D5.1.1 Report on Selection of Opportunities and Projects - a

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D5.1.1 Report on Selection of Opportunities and Projects – a

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Bottom-up Broadband Pilot Proposals in Europe (C4EU 5.1.1: Report on Selection of Opportunities and Projects - a)

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Abstract

This technical report introduces the concept of Bottom-up-Broadband (BuB), which describes networking initiatives driven by end user needs. An overview of the particular technologies of interest in the framework of the C4EU project is provided. For each of these technologies, we identify potential pilots initiatives. We have created a “pilot template” form that we fill in for each of the identified pilots. This information will prove very useful to choose which of the pilots will be pursued in the framework of the project. Finally, an example project planning to execute a BuB pilot is discussed.

Index Terms

Bottom-up-Broadband (BuB), wifi, super-wifi, fiber, sensor networks

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I. Introduction

THIS document offers an overview of technologies and pilot opportunities to test the concept of Bottom-up-Broadband (BuB). In the BuB approach, the broadband users take an active role in the choice, definition, deployment and maintenance of the broadband network infrastructure. The involvement of the final users has some clear advantages such as the possibility to tailor the project to specific needs, the opportunistic use of technologies, infrastructure or spectrum, and the possibility of community-driven knowledge dissemination and creation.

In this report, we offer some background in Section II. We proceed to define Bottom-Up-Broadband in Section III. Then, we identify potential pilot opportunities in the framework of the Commons4Europe project in Section IV. For each pilot opportunity, we detail all the relevant characteristics using a *pilot data sheet* in Section V. This data sheet can help, in the future, to decide which pilots will be pursued in Commons4Europe. Finally, Section VII concludes the report.

II. Related Work

BuB can be an alternative to commercial typical deployment in places where the traditional operators do not operate. As an example, [1] offers a guide for deploying mesh networks in developing countries. This guide also details several case studies of pilot deployments. European examples of alternative models for network deployment include [2], [3].

A success story in Europe is described in [4]. The *guifi.net* network is growing exponentially in terms of number of active nodes. It has been recognized as an European Living Lab and is also expanding in terms of offered services and access technologies. Examples of services include Internet connection via a local Internet exchange point, file sharing and VoIP. Regarding technologies, besides wireless access, *guifi.net* is also offering fibre-from-the-farm (FFTF) connections.

Regarding sensor networks, they are becoming an attractive alternative for environmental monitoring and automated metering. As an example, the SyncSenc research project developed a solution for automated meter reading. A next step after collecting the data by means of wireless sensor networks is to share this data and make it available to end-user applications. This is the research direction that has been explored in the Open Cities research project. The present project will complement the previous ones by considering bottom-up deployments by end-users.

Regarding the use of white spaces, we have identified three institutions that are actively designing and prototyping hardware to transmit wifi-like signals in the white spaces. Both Rice University (USA) and Meraka Institute (South Africa) are working towards the construction of low-cost radios based on a frequency translator to build networks in the UHF band. This hardware is expected to be available in the early 2013. The Canadian Research Centre Canada has worked on a pilot deployment using a Mikrotik RB433AH Router and a Ubiquiti XR7 radio.

Another key ingredient for a SuperWifi pilot is the channel sensing device. A popular kit is the one composed by the GNU Radio software and a Universal Software Radio Peripheral (USRP) board. The daughterboard TVRX2 for the USRP can be used to detect the presence of TV stations in the UHF band.

Existing experimental results are based on a platform that is similar to the one that we plan to use in this project. In [5], an USRP is used for channel sensing and a WiFi card combined with a UHF translator is used for transmission and reception.

III. Bottom-Up-Broadband (BUB)

The term bottom-up-broadband (BUB) defines network design, deployment and operation initiatives driven by end user needs. These end users can be individuals, companies or institutions. This concept is in contrast to the traditional top-down approach in which commercial telecommunications operators are the ones that take the responsibility of deploying the network and then offer the users a set of services to choose from.

In BUB, those that need the network are the ones that take the initiative and participate in the organization and funding of the project. This model often presents some difficulties, such as the need to reach an agreement among the many different parties involved in the network deployment. BUB also has some clear advantages, such as the possibility to deploy networks in regions that are not attractive to commercial operators. Furthermore, BUB can also be a good alternative for niche markets that require tailored network deployment. Even in urban areas in which there is already a commercial offer for telecommunications service, BUB has shown to be a good option for networking enthusiasts that want to take an active role in network deployment and have a tighter control over the network that they use.

BUB is not only about Internet access or communication services. Knowledge transfer and digital education are also key ingredients of BUB deployments. This is a double-edged sword. On the one side, from the user perspective, BUB is not a turnkey solution. Planning, deployment and maintenance can be very time-consuming and require the constant attention and involvement from the part of the user. The good part is that a collaborative community is constructed around the BUB initiatives. This community interacts in informal mailing lists and periodic meetings, and the participants are eager to help, teach and collaborate to achieve challenging goals.

IV. PILOT OPPORTUNITIES

TABLE I
PILOT OPPORTUNITIES

Wifi/SuperWifi	Fiber	Sensor
FCMOSNET	FCMOSNET	
NQN	NQN	
Hulme High Street	Hulme High Street	
CAC		
	PRBB	
OpenWisp		
EuropeWIFI		
	Gurb	
	Rubi	
Vic	Vic	
		sensorWIFI
		Open Sensor Network

From the technological perspective we will consider three different technologies: wireless broadband (WiFi and super-WiFi), fibre optics broadband, and wireless sensor networks.

WiFi is the traditional technology to build community networks and has been effectively used in different deployments. Nevertheless, it is still our interest to replicate success models in different cities and communities. In those ecosystems that have not been exposed to the idea of BuB, WiFi can be the technology of choice to make it possible for unexperienced communities to have a first successful contact with BUB deployments.

The amount of traffic that can be supported by WiFi networks is limited. To deliver applications such as high definition IPTV, other technologies should be considered. Optical fiber is the answer to provision high-bandwidth channels to those BuB projects that require it. Obviously, the deployment of fiber is much more challenging that the installation of a radiolink, but in some scenarios the advantages of fiber certainly outweight the deployment difficulties.

The next step, in terms of novelty, is the deployment of wireless sensor networks. Wireless sensor networks are integrated by a large number of simple battery-powered nodes that gather and transmit information about the environment. The nodes and the gathered information can be shared and the network can also be deployed in a collaborative fashion, in which different participants deploy sensors in those location in which they are interested in.

The most challenging technology considered in this project is super-WiFi, which supports communication in the TV white spaces. The TV frequency bands have the advantage of offering longer propagation distances and better wall penetration than WiFi bands. Nevertheless, this technology is surrounded by regulatory uncertainties and, at the time of this writing a few research groups are working on the first hardware prototypes to operate community networks in these bands.

Considering the above mentioned technologies, we have identified some potential pilot deployments that we summarize in Table I and we detail in the next section.

