



Software framework for runtime-Adaptive and secure deep Learning On Heterogeneous Architectures

Project Number 780788

Project Acronym ALOHA

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Brief description:

This document describes the actions undertaken in the first two months of the project to build ALOHA digital presence, going from website to social media channels. It also describes the instruments that will be used to measure the performance of the identified channels.



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The ALOHA Consortium is the following:

#	Participant Legal Name	Acronym	Country
1	STMICROELECTRONICS SRL	STM	Italy
2	UNIVERSITA DEGLI STUDI DI CAGLIARI	UNICA	Italy
3	UNIVERSITEIT VAN AMSTERDAM	UVA	Netherlands
4	UNIVERSITEIT LEIDEN	UL	Netherlands
5	EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZUERICH	ETHZ	Switzerland
6	UNIVERSITA DEGLI STUDI DI SASSARI	UNISS	Italy
7	PKE Electronics AG	PKE	Austria
8	CA TECHNOLOGIES DEVELOPMENT SPAIN SA	CA	Spain
9	SOFTWARE COMPETENCE CENTER HAGENBERG GMBH	SCCH	Austria
10	SANTER REPLY SPA	REPLY	Italy
11	IBM ISRAEL - SCIENCE AND TECHNOLOGY LTD	IBM	Israel
12	SYSTMATA YPOLOGISTIKIS ORASHS IRIDA LABS AE	IL	Greece
13	PLURIBUS ONE SRL	P-ONE	Italy
14	MedyMatch Technology, Ltd.	MM	Israel

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P-ONE	10/02/2018	0.3	Minor changes
P-ONE - UNISS	12/02/2018	0.4	Revision
P-ONE	21/02/2018	0.5	Linkedin profile released; Final draft
UNISS	22/02/2018	0.6	Revision
UNICA	22/02/2018	0.7	Revision
P-ONE	27/02/2018	1.0	Final version

Table of Contents

1	Introduction	6
2	Project graphical identity	7
2.1	Project Logo	7
2.2	Website header and standard templates for deliverables	9
3	Website	10
2.3	Location and hosting of the website	10
2.4	Technical development and CMS	10
2.5	Website general structure	11
2.6	Contents of each section	12
2.7	Website Analytics and viewers monitoring	15
4	Social networking	17
2.1	Twitter	17
2.2	LinkedIn	18
5	Conclusions	19
6	References	20

Figures

Figure 1 – ALOHA logo	7
Figure 2 – Evolution of the project logo	8
Figure 3 – Website header	9
Figure 4 – Template for deliverables.....	9
Figure 5 – Website navigation tree	11
Figure 6 – Website layout.....	12
Figure 7 – ALOHA’s analytics dashboard	16
Figure 8 – ALOHA’s Twitter profile	17
Figure 9 – ALOHA’s LinkedIn profile	18

Tables

Table 1 – Homepage	12
Table 2 – Project	13
Table 3 – Consortium.....	14
Table 4 – News & Events	15

1 Introduction

One of the important objectives declared in the ALOHA's Description of Action is to guarantee an appropriate digital presence, useful to disseminate at best the consortium activities. In order to effectively promote the ALOHA activities and its public deliverables and results, a set of communication tools will be used.

This deliverable aims to provide an initial description of both the structure and content of the **ALOHA public website** [1]. The website is designed in line with the overall ALOHA dissemination strategy, and it was published in the first month of project's lifetime (January 2018).

It can be accessed from www.aloha-h2020.eu. Its main goal is to maximize visibility and impact of the project, making all project's activities and results accessible to the research community. To this end, the site has been developed with **social networking features** that aim to reach a wider research community as well as the general public.

In the following Chapter, we shortly describe the project graphical identity used to design the website, in line with the dissemination material.

Next, in Chapter 3, we describe the website in its form at the time of delivery of this document, the tools used to create it and the *web standards* that it adheres to, along with the hardware and network infrastructure we use to run it. We conclude the Chapter by presenting the tools that will be used to monitor the users' views and the website's traffic.

In Chapter 4, before concluding this document, we summarize the social networking features [2][3].

2 Project graphical identity

In order to create a project graphical identity for the website, the contents that it will contain and, in general, for all the ALOHA dissemination and communication activities involving presentations, the following material has been produced.

