



Project Acronym	Fed4FIRE
Project Title	Federation for FIRE
Instrument	Large scale integrating project (IP)
Call identifier	FP7-ICT-2011-8
Project number	318389
Project website	www.fed4fire.eu

D8.5 First Report on the Federation Authority

Work package	WP8
Task	Task 8.2
Due date	31/03/2014
Submission date	13/05/2014
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Version	1.0
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Abstract	This document contains an update of the description of the purpose and operation for the Fed4FIRE Federation Authority at project month 18.
Keywords	Federation Authority, Sustainability, Service, Federator

Nature of the deliverable	R	Report	X
	P	Prototype	
	D	Demonstrator	
	O	Other	
Dissemination level	PU	Public	X
	PP	Restricted to other programme participants (including the Commission)	
	RE	Restricted to a group specified by the consortium (including the Commission)	
	CO	Confidential, only for members of the consortium (including the Commission)	

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Executive Summary

This document is an update of the description of the purpose and operation for the Fed4FIRE Federation Authority. The overall purpose of the federation authority is threefold:

- to determine processes, conventions & policies to enable the sustainable operation of a Fed4FIRE federation during and after the project,
- to determine planning for, and the role of a federation authority beyond the end of the project, and
- to ensure that the project's design choices are consistent with these above defined constraints in terms of Fed4FIRE federation sustainability and also with the aims and constraints of the project partners.

The work to define the Federation Authority has been very closely connected with Task 2.3, Sustainability. This is mainly because we see that the Federation Authority will transform into the so-called "Federator" – the body that will enable federation beyond the end of the project. The Federator is actually the role that Fed4FIRE needs to define and determine how to operate viably beyond the end of the project. We expect the outcome of the sustainability work in Fed4FIRE to be a specification of the functions required of a Federator – i.e. what needs to be done to enable federation, and how the Federator can sustain itself – i.e. generate enough revenue to cover its operating costs.

As expected some deviations have occurred between the plan made in D8.2 and what has actually happened. This is mainly because of the close collaboration between T8.2 and T2.3. These two tasks are very closely aligned and share similar objectives – T2.3 is responsible for determining sustainability and T8.2 is responsible for specifying a business entity that will be sustained. To all intents and purposes, these two tasks are now behaving as one consolidated entity, and we believe this is to the benefit of the project because barriers are removed and common thinking exploited.

Acronyms and Abbreviations

FFA	Fed4FIRE Federation Authority
AUP	Acceptable Use Policy
F2F	Face To Face
SLA	Service Level Agreement
SFA	Slice Federation Architecture

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1 Introduction

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Because IT Innovation's (and indeed the overall) effort in T8.2 is extremely small, we have combined the Federation Authority work with our contributions to T2.3. As a result, this deliverable will be short, and the main body of the work for the Federator will be described in D2.6, due at PM22.

This deliverable will take the form of following D8.2, where we made an initial plan. The original text of D8.2 is included (*italicised*), and following this, comments are made in each section to describe progress and deviations.

2 Audience

The target audience the FFA aims to help are existing and prospective members of a Fed4FIRE federation. These are broadly in two categories: testbed operators and experimenters, and both are required to make a viable federation¹.

Testbeds who are not part of the project will wish to know what the benefits of participating in the federation are and the commercial, operational, technical and other obligations they need to accept in order to become part of the federation. Should they wish to join, they will need to know how conformance to these obligations is measured and the mechanics of joining. Currently the benefits of joining are not clearly spelt out but could include technical support, a common operational environment, joint promotional benefits etc.

¹ It should be noted that the same person may have both roles: they may be a testbed owner and an experimenter in different contexts.

The other category is experimenters, and these may already be registered by testbeds, or may be 'new' – without any registration at a testbed.

