certainly possible for individuals to set up their own Wiki or other content-management sites, this takes time, technical skills, and funds – both at project initiation and on an ongoing basis - all of which are almost always in limited supply for both graduate research students and community groups. Part of what makes Appropedia feasible for a small and mostly-volunteer team to administer is the same economics of scale that have contributed to Wikipedia's success:- that having invested the time and resources to set up the platform and perform ongoing maintenance, the 'marginal cost' of adding an extra project or community group to the site is very low.

Reflecting on our experience, some of the considerations that are likely to be important when considering Appropedia in particular include:

- The technical skills of potential participants in the project, in terms of both system administration (I.E. setting up a server), and whether they would be prepared to invest a degree of time to learn a Wiki syntax. Although in the latter respect, Appropedia is planning to add a WYSIWIG (what-you-see-is-what-you-get) editor in coming months.
- Whether an organisation or set of participants is happy for the information they're creating to be part of a much broader collaborative site – the majority of content over which they do not have primary editorial control. Some civil society organisations

may wish to only participate in producing content on a platform that is directly linked to their 'brand' and over which they have a final say. However, as demonstrated by Patrick's project among others, it is quite possible to participate in an Action-Research project on Appropedia while maintaining separate organisational and personal websites.

- Related to the above concern is whether the potential to interact with a larger 'community of practice' doing separate but related projects and work on Appropedia is considered a significant potential benefit. This includes the decision to make the work public, which may support gaining participants in the project along the way.
- Whether the releasing of some rights over content, by the CC-BY-SA-3.0 license, is acceptable to the organisation.
- Closely linked to this, is whether the goal of contributing to a long-term global knowledge 'commons' sits well with the values and goals of the participating organisations. This includes Appropedia's knowledge policies discussed in section 0 above, which while certainly compatible with the use of the site by community organisations, do place constraints on the type of content published and introduce the potential need to interact with other contributors with differing points of view and assumptions.

It isn't possible to treat all of these issues here, and they are likely to vary in different contexts. One broad-brush reflection, though, is that the nature of several of these factors is likely to result in an assessment favourable to using Appropedia in community-based projects where at least one of the partners explicitly has an Action Research or Service Learning objective. That is, several aspects of using Appropedia or a similar platform and the requirements for doing good-quality Action-Research overlap. These include the need to question knowledge produced in a project context through different points of view, and the goal of producing insights of potentially lasting broad value, and that go beyond the concerns of the particular project involved. The challenge is to do so effectively in a way that also takes the rights, concerns and interests of the community group participants in the project into account.

Appropedia's support for the Participatory and Reflective goals of Action- Research and Service Learning

In the case of Patrick's project on Appropedia, while he has sent links to OSSTIP wiki pages to participants and collaborators and received useful feedback on the contents – there has not yet been a significant amount of editing of the pages directly by other participants in the project. Patrick has neither encouraged nor discouraged participants from editing pages on the site – and as yet, hasn't specifically incorporated Appropedia into the data-gathering methods of the PhD work. Patrick's PhD is using a form of AR from the Information Systems discipline that, while recognising that involving participants in the research findings is important and can actually improve the result, also recognises the 'research' is the primary interest and responsibility of the academic researcher, whereas the 'project' is the primary interest of the participants and their organisation (McKay & Marshall, 2001).

Some Action-Research traditions emphasise community-group participation in the development of project research questions, and knowledge-systems, more than others (Copeland & Hill, 2010; Herr & Anderson, 2005, p29-48). In the more 'participatory' versions of these, participants are required to have a key role in not just defining the project goals but also the research agenda. In that tradition, there would certainly be a major concern that any web-pages about the project be a collaborative construction. Perhaps usefully bridging these different perspectives is the view proposed by Tacchi, Slater, & Hearn (2003) in their *Ethnographic Action-Research handbook*, which argues that one of the key goals of an action-researcher should be to help progressively develop a 'research culture' in the communities and organisations in which they work. Gradually increasing the community participation in

developing and maintaining the knowledge-base of the project in a system like Appropedia would then be an important part of fulfilling this goal.

