D7.4 Collection of dissemination activities

Primary Author(s)	Amy McCready | Bax & Company
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Project Coordinator	Núria Parera | Applus IDIADA
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Executive summary

Deliverable 7.4 presents an overview of the communication and dissemination activities executed across the entirety of the SAFE-UP project and assesses their impact with regards to specific Key Performance Indicators (KPIs) set in Y1 (2020).

The dissemination objectives of SAFE-UP were to ensure the communication of project innovations, intermediary results, and outputs to relevant external audiences, maximise the impact of project outcomes for future autonomous driving safety (especially for VRUs), and convey a clear message on the benefits of safety technologies to all types of traffic participants.

To achieve these objectives, a comprehensive communication and dissemination strategy was implemented by BAX, with support from lead partner IDIADA. The SAFE-UP website served as a central hub for disseminating project-related information, including project news updates, deliverable summaries, contributions from Advisory Board members, infographics on crash scenarios, public deliverables, newsletters, and testing and simulation videos. The website received a total of 14,000 visits by 11,000 unique visitors, surpassing the target of 3,000 visitors. The website also achieved 390 inbound links, enhancing its credibility and visibility within the online community.

The project also developed and distributed four newsletters, each containing valuable content such as project achievements, milestones, and resources. These newsletters had contributions from members of the project Advisory Board and were published on the SAFE-UP website and ELTIS Mobility Portal.

Although just under the set target of 300 subscribers (295), with an ever-increasing number of LinkedIn followers, it is safe to say that the SAFE-UP project's visibility and community is continuing to grow due to efforts in communication and dissemination.

Social media platforms, including Twitter and LinkedIn, were utilised to reach a wider audience. The project had 257 Twitter followers and 586 LinkedIn followers – a total following of 843 - with various tweets and posts generating high impressions. Additionally, a dedicated YouTube channel was launched, featuring videos related to VRU collision avoidance tests, among others. The project actively participated in external conferences and workshops, presenting its work and results to relevant audiences. A total of 30 events were attended, surpassing the target of 25 events. The project also attracted over 700 visitors to its exhibits and presentations, close to the target of 800 visitors.

While under our initial target of 50 mentions in articles (36 in total), we do foresee the project gaining more visibility now that it has reached its completion and has more tangible results to disseminate.

Overall, the communication and dissemination efforts of the SAFE-UP project have successfully reached and engaged with target audiences, exceeding several key performance indicators. The project's website, newsletters, social media presence, and participation in events have contributed to the effective communication of project outcomes and the promotion of safety technologies for future autonomous driving, particularly for VRUs.

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Table of contents

List of figures

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List of tables

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List of abbreviations

Abbreviation	Meaning
AV	Autonomous Vehicles
AD	Autonomous Driving
CA	Consortium Agreement
CAV	Connected Automated Vehicles
D	Deliverable
EC	European Commission
GA	Grant Agreement
KPI	Key Performance Indicator
MaaS	Mobility as a Service
OEM	Original Equipment Manufacturer
PM	Person Month
R&D	Research and Development
RTO	Research and Technology Organisation
SC	Steering Committee
SotA	State-of-the-Art
T	Task
VRU	Vulnerable road user
WP	Work Package

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1. Introduction

The SAFE-UP project's communication and dissemination efforts were led by BAX, in close collaboration with lead partner IDIADA. Academic and research partners were also responsible for academic community communication, and industry partners responsible for communication through their value chain partners.

1.1 Dissemination objectives

SAFE-UP's aim has been to engage with all types of traffic participants (e.g. drivers, riders, VRUs) to convey a clear message on the benefits entailed in the new active and passive safety technologies. The main objective was to maximise the impact of the project outcomes for increasing safety in future AD, especially for VRUs. The aim was also to avoid any misunderstandings surrounding how this type of disruptive technologies work and ensure that their increased safety is very well perceived by the public.

Three main methods of communications were followed: publications of results in international research articles with a high index of impact, presentation in congresses/conferences, and active presence in social media.

SAFE-UP's dissemination actions aimed to:

- Ensure that project innovations, intermediary results and outputs are communicated to the relevant external audiences.
- Maximise the impact of the project outcomes for increasing safety in future autonomous driving, especially for VRUs.
- Convey a clear message on the benefits entailed in the new active and passive safety technologies, when engaging with all types of traffic participants (e.g. drivers, riders, VRUs).

1.2 Target audiences

Table 1: Target audiences and main means of reaching them

TARGET AUDIENCE	Relevant COMs channels
RESEARCH RTOs, Universities and R&D departments	Events Publications Website
BUSINESS For-profit Industry (no R&D departments): automotive manufacturing (OEMs, TIERx)	Events Publications
INSTITUTIONS	Website

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Policymakers and Standardisation bodies (e.g. EURONCAP)	Newsletter Events
USERS Citizens, VRUs, drivers (also commercial); user associations (e.g. FEVR, Public Transport e.g. EPF, drivers associations e.g. RACC)	Social media Website

2. Dissemination activities

To enhance the scope, impact, and visibility of the SAFE-UP project and its results, a comprehensive communication and dissemination strategy was implemented at the start of the project and updated throughout the project when appropriate. This section provides an overview of the multifaceted communication and dissemination efforts undertaken by the SAFE-UP consortium to engage with the target audiences and achieve the project's key performance indicators (KPIs) related to website engagement, newsletters, social media presence, events, and publications.

2.1 Website engagement

KPI: 50 content downloads | Result: 609 unique content downloads

KPI: 100 inbound links | Result: 390

KPI: 3000 unique website visitors | Result: 11,000 (Average 3667 per year)

The SAFE-UP website (safe-up.eu) has served as a central hub for disseminating project-related information and resources.

It was important to maintain a modern, dynamic, and user-friendly website throughout the project, to match the innovativeness and person-focused work conducted in the SAFE-UP project.

The website includes the following content (non-exhaustive list):

- Project news updates
- Deliverable summaries
- Partner interviews
- Contributions from Advisory Board members
- Infographics on crash scenarios between vulnerable road users - pedestrians, cyclists and motorcyclists.
- Public deliverables
- Our 4 newsletters

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- Breakdown of the four demos
- Testing and simulation videos

Figure 1: Slide from the WP7 presentation given at the final event showcasing available content on the website

