Horizon 2020

Excellent Science

Call: ERC-2018-STG

(Call for proposals for ERC Starting Grant)

Topic: ERC-2018-STG

Type of action: ERC-STG

(Starting Grant)

Proposal number: 802512

Proposal acronym: COSMOLOCALISM

Deadline Id: ERC-2018-STG

Table of contents

How to fill in the forms

The administrative forms must be filled in for each proposal using the templates available in the submission system. Some data fields in the administrative forms are pre-filled based on the previous steps in the submission wizard.

Proposal ID **802512** *Acronym* **COSMOLOCALISM**

1 - General information

Topic	ERC-2018-STG
Call Identifier	ERC-2018-STG
Type of Action	ERC-STG
Deadline Id	ERC-2018-STG

Acronym	COSMOLOCALISM
Proposal title*	Design Global, Manufacture Local: Assessing the Practices, Innovation and Sustainability Potential of an Emerging Mode of Production

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months*	*48*
Primary ERC Review Panel*	SH2 - Institutions, Values, Environment and Space
Secondary ERC Review Panel	Not applicable (if applicable)
ERC Keyword 1*	*Democratisation and social movements*

Please select, if applicable, the ERC keyword(s) that best characterise the subject of your proposal in order of priority.

ERC Keyword 2	*Environmental and climate change, societal impact and policy*
ERC Keyword 3	*Technological change, innovation, research & development*
ERC Keyword 4	*Not applicable*
Free keywords	*Digital commons, open innovation, political ecology, open design, open hardware, technology governance, desktop manufacturing, sharing economy, cooperatives, post-growth, social entrepreneurship*

Abstract*

COSMOLOCALISM will document, analyse, test, evaluate, and create awareness about an emerging mode of production, based on the confluence of the digital commons (e.g. open knowledge and design) with local manufacturing and automation technologies (from 3D printing and CNC machines to low-tech tools and crafts). This convergence could catalyse the transition to new inclusive and circular productive models, such as the "design global, manufacture local" (DGML) model.

DGML describes the processes through which design is developed as a global digital commons, whereas the manufacturing takes place locally, through shared infrastructures and with local biophysical conditions in mind. DGML seems to form economies of scope that promote sustainability and open innovation while celebrating new ways of cooperation. However, such claims rest on thin conceptual and empirical foundations.
COSMOLOCALISM is a multiphase, pilot-driven investigation of the DGML phenomenon that seeks to understand relevant

organisational models, their evolution, and their broader political economy/ecology and policy implications. Through the lens of diverse case studies and participatory action research, the conditions under which the DGML model thrives will be explored.

COSMOLOCALISM has three concurrent streams: practices; innovation; and sustainability. First, DGML practices will be studied, patterns will be recognised and their form, function, cultural values, and governance structure will be determined. Second, the relevant open innovation ecosystems and their potential to reorient design and manufacturing practices will be examined. Third, selected DGML products will be evaluated from an environmental sustainability perspective, involving both qualitative and quantitative methods. The interdisciplinary nature of COSMOLOCALISM will explore new horizons to substantively improve our understanding of how we could do "more" and "better" with less.

Remaining characters 53

In order to best review your application, do you agree that the above non-confidential proposal title and abstract can be used, without disclosing your identity, when contacting potential reviewers?* (•) Yes ( ) No

Proposal ID **802512** *Acronym* **COSMOLOCALISM**

Declarations

In case of a Synergy grant application 'Principal Investigator' means 'corresponding Principal Investigator on behalf of all Principal Investigators', and 'Host Institution' means 'corresponding Host Institution'.

1) The Principal Investigator declares to have the written consent of all participants on their participation and on the content of this proposal, as well as of any researcher mentioned in the proposal as participating in the project (either as other PI, team member or collaborator).*	☒
2) The Principal Investigator declares that the information contained in this proposal is correct and complete.	☒
3) The Principal Investigator declares that all parts of this proposal comply with ethical principles (including the highest standards of research integrity — as set out, for instance, in the European Code of Conduct for Research Integrity — and including, in particular, avoiding fabrication, falsification, plagiarism or other research misconduct).	☒

4) The Principal Investigator hereby declares that *(please select one of the three options below)*:

- in case of multiple participants in the proposal, the Host Institution has carried out the self-check of the financial capacity of the organisation on http://ec.europa.eu/research/participants/portal/desktop/en/organisations/lfv.html or to be covered by a financial viability check in an EU project for the last closed financial year.Where the result was “weak” or “insufficient”, the Host Institution confirms being aware of the measures that may be imposed in accordance with the H2020 Grants Manual (Chapter on Financial capacity check).	○
- in case of multiple participants in the proposal, the Host Institution is exempt from the financial capacity check being a public body including international organisations, higher or secondary education establishment or a legal entity, whose viability is guaranteed by a Member State or associated country, as defined in the H2020 Grants Manual (Chapter on Financial capacity check).	○
- in case of a sole participant in the proposal, the applicant is exempt from the financial capacity check.	◉
5) The Principal Investigator hereby declares that each applicant has confirmed to have the financial and operational capacity to carry out the proposed action. Where the proposal is to be retained for EU funding, each beneficiary applicant will be required to present a formal declaration in this respect.	☒
The Principal Investigator is only responsible for the correctness of the information relating to his/her own organisation. Each applicant remains responsible for the correctness of the information related to him and declared above. Where the proposal to be retained for EU funding, the Host Institution and each beneficiary applicant will be required to present a formal declaration in this respect.	

According to Article 131 of the Financial Regulation of 25 October 2012 on the financial rules applicable to the general budget of the Union (Official Journal L 298 of 26.10.2012, p. 1) and Article 145 of its Rules of Application (Official Journal L 362, 31.12.2012, p.1) applicants found guilty of misrepresentation may be subject to administrative and financial penalties under certain conditions.

Personal data protection

The assessment of your grant application will involve the collection and processing of personal data (such as your name, address and CV), which will be performed pursuant to Regulation (EC) No 45/2001 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data. Unless indicated otherwise, your replies to the questions in this form and any personal data requested are required to assess your grant application in accordance with the specifications of the call for proposals and will be processed solely for that purpose. Details concerning the purposes and means of the processing of your personal data as well as information on how to exercise your rights are available in the privacy statement. Applicants may lodge a complaint about the processing of their personal data with the European Data Protection Supervisor at any time.

Your personal data may be registered in the Early Detection and Exclusion system of the European Commission (EDES), the new system established by the Commission to reinforce the protection of the Union's financial interests and to ensure sound financial management, in accordance with the provisions of articles 105a and 108 of the revised EU Financial Regulation (FR) (Regulation (EU, EURATOM) 2015/1929 of the European Parliament and of the Council of 28 October 2015 amending Regulation (EU, EURATOM) No 966/2012) and articles 143 - 144 of the corresponding Rules of Application (RAP) (COMMISSION DELEGATED REGULATION (EU) 2015/2462 of 30 October 2015 amending Delegated Regulation (EU) No 1268/2012) for more information see the Privacy statement for the EDES Database).

Proposal ID **802512** *Acronym* **COSMOLOCALISM**

List of participants

#	Participant Legal Name	Country
1	TALLINNA TEHNIKAULIKOOL	Estonia

Proposal ID **802512** *Acronym* **COSMOLOCALISM** *Short name* **TUT**

2 - Administrative data of participating organisations

Host Institution

PIC	***Legal name***
999842536	*TALLINNA TEHNIKAULIKOOL*

Short name: TUT

Address of the organisation

Street Ehitajate tee 5

Town TALLINN

Postcode 19086

Country Estonia

Webpage www.ttu.ee

Legal Status of your organisation

Research and Innovation legal statuses

Public body ..... yes
Non-profit ..... yes
International organisation ..... no
International organisation of European interest ..... no
Secondary or Higher education establishment ..... yes
Research organisation ..... yes
Legal person ..... yes

Enterprise Data

SME self-declared status ..... 08/10/2002 - no
SME self-assessment ..... unknown
SME validation sme ..... unknown

Based on the above details of the Beneficiary Registry the organisation is not an SME (small- and medium-sized enterprise) for the call.

Department(s) carrying out the proposed work

Department 1

Department name: Ragnar Nurkse Department of Innovation and Governance ☐ not applicable

☐ Same as organisation address

Street: Akadeemia street 3

Town: Tallinn

Postcode: 12618

Country: Estonia

Principal Investigator

The following information on the Principal Investigator is used to personalise the communications to applicants. Please make sure that your personal information is accurate and for any ERC specific question please contact the ERC using the following e-mail address:

For Starting Grant Applicants: ERC-2018-StG-applicants@ec.europa.eu

The name and e-mail of contact persons including the Principal Investigator, Host Institution contact are read-only in the administrative form, only additional details can be edited here. To give access rights and contact details of contact persons, please save and close this form, then go back to Step 4 of the submission wizard and save the changes.

ORCID ID	0000-0002-3276-9282
Researcher ID	N / 4588 / 2015 — *The maximum length of the identifier is 11 characters (ZZZ-9999-2010) and the minimum length is 9 characters (A-1001-2010).*
Other ID	*Please enter the type of ID here* / *Please enter the identifier number here*

Last Name*	KOSTAKIS	Last Name at Birth	Kostakis
First Name(s)*	Vasileios	Gender*	(•) Male ( ) Female
Title	Dr.	Country of residence	Greece
Nationality*	Greece	Country of Birth*	Greece
Date of Birth* (DD/MM/YYYY)	23/02/1985	Place of Birth*	Ioannina

Contact address

Current organisation name	Tallinn University of Technology (TALLINNA TEHNIKAULIKOOL)
Current Department/Faculty/Institute/ Laboratory name	Ragnar Nurkse Department of Innovation and Governance

☐ Same as organisation address

Street	Akadeemia street 3		
Postcode/Cedex	12618	Town*	Tallinn
Phone*	00302651307460	Country*	Estonia
Phone2 / Mobile	00306951760466		
E-mail*	vasileios.kostakis@ttu.ee		

Proposal ID **802512** *Acronym* **COSMOLOCALISM** *Short name* **TUT**

Main Administrative Contact Person

Organisation Legal Name **TALLINNA TEHNIKAULIKOOL**

First name* **Liina** Last name* **Kotkas**

E-Mail* **liina.kotkas@ttu.ee**

Position in org. *Coordinator of Externally Funded Research and Development Projec*

Department *Research Administration Office* ☐ Same as organisation

☒ Same as organisation address

Street Ehitajate tee 5

Town TALLINN Postcode 19086

Country Estonia

Phone 003726203531 Phone2/Mobile 003725022588

3 - Budget

Participant Number in this proposal	Organisation Short Name	Organisation Country	Total eligible costs/€ (including 25% indirect costs)	Requested grant/€
1	TUT	EE	1 017 275	1 017 275
Total			1 017 275	1 017 275

4 - Ethics issues table

1. HUMAN EMBRYOS/FOETUSES		Page
Does your research involve Human Embryonic Stem Cells (hESCs)?	○ Yes ◉ No	
Does your research involve the use of human embryos?	○ Yes ◉ No	
Does your research involve the use of human foetal tissues / cells?	○ Yes ◉ No	
2. HUMANS		**Page**
Does your research involve human participants?	◉ Yes ○ No	53
Are they volunteers for social or human sciences research?	◉ Yes ○ No	53
Are they persons unable to give informed consent?	○ Yes ◉ No	
Are they vulnerable individuals or groups?	○ Yes ◉ No	
Are they children/minors?	○ Yes ◉ No	
Are they patients?	○ Yes ◉ No	
Are they healthy volunteers for medical studies?	○ Yes ◉ No	
Does your research involve physical interventions on the study participants?	○ Yes ◉ No	
3. HUMAN CELLS / TISSUES		**Page**
Does your research involve human cells or tissues (other than from Human Embryos/ Foetuses, i.e. section 1)?	○ Yes ◉ No	
4. PERSONAL DATA		**Page**
Does your research involve personal data collection and/or processing?	○ Yes ◉ No	
Does your research involve further processing of previously collected personal data (secondary use)?	○ Yes ◉ No	
5. ANIMALS		**Page**
Does your research involve animals?	○ Yes ◉ No	
6. THIRD COUNTRIES		**Page**
In case non-EU countries are involved, do the research related activities undertaken in these countries raise potential ethics issues?	○ Yes ◉ No	

Proposal ID **802512** *Acronym* **COSMOLOCALISM**

Do you plan to use local resources (e.g. animal and/or human tissue samples, genetic material, live animals, human remains, materials of historical value, endangered fauna or flora samples, etc.)?	○ Yes ◉ No	
Do you plan to import any material - including personal data - from non-EU countries into the EU?	○ Yes ◉ No	
Do you plan to export any material - including personal data - from the EU to non-EU countries?	○ Yes ◉ No	
In case your research involves low and/or lower middle income countries, are any benefits-sharing actions planned?	○ Yes ◉ No	
Could the situation in the country put the individuals taking part in the research at risk?	○ Yes ◉ No	
7. ENVIRONMENT & HEALTH and SAFETY		Page
Does your research involve the use of elements that may cause harm to the environment, to animals or plants?	○ Yes ◉ No	
Does your research deal with endangered fauna and/or flora and/or protected areas?	○ Yes ◉ No	
Does your research involve the use of elements that may cause harm to humans, including research staff?	○ Yes ◉ No	
8. DUAL USE		Page
Does your research involve dual-use items in the sense of Regulation 428/2009, or other items for which an authorisation is required?	○ Yes ◉ No	
9. EXCLUSIVE FOCUS ON CIVIL APPLICATIONS		Page
Could your research raise concerns regarding the exclusive focus on civil applications?	○ Yes ◉ No	
10. MISUSE		Page
Does your research have the potential for misuse of research results?	○ Yes ◉ No	
11. OTHER ETHICS ISSUES		Page
Are there any other ethics issues that should be taken into consideration? Please specify	○ Yes ◉ No	

I confirm that I have taken into account all ethics issues described above and that, if any ethics issues apply, I will complete the ethics self-assessment and attach the required documents. ☒