V. BUB PILOT DATA SHEET

We have prepared a pilot data sheet template to gather and classify all the information regarding the potential pilots that we have identified in Table I. The *mind map* for this template is presented in Figure 1. The data sheet includes a brief description of the project and geographical information. It also provides information about the relative risk of the pilot, key contacts and regulatory issues which are of particular interest in the context of the C4EU project.

In the remainder of this section we present the pilot proposal data sheet for the Bottom-up Broadband initiatives in Europe summarized in Table I.

A. FCMOSNET

- Title: MDDA: Commons For Europe: Bottom-up Broadband Proposal for FC United Moston Community Stadium Network (FCMOSNET)
- Brief description: To create a club/community led, high-speed fibre / WiFi network around a new stadium being built to support the activities of Football Club United of Manchester (FCUM) football club in the Moston area of North Manchester, UK that will provide free/low-cost public WiFi and low-cost fibre broadband internet access to community residents, community partners (schools youth clubs, business and visitors).

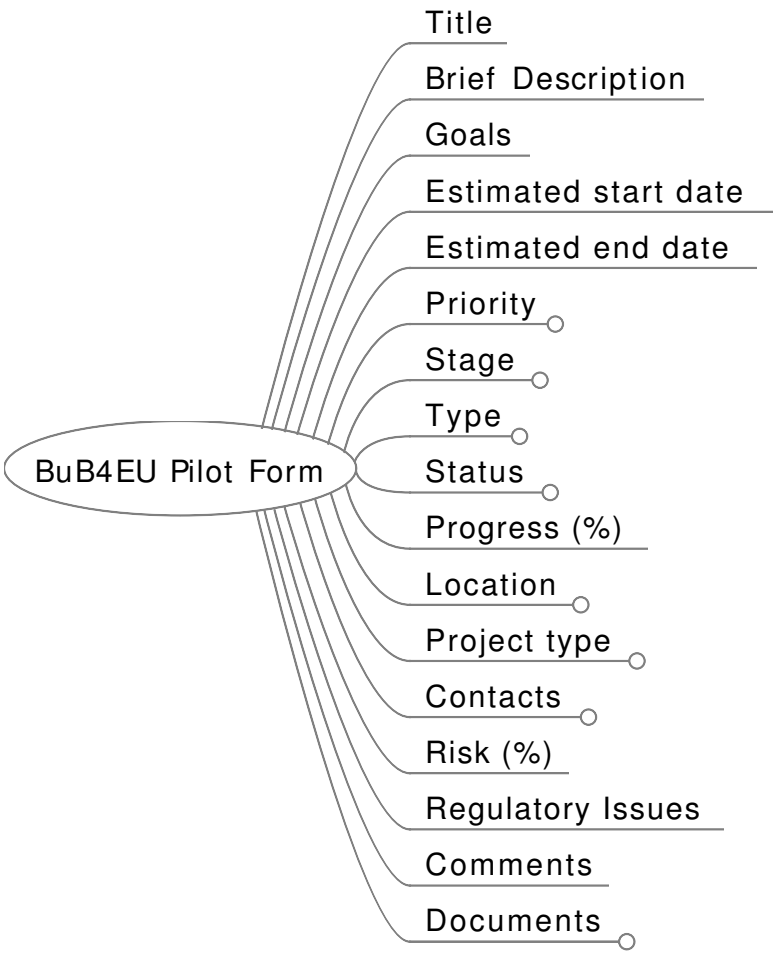

Fig. 1. The BuB pilot data sheet includes relevant information that will help to choose which pilots will be developed in the Commons4Europe project.

The initiative will be based on (and develop) an existing model for providing public WiFi developed by Manchester Digital Development Agency, which uses low cost equipment to wirelessly distribute and share high speed internet connectivity to a wide geographic area from an existing high-speed fibre internet connection. Included in the partnership will be the Sharp Project [a city council led digital media complex in North Manchester] http://www.thesharpproject.co.uk/

The network will form part of the clubs existing Industrial Provident Society (IPS) and the model will support the other pilot proposals [speciffically NQN] http://www.fsa.gov.uk/Pages/Doing/small_firms/MSR/Societies/. An industrial and provident society is an organisation conducting an industry, business or trade, either as a co-operative or for the benefit of the community, and is registered under the (UK) Industrial and Provident Societies Act 1965. FC Uniteds new stadium is the focus of this proposal for the following reasons:

1) The planning permission for the new FCUM stadium has been granted by Manchester City Council, due to the nature of creating a community facility that extends beyond the boundaries of the stadium itself, the clubs plans, intentions have already mentioned the deployment of such a network for the benefit of the local community, this proposal would help support this activity to ensure its correct deployment and sustainability.
2) Providing free/low-cost public WiFi internet access sourced from one network across the whole of the proposed area would enable local community groups/centre to increase their digital skills and increase digital inclusion, provide a platform for promotion of activities taking place in the local community area and support the economy of the locality and the city.
3) The community facility already has a number of local stakeholders and groups that are to be engaged through the use of next generation connectivity including: Two local schools, an older person's residential home, a number of local junior sports clubs, and active local theatre group.
4) The area sits within a key regeneration zone for the city and as such proposals such as these are welcomed into the area in order to support new initiatives and activities in the community.

5) Manchester Digital Development Agency, who will support this proposal by providing technical advice and project management support, has strong connections to existing business forums, community associations and government agencies in the area through contacts and agencies in the wider city council administration. Based on previous and ongoing contact with these organisations, agencies and people in the locality, there is a strong level of demand for this BuB proposal to get started.
6) As mentioned the leadership of the Sharp Project has a strong interest in developing a close working relationship with the club in order to engage local citizens and provide outreach via the activities of the football club.
7) The Club already engages in its own community strategies and these include potential media training for its own volunteer run TV, Radio, Photography and Press section - this becomes an essential link to the digital activities planned with regard to a collaboration with the Sharp Project.

- Goals:
  - To create a clear project plan for the implementation of this proposal.
  - To create a steering group from stakeholders to advise and manage the development of the network. Stakeholders will include FCUM, Sharp Project, MDDA, Manchester City Council, local resident and community groups.
  - To work within the existing Industrial Provident Society (IPS), its constitution and associated legal frameworks of the club. Note that FCUM is already constituted as an IPS.
  - To deploy the network using a mix of technologies.
  - To document the creation and implementation of the network.
  - To provide a single service public WiFi access around the local area
  - To define and produce pricing models for commercial use of the network.
  - For the IPS to own all appropriate assets and IPR related to the network, where appropriate.
  - For the network to become self-funding and sustainable after the conclusion of the Commons For Europe project.
  - To assess the impacts (benefits and drawbacks) of this model to enable replication across Europe.
  - To support the other MDDA BuB pilots through the use of IPS models through a process of knowledge sharing.
- Start date: Jan 2013 [Although preparation will support the club's stadium build to ensure relevant infrastructure is in place to deploy the pilot if successful
- End date: TBC
- Priority: Normal
- Stage: Pre-project
- Status: Not started
- Progress: 0%
- Country: United Kingdom
- Area: Great Manchester
- City: Manchester
- Neighbourhood: Moston
- Project type: Hybrid (WiFi)
- Contacts: Strategic contact:
  - Dave Carter, MDDA.

