Uncommon Commons:

The unlikely tales of programmers, educators, pirates and lawyers in the land of the commons[1]

Prodromos Tsiavos
p.tsiavos@lse.ac.uk
Edgar Whitley
e.a.whitley@lse.ac.uk

London School of Economics and Political Science

The profile of Free / Libre Open Source Software (FLOSS) in recent years has highlighted what some describe as a new mode of production that applies both to software and other forms of technology such as Personal fabrication / Open Hardware (Seaman, 2002) or content, for example, Wikipedia and other cultural goods (Tapscott & Williams, 2008). This mode of production revolves around the involvement of the end user and in that sense it has been described as a process of "democratising" innovation.(Von Hippel 2006) Olson's work (Olson 1971) on collective action constitutes the basis for most subsequent explanations of such production organising. However, perhaps the most detailed model describing such phenomenon is provided by Benkler describing it as a Commons Based Peer Production (CBPP) model. He identifies a number of constituent elements of any CBPP project (Benkler, 1998; 2002; 2006), which we present in section two.

Benkler describes CBPP as a model that is both very likely to emerge as a result of the existence of certain technological conditions and as a desirable model to be achieved when it does not "naturally" emerge. Cases such as Linux are examples of the former scenario. The careful organization of production in a mode that tries to resemble CBPP in the case of corporations such as Symbian, Nokia or IBM is closer to the latter scenario.

The proliferation of cases where some form of CBPP is applied supports Benkler's argument regarding the potential prevalence of CBPP as a dominant production model for a ubiquitously networked environment. While CBPP constitutes a generic model for describing such production, not all information goods share the same characteristics. As Cheliotis notes (Cheliotis 2009), there are substantial differences both in the development and the licensing of functional vis-a-vis cultural artefacts. This does not cancel the validity of Benkler's model as a generic description of the phenomenon but rather sensitises us in the differences in various implementations of the model. Most importantly, as Benkler frequently notes, CBPP calls for a serious reconsideration of the regulatory environment supporting innovation and creativity. In a world where the problem to be addressed is not just one of incentives but also involves the abolition of frictions, the legal or regulatory system should aim to reflect these organizational realities. Benkler, following a stream of earlier theorists such as Moglen (1997) and Boyle (1997) argues that the current intellectual property rights system for regulating innovation and creativity falls short in terms of supporting CBPP forms of production (Benkler, 2006).

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[1] This paper is based on the work I have been doing with Dr. Edgar Whitley and a group of three of my students at the LSE, Daniel Schenavsky (Symbian), Lucy Laou (National Gallery and Victoria and Albert) and Thanos Koutoulas (fanedit, vsrealms) on different aspects of Commons Based Peer Production as well as on my previous research on the Creative Commons case. The National Library of Health, MyExperiment and CenturyShare cases are part of a broader study I have conducted for the Joint Information Systems Committee (JISC) together with Naomi Korn on the re-use and sharing of content between public service organisations in the UK.

Benkler focuses his critique on the *content* of the current regulatory regime arguing that it is one that is seeking to provide incentives, rather than one aiming at reducing friction. Regulation is also affected by *form.* Regulation is increasingly effected by a mixture of technological standards, applications and End User Licence Agreements (EULAs) (see, for example, Elkin-Koren, 1998; Littman, 1997). Behaviour on a platform like Facebook is limited both by the applications that govern end user behaviour and the EULA that defines the permissible uses of content on such a service (Lessig, 1996b; Lessig, 1998). The issue of the regulatory impact that CBPP has on the way we produce and experience regulation is of great importance as it sets the background against which most of human activity in technology intensive environments takes place (Mlcakova & Whitley, 2004).

This change of form has raised substantial questions regarding the extent to which these new forms of regulatory intervention reflect the same values and adhere to the same standards of participation, accountability and transparency that traditional legislation is supposed to follow. This problem of "substitution" of one type of regulatory form for another leads to questions of *process*: what is the process of development of these new regulatory forms that should be followed in order to achieve a result that most closely resembles the democratic standards seen in the more traditional forms of regulation? (Lessig, 1998; Lessig, 1999a; Lessig, 1999b; Brownsword, 2005; Brownsword, 2006; Black, 2000; Black, 2001).

Thus, we reach the key questions that this paper seeks to address: how is CBPP applied in different contexts? how different is the production of commercial software (Symbian) from that of licences (Creative Commons), torrent trackers (demonoid and The Pirate Bay) or a social networks implemented by cultural organisations (Tate, Victoria and Albert, Saachi)?

The application of CBPP as a model for the production of a different types of "products" seems to be desirable both for reasons of efficiency (lower production costs) and relevance (closer reflection of the needs of the users of the end product). These assumptions are supported by the literature referring to the incentives of participants to open source and content projects. The following types of incentives are offered by the relevant literature (Von Hippel et al. 2003) (Cheliotis 2009; Gopal et al. 2006): (a) participants are able to extract utility from adjusting the produced artefact to their own needs (a case which is intensified in the case of a regulatory instrument) and (b) the product is likely to be improved (c) the contributor accrues reputation gains from the participation to the productions process (d) in the case of functional artefacts there may be positive network externalities for the free adoption of the product.

