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## **NGI Commons | D1.1 ACTIVE COMMUNITIES OF COMMONERS AND RELEVANT COMMONS**

Valérien Guillier, Mélanie Dulong de Rosnay, Francesca Musiani

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## D1.1 ACTIVE COMMUNITIES OF COMMONERS AND RELEVANT COMMONS

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|          |  |
|----------|--|
| Abstract | The document offers to map Digital Commons in Europe. In order to do so, we first map the history and the definitions of the concept by scholars and compare it to Free Libre Open Source Software and to Digital Public Goods. We then focus on the beliefs and imaginaries we were able to identify as common to multiple interviewees. We then focus extensively on the sustainability models these Digital Commons mobilize and how they customize their structures to their needs. The last part aims to understand whether and how interviewees use the concept of Digital Commons in their practice, and what value they associate with this concept. |
| Keywords | digital commons, internet commons, case studies, interviews, sustainability, values, communities, governance, innovation   |

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\* R: Document, report (excluding the periodic and final reports)

DEM: Demonstrator, pilot, prototype, plan designs

DEC: Websites, patents filing, press & media actions, videos, etc.

DATA: Data sets, microdata, etc.

DMP: Data management plan

ETHICS: Deliverables related to ethics issues.

SECURITY: Deliverables related to security issues

OTHER: Software, technical diagram, algorithms, models, etc.

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## EXECUTIVE SUMMARY

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Digital Commons (DCs) is all at once a concept to describe different digital resources, open and shared collectively. However, the definition of the concept is sometimes considered fuzzy or obscure, even to those who produce those digital resources. Moreover, there is a need to identify the state and maturity of the field. This deficit of knowledge also encompasses the values and representations of the actors.

This research relies on desk research to map the definitions chronologically and show the evolution from the scholarly definition of Digital Commons, based on the openness as a refutation of enclosures copyright, to a definition involving the communities and their self-organisation (which is more aligned with the original concept of commons) and a political purpose (digital rights, right to access information, etc.). This research also demonstrates that political definitions follow the same chronological movement. This desk work also allowed us to elaborate a distinction between Digital Commons, the Free Libre and Open Source movement and the Digital Public Good movement. The Free Libre Open Source movement is characterized by the open licenses on the content and the 4 freedoms; The Digital public good adds a form of political purpose by adding the requirement to use Sustainable Development Goals (SDGs), but none of them focus on governance as Digital Commons do.

The report also relies on 23 interviews to describe 14 cases of projects that address, leverage or produce DCs, and to discuss their shared values. One of the main findings is that whereas openness is broadly shared, many actors have introduced conditions, delays or clauses in the licenses, for a variety of reasons. Other values that are commonly associated with the Internet are also expressed like the importance of (open) standards and the importance of decentralisation.

This study also focuses on sustainability models, showing that for-profit and nonprofit organisations are often both used in the same project for different purposes, and that the funding schemes are very different from one Digital Commons to another. However we notice a strong implication of the public bodies (the EU and member states but also local authorities and agencies) as client, user, contributor, funder, prescriber. We show that communities are a struggle for the actors, either to create them, to have people contributing to them, or to integrate them. In this respect, investigating governance of the various communities is paramount. An interesting discussion occurs, e.g. around the paradigmatic figure of the Benevolent Dictator for Life (BDFL), which appears to sometimes be a driving force when creating the projects but also has to organise a form of transition (for multiple reasons) toward a collective organisation. We also show that customisation of the governance models and structures seem to characterise the field, which makes it difficult to envisage the creation of standardisation bodies related to Digital Commons (while it is more feasible for Free, Libre, Open Source Software or DPGs).

The report shows that not all actors refer to Digital Commons, or, in some cases, are indeed referring to another concept. One of the findings of this study is that Digital Commons coexist, in the interviewees' mind, with two competing concepts, namely "Social and Solidarity Economy" and "Openness". As for the values usually associated with Digital Commons (or that the actors claim to have), we show that building infrastructure (whether material, technological, human) is central in the discourse. The social value and environmental footprint are concerns that the actors try to tackle with multiple motivations. They also look favorably upon the idea of innovation, but many seem to condition this innovation to social or ecological interests.

This report calls for further research on the role that the Digital can play for public agencies and institutions, whose appearances are recurring in this study; the way public and private seem to interact in novel ways could be interesting to explore. The report also shows that funding such as Next Generation Internet (NGI) programme are particularly well adapted for

the actors and the SMEs that constitute the ecosystem of the Digital Commons. This type of cascade funding should be extended, beyond the initial requirement to innovate, to integrate further concepts, like improving user interface, supporting community organisation, etc.

This report provides mapping and extensive interviews as a way to better understand the diversity of the Digital Commons. In many ways, supporting SMEs and individuals producing Digital Commons is contributing to achieve digital sovereignty, understood as autonomy and self-determination of the digital tools our digitalised societies (individuals, organisations, public entities) rely on. This report could be extended with a clear focus on the ways in which States are involved in this movement, what it allows them to do, and the opportunities that lay in front of them.

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## ABBREVIATIONS

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|              |  |
|--------------|--|
| <b>3GPP</b>  | 3rd Generation Partnership Project   |
| <b>AGPL</b>  | Affero General Public Licence  |
| <b>AKA</b>   | Also known as  |
| <b>AMKE</b>  | Αστική Μη Κερδοσκοπική Εταιρία (Civil Non-Profit Company)  |
| <b>AI</b>    | Artificial Intelligence  |
| <b>AISBL</b> | Association Internationale sans but lucratif (non-profit international association)                                |
| <b>API</b>   | Application Programming Interface  |
| <b>BDFL</b>  | Benevolent Dictator For Life   |
| <b>CC</b>    | Creative Commons   |
| <b>CEA</b>   | Commissariat à l'Énergie Atomique et aux énergies alternatives (Atomic Energy and Alternative Energies Commission) |
| <b>CG</b>    | Computer Graphics  |
| <b>CPR</b>   | Common-pool Resources  |
| <b>CEO</b>   | Chief Executive Officer  |
| <b>CIS</b>   | Centre Internet et Société (Center for Internet and Society)   |
| <b>CNRS</b>  | Centre National de la Recherche Scientifique (French National Center for Scientific Research)                      |
| <b>DC</b>    | Digital Commons  |
| <b>DCCP</b>  | Digital Commons Community Platform   |
| <b>DVD</b>   | Digital Video Disc   |
| <b>DMA</b>   | Digital Market Act   |
| <b>DNA</b>   | Deoxyribonucleic Acid  |
| <b>DINUM</b> | Direction interministerielle du numérique (French interministerial office for the digital affairs)                 |
| <b>DPG</b>   | Digital Public Goods   |
| <b>DPGA</b>  | Digital Public Goods Alliance  |
| <b>DPI</b>   | Digital Public Infrastructure  |
| <b>DX4D</b>  | Digital Transformation for Development   |
| <b>EDIC</b>  | European Digital Infrastructure Consortium   |
| <b>ERC</b>   | European Research Council  |
| <b>EU</b>    | European Union   |
| <b>HR</b>    | Human Resources  |
| <b>IAD</b>   | Institutional Analysis and Development   |
| <b>INBO</b>  | Instituut voor Natuur- en Bosonderzoek (Research Institute for Nature and Forest)                                  |
| <b>IEEE</b>  | Institute of Electrical and Electronics Engineers  |
| <b>IETF</b>  | Internet Engineering Task Force  |
| <b>IMEC</b>  | Interuniversity Microelectronics Centre  |
| <b>FEP</b>   | Fediverse Enhancement Proposal   |

|               |  |
|---------------|--|
| <b>FIRE</b>   | Future Internet Research and Experimentation   |
| <b>FLOSS</b>  | Free Libre Open Source Software  |
| <b>FOSS</b>   | Free Open Source Software  |
| <b>GKC</b>    | Governing Knowledge Commons  |
| <b>GDPR</b>   | General Data Protection Regulation   |
| <b>gGmbH</b>  | gemeinnützige Gesellschaft mit beschränkter Haftung (non-profit Limited liability company)   |
| <b>GmbH</b>   | Gesellschaft mit beschränkter Haftung (Limited liability company)  |
| <b>GNU</b>    | GNU's Not Unix   |
| <b>GPL</b>    | General Public Licence   |
| <b>IC</b>     | Internet Commons   |
| <b>IT</b>     | Information Technology   |
| <b>IP</b>     | Intellectual property  |
| <b>INRIA</b>  | Institut national de recherche en informatique et en automatique (National Institute for Research in Digital Science and Technology) |
| <b>MLS</b>    | Messaging Layer Security   |
| <b>MSC</b>    | Matrix Specification Changes   |
| <b>NATO</b>   | North Atlantic Treaty Organisation   |
| <b>NC</b>     | Non Commercial   |
| <b>NGI</b>    | Next Generation Internet   |
| <b>NGO</b>    | Non-Governmental Organisation  |
| <b>OER</b>    | Open Educational Resources   |
| <b>OFDMA</b>  | Orthogonal Frequency-Division Multiple Access  |
| <b>OKFN</b>   | Open Knowledge Foundation  |
| <b>OSI</b>    | Open Source Initiative   |
| <b>RFC</b>    | Request for Comments   |
| <b>RIE</b>    | Réseau Interministériel d'État [Intergovernmental State Network]   |
| <b>RU</b>     | Resource Unit  |
| <b>SA</b>     | Share Alike  |
| <b>SDG</b>    | sustainable development goals  |
| <b>UE</b>     | European Union   |
| <b>UK</b>     | United Kingdom   |
| <b>UX</b>     | User experience  |
| <b>UN</b>     | United Nations   |
| <b>UNESCO</b> | United Nations Educational, Scientific and Cultural Organization   |
| <b>US</b>     | United States  |
| <b>W3C</b>    | World Wide Web Consortium  |
| <b>ZUM</b>    | Die Zentrale für Unterrichtsmedien im Internet (Center for educational media on the Internet)  |

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# 1 INTRODUCTION

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## 1.1 MAPPING DIGITAL COMMONS IN EUROPE

Practitioners, scholars, as well as institutions in European countries and in the European Union most often refer to Digital Commons and/or to Internet Commons to describe digital tools, the collectives who build, maintain, and protect collectively-owned digital resources. The concept sometimes adds to others like Free Libre and Open Software, open data, open hardware, open knowledge or Digital Public Goods, all of which have already been well defined and studied. It also refers to the Commons per se (beyond digital technologies and processes), for which an established literature that spans the last 50 years exists as well.

This report adds an important contribution to these sets of literature by questioning the concept of the “(digital) commons” via an exploration of the resources and communities that subtend it, to comprehend their inner workings and their needs, what constitutes “Digital Commons” on the ground, in daily, mundane interactions and practices. Based on a review of literature and multiple interviews, which are shared as open data (see Annex 4: Interview transcripts), the aim is also to analyse the relationship actors have to the concept of Digital Commons, the understanding of it but also question the values that are often associated with Digital Commons. Do the actors effectively share those values and how do they try and operationalise them in their organisations? This report also focuses on the sustainability models of these Digital Commons. As many actors have told us, they like what they are doing but also need to make a living. The idealised vision of contributors freely giving their time still exists, but most of the projects we looked at rely on full-time contributors, who need to be compensated for their work.

## 1.2 OBJECTIVES OF THE REPORT

This report is the deliverable for the first task of the NGI Commons project, entitled “DC/IC Mapping”. This exercise of definition and conceptual framing is useful in several respects in order to provide an overarching scientific framing to the project. Since “mapping” relates to both the concepts and the actors, we chose to study the evolution of the concept in time. We also examine whether it is a uniformly understood concept or its definitional variations, such as the abbreviation DC/IC for Digital Commons and Internet Commons may suggest. The other contribution of this mapping is to question political coherence and objectives achieved by the actors who choose the particular economic model called peer production, or internet collaboration, instead of traditional firms or start up structures. By studying the purposes and political projects of Digital and Internet Commons, we also address a critique addressed to the concept of commons, addressing its supposed ‘fuzziness’ and taking the opportunity to consider related concepts which are useful because they rely on different axioms, reflects multiple objectives, and are used in different public arenas.

A subsequent report of the NGI Commons project, D3.3 Governance frameworks for the Digital Commons, will further explore factors of success for digital and Internet Commons and provide “a set of governance recommendations for DC initiatives, covering governance models with a proven track record for realising maximum societal impact and sustainability of DC initiatives”.

This first section of this Deliverable provides a literature critical analysis of the concepts of Digital Commons, Internet Commons, open source software, digital public good and digital public infrastructure. It then presents the methodology which was defined to select the 20 interviewees, in order to have a representative panel of the commons considered, according to the type of resource, the degree of openness, the implication of contributors, the institutional profile, country of origin, and whether those projects already obtained NGI funding.

After that conceptual and methodological first section, we provide a detailed analysis of the contributions of our interviewees, with the expectation to understand more about their values and beliefs when choosing to develop their projects as open (section 2), how they reached economic sustainability, with a discussion on public and private funding (section 3), and what is their definition of the commons (section 4).

## 1.3 DIGITAL COMMONS AND RELATED CONCEPTS DEFINITIONS

### 1.3.1 A Brief History of Digital and Internet Commons

Digital Commons are a fairly recent concept, produced at the crossroads of two different ideas which were brought closer at the turn of the 21th century during the development of cyberlaw and internet policy scholarship and advocacy.

#### 1.3.1.1 Commons

The concept of ‘Commons’ was initially developed by and around Elinor Ostrom in what is now called the ‘Bloomington school’, and initially focused on the environmental, natural resources exploited by humans, including forests, pastures, irrigation systems or fresh water reserves [1]. As a researcher in political sciences, Ostrom specifically looked at the collective organisation of resources, drawing from the field of Keynesian economics and specifically from the work of Samuelson, who aimed to provide legitimacy to a greater involvement of the state [2]. As such, Ostrom and most of the commons scholars used Samuelson’s divide between goods based on two criteria: excludability and rivalry<sup>1</sup> (as summarised in Table 1).

TABLE 1: REPARTITION OF THE GOODS BASED ON EXCLUDABILITY AND RIVALRY, [3]

|                    | Low rivalry  | High Rivalry          |
|--------------------|--------------|-----------------------|
| Low excludability  | Public goods | Common-Pool resources |
| High excludability | Toll goods   | Private goods         |

Ostrom’s focus, however, is not on the political economy of goods, but rather on the governance needed for the Common-Pool Resources (CPR) which needs to be managed over time, as well as the governance these commons need to be sustainable. One important conceptual framework of this influential<sup>2</sup> and interdisciplinary academic community – and school of thought – is a list of eight rules or governance principles which have been identified as essential to obtain and maintain sustainable these Common-Pool Resources<sup>3</sup>.

<sup>1</sup> In their first exploration of this idea, Ostrom & Ostrom refer to “Jointness of use or Consumption” rather than rivalry, which has been used later. See [3]

<sup>2</sup> Ostrom was awarded with Ostrom and the Nobel Prize in Economic Sciences in 2009 for their work on rules and institutions allowing sustainable and equitable management of shared resources.

<sup>3</sup> Based on <https://earthbound.report/2018/01/15/elinor-ostroms-8-rules-for-managing-the-commons/>

1. Commons need to have clearly defined boundaries and are not necessarily in open access.
2. Rules should fit local circumstances.
3. Participatory decision-making
4. Monitoring
5. Graduated sanctions for abusers
6. Easy mechanisms of conflict resolution
7. Right to organise, legal recognition by an authority.
8. Cooperation with larger networks

Those principles and frameworks have been adapted to the specificities of several categories of commons, such as Free or Open Source Software (FOSS) commons [4,5], urban commons [6], knowledge commons [7] followed by the Governing Knowledge Commons (GKC) framework [8] and the derived book series<sup>4</sup> on privacy, market, medical knowledge, smart city and misinformation as knowledge commons), infrastructure commons [9], data commons [10], etc. Extracted from an analysis of thousands of cases, the aim of these many academic principles and theoretical frameworks was not to prescribe, but rather to describe what fundamental requirements were met across all successful commons and the Institutional analysis and development (IAD) framework (see Fig. 1), an analytical tool for the commons [1]. This early work had multiple developments, but especially when the actors of the Free Libre Open Source Software movement came across this body of work and started to use it to analyse their own practices and approaches.

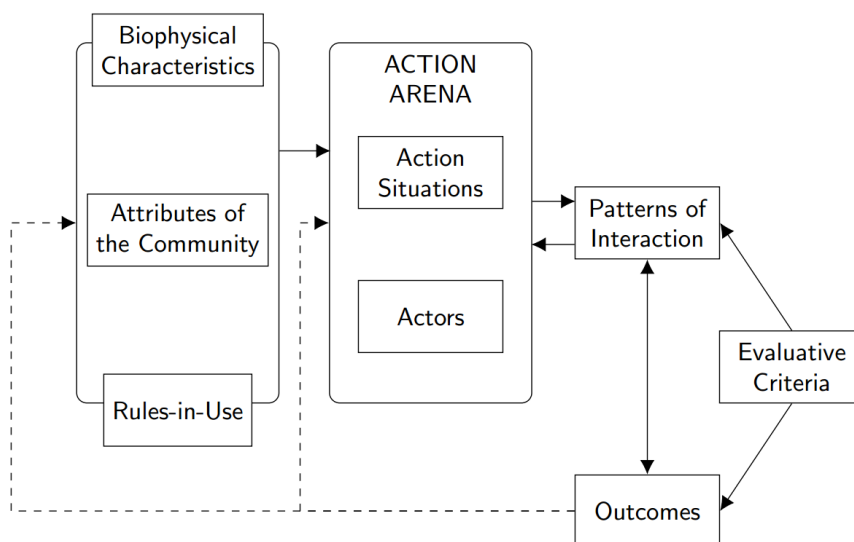


FIGURE 1: INSTITUTIONAL ANALYSIS AND DEVELOPMENT (IAD) FRAMEWORK. FROM [1]

### 1.3.1.2 Early 2000s: The extension to information and knowledge commons

Research on the commons as an institution was read by Anglo-saxons constitutional and intellectual property law professors, many of whom were concerned by the shrinking of the public domain following a double extension of copyright that was occurring at the turn of the

<sup>4</sup> <https://knowledge-commons.net/publications/>

21st century. Copyright was, at the time, the subject of length extension, but was also applied to new aspects of knowledge, which it had not previously been subject to. This concern around copyright also included knowledge and, more specifically, scientific knowledge and the public domain [4,5].

These scholars were more specifically referring to the idea of ‘free and open knowledge’, and focused on copyright and the limits of the ‘intellectual property’, which is very different from usual property rights over physical goods. Their main perspective was of property and its limits, and they also focused on use and development of free licences (as a way to use property rights against themselves) and the public domain (as a collective limit that society opposes to this property). A group of lawyers reused the concept of commons to apply it to copyright public licenses they named ‘Creative Commons’, which allowed them to circumvent the legal extension; and to authorise the authors applying these licences to their work to not fully exercise their rights under copyright, but grant in advance some of them to the public<sup>5</sup>. The purpose of these efforts was to create a pool of open access resources rather than a commons, because there was no shared governance.

In 2001, a seminal conference<sup>6</sup> on the public domain gathered law professors with scholars conceptualising information, research, and cultural commons. One person central to this meeting was Elinor Ostrom’s co-author, Charlotte Hess, a librarian who provided a context within which the worlds of open knowledge and the world of the commons were able to find common ground [6]. Hess was concerned with the knowledge commons and more broadly conceptualised the new commons [7–9]. In this reframing process, commons are not defined by their intrinsic characteristics (e.g. excludability or rivalry), but rather by their relationship to collective action and the risk of enclosure.

In Hess’ work, there was a shift in the concept of the commons, from a concept used only to describe natural resources and their collective management toward collective action around ‘knowledge commons’ in a broader sense. In this new conceptualisation and its related use cases, the act of ‘commoning’ exists because there is a community around the resource, even if Samuelson’s (and Ostrom’s) criteria would lean toward it being classified as ‘public goods’ or ‘private property’.

This movement toward knowledge as a commons, or simply knowledge commons (as it came to be known), immediately included the digital realm. However, knowledge should not be assimilated to intangibility. Ostrom & Hess analyse knowledge commons using the same IAD-framework, emphasising that the ‘biophysical characteristics’ of knowledge commons are actually composed of three indistinguishable components: Ideas, artefacts, and infrastructure [10].

The authors showed that ideas therefore never exist and circulate without tangible artifacts they are inscribed on (e.g. books or files on a hard drive), which are in turn included in a broader infrastructure (e.g. a library or a computer network). The same is true of tangible commons, which are always embedding knowledge commons. There is, in that sense, a reduction when knowledge (including software) is thought as a perfect intangible good, and therefore one which is never subject to rivalry or excludability.

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<sup>5</sup> One of the original legal conditions reverting the principle of copyright came from the legal hack inspiration of the GNU GPL license which created Free Software in 1989 around the idea of copyleft.

<sup>6</sup> Proceedings edited by James Boyle <https://scholarship.law.duke.edu/lcp/vol66/iss1/>

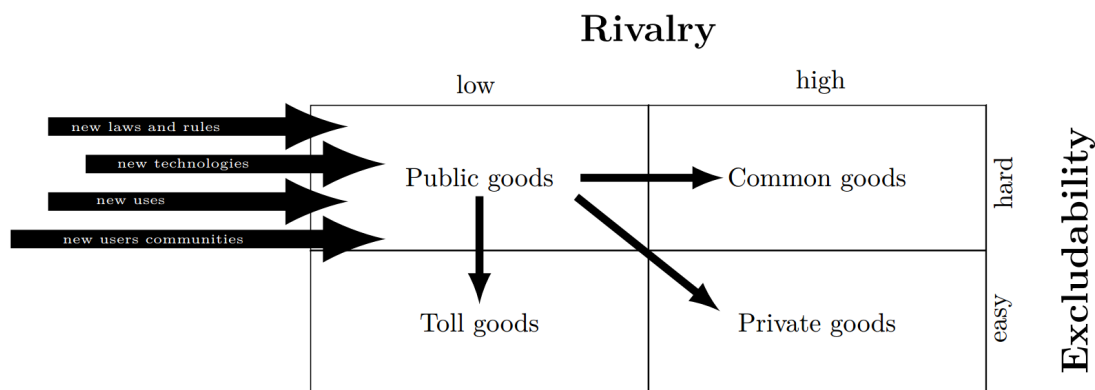


FIGURE 2: GOODS CAN CHANGE CATEGORIES UNDER THE INFLUENCE OF NEW LAWS AND RULES, NEW TECHNOLOGIES, NEW USES, NEW USER COMMUNITIES. TRANSLATED BY THE AUTHORS FROM [8]

As this understanding of the commons emerged, other theories of the commons were conceptualised as well, based on different political paradigms (some of which will be introduced later on). This report focuses on the Ostrom school of thought on commons (and the Governing Knowledge Commons framework mentioned above), in large part because its contribution on governance and sustainability, which goes beyond a sole focus on the availability of the resource often linked to the intangible nature of information and digital artefacts.

The inscription of Digital Commons in the history of cyberspace [11] and public domain [4,12] partially misled some definitions of the Digital Commons to comply with the illusion of intangibility and the zero marginal cost theory is a utopia. This has very little to do with the commons<sup>7</sup> as Ostrom and Hess defined it, and more with the utopia of peer to peer online sharing at the beginning of the cyberspace democratisation.

When speaking about Digital Commons according to the IAD frameworks, there must be the “attributes of the community” (which then must exist as such) and “Rules in Use”. These attributes are therefore explored in the following section.

### 1.3.1.3 The importance of the community and of the rules to Digital Commons

In the Digital Commons ecosystem, the ‘rules’ governing the commons were thought to be the licenses’ conditions, which were inspired by the idea of copyleft, while the ‘community’ was less clear. Copyleft should be understood as the effect of some free licences, that require the potential changes to an original work to be shared under the same conditions (i.e same license) if they are to be shared.

The Free, Libre, and Open Source Software (FLOSS) movements include all actors producing and using open source and/or libre software. In these communities, the community has sometimes been assimilated to the user base of the software (and sometimes the contributors to its code) and the rules in use to the licence applicable to the code. But, it is also quite clear that the community (especially when composed of users) does not have a say in how many FLOSS projects are governed. Moreover, the licence of a free – as decided by the original author of the code – is hardly changeable once the project has taken many contributions — as copyright would need everybody to agree on this change. Moreover, considering rules in use is at least incomplete, as the licence makes sure the ownership is not a way to exclude other participants, but doesn’t properly define rules in use (how the collaboration should be

<sup>7</sup> We borrow this critique and follow the reasoning of Lionel Maurel, which he developed in his talk during the colloquium called “Territoires solidaires en commun: controverses à l’horizon du translocalisme” held in Cerisy between the 12th and the 19th of July 2019, directed by Elisabetta BUCOLO, Hervé DEFALVARD et Geneviève FONTAINE. (For the recording, see [13])

organised, monitored)<sup>8</sup>.

Lastly, the concept of Digital Commons is used to describe common-pool resources that are not only FLOSS: knowledge (or contents), data, standards, hardware are usually mentioned as resources that could be managed as — or considered — Digital Commons. They suffer the same uncertainty about the governance as being free only means being under a free licence.

The concept, torn between a new way to describe open resources and the whole theory of collective governance which it carries, appears sometimes to be unclear or fuzzy, and need therefore to be better defined.

### 1.3.2 Defining Digital Commons today

Defining Digital Commons is no easy task. As shown above, the concept has multiple roots. As it is a recent topic, few researchers and two public and international institutions have offered definitions. The NGI Commons consortium also offered a definition of Digital Commons at the beginning of the project, building upon those.

This section aims to improve understanding of the notion by analysing these definitions of Digital Commons, to show potential contradictions and compare with the user definitions, uses and expectations of this concept (as outlined in the following sections). In order to see the evolution of the concept over time, we first consider a few definitions and attempt to put them in context. Therefore, we first review scholars' definitions from six different works between and 2021, then move to institutional definitions which try to find a common ground and operationalise these definitions for national and international policymaking and political action.

We start with a definition of commons, that was largely debated in the field, from *The Wealth of Networks*, a book at the origin of commons-based peer production that articulates the underlying economic model he foresees for the digital realm. Nevertheless, Benkler mentions the commons to describe digital objects and their specificities, but never uses “Digital Commons” as such<sup>9</sup>. He offers the following definition:

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*“Commons” refers to a particular institutional form of structuring the rights to access, use, and control resources. It is the opposite of “property” in the following sense: With property, law determines one particular person who has the authority to decide how the resource will be used. That person may sell it, or give it away, more or less as he or she pleases. [13]*

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This broad definition comes early on in the book, where the author seeks to define “commons based peer-production”, the central concept in the book. It exemplifies the earlier described vision of the commons of the free movement activists and scholars; namely, that commons as such are opposed to ownership, the same way free software and the public domain were opposed to the extension of copyright. Later in the same book, Benkler writes:

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*Commons are an alternative form of institutional space, where human agents can act free of the particular constraints required for markets, and where they have some degree of confidence that the resources they need for their plans will be available to them. Both freedom of action and security of resource availability are achieved in very different patterns than they are in property-based markets. [13]*

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<sup>8</sup> Some researchers name these communities epistemic communities [14] but recall that this rather a potential, and other on the contrary explicitly evoke “commons without communality” [15]

<sup>9</sup> He also uses, quite singularly, the terminology of “open-access commons” in a handbook book chapter [16]

Once again, the focus is on freedom of action and resource availability are central. In both cases, the institutional space is recognised but what is defining it is merely the absence of constraints, rather than proper rules in use. In her doctoral thesis on governance of online creation communities, Fuster Morell describes Digital Commons as:

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*The Digital Commons are defined [...] as information and knowledge resources that are collectively created and owned or shared between or among a community and that tend to be non-exclusive, that is, be (generally freely) available to third parties. Thus, they are oriented to favor use and reuse, rather than to exchange as a commodity. Additionally, the community of people building them can intervene in the governing of their interaction processes and of their shared resources. [14]*

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This definition still tries to describe commons as information and knowledge, while permanently focusing on the (partly tangible) infrastructure that enables and influences the collaboration which shapes those very same commons. However, if the supposed intrinsic characteristics of the Digital Commons seem to still be central, there is a mention of the community intervening to govern the interaction processes and the resource. This is, implicitly, a recognition that not all open resources necessarily leave a space for the community to govern themselves and the resource.

