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D7.4: NUBOMEDIA community rules and promotion strategy

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Version History

Version	Date	Authors	Comments
0.1	20-01-2016	Luis Lopez	Initial Version
0.2	25-01-2016	Teo Redondo	First Revision

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Acronyms and abbreviations:

API	Application Programming Interface
AR	Augmented Reality
IMS	IP Multimedia Subsystem
IoT	Internet of Things
KMS	Kurento Media Server
RTC	Real-Time Communications
RTP	Real-time Transport Protocol
SCTP	Stream Control Transmission Protocol
VCA	Video Content Analysis
WebRTC	Web Real Time Communications

1   Executive summary

This document contains a description on the governance rules and structure of the NUBOMEDIA Community: an open source software community and its associated ecosystem that is built with the aim of maintaining, evolving and disseminating the results of he NUBOMEDIA research project. To conclude, this document also presents the dissemination strategic guidelines of the community as well as a brief description of the software repositories associated to it and its draft website.

2   Introduction

Open Source Software strategies can be useful for multiplying the impact of software products and for disseminating them more effectively and rapidly among the different stakeholders. There are many examples of very successful projects that have succeeded in the generation of profitable business models and for stimulating the emergence of novel industries, standards and services. Among them, we can cite the Apache ecosystem, the Asterisk VoIP stack, the MySQL DDBB manager, the Linux kernel, the Mozilla Foundation browsers, etc. Our objective is making NUBOMEDIA one of such successful projects by becoming the FOSS reference on the area of interactive multimedia communications.

This objective is not simple given the relevant hype that WebRTC solutions has generated in the area during the last few years, which has made relevant stakeholders and thousands of developers to enter into the play. In addition, due to its own nature, NUBOMEDIA is a heterogeneous collection of technology which provides a bunch of capabilities that can be useful both as a whole and as separated solutions for specific problems.

Anyhow, gaining the attention of wide developer audiences will strengthen significantly the dissemination capabilities of the project and the business impact it may generate. For this, two essential ingredients are a must:

- The existence of a flexible FOSS license guaranteeing flexibility, freedom, fairness and different types of business models around the software.
- The release of useful software artifacts under that license suitable for helping developers and the orchestration of the community activities through the appropriate communication policies.

This deliverable is concentrated on the second aspect. For this, we define governance mechanisms for the community taking into consideration the different sensibilities and needs of the involved organizations as well as the possibility of the different involved projects to evolve with independence. We also define the main communication mechanisms for the community that be designed around a community website and a number of social channels. These shall be leveraged for giving cohesion to NUBOMEDIA as a whole. The following sections are devoted to introducing all of them.

3   Community governance and structure

3.1   The NUBOMEDIA project and the NUBOMEDIA community

Our objective in this deliverable is to specify how the activities carried out into the NUBOMEDIA Project (a research project funded by the European Commission) can be

leveraged for creating the NUBOMEDIA Community (an open source software community). This community should contribute to enhance the exploitation and dissemination of results, so that the project gives the investment back to the society, and to provide a mechanism for the generated technologies to survive beyond the project.

Achieving this objective requires finding a balance between two different forces: on one side, the needs of the project for which the community is instrumental; on the other, the needs of the community for which attracting developers is critical.

Starting with the former, the needs of the project in relation to the community are clear and can be enumerated in the following way:
- The creation and consolidation of the community must take place in the context of duration of the project and through the resources that the project makes available to it, being both limited and bounded. This decreases the flexibility for organizing the community as an independent entity.
- The community initial software assets shall be the ones associated with the project partners' activities. In the short and medium term, this means that it is such partners who need to invest the appropriate resources for maintaining such assets and for communicating them to potentially interested developers. Due to this, the community governance model needs to be compatible with their different interests, sensibilities, roadmaps and expectations. This shall generate some degree of fragmentation which is unavoidable.
- Due to contractual reasons, the community's initial objectives need to be aligned with the ones of the project. The objectives of the project were designed several years ago and may not be fully aligned with current state-of-the-art in relation to market status and market needs. This decreases the flexibility of the community to take the most appropriate shape for adapting to current trends and market status.

On the other hand, for being successful the community requires a number of ingredients, which include the following:
- To have very high flexibility for adapting in an agile way to developer needs and market trends, even if this means dropping support for some technological pieces for enhancing others.
- To offer a unified and coherent vision, discourse and organizational structure susceptible of being understood by developers in a seamless and simple way.
- To be expansive trying to maximize impact by incorporating all kinds of organizations, individuals, business models and support mechanisms susceptible of helping in its mid-term survival, even if they are not fully aligned or compatible with all partners' or project's objectives.

Following this discussion, and trying to achieve a balance among these opposite forces, we propose to create the NUBOMEDIA community basing in a governance model built upon a number of design decisions.

The first of them deals with the community as an entity. Many communities out there are articulated around some kind of legal entity that sometimes takes the form of a company but most frequently takes the form of a foundation. The community governance model is then driven by the specific regulations of such legal entity. There are also many other relevant communities that are not managed through any kind of entity. They consist just of an association among different stakeholders which may include organizations and individual developers, who cooperate pursuing their own

objectives but who share a common interest in the specific artifacts settled under the community umbrella. These communities tend to be more organic and they self-organize following a number of implicit or explicit rules that are accepted by all the members and that are enforced by the community as a whole through one governing rule: meritocracy [RAYMOND1999]. In the context of FOSS software, meritocracy is the direct consequence of the value of contribution in a FOSS project. Anything else in FOSS, such as democracy, ultimately lowers contributions to the benefit of uninvolved people and to the law of numbers, masses and manipulation. That's why FOSS has never been about democracy but about meritocracy, even if it practices limited democracy among its contributors. But that notion belongs to community processes [STDF2011].

In relation to this specific topic, we chose the second option: the organic and self-organized community. We select this model for a number of reasons:

- The legal entity model is not compatible with the financial and time constrains we have in the NUBOMEDIA project. Growing such legal entity would require relevant investments for which no specific funding has been reserved. In addition, coming to an agreement on formal governance rules to be accepted by the NUBOMEDIA Project legal representatives would require huge time and effort investments that might generate relevant impediments for objectives of both the community and the project.
- There are no clear evidences on the advantages of supporting the community through a legal entity. Moreover, many authors defend that they are counterproductive because they increase the bureaucratic effort, which tends to discourage developers from participating [OMAHONY2005]. Although having the support of a legal entity may enforce the emergence of clear driving authorities, many relevant FOSS communities just self-organize and generate a notion of authority through very simple democratic mechanisms [OMAHONY2007]. Hence, the effort of articulating the NUBOMEDIA community through a legal entity is not clearly justified.

