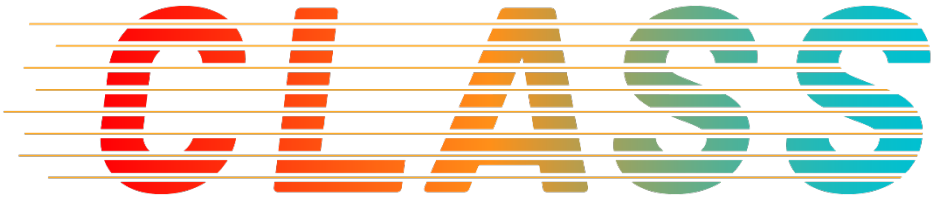

D6.6 Final Communication and Dissemination Report

Version 1.0

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Version	Author	Description of Change
0.1	Nikoleta Kiapidou (BSC)	First draft
0.2	Erez Hadad (IBM), Roberto Cavicchioli (UNIMORE)	Comments and additions by the contributors
0.3	Nikoleta Kiapidou (BSC)	Second draft sent to internal review
0.4	Rut Palmero (ATOS)	Comments by internal reviewer
1.0	Nikoleta Kiapidou (BSC)	Final version ready for EC

Table of contents

Executive Summary

This document reports on the dissemination activities carried out by the CLASS project from January 2018 to June 2021.

This report includes a complete list of events, presentations, publications and promotional material related to the project throughout its timeline. It also includes detailed information on the website and social media performance, any coverage in the press, as well as activities about collaborations with other projects and initiatives.

The dissemination activities of CLASS, carried out by the dissemination team and the help of all partners, were based on the tasks outlined in the D6.1 Communication and Dissemination plan.

1 Introduction

The objective of this report is to present a detailed list of the communication and dissemination activities, which took place during the project's lifetime, as planned in the D6.1 Communication and Dissemination plan. After establishing the project's brand and presence in the community, the dissemination team and project partners enhanced their activities in order to make CLASS even more known in the fields of software architecture, big data analytics and smart cities by growing the website and social media, developing different dissemination material, participating in numerous events, and publishing scientific papers.

2 General objectives

The main purpose of the Dissemination and Exploitation work package (WP6) is to maximise the visibility of the project to multiple target audiences in order to foster possible uptake and support CLASS partners in the exploitation of the project results.

For that purpose, the general objectives of WP6 are:

1. Identify and perform communication and dissemination activities in order to maximise the impact of the project, in collaboration with other EU research activities, scientific audiences, and industry forums.
2. Identify the exploitable results of the project and define the potential commercial products and commercial strategies for these results (target market, business model(s), distribution channels and promotional strategy) to reach the market.

The present report will only consider point 1, described above, which is related to communication and dissemination.

The exploitation strategy (point 2), was described in a separate deliverable D6.3 Initial exploitation report, and any updates have been reported in the D6.5 Intermediate exploitation report and D6.7 Final exploitation report.

3 Corporate image

In accordance with deliverable D6.1 Communication and Dissemination Plan, the first step was to define a common graphic identity. The branding of the CLASS project (including logo and style, font, project templates, poster, etc.) was established and its guidelines have been shared with all partners via email and the project Intranet and correctly implemented by all partners throughout the duration of the project. The branding material of CLASS can be found on the dedicated Branding page on the project website.

4 Dissemination tools

During the project, the dissemination tools supported the establishment and growth of CLASS through the project's website and social media channels, participation in

events, and the communication and dissemination pack that consists of several promotional materials, such as poster, presentation, roll-up, and videos.

4.1 CLASS website: https://class-project.eu/

The CLASS website is the main dissemination and communication channel of the project, where all project updates, news and technical information are published. During the first year of the project, the website consisted of overview pages (including about, partners, publications, media, and contact). In the second and third year of the project when more information about the CLASS software architecture and use case was provided by the technical partners, the website was substantially updated and populated with more pages.

These were the Industrial Advisory Board (IAB) page that includes details on the IAB members, the architecture page that contains a description of the CLASS software architecture along with a full list of the components and link to the dedicated CLASS GitHub channel, and the use case page that provides an overview of the CLASS smart city pilot as well as details on the four use case applications (see Figure 1).

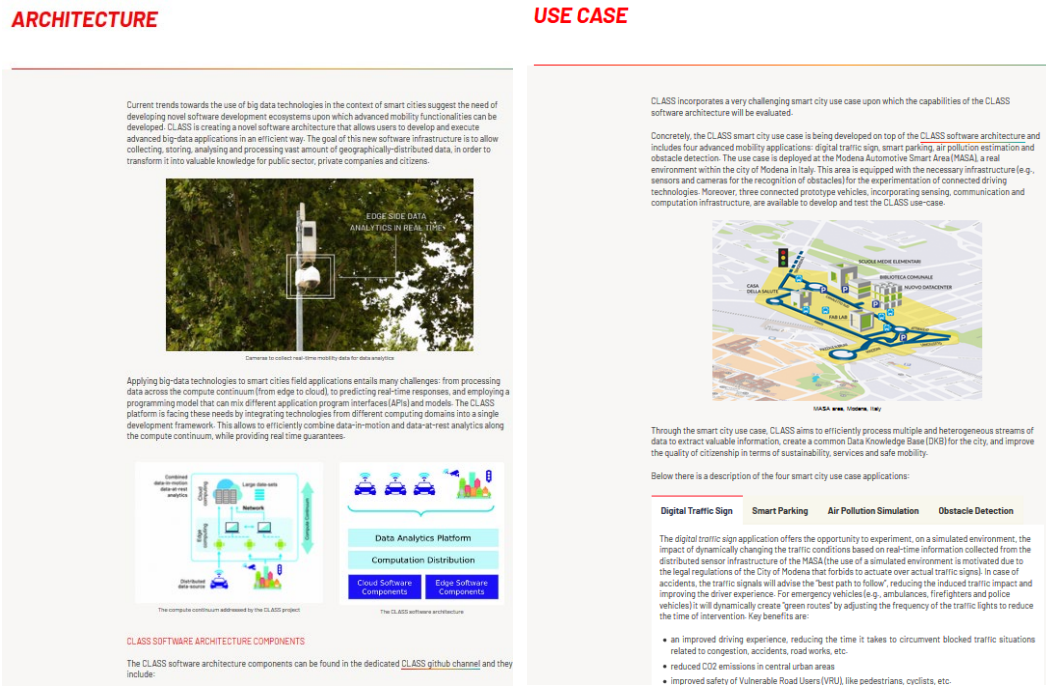

Figure 1: Layout of the new architecture and use case pages of the CLASS website

Another page, called Equality & Diversity was created to highlight the contribution of CLASS to the values of equality, diversity and inclusion in the community. Furthermore, more Results pages were created (see Figure 2): the Success Stories page, where there are CLASS-related success stories regarding successful project presentations, innovations, and use cases, the Demos page, where there are short demo videos related to the software architecture and use case of the CLASS project, and the Key Exploitable Results page, which includes the key exploitable project assets

as identified by the partners and uploaded on the European Commission's Horizon Results platform.