  Operational contacts:
  - Alan Holding, MDDA.
  - Paul Spensley, MDDA.
- Risk: 2%
- Regulatory issues:
  - Planning permission
  - Radio licensing (mitigated by use of equipment that does not require licensing)
  - Data protection (mitigated by terms and conditions of use of the network)
  - Health and Safety (but we are well aware of the requirements for installing equipment, etc.)
  - Public Liability Insurance
  - Where relevant, adhere to English law in relation to internet service provision.
- Comments: (This pilot proposal has been prepared by Alan Holding / Paul Spensley, MDDA).
  We hope this proposal is approved. If approved, we would like to work with one of the other winning Commons For Europe proposals that is similar this this one. This would enable us to share knowledge with project partners as the network is developed.

Fig. 2. A situation map for the FCMOSNET pilot.

Fig. 3. An image for the FCMOSNET pilot.

Figure 2 (http://g.co/maps/36tcp) and 3 present a situation map and a projected image of the FCMOSNET pilot. The following is the information about FC United:

> FC United of Manchester is a community football club owned and democratically run by its 2,000-plus members. Its corporate structure is a Community Benefit Society and membership is open to all, with everyone an equal co-owner, holding one voting share in the club.
> *Who we are:* The club was founded in 2005 and is a semi-professional football club, currently playing in the Northern Premier League. The club regularly attracts crowds of more than 2,000 - several times the league average - and boasts many on and off the field achievements including three consecutive promotions and a number of trophies.

It is unique at its level of English football in having its obligations to its fan communities and local communities written into its Club Objects. The club was awarded Cooperative UK's Cooperative Excellence Award in 2009 for its cutting edge work with local communities.
FC United seeks to change the way that football is owned and run, putting supporters at the heart of everything. It aims to show, by example, how this can work in practice by creating a sustainable, successful, fan-owned, democratic football club that creates real and lasting benefits to its members and local communities.
The development of a new community football and sports ground, which we are now asking you to support, is a vital element in that journey.
Many football club developments place their clubs in debt or place the club in the hands of major investors. With your support we can show a better way. The Board believe that your investment will be for long term benefit and will help FC United succeed in its mission, creating social, environmental and financial returns.
Links

- FC United in the Community: http://www.fc-utd.co.uk/community.php
- FC United Community Stadium Information: http://s.coop/june11leaflet

B. Northern Quarter Net (NQN)

- Title:Northern Quarter Net (NQN)
- Brief description: To create a community-led, high-speed fibre / WiFi network in the Northern Quarter area of Manchester, UK that will provide free public WiFi and low-cost fibre broadband internet access to residents, business and visitors.
  Northern Quarter Net (NQN) will be based on (and develop) an existing model for providing public WiFi developed by Manchester Digital Development Agency, which uses low cost equipment to wirelessly distribute and share high speed internet connectivity to a wide geographic area from an existing high-speed fibre internet connection.
  NQN will be an Industrial Provident Society (IPS) http://www.fsa.gov.uk/Pages/Doing/small_firms/MSR/Societies/.
  An industrial and provident society is an organisation conducting an industry, business or trade, either as a co-operative or for the benefit of the community, and is registered under the (UK) Industrial and Provident Societies Act 1965.
  The Northern Quarter (NQ) https://en.wikipedia.org/wiki/Northern_Quarter_(Manchester) is the focus of this proposal for the following reasons:
  - The NQ is home to a wide range of SMEs from many sectors, including digital creatives, artist creatives, cafes and restaurants, galleries, fashion designers, bars and clubs, craft centres, architects and many more. The relatively low rental and lease costs of many of the buildings in the NQ allow for starting businesses to have a physical trading presence in Manchester city centre that is very close to high footfall commercial areas of the city centre (such as the Arndale Centre shopping mall, Market Street, Piccadilly Gardens).
  - Providing free public WiFi internet access from one network across the whole of the NQ area would enable businesses to increase customer numbers, provide a platform for promotion of activities taking place in the NQ and support the economy of the NQ and the city.
  - The NQ is home to the Manchester Digital Laboratory (known as the MadLab) http://madlab.org.uk/, a volunteer-led, community space focused on improving the digital skills of residents and businesses through a range of volunteer and community led activities, ranging from business networking events, computer programming workshops, social gatherings and many others. As well as supporting local residents and businesses through its activities, the MadLab helps raise the profile of the NQ as a creative centre through its connections with national and international digital and creative entrepreneurs, thinkers and doers. The involvement of the community-led MadLab is important to this BuB proposal as the MadLab building is intended to be one of the key distribution points for the network, and many of the key people from the MadLab community have skills in areas that can support and contribute to the development and management of the network, for example marketing, business development, legal, computer programming, computer networking, community outreach, and similar.
  - The NQ is a relatively small geographic area. Most of the small businesses and community groups know each other, and work together to promote each other's services and activities in order to support the economy of the NQ and the city. As such, it is more like village in the centre of the city than just another suburb, and this proposal would help to strengthen the position of the NQ as Manchester city centres creative and digital hub.
  - Manchester Digital Development Agency, who will lead this proposal, already has strong connections to existing business forums, community associations and government agencies in the NQ (including CityCo,

Northern Quarter Small Business Forum). Based on previous and ongoing contact with these organisations and people in the NQ, there is a strong level of demand for this BuB proposal to get started.
  - Uniquely for Manchester city centre, the NQ has a number of social housing estates, many of which are home to people on low incomes or unemployed. As well as supporting the business and community sectors of the NQ, this proposal will work with the social landlords of these estates to provide options for connectivity to the NQN.
- Goals:
  - To create a clear project plan for the implementation of this proposal.
  - To create a steering group from NQ stakeholders to advise and manage the development of the network.
  - To create the Industrial Provident Society (IPS), its constitution and associated legal frameworks
  - To deploy the network using a mix of technologies.
  - To document the creation and implementation of the network.
  - To provide a single service free public WiFi access across the NQ area.
  - To define and produce pricing models for commercial use of the network.
  - For the cooperative to own all appropriate assets and IPR related to the network.
  - For the network to become self-funding and sustainable after the conclusion of the Commons For Europe project.
  - To assess the impacts (benefits and drawbacks) of this model to enable replication across Europe.
- Start date: December 2012 (can be earlier dependent on approval from project partners and other external factors)
- End date: December 2013 (dependent on production of project plan)
- Priority: High
- Stage: Pre-project
- Status: Not started
- Progress: 0%
- Country: United Kingdom
- Area: Greater Manchester
- City: Manchester
- Neighbourhood: Northem Quarter (City Centre and Ancoats Wards)
- Project type: Hybrid (Fiber optics and WiFi)
- Contacts: Strategic contact:
  - Dave Carter, MDDA.

