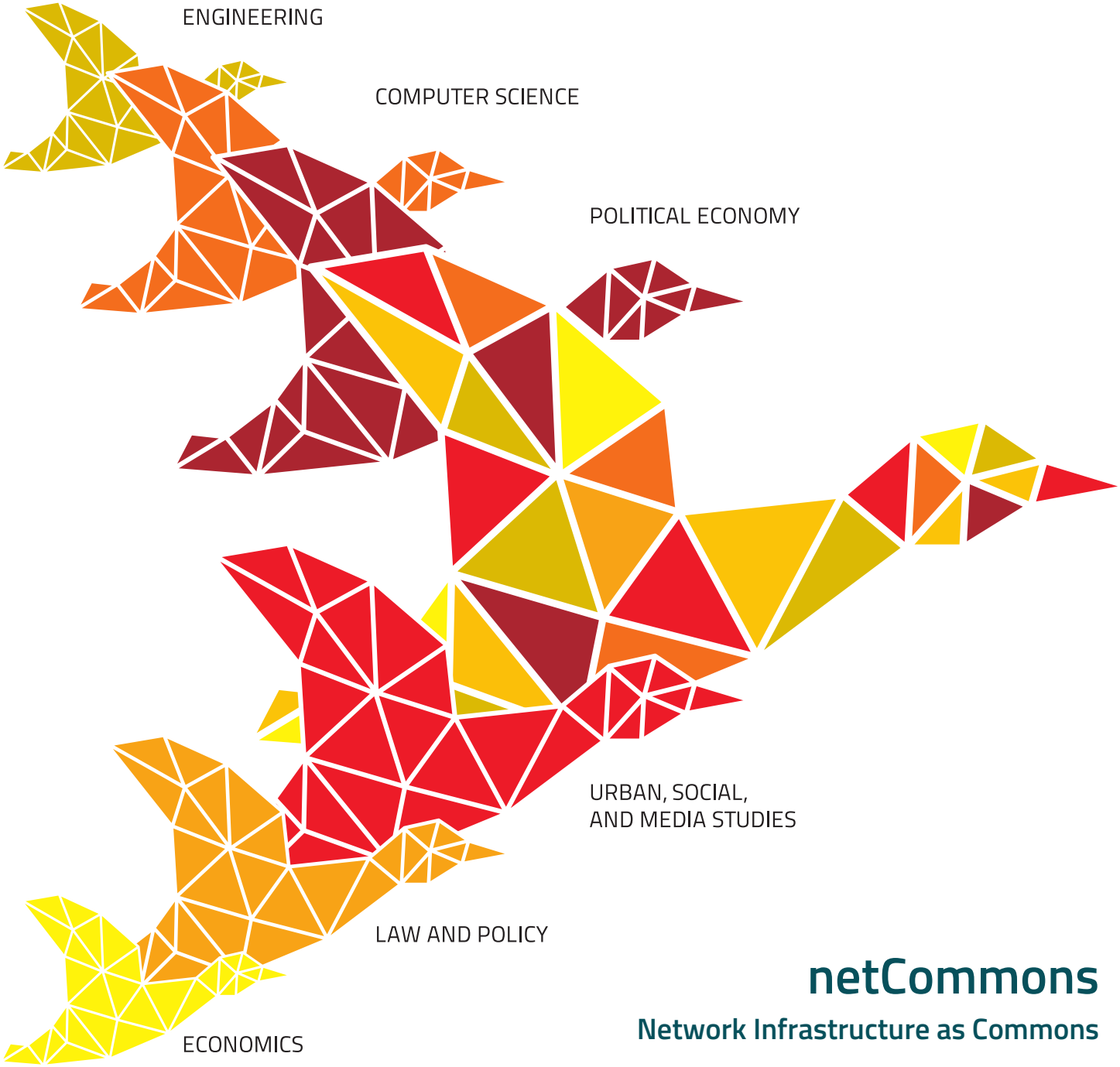

netCommons

Network Infrastructure as Commons

Incentives for Participation and Active Collaboration in CNs

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Executive summary

This document is an early draft version of deliverable D2.8, the second deliverable out of the netCommons task 2.2 ”Incentives for Participation and Active Collaboration in Community Networks (CNs)”. It is the follow-up deliverable of D2.3, which provided a thorough review of participation and collaboration incentives in CNs identifying the way they work and their relevance to the different CN stakeholders.

In D2.8 the work focuses on the two CNs that were identified in D2.3 [1] as case studies for design and analysis purposes: the guifi.net CN, in Catalonia, Spain and the Sarantaporo.gr, in Central Greece. In the case of the first CN, which represents a success story with innovative approaches to the technology used and its operational strategy, the emphasis is more on the study, analysis and optimization of *existing* incentive mechanisms. On the contrary, the work on Sarantaporo.gr is on both fronts, design and analysis of incentive mechanisms.

