D7.5: Final report on communications

[WP7 – Communication and dissemination]

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Abstract

In this report we present and evaluate key performance indicators of the SIENNA project's communication activities for the duration of the project. The report is focused on the third phase of the SIENNA project's communications strategy (month 31-42), and how communication activities have supported the project's impact though four activities: namely the SIENNA project's public consultation of proposals for the ethical management of human genomics, human enhancement, artificial intelligence and robotics; the development and sharing of a series of policy briefs with recommendations for European and national policy-makers; the SIENNA project's final conference; and a high-level policy event organised by the European Parliament's STOA network together with the PANELFIT and SHERPA projects.

Document history

Version	Date	Description	Reason for change	Distribution
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Information in this report that may influence other SIENNA tasks

Linked task	Points of relevance
T7.1 Communication and dissemination plan	The social media strategy and outline for impact collaboration with the PANELFIT and SHERPA projects for AI & robotics is described in this document.
T7.2 Website launch and maintenance	The structural changes on the SIENNA website are described in this document.
T7.3 Graphical identity and guidelines for use	The visual identity for collaboration with the PANELFIT and SHERPA projects is outlined in this document.
T7.4 Scientific dissemination	This document lists KPI's for scientific dissemination as described in the DoA.
T7.5 Stakeholder communication and public relations	Stakeholder communication and public relations activities are reported in this document.
T7.6 Measuring outreach	Reports on dissemination and communication activities are annexed to this report, and KPI's listed in the document.
T1.4 Conduct stakeholder analysis and compile a contact list	The use of the stakeholder analysis contact list for e-mail newsletters and invitations to SIENNA events are described in this document.
T6.6 Formulate a sustainability plan	Input from this report will feed the exploitation and sustainability planning for SIENNA

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Executive summary

The SIENNA project has used a three step approach to communications, building strategy in three steps: Tactics in the initial phase (month 1-12) focused on raising awareness of the existence of the project, identifying and connecting with stakeholders. In the second phase (month 12-30), tactics moved from raising awareness to develop strategy to maximise impact, involving stakeholders in shaping key messages. Networks, projects and initiatives identified in the first year were assessed for potential collaborations that could support the dissemination of outputs from, and impact of, the SIENNA project. This is described in an interim report (SIENNA D7.4 Interim Report on communications, WP7 Communication and dissemination). The current report is focused on the third phase of SIENNA communications (month 31-42), where tools and tactics used builds on the knowledge produced in the first and second phase with a focus on supporting impact by mobilising and engaging stakeholders and gatekeepers, and providing publicity for project activities in our channels to the audiences we have built. These include a public consultation of proposals from the project, a series of policy briefs, a final conference, and a workshop organised together with the European Parliament Panel for the Future of Science and Technology (STOA), and the SHERPA and PANELFIT projects. We have used the website, Twitter, and newsletter to push content to audiences, inviting them to participate and contribute to in project activities, calling them to action to register for an event, read a report, or watch a video.

SIENNA webinars, workshops, and other events provide input not only to the outputs coming from the project but also helps shape the way we talk about them. We have organised a series of webinars to present and discuss results, engage with stakeholders, and support collaborations with other projects. Providing an important venue for scientific dissemination, and an important part of our publicity strategy. In December 2020, SIENNA issued the first in a series of policy briefs that have played an important role in communicating recommendations from the project. Video has been an important medium for communicating to different audiences, using short clips with succinct messages to increase visibility, support project branding, build audiences, and call people to action in social media, newsletters and on the project's website. We have also used recordings of webinar and conference presentations for scientific dissemination and to extend our reach beyond those who were able to participate in the live events. We have used the project's website, newsletter and Twitter to do publicity for results and events, using webinars and other events to build our audiences and to develop content for our channels. Presentations have been recorded and shared on YouTube, web and Twitter. To build our audiences, registration forms have all been fitted with an opportunity for attendees to opt-in to receiving regular e-mail updates. To ensure content is relevant to our audiences, we have divided our audience into segments. Allowing us to issue communications to audiences who have stated that they are interested in the respective technology areas separately. This is also mirrored on the SIENNA website, providing one landing page per technology area, to ensure the content is relevant to website visitors.

This report describes our audiences and channels. It evaluates our tools and tactics by reporting different key performance metrics. It also shows the impact of a global pandemic on our reach, and how we have adapted by changing our plans but also how we have navigated this new landscape. Changing tactics takes time and effort. This report shows that effective science communication requires appropriate resources.

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List of acronyms/abbreviations

Abbreviation	Explanation
AI	Artificial Intelligence
DoA	Description of Action
DOI	Digital Object Identifier
EC	European Commission
EU	European Union
GDPR	General Data Protection Regulation
HBP	FET Flagship Human Brain Project
ISO	International Organization for Standardization
PANELFIT	Participatory Approaches to a New Ethical and Legal Framework for ICT (H2020 project)
RPO	Research performing organisation
STOA	European Parliament Panel for the Future of Science and Technology
SEO	Search Engine Optimisation
SHERPA	Shaping the ethical dimensions of Smart Information Systems (SIS) – A European Perspective (H2020 project)
KPI	Key Performance Indicator
URL	Uniform Resource Locator
WP	Work Package

Table 1: List of acronyms/abbreviations

Glossary of terms

Term	Explanation
Audience	Group for which SIENNA communication or dissemination is targeted.
Bounce rate	A website's bounce rates is a representation of the percentage of website visitors who enter the site and then leave, or "bounce", rather than continuing to browse the website and view other pages on the same site.
Consortium	Collectively, all parties that have signed the Consortium Agreement.
Consortium member	Individual involved in the SIENNA project.
Content owner	Individual responsible for accuracy of content in specified channel (or part of channel).
Data Protection Notice	Notice listing data controllers, the purposes and legal basis for processing personal data, the recipients of this personal data, the period and nature of processing, and the rights of the individual.
Dissemination	Active and tailored scientific (or research) communication of results to different academic audiences.
External communication	Adapting and informing about key messages and/or disseminations for different audiences.
InfoGlue	Content Management System (CMS) used by Uppsala University.

Term	Explanation
Impressions	On Twitter, "Impressions" indicates the number of times a tweet has appeared in users' flows. On YouTube, "Impressions" indicates the number of times a "thumbnail" (i.e. the still image of the video) was shown to YouTube users.
Internal communication	Sharing information between partners and/or members within the SIENNA consortium
Key message	The main points SIENNA wants target audiences to hear and remember.
Landing page	Main point of entry (start page) for general and/or specific audiences on the SIENNA website.
Organic reach	Social Media metric showing how many unique accounts have seen a post one time.
Partners	All partners of the SIENNA project are organisations – full or associate. 'Full partners' refers to any of the 11 beneficiaries of the project who receive funding for project activities.[1] 'Associate partners' refers to the two non-crucial partners who do not receive funding for project activity.
Plain language	Communicating in a clear, concise and structured way, avoiding jargon or convoluted language (i.e., in plain writing or plain English).
Session	A website session is a group of interactions with a website during a certain amount of time. One session can include multiple page views and interactions.
Stakeholder	A relevant actor (persons, groups or organisations) who: (1) might be affected by the project; (2) have the potential to implement the project's results and findings; (3) have a stated interest in the project fields; and, (4) have the knowledge and expertise to propose strategies and solutions in the fields of genomics, human enhancement and human machine interactions i.e., artificial intelligence (AI) and robotics. (SIENNA D1.2 definition)
Unique page view	A unique page view aggregates page views generated by the same user in the same session. A unique page view represents the number of sessions during which that page was viewed one or more times.
Visual identity	Graphical identity and other visual components (such as colour scheme, fonts) used in SIENNA communications (i.e., web, printed materials, report and presentation templates).

Table 2: Glossary of terms

[1] SIENNA, Description of Action, Part B, p. 38.

1. Introduction

1.1 Background

The SIENNA project's communications strategy and plan has been developed in three steps (outlined in our report D7.3 Communication and dissemination plan): In an initial phase (month 1-12), we launched channels (web, Twitter, Newsletter, and YouTube) and activities with the aim to raise awareness of the project, its objectives and scope, and to build audiences for the project overall, and for the human genomics, human enhancement, AI & robotics work streams respectively. In a second phase (month 13-30, as described in our report D7.4 Interim report on communications) the communications work stream initiated the development of the strategy for impact collaboration and interaction with key stakeholders. This task was handed over to work package 6 and the subsequent plan and activities to achieve buy-in and impact will be reported as part of the project's sustainability plan. This report covers the duration of the project, with a focus on activities in the final phase of our communications strategy (month 31-42) translating lessons learned in the first two phases to strategy and plan, with the aim to **support impact** and use the channels and audiences built though communications activities to share results, receive input from stakeholders and support policy impact.

The objectives of the project's communications strategy and plan has been to:

- enable SIENNA consortium members to effectively communicate and meet overall objectives;
- effectively engage with, and tailor communication and dissemination to, stakeholder groups, and ensure our stakeholders understand the value of SIENNA results;
- enable SIENNA to disseminate and communicate the results of the project in a timely manner;
- enhance the project's visibility and reputation and foster its impact widely, at the EU and international level;
- change stakeholder behaviour and perceptions where necessary;
- demonstrate the success of the SIENNA project;
- set measurable goals and objectives of communication and dissemination.

The SIENNA communication and dissemination strategy was designed with the aim to support impact by making outputs **discoverable and findable** (using DOI + complementary strategy to generate publicity); making outputs **available** (using Open Access); making outputs **relevant** (by re-framing and re-packaging content for different stakeholders and audiences); and making the project and its results **understandable** (by translating content to other languages, but also by adapting the communication for different audiences). This strategy has been successfully implemented.

1.2 Objectives

This report builds on the SIENNA project's report *D7.4 Interim report on communications*, with a focus on describing our communication and dissemination strategy in the final phase of the project, reporting on activities and key performance indicators with the aim to evaluate the effectiveness of the strategy, and how it was operationalised. In this document we offer an overview of our reach and engagement in relation to activities carried out between October 2017 and March 2021. Activities are evaluated in relation to the tentative list of Key Performance Indicators (KPI's) outlined in the report *D7.3 SIENNA Communication and dissemination plan*.

1.3 Scope and limitations

This report outlines how the communications work package in the project has coordinated and supported the activities of several work packages. The interim report included a section on impact strategy for the project's AI and robotics work stream. This is no longer part of the scope of the communication strategy. Our initial work was handed over to task 6.6, contributing to the discussion on how to curate and sustain SIENNA outputs and ensuring the sustainability and exploitation planning is aligned with dissemination and communication plans. Actions in this work stream was reported in the project's sustainability plan.

2. Activities to support legacy and impact

In the last phase of our communications (month 31-42), activities have focused on supporting the uptake of SIENNA recommendations through publicity for results and the project's proposals through traditional publicity activities (press and social media), and engagement with stakeholder audiences through webinars, consultations and a series of events. In the last four months of the project, our efforts focused on four major activities: 1) the SIENNA project's public consultation of proposals for the ethical management of human genomics, human enhancement, artificial intelligence and robotics; 2) the development and sharing of a series of policy briefs with recommendations for European and national policy-makers; 3) the SIENNA project's final conference; and a 4) high-level policy event organised by the European Parliament's STOA network together with the PANELFIT and SHERPA projects. After ending, the SIENNA project launched a scheduled legacy Twitter campaign, sharing links to publications, video recordings from the final event, and other outputs. This is outlined in this document. We expect this legacy campaign to be used by other H2020 project building on SIENNA results to interact with our audiences, supporting the sustainability of the SIENNA communications strategy, transferring some of our audiences to other projects.