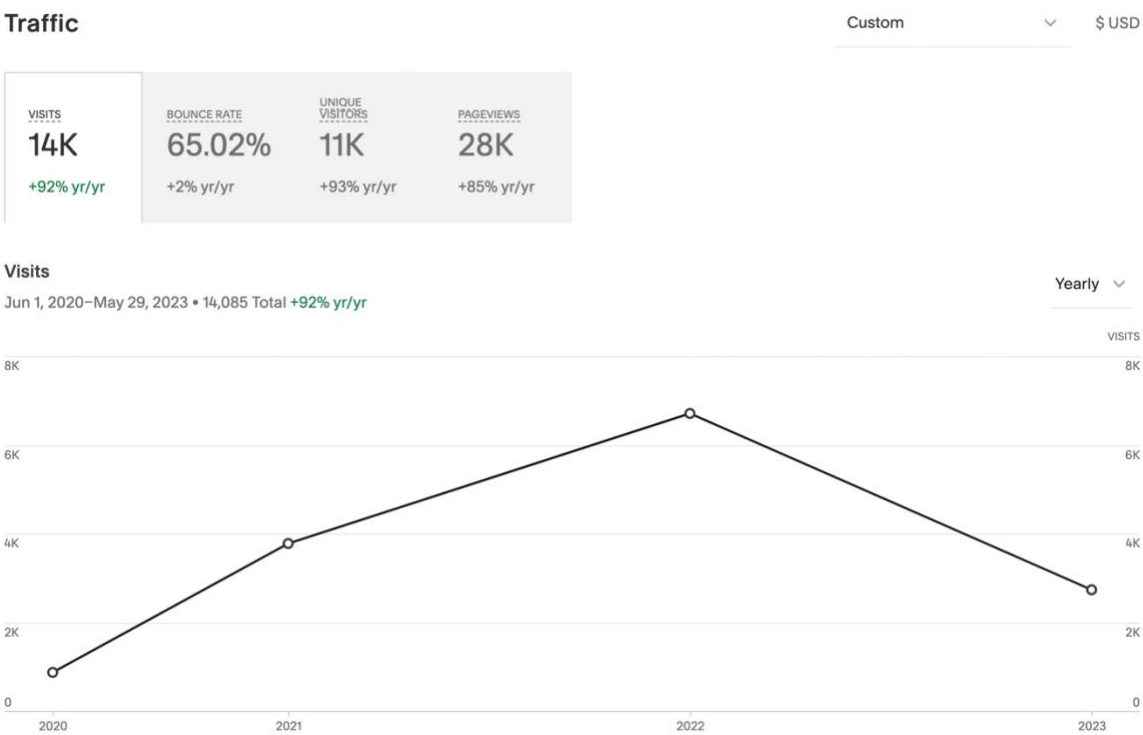

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Figure 2: Screenshot of Squarespace Analytics dashboard indicating total website visits and unique visitors

Over the course of the past three years, the website has received a total of 14,000 visits, by 11,000 unique visitors – an average of 3667 visitors per year – surpassing our target of 3,000. Visits should not be confused with page views, of which we received 28,639.

As illustrated in Figure 2, 2022 was SAFE-UP's most active and engaging year in terms of audience reach. Not only did the project release more original content during this period, but the partners were especially busy participating in relevant events.

In the table below, 15 of the most viewed website pages are ranked from the highest number of views to the lowest.

Table 2: View count of top 15 most-viewed pages of the website

#	Page title	Views
1	Home page	9696
2	Resources	3074
3	News	1861
4	Partners	1561
5	Context	1480
6	Demonstrators	1134
7	Work plan	852
8	Communication between automated vehicles and vulnerable road users in future traffic	700
9	Contact	650
10	SAFE-UP driving key research for Euro NCAP's future vehicle safety assessment	616
11	Biomechanics expert reveals safety concerns of novel seating positions	465
12	Current Safety-Critical Scenarios for Car-to-Pedestrian crashes in the EU	385
13	SAFE-UP's Demo 3 Integration week at BOSCH: a recap	278
14	EU road deaths: we need safer infrastructure for all	276
15	SAFE-UP's Demo scenarios: a breakdown	265

The project website having 390 backlinks (inbound links) is highly advantageous for communication and dissemination purposes. Backlinks serve as essential connectors between websites, acting as virtual endorsements and citations that enhance the credibility and visibility of a website, and in this case, the project. With a substantial number of backlinks, the website enjoys increased exposure and reach within the online community. This allows for effective communication of its objectives, findings, and initiatives to a wider audience, including researchers, stakeholders, and other interested individuals. Furthermore, the diverse network of backlinks indicates that the website is trusted and

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respected within its field, further solidifying its reputation as a reliable source of information, which we hope to maintain beyond the project's completion.

Another key performance indicator of the project was to achieve at least 50 content downloads from the website. We interpreted this as 50 unique user downloads, of which we have greatly surpassed (609).

The types of content that can be easily downloaded from the website include public deliverables, infographics based on research, PowerPoint presentations from webinars, and promotional materials.

The top 5 file downloads can be seen in the table below.

Table 3: Top 5 content downloads

#	Content title	Type	Number of downloads
1	**Task 2.1 Definition of Safety-Critical Scenarios** (https://static1.squarespace.com/static/5efaed43294db25b18168717/t/60c9d4cd5f246a0a0612ef27/1623839956547/Task+2.1+Definition+of+Safety-Critical+Scenarios.pdf)	Infographic	158
2	**D2.6 USE CASE DEFINITIONS AND INITIAL SAFETY-CRITICAL SCENARIOS** (https://static1.squarespace.com/static/5efaed43294db25b18168717/t/627e752a8d7775630d2ea94a/1652454782434/SAFE-UP_D2_6_Use%2Bcase%2Bdefinitions%2Band%2Binitial%2Bsafety-critical%2Bscenarios_.pdf)	Deliverable	134
3	**Main contributing factors behind 576 multi-vehicle crashes involving motorcyclists, scooter & moped riders.** (https://static1.squarespace.com/static/5efaed43294db25b18168717/t/60c9d8e358ac9a2c10349c25/1623840997459/KT+graphic_Main+contributing+factors+behind+576+multi-vehicle+crashes+involving+motorcyclists%2C+scooter+%26+moped+riders.pdf)	Infographic	105
4	**What are the most common crash scenarios involving small motorcycles and mopeds?** (https://static1.squarespace.com/static/5efaed43294db25b18168717/t/624b00c5ea263970be60ae50/1649082566585/CAR2PTW-SM.pdf)	Infographic	95
5	**D2.4 Definition of the future use cases: scope and data to build digital twins of use cases** (https://static1.squarespace.com/static/5efaed43294db25b18168717/t/627e72b56777520caa68f4e1/1652454080898/SAFE-UP_D.2.4_Definition%2Bof%2Bthe%2Bfuture%2Buse%2Bcases%2Bscope%2Band%2Bdata%2Bto%2Bbuild%2Bdigital%2Btwins%2Bof%2Buse%2Bcases_.pdf)	Deliverable	70

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2.2 Newsletters

KPI: 300 subscribers | Result: 295 subscribers

KPI: 300 opens/downloads per newsletter | Result: 150

Four newsletters were developed and distributed over the course of the project. While an initial target of two newsletters per year was set at the start of the project, the dissemination leader advised to only issue a newsletter when there was sufficient content to share, like project achievements, milestones, or relevant resources. Moreover, each newsletter took the form of a multi-page PDF content, rather than a standard email message, in order to pack in more valuable content. Such an output requires more time and careful curation than a simpler email.

As illustrated in the below figure, each of the four newsletters had one special contribution from a member of the project Advisory board.

1. In February 2021, Johanna Tzanadiki from ERTICO wrote a piece titled 'Taking a more holistic approach to mobility', which has been viewed around 260 times.
2. In December 2021, Antonio Avenoso of the European Transport Safety Council wrote an article titled 'EU road deaths: we need safer infrastructure for all', which has been viewed around 670 times.
3. In July 2022, Adriano Palao Bernal from Euro NCAP was featured in an interview titled 'SAFE-UP driving key research for Euro NCAP's future vehicle safety assessment', which has been viewed around 2150 times.
4. In February 2023, Lisa Spellman of the Vulnerable Road User Safety Consortium contributed to the SAFE-UP newsletter with 'A shared vision to tackle shared road safety issues', which was viewed around 570 times.