How to Complete your Ethics Self-Assessment

Proposal ID **802512** *Acronym* **COSMOLOCALISM**

5 - Call specific questions

Academic Training	
Are you a medical doctor or do you hold a degree in medicine? Please note that if you have also been awarded a PhD, your medical degree may be your first eligible degree.	○ Yes ◉ No
Date of earliest award (PhD or equivalent)* - DD/MM/YYYY	11/07/2011
With respect to the earliest award (PhD or equivalent), I request an extension of the eligibility window, (indicate number of days) [see the ERC 2018 Work Programme and the Information for Applicants to the Starting and Consolidator Grant 2018 Calls].	○ Yes ◉ No
Eligibility	
Please indicate your percentage of working time in an EU Member State or Associated Country over the period of the grant: Please note that you are expected to spend a minimum of 50% of your total working time in an EU Member State or Associated Country.	90,00
I acknowledge that I am aware of the eligibility requirements for applying for this ERC call as specified in the ERC Annual Work Programme, and certify that, to the best of my knowledge my application is in compliance with all these requirements. I understand that my proposal may be declared ineligible at any point during the evaluation or granting process if it is found not to be compliant with these eligibility criteria.*	☒
Data-Related Questions and Data Protection (Consent to any question below is entirely voluntary. A positive or negative answer will not affect the evaluation of your project proposal in any form and will not be communicated to the evaluators of your project.)	
For communication purposes only, the ERC asks for your permission to publish, in whatever form and medium, your name, the proposal title, the proposal acronym, the panel, and host institution, should your proposal be retained for funding.	◉ Yes ○ No
Some national and regional public research funding authorities run schemes to fund ERC applicants that score highly in the ERC's evaluation but which can not be funded by the ERC due to its limited budget. In case your proposal could not be selected for funding by the ERC do you consent to allow the ERC to disclose the results of your evaluation (score and ranking range) together with your name, non-confidential proposal title and abstract, proposal acronym, host institution and your contact details to such authorities?	◉ Yes ○ No
The ERC is sometimes contacted for lists of ERC funded researchers by institutions that are awarding prizes to excellent researchers. Do you consent to allow the ERC to disclose your name, non-confidential proposal title and abstract, proposal acronym, host institution and your contact details to such institutions?	◉ Yes ○ No
For purposes related to monitoring, study and evaluating implementation of ERC actions, the ERC may need that submitted proposals and their respective evaluation data be processed by external parties [1]. Any processing will be conducted in compliance with the requirements of Regulation 45/2001.	
Have you previously submitted a proposal to the ERC? If known, please specify your most recent ERC application details.	◉ Yes ○ No

Proposal ID **802512** *Acronym* **COSMOLOCALISM**

Proposal number 714694

Other details ERC-2016-STG

Proposal ID **802512** *Acronym* **COSMOLOCALISM**

Excluded Reviewers

You can provide up to three names of persons that should not act as an evaluator in the evaluation of the proposal for potential competitive reasons.

Proposal ID **802512** *Acronym* **COSMOLOCALISM**

Extended Open Research Data Pilot in Horizon 2020

If selected, all applicants will participate in the Pilot on Open Research Data in Horizon 2020[1] , which aims to improve and maximise access to and re-use of research data generated by actions.

However, participation in the Pilot is flexible in the sense that it does not mean that **all** research data needs to be open. After the action has started, participants will formulate a Data Management Plan (DMP), which should address the relevant aspects of making data FAIR - findable, accessible, interoperable and re-usable, including what data the project will generate, whether and how it will be made accessible for verification and re-use, and how it will be curated and preserved. Through this DMP projects can define certain datasets to remain closed according to the principle "as open as possible, as closed as necessary". A Data Management Plan does **not** have to be submitted at the proposal stage.

Furthermore, applicants also have the possibility to opt out of this Pilot completely at any stage (before or after the grant signature), thereby freeing themselves retroactively from the associated obligations.

Please note that participation in this Pilot does not constitute part of the evaluation process. Proposals will not be penalised for opting out.

We wish to opt out of the Pilot on Open Research Data in Horizon 2020.	○ Yes	◉ No

[1] *According to article 43.2 of Regulation (EU) No 1290/2013 of the European Parliament and of the Council, of 11 December 2013, laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.*

ERC Starting Grant 2016
Research proposal [Part B1]

Design Global, Manufacture Local: Assessing the Practices, Innovation and Sustainability Potential of an Emerging Mode of Production

COSMOLOCALISM

Principal Investigator: Vasilis Kostakis

Host institution: Tallinn University of Technology

Duration: 48 months

Proposal summary

COSMOLOCALISM will document, analyse, test, evaluate, and create awareness about an **emerging mode of production**, based on the **confluence of the digital commons** (e.g. open knowledge and design) **with local manufacturing and automation technologies** (from 3D printing and CNC machines to low-tech tools and crafts). This convergence could catalyse the transition to new inclusive and circular productive models, such as the **"design global, manufacture local"** (DGML) model.

DGML describes the processes through which design is developed as a global digital commons, whereas the manufacturing takes place locally, through shared infrastructures and with local biophysical conditions in mind. DGML seems to form **economies of scope** that promote **sustainability** and **open innovation** while celebrating new ways of **cooperation**. However, such claims rest on **thin conceptual and empirical foundations**.

COSMOLOCALISM is a multiphase, **pilot-driven investigation** of the DGML phenomenon that seeks to understand relevant organisational models, their evolution, and their broader political economy/ecology and policy implications. Through the lens of diverse **case studies** and **participatory action research**, the conditions under which the DGML model thrives will be explored.

COSMOLOCALISM has three concurrent streams: **practices**; **innovation**; and **sustainability**. First, DGML practices will be studied, patterns will be recognised and their form, function, cultural values, and governance structure will be determined. Second, the relevant open innovation ecosystems and their potential to reorient design and manufacturing practices will be examined. Third, selected DGML products will be evaluated from an environmental sustainability perspective, involving both qualitative and quantitative methods. The interdisciplinary nature of COSMOLOCALISM will explore new horizons to substantively improve our understanding of **how we could do "more" and "better" with less**.

Section a: Extended synopsis of the scientific proposal

1. Motivation

The starting points of COSMOLOCALISM are a **problem** and a **nascent opportunity**. The problem is the **deep environmental as well as economic crisis** experienced in Europe, and especially in countries of the periphery such as Greece and Spain. Technology diffusion and the creation of new synergetic and sustainable economic options in the areas worst hit by the crisis are of paramount importance for EU's social cohesion. At the same time, **the confluence of the digital commons of knowledge, software, and design with local manufacturing and automation technologies** presents an opportunity, albeit an under-researched one.

2. Theoretical background

The most important means of information production have been distributed in the population of most advanced societies as well as in parts of emerging economies (Benkler, 2006; Castells, 2000). Once individuals have access to computers and social networks, they can freely collaborate and produce digital commons of knowledge, software, and design. Initiatives such as the free encyclopaedia **Wikipedia** and a myriad of **free and open-source software projects** exemplify a new mode of information production, named "commons-based peer production" (Benkler, 2006). They **demonstrate how people, driven by diverse motives, can produce complex "digital artefacts" if they are given access to the means of production**.

Commons-based peer production (CBPP) is, therefore, **a new way of value creation and distribution**, where open technological infrastructures allow individuals to permissionlessly communicate, self-organise, and therefore, to create value together (Bauwens, 2005).

If the first wave of CBPP included open knowledge projects, the second wave seems to be moving towards open design, which, when linked to the production of open hardware, can have a **strong impact on manufacturing** (Rifkin, 2014). Contrary to the conventional industrial paradigm and its economies of scale, CBPP and local manufacturing and automation machinery could develop commons-based economies of scope (Kostakis et al., 2017). While the advantages of scale rest on high-capital-entry and cheap global transportation, the commons-based economies of scope share infrastructure costs in terms of intangible and tangible productive resources (Kostakis et al., 2013; 2015a; 2017). They utilise the capabilities of the new fabrication tools which, up to a degree, are computerising the manufacturing industry (Hermann et al., 2015; Gershenfeld, 2007).

Furthermore, just as networked computers have been democratising the means of production of information and communication, **the emergence of networked "makerspaces" or "micro-factories" seems to democratise the means of making** (Niaros et al., 2017; Kostakis et al., 2015a). Such spaces can either be makerspaces, fab labs, or other co-working spaces, which are equipped with local manufacturing and automation technologies, such as the three dimensional (3D) printing and computerised numerical control (CNC) machines or traditional low-tech tools and crafts. Moreover, such spaces often offer collaborative environments where people can meet in person, socialise and co-create (Niaros et al., 2017; Kostakis et al., 2015b).

Kostakis et al. (2015a; 2016; 2017) have explored the contours of an emerging form of production that builds on this convergence of the digital commons of knowledge, software, and design with local manufacturing and automation technologies. They call it **"design global, manufacture local"** (DGML) and assume that it could potentialise new, sustainable and inclusive models of production. DGML **describes the processes where design is developed and improved as a global digital commons (i.e. a shared resource), while the manufacturing takes place locally, often through shared infrastructures and with local biophysical conditions in mind** (Kostakis et al., 2017). Put simply, it follows the logic that what is light (knowledge, design) becomes global, and what is heavy (manufacturing) is local and shared (Kostakis & Bauwens, 2014).

For example, see the Wikihouse project that produces open source designs for houses; the OpenBionics project that produces open source designs for robotic and bionic devices; the FarmHack, Open Source

Ecology and L'Atelier Paysan communities that produce open source designs for agricultural machines; or the RepRap community that produces open source designs for 3D printers. They demonstrate how a technology project can leverage the digital commons to engage the global community in its development (Giotitsas & Ramos, 2017). They furnish concrete examples of **how digital commons along with local manufacturing could enhance the autonomy of people and transform all sectors of production in the direction of sustainability** (Dafermos, 2015; Gershenfeld, 2007; Kostakis et al., 2016, 2017).

3. Research objectives and questions

The claims about the democratisation, innovation, and sustainability potential of value models that build on this conjunction rest on thin conceptual and empirical foundations. Therefore, **the main objective is to provide a unique body of empirical data to explore and theorise upon the conditions under which digital commons converges with local manufacturing and automation technologies**. To this end, COSMOLOCALISM has three concurrent streams: practices; innovation; and sustainability.

3.1. Practices

DGML practices will be studied, patterns will be identified and their form, function, and governance structure will be determined. The main academic interest here lies in understanding the political economy of the DGML practices as currently implemented, in seed form, by commons-oriented productive communities and enterprises. What are their business and organisational models as well as their relations with law, custom, and governance? How can a convergence with the cooperative movement, in the form of platform or open cooperatives (Scholz & Schneider, 2017; Bauwens & Kostakis, 2014), take place? Which of their social, political, and cultural values affect technological development and innovation, and how in turn, do these affect society, politics and culture? How are technologies that enable distributed cooperation, such as the blockchain, used? What kind of technology is being developed, and for whom?

3.2. Innovation

The relevant open innovation ecosystems will be examined to identify their impact and capacity to reorient design and manufacturing practices. Policy proposals will be formulated that may act as a guideline for the model to scale-up. From the perspective of the systems of innovation literature (Freeman, 1995; Geels, 2002; Lundvall, 1992; Nelson, 1993), it is important to understand both theoretically and empirically the significance of the DGML model. In short, recognising the collective character of production and innovation, what can the state and the market learn in order to build more inclusive, smart and sustainable institutions? How can now digital commons, coupled with local manufacturing technologies, spur technological advance?

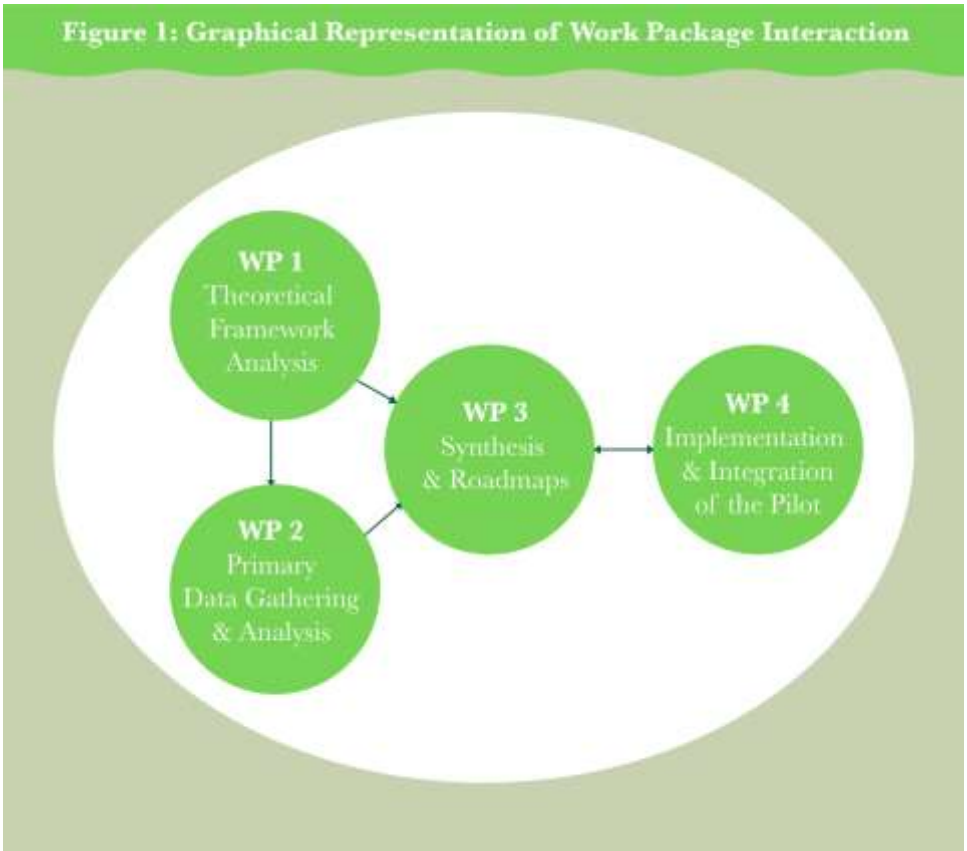
3.3. Sustainability

Selected DGML products, such as agricultural machines, a "smart" beehive, a 3D printer or a sophisticated bionic hand, will be evaluated from a political ecology perspective. For example, is a 3D printer produced via DGML practices more sustainable than a 3D printer produced via the classical industrial practices? What is the lifetime environmental impact as well as the labour costs of a DGML product versus an industrial product of the same class? Is the DGML model more sustainable than the incumbent industrial model? Do they complement or antagonise each other? How do DGML communities perceive "sustainability" and how do they integrate it in the design process? How can DGML enable the transition to a circular economy?