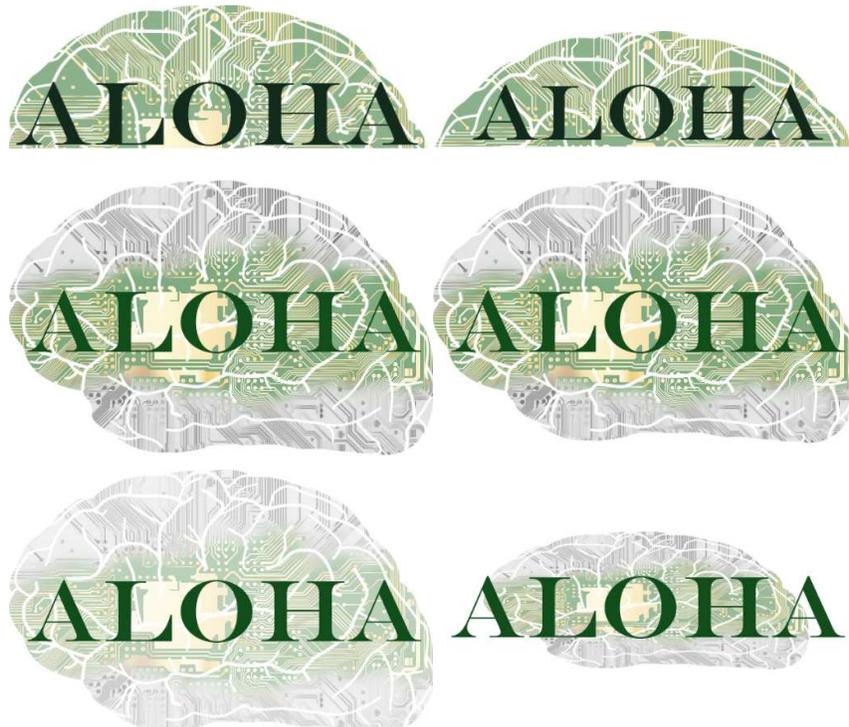
2.1 Project Logo

A project logo has been designed at the University of Cagliari with the purpose of communicating technological feelings, mixing together the concepts of human brain and artificial intelligence. The logo is shown in Figure 1.



Figure 1 – ALOHA logo

Several versions of the logo have been considered before releasing the chosen one. Some of them are reported in Figure 2, to highlight the progress made before reaching the final version.



Aloha Aloha

Aloha Aloha

Aloha Aloha

Aloha Aloha

ALPHA ALPHA

ALPHA ALPHA

ALPHA ALPHA

Figure 2 – Evolution of the project logo

2.2 Website header and standard templates for deliverables

The concept behind the logo has been used to create the website's official header (see Figure 3) and the logo has been used to create standard templates for presentations and deliverables (as in the present document, see Figure 4).



Figure 3 – Website header

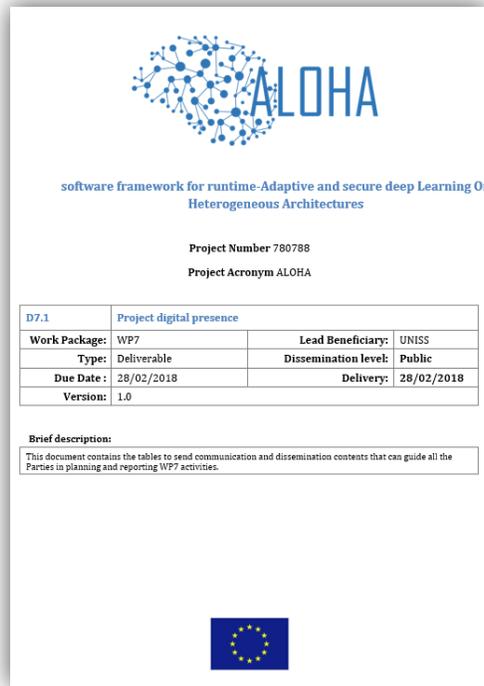


Figure 4 – Template for deliverables

3 Website

In the following, we describe the ALOHA website in its form at the time of the delivery of this document. In particular, we describe:

- the tools used to create the website;
- the contents and features of the ALOHA website;
- and the web standards that the site adheres to.

As the goal of the website is to raise awareness about the project activities, its main target is non-specialists people. Hence, the language used is purposely non-technical and accessible to the general public, as well as to the research community at large.

2.3 Location and hosting of the website

The website is visible from the URL www.aloha-h2020.eu.

The domain is managed by Task 7.1 (Communication strategy and planning) Leader, PLURIBUS ONE.

The website is hosted on servers owned and operated by Aruba S.p.A. (<https://www.aruba.it>), an Italian web hosting service company. More in detail, the website is hosted on a Linux server running Apache as webserver and using MySQL as database backend.

2.4 Technical development and CMS

The website has been developed using the open source Content Management System (CMS) “Joomla!”, version 3.7.

Joomla! is written in PHP, and uses object-oriented programming (OOP) techniques and software design patterns, stores data in MySQL, MS SQL, or PostgreSQL databases. It includes features such as page caching, RSS feeds, printable versions of pages, news flashes, blogs, search, and support for language internationalization. It is estimated to be the second most used content management system on the Internet, after WordPress.

People involved in the development of the website:

- Matteo Mauri (P-ONE): design, web editing, content editing, graphic editing;
- Battista Biggio (P-ONE): technical and administrative support; content planning support;
- Giulio Urlini (STM), Paolo Meloni (UNICA), and Francesca Palumbo (UNISS): content planning support;

2.5 Website general structure

The current version of the website is organized as shown in

Figure 5.

The final version of the “News & Events” section (that works as a blog displaying News, Events and Media) could contain more categories with respect to the one shown in the figure.