Both Benkler's and Fuster Morell's definitions question the reduction of the information to a commodity, especially if it hinders sharing freely and the collaboration made possible by the digital artifacts of knowledge. However, this does not forbid it to be part of products. Bauwens, Kostakis and Pazaitis [15] push this possibility to the extreme, asserting that:

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*[Digital Commons of knowledge, software and design] represent the pooling of productive knowledge that is an integral part of the capacity for any production, including physical goods [19]*

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Conforming to their ideas of 'cosmolocalism' (a neologism defining the combination of sharing the knowledge globally and relocating the production locally), the authors assume that knowledge comes prior to any production process and that most knowledge belongs to the commons. This definition appears to draw on some philosophical thinking of the commons, especially post-operaists [16–18]. In this approach, knowledge and collaboration are prior to the exploitation by capitalism, therefore shall transcend it because the general intellect of the multitude will always overflow the capacity to exploit it.<sup>10</sup> While highly stimulating, this philosophical (yet teleologist) approach is not taking an analytical perspective required for describing the Digital Commons in this report.

It does not really help characterising what should be called Digital Commons, even if it puts emphasis on the action of pooling (rather than on the resource itself). This matches the displacement Hess did with the new commons (from the focus on the resource to the commoning as an action).

Another approach is that of Fuchs, who conceptualises the commons in the following way:

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*The Digital Commons are digital resources that are commonly controlled by humans. [19]*

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This definition is also quite simplistic and puts the emphasis on the control of the resources by the human (in context of a discussion on the digital public sphere, also related to Wi-Fi

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<sup>10</sup> These theories are developed in [23–26]

community networks as Internet Commons). This focus on the control by humans should be understood as a proper inversion of the relationship one can have with a digital product: One can understand this definition as opposed to any closed source Digital Resource that is managed as a commodity, as it is not commonly controlled by humans. In a less radical understanding, this could match the Human Rights, the human dignity and the “human dimension” that can be found in the European Declaration on Digital Rights and Principles for the Digital Decade [24]

Another definition is based on a holistic historical evolution of the commons. It reads as follows:

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*The Digital Commons are a subset of the commons, where the resources are data, information, culture and knowledge which are created and/or maintained online. They are shared in ways that avoid their enclosure and allow everyone to access and build upon them. The notion of the Digital Commons lies at the heart of digital rights, the political fight to expand, rather than restrict, access to information, culture and knowledge [20]*

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This definition refers to the Digital Commons as part of the commons itself. Here, the resource is no longer the core of the Digital Commons. The enclosure of the resource (e.g. by the market or state, as found in early works on the Digital Commons) are mentioned. The access to the resource is still important for the concept, but the authors try to link Digital Commons to a greater objective of (digital) public good, e.g. digital rights and access to information.

This last definition was quite broadly reused in the latter literature. Still, even if it does not reduce commons to just the resource itself, it does not mention the community, not to mention collective governance, explicitly; rather, it introduces the idea that commons may have a purpose that could at first glance look exogenous to the concept. However, this aspect echoes both Fuchs’ definition focusing on control by the users and Benkler’s and Fuster Morell’s idea of decommodification of digital resources.

These definitions have some form of coherence and in most cases include digital resources that are shared and sometimes collectively produced and managed. They also carry a purpose, implying that the way these digital resources are managed is not neutral in terms of values. These definitions therefore draw on Hess’ conception of the new commons, and actually acknowledge that these commons are not linked to intrinsic characteristics but rather as a collective action to protect or develop them.

Based on these definitions, we therefore argue that the definition of Digital Commons should focus on collective governance (of the resource and of the rules-in-use), which is essential and missing in some of the theory of the commons. Ostrom’s work has been sometimes qualified as apolitical, however the participation by the community is at the heart of all the commons. As for Digital Commons, we also claim that their legal protection is even more important to their existence than to tangible commons’, since they are threatened by copyright extension or other fate related to intangible resources (pollution, lack of findability, interoperability, change of format) and requires care work too.

Often, a scholar’s definition, when it comes to practice and policies, aims to describe. However, the definitions adopted by public institutions, which can be derived from academic works, aim to prescribe and can enlighten us on how these works have influenced (or adequately described) the field. The first public recognition of the concept, after a report by French diplomacy [21] aiming at pushing digital ambassador Henri Verdier’s strategic conceptual move that Digital Commons are instruments of digital sovereignty, can be found in the 2022 report of the European Working Team on Digital Commons, gathering Estonia, Finland, France, Germany, Italy, Ireland, Slovenia and Sweden. Those Member States offered this definition in their report:

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*Digital Commons are non-rivalrous and non-exclusive resources defined by distributed and communal production, ownership and governance of informational capacities and technology. They intertwine collaborative governance and open data, open source as well as the principles of open standardization. [22]*

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In this definition, Digital Commons are still characterised as resources, but the communal production, ownership and governance are now central. The definition – the product of political consensus, rather than academic scholarship – mentions different types of commons, but the authors seem to have left out of their list important Digital Commons categories such as open knowledge and open hardware. Most interestingly, there is a reference to Samuelson’s definition of goods by their intrinsic characteristics, but the “non-rivalrous” and “non-exclusive” should not be commons, but public goods, according to the original definition<sup>11</sup>. We will come back to this understanding of public goods, and indeed ‘Digital Public Goods’, in the next section of this report.

In this report, the purpose of the Digital Commons is evoked through the understanding of ‘informational capacities’, which are to be collectively driven. However, the report within which this definition stands does attribute a political and diplomatic purpose to Digital Commons, interesting in the context of state and surveillance capitalism of closed digital platforms. The title of this report is “Toward a sovereign digital infrastructure of commons”. Indeed, the Digital Commons (in this case principally meaning software and data, as hardware and contents are excluded) are presented as infrastructure to achieve sovereignty in the digital realm<sup>12</sup>.

This same Working Group developed a shorter definition which puts an emphasis on maintenance and governance:

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*Digital Commons are non-rivalrous and non-exclusive digital resources defined by shared production, maintenance and governance.*<sup>13</sup>

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The second institutional and policy oriented definition is the Digital Commons European Digital Infrastructure Consortium (hereafter DC EDIC). During the process of applying to the European Commission, the EDIC produced the following definition of Digital Commons:

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*Digital Commons are digital resources which are defined by distributed and communal production, ownership and governance. The governance includes access and sharing rules to ensure the development and sustainability of the resource and the community against exclusive use, exclusive profit or value extraction. [23]*

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This second definition is clearly derived from the first one, several Member States being the same. However, the governance is better defined, and its purpose aligns with those of other commons (development and sustainability of the resource and of the community). There is also a reference to the first definitions (by Benkler and by Fuster Morell) as means of opposition to exclusive use, profit-making, or value extraction.

The second part of this definition mentions the purpose (digital rights and self-determined use

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<sup>11</sup> The binary aspect of the rivalry and exclusivity (“non-”) is likely an effort of simplification, but introduces confusion as rivalry and exclusivity are not entirely non-existent, even in the digital realm. This is the reason why we prefer, with Ostrom & Hess, to use “low” and “high” rather than binary operators.

<sup>12</sup> Sovereignty and digital sovereignty are complex notions that are not central in this report. However, the recent report, by partners of the NGI Commons consortium “Mapping of Digital Commons Policies”, explores the link between public support for Digital Commons and different perceptions or facets of digital sovereignty.

<sup>13</sup> [https://ec.europa.eu/commission/presscorner/detail/e%20n/ip\\_22\\_3898](https://ec.europa.eu/commission/presscorner/detail/e%20n/ip_22_3898)

of the digital technologies) for 3 categories of actors (individuals, industry and government). The autonomy that Digital Commons aims to contribute to the self-determination and the self-sufficiency of these three actors, which is close to the definition of digital sovereignty as used by the German administration (See for example [24]). Openness is here not directly mentioned (although implied in the distributed ownership and the opposition to exclusive use) as the focus is not put on the resource but on the human organisation around it. This last and more recent definition has been retained to characterize what is meant in this report by Digital Commons', as it provides a clear definition encompassing the ideas of the previous ones and focussing less on the resource and more on the commoning.

### 1.3.3 Internet Commons

Internet Commons is another concept close to Digital Commons, that also includes hardware infrastructure, e.g. community networks. The Next Generation Internet, or NGI, is an initiative of the European Commission which has been shaping and providing a framework and funding for open internet between 2018 and 2025. As part of its mandate, the initiative has open source software at its core, and the concept of Internet Commons as such is mentioned in this initiative's Call for Proposals.<sup>14</sup>

Beyond this framework, academic works on Internet Commons are much more scarce than research using the terminology of Digital Commons. (For example, by the authors' count, there are 778 instances for "Internet Commons" against 180.000 for "Digital Commons" on Google Scholar). For those authors who chose to use the Internet Commons terminology, the expression designates for the most part Internet communication infrastructure with its physical, logical, and content layers [25–27], including wireless community networks providing access to the Internet [28] and other resources such as domain names [29].

Following on institutional definitions for Digital Commons in the previous section, we can include the mixed definition of NGI Commons as a project:

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*"Digital/Internet Commons are a form of commons involving the distribution and communal ownership of information resources and technology."*

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To conclude this analysis of the definitions of the state of the art, we see that these definitions evolve over time, and gain complexity, from a perspective of openness to new perspectives including the community, the need for collective governance, and means to preserve or obtain digital rights. We argue that the definition of commons which has emerged over time has less and less to do with the intrinsic characteristics of the (not rival, intangible) digital resources, but rather with the purpose of these Digital Commons, which have to do with digital rights, self-determination and self-sufficiency. In these definitions, openness is a condition that is important (sometimes considered necessary) but is not enough to define Digital Commons, and therefore they cannot be considered synonymous with FLOSS or open source licensing.

These definitions provided a bit more context to see what the characteristics of Digital Commons are, in the literature and in official policy recommendations to develop and support Digital Commons. However, this is not the only concept relating to open digital resources: we showed that Digital Commons and Internet Commons are not entirely identical to Free and Open Source, and the Digital Public Goods seem to be another approach to this question. The next section attempts to question these three notions together, in order to try and see how they overlap and where they do not.

### 1.3.4 Free, Libre and Open Source Software

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<sup>14</sup> <https://www.horizon-europe.gouv.fr/next-generation-internet-fund-ria-32389>

Free and open source is well-established and well-understood. The initial conception of 'Free Software' was once again conceptualised and operationalised in opposition to the overreach of copyright, this time in the field of software, in order to enable free access, modification, and sharing of the source code for software under the same conditions. Richard Stallman and Eben Moglen are the figures of this first idea. Stallman, a computer scientist, developed a system that he wanted to share (GNU for "GNU's Not Unix), while Moglen, a lawyer, developed the first free licence (called GNU General Public Licence, GNU GPL, or GPL) in 1989.

In the understanding pioneered by Stallman, Moglen, Free Software is characterised by four freedoms:

- "The freedom to run the program as you wish, for any purpose (freedom 0).
- The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code (that is the code written and readable by humans to produce software) is a precondition for this.
- The freedom to redistribute copies so you can help others (freedom 2).
- The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this." [34]

The free software movement is motivated by a vision of technologies and of freedom that has multiplied over the years. Sociology shows that there is an ethos of free software [30,31]. However, this ethos should not be wrongly perceived as against the market; selling software or selling products is clearly permitted by the licences and belongs to this philosophy, as long as the four freedoms are respected. "Free" must therefore be understood as in "free speech" not "free beer", to quote Richard Stallman. This is the reason why the French word "Libre" (free as in freedom) is often added to constitute the Free Libre Open Source Software (FLOSS).

The Open Source movement has similar principles. The movement as we now know it was brought into existence and mainly structured by the Open Source Initiative (OSI). Beginning in the mid 1990s, the OSI produced a definition of open source, with guidelines for acceptable licences. The initiative validates the compatibility of the licences with their definition, which includes, among other, the following criteria

- "The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources.
- The program must include source code, and must allow distribution in source code as well as compiled form.
- The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.
- The license must not discriminate against any person or group of persons.
- The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research. [32]

This movement has sometimes been accused of focusing too much on the technical side of this movement (e.g. opening the source code), or focusing on efficiency [33] rather than on the four freedoms [34]. Most of the open source licences are in fact recognised by the two movements and most of the software licences recognised by these movements are compatible with each other. In this report, we chose to use FLOSS to describe the software itself. The Free and Open Source movement as such has then spread to other resources, like open data and databases, open hardware, open knowledge, (or contents) and more recently open source

AI. For each resource, there are multiple licences, allowing certain usages or imposing restrictions.

Open source software has been studied as a commons, applying Ostrom instruments. This has been done in the book *Internet Success: A Study of Open Source Software Commons* [35]

The common ground to the Free Software and open source movements that is important for comparison in this context is that they define licences, which are copyright contracts, turning upside down the initial aim of such contracts and granting rights to the users to access the source code and to use the software (and forbidding those same users from sharing the source code or preventing use or reuse of the software and the source code). In both cases, the movements rely on copyright in order to enforce sharing but no other rule is expected or required to organise contributions, maintenance, diversity, equity and inclusion. This also extends to the following licences applying on open hardware, open data, etc.

This assumption that the community will self-manage and self-organise has of course been challenged in many projects, where several rules were written down in codes of conduct or charters, in order to organise the way the community works, arrange responsibilities in the projects, etc. It is however not always the case and is in no way required to be part of the free and open source movements. Even worse, the strict application of openness is sometimes evoked to justify the status quo and oppose other forms of licences, adding restriction in the name of ethics or equity [36,37].

### 1.3.5 Digital Public Goods and Digital Public Infrastructure

Digital Public Goods (DPGs), the last related concept, has been developed as a policy concept in the last decade with support from the United Nations.<sup>15</sup> Since the beginning, this movement has had the objective of adding purpose to digital development, often just called “digital transformation for development (DX4D)” [38] or; that is to make sure that technology used for development is compatible with the general objectives of the UN.

The launch of the Digital Public Good Alliance (DPGA) in 2018 integrated the recently formalised Sustainable Development Goals (SDGs) to the scope of DPGs. These goals are to provide “a shared blueprint for peace and prosperity for people and the planet, now and into the future.” [39]. In the understanding of the UN and the DPGA, Digital Public Goods are defined as:

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*Open source software, open data, open AI models, open standards and open content that adhere to privacy and other applicable laws and best practices, do no harm, and help attain the SDGs. [40]*

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This concept builds on Samuelson’s partition of the goods, but also draws from Ostrom’s work (which was also concerned with development).

In other words, DPG are, in a way, open source with SDG relevance and other values – like privacy, standardisation, and do-no-harm – attached with the aim of making these DPGs useful in international development cooperation. To reduce it to its most basic elements, DPGs are a sort-of “open source plus”, as Liv Marte Nordhaug, CEO of the DPGA, often says.

This concept contributes to reiterating that openness isn’t enough in itself to achieve certain goals (here, sustainable development goals). With the aim of operationalising the DPG concept, the DPGA has produced a standard and a registry of standardised projects, to clearly define and display projects that comply with the standard. This standard relies on nine criteria

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<sup>15</sup> This history was already briefly summarised in another report from the NGI Commons consortium: see “Mapping Digital Commons policies”, pp. 83-84

summarised below.

1. Relevance to Sustainable Development Goals
2. Use of Approved Open Licenses<sup>16</sup>
3. Clear Ownership
4. Platform Independence
5. Documentation
6. Mechanism for Extracting Data (with exception of the personally identifiable information)
7. Adherence to Privacy and Applicable Laws
8. Adherence to Standards & Best Practices
9. Do No Harm by Design
  - 9.a. Data Privacy & Security
  - 9.b. Inappropriate & Illegal Content
  - 9.c. Protection from Harassment [41]

These principles structure the conception of DPGs and do not mention who should be in charge of the governance, or who should have the ownership of the project. The third principle only mentions that there should be a clear ownership. As mentioned above, the governance is central to commons, and in the last definitions of Digital Commons. If some of the purposes of DPGs can meet those of some Digital Commons, we can safely assume that these two concepts are not interchangeable.

Moreover, several limits have been addressed to the concept of DPGs, like the fact that it focuses on a digital resource that should comply with the “do-no-harm” idea in itself, whereas the context within which it is used will inform who could be harmed and how is ignored. The idea that technology could help development goals has also been accused of technological determinism, or at least of being naive about the role of technologies. Lastly, there are critics on the link between the DPGs and the accomplishment of the SDGs. The standard does not really explain how this link will be fulfilled [41].

DPGs therefore embody the idea of ‘open source plus’, which is trying to draw on the principles of openness and to infuse it with SDGs, and has built an ecosystem around it, which is producing standardisation. It is however not synonymous with the Digital Commons as there is little focus on the governance and ownership of the resource.

To conclude this exploration of the concept of Digital Commons based on several definitions by scholars, and more recently in multi-state policy briefs and on a quick comparison with Free and Open source Software movement on the one hand, and Digital Public Goods on the other, we can conclude that Digital Commons have shifted from a conception of the Free and Open movements, which was quite strict, against the extension of copyright to knowledge and digital artefacts, towards a movement oriented more prominently around the role collective action and governance. While it is assumed that some openness of the resource is central to the concept, and that the Digital Commons should provide support in enforcing digital rights or digital sovereignty, those links should be clarified and made explicit. These questions will be further

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<sup>16</sup> There seems to be some strange logic in the distinction between software and contents, as for software, “only OSI approved licenses are accepted”, which means there should be no restriction. For open content collections however, the use of a Creative Commons license is required. and even if “DPGs are encouraged to use a license that allows for both derivatives and commercial reuse [...] or dedicate content to the public domain [...] licenses that do not allow for commercial reuse [...] are also accepted.” [45]

explored in section 4.4.

In the same way, Digital Commons and DPGs do not necessarily overlap, as the first one could ignore SDGs or other parts of the standard criteria and the second could ignore collective governance and shared ownership, which is central to the Digital Commons. However, this section did not mean to artificially separate these movements, whose defendants seem to all aim to work together toward a better digital world, although they don't always align on what "good" they are looking for. There is an interest to keep these three concepts as they rely on different objectives and methods, but they should be better articulated in order to avoid confusion. However, we need to question whether these definitions and comparisons make sense for the actors themselves. This will be done during the rest of this mapping.

DPGs has also been derived into the more recent notion of Digital Public Infrastructure (DPI) and its corollary Public Digital Infrastructure "which aims to foster an ecosystem where Digital Commons and digital public spaces can emerge and thrive"<sup>17</sup>.

The relation between DPI and Digital Commons has also been studied in a G20 brief [42], recommending a Digital Commons "approach to governing DPI can help scale and localise DPI exchanges, increase transparency and accountability, accelerate their impact, reduce governance complexities, data and localisation frictions, and secure community engagement beyond the governments and companies involved."

## 1.4 CASE STUDY METHODOLOGY

This section defines the methodology for studying 14 cases of Digital Commons that should aim to identify their key characteristics and identify better under-the-radar communities, along with improving the knowledge of Digital Commons in general.

This section offers a concise explanation of case study selection. We explain how we used two different approaches to not forget any important digital common in our research, before presenting criteria that have been used to select the case studies among the large number of projects.

### 1.4.1 Contacts and data protection

Most interviewees were contacted via email. Four respondents were contacted via the Matrix protocol, as the NGI Commons project's Digital Commons Community Platform (DCCP) has been established in rooms accessible via this protocol. The first email, which introduced the project and requested interviews, was sent by the partner of the consortium with a better relationship with the interviewee or by CNRS' team by default.

A second email (if the interview request was accepted) was then sent by CNRS to explain the research, the broad category of questions and to request their agreement on an Informed consent form.

The interview took place either online using a CNRS BigBlueButton instance to conduct the interview remotely and record, or offline; in this case, recorded on an offline audio recorder. The interviews have then been transcribed using a local instance of Whisper AI then proof-read and pseudonymised by CNRS' team.

All documents including recordings and full transcripts and potential other personal data have been stored and processed securely, in accordance with the EU's General Data Protection Regulation (GDPR), and the project's Data management plan. The interviews are shared in

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<sup>17</sup> The notion of DPI has been substantially conceptualised by Open Future. Opinions and publications are available at <https://openfuture.eu/our-work/public-digital-infrastructure/> and the evolution of the concept has been studied in <https://openfuture.eu/publication/digital-public-infrastructure-at-a-turning-point/>

Annex 4: Interviews Transcripts, as well as the information sheet and consent form they all read and signed. All the names in the interview and in this report in the quotations have been changed.

Pseudonymisation is considered a good practice for interviews shared as open data. However, given the very specific nature of each project, changing the project names would not have made any sense. Besides, even with pseudonymisation, some elements could help determine the position and sometimes deduce the name of the interviewed person. By no means the interviewees could consider being anonymous. They have been explicitly told so and were allowed to review the transcript to correct, clarify or expand on their thinking.

## 1.4.2 Case Selection

While 23 interviews across 14 case studies are not enough to encompass the full spectrum of Digital Commons in Europe, we aim to at least be able to represent its diversity and take into account the different definitions we found in the literature and the one we used in our proposal. We interviewed 23 respondents working in 17 organisations about 14 projects, and sometimes interviewed more than one person for each case. We combine several approaches to determine what should be included in this list of case studies. Based on definitions in the literature and the objectives of the project, we developed different approaches to aim at a representative perspective of the diversity of the Digital Commons.

### 1.4.2.1 Resource-based approach

The Digital Commons are, by definition, organised around a digital resource. There are a lot of resources that have been – or can be – qualified as Digital Commons. They include software, software components, standards and protocols, open knowledge, open data, contents and open hardware.

Open data includes all forms of datasets and databases, produced by public institutions (public sector information), companies and private individuals organised in a project. Contents describe all contents (texts, sounds, videos, etc.) which are more than data and are often shared and collectively managed. They are different from the platform on which they are shared and in this study, we will only consider them if there is a collective governance (leaving aside the numerous contents shared by individuals under free licences, for example).

Shared physical networks and IT equipment, which can be considered as rivalrous and sometimes even exclusive resources, will also be excluded, as we are not considering tangible commons but only digital, intangible resources. This differs from open hardware, as open hardware is about sharing designs and not the IT infrastructure itself.

### 1.4.2.2 Governance-based approach

As we saw in the first section of this report, commons cannot (and should not) be reduced to an open shared resource. It is necessary to take into account shared governance (which include collective rights of access, production and property for the communities). For this reason, resources that have no clear distributed and communal form of governance –for instance, if they are predominantly managed by a single private or state organisation – have been excluded from this research.

Through this approach, we want to look at communities that organise with a core interest in shared governance and collective property. This goes beyond digital resources which are available under free or open licences without a community and a governance on other dimensions than libre and open access. Two other types of commons have been considered for this approach: platform cooperatives and international organisations like W3C or IETF standard groups.

Platform cooperativism [43,44] is a movement building platforms for people to use, which are governed by the users, producers, and workers of the platform. They offer a similar service to other well-known digital platforms, without the exploitation of the labour and the extraction of the value for profit; they are instead aimed at generating value to serve the commons. They can be presented as alternatives to commercial or public platforms governed by a single entity or fulfill a need which was not covered. In a platform cooperative, the cooperative movement is often more important than the platform itself. In other cases, the platform is not meant to be shared with everybody, but rather to serve those who are in a cooperative. Platforms can be hosting services or data and are included in our scope as a community with a purpose beyond the software.

International organisations like W3C and IETF define standards by using the Request for Comments (RFC) process: someone proposes a new way to do something, that should be more efficient and better for the Internet (for IETF) or the web (for W3C). This suggestion is then improved by feedback from other experts in the field, pointing out the potential issues and shortcomings of the new standard. After some time and the integration of these feedbacks, standards are set and (sometimes) implemented in the software that runs the Internet and the web. Open standards are developed by communities following certain governance and decision-making rules. They were however finally not included in our scope in the proposal.

### 1.4.2.3 Values-based approach

Digital Commons offer a strategic interest to European Union Member States and institutions because they offer sovereign alternatives to state and surveillance capitalism technologies, products, services, and/or applications. This connection between digital and Internet Commons and digital sovereignty was made in the first paper by French Ambassador for Digital Affairs Henri Verdier and the digital diplomacy team at the French Ministry for Europe and Foreign Affairs [21]. The diplomatic and policy argument was reused in the EC Working Team on Digital Commons' report, and is at the core of the NGI Commons project approach.

The choice of case studies is therefore oriented toward Digital Commons alternatives to services provided by very large, non-European companies. What constitutes “values” and alternative systems [45] is not discussed upfront here, as it is later discussed as a research question for desk research to be asked to the communities.

### 1.4.2.4 Diversity criteria

Even if 14 case studies will not be enough to have an extensive overview of Digital Commons in Europe, they help us explore the extent of the field, and precise a typology of Digital Commons and the diversity of the resources and governance models that are encompassed under the concept. As these criteria were not a definitive typology, but ways to ensure the diversity and the representativity of the case studies to give account for the plurality of models which can be embraced by Digital Commons, only those that can be evaluated before any interview and from an outsider perspective have been kept here.

#### 1.4.2.4.1 Type of resource(s)

A single Digital Commons can have multiple resources that are managed in common (e.g. several softwares, software components, contents, data, metadata, etc) or it can be organised around a single resource. Sometimes the common can be organised through software, but its purpose goes beyond the digital realm. When bike delivery workers decide to unite and use their own dispatch software, the way they organise and constitute a commons of the bike-delivery is partially the software, partially the rules around the usage of the platform and their work. However, in order not to get lost studying all commons and forms of self-organisation, we established as a boundary to remain a “Digital Commons” the need for a digital component (most often in this case, a platform software) to be essential in the organisation, and its governance and ownership to be shared.

As a result, the resources on which we will focus will be software, software components (libraries, etc.), data, contents, norms and standards, knowledge, hardware and platform cooperatives.

#### **1.4.2.4.2 Degrees of openness in licencing**

Because the early literature [5,12,46] on Digital Commons was oriented toward guaranteeing open access (making sure the resource is free, as in free speech) and not necessarily reusable and modifiable, there is still confusion between free libre open source and Digital Commons. While enclosure via intellectual property was the most worrying issue at the turn of the century [12] and oriented the advocacy and development of projects around copyright rules regulating access to public domain works, and later voluntary Digital Commons through the creation of private licences – there is now growing concern (and yet still a vivid debate) about the extraction of the value of the commons by large platforms without value sharing among the community or return to the commons. This has been more recently illustrated by the constitution of datasets for large AI models training data from open content [47,48] Therefore, the degree of openness in licensing seems to be a relevant criteria to ensure the variety of projects. This criteria ranges from ‘fully open’, when it is using a very permissive free licence, to ‘strong restrictions’ (when using a custom licence, specifically if it introduces new restrictions) with the spectrum of ‘open under conditions’ between them (for licences that introduce restrictions like Share Alike, freemium models or other restrictions on commercial use).

