Panacea
People-centric cybersecurity in healthcare

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D8.3 COMMUNICATIONS AND DISSEMINATION: STRATEGY AND ACHIEVEMENTS, INTERMEDIATE VERSION

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Executive Summary

D8.3 is the intermediate version of the PANACEA Communications and Dissemination: Strategy and Achievements. It reports on the achievements at M18 of the project, reviews the overall strategic goals and KPIs, and sets out plans for M19-36.

The review of the strategic goals and KPIs is motivated by the lessons learned over the first 18 months of the project, the impacts of COVID-19 outbreak, and especially the need for a coherent set of clearly defined, market-facing targets (KPIs) with the total number of all foreseen outputs, leaving nothing open to interpretation. The new KPIs are key to easing activity scheduling and impact reporting across the WP8 coordinator team and the consortium. The key takeaway is: Clear action plans and targets make for a happy team.

D8.3 prioritises six core stakeholder groups as key for the successful outcomes of the project and two complementary groups important for continuing the established synergies. The PANACEA community is analysed from both a quantitative and qualitative perspective to show progress towards targets at M18.

The report gives a detailed account of all the impacts achieved since June 2019, including communications, stakeholder engagement and community building, dissemination of results and knowledge sharing. All applicable KPI achievements for the period are summarised in a single table.

The final part of D8.3 defines the roadmap of actions for the period M19-36, split across a short-term (M19-24) and long-term plan (M25-36), which will be assessed against the full set of KPIs. These plans cover all major activities foreseen, including future workshops (virtual and physical), webinars, podcasts, video pills on the Toolkit and its components, showcase videos, marketing packs and adoption kits, essential guides, light reading digests, policy briefs and other targeted measures underpinning the dissemination and exploitation of results.

An overview of the EU policy context, PANACEA solutions and toolkits, and positioning in the standards landscape set the scene for D8.3, the next and final update of which is due in June 2021: D8.4 - Communication and Dissemination Strategy and Achievements, Final version.

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1. Introduction

1.1 Purpose

The purpose of this document is to update the PANACEA strategy defined in D8.2 (May 2019) and report on achievements for the period June 2019-June 2020. It also sets out plans for the period up to M36.

D8.2 was part of the phase focused on setting the research context from the perspective of communication, stakeholder engagement and early dissemination of findings and results. D8.3 takes stock of progress to date, impacts achieved and lessons learned in the light of the COVID-19 pandemic, measures to circumvent barriers to engagement and dissemination over the past months, and revises the strategic goals and timelines accordingly.

In terms of planning future actions and measures, it moves beyond the mid-term assessment towards:

1. Design and integration (M8-24; now focused on July 2020 – December 2020).
2. Verification and validation (M18-35; June 2020 – November 2020).
3. Securing impact (June 2019-June 2020: impact reporting; July 2020-December 2021: defining measures to boost impacts and underpinning the exploitation of results and knowledge.

The main tasks relevant for D8.3 are:

- **Task 8.2 – End-users and Stakeholders Engagement (M1-36):** Setting up and managing the stakeholder community. With the user requirements and scenario scoping now in place, this task is focusing on a core set of requirements for the use cases and on expanding the Stakeholder End-user Platform with a view to intensifying engagement and feedback on the toolkit elements through a profiling exercise to help pinpoint the right stakeholders. For the time being, the stakeholder workshops will be held virtually with additional webinars also planned.

- **Task 8.3 – Dissemination and Communication (M1-36):** Coordinates the overall strategy, planning and monitoring of activities and results achieved. This task will increasingly focus on stakeholder engagement, website updates, enhanced communication messages and new marketing packages with the aim of supporting the exploitation of results and knowledge. This includes community building and profiling.

Other relevant tasks under WP8 are:

- **Task 8.1** – PANACEA **Observatory for Security Framework in Health (January 2019-December 2021)**: Coordinates the online Lookout Watch as a key element of the content strategy. The Lookout Watch is being revised to cover key EU and international policy measures and best practice guidelines to support the positioning of PANACEA and market studies to support T8.4. D8.3 sets out plans for the main output of this task, namely *D8.1:* PANACEA *Security Framework for Hospitals and care centres* (December 2021), as an analysis instrumental to correctly framing the PANACEA vision and key messages to both the healthcare and cybersecurity communities.

- **Task 8.4 – Exploitation and Sustainability (June 2019- December 2021):** Analyses PANACEA assets and competitors within the market perimeter, innovations versus the state of the art, defines the value proposition, and updates joint and individual exploitation plans. Its main outputs are: D8.5 Exploitation Plan and Sustainability Path, preliminary version (December 2020) and D8.6, which is the final version with partner agreements (December 2021).

1.2 Quality assurance
1.2.1 Quality criteria

The QA in the PANACEA project relies on the assessment of a work product (i.e. deliverable) according to lists of QA checks (QA checklists – [QAPeer]) established with the QAM, validated at a project management level and centralized in the [PMP].

For the purpose of the QA of this deliverable, it has been assessed according the following checklists:

- PEER REVIEW (PR) QA CHECKLIST [QAPeer]: this deliverable is a report, it then requires a proper peer review according to the checks defined in this checklist;

1.2.2 Validation process

For the final validation of work products (i.e. deliverables) within the PANACEA project, a final QA review process MUST be used before the issuing of a final version. This QA validation process follows the Quality Review Procedure established with the QAM and validated at project management level in order to guarantee the high-quality level of work products and to validate its adequacy according to the defined quality criteria chosen and defined for each deliverable. The Quality Review Procedure itself and the selection of the QA Review Committee are described in the [PMP]. The QA validation process is scheduled in the QA Schedule [QASchedule] managed by the QAM.

1.3 Relationship with PANACEA R&I and Deliverables

All results and findings of PANACEA are relevant for WP8 as they feed into the communication strategy, give insights into assets tailored to specific stakeholders and help guide dissemination unless except for any confidential information.

Deliverables that are directly related to WP8 are:

- D8.1: PANACEA Security Framework for Hospitals and Care Centres (December 2021).
- D8.2: Communications and Dissemination Strategy and Achievements, 1st version (May 2019).
- D8.4: Communication and Dissemination Strategy and Achievements, Final version (June 2021).
- D8.5: Exploitation Plan and Sustainability Path, Preliminary Version (December 2020).
- D8.6: Exploitation Plan and Sustainability Path, Final Version (December 2021).
- D9.4: Technical Progress Report 1 (December 2019).
- D9.5: Technical Progress Report 2 (June 2020).
- D9.6: Technical Report 2 (June 2021).

1.4 Structure of the document

The rest of this document is structured as follows:

- **Section 2**: Contains the Glossary of Acronyms.
- **Section 3**: Revises the strategic goals and KPIs for Communications, Stakeholder Engagement, Dissemination and Exploitation of Results in the light of lessons learned up to M18 and the COVID-19 pandemic. New KPIs are defined and referenced for easy reporting, specifying the targets for the

period M19-36. This section also summaries the approach used for the SMART campaigns and the analytical dashboard, with illustrative examples.

- **Section 4**: Focuses on the PANACEA Solutions and Stakeholder Groups. It summarises the policy context for the project, its Toolkit and solutions for COVID-19, as well as its positioning in the standards landscape. It re-defines its stakeholders and groups them into six core stakeholders and two complementary groups.
- **Section 5**: Zooms in on the impacts of the communications strategy. It describes the main actions for the website, including content creation, enhanced branding visuals and core messages conveyed through the Blog. It also reports on the dashboard analytics. It also covers impacts of the SMART campaigns, videos and newsletters.
- **Section 6**: Covers the impacts for stakeholder engagement and community building, spanning social media and professional networks, 3rd-party events and webinars. It analyses the PANACEA community from both a quantitative and qualitative perspective. It also reports on the dissemination of results and knowledge sharing, concluding with a summary of the KPI impacts achieved at M18.
- **Section 7**: Defines the roadmap of actions and measures for M19-36, over the short- and long-term, based on the new set of KPIs.
- **Section 8**: Draws the main conclusions and summarises the next steps.
- **Section 9**: Deals with relevant ethical and data privacy aspects.

2. Glossary of Acronyms

Acronym	Description
7HRC	Seventh Health Region-Crete, a healthcare end-user partner in PANACEA.
Communication Plan	The plan for communication activities of project results
Community	The heterogenous group of people that PANACEA addresses as part of its communication and dissemination activities.
Content Strategy	The strategy followed to communicate and disseminate content related to project results
COT	Commercial-off-the-shelf
CUREX	Secure and private health data exchange, Horizon 2020 peer project
Cybersecurity (holistic approach)	Driving real improvements in cyber defence by improving human practices, technologies and processes. Holistic refers to combining these elements together to ensure a more effective approach to cyber resilience and compliance with EU and sector-specific regulation.
Dissemination Plan	The plan for dissemination activities of project results
DOA	Description of Action of the PANACEA project
ECSO	European Cyber Security Organisation
Editorial Plan	The internal process to collect, edit, schedule and publish content on the PANACEA research results
ESP	End-user and Stakeholder Platform, a multi-stakeholder group coordinated in PANACEA WP8 to reinforce stakeholder engagement.
National Health Services	Many EU countries have diverse terms denoting healthcare organisations at local and regional level, e.g. Health Executive Service (HSE) in Ireland; USL/ASL for local health authority in Italy, with ASST for regional territories and U.O.C. for a multi-speciality department.
PoCT	Point of Care Test

Acronym	Description
EU Cybersecurity Act	A permanent mandate for ENISA and a framework for European cyber-security certification - EU cybersecurity Certification Framework.
ENISA mandated under EU Act	European Union Agency for Network and Information Security. Europe's foremost centre for cyber-security expertise, working closely with EU countries and the private sector to advise on and help resolve critical problems of the day.
EU cybersecurity Certification Framework under EU Act	The framework covers digital products, processes, and services valid throughout the Union. The framework focuses on risk-based certification schemes, with a transparent governance framework and market-oriented approach with strong emphasis on globally applicable standards.
FPG	Gemelli University Hospital, a healthcare end-user partner in PANACEA.
GA	PANACEA Consortium Grant Agreement
GDPR	General Data Protection Regulation. Effective from May 2018, the GDPR provides new rules to give citizens more control over their personal data. Compliance as an important competitive edge, especially in the short term.
HSE	South-South-West Hospital Group of the Health Service Executive, a healthcare end-user partner in PANACEA
IP	Intellectual Property
NIS Directive	Cornerstone legislation with measures to boost the overall levels of cybersecurity and preparedness in Europe. The Directive defines legal and technical requirements for critical infrastructures while fostering a culture of security across within them as vital sectors of the EU economy and society, including healthcare.
NIST	National Institute of Standards and Technology
PAC	Project Advisory Committee of the PANACEA project
SDOs	Standards Developing Organisations. PANACEA is monitoring relevant
SEO	Search Engine Optimisation
SERP	Search Engine Result Page
SMART	specific, measurable, achievable, relevant, and time-bound
Secure Hospital	Training on cyber security in healthcare, Horizon 2020 peer project
Sphinx	Solving the Riddle of Cyber-Security protection in Healthcare IT ecosystem, Horizon 2020 peer project
Stakeholders	The various groups of people interested in PANACEA's value proposition. PANACEA addresses them with targeted actions, depending on the specificity of the group.

Table 1: Table of Acronyms

3. Strategy for Communications, Dissemination and Engagement
3.1 Dealing with COVID-19

The impacts of COVID-19 presented at the technical review in April 2020 are particularly relevant for WP8. On top of this, Trust-IT has looked at the overall context and collected expectations from a diverse set of communities through its networks (e.g. 5G and industry forums, HPC and scientific communities, standards organisations). From the scenarios set out at the Technical Review (scenario 1: crisis ends in June 2020; scenario 2: crisis ends in September), where crisis ends" means that cross border movements are possible and End-User staff are available for the project. Below, D8.3 formulates a third hypothesis: COVID-19 will probably have long-term impacts and calls for new approaches to stakeholder engagement.

The main conclusions are summarised below.

- **PANACEA context 1 – Stakeholder engagement**: Impossibility of running workshops and face-to-face meetings with partners.
  - End-user partners (FPG, 7HRC, HSE and ICEM) have been called to the front line and/or crisis management, significantly reducing their availability in contributing to activities.
  - Other partners have also been affected, e.g. forced to rely on smart working and their own computing/network resources, making coordination of activities generally more difficult.
- **PANACEA context 2**- **Dissemination of results**: Blind period for conferences and opportunities for dissemination through presentations, networking and publishing.
  - PANACEA has lost several such opportunities though some may be recoverable later in the year or in 2021.
  - Cancelled events targeted by PANACEA: eHealth Week in Croatia in 15-17 April.
  - Postponed events: CYSEC, originally planned for planned for April 2020 is now scheduled for 27-28 October. Two papers have been submitted. ICEGOV2020 has been postponed to September 2020 (Athens), with one paper accepted with publication of the papers in 2020 even in the event of cancellation.
- **Evolution of COVID-19**: There is much speculation about the evolution of COVID-19 and the so-called "return to reality". The latest evidence points to the low likelihood of physical events taking place in September 2020 despite the more optimistic views of the scientific community, while industry forums (e.g. the 5G Automotive Association) and most standards organisations (e.g. 3GPP) have cancelled physical events until further notice and at least for the rest of 2020.
- **New forms of engagement are clearly needed**, whether they be **webinars**, **virtual events** or **other formats**, e.g. **podcasts**), considering also the long-term need to protect the safety of all the community.

While many activities in WP8 have continued unaffected, albeit not under ideal conditions, T8.2 is the most affected task since it heavily relies on F2F engagement and/or inputs from the healthcare end-user community, which is constrained by COVID-19 crisis management and blanket travel bans.

However, no project can stand still. To ensure impacts for the stakeholder workshops as critical events for collecting feedback from stakeholders:

  - PANACEA is no longer in the position of hosting the 2nd Stakeholder Workshop 1) as originally planned (M18) and 2) organising it as a physical meeting.
  - As such, it has been decided to organise the workshop as a virtual event in late September 2020.

o To overcome barriers to direct stakeholder engagement, the number of planned webinars has been increased from 4 to 6. Two of these webinars will be organised under T.8.2.
o The plan for M19-36 also takes into account the need for future virtual workshops and/or webinars given the uncertainty that still surrounds the pandemic at the time of writing this document.