This study seeks to explore the specifics of CBPP application in a range of high profile but distinctively different contexts:

(a) The development of the Symbian platform

(b) The use of web 2.0 applications by two London based cultural institutions (National Gallery, London; Victoria and Albert Museum, London and Wikipedia Loves Art) and a national broadcaster (BBC CenturyShare project)

(c) Interactions of participants in a series of "deviant" networks (Fanedit, VS-realms)

(d) the development of the Creative Commons Licences

(e) The use of web 2.0 applications allowing re-use of content by the UK e-science network (MyExperiment) and the National Library of Health

Each of the contexts explored in this study constitutes a different "ecology", as often described by the participants to the different projects (e.g. Symbian or CC), around which the development of different products evolves. While the main features of CBPP are prominent in each of the cases, there are distinctive elements appearing in each one of them that highlight novel aspects of the CBPP that may only be elucidated through an in-depth qualitative analysis of its applications. At the same time the differences between different projects highlight their commonalities: for example, in the Symbian case, there is no problem of peer excess capacity (see section two for an analysis of the term), because employees contribute to the development of the platform. On the contrary, the CC licences and the related discussion while presenting most of the CBPP features, it is not really there due to problems of lack of peer excess capacity.

The inherent limitations of the artefact produced (software, licence, discussions, bandwidth, digital pictures) to a great extend sets an additional layer of control of the production process. It seems that it is not the organisation that produces the artefacts, but the artefacts that produce the organisational settings. Accordingly, the key problem of excess capacity at the level of the individual contributor surfaces both in relation to the sophistication of the required contributions (e.g. a comment or a rating in a forum vis-a-vis a software patch, a licence hack or the curation of an image) and in relation to the life cycle of the project (e.g. low hanging fruits at the beginning of the project vs. more sophisticated contributions as the project evolves).

The following section presents the basics of CBPP that are employed as the key tool for analysing the respective cases. We then briefly present some initial findings from the relevant cases and close with some concluding remarks regarding the need to test in detail the elements of CBPP and potentially produce a number of variables for assessing the organisational capacity of organisations to adopt CBPP models of organising their production.

2   Commons based peer production

The model of Commons Based Peer Production was initially proposed by Benkler (2002) to provide an abstraction of the organizational structures underlying the production of FLOSS (Benkler, 2006) based on Coase's view of the firm (Coase 1988) and Olson's (Olson 1971) concept of collective action.

The issue of the changing nature of firms as a result of technological development is not new[see e.g. (Zammuto et al. 2007), (Siggelkow et al. 2003)]. A key aspect of this phenomenon to be highlighted is the transition from organisation as an objectified entity with set boundaries, to "organising" as an objective based ongoing activity with constantly negotiated boundaries. This focus on "organising" (Weick et al. 2005) or "becoming" (Tsoukas et al. 2002) rather than organisations and their interactions with technological change has been an issue of great interest for organisational theory the last decade. The relevant literature traces the transformation of the organisation from a hierarchically structured entity to one consisting in a network of interconnected modules held together by a common objective or set of functions [e.g. (Starkey et al. 2000). It is this literature that starts examining different mechanisms holding such structures together, such as information and communication technologies or trust [e.g. (Adler 2001), (Lazzarini et al. 2008)]. The literature on trust as a device of holding together a network of organisations that are under the strains of continues change is particularly interesting as it explores the tangible and intangible forces that allow such clustering to be possible. At the same time, this kind of literature is still concerned with constellations of formal organisations brought together in order to form supply chains or produce common accepted standards.   However it is from this class of theoretical considerations that we eventually see research dealing with the ways in which communities (Adler 2007) or communities of practice are used within the organisational context for the production of knowledge (Deetz 2000) or software (Lee et al. 2003) In this type of research whether it relates to the production of software or knowledge goods within or between organisations is very much

concerned with motivations (Jeppesen et al. 2006), as they are seen as the "glue" that holds these clusterings together.

Overall, these types of questions lead to a broader and deeper investigation of the nature of the organisation and the social context within which it is placed. Whether they refer to the post-modern organisation (Stephens et al. 2000; Weiss 2000) or question the way in which organisation theory moves to a space far broader than the one it used to occupy (Davis et al. 2005), all these investigations are preoccupied with the expansion or dilution of the traditional organisation not merely in terms of how control is exercised (e.g. hierarchy or network) but also in questioning the boundaries of the organisation itself (Santos et al. 2005).

The literature on standards that is perhaps the one closest to our work since it is a formation that lies by definition beyond the classic organisational model but also constitutes the direct forerunner of Free Software. FLOSS organisational structures have their origins in the Requests For Comments (RFCs) that operated as the primary mechanism facilitating collaboration in the production of Internet Protocols. With the Internet Protocols we encounter a new form of collaboration that is not between units of organisations but directly between individuals that participate in the production of a specific artefact. In the 2000s we see some of the first studies on Open Source dealing primarily with issues of motivation(Roberts et al. 2006)] and classification of such organisational forms or the ways in which FLOSS relates to mainstream commercial organisations (Fosfury et al. 2008). Within the realms of organisational theory such studies are still confined within the boundaries of software development [e.g. (Stewart et al. 2006) and we have to wait for the second half of the 2000s to see the first papers specifically on open content or innovation. However, it is in the early 2000s that Benkler's seminal paper on Commons Based Peer Production appears (Benkler 2002), and it is this paper that we have the first generalised description of a mode of production of which FLOSS is only one of the many incarnations.

Benkler highlights the role of the incentives necessary for creative production (Moglen, 1999), their changing nature as a result of the advent of the internet and the management of complexity that may arise (Raymond, 2001). CBPP can therefore be seen as ensuing from the existence of excess capacity as a result of a great number of potential contributors and the natural tendency of this capacity to be transformed into something creative provided the right organisational structures are in place. Thus, Benkler's work is particularly significant as it helps identify the conditions under which CBPP is likely to be preferred over a hierarchy or market.

The CBPP model has three basic constituent parts, relating to three aspects of the production: (a) the kind of artefact that is to be produced by the project and particularly its granularity; (b) the decentralized, non–hierarchical and self–selected mode of peer production based on excess capacity; and (c) the organisational integration of these contributions in some form of Commons.

These three aspects are presented in Table 1 and are illustrated with examples from FLOSS.