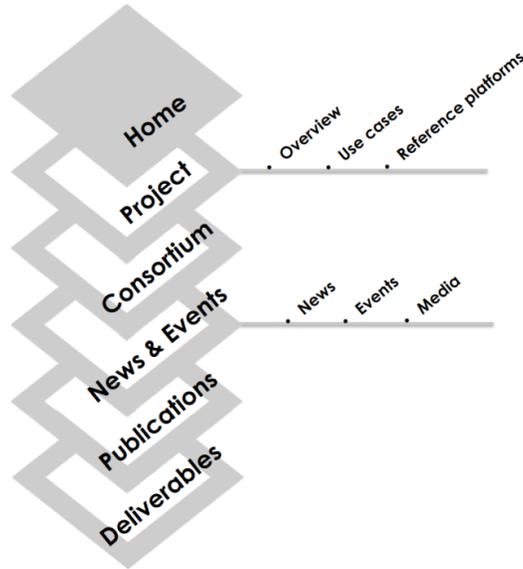


Figure 5 – Website navigation tree

The layout of the website is composed of:

- a header, which displays the ALOHA logo and contains a main slider and a navigation bar, displaying the navigation menu;
- the main body, displaying the actual content (different in every page and often divided in several sub-sections);
- a footer area that contains information and contacts, the official Twitter timeline and Social media channels buttons.

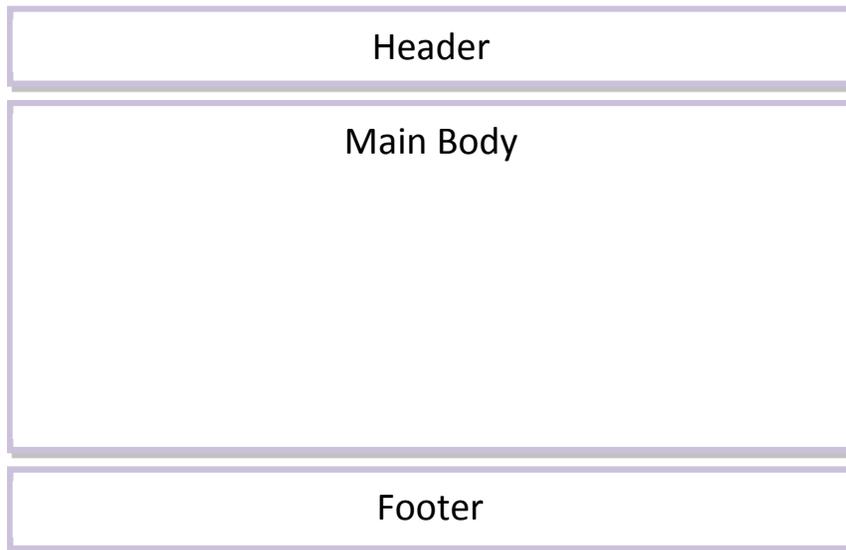


Figure 6 – Website layout

2.6 Contents of each section

In Table 1 to Table 4 we briefly present each section of the ALOHA website. The main goal of the website is to provide information on the project and its goals, while facilitating interested parties to know more about the activities and their outcomes as well as to get in touch with the project team. The website will be a work-in-progress throughout the duration of the project. It will be constantly populated with information about events, as well as talks, publications and news.

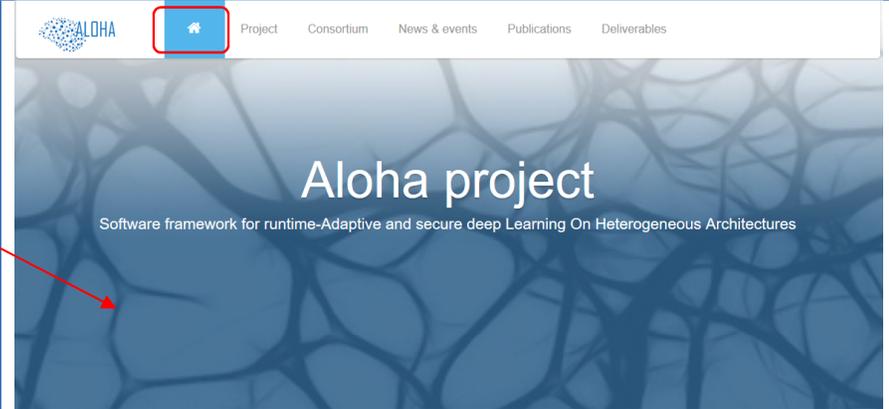
Table 1 – Homepage	
<p>This section contains a slideshow with an introduction to the project.</p>	
<p>A block hosts the 3 most recent articles published in the “News & Events” section.</p>	<p>Deep Learning (DL) algorithms are an extremely promising instrument in artificial intelligence. To foster their adoption in new applications and markets, a step forward is needed towards the implementation of DL inference on low-power embedded systems, enabling a shift to the edge computing paradigm. The main goal of ALOHA is to facilitate implementation of DL algorithms on heterogeneous low-energy computing platforms providing automation for optimal algorithm selection, resource allocation and deployment.</p> <ul style="list-style-type: none">Architecture-awareness The features of the architecture that will execute theAdaptivity The development process considers that the systemSecurity The development process automates the introduction
<p>The primary goal of the Home section is to provide a quick overview of the project.</p>	<h3>Latest News & Events</h3> <div><p>ALOHA in the national Italian TV Network RAI3 Published: Wednesday, 11 January 2018 17:34</p><p>ALOHA project in the Italian TV Network RAI3. Interview with the scientific coordinator Paolo Meloni (Italian Language) Read more...</p></div> <div><p>ALOHA in the press (January 2018) Published: Friday, 26 January 2018 17:34</p><p>ALOHA's kick off meeting (Cagliari, Italy, January 25-26) has been reported by several Italian magazines and web magazines. This post collects a list of articles and blog posts. Read more</p></div> <p>Read More news</p>
<p>A screen capture of the home page is shown on the right.</p>	<h3>Contacts</h3> <p>Project Coordinator</p> <p>Twitter Tweets by @ALOHA_H2020</p>