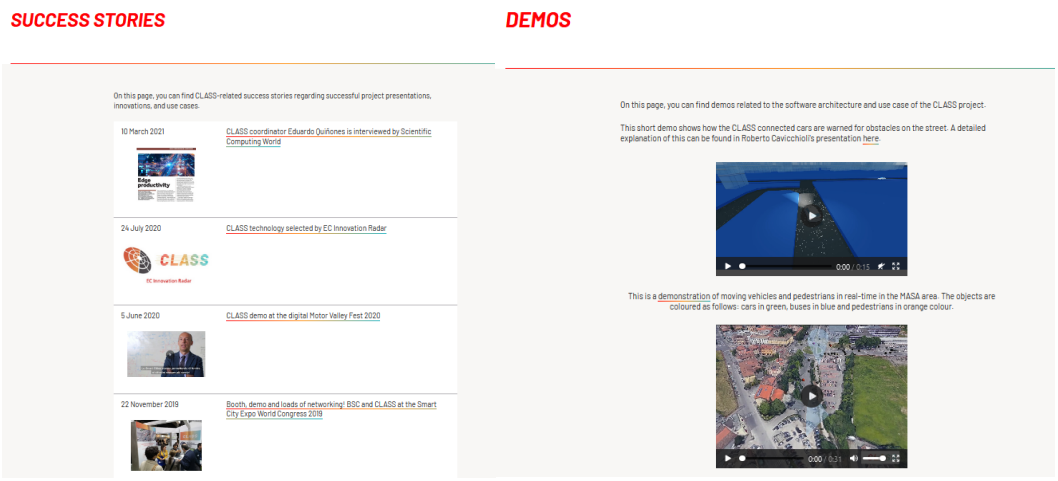

Figure 2: Success Stories and Demos pages on the CLASS website

During the whole period, the overall performance of the project website has been very successful. The website, built in Drupal (open source CMS), complied with the technical requirements of performance and security. In addition, the website hosts the intranet, allowing effective management by the dissemination team and seamless access by all consortium members.

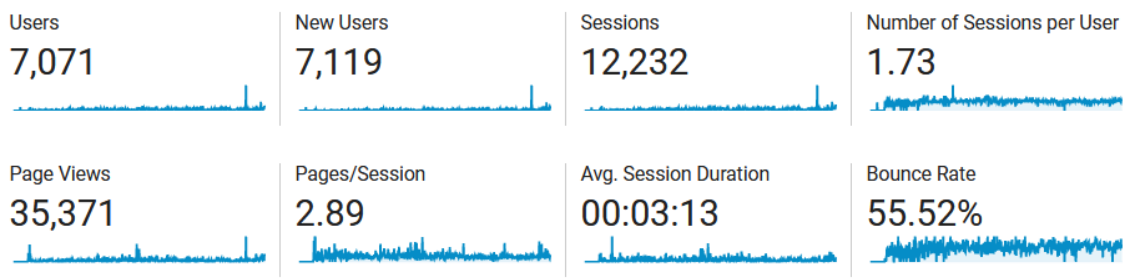

Figure 3: Usage statistics for the CLASS website. Source: Google Analytics

The main indicators of the CLASS website, as collected by Google Analytics, show its satisfactory performance in terms of the number of users, sessions, and page views. As shown in Figure 3, the total number of users and sessions during the project period was 7,071 and 12,232 respectively. The established KPI in the D6.1 Communication and Dissemination Plan for this metric is 1,000 website sessions per year, therefore these statistics have surpassed the initial predictions demonstrating the strong potential of both the project and its communication.

The total number of page views was 35,371, while the bounce rate ranged at 55.5%. This is a good value, as an over 60% would indicate that the website is not sufficiently engaging with the audience. The average session duration of 3:13min and the average number of pages visited per session at 2.89 reinforce this idea, as visitors had long and explorative sessions on the CLASS website.

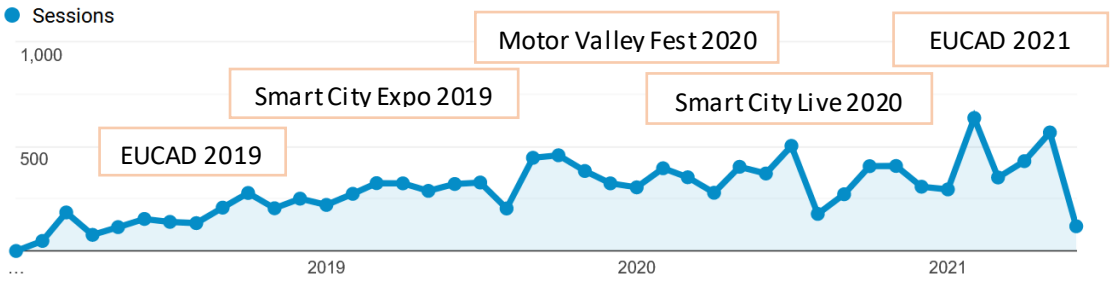

Figure 4: Sessions on the CLASS website. Source: Google Analytics

To understand the flow of sessions in a more efficient way, Figure 4 demonstrates the flow of the total number of sessions along the timeline of the CLASS project. The peaks are related to specific disseminations activities such as the press release (launched in March 2018) and the participation in various events such as EUCAD 2019, Smart City Expo 2019, Motor Valley Fest 2020, Smart City Live 2020, EUCAD 2021. The overall growth during the second and third years also reflects the website updates that were employed in order to add more technical information about the CLASS technology, software architecture components, and use case on the website, create new pages regarding the project results, videos, success stories, and equality efforts, and enrich the page with more news pieces, publications, and details about participation in events.

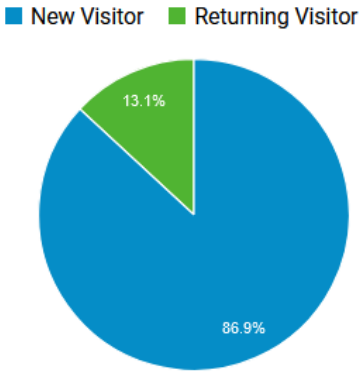

Figure 5: New visitors vs Returning visitors to the CLASS website. Source: Google Analytics

Another encouraging figure is the percentage of new visitors on the CLASS website which ranked at 86.9% (see Figure 5). This number explains the high figures in the indicators of sessions and page views, as the interest of new people in the CLASS project and webpage was becoming more and more prominent.

At the same time, the visitors seemed to have an interest in the main CLASS pages as seen in Figure 6. In particular, the most popular pages on the CLASS website, after the Homepage, were the news and events ones, followed by the About, Partners, and Publications pages, as well as the more technical pages.

	Page	Page Views	% Page Views
1.	/	9,515	26.90%
2.	/media/news	2,122	6.00%
3.	/events	1,376	3.89%
4.	/about	1,306	3.69%
5.	/partners	1,261	3.57%
6.	/publications	1,104	3.12%
7.	/use-case	1,045	2.95%
8.	/user	877	2.48%
9.	/software-architecture	746	2.11%

Figure 6: Most popular CLASS pages and their page views. Source: Google Analytics

Furthermore, the trend of a high interest in the CLASS page is reinforced by the statistics on the traffic source channels (Figure 7). We see that the two main sources are direct typing of the URL on the internet browser (44.5%) and organic search on search engines (37%), which means that the audience engaged directly with the website after learning about the project. At the same time, we notice a significant percentage of traffic that came from referral websites (11.1%) and social media (7.4%).

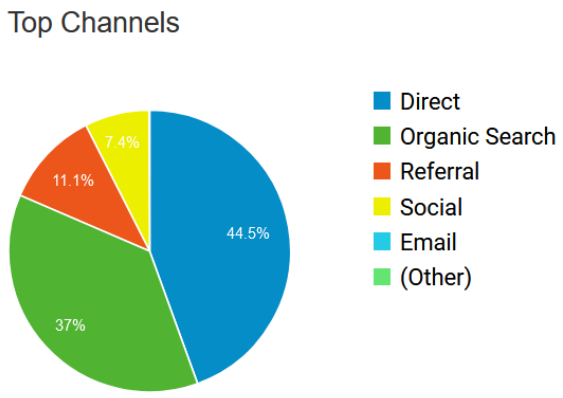

Figure 7: Traffic source channels for the CLASS website. Source: Google Analytics

Looking into the referral sources in more detail (Figure 8), we can see that these involve related organisations with which CLASS has made significant efforts to collaborate in terms of dissemination of its activities, such as BDVA, the local Barcelona sites, Cordis, the Modena sites, EUCAD, and GitHub.