CBPP aspect	Aspect as found in FLOSS	
Project features	Open ended	Ongoing software development
	Modular	Individual modules / interfaces
	Fine granularity	Subroutines for very specific purposes
	Heterogeneous granularity	e.g. User interface modules, real–time processing modules, security and encryption modules
Form of excess capacity	Programmers interested in contributing to FLOSS project; Users willing to report bugs; access to source code	

| Integration | General Public Licence (GPL), Concurrent Version System (CVS) |

Table 1 Aspects of CBPP as found in FLOSS

2.1 Project Features

Benkler refers to features of a peer production project rather than simply an artefact or product. This allows CBPP to apply in the provision of services (e.g. ratings of products or sellers on auction sites) or concentration capacity (e.g. processing cycles) and not just the development of products (such as software or texts). Projects have to be "modular" and the resulting granularity allows many contributors to operate in a more decentralized fashion. The modularity and granularity also determine the level of effort required for a minimal contribution. The lower this barrier, the more likely that individuals will join the project. A distinct set of diverse modules opens up the possibility of contributions from individuals with varying backgrounds and skills. Finally, the project should be open–ended or potentially always unfinished: this provides space for continuous development and operates as an attractor for contributors. For example, in a web browser such as Firefox or an encyclopedia like Wikipedia there is always scope for improvement.

2.2 Forms of excess capacity

In order to succeed, CBPP requires 'excess capacity' in the community of potential contributors and whilst the modular structure of a project can facilitate this, structure alone is not a sufficient condition. Benkler identifies two conditions where this excess capacity can arise. The first is when there is unused capacity in terms of physical goods (e.g. car seats for car sharing, or processor cycles for computer processing). The second arises when the object of production is information and hence is non–rivalrous (e.g. software or content). Given the importance of excess capacity, it is necessary to have in place mechanisms that ensure such excess capacity is available both legally and technically. This is one of the reasons why Commons or Commons Based Property regimes, such as the ones sustained by copyleft licences, are so important in the case of information goods: they ensure that access to common resources remains a legal possibility. We should add a third dimension of excess capacity that has to do with the ability of the peers to make a contribution, either in terms of time or knowledge. For instance, a peer may be willing to contribute a non-rivalrous good such a code patch, but she may not have the necessary skills or time to do so. As we will see in the case descriptions, the lack of excess capacity is one of the key problems in most of CBPP-like projects.

2.3 Integration

The final feature of Benkler's model is concerned with organization and integration. This refers to the process of gathering the contributions and positioning them in a coherent whole. Ideally such integration should be low cost and unobtrusive. Mechanisms for integration may include co–ordination, channelling, filtering and error correction of individual contributions. Forms of integration include formal legal rules (e.g. GPL), social norms (e.g. netiquette), technical systems (e.g. CVS) or hierarchy (e.g. the editorial board of a scientific journal). An example of a centralized integration model is the peer review process for a scientific journal. FLOSS projects typically have more decentralized integration models.

CBPP appears to be a better production system than markets or hierarchies in cases where self–identification of the relevant talent is crucial for the achievement of particular goals (Benkler, 2002). The benefits of CBPP are enhanced by effective error–correction mechanisms. The power of

CBPP as an organizational model is its capacity to aggregate disperse contributions by peers that have excess capacity but are unable to produce any value on an individual basis.

3. The cases

In this section, we present the application of CBPP-like modes of organisation in four different contexts. The Symbian case was selected as a high profile case of commercial Free/ Open Source Software (FOSS) development case. The second group includes galleries and a national broadcaster. The Wikipedia Loves Art at Victoria And Albert and the National Gallery projects illustrate cases of application of CBPP by cultural institutions. While there is a realisation that it is necessary to make its resources as widely available as possible, there is still a great reluctance amongst UK public interest organisations in using CBPP for the re-use of their material. The BBC CenturyShare project allows the sharing of links and user-generated content but remains agnostic as of the type of licence under which the material is made available. The original content provider is the one that actually dictates the terms under which the material may be shared. The third group of cases examines the application of CBPP in activities that may constitute violations of copyright laws. Two cases are illustrated here, the VSrealms and Fanedit communities. In both cases, we have examples of fans of games (VSrealms) or movies (Fanedit) creating their own version(s) of the official products in order to suit their needs or preferences. It is important to note that in these examples we have two parallel CBPP processes: one relating to the production of the actual artefact (e.g. the game characters or the movie) and a second one related to the rating and commenting on the product. The fourth case is that of the development of the Creative Commons licences through a network of affiliated legal experts, an open and a semi-open mailing list. This case resembles the Symbian case, but there is no concrete "open sourcing" strategy with regards to the "legal code" and this is apparent in the organic transition from a decentralised to a CBPP-like process. Finally, we present two cases of re-use and sharing of content in the area of e-science (MyExperiment) and e-libraries (National Library of Health UK). These cases illustrate that while the CBPP principles seem to be most clearly applied in the specific cases, the functionality of such projects is possible because of their ability to target specific audiences that have the peer excess capacity to contribute to the respective projects.