#### **1.4.2.4.3 Degrees of implication and number of contributors**

Recent security events<sup>18</sup> have brought to light the fact that some Digital Commons, even essential ones at the core of internet infrastructure, can be only maintained by a single person. Others are carried by paid workers around the globe. To represent this diversity (which will also likely be related to the type of resource), such a criteria seems to be accurate. But, the question remains on how to measure this implication. The retained option (because for most of the projects, such a metric exists) is how many different people did contribute to this commons in the month preceding a given date. Because such metrics aren’t actually publicly available, this criteria was finally not used.

#### **1.4.2.4.4 Umbrella organisations existence and durability**

The durability question is an important one for the Digital Commons. Having a structured organisation can, upon first analysis, be relevant to evaluating or determining the degree of maturity of a project. If such an organisation exists, it is a priori a good sign for the long term sustainability of the project. To ensure diversity in maturity and in the business models, it is relevant to have projects that have umbrella organisations (foundations, trusts, enterprises, non-profit or other NGO) and some that do not and are non-legally organised collectives.

#### **1.4.2.4.5 Country of origin**

It can be hard to define the country of origin of many Digital Commons, which are often organised at a global scale. However, the country where the umbrella organisation is incorporated (when it exists), the country where the main contributors are located, or the country where it was founded, could all be labelled as the origin country. The point is to ensure diversity in the Member States and European regions represented, and try to have as many European countries (within the EU or not) represented.

#### **1.4.2.4.6 NGI funding**

Not all projects publicly share the same level of information about their funding sources. Some collectives are transparent when others are not. Therefore, for diversity’s sake, and because of the information we get access to, we selected some projects which did receive funding from

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<sup>18</sup> Gates and Krewer 2023, available at: <https://commons.ngi.eu/2024/04/24/responding-to-xz-utils-can-a-digital-commons-approach-reinforce-oss-security/>

NGI while others did not. We call “indirect funding” some funding that is not clearly linked to the umbrella organisation of a given Digital Commons, but still relates to it (like bridges between two services, or plugins carried by different organisations). For this purpose, some projects classified as receiving NGI funding did receive multiple rounds of funding from the NGI, whereas others did receive it only once.

#### 1.4.2.4.7 Selection of interviewees based on the methodology and criteria

Given the definition of Digital Commons, the different approaches and the diversity criteria we set, we selected 26 cases we wanted to study in order to reach 20. It was expected that some actors will not want or will not be able to take part in the interviews in the proposed timetable. In order to be able to compare between projects, we wanted to interview 2 participants per project. At least one should be involved in the governance, and one in the production of the resource, so we could compare discourses that are similar between projects. However, out of the 26 selected projects, only 12 answered positively to the interview requests. The help of the project officer and NLNet allowed us to reach some of them.

We ended up contacting more than 50 people out of 40 projects in total, while keeping the diversity in the selected actors. Only 23 people from 14 projects answered positively about taking part in an interview and we managed to get two interviews for only 6 projects. The list of the selected projects and the diversity criteria is in Annex 3: List of interviews.

### 1.4.3 Research questions

In order to study these projects that represent such a diverse panel, there was a need to determine the research questions that were guiding this research. Here are the research questions that guided this research:

What are the values associated with Digital Commons? Are they shared among the projects? Are they concretely implemented? If so, at what level?

How do imaginaries about the Internet and free culture influence the possible outcomes in terms of work, tangible infrastructure and business and funding models within the commons?

Are there shared forms of governance among the different types of Digital Commons? How are the rights and obligations divided among users?

The second line of questioning about imaginaries was hard to answer given the diversity of the projects and the people who answered. We were sometimes able to see a few patterns throughout the projects, but we were not able to determine with certainty how they directly influenced the work, infrastructure or business models. This report will therefore concentrate on answering the two other questions and will also have a focus on the sustainability models and the role of the public entities, which did not belong to our initial research questions but occurred to us during the analysis of the interviews.

## 1.5 PRESENTATION OF THE CASE STUDIES

We focused on 14 projects, based on 23 interviews with respondents from 17 organisations. What follows is a short presentation of the 14 projects in alphabetical order. A table summarising the projects with regards to the criteria mentioned in the previous section can be found in annex 3.

**Blender** (<https://blender.org>) is a Dutch foundation created in 2002 with the aim to "get the world's best 3D CG [Computer Graphic] technology in the hands of artists as free/open source software". The foundation is completed by two companies, called Blender Institute, where software gets developed, and Blender Studio, which produces films and games using Blender tools. The Blender software was initially developed in 1995 within two different companies and

was not open source but freely usable. The foundation was founded with the aim of managing the open source project after it was bought to the previous bankrupted company funders. There are today approximately 60 people working in the different organisations of Blender.

**CoopCycle** (<https://coopcycle.org/>) is a French non-profit who acts as a federation of bike logistics messengers created in 2017. They provide services for cooperatives and social economy organisations that work in cycle-logistics. Their main service is their logistics platform, that they develop under a reciprocity licence which they conceived on purpose. Coopcycle is a federation of multiple "cooperatives" (which have multiple legal statuses). There are nine people working for Coopcycle, some of which also work part-time in cooperative or the others.

**Europeana** (<https://pro.europeana.eu/about-us/mission>) is a Dutch foundation, aiming to "empower the cultural heritage sector in its digital transformation". The Europeana Foundation is an independent, non-profit organisation that is a part of the Europeana Initiative. This initiative was launched in 2005 and a first prototype went live in 2008. Europeana is today at the heart of the common European Data Space for cultural heritage, a flagship initiative of the European Union to support the digital transformation of the cultural heritage sector. There are approximately 60 staff members in the foundation. Their work "contributes to an open, knowledgeable and creative society". In order to engage actors, mainly of the heritage and education sectors, the Europeana Network association completes the initiative. This association has no paid staff members, but more than 5000 declared members.

**ForgeFed** (<https://forgefed.org/>) is a federation protocol for software forges and code collaboration tools for the software development lifecycle and ecosystem. This includes repository hosting websites, issue trackers, code review applications, and more. ForgeFed provides a common substrate for people to create interoperable code collaboration websites and applications, as an ActivityPub extension. ActivityPub is an actor-model based protocol for federation of web services and applications. The project was started in 2016 but was properly developed after Microsoft bought Github in 2018, a company providing free hosting of Git repositories for open source projects, and relies today mostly on two independent developers (in Germany and Israel), without having a legal structure.

**Framasoft** (<https://framasoftware.org/>) is a French non-profit association created in 2004 (after 3 years of work without formal organisation) to work in the field of popular education, which aims to "contribute to a society marked by social justice, where digital technology allows human to emancipate themselves, going against the imaginaries of surveillance capitalism". They contribute to public debates around technologies, providing knowledge, hosting and developing services based on free software used by millions of users. They are also working to federate similar initiatives (<https://www.chatons.org/>). They aim to remain a 38 people association, including 11 people on the payroll. Framasoft provides a multi-annual strategy roadmap including new services (the current plan is specifically oriented toward providing knowledge and solutions to non-profits to emancipate from Big Tech's their digital tools). They develop, among other software, Peertube (<https://joinpeertube.org/>), a Youtube federated alternative and Mobilizon (<https://joinmobilizon.org>) a Facebook Event federated alternative. All services are free to use and the budget relies mainly on voluntary donations.

**Frictionless Data** (<https://frictionlessdata.io/>). is "an open source toolkit that brings simplicity to the data experience" It helps with describing, extracting and validating the data. It includes a standard (the Data Package: <https://datapackage.org/>) and different software implementations of it (the most used are the python and R versions). It was initially launched by Open Knowledge Foundation in 2007. Since the end of 2024, the python implementation is mainly maintained by a developer at Multi.coop, a French software and data services cooperative. The R implementation is maintained by a team of researchers at the Belgian Research Institute for Nature and Forest (INBO).

**Gaia-X** (<https://gaia-x.eu/about/>) was established in 2020 as an international non-profit

association under Belgian law, under the impetus of the French and German ministries of industry. The association only gathers private companies representatives. Gaia-X aims to "establish an ecosystem, whereby data is shared and made available in a trustworthy environment", while giving the control back to the users by retaining sovereignty over their data. It aims to become "a federated system linking many cloud service providers and users together in a transparent environment that will drive the European data economy of tomorrow." The association has 32 employees working to fulfill their mission.

**Goteo** is a crowdfunding service that was launched in 2011 by the Platoniq Foundation. Platoniq is a Spanish foundation that "was born with the aim of spreading the right to a free culture and the democratisation of the media." (<https://platoniq.net/en/about-us/>) and today "designs digital participatory processes and facilitates innovative participation methodologies to help to form more democratic societies and organisations, making use of open civic technologies." (<https://platoniq.net/en/home/>). Goteo is not only an open source crowdfunding tool, but also offers specific features. As Platoniq is a foundation, and contrary to other crowdfunding tools, the money is considered a gift to Platoniq Foundation (therefore tax-deductible) which then allows it to make grants to the funded projects. They also provide local governments with "match-funding", which is a civic crowdfunding tool where the funding obtained for a project could be matched with public procurements. There are 13 people working at Platoniq, and 6 are directly working for Goteo.

**Matrix** (<https://matrix.org>) is "an open network for secure, decentralised communication". It is a protocol for communication developed under the umbrella of a Community Interest Company: The Matrix.org Foundation C.I.C, a non-profit registered in the UK in 2018 and hiring directly 5 people. The main contributor to Matrix is New Vector Limited, a for-profit private company created in 2017, developing Element (<https://element.io>), an implementation of the Matrix protocol (client and server) described as "A sovereign and secure communications platform". Although they are independent entities, the company, registered in the UK, was created by the same people who created the Matrix foundation and still provides workforce to the foundation. There are also 3 other companies (in France, in Germany and in the US) owned by the UK entity, summing up to 85 staff members worldwide.

**Mastodon** (<https://joinmastodon.org/>) is a decentralised open source social network. It is a German non-profit company (gGmbH) that is financed entirely through user donations, through grants, but also through sold services. The project was launched in 2016 and integrated into the non-profit company in 2021. A US-based foundation was launched in 2024. Today, approximately 10 people are part of the staff of Mastodon.

**Openwifi** (<https://github.com/open-sdr/Openwifi>) is an open hardware project developing a full-stack Wi-Fi design based on Software Defined Radio (SDR). This project was developed by researchers at IMEC and Ghent University in Belgium, and opened and shared under a free licence from 2020 onwards. It allows researchers and teachers all over the world to improve knowledge on Wi-fi and also support IMEC efforts to develop specific features for the industry.

**Software Heritage** (<https://www.softwareheritage.org/mission/>) is an initiative founded in 2016 whose ambition "is to collect, preserve, and share all software that is publicly available in source code form". This archive can be useful for cultural heritage, industry, researchers and public administrations. It is a hosted foundation (under the Inria Foundation umbrella) supported by UNESCO. 17 people are working to develop and manage this initiative, including staff from Inria, the French National Institute for Research in Digital Science and Technology.

**Tzoumakers** (<https://www.tzoumakers.gr/english/>) is an open lab for communities to cooperatively design and manufacture tools for small-scale agricultural production, in the Epirus region, in the Tzoumerka mountain range in Greece created in 2019. They create open hardware solutions for local needs sharing the knowledge with other similar initiatives worldwide, aiming to realise the ambition of cosmopolitanism. Tzoumakers was created by the P2PLab, a research collective based in Greece and Estonia, and is about to become an

umbrella organisation for multiple initiatives in the mountain area, with support of The High mountain, a local social cooperative.

**ZUM** (Zentrale für Unterrichtsmedien im Internet e.V – <https://www.zum.de/>) is a German non-profit founded in 1997 and dedicated to use the Internet as a learning and teaching aid for all types of schools and for extracurricular educational work in German-speaking countries.). Almost 300 volunteers are collaborating to produce open educational resources (OER), organising exchange of experience and creating online infrastructure and tools for their activities.

## 1.6 METHODOLOGY OF THE INTERVIEWS

Over 50 persons (several per project) were contacted by email, either directly or through the intermediary of members of the consortium and project officers who knew them.

An information sheet describing the project and Data protection informed consent forms were produced in collaboration with CNRS data protection office lawyer working with our research unit, Centre Internet et Société (CIS). The consent form is to be found in Annex 1: Consent Form.

The interviews were semi-conducted. The interview grid can be found in Annex 2: Interview Grid We decided to let the interviewees develop their thoughts and to react to them, rather than having a strict canvas to run the interviews. The aim was double: get a better understanding of the projects and have the interviewees to express their views on the projects using their words to try and perceive the imaginaries at work and the concept they actually used or not in their presentations.

Interviews were led mostly by videoconference, one in face to face. All were recorded and transcribed with Whisper and manually corrected. Pseudonymisation was performed manually.

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## 2 NATURE, BELIEFS AND SHARED UTOPIA OF THE INTERNET AND THE DIGITAL WORLD

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In this section, we attempt to show the conception that the actors have of the Internet, and the role they want to play in its development. We identified several political conceptions, which are sometimes articulated with each other, and sometimes not.

Two are legal, of a political nature, and related to openness (2.1) and sharing, sometimes under certain conditions (2.2), a recent concern compared to the freedom era which had only copyleft and attribution as acceptable restrictions.

Two other desires of contribution are of technical nature, but also with a strong political ethos: the desire to contribute to building or implementing standards and protocols (2.3), and therefore take part of a broader movement, and the wish to contribute to decentralisation (2.4), because of its resilience and geopolitical counter-power potential. Indeed, according to Cory Doctorow's theory "to seize the means of computation", contributing to developing open, standard and interoperable tech is seen as acting for the global good, in a cooperative manner, against enclosures and walled gardens [49].

### 2.1 THE OPENNESS UTOPIA

Digital Commons have sometimes been described as goods under open licences. Most of the projects we studied rely on open licensing for their resources. Some of them also have a discourse on openness and its benefits.

In our interviews, we found that openness is considered by some actors as a way of creating interactions or developing networks. Sharing knowledge is evident and this obvious goal is considered the basis of present and future cooperations. For example:

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*To have similar initiatives all over, both nationally and internationally, where they cooperate, where they exchange resources and knowledge and all that, but not be centrally coordinated and to have a big variety in what they do. But just maintain the basic principles of openness. You know, we do something, we share it, you learn from it, you do something different. That is what we aspire to. (Leo, Tzoumakers)*

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Asked why sharing freely is important, Friedrich, a former teacher still teaching German to refugees, who has been interested in Open Educational resources since the early days, explains that teachers always copy material for the class from the web. Friedrich explains:

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*It's copied from anyone. In classes, it's not a problem. But if my thing is in class, it's now lost then for the public. But if it's open educational resources or if it's public domain, people can duplicate it, can give it to other people freely and without having bad feelings[...]. At last, you can ask, "why will I give it for free when I don't get anything?" I don't get anything directly. Okay, first of all, I get a good feeling. Okay, that's very individual. It's a good feeling. Sometimes I see I also get things for free from other people. You can count it. You can't count it like how much you get for this money and for that money. But it's more an idealistic point of view. And I understand that not all people will do it. But I think if you're using CC BY SA, it's a license which guarantees that your name and your copyright is guaranteed and no one can exploit the thing. Why not do this? (Friedrich, ZUM)*

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In Friedrich's conception, openness reflects a common practice of sharing material among

teachers and taking material from multiple sources (including on the web) to produce class material. Sharing it anew is just bringing it one step further in the logic, and in his opinion, you have nothing to lose. The use of the Creative Commons licences on ZUM allows teachers to share with or without copyleft (meaning the SA, or “share alike” clause, which requires anybody sharing material building upon or using the licenced resource to adopt the same licence, forbidding less restrictive licences or the closing of the derived material). The only clause among Creative Commons options which cannot be used is NC (non-commercial, or preserving commercial uses), because the website runs ads to pay for the server costs and small developments (approximately 3000€ per month). How teachers use the resources in their classroom is not a concern regardless of this clause.

When describing Blender, Luca justifies its openness with a metaphor:

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*[...] openness is a key value and public is a very important value. [...] There is this metaphor that we used in the past: Blender is like a public park<sup>19</sup>. So, it's a park in the middle of a city. Everyone can go in it and everyone can enjoy it. And then there are some people that are doing the maintenance, making sure that things are working, making sure that things are functional, that when people break it or that people are littering things get cleaned up. But if you have an apple on a tree in the park, you can take it. It's just there. And somehow this whole thing works. You can go there at any time. There are no restrictions. (Luca, Blender)*

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Interestingly, Luca uses the metaphor of a public good to explain what the software provides: a place to create, wander around, do whatever you want. He is clearly referring to something that is closer to (digital) public goods than he is assimilating the commons with. Luca observes that

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*So Blender is a digital common, just like when you open a tap and water comes out, you go on the internet on Blender.org, click download and you have Blender. No advertising, no login, no registration required, no nothing. You have a fully functional piece of software that can help you to sustain yourself. And to me, that's the definition of a common. You can build your business on top of it. You can use it as an ingredient for making your recipe that then you sell on the market. And I think we fulfill that because you don't have to give anything back. You just have it. It's just part of it. Or in another way, it's part of the infrastructure. It's one of those pieces that you build infrastructure upon. (Luca, Blender)*

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This is even more precise; Luca is assimilating the software to an infrastructure, therefore public, so it is fair and everyone can use it for their own needs. Of course, the production of this discourse cannot be separated from the interest Luca currently has for the EU discussions around financing software. So, for Luca, Digital Commons means basically all three the concepts we previously discussed in Luca's mind: open, commons and public (infrastructure).

However, if it's publicly available, it isn't for sale, in the case of Blender, whether you are giving money or not, you don't get to have special treatment, they do not plan to develop freemium options to differentiate products among audiences. Luca goes on:

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*When it comes to the software, we are very, very strict about the fact that we want it to be free for everyone forever in the same way. There is no preferential special build,*

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<sup>19</sup> Note of the authors: One of the original meanings of a commons, in the United States of America, is exactly a public park.

*special version of Blender that you can have. (Luca, Blender)*

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This position can be surprising, given that Blender is entirely private, privately funded — and that Luca elsewhere regrets not being able to get more public money for this project. Such a position is more likely expected from David, at Europeana, whose budget is almost exclusively paid with European public money, and who is working for an organisation mainly collaborating with public heritage institutions.

*[...] we think we're public infrastructure primarily. We're there for the public good. I don't want to build any unnecessary barriers. We really want to manage this as a commons where people contribute to and take from (David, Europeana)*

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Multiple actors reminded us of the catchphrase “public money: public code” although some of them slightly rephrased it. In the case of Europeana, openness and public domain also overlap, which reflects the legal choices they operated to license not only public domain works digitalised versions but also curated metadata under public domain conditions. In a discussion on copyright protected works in Europeana’s catalogue, he re-stated a strong position on openness and public domain:

*We have a strong opinion about what's public domain. When it was in the public domain in the physical sphere, it should remain in the public sphere, in the digital domain, very clear. Unless there is a creative act involved, which is very solemnly the case. It's really about the first case. The definition of cultural heritage is very vague. It's certainly not 100% coinciding with copyright loss 70 years after the death of the maker, which is very old. (David, Europeana)*

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Most of our interviewees share their content and think openness is necessary. Either because they think of themselves as infrastructure, public domain, public good, or because they adhere to the ethics they associate with openness. However, there are also other collectives that question openness as an absolute, while being attached to the principles mentioned above, and which consider adding some limitations to this absolute.

## 2.2 SHARING, WITH CONDITIONS

Sharing is part of the culture of these actors, but there are conditions, fears, or worries related to releasing their software product under full openness conditions.

For example, New Vector – the company that both created the protocol Matrix and one of its implementations (very likely the most used one), Element – had to change the license of their product, because another company (large, commercial, with activities related to defense) re-used their codebase to provide a closed source solution (which was allowed by the previous Apache licence). Vincent, noted as such, stating that:

*Thales took the party of forking the totality of our repos, that is server and client sides, improving it their way, or at least, bringing some modifications and to sell it as a commercial product, under the name of Citadel, which is entirely private. [...] It has never been open source. [...] This is an example of a competitor, which, therefore, could offer the same thing as we did. That is why Element considers it useful to keep some functionalities, mainly intended for the private sector, private. The AGPL licence has produced changes. It's really to force companies who would want to commercially exploit [our codebase to be] forced to share their changes in open source, or to contact Element*

*for an alternative license. (Vincent, Element)*

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The mentioned AGPL licence is very similar to the GPL licence, but adds one important condition for online services: on top of requiring to respect the licence if you share modified versions of the software, it adds a provision requiring that the source code of modified versions of the software is shared with those who use the software in a web service. This change of licence is a pragmatic move to be able to keep the client and server code open, and it does not affect the Matrix specification itself. On top of this licence change, New Vector developed a few bots to help manage the rooms for administrators of large companies or administrations. They are not open source at all, providing some form of competitive advantage to New Vectors over other companies selling services based on the software they developed.

This concern is also shared by Jonas, who works on a ForgeFed implementation. Jonas shares his feelings as such, saying that:

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*I'm a bit nervous of acting as a research department of Microsoft here at this point, but my understanding is that Microsoft could look at the ForgeFed protocol the same way Meta looks at ActivityPub. And I don't want to go into details right now. Microsoft has enough money to spend on their own research department. (Jonas, Forgefed)*

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The concern here is really the free rider – as defined in the commons theory – and a reason for which commons are not equivalent to full open access [1] that is, some actors benefiting from the resource without contributing to its development and maintenance.

'Free riding' understood as benefiting from a resource without proper right to do so (or without contributing back in the digital realm) was sometimes dismissed in the case of intangible Commons, pretending that since the resource was not rival, there could not be any free riders, but we see in this case that the markets for online services and solutions is actually rival, and that research and development cost money and time to people, who do not want to give free capital to competitors without some form of return (hence the AGPL licence). For similar reasons, Openwifi decided to publish their improvement to the Openwifi platform with approximately two years delay to achieve a maturity level in the solution, because they wanted to keep the competitive advantage in the two fields they are active in: research and providing solutions to the industry.

In both cases, the actors interviewed feel like having an approximate two year advantage (the exact length is not yet defined) is allowing them to do research and publish papers and to offer early access to solutions to enterprises before others do. This system, similar to some extent to the embargo practice in journal publishing (closed access for several months or a few years, then open access) is also born from the consideration of the fact that other researchers in the field used their model but didn't massively contribute to it, although it is open.

With this delay, some researchers waiting to deposit or some national legal mandates requiring deposit of articles in open repositories, do so after a period of six months to two years. This is supposed to give a time-limited comparative advantage to the research team to exploit their data and publish first, before others may build upon the data they offered, or to the commercial academic publisher to sell the most profitable subscriptions, to the supposedly most beneficial markets such as libraries, whose patrons will not wait for the content to age.

Commenting on this matter, Linda from Openwifi noted that;

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*A couple of years ago, the best paper award at Infocom, which is the top conference in our domain, was based on Openwifi. And then, you realize that the platform is powerful, but it was a bit double because we said, "If we had more time to focus on the research,*

*we could also produce more research papers". But in the end, we are building enablers and others are benefiting from our enablers. (Linda, Openwifi)*

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In addition to not fully open licenses and embargos, new licensing models also are considered in order to embed reciprocity as a condition within the license. This is for example the case of Coopcycle.

Coopcycle is a cooperative of workers cooperatives; though technically and administratively, and in their discourse, they tend more and more to be a federation. The Coopcycle federation as such provides a software platform for logistics, and more precisely last kilometre bike delivery. This software has a specific licence called coopyleft (with the two O's like coop), which is a reciprocity licence [50–52]. The main idea of this license is that the rights the licence grants can only be exercised by people working in a cooperative. For non cooperative workers, the copyright is held by the owner of the software. The licence is not free (in the sense of the Open Source Initiative, a body which validates open source licenses) and quite interesting, in the case of Coopcycle, they are creating their own exception, as most of the local cooperatives are actually non-profit (because they are easier to create and manage) and the specificities of the licence they created isn't common knowledge among the members.

While imperfect, the reciprocity licence of Coopcycle tries to question the asymmetry that was also pointed out by above mentioned actors; namely, that open licences set the same rule for all actors including worldwide, including large US multinational companies and single actors, in a belief that this could be a fair fight. Adriana, working at the Open Knowledge Foundation (OKFN) sums up the dilemma they are currently facing:

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*[...] so when Juliana joined the foundation, she decided we had to do something about the Open Definition, which had not been touched for 15 years. Which is not bad I mean, a standard is there not to be touched in principle [...] Now things are slightly different in the sense that the web has evolved and you have to take into consideration different things at the moment. For instance, a lot of discussions have happened around "not for harm", or these kind of criteria that should also be part of how we define open or, better, how we want to define open. There was also a lot of concern around extractivism, for example, and how can that be taken into consideration as well? [...] But the thing is, it's very hard to modify something like the Open Definition, to integrate things without them being a limitation. Modifying something like the Open Definition would require a ton of other consultations with stakeholders, and we want to do things together with the community, but also trying to not introduce too many limitations. Also considering that something like the Open Definition is not binding, you know, you cannot go and tell people you're not respecting the Open Definition. I'll give you a fine, you see what I mean? So to summarise, we want to update it but we haven't found a consensus yet on how we're gonna do that. I am not even speaking about the changes itself, but how we are going to proceed in terms of updating it. (Adriana, Open Knowledge Foundation — Frictionless Data)*

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This long citation shows how openness is in tension in the communities today. It is a highly sensitive topic because it took more than 20 years to get the recognition that open licensing is valid and a right way of sharing some digital resources. However, as the world has evolved and the former enemies of free, libre and open knowledge and resources are now the main contributors, two interpretations confront one another.

One interpretation is based on the principle that the four freedoms and openness are a goal as such, and this is almost completed, as open source is now in most of the consumer devices that include electronics nowadays. The other interpretation is that freeing the software was mainly a means to gain control and sovereignty over the digital realm, and that open core

products that serve digital extractivism or contribute to do people harm shouldn't be acceptable. We also observe that there is a market issue because some competitors (including the biggest extractive actors) could reuse your work and better market your innovation, in large part thanks to the human and financial resources and competitive advantage they have.

Therefore, we found that many actors of the Digital and Internet commons developed legal hacks or strategies (e.g. around licensing, timing, reciprocity and very likely others) in order to prevent unfair competition to act as free riders. Even so, openness is believed to be something important by all actors, even if many of them agree to put some restrictions and not assert that the four freedoms are the only acceptable option.

## 2.3 BUILDING STANDARDS AND PROTOCOLS

The digital realm is ruled by technical standards. Many of the interviewed actors are working toward building standards or implementing them in their product. As standards are supposed to be finite and provide information on how to implement a solution in multiple other software or hardware, so it has to be shared and accessible to all.