- *For a 'new', or 'lone', experimenter without any affiliation with a participating testbed, the federation will need to explain what facilities are available and on what terms (access, commercial obligations etc). As with the testbeds, the benefits of joining or using the federation need to be determined and explained. For 'lone' experimenters, the FFA will also have to determine factors such as:*
 - *eligibility requirements for lone experimenters,*
 - *any registration process so the experimenters can access the testbed resources, and*
 - *terms and conditions in a user agreement with the experimenter.*
- *For experimenters already associated with a member test-bed, there are different issues. There may be local conventions and terms of use that may or may not translate easily to the federated environment. These need examination to determine compatibility between different testbeds' conditions and those of the federation.*

The FFA needs to operate in the context of these three constituencies. Its role, and the interactions that it has, will vary depending on the constituency it is dealing with.

At PM18, the target audience for Fed4FIRE is the same - the main "customers" are experimenters, but Fed4FIRE needs to offer value to both experimenters and testbeds. The benefits to joining the federation are clearer at PM18, and are discussed further in section 3.1.1.

For the case of registering new experimenters not associated with testbeds, we have two main options: use the existing registration authorities we have in the project (namely the SFA member authorities at the Virtual Wall and Planet Lab Europe), or add a further "central" one, to be operated by the Federator.

For the central registration authority, Fed4FIRE has determined an initial policy for registration of users without a home testbed. This was agreed at the Edinburgh plenary meeting and is summarised as follows. Each Fed4FIRE testbed defines a category of experimenter that is registered externally (e.g. through the Fed4FIRE central portal). This category may have very limited rights or quota, but experimenters will be able to at least see the capabilities of the testbed and understand its potential. Experimenters can request upgrades to any default rights or quota, and it is each testbed's decision whether to grant or deny these requests. There is no obligation on testbeds to grant these requests from Fed4FIRE, but it is clearly in the testbeds' interest to attract users and be seen to be helpful. Some testbeds will request experimenters to sign specific Terms and Conditions, e.g. an Acceptable Use Policy, and each testbed is free to determine their own Terms and Conditions.

3 Sustainable Operation of a Fed4FIRE Federation

The FFA needs to make a plan to define how a future Fed4FIRE federation can operate viably beyond the end of the project. This is clearly linked to the work in T2.3, sustainability. There are two major aspects to sustainability from the FFA's point of view:

- *General sustainability of a Fed4FIRE federation after the project – what is required to enable a Fed4FIRE federation to be continued viably beyond the end of the project.*

- *The role and purpose of a Federation Authority in a future Fed4FIRE federation – how an organisation playing this role can add value to the federation.*

Clearly the second point is dependent upon the first, in that we need to understand the future value proposition of a federation beyond the end of the project in order to determine the role of a Federation Authority within it. See Section 4 below for a discussion of this, but the issue of “general sustainability” is also addressed in T2.3, and the FFA’s proposed membership list (indicated in section 4) includes representatives from this task.

The FFA will work closely with the sustainability work in T2.3, providing contributions where possible and appropriate, but the FFA’s main contribution is to define the role of a Federation Authority within it. To define this role, the FFA must determine how an organisation can take over the support and management of a federation – e.g. what value it provides to members of the federation, and how it can make enough money (from either commercial or public sources) to sustain itself.

Close attention will be given to similar activities that are currently taking place in other FIRE projects and federations. Collaborating with these external bodies will lead to a better understanding of what is required, and important lessons can be quickly learned from others’ experience.

In addition to the above, a major function of the FFA is to manage the definition of a number of aspects about a future federation. These aspects are discussed next.

Sustainability is the main function of T2.3, and our progress will be discussed in the upcoming deliverable D2.6, but a few key points regarding our approach to sustainability are discussed here.

In T2.3, we have adopted a service-based approach in defining the functions that a future operator of Fed4FIRE should operate. The reason for this is that adopting a service-based attitude to thinking about functionality forces us to think about aspects such as:

- Who the “customers” are
- What value we will give them, and whether this value is truly useful to them
- How we can deliver that value – e.g. what inputs do we need, and how do we transform the inputs into the useful service for the customers?
- How the organisation providing these services can be funded?