All of these Advisory board contributions were published on the SAFE-UP website and submitted to ELTIS Mobility Portal. Euro NCAP's interview was read over 1000 times on ELTIS alone.

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Figure 3: Slide from the WP7 presentation at the final event showcasing the 4 newsletters

At the start of the project, the objective was to build a subscriber base of at least 300 individuals and ensure a minimum of 300 opens or downloads per newsletter. While SAFE-UP has 295 subscribers to its mailing list, the newsletter open rate was not as the partners expected, as the highest number of newsletter opens achieved was 150.

Having said this, the total number of newsletter views cannot be determined due to Google Analytics (GA) limitations, as GA cannot run its script on PDF files, and therefore, the number of views cannot be calculated. This is a drawback when it comes to reporting.

2.3 Social media

The dissemination lead recognised the significance of social media platforms in reaching a wider audience, primarily through LinkedIn and Twitter, however, a dedicated YouTube channel was launched also.

2.3.1 Twitter

KPI: 400 Twitter followers | Result: 257 followers

On Twitter, SAFE-UP has published a total of 206 tweets and has 257 followers.

One of the most engaging tweets received just under 2000 impressions, and featured one of the knowledge translation products showcasing crash research between drivers and pedestrians.

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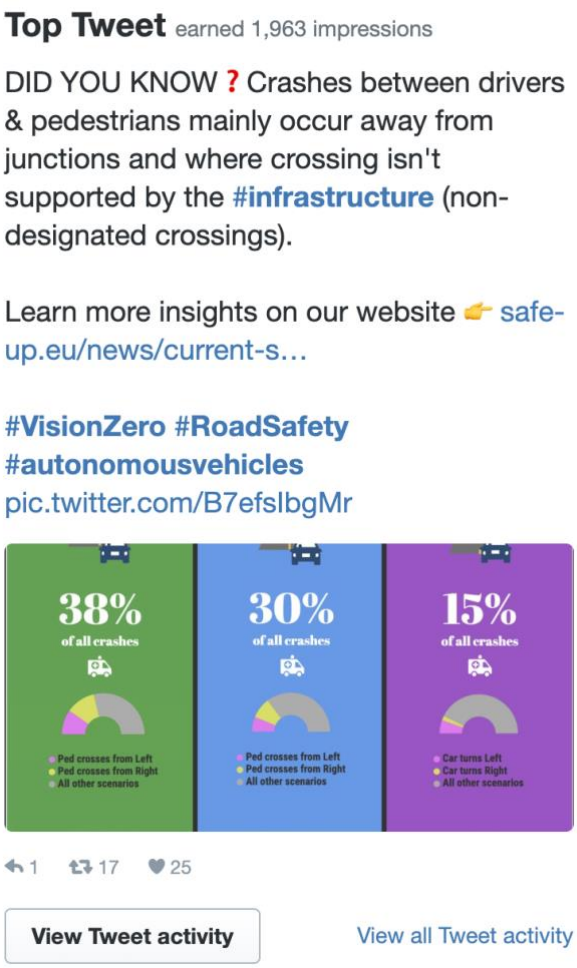

Figure 4: Tweet with most impressions (1,963)

After closely monitoring our social media engagement and analysing the data, it became evident that our target audiences were not as active on Twitter as we initially anticipated. Despite our efforts to reach them through this platform, we observed limited interaction and relatively low levels of engagement. However, an encouraging trend emerged when it came to our advisory board members. We found that they consistently supported us by resharing our outputs, especially the ETSC (European Transport Safety Council) and FEVR (European Federation of Road Traffic Victims). This consistent support from our advisory board members served as a valuable endorsement of our work and helped amplify our message to a wider audience. Their willingness to promote our outputs on various channels demonstrated their belief in the importance of SAFE-UP's work.

2.3.2 LinkedIn

KPI: 300 LinkedIn followers | Result: 586 followers

On LinkedIn, SAFE-UP has 575 unique followers. Over the past year, we have witnessed a remarkable surge in both LinkedIn visits and our follower count, surpassing our initial goal

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of 300 followers. Among various social media platforms, LinkedIn has proven to be the most dynamic and engaging avenue, outshining the likes of Twitter and YouTube. Our most engaging LinkedIn post of the past 12 months featured a recap of the 5th General Assembly (see Figure 4 below).

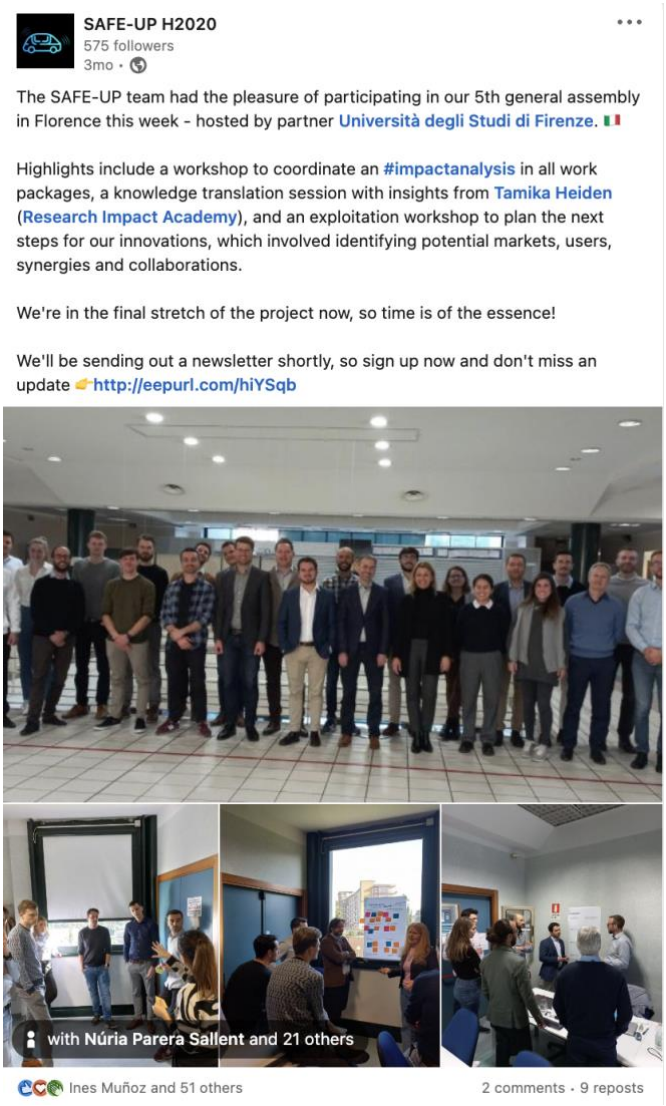

Figure 5: Most clicked LinkedIn post (653 clicks)

In addition, the behind-the-scenes video footage capturing the demo testing from the previous year has garnered substantial attention and positive reception. We are now eagerly awaiting the forthcoming footage from our final event, which we intend to transform into a captivating legacy video. This video will serve as a powerful promotional tool, enabling us to sustain our visibility and outreach beyond the project end. The video will be hosted on our dedicated YouTube channel.