Other activities affecting the activities in WP8 include the dissemination of PANACEA advances and new knowledge through scientific conferences with the blanket cancellation of events

- Stakeholder workshop execution, needed to get feedback from stakeholders.
- Emulation environment availability, needed to finalise DRMP.
- Open call process conclusion, needed to enrol two MD manufacturers, for IMP and Security by Design.

3.2 Review of Strategic Goals

The revised strategy for PANACEA communications, dissemination and stakeholder engagement draws on the experiences and lessons learned over the past year, including the impacts of COVID-19 described above.

Communications:

- Enhance stakeholder messages: Medical staff work in time-pressured environments and typically look for workarounds when it comes to cyber security. It is therefore important to highlight the fact that information and network security is ultimately about the safety and wellbeing of patients.
  Another key message is that cyber security in healthcare is the responsibility of all staff, not just the IT department but also of clinical staff. Key messages need to showcase good practices in the sector, including end-user champions.
  End-users within PANACEA and other partners (e.g. UNAN) are key contributors to defining and driving these messages.
- Continue to tailor messages to stakeholders, adapting the terminology based on expected knowledge levels and information needs.
- Continue to use a balanced mix of elements in the Communications Toolkit, with a priority of **tailored content production** and a **revamped website**, updating the PANACEA findings and outputs. Graphically enhance and update the PANACEA **website**, including the sections on Innovations, including solutions for COVID-19; Use Cases; the About section and stakeholders, as well as populating the Blog. The Lookout Watch will undergo a revamp, with the re-organisation of the categories, new branding and tagging of keywords. All PANACEA images will be graphically enhanced versions; several examples are given in this document.

Other key elements of the toolkit include:

- **Professional Networks**, e.g. LinkedIn, which help to profile stakeholders, map them to PANACEA targeted audiences, and planned activities. This enables more focused communications and therefore more effective engagement.
  Twitter remains an important channel but is less useful in profiling the community in a detailed way.
- **Webinars**: A key channel for engagement during COVID-19 and still uncertain evolution, preventing physical interactions. Webinars also have the advantage of being made available afterwards through the recording, building and profiling the community through registrations, and polling participants on their views related to cybersecurity and healthcare of interest to PANACEA. For this reason, the number of webinars has been increased in Section 3.4. Key takeaways can be relayed across the

community, highlighting stakeholder calls for action. Webinars are also an opportunity to invite participants to join the community and subscribe to the newsletter.

- **Virtual events**: Replacing physical workshops for the foreseeable future as a priority safety measure. At least the 2nd PANACEA Stakeholder Workshop will be organised as a virtual event, using virtual breakout sessions, presentation and panel slots, and online information packs for participants.
- **Promotional material**: Updated material will summarise key information on the website tailored to specific audiences and contexts. All material will be uploaded on the website
- **Videos**: Given the impossibility of video interviews, PANACEA will produce one-minute video pills on the project's advances, and will re-introduce partner interviews if physical events and meetings become feasible.
- **Podcasts:** This is a new feature of the Communications Strategy, enabling "fireside chats" with partners and experts on specific PANACEA topics of general interest (1-3 people at a time).
- **Publication, e.g. Essential Guides and Light reading**: These short publications focus on major topics related to PANACEA, including policy, guidelines and good practices. They will be graphically designed and made available as downloads on the PANACEA website.
- **Press Releases and Announcements**: These cover major breakthroughs and important announcements distributed to healthcare and cybersecurity channels as well as general media outlets.
- **External websites and channels**: Regular updates on the dedicated web page on www.cyberwatchingsecurity.eu, as well as popularised channels like CORDIS.eu.

Stakeholder Engagement:

- Prioritise **quality** over quantity when it comes to community development and stakeholder engagement to ensure concrete feedback is received on both the PANACEA toolkit elements, related policy aspects and key topics for PANACEA. This is one example of how the stakeholder profiling comes into play, with Trust-IT and FPG working together to pinpoint the most relevant stakeholders based on the requirements for validation defined by the owners of the Toolkit elements, as well as other forms of engagement.
- Keep a close track of **stakeholder engagement** in terms of the groups involved and specific actions taken to support the validation of PANACEA.
- Revise the stakeholder groups, defining **six priority stakeholders** for intensified engagement in M19-36. These groups are: Healthcare organisations; Medical Devices and Applications Supply; Healthcare associations (not just patient associations but a broad set of multipliers); policy makers and regulators; insurance companies and standards organisations. The two complementary stakeholder groups are Research institutes; cyber security and privacy professionals reached through earlier networks and synergies with cyberwatching.eu and peer projects.

Dissemination and Exploitation

- Promote PANACEA findings through a series of **Dissemination Summaries** on non-confidential information. These summaries are designed to convey the findings in concise and easily digestible formats.
- Disseminate PANACEA results presented at technical conferences and through peer-reviewed papers through appropriate channels with a view to showcasing advances.
- Draw on D8.5 **Exploitation Plan and Sustainability Path**, Preliminary Version (December 2020, with first draft available end June 2020) and D9.5 **Technical Report** (June 2020) for the website updates on the PANACEA toolkit.
  D8.5 analyses the PANACEA Toolkit elements (assets; including solutions for COVID-19), defines the market perimeter and PANACEA value proposition, updates the exploitation plans and performs an analysis on the strengths, weaknesses, opportunities and threats (SWOT), among other related

aspects. The final version is due in December 2021. Inputs during the production of this deliverable will feed into further updates towards project end. D9.5 gives an overview of PANACEA advances and results over the past six months of the project.

3.3 Review of KPIs and Timelines

PANACEA has revised its Communication and Dissemination KPI targets, as defined in the Grant Agreement and D8.2 as the first communications plan, based on the following criteria:

- The need for a coherent and streamlined approach to counting, tracking and reporting on impacts achieved, avoiding multiple references to the same outputs, e.g. videos, press releases. To ease activity scheduling and impact tracking, each KPI now has a reference number and clear total number of outputs.
- Lessons learned about the most effective measures, necessary improvements and priority actions for M19-36, e.g. webinars as a practical alternative to physical events, with the opportunity to recruit new community members and newsletter subscribers while also enabling the polling of participants viewpoints on key topics.
- The feasibility of achieving some KPIs in the given timeframe due to the impacts of COVID-19. For example, it is unlikely that the project can achieve visibility at 50 3rd-party events over the next 18 months (with 13 achieved by M18). However, other activities can be introduced to counter potentially negative impacts.

The tables below set out the new or revised KPIs. New processes, e.g. tracking sheets, have been put in place for monthly monitoring of impacts and scheduling of activities for the following month.

The first table covers the KPIs for the PANACEA Communication Kit, which has 10 clearly-defined KPI targets. The KPIs are based on the following strategy:

- Content-driven: Interesting and incentivising stakeholders through rich and insightful content.
- Community-centric: Engaging and profiling the community by tracking reactions to content (e.g. LinkedIn posts and engagement in events).
- Actionable and realistic plans: Easy scheduling and tracking of activities, mapping actions to a specific set of KPIs.
- SMART-approach: Measuring impacts and making any necessary adjustments.

The Open Call campaign targets have been adjusted as PANACEA has recruited several major healthcare associations which have members that are prospective applicants. These associations have replaced the EU project synergies cited in the original GA KPI as they are unlikely to have such applicants within their remits or networks.

The table below revises the KPIs. Column 3 specifies the new target for the period July 2020 to December 2021 and Column 4, the differences with the KPI cited in the GA (with new or revised KPIs). For reference, Annex 1 is a comparative analysis of all KPIs in D8.3, the GA and D8.2.

KPI Category	Description	Target for M19-36	KPI differences compared with the GA
Communication Kit: CK KPI #1 (website)	Monthly web content – regular updates with SEO-driven approach/content-rich articles	Min. 66 new pieces of content by M36.	Grand total of 180 min. by M36 (increased from 84).
Communication Kit: CK KPI #2 (website)	Monthly visits to https://www.panacearesearch.eu/,	1000/month by M36 (800/month by M30)	KPI target lowered.
Communication Kit: CK KPI #3 (social media)	Animating Twitter and LinkedIn, tracking of visual impacts.	Min. 8 posts/month. Min. 1 SMART campaign/month on priority actions.	New KPI, merging social media activities with impact reports.
Communication Kit: CK KPI #4 (newsletter)	In-house newsletter production and circulation to subscribers	Monthly from December 2019 (M12) except for holiday periods. Total: 20.	Total 20 min. by M36. Reduced by 4.
Communication Kit: CK KPI #5 (newsletter)	Tracking of newsletter subscribers and actions taken to boost recruitment.	Min. 200 subscribers by M36.	Target added for the KPI.
Communication Kit: CK KPI #6 (promotional banners)	Graphically designed promotional banners for use on the website and social media, including toolkit components.	Min. 4/month. Total 72 by M36.	Revised KPI: grand total of 97.
Communication Kit: CK KPI #7 (promotional material)	Graphically designed fliers and brochures.	Min. 3 updated project fliers. Min. 1 flier on each Toolkit component. Total 10 by M36.	Revised KPI specifically on new set of fliers planned.
Communication Kit: CK KPI #8 (videos)	Professional, in-house videos on the Toolkit (1-minute video pills).	Min. 1 on the toolkit plus 1 on each component. Total 8 by M36.	New KPI.
Communication Kit: CK KPI #9 (press releases)	Press releases targeting healthcare and IT/cyber security media channels. TV/Radio interview (including local in partner area)	Min. 2 press releases. Min. 1 to healthcare media and min. 1 to IT/cyber security channels. Total 2 PRs + 1 TV/Radio interview by M36.	Revised KPI.
Communication Kit: CK KPI #10 (open call campaign)	SMART campaign on the Open Call with impact report and with the support of relevant healthcare associations.	1 pre-call advertising banner (save the date). 1 flier. 2 healthcare associations recruited for support. 1 press release.	Adjusted KPI with new targets for support purposes.
Communication Kit: CK KPI #11 (SERP)	Average position for core set of keywords from M25 to be defined in D8.5	KPI to be defined in D8.5.	

Table 2: Communication Kit KPIs

The table below presents the KPIs for stakeholder engagement and community-building. The number of webinars has been increased and podcasts have been added as a new feature for engagement. Podcasts can

be with PANACEA partners, members of the End-user and Stakeholder Platform (ESP), Project Advisory Committee (PAC) or with stakeholders outside the project and peer projects on topics of mutual interest.

The community member target has been lowered (2000 members by M36) to allow PANACEA to focus on qualitative aspects and targeted engagement around its major outputs and insights. More than 50% of the community must come from healthcare organisations.

Targets for participation at 3rd-party events and engagement with peer projects at physical events are conservative given the uncertainty around such activities at the time of writing this report. However, they will be increased if positive scenarios emerge over the next 18 months.

KPI Category	Description	Target for M19-36	New KPIs and/or changes to GA
Stakeholder Engagement and Community Building: ENG KPI#1 (PANACEA workshops)	PANACEA Stakeholder Workshops (Virtual and Physical, as feasible).	Total 3 by M36, with min. 1 virtual event.	No change (virtual versions included, as measure for COVID-19 impacts).
Stakeholder Engagement and Community Building: ENG KPI#2 (webinars)	PANACEA Webinar organisation and promotion.	Min. 6 by M36, including min. 1 with peer project(s).	Revised KPI with higher targets, with measure for COVID-19 impacts.
Stakeholder Engagement and Community Building: ENG KPI#3 (podcasts)	PANACEA Podcasts, with 1-3 panellists, zooming in on a specific topic.	Min. 2 by M36.	New KPI added as a new engagement feature.
Stakeholder Engagement and Community Building: ENG KPI#4 (profiled community)	PANACEA profiled community ("Community Tracker": quantitative and qualitative analysis).	2000 by M36. Over 50% from healthcare organisations.	Revised KPI with qualitative metrics included.
Stakeholder Engagement and Community Building: ENG KPI#5 (3rd-party events)	3rd-Party Events (positive and negative scenarios based on evolution of COVID-19).	Min. 25 physical events by M36 (positive scenario). Min. 10 virtual events (negative scenario).	Revised KPI; lowered due to COVID-19 outbreak.
Stakeholder Engagement and Community Building: ENG KPI#6 (peer projects)	Engagement with peer projects for joint dissemination of results, e.g. cyberwatching.eu Concertation Meetings.	Min. 2 virtual or physical events by M36.	Revised KPI, specifying concrete actions.

Table 3: Stakeholder Engagement and Community Building KPIs

The table below defines six KPIs for the dissemination of results, aimed at achieving a balance between activities that can be done in-house irrespective of the evolution of COVID-19 and what can be realistically done through other measures. Should positive scenarios emerge, KPIs will be increased and/or reviewed during M19-36.