1.	t.co
2.	linkedin.com
3.	big-data-value.eu
4.	ecatalogue.firabarcelona.com
5.	cordis.europa.eu
6.	comune.modena.it
7.	connectedautomateddriving.eu
8.	baidu.com
9.	github.com

Figure 8: Referral traffic sources. Source: Google Analytics

Analysing the website engagement that social media offer a bit further, we notice that social media channels provided an important number of sessions to the CLASS website (Figure 9). Twitter proved to be a highly engaging channel with over 1,000 sessions, while LinkedIn follows with 683 sessions.

Social Network	Sessions ↓	Sessions
1. Twitter	**1,145**	60.07%
2. LinkedIn	**683**	35.83%
3. Facebook	**59**	3.10%
4. YouTube	**18**	0.94%

Figure 9: Traffic to the CLASS website referred from social media. Source: Google Analytics

4.2 Social media

4.2.1 Twitter

The CLASS Twitter account is used as a platform to share any dissemination activities of the project and create synergies with other stakeholders in the field (Fig. 9). Originally, the strategy on Twitter was to target the sectors of academia and industry. During the development of the project, the audience has broadened to industrial stakeholders, policy makers, local governments, and the general public by including informative tweets about more general subjects, such as events and news in the field of connected cars, autonomous driving and smart mobility.

Figure 10: CLASS Twitter account

Tweets and retweets are posted daily and concern not only events and news of the project, but also conferences and activities related to the general field of smart cities, smart mobility, urban mobility, as well as more particularly technical fields of big data, cloud computing, and edge computing. The most used hashtags on the CLASS Twitter and the ones followed mostly are #bigdata, #bigdataanalytics, #smartcity, #smartmobility, #urbanmobility, #cloudcomputing, and #edgetocloud. A new hashtag #CLASSFinalEvent was created to promote and be shared during the final dissemination event of the project.

The number of followers of the CLASS Twitter account has increased vastly during the second year of the project. In particular, the number of followers has increased from 102 in December 2018 to 285 in December 2019 to 522 in 2020 and over 677 in June 2021, surpassing the KPI originally set at 250 followers. The engagement rate of the CLASS tweets also increased from 0.47% in 2018 and 0.6% in 2019 to 0.92% in 2020 and 0.84% in 2021. This shows the successful strategy of the communication and dissemination team to attract a broad community on Twitter, as well as the communication efforts taken by all partners in terms of providing presentations, attending events, writing news, etc.

4.2.2 LinkedIn

An initial CLASS LinkedIn group was created at the beginning of the project. However, this was not considered an appropriate medium at the second stage of CLASS. This was because LinkedIn groups are rather closed, not allowing for much engagement from users and with limited analytics data. Therefore, the dissemination team decided to delete the group and create the CLASS LinkedIn page in July 2019.

The CLASS LinkedIn page is used as a channel of communicating actions and updates of the CLASS partners to a professional and industrial network. The posts refer to the dissemination activities of CLASS as well as events of the relevant fields. Users have engaged mainly with posts about CLASS news pieces and events.

The page consisted of 81 followers in December 2019 and reached 208 in June 2021. As seen in Figure 11 below, the number of LinkedIn page views increased right after the page was created in 2019 and continued with a positive trend, which was particularly visible during CLASS-related events. These events include the Modena Smart Life (September 2019), HiPEAC CSW (October 2019), Smart City Expo (November 2019), Motor Valley Fest (May 2020), Smart City Live (November 2020), EUCAD, HiPEAC CSW, and BDVA webinar (all in April 2021).

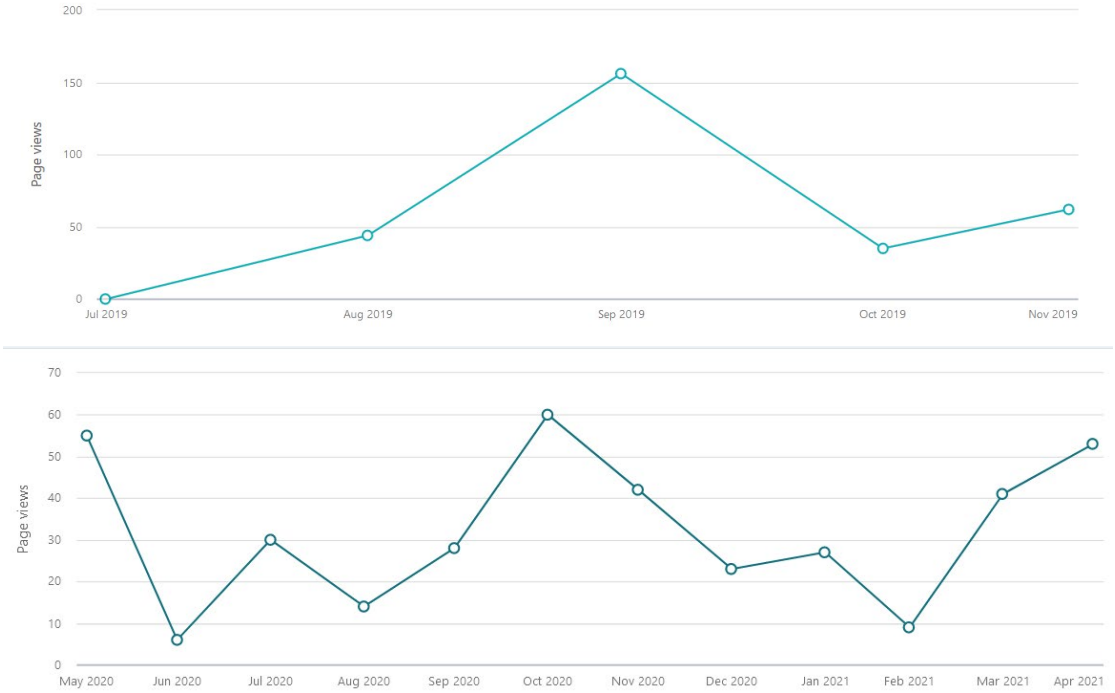

Figure 11: Page views of the CLASS LinkedIn page

As Figure 12 below shows, the top fields of the visitors of the CLASS LinkedIn page are research, information technology, automotive, internet, government administration, higher education, and computer software. Although in the beginning most of the followers were from an educational and research background, this trend changed to attracting more industrial stakeholders, which was the main goal of the CLASS LinkedIn page. More technical content with projects news, updated webpages, and presentations at industry events helped to grow this audience.