4. Methodology, working packages, research team and feasibility

COSMOLOCALISM is divided into **four working packages**: (1) theoretical framework analysis; (2) primary data gathering and analysis; (3) synthesis and roadmaps; (4) implementation and integration of the pilot (participatory action research). The project's streams (i.e. practices, innovation, sustainability) are interconnected and in some tasks of the working packages they overlap. Figure 1 visualises COSMOLOCALISM's mixed-methods approach by providing a graphical representation of the working package (WP) interaction. Considering King et al.'s (1994) note that all methodologies have limitations, a

combination of complementary methods will be employed rather than relying on any single method (Gray et al., 2007).



WP1 will set-up the theoretical framework through desk research/literature review in relation to COSMOLOCALISM's research streams and relevant questions. It will be examining the intersection of technological and innovation studies with organisation theory and the scholarship around the commons to formulate a robust understanding of the phenomenon in hand. Constructivist and critical approaches in the study of technology will be employed in an attempt to make sense of the complex technological system emerging within the examined ecosystem, which will then be applied onto the sociological lens of this novel productive model and its organisational implications.

Within this framework, **WP2** shall focus on data gathering and analysis of ongoing empirical cases of collective action for the production, management and distribution of material and immaterial value. Case studies and small-N comparative research methods will be used due to their advantages for concept and theory development as well as assessment of hypothesised mechanisms (Bates, 2008; Bates et al., 1998; Lieberman, 2005). From the OpenBionics and the Wikihouse project to the communities of RepRap, Sensorica and L'Atelier Paysan, prominent commons-oriented projects will be studied that are implementing and exemplifying the DGML model. Moreover, the impact of the digital commons on technological advance and entrepreneurship will be investigated. An empirical study of at least two different cases will be conducted: the FDM patent, widely used in the 3D printing industry, and the CERN open hardware repository. In addition, WP2 contains the evaluation of selected DGML products from a political ecology perspective.

The data collection techniques in WP2 are associated with triangulation of methods and include in-depth analysis of selected case studies conducted by interviews; participant observation; review of existing data and literature; implementation of the martix for convivial technologies (Vetter, 2017); and quantified data collected for the life-cycle assessment of the DGML artefacts (e.g. energy/material use and waste produced from cradle to grave and during operation). The data collected should enable us to determine factors for success or failure/stagnation, including group size, age, activities, community practices, toolsets (software, hardware), success based on a range of criteria [sustainability, economic impact, growth vector, funding, impact on their field of focus (prosthetics, agriculture, etc)] and more.

WP3 will then build on WP1 and WP2 providing an effective narrative synthesis. The latter is required to recognise patterns across cases, communicate those patterns to a broad audience, and thereby engage in theory testing and development. COSMOLOCALISM will provide synthesised case studies of alternative socio-technical models (niches), their evolution and potential socio-institutional and environmental implications. The subsequent synthesis and analysis seek to provide more refined theoretical premises and hypotheses regarding the evolution and scope of the DGML model.

To that end, **WP4** will adopt a participatory action research (PAR) methodology in order to field-test and inform the guidelines of WP3. Specifically, the goal is to infuse two existing grassroots community, with the assistance of key local facilitators, with the distilled essence of our research. This will provide crucial insights on the potential benefits of the DGML model as well as its, possibly, tumultuous actual implementation in a community context with a global/local orientation. PAR is an action-based, experiential approach that aims to empower communities with research as well as influence the higher level institutional structures (Okali et al., 1994). PAR is considered a qualitative research method which highlights "the notion of action as a legitimate mode of knowing, thereby taking the realm of knowledge into the field of practice" (Tandon, 1996, p. 21). This approach is arguably relevant to knowledge sharing as well as people-centeredness, which are key characteristics not only of COSMOLOCALISM but also of the H2020 framework.

The following list provides **a bird's-eye-view to each working package's tasks (T)**:

WP 1. Theoretical framework analysis: T.1.1. Review of existing commons-oriented economic activities and alternative organisations; T.1.2. Review of the history of appropriate technology and grassroots innovation; T.1.3. Review of the conjunction of ICT with local manufacturing and automation technologies.

WP 2. Primary data gathering and analysis: T.2.1. Ethnographic study of DGML initiatives and communities; T.2.2. Data gathering on digital commons' potential to spur technological advance; T.2.3. Evaluation of DGML products from an ecological economics perspective.

WP 3. Synthesis and roadmaps: T.3.1. Inputs to research and policy for economic sustainability through DGML; T.3.2. Inputs to research, policy and regulatory roadmaps for the EU; T.3.3. Inputs to research and policy for environmental sustainability through DGML.

WP 4. Implementation and integration of the pilot: T.4.1. Build awareness around preliminary roadmaps and develop an action plan; T.4.2. Implementation of the plan; T.4.3. Observation and empirical evaluation of the roadmap.

Resources: The PI will dedicate the 90% of his time during the 48 months. COSMOLOCALISM will involve 2 post-docs who will lead the tasks together with the PI; 3 PhD students; and a project manager with expertise in communication. This will be a multidisciplinary team, including political ecology, technology governance and innovation studies, critical management studies and action research. Additional funding will be allocated for research stays, trips for presenting results, organisation of a workshop series to promote the field, and open access fees. Dissemination will be threefold: academia, civil society, and government officials. The PI has extensive networks in all the aforementioned spheres.

Barriers: This project does not involve a high risk factor. The most obvious roadblock would be negotiating access with the various groups active in the field of interest for this project. Given the PI's familiarisation with most of them however, this would be an obstacle that could be easily overcome. Further, the field tests involve a risk of low participation. To overcome this, the leading candidate community, as well as the potential alternatives, have been selected due to their eagerness to experiment with new technologies and methods as well as their high ideological drive. Last, a possible risk for the evaluation of industrial products on sustainability and lifetime environmental impact can be poor raw data, due to industrial intellectual property policies. Though, a considerable amount of scientific publications is already present for the industrial products to be investigated.

5. Expected outcomes

Ultimate goal of COSMOLOCALISM is to contribute to sustainable transitions research, by formulating a groundbreaking research and action agenda that will identify techno-economic opportunities and challenges that are often fundamentally different from any our society has experienced before. This might be of interest

to innovation scholars, ecological economists, political scientists, engineers, policy makers, practitioners and grassroots communities, as well as to those interested in science, technology and society studies.

In a nutshell, COSMOLOCALISM will deliver a diverse amount of material: from reports, handbooks and guidelines to be used by social entrepreneurs, engineers, designers and activists, to 12-17 academic publications in top-ranked, interdisciplinary journals (wherever possible open access) and two books.

6. References

Bates, R. (2008). *When things fell apart: State failure in late-century Africa*. New York: Cambridge University Press.

Bates, R., Greif, A., Levi, M., & Rosenthal, J. (1998). *Analytic narratives*. Princeton: Princeton University Press.

Bauwens, M. (2005). The political economy of peer production. *CTheory Journal*. Retrieved from: http://www.ctheory.net/articles.aspx?id=499.

Bauwens, M., & Kostakis, V. (2014). From the communism of capital to capital for the commons: Towards an open co-operativism. *tripleC: Journal for a Global Sustainable Information Society*, 12(1), 356-361

Benkler, Y. (2006). *The wealth of networks: How social production transforms markets and freedom*. New Haven/London: Yale University Press.

Castells, M. (2000). *The rise of the network society: Information age*. Oxford: Blackwell.

Dafermos, G. (2015). Transforming the productive base of the economy through the open design commons and distributed manufacturing. *Journal of Peer Production*, *7*. Retrieved from: http://peerproduction.net/issues/issue-7-policies-for-the-commons/peer-reviewed-papers/distributed-manufacturing/

Freeman, C. (1995). The 'National System of Innovation' in historical perspective. *Cambridge Journal of Economics*, *19*(1): 5-24.

Geels, F. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and case study. *Research Policy*, *31*(8–9), 1257–1274.

Gershenfeld, N. (2007). *FAB: The coming revolution on your desktop: From personal computers to personal fabrication*. Cambridge: Basic Books.

Giotitsas, C., & Ramos, J. (2017). *A new model of production for a new economy: Two cases of agricultural communities*. London: The New Economics Foundation.

Gray, P., Williamson, J., Karp, D., & Dalphin, J. (2007). *The research imagination: An introduction to qualitative and quantitative methods*. New York: Cambridge University Press.

Hermann, M., Pentek, T., & Otto, B. (2015). *Design principles for Industrie 4.0 scenarios: A literature review*. Dortmund: Technische Universität Dortmund.

King, G., Keohane, R., & Verba, S. (1994). *Designing social inquiry: Scientific inference in qualitative research*. Princeton: Princeton University Press.

Kostakis, V., Fountouklis, M., & Drechsler, W. (2013). Peer production and desktop manufacturing: The case of the Helix_T wind turbine project. *Science, Technology & Human Values*, *38*(6): 773-800.

Kostakis, V., & Bauwens, M. (2014). *Network society and future scenarios for a collaborative economy*. Basingstoke: Palgrave Macmillan.

Kostakis, V., Niaros, V., Dafermos, G., & Bauwens, M. (2015a). Design global, manufacture local: Exploring the contours of an emerging productive model. *Futures*, *73*, 126-135.

Kostakis, V., Niaros, V., & Giotitsas, C. (2015b). Production and governance in hackerspaces: A manifestation of commons-based peer production in the physical realm?. *International Journal of Cultural Studies*, 18(5), 555-573.

Kostakis, V., Roos, A., & Bauwens, M. (2016). Towards a political ecology of the digital economy: Socio-environmental implications of two value models. *Environmental Innovation and Societal Transitions*, 18, 82-100.

Kostakis, V., Latoufis, K., Liarokapis, M., & Bauwens, M. (2017). The convergence of digital commons with local manufacturing from a degrowth perspective: Two illustrative cases. *Journal of Cleaner Production*. (in press)

Lieberman, E. (2005). Nested analysis as a mixed-method strategy for comparative research. *American Political Science Review*, *99*(3): 435-452.

Lundvall, B. (1992). *National innovation systems: Towards a theory of innovation and interactive learning*. London: Pinter Publishers.

Nelson, R. (1993). *National innovation systems: A comparative analysis*. New York: Oxford University Press.

Niaros, V., Kostakis, V., & Drechsler, W. (2017). Making (in) the smart city: The emergence of makerspaces. *Telematics & Informatics*.

Okali, C., Sumberg J. & Farrington J. (1994). *Farmer participatory research: Rhetoric or reality*. London: Intermediate Technology Publications.

Rifkin, J. (2014). *The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism*. New York: Palgrave Macmillan.

Scholz, T., & Schneider, N. (2017). *Ours to hack and to own: The rise of platform cooperativism, a new vision for the future of work and a fairer Internet*. New York, NY: OR Books.

Tandon, R. (1996). The historical roots and contemporary tendencies in participatory research: Implications for health care. In K. de Koning and M. Martin (Eds.), *Participatory research in health: Issues and experiences* (pp. 19-26). London: Zed Books.

Vetter, A., (2017). The matrix of convivial technology - Assessing technologies for degrowth. *Journal of Cleaner Production*. (in press)

Section b: Curriculum Vitae

PERSONAL INFORMATION

Family name, First name: Kostakis, Vasileios – Date of birth: 23 February 1985 – Nationality: Greek – Status: Married with one child – URL for website: http://wiki.p2pfoundation.net/Vasilis_Kostakis – Research ID: N-4588-2015

EDUCATION

2009-2011 Tallinn University of Technology, **PhD in Technology Governance**. Supervisor: Prof. Dr. Dr. h.c. Wolfgang Drechsler. Awarded: 11/07/2011.
2008-2009 Tallinn University of Technology, **MA in Technology Governance**.
2007-2009 University of Amsterdam, **MSc in Business Studies**.
2002-2006 University of Macedonia, **4-year BSc in Business Administration**.

ACADEMIA

POSTS & AFFILIATIONS

2017- **Harvard University**, Berkman Klein Center for Internet & Society, **Affiliate**.
2016- **Autonomous University of Barcelona**, Institute of Environmental Science and Technology, **Visiting Scholar.**
2016- **VU University Amsterdam**, Department of Social and Cultural Anthropology, **Visiting Research Fellow**.
2015- **Tallinn University of Technology**, School of Business and Governance, Ragnar Nurkse Department of Innovation and Governance, Chair of Governance, **Senior Research Fellow (tenured)**.
2009-2014 Tallinn University of Technology, Faculty of Social Sciences, Ragnar Nurkse School of Innovation and Governance, Chair of Governance, Research Fellow (part-time).

TEACHING

2017- The Commons (10 ECTS; **full teaching course**). Coordinator of a Course of MA in Social and Solidary Economy, Hellenic Open University.
2017- TechEstonia: Technological Development & Entrepreneurial State Solutions (6 ECTS; shared teaching course). Course of BA in Public Administration, Ragnar Nurkse Department of Innovation and Governance, Tallinn University of Technology.
2017- Peer Production and Theories of the Commons (3 ECTS; **full teaching course**). Course of MSc in Public Sector Innovation and E-governance (Erasmus Mundus Joint Master Degree), Tallinn University of Technology, KU Leuven, University of Münster.
2016- Demystifying the "Collaborative Economy": Capitalism, Commons & Future Scenarios (3 ECTS; **full teaching course**). Course of MA in Technology Governance, Ragnar Nurkse Department of Innovation and Governance, Tallinn University of Technology.
2013-2014 Technology & Society (3 ECTS; shared teaching course). Course of MA in Technology Governance, Ragnar Nurkse School of Innovation and Governance, Tallinn University of Technology.
2013-2014 State & Governance (3 ECTS; served as teaching assistant). Course of MA in Technology Governance, Ragnar Nurkse School of Innovation and Governance, Tallinn University of Technology.

SUPERVISION

PhD theses Vasileios Niaros (**defended**); Alex Pazaitis (**near completion**); Alekos Pantazis (ongoing); Christina Priavolou (ongoing); Panagiotis Giannakoulas (co-supervised; ongoing); Kosmas Gavras (co-supervised; ongoing).
MA theses Chris Giotitsas (defended); Jonathan Brough (defended); Alex Pazaitis (defended); Francisco Santos (ongoing); César Fabián Echeverría (ongoing).

CONSULTANCY

2016- **OpenBionics.org**, Open Source Bionic Hands, New Zealand and Greece, **Advisory Board**.

2015-2017 **Minds.com**, Social Networking Platform, USA, **Advisory Board**.
2015 Office of the **Deputy Prime Minister**, Athens, Greece, **Advisor**.
2009-2010 Office of the **Prime Minister** for ICT and E-Governance, Athens, Greece, **Advisor**.