For starters, the Matrix team is defining an open standard for communication. In order to do so, they developed the Matrix Specification Changes (MSCs). They chose not to go for a standardisation through a formal standardisation body like W3C, but borrowed the methodology from multiple sources. As Andrew from Matrix noted:

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*[...] the Matrix spec changes are very similar to RFCs. They're intended to be a little bit lighter weight. One of our concerns with a lot of standard processes is that they tend to be very formal and very heavyweight. With a lot of bureaucracy and that sort of stuff, we want to remove a lot of that and just try and push the protocol to be as fast as it possibly can be instead of getting stuck behind paperwork almost. [...] It's very similar to how the Rust ecosystem operates on their changes. (Andrew, Matrix)*

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Managing a standard that has the aim to become used across multiple softwares, for multiple use requires coordination, and a set of rules for validation. In this area, it is easier to work with the people that are actually implementing it rather than opening it to the outside. That is the reason why, as Jonas from ForgeFed notes, a "standard committee" which however is "not a formal organisation" (Jonas, Forgefed) has been established between people actually working on this across the different open source forge softwares. Jonas notes the reasons for this as follows:

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*[...] it takes time because it's a long process. You have to rethink established procedures on how to do things because federation has a different mind that makes different assumptions, and therefore it's a research project. (Jonas, Forgefed)*

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Mastodon faces a similar problem which is threefold. Firstly, the ActivityPub working group at W3C stopped working after they released the first version, which is far from perfect. Moreover, since the first standard version, new needs have emerged. Therefore an alternative standardisation method has been put into place, the Fediverse Enhancement Proposal (FEP). Alexandre explains:

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*I think there is a repository, it is on Codeberg, and a forum where people say "Here I suggest this FEP number X, which implements... for example, we work on the management of quote posts on ActivityPub. And you post a pull request on the repository, it is merged, and a thread is opened on the forum. People talk. And at some*

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*point, it moves from “draft” to “final” when there are no more people coming to say they disagree. And then, maybe implementors are going to implement them... or not. We got a list of the FEP we implemented on Mastodon. But there are, maybe, 45 FEP, of different levels of implementation, of usefulness, of practicality, etc. Maybe we implemented 10 of them. We regularly contribute to it. When we make additions to ActivityPub, we send a FEP, but there is no core, no decision, no committee. There is a list of published FEP, their status, and that’s it (Alexandre, Mastodon)*

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The situation recently improved with the renewal of the W3C Working Group, which tries, after six years of inactivity, to take this work into consideration. With some clash in terms of method, as W3C processes are formalised, and FEP are not.

Secondly, in this process Mastodon is not an actor as any other in this field: they were one of the first implementations of ActivityPub and are by far the biggest actor in the ActivityPub implementing software today (with approximately 1 million active users). Therefore, the way Mastodon implements something becomes a de facto standard for other software whose developers want to be compatible with.

Thirdly, and because FEP are not a formalised procedure and some FEP can be stuck as “draft” for quite some time, and because the choices made by Mastodon have such a large influence on the other players, the developers have now created an informal group of close reviewers for potential FEP. As Alexandre notes:

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*I try to bring some big collaboration here. Now we have a small group of implementers we consult on our FEP drafts in advance, and we decided to go for private calls for comments because a lot of people discuss ActivityPub norms who never implemented ActivityPub. They are research subjects, protocol purity, things like that. Therefore we now tend to discuss ActivityPub with people who actually implement ActivityPub because at some point it is going to be in software. That is why we created a closed group, with the idea that if the invited people have no more comments, that everybody says that it looks ok, we have less misgivings about implementing it, even if the FEP is still subject to discussions (Alexandre, Mastodon)*

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The relationship between Digital Commons and standards is therefore complex. But it is interesting to notice that people at Mastodon, for example – even when they are dominant in their sector (here ActivityPub implementing software) – tend to care about contributing to the standard and not imposing their view on it when they could do it. Separating the protocols and the implementation is actually something that occurs quite frequently in our set of interviews.

Similarly, Frictionless Data offers a standard (the Data Package) and different software implementations to work with it, and Europeana developed a standard with the digital heritage actors to share cultural heritage data. In both cases, the assessment of the quality of the data and its normalisation are an important part of the standards.

On this front, Openwifi is specific, as they are implementing a standard (the Wi-Fi, or IEEE 802.11 as defined by IEEE, the Institute of Electrical and Electronics Engineers). In their case, the point is not only to fully support the protocol and be fully compatible with off the shelf chips, but also research potential improvements in specific areas, while remaining compliant with the standard. After assessing the market and having clarified the biggest actors are oriented towards the high-volume consumer market with a main focus on speed<sup>20</sup>. Commercial chipsets

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<sup>20</sup> Wi-Fi solutions for the consumer market (i.e. Wi-Fi chips in smartphones, laptops and other appliances) have to be certified by the Wi-Fi alliance, meaning that chipsets have to include a lot of mandatory features specified by the Wi-Fi standard in many generations and releases (not only the latest Wi-Fi generation Wi-Fi 6, but also older 802.11 a/b/g, Wi-Fi4 and Wi-Fi5 generations). Commercial chipsets are therefore very complex and further mainly focus on features that can maximize speed and power efficiency, the main priority for chips in battery-powered devices

are closed boxes with a very poor driver offering limited configuration options and exposing no or limited measurements and statistics<sup>21</sup>. It is impossible for a research team to compete with big chip vendors targeting complex, but low-cost chips for mass consumer markets. However, there is a lot of potential for high-end small-volume professional markets targeting private deployments. In such deployment there is no need to be backwards compatible with all previous Wi-Fi generations, only performance (in particular low latency and reliability) matters. The Openwifi research team therefore decided to focus on low latency, and more precisely bounded latency<sup>22</sup>. Bounded latency means traffic traversing a network is delivered within a specified maximum time. This is an interesting research challenge, which cannot yet be realized with the most recent commercial Wi-Fi 6 and 5G technologies.

Moreover, having an open implementation of the Wi-Fi standard means having a platform where you can make some changes to parameters of this W-Fii connection, which is usually very limited. As Linda puts it:

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*If you buy a commercial Wi-Fi card, it's a black box and the driver is very poor. The most appealing and novel feature in Wi-Fi 6, is OFDMA<sup>23</sup>, a physical layer feature. Also this feature is a blackbox. The only thing you can do if you buy a commercial chip... you have very limited configuration options, e.g., just enable or disable the OFDMA feature. You don't know what's happening internally during communication when the feature is enabled. But with Openwifi an open and rich driver is offered, which gives you access to all possible parameters of a feature allowing to control low level resources, how you allocate the RUs (the resource units) in a OFDMA transmission. Thanks to Openwifi's open chip design and its rich driver, we can offer specialized features and fine-grained control. (Linda, Openwifi)*

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Developing open standards is clearly necessary for them to be largely adopted. Separating the standard from its main implementation seems also to be quite important for broader use and in order for new players to successfully jump in and contribute to the standard itself. But, what Openwifi shows is also that actual open source implementation of open standards is necessary for researchers and technologists to understand what they are doing and to innovate by increasing the control options for wireless connections, compatible with off the shelf chips.

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*In a similar fashion, the Matrix protocol has been used for the first working prototype of interconnection with WhatsApp with end-to-end encryption<sup>24</sup>. This again demonstrates how powerful an existing software can be used to demonstrate feasibility (here of the enforcement of the interoperability of large messaging systems in the Digital Market Act — or DMA). In this case, this work was actually a proof of concept in parallel of the effort of standardisation as Matrix' teams used the API provided by WhatsApp and did not use the MLS (Messaging Layer Security) standard being developed, that should "act as a*

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targeting typical Internet applications, while other features that are highly attractive for achieving lower latency, higher reliability are not a priority.

<sup>21</sup> This means that commercial chipset do not offer the configuration flexibility and do not expose the right internal statistics and fine-grained measurements, needed in small-volume high-end professional applications. Such applications need more guarantees on latency and reliability and demand customizations to meet challenging application requirements.

<sup>22</sup> Latency in this context means the delay in information transmission.

<sup>23</sup> For "orthogonal frequency-division multiple access" a technology introduced in Wi-fi-6 allowing lower latency especially when many devices are connected to the Wi-fi.

<sup>24</sup> End-to-end encryption means that the message is encrypted on one device and decrypted on the other, without being readable throughout its journey, including (here) by Matrix' or WhatsApp's servers.

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*proxy between Matrix and Whatsapp at the end (Andrew, Matrix)”*

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In this way, our interviews showed how central contributing to standards and protocol was in the different cases we study, expanding the vision of the Digital Commons not only to the implementation but to the standard themselves. There is a very likely explanation: as we focus on open projects, many of which are in the field of (machine to machine or human to human) communication. It is of course less important for end-user products that do not focus on communication. Beyond allowing interoperability between open source solutions, it also allows the actors to modify and tinker with other (partially) closed products, do research and development, and to produce innovation and knowledge for all.

## 2.4 DECENTRALISATION BY NATURE?

The Internet is a sum of protocols allowing to interconnect different networks (inter-networks). This allows this global network to be decentralised.

Some of the actors interviewed believe that this decentralisation should even be brought to a-centralisation (from an infrastructure with multiple critical nodes, to an infrastructure where all nodes are equal). This is the ideal of its peer-to-peer (P2P) model, which includes the technical aspects – and the relating negotiations between technical feasibility and political motives or objectives, and the governance – whose decentralisation can be more or less centralised, independently from the technical aspects [53]. Decentralisation comes also with the technical hope that the system shall be scalable, and with the political expectation that it cannot be closed or controlled and source of enclosures or walled gardens.

Interestingly, decentralisation was a topic that many of our interviewees have thought about, and to which they gave different complex answers, far from a simple opposition between centralised and decentralised. Decentralisation was brought up, frequently for resilience reasons. One of them is resilience faced with the geopolitical situation, the climate change and the catastrophes that will result from it. Says Jonas from ForgeFed:

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*So if you're investing in a large data center and it goes up in flames, like with OVH in France, good luck with your services. If you have smaller things, you will have the benefit, which was part of the original Internet design with DARPA. Like you have several nodes that can route around each other if something goes down. So I think we will eventually move to something more decentralised because that's fitting to a changing environment. (Jonas, Forgefed)*

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Here, the argument is twofold: (1) centralisation is creating single points of failures, and (2) it must therefore be avoided. The fact that many actors are in the United States (at the time the US presidential campaign was reaching its end) and that someone could decide from one day to the other that some actors can't sell services abroad seemed very plausible to Jonas.

In addition to resilience, the second argument expressed here also was implied in multiple interviews, e.g. that the original Internet was designed this way, and this is a good way. Because it works, because it has scaled, this should remain the model. In this view, centralisation is bad because it goes against how the Internet was designed. Of course it also brings power issues. For example, Camille at Framasoft speaks about how the CHATONS initiative aimed to decentralise the non-profit, rather than technology itself, so that Framasoft doesn't grow into a new monopolist actor, however conceding that for other purposes – like communication, centralisation and the branding logic<sup>25</sup> – is really efficient so they decided to

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<sup>25</sup> Every service offered by Framasoft starts with “frama—”, i.e. framapad, framadate, or more recently framamia for an IA based transcription service

keep it.

Decentralisation is also invoked for control, e.g. over the data, over the services serving the data, etc. In this view, one should not have to trust someone with how they run your service, but run it on-premise. Therefore, even an organisation like Europeana – which today centralises the cultural data from over 4,000 museums, galleries, archives and libraries all over Europe – express how decentralisation should become a goal of its Foundation:

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*[...] currently, if I would black and white this, I would say the current model still feels like an institution has to do things, hard work to get the data into a place which is now central, which is outside of their remit. Why do that? Ten years ago, that made sense. There was some money to do it. That's not a model that will scale in the long-term future. In the long-term future, as anyone would, as a museum or a library or whatever, I'm responsible for my data. I'm the stewards of the data of my community. So if I were a director of an institution, I would say, yes, I want to make that data available widely. Come find it on my APIs. We're using the standards of the data space. We're part of that protocol. Do with it what you like (David, Europeana)*

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Of course, this also fits the narrative shift that occurred a few years ago when Europeana applied to build the first cultural heritage data space, in accordance with the 2020 strategy for data<sup>26</sup>. But decentralisation also means control on the data, as Andrew explains the importance of: "... being able to have the opportunity to actually truly own your data and have access to it and decide where it goes is very important." (Andrew, Matrix)

The resilience can also include resilience of a standard to the death of the organisation that originated it. For example, when Hector, working on the technical aspects of Gaia-X, explains that Gaia-X is still too centralised, and is asked why it should change, he explains:

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*I wanted to avoid programmed obsolescence of the ecosystem. That is, that if some day, for some reason, the non-profit were to disappear [...]. And if the project were to stop, I wanted the ecosystem implemented by the members not to be discarded and to stay alive even if the legal entity was to disappear. (Hector, Gaia-X)*

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For Hector, decentralisation is a means for the technical systems to live longer than the organisation that originated it. Given the uncertainty and some of the difficulties met during the first phase of the project, the de facto standard that Gaia-X produces in order to constitute dataspace, has no 'center'. When asked to explain why this was so important, he mentions another dataspace and explains the centralisation with an analogy of the nice or bad tyrant, who would have the right to let a partner in or get rid of it. He notes that:

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*It could happen if governance is centralised. I wanted to avoid this kind of system. [...] We often speak about lock-in [...] but there is also lock-out that is forbidding other actors to join the ecosystem. (Hector, Gaia-X)*

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In this view, centralisation confers power, which then must be trusted to do good. Decentralisation comes with the hope that reducing the central points should help reduce centralisation in the decision making process. However, this is not a naive perception of technique governing collective action, as Hector later explains while speaking of inequity in contracting between big actors and small ones:

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<sup>26</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0066> (last visited on the 26th of February 2025)

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*[...] and here you realise there is nothing technical about it. It is not YAML, XML, JSON<sup>27</sup>. [...] with Gaia-X, I quickly understood that this is not a technical project (Hector, Gaia-X).*

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Decentralisation is a goal in itself but can't substitute for the decisions, the discussions, or the governance of a project. It could help a tyrant to centralise power but shouldn't be considered an end, specifically when it comes to governance. Some limits of decentralisation are also pointed out by Alessandro from Software Heritage. When asked about the centralisation of Software Heritage (which is not a decentralised system) and why they did not make it a more centralised system, he explains that these questions were asked at the beginning of the project, in terms of resilience, and that the distributed approach was discarded. He says that:

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*[...] many people push for this, because they are afraid of centralisation. They say that centralisation is a risk because there is someone controlling everything, etc. But there is another approach [...] We said "centralise and replicate". Centralise means a central node but the data is replicated in many places. Why a central node and not a distributed and federated thing? If you look closely, there are not only files. There is the whole internal and deduplicated structure of the graph. And technically we did not have the time nor the energy, nor the capacity to understand whether it was even possible to do something distributed [...] I am a theoretical computer scientist. It is way way more complicated to have distributed things to run properly than centralised things (Alessandro, Software Heritage).*

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This complexity of decentralised systems is not only an argument of those who chose not to go in this direction: Mastodon's interviewees both describe the service as an 'open source decentralised social network' and as an argument to avoid the owner of a social network to influence the public discourse, the elections, and so on. They are entirely convinced that this is a good system, yet they also concede some easy thing become quite complicated, once you take the decentralisation (and digital rights aspects) into account, for example in the case of 'Starter Packs' (a list of accounts you could all follow on a given subject, created by users). They note that:

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*Yes, Starter Packs are cool. But then, it needs to be federated. There needs to be moderation functionality. You shouldn't be able to use it for harassment. You need people to be able to block it, to be removed from a Starter Pack. So we start with an idea of "this is a list of accounts that we allow people to create [...] and that is over". In reality this has a huge scope and real technical federation problems, server synchronisation, etc. which are complicated. Many people said "Starter Packs are a three day job". We got a prototype in three days, then we discovered the complexity behind it, that we need to deal with [...]. (Alexandre, Mastodon)*

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To conclude, amongst those interviewed, there is quite a broad interest in decentralisation, but rarely for itself, or because of a greater good; rather, it is because decentralisation is supposed to bring resilience to the technical system itself, or resilience to potential fluctuations in the organisations that originated it; or even on a broader scale, like geopolitical or environmental issues. If decentralisation sometimes means technical decentralisation, it shall also be understood as an organisational decentralisation, in order to truly mean a limitation of powers. Lastly, decentralisation poses technical challenges that are not easy to solve and could be an answer that others don't really have or solve using different technical solutions.

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<sup>27</sup> These are three formats of files for exchanging structured data.

## 2.5 FREE CHILDREN OF THE DIGITAL KNOWLEDGE

In this section, we focused on actors' 'techno-political values', which were revealed from the interviews. From the ideals of openness – the essence of free software – to emerging legal models limiting open sharing in order to achieve other purposes, as well as the contribution to standardisation and decentralisation – two core features of the Internet – all respondents share strong beliefs associated with tech ethics, akin to a sense of purpose, working for a 'cause' (Giorgos, The High Mountains) close to the public interest. These values are embedded in those that were at the core of the building of the Internet, shared as a common culture, that could be found in important texts of this shared free digital culture (an anthology, after which we named this section has been edited by Blondeau and Latrive [54], which has evolved and gained complexity over time. The ethos of the free software [55] has been extended beyond the original 'cause'.

One of which will be at the core of Section 3, is met by every commons, free or open project: (economic) sustainability. The question of economic sustainability considers where different models are in use: the combination of nonprofit and for-profit models, with sometimes separate entities (companies, foundations, or cooperatives) co-existing for some of the actors studied for different activities; the quasi-absence of funding (advertising, members' contributions, memberships), the dependence on public funding (public grants, public clients, public procurements); private funding through foundations, sponsors and donations; and products and services sales.

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## 3 THE SEARCH FOR A SUSTAINABLE BALANCE FOR DIGITAL COMMONS

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Commons theory focuses on the sustainability of the resource and of the self-organisation that nurtures, develops, maintains, and protects it. In the realm of digital resources, there has long been an acceptance that contributors were not paid. And yet, a large part of research (mostly focusing on FLOSS) has focused on the motivations for contributors to take part while they are not being paid, such as learning experience, belonging to a community, developing a piece which is needed.

As such, the cases we studied mostly include people who are paid for their work. While it could be argued that the research should have focused on more voluntary projects, it should be noted that multiple volunteers declined to participate in this research because they had no time to dedicate to it. Others did not even answer. This could be interpreted as a sign volunteers are already dedicating their time to the community and do not have more time to reflect on it for a goal which is further from a direct contribution.

Due to such considerations, we will focus in this section in some detail on the financial sustainability of Digital Commons projects, including consideration of whether the contributors are paid. Because the interviews were spread across multiple projects (so broad rather than dense) – and as it was not really the focus point of this mapping exercise – this research quite clearly did not observe in detail the articulation between benevolent and paid contributors, with a few exceptions. This would very likely require in situ observation of a few actors in the long run, rather than trying to embrace the whole field of Digital Commons within its diversity.

In this section, we consider how the projects aim to be financially sustainable. Even when the companies were set up for profit, we mostly encountered projects where making profit is just a way to be able to reinvest more in the resource. We then see people with a gift economy model, to then focus on the public funded sector. We found that most of the interviewed projects somehow relied on public support in many forms.

### 3.1 ARTICULATING FOR-PROFIT AND NONPROFIT MODELS

As we already mentioned above, many of the projects we studied are active on a market. Among these, some actors have decided on a for-profit model. They are companies, selling the product or some services around it. We did not find that any of the sampled projects were motivated by profit<sup>28</sup> in the way they described it, but rather that there were many projects whose growth was conditioned by the commercial successes.

We also noticed that in the studied cases, the for-profit entity was often not the owner of the copyright over some important parts. This can, for example, be the case in the separation of a single product, first developed within another company, into two separate entities, with different purpose and status. This happened in the case of Matrix.org, which created the Matrix Foundation and New Vector (trading as Element). Said interviewee Andrew of the difference between these two entities:

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*[...] Element is one of the money-making arms of Matrix. It spends a lot of its time making sure that Matrix is well known and tries to promote Matrix itself. And Matrix is a non-profit*

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<sup>28</sup> This is of course purely declarative, but where some entrepreneurs can sometimes claim they want to make profit, none of the participants even mentioned it. When growth was mentioned it was always to improve the means dedicated to the project.

*that is making sure that the protocols are kept safe. (Andrew, Matrix)*

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The first is clearly a non-profit managing and owning everything referring to the Matrix protocol. The second is a for-profit developing one client and selling this with other products (support, customisation, custom closed-source additional tools), mainly to large public entities willing to have a sovereign, self hosted alternative. It is also noticeable that Andrew himself is paid by Element but entirely made available to the foundation, as a way to support it. This is also a reason why the foundation, which is quite recent — and actually only starting to work as intended — decided to look for funding on their own. They did this in order to be able to support its own workforce and develop the standard beyond what Element can support and need, although Matrix already feels this tension between the interest of the protocols and those of its main implementation.

Blender was structured in a very similar way, except there is not the distinction between protocol and software: all the intellectual property owned on Blender (some is retained by individual developers that are not paid by Blender) is put in the Blender foundation. Contrary to Matrix, there is no specific production at the level of the foundation, therefore no employees. Blender has two for-profit companies for the two main activities: Blender studio is developing the software and manages the administration while Blender Studio is more focused on content creation, content production and knowledge. Luca from Blender summarised the separation as follows:

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*The reason why these are two separate businesses is historical because at some point there was an interest in exploring how much further the studio, the content creation part, could go because content creation, unlike community driven software development, has a bit more of a potential financial upside. being able to create content commercially could have led to being able to help the Blender project. (Luca, Blender)*

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The two for-profit companies are linked with another non-profit entity. This is a classical way in free software to separate the copyright from the lucrative activities. Very often, foundations like Linux Foundation, Eclipse Foundation, Apache Foundation or others play the role of the foundation for small projects that don't want or can't do it themselves. This is a similar model that Software Heritage chose for their project, as it is now a hosted foundation under the umbrella of Inria Foundation.

This is an option that Mastodon did not choose. Alexandre from Mastodon noted the rationale for this choice as follows:

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*[...] these foundation [Linux or Eclipse] successfully told [companies relying on software they host]: "become a member, this will give you advantages, give you visibility. And also you ensure that the technology you are built on won't disappear from one day to the next. We are mostly an end-user product. We have less to sell... we do have products for sale for the enterprises but we are not at all as central as Linux is going to be for Microsoft or Amazon. (Alexandre, Mastodon)*

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Today, Mastodon relies on a German non-for profit company (gGmbH), but the non-profit status is contested and they recently announced that they will move the assets to a foundation, whose status and location (anyhow in Europe) is to be defined in the coming months.

The last model articulating both for-profit and non-profit is the cooperative model, adopted by Multi (contributing to Frictionless Data) and the High Mountains (contributing to develop Tzoumakers). These companies which can be described as part of the social and solidarity economy, are owned by their workers, and are usually allowed to make some profit, most of

which has to be reinvested within the company, and can only remunerate the capital in a very bounded way. They are for-profit with limited profitability, as the purpose is first and foremost social.

## 3.2 BUILDING A FUNDING SCHEME THAT WORKS

Funding the infrastructure and ideally the work done within Digital Commons is a crucial need for their sustainability. All of the projects we interviewed are financially sustainable, and they all built different solutions for their funding, often combining multiple of the categories described below to match their need and depending on the type of commons they build (and services or product they might be able to sell).

### 3.2.1 (Almost) no funding

ZUM relies on its community to produce open educational resources (OER), but initially used to partially rely on them to pay the annual fee to be a member of the association, which they since removed as people were already working for free and asking them to pay on top of it was at some point considered too much. Since they were created, ZUM only benefited once from public money to fund their activities in the early years. Today, they mostly rely on the advertising they have on their websites, to pay for hosting and a bit of software development. They also take care of travel and hosting costs for the annual in person meeting they organise.

They chose carefully the provider of advertising in order for the ads they run on the website to be suitable for children, and they decided that advertising should only exist in the periphery of the content, and not be displayed in the middle of it. This seems to be the result of a negotiation with advertising, which Friedrich recognised is not the ideal way to fund the activity, and the necessity to pay for the monthly costs estimated (in an email later sent by Friedrich) to approximately 3000€ — they have no paid employee. ZUM does not get this public funding. Friedrich from ZUM describes this situation as follows:

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*[...] because we are not the institution who can organize it and things like this. It's a problem. But the best side of this situation is we can work freely. (Friedrich, ZUM)*

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The only grant they had recently was given to the non-profit during an OER event where they decided on-site to apply for a grant and to prepare the pitch for their projects. They received a 10,000€ grant that allowed them to rework the logo and interactive videos.

### 3.2.2 Relying on public support

On the opposite of what we described with ZUM, we found that public support was actually quite important for many of the projects we studied. It can take many forms, from direct support, to the public sector being a client, by ways of the public sector actually contributing to projects.

#### 3.2.2.1 Structural public support

Some projects structurally rely on public support (in different ways we are going to explore). A good example of this is Europeana, which originated top-down from a political decision. The goal of Europeana was not to leave the digitalisation and the digital diffusion of our cultural heritage to US large for-profit companies, but to mutualise heritage preservation activities at the European level.

The funding of Europeana relies on a tendered contract from the European Commission, which provides approximately 80% of the budget. It is currently a four-year contract, which shows the sustainability is not guaranteed over time and contingent on contract renewals. The other 20% of the budget comes from Member States, who voluntarily contribute, and from grants, mostly

from EU programs (Horizon, Creative Europe, Digital Europe, etc).

When asked about potential commercial incomes and having paid services, David from Europeana explains this wouldn't be a problem as such (and it is a standard practice by many museums in Europe to sell analogue and digital products or the right to image), but they almost do not do it. Says David:

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*But we are really careful about it because we think we're public infrastructure primarily. We're there for the public good. I don't want to build any unnecessary barriers. We really want to manage this as a commons where people contribute to and take from. Again, that's not taking out the possibility of paid transactions, but three, and it's not unimportant, we do not have the DNA to sell things. The only place where some funding comes in transactionally is through conferences. We sell tickets to come to a conference. Even there, they will be on a non-commercial basis just to keep the ship afloat. (David, Europeana)*

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Interestingly, the public nature of this resource is clearly defined by the political impulse and the support, both at national and European level. One possible explanation of this foundation not being asked to find other sources of funding might be the shared knowledge that heritage is always a cost for the states, which they recognise as important for historical, educational, and cultural purposes. The very strict attachment of David to openness can be understood as related to this public service mission in both ways: because it is public money, it has to be open, and as it is open for all, without exception, this makes it a public infrastructure – meaning it – in their views – has to be publicly-funded.

However, this public support is now hardly enough, according to Liv, who is part of the Europeana Network Association which is also indirectly funded by this tendered contract. They are now for the first time in their history looking for funding directly, as they notice the Europeana Initiative is under financial strain. Liv notes that:

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*The costs were rising so fast that the European funding was not really following at the same pace. So since quite a few years, we have been exploring how we can optimize our operations as the Europeana initiative, how we can make our work more efficient, the way we work more efficiently. But at a certain point, of course, there will be... the decalage will become a disconnect. And I'm afraid that now that we've entered the age of the dataspace in which the expectations for the Europeana initiative have become way higher, but the funding unfortunately hasn't followed. We are coming close to this disconnect. And especially with the indexing of wages in recent months, in the recent year, year and a half, the situation has become quite stringent. And we decided that as an association, wherever we can contribute, either in executing the work, executing the contract, or in supplying our own funding, we must give it a try. (Liv, Europeana)*

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One of the changes made recently was for the association to take part as a full partner in a European project, although they have, for now, no administrative staff to do the job within the association but only get support from one member of staff in the foundation, dedicated to facilitating the work of the benevolent workers. Software Heritage is also supported by the public in a different way. They are a hosted foundation, under the umbrella of Inria Foundation. It has before been a “project” within Inria, and is destined to become an autonomous project at some point in the future, although this is a complex process, which is only starting. Public funding is also important, although mostly in-kind. Inria – the French national institute for research in digital science and technology – is a fully public research institute which is providing part of the workforce, offices, and space in a data center for Software Heritage. There are other in-kind support, like the CEA, another French public research institution, providing storage for the archive. They also receive public support from UNESCO, which comes with hosting a

workshop every year in Paris, and mostly helps legitimise the initiative.