The case-study oriented work in T2.2 has so far almost exclusively evolved around the Sarantaporo.gr CN. Hence, the current draft outlines the four directions currently pursued in netCommons for incentivizing participation in this CN: their subscription-based funding model, the design of applications that will provide added value to the network, the enrichment of the CN business model with the participation of commercial service providers, and the efforts to educate and train the CN users so that they get to see the CN as an educational platform and community asset at the same time. For each one, we outline the work that has been carried out so far and the plans for the rest of the project lifetime.

Our study of the guifi.net CN will mainly focus on the compensation mechanism introduced by the Foundation that operates the CN, *i.e.*, the process through which service providers share the operational cost of the CN and have the chance to make up for investments on the network infrastructure. The first outcomes of this work will be reported in a subsequent draft of the deliverable (aimed for M24) and the final results will be available by the contractual date of the D2.8 delivery (M30).

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List of Acronyms

CNs	Community Networks
EC	European Commission
EU	European Union
GUADEC	GNOME Users And Developers European Conference
ISP	Internet Service Provider
IXP	Internet eXchange Point
NPO	Non-Profit Organization
RDP	Rural Development Program
SAXs	Salut, Amor i Xarxa
SLA	Service Level Agreement
SPs	Service Providers
TEI	Technical University of Thessaly
VAT	Value Added Tax
VOIP	Voice Over Internet Protocol

1 From the big picture of D2.3 to the case studies of D2.8

D2.8 is the follow-up deliverable of D2.3, entitled "Incentives for Participation and Active Collaboration in CNs" [1]. In D2.3, the goal has been to provide a thorough review of participation and collaboration incentives in CNs. To this end, we start from the different organizational structures met across CN instances and identify the different types of stakeholders that are relevant to them (users, volunteers, commercial service providers, public authorities). We then classify the set of incentives into different incentive categories (political, socio-cultural, and economic), assessing their relevance to each distinct stakeholder type.

We explicitly describe incentives as implicit motives that urge people's involvement in a CN (*e.g.*, their desire for autonomy or do-it-yourself culture) as opposed to incentive mechanisms that are put in place by CNs to respond to these motives (*e.g.*, distributed open decision-making processes, do-it-yourself kits for setting up nodes and antennas). Besides mechanisms already implemented and tested in the CNs, we also discuss in D2.3 mechanisms that are proposed in the scientific literature. An indicative taxonomy of the full set of incentive mechanisms (both proposed-only and implemented) per stakeholder type is given in Table 1.1.

One thing made clear during the review work on incentives and incentive mechanisms in D2.3 is that CNs differentiate strongly, not least due to the different types of involved stakeholders in each case and the environment in which they were developed (rural *vs.*urban). Hence, the decision was made to focus subsequent efforts of netCommons in task 2.2 on two CN case studies, the guifi.net and the Sarantaporo.gr CNs. The first one in Catalonia, Spain, represents one of the CN success stories in Europe and worldwide with strong elements of novelty in the used technology, business model, and strategy. The second one has is a more recently launched activity, which has featured stronger dependence on public subsidy in its deployment phase, and seeks to adopt best practices and viable models for its sustainable operation.

Mechanisms	**Volunteers**	**Users**	**Professionals**	**Public administrations**
Direct reciprocity		x		
Indirect reciprocity		x		
Punishment of free-riders	x			
Community currencies		x	x	
Donation certificates			x	x
Financial compensation			x	
Local data storage infrastructure		x		
Social events and meetings	x	x		
New member induction processes		x		
Workshops and seminars		x		
Online material for DIY fans		x		
Local applications and services		x		
Operation as legal entities		x	x	x
Licenses and Agreements		x	x	

Table 1.1: Incentives mechanisms and relevance to stakeholders.

D2.3 section 4 provides an introductory description of the two case studies and the incentive mechanisms that are in place in them. In D2.8, we analyze these mechanisms (how they work, what behaviors/strategies do they

motivate from the different stakeholders, how could they be improved) and develop new ones, in an attempt to identify best practices that could be exportable to more CN instances.

2 The Sarantaporo.gr case study

In Sarantaporo.gr we have got involved into several activities that aim to strengthen the participation incentives for the community. These activities concern the network funding mechanism, the education and training of the community on different aspects of the CN, the organizational structure of the association that runs the network and its legal hypostasis, as well as the design of local applications and services (smart farming services and CommonTasker application) that increase the value of the CN for the local community.