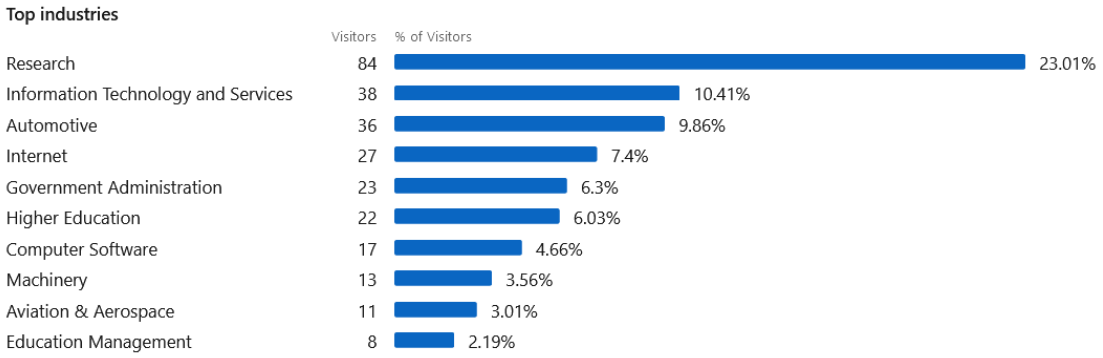

Figure 12: Top industries of the CLASS LinkedIn page visitors

4.2.3 Social media KPIs

The overall performance of the social media accounts of CLASS shows a high growth in the number of followers and engagement of users (Table 1). Both the Twitter and LinkedIn accounts performed very well, with Twitter being exceptionally successful.

The continuous implementation of the editorial plan as well as the numerous events that the CLASS partners participated in along with the additional efforts to engage with the community in a digital way during the Covid-19 pandemic contributed to the great increase in the number of followers in both social media channels.

CLASS social media key performance indicators	2018	2019	2020	2021	Target for project
Number of Twitter followers	102	285	522	677	250
Number of LinkedIn page followers	27	81	178	208	150

Table 1: CLASS social media indicators. Source: Twitter Analytics and LinkedIn

4.3 News pieces

The dissemination team also populates the CLASS website with news pieces according to the editorial calendar and guidelines put together by the WP6 team and shared with the partners in the beginning of the project.

These news pieces are written either by the dissemination team and concern events that partners attend, general news and updates about the project, or they are pieces composed by the technical WPs that inform the audience on the development of the technical work done in the project, the use case applications, and the integration of the software components. The aim of this news is to keep the CLASS news page updated, drive traffic to the website and share content on the social media channels in order to increase their engagement effect.

By the end of the project, there were 40 project-related news pieces published on the CLASS website and shared on the CLASS social media but also through the media channels of the partners. A detailed list can all be found on the CLASS News page.

4.4 Events

Throughout the duration of the project, the partners have been particularly active in attending events in order to present CLASS, communicate its technology, establish collaborations, and help make the project a point of reference in the field. The consortium attended a total of 33 events, including a keynote speech, presentations at conferences, workshops, meetings and tutorials, booth exhibitions, and pitch events.

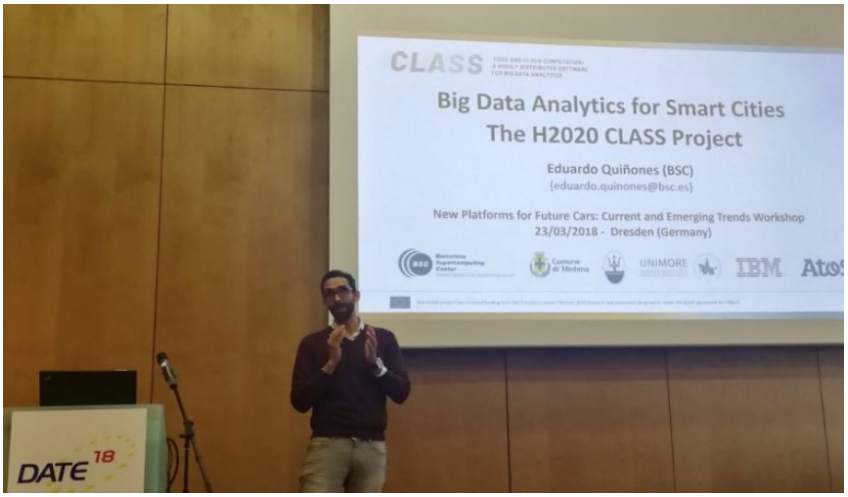

Figure 13: CLASS coordinator Eduardo Quiñones presenting the project at DATE 2018 in March in Dresden, Germany

Noteworthy events include the DATE 2018 and 2019 conferences, Smart City Expo 2018 and 2019, the EUCAD 2019 and 2021 conferences where the CLASS researchers gave talks about the project, took part in exhibitions with popular booths and showcased demonstrations of the CLASS technology. Presentations and booths at these events attracted numerous participants and helped communicate the project in different audiences, for example academics and researchers at DATE, industries and customers at the Smart City Expo, and researchers and policy makers at EUCAD.

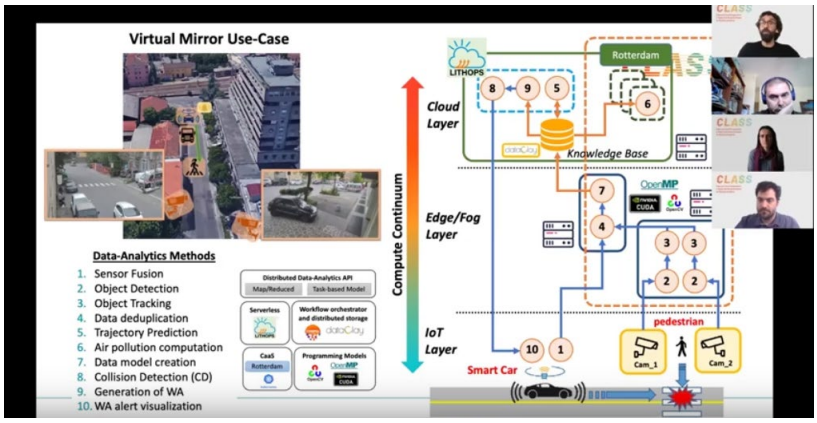

Figure 14: CLASS experts present the CLASS software architecture at the BDVA webinar series in April 2021

Although the Covid-19 pandemic altered the way events were taking place, CLASS continued its efforts to disseminate the project in digital events. In addition, the

project organised its own online tutorials during the final phase to communicate the software architecture and use case in their almost final form within the HiPEAC CSW and BDVA webinar series. Both recordings were uploaded on the project webpage along with the presentation slides of the speakers. These two webinars attracted a total of over 50 attendees. The CLASS coordinator Eduardo Quiñones will also give a training on the CLASS software architecture and integration framework during multiple days at the HiPEAC ACACES Summer School in September 2021.

Furthermore, the final dissemination event was designed as a marking point of the end of the project on 30 June 2021. Although initially planned to be held physically in Modena with a live demonstration of the connected cars in the MASA, the team had to adapt their plans and host it as a digital event instead. Special efforts were made to put together an interesting agenda with presentations and demos by all partners explaining the novelty of the CLASS software framework and its smart city applications. The event was held by BSC on its online event platform and it was promoted through the project and partner media channels to several audiences, including the partner institutions, the project officer and reviewers, the IAB members, computing and software developer and user communities, smart city and industrial experts, and related research project and networks. The recording and presentation slides of the event will be posted on the CLASS website[1].

Figure 15: Promo banner of the CLASS final event

The full list of the specific events that CLASS partners attended can be found on the project's Events page. Details on the events' audience type and size can be found in the Annex of this document.

4.5 Dissemination pack

The CLASS dissemination pack is a number of material prepared by the communication and dissemination team with the help of the partners for informative and promotional purposes. They are handed out in events that project partners take part in, used for presentations and booths, and communicated on the CLASS website, social media, and

[1] Full statistics on the final dissemination event will be shared in the Final project report and during the final project review due to the fact that it takes place on the last day of the project and submission deadline for this deliverable.

wide dissemination activities. They consist of a brochure, poster, PowerPoint presentation, roll-up and the project videos.

4.5.1 Brochure

The general brochure provides information about CLASS: its vision, main characteristics and capabilities of the software architecture, and the project use case. The format of the brochure is a double-sided A4 sheet and folds in three parts, so that interested project partners can easily download and print for their own dissemination activities. It was updated in mid-2019 to include the link to the new CLASS LinkedIn page.