3.1 The Symbian Platform

Symbian is a mobile operating system that was originally founded as a joint venture between Nokia, Sony Erickson, Ericsson, Panasonic and Siemens. The key idea was to share resources and expertise in order to develop an operating system for mobile devices. In the early stages of its development Symbian has been primarily an effort to standardise mobile operating systems and create a competitive to other handset manufacturers platform. As described by Symbian itself, the organisation of the production of the platform at this stage could be seen as a series of concentric cycles with the joint venture at the centre, the owning organisations comprising the inner and the licensees the outer circle. In addition there has been an extended partners' network that benefited from knowledge share through licences issues by Symbian. The revenue was mainly generated by software licence royalties estimated on the basis of sold mobile devices. However, this model proved to be problematic as it required extensive and increasingly complex licensing arrangements. The opening of the Symbian operating system that took place in June 2009 was the result of extensive internal consultations and the result of s long term strategic vision aiming at improving innovation speed, cutting costs and achieving efficiency and effectiveness gains. The transition from a closed to an open platform took place in four stages: (a) acquisition of Symbian by Nokia (b) transfer of ownership to the Symbian foundation. At this stage participating organisations may become members of the Symbian Foundation with a fee of $1,500 (c) Opening up the source code to everyone that signs up on Symbian's web site (d) Allowing not only corporate but also

individual contributions. The Eclipse Public Licence was decided as the preferred legal instrument for opening the relevant code and Nokia has been the primary driver of the project in terms of providing the relevant infrastructure, coordinating the various contributions and providing the human resources and expertise necessary for the project to fly.

3.2.1 Wikipedia loves Art

Wikipedia Loves Art at the Victoria and Albert Museum is part of the wider Wikipedia Loves Art project. It is a free content photography competition involving museums and cultural institutions in the US and UK. Both parties has a clear objective for the project, for the Victoria and Albert Museum (V&A) the objective is for them to compile a digital collection of the major artefacts held at the museum. As for Wikipedia the images collected would be used to illustrate articles throughout the site. A scavenger hunt list is issued containing topics where either the museum or Wikipedia has limited images of. Teams of up to ten members can go around the museum taking pictures, these images are then uploaded onto Flicker with the correct Creative Commons license. Flicker allows for photos to be shared, where individuals can tag it with keywords and publish it not only for the museums to share but for the wider world to use, it further allows for the viewers to comment on the photos.

3.2.2 National Gallery On-line

National Gallery online aims   'to care for the collection, to enhance it for future generations, primarily by acquisition, and to study it, while encouraging access to the pictures for the education and enjoyment of the widest possible public now and in the future, taking advantage of opportunities created by modern technology '. As a result of such aims and with the development of technology the site has allowed peers to come together and produce various contents after being inspired by the gallery's collection. Films and sound effects are posted online by students at the London Film School and Ravensborne College of Design and Communications. For each piece of work   there is a corresponding painting which inspired the student who writes an introduction about their work, viewers are able to rate and share the work via emails and bookmarking and also read up about the painting itself. Similarly 2D and 3D animations are produced by Central Saint Martin's College of Art and Design, and students from Birbeck, London post short fiction responses to paintings within the gallery. The website does not only involve works by university students but also younger children. The Take One Picture project is a scheme for primary schools where the Gallery focuses on one painting from the collection to inspire cross-curricular work in classrooms, the final piece of work by the school is then displayed online. There are also fun activities for children on the site such as Noisy paintings where the user can choose a painting then choose noises to go with the painting and finally send the finish work to someone via email.

3.2.3 BBC CenturyShare

The BBC CenturyShare project is jointly funded by JISC and the BBC Future Media and Technology (FMT), which is responsible for BBC's digital presence. The CenturyShare project is based on 'find, play and share', which is one of the BBC's Future Media and Technology strategies. The idea is to: (a) find BBC's content whether it is on or off the site; (b) play – or enjoy – it; and (c) share it to send it someone else, so that someone else finds it and the circle starts again. This project builds on the concept of liaising with different partners to produce products on the basis of the content that all collaborating organisations have, which is consistent with the key objectives of the SCA in promoting interoperability between and across different cultural sectors. For instance, instead of user-generated content the intention is to use the assets of the partners of the SCA, focused on specific themes, and gather them into one place to give people a way into the collections without going to the owners of them directly. The project is a proof of concept to determine whether it is a viable concept for SCA partners aiming to analyse, aggregate and

augment cultural content. Ultimately, content will be displayed on a timeline, so part of the activity will be taking the material and seeing if there is a date description and then adding more to the description or more keywords etc. The CenturyShare project is of particular interest as it operates in two layers: (a) it provides content collected from a network of providers; and (b) it allows the collection of meta-content created by the users.

3.3.1 Demonoid

It is one of the biggest closed torrent trackers. Only registered members can participate. One can become a member only through invitation. No material is stored on the site's servers. It simply works as an index of links to the actual material. Every user is allowed to upload torrents of variable content. According to the site's policy, the users are responsible for the material it is uploaded. Users are responsible for maintaining the quality of the content shared. They can report to the moderators and administrators material that is not in compliance with the rules of the site, or is not valid, or contains malware. All users are equal, except for the moderators and administrators, and they are obliged to share upload content and not only download. A sharing ratio of 1, at minimum, must be preserved at all times. Users that do not comply with the rules and regulations of the website might receive warnings. After 5 warnings, a user is banned from the community. Some members are recognized and respected by the community for their contribution, even though this does not translate to a more elevated user status. Requests for specific uploads are strictly prohibited. Apart from sharing and seeding, the users also contribute to the material uploaded by other users. This contribution can be in the form of technical help in the case of software, or making of subtitles in case of videos or in general write reviews about the material. Often members of the community choose to promote their bands through the website, by uploading their songs and allowing free access to everybody. Other members are known for releasing their own collection of movies or songs on a regular basis.