The fact that the community is self-organized does not mean that it is anarchic. For guaranteeing its balance between flexibility and efficacy, and for enforcing its alignment with the objectives of the project, we shall define the democratic rules driving to conflict resolution and decision making in the community as part of the community governance model.

The second decision to be taken is in relation of the community structure. Communities exhibiting a simple and unified structure tend to be more attractive for developers and, very particularly, to newcomers. This is due to their ability to communicate a more simple and direct message in relation to the capabilities of the distributed software. However, such uniformity is not possible in projects involving heterogeneous technologies where the involved stakeholders pursue divergent objectives through independent roadmaps. Due to this, many communities organize as an association or aggregation of projects, which are managed independently, but which share a common vision and governance model [MOCKUS2002]. These communities might result more obscure and difficult to understand for newcomers, but they have a very relevant advantage from a practical perspective: flexibility. Letting projects to organize independently sharing just a common vision makes possible for them to maintain custom roadmaps and policies which enhance competition enabling more successful initiatives to shine and filtering unsuccessful ones through natural-selection mechanisms [SCACCHI2006].

Following this, in NUBOMEDIA we took the decision of organizing following the structure of an informal project association. The following arguments support it:

- Due to contractual reasons, the community must integrate all the partners of the NUBOMEDIA project. However, not all the partners have the same degree of commitment towards the NUBOMEDIA open source strategy. For some partners the NUBOMEDIA generated software is a critical asset that needs to be maintained and evolved in an agile and rigorous way, while for others the community just represent an experiment. Due to this, designing the community as a single and uniform project fully sharing governance and decision making would be a guarantee of failure. More involved partners do not require the agreement of less involved ones.

- Due to contractual reasons, the copyright holders for each of the artifacts generated on the NUBOMEDIA project remain under the ownership of their creators. Due to this, organizing the community as a single project with a single repository policy would require all partners to have access to commit changes on others' code. This might generate relevant legal problems in relation to copyright ownership. In addition, this would make extremely complex to maintain control of code evolution, forcing developers to invest relevant resources on coordination problems instead of on developing. Again, this situation would automatically drive towards a community failure.

- The worldwide open source software ecosystem is extremely competitive and, as other technological markets [SCHILLING2002], exhibits a tendency towards a winner-take-all situation. This means that creating successful open source projects may require in many cases destroying competing alternatives. Evidently, this requires a number of ingredients such as high commitment with the project from its stakeholders, agility, innovation capability, technological excellence, etc. The NUBOMEDIA project is a very heterogeneous software stack where some of its components may satisfy those ingredients but others may not. Due to this, linking the future of components having more possibilities with the ones with less is clearly the less appropriate strategy.

As a result of these discussions, we can conclude that the proposed strategy lays down onto a NUBOMEDIA open source software community organized organically through a meritocratic and flexible democratic process. This community as the structure of an association among projects where the NUBOMEDIA community itself is an umbrella providing coherence towards the objective of maintaining and evolving the NUBOMEDIA platform. This coherence is basically achieved through a number of communication channels, which include the community website and the community social channels.

3.2 The NUBOMEDIA Community governance model

This section specifies the NUBOMEDIA Community governance model that has been approved by the NUBOMEDIA project consortium and which shall be used for launching the community in an ordered way.

3.2.1 Definitions

- The NUBOMEDIA Community (or Community in the following) refers to a collection of Assets and a group of Members who act fulfilling with the NUBOMEDIA Governance Model.

- The NUBOMEDIA Governance Model refers to the rules specified in this document.
- The NUBOMEDIA Platform (or Platform in the following) refers to the collection of software artifacts providing the functionalities described in the NUBOMEDIA Project.
- The NUBOMEDIA Project refers to a research project funded by the European Commission under Framework Programme 7 with reference number GA 610576.
- The NUBOMEDIA website, also called NUBOMEDIA Community website or Community website, refers to the website reachable at http://www.nubomedia.eu

3.2.2   The NUBOMEDIA Community objectives

The NUBOMEDIA Community is a Free Open Source Software (FOSS) community having the objective of promoting, enhancing, maintaining and evolving, in the long term, the software generated as a result of the NUBOMEDIA Project. We call the NUBOMEDIA Platform to this software and to the rest of enhancements and extensions that may be created after the above mentioned project ends.

To this aim, the NUBOMEDIA Community shall implement a roadmap for becoming independent from the project once it has concluded, so that the NUBOMEDIA Platform continues to exist after the support of the European Commission ends.

The NUBOMEDIA Community shall be based on a membership mechanism through which members shall commit to the following:
- To maintain and evolve the software assets of the Community
- To comply with the Community governance model and best practices
- To promote the Community and work constructively for defending the NUBOMEDIA good name.

3.2.3   The NUBOMEDIA Community: Associated Projects and Members

For attaining its objectives, the NUBOMEDIA community is organized around two concepts: associated projects and members.

Associated Projects are structured sets of software artifacts providing demonstrable value to the NUBOMEDIA Platform. Associated Projects typically consist of open source software projects which have been designed for providing a capability to the NUBOMEDIA Platform. Hence, from a software perspective, the NUBOMEDIA Community is a collection of Associated Projects whose composition is determined through the NUBOMEDIA Decision Procedures. Hence, Associated Projects maintain full independence to evolve and to define their own governance mechanism and roadmaps as long as the NUBOMEDIA Governance rules specified here are satisfied. Any associated project must have appointed a contact person for everything related to the NUBOMEDIA community.

Members are individuals or organizations who support the NUBOMEDIA Community and who govern it following the NUBOMEDIA Decision Procedures.

3.2.3.1 NUBOMEDIA Community Members

Governance of the NUBOMEDIA Community is managed through Members, who have a right of vote in agreement with the Community Decision Procedures. Membership is free of charge, although it requires the satisfaction of a number of requirements. The Community distinguishes two types of members: Individual Members and Institutional Members:

Individual Members

Individual Members are people who participate on their own without representing any specific organization, company or institution. The following requirements need to be fulfilled in order to become an Individual Member

- To have provided relevant contributions to the Community in terms of monetary donations, infrastructure donations, effort or code.
- To commit to comply with the Community governance model and practices
- To commit to promote the Community and work constructively for defending the NUBOMEDIA good name.

