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**Link and Evangelize the FI-PPP from Europe to the world  
for the benefit of FI research and innovation and to the  
European industry business**

## **FI-LINKS' contribution to H2020 Net Innovation's 2016-2017 Work Programme Open Consultation**

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## BACKGROUND / CURRENT SITUATION

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The Net Innovation Unit is currently in a transition period with the FI-PPP kicking off its 3<sup>rd</sup> and final phase and the launch of smaller, focused calls within the 2014-2015 Work Programme. In addition, the European Commission is also at a turning point, with the election of a new President and new Commissioners including a Commissioner who will take charge of the Information and Communications Technologies and Services domain (currently called the “Digital Agenda”, but likely to change name with the new Commissioner).

In this context it is time to start preparing the next ICT Work Programme for the 2016-2017 timeframe. FI-LINKS has performed the following activities to support the preparation of this Work Programme:

- A preliminary analysis was made of the likely project portfolio in the Net Innovation Unit at the end of 2015, including but not limited to the FI-PPP. This would be one of the starting points for planning the next two years;
- A preliminary analysis was made of the landscape of the Net Futures Directorate activities which may have an impact on the Net Innovation activities in the short and medium term;
- A preliminary proposal was made with various scenarios that could be considered at this stage.

This note can only be considered as a preliminary contribution elaborated in the very short timeframe since the beginning of the FI-LINKS project i.e. a little more than one month. It will need to be discussed further with the Net Innovation Unit in the coming weeks in order to come up with more robust and detailed scenarios that could serve as an input to the text of the 2016-2017 Work Programme.

## NET INNOVATION PORTFOLIO

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€300 million have been - and are still being - invested into the Future Internet PPP, which is entering its final phase, running up to mid-2016. This third step (Phase 3) ensures that technological developments and trials evolve into seed-type activities, generating actual take-up of innovative Internet applications, services, products and solutions; €100 million is being put on the table to help some 1 000 small businesses and start-ups do so. 16 consortia have just been selected to act as “accelerators” in this process and mobilize local SME and Web entrepreneur ecosystems. By doing so, the FI-PPP is looking at stimulating regional smart growth in Europe but also at making the most efficient usage of the outcomes of FI-PPP Phase 1 and Phase 2.

In short, two main outcomes are likely to be available out of the FI-PPP:

1. Under a common brand named “FI-WARE”, a number of solutions, composed of the products developed within the FI-PPP Phase 1 and Phase 2 projects (that will partially continue in Phase 3). These solutions include the original offer of the FI-WARE project, i.e. the “Generic Enablers” (GEs) which allow to accelerate the development of Future Internet related applications and services in any given domain; the vertical offer from the Use Case projects, i.e. “Specific Enablers” (SEs) that are built on top of FI-WARE and are dedicated to a given domain or sector e.g. multimedia and content, manufacturing, logistics, health, energy, etc.; the live instance of FI-WARE called “FI-Lab”, that offers free resources to developers that want to experiment FI-WARE technologies; FI-Ops, the set-of tools that support FI-Lab’s operation, and allows other providers to join the FI-Lab community; and other products and solutions that support the offer



e.g. a portal with information about experimental infrastructures available for tests and trials (the XiPi portal) and other platforms that have been developed by some of the Use Case projects.

2. An ecosystem of Web entrepreneurs and SMEs, who will have developed Future Internet related applications and solutions, based on the FI-WARE offer - but probably not only.

In addition, a third, more-intangible outcome shall also be considered. The FI-PPP has been - and is still - demonstrating that a new way of making innovation in Europe is possible. If the results of Phase 3 are convincing, then the FI-PPP will have shown that such a global approach was successful and worth repeating for the next big challenges.