The last four months of the SIENNA project was by far the busiest for the communications work stream (see table 3). Organising and promoting a public consultation of the project's proposals, along with three public-facing events in the last month of the project: a final conference on 10-12 March, a workshop together with the PANELFIT and SHERPA projects organised and hosted by the European Parliament's STOA panel on 23 March, followed by one last event: An open webinar organised together with the Human Brain Project and SHERPA on 30 March.

Last four months				**After ending the project**		
Dec	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Save the date						
	Public consultation					
		Event(s) publicity				
			SIENNA	#SIENNA legacy on Twitter		
			STOA			
			HBP/SHERPA			

Table 3: Gantt chart of publicity activities and public facing activities December 2020—June 2021

One important part of the project legacy is the publications we have issued in different forms. A major website update included a landing page for publications, pointing to different types of outputs of the project: publications in scientific journals, policy briefs, public deliverable reports, and newsletters and blog posts. Keywords have been added to the metadata on these pages, supporting findability. We have also updated the website with a legacy page, sharing recorded presentations from the final conference.

2.1 Public consultation

Between 11-25 January 2021, the SIENNA project organised a public consultation for a number of proposals. The audiences built through communications activities were invited through e-mail newsletters and a two-step Twitter campaign: One save-the-date step running over the holidays between 17 December and 10 January, and a second step through a series of communications activities. A landing page for the public consultation was developed on the SIENNA website, enabling round-trips (e.g. all technology area landing pages advertised the public consultation, all submitted responses linked to all other documents). The save-the-date campaign was announced via e-mail and repeated on Twitter over the Christmas holidays, followed by a second e-mail to launch the consultation and a Twitter campaign for the duration of the consultation period.

The aim of the public consultation was to receive input on proposals for the ethical management of new and emerging technologies developed by the SIENNA project. The documents that stakeholders and publics were invited to give feedback on included:

Human genomics

- Operational guidance for ethical self-assessment of research

Human Enhancement

- Ethical guidelines for research, development & application of human enhancement
- Proposals for the creation of an appropriate body to oversee and analyse trends towards human enhancement, assess moral and social consequences, provide information and advice.

Artificial intelligence & robotics

- Ethics by design & ethics of use approaches for AI, robotics & big data
- Industry education and buy-in
- AI ethics education, training and awareness raising
- Ethics as attention to context: recommendations for AI ethics

Central to the public consultation campaign was a video asking for input between 11-25 January, listing the technology areas and related proposals. The video was 1.43 seconds long, and uploaded in-stream as pinned Tweets on Twitter it auto-played this message, with a repeating message and call to action

stating that “We want to know what you think!” Although the main channel for this content was Twitter, the video was also published on YouTube, providing a legacy for this campaign (https://youtu.be/BZHbyBrrd9s). The video was shared twice, once on 17 December to save the date, and again on 11 January to launch the public consultation.

The focus and format of the genomics part of the campaign was different from the other two. As patients are a major stakeholder for research and clinical applications of human genetics and genomics, an effort was made to develop a format that allowed patients to give informed input. A patient-facing webinar (open to other stakeholder communities) was organised on 18 January between 10-12 CET, presenting our proposal for ethical self-assessment of research in human genetics and genomics in a format that fits lay audiences. The webinar also offered an opportunity to give input and ask questions as a complement to submitting input and comments in writing through a website interface (bespoke forms were developed for all proposals). The webinar was well received and 43 people, of whom several represented patient organisations. registered to attend, and several of the patient representatives participated actively in the webinar, which was also recorded and posted on YouTube.

The save-the-date part of the campaign consisted of 21 tweets with 11,944 impressions and 268 engagements, of which 38 were link clicks. The average engagement rate of this campaign was 2.24%. The save-the-date email was sent to the entire SIENNA newsletter subscribers list (at the time consisting of 1,042 individuals), with 1,084 total opens, meaning it was forwarded well beyond SIENNA’s own audience by recipients. 56 link clicks were collected, indicating that we were generating anticipation of the public consultation through this newsletter. In the second step of the campaign, the e-mail audience had grown from 1,042 recipients to 1,058. This email was opened 319 and generated 74 link clicks, indicating that it was primarily opened by people who had already heard about and decided whether the public consultation was of interest to them.

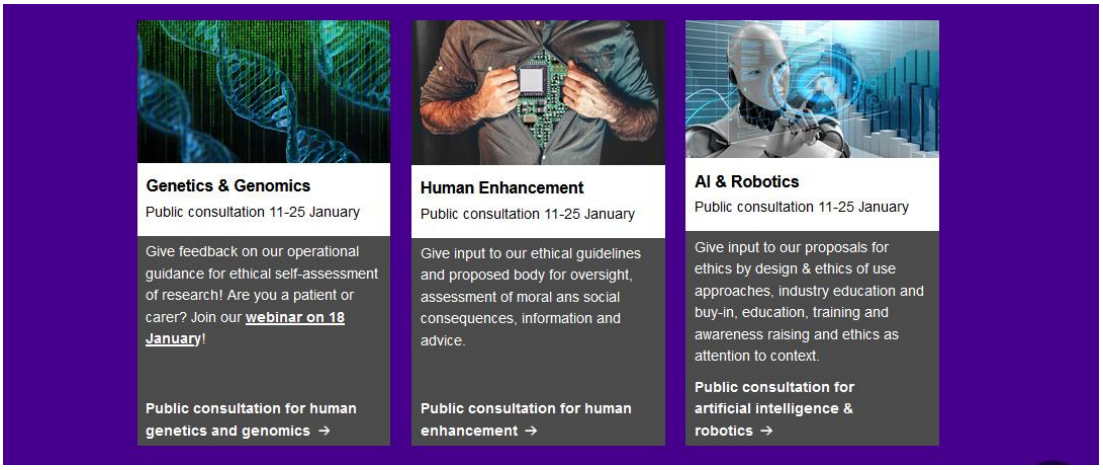

Figure 1: SIENNA public consultation website banners for each technology area

The launch campaign generated around the same amount of link clicks as the save-the-date campaign but reached a wider audience with 16,557 impressions, but with a lower engagement rate (1,46%.) However, in the second step, the number of times SIENNA was talked *about* on the Twitter platform increased from 5 times to 21. The genomics-related part of the campaign included a webinar for patient audiences, utilizing networks with patient organisations to spread the invitation beyond our existing audiences and networks, which has contributed to building audiences for this work stream.

Note: input on recommendations for improving regulation was received in a different process, with a webinar organised on 17 June 2020 on our proposals for enhancing legal frameworks. The webinar had 96 registered participants. The webinar was recorded and published on YouTube.

2.3 Final conference and legacy campaign

The public consultation campaign ended with the launch of a new campaign to promote the final conference that was held between March 10-12. The event was originally planned as a two-day meeting in Brussels, but because of the Covid19 pandemic, the event had to move online. A tab for the conference was added to the top navigation on the project website, replacing the public consultation, and a save-the-date e-mail was sent. By this time the newsletter audience had grown to 1,074 subscribers. A Twitter campaign was launched, with a combination of more general tweets and tweets focusing on the specific technology areas, with keynote speakers and highlights from the programme.

There was a lot of interest in the final conference. In total, 544 people registered for the event, with 292 individuals actually participating either in the full event or in parts. Participants were mainly from research performing organisations (RPO), but with significant proportions representing industry, policy-makers and civil society. There was no significant difference in proportions between these groups between those who registered for the event and those who actually participated.

Figure 2: SIENNA final event registrants and participants per audience segment

Presentations from the final conference were recorded and published on the project's YouTube channel. Because there was little time between the conference and the end of the project, and two more events to promote (STOA workshop on 23 March and a webinar on 30 March), we decided to schedule a legacy campaign on Twitter, using the same hashtag (#SIENNAlegacy) for the final conference and campaign. The final conference web page was replaced by a general legacy web page, with the conference programme, video, and links to project outputs (https://www.sienna-project.eu/legacy/). This page also featured a video that was developed for the final conference and

campaign, presenting the key messages from the SIENNA project in a short video clip. The video tweet was pinned to the Twitter profile to promote the final conference, and posted and pinned again for the legacy campaign. At the time of writing the report, the legacy tweet has had almost 900 views, a number that is expected to build as the Twitter handle is still posting, and also receiving new followers. The campaign will go on between 31 March and 18 June, with two tweets per week, sharing links to publications, video, and other outputs. Taking advantage of the large Twitter following that we have been able to build over the last 3.5 years.

Figure 3: Pinned legacy tweet

2.4 STOA workshop

The SIENNA project has collaborated with the PANELFIT and SHERPA projects on two levels: the coordinators have discussed synergies and how to achieve common goals; and the communication teams have developed a number of joint activities, including a webinar, a video presenting the three projects together, and a publication in the Orbit Journal. The SIENNA and SHERPA projects have also organised joint Ethics by Design training sessions.

In 2020, the SHERPA project initiated discussions on a joint final event. This resulted in an event at the European Parliament on 23 March, organised by STOA: Future-Proofing Disruptive Technologies: Policy Options for the Ethical Governance of AI and Emerging Technologies. The event took its departure from the current discussion on artificial intelligence and the legislative agenda, adding the SIENNA perspective to move the discussion beyond AI. One of the aims was to point to the important issues that need to be addressed and how we can build on lessons learned from the AI discourse to prepare for a new wave of technological and scientific advances to ensure that technology can benefit us all and that we address risks early on.

The event was organised online, which allowed it to be open. The organising committee was led by the SHERPA project's coordinator Bernd Stahl. The agenda included a policy keynote on Europe's approach to Digital Governance by Despina Spanou, Head of Cabinet of the European Commission's Vice President, a research keynote on AI and after – Addressing the next generation of challenges by Yoshua Bengio, University of Montreal, and a final keynote speech by Mariya Gabriel, European Commissioner for Innovation, Research, Culture, Education and Youth. Closing remarks were given by STOA chair Eva Kaili.

The event was meant to stimulate policy related debate about questions related to future disruptive technologies. This was achieved through three panels, organised by SHERPA, PANELFIT and SIENNA respectively. The structure of the panels was developed to allow interaction between invited panelists, but also allowing questions from the audience. Panelists were selected to ensure that questions were addressed from three perspectives: academic, industry and policy. The event was moderated and guided by Vivienne Parry (science journalist and author), ensuring consistency. The themes discussed in the panels were complemented by a round table discussion organised by STOA.

The event was widely publicized. Although exact figures have not been disclosed by STOA, we know that the event attracted over 1,000 registrations, with somewhere between 230 and 280 participants in the actual event, with another 70 following the live stream. The event is recorded and available to watch from the European Parliament's multimedia centre.

2.5 Policy briefs

In December 2020, SIENNA issued the first in a series of policy briefs. The briefs have been published on Zenodo, an open access repository that is indexed in OpenAire, allowing us to track views and downloads (see appendix). They have a uniform design and have played an important role in communicating recommendations from the project. Briefs have been shared with relevant policy makers, but also publicized in SIENNA channels. They have a specific section on the publications page (https://www.sienna-project.eu/publications/policy-briefs/) and are also featured in the legacy Twitter campaign.

Policy brief	Views	Downloads
Trilateral Research. (2020, December 17). Enhancing EU legal frameworks for AI & robotics: SIENNA project Policy Brief #1	450	225
Santa Slokenberga. (2021, January 31). Enhancing EU legal frameworks for genetics & genomics research, SIENNA project Policy Brief #2	179	117
Trilateral Research, Responsible AI and robotics: Enhancing national legal frameworks, SIENNA Project Policy Brief #3	115	88
SIENNA project, Ethics & human rights for new and emerging technologies: SIENNA project Policy Brief #4.	251	189
Yasemin J. Erden, & Philip Brey. (2021, March 24). Promoting ethics for human enhancement technologies: SIENNA project Policy Brief #5	220	119

Table 4: Policy briefs from the SIENNA project (figures from March 2021)

Two SIENNA partners, University of Granada in Spain, and Dalian University of Technology in China, have also provided summaries and recommendations for national regulation based on the studies they conducted to map the regulatory landscape in their respective countries. This work has contributed to other reports from the SIENNA project.