Each of the Individual Members shall have one vote on the Community Decision Procedures

Institutional members

Institutional members are companies, organizations or institutions (e.g. research organizations, universities, etc.). The following requirements need to be fulfilled in order to become an institutional member:

- To have provided relevant contributions to the Community in terms of monetary donations, infrastructure donations or code.
- To appoint one or several physical people who shall represent the institution to all effects at the Community. This representative may be modified at any time at the discretion of the institution.
- To commit to comply with the Community governance model and practices.
- To commit to promote the Community and work constructively for defending the NUBOMEDIA good name.

Each institutional member shall have one vote per each physical representative on the Community Decision Procedures. The number of representatives of an Institutional Members shall be determined following the Community Decision Procedures.

3.2.4 Community Governance Structure

The Community shall be governed by the Community Lead, who shall be supported by a Board of Members. Their roles and obligations are the following:

Community Lead

The Community Lead shall be one of the Community Members, who, appointed by the Board of Members, shall manage the day-to-day aspects of the community to take decisions driving to a successful achievement of the Community Objectives. To this aim, the Community Lead shall have full control on all the Community communication channels including social channels, website and software assets owned directly by the community. The Community Lead shall be selected through voting following the Community Decision Procedures.

Board of Members

The Board of Members comprise all community members who, acting in compliance with the Community Governance Model, shall act as the strategic decision organism of the Community as specified in the Community Decision Procedures. More specifically, all Individual Members shall be part of the Board of Members having one vote each.
All representatives of Institutional members shall be part of the Board of Members having one vote each.

3.2.5 Community Decision Procedures

The Community Lead shall have full freedom to decide on all aspects relative to the Community governance except in what refers to the following specific procedures:

Decision procedure for the integration of new members into the community
The integration of a new Member into the community shall be performed through vote following this procedure:
- Candidatures to become a member shall be endorsed by at least one Member.
- Candidatures to become a member shall provide the information justifying the opportunity of integrating the member into the community. That information should contain any relevant data helping the Board of Members to evaluate the suitability of the new member and their contributions to the Community. The information shall be made available for evaluation by the Board of Members, at least, during 1 month previous to the vote.
- The Board of Members shall vote through any available mechanism providing reasonable reliability guarantees, including e-mail or WWW voting services.
- The new member shall be accepted whenever the number of positive votes is strictly over half of the size of the Board of Members.
- Upon acceptance, the new member shall become part of the Board of Members, in case of Individual Members, or shall be appointed to designate a representative for it, in case of Institutional Members, to all effects.

Decision procedure for determining the number of representatives of an Institutional Member
Upon acceptance of an institutional member, it shall have the right of designating one representative into the Board of Members. Further Board Members can be designated following this procedure:
- Candidatures to become a new representative shall be endorsed by one of the current representatives of the institution.
- Candidatures shall provide the information justifying the need of the institution to have more representatives in the Community Board. The information shall be made available to the Board of Members, at least, during 1 month previous to the vote.
- The Board of Members shall vote through any available mechanism providing reasonable reliability guarantees, including e-mail or WWW voting services.
- The new representative shall be accepted whenever the number of positive votes is strictly over half of the size of the Board of Members.
- Upon acceptance, the new representative shall become part of the Board of Members to all effects.

Decision procedure for appointing the Community Lead
The Community Lead shall be selected among the Board of Members. Once appointed, the Community Lead shall held the post until there is an explicit refusal or another

member of the Board presents an alternative candidate endorsed by at least two other members. In that case, the following procedure shall be followed:

- Candidatures to become Community Lead shall be presented providing any relevant information about candidates to the Board of Members. That information shall be available during at least 1 month previous to the vote.
- The Board of Members shall vote among candidates through any available mechanism providing reasonable reliability guarantees, including e-mail or WWW voting services.
- The new Community Lead shall be the candidate with more votes. In case of tie, the previous Community Lead shall have a deciding vote.

Decision procedure for modifying the Community Governance Model

Any Board Member may propose modifications to the Community Governance Model specified in this document. Their approval shall require the following procedure to be executed:

- Suggested modifications shall be presented together with any additional information considered relevant for their evaluation. That information shall be available during at least 1 month previous to the vote.
- The Board of Members shall vote through any available mechanism providing reasonable reliability guarantees, including e-mail or WWW voting services.
- The proposed modifications shall be approved whenever the number of favorable votes is equal or bigger than two thirds of the size of the Board of Members.

Decision procedure for the removal of Community Members

Any Board Member may explicitly refuse to its membership, in which case, it shall be cancelled automatically. In addition, any Board member may propose the removal of other members or representatives from the Board of Members. For this, the following procedure shall be applied:

- The identity of the specific member or representative to be removed, as well as the justification for removal, shall be provided to the Board of Members. The specific appointed member may answer to that information with further data defending its membership. That information shall be available during at least 1 month previous to the vote.
- The Board of Members shall vote through any available mechanism providing reasonable reliability guarantees, including e-mail or WWW voting services.
- The member or representative shall be removed whenever the number of votes supporting the removal is equal or bigger than two thirds of the size of the Board of Members.

Decision procedure for the integration of new Associated Projects into the community

Any board member may propose the integration of a new Associated Project into the Community. For this, the following procedure shall be applied:

- The proposer shall present all the relevant information demonstrating the interest of the new project for the Community. That information shall be available during, at least, 1 month previous to the vote.
- The Board of Members shall vote through any available mechanism providing reasonable reliability guarantees, including e-mail or WWW voting services.
- The project shall be accepted as an Associated Project whenever the number of positive votes is strictly over half of the size of the Board of Members.

- In case of acceptance, the Associated Project shall have 1 month of time for adapting to the NUBOMEDIA Community Rules in Relation to the Release of Software Artifacts. After that period, the Associated Project shall become part of the community with full rights.

Decision procedure for the removal of Associated Projects from the community

Any board member may propose the removal of an Associated Project from the Community. For this, the following procedure shall be applied:

- The proposer shall present all the relevant information justifying the need for removing the project. That information shall be available during, at least, 1 month previous to the vote.
- The Board of Members shall vote through any available mechanism providing reasonable reliability guarantees, including e-mail or WWW voting services.
- The project shall be removed as an Associated Project whenever the number of votes supporting the removal is strictly over half of the size of the Board of Members.

3.2.6   Community Governance Principles

This section contains a set of informal ethical and behavioral principles that should govern Community members decisions in order to maintain an open vision and attitude towards users, committers and members.

Meritocracy

The basic principle through which authority emerges is meritocracy (literally government by merit). Members demonstrating higher knowledge and commitment with the project should have priority at the time of assigning responsibilities.

Communication

The main communication channels among community members is e-mail. E-mails shall be organized through subjects as "virtual discussion rooms" where conversations shall take place asynchronously. This shall simplify the collaboration in geographically distributed groups. Some projects may also use more synchronous mechanisms such as instant messaging or teleconferences.