A key thing that we have noted is that the services provided by a future operator of Fed4FIRE are distinct from the services provided by the testbeds themselves, and should not be confused. The testbeds provide experimenters resources and services to run specific experiments, and the future operator of Fed4FIRE provides additional services, employed when experimenters want to run federated experiments, or to discover and use testbeds. Fed4FIRE is in effect providing a brokerage service mediating between multiple testbeds and experimenters, for the benefit of both.

In T2.3, we have explored different federation patterns. The main reason for doing this was that before this exploration, there was always an unanswered question: “what does the federation actually do?”. By exploring federation patterns, we have explored different options of what could happen in a federation. This has greatly clarified our understanding of the spectrum of functions needed in a future Fed4FIRE federation.

During our researches into different federation patterns, we found that the EC FP7 FedSM project had defined a number of federation patterns that demonstrated differing levels of involvement by

the so-called "Federator" - the body that enables the federation to happen. The federation patterns can range from very lightweight federation, where Federator simply defines standards and protocols and the participants deal direct with each other, to full involvement, where the user contacts the Federator and the Federator deals with all matters pertaining to delivery of the experimental resources.

These federation patterns were extremely useful to us, and Fed4FIRE has started a very useful collaboration with the FedSM project, who have a standard named "FitSM" - standing for Federated IT Service Management. This derives from established standards like ITIL, but is lightweight and easy to apply. In essence, it provides a checklist and advice for all the things that need to be considered when operating a federated IT service, and we have determined that the future Federator is in need of this.

Because of the applicability of the FedSM federation patterns, and also the FitSM approach to creation and management of federated IT Services, we are using FitSM as a framework for investigating many aspects of the service the Federator provides to the experimenters and testbeds.

3.1 Definitions & Specifications

The FFA must manage the definition of a number of aspects of a future Fed4FIRE federation:

- *Benefits to experimenters of joining or using the federation*
- *Benefits to testbeds of joining or using the federation*
- *Conventions and processes to enable the federation to operate*
- *Rules of the federation*
- *Commitments of an experimenter in the federation*
- *Commitments of a testbed in the federation*

Once defined, these aspects should determine the reasons for participants to join or use the federation, how the federation operates, and the commitments participants need to provide in order to get the benefits of the federation. Each of these points is discussed in more detail next.

3.1.1 Benefits

The benefits to prospective members or users of a federation are part of the value proposition of Fed4FIRE, and the benefits must be clearly described for each member type (as defined in Section 2). Defining Fed4FIRE's value proposition is the responsibility of the whole consortium, but is being led by WP2, and the FFA will certainly contribute.

At PM18, the benefits to the target audiences of Fed4FIRE are clearer, and examples are illustrated in Figure 1.