KPI Category	Description	Target for M19-36	New KPIs and/or changes to GA
Dissemination of results: DISS KPI #1 (in-house publications)	Production and Promotion of Essential Guides and Light Reading on PANACEA insights (graphically designed).	Min. 3 new Essential Guides; Min. 3 new Light Reading publications. Total 6 by M36.	Revised KPI specific to the cited outputs for clarity purposes.
Dissemination of results: DISS KPI #2 (popularised channels)	Articles on PANACEA Achievements submitted to CORDIS Wire.	Min. 2 by M36 (1 at M19; 1 at M35).	New KPI.
Dissemination of results: DISS KPI #3 (videos)	Videos on PANACEA Achievements (professional; in-house).	Min. 2 videos by M36 (1 at M24; 1 at M35).	Revised KPI as a specific output on tangible results.
Dissemination of results: DISS KPI #4 (cyberwatching.eu entry)	Updates of the PANACEA results and achievements on the dedicated cyberwatching.eu entry.	Min. 4 updates by M36 (M19; 24; 30; 36).	New KPI with 1 entry already produced in M9
Dissemination of results: DISS KPI #5 (standards)	Inputs to working groups/technical committees in relevant standards organisations.	Participation in Min. 2 TCs/WGs. Min. 2 inputs.	No change to GA target.
Dissemination of results: DISS KPI #6 (partner end-user interviews)	Written or filmed interviews with end-user partners, e.g. 7HRC, FPG, HSE, ICEM on impacts of PANACEA.	Min. 1 per partner by M36. Total 4 (min).	New KPI, not dependent on evolution of COVID-19
Dissemination of results: DISS KPI #7 (research papers)	Acceptance of research papers (peer reviewed and/or open access).	Min. 5 new research papers/technical publications by M36.	Revised KPI specific to research papers, which are expected to be taken forward despite COVID-19 cancellations.
Dissemination of Results: DISS KPI #8 (joint dissemination)	Joint dissemination with peer projects coordinated via cyberwatching.eu on MTRLs, e.g. webinars on common topic; demo or other type of exhibition stand; workshop session	Min. 5 peer projects. Min. 2 concrete outputs by M36.	Revised KPI with tangible outcomes.
Dissemination of Results: DISS KPI #9 (deliverable summaries)	Publication of graphically designed deliverable summaries as 1 output	1 in-house publication of deliverable summaries from PU deliverables by M36	Revised KPI with specific target.

Table 4: KPIs for Dissemination of Results

The table below covers the KPIs for the exploitation of results. All the KPIs are new to ensure a coherent, practical and market-facing approach. All related actions can be carried out without direct engagement and are therefore not dependent on the evolution of COVID-19. However, new KPIs, e.g. Business KPIs, can be included in D8.5 - Exploitation Plan and Sustainability Path, Preliminary Version (December 2020), and/or based on review recommendations (September 2020).

KPI Category	Description	Target for M19-36	New KPIs and/or changes to GA
Exploitation of Results: EXP KPI #1 (demos)	Production and promotion of technical demos (PANACEA in Action series).	Min. 1 per Toolkit component. Total 7 by M36.	Revised KPI focusing on the toolkit.

KPI Category	Description	Target for M19-36	New KPIs and/or changes to GA
Exploitation of Results: EXP KPI #2 (testers)	Recruitment of stakeholders to test and validate the Toolkit.	Min. 1 per Toolkit component. Total 7 by M36.	New KPI.
Exploitation of Results: EXP KPI #3 (testimonials)	Testimonials on PANACEA Toolkit (on graphically designed banners).	Min. 4 by M36. Total 4 (min.)	New KPI.
Exploitation of Results: EXP KPI #4 (adoption kits)	Production and promotion of Adoption Kits (Practical, "How to implement Toolkit component").	Min. 2 by M36 (1 at M30; 1 at M36). Total 2 (min).	New KPI.
Exploitation of Results: EXP KPI #5 (marketing packs)	Production of professional Marketing Packages on PANACEA assets, e.g. press releases, brochures adapted from related CK KPIs).	Min. 2 by M36 (1 at M30; 1 at M36). Total 2 (min.).	Revised KPI with clear outputs
Exploitation of Results: EXP KPI #6 (exploitation plans)	Updated exploitation plans, with the 1st update in M16.	Min. 4 by M36 (M16; M23; 30; M36. Total 4.	New KPI.
Exploitation of Results: Webinars on the final toolkit demos.	8 webinars (1/toolkit component) in M34-36)	8 demo webinars by M36.	Revised KPI: cost-effective and achievable output.

Table 5: KPIs for Exploitation of Results

3.4 Approach to SMART-based Campaigns and Dashboard Analytics

SMART campaigns refer to communication activities that are specific, measurable, achievable, realistic, time-bound (clear start and end date). PANACEA uses this type of promotional campaign for activities such as events and webinars, partner viewpoints, project assets and results, etc. Dates are set for the campaign launch, mid-term impact monitoring and impacts at the end of the campaign.

Below, an example for the PANACEA Partner quotes graphically designed for use on Twitter and LinkedIn. The first image top left marks the launch of the campaign; the image top right shows impacts on Twitter, while the images bottom left and bottom right show impacts half way through and at the end of the campaign. More examples of SMART campaign impacts are given in Section 5.1.

Figure 1: Example of a PANACEA SMART Campaign

SMART campaigns are included in the communication strategy dedicated to specific activities related to the promotion of events, press releases, webinars etc., in order to achieve the target KPI and maximise the impact of the item promoted. The campaigns are time-bound as they are usually carried out prior, during and after the selected event, to work respectively as teasers, to give more visibility during the event, and to report on the main takeaways and impact after the event has taken place.

Another advantage of the SMART campaigns is that they can be used to target specific stakeholders.

Website analytics are tracked through a dedicated Dashboard. This customised analytical tool created for PANACEA tracks, analyses and displays real-time information on a core set of metrics and Key Performance Indicators (KPIs), such as the number of visitors, page views, new and returning visitors, gender usage, country coverage, and the most popular pages.

A real-time dashboard capable of monitoring the relevant information from the website users' behaviours is an extremely handy tool that helps evaluating the usage of our platform as well as to discover the most exploited contents. We adopted Google Data Studio as data visualisation platform, because of its user-friendliness, completeness and its simplicity in managing data, gathering them from proprietary and not proprietary sources.

Figure. 1: An overview of Panacea dashboard

Figure 2: An example of a well-exploited content, spotted on the dashboard

Visualising data in a chart is an extremely quick way to keep on track the performances of your website. Having all this information clearly showcased in a simple yet effective way, allows us to understand the impact of our activities and whether or not we need a steering in the topic of our campaign, the frequency of publication or even the channels of their dissemination. Having a news page with "an avg. time on page" metric of more than 2 minutes, for instance, equals to having a page that users are actually reading because they are interested in what's written inside. Thanks to such information we are not only able to compare and measure how much traffic the news is driving to our website, but also to identify valuable and potential content to produce to engage more with our public. Moreover, thanks to the data we gather from Google Search Console, we can identify valuable keywords with high click-through rata (CTR) driving traffic to the website.

![Panacea logo - People-centric cybersecurity in healthcare]
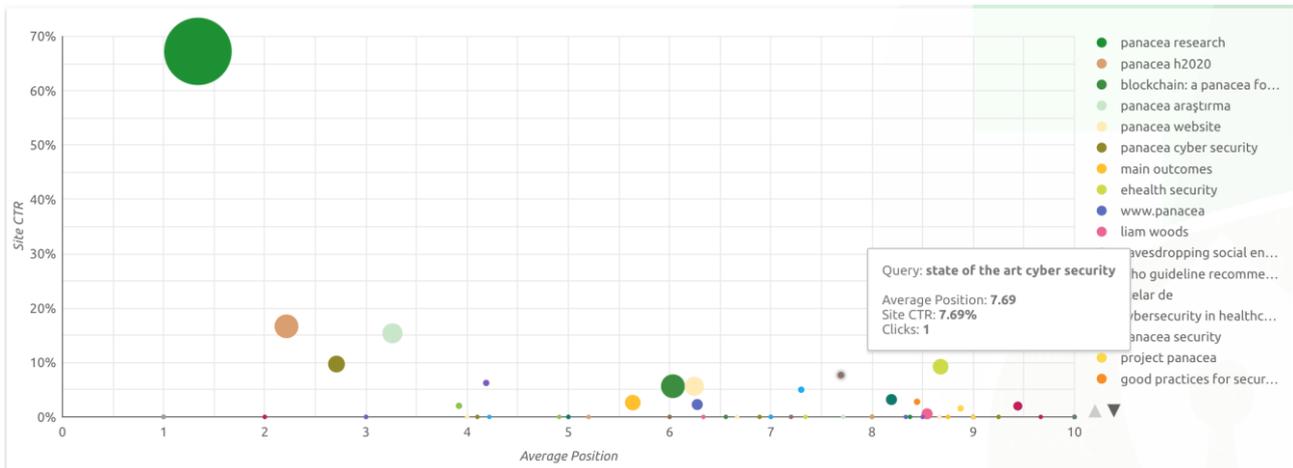
Figure 3: Site CTR vs av. position per KW

What we are measuring on a daily basis:

- Number of unique users.
- Pageviews.
- Av. time on page.
- Av. session duration.
- Sessions.
- Bounce rate.
- Source of traffic.
- Most visited pages.
- Geographical origin of our users (based on IP).
- Twitter/LinkedIn activity impact (posts, followers, likes, shares, impressions).
- Av. SERP position vs CTR (click-through rate) per keyword (SEO).
- Impressions vs clicks per page (SEO).

4. PANACEA Solutions and Stakeholder Groups

4.1 PANACEA Policy Context

EU policy plays a key role in defining cybersecurity requirements, marking a shift in priorities with the NIS Directive defining healthcare organisations as operators of essential services, the Medical Device Regulation (MDR) including obligatory safety and security provisions for medical devices, and EC communications prioritising the digital transformation of healthcare in the strategy for the Digital Single Market (DSM), where cybersecurity is one of the enabling technologies[1].

Healthcare organisations therefore need to comply with an array of legal requirements, from design of IT systems and medical devices to data protection and privacy. Legislative acts relevant to the cybersecurity of healthcare IT assets, medical devices, and operators deal with protecting or processing of personal data stored in medical devices and might apply in parallel to the Medical Devices Regulations.

- **NIS Directive**: fosters a culture of security across sectors vital for the EU economy and society heavily reliant on IT, such as banking, energy, financial market infrastructures, healthcare, transport, water and digital infrastructure. Businesses in these sectors deemed by Member States as operators of essential services have to take appropriate measures and notify incidents of significant impact to competent authorities. Of relevance to PANACEA is also the fact that cloud computing service providers have to comply with the security and notification requirements under the Directive.

- **General Data Protection Regulation (GDPR)**: relates to the processing by an individual, company or organisation of personal data relating to individuals in the EU. Personal data is any information that relates to an identified or identifiable living individual, including any information that can lead to the identification of a person, as well as personal data that has been de-identified, encrypted or pseudonymised but used to re-identify a person. The GDPR is technology neutral and applies to both automated and manual processing. Personal data is subject to protection requirements set out in the GDPR irrespective of how it is stored, e.g. in an IT system, through video surveillance or on paper. Other national legislation may also apply.

- **Medical Device Regulation (EU) 2017/745** and **In Vitro Diagnostic Devices Regulation (IVDR, Regulation (EU) 2017/746)**: Ensuring that devices on the EU market are fit for new technological challenges linked to cybersecurity risks by laying down new essential safety requirements for all medical devices with electronic programmable systems and software. The requirement for manufacturers is to develop products based on the state of the art and principles of risk management, including information security and minimum requirements for IT security measures, such as protection against unauthorized access. The date of application for most MDR provisions is postponed to May 2021 while the date for (EU) 2017/746 remains May 2022[2].

The following figure gives a visual snapshot of relevant EU legislation for cybersecurity and healthcare.

Source: MDCG 2019-16

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[1]   https://ec.europa.eu/digital-single-market/en/news/communication-enabling-digital-transformation-health-and-care-digital-single-market-empowering;
https://ec.europa.eu/commission/presscorner/detail/en/IP_18_3364.
[2] https://ec.europa.eu/growth/sectors/medical-devices_en.
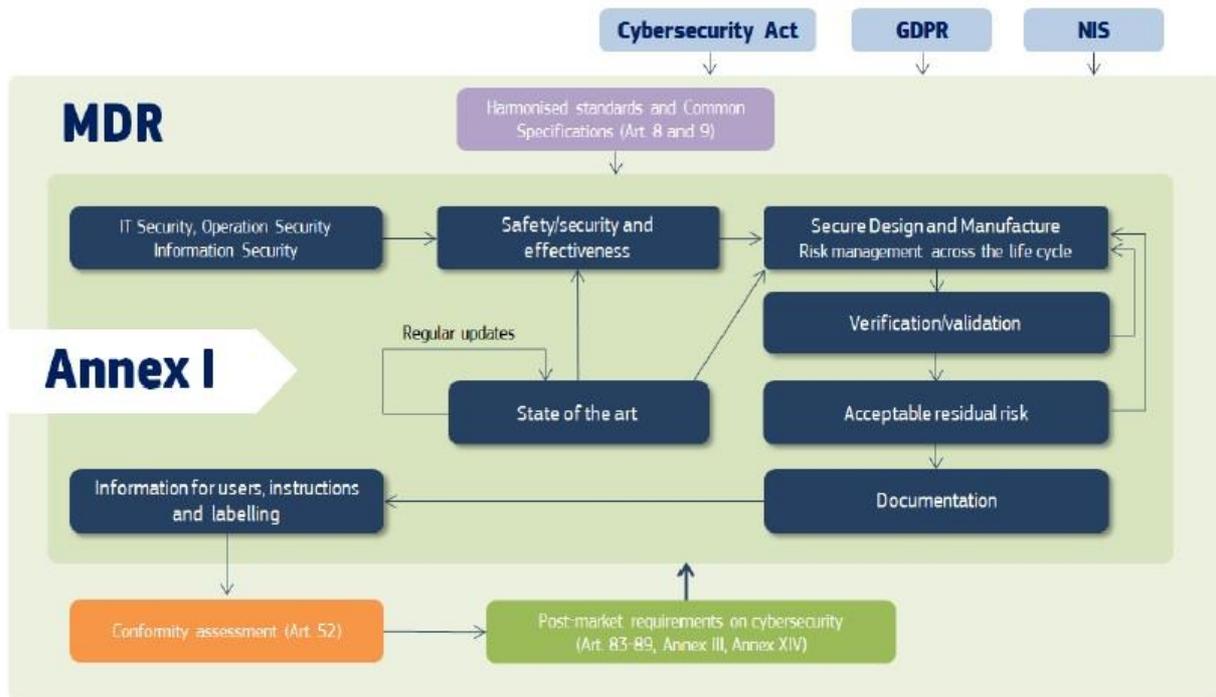
Figure 2: EU Legislation related to Cybersecurity in Healthcare

4.2 PANACEA Toolkit

Improved security of health and care services, data and infrastructures translates into less risk of data privacy breaches caused by cyber-attacks and increased patient trust and safety. This is the mission of PANACEA, by designing, developing and implementing innovative methods, tools, guidelines and best practices meeting the specific needs of healthcare organisations.