  Operational contacts:
  - Alan Holding, MDDA.
  - Paul Spensley, MDDA.
- Risk: 10%
- Regulatory issues:
  - Planning permission (mitigated by involvement of CityCo and Manchester City Council)
  - Radio licensing (mitigated by use of equipment that does not require licensing)
  - Data protection (mitigated by terms and conditions of use of the network)
  - Constitution of the Cooperative (but we have local experts in that)
  - Health and Safety (but we are well aware of the requirements for installing equipment, etc.)
  - Public Liability Insurance
  - Where relevant, adhere to English law in relation to internet service provision
- Comments: We hope this proposal is approved. If approved, we would like to work with one of the other winning Commons For Europe proposals that is similar this this one. This would enable us to share knowledge with project partners as the network is developed. A situation map for the NQN network is presented in Fig. 4 (http://g.co/maps/gbmse)

C. Hulme High Street

- Title: Hulme High Street
- Brief description: The aim of this pilot is to create a community-led and owned high speed broadband / WiFi network in an area around Hulme High Street in Manchester, UK. (http://g.co/maps/c6yy7) The HHS network will be based on (and develop) an existing model for providing public WiFi developed by Manchester Digital Development Agency, which uses low cost equipment to wirelessly distribute and share high speed internet

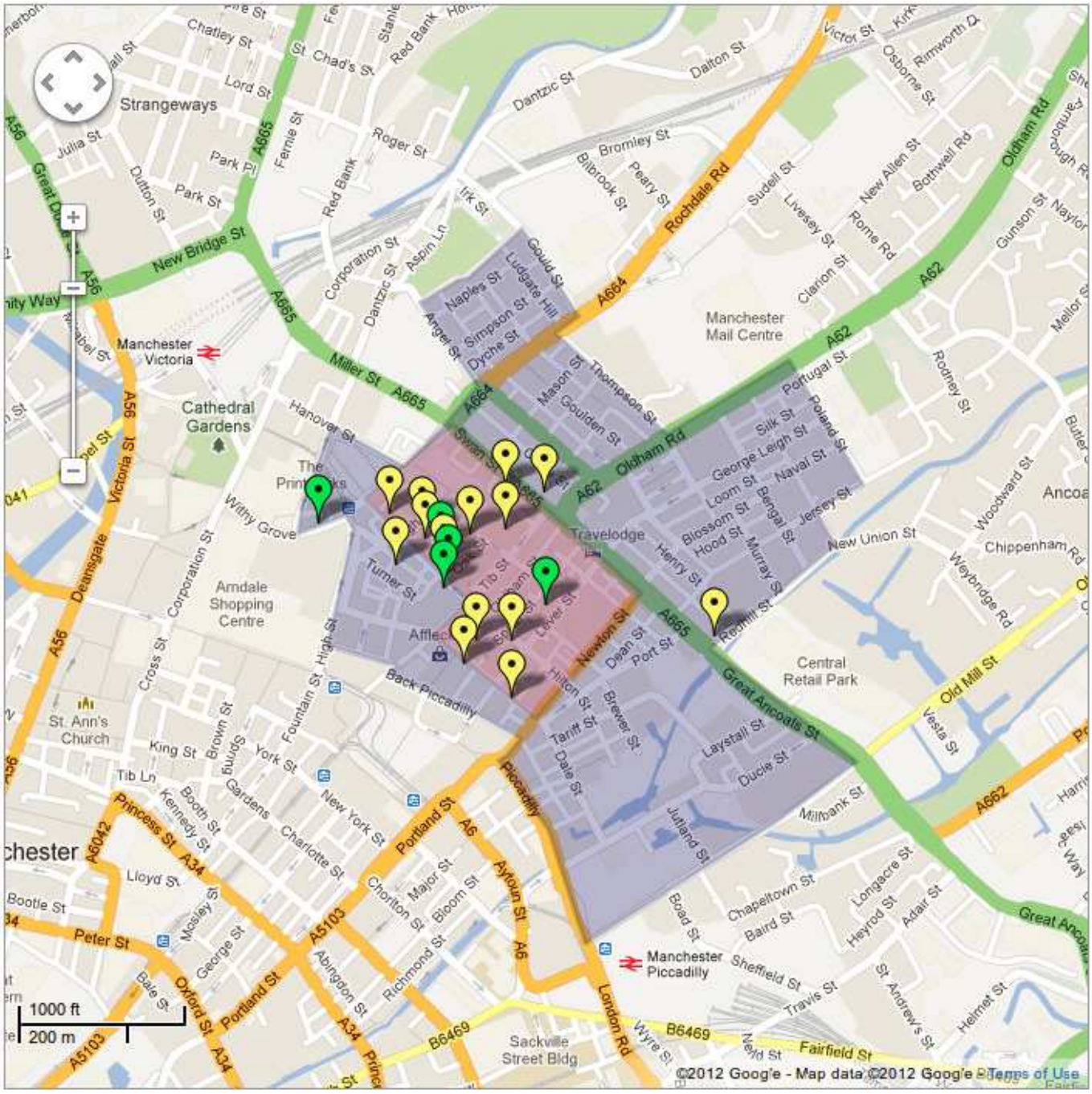

Fig. 4. A situation map for the NQN pilot.

connectivity to a wide geographic area from an existing high-speed fibre internet connection sourced from one location.

MDDA through the Commons For Europe project would work with local residents and business to co-develop plans for the network, assist with its implementation and installation, identify sources of funding (where required) for initial setup costs, and work to develop a sustainable future for the network through a shared cost model, whereby local users and owners of the network share costs for its upkeep. As with the other Manchester Commons For Europe proposals, MDDA will investigate the feasibility of setting up an Industrial Provident Society (IPS) http://www.fsa.gov.uk/Pages/Doing/small_firms/MSR/Societies/ to steer the development of the network, and other organisational models. An industrial and provident society is an organisation conducting an industry, business or trade, either as a co-operative or for the benefit of the community, and is registered under the (UK) Industrial and Provident Societies Act 1965.