In the Work Programme 2014-2015, some budget is planned, mainly focusing on continuing to mobilize and strengthen the European Web entrepreneurs' community around the Future Internet, either directly or through "intermediaries" such as accelerators, incubators, and other such clusters:

- ICT13 (Web Entrepreneurship) is looking at "[creating] an environment in Europe that encourages more Web entrepreneurs to start a business in Europe and grow internationally. The focus of this topic is on entrepreneurs who use Web and mobile technologies as main components in their innovation."
- ICT35 (Innovation and Entrepreneurship support) is aiming at "improving the framework conditions of the European ICT innovation ecosystem so that it offers the best conditions for innovators to capture the full potential of innovations to transform ideas to the market for sustaining growth and jobs."
- ICT34 (ICT contribution to pilot for co-investments by business angels in innovative ICT firms) is adding the business angels ecosystem into the picture.

The likely outcome of these activities is a more dynamic European ecosystem of Web entrepreneurs in Europe around ICT and in particular Future Internet related technologies and services, supported by a few European-wide accelerator groups and coordinated services at the European level, e.g. European-wide events, awards, online courses supporting entrepreneurship, and a more coordinated and more efficient network of procurers and of business angels.

To capitalize on the investment made on the FI-PPP programme, and not disperse focus, the outcome of the WP2014-2015 shall be to strengthen and enlarge the ecosystem which is being initiated in Phase 3 of the FI-PPP (cf. 2. above); and, where possible, leverage on the assets developed within the FI-PPP to support Web entrepreneurs innovation (cf. 1 above), e.g. by adopting FI-Lab as the platform on which to develop and explore their ideas using in-kind resources.

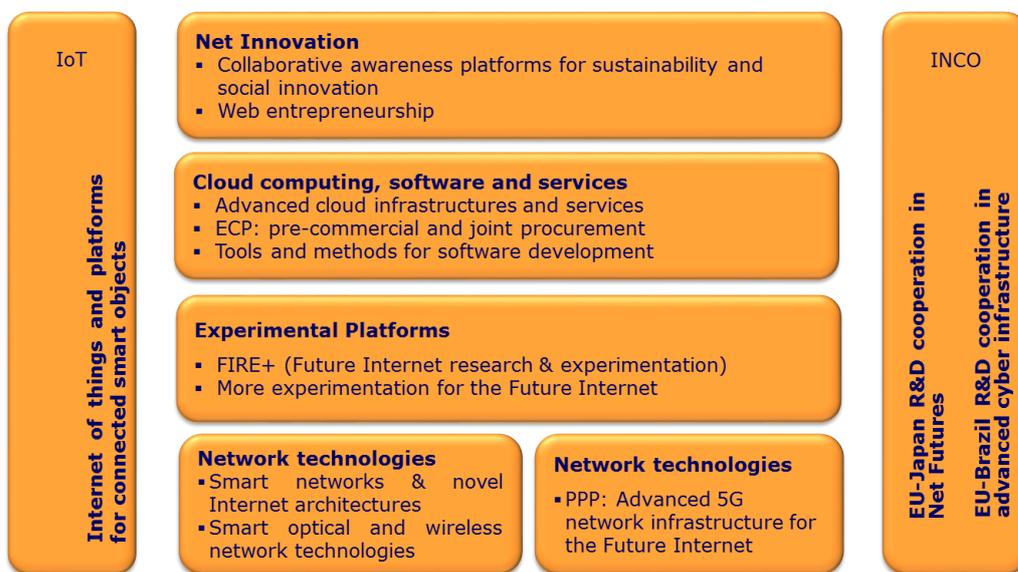
In conclusion, the Net Innovation portfolio by the end of 2015 is likely to include:

- A set of running projects looking at strengthening the ecosystem of Web entrepreneurs in Europe through different means;
- A "FI-WARE" offer coming out of the FI-PPP, probably composed of some commercial elements (open source or not), the still "free to access" FI-Lab platform, and maybe some non-commercial elements (probably open source);
- An ecosystem of Web entrepreneurs.

With the exception of the FI-PPP Phase 3 projects still running for a few months at most, the FI-PPP products and solutions will not be directly offered by the European Commission but by the industrial partners who will have developed such an offer from the FI-PPP projects. In this sense, they cannot be considered as directly part of the portfolio; but they are still an important part of the services to the SMEs and Web entrepreneurs' ecosystem. This ecosystem also does not "belong" to the portfolio per se. However both are important assets that need to be taken into account for the next Work Programme.