The main PANACEA Toolkit is the main output, spanning technical tools, technological and organisational outputs designed to tackle cyber security challenges in healthcare. The Toolkit covers technological solutions, humans and processes, e.g. risk governance, by using a holistic approach.
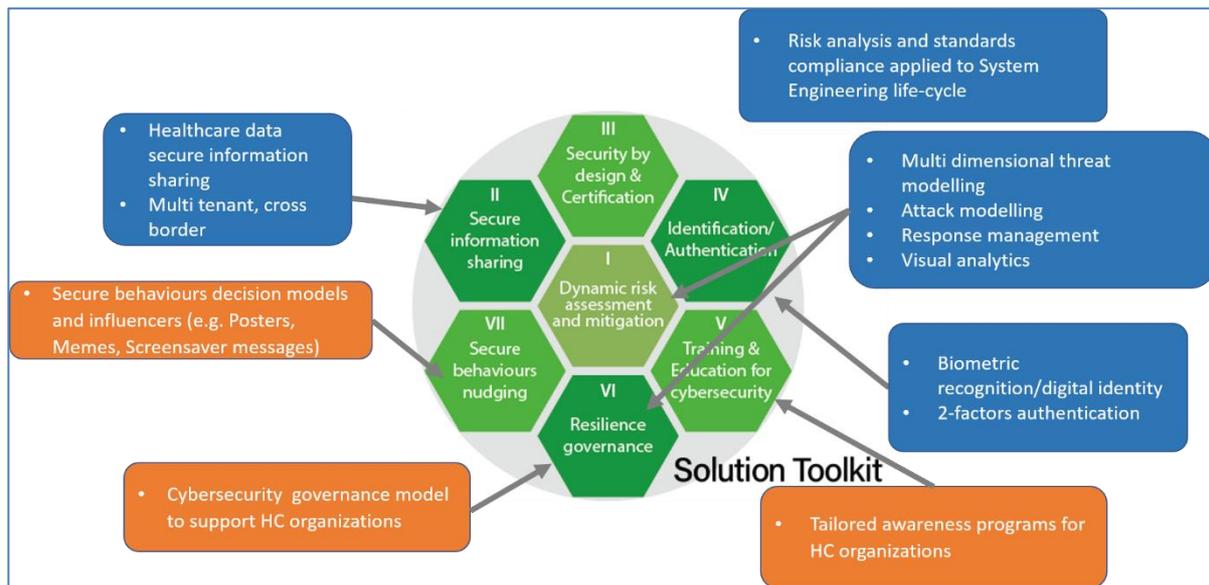
Figure 3: PANACEA Solution Toolkit

Tool for Dynamic Risk Assessment and Mitigation in complex networks [Dynamic Risk Management Platform, DRMP]. Multi-dimensional data acquisition and reachability computation of the monitored environment. Acquisition of IT infrastructure knowledge (scans, topology data-flows, asset characteristics). Acquisition of vulnerability surface knowledge (scans). Acquisition of users and users access information. Acquisition of business and governance models.

- Flexible and open interface to COTS (commercial-off-the-shelf) sensors and systems.
- Multiple data sources normalised to a common data model.
- Advanced multi-layered visualisation.
- Calculating and prioritising possible attack paths on a graph. The attack graph shows multi-dimensional paths, not just technical vulnerabilities but also human access to the network.
- An attack graph shows possible ways an attacker can intrude into the target network by exploiting a set of vulnerabilities.

The **Risk Evaluation** is based on the multi-dimensional attack graph and combined with

- An evaluation of the business impact.
- Calculated from a precise mapping of key business processes vs infrastructural and human assets.
- Impact aspects for the risk computation.

The **Response Evaluation**:

- Generates and prioritises mitigation actions.
- Produces a list of prioritised, specific and actionable risk-mitigation actions based on cost/impact/risk reduction trade-offs.

The response engine ensures multi-faceted mitigation spanning technical, organisational (Resilience Governance) and human (Secure Behaviour Nudging) aspects.

Secure Information Sharing Tool [Secure Information Sharing Platform, SISP]. Protection of healthcare data. Information sharing in healthcare is usually a manual process, which is inefficient, especially during a pandemic. The tool enables real-time sharing of complex and huge data.

- Fully distributed.
- Multitenant/Multi-organisational.
- Cross border (multi regulation compliance).
- Customisable templates and data model.
- Customisable workflow.
- Shared knowledge management (wiki).
- Internationalisation and localisation.
- GDPR compliant.

The tool has the potential to evolve into an EU-wide Healthcare Early Warning System, such as extracting how a virus spreads, finding anomalies and/or making predictions using visual analytics, relations and correlations between warnings.

Security-by-Design and Certification Framework [Security by Design Framework, SbDF]. Overcoming design limitations of medical devices and systems following a typical assessment and system monitoring audit workflow with the support of specific solutions for conformity assessment and risk assessment.

There are two software tools:

- *Secure Design Support Tool* [SDSP]: Supporting the security of a medical device or information system being developed through a software platform for risk assessment analysis over the system or software. Each analysis produces security control to embed new requirements into the system aimed at improving security as necessary.
- *Compliance Support Tool* [CST; a new output stemming from the analysis of the user requirements as useful for checking the compliance of systems and devices with standards]. Supporting the quality assurance process throughout the entire lifecycle of a medical device or system. Putting in place an assessment audit of the process supporting providers or quality managers of medical devices and systems. Ensuring compliance with applicable standards in the health sector.

Identification & authentication [Identity Management Platform, IMP]. Typical solutions for accessing healthcare systems are: Login/Password authentication (1 factor) and Windows Operating System, including for Point-of-Care Tests (POCTs). In practice, credentials are written on post-its and staff on the same team often use the same credentials. Such behaviour is worsened during COVID-19.

Solutions for identification and authentication need to be:

- Easy to use and activate, including unfamiliar staff recruited during a crisis or emergency situation.
- Secure (at least two-factors authentication).
- Affordable (no expensive equipment).
- Easy to integrate into the existing IT infrastructure.
- GDPR Compliant.

PANACEA ensures frictionless log-in based on a smartphone app:

- Recording biometric data and sending it to the Identification Repository.
- Saving a token on the smartphone.
- With Bluetooth activated, the proximity of the smartphone to the medical system is sufficient to trigger the identification of the User via webcam.

- On-going improvements with use of face masks.

Organisational Tools span:

Tool for Training and Education on Cybersecurity [TECT].

- A tailored awareness programme for healthcare organisations with models, guidelines and best practices on cyber security.

Tool for Resilience Governance [RGT]:

- A cyber security governance model tailored to healthcare organisations.

Tool for Secure Behaviour Nudging [SBNT]:

- Decision Models and influencers towards more secure behaviour in healthcare organisations, e.g. posters, memes, screensaver messages.

Toolkit Adoption Options:

- Each component of the PANACEA Solution Toolkit can be implemented and used separately by management and security staff in hospitals, care centres and other medical facilities for assessing and reducing cyber risks to protect privacy, data and infrastructures.
- Once implemented, each component operates by protecting an ecosystem comprising:
  - The broad range of people in healthcare organisations: medical staff (doctors, nurses and auxiliary staff), patients, visitors, operators, security staff, top management, other employees.
  - Clinical information systems and related processes.
  - The administrative information systems.
  - Connected devices used in and outside of the hospital.

The Solution Toolkit will also be able to manage secure information sharing with other HCCs, even when these HCCs are not fully adopting the toolkit.

4.3 PANACEA Solutions for COVID-19

Cyber security is a matter of utmost importance in the healthcare sector. A data breach is an undesirable event in any context but could result here in a serious intrusion into the patient's privacy and in a loss of trust towards healthcare institutions. A shut-down could compromise the functioning of medical devices, implying in the worst scenarios even the death of some patients if, for example, this happens during a surgical operation or if the patient's life depends on a machine. In the context of the global Covid-19 emergency, cybersecurity becomes even more important than usual: on one side, the attackers can take advantage of the fact that hospital have become a weaker target because of their fragile state (with doctors working overtimes and experiencing a lot of stress and fatigue, hospital rooms urgently adapted to welcome Covid-19 patients, and procedures that necessarily have to speed up). On the other hand, hackers can also benefit from new ways of attracting victims by using Covid19-themed phishing emails, malware, scams and frauds.

As PANACEA has always been adopting a people-centric approach to cyber-security, now more than ever the PANACEA Consortium feels the responsibility to put its research to use.

From a communication perspective, this is reflected in the content on the website by dedicating the majority of the produced texts to Covid-19, in order to raise awareness on the emerging and increasing dangers that hospitals are facing.

An example is the blog published in the Blog session of the website: "COVID-19 is extending the cyber threat surface as healthcare organisations come under increasing strain"[3].

Figure 4 - Banner of the blog article related to Covid-19

The blog collects data on the main attacks against hospitals during the pandemic peak in the months of March and April 2020 and the key findings from PANACEA.

As well as for the content published on the website, the third PANACEA webinar in June and the related promotional activities are dedicated to the same topic.

The upcoming website content will offer website visitors updated information on the cybersecurity risks related to Covid-19, the best practices to follow and how PANACEA can help along with the development of its Solution Toolkit.

4.4 PANACEA in the Standards Landscape

Innovative solutions for digital health underpinned by standards ensure interoperability, efficiency, security, privacy and safety. Standards can also bridge the gap between research and market, by enabling the fast and easy transfer of research results to EU and international standards. To contribute to the standardisation landscape, the target for PANACEA is:

- Participation in min. 2 technical committees.
- Contribute min. 2 inputs on cyber security to relevant standards organisations, e.g. working groups (WGs) or technical committees (TCs).

The current mapping of relevant work has looked at partner involvement in relevant groups as a first step towards potential contributions, as indicated in the table below.

Standardisation Activity: Scope of Committee or Group	Partner and Roles
CEN/TC 251/WG I[4]: Health Informatics. Europe	STELAR: Contributing on GDPR, consumer concerns and legal research, WG convenor

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[3]https://www.panacearesearch.eu/watch/blog/covid-19-extending-cyber-threat-surface-healthcare-organisations-come-under-increasing.
[4] http://www.ehealth-standards.eu/;

Standardisation Activity: Scope of Committee or Group	Partner and Roles
ISO/TC 215/WG 4[5]: Health Informatics. International.	STELAR: Contributing on privacy and legal research.
ISO/AWI 22697[6]: Application of Privacy Management in personal health information. International.	STELAR: Participating as a data protection legal expert.
DIN/NA 063-07 FB[7]: Medical Informatics. Germany.	STELAR: Participating as data protection legal expert.
ISO/IEC SC 37[8]: Biometrics. International.	IDEMIA: Participating in the SC working on interchange format, quality, performance testing and reporting, presentation attacks; cross-jurisdictional and societal aspects of the implantation of biometric technologies.

Through WP8, PANACEA will also highlight the implementation of mature standards in its toolkit, creating a visual and campaign on best practices. Through the Lookout Watch, PANACEA will add a new category on relevant EU and international standards/standardisation work to help guide the community on the focus and value of such efforts. These will include related health, including standards related to the MDR, and cyber security standards.

WP8 can also support partners in continuing their contributions to standards organisations beyond the PANACEA lifecycle by pointing them to funding opportunities, such as the Open Calls in StandICT2023.eu (starting in September 2020), as a potential measure for sustaining activities.

4.5 PANACEA Stakeholder Groups and Synergies
4.5.1 Core Stakeholder Groups

WP8's strategy for stakeholder engagement is responding to PANACEA's need to increasingly engage more closely with the core set of stakeholders, including people with the right people to help test and validate the tools, thereby extending the End-user and Stakeholder Platform (ESP), which also includes members of the Project Advisory Committee (PAC).

To this end, PANACEA has created a new tracking sheet bringing all the community together in one place, spanning LinkedIn connections, webinar participants, newsletter subscribers and personal contacts. These contacts are profiled by stakeholder group and other key data inserted, including the recruitment of prospective validators.

The figure below is the new branding for PANACEA Stakeholders, with healthcare associations fitting between the demand and supply sides and covering all major stakeholders, including but not limited to patient associations.

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https://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6232&cs=18CA078392807EDD402B798AA EF1644E1.

[5] https://www.iso.org/committee/54960.html.

[6] https://www.iso.org/standard/73697.html.

[7] https://www.din.de/de/mitwirken/normenausschuesse/named/nationale-gremien/wdc-grem:din21:66549510.