ENTREPRENEURSHIP

2016- **Bitmind.co**, Start-up on blockchain-based governance, North Carolina, USA, **Co-founder**.
2013- **P2P Lab**, Research Hub, Ioannina, Greece, **Founder & Research Director**.
2007- **AOP**, Accounting and E-Consultancy Services (**13-15 employees**), Greece, **Co-founder**.

ACTIVISM

2017- **P2P Foundation**, **Core-member**.
2007-2017 **P2P Foundation**, **Research Coordinator** and **Content Administrator (winner of the 2016 Golden Nica for Digital Communities)**.
2009-2011 Team for the deployment of One Laptop Per Child initiative in Greece, Participative Member.
2009-2011 'Gruppo Nikos Salingaros' for P2P urbanism, Translator.

CAREER BREAK

2010 Sergeant Major of 625 TP KEN-EKE, Perama, Ioannina, & 512 TP Koufovouno, Evros, Greece.

RECOGNITION & OUTREACH

MEMBERSHIPS OF SOCIETIES & JOURNALS

2016- Royal Society for the Encouragement of Arts, Manufactures and Commerce (RSA), Fellow.
2016- Society of Collaborative Networks, Member.
2016- Communia International Association, Member.
2016- European Research Network on Social and Economic Policy, Member.
2016- International Association for the Study of the Commons, Member.
2016- Engaging Science, Technology, and Society, Editorial Board Member.
2015- tripleC, Editorial Board Member.
2015- Journal of Peer Production, Editorial Board Member.
2015- Sustainability Transitions Research Network, Member.
2015- Society for Social Studies of Science, Member.
2015- Global University for Sustainability, Founding Member.
2007- Economic Chamber of Greece, Member.
2016-2017 International Network for Urban Research and Action, Member.
2014-2016 Regional Studies Association, Member.
2014-2016 The International Society for Ecological Economics, Member.

OPINION PIECES IN THE PRESS & COVERAGE

Contributor of 18 essays/articles to **major news portals and magazines** such as *TheConversation, Open Democracy, Huffington Post, Red Pepper, ROAR Magazine* etc.
References by international media such as *De Wereld Morgen, Digital Society Forum, El Diario, Institutional Investor, L'Humanité, Leadership, Resilience, Shareable, Socialter* etc.

PUBLIC SPEAKING

Invited speaker in conferences, symposiums and courses by several major universities, think tanks and civil society organizations. However, since 2015, due to health (eye) issues that do not allow frequent air travel, almost all speaking engagements have been accommodated by colleagues from the P2P Lab.

Appendix: All on-going and submitted grants and funding of the PI (Funding ID)

On-going Grants

Project Title	*Funding source*	*Amount (EUR)*	*Period*	*Role of the PI*	*Relation to current ERC proposal*
Design Global, Manufacture Local	Estonian Ministry of Education and Research	125.100,00	2016-2019	Principal Investigator	This project is a mini-COSMOLOCALISM. COSMOLOCALISM will build on the knowledge gained here. If COSMOLOCALISM is approved for funding, then this project will be discontinued and the research will continue as part of COSMOLOCALISM.
Phygital: Catalysing innovation and entrepreneurship unlocking the potential of emerging production and business models	Interreg – BalkanMed – European Commission	855.172,79	2017-2019	Coordinator	This project includes innovation and action pilots that will be studied by the COSMOLOCALISM project.
Challenges to state modernization in 21st century Europe: Theoretical developments and future scenarios	Estonian Research Council (IUT)	256.000,00	2014-2019	Senior Researcher	One of the streams of this project is to examine what role technology could play in the modernization of the state, that connects with some of the questions of all the three streams of COSMOLOCALISM. If COSMOLOCALISM is approved for funding, I will withdraw from this project.

Section c: Early achievements track-record

I am a **tenured Senior Research Fellow** at the Ragnar Nurkse Department of Innovation and Governance, **Tallinn University of Technology**, and a **Berkman Klein Center Affiliate** (invited), **Harvard University**. Moreover, I am Visiting Scholar at the Institute of Environmental Science and Technology, Autonomous University of Barcelona; Visiting Research Fellow at the Department of Social and Cultural Anthropology, VU University Amsterdam; and Fellow at the Royal Society for the Encouragement of Arts, Manufactures and Commerce.

I am an advocate of the digital commons, and have been active in the field since before I was awarded my PhD along with several other activities related to the subject. These activities, which primarily aimed to cover my material and intellectual needs, include being an **advisor** to two Greek governments as well as to techno-social start-ups, an **activist** with P2P Foundation and **founder** of three enterprises, such as the P2P Lab.

The **P2P Lab** is a community-driven research hub and makerspace dedicated to interdisciplinary research on free and open-source technologies and practices. Its work combines theoretical sensitivity with action research and fieldwork, primarily the implementation of local manufacturing technologies in various societal contexts. It serves as a base for a global network of individuals from various academic and activist backgrounds working collaboratively on a project basis.

Since the reception of a full-time status, for the past three years I have been devoted to academic research. My field of research is multi-faceted yet revolves around the political economy of the digital commons; technology governance; political ecology and technology; local manufacturing; blockchain-mediated organisation; and constructionist learning. Further, due to my activist background I have obtained an **insider's perspective** on the emerging phenomenon of commons-based peer production and consequently helped pave the way for novel research around it. This makes me particularly qualified to lead the proposed research project that will push the boundaries of this burgeoning research field.

In a total of **42 related publications**, **71% are articles in international peer-reviewed journals** from which **63% are single-authored or first-authored**. I favour collaborative efforts in writing and **45% of my publications I have co-authored with students, while only 7% with a supervisor.** At the time of this writing (October, 12th), my Google Scholar citation count is 586 with an **h-index of 14** (**in 2017 alone I have received 169 citations**) in an, admittedly, emerging and heterodox field of scholarship. Moreover, I referee and sit on the editorial boards of four **open access journals** and have had four guest editorships on (open access) special issues.

I have published in **major interdisciplinary journals** such as *Journal of Cleaner Production* (IF: 5.715), *Annual Review of Environment and Resources* (6.268), *Science, Technology & Human Values* (IF: 2.907), *Technological Forecasting and Social Change* (IF: 2.625), *New Media & Society* (IF: 4.180), *Telematics & Informatics* (IF: 3.398), *Futures* (IF: 1.802); and co-authored several chapters for edited volumes, encyclopaedias and handbooks; as well as two co-authored monographs (one forthcoming). **My work has appeared in 13 languages as well as featured in several popular international media**. Five selected articles of mine plus a book, all relevant with the proposed topic, are following (*=student):

- Kostakis, V., & Bauwens, M. (2014). *Network society and future scenarios for a collaborative economy*. Basingstoke: Palgrave Macmillan. Citations: 126.
- Kostakis, V., Latoufis, K.*, Liarokapis, M., & Bauwens, M. (2017). The convergence of digital commons with local manufacturing from a degrowth perspective: Two illustrative cases. *Journal of Cleaner Production*. Citations: 11.
- Kostakis, V., Roos, A.*, & Bauwens, M. (2016). Towards a political ecology of the digital economy: Socio-environmental implications of two value models. *Environmental Innovation and Societal Transitions*, 18, 82-100. Citations: 10.
- Kostakis, V., Niaros, V.*, Dafermos, G., & Bauwens, M. (2015). Design global, manufacture local: Exploring the contours of an emerging productive model. *Futures*, 73, 126-135. Citations: 22.

- Kostakis, V., Niaros, V.*, & Giotitsas, C.* (2015). Production and governance in hackerspaces: A manifestation of commons-based peer production in the physical realm?. *International Journal of Cultural Studies*, 18(5), 555-573. Citations: 56.
- Kostakis, V., & Papachristou, M.* (2013). Commons-based peer production and digital fabrication: The case of a RepRap-based, Lego-built 3D printing-milling machine. *Telematics & Informatics*, 31(3), 434-443. Citations: 40.

ERC Starting Grant 2016
Research proposal [Part B2]

Part B2: The scientific proposal

COSMOLOCALISM in a nutshell

This project will document, analyse, test, evaluate, and create awareness about an emerging mode of production, based on the confluence of the digital commons (e.g. open knowledge and design) with local manufacturing and automation technologies (from 3D printing and CNC machines to low-tech tools and crafts). This convergence could catalyse the transition to a new inclusive and circular mode of production, where the design is developed as a global digital commons while the manufacturing takes place locally with local biophysical conditions in mind.

1. State-of-the-art and objectives

1.1. Theoretical background

Since the introduction of the microprocessor and the beginning of the information and communication technology (ICT) revolution, and after a nearly 30 year-long paroxystic culmination of market experimentation, we find ourselves **in the aftermath of two major bubbles** (Perez, 2009a,b). First was the Internet mania, based on technological innovation, which ended in the NASDAQ collapse in 2000. This was followed by the easy liquidity bubble, based on financial innovations accelerated by the new technologies, ending in the financial crisis in 2007-8. These two bubbles may resemble the 1929 depression in that they share a fundamental characteristic: **the structural tensions within capitalism make the system, at least in its current form, unsustainable** (Perez, 2009a,b).

Environmental crises, political unrest (e.g., the EU coherency crisis triggered by the debt crisis) and protests (from the Indignados movements in Spain and the protest movements in Greece to the Occupy Wall Street movement in the USA) are globally erupting. The world is at a crossroads where the excesses, the fallacies and the unsustainability of the current practices need to be recognised; appropriate regulatory changes have to be made where the usual recipes for confronting tensions fail; and conditions where production capital is put in control, greater social cohesion is achieved, and desperation and anger turn into creation, must be facilitated (Perez, 2002; 2009a,b). It is necessary to **realise the full potential of the current ICT-driven techno-economic paradigm**, and create the new fabric of the economy and overcome the tensions that caused this premature saturation (Perez, 2002).

At the same time, the most important means of information production – i.e., computation, communications, electronic storage and sensors – have radically been distributed in the population of most advanced societies as well as in parts of emerging economies (Benkler, 2006; Castells, 2000). **People have access to networked computers, collaborate and produce digital commons of knowledge, software, and design**. Initiatives such as the free encyclopedia Wikipedia and a myriad of free and open-source software projects exemplify a new mode of information production, named "commons-based peer production" (Benkler, 2006).

Commons-based peer production (CBPP) is, therefore, a new way of value creation and distribution, where open technological infrastructures allow individuals to permissionlessly communicate, self-organise, and therefore, co-create value (Benkler, 2006, 2011; Bauwens, 2005). On the one hand, CBPP takes into

account the values, needs and expectations of the users (Bruns, 2008; Weber, 2004) and, on the other, it circumvents the need for formalisation of tacit knowledge and individual experience into information packets that are typical in market-based or hierarchical decision-making and innovation systems (Benkler, 2006).

While the first wave of CBPP included open knowledge projects, the second wave seems to be moving towards open design, which, when linked to the production of open hardware, can have **a strong impact on manufacturing** (Rifkin, 2014). Contrary to the conventional industrial paradigm and its economies of scale, CBPP and local manufacturing and automation machinery could develop commons-based economies of scope (Kostakis et al., 2017). While the advantages of scale rest on high-capital-entry and cheap global transportation, the commons-based economies of scope share infrastructure costs in terms of intangible and tangible productive resources (Kostakis et al., 2013; 2015a; 2017). They utilise the capabilities of the new fabrication tools which, up to a degree, are computerising the manufacturing industry (Hermann et al., 2015; Gershenfeld, 2007).

Kostakis et al. (2015a; 2016; 2017) have explored the contours of an emerging mode of production that builds on this convergence of the digital commons of knowledge, software, and design with local manufacturing and automation technologies. They call it **"design global, manufacture local"** (DGML) and assume that it could potentialise new, sustainable and inclusive models of production. DGML describes the processes where **the design is developed and improved as a global digital commons (i.e. a shared resource), while the manufacturing takes place locally, often through shared infrastructures and with local biophysical conditions in mind** (Kostakis et al., 2017). Put simply, it follows the logic that what is light (knowledge, design) becomes global, and what is heavy (manufacturing) is local and shared (Kostakis & Bauwens, 2014).

DGML cases such as the L'Atelier Paysan, OpenBionics, Sensorica, Wikihouse, RepRap, or FarmHack demonstrate **how a technology project can leverage the digital commons to engage the global community in its development**. They arguably furnish examples of how digital commons along with local manufacturing technologies could enhance the autonomy of people and transform all sectors of production in the direction of social innovation and sustainability (Dafermos, 2015; Gershenfeld, 2007; Kostakis et al., 2017). Unlike large-scale industrial manufacturing, the DGML model emphasises application that is small-scale, decentralised, resilient and locally controlled. Kostakis et al. (2015a; 2017) postulate that **DGML could recognise the limits and scarcities posed by finite resources and organise material activities accordingly**.

The physical manufacturing arrangement for such a productive model includes micro-factories, which are small-scale community manufacturing facilities providing appropriate technologies ranging from basic farming tools to desktop manufacturing technologies such as 3D printers and CNC milling machines, all of which are open hardware (Kostakis et al. 2015b; Okazaki et al., 2004; Tanaka, 2001). Such micro-factories are intended to displace the process of assembly to the community of the users and thus usher in a productive model characterised by the distributed means of making and open design. **Micro-factories** may be identical to **makerspaces** or **fablabs** that can be found either in hackerspaces, media labs, and other co-working or community-driven spaces (Troxler, 2011; Niaros et al., 2017). Community-driven micro-factories are commonly used by individuals and groups with limited financial resources as a local, physical platform for the mutualisation of resources and the provision of shared access to those means of production that are not yet as available as personal computers and Internet connectivity.

From a multi-level perspective (Geels, 2002), it could be argued that "radical changes begin within networks of pioneering organizations, technologies and users that form a niche practice on the margins of the regime" (Smith, 2007, p. 429). DGML could be understood as a niche practice, which might become a source of innovative ideas for resolving current tensions or even a blueprint for wider transformation (Smith, 2007). It seems that the democratisation, innovation and sustainability potential of such an emerging mode of value creation is important, albeit under-researched. **Robust theoretical and empirical research on the DGML model can trigger fruitful debates over new capitalist and post-capitalist trajectories of the current techno-economic paradigm.**

1.2. Objectives

The claims about the democratisation, innovation, and sustainability potential of such value models currently rest on thin conceptual and empirical foundations. **By exploring the conditions under which the digital commons converges with local manufacturing and automation technologies, the general objective is thus to assess the practices, innovation and sustainability potential of the DGML model.** To this end, COSMOLOCALISM has three concurrent streams: practices; innovation; and sustainability. The following table outlines the **streams (S) of the general objective along with their specific objectives and questions**.