2.1 Novel network funding model

Sarantaporo.gr has recently decided to revise its previous funding model and implement a different approach, which is already in effect since the beginning of 2017. The revenue mix in the early model [2] was heavily depended on European Union (EU) and national programs funding (62%) and private donations (28%). The later included members' annual fees and *collective donations* that the organization received from each village collectively. The *collective donations* were an attempt to spur collaboration among each village's community members, by motivating them to collectively (as a village) raise and donate a proposed yearly fee to the organization, in order to cover some maintenance and operational costs of the local community network.

By the end of 2016 the members of Sarantaporo.gr acknowledged two things: a) funding through EU and local programs requires a lot of resources and is very time-consuming, and b) the *collective donations* scheme didn't work. More specifically, the collection or not of the donations depended mainly on whether a local opinion leader was involved, who was able to organize the village's *yearly crowdfunding* for the network. In cases where such a person was involved, the crowdfuding would be successful. In most cases, though, no such people were available. In one case, collaboration with some local cultural association even resulted in friction and conflict. The local association kept the largest part of the collected funds for its own operation, even though the donations were collected for the community network. These events raised concerns for the economic sustainability of the network.

In an effort to alleviate these problems, the members of the CN core team put in place an alternative model, which falls under the category of subscription models and relies on the regular contributions of the node owners instead of the 'per village contributions' model used so far. The goal set for the new revenue model is to achieve a substantially diversified revenue mix where the generated revenue is 10% programs funding, 20% from donations, 30% from annual subscriptions and 40% from services[1]-related revenue. An emphasis is given to the deployment of *services* on top of the community network, which will augment the value of the network for the local communities. These can be own or 3rd party services, such as Voice Over Internet Protocol (VOIP), smart farming / agriculture, creative / educational games etc. The next big pillar is the *annual subscriptions*. Apart from raising funds, the annual subscriptions is a way to facilitate a more organic relation to the local communities. It allows people who wish to support the community network, but feel they don't have the technical skills or the time to be involved, to do so via a more systematic financial relationship. Upon the equipment installation each node owner signs an agreement for an annual subscription to the organization. This model creates a more direct and transparent relationship between node owners and the organization. Donations provide the opportunity for the wider community and the diaspora to support the community network. Finally, the programs remain as a funding source, but only as a complementary one.

Results so far show that the new approach can have a beneficial impact, both in terms of financial sustainability and active engagement of local community members. The reasoning behind this new approach takes into

[1] own, or 3rd party

consideration that the node owners are people who are more actively engaged with the project and more likely to dive deeper into making the most out of the shared knowledge and expertise of the community network. On top of that they enjoy some additional advantages, both technical and social in nature, such as: better Wi-Fi signal quality, due to proximity, and ability to connect via cable to the router, priority in equipment upgrade, participation in training seminars and in various pilot projects.

Ongoing work: We have analyzed theoretically this subscription model with the aim to optimize the fee that is charged to each node of the CN so that the income of the CN can be maximized while the CN remains attractive even for the financially weaker community members. The respective paper is currently under double blind review.

2.2 Education and training seminars

As discussed in [1], workshops and seminars are used as incentive mechanisms that not only provide training and education to the network's members or potential members, but also strengthen the bonds within the community, cultivate a community spirit and urge them to participate in the network. A great part of the Sarantaporo.gr business plan involves the organization of frequent training workshops and seminars with the purpose of raising awareness of the CN's vision, mission and operation. This is a practice widely used in guifi.net, which is quite active in organizing events *i.e.*, guifi labs, the Salut, Amor i Xarxa (SAXs), or supporting related events *i.e.*, GNOME Users And Developers European Conference (GUADEC), the e-week in Vic *etc.* Sarantaporo.gr has recently decided to put more of its focus to events, workshops and seminars.

2.2.1 Training seminar in Pythio

Apart from the symposium organized in conjunction with netCommons, as part of the participatory design process in November 2016 (described in detail in [3]), a workshop took place in the 4'th and 5'th of March 2017 in Pythio village. The workshop was co-organized by the Sarantaporo.gr core team and the netCommons project. Its goal was to familiarize local community members with the network's basic operation and organizational principles. The workshop comprised an educational technical workshop for node owners and network users, discussions with the participants, visits to three newly connected farms and meetings with the representatives of local organizations, citizens and local administrations.

As far as the educational workshop is concerned, Nethood created a network model on a map and explained the operation principles to the participants, how they can improve connectivity in their villages, and discussed about the new economic model of Sarantaporo.gr. The results showed that even people without technical knowledge could grasp the basic network principles, responsibilities and challenges regarding its development, maintenance and expansion. This indicates that knowledge and information dissemination is an important factor for spurring and maintaining people's interest in actively engaging to the CN.