Hulme High Street is the focus of this proposal for the following reasons:

1) There is a wide range of stakeholders from many sectors, backgrounds and areas of expertise in the local area that can support the practical work of the project. These stakeholders include:
   – The residents association from the Casa Urbano development on Hulme High Street
   – The management company from the development
   – The other three housing developments along the street
   – The local businesses. Pete Finnigan (fishmonger) is chair of the local traders association
   – The sports centre which has strong links with the community and which owns a key building that can be used to support distribution of the network. (http://g.co/maps/vvt6y)
   – The locally elected councillor (Nigel Murphy) lives on the high street and is a member of the residents association.
2) The above wide range of stakeholders demonstrates the strong sense of community that exists in the local area, which will assist the project when raising awareness of the aims of the project and the practical work and input required from local residents. MDDA also has existing working relationships with key individuals in the local area, such as the chair of the residents association.
3) Providing free public WiFi internet access from one network across the whole of the proposed area would enable businesses to increase customer numbers, provide a platform for promotion of activities taking place in the local community area and support the economy of the locality and the city.
4) Increase the “desirability” of the area for people to live and work. The area is in a key area of deprivation for the authorities. http://mapit.mysociety.org/area/71349.html
5) Provide a focal point for joint activities - residents and businesses have already discussed issues such as solar energy and community days
6) Potential for communities to utilise the network for connections with international communities

- Goals:
  – To create a clear project plan for the implementation of this proposal.
  – To create a steering group from stakeholders to advise and manage the development of the network.
  – To investigate the feasibility of setting up an Industrial Provident Society (IPS), its constitution and associated legal frameworks, or other management model to help ensure the sustainability of the network.
  – To deploy the network using a mix of technologies.
  – To document the creation and implementation of the network.
  – To provide a single service free public WiFi access across the HHS area.
  – To define and produce pricing models for commercial use of the network, where appropriate and desired.
  – For the network to become self-funding and sustainable after the conclusion of the Commons For Europe project.
  – To assess the impacts (benefits and drawbacks) of this model to enable replication across Europe.
  – To share technical knowledge with local residents and businesses about the creation, management and maintenance of a Community Wireless ISP network.
- Start date: August 2012
- End date: August 2013
- Priority: Normal
- Stage: Pre-project
- Status: Not Started
- Progress: 0%
- Country: United Kingdom
- Area: Greater Manchester
- City: Manchester
- Neighbourhood: Hulme
- Project type: Hybrid
- Contacts:
  – Dave Carter, MDDA.

  Operational contacts:
  – Alan Holding, MDDA.
  – Paul Spensley, MDDA.
- Risk: 10%
- Regulatory issues:
  – Planning permission

  - Radio licensing (mitigated by use of equipment that does not require licensing)
  - Data protection (mitigated by terms and conditions of use of the network)
  - Health and Safety (but we are well aware of the requirements for installing equipment, etc.)
  - Public Liability Insurance
  - Where relevant, adhere to English law in relation to internet service provision.
- Comments: Prepared by Alan Holding / Paul Spensley, MDDA. Input provided by Steven Flower, Casa Urbano Leaseholders and Residents Association (CULRA)
  We hope this proposal is approved. If approved, we would like to work with one of the other winning Commons For Europe proposals that is similar this this one. This would enable us to share knowledge with project partners as the network is developed.

D. CAC Pilot

- Title: BuB Local IP TV Broadcast Station Pilot
- Brief description: The process of digitalization of the TV broadcasters in Spain has finished. Nowadays only DTT is allowed in the UHF band and the number of local broadcasters has been dramatically reduced. These TV stations cover local events and provide contents of interest for a geographically limited area. These stations have been traditionally supported by local governments, associations or NGOs for technical support, facilities and content. The audience of local TV stations is very fragmented in the sense that each of the TV stations targets a reduced audience.
  This pilot offers an opportunity to provide an IP TV service using Super Wifi technology deployed on a local basis. Super Wifi can be a convenient technology to deliver both IP and TV local contents.
- Goals: To deploy SuperWifi technology in municipalities as an IP platform to deliver TV services. And to test its stability, coverage and availability.
- Start date: February 1st, 2013
- End date: July 1st, 2013
- Priority: Normal
- Stage: Prospect
- Status: Not started
- Progress: 0%
- Country: Spain
- Area: Catalonia
- City: To be decided.
- Neighbourhood: To be decided.
- Project type: Super-Wifi
- Contacts: Albert Domingo, Jaume Barcelo, Miquel Oliver
- Risk: 50%
- Regulatory issues: At the time of this writing, the use of UHF white spaces for data transmission is allowed for experimentally use only.
  Nevertheless, the use of white spaces is permitted in the USA and it is possible that our pilots can help to open a regulatory path in the EU to build networks in the unused UHF channels.
- Comments: The pilot is oriented to provide engough capacity to afford streaming services. The IPTV platform itself is not included in the development. The pilot will involve the Consell Audiovisual de Catalunya (CAC) and municipalities.

E. PRBB

- Title: PRBB
- Brief description: To connect a research center and business incubator to an Internet exchange point.
- Goals: To validate the commons model to offer connectivity to a very demanding high-profile institution.
- Start date: July 2012
- End date: Feb 2013
- Priority: Normal
- Stage: Prospect
- Status: Not started
- Progress: 0%
- Country: Spain
- Area: Catalonia

- City: Barcelona
- Neighbourhood: Vila Olimpica
- Project type: Fiber
- Contacts: Roger Baig, Jaume Barcelo, Francesc Manaut
- Risk: 25%
- Regulatory issues: PRBB is Barcelona's Biomedical Research Park. The park hosts a conglomerate of public research institutions and spin-offs. The research institutions need access to the regional research optical network while the commercial companies need access to the Internet but are not entitled to use the public research network. This represents a new situation that will require an agreement among the involved parts and new solutions to satisfy all the different requirements.
- Comments: The research park lies in a very well connected area and it is likely that there is presence of municipal fiber that can be used in a framework of "commons" to effectively provide a high quality network connection.

F. OpenWisp for free Wifi

- Title: OpenWisp for free Wifi
- Brief description: The Province of Rome has started a project for free Wifi (named ProvinciaWiFi), aiming at extending the opportunities of the citizens to access broadband Internet. ProvinciaWiFi promotes WiFi networks, bottom up networking and broadband diffusion. ProvinciaWiFi uses free software tools, which can be easily adopted and replicated by other Public Administrations across Europe. The open source choice has many reasons: the use of open standards, efficiency, interoperability, and data protection guaranteed by the verifiability of source code. The ProvinciaWiFi's open source kit (named OpenWISP - Open Wireless Project) has been developed by the Province of Rome in collaboration with the Consortium Interuniversity Caspur. Through Open Licenses Source and Creative Commons the Province of Rome made the software accessible to other public administrations and stakeholders that can download it, use it and, possibly, help to develop and improve it. The Kit has already been adopted and reused by several Public Administrations in Italy.
- Goals: ProvinciaWiFi's goal is to build and expand free public WiFi and super WiFi access points in the territory and to give free internet connection to all citizens. Open Wisp, the software kit used for Provincia Wifi, can beeasily used toset up interconnected networks at no cost; the model could be easily replicated in other cities.
- Start date: July 2012
- End date: 2014
- Priority: Normal
- Stage: Prospect
- Status: Not started
- Progress: 0%
- Country: Italy
- Area: Provincia di Roma
- City: Different cities
- Neighbourhood: Different neighbourhoods
- Project type: WiFi
- Contacts: Francesco Loriga (Provincia di Roma), Maurizio Goretti (CASPUR)
- Risk: 5%
- Regulatory issues: In Italy, it is required to identify every person who connects to Internet through Provincia Wifi. The solution to this challenge is to use a mobile phone number which the user must introduce at the moment of registration. In Italy, each telephone number is associated to personal identification card number.
- Comments: More details are available at the website: www.openwisp.org