Adequate planning for this aspect is likely to involve thought by the researcher about training needs for community participants, and also careful thought about both practical and ethical issues of whether participant contributions to a public website are appropriate to include as formal research 'data' – both of which should be discussed with the community partners.

A related issue to concerns of how well Appropedia supports the participatory aspects of Action Research is how well it could support the required reflective aspects of the process. Work on providing better standards, perspectives, and even a community-of-practice in this respect would also be of value to the closely-related Service Learning use of Appropedia as part of tertiary education. A useful small step towards this could be adding to the template for new Project pages sections for “mid-project reflections” and “post-project lessons learnt”. A somewhat similar tradition is seen on a number of the discussion pages for Humboldt State University project pages, where students practice a kind of peer review on each others' articles²².

The OSSTIP project in relation to other Appropedia community-developed content

Two of the key differences between the OSSTIP project on Appropedia and many of the other pages and projects are:

- a focus on entire integrated systems at the scale of *cities or regions*, i.e. the systemic functioning of a transport network – rather than a focus at the *individual or community-scale*;
- a focus on *collectively changing government policy* towards transport at this large scale, rather than on developing, improving and then supporting *autonomous use of small-scale technologies or practices* by individuals or small groups.

This can be seen as part of a movement beyond Appropedia's heritage in the Appropriate Technology movement and focus on developing world settings. Chris notes that this large scale and policy-oriented content has always been part of Appropedia's intended scope, but that this is one of the first examples of such work.

Indeed, one of the key arguments for the importance of a collective focus at the level of shifting policy 'paradigms' of urban transport is that while individual efforts such as choosing to cycle instead of drive can be beneficial, the potential for such behaviour change does have real limits unless collective political work is also engaged in to change the infrastructure and institutions that shape the transport decisions of a majority of citizens (Mees, 2010, p197-201).

Some of Appropedia's strongest work thus far, connected to its Appropriate Technology heritage, has involved developing and refining new technologies designed to improve life at the small-community scale in a low-impact manner. In terms of a knowledge platform, this has involved connecting 'socio-technical communities' of technologists, engineers, designers, and people willing to trial and further develop the technologies in practice. In a related way, Appropedia also has strong connections to various approaches to developing more sustainable ways to live in small to medium-scale communities, such as Eco-Villages, in multiple places around the world²³.

One implication raised by hosting the OSSTIP project on Appropedia is that there may be a need to begin cultivating “policy communities” to develop and discuss key ideas relevant to sustainability, in addition to Appropedia's existing spatial and socio-technical communities.

22 E.g. [http://www.appropedia.org/Talk:The Bottoms wildlife pond greywater plumbing](http://www.appropedia.org/Talk:The_Bottoms_wildlife_pond_greywater_plumbing)

23 See for example the Potawot intentional community, <http://www.appropedia.org/Potawot>

This could then support a process of better negotiating what scales different policies and technologies should best work at – the answer to which may be very different between policy areas, and in different regions. Appropedia's hyper-linked Wiki nature excellently facilitates making links and connections between these scales and contexts – but there still remains the challenge of creating a collective knowledge-base that can guide both contributors and readers to appropriate solutions.

In the next section we consider some of the particular challenges and epistemological issues of creating useful knowledge at this larger scale, and also the role such knowledge-development has to action in creating policy change.

Authoritative Knowledge or Knowledge for Change? Issues of Deliberation and Advocacy in Knowledge of Complex Systems

Any effort to change large socio-technical systems, such as public transport networks and the institutions that govern them, involves a political aspect because the outcome of each decision affects from several thousand to multiple millions of people. Further, as discussed in section 0 it involves developing and advocating an alternative 'policy paradigm' based on different values, understanding of the system involved and the efficacy of potential solutions.

Work at the GAMUT center has emphasised that the political nature of policy debates around complex systems such as city-scale transport networks very quickly butts up against any goal of completely 'neutral' or 'apolitical' knowledge. Sustainable Development as an overall movement certainly challenges a lot of the 'received wisdom' that underlay the mainstream development of societies in the 20th century. On the other hand, both authors recognise that solutions that will actually be effective in improving these systems need to be based on careful, thorough research, open to critique, not on 'wishful thinking' (Yankelovich & Friedman, 2011, p. 18) or pseudo-science.