3.3.2 Fanedit

It is a forum that contains information and discussion boards about fan edit movies. A fan edit movie is a version of an existing movie, tv show or other source material that is somehow changed and interpreted in a different way. These alterations vary from simple colour correction to cutting or adding new dialogue scenes or special effects. Fan edits are not to be used for commercial reasons and supposedly are intended to be used only by those who own the source material (usually commercial DVDs). Initially this trend was restricted to the Star Wars movies, but has expanded to all kinds of movies. Members of the fan edit community have faced legal problems in the past (Phantom Editor for example), concerning their editing actions and the website itself was forced to temporarily stop its operation. At its current form, the website does not host any form of material or links to it, apart from discussions and information about concerning the different fan edits. Members are obliged by the rules not to post or ask for direct links to the actual edits. The web site administration is encouraging the community members to buy the official DVDs, supporting this way the official film industry. In general the rules of the website have become quite strict in order to avoid litigation problems. Nevertheless, one can easily have access to unlicensed material through this website. Editors use rapidshare and torrents to upload and share their material. In addition, the site contains a forum where the users may discuss various fanedit related topics as well as sections where they may rate content. If the ratings are bellow a certain mark, the user making the rating is obliged to provide an explanation of his low rating. http://fanedit.org/

3.4. The CC Case

Structurally, CC operates in three levels: (a) CC headquarters; (b) CC International; and (c) the network of CC national projects run by national CC project leads (Creative Commons, 2009a). It is important to note at this stage that the national CC affiliates or project leads and their respective projects do not have any hierarchical relationship with the CC headquarters. Their relationships are governed by Memoranda of Understanding (Creative Commons, 2005). A hosting institution is a legal entity existing in the jurisdiction where a new CC licence is to be transferred or "ported". It undertakes to do all the necessary legal work for the licences to be legally applicable in its jurisdiction. The hosting institution is limited in the ways it may use the CC logo and other CC trademarks.

Besides the formal organizational structure of CC, a series of formal and informal, physical and virtual fora have emerged. Here licences and CC policies are discussed and developed. CC initiated fora are the iSummit annual meeting and the various CC or iCommons related mailing lists.

Various mailing lists have been set up and are used as means of discussion between the members of the wider CC community. The analysis in this paper is based on three lists: (a) the *cc–licenses* mailing list that deals with the development of the CC licences (b) the *cc–community* mailing list that deals with various issues related to the CC licences but not necessarily their development and (c) the *cc–i* list that is used by national CC affiliates. The first two lists are public whereas the latter is private with access restricted to CC national affiliates. The *cc–community* list is unmoderated. Moderation was introduced on the *cc–licenses* list in February 2007 in response to concerns about "noise" unrelated to the development of the licences.

As mentioned above, the use of mailing lists for the development of legal instruments was not new for the founders of the CC project. Copyright's Commons, the direct ancestor of Creative Commons, was part of the larger Open Law project hosted at Berkman Centre for the Internet and Society, a project using a FLOSS–like mailing–list based process in order to develop legal instruments (Open Law, 2003).

In addition to the mailing lists, CC headquarters, regional (e.g. Europe and Asia) meetings and global events (the iSummit), complemented by informal conversations amongst participants, all play an important role in the development of the licences.

Specifically in the context of CC licences development over the mailing lists, this can be seen to be developed in two broadly described modes: one is in the normal course of the life of a licence where different issues related to its implementation and interpretation are discussed; and a second one, is during an expressed period of public or semi–public consultation preceding the introduction of a new licence version (e.g. CC v.3.) or new licence (as in the case of CC Zero). The accumulation of comments and potential issues in the former period normally informs the amendment of the licences and leads to a new version or it raises issues that lead to the need for a new licence. Both implicitly and explicitly CC has been against the proliferation of licences (Linksvayer, 2008) and actively tries not to introduce new licences unless there is an absolute need to do so. Such an inescapable need emerges when there are expressed and verified legal and practical problems with existing licences that may be resolved through amendment (need for a new version) or require a totally new legal instrument [withdrawal of licences (e.g. Developing Nations Licence) or new licence (e.g. CC Zero)]. It seems hence that a good understanding of the operation of the licences both in the practical level and in the level of multiple jurisdictions is essential for the operation of CC as an organization: if the licences become redundant, the CC as a project providing this "middle–ground" will fail. For that reason the collection of input both from jurists from all the CC hosting institutions' jurisdictions and from users of the CC licence is invaluable for CC. This relates to a great extent to the network-like structure seen in the level of developing a network of National CC affiliates that have the legal expertise and are willing to

contribute to the production of the national licences. At the same time CC has been adamant that the decision making and strategic orientation of the licensing project needs to remain with the headquarters. This dual nature of CC is reflected on the organization of the licence development process.

This is also reflected on the third tier of the CC organisational structure. The decision for the development of a new licence or the initiation of a new revision cycle rests ultimately with the CC headquarters. The decision is taken by the CC Board of Directors and then implemented by the CC general legal counsel, who is responsible for the coordination of all the legal work in relation to the discussion of the licences. During the days of the first legal counsel, Glen Otis Brown, and as we see in the first period of the licence development such consultation was pretty loosely defined with only some pointers to be discussed on the cc licenses mailing list, at the time the only list in existence for the cc communications.

3.5.1 My Experiment
The MyExperiment Virtual Research Environment (VRE), funded by JISC and the Engineering and Physical Sciences Research Council (EPSRC), enables scientific communities to share digital items associated with their research. In particular it uses Web 2.0 technologies in order to enable these communities to find, share and execute scientific workflows, which include text, diagrams and data, using a range of Creative Commons licences. If the user wants further access, and the ability to upload and share workflows, they will need to sign up. The software that powers Myexperiment.org is also downloadable so that a user can run their own instances of MyExperiment

3.5.2 NHS LOR
The National Library of Health (NLH) eLearning Object Repository (LOR) project is part of the National Health Service (NHS) Institute for Innovation and Improvement. Its main objective is to provide access to standards-based e-learning objects via a cross-searchable and browseable open web interface. All registered members of the NHS workforce will be able to search the repository and download objects that are on Open Access for use within local Learning Management Systems (LMS).