The visits to the newly connected farms confirmed the challenge related to changing local community members consumer mentality towards a more active engagement in a community-led infrastructure. The 'instinctive' response of the people is to pay a fee for someone else to set up and maintain the infrastructure, so they can enjoy Internet connectivity, *i.e.*, the model of the incumbents. Interestingly enough, although they contributed their time, effort and space to install the equipment, it was not self-evident for them that they could be in charge of maintaining and expanding their infrastructure according to their needs. This highlights the need for a strong component of mentality change and training for this group.

Meeting with representatives of local organizations, citizens and local administrations aimed to outline the critical importance of forming local groups for the management of the infrastructure and explore the feasibility of this approach. The single most critical factor is the availability of human resources. The biggest barrier is the technical complexity of the task in par with locals' perception associated with this task. In other words,

although it may be a technically challenging task, the locals can have the capacity to carry out the work, so long as they manage to overcome the *it's-someone-else's-job* mentality.

2.2.2 Training seminar in Sarantaporo

The most recent event took place on the 15th and 16th of July in Sarantaporo, the village after which the CN was named. The Sarantaporo.gr core team and the Nethood team organized a two-day event with two types of seminars taking place. The first one (15th of July) aimed at educating the participants on the creation and operation of digital networks and the second one (16th of July) at demonstrating the basic principles regarding computers and the Internet. Evidently, the second seminar was mostly focused on teaching children and their parents some basic computer and Internet skills, while the first one was addressed to people with technical background or with great interest towards digital networks that could potentially help the core team with Sarantaporo.gr operation and maintenance.

Another part of the seminar, was devoted in sharing gained knowledge from Sarantaporo.gr, for the expansion of the CN paradigm to the Municipality of Northern Tzoumerka. In this regard, an open discussion was held right after the seminar on the 15th, with the objective to transfer experiences, practices and know-how from the creation and operation of Sarantaporo.gr.

2.2.3 Core team training

Equally important are such seminars with respect to the free-riding phenomenon. Several community members not only refuse to contribute to the community network, financially or in kind, but in some cases also discourage the engaged members of the community by claiming that *it is the obligation of the local authorities to cater for the network and not theirs*. Two different worlds collide in the context of the community network, as it also happens in everyday life with many other things in these communities. A cultural change needs to take place in order to reduce the free-riders effect and this can occur only with a strong component of training and education.

Training and seminars are also important for the core team of Sarantaporo.gr. During three weekends of May 2017, two Sarantaporo.gr core members received training on advanced networking in the following topics:

- MikroTik Certified Network Associate
- MikroTik Certified Routing Engineer
- MikroTik Certified Inter-networking Engineer

The seminars were funded by a grant from an Non-Profit Organization (NPO) called *The People's Trust*, which was awarded to the Sarantaporo.gr as a prize in the framework of the *Ashoka Impact* award, 2016. The acquired skills are highly relevant to the CN architecture planning and the CN maintenance. The specific knowledge is also the base for the training seminars Sarantaporo.gr organizes for the local support groups.

The following month, two more members attended the LibreMesh seminar in the Hackerspace of Athens. In this seminar, the members learned about the new framework for creating OpenWrt/LEDE-based firmware for wireless mesh nodes. Several communities around the world use LibreMesh as the foundation of their local mesh firmware. Such firmware allows simple deployment of auto-configurable, yet versatile, multi-radio mesh networks. This technology is considered as an alternative for the currently used OpenMesh protocol. Its main advantage being its ease of use and very low barrier to entry for people who are not technology-savvy. Its designers aim at creating a tool, which will facilitate the formation of local communities, without demanding technical skills.

Ongoing work: The aimed work under this activity involves more workshops and seminars to keep providing training and educational services to the local community of Sarantaporo.gr and enhance their engagement to the network.

2.3 Establishing an unambiguously lawful legal entity

As discussed in [1], it is sometimes difficult for a CN to attract new participants when the legal framework involving the CN is not well defined. On the contrary, well defined rules of operation and recognition by the state and local administrations increase people's confidence and ease the participation in the network.

In an effort to legally represent the network most CNs create a legal entity (non-profit organizations, social enterprises, *etc.*). In Sarantaporo.gr, a **non-profit civil partnership**, developed by the CN's core team, serves as the legal representative of the CN. The partnership follows a set of rules and is subject to the Greek legal framework about NPOs. However, the legal framework of Greece does not clearly state the potential of such partnerships to provide Internet access, leaving the network's operation in a *gray zone*.