Table 1: Research objectives and questions.

Assessing the practices		
S1	Specific Objective & Questions	To identify the business and organisational models of several DGML initiatives. Relevant questions: • What are their relations with law, custom, and governance? • How do the collective capacities of commons-oriented, entrepreneurial actions create shared forms of sociality and bring forward new collective forms of sustainable livelihood? • How can a convergence with the cooperative movement, in the form of platform or open cooperatives, take place? • What is the representation of groups and social interests likely to be affected by a particular kind of technological change brought to the forefront by DGML initiatives? • How are technologies that enable distributed cooperation, such as the blockchain, used? • What technology is being developed, and for whom?
Assessing the innovation potential		
S2	Specific Objective & Questions	To examine the DGML innovation ecosystems, identify their impact and capacity to reorient design and manufacturing practices, and formulate policy proposals for the successful scaling-up of the model. Relevant questions: • What is the role of the digital commons in new user-driven forms of technological innovation? • How DGML innovations and practices (in behaviour and policy) struggle against incumbent systems or socio-technical regimes? • Under which conditions can DGML innovations exert greater influence? • What are recurring patterns and mechanisms? • How can they gain momentum, adapt, grow and become mainstream? • What can the state and the market learn in order to build more inclusive, smart and sustainable institutions? • How can now digital commons, coupled with local manufacturing technologies, spur technological advance?
Assessing the sustainability potential		
S3	Specific Objective & Questions	To evaluate selected DGML products from an ecological economics perspective. Relevant questions: • What is the lifetime environmental impact as well as the labour costs of

		a DGML product versus an industrial product of the same class? For instance, is a 3D printer produced via DGML practices more sustainable than a 3D printer produced via the conventional industrial practices? • What is the degree to which the users of a DGML product feel in control of the technology and knowledge necessary for its use and manipulation? • How well do the DGML practices fit in the existing natural and cultural environment of its application? • How do DGML communities perceive "sustainability" and how do they integrate it in the design process? • Is the DGML model more sustainable than the incumbent industrial model? Do they complement or antagonise each other? • How can DGML enable the transition to a circular economy?

1.3. Impact

COSMOLOCALISM aims to make a novel contribution to the **sustainable transitions research** as well as to the action agenda for innovation scholars, ecological economists, political ecologists, critical management scholars, political scientists, engineers, policy makers, practitioners, designers and hackers. COSMOLOCALISM will enable an understanding of the transitional dynamics of new modes of production that seem to be small-scale, on-demand, decentralised, resilient, locally controlled but simultaneously developed on a global basis. It will also provide an evidence-based documentation of the sustainability aspects of digital commons' convergence with local manufacturing and automation technologies, and advance their integration into a coherent mode of production and value distribution. This may allow us to **bridge commons-based modes of information production with existing physical infrastructures, while tracing collaboration amongst diverse stakeholders, distributing the means of making and, thus, empowering open innovation ecosystems.** Hence, COSMOLOCALISM is expected to substantially contribute to our understanding on how to improve innovation capacity and integration of new knowledge in the vein of a Responsible Research and Innovation paradigm.

2. Methodology

2.1. Mixed methods research

Considering King et al.'s (1994) note that all methodologies have limitations, a combination of complementary methods will be employed rather than relying on any single method (Gray et al., 2007; Poteete et al., 2010). COSMOLOCALISM will thus use mixed-methods by combining quantitative and qualitative analysis (della Porta & Keating, 2008). The results from the diverse methods will be triangulated to formulate a complete picture and, thus, address individual method limitations.

The qualitative analysis will be based on:

- Ethnographic case studies of several DGML initiatives (grassroots communities and social enterprises) conducted by interviews; field-based participant observation; review of existing data and literature. A tentative list of the DGML projects that will be intensively studied includes: FarmHack (USA); L'Atelier Paysan (France); OpenBionics (New Zealand); Phygital (Greece); RepRap 3D printer (UK); WikiHouse (UK); Nea Guinea (GR); Sensorica (CA).
- In-depth case studies of at least two prominent digital commons cases which have arguably propelled much innovation and entrepreneurial activity: the Fused Deposition Modelling (FDM) patent which expired in 2005 and has widely been used in the 3D printing industry, and the CERN open hardware repository that seems to represent an opportunity to innovate not only in technology but also in business models.

- Interviews in the context of the assessment of DGML hardware artefacts from a political ecology perspective.
- Participatory action research that will involve fieldwork observation and action with personal involvement during the pilot, so that theoretically informed practice is developed (McTaggart, 2001). The goal will be to infuse an existing grassroots community, with the assistance of key local facilitators, with the distilled essence of our research (in the form of guidelines and best practices). This will provide crucial insights on the potential benefits of the DGML model as well as its, possibly, tumultuous actual implementation in a community context. Phygital, with its initiative to create infrastructures for designing globally and manufacturing locally small-scale agricultural machines is a candidate community, based in the mountainous municipality of Northern Tzoumerka (population: 5714), Greece. See more about the Phygital project here: http://www.interreg-balkanmed.eu/approved-project/29/.

The quantitative analysis will be based on:

- Data collected through our ethnographic research that can be quantified, such as group size, age, activities, community practices, toolsets (software, hardware), growth vector, funding, impact on their field of focus (automotive, agriculture, etc) and more.
- Data collected for the life-cycle assessment of DGML hardware artefacts (e.g. energy and material use and waste produced from cradle to grave and during operation).
- Data collected in relation to the impact assessment of the pilot. The latter will involve fieldwork with the local communities that will provide us with comparative quantity data.

COSMOLOCALISM's quantitative and qualitative analysis will thus provide gist for an effective narrative synthesis. The latter is required in order to recognise patterns across cases, communicate those patterns to a broad audience, and thereby engage in theory testing and development. COSMOLOCALISM will provide synthesised case studies of alternative socio-technical models (niches), their evolution and potential socio-institutional and environmental implications. The subsequent synthesis and analysis seek to provide more refined theoretical premises and hypotheses regarding the evolution and scope of the DGML model. Section 2.2 provides a detailed description of the working package specific methods, components, timing and interaction.

2.2. Implementation

COSMOLOCALISM is organised in **four working packages (WPs)**. Figure 1 visualises the mixed-methods approach by providing a graphical representation of WPs interaction.

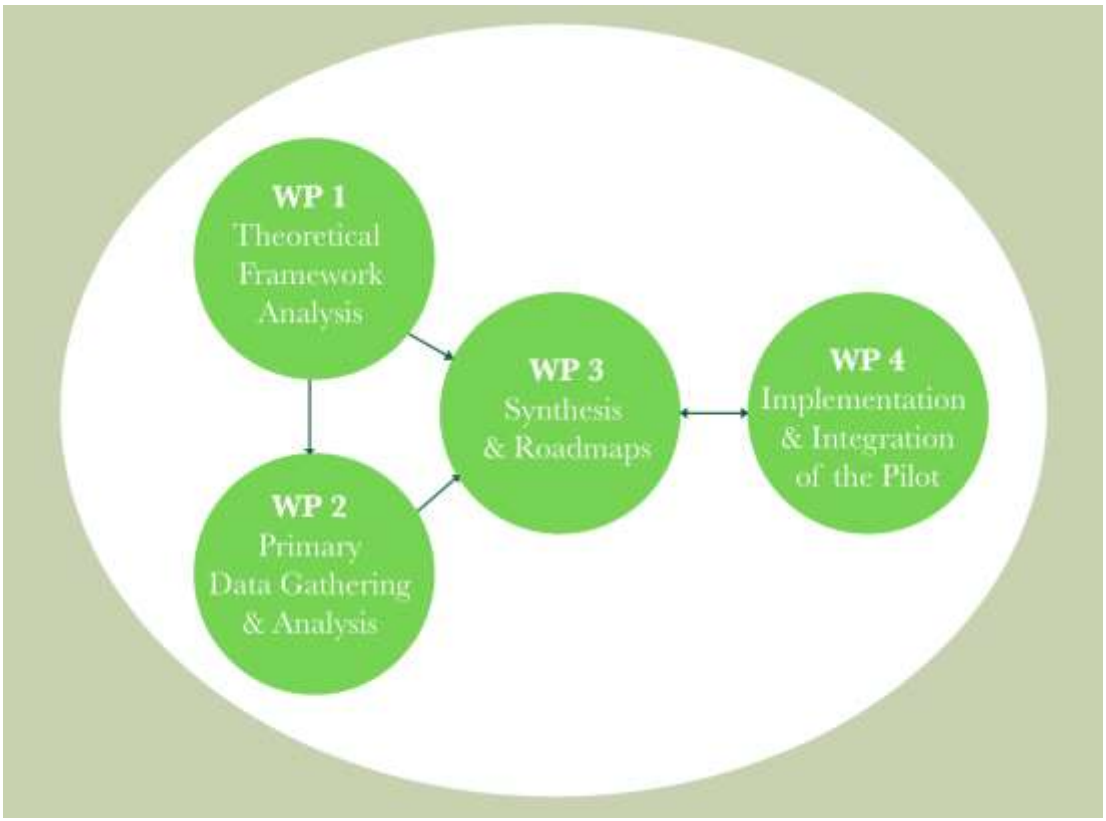


Figure 1: Graphical representation of working packages interaction.

WP1 is responsible for setting-up the theoretical framework through desk research/literature review in relation to COSMOLOCALISM's research streams and relevant questions. It will be examining the intersection of technological and innovation studies with organisation theory and the scholarship around the commons to formulate a robust understanding of the phenomenon in hand. Constructivist and critical approaches in the study of technology will be employed in an attempt to make sense of the complex technological system emerging within the examined ecosystem, which will then be applied onto the sociological lens of this novel productive model and its organisational implications.

WP2 will then gather and analyse data from several ongoing empirical cases of DGML initiatives. Furthermore, WP2 will evaluate selected DGML products from a sustainability perspective. It will also include two in-depth case studies about digital commons' potential to spur technological innovation and entrepreneurship. By building on the previous WPs, **WP3** will provide an effective narrative synthesis and a number of roadmaps and policy proposals. The latter will also derive from a multi-perspective evaluation of the processes that will take place during the implementation of the pilot in **WP4**. Moreover, WP4 will adopt a participatory action research methodology in order to field-test and inform the guidelines of WP3.

Next, a detailed description of the WPs and their tasks (T) follows:

Table 2: Work package description.

Work package number:	**1**
Work package title:	**Theoretical framework analysis**
Description of work	
T.1.1. Review and critical analysis of existing commons-oriented economic activities and alternative organisations (M1-M6). The focus of this task will be to explore the organisational models and cultures that are enabled by the	

sharing of knowledge and other resources in existing commons-oriented projects. Through desk research we will look at the ways in which the collective capacities of commons-oriented, entrepreneurial actions create shared forms of sociality and bring forward new collective forms of sustainable livelihood.

T.1.2. Review and critical analysis of the history of appropriate technology and grassroots innovation (M1-M6).

The goal of this task is to provide a historical account of appropriate technology, successful and failed case studies as well as to explore its relation with bottom-up forms of innovation. This will help us to understand patterns of success and failure as well as to examine part of the history of what is nowadays called "social innovation and sustainability".

T.1.3. Review and critical analysis of the conjunction of ICT with local manufacturing and automation technologies (M1-M6).

The goal of this task is to explore opportunities and challenges within the fields of ICT (not necessarily open source), local manufacturing and automation technologies across multiple dimensions. This will provide input from secondary sources on how and why enterprises (small-medium enterprises, and multinational corporations) and grassroots communities have been utilising practices and tool-sets that build on such a conjunction.

Work package number:	**2**
Work package title:	**Primary data gathering and analysis**

Description of work

T.2.1. Ethnographic study of DGML initiatives and communities (M6-M21).

The focus of this task will be to enrich and advance the work of T.1.1 by doing fieldwork in selected DGML enterprises and communities such as FarmHack, L'Atelier Paysan, OpenBionics, Phygital, WikiHouse, etc. Ethnographic research methods will be used with the aim to: (a) identify success stories, recurring patterns and principles of DGML organisation; (b) document the organisational needs and processes that underpin the sharing of physical and digital resources; (c) explore the ways in which the use of the shared infrastructures fosters new forms of collective organisation.

T.2.2. Data gathering on digital commons' potential to spur technological advance (M6-M15).

This task will include at least two in-depth case studies of prominent digital commons cases which have arguably propelled much innovation and entrepreneurial activity. First, we will study the Fused Deposition Modelling (FDM) patent which expired in 2005 and has widely been used in the 3D printing industry. A comparative data analysis before and after the expiration of the patent will be used, in order to establish whether the FDM patent has spurred or hindered technological innovation and entrepreneurship. The respective indicators will be related to scholarly publications, patents filaments, market data and more. Moreover, the second case study will involve the CERN open hardware repository (COHR) which seems to represent an opportunity to innovate not only in technology but also in business models. It will be examined how COHR has been utilised by for-profit and nonprofit entities.

T.2.3. Evaluation of DGML products from an ecological economics perspective (M9-M21).

This will involve a quantitative and qualitative assessment. The former will conduct a life-cycle assessment (LCA) of 2-3 DGML technological solutions (e.g. a digitally fabricated beehive, an open source 3D printer, and a wireless data transmission, field sensor node). Such solutions have already been developed by projects that will be studied in previous tasks. LCA will include an assessment of the energy and material uses of the product from cradle to grave, including during its use and operation. This will be compared against the life-cycle of a conventional technology. Different states will be distinguished, such as extraction

of materials, production, transport, disposal of equipment, and the environmental impacts of each assessed. For the assessment, the CML 2 baseline 2000 will be used. Qualitative assessment will be based on observations of the application of the technology, interviews and focus groups such as farmers or makers. Technologies will be compared according to three key criteria for sustainability: (a) "autonomy"; (b) "resilience"; (c) "ecological adaptability". The end result will be an actual comparison of the environmental and social costs and benefits of the applied technologies, as well as the development of a prototype approach for an ecological-economic evaluation of any DGML solution.

Work package number:	**3**
Work package title:	**Synthesis and roadmaps**

Description of work

T.3.1. Inputs to research and policy for economic sustainability through DGML (M21-M27 / M42-M48).