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2.3.3 YouTube

With a total of 1718 channel views, the YouTube viewership demonstrates promising engagement. One of the key reasons YouTube was a good idea is that it allowed the project to reach a wide audience, transcending geographical limitations and providing a convenient and accessible medium for sharing information.

The video showcasing the VRU collision avoidance tests in adverse weather conditions, with its 525 views, was particularly significant. It was thoughtfully produced to be featured on the Demo 3 overview page on the project's website, adding credibility and providing potential stakeholders with a tangible glimpse of the project's valuable work.

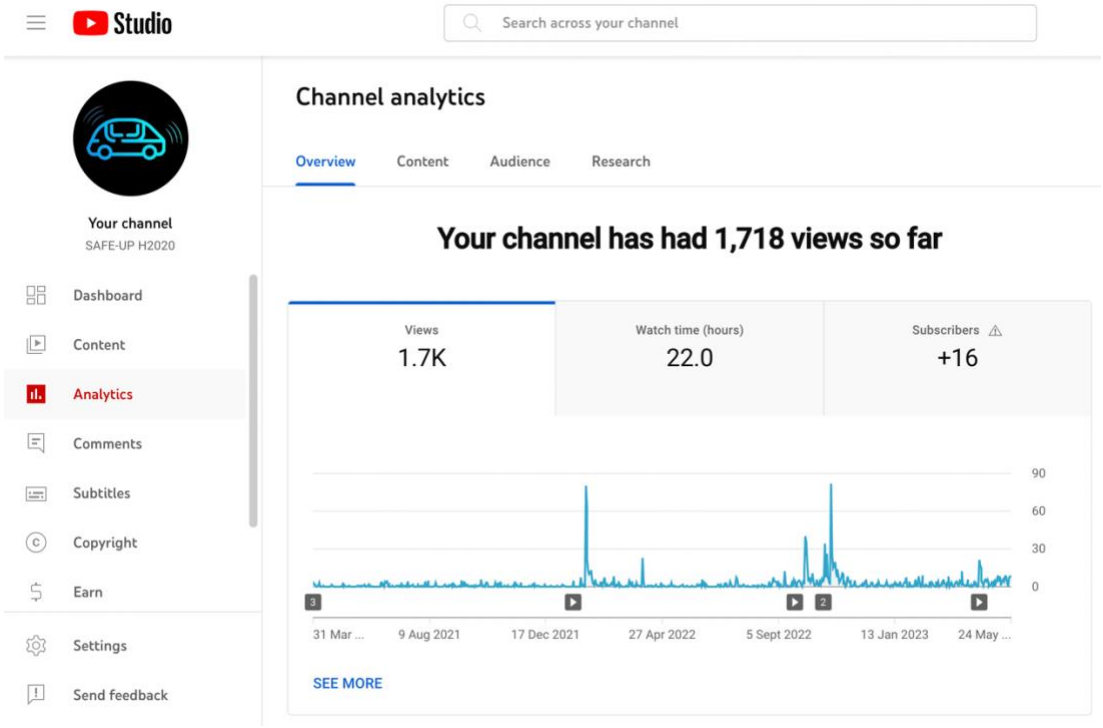

Figure 6: SAFE-UP YouTube channel dashboard

2.4 Events

KPI: 25 EVENTS (where SAFE-UP is presented) | Result: 30 events

KPI: 800 visitors to SAFE-UP exhibits/presentations | Result: 700+

Since 2021, project results have been communicated and disseminated at several external conferences and workshops attended by project partners. The following tables provide a full list of external conferences and workshops in which the project partners have presented their work, or plan to present their work, related to the SAFE-UP project and its results:

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Table 4: Full list of events participated in

#	Event name	Type	Date	Partners involved	Presentation/session title
1	**3rd Annual Automotive Safety Online Summit**	Online Conf (panel)	16/2/21	TNO	N/A
2	**H2020 Transport Research Conference**	Conference (in-person)	29/3/21	IDIADA	Automated driving and the users
3	**ITS World Congress**	Conference (in-person)	11-15/10/21	IDIADA, CERTH, AIMUN, BAX	A comprehensive look into proactive safety: solutions for a highly automated and mixed traffic environment
4	**HUMANIST Conference**	Conference (in-person)	26/10/21	CERTH	Connected VRUs to enhance vehicle perception and safe interaction with connected automated vehicles in urban environments
5	**33rd IEEE Intelligent Vehicles Symposium**		5-9/6/22	TUD	Prediction-Based Reachability Analysis for Collision Risk Assessment on Highways.
6	**IEEE VTC Conference Spring 2022**		19-22/6/22	CEA	Assessment of V2X Communications to Reduce Vulnerable Road Users Crash Risks
7	**The 2022 TRB Automated Road Transportation Symposium**		18-21/7/22	AIMSUN	Traffic simulators are a right tool for evaluating Connected and Autonomous Vehicles?
8	**TÜV SÜD & THI Conference**		27-28/9/22	AUDI	Active vehicle safety systems for vulnerable road users in the focus of SAFE-UP - A Horizon 2020 research project
9	**IFZ 14th International Motorcycle Conference**		3-4/10/22	UNIFI	Knowledge Translation practice to enhance motorcycle research impact
10	**IEEE Int. Conference on Intelligent Transportation Systems (ITSC)**		8-12/10/22	TNO	Long Horizon Risk-Averse Motion Planning: A Model-Predictive Approach
11	*(Same as above)*		8-12/10/22	TNO	Informed sampling-based trajectory planner for automated driving in dynamic urban environments

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12	*(Same as above)*		8-12/10/22	TUE/TNO	Scenario-based Evaluation of Prediction Models for Automated Vehicles
13	*(Same as above)*		8-12/10/22	CEA	Performance Analysis of V2X-based Systems for Improved Vulnerable Road Users Safety
14	**TRA Conference**		14-17/11/22	CERTH/TME	Characterisation of a C-ITS based VRU safety system: Methodology towards scenarios selection
15	*(Same as above)*		14-17/11/22	THI	Performance analysis of CNN speed and power consumption among CPUs, GPUs and an FPGA for EU GDPR 2016/679 compliant applications
16	*(Same as above)*		14-17/11/22	CERTH/UNIFI	Training road users for future mixed automated traffic contexts: A practical framework for creating evidence-based education and awareness schemes
17	**4th Symposium for Management of Future Motorway and Urban Traffic Systems (MFTS)**		**30/11/22 – 2/12/22**	TUD	Reachability-Based Confidence-Aware Probabilistic Collision Detection in Highway Driving
18	**27th ESV Conference**		**3-6/4/23**	IDIADA	Comparison of the Injury Risk Prediction of the THOR-Reclined Dummy and the THUMS HBM
19	*(Same as above)*		**3-6/4/23**	AUTOLIV	Passenger cars in head-on crashes with heavy goods vehicles: For what severity should future car restraint systems be designed?
20	**CARHS Automotive CAE Grand Challenge 2023**		**25/4/23**	IDIADA	Comparison of the Injury Risk Prediction of the THOR-Reclined Dummy and the THUMS HBM

As well as the above partner presentations, SAFE-UP was represented at three exhibitions - two in-person and one online – which are listed in Table 5.

Although difficult to calculate the exact number of visitors to each project exhibition and audience members watching partner presentations, based on the number of attendees at large-scale conferences like the TRA, we can confidently estimate between 700 and 800.