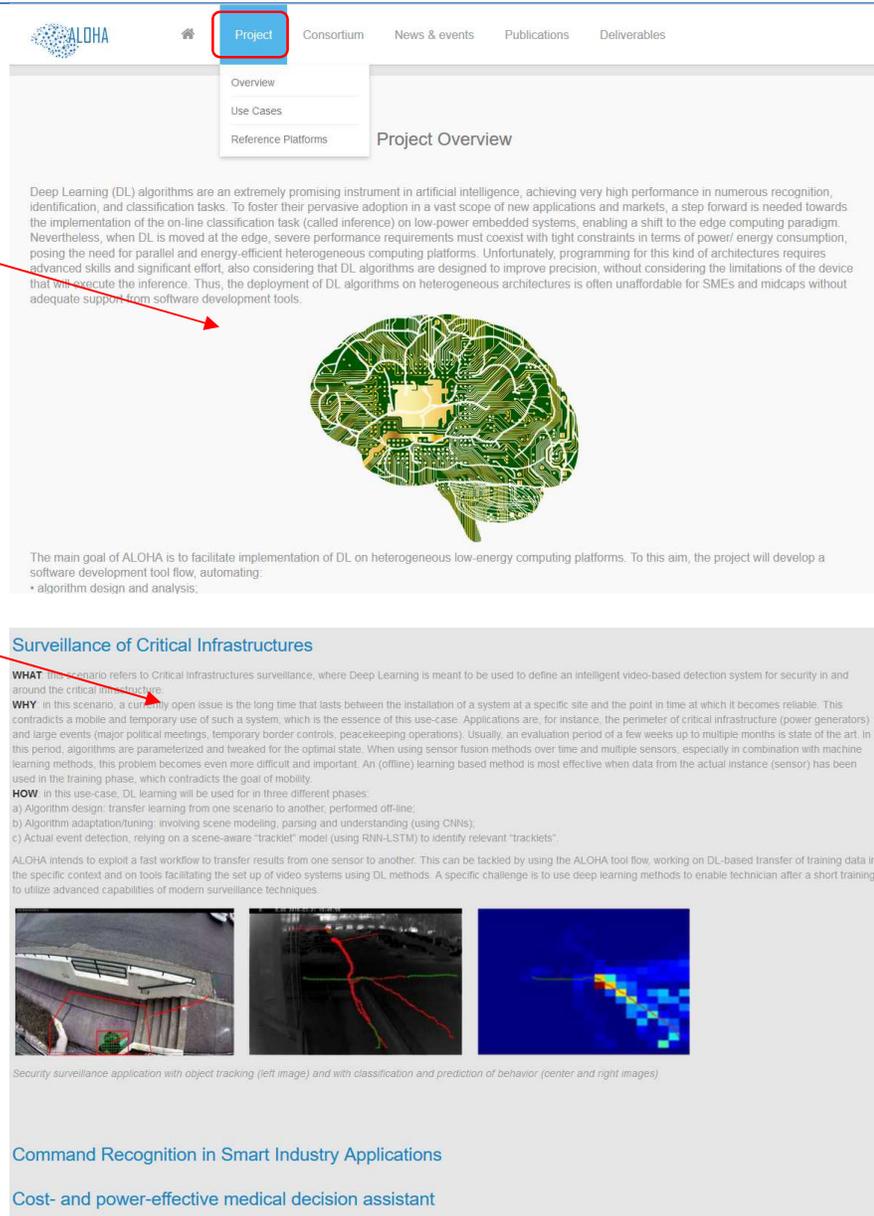
Table 2 – Project

This section is divided into 3 sub-sections:

The first section contains a description of ALOHA objectives and key features.

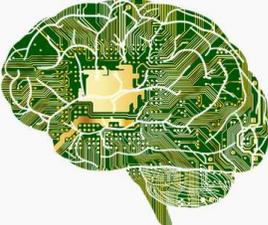
The second one presents the ALOHA use cases.