4. Analysis and discussion

In this section we briefly present the key features of CBPP as illustrated in each of the group cases presented in section four. For reasons of simplicity, each of the CBPP features (e.g. modularity, granularity etc) is discussed separately across all cases and at the end a series of additional CBPP elements that came out of the study are further presented and discussed.

4.1 Project features

This is perhaps the key element in appreciating the differences between the various cases. The features of the artefact produced to a great extent affect the overall outlook of the CBPP model applied in each case. In terms of modularity, in all cases there are elements of breaking down the produced artefact in smaller parts. However, the levels of granularity and heterogeneity substantially differ from project to project. In the case of the Symbian, the product presents high levels of granularity and heterogeneity that attract a variety of developers as indicated in Benkler's original hypothesis. It is, nevertheless, important to note that the heterogeneity is "contained" within the realms of a mobile phones operating system and in that sense the audience to which the open

software is addressed is limited in terms of expertise and interest. This is not a surprise, as it is something we see in most FOSS projects.

In the case of wikipedia loves art, there is modularity and pretty fine granularity in the sense that the act of taking a picture or documenting a particular item may be broken into pieces and requires a small amount of effort. However, the heterogeneity of what an individual may do is fairly limited in the sense of the project being one aiming specifically at enriching the documentation of the VnA collections by employing user-generated content. Again the limited heterogeneity of the tasks that are to be performed by the individuals participating to the project is not a limiting factor in the sense that the participants to the project are already interested in a limited range of issues. It would, nevertheless, be interesting to explore whether the project will fork in the future with additional tasks or issues.

The BBC CenturyShare project features CBPP only at the level of sharing links and comments regarding such resources or uploading individual comments. This is an interesting version of CBPP as it separates the re-use of the organisational content from the user-generated one. CBPP is only applied with respect to the latter, whereas for the former a federated network structure is employed. The existence of multiple resource the users comment on, discuss about or compile has as a direct result that there is not a single item that continuously grows as a result of the production process, but rather a constellation of often unconnected resources that attract communities of users sharing the content with each other. This differentiates such project from "deeper and narrower" projects such as wikimedia or symbian that have a more limited focus.

The Demonoid case resembles the CenturyShare in the sense that again there is not single object being produced but rather content shared by users that also provide comments and ratings. The difference between the legal CenturyShare and illegal Demonoid service has to do with the rights the users acquire on the content and hence the depth in which CBPP may penetrate. In the CenturyShare case, the user cannot download or alter the content, as in the Demonoid case. In the latter, users often cluster around a resource to create additional material, provide comments or subtitles. The case of Fanedit goes a step further, since the participants to the relevant community are primarily interested in providing different versions of their favorite movies and commenting on them. Here the modules are movies and granularity is of a pretty low level since each movie requires substantial investment in time to be edited. Also, the platform operates as a the place where the edits are presented and commented, not the place where they are created. In the Fanedit case there are two levels of CBPP operating in parallel: the editors that are a smaller group do the edits of popular movies and the audience comments on such edits. It is also interesting that there is no real remix between the modules (e.g. one movie with another) or in the cases when this is the case the remix includes very limited resources (e.g. two movies). The mixing of the edits wherever it exists it is pretty shallow: the editors work with a library of movies or some edits but there is a very limited amount of subsequent remixes that is possible on a single resource.

In the Creative Commons we encounter two types of modularity: one that is formally created by CC headquarters and is seen in the structure of the licences and another one that is the result of the lengthy discussions between the various members of the community. The former is of a fairly low granularity whereas the latter is of a much finer one as the participants choose the size of issue they would like to tackle. Similarly to many of the other CBPP-like projects, CC appears to operate in multiple levels: at one level, there is production of licences as legal instrument, something that requires expertise and time and is organised in a less CBPP and more a decentralised network fashion; at a second level, collective meaning is produced through the interactions between the participants as to the operation and meaning of the terms of the licence. In the latter level the

production process is much closer to a CBPP model compared to the former. The reasons behind this differentiation are explained in more detail in the peers' section.

In the case of MyExperiment and NLH LOR projects, the size of the modules is defined by the participants to the platforms that contribute smaller or larger parts depending on their expertise and time. Here, especially in the case of MyExperiment we do not have a single artefact that is continuously expanding, neither a galaxy of items around which only comments and links develop. Instead, we have deep interactions around data (e.g. social statisticians' data), experiments or even papers. The heterogeneity is maintained by providing a horizontal infrastructure, technical, legal and social that may be deployed by different communities in order to structure their interactions in a CBPP fashion.

4.2 Forms of excess capacity

The nature of each of the projects is in direct analogy with the forms of excess capacity we find both in relation to the produced artefact and the peers.

In the Symbian case, the software that is produced is of a non-rivalrous nature, whereas the individuals that participate in the production have the expertise to contribute due to their interest, professional or personal, in the project. It is important to note that in the process of transitioning the development mode from a closed to an open one there are safety nets ensuring the project remains operational. Nokia and the other participating entities have a core number of developers that are interested in contributing and are compensated for their time and knowledge. These form a critical mass of peers that will ensure the project is running. The CBPP model assumes that the cost for the individual contributor is so low that no incentives are really required, whereas in the Symbian case, at least as far as the core developers are concerned, there is no such issue since they are employees of the participating companies. This core group of developers is complemented in the final stages of the Symbian project with other developers that are participating to the project not necessarily because they belong to one of the partnering entities. It is interesting to see as the project unfolds what the percentage of non-corporate developers will be as the project matures.