This task will build on T.1.1 and T.2.1 and will also be informed by T.4.3. It will investigate economically successful and unsuccessful forms of collective organisation that emerge in participants of DGML projects for sharing and using resources (e.g. machinery, knowledge, information). The analysis will draw upon the work of Ostrom (e.g. Ostrom, 1990, 2010) to identify the type of rules or organisational arrangements under which economically sustainable and innovative DGML projects develop collectively.

T.3.2. Inputs to research, policy and regulatory roadmaps for the EU (M21-M30 / M42-M48).

This task aims to provide policy proposals in relation to the Innovation Union objectives regarding Social Innovation as well as the EU strategic priorities. There will be discussed the theoretical models most frequently used for recommending state and market as the appropriate coordinating institutions of production. Then we will build on T.1.2, T.2.2 and T.4.3 to describe emerging alternatives. We thus seek to provide both more refined theoretical premises and hypotheses regarding the evolution and scope of the DGML model. Our discussion will be cumulated into policy briefs and recommendations on how to take into account the implications of such models in national economic and innovation policies but also governance systems for the smart, sustainable and inclusive development of the EU nations.

T.3.3. Inputs to research and policy for environmental sustainability through DGML (M21-M30 / M42-M48).

This task will mainly build on T.1.2, T.1.3, T.2.2, and T.2.3 with the aim to provide research and policy proposals in relation to the environmental performance of DGML products, and their implications in terms of resource and energy use, as well as their sustainability in a possible future of resource scarcity and altered environmental conditions.

Work package number:	**4**
Work package title:	**Implementation and integration of the pilot**

Description of work

T.4.1. Build awareness around preliminary roadmaps and develop an action plan ("plan" part of PAR) (M30-M36).

Following the "Participatory Action Research" (PAR) cycle this task will develop the strategy for the implementation and integration of the pilot. Strategy development emerges through the "plan" part of the recursive PAR cycles. The strategy will be developed jointly by the COSMOLOCALISM research team and the chosen pilot community (e.g. Northern Tzoumerka, Greece, where the Phygital project has been

taking place), and will be advised by a brief situation analysis. The roadmaps developed in the WP3 will be used as guidelines. Central to the strategy is the ongoing engagement of the pilot community in terms of understanding and identifying with the objectives of the pilot and in the practical use of both the DGML products and practices. The strategy will also include a framework for technical and manufacturing support of the local community. A number of community facilitation methods will be specified, beginning with the PAR cycle and integrating techniques such as "open space technology" and "world cafe". We will also suggest the use of the "Four A" methodology defined as "awareness", "agency", "association" and "action" to engage the community in the bigger issues of resilience, sustainability and social innovation.

T.4.2. Implementation of the plan ("act" part of PAR) (M33-M45).

This task seeks to build awareness on the core tenets of DGML practices and products. It is understood that a multi-method approach is necessary. Of great importance is the development of communication methods. We will be in constant contact with the selected community over the course of this task. With convenient facilities and drop in locations, members of the pilot community will be supported on an "as needs" basis. Regular low-cost workshops will be held and "open educational resources" developed to support the ongoing education of the pilot community. The facilitators and community leaders identified in the pilot community along with the COSMOLOCALISM team will support the general outreach and dissemination strategy and help in identifying appropriate target groups. Information and promotional materials will be created showcasing the specific solutions being tested and regular findings from the pilots. This task also encompasses the support of the pilot community in terms of manufacturing and ongoing technical support. Selected DGML solutions will be manufactured for deployment. Once the solutions are deployed a cycle of technical support, repair and re-manufacture will take place based on real performance data from the field (we will also be in contact with the respective global DGML community). Environmental and economic advantages and constraints will form the context for the deployment of the solutions. Differences in light levels, humidity, heat, wind, soil and geology and labour needs and costs all influence the success of the solutions when utilised in the "real world". Moreover, the wider social context will be taken into account, in relation to the local acceptance of the solutions and their adaptability to specific norms and regimes, socio-cultural characteristics, traditional collaboration and learning patterns. As this task progresses the pilot community may contribute to the refinement of the solutions and suggested solutions themselves. New or modified solutions will also be available under a commons-oriented license.

T.4.3. Observation and empirical evaluation of the roadmap ("observe" and "reflect" parts of PAR) (M39-M45).

Extensive data gathering will take place during the implementation task in order to formulate a thick description of the whole process. The data collected will concern, among others, behaviours, material flows as well as possible issues that occur in technical, personal and theoretical level. Multiple methods will be employed like field note taking; sound, photography and video recording; unstructured interviews and focus groups. After a preliminary analysis of the data, the data and results will be shared with the participants who in turn will conduct a member check, i.e. evaluate their validity and provide feedback. In essence, the data will be evaluated using the experience gained in previous WPs (T.1.2, T.1.3, T.2.1, T.2.2). The context and evaluation of the outcomes will form the basis for the new phase of redesign and implementation, which in turn will lead to the final process of evaluation (i.e. dual streaming of the T.4.1, T.4.2 and T.4.3). The final findings will be interpreted through their systemic relation to wider political-economic contexts. Theorising will take place according to the roadmaps formed in WP3 and their link to macro-level theories, which address the current and emerging models of production.

Moreover, figure 2 shows **the timing of WPs and their components**.

WORKING PACKAGE	Year 1	Year 2	Year 3	Year 4
WP 1 – Theoretical Framework Analysis				
1.1. Review and critical analysis of existing commons-oriented economic activities and alternative organisations				
1.2. Review and critical analysis of the history of appropriate technology and grassroots innovation				
1.3. Review and critical analysis of the conjunction of ICT with local manufacturing and automation technologies				
WP 2 – Primary Data Gathering & Analysis				
2.1. Ethnographic study of DGML initiatives and communities				
2.2. Data gathering on digital commons' potential to spur technological advance				
2.3. Evaluation of DGML products from an ecological economics perspective				
WP 3 – Synthesis & Roadmaps				
3.1. Inputs to research and policy for economic sustainability through DGML				
3.2. Inputs to research, policy and regulatory roadmaps for the EU				
3.3. Inputs to research and policy for environmental sustainability through DGML				
WP 4 – Implementation & Integration of the Pilot				
4.1. Build awareness around preliminary roadmaps and develop an action plan				
4.2. Implementation of the plan				
4.3. Observation and empirical evaluation of the roadmap				

Figure 2: Gantt chart.

Last, the following table includes a list of **COSMOLOCALISM's deliverables** (of general interest) and relevant academic publications.

Table 3: Deliverables.

General deliverables
• A synthetic report on challenges and opportunities arising from the conjunction of digital commons and local manufacturing technologies. • A handbook, in a codified manner and enriched with visual content, of best organisational practices from existing DGML business models. • A field-comparison report between DGML and conventional products. • A protocol (user guidelines) for the integrated assessment of DGML artefacts (hardware). • An outreach methodology pamphlet for action learning on existing DGML organisational models and best practices to help community facilitators in engaging with their communities. • A handbook, in a codified manner and enriched with visual content, with community engagement practices for building awareness and inspiring action around DGML phenomena. • Policy reports and roadmaps reflecting on our analysis in relation to DGML entrepreneurship. • A report with policy recommendations in relation to the H2020 priorities. • Project website (objectives, work processes, audiovisuals, infographics, open web-based archive with annual reports, open-access publications etc).
Academic publications
• 12-17 academic research papers to be submitted to top-ranked journals such as *Science, Technology and Human Values; Research Policy; Journal of Cleaner Production; Organization; New Media & Society; Science and Public Policy; Environmental Innovation and Societal Transitions; Technological Forecasting and Social Change; Futures; Telematics & Informatics*. • Two books: one which could be regarded as an intermediate "progress report" for an ongoing research effort; and another on the normative aspect which could be viewed as a political and cultural analysis of these emerging phenomena (the journal articles will capitalise the writing of the two books).

2.3. Barriers

This project does not involve a high risk factor. The most obvious roadblock would be negotiating access with the various groups active in the field of interest for this project. Given the PI's familiarisation with most of them however, this would be an obstacle that could be easily overcome. Further, the field tests involve a risk of low participation. To overcome this, the leading candidate community, as well as the potential alternatives, have been selected due to their eagerness to experiment with new technologies and methods as well as their high ideological drive. Last, a possible risk for the evaluation of industrial products on sustainability and lifetime environmental impact can be poor raw data, due to industrial intellectual property policies. Though, a considerable amount of scientific publications is already present for the industrial products to be investigated.

2.4. Dissemination

We will attempt to increase the impact by targeting mainly on **academia**. However, COSMOLOCALISM will be of interest to a wider set of **commons-oriented organisations** (COO), including **practitioners, nonprofits, micro-enterprises, start-ups** and **small-medium enterprises**, as well as to the **open source community** (OSC). Our dissemination efforts will thus include the activities shown in the table below.

Dissemination Activity	Details	Target Audience
Publications	Publication of the socio-technical and scientific concepts and results, achieved by COSMOLOCALISM, in top-ranked journals. Two books. A working paper series will be created where the final drafts of our papers will be published under a commons-based license.	Academia
Participation at international conferences	Submitting and presenting research articles in highly recognised international conferences and workshops organised by the International Society for Ecological Economics; Research & Degrowth; Sustainability Transitions Research Network; the European Group for Organizational Studies; and others.	Academia
Participation at non-academic events	Participating in non-academic events in order to interact with the communities involved, e.g Maker Faire; Free Culture Research Conference; Wikimania; Open Knowledge Festival; Ouishare.	COO & OSC
Organisation of local COSMOLOCALISM workshops	These training "do-it-yourself & do-it-with-others" workshops will take place as part of the PAR cycle of the pilot, possibly in Northern Tzoumerka, Greece, where the Phygital project is taking place.	Local communities
COSMOLOCALISM website	A web portal will be built for public dissemination of project information and results, including the project structure, vision, challenges, progress and achievements.	Academia, COO, OSC & Public
Open web-based archive	All the outcomes of the project will be publicly available including: deliverables, research reports, data-sets, surveys, dissemination materials, source code and open-access publications.	Academia, COO, OSC & Public

3. Resources (including project costs)

3.1. Team members

Apart from the PI, the team envisioned to carry out this project will consist of one post-doctoral researcher and three PhD students. The team will be structured around the three different, albeit interrelated, research streams included in the project. The following comments on the specific roles of each member of the research team should be interpreted in the context of a team working closely in all aspects of the project.

Principal Investigator: The PI will be involved in the project for 90% of his time during the full duration of the project. He will be in charge of the overall scientific direction of the project in order to guarantee a fruitful integration of each collaborator's work on the different aspects of the project (embodied by the different WPs). Moreover, the PI will have primary responsibility for everyday oversight of the research design and conduct of the project and its various activities. He will also be actively involved in conducting case study research and supervising the doctoral students employed in the project.

Post-doctoral Researchers (2): The postdoctoral researchers will be PhD holders from the field of environmental sciences/ecological economics/political ecology and should be familiar with the "do-it-yourself & do-it-with-others" culture and open source technologies. The postdoctoral researchers will focus on the sustainability stream of the project and will be involved in analyzing data and conducting case study research, especially regarding the life-cycle assessment of the technological solutions. They will be on the team for 24 months (M9-M33).

PhD Students (3): In order to further the project, but more importantly to develop a new generation of scholars working in this area, three four-year research PhD studentships will be announced, to be held at the Ragnar Nurkse School of Innovation and Governance under the supervision of the PI. The first of these students will be in the area of organisational studies, the second in the area of innovation studies and the third in the area of environmental sciences/ecological economics. In addition, all students should be familiar with the "do-it-yourself & do-it-with-others" culture and open source technologies. The PhD students roles will involve in data collection, analyzing data and conducting case study research. Last, they will also provide bibliographic support and logistical support for the conduct of conferences and research travels.

Project Manager (1): A project manager for 50% of her/his time, for the full duration of the project, will be hired.

3.2. Budget justification

Personnel costs include salaries of the principal investigator, postdoctoral, and doctoral fellows. Personnel cost rates are based on TUT's institutional averages.

Travel costs intended to cover trips of the team to targeted case study sites for research purposes, as well as academic conferences, presenting findings of the project. Specifically, regarding visits to the case study areas, there will be 20 one-week trips within Europe and 5 three-week trips overseas. In addition, there will be 2 one-week trips per person per year to present the results in major conferences.

Equipment costs cover five computers for the personnel and the purchase of electronic prototyping devices for the development of the technological solutions. TUT will provide office space and computer network access, whereas the P2P Lab will offer, pro-bono, its mobile makerspace equipped with 3D printers, a 3D scanner and a small-scale CNC machine.

Other goods and services include consumables such as materials for manufacturing the solutions (PLA, ABS & TPE filaments, aluminum etc). In addition, publication costs include setting up a project website that features interim results, concept papers, presentations and findings of the project, and providing open access to the produced journal articles. Last, the organizing of 4 local workshops for the pilot community (including costs for the dissemination material and catering of the events' participants etc) is covered.

3.3. Project costs

The following table summarizes the budget requested for the entire project duration.

Cost Category			Total in Euro
Direct Costs	**Personnel**	PI	172800
		Senior Staff	0
		Postdocs (2)	148800
		PhD Students (3)	302400
		Other (project manager)	50400
	i. Total Direct Costs for Personnel (in Euro)		600000
	Travel		117000
	Equipment		10500
	Other goods and services	Consumables	4500
		Publications	17500
		Other (workshops)	4800
	ii. Total Other Direct Costs (in Euro)		154300
A – Total Direct Costs (i + ii) (in Euro)			754300
B – Indirect Costs (overheads) 25% of Direct Costs (in Euro)			188575
C1 – Subcontracting Costs (no overheads) (in Euro)			0
C2 – Other Direct Costs with no overheads (in Euro)			0
Total Estimated Eligible Costs (A + B + C) (in Euro)			**1017275**
Total Requested EU Contribution (in Euro)			**1017275**

Please indicate the duration of the project in months:	**48**
Please indicate the % of working time the PI dedicates to the project over the period of the grant:	**90%**
Please indicate the % of working time the PI spends in an EU Member State or Associated Country over the period of the grant:	**90%**

4. References

Bates, R. (2008). *When things fell apart: State failure in late-century Africa*. New York: Cambridge University Press.

Bates, R., Greif, A., Levi, M., & Rosenthal, J. (1998). *Analytic narratives*. Princeton: Princeton University Press.

Bauwens, M. (2005). The political economy of peer production. *CTheory Journal*. Retrieved from: http://www.ctheory.net/articles.aspx?id=499.