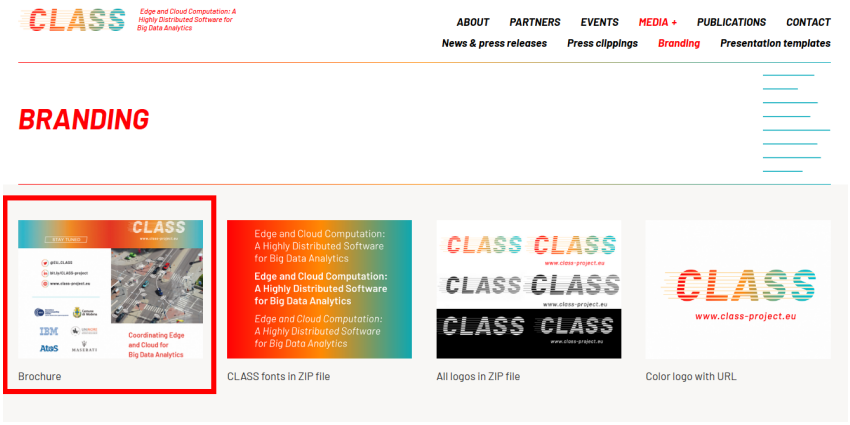

Figure 16: Screenshot of CLASS the website with downloadable Brochure (highlighted in red)

The brochure has been printed out, shipped to the CLASS partners and handed out at several events, in particular the booth exhibitions and demonstrations done by the partners at local and international events. It is also available on the Branding page of the CLASS website.

Figure 17: The CLASS brochure printed

4.5.2 Poster

The CLASS poster, agreed by the consortium, provides an overview of the project. Similarly to the brochure, it includes details on the CLASS vision, technology and use case.

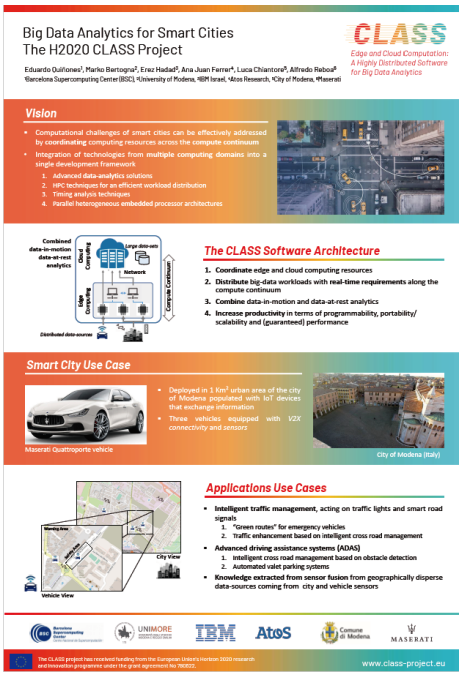

Figure 18: The CLASS poster

It can be downloaded and printed out from the intranet along with the template to produce further posters with more specialised information depending on the nature of each event or presentation and type of audience.

4.5.3 Presentation

In the same vein, the CLASS generic presentation was produced in the first year of the project and offers a more detailed overview of the project. The aim of this presentation is for all partners to present the CLASS project in a similar way and align key project messages. It has therefore been distributed among the partners and is available to download from the website intranet. The templates are also available for partners to use in order to elaborate new presentations.

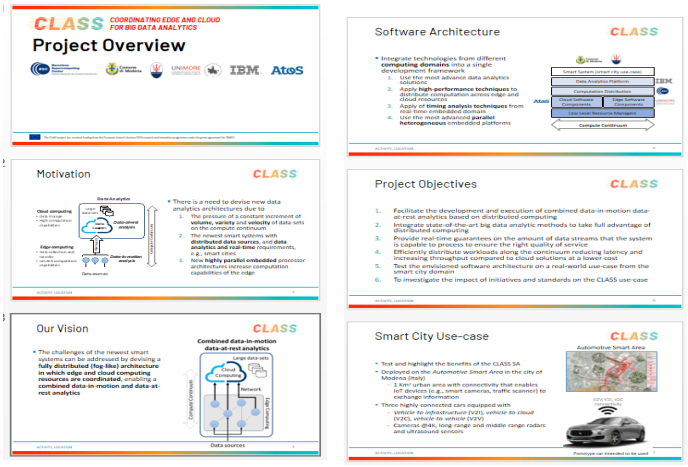

Figure 19: The CLASS generic presentation

4.5.4 Roll Up

A roll up has been created and displayed in events where CLASS had a presence. Its aim is to make the project's branding and key messages more visible at booths, stands and general project displays. It is available on the CLASS branding page and intranet.

Figure 20: CLASS roll up at "Smart Roads" (left) and "Smart City Expo 2018" (right)

4.5.5 Videos

The first CLASS video was posted online in December 2018. This first video aims to present in 2 minutes the project with the major key facts so that the targeted audiences gets a broad idea of CLASS project. The main targets of this video are scientific audiences as well as industry, to raise the awareness of the CLASS project. The video has a voice over, as well as some key words appearing on screen and animation that helps reflecting the CLASS use case of connected cars.

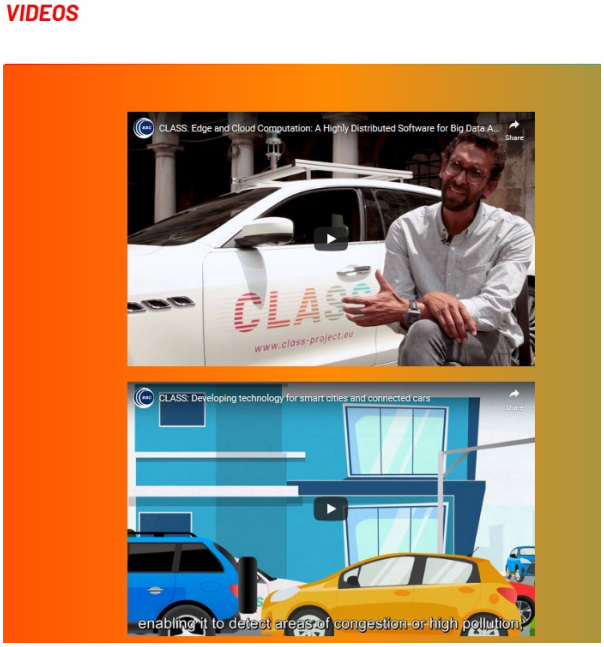

Figure 21: CLASS videos on the project website

The second CLASS video was posted online in March 2019. This is an animation video that explains the CLASS technology in a more understandable manner by describing

how smart communication between vehicles and cities is moving forward thanks to the project. The main audience type that this video is targeting is knowledge communities interested in smart cities and big data analytics in more general terms as well as the general audience.

The final CLASS video was filmed in the MASA area in Modena during the final technical meetings that took place in June 2021. The filming tasks included recording interviews with the project coordinator and partners, shooting scenes from the Maserati connected cars, and aerial images from a drone that captured the CLASS use cases in a highly engaging visual way.

All CLASS videos were posted on the YouTube channel of BSC, which is an already established channel with 1.12K subscribers. They are also available on the dedicated videos page on the project website. This resulted in 433 views for the first video and 734 views for the second video so far[2]. They represent dissemination material that can be used for the website, social media, exhibitions and presentations.