A third section shortly introduces the ALOHA reference platforms:
- STMicroelectronics Orlando
- NEURAghe



The screenshot shows the ALOHA project website. The navigation menu includes 'Project', 'Consortium', 'News & events', 'Publications', and 'Deliverables'. The 'Project' menu is open, showing 'Overview', 'Use Cases', and 'Reference Platforms'. The main content area is titled 'Project Overview' and contains the following text:

Deep Learning (DL) algorithms are an extremely promising instrument in artificial intelligence, achieving very high performance in numerous recognition, identification, and classification tasks. To foster their pervasive adoption in a vast scope of new applications and markets, a step forward is needed towards the implementation of the on-line classification task (called inference) on low-power embedded systems, enabling a shift to the edge computing paradigm. Nevertheless, when DL is moved at the edge, severe performance requirements must coexist with tight constraints in terms of power/ energy consumption, posing the need for parallel and energy-efficient heterogeneous computing platforms. Unfortunately, programming for this kind of architectures requires advanced skills and significant effort, also considering that DL algorithms are designed to improve precision, without considering the limitations of the device that will execute the inference. Thus, the deployment of DL algorithms on heterogeneous architectures is often unaffordable for SMEs and midcaps without adequate support from software development tools.



The main goal of ALOHA is to facilitate implementation of DL on heterogeneous low-energy computing platforms. To this aim, the project will develop a software development tool flow, automating:

- algorithm design and analysis;

Surveillance of Critical Infrastructures

WHAT This scenario refers to Critical Infrastructures surveillance, where Deep Learning is meant to be used to define an intelligent video-based detection system for security in and around the critical infrastructure.

WHY In this scenario, a currently open issue is the long time that lasts between the installation of a system at a specific site and the point in time at which it becomes reliable. This contradicts a mobile and temporary use of such a system, which is the essence of this use-case. Applications are, for instance, the perimeter of critical infrastructure (power generators) and large events (major political meetings, temporary border controls, peacekeeping operations). Usually, an evaluation period of a few weeks up to multiple months is state of the art. In this period, algorithms are parameterized and tweaked for the optimal state. When using sensor fusion methods over time and multiple sensors, especially in combination with machine learning methods, this problem becomes even more difficult and important. An (offline) learning based method is most effective when data from the actual instance (sensor) has been used in the training phase, which contradicts the goal of mobility.

HOW In this use-case, DL learning will be used for in three different phases:

- a) Algorithm design: transfer learning from one scenario to another, performed off-line;
- b) Algorithm adaptation/tuning: involving scene modeling, parsing and understanding (using CNNs);
- c) Actual event detection, relying on a scene-aware "tracklet" model (using RNN-LSTM) to identify relevant "tracklets".

ALOHA intends to exploit a fast workflow to transfer results from one sensor to another. This can be tackled by using the ALOHA tool flow, working on DL-based transfer of training data in the specific context and on tools facilitating the set up of video systems using DL methods. A specific challenge is to use deep learning methods to enable technician after a short training to utilize advanced capabilities of modern surveillance techniques.



Security surveillance application with object tracking (left image) and with classification and prediction of behavior (center and right images)

Command Recognition in Smart Industry Applications

Cost- and power-effective medical decision assistant

Reference platforms



To generalize the assessment of the project outcomes to the wide landscape of emerging low energy customized and heterogeneous platforms, ALOHA will be tested considering two main platforms as reference.

a) **STMicroelectronics Oriando**: a low-power IoT end-nodes integrating specialized hardware blocks for specific compute-intensive data processing
 G. Desoli et al., "14.1 A 2.9TOPS/W deep convolutional neural network SoC in FD-SOI 28nm for intelligent embedded systems", 2017 IEEE International Solid-State Circuits Conference (ISSCC), San Francisco, CA, 2017, pp. 238-239. doi: 10.1109/ISSCC.2017.7870349

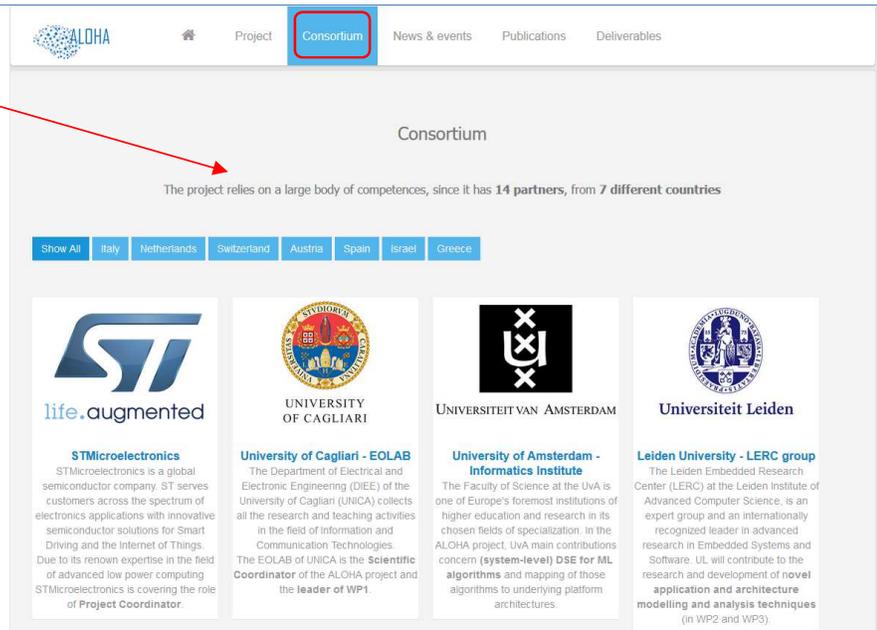
b) **NEURAghe**: a zynq-based heterogeneous architecture accelerating convolutional neural networks
 P. Meloni, A. Capotondi, G. Deriu, M. Brian, F. Conti, D. Rossi, L. Raffo, L. Benini, "NEURAghe: Exploiting CPU-FPGA Synergies for Efficient and Flexible CNN Inference Acceleration on Zynq SoCs", 2017. <https://arxiv.org/abs/1712.00994>