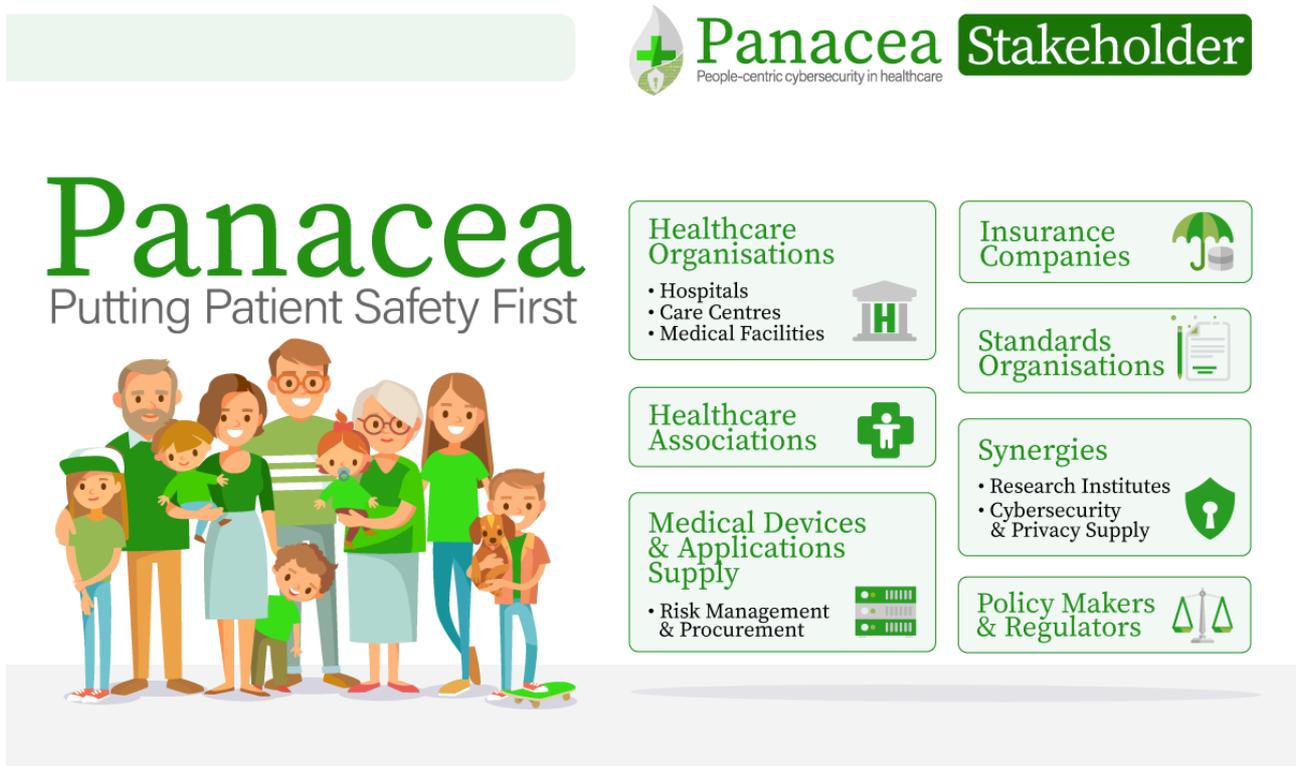[8] https://www.iso.org/committee/313770/x/catalogue/.

Figure 5: PANACEA Stakeholders

The table below gives more details on each stakeholder group and priority levels for M19-36 though several will be important after project end for the exploitation of assets.

Stakeholder Group and Priority Level	Overview
#1: Healthcare organisations **Demand side | high priority**	Hospitals, care centres, groups of hospitals, regional healthcare organisations, medical facilities. This covers a wide range of stakeholders from medical staff to IT teams, clinical risk managers, and procurement officers, working with healthcare organisations. Findings from PANACEA point to very low awareness of cyber security and poor practices (e.g. work-arounds), often leading to weak security links within a hospital. It is therefore important to increase awareness across the entire organisation that cybersecurity is everyone's responsibility, not just the IT team's.
#2: Medical devices and applications **Supply side | high priority**	This group covers the supply (device manufacturing, medical application developers/suppliers, healthcare services, pharmaceutical companies, IT procurement officers, IT service providers). Communications and engagement draw also on the good practices coming from the ENISA procurement and the MDR guidelines. Medical device manufacturers are a key target of the PANACEA Open Call.
#3: Healthcare associations **Demand side and supply | High priority**	Healthcare associations are important channels for reaching medical professionals, patient associations, thus covering citizens and other stakeholders like innovators and investors

Stakeholder Group and Priority Level	Overview
	in healthcare (e.g. start-ups, SMEs, VCs). PANACEA has thus broadened the scope of its outreach and intends to intensify engagement with this priority group over the next 18 months.
#4: Policy Makers and Regulators **Demand and Supply sides | medium-high priority**	This group plays a key role in implementing the DSM strategy from a cyber security and healthcare perspective, as well as new priorities in the wake of COVID-19. PANACEA intends to intensify its engagement with this group at the national and EU levels, including interactions with ENISA.
#5: Insurance companies **Demand and Supply sides | Low priority for M1-18); Medium-high for M19-36**	The focus on risk governance and tools to detect, analyse and react to threats and incidents will enable insurers to calculate residual risks and guide healthcare organisations in reviewing their policies. Ultimately, this can lead to tailor-made insurance solutions. PANACEA will target this group at a later stage, tapping into Aon's network and the community developed through the WISER IA (Trust-IT).
#6: Standards Organisations **Demand and Supply sides | Medium priority**	PANACEA is mapping the standards landscape for healthcare and cyber security with a twofold goal: (1) pinpointing potential opportunities to contribute to on-going work and (2) reinforce the positioning of PANACEA. Mapping and engagement will draw on the extensive community built in the 5G space and through the STANDICT.eu CSA (Trust-IT).

Table 6: Core Stakeholder Groups

4.5.2 Complementary Stakeholders and Synergies

The table below summarises the two complementary stakeholder groups, which are also at the basis of the PANACEA community from earlier projects and involvement in the EC Cluster Group on Data Protection, Security and Privacy (DPSP). In PANACEA.

Stakeholder Group and Priority Level	Overview
#7: Research Institutes	Departments within universities and research institutes dedicated to healthcare research. Research centres entirely dedicated to healthcare. Departments, centres and research groups focused on cybersecurity. These can be found also in peer projects and in projects supported by cyberwatching.eu.
#8: Cybersecurity and Privacy Supply	Suppliers of cybersecurity and privacy services and products (IT, network security and healthcare). Examples include providers featured in the ECSO COVID-19 Cybersecurity Response Packages. The PANACEA community already has a pool of such stakeholders and others can be found in the cyberwatching.eu Project Hub and Marketplace.

Table 7: Complementary Stakeholder Groups

These groups can be reached through synergies:

- **cyberwatching.eu**: Hub of cyber security and privacy professionals (individuals, SMEs, large companies) and peer projects for joint activities, such as concertation meetings (virtual or physical), webinars, promotional support services, common space for the dissemination of results.
- **Peer projects**: Exchange of new knowledge; joint events and dissemination.

Both groups are prospective partners in future funding programmes and in general for gauging progress towards EC policy goals for R&I, for example, through the European Project radar[9]

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[9] https://cyberwatching.eu/technology-radar-

5. Impacts of the Communication Strategy
5.1 Website Activities and Analytics
5.1.1 Content Creation

The website is a key entry point for the PANACEA project. As such, it needs to evolve with the project's advances with a content-rich approach feeding into the SMART campaigns and stakeholder engagement measures. Section 7 gives more details on the next steps for the website evolution.

The table below summarises the main sections of the website, scope and stakeholders for the period M6-18.

Website Section	Scope and Stakeholders
About PANACEA https://www.panacearesearch.eu/about-panacea	Basic information about the project, its goals, partners and stakeholders, giving all target groups a concise overview.
Use Cases https://www.panacearesearch.eu/use-cases	A summary of the end-user requirements and motivations for being part of PANACEA. Targets healthcare organisations, associations, policy makers.
Innovations https://www.panacearesearch.eu/innovations	PANACEA advances through the development of the Solution and Delivery Toolkits. Targets healthcare organisations and associations.
Media: Blog, Events, In the Press, Marketing Kit, News, Press Releases, Videos, Newsletter https://www.panacearesearch.eu/watch/blog https://www.panacearesearch.eu/events https://www.panacearesearch.eu/in-the-press https://www.panacearesearch.eu/marketing-kit https://www.panacearesearch.eu/news https://www.panacearesearch.eu/press-releases https://www.panacearesearch.eu/videos https://www.panacearesearch.eu/newsletter	The Blog is designed primarily for healthcare organisations offering user-friendly content on cyber threats and vulnerabilities. The events section features upcoming event announcements and concise reports on past events (temporarily on hold due to COVID-19). The news section reports on project and other related news, not included in the Lookout Watch or Blog.
Webinars https://www.panacearesearch.eu/webinars	Gives direct access to upcoming and past webinars. All presentations, recordings and takeaways are published here.

Table 8: Summary of Web Sections

Enhanced Branding Visuals

First steps have been taken towards the revamp of the PANACEA website during this period, for example, enhanced branding visuals for the Solution Toolkit – Technical components. The figures below show the newly graphically designed images, with concise descriptions (image on the left) and shaded green area on the specific tools (figure on the left and below).
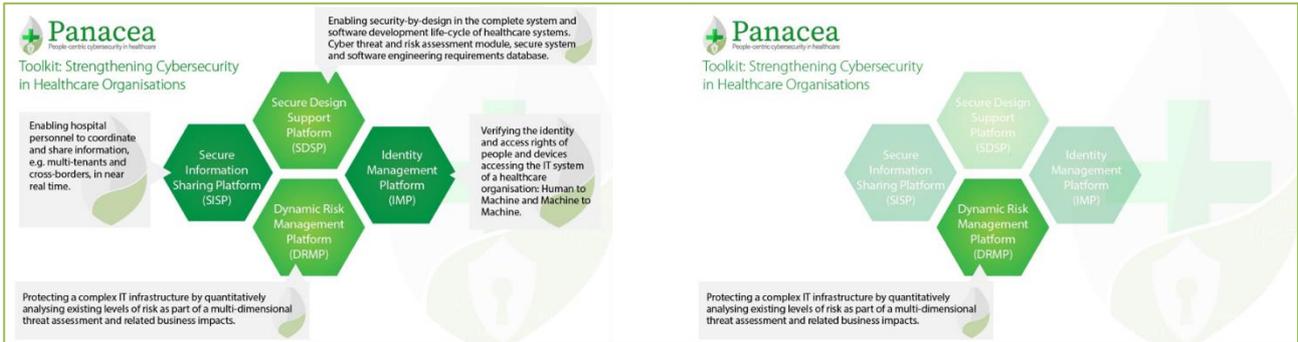
Figure 6: Enhanced Branding - Toolkit 1

Figure 7: Enhanced Branding - Toolkit 2

A first SMART campaign was launched in late June 2020 on Twitter aimed at increasing visibility of the Toolkit and its innovations. The image below shows an example of the first impacts achieved.

Figure 8: Early Impacts of new SMART Campaign on the Toolkit

Blog

The PANACEA Blog was launched in March 2019 (https://www.panacearesearch.eu/watch/blog). The first phase has focused on raising awareness of common risks and cyber-attacks targeting hospitals and other types of healthcare organisations, including Essential Guides, and will continue to do so. More recently, the

blog posts have also covered policy initiatives, COVID-19 and PANACEA partner drivers for involvement in the project.

The table below lists the main actions and communication goals in the period M6-18.

Blog Post Focus and Date	Audiences Targeted	Link to Communications Strategy
Social Engineering attacks: Quick Guide for IT teams and their Senior Managers, August 2019[10]	Healthcare staff (IT and senior management), drawing on ENISA guidelines.	Essential Guide with core messages to stakeholder groups 1 and 3 (IT staff; decision-makers), *Campaign on 1st Essential Guide, attacks against critical medical systems*
Essential Guide on Social Engineering Attacks, October 2019[11]	Healthcare staff (mostly medical/non-technical) as a first introduction to common cyber-attacks. The blog draws on ENISA guidelines for cybersecurity in healthcare.	Core messages to stakeholder groups 1 and 3, with insights from stakeholder group 5. *Sleepless in Seattle Social Media Campaign*
Digital Health: Medical Professor viewpoints on innovation and cybersecurity, October 2019[12]	Healthcare staff (medical IT and senior management), drawing on real-life experiences and findings of PANACEA.	Core messages to stakeholder groups 1 (medical, IT staff, decision makers and 3. LinkedIn campaign as a follow-up of the cyberwatching.eu post-webinar campaign.
COVID-19 is extending the cyber threat surface as healthcare organisations come under increasing strain[13] March 2020	Healthcare staff (medical and IT staff, decision makers for governance).	Core messages on increasing threat landscape during the pandemic. This post is linked to one of the themes of the PANACEA webinar in June 2020.
PANACEA Research drivers for contributing to cybersecurity in healthcare, May 2020.	Healthcare organisations, research communities interested in the drivers behind PANACEA based on the partner testimonials (See Section 5.3).	Core messages on the need to improve cyber security in healthcare. Human-centric approach to communications.

Table 9: PANACEA Blog Posts

Below a sample of the impacts achieved from the blog posts:

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[10]   https://www.panacearesearch.eu/watch/blog/social-engineering-attacks-quick-guide-it-teams-and-their-senior-managers.
[11] https://www.panacearesearch.eu/watch/blog/essential-guide-social-engineering-attacks.
[12]   https://www.panacearesearch.eu/watch/blog/digital-health-medical-professional-viewpoints-innovation-and-cybersecurity.
[13]   https://www.panacearesearch.eu/watch/blog/covid-19-extending-cyber-threat-surface-healthcare-organisations-come-under-increasing.
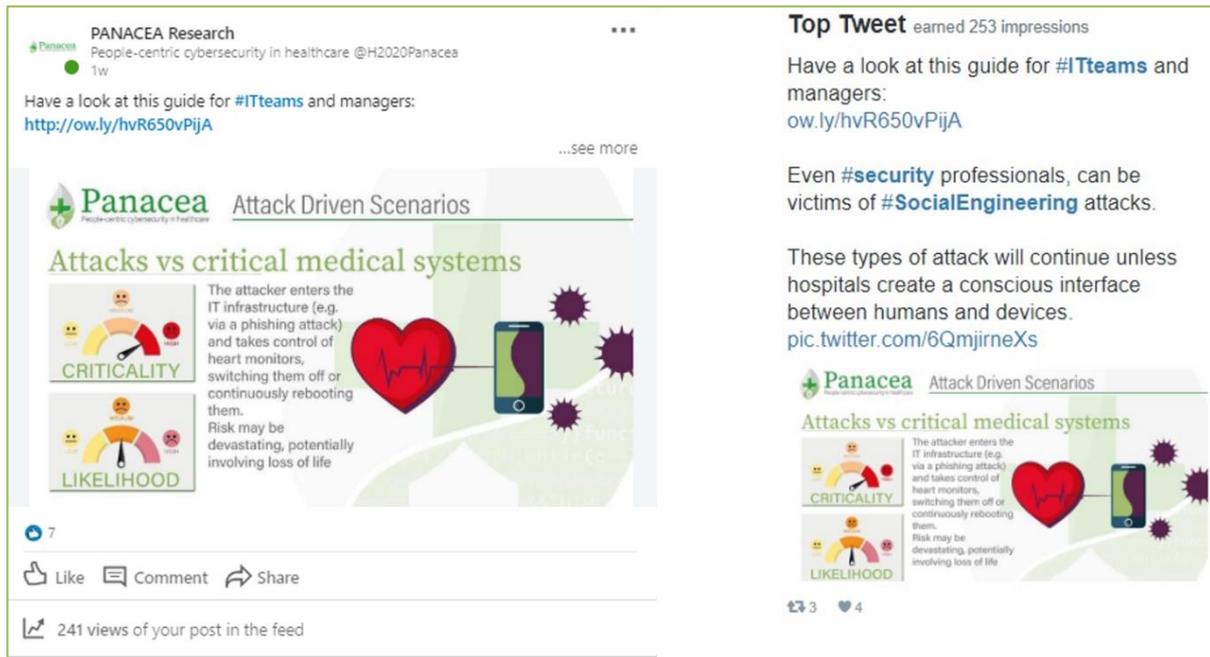
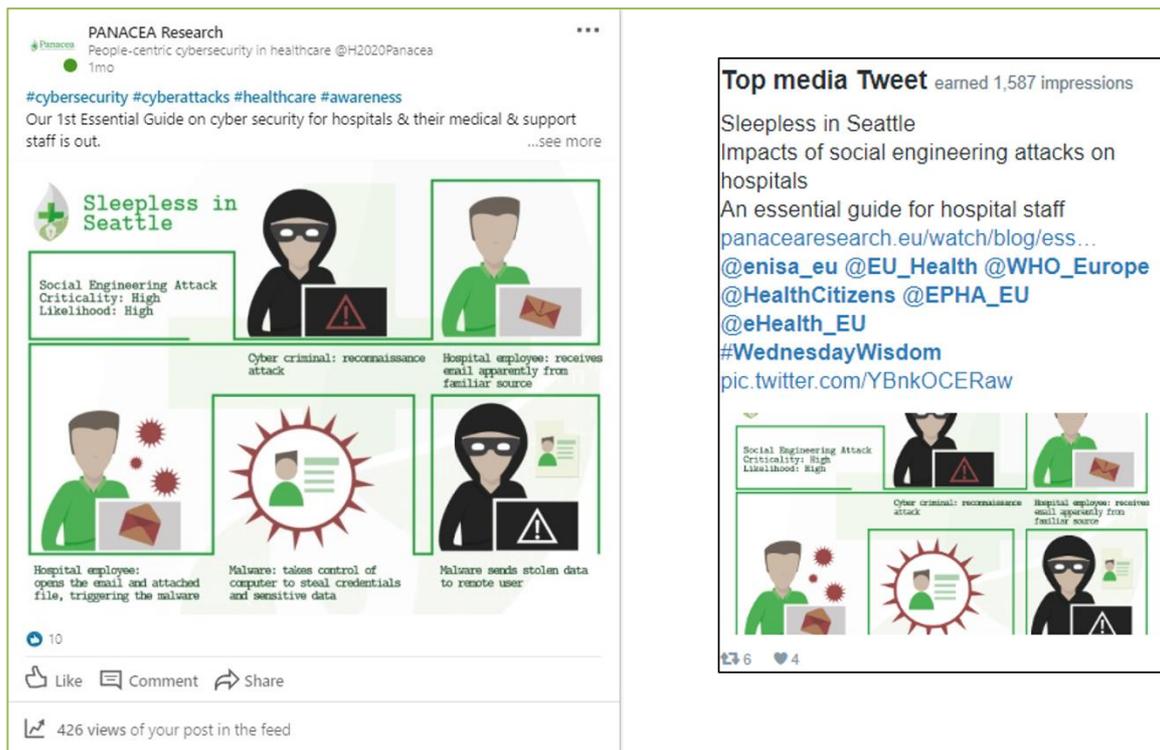Figure 9: Impacts of Campaign on 1st Essential Guide

Figure 10: Impacts of Campaign on 2nd Essential Guide

5.1.2 Dashboard Analytics

The data-driven approach of our communication strategy is well showcased in our monitoring dashboard. The project has a keen eye on all the relevant metrics coming from the website as they highlight in simple yet effective way the numbers that count, thus driving a lot of extremely valuable information about our impact on the community. With reference to the figure above, here are the metrics we are keeping track of in our dashboard and the information we use to retrieve out of them:

What we are measuring daily:

- Number of unique users (*visibility and interest generated in new people/new market segments*).
- Pageviews (*curiosity we raise among people*).
- Av. time on page (*quality of a specific content*).
- Av. session duration (*overall quality of our content*).
- Sessions (*curiosity we raise among people*).
- Bounce rate (*coherence between titles on SERP and quality/relevance of the content*).
- Source of traffic (*relevant external channels for dissemination, comparison with the effort we put on them*).
- Most visited pages (*relevant content*).
- Geographical origin of our users based on IP (*geographical impact*).
- Posts, followers, likes, shares, impressions on Twitter & LinkedIn (*impact on social media*).
- Av. SERP position vs CTR (click-through rate) per keyword (*most exploited/exploitable keywords and topics).*
- Impressions vs clicks per page (*most exploited/exploitable keywords and topics).*

5.2 Lookout Watch

The PANACEA Lookout Watch (https://www.panacearesearch.eu/watch) is part of the activities in Task 8.1 on the PANACEA Observatory for a Security Framework in Health. This task will produce the PANACEA *Security Framework for Hospitals and care centres* (D8.3) in December 2021, an analysis for framing the PANACEA vision and defining key messages for healthcare and cyber security communities.

Within this context, the Lookout Watch serves as an online tool tracking and giving insights into policy measures, market trends and research related to cyber security and healthcare. The tool is also useful for related analyses in Task 8.4 on Exploitation and Sustainability, which helps pinpoint new reports and studies that can be fed into the Watch.

The overarching goal of the Watch is to make it a key reference for stakeholders at the policy level, within the healthcare and cyber security sectors, including peer projects, and the wider community.

The table below lists the reports, papers and studies uploaded on the Watch since June 2019.

Title and Topic	Publication Date (Q-Year)
6th Annual Benchmark Study on Privacy and Security of Healthcare data	Q3-2019
Cybersecurity in hospitals: a systematic organisational perspective	Q3-2019
Next Generation Cyber Security Solution for an eHealth Organisation	Q3-2019
A Survey of cybersecurity approaches for attack detection, prediction and prevention	Q3-2019
Towards the Cybersecurity Paradigm of eHealth: Resilience and Design Aspects	Q3-2019

Title and Topic	Publication Date (Q-Year)
Cybersecurity in healthcare: a narrative review of trends, threats and ways forward	Q3-2019
Big data security and privacy in healthcare: a review	Q3-2019
Why employees (still) click on phishing links: an investigation in hospitals	Q3-2019
2018 European Cybersecurity Research and SerIoT project	Q3-2019
NIST NICE Cybersecurity Framework	Q3-2019
ENISA Smart Hospitals Security and Resilience for Smart Health Services and Infrastructures	Q3-2019
ENISA Security and Resilience in eHealth Security Challenges and Risks	Q3-2019
Availability Models for healthcare IoT Systems: classification and research	Q3-2019
Analysis of the Growth of Security Breaches: a multi-growth model approach	Q3-2019
An investigation into healthcare data patterns	Q3-2019
Trends in Malware Attacks against U.S. Healthcare Organisations, 2016-2017	Q3-2019
Cybersecurity scores for the G20 Countries	Q3-2019
Systematic Literature Review and Metadata Analysis of ransomware attacks and detection mechanisms	Q3-2019
European Hospitals' Transition Towards fully electronic-based systems: Do Information Technology and Security Follow?	Q3-2019
US Healthcare Trends and Contradictions in 2019	Q3-2019
The EU Cybersecurity Act	Q3-2019
Advancing Cybersecurity of health and Digital Technologies	Q3-2019
Smart Healthcare Systems, wearable sensor devices and patient data security	Q3-2019
Privacy and Metadata: the hidden threat to whistle-blowers in public health systems	Q3-2019
A strengthened collective cyber and information security effort	Q3-2019
ECSO Healthcare Sector Report	Q3-2019
Cyber-Analytics: Modeling Factors associated with healthcare data breaches	Q3-2019
ENISA: NIS Directive and Cybersecurity in eHealth	Q3-2019
Implementation of the General Data Protection Regulation: A survey in clinics	Q3-2019
Summary of the US HIPAA Security Rule	Q3-2019
WHO Guidance recommendation on digital interventions for health system strengthening	Q3-2019
2019 HIMSS Cybersecurity survey	Q3-2019
EC Recommendation on a European Electronic Health Record exchange format	Q3-2019
Healthcare's huge cybersecurity problem	Q3-2019
SEA: a secure and efficient authentication and authorization architecture for IoT-based healthcare	Q4-2019
ENISA good practices for the Security of IoT	Q4-2019
ENISA Procurement Guidelines for cybersecurity in Hospitals (ENISA)	Q2-2020
Medical Device Regulation (EU) 2017/745 and In Vitro Diagnostic Devices Regulation (IVDR, Regulation (EU) 2017/746)	Q2-2020
MDCG 2019-16 Guidance on Cybersecurity for medical devices	Q2-2020
ECSO: COVID-19 Cybersecurity Response Package. An ECSO Cyber Solidarity Campaign	Q2-2020

Table 10: Content on the Lookout Watch

Activities are underway to ensure the Watch is regularly updated and revised to cover key EU and international policy measures and best practice guidelines, as well as new market trends,

5.3 SMART Campaign Impacts

Below, we analyse the impacts of social media campaigns, covering overall impacts and specific campaigns on Twitter and LinkedIn, such as the insights from partners conveyed through graphically designed banners. Below, a sample of the impacts achieved. These insights have recently been captured in a blog post[14]. Here, we summarise the main impacts this campaign, based on the SMART-based in Section 3.3 across diverse timelines.

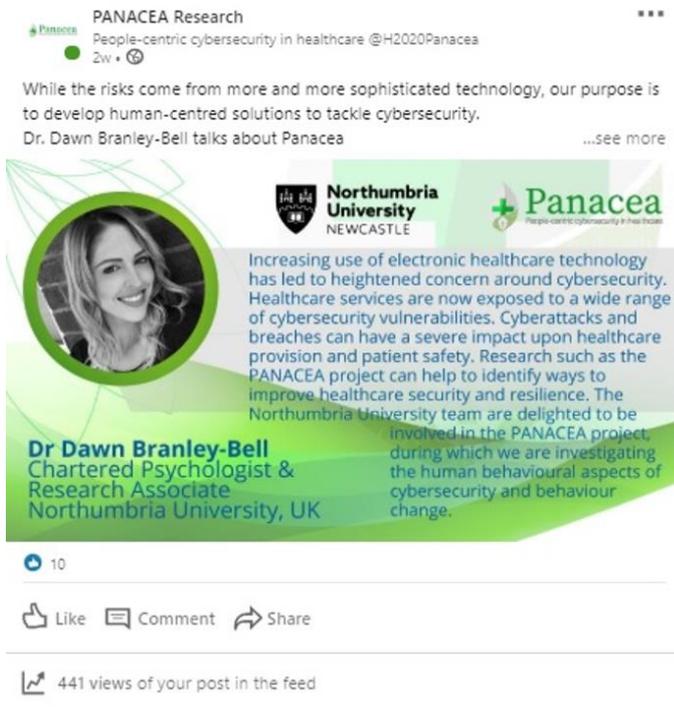The partner insight campaign was first launched in Q2-2019. A sample of impacts is showed below, with a summary table at the end.

Figure 11: SMART campaign with Sabina Magalini

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14   https://www.panacearesearch.eu/watch/blog/panacea-research-drivers-contributing-cybersecurity-healthcare.

Figure 12: SMART campaign with Dawn Branley-Bell
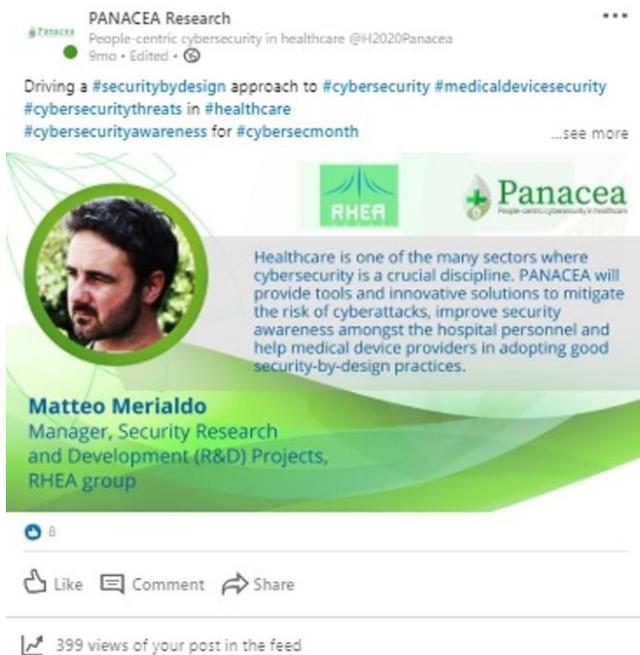
Figure 13: SMART Campaign with Matteo Merialdo
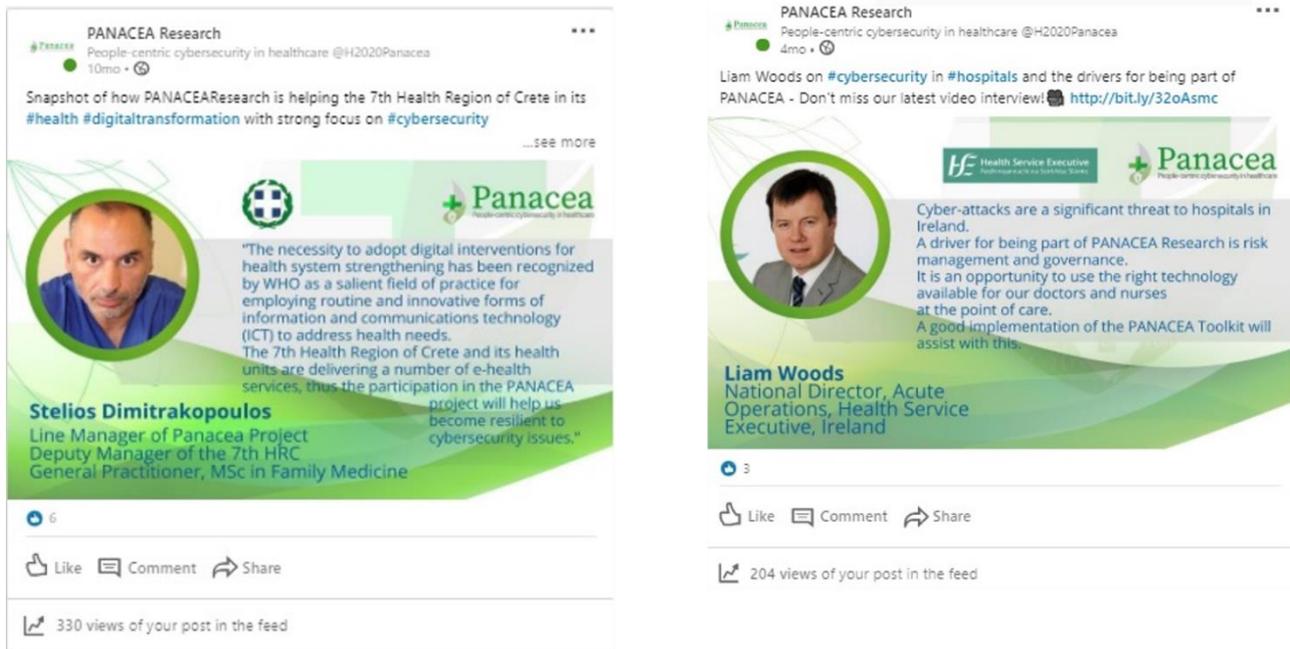
Figure 14: SMART Campaigns with Stelios Dimitrakopoulos and Liam Woods