- Javier Valls Prieto. (2021, March 23). Genética y genómica humana. Mejora del marco jurídico de España (Version 1.0). Zenodo. http://doi.org/10.5281/zenodo.4633448
- Javier Valls Prieto. (2021, March 23). Inteligencia artificial y robótica. Cómo mejorar el marco legal en España (Version 1.0). Zenodo. http://doi.org/10.5281/zenodo.4633470
- Yan Ping, Liu Hongzuo, & Wang Qian. (2021, March 24). Human Genetics and Genomics Law in China (Version 1.0). Zenodo. http://doi.org/10.5281/zenodo.4633486

3. Scientific dissemination

All public SIENNA deliverable reports are published open access on Zenodo, and all peer-reviewed papers will be published open access (as outlined in the Grant Agreement article 29.2). We have met and surpassed all key performance indicators for scientific dissemination outlined in the Description of Action (see table 5).

Activity	KPI	May 2019	March 2021
Scientific publications	5 publications submitted/accepted (by month 42)	2	11
Open access	Gold open access or green open access provided by end of journal embargo	1	10
Webinars	6 webinars held by month 42	1	9

Table 5: KPI's for scientific dissemination

3.1 Scientific publications

Researchers in the SIENNA consortium have published results in peer reviewed journals and pre-print repositories. More manuscripts are under preparation or have been submitted to journals for publication.

3.1.1 Genomics

1. Raz AE, Niemiec E, Howard HC et al, Transparency, consent and trust in the use of customers' data by an online genetic testing company: an Exploratory survey among 23andMe users, New genetics and society, 2020;39:4 459-482
2. Niemiec E, Howard HC, Ethical issues related to research on genome editing in human embryos, Computational and Structural Biotechnology Journal, 2020;18 887-896
3. Niemiec E & Howard HC, Germline Genome Editing Research: What Are Gamete Donors (Not) Informed About in Consent Forms?, The CRISPR Journal, 2020;3:1 52-63
4. Niemiec E & Howard HC, "Genethics" and Public Health Genomics, in Applied Genomics and Public Health / [ed] George P. Patrinos, San Diego: Elsevier Inc./Academic Press, 2020, 1, p. 243-257
5. Slokenberga S & Howard HC, The right to science and human germline editing. Sweden, its external commitments and the ambiguous national responses under the Genetic Integrity Act, Förvaltningsrättslig Tidskrift, 2019;2:199-222.
6. Canellopoulou-Bottis, Maria, The Greek Law on Genetics and Genomics - An Overview and Outlook for Future Perspectives, SSRN, available online December 4, 2018

Forthcoming publications

- Operational guidance for ethics self-assessment. Lead author: Mats Hansson
- Code of conduct for genomics data sharing. Lead author: Amal Matar

3.1.2 Human enhancement

1. de Araujo M, The Ethics of Genetic Cognitive Enhancement: Gene Editing or Embryo Selection?, Philosophies, 2020;5(3):20

Forthcoming publications

- Ethical guidelines for human enhancement. Authors: Yasemin J Erden & Philip Brey
- Application of SIENNA ethical guidelines for Human Enhancement on the neural prosthesis case study in D5.3. Authors: Yasemin J Erden & Philip Brey

3.1.3 AI & robotics

1. Resseguier A & Rodrigues R, Ethics as attention to context: recommendations for the ethics of artificial intelligence, Open Research Europe (version 1, March 2021, awaiting peer-review)
2. Rodrigues R, Legal and human rights issues of AI: Gaps, challenges and vulnerabilities, Journal of Responsible Technology, first published 16 October, 2020.
3. Rességuier A & Rodrigues R, AI ethics should not remain toothless!: A call to bring back the teeth of ethics, Big Data and Society, first published 22 July, 2020.
4. Fernow J, de Miguel Beriain I, Brey P, & Stahl B, Setting future ethical standards for ICT, Big Data, AI and robotics, ORBIT Journal 2019, 2019(1).

Forthcoming publications

- AI in medicine from a philosophical and ethical perspective. Authors: Stephen Rainey, Yasemin J. Erden & Anaïs Resseguier
- SIENNA multistakeholder approach. Lead author; Philip Brey
- Ethics by Design for AI. Authors: Brand Dainow & Philip Brey
- Research ethics for AI (proposed publication). Authors: Brand Dainow & Philip Brey

3.1.4 Generalised approaches

No papers about the generalised approaches were submitted before the end of the project, but results from WP6 will also be published in scientific journals. Forthcoming publications include:

- Methods for legal analysis. Authors: Konrad Siemaszko & Zuzanna Warso
- Socio-economic impact assessment for new and emerging technologies. Authors: Marina Diez Rituerto, Rowena Rodrigues, Anaïs Resseguier & Nicole Santiago. Other contributors to be confirmed
- SIENNA ethical analysis approach. Lead author: Philip Brey

3.1.5 Altmetric data for scientific publications

The SIENNA website uses a publication list generated by the Uppsala University DiVA database, which allows us to display Altmetric scores in real-time. Several SIENNA publications have received high

Altmetric scores, with a paper by Anaîs Rességuier and Rowena Rodrigues titled « AI ethics should not remain toothless » which has been shared extensively by academics on Twitter, in blogs, one news outlet (Medium blog post about the Timnit Gebru case) and one policy source (European framework on ethical aspects of artificial intelligence, robotics and related technologies). Another example a book chapter Emilia Niemiec & Heidi C. Howard ("Genethics" and Public Health Genomics, in Applied Genomics and Public Health) with 74, mainly attibuted to news coverage based on the publisher offering free content in relation to rare disease day. In addtion, a paper by Rowena Rodrigues titled « Legal and human rights issues of AI : Gaps, challenges and vulnerabilities » have scored 25, which can be attributed to extensive sharing by academics on Twitter, and blog posts about the paper. Visit the SIENNA website for a full list of papers with Altmetric data: https://www.sienna-project.eu/publications/papers/).

3.2 Presentations (oral and posters)

At the core of academic practice is presenting results and discussing them with peers. SIENNA researchers have presented their work at a number of events, reaching over 4,000 stakeholders representing the scientific community, industry, policy makers, civil society and the general public. The number of presentations divided by technology area are listed in table 6.

Presentations	**2017**	**2018**	**2019**	**2020**	**2021**	**No of people**	**Audiences**
AI & Robotics	0	14	14	2	1	1,798	Scientific Community, Industry, Policy Makers, General Public
Human Enhancement	0	1	7	1	2	505	Scientific Community, Civil Society, General Public, Policy Makers
Human Genomics	1	3	4	1	0	1,675	Scientific Community, Industry, Civil Society, General Public
About SIENNA	1	3	2	0	1	345	Scientific Community, General Public
Total	2	21	27	5	4	4,323	All

Table 6: SIENNA Presentation KPI's, number of people reached and audience

3.3 Deliverable reports

SIENNA deliverables have been made available on the project website. Initially as PDF's, but starting in the autumn of 2020, reports have been published with a DOI on Zenodo, an Open Aire repository, which allows tracking of downloads and Altmetric data. Metrics for views, downloads and altmetric scores for all reports are listed in annex to this report (figures from 26 April). The reports with most views includes those for which we have done most publicity, with D4.5 Public views on artificial intelligence and robots across 11 EU and non-EU countries at the top with 579 views and 328 downloads, followed by D4.6: Qualitative research exploring public attitudes to AI and robotics with 512 views and 113 downloads. There has also been great interest in the reports on Human Enhancement, with 410 views and 291 downloads for D3.4: Ethical Analysis of Human Enhancement Technologies and 369 views and 293 downloads for D3.1: State-of-the-art Review: Human Enhancement. The recommendations enhanced legal frameworks (SIENNA D5.6: Recommendations for the enhancement of the existing legal frameworks for genomics, human enhancement, and AI and robotics) also generated much interest, with 308 view and 204 downloads.

Top Altmetrics scores for these reports was 17, reached by the public opinion surveys for both AI and robotics and human enhancement. Followed by a number of reports scoring 11, including the report on qualitative work for human enhancement. This is however the result of the UK Daily Mail posting the wrong link in relation to a text about the AI and robotics survey report, and not a result of publicity activities in relation to these reports per se (see annex for full list of Altmetric data).

3.4 Webinars

The SIENNA project has organised a series of webinars to present and discuss results, engage with stakeholders, and support collaborations with other projects. These webinars have been an important venue for scientific dissemination, and an important part of our publicity strategy for the project. As a rule, webinars have been advertised in our newsletters, on the project's website, and on Twitter. Presentations have been recorded and shared on YouTube, web, and Twitter. To build our audiences, registration forms have all been fitted with an opportunity for attendees to opt-in to receiving regular e-mail updates from us, which most of the attendees also have done.

Webinars offer people from all over the world, who otherwise would not have been able to engage with us, an opportunity to participate. Recording the webinars and posting them on YouTube adds an opportunity for those who are not able to attend due to other commitments or time differences to see the presentation afterward. And at the onset of the global Covid19 pandemic, our experience organising this kind of public-facing event proved useful. We have used a GDPR compliant version of Zoom provided by Uppsala University for the webinars. Having the infrastructures and know-how in place proved helpful when many of our planned activities, including workshops and the final conference, had to move online.

Title of webinar	Date	Registered attendees (participants)	No of views on YouTube
SIENNA/SHERPA/PANELFIT AI webinar	20/05/19	39	344
SIENNA Legal analysis webinar	05/03/20	97	403
SIENNA Ethics by Design in AI & Robotics	22/05/20	39	40
SIENNA Enhancing legal frameworks webinar	17/06/20	96	84
SIENNA Ethical analysis of AI & robotics technologies webinar	01/07/20	45	159
SIENNA Ethical guidelines for human enhancement webinar	14/12/20	114	159
SIENNA Ethics self-assessment for genetic and genomics research	18/01/21	43	54
Addressing societal concerns at public research funding	05/03/21	28	7 (limited publicity)
SIENNA & HBP ethics & society	30/03/21	120	68

Table 7: Webinars and KPI's (8 April 2021)

4. Developing strategy and measuring performance

In the last phase of the project, the communications strategy has been focused on supporting impact by providing publicity for project activities in the channels we have built, for example the public consultation, policy briefs, final conference, and STOA workshop. We have used the website, Twitter, and newsletter to push content to audiences, inviting them to participate and contribute by giving input in webinars presenting proposals and recommendations, and in a more formal way through the public consultation. Here, YouTube has also played an important role, both as a repository for content, but at the end of the project also as a more direct channel to an interested audience.

4.1 SIENNA website

The SIENNA website was launched on 29 September 2017. This was part of a strategy to ensure there was an operational point-of-contact at the start of the project, harnessing all the initial publicity activities and the press release helped us build our audience. The website is hosted by Uppsala University, who is also responsible for domain registration. This ensures the website will stay operational for 5-7 years after the project ends, supporting project legacy and sustainability. The website was structured to ensure audiences interested in specific technology domains could access only the relevant information (with separate landing pages for genomics, human enhancement, and AI & robotics), or look at the project as a whole.

Structure changes: One anticipated structure change was implemented on the website in May 2019, adding a tab for publications in the top navigation, and publication pages on all technology area landing pages. In January 2020, we added a tab in the top navigation for the public consultation campaign. This tab was replaced by a tab for the final conference, which was later renamed "SIENNA legacy" and will remain as a legacy page after the project ends. A major update was also made to the publications page, adding keywords to support findability.

4.1.2 Audience analysis for web

Following the implementation of the GDPR, Google Analytics tracks less personal information about website visitors. As a result, so does SIENNA's website. Even so, the data Google does provide lets us

know 76% of SIENNA website visitors are accessing the website using their laptop, and 24% are using their phone or a tablet. This implies that they are visiting in their professional capacity, rather than for their personal interest.