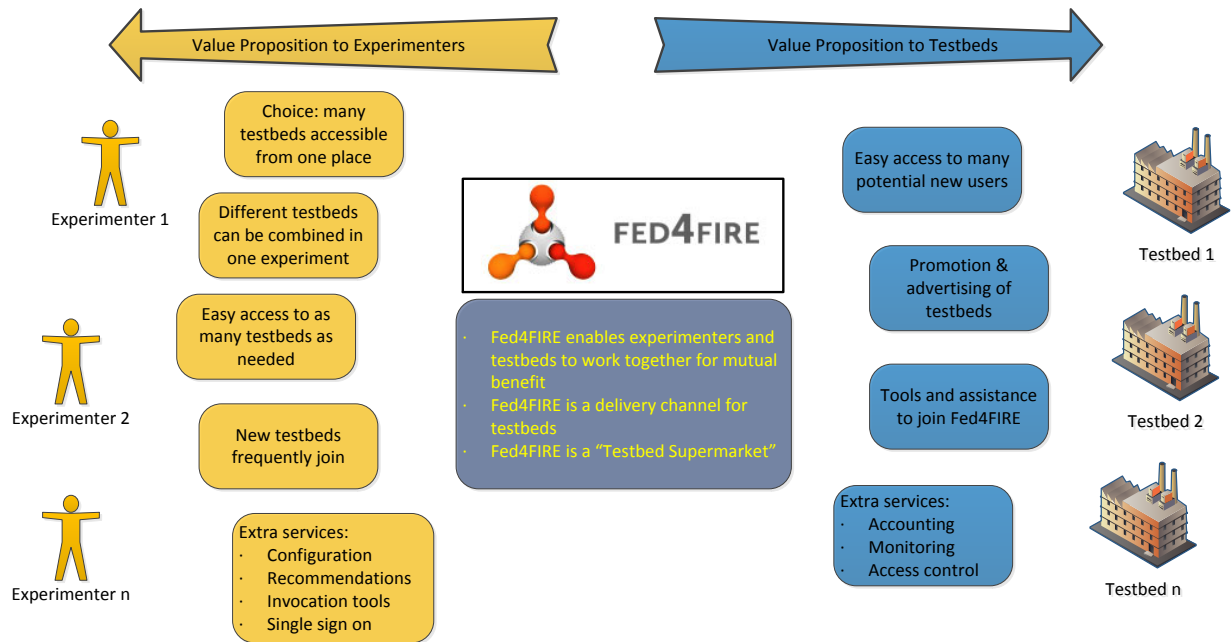


Figure 1: Examples of Fed4FIRE benefits to experimenters and testbeds

For the testbeds, the main benefit is the potential to reach more experimenters than if they were outside the federation.

For experimenters, the benefits are:

- Promoting and advertising the services of the participating testbeds, so that new experimenters can easily find and use the testbeds
- A wide choice of testbeds offering different types of experimentation
- The potential to run a single experiment across multiple testbeds
- Ease of access to the testbeds (e.g. single sign on, reservation managed by the federator, etc).

3.1.2 Conventions & Processes

The FFA should manage definitions of conventions & processes to enable the creation and operation of the federation. This means specifying the "common" functions - things that can be shared to enable / help the federation, e.g. vocabularies, protocols, standards and procedures to enable members of the federation to interact and run experiments over multiple testbeds. The FFA has no effort to do the actual work of standardisation (this is done in T8.3), but the FFA can determine that certain aspects need standardisation, and make recommendations to T8.3. Some examples of the things that may be considered are:

- *Vocabularies – e.g. definitions of terms, naming conventions.*

- *In particular here are the meanings of terms that may be used in assertions that may form part of an access control decision, and any federation-wide naming conventions for SFA's "XRN"².*
- *Meanings of assertions in security tokens. For example, we can define what a role of "Principal Investigator" is, so all testbeds can understand its meaning when it is asserted that a user has that role.*
- *Procedures for executing common tasks in a federation (e.g. user or testbed registration).*

Through our use of the FitSM framework, we have identified some of the processes needed for managing and operating services in the federation, in particular the services offered by the Federator. These will be discussed in more detail in D2.6, and also can be found in the FitSM documentation³.

3.1.3 Rules of the federation

Depending on the scope of a future Fed4FIRE federation, there may be rules for the federation. If this is the case, the FFA should determine what rules may be appropriate and work with any future Federation Authority to provide a set of rules that they may take forward into operation of the federation beyond the project's end.

Rules will determine the terms and conditions that experimenters and testbeds must agree to in order to join or use the federation. We will need to investigate how any federation-wide rules are compatible with existing user agreements or rules at individual testbeds, and if there is a conflict, which takes precedence.

Some examples of the types of rules could be:

- *An Acceptable Use Policy (AUP) for experimenters at testbeds. This determines what users may do at testbeds and what they may not. This may be in addition to any AUP for an individual testbed, and we will have to determine which AUP takes precedence.*
- *Basic Undertakings provided by testbeds. This determines a minimal set of provisions that testbeds all need to support, for example non-disclosure, adequate security, privacy, etc. Any additional provisions made by testbeds (e.g. the provision of the testbed services that the experimenters want to use, specified in SLAs) will be additional to this.*

At PM18, the basic undertakings of the testbeds has been initially defined, and is part of the initial registration policy for users, discussed above in Section 2. The acceptable usage policy is not yet defined, but is part of the FitSM standard and required for new users of the federation, so will be considered as part of the sustainability task, T2.3, and expected within the next six months. It is expected that at federation level, any rules that are defined will be at a basic, "lowest common denominator" level, so as to enable all parties to agree to them.