The provision of Internet access is currently achieved through the collaboration with the Technical University of Thessaly (TEI), which provides the network's Internet bandwidth 'pro-bono', as a contribution towards the local communities. Sarantaporo.gr is in charge of the common network infrastructure and the Internet provision, but cannot charge a fee for Internet access, since it is not an official Internet Service Provider (ISP). Funding the network operation and maintenance is, thus, a real challenge.

Hence, due to legal and economic constraints, the Sarantaporo.gr core team is considering alternate options, for a legal entity which will best be able to develop and run the community network. The provision of Internet services is largely bounded by the legal framework of Greece leaving the core team with limited options regarding its potential organizational models.

A possible alternative is the non-profit ISP entity. This form enables the NPO to consider scenarios such as installation of optical fiber, negotiate Internet access with Internet Exchange Points or become an Internet eXchange Point (IXP) by itself. The main concern with this option, though, is that there is no beneficial legal or taxation framework for non-profit ISPs and, on the other hand, such an entity will be restricted by all the obligations of the incumbent ISPs, such as support of customers via call centers, data retention policies, license fees *etc.*. Thus, this approach rather endangers the proximity of the organization to the local communities and sets barriers on the more active engagement of the locals.

Another approach is a consumers' cooperative. This provides full Internet access and services to its own members, while at the same time serves the whole local community and the visitors by providing basic Internet connectivity. The cooperative can overcome the ISP legal and financial obligations, however it has to deal with the challenge of legal liability in case of an illegal activity by one of its members. In this regard, the EU legislation differentiates between ISPs and all the rest: an ISP is not held liable for any potentially illegal activity of the users, whereas the cooperative is (this is also the case for individuals). This is actually one of the requests that many CN organizations have made to the European Commission (EC) in view of the ongoing Consultation for the new EU electronic communications Code, as reflected in the jointly authored *Policy Recommendations for Sustaining Community Networks* [2].

Ongoing work: This thread proceeds through consultation with legal scholars, affiliated or not with the project, as well as monitoring of the legal framework evolution nationally and at EU level.

2.4 Enriching the service offer with smart farming services

The local economy in the villages of the Sarantaporo area mostly depend on agriculture and animal herding. The region is famous for its almond trees, which used to yield almost half of the country's almond production. Agriculture is an important factor for local development and locals are looking for ways to modernize their farming methods. Apart from improving efficiency and performance, this can also have a positive impact in keeping the young population in the region, since *smart agriculture* sounds more attractive and looks more

[2] https://wiki.laquadrature.net/Paquet_Telecom_2017/lettre_NetCommons/english

promising for young people. This was one of the subjects discussed in the netCommons symposium in 26-27 of November [3], where the locals provided feedback to the netCommons project regarding the 1st release of the mobile crowdsourcing application *i.e.*, CommonTasker. The presence of the Sarantaporo.gr CN in the region is a beneficial factor for deploying such solutions, since it provides the necessary connectivity layer. It remains to be proved whether this can function as an incentive for local young farmers to actively engage with the CN development. Concerning the CommonTasker application, it is currently being modified to attain new features, in line with the above mentioned insights. GAIA Epicheirein, an agricultural cooperative, is also contributing to this.

2.4.1 GAIA Epicheirein

GAIA Epixeirein[3] is a cooperative comprised of a number of partners aiming to reconstruct the Greek agricultural sector and improve its competitiveness. It provides a variety of services on a subscription basis, targeting both the national and community agricultural directives and farmers' compliance to them as well as the actual production and ways for improving it. The agriculture support is done by using the on-line platform of the company and face-to-face meetings with the farmers. However its services are useful for a wide range of stakeholders such as producers, agronomists, traders, researchers, consultants, consumers, manufacturers, public bodies, etc. In more detail, these services include:

- **GAIA Society:** composes of components that provide information through a Greek agricultural encyclopedia (GAIA-PEDIA), offer the ability to interact with other related entities (producers, scientists, consumers, public officials) through an on-line network (GAIA-NET), provide certificates for managing the company's applications (GAIA-DIPLOMA) and also offers education and knowledge to its users (GAIA-LEARNING).
- **GAIA Management:** providing services and tools for management and financial monitoring such as a tool for business plan assessment acting as an investment consultant (GM-BSNSS PLAN), a service able to study the sustainability of user's business (GM-FEAS PLAN), a program operating as accounting support, designed to organize the income and outcome of the business (GM- REV EXP) and a refund management application that helps the farmers with managing their Value Added Tax (VAT) refunds (GM-VAT REF).
- **GAIA Infarm:** focused on services of agricultural production and intelligent agriculture with a service for traceability of plant production (GI-PLANT) supported by experienced GAIA executives.
- **GAIA Commerce:** providing specialized services for creating and utilizing new effective ways to implement commercial transactions such as contractual agriculture designed to help producers searching for customers and businesses seeking product supply (GC-CONTRACT), export support services (GAIA EXPORTS), on-line buying with basket of agricultural products (GC-BASKET), offers for third-party services (GC-3RD PARTY SRVS) and electronic auctions for agricultural products (GC-AUCTION).
- **GAIA Subsidy:** offering services for subsidizing and regulating obligations towards the Greek State through integrated solutions for the Rural Development Program (RDP) 2014-2020 and frequent sheep and goat registering (GS-SHEEP&GOAT).
- **Centers for the service of farmers:** apart from the on-line help to farmers and in addition to it, GAIA has also created Centers for the service of farmers in a country-wide network promoting and providing services across the rural areas.