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Table 5: SAFE-UP exhibits

#	Event name	Type	Date	Partners involved	Presentation/session title
1	**EUCAD 2021**	Online exhibit	20-22/4/21	BAX/IDIADA	N/A
2	**TRA 2022**	In-person exhibit	14-17/11/22	BAX/IDIADA	N/A
3	**EUCAD 2023**	In-person exhibit	3-4/5/23	BAX/IDIADA	N/A

Table 6: Upcoming scheduled events/pending acceptance

#	Event name	Type	Date	Partners involved	Presentation/session title
1	**European Control Conference**	Conference	13-16/6/23	BOSCH	Synthesis and application of constrained flatness-based real-time trajectory planning for autonomous emergency steering
2	**International Symposium on Transportation Data & Modelling (ISTDM2023)**	Symposium	19-22/6/23	AIMSUN	Using a Cloud-based simulation environment for assessing future safety-critical scenarios with ADS
3	**ITS European Congress**	Conference	22-24/5/23	IKA	Design of a VR Bicycle Simulator for the Parametrization of VRU Behavior Models
4	**IRCOBI 2023**	Conference	13-15/9/23	VIF	Volunteer study to determine vehicle occupant kinematics and their interaction with the environment in pre-crash scenarios in standard and reclined sitting position
5	**World Congress of the International Federation of Automatic Control (IFAC)**	Conference	9-14/7/23	TUE/TNO	Robustness Benchmark of Road User Trajectory Prediction Models for Automated Driving
6	**World Congress of the International Federation of Automatic Control (IFAC)**	Conference	9-14/7/23	TNO, TUE, TUD	Optimization-based Fault Mitigation for Safe Automated Driving
7	**TRA 2024**	Conference		IDIADA	Safe-Up – Proactive Safety Systems and Tools for a

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					Constantly Upgrading Road Environment

In addition to the above, the SAFE-UP partners teamed up with fellow R&I projects OSCCAR and HEADSTART in November 2020 to host a knowledge transfer webinar. The aim was to facilitate synergies between SAFE-UP and other related innovation projects, identifying State-of-the-Art results to build upon, as well as raising awareness of available tools and databases for partners.

The final project conference was also recently held (on May 17th) at lead partner Applus+ IDIADA's headquarters in Spain, where around 50 researchers, policymakers, automotive experts and road safety enthusiasts came together for a showcase of the project's final demonstrators and gained insights from the experts behind the project. External attendees included around 15 representatives from Euro NCAP, Fraunhofer, Generalitat de Catalunya, I2CAT, SEAT, BMW Group, and more.

Figure 7: Promotional visual for SAFE-UP's final event 'Making future mobility safer for people inside and outside the vehicle'

The final event was also documented in an article on May 19th 2023 by the European Commission on its dedicated Catalan website: https://barcelona.spain.representation.ec.europa.eu/noticies-i-esdeveniments/noticies/un-projecte-europeu-amb-participacio-catalana-creara-nous-sistemes-de-seguretat-les-carreteres-2023-05-19_ca

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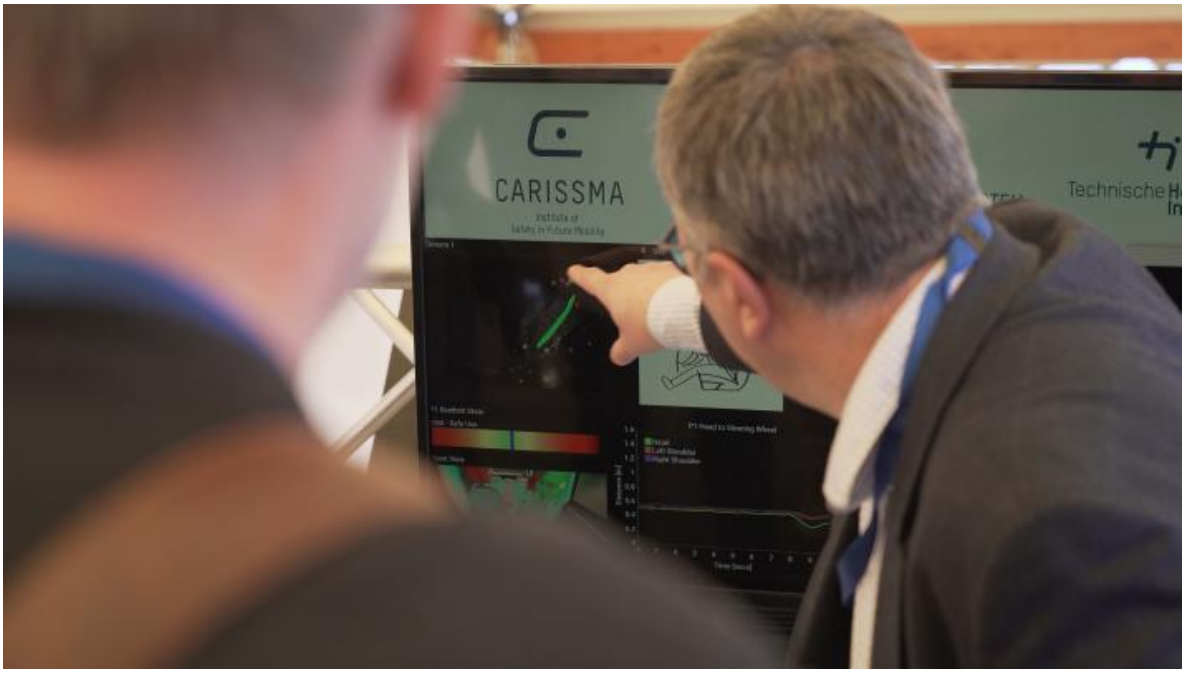

Figure 8: Photos of SAFE-UP final event featured on the European Commission's Catalan website

2.5 External publications

KPI: 50 articles with SAFE-UP mention | Result: 36 mentions

To increase visibility and promote the project's research outcomes, efforts have been made to secure publications with SAFE-UP mentions. These include scientific papers as well as articles in relevant media platforms.

One of our target publications was Intelligent Transport (IT). Intelligent Transport is a leading source for transport related topics such as MaaS, connectivity, CAVs, road safety, etc.

In the 3rd issue of 2021, SAFE-UP's motivation and objectives were presented, along with the AV simulation model from IDIADA and its integration in the AIMSUN Next platform, as well as the challenges simulation poses when it comes to deriving future safety-critical scenarios.

The magazine is distributed quarterly to over 11.446 key decision makers across Europe, such as Transport Ministers, local and regional government decision makers, Chief Executives, Managing Directors, Procurement Directors, among others.

As well as the digital magazine, it was also printed, and you can share the individual article from the IT website.

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ROAD SAFETY

A proactive approach to effectively integrate **autonomous vehicles for future road safety**

With the European Union set to miss its target to halve road deaths by 2030, autonomous vehicles provide many of the solutions to some of road safety's most dangerous problems. SAFE-UP, a European initiative on road safety, is working to deliver the promised potential of autonomous vehicles to keep all road users safe.

PROGRESS ON REDUCING road fatalities in the European Union (EU) has stalled in recent years (at some 25,000 yearly fatalities). While the underlying trend remains downward, progress has slowed down in most countries since 2013 and, at this rate, the EU's target of halving the number of road deaths by 2030, relative to the 2010 baseline of around 30,000 fatalities, will not be met. Current approaches to the development of safety systems, reactive to evidence on the road, will not be sufficient to overcome this situation.