Documentation

Each project is responsible for its own project communication mechanisms. This includes the project website, which is optional, and the project documentation, which is mandatory.

Philosophy

While there is no official philosophical doctrine, the following principles are considered as core beliefs of the Community:

- Collaboration: this is the way to work and to solve problems.
- Commercial-friendly standard license: LPGL and Apache-like licenses are preferred.
- Consistently high quality software: test, test and test.
- Respectful, honest, technical-based interactions: leave your ego at home.
- Faithful implementation of standards: standards are not mandatory, but are preferred.

Operation

All projects are composed of volunteers and none of their members are paid directly by the NUBOMEDIA Community. Committers and members may be paid to work on the projects by any interested individual or organization, but never by the NUBOMEDIA Community itself. The NUBOMEDIA Community, however, may contract out other different services including infrastructure administration, accounting or communication.

Balancing confidentiality and public discussion
We endeavor to conduct as much discussion in public as possible. This encourages openness, provides a public record and stimulates the broader community. However, sometimes internal communication is necessary. In this case, members should use their common sense for maintaining reasonable etiquette and do not disclose sensitive information without the permission of the affected people or entities.

3.2.7 Community Rules in Relation to the Release of Software Artifacts

This section contains a set of rules and recommendations for the release of software artifacts in the context of the NUBOMEDIA Community. All Associated Projects MUST comply with the rules and SHOULD take into consideration the recommendations and comply with them whenever it is possible.

3.2.7.1 Community Rules

Distribution of source code
- With independence on the existence of multiple distributions mechanisms, all associated project MUST make available the source code in GitHub (http://www.github.com)
- Each GitHub repository README.md file MUST include the following:
  - The following sentence: "This project is part of NUBOMEDIA"
  - A link to www.nubomedia.eu
  - Licensing and contributions policies
  - A short description of the repository structure
- The released artifacts must comply with the following:
  - They MUST contain the source code of any NUBOMEDIA-related feature.
  - They SHOULD contain source code of examples and tutorials
  - They MUST contain up-to-date documentation including:
    - Installation guide
    - Developers guide
    - Reference documentation
  - Documentation sources MUST be under version control in GitHub
  - Up-to-date versions of the documentation MUST be published in https://readthedocs.org/

Distribution of open binaries
- All Java API releases MUST be distributed through maven central
- All JavaScript API releases MUST be distributed through bower (browser) and npm (node)
- All Debian or Ubuntu artifacts MUST be distributed through a public debian repository

Community support

- All Associated Projects MUST maintain a public issue tracker where bugs and problems can be reported
- All Associated Projects MUST maintain a public mailing list where questions from potential end users shall be answered
- All Associated Projects MUST nominate a responsible person that could be contacted in case of problems.

Continuous integration rules
- All Associated Projects SHOULD create and maintain a public CI system validating
  - That all artifacts can be built and deployed accordingly to the installation guide
  - That artifacts' functionalities are validated with, at least, one integration test each.

3.2.7.2 Community launch

As the Community is the result of the NUBOMEDIA Project, the initial community structure shall be created from the project decision making organisms. The official launch of the community to the public with full independence of the project shall also be provided by such organisms and shall never be after the last day of the project (i.e. Jan, 31st 2017)

4   The NUBOMEDIA community structure

As specified above, the initial community structure, including members and associated projects, shall emerge from the project. In relation to this, the project has decided to use the following structure:

4.1   Associated projects

This section contains the list of associated projects to the NUBOMEDIA community at the time of this writing.

4.1.1 Kurento
- **Description**:
  - Kurento is an open source media server that is providing to NUBOMEDIA its media capabilities. Kurento also provides a number of high level APIs including server-side SDKs in Java and JavaScript and client side SDK for WWW platforms.
- **Source code repositories:**
  - https://github.com/kurento
- **Continuous integration and testing**
  - http://ci.kurento.org/jenkins
- **Issue tracker:**
  - https://github.com/kurento/bugtracker/issues
- **Documentation:**
  - http://doc-kurento.readthedocs.org
  - http://doc-kurento-repository.readthedocs.org
  - http://doc-kurento-jsonrpc.readthedocs.org
  - http://doc-kurento-tree.readthedocs.org
  - http://doc-kurento-room.readthedocs.org
- **Public mailing list:**

- o kurento-public@gmail.com
- **Website:**
  - o http://www.kurento.org
- **Involved NUBOMEDIA project partners**
  - o URJC, NAEVATEC
- **Main contact person:**
  - o Luis Lopez (URJC)

4.1.2 NUBOMEDIA-VCA

- **Description**:
  - o This project contains a bunch of modules providing computer vision capabilities for NUBOMEDIA
- **Source code repositories:**
  - o https://github.com/VTOOLS-FOSS/NUBOMEDIA-VCA
- **Continuous integration and testing**
  - o http://jenkins.nubomedia.eu
- **Issue tracker:**
  - o https://github.com/VTOOLS-FOSS/NUBOMEDIA-VCA/issues
- **Documentation:**
  - o http://nubomedia-vca.readthedocs.org/en/latest/index.html
- **Public mailing list:**
  - o https://groups.google.com/d/forum/nubomedia-vca
- **Website:**
  - o NA
- **Involved NUBOMEDIA project partners**
  - o VTOOLS
- **Main contact person:**
  - o Victor Hidalgo (VTOOLS)

4.1.3 NUBOMEDIA PaaS Manager

- **Description**:
  - o This project provides an implementation for the NUBOMEDIA PaaS Manager.
- **Source code repositories:**
  - o https://github.com/fhg-fokus-nubomedia/nubomedia-paas
- **Continuous integration and testing**
  - o NA
- **Issue tracker:**
  - o NA
- **Documentation:**
  - o NA
- **Public mailing list:**
  - o NA
- **Website:**
  - o NA
- **Involved NUBOMEDIA project partners**
  - o FRAUNHOFER
- **Main contact person:**
  - o Alice Cheambe (FRAUNHOFER)

4.1.4   NUBOMEDIA Media APIs

- **Description**:
    - This project provides the main development APIs for NUBOMEDIA.
- **Source code repositories:**
    - https://github.com/fhg-fokus-nubomedia/kurento-client-extended
- **Continuous integration and testing**
    - NA
- **Issue tracker:**
    - NA
- **Documentation:**
    - NA
- **Public mailing list:**
    - NA
- **Website:**
    - NA
- **Involved NUBOMEDIA project partners**
    - FRAUNHOFER
- **Main contact person:**
    - Alice Cheambe (FRAUNHOFER)