The following communications actions were implemented for all videos:

- News to be posted on the website and shared with technical media
- Promotion of the videos via the partners' media channels linking to the video
- Dissemination on the CLASS social media channels

Additional videos that were produced during CLASS, were two videos that were produced by the CLASS partners UNIMORE and Comune di Modena and shown during the Motor Valley Fest 2020. These videos, posted on the CLASS website, include information on the technical details of the CLASS software framework and its smart city use case and feature interviews with CLASS team members from Italy. Furthermore, as mentioned earlier, the recordings of the CLASS webinars within the HiPEAC CSW and BDVA webinar series were also posted on the CLASS videos page and well as the event organiser pages.

4.5.6 Factsheets

Two factsheets will be created right after the end of the project to address the CLASS software architecture and use case to two different types of audiences. First, a factsheet directed to industrial stakeholders will be produced to demonstrate a summary of the project, its market potential, and end-user capabilities. The main audience of this factsheet will be actors from the automotive, smart cities, and big data sector, as well as IT providers (Cloud providers, Edge providers, Big data vendors and practitioners). Second, a factsheet dedicated to the research community will be published in order to present the CLASS infrastructure from a research-oriented perspective. The main target audiences of this factsheet will be software, big data, embedded, and HPC researchers.

Both factsheets will be designed professionally, while the content will be validated with all partners. They will be posted on the CLASS website and shared on the social

[2] The link to the third video as well as its number of views will be shared during the final review, as the video was published just before the submission of this report.

media channels, with the partners, and relevant communities, such as the BDVA, HiPEAC, EUCAD, as well as related projects, such as the ones listed in Section 6 of this document. These two factsheets have not been produced yet as the partners are finalising the technical aspects of the project results. The final results will be translated into executive briefings right after the end of the project in order to create and launch the factsheets[3].

5 Press strategy

In March 2018, a first press release titled "Developing the technology for future smart cities and connected cars" was composed and sent to technical media to emphasize the need of HPC for smart cities and connected cars. This press release was approved by all partners. The dissemination leader encouraged the CLASS partners to replicate this on their own media channels, while the press release was sent to the CLASS Project Officer to do the same. In addition, BDVA also included it in its newsletter for big data experts, due to the close collaboration with the CLASS project.

A second press release titled "CLASS software framework makes Modena smarter in real-life setting" was launched in December 2019. This press release focused on how the CLASS software architecture is being implemented in the MASA area of Modena, the specific smart city use-case applications, and the software architecture components that have been publicly available on the dedicated CLASS GitHub channel. The piece was validated by all partners and was sent out to the CLASS project officer. It was then distributed to HPC media channels, as well as smart city and embedded computing media outlets.

A final press release was launched at the end of the project in June 2021 in order to celebrate the project ending and publish the final results in a reader friendly manner to the wider audience. This audience included policy makers and local city authorities, industrial stakeholders, practitioners and end-users, researchers, and the general public. It was shared with EC-related channels, such as Cordis, EUCAD, EU Science and Innovation Hub, with smart city and urban mobility media, with related EU projects of HPC, smart cities, embedded computing, and big data analytics applications, and research organisations, such as BDVA, HiPEAC, and the project partner institutions.

Apart from the press releases, further efforts to maximise the project's media coverage were made during the two years. Two main strategies were employed: dissemination of the project to local media through the partners and coverage of the CLASS technology by smart city media and other technical press outlets in the related fields. Indeed, partners helped to disseminate the project through local media, such as in Modena Today and Strade & Autostrade (Italian medium) and El Pais (Spanish medium). In addition, CLASS also gained significant press coverage among software and smart city related media, such as Smart City Media, Intelligent Transport, Scientific Computing World, Cities Today, Automotive World, etc.

[3] As the final statistics and information on the final event, information about the final version of these factsheets will be shown at the final project review.

Edge productivity

RESEARCHERS HAVE CREATED A SOFTWARE FRAMEWORK TO INCREASE PRODUCTIVITY OF DEVELOPERS WORKING WITH EDGE COMPUTING, IN A SERIES OF EUROPEAN-FUNDED PROJECTS

Researchers from Barcelona Supercomputing Center (BSC) are working on three projects to make edge computing easier to use and more performant and productive for developers.

The work initially focused on the development of a novel big-data software architecture to enable the development, deployment and execution of advanced analytics services through edge-to-cloud computation, featuring AI, data-in-motion and data-at-rest analytics methods for the efficient processing of vast amounts of geographically distributed data.

This framework is being applied to different use cases through the European projects Class, Elastic and Ampere, co-ordinated by Eduardo Quiñones, senior researcher at the BSC.

While the projects do share similar goals in increasing productivity for developers using edge computing resources, Class and Elastic focus on distributed environments. More specifically, scenarios that can be found in smart cities where there is not a single computing unit. Instead, the computing capabilities of the city are distributed across multiple computing elements. These elements may be located at the edge-side, in cabinets at street level, tram stops or bus stops and the near edge/fog nodes and in the cloud.

The Ampere project focuses on developing a framework for computing resources that are needed in cyber-physical systems (CPS) in which the number of computing elements does not have a wide distribution. These systems are all concentrated in a more close environment, for example, in a single connected vehicle.

Promoting productivity

'For Class and Elastic we are developing a software architecture which will facilitate the development, deployment and execution of what we call complex data analytics workflows into this distributed environment – what we call the compute continuum,' said Quiñones.

'You could have data analytics at the edge-level that are responsible for collecting data from a series of cameras. The result of this analytics is then sent to a near-edge computing node responsible for collecting the results of other edge devices and combining this to augment the information that is available. This information can be uploaded to the cloud providing offline analysis, or it can be sent back again to the edge to implement real-time analysis.'

The added complexity for these projects is how to implement this efficient distribution of analytics workflows in a way that clears the complexity of the underlying resources from the developer. 'How can we facilitate designers to describe this complex data analytics workflow without knowing the complexities of the compute continuum underneath?' notes Quiñones.

'In the case of Ampere, we are trying to follow similar objectives, but, in this case, we are addressing heterogeneous computing platforms,' Quiñones added. 'Platforms comprised of multicore processors and GPUs, multicore processors and FPGAs and many-core fabrics connected to a host device. Here the objective is how we can describe our systems in such a way that we are hiding the complexities of these platforms, while still exploiting all of the computing capabilities,' added Quiñones.

"This technology means authorities and city infrastructure can 'predict trajectories of all objects the camera and connected car can see'. You can detect collisions before they happen"

Figure 22: View of the Scientific Computing World article featuring an interview of the project coordinator Eduardo Quiñones about CLASS

In total, 59 press clippings[4] were documented during the reporting period, including references in the BDVA newsletters. They can all be found on the CLASS press clippings page as well as in the Annex of this document.

6 Related projects and organisations

6.1 HiPEAC

CLASS is part of the HiPEAC network and makes use of HiPEAC's communication channels and events. In particular, HiPEAC has published a presentation of the project both on its website and short articles in its magazine, featuring an interview with the CLASS coordinator as well as CLASS participation in the Smart City Live 2020. Furthermore, CLASS experts have participated in the ACACES 2019 and 2021 Summer Schools, co-organised by HiPEAC, as well as the HiPEAC CSW in 2019 with a keynote speech by the CLASS coordinator and 2021 with a webinar.

[4] The final number of press clippings will be shared during the final project review.

Figure 23: Banner for the promotion of the CLASS webinar in the HiPEAC CSW 2021

6.2 BDVA

CLASS is a member of the Big Data Value Association (BDVA) and participates regularly in the BDVA newsletter and in the network's events and conferences, such as the BDV PPP Summit 2019 and the BDVA webinar series. The project has been added to the BDVA Landscape, an online map of big data projects, institutions, and use cases, while an extended description of the CLASS pilot use case has been published on the BDVA list of pilot studies. In addition, the CLASS partners have participated with a chapter in BDVA's open access book "Technologies and Applications for Big Data Value" to be launched by Springer. BDVA has also disseminated the CLASS final event to their mailing lists and networks encouraging their members to attend.