On top of these public in-kind contributions, the initiative is taking part in European projects, mainly the recently started Code Commons. Software Heritage also got funding from foundations, such as the Sloan Foundation, which paid engineers to help working on a dedicated topic. The rest comes from what Software Heritage calls “memberships”, providing cash to further develop the initiative. Similarly to Europeana, there is no will to have commercial products. Marie states the goals of Software Heritage as such:

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*The aim is not to sell. We offer what we call membership, but it has more to do with patronage. We don't sell services. Absolutely not. (Marie, Software Heritage)*

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Interestingly, this claim has recently been confirmed in the way Software Heritage managed recent requests from AI companies, which were willing to access the database of software code they have built over the past years. This database can be accessed for consultation or to search some line of code, but you cannot get a dump of the whole database. Even if they are convinced that some big actors did scrap the whole database using the API, and although almost everything that is stored in this database is publicly available online in public repositories, they were approached by two companies interested in getting access to the data but under conditions<sup>29</sup>. Once again, there is a negotiation based on Software Heritage taking the position of a non-profit, with a serious consideration of public interest.

Some other projects heavily rely on European projects to exist. This is public funding without certainty, with overheads, but with administrative extra work. This was for example the case of Tzoumakers, which was set up and developed using multiple grants, or Goteo, which permanently has a few active European projects going on. The whole existence of these initiatives relies on project-related national or European funding. This poses an existential question to these projects: what will happen if / when the funding ends.

### 3.2.2.2 What (will) happen when publicly-funded projects end?

Some projects exist thanks to or are carried out by European funding. The funding as it exists has an end and brings uncertainty to some actors. The interviews showed questions or strategies developed by the projects to think beyond these deadlines.

For example, Jonas from ForgeFed is developing an open source federated forge backend server (Vervis) and the front-end (Anvil). ForgeFed's work is complementary to the development of the ForgeFed protocol, as it provides an implementation and a way to test the limits and potential missing bits of the protocol. The NGI funding, initially attributed to ForgeFed has been extended to Vervis, as working on the protocol, its implementation and the front-end are too different of tasks for them to be handled single handedly. After the first year of work, the NGI Zero Entrust funding has also been extended, meaning that another year of work to further develop the protocol, beyond the proof of concept they were able to have running. The protocol isn't ready yet, and will very likely not be completely ready after 2 years of work, let alone implementation in multiple softwares (which will guarantee that it can be considered as a technology-agnostic protocol). However, the two independent developers seem not to really focus on creating a business out of this and mostly hope to get more funding: they are thinking about asking the Sovereign Tech Fund (which was mentioned by many interviewees), and other funding sources. For now, Jonas isn't looking for money, but rather for help. He says as

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<sup>29</sup> Software Heritage decided to give access freely, but also to use their position to negotiate terms of reuse by these two companies: they negotiated that models trained with the data should be freely accessible (including the weights, so that the model can be used offline by someone unrelated to them), transparent (mention all the identifiers of the codes that had been used in training) and that anybody could opt-out (which means removing the code from the training data if they don't want it to be part of this dataset).

such, noting that:

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*Right now, the development is a little bit slow. We are still in the alpha phase, and we learn about which information we need to play back and forth to move both projects along. (Jonas, ForgeFed)*

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On top of this, the status of Jonas, as an independent worker, can not depend on a single stream of revenue, according to German law. As a result, he is trying to develop other activities beyond contributing to the ForgeFed project (and Vervis is not to a point where selling commercial products is even an option). Additionally, the market doesn't seem a viable option for the protocol (that intrinsically is written to be shared and used in several softwares), even if Jonas has other business-oriented projects in preparation.

Tzoumakers is a bit specific within our projects, as it is one that has a very clear geographical location as it is a maker-space. The project only exists thanks to public (and mainly European) funding. The funding was necessary for P2PLab – who launched the project – to keep working and for the makerspace to be developed. The project was initiated by P2PLab, within the context of an Interreg program, used for creating contacts in the villages and equipping the space with machinery. A small Creative Europe project followed, and helped to organise workshops. This was followed by a European Research Council (ERC) funding mostly based in Estonia, but some of the research was done in Greece. The municipality of Kalentzi paid a few bills for the space, but no regional or national level funding was obtained. The project was then handed over to the people in the village to continue without P2P lab impulse, yet with support from the High Mountains, a social cooperative dedicated to the development of the region, who decided to get involved.

In the case of Tzoumakers, their aim is to find a sustainable business model for a service whose utility for the local communities was not immediately obvious. However, sustainability is still an issue and a challenge, unless they can secure additional public support. In the same way, as Greece's public support is now at a bare minimum, the High Mountain cooperative relies quite heavily on European funding to develop their activities. The earnings of the farmers within these villages are low, it is hard to have people to pay for the services, even a small price. At the same time, relying on grants has its own drawbacks. Giorgos from The High Mountains summarises this predicament in the following way:

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*So, we are trying to be also in the market or being paid for the social services that we provide. Because if it's only European projects or funds, grants in general, then usually you are mainly trying to do the bureaucratic job for the funding and then you live outside what you really have to do [laugh]. Yeah. So, for us, the cause is the first thing. And we are trying to be loyal to our cause and to really help the communities. (Giorgos, The High Mountains)*

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Contrary to the ZUM project, these initiatives are relying on public funding but struggle to secure regular support from public entities or from their activities. Instead, they are navigating multiple projects, and developed some expertise in writing the grant applications. Nevertheless, the organisation's sustainability becomes very fragile once the grants come to an end. Some of them might have the opportunity to build services and sustain themselves this way, while others have no economic model to build on the open resource. For those others, they often will not be able to create a direct or an indirect stream of income out of their activity (for example standardisation), which often calls for longer-term public support of such activities.

### 3.2.2.3 Public entities as main clients

Some projects have public entities as main clients. This is for example the case of New Vectors. They mainly sell to public entities, for large administrations, armies or para-social entities (like social security services). Vincent from New Vector notes as follows:

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*Usually, they are services where they want to replace consumer instant messaging applications, WhatsApp and Signal, to regain control over this service, which is replacing the use of emails for internal communication. [...] The security aspect interests the defense in several countries. [...] NATO has also a fork [of Element], an application called NI2CE [...] which is available in the stores [...] I think we see that we clearly answer the needs, specifically because we are open source to the public sector. (Vincent, New Vector)*

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Having nation-states as clients is not necessarily easy, especially to let them understand the necessity of paying for maintenance and future improvements on the software, which is separate and complementary from the work on their instance, since public finance principles can be at odds with financial and technical sustainability. For example, the Government of France was one early client of New Vector, and they decided to fork the software and to customise it to their needs, managing the whole infrastructure by themselves. The fork is called Tchap and is managed by the DINUM (French Interministerial Direction for Digital Affairs).

That said, there have been two main difficulties for New Vector in this otherwise good collaboration with the French administration. The first difficulty was related to the subscription model New Vector is shifting to. This model relies on public entities paying a yearly subscription to the software, to pay for customisation, update, maintenance, sometimes support and the closed-source bots they are offering. The French government only accepts to work with calls for funding one specific mission when they need it. Therefore, they did not want to, or indeed could not, pay for the subscription model that New Vector is offering.

The second difficulty is linked to the first one: one of the products that is only available to organisations paying the subscription are the bots to easily manage the rooms, which are not free. DINUM only wants to work with free software, therefore refusing the closed source options. Antoine from New Vector summarised this situation with the French government as follows:

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*However, it remains necessary for them to stay in contact [with us] and have... be close to us, if only for security updates, to be well informed and reactive on the updates on the server side. [...] The interest in subscribing is to help with the updates, given that an Ops Team can do it themselves. [...] They don't need all the functionalities. As the bots aren't open source, they deprive themselves of it. In some areas, like these, where the collaboration is stuck. (Antoine, New Vector)*

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The direct contribution to the Digital Commons by the public sector is something we did not get to study extensively in the context of this study, and can be elaborated in future research. There could also be interesting developments on the motivations for the state to directly contribute to such initiatives, the difficulties they might have to collaborate with private companies and other states.

For now, we can already notice that New Vector acts as a private company, selling the same type of product to different states. Besides mutualising the cost of development, it also allows to envision the possibility for French and German public administrations, for example, to interconnect these messaging apps – which would be easy, as federation is part of the Matrix protocol – to have a transnational messaging system for public bodies.

Goteo is an initiative of the Platoniq Foundation, which is also heavily relying on selling

solutions to the public sector. Goteo is a crowdfunding platform, which is built to allow public entities to match funding for specific projects with public funding. Platoniq is a foundation dedicated to designing participatory processes and among other activities, sets up consultations for different local collectivities, whose online activities are using Decidim platform. The two foundations have been created separately and were run by the same people. They were merged in 2021. Goteo, as a crowdfunding platform, is partly funded by the users, although this constitutes only a small share of the overall budget.

Raquel from Goteo and Platoniq believes in the efficacy of this approach to splitting out operations, noting that:

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*We think this is a good way to find balance between the common participation process that crowdfunding is in a certain way — Philippe always wants to talk about crowd advocacy in this sense — and then a new way for the public administrations to spread the money without putting so much bureaucracy on it. (Raquel, Goteo | Platoniq Foundation)*

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In reality, match funding is based on a grant by the public administration to Goteo, which is then sub-granting to the successful projects, the same way their crowdfunding works (e.g. individuals give to Goteo, which means the pledge is tax-deductible). The foundation then grants the successful projects with the amount they raised. Platoniq is dedicated to public participation, to democratic processes within decision-making (developing ways of organising the participation beyond the online platform) and to public funding (with match-funding through Goteo).

They somehow try to ensure that these processes will exist, even despite potential interference by politics, fe.g. when a public consultation does not lean in the direction wanted by the power in place. Philippe from Goteo describes these power imbalances as such:

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*We have a specific program that we called “participation wash”, which is basically ensuring the participation by local governments is really participation and not something pre-cooked and pre-designed. So, that means we also have, we have also developed protocols to... Since we're also providers of decision platforms for certain regions and governments, we also have developed protocols where [we vouch for] the data that is published on the platform. So, no regions can unplug the platform and we lose track of whether participation or voting is manipulated by a regional government or city government. [...] So we also had to develop methodologies for that. And tools. (Phillipe, Goteo | Platoniq foundation)*

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Interestingly, this conception of participation is also a way for Platoniq Foundation to act as a third-party in consultation processes to ensure the quality of the consultation. On top of the small share of the ‘traditional’ crowdfunding and the European projects they are part of, the Platoniq Foundation offers services to public bodies in terms of participation and funding initiatives, and has developed a strong sense of the public interest.

Another interviewee working mostly with public clients is Multi. This is a French cooperative providing services in development and open data, with a focus on ‘public interest digital’, which is a concept they did not completely define yet. They are contributing to multiple projects, including the Frictionless Data project, which is part of this report. Multi has been developing for an association of French local authorities (later handed over to the French government) a tool to validate and improve the quality of Open Data, called Validata, the responsibility of which has since been handed over to DataGouv, the French platform for Open Data, also developed by DINUM.

Validata relies on Frictionless Data, and provides some missing functions, a graphical interface, and some specific customisation to the data templates to fit the needs of the public sector in France. However, Frictionless Data seems to be also quite used outside of public administrations by researchers (which remains public actors in most cases). As Multi wants to work toward the “public interest”, they are working on open source and open data projects, and mostly with public entities. They say that:

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*Historically, we had a core business around open source and open data. Open source is not specifically public, but it is true that open data... public actors have plenty of rich data to exploit. There are initiatives by DINUM, specifically on the valorisation of open data, etc. Naturally these are people we want to work with and there is a potential market. Today, we diversify our activity, but we want to make a digital of general interest and it is clear that many of the general interest initiatives are carried out by the public sector, quite naturally, since public expenses are dedicated to do things for the whole society (Jean, Multi | Frictionless Data)*

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Here the fact that they want to have a positive impact with their contribution to the markets of open source software development and open data has led the people at Multi to turn to public actors. The softwares and processes they contribute to have to conform to their view of the public interest, which is still a subject of negotiation and discussion among the staff of Multi. Because the solutions they are working on are open data, they recently had interest in the Validata package by the technical team of a German Land, and they received shortly after a proposal for a translation of the interface into German.

Selling to public entities appears to some entities to be more ethical, or more aligned with their values. This is for example also the case for Mastodon, where service for public entities is now a small share of their revenue, but an activity they wish to develop, as it aligns with their overall mission, which is to foster a healthy public debate online, which in turn implies that the main actors of the public space (states, administrations, politicians, journalists) have to join.

#### 3.2.2.4 Limits and praise of public funding

On top of some limitations of public funding and difficulties some of the actors that we already mentioned had, there were a few criticisms and praise addressed to the existing funding by the interviewees, which needed to appear in this section. Camille describes why they asked for NGI funding but didn't go for large European projects or even ask for funding from France. Says Camille:

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*[...] for all that touch to funding, two problems arise: there is the issue of dependance, and the official or non-official expectations which can be linked to a funding. Our independence and capacity of action, and our freedom of speech is really important for us. Besides, there is another issue, which is the complexity of the grant application in the French administration. [...] Many non-profits have then to specialise in the funding application process. The last huge problem we see with public funding is the disappearance of operating grants for project grants. [...] mechanically depend on these time of funding would lead us toward permanent innovation or bullshit-writing (Camille, Framasoft)*

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However critical of public funding, Camille praises NGI for it is in his mind the exact opposite of what he described before. He explains that:

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*NGI is the best thing that happened to the Free software world in the last 10 or 20 years. Because there are small grants. As soon as you move to bigger grants, you have*

*application specialists that will phagocytise this. [...] For small structures, self-employed developers, non-profit, [large applications] are too heavy, and you can't compete with applications experts. [...] But when the upper limit is 50000, these experts can't be bothered. Whereas 50 000 for us... 50000 that is a staff member, actually. This is one year of work for a non-profit, a small dev, etc. (Camille, Framasoft)*

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Framasoft has a particular position in the field as they are mainly funded by individuals. However these two long extracts summarise a position that multiple others expressed in their interviews. Camille and other interviewees also explain that NLNet, which was sub-granting for NGI, was particularly relevant in the way they accompany the grantees: the way they understand the work developers are doing, the feedback they give for a funding application is really useful and sometimes allows to improve the projects. Moreover the contribution is not only financial but also includes accessibility, licensing.

The only regret is that design and UX was not offered the same way, as so many software developers need it and can't pay for other actors to provide help. This is also a central critique from Luca from Blender. He summarises his concern as follows:

*But if you say we are working to improve the usability and the design of tools for artists to create content, that doesn't count as innovation. That doesn't count as research. And that's very frustrating. Because that's a lot of the work that we do, like product design. Of course you do engineering. Of course you do! But engineering is nothing without the bridge that brings it to the user. So what are you researching? Especially if you make software, software is meant to be used by people! (Luca, Blender)*

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Another concern comes from Alexandre at Mastodon. After explaining he can't hire freelancers with this funding, he explains that he is facing a dilemma, as he hires new people to do the job, without being sure that he could keep paying them after the funding has ended.

The last concern has to do with maintenance. Most of the commons studied – and not only the software ones – need to keep working on the resource as it is never stable once and for all. There are updates, corrections, improvements to be made on the data, the software, the dependencies, the infrastructure. Maintenance is, in some projects like Mastodon the main activity in the coming months. Hence the general interest for the Sovereign Tech Fund, expressed in many interviews.

Being paid for the maintenance is not the most obvious thing, specifically from public funders. Jean managed to do it for Validata (a tool relying on Frictionless Data) in its relationship to the DataGouv team:

*They are technical interlocutors, who understand the need for maintenance, to update some libraries. So, the funding was leaning towards that. They were new functionalities, it was a package, but they agreed when I mentioned the need to rework the code over long periods of time. When I went on board this project, I did, I think easily 6 weeks to 2 months — there were bug corrections included, sure — of project takeover, including cleaning some parts of the code (Jean, Multi | Frictionless Data)*

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Jean was able to convince its technical interlocutors to fund maintenance, as part of a bigger package, and as he was getting on board this new project. He also conceded that he was not sure this would have been as easy if the interlocutors would have not been technicians.

One of the findings of this study is the certain omnipresence of the public sector in the studied cases. While this might have been slightly different if more industrial actors had been able to participate in the sample, it nevertheless reflects a trend that the public is omnipresent in Digital

Commons projects, particularly in purchasing (and sometimes indirectly mutualising with other countries or collectivities), funding, providing content, contributing, supporting or doing research.

This can, in part, be understood as in contradiction with the criticism of bureaucracy that came quite often in our interviews, e.g. the heavy administrative work involved in grants writing and management, which can seem inadequate for small structures that develop Digital Commons and Internet commons. Instead of traditional public grants, funding conditional to developing a new product could be replaced by small, unconditional grants following the model of NGI Zero, also authorising less innovative but also necessary maintenance and infrastructure work.

This action (by public administrations and by communities of the Digital Commons) seem to fit the movement of “reform entrepreneurs” (in administrations) and “hacking the state” (from the communities) described by Shulz [56]. This is also in line with the role of the State as an entrepreneur, and the fact that many very important technologies, the Internet to start with, have been funded through very important public funding allocated to private companies [57].

### 3.2.3 Private Funding

Private funding is also a way to fund non-profit organizations. Among our interviewees, this is an option that multiple members have chosen, or more precisely that is made possible by their activities: private funding by companies, individuals or foundations.

Gaia-X is a project launched by two Ministers, with hundreds of companies aboard, who chose to build a non-profit to organise their activities. Their budget relies on the subscription by the members, which are for profit companies, benefitting from the Data Space they created. Gaia-X doesn't have sponsors, nor does it depend on a European project or funding. The work they do is paid by its members that chose to mutualise this research and development on data-sharing within a non-profit. Hector mentions that they will keep existing “as long as the members have an interest in what we do”. In this case, private funding means “working for” the funders.

On the contrary, Software Heritage partially relies on private funding, which are sponsors (even if they sell “memberships”). The activities of the software code archive are mostly, but not completely independent from these founders.

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*[...] since the beginning every year, we organise a meeting of all the funders, [...] above 10000€ [...]. We gather them, and we have a full day of work during which, in a very transparent way, we tell them everything. Look — there are no big secrets, but still — for example, the finances of the project. [...] So what we try to do is to have them voting for the most requested feature. So in general, that's my job, we try to not reproduce the daft thing of the companies I talked about earlier [...]. In fact, we are not going to go for the very cool stuff which only interests someone in its corner, which would interest nobody else. I want the functionalities to be generic and transversal, which are useful for the whole archive and which fits the needs of many people. So, having the sensation of these people, who have different profiles, who see what they are talking about, allows us to prioritise things [...] there is no formal decision, but this is about trust. (Alessandro, Software Heritage)*

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Here the roadmap is still written by Software Heritage, but hearing from different actors is considered to have a good influence on the archive as the funders are those who find interest in the continuation of the archive and potentially to use it. Moreover, the funders do not get to write to the roadmap, nor to really alter it, but to suggest priorities within functionalities that are defined by the team at Software Heritage. Lastly, as it is a yearly meeting, this decision is taken collectively, so everybody can see what was decided the year before, and see the progress on these features or issues.

Blender claims a complete independence toward the private funders. In its sponsors, they have silicon makers (Intel, Nvidia, AMD, etc) and many other organisations in the tech sector, the industrial sector, and the automotive sector. The support can be financial or an engineering support. The reason why they think this is important to fund Blender is because they need it in their activities “and it is in their best interest to make sure that Blender works well” (Luca, Blender). For Luca, the best way to make sure that the companies can't have control is not to depend only on them for the funding. He says:

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*With this donation [...] there is no control attached. But it's pretty obvious that if one organization comes in and gives you a million and everybody else is giving you a thousand, there is a difference. And so we want to try and prevent that, try to keep things as even as possible. (Luca, Blender)*

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This is why Blender is trying to rely on three equally important contributions: the public sector (they are working on it), the industrial sector (which is a success from the last years) and the individual donations (which have been there since the beginning of the project).

### 3.2.4 Relying on individuals donations

Digital Commons have often been described as a gift economy, whereas we have seen that many operate on a market. However, we do see some projects that operate (almost) without selling any product, relying on the generosity of the public to fund their activities.

This is, for example, how Blender and Framasoft operate. Blender relies on individual donations today and it's always been the case. The original code was not free, and the founder of Blender had to gather money to pay the investors in his bankrupt former company for the code to be owned by the foundation and shared for the first time as open source. The early projects relied on huge crowdfunding campaigns for movies (all backers were in the credentials, and most received the DVD of the movie). So, the development of the software was organised around the development of the software, which was not ideal.

Therefore, they tried to set up a new model in order for users to contribute more regularly. As there are two companies (Blender Studio and Blender Institute), they have different models. Blender Studio sells access to a platform with tutorials, assets created around the movies (and games) and more broadly the use of the software. This access is based on a subscription model, which “multiple thousands” of people chose to join and enjoy. Says Luca:

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*In an ideal scenario, I would love it if the activities that the studio does to be fully donation-based and crowdfunded with the content being freely available for everyone. We don't live in that world yet, (Luca, Blender)*

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The reality Luca is referring to is that people seem to not want to set up regular donations to a project if they don't see what they are paying for, or to be more precise, if they don't get something extra in return. Indeed, he is quite disappointed to compare this model to Blender Institute: the institute is producing a software he estimates to be downloaded 18 million times a year, and only “around 3000, 4000 people in the world who chose to set up a recurring donation to Blender to support its development”. Wikipedia and Thunderbird are examples of how it can be done, in his opinion, but with some criticism: asking for money is hard to do in a way that he finds acceptable.

Framasoft relies on a yearly call for funding, during the last 2-3 months of the year. They offer to fund once or to set up a monthly payment. The non-profit hires ten staff members on a budget that is overwhelmingly relying on these public donations. They provide free online services to approximately two million people every month:

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*We estimate that 10 years ago, approximately one out of 1000 people were giving [money] and were allowing the rest to benefit from our actions. Now, it's outright one out of 2000 (Camille, Framasoft)*

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Framasoft really relies on the gift economy. In the last few years, they had a yearly campaign to get funding, where they announce what they achieved in the past year and their projects for the coming year. This yearly plan fits into a broader 3-years roadmap (currently called “Collectivise / Convivialise Internet” and focused on equipping solidarity collectives with web tools that match their values<sup>30</sup>). Interestingly, the plan isn’t open to discussion. They share a vision to which they hope the people will respond and give money (their yearly budget is just under one million euro).

Relying on public support is hard and brings uncertainty although the two projects we studied are reasonably successful at it. Framasoft also has grants from diverse foundations (also counted as donations in the public discourse) and a few grants for specific projects (especially NGI, see above). Blender diversifies its revenues, with private company sponsors and tries to get more public money. The independence that the individual donations provide comes with uncertainty, but also a huge amount of work to get people onboard. Based on the interviews, it seems to only allow large and well-identified actors to be able to sustain their activities and benefit from this gift economy.

### 3.2.5 Selling products or services as a non-profit

Selling products or services is also a viable way for the non-profit to fund themselves. We already mentioned that some of the projects we studied were selling products or services. That is for example the case of Goteo, a foundation which provides a crowdfunding platform and takes a 6% share of the given collected amounts to pay for the service. It is also the case of others, like Openwifi. As already mentioned, this project is part of the research of IMEC, a large non-profit independent research laboratory on microelectronics in Flanders, Belgium. The researcher developed Openwifi as part of a European project<sup>31</sup> (at the time part of the Future Internet Research and Experimentation (FIRE) program). Openwifi also benefited from a few other grants (including NGI). It allowed them to develop a complete functional and standard compliant Wi-Fi platform that they share under a free licence. Among other activities, Openwifi provides solutions for the industry, specifically on bounded-latency Wi-Fi. This research has attracted the attention of some industries. Selling solutions for industries is also a way to fund the development of Openwifi:

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*The main goal is to build the critical mass needed to keep the open source project going and to ensure a minimum maturity level. It's based on a roadmap to further extend it with new features... There is a need to scale up the Openwifi initiative, because we realize that our open source project is used by many people, but our internal research and development of new features is going too slow. We need some more critical mass and we need some more stability to keep senior researchers on board, not just juniors. [...] It's important to keep them [senior researchers] on board to move ahead. We have realized that we have now reached the limits of our model where most of the research is still funded by the traditional funding channels. So we are looking for some extra models for funding. The idea is not to make profit (we are a non-profit research organisation), but to make the open source project more sustainable so that we can continue to offer attractive features with sufficient maturity, to maintain the platform and to provide*

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<sup>30</sup> <https://framsoft.org/en/roadmap>

<sup>31</sup> <https://www.orca-project.eu/>

*support. (Linda, Openwifi)*

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Here selling is seen — at least for now — as a viable option to guarantee the human resources for further development, maintenance and support. This is something that we saw across most of the projects: the only reason why they don't grow is because of the lack of secured income that would allow that. The issue for Openwifi is to find exactly what product to sell. They developed an evaluation kit with only binaries (so no source code) for industries to experiment and see if the solution could fit their needs. The evaluation kit could be rented for 6 months and then sent back. They also have a dual licensing scheme, allowing them to sell the sources at some given point for industries to build, including closed-source solutions for themselves on top of it. However, this model doesn't really work as expected, as they estimated the licensing price (based on the effort needed to build the IP) of this scheme very high and they struggle finding industries willing to pay the price. Therefore they are currently envisioning a shift toward a subscription model. The industries would pay a yearly subscription to get access to the up-to-date code with extra new features the Openwifi team has recently developed or is currently developing. There are multiple subscription models<sup>32</sup>. Most Openwifi users are happy with the rich driver. The free version, as we wrote earlier, would remain free, but with an approximate 2 year embargo (the exact embargo duration is still under discussion)

This subscription model is very attractive for many Digital Commons actors, as it secures a regular and foreseeable income, and that is why multiple initiatives we studied tend toward that model. It requires that you are producing value that you can somehow exclusively offer on top of the free and accessible resource but they seem to have found a way.

In the same way, Mastodon is considering another popular model of selling services on top of their free code: they have been asked by two large entities, including the European Commission to host and manage an instance for them. This is work that Mastodon's team know how to handle (they already manage one of the largest instances<sup>33</sup>). This constitutes a small share of the income but people at Mastodon want it to grow in the coming months / years.

We saw that the funding models vary from one project to another. Most of them combine multiple sources of funding, and develop models that the resource they work with and their status allow. There is very likely no archetype of a model for all Digital Commons and the slicing we offer for analytical purposes could even be challenged. As we wrote earlier, there is however a very high participation of the public entities (states, European Union, local governments) in developing, buying, supporting, producing or using Digital Commons). This could be further explored and potentially also mitigated by other studies more focused on industrial actors.