In the Wikipedia loves art the actions required by the peers are of fairly low cost and do not require major expertise or time, so both the artefact and peer excess capacity is in place. In National Gallery case, the participation is ensured by the fact that the participants are doing so as a result of their educational activities. This linking between an educational task and the CBPP mode of production provides both the necessary support to acquire the required peer capacity and the time that the peers spend as part of their educational activities. Finally, the BBC CenturyShare project is possibly the most clearly CBPP project though as expressed above it is of a fairly narrow nature, at least for the time being and depends on the availability of resources by third parties. Again here, though there is excess capacity in the comments produced, there is no real sharing of content but rather of links to that content that is still distributed in a central or federated fashion. The excess capacity at the level of the peers is ensured by the fact that their activities are reduced to ratings, comments, compilations of lists and other acts of communication that remain low-cost, high collective value activities. It is important to explore what will the evolution of these projects in time, as well as the kind of value produced for the participant organisations and the BBC that operates as the aggregator of the content.

Similarly in Demonoid the participation at the level of sharing content or making comments is based on a freely available set of resources, such as pirated content and bandwidth. With regards to deeper collaboration activities such as subtitling, editing or extensive commenting (especially by

the uploaders), the skills and time require often lead to organisational forms other than CBPP: the individuals getting the content itself, also known as cappers, are grouped in small teams that are organised in a rather hierarchical fashion. The various teams do not have a hierarchical relationship with each other, but the administrators of the web-site certainly exercise some minimum control on them and are the ones initiating most of them. Finally, in the case of Fanedit, the comments that require the minimum expertise are organised in a CBPP-like fashion whereas the editing of the movies happens in small teams or by individuals that sign their work and then make it available to the community.

In the case of Creative Commons, the lack of excess peer capacity has led to the introduction of a network of affiliates that support the licences at the local level. Interestingly these are compensated for their time usually by being employed by an academic institution. The academic setting seems to provide the greater pool of expertise for CBPP-like organisational settings. This is also the case with MyExperiment that is addressed directly to the academic community. The users of the service often correlate their participating with the quotations they receive for their work, but there are also cases where participation is encouraged by the collective benefit from faster incremental development in cases of experiments. In the case of NLH LOR the practitioners providing the open repository with the relevant resources are not driven by the need to increase their academic reputation but rather from the need to share resources, particularly of educational nature and thus reduce the cost and time of educational material production. The excess capacity is again doubtful: there is not extra time that the practitioners have; instead, they are either actively encouraged by their employers (mostly hospital belonging to the NHS) to use the service or it is part of their job description to provide such material to the repository.

4.3 Integration and error correction mechanisms

In the case of the Symbian platform the integration and error correction mechanisms employed follow the patterns we see in the most of the open source cases, i.e. mailing lists, version control systems and wikis. However, what is interesting in this case is that the informal channels of communication existing in the case of other open source projects co-exist with more formal organisational structures, like the ones that the forerunners of the open Symbian system have employed. Especially in the transition phase from the closed to the open model, the contributions to the source code were only allowed by individuals belonging to specific organisations, the ones that were already part of the extended Symbian network. The coordination and error correction thus was not as automated as in other scenarios but frequently following hybrid hierarchy-network-CBPP models. Not surprisingly, the licence used allows the further commercial exploitation of derivatives without copyleft obligations.

In the case of wikipedia loves art, the coordination and channeling of contribution happens in a wikipedian fashion, but Victorian and Albert maintains a great deal of control as to the prioritisation of tasks and activities. In the case of National Gallery On-line project, whereas we have a series of decentralised activities the integration of the contributions is not done in an automated and seamless fashion. This is partially at least because of the very strong institutional network structuring the different interactions. The various contributors are mainly minors that "work" within an educational context. In many cases, simple email is used in order to send the contributions to a central point, which then disseminates them further. The licence agreements used are an extended version of the fair dealing provisions and super-distribution is in most cases not allowed. Finally, in the case of the BBC CenturyShare project, the site itself operates as a coordination mechanism. The users are allowed to freely compile lists of URLs and provide comments or their own content

to support their compilations. The system is agnostic as to the licence under which the content provider makes it available, but recombination of the original material is normally not allowed.

In the case of Demonoid, the contributions are channeled through forums or the upload system. There are specific rules that the tracker poses as to the quality, format and kind of the material that is uploaded. The users are obliged to adhere to such rules and there are members of the community that operate as administrators and monitor the application of such rules. In addition, other members of the community operate as "captains" for different tasks to be done, such as the capturing of content. In such case the aggregation and dissemination of the content happens in micro-groups that make use of the tracker's infrastructure. In the case of Fanedit, the website operates as a coordination mechanism exclusively for the ratings, commenting and compilation of titles of fanedits. A separate site is responsible for the provision of the links that are normally either in the form of torrents or rapidshare links. In that sense the Fanedit site is similar to the BBC CenturyShare project that does not provide access to the actual content. Forums are also extensively used in order to discuss the content, however, the production of the actual content is something that due to the kind of expertise required and the size of the modules (movie) by individuals or small teams that only contact each other once the work is over.

The coordination in the CC case is more complicated as it involves open mailing lists such as cc-community and cc-licences, closed lists of affiliates cc-i or cc-Europe, forums, blogs and regional or global face to face meetings (e.g. iCommons, CC Europe/ Asia working groups). A lot of the work is being also done by paid employees in the CC Headquarters that interact and coordinate the non-paid affiliates. In the last year there have been developments for more self-organisation in the regional level but the problem of lack of excess capacity in terms of time has made the progress of these efforts slow.

The coordination in the case of MyExperiment is managed by using the web 2.0 platform provided to the various communities of researchers that also use the CC+ infrastructure in order to express the micro-norms regulating the use and access of the common material. While CBPP is found in this case in its purest form, there is no single mega-project which attracts the users but rather there is an ecology of projects and users that link to each other or remain isolated not as a result of legal or technical restrictions but rather as a conscious choice of the different communities. Finally, in the case of NLH LOR, the error correction is still a pretty hierarchical affair in the sense that only the administrators are able to confirm that a certain resource is to stay in the system. These administrators are informed about changes etc by users but it is still their final responsibility which resource and for how long they will remain in the system.