G. EuropeWIFI

- Title: EuropeWIFI
- Brief description: in 2011, three Public Administrations (PA) in Italy, the Province of Rome, The City of Venice and the Region of Sardinia started a project to share their Wi-Fi resources with users of the other PAs, with the aim of extending the opportunities for citizens to access free PA broadband Internet, and promote the federation of their Wi-Fi users.
  By law in Italy every Internet user must be authenticated through an ID card. This law must be respected by every PA who decides to provide a free Internet access service.
  Every PA has its own user database. Users that travel between different cities must typically create different accounts in each city. For this reason some PAs have decided to build a cross-authentication architecture (Proxy

RADIUS) managed by CASPUR, which allows 22 PAs to “share their users” (i.e. give their users the opportunity to use a single account to be authenticated over all the Internet access services provided by participating PAs). This experiment could be extended to a European level with the aim of promoting free access to the Internet for European citizens.
Any European citizen wishing to use the free Internet access made available by an italian PA would find it more difficult than an Italian due to the local laws regarding user authentication. The same problem could arise in other European countries due to the different national laws.
We propose to replicate what was done in Italy at a European level to promote a transnational authentication between European PAs that offer free Internet access to their citizens.
Europeans should be able to use their national PAs free account in different cities around Europe that offer the same service. The creation of a simple cross-authentication infrastructure (proxy RADIUS) is needed. At the same time a study of common technical requirements and different national laws is required and could lead to having a unique European standard for the authentication of users.

- Goals: To explore an effective model as a candidate for a pan-European Public WiFi model.
- Start date: July 2012
- End date: 2014
- Priority: Normal
- Stage: Prospect
- Status: Not started
- Progress: 0%
- Country: Different European Countries
- Area: TBD
- City: TBD
- Neighbourhood: TBD
- Project type: WiFi
- Contacts: Francesco Loriga (Provincia di Roma), Maurizio Goretti (CASPUR)
- Risk: 5%
- Regulatory issues: Each European country presents a different framework for public WiFi offering. Italy regulations are particularly stringent and therefore there are chances that the Italian solution fits also the regulation requirements of other countries. This particular solution identifies the users by means of a telephone number and tunnels all the traffic from the access point using a VPN. Note that, in Italy, it is necessary to provide an identification card to obtain a telephone number, and therefore the telephone number identifies an individual.
- Comments: The success of ProvinciaWiFi and the relatively ease to deploy hotspots are advantages to consider in this pilot. A solution similar to Eduroam (that uses a RADIUS tree for authentication) can be envisioned to provide public WiFi across Europe. More details are available at the website: www.openwisp.org

H. Gurb

- Title: Gurb
- Brief description: Fiber-from-the-farm[1] (FFTF) deployment at Gurb (Phase 2).
- Goals:Replication of first pilot Prepare 3rd phase in Urban area reusing new municipality-owned infrastructure.
- Start date: June 2012
- End date: August 2012
- Priority: Normal
- Stage: Execution
- Status: Not started
- Progress: 10%
- Country: Spain
- Area: Catalonia
- City: Gurb
- Neighbourhood: Parroquies de Vespella i Sant Andreu
- Project type: Fibre-optics
- Contacts: Ramon Roca, GurbTec
- Risk: 25%
- Regulatory issues: To be done.
- Comments:

[1] In BuB deployments we use the convention that the network originates at the user. This is in contrast to the traditional model in which the network terminates at the user such as in fiber-to-the-home (FTTH).

I. Rubi

- Title: Rubi
- Brief description: Fiber-from-the-home (FFTH) project in urban and industrial areas.
- Goals: To deploy a fiber pilot that serves both an industrial area and a residential neighbourhood in a small-sized city (ca. 75.000 inhabitants).
- Start date: March 2012
- End date: September 2012
- Priority: Normal
- Stage: Prospect
- Status: Not started
- Progress: 0%
- Country: Spain
- Area: Catalonia
- City: Rubi
- Neighbourhood: Industrial area
- Project type: Fibre-optics
- Contacts: Ramon Roca, Angel Ruiz
- Risk: 10%
- Regulatory issues: To be done.
- Comments:

J. Vic

- Title: Vic
- Brief description: Fiber-from-the-home (FFTH) project in urban and school areas. The idea is to create a high-speed fibre and WiFi network in Vic (Catalonia/Spain) that will provide open and neutral WiFi and fibre broadband Internet access to citizens, business and schools.
- Goals: To deploy fiber pilots that serves both residential neighbourhood, business and schools areas and to interconnect WiFi nodes.
- Start date: May 2012
- End date: September 2012
- Priority: Normal
- Stage: Execution
- Status: In progress
- Progress: 5%
- Country: Spain
- Area: Catalonia
- City: Vic
- Neighbourhood: City center, Av. Olimpia, sports area
- Project type: Hybrid Fibre-optics/WiFi
- Contacts: Lluis Dalmau, Gaufix, GurbTec
- Risk: 5%
- Regulatory issues: To be done.
- Comments: This pilot proposal has been prepared by Lluis Dalmau. A situation map for the pilot is presented in Fig. 5 (http://g.co/maps/s5322).

K. sensorWIFI

- Title: sensorWIFI
- Brief description: The coverage umbrella provided by provinciaWIFI can be used to gather information from sensors.
- Goals: The goal is to explore new collaboration models in which different technologies are combined to make a more efficient use of common resources.
- Start date: July 2012
- End date: 2014
- Priority: Normal
- Stage: Prospect
- Status: Not started