## THE NET FUTURES LANDSCAPE

The Net Innovation Work Programme cannot be considered only on its own; it needs to be positioned in a more global landscape, which first of all comprises the other Net Futures areas, which are depicted in the picture below.



One important aspect to be taken into account is the launch of another PPP in the 5G domain. This new PPP is attracting a lot of attention already (as all new initiatives do) including at the political level. Due to the current context in the European Commission, i.e. the appointment of a new President and new Commissioners, there are some activities that are currently taking place, in order to improve the visibility of this PPP. As an example, an EU-Korea agreement was recently signed to strengthen cooperation between the EU and Korea on this particular subject. Other agreements with Japan and China are also in the pipeline.

The Net Innovation Unit could take advantage of this publicity in order to involve its upcoming Web entrepreneurs and SME communities to either participate, or probably more likely liaise with - and take advantage of - the activities that will be performed in the 5G PPP projects.

The NESSI ETP has recently proposed to the European Commission a definition of a PPP in the area of the *data-driven economy*, to develop a big data community and encourage the exchange of best practices on big data. If evaluated successfully, the European Commission stated that it could be launched by the end of 2014.

In case the Big Data PPP becomes a reality, the Net Innovation Unit could liaise with it by supporting the PPP activities through the involvement of the established FI-PPP Web entrepreneurs and SME communities. Existing FI-PPP technologies, as well as other FI-PPP assets may be of interest for the Big Data PPP.



To a lesser extent (because of the smaller size of the effort), interactions with the activities performed in the other areas, i.e. IoT, Cloud Computing, Software and Services, and Experimental Platforms, should also be taken into account, as well as International Cooperation (INCO) activities.

Last, but not least, interaction and cooperation with more-generic SME programmes could also be considered, where the SME instrument (Horizon 2020) offers seamless business innovation support from idea to market, covering the three stages of the full innovation cycle (proof-of-concept, innovation development and commercialisation).

## PRELIMINARY SCENARIOS

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The preliminary scenarios are based on one hand on the analysis performed in the previous sections and take into account the assets that will be available by end of 2015 and build on them; and on the other hand on other disruptive ideas – disruptive in the sense that they are looking at new visionary orientations and not at building upon existing assets.

### SCENARIOS BUILDING UPON EXISTING ASSETS

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#### **Build upon the outcomes of the “FI-WARE/FI-Lab/FI-Ops” offer**

Three of the key results from the FI-PPP are: FI-WARE, FI-Lab and FI-Ops. The “continuation” of the FI-PPP programme should be based on taking advantage of - and promoting - these tools.

These tools were created with a high investment in the FI-PPP programme, both in the technological and marketing aspects, in recognition of the value of supporting businesses in Europe, especially start-ups and entrepreneurs.

In addition, there is another important part of the FI-PPP results which is the work done in classifying and profiling infrastructures, and gathering them into a portal called XiPi, which offers experimenters information about where and how to experiment with the Future Internet technology.

One step further would be to adapt this offer to the needs of entrepreneurs and SMEs in Europe, satisfying their needs to lower the costs of entering a business sector by enabling the renting capacity.

Last, but not least, there are a number of Specific Enablers which can be promoted in particular sectors, after understanding the level of maturity and the direct applicability to the sector. These would be key in sectors where there is delay in the Future Internet technology adoption in general and where the FI-PPP results can promote the upgrade of business and productive processes. Promoting and encouraging the use of all other outcomes including others tools (e.g. XiPi) and Use Case platforms should also happen.

New calls for projects probably cannot achieve the intensity of investment from the FI-PPP programme and therefore should be more focused on certain aspects of the Future Internet innovation. The following directions could be considered:

- Take the best of the FI-PPP and further upgrade: i.e. support the update of those Enablers which have been widely used (most accessed, downloaded or interacted with) by the start-ups and entrepreneurs in the 3rd phase of the FI-PPP, where a level of maturity has been achieved to ensure a future commercial operation by entrepreneurs in their business (thus using an Open Innovation approach in driving the evolution of FI-PPP results).
  - e.g. in the case that cloud, BigData and IoT are the most used Enablers, the focus should be placed on these, based on the “demand side” from the entrepreneurs.
- Customise the offer: i.e. adapt FI-WARE, FI-Lab and FI-Ops to the needs of specific applications or sectors, but with a dedicated approach and promotion of their use. Some effort has been dedicated in Phase 1 and Phase 2 projects towards Smart Cities; this effort should be expanded,

and other real business applications for Operators, Service Providers and EU manufacturers could be promoted. For example, dedicated “sub-platforms” made of relevant GEs and SEs for a given domain could be developed. It could even be possible to go further in the customization and adaptation process by using the concept of customised FI-WARE/FI-Lab/FI-Ops through a reduced and focused approach that can be applied to offer a platform where local experimenters and start-ups can offer their specific apps (e.g. apps for tourism developed by an entrepreneur offered to the citizens using a tailored FI-WARE framework for Smart Cities, which would be adapted to the specific requirements of that city). This may include specific purpose cloud hosting solutions and instances, that, rather than providing infrastructure able to accommodate any scenario, but none in an optimized way, support the needs of a given domain (e.g. 3D gaming, IoT...). Then, Specific Enablers which are sufficiently mature could be incorporated into the tailored offer.

- Work with the community to ensure continuity: the developers of Future Internet tools should work in cooperation with the general developers' communities to ensure a wider adoption and the achievement of a “de-facto” standard of FI-WARE as the Future Internet OS, FI-Ops as the operation environment and FI-Lab as the meeting place for entrepreneurs and the capacity to build the Future Internet. Following initial encouraging results, future work should ensure that FI-WARE is increasingly aligned and contributing to Open Source relevant initiatives (rather than building new ones), to ensure its impact and acceptance in a wider ecosystem than the European one; This could lead to exploring boundaries beyond Open Source software, and touch base with Open Source hardware-related initiatives such as Arduino in IoT, or RepRap in the field of 3D producers;
- In the security area, the FI-WARE security chapter could be expanded to cover issues that have not yet been included. For example, there are some Generic Enablers for Security or Privacy but nothing regarding cryptography, or tools for end-users.
- In the IoT domain, there are a number of adapters to different IoT gateway protocols and devices but more could be done there as well. For example, Device Management, OS for devices, semantics at the device level, peer2peer communication between objects, could be added.
- Fully embrace the cloud approach, not only by making Generic Enablers available through the cloud and web-native, but by making them cloud-native services. Native cloud applications and services are based around a design architecture and patterns that are different from the traditional ones that inherit in their principles the basic concept of high availability and scalability of cloud computing infrastructures.
- Extend further the mobilisation of European infrastructure to provide capacity and resources, e.g. through the enhancement of the infrastructure capacity to offer more services and more capacity to SMEs and experimenters. For example:
  - Incentives should be offered - and the value proposition made clear - to infrastructure owners and operators to join and increase FI-Lab capabilities.
  - Tools shall be developed for easing the access of SMEs to FI-WARE, integrated with the regular innovation process of SMEs will help the wider use and promotion.
  - Expand the XiPi portal into a full FI-WARE brokerage service, starting from the existing XIFI federation of infrastructures.
- If Phase 2 and 3 are successful, FI-Lab will be sustainable beyond the FI-PPP Programme and be backed by a number of federated infrastructures including a number of Future Internet facilities beyond cloud hosting ones. This capacity should be exploited in future calls – e.g. a call could be launched for projects to maintain the platform and add new features, and all new Research and Innovation Actions should be encouraged to contribute and adopt the platform. This should apply to the 5G PPP as well.

- Maintenance of national nodes (e.g. with EIT ICT Labs) and other initiatives which can sustain the local use and the creation of national hubs or mirrors.

### **Build upon the outcomes of the constitution of the Web entrepreneur European ecosystem**

The ecosystem of Web entrepreneurs and SMEs, along with the newly constituted European-wide ecosystem of accelerators and “innovation hubs”, should be involved in the usage of the technologies and services which are developed by the Net Innovation related projects. When writing the call text this should be included to a certain extent.

However, at the same time, large, small and medium-sized companies (not the start-ups) and the academic institutions, which are the ones driving the innovation ecosystem around technologies, shall be taken into account and the interaction between the various players shall be encouraged in order to create a full Future Internet European ecosystem.