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<sup>32</sup> Some are only giving access to the features through the open and rich driver, some including the FGPA code targeting a smaller community having FPGA skills to modify the logic, to address their specific needs

<sup>33</sup> <https://mastodon.social>

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## 4 ACTORS' DEFINITION OF DIGITAL COMMONS

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We assumed during the whole report that all of these projects are Digital Commons. As we tried to demonstrate in the first part, there is a clear definition of Digital Commons, even if this definition evolved over time. In this part, we will not try to force this definition onto the studied cases, as almost none completely fit a single definition, but all more or less develop certain aspects more than others. Rather, we will compare their own understandings and conceptions of the Digital Commons.

### 4.1 A CONCEPT IN COMPETITION

We find that the concept of Digital Commons is rarely used as such within the communities we studied. Multiple perspectives exist, but the actors seem to have a preferred concept they refer to, which then enter a form of competition.

#### 4.1.1 The commons as a political standpoint

David (at Europeana) is one of the few interviewees who explicitly mentioned the commons. When asked what he means by the term, we find a mix of multiple definitions, starting with the oldest ones, and gradually developing into the newer ones:

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*So that's the public side of it. So open source, open data, all these kinds of things and freely and publicly available and as a shared resource. The Commons part of it... from the beginning, we've been, I think, as many organizations do, who are interested in the subject, struggling a bit with what that really means. Most common knowledge will say it should be a shared resource. It should be something that is collectively managed at least to some level. There needs to be collective governance. I would say it's a little tricky. I can't claim that the whole Europeana and the whole dataspace is collectively managed, completely democratically and so forth because we're also interfacing with the European Commission and the Member States who have a large say in how things are being managed. So here we're not a pure Commons, I would say. [...] Because, of course, the third and most important component is shared rules and norms about access, responsibilities and so forth. (David, Europeana)*

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Interestingly, David offers a definition of the Digital Commons quite close to the one we suggested at the end of the first section: there is a shared resource, a community, a collective governance, principles and values. He tries to compare Europeana to the definition of the commons he gave and concedes Europeana does not fully comply with the definition of a Digital Commons.

The question of governance is clearly one that is not easy to solve, when public entities are part of, or even at the origin of an initiative. If the use of the term can be frequent, the work to share a definition, or even to try and comply with it is not something that has been self-evident. For example Liv, from the Europeana Network Association does not really have the same definition and after conceding it's not her field of expertise, explains that "... this idea of the commons, this idea of public goods, it's very close to one another." (Liv, Europeana Network Association).

People at Framasoft clearly and openly refer to the commons, and sometimes to Digital Commons. Camille describes the purpose of the association as "popular education to the stakes of the digital and cultural commons". Olivier, a benevolent member of Framasoft explains the next directions the non-profit should take, he mentions AI, low-tech, and Digital Commons. He says that:

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*There has been a lot of work on the commons or the Digital Commons but in a certain way: “who owns the code, and what is common, what is not common?” This is not the core of the question, which actually is “how should the public action and the private action, meaning here the private companies, interact to safeguard a bare minimum of the Digital Commons, which the users could use and enrich?”. When some consider, for example, that Microsoft or Google are the first contributors to the “commons”, one needs to look at what these are. Are these commons here to generate profit for these large companies, or can the general public benefit from them? These are questions that will need to be put to discussion, including with the public bodies. (Olivier, Framasoft)*

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Here, the commons as such is used and understood in a sense that is not analytical, but rather political. This is a sense that we did not develop in this report but that has been broadly discussed, from a political philosophy point of view with regards to the Common<sup>34</sup> [58–60]. In this interesting debate, the common is sometimes considered as “already-there” that yet needs to be permanently reworked. Although he never mentions these references, Olivier seems particularly close to the argument of an article Hardt wrote about capital and extractivism from the commons [17].

Giorgos and Leo both refer to the tangible part of the commons. This is not surprising, since this is the single project with a clear territorial embedding, with a specific attachment to the mountains and the people living there. Giorgos specifically refers to the common management of natural resources in the line of Ostrom first case studies, with an emphasis on the need to not overextract, which led to the tragedy of the commons argument. He says that:

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*[...] we believe that mountains, forests, waters, and air are common resources. That's how it was managed before from the local communities. And that's what I told you also for pastures and the waters from the rivers in the villages. So it was managed like that. We strongly believe that local resources should benefit local societies and local people and not over-extracting these resources to transfer them to the cities or somewhere else. So we believe in a self-sufficiency model, also in energy, in resources in general, how much is possible. But every society should have its own resources to get over and to develop further. (Giorgos, The High Mountains | Tzoumakers)*

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Giorgos definition refers to the past, specifically the period between the Ottoman Empire and the creation of municipalities, where communal organisation and management of the resource used to be the norm, according to him. He opposes extractivism to the commons, as an evolutive form of enclosure (since the extraction can be done without direct ownership, since exploitation of the natural resource can occur while there is a public ownership of the land).

Leo from P2PLab defines it differently, saying that:

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*[...] the Digital Commons entails any kind of intangible resource that can be shared widely for people to appropriate and adapt to whatever needs they have locally. So not only the blueprints for a piece of hardware, but also a recipe or the instructions for a folk dance or the practices used by a community to co-manage some sort of local resource. As far as this information becomes global through telecommunication technologies, and people can get to see it and either be inspired by it or adapt it to whatever they are doing or learn from it (Leo, P2PLab | Tzoumakers)*

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<sup>34</sup> ‘The Common’ is in these approaches conceived in a singular form, whereas the studies based on a more analytical framework usually use the plural form.

This definition of the commons is naturally close to the one developed by Bauwens, Kostakis and Pazaitis [15], who are also active in the P2PLab in different areas of the world. This refers to the notion of cosmopolitanism, which envisions a local production with a shared global knowledge as a horizon or societies. Interestingly, the needs of the local population come into this definition, which could be considered self-evident but is still an important consideration, especially if we bring it back in the Digital Commons since technical innovation is not systematically (to put it mildly) based on needs expressed by the people.

Philippe at Goteo also mentioned the commons quite a lot, and as he didn't give a proper definition, he mentioned Digital Commons, affective commons, natural commons, heritage as a commons. The idea of knowledge commons and Digital Commons seems to be articulated around the idea of sharing, and some form of political or ethical meaning of the actions. It is for example quite clear, when he speaks about a "social impact calculator" to orient and enlighten the choices of the people when they submit a project on Goteo. He says:

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*It's also why the social impact calculator tries to play around with the values of the commons. But at the end of the day, the social impact calculator is giving you economical numbers to understand what's the benefit of sharing a specific decision on choosing an ethical provider instead of a not ethical provider. (Philippe, Goteo)*

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But equally, people at Goteo refer to the social and solidarity economy, which they are not the only one to refer to. It seems to be a competing concept to the commons.

#### 4.1.2 Social and solidarity economy

Social economy is a concept that has been widely debated among the actors [61], with definitions that aren't always unified across European countries. In the EU social economy plan, for example, it is noted that:

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*The social economy covers entities sharing the following main common principles and features: the primacy of people as well as social and/or environmental purpose over profit, the reinvestment of most of the profits and surpluses to carry out activities in the interest of members/users ("collective interest") or society at large ("general interest") and democratic and/or participatory governance [62]*

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This definition is very likely the smallest common denominator but still can be useful to consider the categories and the values that primarily seem to drive the actors described in this part. It was mentioned that Goteo was referring both to the commons and to the social economy. When they started to design the platform "it was pretty clear that behind the platform, we should have a social contract." (Philippe, Goteo)<sup>35</sup>. They get funding from national and international programs for the social economy, and belong to European networks for the social economy.

In a similar way, Coopcycle refers to social value when describing the reason why they created their activity. Coopcycle was not founded by delivery workers, but by people convinced of this social objective to offer a way for them to own their platform. Interestingly, they did and there is now Coopcycle, owned and governed by workers from local delivery companies, part of the federation, and an association from former benevolent contributors to the software, who by design were not intended to be part of the federation. As Thomas from Coopcycle describes:

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*What was problematic about the [bike-delivery] platforms... There were many issues, but*

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<sup>35</sup> An article on this idea has been published by the Foundation, available at: <https://lab.cccb.org/en/crowdfunding-as-the-trojan-horse-of-the-commons/>

*one of them was this idea of self-employment and that workers had no protection. The idea was to oppose wage labour to this model. (Thomas, Coopcycle)*

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Here the values of carrying activities in the interest of the users (that initially were not there) and the idea that Coopcycle and the local companies could become cooperatives (which for the most part, they never did) sets the set of values of Coopcycle within the social economy scope – although they do not directly refer clearly to it.

Framasoft, also refers to both the commons and the social economy. They are a non-profit, part of multiple networks of non-profit. They have been working on a manifesto to clarify the values within its members and to express them to the outside world.<sup>36</sup> The preamble expresses that “[they] act for a more dignified world, built on sharing, solidarity and the Commons”, then stresses the importance of emancipation. This is very similar for Tzoumakers, who “want [Tzoumakers] to retain a more of a social enterprise aspect rather than a proper business”. The people in the villages they work in are a bit careful about cooperatives:

*[...] because of past experience in previous decades where cooperatives were formed for farmers, but then very quickly were co-opted by people from the leading parties of the time where they just served their own private interests. So the collaborative efforts between farmers and the cooperatives themselves have been kind of tainted in the previous decades. So when we speak to farmers about collaborative efforts, they tend to be very suspicious, let's say. They say, oh, no, I know all about cooperatives, they say, and there's just some assholes trying to eat government money and EU money. So they're not interested. (Leo, Tzoumakers | P2P Lab)*

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This proximity between commons and social economy isn't a discovery of this research. Because of the interest for self-governance, the attention to the people and the workers, that can be important for commons, and many non-profit or cooperative forms are used to legally organise the commons, many have already worked to bring the social economy closer. La Coop des Communs is an association working toward this objective<sup>37</sup>.

In a book on the exact same subject, the authors see four reasons to work on the potential proximity of commons and the social economy:

- Going beyond the dichotomy public/private dichotomy (referencing to the knowledge and Digital Commons)
- Governance models of the commons are somewhat similar to those of the social economy
- Working to market the products of commons to a fair price meets historical objectives of the social economy
- The commons have a political objective, a purpose, that can converge with the social economy.

Other research shows that territoriality is also an element of proximity between commons (including Digital Commons — there is likely more research to be done on this specific relationship) and social economy [50,51]. This proximity between commons and social economy is to take into consideration more in future work, especially when it comes to economic sustainability. Our interviews confirmed that some Digital Commons, especially when it comes to business models matching democratic governance and values, can also be

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<sup>36</sup> This manifesto is accessible at: <https://framsoft.org/en/manifest>

<sup>37</sup> This non-profit helps bridging the knowledge gap between an old and well studied movement (social and solidarity economy) that have a rich 150 years old history while the commons, and especially the Digital Commons have a 20 to 40 years history.

close to social economy.

### 4.1.3 Free software, open data, open hardware, standards

One of the early definitions of Digital Commons – and it is part of most of the definition since then – had to do with sharing software, data, hardware and standard, using free licenses. Many of the interviewees, instead of talking about Digital Commons are rather staying close to the idea of openness or freedom, in different manners and for different reasons. For example, at Element, the aim is to “free the communication”, which is achieved through “open source and mostly federation” (Vincent, Element). The same is true for Matrix, where the protocol has to be open, and this necessity is almost naturalised.

At the Open Knowledge Foundation, the commons is a term used, but one without a clear definition. Adriana from the Foundation summarises their basic understanding as follows:

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*I think commons is a more basic concept in a way. And not all the commons are Digital Public Goods, possibly. I would say that the main difference is that is released with an open license is probably part of the commons, but it doesn't mean that they automatically become a Digital Public Goods. (Adriana, Open Knowledge Foundation | Frictionless Data)*

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In this framing, the different concepts are a bit confused, but what can be understood as commons is basically something that is free. However, free does not mean that it fits the Digital Public Good definition, which lets us presume that the DPG and the requirements for SDG (Sustainable Development Goals) are a bit clearer. It is similar at Blender where Luca explains that:

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*Blender is a digital common, just the same way I was saying before you open a tap and water comes out, you just go on the internet on Blender.org, you click download and you have Blender. No advertising, no login, no registration required, no nothing. You have a fully functional piece of software that can help you to sustain yourself. And to me, that's the definition of a common. (Luca, Blender)*

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When he says it is public, it really is. When, in a later (non recorded) discussion about the Oscars and Caesars nomination<sup>38</sup> for the animation movie Flow – which was made using Blender Luca mentioned he did not know the director, who just took the software and started working.

For Linda, at Openwifi, open source is also the way to define what they are doing, which, in our view, is an extension of the scholar tradition of sharing knowledge and improving gradually. Said Linda:

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*Openwifi is offering more than a physical layer. Most academic researchers are mainly interested in advancing wireless communications by increasing the physical layer bit rates (e.g., by new waveforms). Openwifi is offering a full-stack solution with a quite clever design because we made our architecture compliant with the Linux environment. [...] This allows researchers to operate our Wi-Fi design the same way as any other commercial Wi-Fi interface card, which makes it very attractive for the research community. In the public domain we offer a full-stack Wi-Fi 4 compliant solution. This is not the most recent Wi-Fi technology, but it allows doing research and innovation on top of it because we offer a much richer driver offering more advanced control and monitoring*

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<sup>38</sup> The movie has since won both awards.

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*features compared to commercial Wi-Fi 4 chips. (Linda, Openwifi)*

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In a similar way, Friedrich at ZUM is considering sharing his work as an extension of what teachers already do. In their mind, openness seems to fit a shared and everyday practice that is part of their profession already.

Hector, at Gaia-X, does not refer at all to Digital Commons. He speaks a little about openness, but keeps coming back to the need for collective governance. For example, when comparing the different data spaces and arguing for decentralisation (see above), Hector answered a question whether Gaia-X being open source helped to avoid lockout, to ensure participation in the standard itself:

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*Open source has an important role, but it doesn't guarantee open governance. The whole code we produce is currently open source. However, the governance of "what is recognised as being entitled, authorised or recognised to run these confirmation nodes", that is chosen by Gaia-X. (Hector, Gaia-X)*

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All of these individual understandings show us that the concept of Digital Commons is not broadly shared, and is also in competition with other ideas and terms, particularly around the idea of openness (sometimes expressed as "public good" or DPGs) and the social economy. There are of course reasons why these concepts are in competition with each other, given the overlaps we (and other researchers) have already identified.

## 4.2 THE STATE OF COMMUNITIES

We showed in Section 1 that the communities were central to the definition of commons. In this section we want to try and describe the communities of the cases we studied. Once more, a monograph of a few cases would have been more precise, but this general overview gives an interesting transversal idea that we regrouped in broad categories.

### 4.2.1 Building a community

For most projects, the community was built afterwards. In Digital Commons, most of the projects start at the initiative of an individual or a few people, or of an organisation. For example, Tzoumakers started as a research project, and has proven itself useful for the local farmers, but not necessarily to the point for them to be willing to pay for the makerspace or to fully understand the relationship that the makerspace wants to create (not be there as a service provider but an enabler).

Leo explains how they have been trying to fit the makerspace within the general context of solidarity within families and between farmers that exists in the region. He notes that:

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*But we definitely don't use the words because you need to be adapting your vocabulary and the way that you frame a certain idea to the listener, of course. So instead of speaking about Digital Commons, we speak about understandings and know-how that you have and you can share with someone who in turn will share their own know-how and understandings. And that's how we better understand things and better build things. (Leo, Tzoumakers | P2PLab)*

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This difference in conceptual understanding of the practice also exists in Coopcycle. As previously noted, Coopcycle was not created by bike-delivery workers, but rather by people interested in setting up a collective organisation for them to own their tools of production, that is the platform, aligning with what has been conceptualised as platform cooperativism [52,53].

As previously mentioned, the founders have created a separate association (as they have no role to play in the worker-owned cooperative), and there has been some friction between the two organisations about what should be done.

When asked about the reference to the commons, Thomas answers that:

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*Originally, that's the idea. Once said that, the structures that rejoined Coopcycle have trouble understanding that. We provide services to structures, paid according to their use, and with a limited co-ownership [of Coopcycle and the platform], who meet once a year for the General Assembly, but who are still less in co-governance... that is easier to understand [...] for us, there was an imperative to help delivery workers working for platforms, so we had to provide tools without the whole theoretical framework before, as they needed the tool at a given point [...] still, I think we prove that [...] some of it remains (Thomas, Coopcycle)*

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The initiation of the community, and the potential shift of values between the creators and the participants is likely to be broad if it is not designed to be central in the first place. Once again, this issue is not surprising and exists under different forms in many groups.

#### 4.2.2 Open but alone

Openness doesn't guarantee that a community will form, or in some cases can even not be the concern of the actors. For example, Goteo offers a crowdfunding platform under a free licence, but there are many reasons why you wouldn't have many contributors: this is primarily a tool for people willing to organise multiple crowdfunding campaigns. You do not need it to raise money for one project. So the few reuse that Philippe was aware of were large entities (a city, universities, etc) that were willing to have a platform to organise periodically such systems.

Philippe also mentions that Goteo allows non-monetary contributions, and that the university of Barcelona uses the code of Goteo, but only the non-monetary part, having removed all references to money in the platform. But as Goteo is way more than the platform they coded, there are actually few working platforms. As Philippe notes:

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*[...] if you want to set up your own Goteo, or you want to develop your own Goteo, that means you also have to have a series of methodologies of engagement locally. Because if you have a Goteo set up, that doesn't mean the project you're publishing through that platform, which is yours, would be successful [...] So we don't have as many contributors as we would guess. So we have lots of replicas. Actually, I stopped looking at how many forks of Goteo were on GitHub. I think it was more than... I can find the number if you want [137]. It was a huge number, but four of them are still running. You know what I mean? So we do have internal developers for Goteo. We're not activating any specific engagement program around the code<sup>39</sup>. It's true. (Philippe, Goteo)*

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Although they are exceptions, it shows that when the resource is embedded in an organisation and tailored to its needs and inner workings, it is not obvious that it could be reused. Worse, when it is actually reused, it is largely modified and there is no contribution that can be made useful for multiple users.

This is largely because the software (and the open data it produces) are part of a larger economic and social organisation and not a product in itself: the crowdfunding platform process

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<sup>39</sup> This situation has changed after the interview since Goteo is rebuilding the platform from scratch with a new engagement strategy. See: <https://en.goteo.org/project/goteo-pero-mejor>

includes checking for the validity and the legitimacy of the project, whether the incentives and the objectives are acceptable, whether it fits the social objectives of Goteo. In this way, the platform is part of a larger process. This is a bit similar to Coopcycle, whose platform is mainly developed by benevolent developers from the early days and members of staff. Here again, the platform is a tool within last-mile bike delivery logistics companies, but there are many other challenges beyond the platform to be solved and the sole reuse of the platform won't help. Therefore these projects are open source, they can have very few contributors.

### 4.2.3 If you prove yourself

In other cases, openness is not necessarily a synonym of building a large community of contributors.

At Framasoft, there is no will to grow much. The association has approximately 38 members, counting the 11 staff members. The idea here is to have people that actually contribute to be part of the non-profit. The new members are co-opted and some leave when they don't align with the organization or if they have not been active. The small membership is expected to be active in working groups to actually run the organisation, which does not forbid others contributing voluntarily to the activities of the association or to the two software Framasoft develops (Mobilizon and PeerTube).

Building on these points, Camille from Framasoft explains why it is important to keep a "human size":

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*[...] if you don't know the person, their non-verbal, their mode of expression, you could completely miss the communication and the efficiency and the human part of it all. So there is that. [...] There is a limit around 10 for the staff members and a limit around 50 people in total, including the 10 staff members. That is approximately the limits we have set. (Camille, Framasoft)*

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Blender is open, so anyone can join the working groups on a given subject but this openness comes with several conditions. Asked how you decide which contribution make it to the code, Willem explains that:

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*It's a big question. Because it's open source. So up to a certain point, you don't. It's as simple as that. People contribute because they feel like it. They scratch their own itch. You have no control over that. So that's just a thing to accept. People will throw things over the fence and accept you to accept it. Because it works for them and they don't want to spend more time on it. Other people are really involved and want to see it improved and landed properly. And so they will keep working on things in collaboration with other Blender developers to really polish it and make it nice before it lands in Blender. (Willem, Blender)*

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Each working group, organised around modules, organises a weekly meeting, "open for everybody to join in" (Willem, Blender); this includes people writing the software and artists. On who gets the rights to do things, Luca explains that he considers Blender to be "a pretty meritocratic system":

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*And then it comes a lot down to your own vision, ability to communicate and the ability to deliver working software and software that is fun to use and software... And that is so hard that not a lot of people can do it ultimately. And so that's the meritocracy part of it, which is that, really to be able to pull this off, it takes quite some skills. And it's very interdisciplinary, because you need to have some pretty good engineering skills. design skills, usability skills. And as an individual contributor, you can advance areas of Blender*

*yourself, but you need to be really motivated, work really hard and be very skilled. And that is always a possibility. And that is something that is very much respected by the community of contributors. I think what happens fairly often is that Blender being so large and popular, lots of people think they can do it. So lots of people come and say, you should do this. You should do these three features. And with these three features, all problems, AKA my problems, will be solved and Blender will be perfect. We have to deal with that very often. (Luca, Blender)*

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These two projects decided to solve the need to filter out the people, to keep the project running and according to the vision they develop. Definition of the community and a closed community are two separate things. These two initiatives ensure using two different strategies, that they have a defined community that is stable over time, to ensure coherence and efficiency while being open: co-optation (based on previous experiences and encounter) and meritocracy. These strategies are also not new to practitioners or scholars working on open source projects.

## 4.3 GOVERNANCE OF THE COMMUNITY

We started to explain that governance was actually quite an important point of the definition of Digital Commons. Although we still can not study in detail the governance of each project (based on two interviews at best), and because governance will be the subject of another deliverable of the project (D. 3.3), we found some interesting trends.

### 4.3.1 Leaving the BDFL behind?

The Benevolent dictator for life (or BDFL) is a figure that has been found in many projects of open source software and in some knowledge projects. This well known figure of many open projects has little to do with the democratic decision-making that is characteristic of the commons. Schneider suggests that this “feudal” management model could have been embedded in the first tools (and the fact they were hosted in people’s houses), but argues that even when tools don’t organise centralised control, people tend to recreate it artificially. He also shows that some very solid and long-term projects can be organised democratically — although not without flaws, giving the examples of Debian and Wikipedia [54].

Some of the projects used to have charismatic leadership that were not necessarily called BDFL. Reflecting about the current management of Frictionless Data and the way the projects get traction or not, Adriana comes to the subject of this central role sometimes played by actors:

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*[...] what I observe in a lot of open source projects and not only open source projects, I think projects in general, is that sometimes when they're successful, it's also because there is a very charismatic leader that is there to bring them forward. And Jack was definitely that. He was super charismatic, super convincing. He really managed to gain traction for a lot of those projects. But a lot of the time I find that in the long term, those kind of people that then become the magnet of the whole thing it's not healthy. And it's not really sustainable in the long term. I think it also upsets people because then everything is centralised in one person. And when you invest your time in a project, then you also want your say. I don't know if this is what happened with Jack, to be honest. I know that some people were upset with him at the time. I don't know why, because I was not around. But it's like Python, you know, this kind of illuminated dictatorship. Sometimes it works, sometimes it doesn't work. Personally, I think there's a reason why tyranny didn't work, you know (Adriana, Open Knowledge Foundation | Frictionless data).*

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There is quite a lot of ambivalence in this definition, as, contrary to Schneider’s position, Jack managed to bring people along and to have the project starting and running. There is merit in

this position, which however has drawbacks. It could be the tendency to decide alone, some attitude issue, or other problems. It could also be a situation that everybody is happy with, but that needs to end, because that person is getting old and needs to be replaced. That is basically how Johannes, who founded Blender is described by the two interviewees who worked closely with him.

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*[...] basically you can't replace Johannes as is. You can't find a single person who has all the knowledge that he has, who has 30 years of experience working on Blender and maneuvering in the VFX and 3D and graphical industries, as well as knowledge on development, as well as knowledge on design, as well as knowledge on the whole fiscal side of things, what kind of subsidies are available, how to talk with that organization, how to talk with that organization, being involved with foundation memberships. There are so many sides to what he is doing. So part of it was getting more people, but also part of it was getting more explicit about what Blender means and what the way of working is at Blender. What is the philosophy? What is important there? What are his guidelines? (Willem, Blender)*

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Replacing Johannes, has explicitly described as a BDFL, after 25 years of knowing the in and outs of the software, the animation, the foundation, the companies that he founded requires to replace him with several people, taking over one of the aspects. But in the case of Blender, it brings up the necessity to make the mission, the spirit of the founder explicit, which is no easy task, but is central in the way the project evolves, according to the interviews. The same tension is to be seen when Alessandro speaks about Software Heritage. Expanding on the confidence (with the sponsors, see above), he explains that there is a lot at stake:

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*[...] that is a challenge, how do you get away with this confidence question? If I imagine the whole team being ran over by a truck [...] who is making sure things keep working properly? Without people you are confident with. That's where governance comes into play. So you need the structure to have a clear governance where you know there is a council of users, a scientific council, a General Assembly, clarity over who nominates future direction. (Alessandro, Software Heritage)*

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Taking W3C as a counter example, he explains that W3C had no clear legal status, and there were multiple entities of W3C worldwide hosted by other institutions in the US, France and Japan:

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*And all of it worked quite well because there was Tim Berners-Lee, who was the undisputed leader. He retired... What do we do now? And Étienne, who was in there, had clearly seen that there was the need for a proper structure. And the governance was not only to be "the leader said that" but the structure itself. (Alessandro, Software Heritage)*

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On multiple occasions, interviewees made reference to "startup mode", which they were sometimes in, or slowly phasing out. In this launching phase, the role of this central figure with a vision, a capacity to bring people together around the project, and create a sustainability model:

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*It's like in startups. People don't buy the products, they buy the people. Maybe the products are not good, but I see who I am working with. You will make something that works. That is the initial phase, you trust the creators and the initiators (Alessandro, Software Heritage)*

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But it also seems that this role has, at some point, which can be early or not, to be part of a bigger governance model, which should include democratic modes of doing things. This is where the Digital Commons approach can help build a governance that works for all the people, and allows human sustainability by avoiding or anticipating the fatigue of the founding figure. This process takes time and requires many skills that people don't necessarily have, as it is far from their field of expertise (there are legal, financial, tax and employment related questions). What has been called foundation is one of the models to organise governance as a non-profit, which is no guarantee in itself that the governance will be democratic, or even good.

### 4.3.2 The foundation model(s)

Software heritage is considering a change of status in the next five years, whereas Mastodon aims to do it in the coming months. Blender and Matrix already set up their foundation years ago.

The Blender foundation is a Dutch “Stichting” (foundation). Johannes, who founded Blender, but also the offices are all in the Netherlands, so it makes sense for them to have this national status. This foundation has been created in order to gather the money and buy the code from one previous bankrupted company's creditors. The foundation can receive donations, but isn't yet recognised as a charity so it can't offer tax-credit. This foundation has had Johannes as a chairman for 25 years, but doesn't formally take decisions for the project. It sets the vision and owns most of the copyrights. However, there is no contributor licence agreement at Blender, and some benevolent developers don't want to sign anything and have any contractual obligation toward Blender, so some of the copyright is owned by individuals.