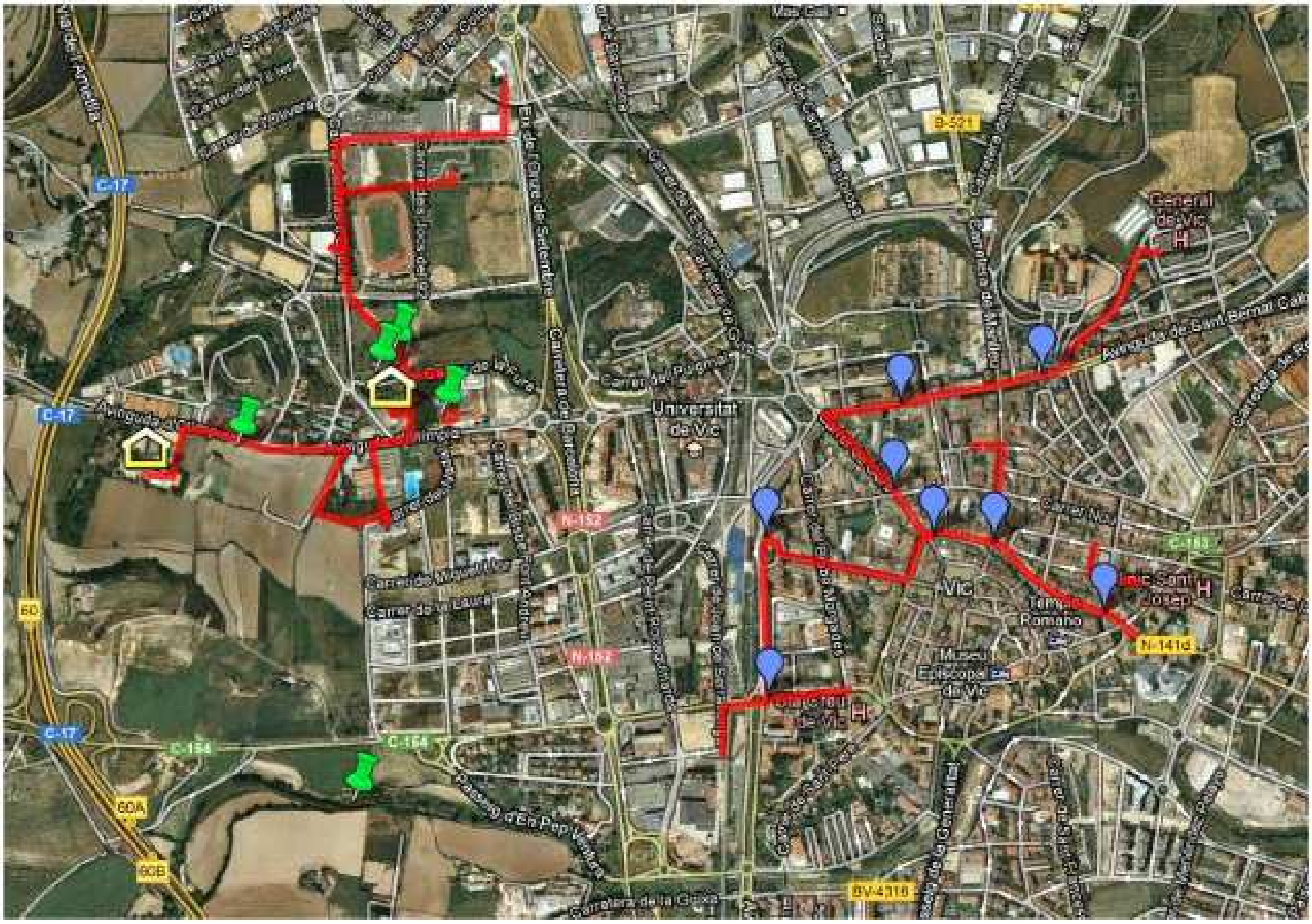

Fig. 5. A situation map for the Vic pilot.

- Progress: 0%
- Country: Italy
- Area: Provincia di Roma
- City: TBD
- Neighbourhood: TBD
- Project type: WiFi+Sensor
- Contacts: Provincia di Roma, CASPUR
- Risk: 35%
- Regulatory issues: Common resources, such as a wifi access network, can be utilized by a multitude of different services. Albeit more efficient from a technological perspective, this approach is new and needs to be validated in terms of regulation.
- Comments: The transmission of data from sensors to databases is one of the key issues to consider when deploying sensors. The availability of a low-cost network to collect may encourage spontaneous and bottom-up sensor deployment.

L. Open Sensor Network

- Title: Open Sensor Network
- Brief description: A platform to collect real-time information from sensor networks across Europe and make it available to application developers.
- Goals: It is expected that the availability of public data sets of real time data gathered from sensor networks enables application developers to create innovative solutions and services. This pilot provides a clear link between the bottom-up-broadband and the code pilots by offering data to feed the applications developed in the code pilots.

- Start date: May 2012
- End date: November 2013
- Priority: Normal
- Stage: Review
- Status: In progress
- Progress: 40%
- Country: Spain, United Kingdom, Finland and the Netherlands
- Area: Barcelona, Manchester, Helsinki and Amsterdam
- City: Barcelona, Manchester, Helsinki and Amsterdam
- Neighbourhood: 22@, Northern Quarter, Town Hall street and a neighbourhood comprised between the Airport and the city of Amsterdam.
- Project type: WiFi
- Contacts: Miquel Oliver, Manuel Palacin, Albert Domingo
- Risk: 20%
- Regulatory issues: Some of the data may need to be pre-processed or kept private to safeguard the privacy of the citizens.
- Comments: This initiative has been ongoing for one and a half year and includes different sensor networks.

VI. Project Planning Template

We provide a template for the execution phase of a BuB project. The deployment of a BuB pilot involves several different aspects, including financial, legal, social and legal aspects. The following plan can be used as a checklist for those engaging in BuB deployments to make sure that they have a global view of the project.

The main tasks and subtasks of a BuB project are as follows:

- Warm-up
- Project plan
  - Scope definition
  - Project development
- Project review & commitment
  - Identify stakeholders
- Execution
  - Provisioning
  - Deployment
  - Wholesale access
  - Legal & compliance
- Start operations
- Project Management

A detailed view of the aforementioned tasks is offered in Fig. 6 and an example of time planning is presented as a Gantt diagram in Fig. 7. This example has been created by *guifi.net* and it is included for reference.

VII. Conclusion

In this report we have identified the technologies of interest to deploy BuB pilots and described a number of potential pilots to be pursued in the framework of the project. As a next step it is necessary to select a subset of the identified pilots that covers all the scenarios of interest of the C4EU project, fulfills the goal of extending BuB initiatives and can be sustained in the long term.