Analysis of road accident statistics suggests that more than 90 per cent of all road collisions are caused by human error, such as distraction, fatigue or infractions'. That is why several leading academic and industrial partners have joined forces to develop a novel proactive approach, enabling the identification of potential safety threats as a basis to develop future safety concepts required in novel emerging mobility scenarios, particularly automation. SAFE-UP, the latest European flagship initiative on road safety, is focused on delivering the promised potential of new automated mobility to keep all road users safe - drivers, vehicle occupants and Vulnerable Road Users (VRUs), including pedestrians, cyclists and users of two-wheelers.

How will AVs interact with the road environment?

To understand how autonomous vehicles (AVs) will change the situation on our roads, how they will interact with other road users and how safety-critical these interactions will be, it is vital to apply reliable tools to simulate the road transport system in future conditions. SAFE-UP will enhance current state-of-the-art traffic simulation tools, including a collaboration between the transport modelling specialists Aimsun and the automotive firm Applus+ IDIADA, which specialises in automotive engineering services.

28

Intelligent Transport | Volume 05, Issue 03

model. In turn, the model, having a restricted view of the environment, could make different decisions than in favourable environmental conditions, where it would have more information about the environment.

How do we know that they are fit for purpose in the real world?

The simulation and prediction of future safety-critical scenarios requires the development of a new modelling framework. Until now, driving behaviour of vehicles and riding behaviour of VRUs has been idealised, and simulation of accidents is bounded by the model's definition. Since road accidents are extremely rare among the high number of trips made on our roads, hard evidence for behavioural mechanisms in accident or near-miss conditions has been difficult to observe.

This is where driving behavioural models are needed to bridge the gap between the fields of traffic flow theory, simulation, traffic safety and psychology. To do this, three types of models are being developed: the first is an advanced human-driven car; the second is automated driving behaviour with 2D trajectory planning controlling longitudinal and lateral movements; and the third is behavioural models for VRUs, such as cyclists, pedestrians and powered two-wheelers (PTWs).

This new generation of behavioural models together with new safety metrics is systematically integrated in the Aimsun Next traffic simulation platform. It enables harmonised simulation of the next generation of all road users' behavioural models (driver, AV and VRU), capturing the failure of sensors, risks those drivers and riders might take, their errors of judgement and distracted perception in future mixed traffic conditions.

Aimsun will model and simulate future safety scenarios to set the baseline for safety-critical situations in the defined use cases. The modelling process will build a digital twin of the infrastructure environment, traffic conditions, technology level, penetration rates and behavioural parameters, covering potential crash locations in urban and interurban roads.

A new roadmap to effectively introduce AVs?

Besides reliable simulation tools to assess new safety-critical situations, we believe that an effective introduction of AVs on our roads will only happen with a holistic approach, coupling the technological benefits of the vehicles and simulation with the requirements of infrastructure and policies, together with the definition of new business models. Led by strategy consultancy Bax & Company, another member of the initiative, SAFE-UP will publish before the end of 2021 a new roadmap that presents its view to achieve this.

AVs will change the way that we travel in an unprecedented manner, touching upon road safety, traffic efficiency, reduced emissions, reduced travel costs and more comfort. We expect most of the implications of autonomous driving to be very positive, dramatically reducing the number of road fatalities and incidents. With a potential impact on 64 per cent of all road fatalities (urban, peri-urban and highway settings), SAFE-UP will effectively contribute to reach the EU's Vision Zero goal for 2050, when road fatalities should be completely avoided.

For further information, visit:

Website: SAFE-UP.EU
Twitter: @SAFE_UP
LinkedIn: safe-up-h2020

SAFE-UP

References

1. EuroNCAP 2025 Roadmap

MORE INFORMATION

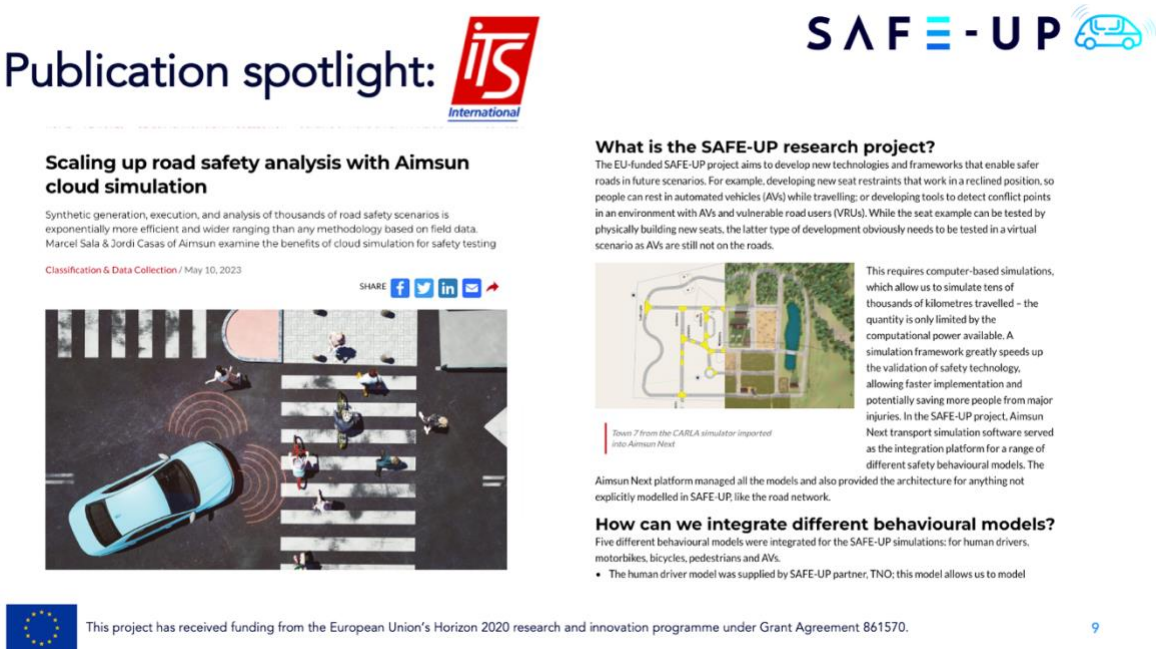
The SAFE-UP project is co-managed by Applus+ IDIADA and Bax & Company. The project started in June 2020 and will run until May 2023.

The consortium includes OEMs Audi and Toyota; automotive suppliers Autoliv, Bosch and ZF; and research organisations such as CERTH, CHALMERS, IKA, TNO, TU Delft, TU Eindhoven, THI, CEA, Virtual Vehicle and the University of Florence. Future safety-critical events simulation is integrated and carried out by Aimsun. The results of the project are to be demonstrated at the test facilities of THI and Applus+ IDIADA.

The SAFE-UP project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement 861570.

29

Figure 9: SAFE-UP's double-page feature in Intelligent Transport's November 2021 issue



Publication spotlight: ITS International

SAFE-UP

Scaling up road safety analysis with Aimsun cloud simulation

Synthetic generation, execution, and analysis of thousands of road safety scenarios is exponentially more efficient and wider ranging than any methodology based on field data. Marcel Sala & Jordi Casas of Aimsun examine the benefits of cloud simulation for safety testing

Classification & Data Collection / May 10, 2023

SHARE

What is the SAFE-UP research project?