### **Build upon the outcomes of the both the FI-PPP and the ecosystem**

One of the cornerstones of a successful follow-up of the Future Internet PPP is the adoption of communities of developers but also the sustainability of the FI-WARE nodes in Europe and beyond.

One option would be to organize a “club” of FI nodes able to maintain and upgrade consistently the FI-WARE platform in the future, but also able to find a stable business in order to provide a sustainable environment for developers and SMEs using the platform. This should start from the European nodes but could then be expanded to nodes outside Europe.

At international level, the Work Programme could look at continuing to help countries having been identified as having a relevant ecosystem to adopt the FI-WARE platform and to set up nodes. Support could be provided to help them use such European technologies instead of technologies coming from Japan, the US or others. This activity is being initiated in Phase 3 with Mexico and Brazil (the latter to a lesser extent so far); it needs to be continued to achieve a more global coverage, hopefully leveraging from a successful outcome from Phase 3 at European level and in Mexico and/or Brazil.

## **NEW “DISRUPTIVE” SCENARIOS**

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Some ideas concerning new ideas not necessarily based on the outcomes of the FI-PPP or of the first two “Web entrepreneurs” related calls within H2020 include:

- Cross actions between the new Big Data PPP and the 5G PPP. For example:
  - Existing results from the FI-PPP and other Future Internet related activities will indeed require more network facilities, typically to explore how to better use SDN and NFV for cloud, big data or IoT.
  - QoE and QoS are critical in several domains. These cannot be guaranteed without proper network architectures and transparent interaction between applications (and eventually users) and the network itself. Interactions are needed with the 5G PPP actions to ensure that future networks become more open, programmable and application-driven, thus opening new scenarios for value-added services by Operators and Service Providers.
- Security and Privacy is increasingly a hot topic and cryptography has not been addressed. A kind of PGP for IoT, or other such mechanisms, is expected also for cloud services. Innovative concepts and projects could be called for in this domain.
- In the cloud area, nothing has been done regarding hybrid cloud. Openness is a key success factor and hybrid cloud will extend the scope of potential platforms and reinforce value for platform providers.
- Environment sustainability is a fundamental aspect for the EU’s future economy. Services and infrastructures of the future should be designed taking this into account. Applications and

platforms hosting them should have clear KPIs in term of energy efficiency and should be able to adapt accordingly.

- In the Big Data area, tools and requirements are evolving very quickly. There is no frozen picture and new technology will emerge soon including parts related to visualisation. This deserves a particular effort in the next Work Programme.
- The boundaries between FIRE and the FI-PPP have started to become blurred in the past couple of years, with increasing interaction between INFINITY/XIFI and FIRE projects, and with FIRE trying to attract SMEs and industry. It could be the right time for the Net Future Directorate to distinguish again more clearly between projects using the FI-PPP infrastructure as being closer to market, with FIRE going back to its original roots as being more long-term advanced and open for disruptive Future Internet concepts. In parallel, FIRE testbeds (or elements of FIRE testbeds) should be encouraged to migrate to the FI-PPP family as they become more mature and adapted to the needs of industry, continuing the process already initiated with the XIFI project, where some FIRE facilities have joined the federated set of infrastructures.
- National initiatives and other European initiatives, like EUREKA, should be encouraged to maintain pressure for relevant projects to use the FI-WARE solution. FI-WARE should be promoted at national, regional and local level to become “the” European platform for the Future Internet. At the European level, Big Data and 5G projects should also use FI-WARE, e.g. with existing data from Smart Cities as a sandbox to deploy new technologies.
- From an industry standpoint, the FI-PPP is regarded as different from other initiatives in the sense that it allows for a deeper involvement of the industrial players, making the initiative more flexible and capable of responding more quickly and efficiently to market evolution. The next Work Programme should consider activities in relation with keeping track of the results, analysing the impact, and documenting the lessons and best practices learnt during the programme. This might help not only validate the risky leap forward in the FI-PPP model, but also to predict the applicability and outcomes outside the ICT sector.

## AUTHORS

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