The Matrix.org foundation is not a charity either, it is a Community interest company, which is a type of social enterprise in the UK. Here again, this is not a charity, and there is no mention of tax credit if there is a gift. On the Matrix' website, when mentioning the membership to the foundation, the target seem to be the enterprises: the foundation members listed are only enterprises, whereas the foundation shall have nine “community representatives”, which are four Individual Members, three Ecosystem Members and two Associate Members and 9 “funders representatives” (organised by funding-tiers) plus five “foundation representatives”<sup>40</sup>. The diversity of profile that should emanate from this leaves a great deal of power to companies or institutions representatives. Interestingly, although they could join and they are one of the major markets for Element, there is no public entity at the board of the foundation, yet.

During the interviews, Mastodon was in the process of changing their organisation. They announced it in January 2025 on their blog<sup>41</sup> and have to find a functioning organisational model before April or May because the non-profit company status which was set up in Germany (gGmbH) was removed by the German tax authorities. They are actually contesting this decision but the appeal process could end up turning the non-profit company into a classic for-profit company (GmbH). In 2024, they also set up an US charity (501(c)(3)), in order to collect donations (and to be able to allow tax-credits in the US):

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*Yes, of course. So the US entity was started as a completely separate entity. So it's not directly affiliated with Mastodon. It carries the Mastodon name. So there is a trademark license agreement between both entities. But we started it mainly for two reasons. First of all, fundraising purposes. For Americans, it's obviously much easier to donate to a tax exempt organisation, or not easier, but more attractive. And the second thing is to build bridges to American partner organisations. (Henry, Mastodon)*

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<sup>40</sup> See <https://matrix.org/membership/>

<sup>41</sup> See <https://blog.joinmastodon.org/2025/01/the-people-should-own-the-town-square/>

However this US entity is not going to be the main Mastodon foundation. The plan is rather to create a new structure, which has to be in Europe for “practical reasons” (most employees are in Europe), but also for “ideological reasons” (“philosophy on how to build software” and “how to deal with privacy”) according to Henry. But the change goes beyond finding a new non-profit status somewhere in Europe: Mastodon gGmbH is a company with one owner, Frederick, the founder of Mastodon and its first developer. Frederick is the actual CEO of the gGmbH and will very likely give up this place as he “doesn’t enjoy” (Alexandre) it and wants to get back to producing the software. Interestingly, this is a founder who wasn’t described as a BDFL, is described only positively, but still has chosen a company form that doesn’t fit the values of Mastodon:

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*[...] we have had a majority owner, Frederick, of the Mastodon assets. So Frederick is a trustworthy person and he only wants the best for Mastodon. But I think objectively, this is not ideal to have public goods basically and have them owned by a single person, no matter whether it's Frederick or I don't know, a venture capital fund or something like this. It doesn't matter. I think it's not great. This is something that must be fixed in the future. (Henry, Mastodon)*

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Here the change of organisation is actually threefold: change in the governance, change in the legal and administrative aspects of the initiative and change in the ownership of the assets of Mastodon. For this reason, the changes have been (and will be) phased: the most urgent:

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*Create a structure, have a bank account, be able to circulate the funds, be able to retrieve the assets, which for now are in Germany. How do we transfer this? How much does it cost? What taxes? [...] can we also bring back money from the United-States? (Alexandre, Mastodon)*

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For this process, the few people actually involved are accompanied by lawyers and also by the board of the US foundation, who are people they carefully chose to help guide them. They also took advice from many other open source foundations. The envisioned initial board will very likely be chosen to set up the rules of the foundation, which will include election for the future board members. The urge to solve this first step is prior to the final objective of a more democratic governance, which the interviewees stress is equally important. This urgent change of structure is quite a difficult and expensive process. They recently turned down venture capital funding, which Henry thinks are an acceptable way of funding for other companies but not for Mastodon, because

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*[...] at a certain point, there would have been an ask for a return. And this return is something that Mastodon in its current form simply can't offer an investor because the user data that we collect is the absolute bare minimum, as you know. We don't have any advertisement capabilities. So we would have had, basically, down the line, to completely rebuild probably the user model and what data we collect or what we try to sell them on top. [...] And I think it's very, very far away from the core ethos that we currently try to embrace. So I think as a financing form, it would have been an extremely bad strategic decision. (Henry, Mastodon)*

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Interestingly, they managed to get large funding from individual wealthy donors to fund this threefold process of change in the governance of the project. For the development of the project itself, they want to hire more people, but gradually,

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*We need to hire the right people, in the right state of mind. We need to have the time to include them, that they take the time to blend in, to take their positions, see if they are*

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*fine with it, to incorporate the values and all this. [...] I saw it too many times with clients in my consulting activity<sup>42</sup> who took investors. [...] you have six months to hire 40 people in a team of 20. It doesn't work. It rarely has the expected effects (Alexandre, Mastodon).*

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While Mastodon has a large user-base (approximately 1 million active users) it also has a very fragile governance model; simultaneously it is one of the projects where the interviewees were the sharing the most the importance of the embeddedness of their values — which are yet not collectively defined — in the structure itself, including the importance of democracy. Interestingly, the foundation model they imagine — “nothing is decided yet” said Alexandre — is not a “foundation” by status, but rather a Belgian international association (AISBL), which would be able to have the charity status, in order to offer tax-exempts but would not be a foundation by status. The Mastodon Foundation could then be the owner of the German — maybe yet become for profit — company, getting closer to the model of Blender. This model of a foundation keeping the assets, and specifically the copyright seem to be appreciated among open source projects, according to the interviewees. However, not everybody wants to have this model. The organisations tend to choose a form that fits their needs.

### 4.3.3 Custom needs, custom organisations

Other organisations have chosen other administrative forms than the foundation — or didn't choose a form yet.

Tzoumakers for example was just a project without a legal person. It was an initiative carried out by P2PLab, and now continued with support of The High Mountains. Giorgios would like to unite multiple initiatives including other makerspaces and other artisanal projects of the region under the umbrella of Tzoumakers. It will therefore obtain a legal personality after several years of existence. According to a plan diffused on their website<sup>43</sup>, a non profit company is being created (AMKE) and will be governed by the people and the organisations that will work under its umbrella.

Framasoft is a simple French non-profit (association). It fits their political discourse (helping the social economy with free tools) and it is relevant for other organisational purposes — being able to have grants (some of the grants are dedicated only to non-profit), having paid staff and benevolent contributors in the same structure (almost no company status allows this). When asked if they should grow, Olivier answers:

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*It depends how. I mean, if we had to grow, today, we would grow into another form than the non-profit association. I see no other solution. It could only become something like a cooperative. Given the values we share, it could only be a cooperative (Olivier, Framasoft)*

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The main reason given by Olivier for this hypothetical evolution is that the legal and HR responsibility of the (by law benevolent) board members of the non-profit regarding the employees is quite high and many volunteers want to stay away from it. The friction between staff members and benevolent, due to the difference of rhythm, therefore of information is known in structures where staff members and benevolent contributors work together, not only for producing the resources, but also for the daily life of the organization. Framasoft and Tzoumakers have found national statuses that meet their needs.

As they are territorially anchored, they don't necessarily need international statuses and multiple entities worldwide. This is however something that bothers Alessandro for the future

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<sup>42</sup> Alexandre's main activity is to do technical consulting for start-ups.

<sup>43</sup> [https://docs.google.com/document/d/1x0i2Tj36Vv1\\_63x20mF4oloXCc\\_6DDhNO95RZOGxfv4/edit](https://docs.google.com/document/d/1x0i2Tj36Vv1_63x20mF4oloXCc_6DDhNO95RZOGxfv4/edit)

of Software Heritage. The organisation is now a hosted foundation. It has no legal status but is aiming to define one in the next five years. The project is supported by UNESCO, which is an international multilateral organisation. At the same time, this archive aims to become an archive for the people of the world and doesn't necessarily want to have to comply with the equilibrium exercise that multilateralism can sometimes require.

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*[...] you need to understand what you are going to go for. Do you want [...] a multi-states structure? Do you want to avoid having States? And then, you have an organisation, which is not international, but national, because, you see, all these foundations claiming to be international foundations are absolutely not international. Linux Foundation is a foundation under the US law, Eclipse, now, a foundation under the Belgian law. (Alessandro, Software Heritage)*

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The needs and status of Software Heritage and Tzoumakers will never be the same (and should very much not be). These are examples of how the people decide to set up legally, in a given place with given people and political objectives, that were mentioned in our interviews or in the literature these projects produce. However, we saw that the point of these organisations is not to conform to a given status, but to align the organisational models to the requirements and the capacities of the collectives, but more importantly to the values they want to carry.

## 4.4 THE VALUES OF THE COMMONS

### 4.4.1 Building infrastructure

Building infrastructure is actually central for many projects we studied, with some important characteristics or purposes (decentralisation, governance and values, sovereignty). We already mentioned some of them disparately within this report, but we would like to consider the importance of infrastructure for the interviewees.

Infrastructure is a concept that can be understood very differently. The main conception of infrastructure in the context of this study would very likely be the Road and Bridges report [55], where the author is compare physical infrastructures with digital ones, where the digital suddenly lacks all tangibility and is purely made of software (pp. 38-45), and in the spirit of the report, FLOSS, that is then considered as a Digital Public Good. Most of the interviewees who are quite familiar with European discussions on digital issues and the concept of “digital infrastructure” seem to have accepted this reality. Other interviewees, some of which are computer scientists, are rather reluctant to call software “infrastructure”, as the lower layers of the digital are usually considered to be physical infrastructures (machines and cables). While the aim of this report is not to discuss what exactly composes the digital infrastructure, we will for now consider that both can be considered digital infrastructures, and show how the actors are dealing with this idea. Some are still doubtful faced with the idea of intangible infrastructure:

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*There are things I saw with such reasoning, like “platform state”, “infrastructure commons” with very concrete things. I think of the RIE [Réseau Interministeriel d'État], the State interministerial network, if I am not mistaken. These are not just discourses, there are also concrete things. Meanwhile, we answer, right now, to a call for a research grant, where they mention quite a lot of the infrastructure and I have a hard time connecting it to anything. [...] anyway it eludes me [...]. From a technical point of view, the infrastructure is going to be... I produced code. Now there is one step for the users to access it, it is going to be the server [...] server and data centers, and pretty much physical things at the end of the day (Jean, Multi)*

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Jean is quite confused with the idea that tangible goods could be infrastructure. On the contrary, Alessandro, when he defines Software Heritage, speaks about the archive as an infrastructure:

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*The aim is to build a long term non-profit multistakeholder international infrastructure, whose precise mission is to collect all publicly available source code, to make sure they are not lost and to make them available for all possible uses humanity can think of. (Alessandro, Software Heritage)*

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In the same way, David describes Europeana data space as a “fairly decentralized infrastructure”. As for Luca, he oscillates between infrastructure being the tangible layer (“everything like from having a website, having an infrastructure, having, you know, we self host a lot of our infrastructure”) to the possibility of Blender being an infrastructure, arguing that a fund like the Sovereign Tech Fund should get interested to fund them:

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*And then when you take a kind of a consumer, like a user product like Blender, I do often make an argument saying that Blender is infrastructure because it's like it's commons basically. You just use it to do stuff. It's like a web browser. You just have it and you do things with it. But for them, the definition is a little bit different because it's more like about the mid-low layer of things, more like about libraries and protocols and projects like that. (Luca, Blender)*

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Here again it comes down to a definition close to Eghbal: Blender is a public good (assimilated to commons), and as such constitutes an infrastructure on which people can do things. In the physical analogy Eghbal uses, the end-user product is similar to a maker-space: a place with tools open for people to produce what they want and need. In the case of Blender, a tool to express oneself. This is very similar to Mastodon, where Henry considers that:

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*We consider Mastodon as, although not on the protocol level, basically on top of this, but very, very close to infrastructure. If you think about it, maybe not so much on the societal level, sorry, not so much on the technical level, but if you think about social media from a society point of view, communication is really the plumbing, the blood, so to speak, of the society. Without communication, a society doesn't exist. (Henry, Mastodon)*

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Here Mastodon is considered an infrastructure, as much as some media could be considered infrastructure for the public debate, in an Habermasian idea of a public space. Here that the infrastructure is software or hardware is not the question, the digital products constitute infrastructure for the rest of the society to thrive, work, create, innovate, etc. In a similar way, beyond the dichotomy of tangible and intangible — which, as we showed in the first section doesn't make much sense, since there is no intangible goods without what Hess and Ostrom called avatars and infrastructure (which in this case are quite tangible), other definitions of infrastructure arise. For example, when asked about sovereignty, Linda explains:

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*Indeed, that's the European Chip Act.I. Digital sovereignty means digital independence at the European level. To further explain, I make a comparison with 3GPP [alliance of standards organizations which develop protocols for mobile telecommunications], Europe is strong in infrastructure: we have Nokia, and Ericsson as important infrastructure providers. But unfortunately, the Wi-Fi and 5G radio chipset that is in your smartphone or in your laptop, it's not produced in Europe. Europe has no IP [Intellectual property] for (digital) design of radio chips and have to rely on end devices with chipsets that are designed and produced in Asia and US. Coming back to the 3GPP example, any features may be supported in European infrastructure, but unfortunately the features*

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*cannot be exploited in deployments because there is no support for those features supported in the end device. So in terms of European sovereignty, I think open source projects can help to educate and train students who later become experts and can help Europe to bring back the expert knowledge they had in the past. In the past, Europe had many radio technology experts in the past. if I need to hire a radio technology expert today, it's very hard to find them because nowadays computer science students are not anymore interested in wireless communications because of the current AI machine learning hype. (Linda, Openwifi)*

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Infrastructure here is understood in a twofold manner here: First the chips themselves and the ability to build them. It is a matter of patents, of knowledge of conception and production, and according to Linda, this doesn't exist anymore in Europe (she also develops that later on). Here, she speaks about infrastructure in a tangible and economical sense (and the patents and companies associated with the production of them)<sup>44</sup>. But the second way she seems to interpret Openwifi as an infrastructure, or an educational platform, is when she explains how hard it is to find students that get interested in learning chip and radio design, as most of them want to become data science experts and high-level software engineers (e.g., cloud computing) and are not interested in the underlying electronics and physics and low level code that is needed to build a radio, Their interests are driven by the AI hype — following another hype on Blockchain, and pretty much seem to follow a pattern described by the sociology of expectations, which shows how cycles form in technology development, with firstly high technical expectations and hopes, followed by economic expectations and investment to end up being often deceptive and replaced by other exciting new features [56–58]. Openwifi can therefore be interpreted<sup>45</sup> as an infrastructure (the technological stack) that allows them to produce infrastructure (the knowledgeable engineers) that will produce future infrastructures (chips for the sovereign tangible infrastructure). Linda — who is also a university professor — defines education and knowledge as important (one could call it an infrastructure), as well as a research tool and a product they could innovate on, to offer solutions for the industry.

Digital Commons as Infrastructure takes many different meanings, some of which are directly related to the ideas of Digital Public Goods and their analogy to tangible infrastructures like roads and bridges. Some are confused by this analogy and prefer to call the tangible electronic equipment infrastructure. But in sum, many of them consider their activity as central for others or themselves to invent, innovate, learn, produce, work. Innovation is in itself a debated topic.

#### 4.4.2 The innovation conundrum

Innovation in itself is part of the evolution of the digital economy including the Digital Commons movements. This report is part of a European project financed under the NGI program, which is itself included within the Horizon Europe program and is set to finance innovation in the field of open technologies. We find that while all actors are funded to make something new<sup>46</sup>, they have different relationships to the idea of innovation. There might be several reasons why the actors want to innovate; it could be the technical challenge or it could also be because the actors have to, because of competition, of a funder's request, or to achieve ideals. Many of the interviewees spoke about innovation, in many different ways. Some of them have already

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<sup>44</sup> Much of the IP of a radio chip is in the chip design (turning the specifications of the standard into a chip design together with vendor-specific proprietary algorithms). There is also a lot of IP involved in the semiconductor processes & processing tools needed to manufacture the chips. While Europe has a strong position and is even leading worldwide for semiconductor processing and fab tools, it lags behind in design of advanced chips for wireless communication, and has very limited capabilities for semiconductor manufacturing. This puts Europe in a weak position in the current geo-political context.

<sup>45</sup> For Linda, 'infrastructure', which is commonly used for access points (i.e. tangible elements), is misleading in this context, as she mentioned during the review of this report.

<sup>46</sup> As opposed, among others, to regular maintenance or ergonomics

appeared before in the previous sections.

Europeana seem to be bound to innovate. They don't want to become irrelevant, and consequently to lose their funding. Therefore, they had to take part in a tender procedure to get the funding for the 4 next years. The last call was organised around the idea of turning Europeana into a dataspace. The above mentioned worries of Liv about the potential disconnect also express that this innovation request comes on top of the actual usual day to day work of the Europeana Initiative. Besides, as Liv mentions, "Europeana is known to be always at the front end of innovation in the cultural heritage sector".

Meanwhile, there is a sense of evidence when it comes to AI, people at Europeana seems quite optimistic about innovation and its positive aspects: the data is scrapped by European start-up companies that are saying they are willing to respect openness; Europeana is also part of a consortium where they develop another AI to remove bias from historical metadata, in order to suggest a less biased language for some of the racist or misogynistic language of the time. This position toward AI could be said optimistic (asking if AI is really able to solve new issues) or pragmatic (as AI is here, one should take part and steer it to a greater good instead of fighting it) is also to be found in Alessandro's words at Software Heritage.

However, even this will to innovate can come with difficulties. After explaining how lucky they feel to have EU public funding to develop the Europeana Initiative, David explains that:

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*[it] also comes with EU constraints [...] you're almost not allowed to fail. You're almost not allowed to experiment. If you do, then you need to hand the money back and say, you can't build an innovative platform if you can't fail. Well-known complaint about EU funding. (David, Europeana)*

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In Leo's mind, this is not the only limit to innovation. Once again he relates to the Digital Commons as he perceives them:

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*When currently innovation is pushed forward by the idea of a patent, even though patents through research that, if anything... they hinder innovation. So I think that at the grassroots level when you cultivate this idea of openness and when you cultivate business models that are empowered by openness rather than being limited by it. (Leo Tzoumakers | P2PLab)*

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In these two cases, innovation is self-evident, but some external factors might make it harder for people to innovate (technically). Moreover, in Leo's interview, he made it quite clear that innovation should also favor initiatives that are not motivated by growth but by the needs, and that innovation should strategically be oriented toward socio-economic models that are hard to industrialise. What the innovation should be turned toward is also a concern for multiple interviewees. For example, coming back to AI, there was also a concern at Framasoft, where they tried to question if, how and what they should use it for:

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*How in this digital world, people, and more generally society get to grips with AI and then how we — free software activists, with our desire to make the digital more ethical — how are we going to get to grips with the thing? Can we set free AI models? What effect will it have on our digital practices? Second thing, the low-technicisation, because we also think, on the one hand, that there is an environmental aspect of AI, and more broadly, of the digital world, which we are concerned about and we need to think about. Then, on the other hand, do we need to consider that — I don't like the word but — digital progress should necessarily include more innovation and therefore always more consumption, energetical or purely device consumption? (Olivier, Framasoft)*

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This reflection questions not innovation but the purpose of it and the expected outcomes. This also anticipates the following sections on social economy and the environmental concerns, because in these two fields as in many commons, researchers and practitioners question the growth objective as being viable (or its primacy).

But beyond innovation, there are also questions about innovation as a goal while Digital Commons also need to consolidate. It was shared among multiple interviewees but clearly expressed in the following remark, when we were about to stop the interview:

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*A complementary remark, not only on NGI, and maybe NGI does it less, I don't know. On funding... on the way funded projects are selected. I have the impression, this is not much, but in a general sense, that it is way easier to find funding for things that are sexy and fashionable. If I were to develop an open source product including AI, it would be way easier for me to find where to ask and get funding. There is a side-effect, which is that these are all new features. And sometimes, in open source projects, you want to consolidate, rather than creating new things. (Jean, Multi)*

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This is a need that is not only an external issue. For example when asked about how the decisions were made to improve the software at Blender, Willem explained:

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*The 4.3 release was delayed and there were some issues there and there were a lot of high priority bugs being reported. So we had, I think, two corrective releases afterwards. And then Ivan, among other people, said, like, look, this is not a good situation to be in. So let's pause. Let's stop with all the new stuff and just work on what's currently in Blender for two months. And that's what we now have called it the winter of quality. So that happens. And I was very grateful to him for saying that because I also felt like things are packed too closely together. So, yeah, I'm always eager to say yes when people say, let's do something cool. But in this case, I was very happy when Sergey said, let's not do something cool and let's focus on improving what we have. (Willem, Blender)*

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The financial autonomy Blender has allowed them to make this bold choice that Willem enjoyed so much. This work of maintenance is sometimes hard to fund, when the funding comes along with innovation. But this relationship between funding and innovation sometimes misses other points. We already mentioned Framasoft's and Blender's regrets that UX improvement couldn't be funded by many funding sources because it is not considered to be innovative.

Innovation can take multiple forms and is generally embraced by the actors we interviewed. However, some are more inclined to work toward social innovation or even within their field, to innovations that are not really considered as such (UX for the software, for example). Lastly, there are concerns about innovation when it comes to the people and the ecological footprint of the digital ecosystem the actors are part of. They are trying to question their own practice and want to have a say in the expected outcomes of innovation.

#### 4.4.3 The ecological footprint of the digital

The idea that Digital Commons could intrinsically be better for the environment has been around and debated for some time now [15,59]. It has also been questioned whether decentralised architectures, in addition to their values in terms of resilience and power distribution, also have a lower footprint than their centralised equivalents relying on more servers and data centers, and this task requires environmental impact assessment. The consequences of the massification of digital technologies on the state of the ecosystems and the effects it has in terms of climate change should call for a serious redirection [60]. The relation between commons and ecological redirection has been conceptualised as negative

commons [61]. Many actors seem to be concerned with the subject, and try to take the measure of the issue, although most of them express concerns but have hardly taken measures.

Coopcycle is for example producing a discourse on the environmental impact of their activities. In their mission statement (sent by email between the two parts of the interview) Coopcycle refers to "environmental sustainability". As we explicitly asked how this influenced the way they develop the software platform, we faced some form of misunderstanding:

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*For the software development part... sorry, trying to think about it... I think that for environmental sustainability, concretely, it's implemented in bike delivery. That is mostly respected. (Thomas, Coopcycle)*

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From an environmental perspective, bike delivery is for sure better than other motorised options. But the digital part was not a concern to the extent that the question seemed odd. This is part of the contradiction everybody experiences when measuring each of their actions in front of the massive challenges climate change poses.

At Blender, Luca expresses how uncomfortable this contradiction was when they mass produced a gadget as a crowdfunding incentive, in order to pay for a developers workshop and fly the developers in:

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*And it was a little rocket with the Blender logo. It cost — I don't remember — like 30, 40 euros or something like that. Something that was as high margin as possible [...] And people bought it like it was a... Yeah, I don't know. They were very excited to have it and lots of people got it. And I remember not feeling super well about this because — this is my opinion, of course — producing a token out of plastic to give to people so that they can show their support to the project instead of letting people simply donate towards the project. I love making products. I love to make physical things that you can hold and you can look at and be happy with it. And at the same time, there is this element of consumerism to it that is a bit unsettling because the reality is that to make this project successful, we have to do this. Otherwise, people will not donate. (Luca, Blender)*

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This example is not about the digital practices at Blender, but shows the contradiction the actors are facing, between developing their activity — which are naturally really important to them — and the effects it has on the environment — which, for some of them, is a sincere concern.

People at Tzoumakers are really able to link their practice of a commons with environmental sustainability:

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*So there are a lot of agronomic practices that people employ that are not really market oriented, you know, agroecology practices where they are very sustainable. They are geared towards people operating on a smaller scale. [...] proprietary market driven technology development institutions don't really see any profit to be made out of this. You know, if you have a thousand farmers spread across Europe applying a specific agroecological practice, then that's not enough of a crowd. It's not allowed to invest company resources for R&D to develop a little solution to make their lives easier, to make their practices a bit less backbreaking, let's say, because there's no demographic to actually buy that, to justify. [...] Whereas through the open source little ecosystems around, profit making isn't really the primary motivation. For some it might be, but there are people actively developing that type of hardware that see the benefit. They do it for the joy or they do it because they make some money, but they don't look to maximize*

*their profits. [...] So I think that the link [between Digital Commons] is much easier to forge basically. I'm not saying that it is already preexisting, but openness allows for that link to be forged and for that link to be very powerful. Because if you look at what L'Atelier Paysan<sup>47</sup> is doing, you're not gonna find any machinery that they produce that is useful to a massive farm that works with pesticides and has zero concerns about environmental stuff. They only work with people that do this kind of thing because the potential is there. (Leo, Tzoumakers | P2PLab)*

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This long development articulates the relationship between the different important ideas that Leo is linking to the Digital Commons. When market driven tool developments only focus on industrial agriculture because their primary concern is to grow, there is a need for tools. Therefore developing open hardware by and for the farmers, and sharing them in order for others to improve, is a dynamic which is not market driven, but driven by the needs of people.

In that sense, Digital Commons (here also assimilated to openness). Once again, we see the needs (of the farmers) as a primary motivation for collective action. And while he is critical about industrial agriculture and the main focus on growth for the tool-making industry, this approach is also very pragmatic as Digital Commons is a way to produce tools to sustain agroecological farming practices, which would otherwise be harder or less effective. Similarly and even closer to the digital devices, Jonas explains that:

*And the interesting question would be to find a way to have these common needs met without the capitalism economic model because capitalism fundamentally assumes that everything grows all the time, over time. And we have a planet with finite resources and we want to have infinite growth and it can't be sustainable. [...]. So we need to find another way. And I think thoughts like degrowth or if you focus on the software industry with frugal computing could be in a really good way. But frugal computing like designing your software in a way that it can run on cheap hardware takes a different approach. And I want to explore that with Forgejo, with Mark and Richard to see whether we can have our needs met with lower hardware. So if we don't want to scale vertically like having ever bigger machines, we need to scale horizontally. That means more of the same next to each other. That also implies that we will have to build up a network to share resources. And then we are back to ForgeFed where we have, for example, one provider offering CI services, another one hosting code services. You don't want to have a single computer hosting all the code services because then once that goes down, nobody can work on it. (Jonas, Forgefed)*

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Here again, the concerns about the planetary limits and the contradiction with the growth of the digital economy is also a justification for federating systems. Federation comes as a way to distribute resources and tasks, and as a way to be more resilient. And the work done by Jonas comes and fits into this objective.

In these last two examples, Digital Commons are concretely conceived as ways to develop digital systems in a direction that might be compatible with planetary limits, while taking care of the needs of humans rather than economic growth. But this social value and the potential relationship the actors make to the Digital Commons should also be further explored.