Table 3 – Consortium

This section provides information about the partners of the ALOHA consortium.

A logo, a short description and a link, are provided for each partner.

Partners' descriptions can be filtered by nationality.

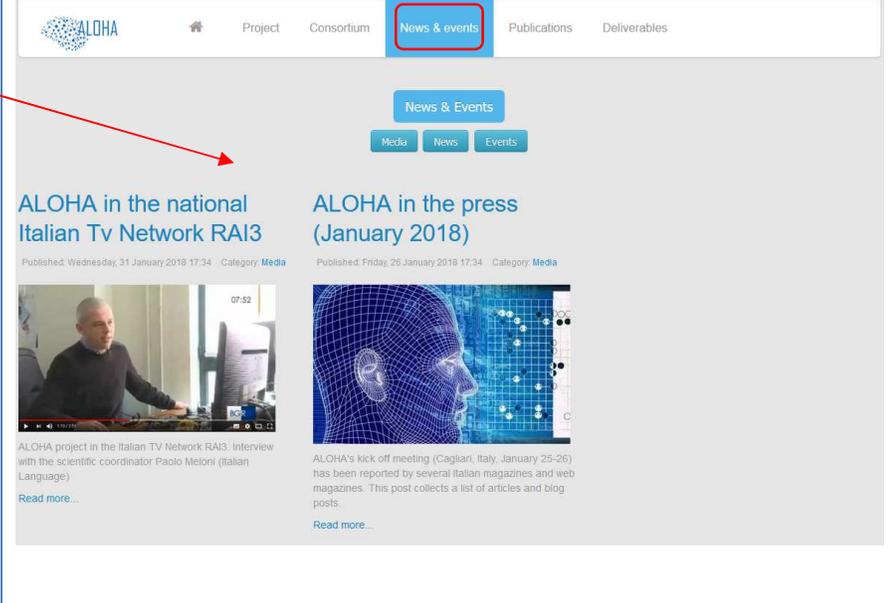


The project relies on a large body of competences, since it has **14 partners**, from **7 different countries**

[Show All](#)
[Italy](#)
[Netherlands](#)
[Switzerland](#)
[Austria](#)
[Spain](#)
[Israel](#)
[Greece](#)

Partner	Logo	Description
STMicroelectronics		STMicroelectronics is a global semiconductor company. ST serves customers across the spectrum of electronics applications with innovative semiconductor solutions for Smart Driving and the Internet of Things. Due to its renown expertise in the field of advanced low power computing STMicroelectronics is covering the role of Project Coordinator.
University of Cagliari - EOLAB		The Department of Electrical and Electronic Engineering (DIEE) of the University of Cagliari (UNICA) collects all the research and teaching activities in the field of Information and Communication Technologies. The EOLAB of UNICA is the Scientific Coordinator of the ALOHA project and the leader of WP1.
University of Amsterdam - Informatics Institute		The Faculty of Science at the UvA is one of Europe's foremost institutions of higher education and research in its chosen fields of specialization. In the ALOHA project, UvA main contributions concern (system-level) DSE for ML algorithms and mapping of those algorithms to underlying platform architectures.
Leiden University - LERC group		The Leiden Embedded Research Center (LERC) at the Leiden Institute of Advanced Computer Science, is an expert group and an internationally recognized leader in advanced research in Embedded Systems and Software. UL will contribute to the research and development of novel application and architecture modelling and analysis techniques (in WP2 and WP3).

Table 4 – News & Events

<p>This section works as a blog showing news and announcement, events, media and articles written related to ALOHA.</p> <p>The consortium staff will constantly pursue the publication of articles about the research progress, in order to disseminate the research results to a broad audience of scientists as well as general public.</p>	
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The publications and deliverables pages are almost empty at the moment of delivering this document. They will host, as soon as available, documents related to the scientific papers and official public deliverables produced within the project.

2.7 Website Analytics and viewers monitoring

The website was registered with Google Analytics by Pluribus One on February 2018 (after the website release), measure its impact and effectiveness. This allows the consortium to record and report information such as the number of visitors and sessions within a selected date range, the geographic distribution of visitors and the popularity of various links and sections. Google Analytics can help to improve the website and learn more about its visitors' experience.