GAIA is offering its services, among other places, to the rural area covering the Sarantaporo.gr. One of its latest projects includes smart farming applications as a part of its INFARM project. The implementation of the application managed and developed by one of GAIA's shareholders *i.e.*, Neuropublic.

[3] https://www.c-gaia.gr/

In 2013, GAIA released a project about Intelligent Agriculture/Smart Farming with the goal of starting a new era of farmer support and agricultural advice. The project involved the design and development of flexible and low cost telemetric stations for monitoring environmental and territorial parameters, called GAIATron. The stations are energy-independent and they do not need frequent maintenance. They are also able to communicate with each other through wireless mesh networks. The project advanced and in 2015, the company started a pilot project aiming at producing and installing 10.000 GAIATron stations all over Greece (GAIA SENSE). It was designed as a part of GAIA INFARM smart farming services. In the first phase of the project, GAIATrons were installed in selected areas for data collection and monitoring. The project's due date lies at the end of 2019.

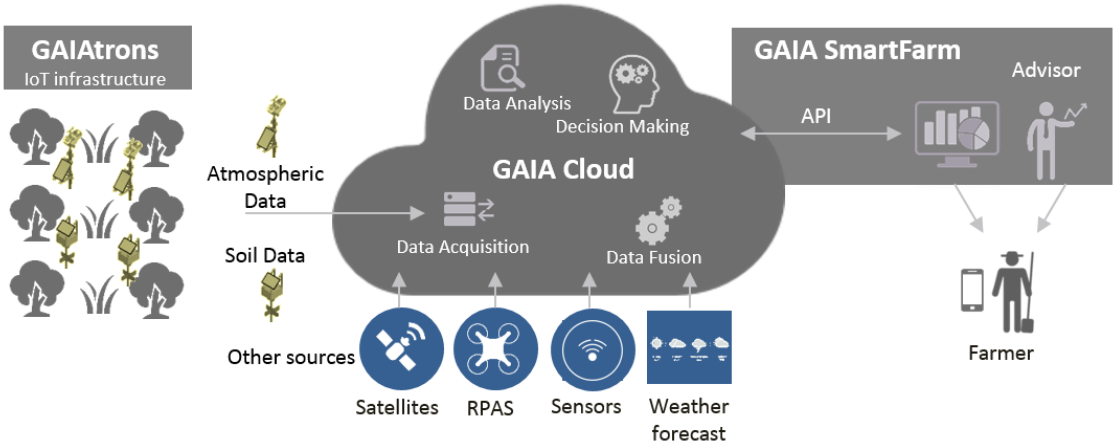

Figure 2.1: GAIA SENSE. GAIA Infrastructure for supporting smart farming services.

The structure of the network is presented in Figure 2.1. GAIA SENSE system uses parameters from the network of environmental sensors. Data is gathered through GAIATrons, satellites, RPAs, sensors or weather forecast stations and combined from the various sources. The parameters feed a decision-making support system based on GAIA cloud infrastructure. Using a combination of technological and human components the parameters produce a comprehensive analysis of the agricultural area which are transformed to advice for the producers' everyday cultivation practices.

2.4.2 Smart farming in Sarantaporo.gr

Sarantaporo.gr can play a complementary role for the plans developed by GAIA. Due to the geophysical characteristics of the area, it is often quite difficult to access the Internet through conventional mobile operators. Meaning, that all of the gathered data cannot be forwarded to GAIA's cloud unless there is a network able to carry this data. Sarantaporo.gr can solve this coverage issues providing the network for gathering and forwarding data. Farms can deploy new nodes and extend the network in order to receive the agricultural services provided to them by GAIA SENSE system. Within 2017, there are 3 examples of farms that installed new nodes in order to be part of Sarantaporo.gr CN. Those farms are located in a plain near Sarantaporo village, where almost 120 animal farms are installed. It is a region with no access to Internet or even phone land line. Currently the only alternative for these professionals to achieve Internet connectivity is through the Sarantaporo.gr CN.