² See "SFA Entities" section in <http://opensfa.info/doc/opensfa.html>

³ Available at: <http://www.fedsm.eu/fitsm>

3.1.4 Commitments

The commitments are what federation participants have to provide in order to get the benefits they want. This could possibly include any payment (e.g. on the part of an experimenter) or the provision of resources (e.g. on the part of a testbed). Specific commitments may be negotiated between an experimenter and a testbed individually, but if there are any federation-wide commitments, they should be specified by the FFA. Some commitments may be defined in rules that the participants need to abide by, and these rules are discussed above.

At PM18, the specific commitments from participants are not defined, mainly because they are dependent on the choice of federation model. In addition, we must be aware that commitments are usually between two parties – one party making the commitment and the other party receiving the commitment. If we adopt a lightweight federation model for example, where all the Federator does is define standards, there is very little in the way of commitments that the Federator is involved in. On the other hand, if we adopt a more demanding federation model where the Federator takes responsibility for provisioning and running an experiment, the commitments between the experimenter and the Federator, and the Federator and the testbeds will be also more demanding. The basic commitments are already defined (discussed in the initial registration policy in Section 2), and are set to a very low level so as not to put too many demands on testbeds, but testbeds are free to offer more resources etc., if they so wish. We will investigate extensions to these commitments made by each participant if they become necessary. Any investigations of this nature will additionally help us to evaluate the different federation models, as we can then judge which balance of commitment against benefit is more attractive to each participant.

3.2 Agreements & Contracts

In a federation where participants “join”, there is likely to be some form of agreement or contract. What form this will take, and who the agreement will be between is not yet known, as the shape of the future federation is not known. Once the federation scope is established, the FFA will work with the sustainability task to determine template agreements for its participants. The agreements are likely to contain elements of the factors that the FFA is responsible for specifying (see above), for example:

- *Rules of the federation*
- *Commitments of an experimenter in the federation*
- *Commitments of a testbed in the federation*

The contracts required are predicated on the commitments required, and as such, the contracts are yet to be determined. It is expected that the forms of the contracts will be straightforward once the commitments have been determined, as the contracts are simply codification of the commitments.

4 Evaluation

As described in the previous section, the FFA is responsible for determine processes, conventions & policies to enable the sustainable operation of a Fed4FIRE federation during and after the project. Therefore, the FFA should evaluate the consequences of technical and architectural choices in this context. An initial set of evaluation questions could include the following.

- *We need to be certain that the project's decisions and architecture result in sufficient benefits for both the consortium as a whole, and also to the individual partners.*
- *We need to ensure that the project's choices are compatible with any longer term sustainability objectives.*

The FFA will report its findings and recommendations to the project's executive committee, management and architecture WPs. The FFA can also act as a collection point for comments, issues and concerns from the wider project to feed back to the management and architecture.

At PM18, the sustainability task is mainly responsible for evaluating architectural decisions, and this has occurred with the development of the cycle 2 architecture. The sustainability partners were consulted during the design of the cycle 2 architecture, and the comments and inputs made by sustainability were taken on board, and are reflected in the architecture. This effort will be continued in the third development cycle of the project.

5 Project-Wide Issues Affecting the FFA

Two related issues that affect the FFA (in its form as described above) are:

- *We need to have a consistent idea of what Fed4FIRE means by "federation". For example what is in scope and what is out of scope? What properties should a Fed4FIRE federation have?*
- *What is the value proposition / added value of a Fed4FIRE federation? Why should experimenters and testbeds come to participate in a Fed4FIRE federation – what do they get out of it? What is the added value over and above simply using a testbed?*

For both of the above, it is clearly understood that it is the responsibility of all partners in the consortium to contribute to these, but WP2 will facilitate and drive these tasks, e.g. pushing the tasks forward and providing forums, meetings etc. Work addressing both of these issues will feed into the FFA, and it is very likely the FFA will contribute to these issues.