Some data from the traffic monitoring and some screenshot of the ALOHA Google Analytics dashboard are illustrated in Figure 7; date range: 08 – 22 February 2018.

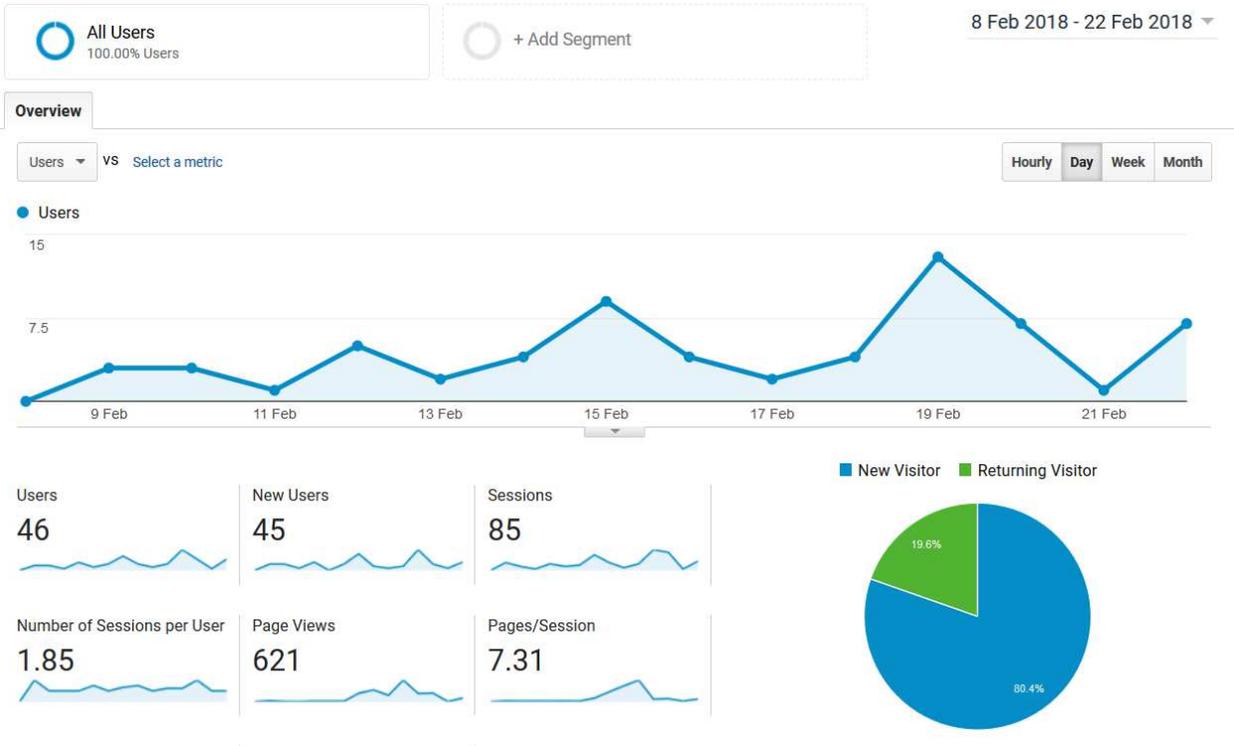


Figure 7 – ALOHA's analytics dashboard

4 Social networking

Social networks are useful to promote contents and products developed within the project, and to disseminate the research results to a broad audience of scientists, stakeholders and the general public. Social networking channels such as Twitter and LinkedIn have been created, and the related social channel buttons are currently displayed on the website (footer area).

2.1 Twitter

Twitter is a social networking microblog that enables users to communicate with short messages called tweets. Users are able to “follow” other users, which results in the tweets of the followed user being displayed in their personal message feed.

The Twitter profile of the ALOHA project is displayed in Figure 8. It has been also integrated into the website in the form of a news feed in the footer part of its layout.

The Twitter channel of the project is available at https://twitter.com/ALOHA_H2020 (or typing the tag @ALOHA_H2020 in the search bar of the Twitter platform).