4.1.5   NUBOMEDIA ARMODULE

- **Description**:
    - This project provides basic augmented realty capabilities to NUBOMEDIA.
- **Source code repositories:**
    - https://github.com/nubomedia-vtt/armodule/
- **Continuous integration and testing**
    - NA
- **Issue tracker:**
    - https://github.com/nubomedia-vtt/armodule/issues
- **Documentation:**
    - http://nubomedia-vtt-ar.readthedocs.org/en/latest/
- **Public mailing list:**
    - https://groups.google.com/forum/#!forum/nubomedia-vtt
- **Website:**
    - NA
- **Involved NUBOMEDIA project partners**
    - VTT
- **Main contact person:**
    - Satu-Marja Mäkelä (VTT)

4.1.6   NUBOMEDIA MSDATA

- **Description**:
    - This project provides augmented reality capabilities for multisensory applications.
- **Source code repositories:**
    - https://github.com/nubomedia-vtt/msdata
- **Continuous integration and testing**
    - NA
- **Issue tracker:**
    - NA

- **Documentation:**
  - NA
- **Public mailing list:**
  - https://groups.google.com/forum/#!forum/nubomedia-vtt
- **Website:**
  - NA
- **Involved NUBOMEDIA project partners**
  - VTT
- **Main contact person:**
  - Satu-Marja Mäkelä (VTT)

4.1.7 NUBOMEDIA Android Client
- **Description**:
  - This project provides an Android client for NUBOMEDIA
- **Source code repositories:**
  - https://github.com/nubomedia-vtt/kurento-room-client-android
- **Continuous integration and testing**
  - NA
- **Issue tracker:**
  - https://github.com/nubomedia-vtt/kurento-room-client-android/issues
- **Documentation:**
  - http://kurento-room-client-android.readthedocs.org/en/latest/index.html
- **Public mailing list:**
  - https://groups.google.com/forum/#!forum/nubomedia-vtt
- **Website:**
  - NA
- **Involved NUBOMEDIA project partners**
  - VTT
- **Main contact person:**
  - Satu-Marja Mäkelä (VTT)

4.1.8 NOVA Docker
- **Description**:
  - This project provides the capability of pulling docker images on all compute nodes running nova-docker.
- **Source code repositories:**
  - https://github.com/usv-public/nubomedia-nova-docker
- **Continuous integration and testing**
  - http://jenkins.nubomedia.eu
- **Issue tracker:**
  - https://github.com/usv-public/nubomedia-nova-docker/issues
- **Documentation:**
  - http://kurento-room-client-android.readthedocs.org/en/latest/index.html
- **Public mailing list:**
  - https://groups.google.com/forum/#!forum/nubomedia-usv
- **Website:**
  - NA
- **Involved NUBOMEDIA project partners**
  - USV
- **Main contact person:**
  - Alin Calinciuc (USV)

4.1.9 NUBOMEDIA Graph Editor

- **Description**:
  - This project provides a visual development GUI capability for NUBOMEDIA.
- **Source code repositories:**
  - https://github.com/GlassOceanos/nubomedia-graphedit
- **Continuous integration and testing**
  - NA
- **Issue tracker:**
  - NA
- **Documentation:**
  - http://nubomedia-graph-editor.readthedocs.org/
- **Public mailing list:**
  - https://groups.google.com/forum/#!forum/nubomedia-usv
- **Website:**
  - NA
- **Involved NUBOMEDIA project partners**
  - ZED
- **Main contact person:**
  - Teofilo Redondo (ZED)

4.1.10 OpenBaton NFVO

- **Description**:
  - This project provides the NFVO for NUBOMEDIA.
- **Source code repositories:**
  - https://github.com/openbaton/NFVO
- **Continuous integration and testing**
  - https://travis-ci.org/openbaton
- **Issue tracker:**
  - users@openbaton.org
- **Documentation:**
  - http://openbaton.github.io/documentation/
- **Public mailing list:**
  - users@openbaton.org
- **Website:**
  - http://openbaton.github.io/
- **Involved NUBOMEDIA project partners**
  - TUB
- **Main contact person:**
  - Giuseppe Carella (TUB)

4.1.11 NUBOMEDIA Media Server VNFM

- **Description**:
  - This project provides the VNFM for the NUBOMEDIA Media Server.
- **Source code repositories:**
  - https://github.com/tub-nubomedia/ms-vnfm
- **Continuous integration and testing**
  - NA
- **Issue tracker:**
  - users@openbaton.org
- **Documentation:**

- o   http://elastic-media-manager.readthedocs.org/en/latest/
- **Public mailing list:**
  - o   users@openbaton.org
- **Website:**
  - o   NA
- **Involved NUBOMEDIA project partners**
  - o   TUB
- **Main contact person:**
  - o   Giuseppe Carella (TUB)

4.1.12 NUBOMEDIA iOS Client APIs

- **Description**:
  - o   This project provides the iOS client SDKs for NUBOMEDIA.
- **Source code repositories:**
  - o   https://github.com/nubomediaTI/Kurento-iOS
- **Continuous integration and testing**
  - o   NA
- **Issue tracker:**
  - o   https://github.com/nubomediaTI/Kurento-iOS/issues
- **Documentation:**
  - o   http://kurento-ios.readthedocs.org/
- **Public mailing list:**
  - o   https://groups.google.com/forum/#!forum/kurento-ios
- **Website:**
  - o   NA
- **Involved NUBOMEDIA project partners**
  - o   TI
- **Main contact person:**
  - o   Fabio Mondin (TI)

5   Communication strategy

5.1   The NUBOMEDIA communication strategy

5.1.1   Communication objectives

The communication strategy for the NUBOMEDIA community has the purpose of contributing to attaining the objectives of the community and, in particular, the creation of the appropriate ecosystem enabling the NUBOMEDIA platform to evolve and be maintained after the project ends. For this, the specific communication objectives are the following:

- To generate awareness of the NUBOMEDIA distinguished name among stakeholders of the real-time media communication market so that the NUBOMEDIA name gets associated with the involved technologies (e.g. WebRTC, NFV, Augmented Reality, Computer Vision, etc.)
- To generate awareness among decision makers in relation to the business possibilities of NUBOMEDIA and its associated projects in the real-time media market.
- To generate awareness among real-time media developers in relation to the technological capabilities of NUBOMEDIA and its associated projects.

- To provide the appropriate communication channels for consolidating the interest of developers wishing to get involved into the community or to consume any of the software artifacts published by the associated projects.

5.1.2   Current situation

Current situation is characterized by two forces: huge competition and complexity on the involved markets, on one side, and huge opportunities for novel technologies, on the other.