The EU-funded SAFE-UP project aims to develop new technologies and frameworks that enable safer roads in future scenarios. For example, developing new seat restraints that work in a reclined position, so people can rest in automated vehicles (AVs) while travelling; or developing tools to detect conflict points in an environment with AVs and vulnerable road users (VRUs). While the seat example can be tested by physically building new seats, the latter type of development obviously needs to be tested in a virtual scenario as AVs are still not on the roads.

Town 7 from the CARLA simulator imported into Aimsun Next

This requires computer-based simulations, which allow us to simulate tens of thousands of kilometres travelled – the quantity is only limited by the computational power available. A simulation framework greatly speeds up the validation of safety technology, allowing faster implementation and potentially saving more people from major injuries. In the SAFE-UP project, Aimsun Next transport simulation software served as the integration platform for a range of different safety behavioural models. The Aimsun Next platform managed all the models and also provided the architecture for anything not explicitly modelled in SAFE-UP, like the road network.

How can we integrate different behavioural models?

Five different behavioural models were integrated for the SAFE-UP simulations: for human drivers, motorbikes, bicycles, pedestrians and AVs.

- The human driver model was supplied by SAFE-UP partner, TNO; this model allows us to model

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9

Figure 10: Slide from the WP7 presentation at the final event spotlighting recent ITS International article

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Table 7: Accepted journal submissions and publications

#	Name	Type	Date	Partners involved	Presentation/session title
1	**IEEE Transactions on Intelligent Transportation Systems**	Journal	April 2022	TUD	Synthesis and application of constrained flatness-based real-time trajectory planning for autonomous emergency steering
2	**IEEE Transactions on Intelligent Transportation Systems**	Journal	February 2022	TUE/TNO	Using a Cloud-based simulation environment for assessing future safety-critical scenarios with ADS
3	**OpenAIRE**	Doctoral thesis	March 2022	CHALMERS	A Holistic Safety Benefit Assessment Framework for Heavy Goods Vehicles
4	**Frontiers in Future Transportation, section Transport Safety**	Journal	June 2022	AUTOLIV	Design of a VR Bicycle Simulator for the Parametrization of VRU Behavior Models
5	**IEEE ITSC 2022**	Conf proceedings	October 2022	TNO	Long Horizon Risk-Averse Motion Planning: A Model-Predictive Approach
6	**IEEE ITSC 2022**	Conf proceedings	October 2022	TNO	Informed sampling-based trajectory planner for automated driving in dynamic urban environments
7	**IEEE ITSC 2022**	Conf proceedings	October 2022	TNO, TUE	Scenario-based Evaluation of Prediction Models for Automated Vehicles
8	**IEEE Xplore**	Journal	November2022	CEA	Performance Analysis of V2X-based Systems for Improved Vulnerable Road Users Safety
9	**Springer Professional / ResearchGate**	Journal	November 2022	IKA	Pre-crash Repositioning of Rearward Shifted Seats in Automated Vehicles
10	**Elsevier Engineering**	Journal	February 2023	TUD	Robustness Benchmark of Road User Trajectory Prediction Models for Automated Driving
11	**Elsevier journal Engineering**	Journal	February 2023	IKA	Reachability-Based Confidence-Aware Probabilistic Collision Detection in Highway Driving
12	**2023 IFAC World Conference**	Conf proceedings	May 2023	TUD, TNO. TUE	Optimization-based Fault Mitigation for Safe Automated Driving

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As well as the above published research papers, and features in target publications Intelligent Transport and ITS International, SAFE-UP has been featured on various other platforms, like the newsletter of the EFA (European Driving Schools Association), ELTIS Mobility Portal, metaforespress.gr, fersi.org, connectedautomateddriving.eu, and EU Agenda.

For a full overview of our KPI results including a breakdown of our article mentions, please see Table 7 (p.31).

Although we did not reach our initial goal of attaining 50 mentions for the SAFE-UP project in various articles, we are proud to note that the 36 achieved mentions have effectively reached all our intended audiences. Our project garnered attention from scientific researchers, policymakers, and even non-expert audiences, ensuring broad dissemination of our research. Now that the project has concluded and the Knowledge Centre is set to be launched soon (see D6.3 for more details), we anticipate an even greater dissemination of tangible results. The groundwork laid by the articles mentioning our project has set the stage for further sharing and utilisation of our findings, thus maximising the impact of the SAFE-UP project.

2.6 Other supporting activities

Several additional activities support the overall communication and dissemination strategy. These include the development of promotional materials such as a roll-up, videos on the demos and simulation software, and a promotional slide deck. Furthermore, the establishment of a communication group comprising representatives from partner organisations aimed to guide communication activities, enhance collaboration, and share project-related updates. Dissemination guidelines were also provided to partners to facilitate their contributions and ensure consistency in content sharing. Additionally, a dedicated SAFE-UP YouTube channel was created to showcase project-related videos.

2.6.1 Promotional materials

The below figures illustrate some of the promotional materials used at conferences where SAFE-UP was presented or exhibited, and also to facilitate direct outreach, for example, in emails to potential advisory board members.

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Figure 11: Project Coordinator Núria Parera alongside the project roll-up at SAFE-UP's EUCAD 2023 booth