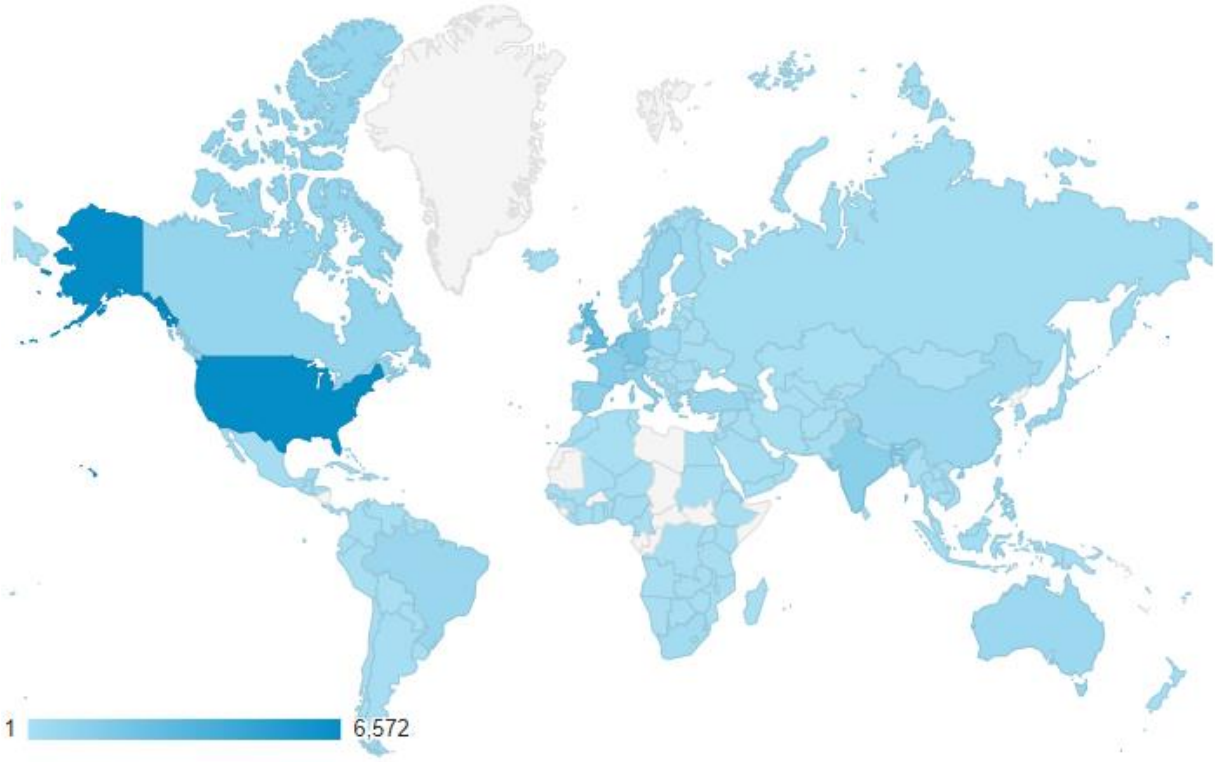

Figure 4: Number of website visitors per country

Looking at the top 10 countries of residence of website visitors, we find the US at the top of the list, making up 20% of website visitors. European countries at the top of the list include the UK and the Netherlands, Germany, France, Belgium, and Spain. Together, they make up 27 percent of SIENNA's website visitors. But there is also many visitors from India (around 4% of web visitors) and Canada (2.5% of web visitors).

4.1.3 Measuring website performance

Between October 2017 to March 2021, we have recorded 81,397 unique page views from 31,370 unique users. We are using website performance in the first six months as a benchmark for performance during the rest of the project, with 1,153 users visiting the site in the first six months. The data is collected using Google Analytics.

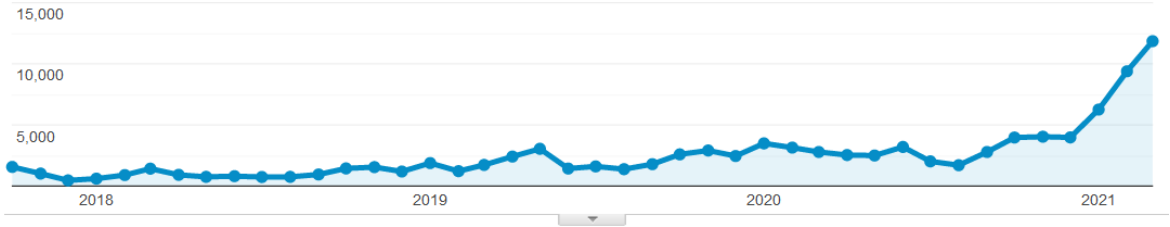

Figure 5: Number of Unique Page views of the SIENNA website per month October 2017 to March 31 2021

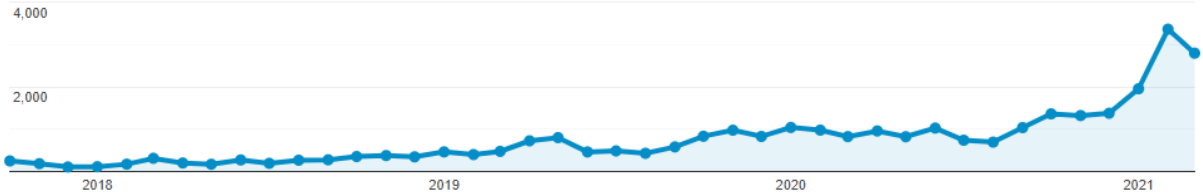

Figure 6: Number of New Users (visitors) of the SIENNA website per month October 2017 through March 2021

From early on in the project, there has been a steady increase in the SIENNA website audience. The figures above show how visitors and unique page views have fluctuated during the project, but with a steady increase throughout. In May 2019, we saw a significant increase in both page views and visitors thanks to the launch of the publications page and the first SIENNA publications. There is also a correlation between web visitors and communication campaigns, such as the save-the-date campaign for the public consultation launching in December 2020, the actual public consultation in January 2021, and campaigns promoting the final event with visitors peaking at 3,362 during February 2021. When it comes to the number of unique page views, this number peaked at 9,824 page views in relation to the final event March 10-12.

Sessions and users: We use sessions (each website visit) and users (each unique visitor) to estimate our reach, and how well the website performs its role as the main point-of-contact and public information repository about the project. Every time a user visits only one page before leaving, this adds to the overall "bounce" rate of the website. A "good" bounce rate is often considered to be below 55%, but how visitors behave on a website is sometimes determined by the ways in which we drive traffic: Posting a social media link to a website with a link to an external registration form is designed to be a bounce, not intended to keep visitors on the website. The bounce rates of the SIENNA website have increased with time, which we consider a result of this tactic. Using Twitter to link to a news item on the website, which in turn sends users to other websites using a call to action. The most common

calls to action include linking to a published paper, a deliverable report or policy brief on Zenodo, a registration form for an event, newsletter sign-up, or a video on YouTube. Because this has been a deliberate tactic, we have not put any strategies in place to lower the bounce rate. Instead, we monitor the number of registrations to events, views, and downloads on Zenodo (see appendix for information on downloads per deliverable), and video views. Which overall indicate that driving traffic in this way is a successful tactic.

The average length of the sessions (over two minutes which is in line with industry standards) and the number of pages visited per session (2.5 where we would aim for 2 for an average performance) indicate that the website is indeed performing as expected.

SIENNA website	Oct 17 – Mar 18	Apr 18 – Sept 18	Oct 18 – Mar 19	Apr 19 – Sept 19	Oct 19 – Mar 20	Apr 20 – Sept 20	Oct 20 – Mar 21	Total
Sessions	1,959	2,072	3,602	4,666	7,141	6,751	17,922	26,191
Users	1,153	1,437	2,473	3,489	5,536	5,341	12,311	31,740
Sessions per user	1.7	1.44	1.46	1.31	1.29	1.26	1.46	1.41
Bounce rate	50.64%	61.39%	59.66%	62.30%	63.14%	65.34%	63.48%	60.41%
Average session duration (in minutes)	02:59	01:52	02:12	01:53	02:03	01:44	01:51	02:04
Pages per session	3.05	2.38	2.5	2.5	2.43	2.18	2.20	2.50

Table 8: KPI: Google Analytics metrics for website user behaviour

Sources of website traffic: The majority of our website traffic was generated by Google searches (46,337 unique page views), indicating that our Search Engine Optimisation (SEO) works in our favour. Another 28,184 views were the result of direct traffic (typing the URL directly in your browser), or traffic from pages without cookies, which prevents Google Analytics from gathering information about how a user enters the site. Web traffic increased dramatically (with 162.3 %) in the last six months of the project. Based on this, we can conclude that activities in the last phase of the project were of great interest to the audience we have built. During the last six months of the project, many visitors also entered the website by typing out the URL in their browser. Indicating that they had visited the website before and were interested in SIENNA outputs. An increase in social media traffic also indicates an increase in people talking about SIENNA in social media channels. Much of the social media traffic in the last six months of the project can likely be attributed to our own Twitter campaigns. But with the amount of traffic from third-party websites, it is also evident that more people were talking about SIENNA on their own websites during the final stages of the project. The same appears to be true for social media.

Source	Oct 17 – Mar 18	Apr 18 – Sep 18	Oct 18 – Mar 19	April 19— Sept 19	Oct 19— Mar 20	Apr 20— Sep 20	Oct 20— March 21	Total number of unique page views generated Oct 17 – Mar 21
All	4,580	3,771	7,221	9,315	13,810	11,787	30,913	81.397 (100%)
Search engines	1,945	2,017	3,695	5,144	9,085	8,024	16,427	46.337 (56%)
Direct hits/no cookies available	1,883	1,230	3,037	3,442	3,772	3,000	11,820	28.184 (34%)
Social media	224	255	197	573	530	481	1,600	3.860 (4,74%)
Third-party websites	528	269	292	156	423	282	1,066	3.016 (3,7%)

Table 9: KPI: Sources that generated most unique page views for the SIENNA website (data from Google Analytics)

Exploring what type of content that generated more visitors, kept them on the website, and had them wanting to explore more content on the SIENNA website can offer important insights for other Horizon 2020 projects with similar audiences.

Most users enter the SIENNA website through the start page (www.sienna-project.eu). As we would expect, many visitors also enter through the news feed: indicating that the strategy to write editorial content about publications, project outputs, and events and share these on social media is effective. One of the lessons learned is that dividing the content on the SIENNA website per technology area was a success. The three tech-area specific landing pages all place in the top ten pages on the SIENNA website when it comes to generating visitors. As do the infographics developed for the project in the first year, especially the one about the ethics of human enhancement. The pages developed to advertise the SIENNA final event, despite staying up for only a couple of weeks, are also among the most visited on the SIENNA website. Once on the website, those who entered the main landing page move on to read about the project, to the AI and robotics pages, to the list of partners, publications pages, or move on to clicking external links. Users who spend more time on the website often move on from the page where they entered the website to look at the pages about human enhancement, the main newsfeed, or the technology-area specific news feeds.