5. Conclusions

5.1 The internal regulatory power of the produced artefact

The cases prove that, consistently with Benkler's initial assumptions, the external form of the produced artefact is irrelevant: CBPP-like models may be applied equally to cultural or scientific products, text, software, video or sound. What is important is the internal structure of the artefact, i.e. its modularity, granularity and heterogeneity. Moreover, what the cases suggest is that even when the artefact that is to be produced does not initially exhibit such properties, over the course of time, the crowds participating in such production process will form it so that its modularity, granularity and heterogeneity increases. The CC case is a good example: the licences are of limited granularity in the beginning, however as the project matures, the users/ affiliates identify specific issues that become the modules on which groups will work. These modules are further

refined as more individuals start working on them. Accordingly in the demonoid case, the groups of "cappers", i.e. individuals capturing content or producing subtitles were not initially formed, but as the project matures, there is need for self organisation at that level. In a self-producing fashion, the CBPP features of the artefact even if they are not there at the beginning of the project, they will appear in its life-cycle or the project will collapse. In other words, the artefact's structure regulates and organises the production around it.

5.2 Excess capacity issues and the initial content problem

The implications of the nature of the artefact are also evident with regards to the level of excess capacity required by the individual to participate to the project. For instance, in the Fanedit project the time and effort by the individual are of such magnitude that a new edit may take months to complete. On the other side of the spectrum, rating (fanedit forum) or compilation (CenturyShare) or sharing (demonoid torrent sharing) are the projects requiring the least possible by the participants. However, the greater the investment required by the peer the deeper the involvement to the production process (e.g. CC or cappers in Fanedit).

The excess capacity required by the peers does not remain static in the duration of the life of a project. This is true for projects seeking to develop products rather than projects that produce "artefacts" with no continuity such as ratings. When the projects begin, the problems appearing for solution are low hanging fruits that invite broad participation. However, as the project matures more wicked problems appear that often require expertise and knowledge of the specific project. This increases the value of consistent contributors but increases participation costs for new peers. This problem may be solved by increasing granularity of the modules or increasing the knowledge of the peers and by ensuring there is clear documentation of the project. However, all these efforts require additional effort that increases the cost of the projects. This is why a substantial number of the projects is funded by commercial (Symbian) or public (National Gallery) organisations. In many other cases, the CBPP system is ancillary to other activities, mainly educational (e.g. NLH LOR) or academic/ research (e.g. MyExperiment).

There is also often a cost for providing the initial content which will be used in order to get the CBPP model started. In the case of projects such as Demonoid the problem is solved by pirating the relevant material; in National Gallery or Wikimedia loves art Victoria and Albert, the galleries themselves make the content available to users to digitize it; in the case of Symbian a commercial and in NLH LOR a public organisation makes the content available for further changes to be made by the users of the respective systems. Finally, in the case of MyExperiment the content is made available by the communities themselves as it is born digital whereas BBC's CenturyShare relies on the content providers themselves to decide how to make their content available. In other words, all CBPP projects are operational only once there is some material in place that may be used in order to alter it or to produce meta-content based on this. The question of how this initial content is to be found remains a central issue and reflects on the cost or the legality of each of the projects.

5.3. Ecologies of Commons Based Peer Production

In most cases, even when the project starts as an effort to produce a single product, as it matures it breaks down in a number of micro projects that use CBPP-like models in order to materialise their production objectives. This is evident in projects like MyExperiment, Demonoid, Symbian, CC and Wikimedia loves art, where there is space for self organisation and a deeper involvement with the material is required. In that sense we do not see single units of production but rather *ecologies* of micro-cbpp units that co-exist and produce multiple often parallel products. Even the infrastructure used for the coordination of the different efforts of peers is fragmented and not operated by a single entity. Interestingly, this is particularly intense in cases where there are great legal concerns: in the case of demonoid, the capturing, the tracking and commenting and the actual sharing of the files happen using different infrastructures that become more decentralised as

the activity becomes more likely to be illegal and in that sense the liability is pushed at the ends of the network. In the case of BBC's CenturyShare, the platform is agnostic as to the licence of the conferred content: that remains a sole responsibility of the content provider and the individual aggregator of the content.

5.4 More Openness means more control

The more a system resembles the CBPP model, the more likely that there are very efficient mechanisms of tracking of contributions and contributors as this tends to maximise the value for the entity controlling the platform, increases the quality control of the material and benefits the participants (reputation, pedigree control). This is apparent in the most mature CBPP cases such as Symbian and MyExperiment, but they also require greater institutional support in order to sustain the operation of the relevant infrastructure.

5.5 Final comments

Overall, elements from the CBPP model as presented in Benkler's work appear in all the examined cases. However, there are great differences between them and they could be placed in a spectrum of maturity as to how "CBPP" they really are. The most common problems are the lack of peer excess capacity in the long run to keep producing artefacts in a commons based fashion, as well as how the cost to the original resources that will be then used for peer production will be achieved. The latter is a great problem especially for education, memory and culture institutions that have to pay great amounts of money in order to clear resources to then use them in a CBPP scenario. A lot of these problems seem to be currently solved through private-private or public-private partnerships or simply public funding as a result of explicit national policies. Consistent to Benkler's original work, the still critical question is how to design an institutional ecosystem where these forms of production may be encouraged. By identifying the aspects of CBPP production that are most problematic in their implementation across a variety of cases we have the opportunity to target our policies to the areas of greater emergency and contribute to the cultivation of the most effective and efficient CBPP ecosystems.

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