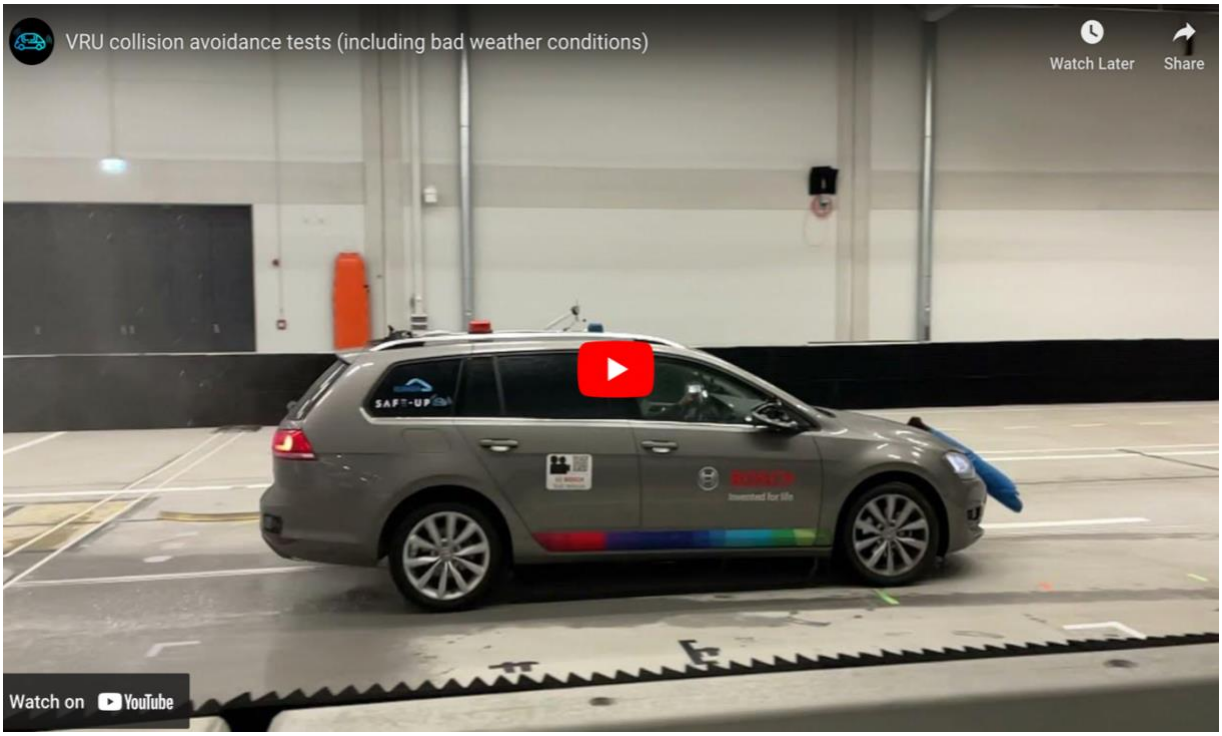

Figure 12: A screenshot of the SAFE-UP YouTube channel's most watched video on VRU collision avoidance tests at THI

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BAX is currently developing an interactive results platform to showcase the innovations developed during SAFE-UP. This platform will serve as a legacy product – an attractive and user-friendly reference for years to come. It will be embedded on the SAFE-UP website but also can be featured on the partner websites.

2.6.2 Communications representatives

At the start of the project, the dissemination manager (BAX) attempted had the intention of assembling a communication group, comprised of at least one representative per partner.

The purpose of this group was to better guide the communication activities, materials and efforts whilst removing any internal barriers to effective communication. Aiming to:

- Enhance scope, impact, and visibility of SAFE-UP and its results.
- Facilitate communication/collaboration between communication departments of all of the project partners.
- Increase the reach of SAFE-UP's communication outputs and results by sharing them through communication channels of all project partners.
- Extract relevant news on a local level and share it with the project consortium.

As not every partner organisation had a communications/marketing professional to participate to this extent, representatives were appointed to simply promote the main outputs and milestones of the project and ensure their respective partners' dissemination efforts were reported to the dissemination manager.

2.6.3 Dissemination guidelines

As well as the mandatory dissemination plan deliverable prepared at the start of the project, Dissemination guidelines for partners were prepared in Y2 to encourage partners to contribute to a steady flow of content shared through the project's channels, and to remind them about key targets.

This document included guidelines and useful reminders within the following sections:

- Why communication & dissemination is important
- Our target audiences
- Our main KPIs
- Types of content that can be shared through the project's channels
- How to share the content with the dissemination manager (BAX)
- Process for sharing multimedia from the website*
- H2020 Publicity requirements
- Outreach measures

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- Reporting & content submissions
- Posting on social media
- Useful links (i.e., dissemination activities reporting form, brand manual, overview of journal & conference submissions, templates, etc.)

*As Google Analytics cannot monitor the number of times a PDF has been viewed, whenever a new infographic was ready to be promoted, we either uploaded the visual directly to social media, or shared a link to the Resources page on the website, instead of the direct link to the infographic. This enabled us to track the number of clicks the file received from that page, and therefore monitor its performance for reporting purposes.

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3. Conclusions

The dissemination activities carried out as part of the SAFE-UP project have been effective in reaching and engaging various audiences. The project's website has provided a substantial volume of content, attracting a total of 11,000 unique visitors and generating 609 content downloads. Additionally, the website has gained 390 inbound links, indicating its relevance and value to other online sources.

The project's four newsletters have also proven to be an effective communication channel, although each newsletter's total reach is not possible to determine, since Google Analytics cannot provide data on PDF documents. With 295 subscribers and around 150 regular readers per newsletter, the information disseminated through this medium has reached a considerable audience. The slow but steadily growing number of opens and downloads per newsletter demonstrates the engagement and interest of the subscribers. As the subscriber base continues to expand, the newsletters hold great potential for reaching a broader audience.

Engagement on social media platforms, such as LinkedIn and Twitter, has been encouraging. The project's LinkedIn page has 586 followers, primarily from the automotive, research, and higher education sectors. The consistent posting activity on this platform has helped maintain and grow the follower base, ensuring a steady flow of information and updates to interested parties. Similarly, the project's Twitter account has garnered 257 followers. The increasing interactions, retweets, and account mentions indicate a growing interest in the project and its activities.

Presenting at around 30 events has allowed the SAFE-UP project to engage with a targeted audience, including researchers, industry professionals, and educational institutions. With approximately 700 audience members attending conference presentations and exhibitions, the project has effectively disseminated its message and findings to key stakeholders. Although specific statistics are not available for some events, the overall presence and engagement at the exhibits have contributed to the project's visibility and impact.

The project's mentions in 36 articles, including media coverage and citations, have further extended its reach. Researchers, industry professionals, readers of trade magazines, standardisation bodies, and the general public have been exposed to SAFE-UP through these articles. Although under our initial target of 50 mentions, we do foresee the project gaining more visibility now that it has reached its completion and has more tangible results to disseminate – particularly the soon-to-be launched Knowledge Centre.

In conclusion, the dissemination activities of the SAFE-UP project have proven to be effective in reaching diverse audiences and generating engagement. The project's website, newsletters, social media presence, event presentations, and media coverage have all contributed to the visibility, credibility, and impact of the project. Moving forward, continued efforts in these areas, along with the upcoming launch of the e-learning platform, will facilitate the dissemination of knowledge and ensure the project's lasting influence in the field.

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Table 8: Complete overview of KPI results

Name	Target	Metrics	Who	Result
SAFE-UP website	All audiences	- Volume of content available - 3.000 unique visitors - 50 content downloads - 110 inbound links	BAX (With support from UNIFI)	- 20 news items / 6 infographics / 1 poster / 5 PPTs / 15 deliverables / Knowledge Centre coming soon **- 11,000 unique visitors** (3.6k average per year) **- 609 unique content downloads** **- 390 inbound (back)links**
Newsletter	All audiences	- 300 readers - 300 opens/downloads per newsletter	BAX	**- 295 subscribers** - 2nd newsletter: ~80+ - 3rd newsletter: ~100+
LinkedIn	Research, industry, academia	- 300 followers - Increasing # of posts	BAX	**- 586 followers** (Mainly hailing from Automotive, Research, Higher education) - 27 in 2021, 43 in 2022
Twitter	All audiences	- 400 followers - Increasing interactions - Account mentions	BAX	**- 257 followers** - 200+ retweets - 94 account mentions
Events	Research, industry, academia	SAFE-UP presented at 25 events	All	27 events (incl. 7 upcoming presentations)

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		800 visitors to SAFE-UP exhibits (presentations)		3 exhibits **= 30 events** **~700 audience members (ITS, H2020RTR, HUMANIST - no stats from EUCAD 2022/2023)**
Articles (including media coverage & citations)	Researchers, industry, readers of trade magazines, Standardisation bodies, general public	50 articles with SAFE-UP mentions	All	**36 SAFE-UP mentions** ELTIS: 8 EU AGENDA: 7 Intelligent Transport: 2 ITS International: 1 EFA: 2 Metaforespress: 1 FERSI: 1 Thums User community: 1 CAD website: 1 Scientific papers: 12

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