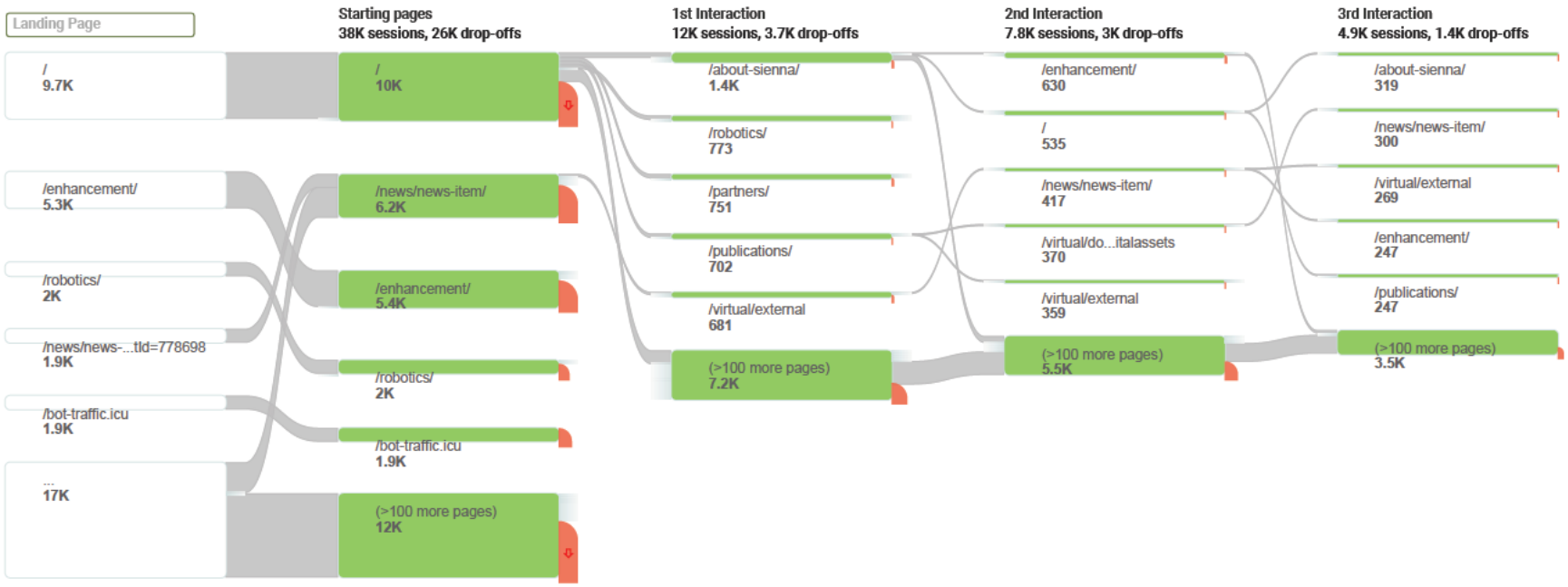

Figure 7: How SIENNA website users navigate the website (data from Google Analytics April 2021)

4.2 SIENNA social media strategy

The SIENNA project uses Twitter to share information, call people to action and engage with stakeholder audiences. This is an agile process that depends on continuous evaluation of how content performs, who is engaging with the content, and what audiences we are building. Twitter strategy in the first two phases of the project are described in the interim report on communications (D7.4), which focused on building audiences and sharing results. In the last year, an effort was made to engage with these audiences and calling them to different kinds of action, ranging from reading a report, to attending an event or give input to proposals.

In the initial phase of the project, SIENNA's social media presence focused on identifying stakeholders on social media and listening to social media conversations to see where SIENNA's content fits. SIENNA established a Twitter account (@SiennaEthics) which had 886 followers on 8 April 2021, increasing to 895 followers on April 17. This can be compared to 355 followers on 3 June 2019, and the number of followers is expected to continue to increase as the handle is still active, pushing out content though a legacy Twitter campaign with two tweets per week between 1 April and 18 June.

4.2.1 Social media metrics

Trying to make sense of social media metrics requires understanding what kinds of content is favoured by algorithms, i.e. content that will keep users on the platform as long as possible. We are using two social media channels: YouTube and Twitter. Despite growing an audience on YouTube, it is mainly used as a repository for video and will be discussed later on in this report. Our main channel is Twitter, which gives us access to both an audience, and metrics that can help evaluate tactics and adapt our strategy to fit with what both the algorithms and intended audiences prefer. The number of followers an account has, and the number of likes and retweets is publically available information. From 2020 and onwards, the SIENNA Twitter presence has focused on project results, which were previously unavailable. And with the audience already built, the metrics of interest have changed. From the autumn of 2019 and onwards, more focus was placed on publicity for project results, opportunities to interact with SIENNA through open webinars, and creating anticipation for the SIENNA public consultation and final event(s), whereas the focus on closed stakeholder workshops diminished. In addition, we started placing more focus on other Twitter metrics than follower-increase alone.

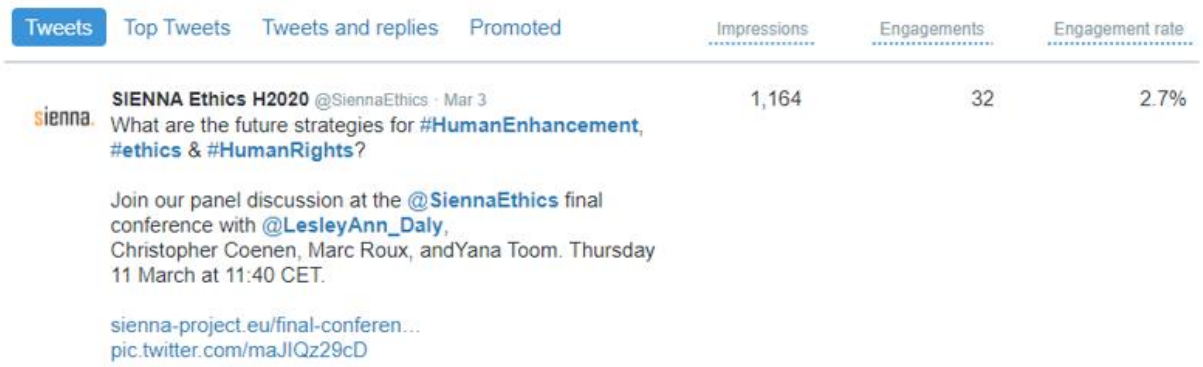

Figure 8: How clicks (engagements) divided by organic reach (impressions) give the engagement rate in Twitter Analytics.

To understand the full picture, we use information about **reach, engagements** or clicks, and **engagement rate** using Twitter Analytics (and YouTube Analytics). When we look at the reach, we can estimate how big our actual audience is, beyond those that actively follow us (i.e. the number of people that see our content, e.g. a tweet). This is referred to as an *organic* audience.

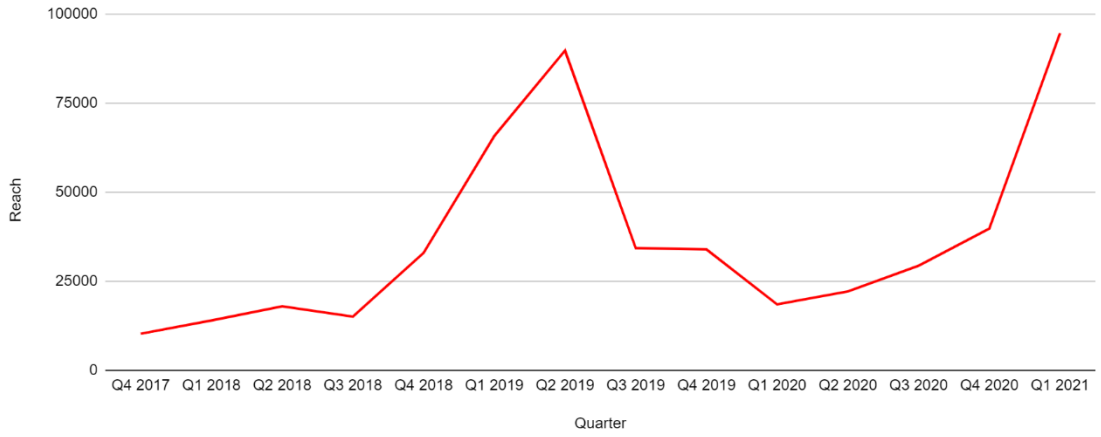

Figure 9: @SiennaEthics Twitter reach Q4 2017 through Q1 2021

Reach is an important metric as it allows us to find out how many times SIENNA content has appeared in Twitter user's feeds. Advertising content from in-person events has proven to be one of the most successful strategies to get attention for project activities on Twitter. The peak @SiennaEthics' reach in Q2 of 2019 is largely attributable to a SIENNA workshop that took place in Uppsala and Gothenburg on 13-15 June 2019. From this workshop, we were able to get photos of people presenting, tag them on Twitter, and connect to their networks. Following that peak, we saw a return to normal in Q3 of 2019. Looking at the fluctuations in @SiennaEthics reach also reveals just how great of an impact the pandemic has had on our project communications on social media. Reach is directly related to people's willingness to share content with their own audience by retweeting. By looking at the reduced reach from Q4 2019 to Q1-2 2020, it becomes evident that the pandemic influenced this willingness to share content that was not related to the pandemic. Following this lapse in the audience's attention, we managed to get equal amounts of attention for the SIENNA final event in March 2021 as we did for the SIENNA workshop in June 2019.

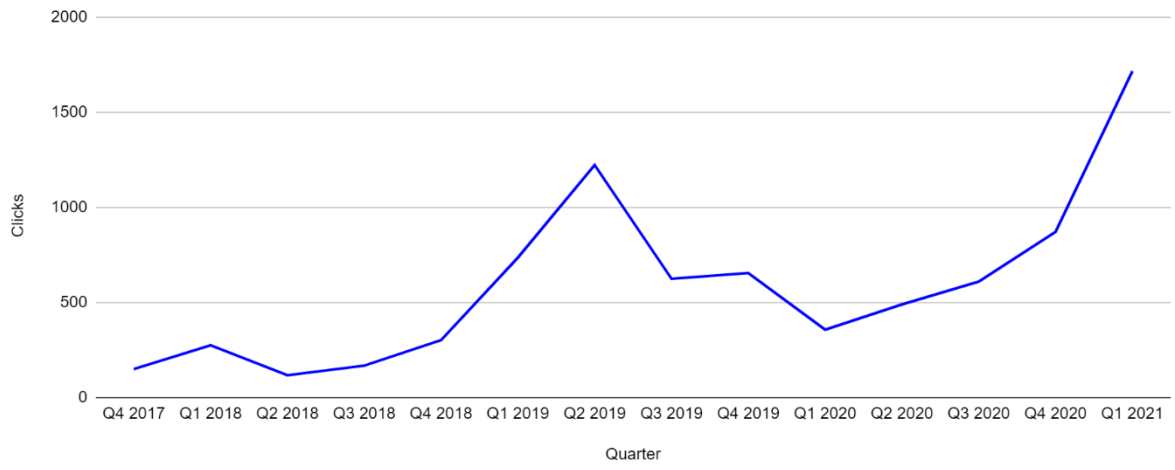

Figure 10: @SiennaEthics Twitter engagements and clicks Q4 2017 through Q1 2021

The engagement metric is a tool to find out what content the audience is interested in engaging with. The campaign for our June 2019 workshop was successful also in this respect. However, the pandemic-induced drop in our reach on Twitter is equally as visible when looking at how many people engaged with or clicked on SIENNA's Twitter content during the first months of 2020. However, we recovered quickly, with engagements returning to somewhat normal levels already in Q2 2020. What is also evident is that we have built an audience interested in the public consultation, final conference, webinars, and results that were released at the end of the project.