At PM18, the above has happened through our identification of the federation patterns, and the identification of the value proposition to both experimenters and testbeds. Also T2.3 has become a focal point for all things associated with sustainability and the federation authority, and also communicates with the rest of the project. This is described in D2.6.

6 Membership

Skills in multiple disciplines are needed for the FFA for it to provide a balanced view in a wide range of subjects and topics. In addition, the different facets of the project need to be fairly represented. To this end, we have recommended representatives from each workpackage, and added people with specific skills. The following table shows our proposed member list for the FFA.

Partner	WP	People	Skills
<i>iMinds</i>	<i>WP1, WP2</i>	<i>Wim Vandenberghe Piet Demeester Brecht Vermeulen Jan Van Ooteghem</i>	<i>Project management (WP1) Architecture (WP2) Sustainability (WP2)</i>
<i>IT Innovation</i>	<i>WP7, WP8</i>	<i>Michael Boniface Steve Taylor</i>	<i>Chair of FFA (WP8) Security (WP7)</i>
<i>UPMC</i>	<i>WP3</i>	<i>Timur Friedman</i>	<i>Testbeds, SFA (WP3)</i>
<i>FOKUS</i>	<i>WP5</i>	<i>Florian Schreiner</i>	<i>Technical design & implementation (WP5)</i>
<i>EPCC</i>	<i>WP4</i>	<i>Mark Sawyer</i>	<i>Services & applications (WP4)</i>
<i>DANTE</i>	<i>WP8</i>	<i>Dai Davies</i>	<i>Operations (WP8)</i>
<i>ATOS</i>	<i>WP7</i>	<i>Josep Martrat Felicia Lobillo</i>	<i>Business & industry perspective (WP7)</i>
<i>NICTA</i>	<i>WP6</i>	<i>Max Ott</i>	<i>Monitoring & logistics (WP6)</i>

At PM18, the federation authority has occurred in a different way to that described above, and this is mainly because of the realisation of the similarities between the work of the sustainability task T2.3 and the federation authority (T8.2). Hence, a working group in the T2.3 sustainability task has taken the above plan's place to define the federation patterns, the functions and viability of the Federator into the future. The membership of this working group is voluntary and based around the interest of the individual participants in sustainability, but the majority of the workpackages are represented. The table below shows the main participants, who have actively contributed to the sustainability work.

Partner	WP	People	Skills
<i>iMinds</i>	<i>WP1, WP2</i>	<i>Wim Vandenberghe Jan Van Ooteghem</i>	<i>Project management (WP1) Sustainability (WP2)</i>
<i>IT Innovation</i>	<i>WP7, WP8</i>	<i>Steve Taylor</i>	<i>Security (WP7)</i>

		Paul Grace	Sustainability (WP2)
FOKUS	WP5	Mikhail Smirnov	Technical design & implementation (WP5)
EPCC	WP4	Mark Sawyer	Services & applications (WP4)
DANTE	WP8	Dai Davies	Operations (WP8)
ATOS	WP7	Felicia Lobillo	Business & industry perspective (WP7)

Note that it is planned to involve additional people from wider workpackages and tasks in the sustainability discussions of T2.3 once the vision of this core team has crystallised. This two-step approach was adopted for efficiency reasons.

7 Operating Mechanism

The suggested format for the FFA is regular dedicated F2F meetings (perhaps every 6 months, and co-located with the project's plenary meetings). It may be a good idea to have a standardised agenda for the FFA, to ensure that the main work of the FFA is addressed in each meeting. This agenda may of course evolve by agreement of its participants.