Acknowledgment

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WBS	Name	Start	Finish	Work	Duration	Slack	Cost	Assigned to
1	**Warm-up**	**Mar 14**	**Mar 31**	**6d**	**13d**	**73d 5h**	**0**	
1.1	Informative & assessment	Mar 14	Mar 14	1d	4h	4d 4h	0	Project promoters, guifi.net Foundation
1.2	High-level plan & Scope	Mar 20	Mar 26	5d	5d	1d	0	Project promoters
1.3	C-Level Commitment	Apr 2	Mar 31	N/A	N/A		0	Project promoters
2	Kick-off	Apr 6	Apr 6	N/A	N/A		0	Local partners, Project promoters, guifi.net Foundation
3	**Project Plan**	**Apr 2**	**Apr 30**	**30d**	**20d 6h**	**67d 6h**	**0**	
3.1	**Scope definition**	**Apr 2**	**Apr 4**	**5d**	**2d 4h**	**86d 1h**	**0**	
3.1.1	Objectives definition	Apr 2	Apr 4	5d	2d 4h	67d 4h	0	Local partners, Project promoters
3.2	**Proj. development**	**Apr 4**	**Apr 25**	**15d**	**15d**	**71d 1h**	**0**	
3.2.1	Map	Apr 4	Apr 18	10d	10d	67d 4h	0	Local partners
3.2.2	Inventory	Apr 18	Apr 25	5d	5d	67d 4h	0	Local partners
3.3	Economic evaluation	Apr 25	Apr 30	10d	3d 2h	67d 6h	0	Local partners, Project promoters, guifi.net Foundation
4	**Project review & commitment**	**Apr 9**	**Apr 25**	**85d**	**12d 4h**	**71d 1h**	**0**	
4.1	**Identify stakeholders**	**Apr 9**	**Apr 20**	**60d**	**10d**	**73d 5h**	**0**	
4.1.1	Users	Apr 9	Apr 20	20d	10d	73d 5h	0	Local partners, Project promoters
4.1.2	Professionals and service providers	Apr 9	Apr 20	20d	10d	73d 5h	0	Local partners, Project promoters
4.1.3	Investors	Apr 9	Apr 20	20d	10d	73d 5h	0	Local partners, Project promoters
4.2	Finance commitment	Apr 9	Apr 25	25d	12d 4h	1d 1h	0	Local partners, Project promoters
5	**Execution**	**Apr 25**	**Aug 1**	**136d**	**70d**	**1d 1h**	**0**	
5.1	**Provisioning**	**Apr 25**	**Jun 27**	**46d**	**45d**	**26d 1h**	**0**	
5.1.1	Cable & accessories (dark)	Apr 25	Jun 27	45d	45d	1d 1h	0	Local partners
5.1.2	Electronics	Apr 25	Apr 26	1d	1d	70d 1h	0	Local partners
5.2	**Deployment**	**Apr 25**	**Jul 18**	**30d**	**60d**	**1d 1h**	**0**	
5.2.1	Fiber	Jun 27	Jul 18	15d	15d	1d 1h	0	Local partners
5.2.2	Configuration	Apr 25	May 16	15d	15d	46d 1h	0	Local partners
5.3	**Wholesale access**	**Apr 25**	**May 25**	**45d**	**22d 4h**	**48d 5h**	**0**	
5.3.1	Carriers identification	Apr 25	May 2	10d	5d	48d 5h	0	Local partners, guifi.net Foundation
5.3.2	Contracts	May 2	May 4	5d	2d 4h	48d 5h	0	Local partners, guifi.net Foundation
5.3.3	Wholesale provisioning	May 7	May 25	30d	15d	48d 5h	0	Local partners, guifi.net Foundation
5.4	**Legal & Compliance**	**Apr 25**	**May 14**	**5d**	**13d**	**33d 1h**	**0**	
5.4.1	**Notifications (if needed)**	**Apr 25**	**May 14**	**4d**	**13d**	**33d 1h**	**0**	
5.4.1.1	Regulator (NRA)	Apr 25	Apr 26	2d	1d	31d 4h	0	Local partners, guifi.net Foundation
5.4.1.2	Co-ocupation (other operators)	May 11	May 14	2d	1d	33d 1h	0	Local partners, guifi.net Foundation
5.4.2	Permits for access public domains	May 11	May 11	1d	4h	33d 5h	0	Project promoters, guifi.net Foundation
5.5	Testing	Jul 18	Aug 1	10d	10d	1d 1h	0	Local partners
6	Start operations	Aug 1	Aug 1	N/A	N/A	1d 1h	0	
7	Project Management	Mar 1	Aug 2	331d 7h	110d 5h		0	Local partners, Project promoters, guifi.net Foundation

Fig. 6. A detailed list of the tasks involved in the planning and deployment of a BuB pilot. Example provided by *gufi.net*.

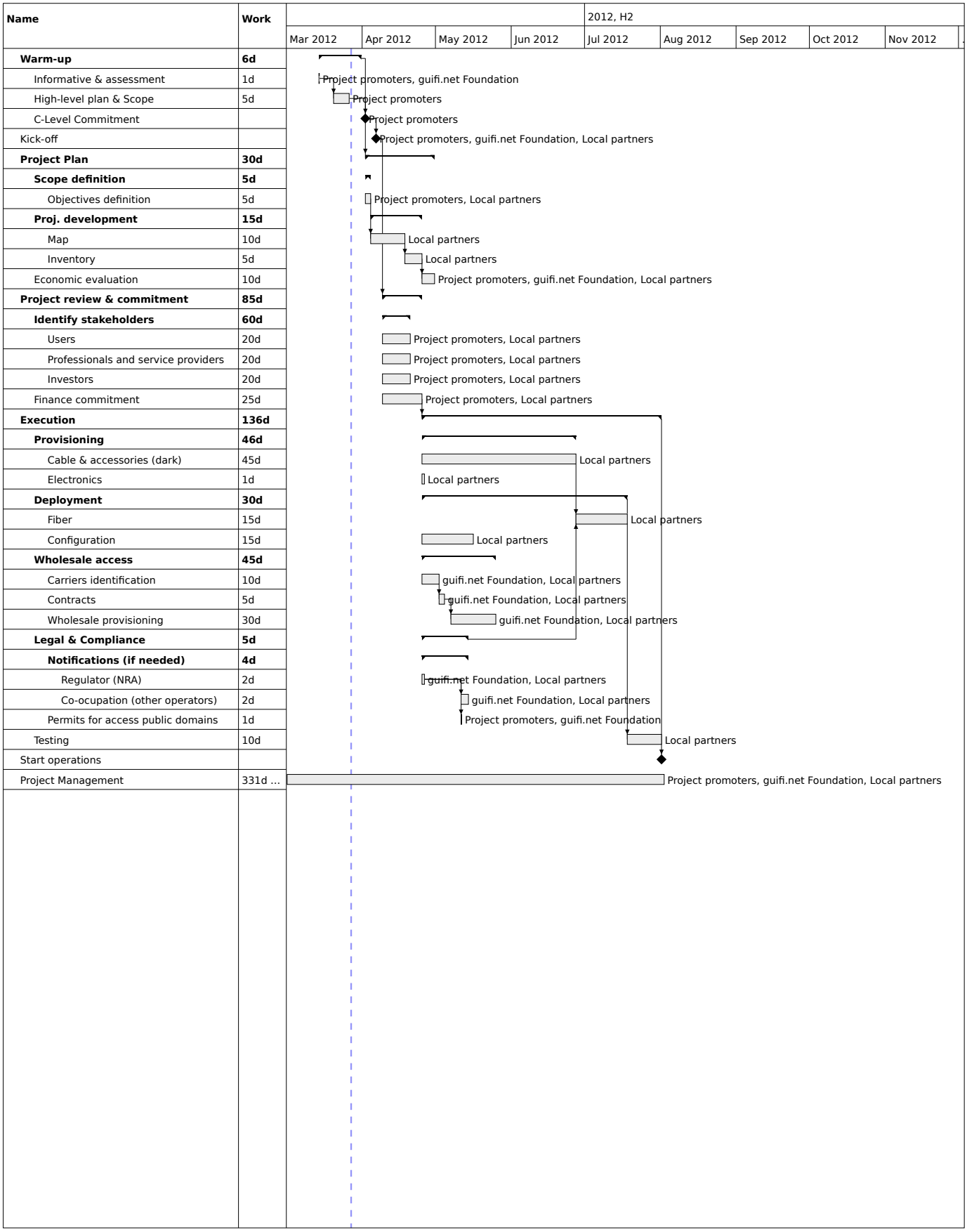

Fig. 7. Gantt diagram for a generic BuB deployment. Example provided by *gufi.net*.