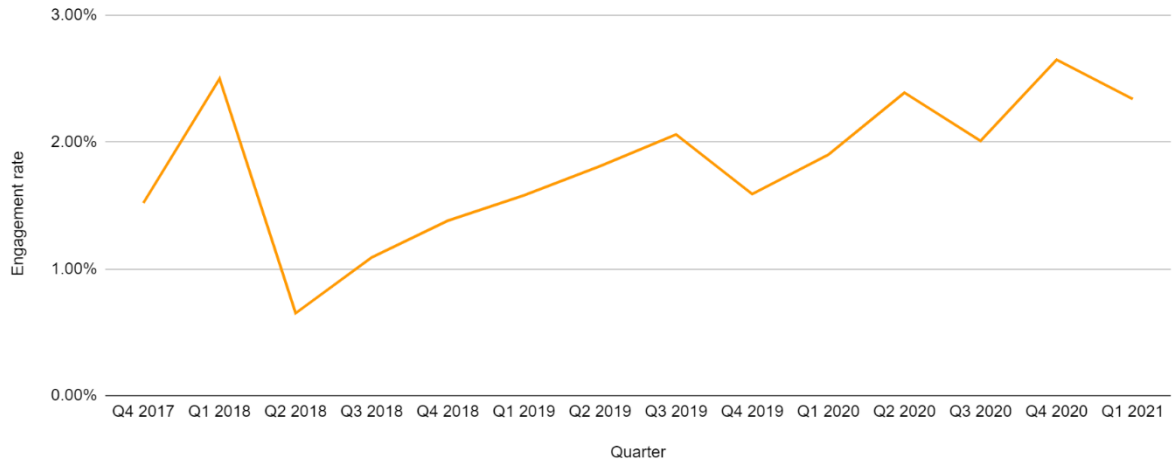

Figure 11: @SiennaEthics Twitter engagement rate Q4 2017 through Q1 2021

To get the most valuable information possible from Twitter Analytics, we need to look at reach and engagement combined. The Twitter engagement rate is calculated by dividing the number of engagements by the reach of a tweet. On average, tweets that have an engagement rate of 0.5% would

be considered average, whereas anything over 1% would be considered good. Early in the project, few people saw our content, but those who did chose to engage with it to a large extent. Once the @SiennaEthics audience started growing, the engagement rate became lower. This is to be expected at launch because the first people to engage are often a smaller group of people who are close to the project and by default also very interested. As expected, what followed was an initial dip in engagements, but as our audience grew, the engagement rate level normalised in Q3 2018. From then on, the SIENNA Twitter channel has continued to reach a high engagement rate.

While people were less likely to retweet SIENNA content at the beginning of the pandemic and were less likely to engage, it is important to note that despite the decline of our reach and number of engagements in the first months of the pandemic, we still see an increase in the average engagement rate. This shows that the people who follow @SiennaEthics are interested in the content we share, and do engage with the content we produce and that we have built an audience that is eager to see SIENNA's results.

Our Twitter audience: In terms of who follows @SiennaEthics on Twitter, looking at the most common keywords in our audiences' Twitter bios (short self-authored descriptions of who or what entity is running an account) can help us answer whether we have built the *right* audience in order to maximise impact using a tool called Followerwonk. The results show how SIENNA's Twitter audience describe themselves and their interests.

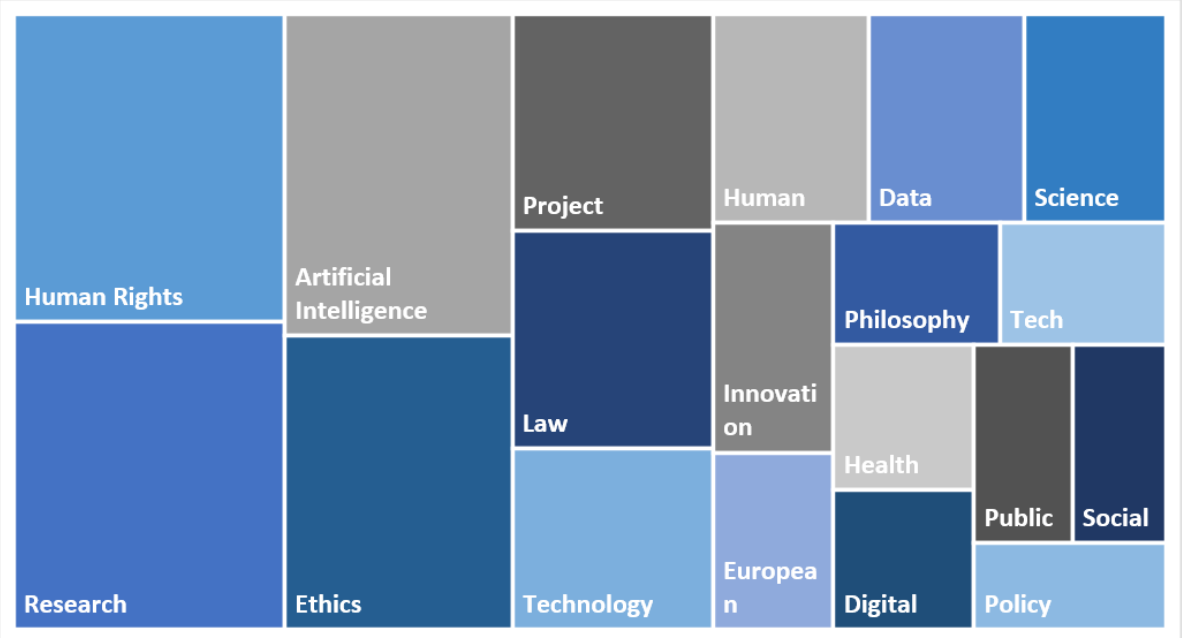

Figure 12. Word-cloud describing results from our analysis of Twitter bios (February 2021)

This analysis shows that we reach users who are interested in human rights, artificial intelligence, ethics, law, and technology (listed as the most common interests in our audience). We can also see that a large number of our Twitter followers have described an interest in health, data, philosophy,

innovation, and policy. This suggests that we have a broad reach within the scientific community, covering social science and humanities, but also medicine, pharmacy, science and technology, as well as in industry and policy-making. Further, noting that the word “project” is one of the more common in our followers’ Twitter bios indicates that we have also reached into the large networks of fellow Horizon 2020 projects as well as other research projects on Twitter.

Most of our followers are located in the United Kingdom, which is not surprising as SIENNA is using the English language to communicate. This is likely where we find most of our general public followers as the threshold for the general public to follow us is lower for those whose first language is English. The second-most frequent location of SIENNA followers is Brussels, Belgium, indicating a following among EU-level policy-makers and civil society organisations. Although most of SIENNA’s Twitter audience is located in Europe, we also have a large representation of followers from South America, as well as the USA. Likely in part thanks to our partners in the Americas and the Spanish-language content we have developed.

Measuring success: There are many to engage with a tweet. Most coveted is the URL click, which means someone followed the call to action in a tweet and chose to engage with the project. Other important metrics are those that imply endorsement, such as likes, and those that indicate that someone else finds the content you are producing worthwhile and want others to see it, the retweet. The tweets that resulted in most URL clicks were about publications written or presented by SIENNA researchers, as well as content from live events (whether in-person or digital interactions). For likes, interacting with other Horizon 2020 projects proved a successful strategy, as did advertising online events. And throughout the project, the content that has rendered most retweets was about our public consultation, our collaborations with other Horizon 2020 projects, and our events. Sharing videos, infographics and live-tweets from events also generates more URL clicks. Hashtag clicks are less frequent. However, the value of using hashtags to place a tweet in the right context should not be underestimated.

@SiennaEthics	Nov 2017 – Apr 2019	May 2018 – Oct 2018	Nov 2018 – Apr 2019	May 2019 – Oct 2019	Nov 2019 – Apr 2020	May 2020 – Oct 2020	Nov 2020 – Mar 2021	Total
No of original* tweets	14	20	82	129	33	82	147	507
Reach	24,274	36,991	107,029	132,413	45,698	55,696	122,638	524,739
Clicks	425	331	1,153	1,967	901	1,271	2,250	6,331
Retweets	39	59	170	342	174	226	459	1,469
Likes	53	86	349	486	203	281	506	1,964
User profile clicks	50	15	147	216	82	118	146	774
URL clicks	70	68	139	208	143	139	308	1,075
Hashtag clicks	42	6	41	37	8	10	34	178
Detail expands	142	54	138	345	152	362	546	1,739
Media views	29	66	82	272	133	120	2992	3,694
Media engagements	29	40	164	292	133	120	233	1,011
Replies	0	2	4	32	6	14	18	76
Engagement rate	**1.75%**	**0.89%**	**1.16%**	**1.83%**	**1.87%**	**2.48%**	**2.31%**	**1.76%**

Table 11: KPI: @SiennaEthics Twitter engagements November 2017 – March 2021 (*number of tweets posted, not including retweets)

All in all, the engagements on SIENNA's Twitter content have continued to increase during the project. With the final six months being the most successful. Perhaps the most important lesson is the impact of uploading video with a tweet. Not only does video content boost the audience's willingness to share the content onwards (by retweeting), but tweets that use video has a greater success rate with both URL clicks and likes as well. In total, SIENNA's use of video on Twitter alone has resulted in over 2,900 views, and these will continue to accumulate after the end of the project. This is why we chose to include the SIENNA key messages video on the SIENNA goodbye tweet on 31 March 2021, to continue spreading these messages to stakeholders after the project end. At the time of writing (17 April 2021) this video was viewed almost 900 times.

In addition to benchmarking our own metrics against previous periods, comparing and contrasting with "competitors" is another tool to help measure social media success. SIENNA should be benchmarked against other H2020 projects in related areas (e.g. PANELFIT and SHERPA), or projects starting in October 2017.

Project name (and Twitter handle)	Following	Followers	Tweets (including retweets)
SIENNA (@SiennaEthics)	853	886	1,181
SHERPA (@project-sherpa)	172	587	935
PANELFIT (@panelfit)	275	303	404
EASITrain (@EasiTrain)	178	62	220
PhD4GlucoDrug (@PhD4GlycoDrug)	60	66	15
Analytics4Biologics (@Analytics4Bio)	5	7	9
ATHOR (@etnathor)	146	166	390
RESOLVD (@REOLVD_EU)	249	296	752
FLEXCoop (@FLEXCoop_H2020)	372	573	661
mCBEEs (@itn_mcBEEs)	20	23	29
ReUseHeat Project (@ReUseHeat)	309	709	733
Nanostencil (@Nanostencil_EU)	6	5	3
CHE Project (@che_project)	665	451	711
Stardust (@Stardusth2020)	306	861	1,500
HOLISDER project (@HolisderProject)	597	429	208
ConFlex consortium (@ConFlex2017)	23	42	110
Mat4Rail (@Mat4Rail)	165	129	53
H2020-MEMO2 (@H2020_MEMO2)	77	107	155
Spine (@Spine_Project)	181	115	92
TRAIN-EV (@train_ev)	270	911	270

Table 10: KPI: SIENNA benchmarked against Public Twitter metrics of other H2020 projects (8 April 2021)

SIENNA is the second-most active account after the Stardust project, which is also among the top three in terms of following. SIENNA with its 886 followers is second only to TRAIN-EV that has 911 followers. Stardust is the third-most followed account with 861 followers. Both Stardust and TRAIN-EV are niche projects and do not share SIENNA's challenge of keeping stakeholders in three technology areas interested at the same time. They can also rely on their niche to build their following, as with TRAIN-EV, with only 270 tweets total. Comparatively, both SIENNA and Stardust have been actively tweeting from early on in the project and have done so frequently, making the case for taking a similar approach in future projects to ensure early audience growth and continued interest in the project.

Monitoring the tone in conversations about SIENNA is another tool to measure success. For this, we use social media listening and **sentiment analysis** to monitor the perception of the SIENNA project. Although most social media users mentioning SIENNA use a **neutral to positive sentiment,** there are also some examples of *very* positive feedback on Twitter, particularly at the end of the project.