In relation to the former, the real-time media ecosystem is one of the technological arenas with wider activity and competition. In particularly the area of WebRTC is very hot and many relevant stakeholders are taking positions there. In addition to technological giants such as Google, Microsoft, Intel, Ericsson, Oracle or Cisco, who are playing in the WebRTC arena; in the ecosystem there has been many relevant investments (over 1B$) into startups and mid-sized companies [BLACCSPOT2015]. This generates a huge competition among technologies, solutions, vendors and providers. In addition to this, the technologies involved in real-time media are under huge revision through an overwhelming and very complex standardization activity where technical problems are combined with commercial strategies. This generates further uncertainties from the perspective of interoperability.

However, on the other hand, all these activity shows huge business opportunities and many analysts defend WebRTC technologies as the next wave of human-to-human communications displacing even the traditional phone service [BUBLEY2015]

5.1.3   Current status of the community

The NUBOMEDIA community has just been born. The NUBOMEDIA project partners have been making a very relevant effort during the last two years for creating a valuable technology in the area of real-time multimedia communications. These efforts have generated some success histories such as the ones of the OpenBaton and Kurento open source software projects, which are part of NUBOMEDIA. However, the NUBOMEDIA community, as an umbrella for all its associated projects, is not yet popular and has not generated a name beyond the communication activities carried out in the associated research project.

5.1.4   SWOT analysis

The following SWOT analysis might be useful for identifying the specific communication actions to be taken for the NUBOMEDIA Community:

Strengths
- Technological capability: NUBOMEDIA is a unique technological stack exposing capabilities beyond the reach of any other technological solutions, proprietary or open source. Its ability to combine real-time communications and advanced media processing makes it useful for many application scenarios.
- Timely arrival: NUBOMEDIA arrives in time and shape to the WebRTC ecosystem bringing novel ideas at the time everything is under definition and when there is still space for new entrants.

Weaknesses
- Complexity: The wide technological capabilities of NUBOMEDIA have a cost: complexity. NUBOMEDIA technologies may have a longer learning curve than

other technologies just providing communications. This might be a weakness only to the extend in which developers wish to have only plain communications.

- Fragmentation: NUBOMEDIA technologies are fragmented. Although the community may play a unifying role at the time of giving coherence to the community, we will not have the coherence of monolithic software projects controlled by a single organization.
- Lack of commercial deployments: NUBOMEDIA is a powerful stack, but it is not offered off-the-shelf for developers through pay-per-use models as other competing solutions. This is a relevant barrier for NUBOMEDIA adoption.

Opportunities
- Person-to-person communications: At the time of this writing, the area of interpersonal communications is very active. There are huge opportunities for new solutions and technologies and NUBOMEDIA can play a relevant role here competing with other similar solutions.
- Person-to-machine and machine to machine communications: This market is not still so active like the above mentioned one, but it might become even more relevant in the future. NUBOMEDIA unique architecture enables services in this area beyond the reach of other solutions.
- Designed for developers: To the best of our knowledge, NUBOMEDIA is the first PaaS supporting RTC services in the market. This makes it particularly attractive for developers wishing to combine simplicity and flexibility.

Threats
- Financial starvation: Given the huge activity around RTC in general, and WebRTC in particular, there are market stakeholders with huge amount of financial resources. Given the winner-take-all characteristic of most software markets, this generates relevant risks for the NUBOMEDIA Community, which has very limited resources.
- Inherited project threats: The Community inherits many risks from the project itself, such as lack of partners to provide the appropriate technology, lack of commitment, bureaucratic collapse due to the need of micro-management and micro-coordination, etc.
- External factors: Factors external to the Community may have a huge impact on it. In particular, the evolutions of WebRTC implementations of the different vendors or the specific policies that Internet providers may take in relation to WebRTC traffic and services.

5.1.5   Communication plan

Our communication plan takes into consideration all the above mentioned objectives, as well as the current status, situation and SWOT analysis, for defining a set of actions to execute. These are specified in the following paragraphs.

- General awareness actions
  - Objective: To generate general awareness of the NUBOMEDIA distinguished name and of the associated projects.
  - Audience: Developers and managers interested in the relevant technologies of NUBOMEDIA: RTC, WebRTC, Augmented Reality, Computer Vision, Cloud Computing and PaaS.
  - Message: Concentrated on short and targeted messages showing NUBOMEDIA technologies possibilities on the involved areas.

Messages should associate the NUBOMEDIA distinguished name and/or the name of the associated projects with innovative ideas or trends on the target technological areas.
  - o Channels: Twitter, industrial events.

- Developer-targeted actions
  - o Objective: To communicate the technological capabilities of NUBOMEDIA.
  - o Audience: Developers in three main technological areas: RTC media communications, media processing, cloud computing.
  - o Message: must be concentrated on showing the strengths of NUBOMEDIA and its associated projects in the involved technological areas by providing technically relevant information and examples.
  - o Channel: Blog posts, development events, technical papers.

- Decision maker-targeted actions
  - o Objective: To communicate the business possibilities of NUBOMEDIA in different application domains.
  - o Audience: Intermediate staff managers, product managers.
  - o Message: must target showing the potential of NUBOMEDIA in specific application domains, significantly in the ones involved in the NUBOMEDIA demonstrators.
  - o Channel: Blog posts, industrial events.

- Developer support actions
  - o Objective: To provide support and guide to developers wishing to get involved into the community either as users or as contributors.
  - o Audience: Developers.
  - o Message: Deep technical information.
  - o Channel: Web documentation, issue trackers and support mailing lists.

5.1.6 The website as the cornerstone of the communication strategy

The cornerstone of the NUBOMEDIA Community and of its communication strategy is the NUBOMEDIA Community website. From a strategic perspective, this website must comply with the following:

- The Community website and social channels must be associated with the project website and social channels, so that they reinforce their respective communication objectives.
- The Community website must be used as an umbrella for the whole community. In fact, to some extent, the community is the website and its social channels so that they shall be in charge of providing a unified vision for the associated projects that comprise the community.