Figure 24: The CLASS pilot use-case on the BDVA website

6.3 MASA

CLASS automotive tests take place on the Modena Automotive Smart Area, a testing urban area of one square kilometer with features such as 5G connectivity, big data and data analytics techniques. Apart from the use case applications being applied in the MASA, the partners also participated in MASA-related events, such as the Smart Roads: The Digital Revolution, the Motor Valley Festival 2019 and 2020, the Modena Smart Life 2020, and the Smart Building Expo 2019. Furthermore, two of the project

videos were filmed in the MASA area showcasing the connected cars and smart city capabilities of the project in the urban laboratory.

Figure 25: Map of the MASA area as shown on the CLASS use case page

6.4 European projects

CLASS has had interactions with other European projects in an attempt to both communicate the project to a wider audience but also to explore potential synergies and share technical knowledge on relevant use cases. The table below lists these projects and the type of the particular interactions with CLASS.

Project	Description	Interactions with CLASS
ELASTIC	A Software Architecture for Extreme-Scale Big-Data Analytics in Fog Computing Ecosystems	Sharing expertise and knowledge on the software architecture and use case. Co-organising booths and stands at events (DATE 2019, BDV PPP Summit 2019, HiPEAC Computing Systems Week Autumn 2019, Smart City Expo 2019 and 2020, HiPEAC ACACES 2021). Disseminating each other's news, events, and updates on their media channels.
LEGaTO	Low Energy Toolset for Heterogeneous Computing	Exploring edge-computing synergies on the smart city use cases. Exchanging industrial knowledge and contacts (two meetings occurred between the projects' coordinators).
Trafair	Understanding traffic flows to improve air quality	Co-participating in events (Modena Smart Life 2019). Interacting on social media.
DataBench	Providing certifiable benchmarks and evaluation schemes of BDT performance of high business impact and industrial significance	Exploring possibilities to test benchmarking solutions of DataBench in CLASS. Both projects are under the umbrella of BDVA.

5G-MEDIA	Capitalizing and properly extending the valuable outcomes of the running 5G PPP projects to offer an agie programming, verification and orchestration platform for services	Exploring the similarities of the Serverless concept developed in the cloud infrastructure of the 5G-MEDIA project, and the exploratory activities regarding the use of Serverless in the CLASS project.
SECREDAS	Security, safety and privacy across multiple application domains: Road, Rail and Health	Exploiting the CLASS software architecture and analytics to verify anomaly detection in the smart-city use case.
5GMETA	The 5GMETA open platform aims to leverage car-captured data to stimulate, facilitate and feed innovative products and services.	The data gathered by the CLASS project can be used in the project to contribute in providing innovative services.

Table 2: Interactions between CLASS and other European projects

6.5 Open Communities

CLASS is actively involved with open communities. One major route of this is involvement with open-source projects, by consuming, adapting and contributing back to a project's code base. More specifically, WP5 (Analytics Layer) employs OpenWhisk as a foundation for CLASS' event-driven and inclusive programming model. In that capacity, CLASS has contributed a new performance evaluation tool to OpenWhisk, called owperf. This new tool is quite comprehensive, featuring testing capabilities that were missing from previous tools, such as the ability to thoroughly test event-driven performance of OpenWhisk applications, combining both arrival process generation for events and analysis of OpenWhisk's activation records. The tool has been presented to the community, gained a welcoming response and was eventually merged into the code base of OpenWhisk.

A second, more dominant sequence of contributions has been made by CLASS to the open-source project of Lithops (also used by CLASS). First, a detailed architecture diagram and technical documentation. Then, a new variant of low-latency Lithops has been developed in CLASS and is being converted to PRs (Pull Requests) and submitted to Lithops as contributions, featuring several important performance optimizations such as much-improved client-to-worker communication. Such contributions exemplify CLASS' commitment to promoting the open-source culture which underlies the thriving of large and valuable public software projects.

Following this vein, the project has created a dedicated GitHub channel where one can find links to all the software components of the CLASS architecture. All partners contributed to this channel and populated it with the corresponding data and also included the EU project acknowledgment. The GiHub channel along with an explanation of each software component and its category have been published on the CLASS website and social media profiles.

7 Publications

At an earlier stage of the project, a document containing the publication procedures and guidelines was distributed internally to all partners in order to accommodate the H2020 Publications rules and be compliant with the Open Access policy.

There have been 12 scientific publications related to CLASS in the form of conference proceedings and journal articles. In addition, there will be one book chapter in the upcoming book of BDVA "Technologies and Applications for Big Data Value" to be published by Springer in due course. They are all either Green or Gold Open Access, published under the CC-BY license, and include the EU acknowledgment and project number.

Full details on the current CLASS publications as well as any future ones can be found on the CLASS publications page that is regularly updated. This page includes metadata of the publications and links to the published and deposited versions.

8 KPIs

All dissemination activities and tasks have been carefully monitored. The metrics defined in D6.1 Communication and Dissemination Plan show the progress of the project and the success of the dissemination efforts, as all KPIs were met and many of them even surpassed the initial target.

KPI	Explanation	Total achieved by the end of the project	Total Target
Press releases	At least 1 in a year	3	3
Media clippings	Articles appearing in the press about CLASS	56	50
Whitepaper and factsheets	Number of business and scientific whitepapers or factsheets published	1 business and 1 scientific factsheet	1 business and 1 scientific whitepaper/factsheet
Project presentation	General overview presentation regularly updated	1	1
Project posters	Number of posters	3	2
Project videos	Number of project videos	7	3
Website sessions	Number of sessions registered by Google Analytics	35,371	1,000 sessions / year
Events and conferences attended	Keynotes and events organised, including conferences booths, tutorials and workshops (with significant attendance, i.e. above 30 people)	33	2 keynotes 1 event organized/year 2 booths in conferences
Scientific publications	Peer-reviewed journals, conference proceedings, etc.	12	12

	in green open access. At least 4 per year.		
Twitter	Number of followers	677	250
LinkedIn page	Number of followers	208	150

Table 3: List of KPIs as outlined in the CLASS D6.1 Dissemination and Communication Plan

9 Conclusions

CLASS proved very successful in terms of its dissemination and communication potential, with a high number of related activities throughout the years of its duration, as demonstrated in the performance of the KPIs in Table 3. During the first year of the project, the dissemination tasks focused around defining the brand, creating the main communication channels (website, social media), participating in key events, and establishing initial collaborations. The main aim of this strategy was to launch the project in an efficient manner and start building a community around it. The exploitation activities also started from an early stage of the project, as reported in the D6.3 Initial exploitation report.

The communication and dissemination during the second phase of the were aimed at communicating the development of the technology and the use case as well as establishing CLASS as one of the leading projects in the field of big data analytics and smart city applications. The activities were concentrated on updating the website with technical information, growing the social media, producing a second video, attending numerous events to showcase the project's initial results and demos, publishing the first scientific papers and a second press release, and securing further collaborations with relevant organisations and European projects.

During the final project phase, which happened to be happening at the same time as the Covid-19 pandemic, the communication and dissemination efforts focused on continuing the establishment of CLASS in the software, big data, and smart cities ecosystem. The team managed to adjust to the new circumstances in a fast pace by delivering online events and webinars, publishing more scientific papers and news stories on the CLASS website, enriching the social media with short videos, banners, and more visual and engaging posts to keep the motivation of the CLASS audience lively and encourage even more visitors to be informed about CLASS.