Dealing with the tension between challenging un-sustainable status quo policies whilst avoiding wishful thinking and pseudo-science is not easy and as Schuler (2001) foreshadowed over a decade ago, is likely to involve a long-term research effort and experimenting with multiple deliberative 'patterns' for how ICTs can best support group civic knowledge development, debate and co-operation²⁴.

It is interesting in this respect that one of Wikipedia's policy pages explicitly states that it is "not an experiment in democracy"²⁵. While this may be correct in terms of not using voting-based methods as a final arbiter of devising appropriate content – this is arguably a fairly narrow interpretation of democracy. This framing doesn't consider the role that authoritative knowledge plays in social decision-making and its potential role as an arbiter of disputes – Wikipedia's importance *to* democracy. Instances of long-running debates around the content of Wikipedia pages where there are strongly held competing political views, such as the nature of Cuba's political system, illustrate this issue²⁶.

We have already briefly profiled how Appropedia's rules and attitude towards content-creation differ to Wikipedia – and that these differences allow the possibility of community-scale service learning and/or action research projects to be hosted on the site. But they also create the potential for the site to play a different role in decision-making – one that is more deliberative rather than completely focused on the 'end result' of authoritative knowledge. The evolution of Appropedia's proposed Rigor guideline for content could be important in this respect.

One way to engage with this opportunity, which the OSSTIP project suggests, is to create a precedent and room on the site for more deliberative aspects that are less oriented towards a particular solution, and more towards discussing principles of where different approaches

24 See the Public Sphere Project, <http://www.publicsphereproject.org/>

25 See <https://en.wikipedia.org/wiki/Wikipedia:NOTDEMOCRACY>

26 See http://seattletimes.com/html/nationworld/2002973183_wiki05.html

apply, how they relate to a community's values and goals, etc. While Wikipedia's encyclopaedic layout of Wiki pages may predominate now in how we think about the media, the technology can certainly accommodate different forms. Notably, the first Wiki website, the Portland Pattern Repository WikiWikiWeb²⁷, included many different 'forms' or 'patterns' of pages, some of which explicitly represented an exchange of alternative views rather than an existing consensus.

Alternatively, Appropedia could look to develop links to appropriate external websites that more explicitly support the deliberative aspect of knowledge-creation, such as Debatabase (formerly Debatepedia)²⁸, Loomio²⁹, and some that support textual argumentation with far more visual processes, such as debategraph³⁰. Academic literature is still coming to grips with the potential and best practices in this rapidly evolving area (Hoffmann, 2011; Towne & Herbsleb, 2012).

Developing sufficient high-quality knowledge to address these complex, multi-scale issues – particularly in a more deliberative, interactive way - is a significant task and requires time and attention. Appropedia's approach of creating a 'knowledge commons' allows anyone with a compatible mission and approach to utilise the site. But whether societies' existing experts in relevant fields have an opportunity and incentive to do so is a different matter. This is a complex issue, but increasing calls for greater public access to government funded research and relevant data, as well as Appropedia's significant focus on the potential of Service Learning in partnership with university academics, suggest at least a partial way forward here.

Conclusion

The effort to use Appropedia as a platform for hosting an Action-Research project centered on Free and Open Source transport informatics software has given us an interesting perspective at the point where community knowledge, researcher expertise, and policy debates meet. In a spirit of reflective practice, we feel Appropedia's seven-year history of hosting and facilitating the development of a global knowledge commons has produced significant benefits, but that the present moment is also a good time to consider possible refinements in approaches and goals. As the OSSTIP project continues to completion we believe it can serve as a useful case-study in this work, in particular with respect to connecting community knowledge to the need for deliberation on the future course of the complex systems and policy paradigms that underpin our society and ecosystem.

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27 <http://c2.com/cgi/wiki>

28 See <http://idebate.org/debatabase> and for the Debatepedia archives, http://dbp.idebate.org/en/index.php/Welcome_to_Debatepedia! Interestingly, the Debatepedia Climate Change and Clean Energy portal claims to have been part-funded by the United Nations Foundation - http://dbp.idebate.org/en/index.php/Climate_change_and_clean_energy_portal.

29 See <https://www.loomio.org/>

30 See <http://debategraph.org>

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