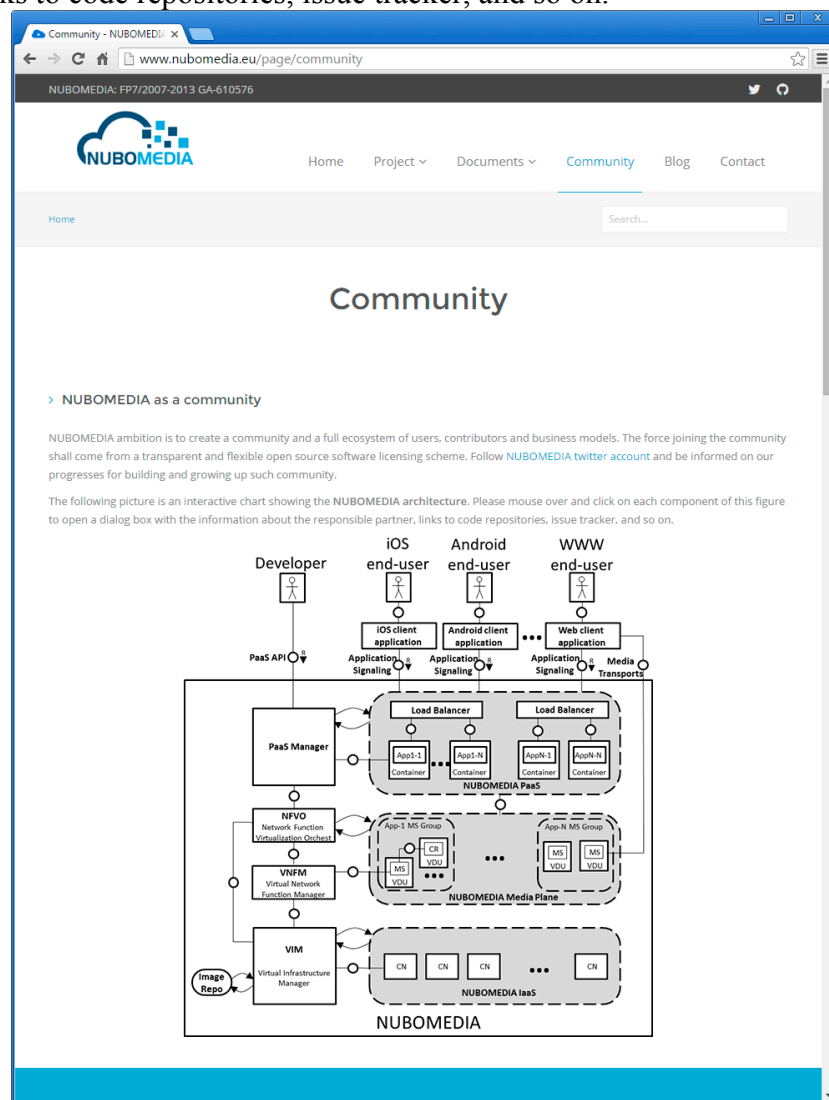### 5.2 The NUBOMEDIA community website

As specified above, the website is the main communication channel of the NUBOMEDIA Community. Following the strategic guidelines described above, the community website and the project website shall be created in convergence, so that at the beginning, the project-related contents have more relevance but slowly, the community related-content gains importance on it until it absorbs it all.

To this aim, we have created a first version of the community page which consists of a brief description and a number of hyperlinks to the associated projects. As specified in NUBOMEDIA Project Task 7.2, these contents shall be evolved until a full-featured and mature community page is in place.

This preliminary version of the community has been integrated as part of the NUBOMEDIA project website in a specific section devoted to "Community"

- http://www.nubomedia.eu/page/community

As shown in **Figure 1**, the page shows an architectural diagram of NUBOMEDIA. This diagram is interactive: users can mouse over it and click on the component of their interest. Upon click, a dialog box is opened with the information about the responsible partner, links to code repositories, issue tracker, and so on.

Figure 1 NUBOMEDIA community web page screenshot

At the top of the picture we can see the different types of users of NUBOMEDIA, namely developers and end-users. There are different kinds of end-users, for example iOS, Android, and WWW users.

The first component within the NUBOMEDIA architecture is the PaaS (Platform as a Service), which we associate with the development capabilities exposed by

NUBOMEDIA: an elastic PaaS cloud for interactive social multimedia   27

NUBOMEDIA. As the other components, this part of the picture is highlighted when the mouse is over it (see left part of **Figure 2**). When clicking in this area, a dialog box opens showing the partners involved in the development of such capabilities (see right part of **Figure 2**). This component involves three main associated projects:
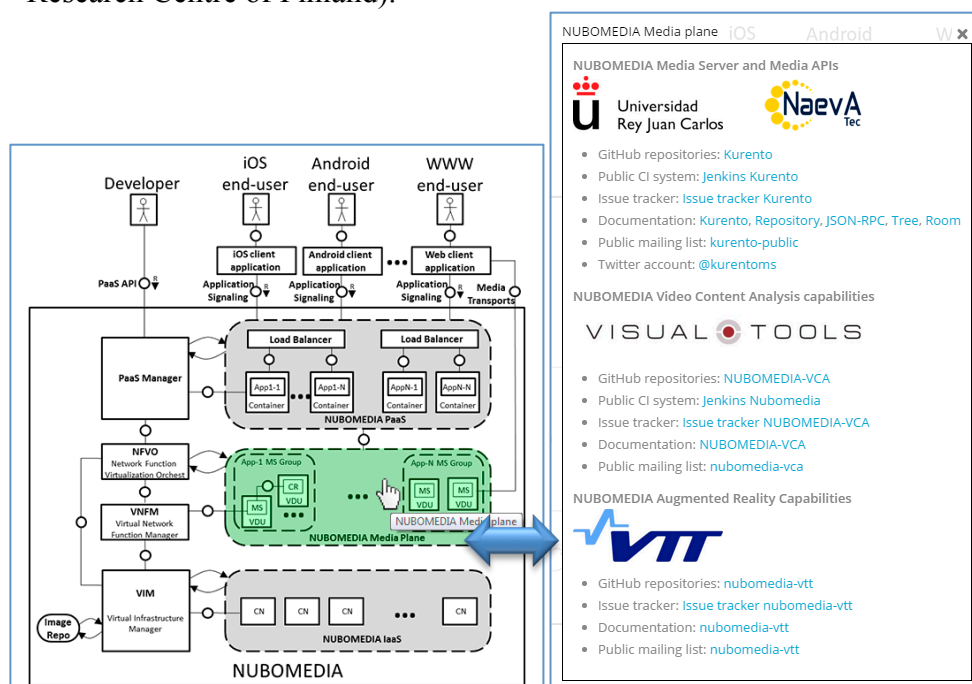
- NUBOMEDIA PaaS infrastructure and APIs (developed by Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V.)
- NUBOMEDIA Visual Development GUI (developed by Zed Worldwide)
- NUBOMEDIA iOS Client APIs (developed by Telecom Italia).
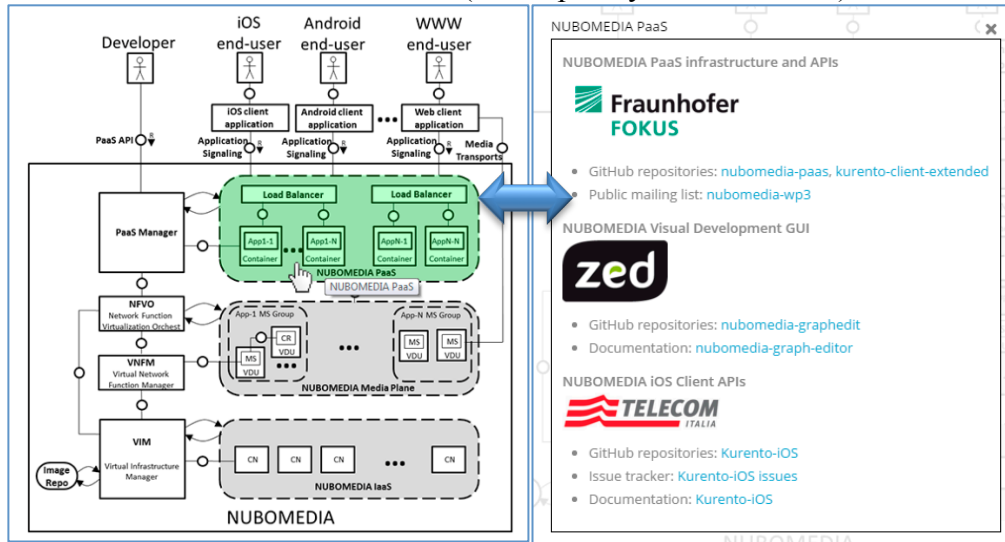
Figure 2 NUBOMEDIA PaaS