Bauwens, M., & Kostakis, V. (2014). From the communism of capital to capital for the commons: Towards an open co-operativism. *tripleC: Journal for a Global Sustainable Information Society*, 12(1), 356-361

Benkler, Y. (2006). *The wealth of networks: How social production transforms markets and freedom*. New Haven/London: Yale University Press.

Benkler, Y. (2011). *The penguin and the leviathan: The triumph of cooperation over self-interest*. New York: Crown Business.

Bruns, A. (2008). *Blogs, wikipedia, second life, and beyond: From production to produsage*. New York: Peter Lang.

Castells, M. (2000). *The rise of the network society: Information age*. Oxford: Blackwell.

Dafermos, G. (2015). Transforming the productive base of the economy through the open design commons and distributed manufacturing. *Journal of Peer Production*, *7*. Retrieved from: http://peerproduction.net/issues/issue-7-policies-for-the-commons/peer-reviewed-papers/distributed-manufacturing/

della Porta, D. & Keating, M. (2008). *Approaches and methodologies in the social sciences: A pluralist perspective*. Cambridge: Cambridge University Press.

Freeman, C. (1995). The 'National System of Innovation' in historical perspective. *Cambridge Journal of Economics*, *19*(1): 5-24.

Geels, F. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and case study. *Research Policy*, *31*(8–9), 1257–1274.

Gershenfeld, N. (2007). *FAB: The coming revolution on your desktop: From personal computers to personal fabrication*. Cambridge: Basic Books.

Giotitsas, C., & Ramos, J. (2017). *A new model of production for a new economy: Two cases of agricultural communities*. London: The New Economics Foundation.

Gray, P., Williamson, J., Karp, D., & Dalphin, J. (2007). *The research imagination: An introduction to qualitative and quantitative methods*. New York: Cambridge University Press.

Hermann, M., Pentek, T., & Otto, B. (2015). *Design principles for Industrie 4.0 scenarios: A literature review*. Dortmund: Technische Universität Dortmund.

King, G., Keohane, R., & Verba, S. (1994). *Designing social inquiry: Scientific inference in qualitative research*. Princeton: Princeton University Press.

Kostakis, V., Fountouklis, M., & Drechsler, W. (2013). Peer production and desktop manufacturing: The case of the Helix_T wind turbine project. *Science, Technology & Human Values*, *38*(6): 773-800.

Kostakis, V., & Bauwens, M. (2014). *Network society and future scenarios for a collaborative economy*. Basingstoke: Palgrave Macmillan.

Kostakis, V., Niaros, V., Dafermos, G., & Bauwens, M. (2015a). Design global, manufacture local: Exploring the contours of an emerging productive model. *Futures*, *73*, 126-135.

Kostakis, V., Niaros, V., & Giotitsas, C. (2015b). Production and governance in hackerspaces: A manifestation of commons-based peer production in the physical realm?. *International Journal of Cultural Studies*, 18(5), 555-573.

Kostakis, V., Roos, A., & Bauwens, M. (2016). Towards a political ecology of the digital economy: Socio-environmental implications of two value models. *Environmental Innovation and Societal Transitions*, 18, 82-100.

Kostakis, V., Latoufis, K., Liarokapis, M., & Bauwens, M. (2017). The convergence of digital commons with local manufacturing from a degrowth perspective: Two illustrative cases. *Journal of Cleaner Production*. (in press)

Lieberman, E. (2005). Nested analysis as a mixed-method strategy for comparative research. *American Political Science Review*, *99*(3): 435-452.

Lundvall, B. (1992). *National innovation systems: Towards a theory of innovation and interactive learning*. London: Pinter Publishers.

Nelson, R. (1993). *National innovation systems: A comparative analysis*. New York: Oxford University Press.

Niaros, V., Kostakis, V., & Drechsler, W. (2017). Making (in) the smart city: The emergence of makerspaces. *Telematics & Informatics*.

Okali, C., Sumberg J. & Farrington J. (1994). *Farmer participatory research: Rhetoric or reality*. London: Intermediate Technology Publications.

Okazaki, Y., Mishima, N., & Ashida, K. (2004). Microfactory - concept, history, and developments. *Journal of Manufacturing Science and Engineering*, *126*(4), 837–844.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge: Cambridge University Press.

Ostrom, E. (2010). Beyond markets and states: Polycentric governance of complex economic systems. In K. Grandin (Ed.), *The Nobel Prizes 2009*. Stockholm: The Nobel Foundation.

Perez, C. (2002). *Technological revolutions and financial capital: The dynamics of bubbles and golden ages*. Cheltenham: Edward Elgar Pub.

Perez, C. (2009a). The double bubble at the turn of the century: Technological roots and structural implications. *Cambridge Journal of Economics, 34*, 779-805.

Perez, C. (2009b). Technological revolutions and techno-economic paradigms. *Cambridge Journal of Economics, 33*, 185-202.

Poteete, A., Janssen, M. & Ostrom, E. (2010). *Working together: Collective action, the commons, and multiple methods in practice*. Princeton: Princeton University Press.

Rifkin, J. (2014). *The zero marginal cost society: The internet of things, the collaborative commons, and the eclipse of capitalism*. New York: Palgrave Macmillan.

Scholz, T., & Schneider, N. (2017). *Ours to hack and to own: The rise of platform cooperativism, a new vision for the future of work and a fairer Internet*. New York, NY: OR Books.

Smith, A. (2007). Translating sustainabilities between green niches and socio-technical regimes. *Technology Analysis & Strategic Management*, *19*(4), 427-450.

Tanaka, M. (2001). Development of desktop machining microfactory. *Riken Review*, *34*.

Tandon, R. (1996). The historical roots and contemporary tendencies in participatory research: Implications for health care. In K. de Koning and M. Martin (Eds.), *Participatory research in health: Issues and experiences* (pp. 19-26). London: Zed Books.

Troxler, P. (2011). Libraries of the peer production era. In B. Van Abel, L. Evers, R. Klaassen & P. Troxler (Ed.), *Open design now* (pp. 86-95). Amsterdam: BIS Publishers.

Vetter, A., (2017). The matrix of convivial technology - Assessing technologies for degrowth. *Journal of Cleaner Production*. (in press)

Weber, S. (2004). *The success of open source*. Cambridge: Harvard University Press.

Commitment of the host institution for ERC Calls 2018[1, 2, 3]

The Tallinn University of Technology, which is the applicant legal entity,

confirms its intention to sign a supplementary agreement with
Dr Vasileios Kostakis

in which the obligations listed below will be addressed should the proposal entitled COSMOLOCALISM : "Design Global, Manufacture Local: Assessing the Practices, Innovation and Sustainability Potential of an Emerging Mode of Production"

be retained.

Performance obligations of the *applicant legal entity* that will become the beneficiary of the H2020 ERC Grant Agreement (hereafter referred to as the Agreement), should the proposal be retained and the preparation of the Agreement be successfully concluded:

The *applicant legal entity* commits itself to hosting *[and engaging]* the *principal investigator* for the duration of the grant to:

a) **ensure that the work will be performed under the scientific guidance of the *principal investigator* who is expected to devote:**
- *in the case of a Starting Grant at least 50% of her/his total working time* to the ERC-funded project (action) and spend at least 50% of her/his total working time in an EU Member State or Associated Country;
- *in the case of a Consolidator Grant at least 40% of her/his total working time* to the ERC-funded project (action) and spend at least 50% of her/his total working time in an EU Member State or Associated Country;
- *in the case of an Advanced Grant at least 30% of her/his total working time* to the ERC-funded project (action) and spend at least 50% of her/his total working time in an EU Member State or Associated Country.

---

[1] A scanned copy of the signed statement should be uploaded electronically via the Participant Portal Submission Service in PDF format.
[2] The statement of commitment of the host institution refers to most obligations of the host institution, which are stated in the H2020 ERC Model Grant Agreement (MGA). The H2020 ERC MGA is available on the ERC website at http://erc.europa.eu & http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html. The reference to the time commitment of the Principal Investigator is stated in the ERC Work Programme 2017.
[3] This statement (on letterhead paper) shall be signed by the institution's legal representative and stating his/her name, function, email address and stamp of the institution.

b) carry out the work to be performed, as it will be identified in Annex 1 of the Agreement, taking into consideration the specific role of the *principal investigator*;

c) enter — before signature of the Agreement — into a '*supplementary agreement*' with the *principal investigator*, that specifies the obligation of the *applicant legal entity* to meet its obligations under the Agreement;

d) provide *the principal investigator* with a copy of the signed Agreement;

e) guarantee the *principal investigator's* scientific independence, in particular for the:

   i) use of the budget to achieve the scientific objectives;

   ii) authority to publish as senior author and invite as co-authors those who have contributed substantially to the work;

   iii) preparation of scientific reports for the project (action);

   iv) selection and supervision of the other *team members* (hosted *[and engaged]* by the *applicant legal entity* or other legal entities), in line with the profiles needed to conduct the research and in accordance with the *applicant legal entity's* usual management practices;

   v) possibility to apply independently for funding;

   vi) access to appropriate space and facilities for conducting the research;

f) provide — during the implementation of the project (action) — research support to the *principal investigator* and the team members (regarding infrastructure, equipment, access rights, products and other services necessary for conducting the research);

g) support the *principal investigator* and provide administrative assistance, in particular for the:

   i) general management of the work and his/her team

   ii) scientific reporting, especially ensuring that the team members send their scientific results to the *principal investigator*;

   iii) financial reporting, especially providing timely and clear financial information;

   iv) application of the *applicant legal entity's* usual management practices;

   v) general logistics of the project (action);

   vi) access to the electronic exchange system (see Article 52 of the Agreement);

h) **inform the *principal investigator* immediately (in writing) of any events or circumstances likely to affect the Agreement (see Article 17 of the Agreement);**

i) **ensure that the *principal investigator* enjoys adequate:**

   i) **conditions for annual, sickness and parental leave;**

   ii) **occupational health and safety standards;**

   iii) **insurance under the general social security scheme, such as pension rights;**

j) **allow the transfer of the Agreement to a new beneficiary ('portability'; see Article 56a of the Agreement).**

k) **take all measures to implement the principles set out in the Commission Recommendation on the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers[4] - in particular regarding working conditions, transparent recruitment processes based on merit and career development – and ensure that the *principal investigator*, researchers and third parties involved in the project (action) are aware of them.**

For the host institution (applicant legal entity):

Date

05.09.2017

Name and Function

Renno Veinthal ; Vice-Rector for Research.

Email and Signature of legal representative

Renno.Veinthal@ttu.ee ; .....

TALLINNA TEHNIKAÜLIKOOL TTÜ

Stamp of the host institution (applicant legal entity)

IMPORTANT NOTE: In order to be complete all the above mentioned items are mandatory and shall be included in the commitment of the host institution.

[4] Commission Recommendation 2005/251/EC of 11 March 2005 on the European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers (OJ L 75, 22.3.2005, p. 67).

EESTI VABARIIK

TALLINNA TEHNIKAÜLIKOOL

DIPLOM

Tallinna Tehnikaülikool tunnistab, et

Vasileios Kostakis,

sündinud 23. veebruaril 1985. aastal,

on täitnud doktoriõppe

avaliku halduse õppekava

täies mahus ja talle on antud

filosoofiadoktori (tehnoloogia valitsemine) kraad

Doctor of Philosophy (technology governance)

Rektor Andres Keevallik

Sotsiaalteaduskonna dekaan Sulev Mäeltsemees

Tallinnas 11. juulil 2011. aastal

TALLINNA TEHNIKAÜLIKOOL TTÜ 1918

OB 000189

REPUBLIC OF ESTONIA

TALLINNA TEHNIKAÜLIKOOL
Tallinn University of Technology

DIPLOMA SUPPLEMENT

Annex to Diploma No OB000189, attached S213358, S213359

This Diploma Supplement model was developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgments, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.

1. INFORMATION IDENTIFYING THE HOLDER OF THE QUALIFICATION

1.1. Family name:	**Kostakis**
1.2. Given name:	**Vasileios**
1.3. Date of birth (day/month/year):	**23.02.1985**
1.4. Personal identification code:	**not applicable**

2. INFORMATION IDENTIFYING THE QUALIFICATION

2.1. Name of qualification and (if applicable) title conferred (in original language):	***filosoofiadoktor (tehnoloogia valitsemine)*** **Doctor of Philosophy (technology governance)**
2.2. Main field(s) of study for the qualification:	**Public Administration (code 80411)** **30.03.2006 (date of registration)** **technology governance (main field of study)**
2.3. Name and status on awarding institution (in original language):	**Tallinna Tehnikaülikool, public university**
2.4. Name and status of institution (if different from 2.3.) administering studies (in original language):	-
2.5. Language(s) of instruction:	**English**

3. INFORMATION ON THE LEVEL OF THE QUALIFICATION

3.1. Level of qualification:	**Third cycle higher education** **Estonian Qualification Framework Level 8**
3.2. Official length of programme:	**4 years, 240 ECTS (European Credit Transfer and Accumulation System) credits**
3.3. Access requirement(s):	***magistrikraad*** **(Master´s degree) or a corresponding qualification**

4. INFORMATION ON THE CONTENTS AND RESULTS GAINED

4.1. Mode of study:	**full-time**
4.2. Programme requirements:	**Completion of 240 ECTS credits programme, general studies 8.0, special studies 37.0, graduation thesis 195.0**

DS 050663

4.3. Programme details (e.g. modules or units studied) and the individual grades/marks/credits obtained:

Course code	Course	ECTS credits	Date	Grade	Teaching staff member
Tallinn University of Technology					
HHA9900	Internship	6.0	15.04.2011	A	Rainer Kattel
HHI9030	Innovation Systems	6.0	06.06.2011	5	Tarmo Kalvet
HHX9070	PhD Seminar	6.0	08.06.2011	A	Rainer Kattel
HHI9010	Innovation	4.0	08.06.2011	A	Rainer Kattel
HHI9020	Public Administration and Innovation	6.0	08.06.2011	4	Rainer Kattel
HHL9100	Research Methods in Social Sciences	6.0	10.06.2011	4	Ringa Raudla
Recognised on the basis of prior learning:					
HHX9080	Research and Supervision Training	3.0	18.04.2011	A	
HUP9010	Organisation of Research and Education	4.0	18.04.2011	A	
HHX9090	Teaching Practice	4.0	19.04.2011	A	
Title of thesis: The Political Economy of Information Production in the Social Web: Towards a "Partner State Approach"					
		195.0	11.07.2011		Wolfgang J. M. Drechsler

Total workload in ECTS credits: 240.0

Weighted average grade: 4.33

4.4. Grading scheme:

5 or A	**excellent**
4 or B	**very good**
3 or C	**good**
2 or D	**satisfactory**
1 or E	**sufficient**
0 or F	**insufficient**

The minimum passing grade is 1 or E, in the Pass/Fail assessment it is Pass.