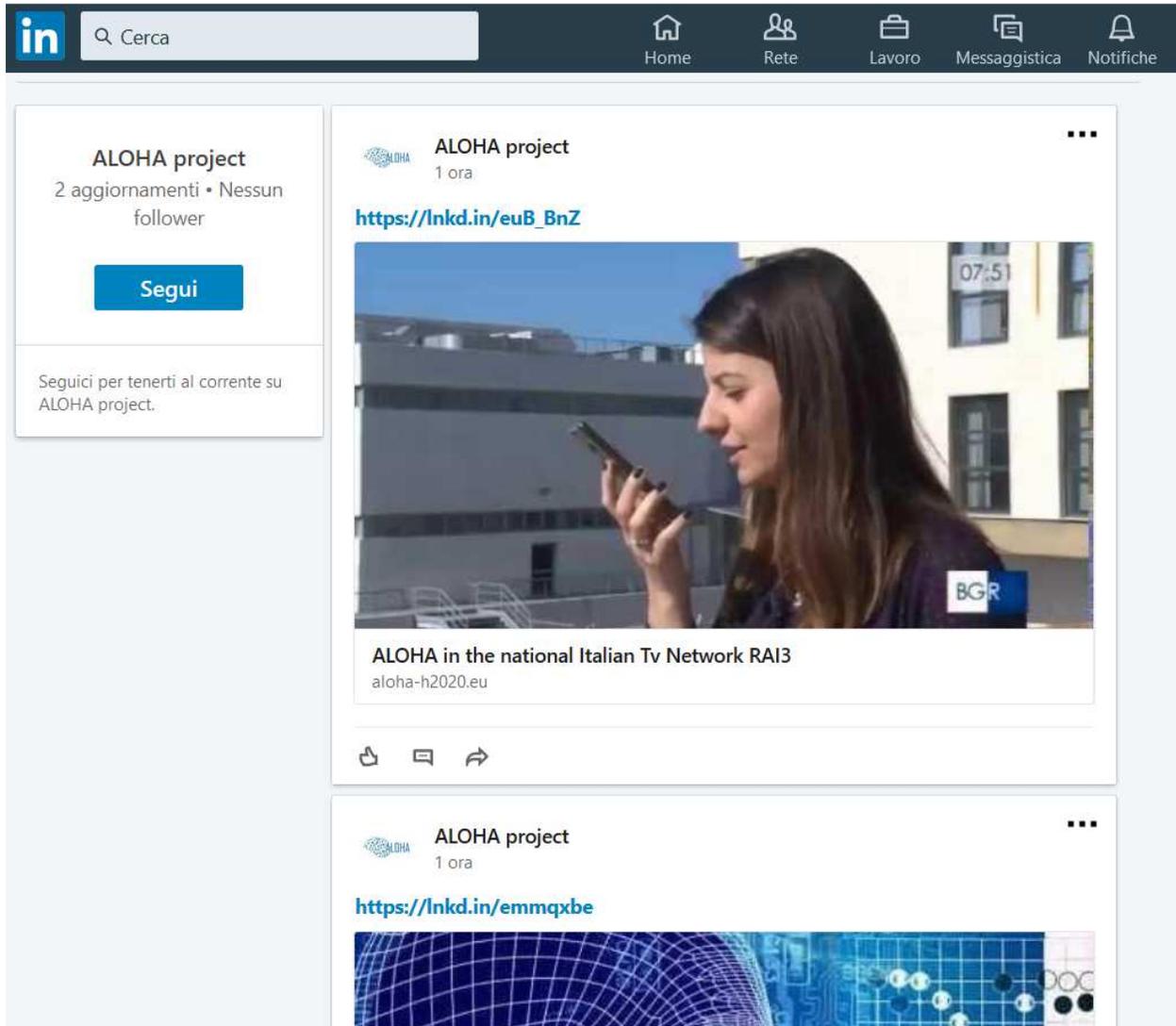
At the moment this channel has 31 followers and 25 tweets. It will be constantly updated during the project lifetime.



Figure 8 – ALOHA’s Twitter profile

2.2 LinkedIn

LinkedIn is a business and employment-oriented social networking service that operates via websites and mobile apps. It is a good platform to share scientific slides and technical presentations in an interactive way, and the ideal network to establish connection with scientists and other stakeholders. The ALOHA's LinkedIn page is available at <https://www.linkedin.com/company/aloha-project/>



The image shows a screenshot of the ALOHA project's LinkedIn profile. The top navigation bar includes the LinkedIn logo, a search bar with the text "Cerca", and icons for Home, Rete, Lavoro, Messaggistica, and Notifiche. The profile header displays the ALOHA project logo, the name "ALOHA project", and "1 ora" indicating the post's age. A blue button labeled "Segui" is visible. Below the header, there are two posts. The first post features a video thumbnail of a woman with long dark hair looking at her smartphone. The video title is "ALOHA in the national Italian Tv Network RAI3" and the URL is https://lnkd.in/euB_BnZ. The second post features a thumbnail with a blue grid pattern and the URL <https://lnkd.in/emmqxbe>. The profile also shows "2 aggiornamenti • Nessun follower" and a note: "Seguici per tenerti al corrente su ALOHA project."

Figure 9 – ALOHA's LinkedIn profile

5 Conclusions

In this document, we presented the instruments we defined to put in place ALOHA digital presence, which include logo, website, and social media channels.

We provided a description of the website sections and contents and outlined the social networking channels (Twitter and LinkedIn) representing integral part of the ALOHA communication and dissemination digital strategy. Furthermore, we provided an overview of the components and methodology we used to deploy the website. We also detailed its software and hardware hosting environment.

Lastly, we should mention that in its current form, the ALOHA website is already capable of providing the functionality requirements that were described in the project's description and proposal. However, in addition to the existing commitment to keeping the ALOHA website running and up to date, the consortium will continue looking through the whole remaining course of the project for features that could be integrated to it, in order to provide an enhanced experience to the visitors.

6 References

- [1] www.aloha-h2020.eu
- [2] https://twitter.com/ALOHA_H2020
- [3] <https://www.linkedin.com/company/aloha-project/>