SMART Campaign: Partner Insight Cards	Time frame: October 2019-May 2020	Impacts Achieved: LinkedIn plus Twitter
Daniele Gui, FPG	September 2019	627 views + Top Tweet
Sabina Magalini, FPG and UCSC	May 2020	712 views + Top Tweet
Dawn Branley-Bell, UNAN	May 2020	441 + 551 views from an earlier campaign + Top Tweet (May and June 2020)
Matteo Merialdo, RHEA	September 2019	399 views + Top Tweet
Stelios Dimitrakopoulos, 7HRC	October 2019	330 views
Liam woods, HSE	March 2020	204 views

Table 11: PANACEA SMART Campaign on Partner Insights

The human-centric SMART Campaign using the Partner Insight Cards has generated **3,264 views** on LinkedIn and **4 Top Tweets**, showing that it has been an effective campaign.

5.4 Videos

Videos are used to offer a visual snapshot of PANACEA or zoom in on specific partner views. The video production processes are:

Pre-production phase:

- Defining goals and overall concept.
- Agreeing on a core set of questions.
- Conducting the interview(s).

Production and post-production phases:

- Producing the storyboard with instructions for the video developer, texts, branding, images and background music to use.
- Creating the video, testing and editorial check.
- Uploading on the YouTube channel and promotional campaign.
- Uploading on the website section: Media > Video" [15]:

The table below is a summary of the videos produced during the reporting period. These videos were filmed at PANACEA project meetings.

Video Title	Publication Month and YouTube Link
Project overall presentation	December 2019[16]
PANACEA Research in three words	January 2020[17]
Fireside chat with HSE National Director, Acute Operations - Liam Woods	February 2020[18]
Fireside chat with HSE Chief Emergency Management Officer - Peter Daly	April 2020[19]

Table 12: Overview of PANACEA Videos

Sample of Video Impacts

The images below show examples of the SMART campaigns on the PANACEA videos.
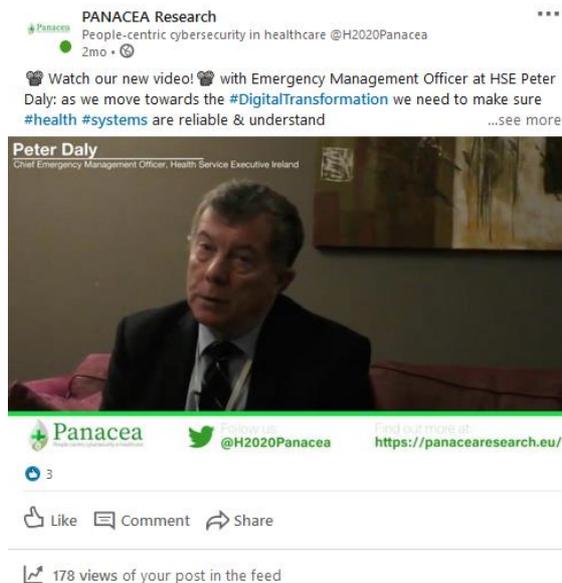
Figure 15: Fireside Chat with Peter Daly, ICEM

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[15] https://www.panacearesearch.eu/videos.
[16] https://www.youtube.com/watch?v=iYov0YyZK10&t=34s.
[17] https://www.youtube.com/watch?v=s6abBe-TYKg.
[18] https://www.youtube.com/watch?v=6sxqAHu9z40.
[19] https://www.youtube.com/watch?v=7cwUt9tz-sk.

Figure 16: Fireside chat with Liam Woods, HSE
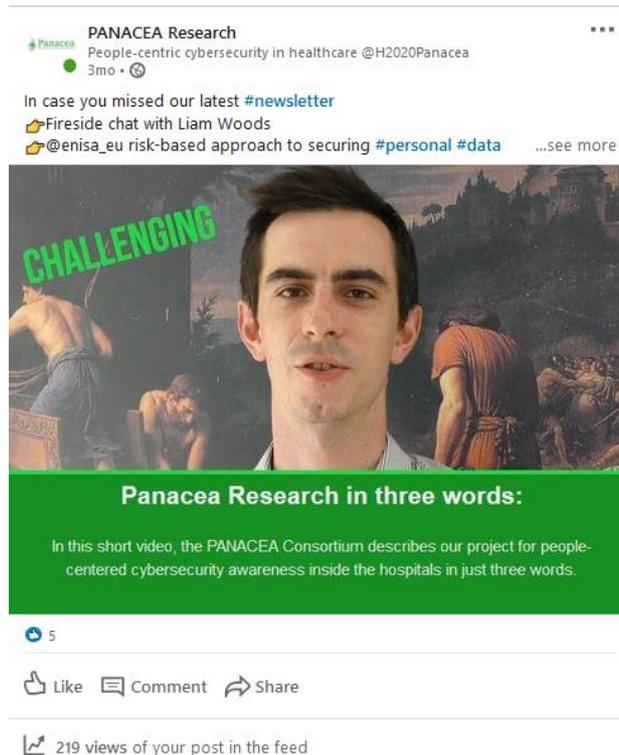
Figure 17: Video - PANACEA In Three Words

Figure 18: PANACEA "In Three Words" Video

Below, the statistical analysis updated in June 2020.

Video	Twitter	LinkedIn	YouTube Views
Project overall presentation	Likes: 6 Retweets: 4 Impressions: 572 Total engagements: 59	610 views of the post in the feed	73 views
PANACEA Research in three words	Likes: 2 Retweets: 2 Impressions: 585 Total engagements: 11	222 views of the post in the feed	36 views
Fireside chat with HSE National Director, Acute Operations - Liam Woods	Likes: 6 Retweets: 4 Impressions: 1263 Total engagements: 18	232 views of the post in the feed	49 views
Fireside chat with HSE Chief Emergency Management Officer - Peter Daly	Likes: 8 Retweets: 4 Impressions: 843 Total engagements: 19	181 views of the post in the feed	18 views

Table 13: Statistical Analysis of Video Impacts

5.5 Newsletters

The first newsletter was produced and circulated in May 2019: PANACEA Research Newsletter – Issue #1 - Delivering people-centric cybersecurity solutions in healthcare. The table below lists the newsletters produced after M6 (June 2019). Monthly newsletters were introduced in early 2020 and will continue over the next 18 months, excluding holiday periods (e.g. summer and end of year breaks).

Issue	Title	Month
#2	PANACEA Research Newsletter: Webinar coming soon! - Cyber security for Healthcare: Human and Legal Perspectives[20]	September 2019
#3	PANACEA Research Newsletter: Good Practices for Security of IoT - Secure Software Development Lifecycle[21]	December 2019
#4	PANACEA Research Newsletter: Key Findings of PANACEA Research on cyber risk scenarios in healthcare organisations[22]	February 2020
#5	PANACEA Research Newsletter: Meet Liam Woods - Director of Acute Operations at HSE Ireland[23]	March 2020
#6	PANACEA Research Newsletter: PANACEA Research Insights on Cybersecurity in Healthcare[24]	April 2020
#7	PANACEA Research Newsletter: PANACEA Research Insights on Cybersecurity in Healthcare[25]	May 2020

Below a sample of features for the May, March and February 2020 newsletter features.

Figure 19: Sample of Newsletter Features in 2020

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[20]
http://newsletter.panacearesearch.eu/Newsletter.ashx?action=onlinenewsletter&idnewsletter=10&guid=%24guid%24&source=%24source%24&lang=en.

[21]
http://newsletter.panacearesearch.eu/Newsletter.ashx?action=onlinenewsletter&idnewsletter=13&guid=%24guid%24&source=%24source%24&lang=en.

[22]
http://newsletter.panacearesearch.eu/Newsletter.ashx?action=onlinenewsletter&idnewsletter=14&guid=%24guid%24&source=%24source%24&lang=en.

[23]
http://newsletter.panacearesearch.eu/Newsletter.ashx?action=onlinenewsletter&idnewsletter=15&guid=%24guid%24&source=%24source%24&lang=en.

[24]
http://newsletter.panacearesearch.eu/Newsletter.ashx?action=onlinenewsletter&idnewsletter=16&guid=%24guid%24&source=%24source%24&lang=en.

[25]
http://newsletter.panacearesearch.eu/Newsletter.ashx?action=onlinenewsletter&idnewsletter=17&guid=%24guid%24&source=%24source%24&lang=en.

The figure below shows the trends for newsletter subscribers between December 2019 and June 2020. Subscribers are added to the "Community Tracker" for profiling and are also invited to join the PANACEA community on LinkedIn and Twitter (if they have accounts). A good tactic for increasing subscriptions is through registration to newsletters.

Figure 20: Subscription Trends for the PANACEA Newsletter

6. Impacts of Stakeholder Engagement and Community Building

6.1 Engagement Impacts

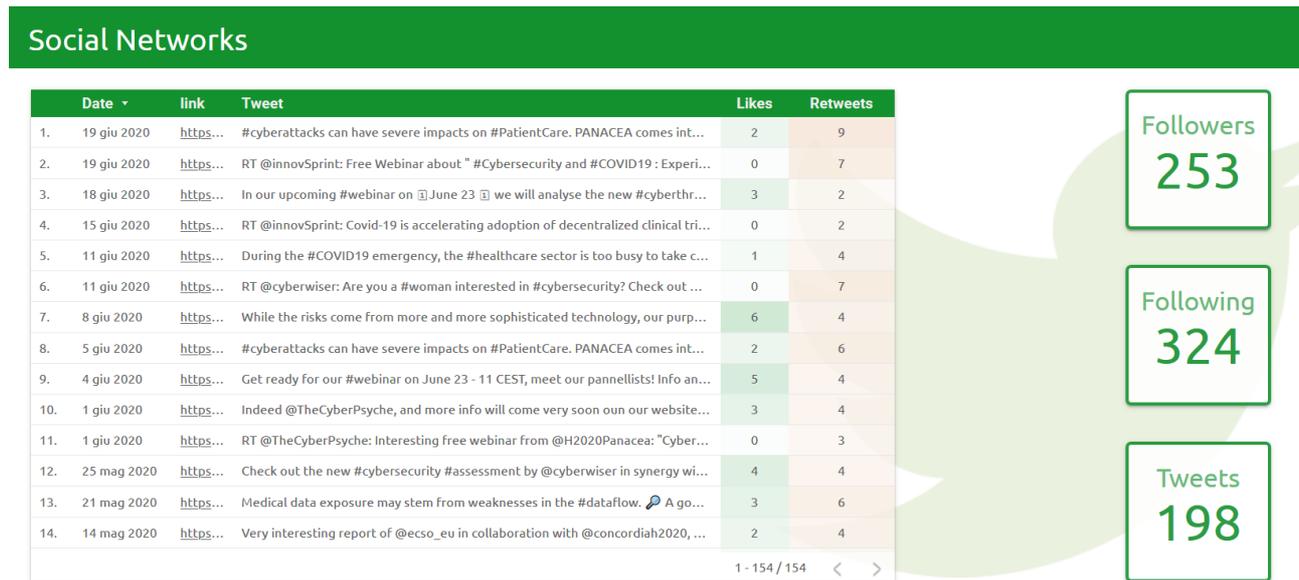### 6.1.1 Social Media Impacts

Figure 21: Overall Twitter Impacts

LinkedIn – Showcase Page: The figure below refers to the impacts for the showcase page as collected through the dashboard while the main PANACEA LinkedIn community counts 814 connections, whose profiles feed into the qualitative assessment.
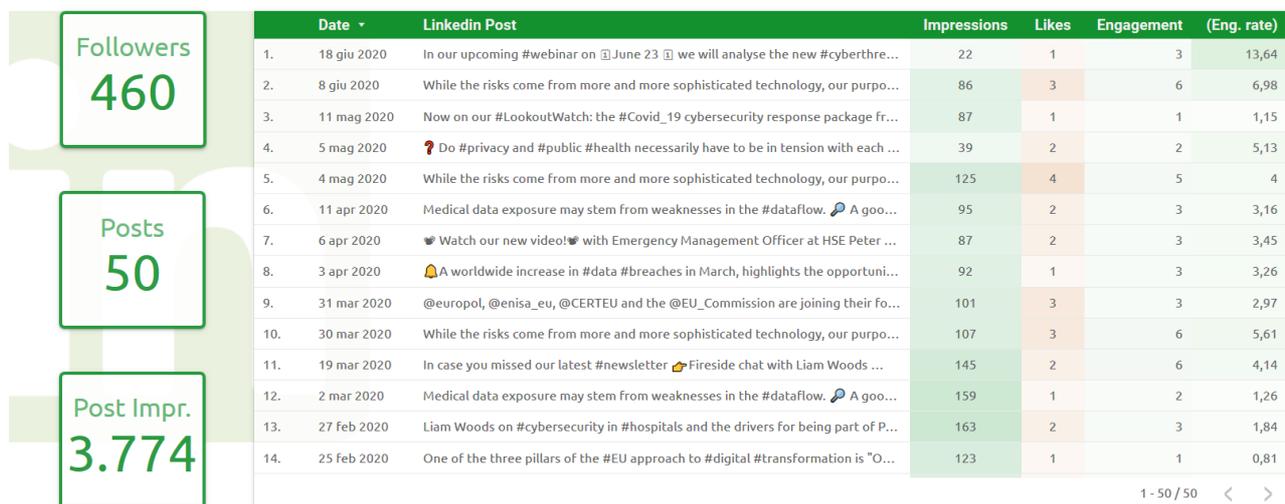
Figure 22: Impacts of the PANACEA Showcase Page