Following the same model, in the NUBOMEDIA Media Plane component (see **Figure 3**) there are a number of associated projects:

- NUBOMEDIA Media Server and Media APIs (developed by Universidad Rey Juan Carlos and Naevatec)
- NUBOMEDIA Video Content Analysis capabilities (by Visual Tools)
- NUBOMEDIA Augmented Reality Capabilities (created by VTT Technical Research Centre of Finland).

Figure 3 NUBOMEDIA Media Plane

The partner responsible of the NUBOMEDIA NFV Cloud Components (i.e. Network Function Virtualization Orchestrator, NFVO; and Virtual Network Function Manager, VNFM) is Technische Universität Berlin (see **Figure 4**).

Figure 4 NUBOMEDIA Virtual Network

Finally, the NUBOMEDIA Virtual Infrastructure Management (Virtual Infrastructure Manager, VIM; and NUBOMEDIA Infrastructure as a Service, IaaS) has been developed by Universitatea Stefan cel Mare Suceava (**Figure 5**).

Figure 5 NUBOMEDIA Virtual Infrastructure Management

6   Community roadmap

6.1   The NUBOMEDIA community and the NUBOMEDIA project
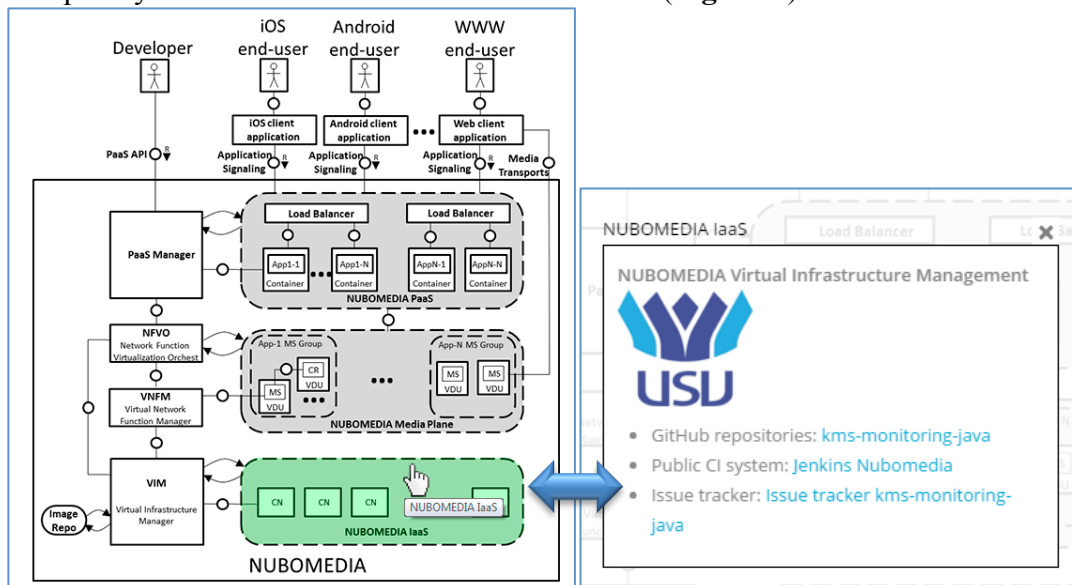
The NUBOMEDIA Community need to react in a very agile way to changes in the environment and in the project. Due to this, a rigid and precise roadmap for it would not be appropriate. However, a guiding roadmap may be positive for helping in decision making and for pushing to action. This roadmap comprises the following milestones.

- Community structure definition.
  - Target objective: To specify the structure of the community so that the needs of the NUBOMEDIA Project, the partners and the community are satisfied.
  - Target deadline: December 2015

- Community governance and rules.
  - Target objective: To specify a number of reasonable governance rules enabling a democratic and meritocracy-based decision making. These rules must be compatible with the different sensibilities of the NUBOMEDIA project partners.
  - Target deadline: December 2015

- Creation of the associated projects
  - Target objective: Create the associated project structure for the Community so that the partners are provided with full control on their artifacts and the community has a suitable structure for attaining its objectives. This objective involves launching the projects with all the requirements they may satisfy including open source software repositories.
  - Target deadline: January 2016

- Basic WWW site.
  - Target objective: To create a basic and simple community website suitable for exposing to the world links to the appropriate information and associated projects.
  - Target deadline: January 2016

- Activation of the community
  - Target objective: To present the community to the world. This requires the associated projects to have the appropriate quality in relation to its stability and documentation. This also requires to activate in a public way all support mechanisms including the support mailing lists and the issue trackers. This milestone also involves to activate the community social channels.
  - Target deadline: April 2016

- Evolved WWW community site.
  - Target objective: To launch an advanced community site providing the appropriate information and guides enabling developers to understand and access NUBOMEDIA technologies in a seamless way.
  - Target deadline: September 2016.

7 References

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