It should also be mentioned that dissemination activities are closely connected with exploitations tasks in this common WP. The team has been in close collaboration with the Exploitation task leader from the consortium partner Atos. The exploitation tasks are focused on the identification of exploitation routes or business opportunities for project outcomes, target markets as well as Intellectual Property Rights (IPR) management activities. In addition, the CLASS IAB was a significant asset of the project, with its members offering feedback from an industrial point of view. A dedicated IAB page was published on the CLASS website with information on the IAB members and activities. The full exploitation activities are reported in detail in have been reported in D6.7 Final exploitation report.

Overall, the performance of the dissemination and communication part of the CLASS project has proved to be satisfactory. The numerous events, publications, press clippings, videos, website and social media visitors and engagement demonstrate the efforts of the WP6 team in establishing the project within the European edge-to-cloud computation and smart city applications ecosystem.

10 Annex

A detailed list of the CLASS dissemination activities, M1 (January 2018) - M42 (June 2021):

Partner	Type of activity	Details	Starting Date	Total Size Audience	Size of audience by type								
					Scientific Community	Industry	Civil Society	General Public	Policy Makers	Media	Investors	Customers	Others
BSC	Other	Press clippings	16-01-18	300000	100000	100000	10000	20000	20000	20000	10000	10000	10000
BSC	Social media	Twitter	17-1-18	662	200	200	30	30	52	60	30	30	30
BSC	Website	CLASS website	10-2-18	13000	5000	5000	700	700	700	600	100	100	100
BSC	Social media	LinkedIn	1-7-19	204	84	80			10	10	10		10
BSC	Video / film	CLASS videos	14-12-18	10000	4000	4000	400	500	500	500	50	50	
BSC	Participation to an event other than conference / workshop	CLASS presentation in a MOVECIT meeting	12-02-18	30	20	5	5						
IBM	Other	CLASS presentation at IBM Haifa	14-02-18	20		20							
IBM	Pitch event	CLASS presentation at Cellnex	15-02-18	20		20							
BSC	Participation to a Workshop	Oral presentation at workshop at the DATE18 Conference	23-03-18	30	30								
BSC	Press Release	First PR	27-03-18	1000	200	200	100	100	100	100	100	100	
BSC	Other	CLASS presentation at BDEC meeting	27-03-18	20		20							
BSC	Non-Scientific and non-peer reviewed publication	News pieces on CLASS website	28-03-18	300000	100000	100000	10000	20000	20000	20000	10000	10000	10000
BSC	Flyer	Class flyer	16-04-19	1000	200	200	100	100	100	100	100	100	
IBM	Participation to a conference	CLASS poster at SYSTOR 2018	04-06-18	50	35	15							

Atos	Exhibition	CLASS booth at Smart Agrifood Summit	20-06-18	20	10	8	2						
BSC	Participation in activities organised jointly with other H2020	Organisation of a panel together with BDVA at IoT Week 2018	06-07-18	10	7	3							
IBM	Pitch event	CLASS presentation at SEAT headquarters	09-07-18	20	20								
UNIMORE	Participation to a conference	CLASS presentation at MASA 2018 conference	27-09-18	300	100	200							
Modena	Exhibition	Smart City Expo Congress	13-11-18	350	180	150	20						
BSC	Exhibition	ICT 2018	04-12-18	300	200	70				2		28	
IBM	Pitch event	Presentation of owperf to OpenWhisk community	19-02-19	30	15	5	5						
BSC	Exhibition	DATE 2019	25-03-19	400	250	100	20			10	10	10	
BSC	Exhibition	EUCAD 2019	02-04-19	200	100	80	20						
UNIMORE	Participation to a conference	Motor Valley Festival 2019	17-05-19	105	25	45	5	25		5			
BSC	Participation to a conference	Major Cities conference, Venice, Italy	13-06-19	200	50	150							
Atos	Pitch event	ATOS Research & Innovation Hub	29-05-19	25		25							
UNIMORE	Participation to a conference	WETICE 2019	13-06-19	35	25	2	3						
BSC	Participation to a conference	Presentation at BDV PPP Summit	26-06-19	40	25	15							
IBM	Other	CLASS flyers added at a public brochure station in IBM lab for other employees and visitors	07-07-19	50	45	5							
UNIMORE	Participation to a conference	Presentation at ECRTS 2019 conference	12-07-19	80	60								
BSC	Participation to a conference	Poster presentation at ACACES 2019 Summer School	17-07-19	70	70	10							

IBM	Other	CLASS blog post projected on the lab's TV screen for a week - for IBM employees and visitors	27-07-19	300	250	80	50		70	20			
UNIMORE	Participation to a conference	Talk about MASA and CLASS at the Smart China Expo	28-08-19	300	80	20	10		150	20	20		
UNIMORE	Participation to a conference	Poster presentation at Summer School on Applied Harmonic Analysis and Machine Learning	12-09-19	150	150								
Modena	Participation to a conference	Talk about CLASS at the Modena Smart Life 2019 conference (presentation with Trafair project)	27-09-19	50	30	20							
UNIMORE	Participation to a Workshop	Presentation at the 1st CoRAI Summit on the Future of the Autonomous Mobility	09-10-19	50	20	20			10				
Atos	Participation in activities organised jointly with other H2020	CLASS flyers at the BDVA Booth of the BDV Forum in Helsinki	14-10-19	50	20	30							
BSC	Participation to a conference	Keynote speech at the HiPEAC CSW Autumn 2019	30-10-19	40	30	10							
Modena	Participation to a conference	Talk about CLASS at the Milan Smart Building Expo	14-11-19	60	10	20	5	5	10	10			
BSC	Exhibition	Smart City Expo Congress 2019 booth	19-11-19	550	100	350	20		20	20	20	20	
Modena	Participation to a conference	Talk about CLASS at the Forum PA Citta event	26-11-19	40	5	5	5		20	5			
BSC	Press release	Second PR	12-12-19	100000	25000	25000	15000	5000	15000	2000	5000	5000	3000
UNIMORE	Participation to a conference	Workshop at HiPEAC Conference 2020	21-01-20	45	25	20							
BSC	Participation to a conference	Edu Quiñones speaks at the Legato final event	29-06-20	60	40	20							
BSC	Other	Video for social media	22-04-20	200	50	50	30	10	10	10	10	10	20
Modena/UNIMORE	Exhibition	Motor Valley Festival 2020	15-09-20	200	50	50	30	10	10	10	10	10	20

Maserati/UNIMORE	Participation to a workshop	Webinar: Guida autonoma: a che punto siamo?	08-07-20	35	10	10	5						
Modena	Participation to a conference	Modena Smart Life 2020	25-09-20	100	50	50							
BSC	Participation to a conference	Smart City Live 2020	17-11-20	500	50	50							
UNIMORE	Participation to a conference	Genova Smart Week 2020	23-11-20	150	50	50	25		25				
BSC	Exhibition	EUCAD 2021	22-04-21	150	50	50	25		25				
BSC, IBM, UNIMORE, Atos	Training	HiPEAC CSW '21 Tutorial	22-04-21	60	30	30							
BSC, IBM, UNIMORE, Atos	Training	BDVA Webinar	28-04-21	15	10	5							
UNIMORE	Participation to a conference	Next Generation Mobility	20-05-21	30	20	10							
BSC	Press release	Final PR	23-06-21	2000	400	400	200	200	200	200	200	100	
BSC	Exhibition	ISC 2021	24-06-21	TBC									
All	Organisation of a Conference	CLASS final event	30-06-21	TBC									
BSC	Training	ACACES 2021	13-07-21	TBC									