The CommonTasker application, designed for Sarantaporo.gr, is taking on an alternate role in addressing the locals' needs for service provision. After discussions and contacts with GAIA, CommonTasker is being transformed to offer users extra capabilities. It can be used for the collection of agricultural data from farmers and for attracting users' contributions i.e. farmers' inputs through the design of a gamification mechanism. The application aims essentially at gathering text input about the farmers' daily practices in the farm, while the gamification mechanism is being designed to incentivise farmers to contribute on a daily basis via per user, per

village or per age groups scores and ranking lists. The acquired data will then feed the cloud of GAIA SENSE, which is bound to provide personalized agricultural services to the users.

Ongoing work: There is a continuing interaction with GAIA and Neuropublic, eventually aiming at the provision of smart farming services over the Sarantaporo.gr CN. There are two main intermediate objectives (*a.k.a* milestones) under this thread, which depend on the continuing interest and engagement of GAIA in the project activities. The one relates to the pilot demonstration of smart farming services over the CN, which will require, among others, adaptation of the wireless interface of the GAIATRON nodes. The second one relates to the interfacing of the CommonTasker mobile application, as developped and reported in netCommons WP3, with the GAIA backend infrastructure.

3 Guifi.net

The research work on the guifi.net network addresses its network economics and, in particular, the incentive (cost-sharing) mechanism the foundation has put in place to motivate the participation of all its stakeholders. This work is ongoing.

Fig. 3.1 presents the main stakeholders around the guifi-net ecosystem:

3.1 Service providers

The set S of Service Providers (SPs). Each SP $i \in S$ is a commercial entity that offers services (Internet access) over the common infrastructure. It gets paid by its subscribers a monthly service subscription fee and (may) invest on the commons infrastructure.

At each decision epoch (*e.g.*, monthly), SPs decide on two things: the fee to charge to their subscribers (this could happen over longer intervals), and whether and how much to invest on the network commons infrastructure.

3.2 Users

The set U of end users who are members of the CN and may join or not a service. When they do, they subscribe to one of the service providers for a fee.

Users decide which SP to subscribe to depending on the charged fees and the alternatives they have.

3.3 The guifi.net foundation

This is the entity operating the CN. On the one hand, it establishes peering agreements to higher-tier ISPs (in that acting as an ISP itself) and pays them monthly the cost of Internet traffic produced over the commons infrastructure (according to some Service Level Agreement (SLA) and normal charging processes). On the other hand, it devises and enforces the cost-sharing policy among service providers (through compensation tables), thus implicitly generating (dis-)incentives for the participation of service providers and their involvement to the network growth

Sharing strategies (aka policies) could vary. Two apparent examples are:

- *equal sharing:* split the costs equally between all participants
- *proportional sharing:* charge each SP according to the portion of traffic its subscribers generate over the commons infrastructure

3.4 Transit ISPs

They sign SLAs with guifi.net that determine the cost of the peering. They may introduce another dimension of strategic decision-making. If charges are negatively correlated to the volume of guifi subscribers, both SPs and users have additional incentives to join the network:

- SPs end up with higher margins, hence they can invest more on the infrastructure/coverage of the network to make it more attractive or can reduce the subscription fees

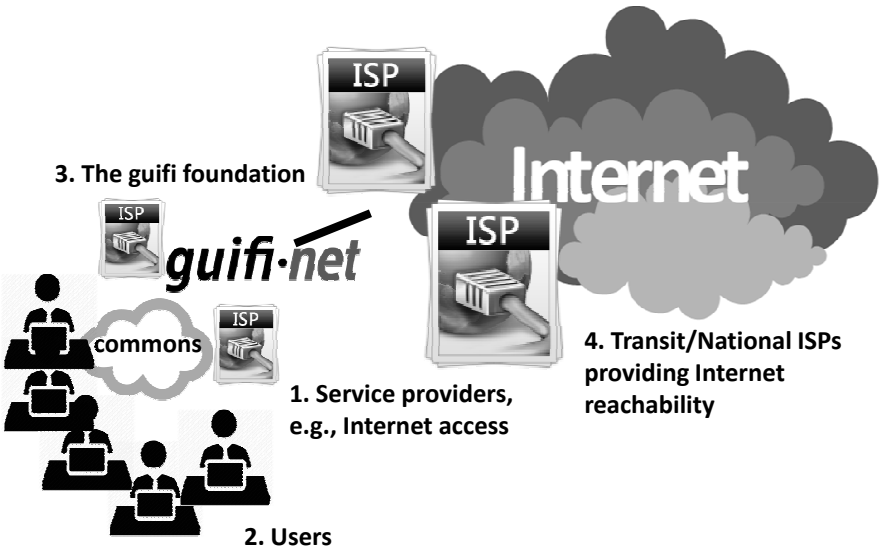

Figure 3.1: The stakeholders around the guifi.net CN.