Beyond who we reach, and how we perform compared to others, finding out how many people actually click our links, watch our videos or expand our images and why can show us what has been successful to get people engaged with the project. As the project progressed, so did the goals of our campaigning. Once we had built our audience, metrics other than the number of followers became interesting as we started sharing results and moving towards supporting project impact. Live-tweeting from SIENNA

workshops proved a successful strategy when we were bringing together stakeholders for in-person meetings. However, during the pandemic, in-person workshops were no longer a possibility and we found that online workshops did not have the same attraction of new followers. With online SIENNA workshops, people turned out to be less likely to tweet as participants during the events, which also changed the role that event-centred campaigns could play.

However, while losing the attraction of in-person workshops during the pandemic, we have still gained a larger audience for SIENNA. Moving from reporting during live events, and engaging with participants and their networks in-person, to publicity for webinars and recorded presentations, prolonged the period under which an event receives attention, and allowed us to continue building an audience.

4.3 Using video to communicate

Video has been an important medium for communicating to different audiences, using short clips with succinct messages to increase visibility, support project branding, building audiences, and calling people to action in social media, newsletters, and on the project's website. We have also used recordings of webinar and conference presentations for scientific dissemination and to extend our reach beyond those who were able to participate in live events.

Initially, a video presenting the SIENNA project, and one video for each of the three technology areas was developed. These videos were translated by partners to several languages, extending our audiences, especially in the Spanish-speaking world. All four videos were embedded on the project's landing page, allowing website visitors to get a quick overview of the domains covered by the project. They have also been embedded on the technology area-specific landing pages and shared in social media. Videos were developed using an inexpensive tool (Biteable) that allows a maximum of 80 characters of text on top of a six second stock video clip. Using this format with a uniform font, strict adherence to the visual identity in the selection of stock video, and using the same background music has supported both audience building and project branding.

These videos represent the most-watched video clips on the SIENNA YouTube channel, with over 1,700 views on the English language clip about Human Enhancement, and almost 1,600 views on the Spanish translation of the same clip. The more general project presentation clip had almost 1,000 YouTube views, the clip about AI and robotics had just over 1,000 views, while the clip about human genomics had just over 400 views. The proportions of video views between the technology areas reflects how active the respective audiences have been in other channels, with the human genomics audience building towards the end of the project when we have communicated more directly with the patient and rare disease community, using the patient-facing webinar as part of the public consultation (which is also available on video).

The second format, recorded presentations, have played an important role in our scientific dissemination strategy, giving those who are interested in unpublished results an opportunity to get a high-level presentation, for example towards the end of the project where the final conference was recorded. Despite the length of this content, several of the videos have had a considerable number of views, for example a presentation by Philip Brey on the ethical analysis of AI robotics with 162 views, and the legal analysis of AI and robotics and human enhancement with over 100 views respectively.

Suggesting that there is considerable interest also in this video format and that this is indeed an effective way to communicate.

The SIENNA YouTube channel (https://www.youtube.com/channel/UCSn_2EYn7tDgz7ZD3fcF_0w) launched 11 November 2017 and the SIENNA project video generated 177 views in the first month, reaching a total of 8,344 by the end of the project. Although we initially planned for YouTube to work as a repository for SIENNA video rather than a social media channel, in the last phase of the project our audience grew substantially. At the time of writing, the SIENNA project's YouTube channel has 146 subscribers, compared to 49 subscribers for the SHERPA project, and 8 for PANELFIT. Looking at the number of views on videos on those two channels, we see that the SHERPA project's top-performing video has 1,000 views (Welcome to SHERPA), followed by a cluster of videos with around 200 views each. While the PANELFIT project's top-performing video has 321 views, followed by a cluster of videos with between 30-40 views each. Note that these figures only capture the views on videos on YouTube, and does not include views on content that was shared native on social media or in other video repositories. They only serve as benchmarks for performance on YouTube.

The objective of SIENNA's YouTube presence was never to build a following or engage socially. Therefore, rather than tracking subscribers (146 in total), we are tracking **watch time** as a KPI. And most of our views are on video that has been embedded on web or in e-mail newsletters.

Figure 13: Total watch time for SIENNA YouTube videos, November 2017 to March 2021

In addition to views, we are looking at watch time, benchmarking development against the performance in the first six months of 2018, with 315 minutes. Between May 2018 and October the same year, viewers spent 376 minutes watching SIENNA videos. In total, our YouTube audience spent 14,723 minutes watching SIENNA YouTube videos (November 2017 through March 2021). These figures do not represent the total view time on SIENNA video content, which has also been uploaded in-stream as native content on Twitter, for example as part of the public consultation campaign, or the #SIENNAlegacy campaign in relation to the final project conference and after the project ended.

Video	Nov 17 – Apr 18	May 18 – Oct 18	Nov 18 – Apr 19	May 19 – Oct 19	Nov 19 – Apr 20	May 20 – Oct 20	Nov 20 – Mar 21	Total
Views	376	386	595	745	1,713	2,015	2,514	8,344
Watch time	315	376	717	1,428	2,592	3,348	5,946	14,723
Impressions	897	1,785	3,748	5,842	10,280	12,089	18,451	53,122

Table 12: KPI's for SIENNA video 31 March 2021

In trying to determine who we reach with video content, we looked at the origin of the 8,344 views and 14,723 minutes of watch time. In terms of devices, 60% of the video views were from a desktop computer, with 34% of the views from mobile devices. The vast majority, 91% of the views came from non-subscribers, supporting the conclusion that YouTube does not act as a social media channel for the project. Metrics also support the decision to embed video on the SIENNA website, with 26% of the traffic coming from www.sienna-project.eu. Breaking down the origin of YouTube traffic, we can also see that most of the views on the SIENNA channel came from Mexico, Sweden, Brazil, the Netherlands, and Italy. The amount of traffic from Mexico is in line with the fact that the second most viewed video on the channel is a translation of the introduction to human enhancement to Spanish, extending our reach to Latin America.

4.4 Talking to stakeholders: SIENNA workshops

SIENNA webinars, workshops, and other events provide input not only to the outputs coming from the project but also helps shape the way we talk about them. For this reason, the workshops with experts and stakeholders have played an important part in developing communication strategy: both for how to do publicity for the activities themselves, but the discussions have also shaped the way we frame and explain the technologies themselves, and the ethical and human rights challenges they bring.

The first SIENNA stakeholder workshop was hosted by Uppsala University, Sweden on 4-5 April 2018, discussing fundamental aspects of the project. This was followed by stakeholder workshops covering the legal aspects hosted by the Helsinki Foundation for Human Rights in Poland on 8-9 November 2018. Stakeholders were invited to discuss future impacts and ethical challenges for AI & Robotics, Human Enhancement and Genomics in London hosted by Trilateral Research Ltd on 15-18 January 2019. We have also invited stakeholders and experts to a workshop on ethical analysis was hosted by the Ionian University in Athens on 9-10 April 2019. The last face-to-face workshops on ethical challenges for AI & Robotics and Human Enhancement were hosted by Uppsala University in Uppsala on 13-14 June 2019, and on Human Genomics University in Gothenburg on 14-15 June 2019, also hosted by Uppsala. The reason this workshop was held elsewhere was strategic, organising the event in connection with the European Society of Human Genetics meeting (15-18 June 2019).

In 2020, all meetings changed. Instead of organising face-to-face events, we had to move online. Changing tactics for workshop publicity (as previously discussed), but also the timelines, format, and structure of the meetings. Three workshops were held after this shift in strategy: The workshop on operational guidelines took place digitally and was divided into three segments. It was held on 8-9 September 2020 (Artificial Intelligence and Robotics), 10-11 September 2020 (Human Enhancement Technologies), and 22-23 October 2020 (Human Genetics & Genomics). The workshop on Research Ethics Committee codes and guidelines was hosted by EUREC and took place digitally on 26-27 October 2020. The last of the SIENNA workshops was entitled Enhancing Methods for Ethical and Legal Analysis of Emerging Technologies took place on 14-15 January 2021, hosted by the University of Granada.

4.5 Issuing newsletters

The SIENNA project issues regular e-mail newsletters. To ensure content is relevant to our audiences, we have divided our audience into segments. Allowing us to issue communications to audiences who have stated that they are interested in the respective technology areas separately. On a smaller

number of occasions, such as the public consultation, final event, and STOA panel on disruptive technologies, we have also combined the audience segments. These audiences sometimes overlap, so in order to ensure we do not tire those individuals who have subscribed in different audience segments, newsletters have been timed at least a couple of days apart. To keep audiences engaged, newsletters have been issued in relation to activities or results instead of on a regular schedule.

Because of differences in the approaches to communicating between the three work technology areas, newsletters have been issued in different ways, resulting in more issues for AI & robotics and human enhancement than for genomics. The audiences also differ in size, with AI and robotics being the largest. Looking at engagement metrics such as open rates, they are very similar between the audiences, but the average open rate is significantly lower on the mailings sent to all audiences (just over 32% compared to 37-38% for technology area-specific mailings), illustrating the usefulness of the strategy to divide the audiences into segments for the different technology domains.

We use MailChimp software to manage audiences and issue newsletters. This software also allows us to track KPI metrics in the form of open rates, click rate, the number of bounces, and unsubscribes. In general, our audiences are interested and rarely unsubscribe. Overall, 28% of the subscribers are highly engaged and often open and click SIENNAs e-mails. The average open rate for issued newsletters is 32.2%, with an average click rate of 7%. Most of the e-mails were opened form a desktop computer (71.1%) compared to just under a third being opened from a mobile device (28.9%), suggesting people subscribe to SIENNA newsletters in a professional capacity.

4.5.1 Audience analysis for newsletter

A snapshot of 600 of our 1400 newsletter subscribers tells us that the vast majority of SIENNA newsletter subscribers work at research performing organisation (RPO). But there is also great interest from policy makers, industry and civil society organisations. Even some members of the media have subscribed to receive our newsletter. Because entering your organisational affiliation is not mandatory, many newsletter subscribers have also left this field blank, which results in 7,67% of the subscribers in this snapshot audience have their affiliation listed as other, which in most cases means that they are self-employed or that their organisational affiliation has not been made available to us.

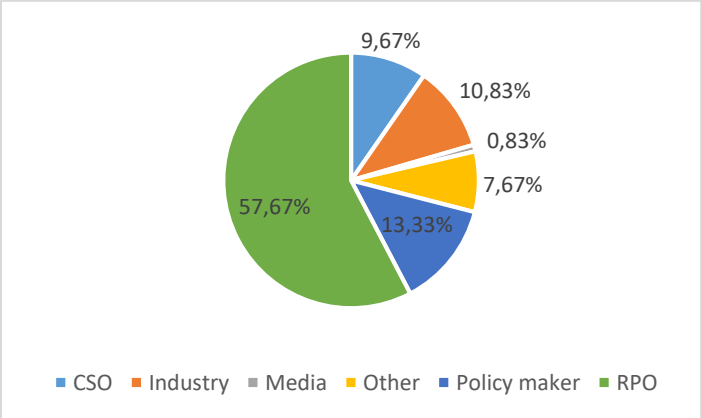

Figure 14: Snapshot of organisational affiliations of SIENNA newsletter subscribers (by type)

By the end of the project, a total of 1,446 individuals had subscribed to the SIENNA newsletter, with only 54 individuals unsubscribing at some point. This audience is divided in three audience segments. These segments have some overlaps and have grown in different proportions, with the genomics audiences showing the largest growth, primarily towards the end of the project. From the first e-mail sent in May 2019 to the last send on 31 March 2021, our audiences have grown significantly. The Artificial Intelligence and Robotics audience segment grew by 46%, from 454 to 981; the Human Enhancement newsletter segment grew by 41%, from 318 to 768; and the Human Genomics audience segment grew by a total of 59%, from 321 to 540 subscribers

4.6 Publicity

There has been a lot of interest in SIENNA results and great news value in the results of the project's empirical work. We have used the project's website newsfeed, Twitter, and newsletter to do publicity for publications and reports. We have also used Uppsala University's channel the Ethics Blog, with a large returning audience interested in bioethics, technology, policy, and law. We offered media training to all the consortium's members, and several of them have given interviews. We have also issued two global press releases through the University of Twente in both Dutch and English: one to launch the project, and one to share results from the public opinion survey on AI and robotics.