#### 4.4.4 The social value of the digital

The Tzoumakers initiative was under review at the time of the interviews, in order to find a way for them to be sustainable. As already mentioned above, they try to fit the needs of the people

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<sup>47</sup> L'Atelier Paysan is a French cooperative for farmers to share their practices and tools, including developing and sharing open hardware, which is an example regularly taken by Leo for what Tzoumakers aimed to be.

locally, and balance between finding a sustainable way to continue their activities, which are useful to the people, but without turning everything into a product. The High Mountain is always trying to find a socially accessible compromise, and most of their work for now is not paid, and the conclusion to this explanation is: “You invest also in people, in initiatives, in the things you believe. So it comes somehow like that.” (Giorgos, Tzoumakers | The High Mountains). When it comes to the social value, there is the risk that these are not well defined, to which the interviewees gave two different and very complementary answers.

Goteo, although referring to the commons and social economy and not to Digital Public Goods, uses the sustainable development goals for development in order to try and assess the social value of the projects submitted to their crowdfunding platform. They have developed a social value calculator, trying to take into account the direct and indirect socio-economic effects by the projects, and other types of values [62]. This work is done by members of Goteo’s staff assessing with the project the footprints they are going to have along three directions: social, ecological and democratic. These three footprints are related to some SDGs that directly relate to it.

Framasoft on the other hand, is led by people with a strong idea of the social value they want the digital to have. Interestingly, even if they want the digital to help move forward the causes they believe in, they are also not trying to solve all of the issues. In the manifesto they wrote:

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*We did not, on purpose, put forward the shared values that we all care for within Framasoft, on the ecological crisis and the ecological emergency, on the social injustice issues, the issues of feminism, as well as the queer and the racism issues, and so on. We did it on purpose, not to express them explicitly but for us, it is part of the first point “a more dignified world, built on sharing, solidarity and the Commons” and you see “the injustices, indignities and indecencies of the current world” that is what we put inside. Because for us, there is at the same time a potential indecency to claim yourself being part of these struggles, whereas we don’t necessarily have the competence, we are not exemplary... we try to work on this subject as much as possible but this is not our militancy core. Calling ourselves allies is one thing, pretending we’re activists on this question is another. So we prefer to position ourselves as allies on this matter. And for us, internally, the point is also not to overload our shoulders and to fall. That is a question of self-care (Camille, Framasoft).*

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This position of ally is something that has been thought through. The struggles mentioned are really important for them, some of them concern them sometimes personally. However, they focus on what they know, which is and try and make the tools they offer as helpful as possible for these struggles:

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*We noticed that... with Peertube, but as soon as something works. Many people come and say “accessibility could be improved. – yes”, “you still use Blacklist and Whitelist”... sorry Blacklist [laughs] I even swapped the word in my mind. “You use Blacklist and Whitelist, this is colonial, racist, and all”, which is true. (Camille, Framasoft)*

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Framasoft’s mission isn’t to save the world, but to build software and to sustain those who do. This idea that you could be an ally and provide tools for collectives and networks you are part of, is also shared by Goteo, and Philippe, as Camille at Framasoft, explains that they often bring digital solutions based on Goteo or Decidim to the networks and consortia they are part of. Of course, many other interviewees didn’t think specifically of these matters, either because they are focused on the digital realm where these issues are sometimes considered irrelevant (or out of scope).

But some of the Digital Commons did consider the role and the social value they could bring.

These two strategies are actually not similar: one is to say that the Digital Commons they provide should do something outside of the digital realm, the other asserts that it should make the digital realm more helpful and friendly to others' struggles.

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## 5 CONCLUSION: SUSTAINABILITY AT HEART, CUSTOMISATION AS A PROCESS

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This report has mapped how Digital Commons relates as a concept to other, cognate ones (mainly Free Libre Open Source Software and Digital Public Goods), while attempting to understand how the concept is already used, conceived and “practiced” by the individuals and organizations that produce them. To this end, we relied on interviews to better understand the inner workings of the projects but also to explore their beliefs and shared knowledge.

Section 1 presents the various definitions of Digital Commons and cognate concepts, their evolution over time and the importance of community structures, rules and governance: from tangible to Knowledge commons, Internet commons and Free Libre and Open Source Software and finally, Digital Public Goods and Infrastructure. We then described the methodology and criteria to select case studies for interviews, in order to reach diversity according to a set of criteria such as the type of resources available to them, the degree of openness of their licensing, the implication of contributors, the size of the communities, the country of origin of members and their prior obtention of NGI funding or not.

Section 2 presents the core beliefs and shared utopias of contributors we interviewed. They are related to openness as a techno-political ideal, with the recent emergence of the need to moderate it by certain restrictions to sharing for a greater good, and to the contribution to key features of the Internet: standardisation, the development of protocols and the contribution to decentralisation. We find that many of them share an ethos of freedom and free access to information that is often related to the Internet itself. Other successful large projects are also used as references by the respondents.

Section 3 focuses on the search for financial sustainable models, and shows that a major concern for those projects who continuously rely on public grants is the uncertainty of their duration and amount over time. Some projects might have the opportunity to build services and sustain themselves economically this way, but others are really designed to remain open, and will not be able to create a direct or an indirect stream of income out of their activity (for example producing standards), which calls for some longer term support of such activities. In order to mitigate that risk, we identified several practices which could deserve further research to better understand and maybe improve State involvement to support the financial sustainability of digital and internet commons. Of course these suggestions should be discussed by the stakeholders on both sides to avoid unwanted side effects, being a stiffening of innovation or a control on the values and directions.

- First, it could be interesting to identify if some criteria could be established to prioritise support at the end of a period when funding (e.g. European) was successfully obtained, or if this is not a good idea, what other public support mechanisms could be designed. Another problem of relying on grants is that they have to be managed, which requires bureaucratic time and skills. It could therefore be examined if and how lighter, more simple funding schemes, along the lines of what is proposed by NGI, could also be offered by States. The transposability of the models of subgranting, inspired by Platoniq or NLnet, could also be explored. Another feature to be considered is the appeal of the coaching, the contribution beyond financing, related to accessibility and licensing, and the need to extend such mentoring and support to other aspects of product development, such as design and user experience. The French DINUM or German Zendis model could be the focus of further research, as they offer such extra professional services and organisational guidance to their grantees. It was also identified in the literature, and confirmed in the section of this report that is focused on governance, that these young organisations also face legal, financial, tax and HR employment questions. These may require training or mentoring to ensure not only financial but legal and human sustainability of the projects, which may require changing

status in order to improve governance or solve an administrative or tax issue.

- Second, if selling to public entities appears to some entities to be more ethical, or more aligned with their values, the dependence to States as clients can also be problematic, because public finance rules are not always compatible with the need to design specific subscription models to stretch the funding to cover more fundamental work, such as maintenance, dependencies, infrastructure and future improvements on the software, which is separate and complementary from the sysadmin work on their instance. If public finance principles are at odds with financial and technical sustainability, it would be interesting to study the direct contribution to the Digital Commons by States, the motivations for the State to directly contribute to such initiatives, such as the legal mandates to not use closed software, or the increasing need to rely on sovereign solutions.
- Finally, it would be useful to study the difficulties States have to collaborate with private companies, due (albeit not exclusively) to the gap between what the State can pay for and what parts of open and free software development are uncovered, therefore unsustainable. Such study would make it possible to identify possible solutions and propose recommendations in that direction, to also cover other costs, from maintenance to usability and ergonomics, or financing more easily freelance status work and subcontracting. Ways to fund maintenance could be inspired by the current work of the Sovereign Tech Fund and the French DataGouv team. The model of subscription, very attractive for many, as it secures a regular and foreseeable income, could also be further researched and its suitability for public entities enquired.
- A third avenue to explore for States support of digital/internet commons is mutualisation of development costs. Based on the example of Matrix, French and German public administration could interconnect these messaging apps thanks to the federated protocol to have a transnational messaging system for public bodies. The model of sponsorship by private partners, with a fee for a meeting and transparent information, could also be explored to gather different States.

Section 4 presents the multiple definitions of the commons according to the actors. We found that they do not fit in a single definition, some developing certain aspects more than others, and do not comply with all elements of the academic definition with a shared resource, a community, a collective governance and political values.

More importantly, even if some actors refer to the commons and Digital Commons, many actors also refer to other, sometimes multiple cognate concepts: publicly available, public goods, open, free, sharing, with political values such as privacy, trustworthiness, but also social and solidarity economy and the proximity with cooperatives, with comparable democratic governance and political objectives. Many also referred to the specificities of free and open source software, the sharing of knowledge as a professional practice and the importance of decentralisation.

Still, the existence of multiple competing concepts is accompanied by a substantial overlap of practices, values and needs, and it should not be instrumentalised as a reason for States to not support the commons in light of an alleged “fuzziness” of the concept or because there are already sectoral policies in favour of social and solidarity economy and open source software which might benefit Digital Commons, internet commons or Digital Public Goods and infrastructure.

A key element of Digital Commons are communities, and for most projects, the community was built afterwards; that is to say, after the initiative had been started by an individual, a few people, or an organisation, following a certain objective. This may explain a difference of values between founders and users in some projects.

One project was created not by the workers but by people interested in setting up a collective organisation for them to own their tools of production. Openness doesn't guarantee that a community will form, or have contributors. One interesting finding was that although there are exceptions, when the resource is embedded in an organisation and tailored to its needs and inner workings, it is not obvious that it could be reused.

Worse, when it is actually reused, it is largely modified and there is no contribution that can be made useful for multiple users. This is largely because here, the resources, in these cases, are part of a larger economic and social organisation and not products in themselves. A shared digital resource isn't enough to make a social organisation around it and the social aspects are often way less documented by the community. Some communities decided to remain at the same time close to ensure stability and coherence and open based on meritocracy and cooptation, which has already been observed by the literature.

This impacts governance, and the traditional figure of the Benevolent dictator for life, which does not only question democratic decision-making, but human sustainability, a problem also identified in other organisations including non-profits and start-ups, and the need to replace individuals with broad knowledge and document history and the original mission political vision.

Different organisational statutes have been adopted to fit their needs, cooperatives, associations, foundations, social enterprises, non-profit companies, charities – for practical, legal and administrative, but also ideological reasons. This choice impacts governance, and rights ownership, allowing creative management of assets and dual licensing practices described in section 2, and requires time and guidance. The point of these organisations is not to conform to a given status, but to align the organisational models to the requirements and the capacities of the collectives, but more importantly to the values they intend to carry.

The values of the commons which we studied are ecological, social, building infrastructure and questioning innovation, and what lays behind, such as maintenance. Many of these projects consider themselves as infrastructure for society and the people (rather than for the digital world itself) which also comply with the fact they often think of themselves as public goods. Some question this infrastructural aspect as they rather use this concept to describe machines and cables. Innovation is probably one the values that is the most debated between the respondents: some praise innovation and want to innovate, others use the term to refer to social innovation, while some would rather use other concepts, specifically leaning toward a vision of a more sustainable and human friendly future. Indeed, many question the ecological impact of their digital and material activities, while most concede that they don't have actually done much to implement these values. This last question of the values of the commons brings us back to the research question raised by section 3 of the role of the public sector, and the possibility to also support tasks adjacent to those awarded in grants, product development or service subscription, in order to fulfill those values, which are also public service missions.

This report concludes a one-year research aiming to map Digital Commons in Europe. This mapping supports the conclusion that there seems to be a coherent definition of Digital Commons, which is however rarely used, or endowed with multiple meanings by the actors. To clarify, few projects studied in this report are actually fitting all criteria of the definition of Digital Commons we found. This report did not mean to assess conformity to a definition nor to find a definition that could describe them all, that would only be a highest common denominator lacking relevance.

However the focus on the commons helped spot some of the struggles some projects have with managing (or even building) a community, or the importance of the governance. This governance should be further studied and specifically introducing multiple layers of governance: according to the theory of the Commons, governance over the resource and of the community are known and well established but our research made quite clear that the venture and its administrative form (for-profit, nonprofit or sometimes the way these are intricate) have to be considered as well. Focus on the Digital Commons aspects allows us to

go beyond the free licenses, that are only defining modality of ownership over the Digital Resource.

Contrary to the case of DPGs, for which a standardisation entity exists and assesses the conformity to a given standard, there is no standard for Digital Commons. While we see that some models seem to work and have been reproduced in other projects for specific parts of the governance over the resource, others are customized to fit the needs and political values of the projects. Following the literature on tangible Commons, we argue that there should very likely not be a standard for Digital Commons, but rather a few rules deduced from the analysis of the projects. While this study is not enough to determine with certainty such rules, a few patterns seem to occur, for example:

- There is a separation of the for-profit and non-profit parts of the initiative (when both are present, which is not the case of all projects): the non-profit secures the commonality aspects, while the for-profit allows people to live from their work
- Most projects are started by individuals or organisations that will not spontaneously create community. The goal is, ultimately, to achieve a collective governance over the whole commons.
- The EU and its Member States are very present in the life and evolution of several projects, either for-profit or nonprofit. Public entities use, buy, sponsor, support and sometimes produce digital resources that can be qualified as Digital Commons – and at times, indeed, they are labeled explicitly as such.

While this mapping has been a mapping of diversity of the Digital Commons in Europe, we can also conclude on the fact that European borders are hard to define with digital resources as they can be developed regardless of borders. Most Digital Commons have contributors across multiple countries to continents. This work could be usefully complemented by similar studies in other regions of the world. Moreover, many actors challenge a border-based definition of digital sovereignty to focus on freedoms of the users, and the European values they are enabling by offering digital resources for the people rather than extractive proprietary solutions, wherever they come. The definition of (digital) sovereignty seems therefore to encompass autonomy and self-determination (for the software and online service uses and the ability to move away from them, data portability and interoperability, etc.), and moves beyond the original connotation related to States, to invest possible prerogatives or claims of firms and organizations, but also of citizens, both as individuals and organized civil society.

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# ANNEX I: INFORMATION SHEET AND CONSENT FORM

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## INFORMATION SHEET ON THE DATA PROTECTION IN RESEARCH STUDIES

**Title of Project: NGI Commons — Open Source and Internet Commons for Europe's Digital Sovereignty**

**VERSION 1.0**

\*\*\*\*

The data collected about you will be processed as part of the project NGI Commons conducted by Valérien Guillier. The data controller is Mélanie Dulong de Rosnay (Unit Director, 59-61 rue Pouchet, 75849 PARIS CEDEX 17)

### Description of project and processing

The purpose of this project is to map open digital project with a shared governance. We aim to analyze:

- How the work is organized within the project
- How decisions are made within the project
- What values are important in the project
- What funding and sustainability model you have
- What relationship to other projects and to the private and public sector you have

The legal basis of the data processing is the execution of a mission in the public interest for the purpose of scientific research (article 6, 1, e) of the GDPR

Data processing concerns volunteer or salaried contributors to a collectively managed resource or its governance

### Data collection, recipients et storage

Collected and processed data are:

- Identification data: last name – first name – Sex – Age groups – email
- Data on professional life: Diplomas – Schools – Elective offices
- Data on political opinions: political values and orientation

This data may be the subject of subsequent work by the consortium within the framework of NGI Commons and of reuse for subsequent research purposes.

The recipients of this data are the researchers of the Center for Internet and Society (UPR 2000) involved in this project as well as NGI Commons partners (Open Future, OpenForum Europe AISBL, Linux Foundation Europe, Martel Innovate BV, Martel GmbH).

The data will be pseudonymized before publication of the research results.

No data transfer outside the European Union will occur

Recording data will be stored 6 months after the end of the recordings and the transcribed data will be stored up until 24 months after the end of the NGI Commons project (that is until december 2028) and thereafter permanently archived

## Free Participation

Your participation to this project is completely free and voluntary

## Security measures

In order to guarantee the confidentiality of your data and avoid any disclosure, all security measures have been taken, for the software and the hardware

## Exercise your rights

You can access and get a copy of the data related to you, oppose data processing or ask for rectification. You also have the right to limit data processing of your data. To exercise your rights please address:

Valérien Guillier  
59-61 rue Pouchet, 75849 PARIS CEDEX 17.  
[valerian.guillier@cnrs.fr](mailto:valerian.guillier@cnrs.fr)

You can also contact the Data Protection Officer (DPO) of the CNRS at the following address:

CNRS - Service protection des données  
2 rue Jean Zay, 54519 Vandoeuvre-lès-Nancy  
[dpd.demandes@cnrs.fr](mailto:dpd.demandes@cnrs.fr).

Please note, however, that the exercise of the right to erasure (article 17 of the GDPR) could be prevented due to the fact that this data processing pursues a mission of public interest. The same applies to the exercise of the right to portability (article 20 of the GDPR).

If you consider that your data protection rights are not respected, you can submit a complaint online to the CNIL, 3 Place de Fontenoy, TSA 80715 – 75334 Paris Cedex 07 (<https://www.cnil.fr/>).

## CONSENT FORM

**Research Project:** « NGI Commons »

**Data controller:** Mélanie Dulong de Rosnay (*Directrice d'Unité, 59-61 rue Pouchet, 75849 PARIS CEDEX 17.*)

**Project manager:** Mélanie Dulong de Rosnay

**Principal Investigator:** Valérian Guillier

**Participant:** **First name and Last name**

**Please read this form carefully.**

**Don't hesitate to ask questions when you don't understand something or want clarification.**

- I confirm that I have read and understood the information communicated in the information sheet, I have got satisfactory answers to my questions, I have been informed that I am free to withdraw my consent or withdraw from this research at any time, without prejudice.

YES  NO

- I consent to the data controller processing my so-called "sensitive" personal data, in accordance with the exceptional regime provided for in Article 9, 2. a) of the General Data Protection Regulation (GDPR).

YES  NO

- I give my consent to the processing of my data; however, I understand that it is carried out in the pursuit of a mission of public interest for scientific research purposes (Article 6, 1. e) of the GDPR).

YES  NO

- I agree that data relating to my voice will be collected, stored and used by the project team.

YES  NO

- I agree that my pseudonymised comments are used for scientific publications and conferences, seminars or in any form of promotion of the project (articles, books, etc.)

YES  NO

**Place, Date: Signature of participant**

**Investigator Certification:** I hereby certify that I have explained to the participant the nature, importance and scope of the project. I declare that I satisfy all obligations in relation to this project. If I become aware, at any time during the completion of the project, of elements likely to influence the participant's consent to take part in the project, I undertake to inform them immediately.

**Place, Date: Signature of investigator:**

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## ANNEX II: INTERVIEW GRID

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### WORK ORGANISATION

- What is your organisation about?
- What do you make/do in the project?
- Since when do you take part in the project?
- Why did you join the project?
- What roles did you have in the project so far? In the making of the resource and in the governance of the project
- What do you like / dislike about this project?

### ORGANISATION MODELS

- What kind of business model does this project have? Freemium, paid services / products, paid by-products, paid improvements, public funding, private funding, volunteer contributions?
- What socio-legal form (informal, cooperative, association, company) for the project and potential umbrella organisation?
- What sort of work-organisation does this project rely on? Paid and/or free contributions? multiple private companies' contributions? Single private company? Single actors contributing?
- How are contributions organised (bottom-up commons-based peer production? top-down coordination? A mix of both?)
- How big can and should the project grow? How can they ensure sustainability and maintenance and beyond, scaling opportunity and limits? How should the project fund this development?
- How do the actors conceive and work on the project's sustainability?

### HOW INTERCONNECTED IS THIS PROJECT WITH OTHER ECOSYSTEMS

- How do the actors take part to events, federations, advocacy, lobbying at the national, european and international levels?
- What network(s) do they take part in?
- What relation do they have to public, private and other community-based actors (relationships & interconnection with ecosystem)? How do they conciliate public top-down strategic interventions with community-based approaches?

### FUNDING MODELS AND PUBLIC SUPPORT FOR COMMUNITY-BASED DIGITAL PROJECTS

- Did they ask and/or receive funding? What type of funding did they ask for? What was the purpose of this funding? Where did they get it? How did they choose the funding? How hard

was it to get (what conditions)? If they didn't ask for funding, what were the reasons (No need, political reluctance, administrative burden, lack of opportunities or of internal competences,...)?

- What is the project's current funding model? Based on their experience, what are the benefits and challenges associated with their current funding model?
- What are their needs for this project in terms of work, use, funding? How could/should public entities (EC, States, EDIC, sovereign funds, etc) help provide what kind of support (public policies, funding, public procurement contracts, public visibility, accommodating legal framework...)?
- Are there any other projects/communities (in their field or other digital commons or not) that they believe have particularly effective or innovative funding models? What lessons can be learned from their approach?
- If they could change one thing about the current funding ecosystem in Europe, what would it be and why?
- Have they been funded by the NGI programme? What factors do they think funding bodies like NGI should prioritise to maximise their impact and alignment with the projects' needs?
- What are key initiatives (other funding, incubators, etc.) they have benefited from in the past?
- Are there legal frameworks or policies that the actors consider to be a problem for the development or the growth of their project, or have been particularly useful to their creation or development? Are they able to contribute to policy-making or do they feel represented at the EU/EC/EP/national tables or would there be a need for an advocacy coalition?
- How much do the actors perceive other countries or regions' efforts to structure and valorize similar projects? How do they think these initiatives should and/or could be reproduced in their country / in the EU?
- Is there any level of intervention (local, national, European, global) that seems most relevant for them?
- What practical advice would they offer to similar projects?
- Would they have benefitted from mentoring from larger or older similar projects, or be amenable to mentor a younger project?

## **(HOW) CAN/SHOULD DIGITAL COMMONS TRANSFORM SOCIETY, ACCORDING TO THE ACTORS?**

- How do actors subscribe, use and define the concept of DC? What are the variations? Do they reflect different subcommunities or values?
- How do actors define key characteristics of the digital commons?
- How do actors evaluate the role of their DC in the shaping of society and the affordance or human rights and digital rights and freedoms? the role of DC as a whole in the shaping of society and the affordance or human rights and digital rights and freedoms?
- What is needed, according to them, for the DC to be more widely adopted, powerful and useful to society? What are the barriers they have met to reach their full potential and be known by users?
- What do they think are or should be public digital infrastructures?

- How important should DC be in the shaping of Public Digital Infrastructures / sovereign digital infrastructure? How important are Public Digital Infrastructures for the prosperity and development of DC?
- How much does the commons they are part of contribute / take part to the movement of decentralisation, sovereignty and resilience of [the Internet/the Commons / the DC / the economy]?

## WHAT ARE THE VALUES ASSOCIATED WITH THE DC?

- Does the project wish to convey values? What values are carried by the project?
- How do the actors mobilise values? Which values are spontaneously displayed? Which values do they think are specific to their field/DC and which do they think are more universal to all DC?
- How do they define these values and objectives? How were these values set? Are they updated? In what spaces are they discussed?
- What justification of the link between their DC and the associated value are they giving?
- How are these values actually implemented? (in governance, in producing the commons, are they part of the communication, the licensing conditions, the business models, to get funding?)
- Are the values reasons for people to join and use this DC?
- Who are the actors who generate the values, i.e. top-down developers (e.g. maintainers), grassroots contributors/users (e.g. community) or both?
- What are the mechanisms, if any, for evolving and negotiating project values? (related to governance analysis in Task 3.3)
- Are the values that are commonly associated to DC (sovereignty, respect of privacy and what other human and digital rights and freedoms, ecology, etc) endogenous to the projects (i.e values which are goals produced by the DC?) or do they constitute an exogenous way of justification (imported from current discourse for valorization), etc.

## ANNEX III: LIST OF INTERVIEWS

TABLE 2: LIST OF INTERVIEWS

| Project                  | Type                      | Website   | Country | NGI direct funding | NGI indirect funding | License(s)                           | Sharing terms                                   | Umbrella name (if any)                                 | Umbrella type          |
|--------------------------|---------------------------|---|---------|--------------------|----------------------|--------------------------------------|---|--|------------------------|
| <b>Blender</b>           | software, knowledge       | <a href="https://blender.org">blender.org</a>                   | NL      |                    |                      | GPLv3; CC-BY                         | Under conditions (SA, freemium)                 | Blender foundation; Blender institute                  | Foundation; enterprise |
| <b>ZUM</b>               | knowledge                 | <a href="https://zum.de">zum.de</a>                             | DE      |                    |                      | CC                                   | Under conditions (SA, freemium)                 | Die „Zentrale für Unterrichtsmedien im Internet e. V.“ | Non-profit             |
| <b>Coopcycle</b>         | platform coop             | <a href="https://coopcycle.org">coopcycle.org</a>               | FR-DE   |                    |                      | MIT, coopcycle licence               | Strong restrictions (own licences, copyfarleft) | Association Coopcycle                                  | Non-profit             |
| <b>Framasoft</b>         | software                  | <a href="https://framasoftware.org">framasoftware.org</a>       | FR      | 4                  | 1                    | AGPLv3                               | Under conditions (SA, freemium)                 | Framasoft  | Non-profit             |
| <b>Goteo</b>             | software                  | <a href="https://www.goteo.org">www.goteo.org</a>               | SP      |                    |                      | AGPLv3                               | Under conditions (SA, freemium)                 | Platoniq Fundación                                     | Foundation             |
| <b>Forgefed</b>          | standard, software        | <a href="https://forgefed.org">forgefed.org</a>                 | US-CH   | 2                  |                      | CC0                                  | Fully open                                      |  |                        |
| <b>Matrix</b>            | software, standard        | <a href="https://matrix.org">matrix.org</a>                     | UK      |                    | 4                    | Apache2                              | Fully open                                      | The Matrix.org foundation C.I.C                        | Foundation             |
| <b>Software Heritage</b> | software, data, standard  | <a href="https://softwareheritage.org">softwareheritage.org</a> | FR-WW   | 4                  |                      | GPLv3                                | Under conditions (SA, freemium)                 | Inria / software heritage?                             | Foundation             |
| <b>Europeana</b>         | data, knowledge, standard | <a href="https://europeana.eu">europeana.eu</a>                 | EU      |                    |                      | European Union Public Licence v. 1.2 | Under conditions (SA, freemium)                 | Fondation Europeana                                    | Foundation             |

|                              |                                    |   |         |   |  |                              |                                       |  |            |
|------------------------------|------------------------------------|---|---------|---|--|------------------------------|---------------------------------------|--|------------|
| <b>Gaia-X</b>                | data,<br>standard                  | <a href="https://gaia-x.eu">gaia-x.eu</a>   | EU-BE   |   |  | Eclipse<br>Public<br>Licence | Under condition<br>(SA)               | Gaia-X European<br>Association for Data<br>and Cloud AISBL | Non-profit |
| <b>Openwifi</b>              | hardware,<br>software,<br>standard | <a href="https://github.com/open-sdr/openwifi/blob/master/doc/README.md">github.com/open-sdr/openwifi/blob/master/doc/README.md</a> | BE      | 1 |  | AGPLv3                       | Under<br>conditions (SA,<br>freemium) |  |            |
| <b>Mastodon</b>              | software                           | <a href="https://joinmastodon.org">joinmastodon.org</a>   | DE      | 1 |  | AGPLv3                       | Under<br>conditions (SA,<br>freemium) | Mastodon gGmbH   | Non-profit |
| <b>Tzoumaker</b>             | software                           | <a href="https://tzoumakers.gr">tzoumakers.gr</a>   | EL      |   |  | ???                          | Under<br>conditions (SA,<br>freemium) |  |            |
| <b>Frictionless<br/>Data</b> | data,<br>software                  | <a href="https://frictionlessdata.io">frictionlessdata.io</a>   | UK - FR | 1 |  | MIT                          | Fully open                            | Open Knowledge<br>Foundation / Multi                       | Foundation |

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## ANNEX IV: INTERVIEWS

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Please refer to the document “**D1.1 Active communities of commoners and relevant commons – Annex IV**”.