5. INFORMATION ON THE FUNCTION OF THE QUALIFICATION

5.1. Access to further study: **the doctoral degree is the highest qualification in the Estonian higher education system**

5.2. Professional status: **No special information is indicated, provides access to positions in the labour market, where doktor-level education is required**

6. ADDITIONAL INFORMATION

6.1. Additional information: **The study programme has been accredited by the Estonian Higher Education Quality Assessment Council on 02.06.2009**

6.2. Futher information sources:

www.ttu.ee
Tallinn University of Technology
Faculty of Social Sciences
Ehitajate tee 5, 19086 Tallinn
ESTONIA
Tel: +372 620 2646
Fax: +372 620 20 20
E-mail: h@ttu.ee

Estonian ENIC/NARIC
(Academic Recognition Information Centre)
Archimedes Foundation
L.Koidula 13 A
10125 Tallinn
ESTONIA
www.archimedes.ee/enic
Tel.: +372 697 9215
Fax.: +372 697 9226
E-mail: enic-naric@archimedes.ee

7. CERTIFICATION OF THE SUPPLEMENT

7.1. Date **15.07.2011**

7.2. Signatures

7.3. Names **Sulev Mäeltsemees** **Elve Vunn**

7.4. Capacity **Dean of Faculty of Social Sciences** **Secretary**

7.5. Official stamp or seal

TALLINNA TEHNIKAÜLIKOOL TTÜ 1918

8. INFORMATION ON THE HIGHER EDUCATION SYSTEM OF ESTONIA

8.1. GENERAL ORGANISATION

The general legal basis of the system of higher education is laid down by Republic of Estonia Education Act, Universities Act, Institutions of Professional Higher Education Act, Private Schools Act, Vocational Educational Institutions Act and the Government of the Republic Regulation of 18 December 2008 No 178 Standard of Higher Education.

Since the academic year 2002/2003, the general structure of the system of higher education has had three cycles that comply with the bachelor-master-PhD model of the European higher education area. In the first cycle of higher education, there are two branches with distinct learning outcomes - Bachelor's study and professional higher education study. Master's study is conducted in the second cycle of higher education and in the third - Doctoral study. In some fields of study, Bachelor's study and Master's study have been merged together into integrated study. Requirements for different cycles of education, including the requirements for their learning outcomes and the correspondence to the Estonian qualifications framework are regulated by the Standard of Higher Education.

Higher education is acquired in universities, institutions of professional higher education and some vocational education institutions. By form of ownership, educational institutions providing higher education are divided into state institutions, universities in public law and private institutions. Universities offer Bachelor's, Master's and Doctoral study and may provide professional higher education. Professional higher education institutions offer professional higher education programmes and may offer Master's programmes, but in cooperation with universities. An institution of professional higher education may offer Master's study programme independently according to study programmes of religious studies and theology or military study programmes.

8.2. STATE RECOGNITION OF DIPLOMAS

State recognition of diplomas is based until 31.12.2011 on a positive accreditation decision of a study programme and since 2009 a right will be given to the educational institution to conduct studies in the relevant study programme group and to issue corresponding academic degrees and diplomas. In years 2009 - 2011 both regulations are valid for issuing state recognised diplomas.

A person who has completed the joint study program shall be awarded with a state recognised joint diploma by multiple institutions. The form of joint diploma is equivalent to the form of diploma that is given upon completion of corresponding study programme.

8.2.1. Accreditation

Diplomas that are issued after completing an accredited study programme are recognised by the state. Until 1 January 2010 positive accreditation decisions made, including conditional accreditation decisions have validity of seven or three years correspondingly, but no longer than 31.12.2011. Diplomas of universities in public law that are given upon completion of study programmes that were entered into the registry before 1 June 2002 and professional higher education diplomas that are given upon completion of study programmes

that were entered into the registry before 30 June 2003 have state recognition without accreditation. Until 31 December 2008, accreditation was performed by the Higher Education Quality Assessment Council. On 1 January 2009, the Estonian Higher Education Quality Agency was formed for carrying out quality assurance procedures and accreditations.

8.2.2. The right given to an educational institution to conduct studies in a study programme group

Since 2009 on the basis of an assessment of all study programme groups - a transition assessment - the Government of the Republic issues to an educational institution, for an undetermined or determined period of time (one to three years), the right to conduct studies in the relevant study programme group and to issue corresponding academic degrees and diplomas. Since 1 January 2012, an educational institution may issue state recognized graduation documents only if the right to conduct studies has been granted for the study programme group.

Recognition of qualifications issued for previous higher education systems and their correspondence to the qualifications of the system currently in force is regulated by the Government of the Republic Regulation of 6 June 2005 No 120 Correspondence of Qualifications Issued in Republic of Estonia and Qualifications Issued in Former Union of Soviet Socialist Republics Prior to 20 August 1991.

8.3. ADMISSION REQUIREMENTS

8.3.1. General requirements

The general admission requirement for the first cycle of higher education is secondary education proved by a corresponding document - an upper secondary school leaving certificate, a certificate for having acquired vocational secondary education, corresponding certificates and diplomas of earlier systems and qualifications allowing admission into educational institutions providing higher education of foreign countries. An upper secondary school leaving certificate is issued upon completion of the 12th year (9 years of basic education and 3 years of general secondary education). Passing of state examinations is proved by a state examination certificate that is valid together with the upper secondary school leaving certificate.

8.3.2. Specific requirements

In addition to the general requirements, an educational institution may establish additional admission requirements. These may include admission examinations, state examination results, professional tests, interviews, etc.

8.4. ORGANISATION OF STUDIES

General requirements for studies, study programmes and members of teaching staff are established by a framework document Standard of Higher Education. The nominal duration of study is measured in academic years, the study load for a programme in credit points. One credit point (*AP*) of the credit point system in force until 31 August 2009 corresponds to 40 hours or one week of study by a student. One academic year amounts 40 credit points (*AP*), corresponding to 60 credit points (ECTS credits) of the European Credit Transfer and Accumulation System (ECTS).

Since academic year 2009/2010 the European Credit Transfer and Accumulation System has been the national credit point system. The Estonian acronym for the European Credit Transfer and Accumulation System credit point is EAP (*Euroopa Ainepunktisüsteemi ainepunkt*). One ECTS credit corresponds to 26 hours of study by a student - amounting to 1,560 hours or 60 ECTS credits for an academic year.

8.5. QUALIFICATIONS OF HIGHER EDUCATION AND CORRESPONDING STUDIES

8.5.1. Professional higher education

Professional higher education is study in the first cycle of higher education, the aim of which is to acquire the competences necessary to work in a certain profession or continue Master's study. The nominal duration of study is 3 to 4,5 years, 180-270 ECTS credits. A person who has completed the education shall be awarded a diploma (on a grey-blue form with the indication E) certifying the completion of the study programme of a professional higher education - professional higher education diploma.

A professional higher education diploma enables access to Master's study.

8.5.2. Bachelor's study

Bachelor's study is a study in the first cycle of higher education, the aim of which is to improve general educational knowledge and to acquire basic knowledge and skills in a field of study in order to continue Master's study and commence work. Its nominal duration is predominantly 3 years, 180 ECTS credits or, exceptionally, 4 years, 240 ECTS credits.

A person who has graduated the study is awarded a diploma (on a green-yellow form with the indication L) certifying the completion of the study programme. A graduate is awarded a *bakalaureusekraad* (Bachelor's degree). A *bakalaureusekraad* enables access to Master's study.

8.5.3. Master's study

Master's study is a study in the second cycle of higher education during which a student improves his or her knowledge and skills in his or her field of study and acquires the knowledge and skills necessary for independent work and Doctoral study. The main objective of Master's study is to train a student to become a specialist with in-depth knowledge. The access requirement is completion of the first cycle of higher education (*bakalaureusekraad*, professional higher education diploma or a corresponding qualification). The nominal duration of study is 1-2 years, 60 to 120 ECTS credits, but not less than 5 years and 300 ECTS credits together with the first cycle. Upon completion of a Master's study programme entered into the register before 1 June 2002, the *magistrikraad* is awarded as a research or a professional degree. In the research Master's study, research work shall constitute at least 50% of the study programme's workload and the Master's thesis shall present a novel scientific treatment of a problem of the field of study. In professional

Master's study, research, development or creative work shall constitute at least 25% of the study programme's load and the study is aimed at finding a novel solution to a professional problem related to creativity. Under the conditions and pursuant to the procedure established by the university the completion of a Master's study programme entered into the register before 1 June 2002 may be regarded as a part of Doctoral studies.
A person who has graduated Master's study is awarded a diploma (on a silver form with the indication M; for study programmes entered into the register before 1 June 2002, on a brown form with the indication C) certifying the completion of the Master's study programme. A graduate is awarded a *magistrikraad* (Master's degree). A *magistrikraad* enables access to Doctoral study.

8.5.4. Study based on integrated study programmes of Bachelor's and Master's study

Integrated Bachelor's and Master's study is a study in one single cycle including both basic and specialized studies. Integrated single cycle studies are: medical studies, veterinary medicine studies, pharmacist studies, dentistry studies, architectural studies, civil engineering studies or pedagogical studies for class teachers. The nominal duration of medical studies, and since 2002/2003 admission also of veterinary medicine studies, is 6 years, 360 ECTS credits. The nominal duration of other integrated studies is 5 years, 300 ECTS credits. Upon completion of the study, a diploma (on a silver form with the indication M) is awarded certifying the completion of the study programme. Graduation of the study results in a qualification *magistrikraad* (Master's degree). Exceptionally, in medical, dentistry and veterinary training, an *arstikraad* (Degree in Medicine), a *hambaarstikraad* (Degree in Dentistry) and a *loomaarstikraad* (Degree in Veterinary Medicine), respectively, are awarded.
A qualification awarded upon completion of an integrated study programme enables access to Doctoral study.

8.5.5. Doctoral study

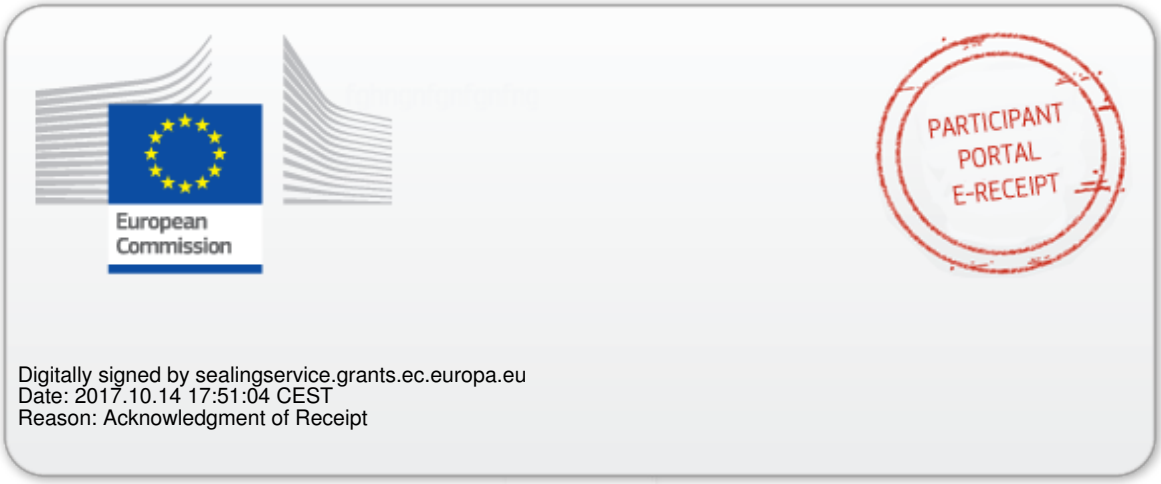
Doctoral study is study in the third cycle of higher education, the aim of which is to acquire the knowledge and skills necessary for independent research, development or professional creative activity.The general access requirement for Doctoral study is a *magistrikraad* or a corresponding qualification. The nominal duration of study is 3 to 4 years, 180-240 ECTS credits. A person who has graduated the study is awarded a diploma (on a gold form with the indication O; for study programmes entered into the register before 1 June 2002, on a white form with the indication D) certifying the completion of the study programme. A graduate is awarded a *doktorikraad* (Doctor's degree). A *doktorikraad* is a research degree for which the candidate has to compose and defend a Doctoral thesis - independent scientific research or creative work.

Annex on ethical issues

There are no significant ethical issues arising from this proposal. The main ethical issues stem from the interactions between researchers and participants in the conduct of social science methods of research such as interviews, focus groups and observation, where it will be ensured that they will be anonymous and do not result in discriminatory practices or unfair treatment. Ethical procedures of the institutions involved in the research will be followed.

The risks to participants are deemed to be low. The confidentiality and anonymity of participants will be respected and informed consent will be obtained from all participants, along with the necessary notifications/authorisations for collecting and processing their data. Potential participants will also have the right to decline to participate or withdraw their consent. Specifically working with vulnerable groups such as people with disabilities or children does not form part of this project. Any recorded information (audio and/or visual) will specially be considered, to ensure that privacy and personal identities are protected. This proposal does not involve collecting or processing of sensitive data as well as it does not involve data transfer to third countries. The purpose of the research will be clearly explained to research participants and they will be kept informed of research results.

Regarding the processing of personal data and the protection of privacy in the electronic communications sector, as well as the retention of data generated or processed in connection with the provision of publicly available electronic communications services or of public communications networks (e.g. cloud, big data, open data, cookies etc.), our research will comply with the relevant legislation (in particular EU Directives 2002/58/EC,



This electronic receipt is a digitally signed version of the document submitted by your organisation. Both the content of the document and a set of metadata have been digitally sealed.

This digital signature mechanism, using a public-private key pair mechanism, uniquely binds this eReceipt to the modules of the Participant Portal of the European Commission, to the transaction for which it was generated and ensures its full integrity. Therefore a complete digitally signed trail of the transaction is available both for your organisation and for the issuer of the eReceipt.

Any attempt to modify the content will lead to a break of the integrity of the electronic signature, which can be verified at any time by clicking on the eReceipt validation symbol.

More info about eReceipts can be found in the FAQ page of the Participant Portal. (http://ec.europa.eu/research/participants/portal/page/faq)