Initially, leaders of the work packages on human genomics and human enhancement expressed an interest in publishing the data from the public opinion surveys in academic journals. Because of embargoes on those reports, publicity for the surveys was delayed until 15 October 2020, when the University of Twente issued a global press release entitled "People prefer robots that look different from them". According to our tracking, this was covered by 18 news outlets in 7 countries, in 5 different languages, including Italy, South Africa, the United Kingdom, USA, Russia, Germany and the Netherlands. Outlets ranged from tabloid press (Daily Mail, UK) to morning radio (South Africa), and professional journals and news media.

Overall, there has been a lot of interest in the project. A list with links to news coverage is available on the SIENNA project website (https://www.sienna-project.eu/news/sienna-in-media/).

5. Final thoughts and take-aways

In the wake of a global pandemic, the SIENNA project had to adapt. We have had to change our plans, but also navigate a new social media landscape. We have struggled to get attention to content that was not related to Covid-19, changed our strategy, and managed to get back to pre-pandemic levels of interaction with our audiences, building an active community that has been ready and eager to listen to results at the end of the project.

Changing tactics takes time and effort. What might seem simple, moving a meeting online and recording a presentation, requires a lot of resources. Because of cancelled face-to-face meetings, we were able to re-purpose part of the communications budget from direct cost and travel to salaries, which made the effort in the last months of the project possible. The public consultation campaign, policy briefs, legacy video and campaign, website updates, final conference, STOA workshop, and a webinar with the Human Brain Project and SHERPA the day before SIENNA officially ended would not have been possible with the human resources we had budgeted. We were fortunate enough to be able

to add both time and new members to the communications team, receiving support for layout, video production, and editorial writing.

The way the world has changed extended our reach, but it also pushed our resources to the very limit. Keeping partners engaged, involved, and informed, building our audiences, coordinating content production, supporting a public engagement process, and figuring out how to present the legacy of a big project to a wide range of audiences has been a learning experience, a challenge, and an extraordinary opportunity to build our science communications toolkit. Organising joint events with other projects has also supported sustainability of the SIENNA science communications strategy, transferring knowledge and audiences to other projects, for example SHERPA and PANELFIT, the Human Brain Project and the new TechEthos project that will build on SIENNA results.

The strategy to divide our audiences between the different technology domains took a lot of effort and thinking in the initial phases of the project. Now, 3.5 years later, we can conclude that this was a successful strategy, and well worth the effort.

6. References

Josepine Fernow (2017) SIENNA D7.1 Press release, WP7 Communication and dissemination (Version 1.0). Zenodo

Josepine Fernow (2017) SIENNA D7.2 Website launch, WP7 Communication and dissemination (Version 1.0). Zenodo

Josepine Fernow (2017) SIENNA D7.3 Communication and dissemination plan, WP7 Communication and dissemination (Version 1.0). Zenodo

Josepine Fernow, & Anna Holm (2019) SIENNA D7.4 Interim Report on communications, WP7 Communication and dissemination (Version 1.0). Zenodo

Annex 1: KPI's for SIENNA newsletters

Newsletter issue	Key code	Date	Recipients	Bounces	Opens	Clicks
SIENNA AI & Robotics newsflash May 2019	AIR	2019-05-15	454	23	44.32%	11.60%
SIENNA Genomics first e-mail	HG	2019-05-21	321	23	41.95%	8.05%
Human enhancement first e-mail	HET	2019-05-28	318	27	46.74%	14.78%
SIENNA AI & Robotics newsletter November 2019	AIR	2019-11-12	508	24	41.53%	8.47%
SIENNA Human Enhancement newsletter January 2020	HET	2020-01-28	359	17	45.03%	11.70%
SIENNA: legal analysis for genomics, human enhancement, AI & robotics	GENERAL	2020-02-17	943	46	39.80%	9.36%
SIENNA: Codes, guidelines & legal requirements for AI & Robotics	AIR	2020-06-02	557	24	38.27%	7.88%
SIENNA: Codes, guidelines & legal requirements for Human Genomics	HG	2020-06-02	428	15	39.95%	7.75%
SIENNA: Enhancing legal frameworks webinar 17 June 2020	GENERAL	2020-06-04	967	34	34.08%	6.32%
SIENNA: Enhancing legal frameworks webinar 17 June 2020 (copy 01)	GENERAL	2020-06-12	964	32	29.40%	3.33%
SIENNA: Ethical analysis AI & robotics webinar 1 July	AIR	2020-06-18	572	12	39.82%	10.18%
SIENNA: Codes, guidelines & legal requirements for Human Enhancement	HE	2020-07-02	437	3	40.78%	7.14%
SIENNA: 11,000 people and their attitudes to AI & Robotics	AIR	2020-10-15	576	5	32.75%	8.06%
SIENNA: Broaden discussions on genetic cognitive enhancement (HET)	HET	2020-10-29	445	6	34.40%	6.38%

SIENNA: Broaden discussions on genetic cognitive enhancement (HG)	HG	2020-10-29	462	11	30.60%	4.21%
SIENNA HET Webinar	HET	2020-12-03	445	6	39.86%	12.30%
SIENNA Save the date public consultation	GENERAL	2020-12-17	1,042	17	31.51%	5.46%
SIENNA Public consultation 11-25 January 2021	GENERAL	2021-01-11	1,058	11	30.47%	7.07%
SIENNA: Ethical self-assessment for research on genetics and genomics	HG	2021-01-13	540	6	33.52%	5.99%
SIENNA Public consultation: AI & robotics 11-25 January 2021	AIR	2021-01-19	685	5	34.12%	5.44%
SIENNA Human Enhancement | Public consultation 11-25 January 2021	HET	2021-01-19	545	5	33.89%	5.19%
SIENNA: Save the date for our final converence!	GENERAL	2021-01-26	1,074	14	32.55%	8.49%
SIENNA: Register to join our final conference!	GENERAL	2021-02-08	1,084	15	30.22%	10.38%
SIENNA: Final conference programme published!	GENERAL	2021-02-18	1,074	11	29.26%	6.77%
SIENNA: Final conference & STOA event	GENERAL	2021-03-09	1,075	8	31.68%	8.81%
SIENNA webinar on trust and transparency in AI	AIR	2021-03-22	981	8	37.31%	11.00%
SIENNA Promoting ethics for human enhancement technologies	HET	2021-03-25	768	3	34.38%	7.19%
SIENNA: Leaving a legacy	GENERAL	2021-03-31	1,398	12	31.46%	6.64%

Table 12: KPI's for SIENNA newsletters (figures from 31 March 2021)

Annex 2: KPI's for deliverable reports (Zenodo views, downloads and Altmetric data)

SIENNA deliverables have been uploaded to the Zenodo platform which allows for sustainable, open access publishing of European research outputs. The process of uploading SIENNA deliverables to this repository launched in October of 2020.

Deliverable	Zenodo views	Zenodo downloads	Altmetric score
SIENNA D1.1: The consortium's methodological handbook	161	146	0
SIENNA D2.1: State of the art review of human genomic technologies	130	123	0
SIENNA D3.1: State-of-the-art Review: Human Enhancement	369	293	14
SIENNA D4.1: State-of-the-art Review: Artificial Intelligence and robotics	219	183	0
SIENNA D2.2 Analysis of the legal and human rights requirements for genomics in and outside the EU	125	121	0
SIENNA D3.2: Analysis of the legal and human rights requirements for Human Enhancement Technologies in and outside the EU	186	160	11
SIENNA D4.2: Analysis of the legal and human rights requirements for AI and robotics in and outside the EU	290	237	0
SIENNA D2.3: Survey of REC approaches and codes for genomics	79	66	0
SIENNA D3.3: Survey of REC approaches and codes for human enhancement (Version V3.0)	97	65	11
SIENNA D4.3: Survey of REC approaches and codes for Artificial Intelligence & Robotics	171	150	0
SIENNA D2.4: Ethical Analysis of Human Genetics and Genomics	149	119	0
SIENNA D3.4: Ethical Analysis of Human Enhancement Technologies	410	291	17
SIENNA D4.4: Ethical Analysis of AI and Robotics Technologies	331	272	0
SIENNA D2.5: Public views on genetics, genomics and gene editing in 11 EU and non-EU countries	84	81	0

SIENNA D3.5: Public views of human enhancement technologies in 11 EU and non-EU countries	295	188	17
SIENNA D4.5 Public views on artificial intelligence and robots across 11 EU and non-EU countries	579	328	4
SIENNA D2.6: Qualitative research exploring public attitudes to human genomics	51	44	0
D3.6: Qualitative research exploring public attitudes to human enhancement technologies	111	80	11
SIENNA D4.6: Qualitative research exploring public attitudes to AI and robotics	512	113	6
SIENNA D5.6: Recommendations for the enhancement of the existing legal frameworks for genomics, human enhancement, and AI and robotics	308	204	3
SIENNA D2.7 Proposal for an ethical framework for the assessment of genomics technologies and for research in genetics and genomics	Not yet published	Not available	Not available
SIENNA D3.7: Proposal for an ethical framework for human enhancement	95	82	0
SIENNA D4.7 An Ethical framework for the development and use of AI and robotics technologies	Not yet published	Not available	Not available
D5.1 Report documenting elements to open and complement operational guidelines for research ethics committees	Not yet published	Not available	Not available
D5.2 An international code of conduct for data sharing in genomics: A proposal	Not yet published	Not available	Not available
D5.3 Methods for promoting ethics for human enhancement	Not yet published	Not available	Not available
D5.4: Multi-stakeholder strategy and practical tools for ethical AI and robotics	Not yet published	Not available	Not available
D6.1 Generalised methodology for ethical assessment of emerging technologies	Not yet published	Not available	Not available

D6.2 Report on adapting methods for legal analysis of emerging technologies	Not yet published	Not available	Not available
D6.4 Methodology to help public research funding organisations reconcile the views and interests of scientists and citizens	Not yet published	Not available	Not available
D6.3 Methods for translating ethical analysis into instruments for the ethical development and deployment of emerging technologies	Not yet published	Not available	Not available
D6.5 Sustainability plan	Not yet published	Not available	Not available
SIENNA D7.1 Press release, WP7 Communication and dissemination	11	7	0
SIENNA D7.2 Website launch, WP7 Communication and dissemination	11	10	0
SIENNA D7.3 Communication and dissemination plan, WP7 Communication and dissemination	12	9	0
SIENNA D7.4 Interim Report on communications, WP7 Communication and dissemination	10	7	0
D7.5 Final report on communications	Not yet published	Not available	Not available

Table 13: KPI's for SIENNA deliverable reports (collected 26 April 2021)

Annex 3: KPI's for policy briefs (Zenodo views, downloads and Altmetric data)

Policy brief	Zenodo views	Zenodo downloads	Altmetric score
Enhancing EU legal frameworks for AI & robotics: SIENNA project Policy Brief #1	470	235	10
Enhancing EU legal frameworks for genetics & genomics research, SIENNA project Policy Brief #2	192	123	2
Responsible AI and robotics: Enhancing national legal frameworks, SIENNA Project Policy Brief #3	126	91	0
Ethics & human rights for new and emerging technologies: SIENNA project Policy Brief #4	276	204	6
Promoting ethics for human enhancement technologies: SIENNA project Policy Brief #5	244	129	10
Genética y genómica humana. Mejora del marco jurídico de España	30	19	0
Inteligencia artificial y robótica. Cómo mejorar el marco legal en España	66	27	2
Human Genetics and Genomics Law in China	29	16	0

Table 14: KPI's for SIENNA policy briefs (collected 26 April 2021)