- users see either a more attractive or cheaper network

The ongoing analytical work in this thread addresses two main questions:

- (analysis) how good is the cost-sharing mechanism currently adopted by guifi.net?
- (design) what is the optimal cost-sharing mechanism that could be put in place (different definition of optimality will be considered, centered around the interests of all stakeholders)

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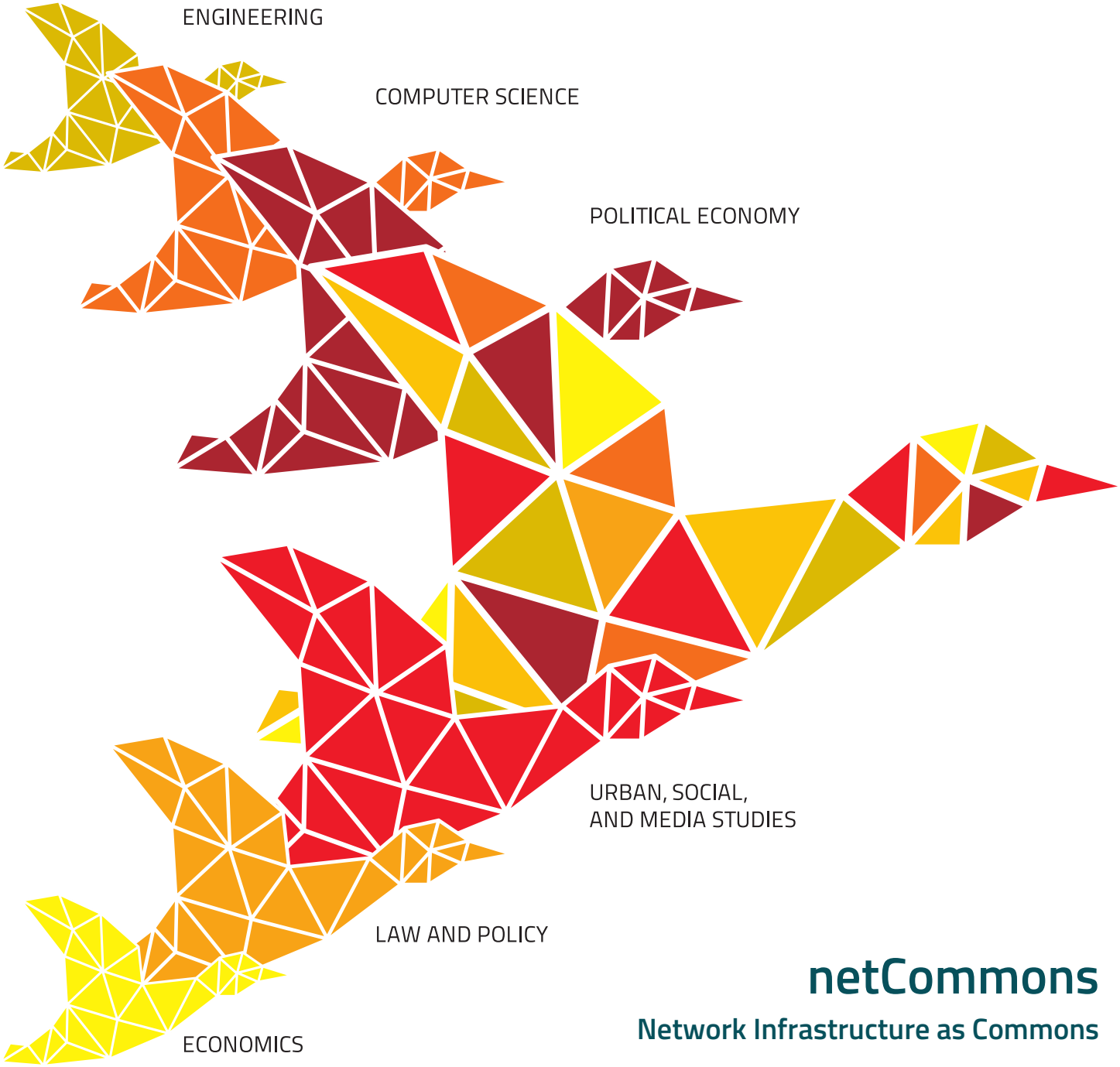

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Incentives for Participation and Active Collaboration in CNs

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