The outcome of the meeting is a report summarising the decisions and recommendations of the FFA, plans for next steps, and any proposed actions or interactions with other workpackages. The report is submitted to the executive committee and the project's architecture workpackage, who should consider its content and make a response, stating which recommendations will be implemented (and why) and which will not (and why), and the recommendations taken up can become part of the project's planning.

At PM18, the above plan has also not happened, but has been replaced by focusing on T2.3 as the sustainability working group. T2.3 has regular bi-weekly teleconferences, which discuss progress, make decisions, set and track actions etc. Next to that, T2.3 has organised related sessions at every plenary meeting since the drafting of the above plan:

- Ghent plenary (April 23-25 2013): 1 hour session during the plenary track + dedicated workshop of 2 hours
- Edinburgh plenary (September 3-5 2013): dedicated workshop of 3.5 hours, split over two days.
- Southampton plenary (December 3-5 2013): dedicated workshop with the FedSM project of 3 hours + dedicated workshop of 1 hour
- Ghent plenary (April 1-3 2014): 2 hours session during the plenary track

There is thus very good communication between all participants working in the sustainability task, and strong links with other WPs and tasks. As a result, the plan above is regarded as superseded by the regular sustainability teleconferences, sessions at plenary meetings, and associated work.

8 Conclusion & Roadmap

In the Fed4FIRE Description of Work, the FFA activity is divided into 5 phases, the first of which is completed by the submission of this roadmap deliverable at M6. This will be followed by deliverables that correspond to the end of the different phases at M18, M28, M38 and M48 respectively.

It is clear that there are important interdependencies between the work of the FFA and other activities within the project (sustainability, SLA, architecture, etc.), and that as the project evolves, it is expected that the plan set out in this deliverable will evolve as the project continues. At the end of each phase of the project, any updates to this plan will be discussed in the accompanying deliverable.

At this stage, we can determine the plan for the FFA activities during the oncoming year, between M6 and M18. This will focus on:

- *Establishing the FFA:*
 - *Getting agreements from the proposed members to participate in the FFA*
 - *Scheduling meetings*
 - *Determination of a standardised agenda for the meetings*
 - *Liaison with other WPs and Tasks in the project*
- *Work on processes, conventions & policies to enable the sustainable operation of a Fed4FIRE federation during and after the project. This involves close interaction with many other workpackages and tasks, and is likely to be iterative.*
- *Evaluation of the project's design choices in terms of the aspects defined in Section 4.*
- *Analysis of the next steps that may be taken in order to prepare actual operation of an FFA during and after the project.*
- *Consultation with other FIRE projects and federations on sustainable operation beyond their projects' ends and the nature of any Federation Authorities they may have.*

The next deliverable, due at PM18, will report on the progress of the FFA against the plan above, and highlight any updates to the plan as necessitated by the project's evolution.

In conjunction with T2.3, this task has made the following progress:

- Recognised that the federation authority is strongly connected with sustainability, and as a result begun a close collaboration with the sustainability task T2.3.
- We have proposed an initial definition of the federation authority.
- We have proposed a value proposition to both experimenters and testbeds.
- We have begun a collaboration with the EC FP7 FedSM project and are using their FitSM standard to guide the development of the federator's offer.
- We have proposed a basic registration policy for users without accounts at testbeds already.

There are deviations from the plan presented in D8.2, and these have been discussed and justified in this deliverable. For the future, at PM18, the updated roadmap is as follows:

- Continue using the sustainability working group as the federation authority members, and bring the sustainability work and the federation authority work closer together. There may be a case for consolidating the effort into one task, as the federation authority and the work done in T2.3 are becoming so tightly coupled and interdependent.

- Evaluate the commitments and benefits for the federation participants in the different federation patterns.
- Continue to use FitSM as the framework for specifying the Federator services, the commitments, the benefits and the contracts.
- Determine estimated costs to the Federator of different federation patterns.
- Continue to collaborate with FedSM.
- Report findings to WP2 architecture design and the rest of the project via the usual channels of email, teleconferences, and plenary meetings.