Impacts of social media SMART campaigns

Impacts of social media SMART campaigns	
Number of Twitter Impressions since June 2019	139.870
Number of Twitter Impressions since project's beginning	205.126
Total number of Tweets	205
Total number of Tweeter followers	252
Total number of likes	726
Total number of retweets	844
Profile visits: M1-M6	343
Likes M1-M6	175
Retweet M1-M6	162
Profile visits Q1 2019	34
Likes Q1 2019	55
Retweet Q1 2019	34
Profile visits Q2 2019	309
Likes Q2 2019	120
Retweet Q2 2019	128
Profile visits Q3 2019	172
Likes Q3 2019	182
Retweet Q3 2019	205
Profile visits Q4 2019	226
Likes Q4 2019	91
Retweet Q4 2019	147
Profile visits Q1 2020	519
Likes Q1 2020	171
Retweet Q1 2020	206
Profile visits Q2 2020	464
Likes Q2 2019	107
Retweet Q2 2020	124
Total profile visits since project's beginning	1724

Table 14: Twitter Impacts

6.1.1 Webinar Impacts

The table below summarises the two webinars (co-)hosted since June 2019.

Webinar Title	Date	Scope	Audiences Reached
Cybersecurity for Healthcare: Human and Legal Perspectives[26] **Partners:** FPG/UCSC; Trust-IT, Aon	26.09.2019	Jointly organised with cyberwatching.eu to increase awareness on cyber risks and vulnerabilities in healthcare IT systems. Give participants a novice's guide to GDPR on health data. Highlight the importance of risk governance models through the PANACEA example.	60 registrants SMEs (28%); Academia and Research (20%); Large companies (18.3%); Healthcare organisations/associations (11.5%); General public (10%); Government (5%). Country coverage: BE; DE; ES; GR; IT; RO; SE; UK. India.

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[26]   https://www.panacearesearch.eu/webinars/webinar-2609-cyber-security-healthcare-human-and-legal-perspectives.

Webinar Title	Date	Scope	Audiences Reached
Cybersecurity and COVID-19: Experiences from the Frontline[27] **Partners:** FPG/UCSC; 7HRC; RHEA; Trust-IT	23.06.2020	Sharing first-hand experiences in healthcare in healthcare cybersecurity during the pandemic, good practices to tackle the challenges and showcase the PANACEA Toolkit.	50 registrants Academia and Research (30%); SMEs (20%); Large Companies (28%); Public-sector organisations (10%); Policy Makers (8%); Medical device supply (2%) Country coverage: 16 EU: AT; BE, CY; DK; FI; FR; GR; IT; LU; RO; UK Hong Kong, India, Saudi Arabia, USA

Table 15: Summary of PANACEA Webinars

Joint Promotion of the webinar with cyberwatching.eu

The webinar with cyberwatching.eu was jointly branded promoted through relevant channels as shown in the figure below.
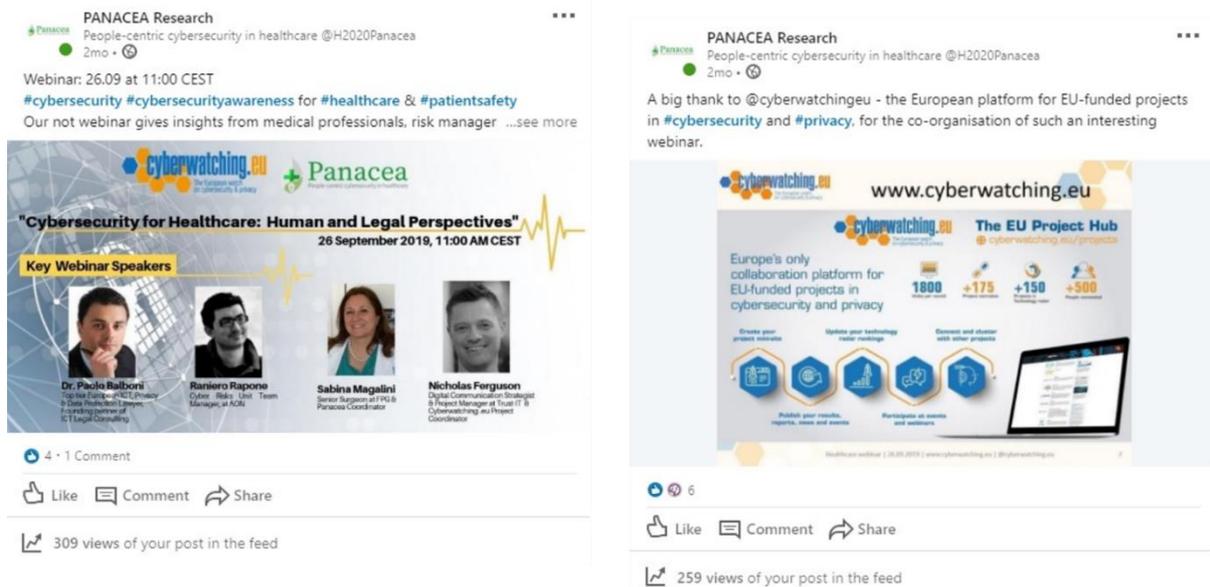
Figure 23: Joint Promotion of Webinar with cyberwatching.eu

Outcomes of the webinar with cyberwatching.eu

- cyberwatching.eu Project of the Week.
- Post-webinar insights, e.g. the PANACEA Cybersecurity Governance Model.

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[27]   https://www.panacearesearch.eu/webinars/panacea-webinar-cybersecurity-and-covid-19-experiences-frontline-23rd-june-2020-1100-cest.

- Blog post on key insights on cybersecurity in healthcare based on the insights of Dr Magalini.
- Availability of the presentations and recording online.

Figure 24: Impacts of the Webinar with cyberwatching.eu

Promotion of Webinar on COVID-19 and Cyber Security

Promotion of the webinar on 23 June 2020 included the creation of a dedicated banner with the panellists and moderators, promotion by cyberwatching.eu and through the EC Cybersecurity and Privacy Newsletter[28] and online event channels, e.g. the Infosec event calendar[29]. Personalised invites were sent by email and through LinkedIn (one-to-one and multiple invites).

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[28] https://ec.europa.eu/newsroom/dae/newsletter-specific-archive-issue.cfm?newsletter_service_id=364&lang=default.
[29] https://infosec-conferences.com/events-in-2020/cybersecurity-and-covid-19/.
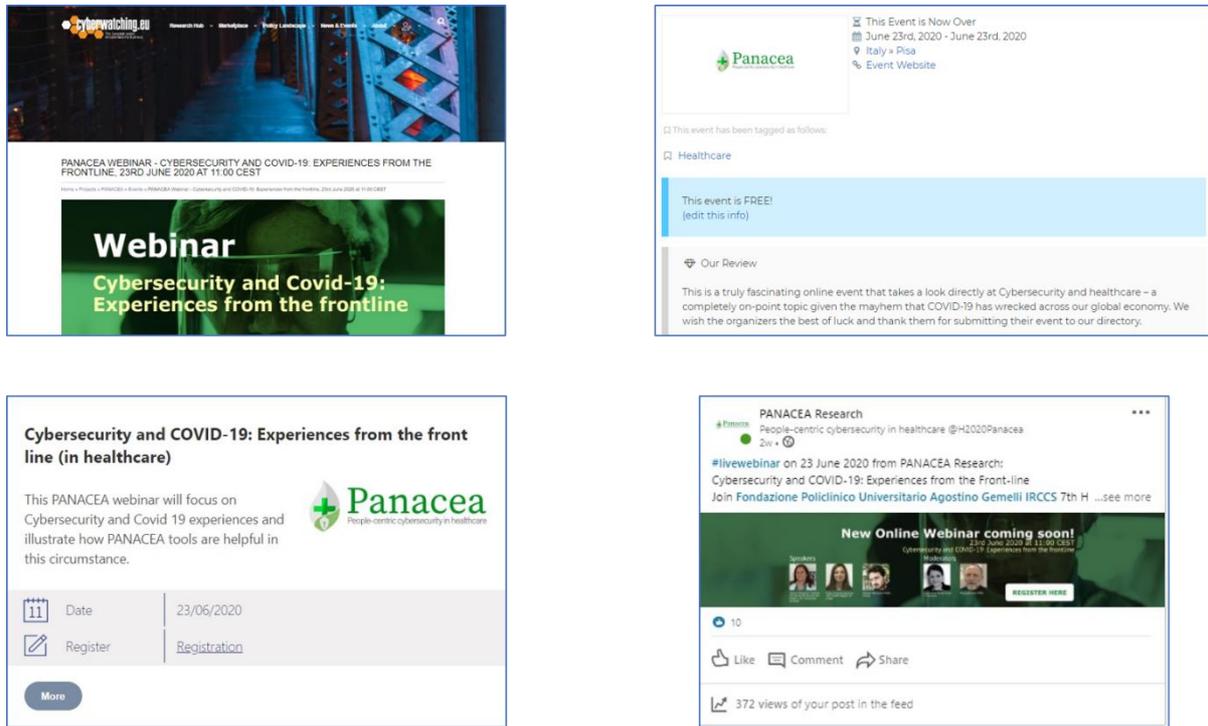
Figure 25: Promotion of the Webinar on Cybersecurity and COVID-19

The SMART promotional campaign also included Teasers on common cyber-attacks drawing on the contribution of Dr Sabina Magalini to the 10th TCON in April 2020, one of the drivers behind the webinar, and have so far gained 592 views on LinkedIn.

Figure 26: Impacts of the June Webinar Teasers

Post-webinar Impacts

The post-webinar campaign has focused on sharing some key insights and drawing attention to the recording and presentations, so far gaining 497 views.
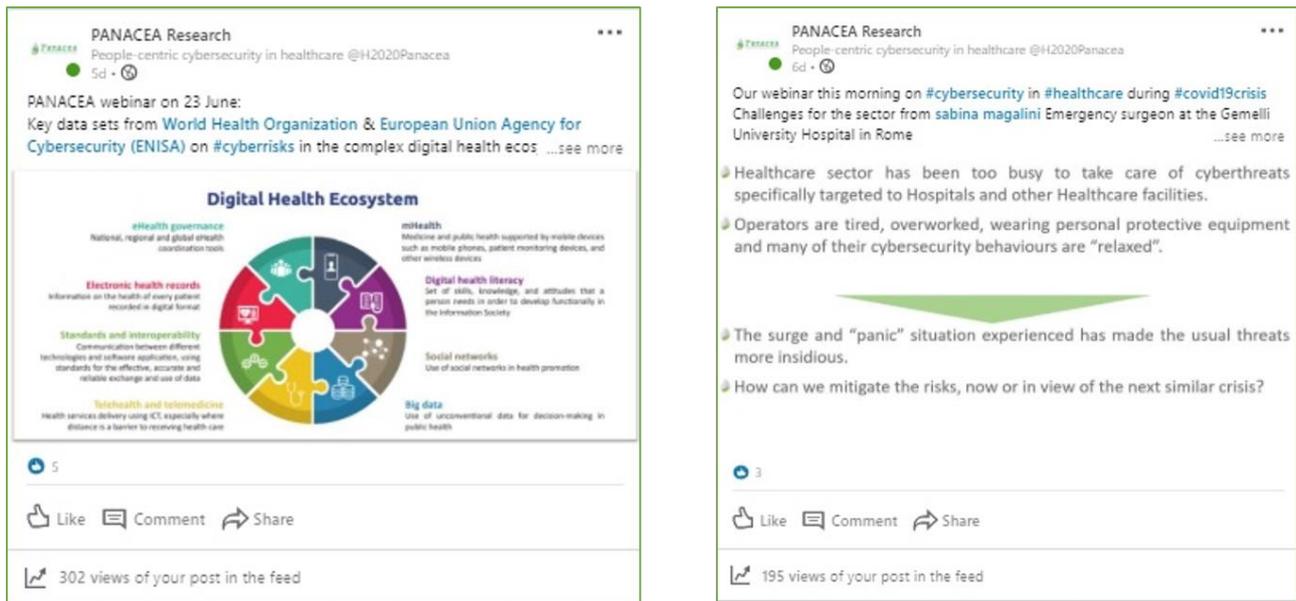
Figure 27: Sample of post-webinar promotional impacts

Other key outcomes of the webinar include:

- Pinpointing prospective testers of the PANACEA toolkit.
- Expanding the community and stakeholder profiling by inviting non-members to join.
- Increasing the number of newsletter subscribers by adding it as a choice to the registration form: 24 new subscribers were recruited.

Insights from the webinar polls

The webinar polls generating insights into participant views on 1) barriers to better cyber security in hospitals (17 respondents) and (2) best ways to improve cybersecurity in healthcare (16 respondents). The results are illustrated in the figures below.
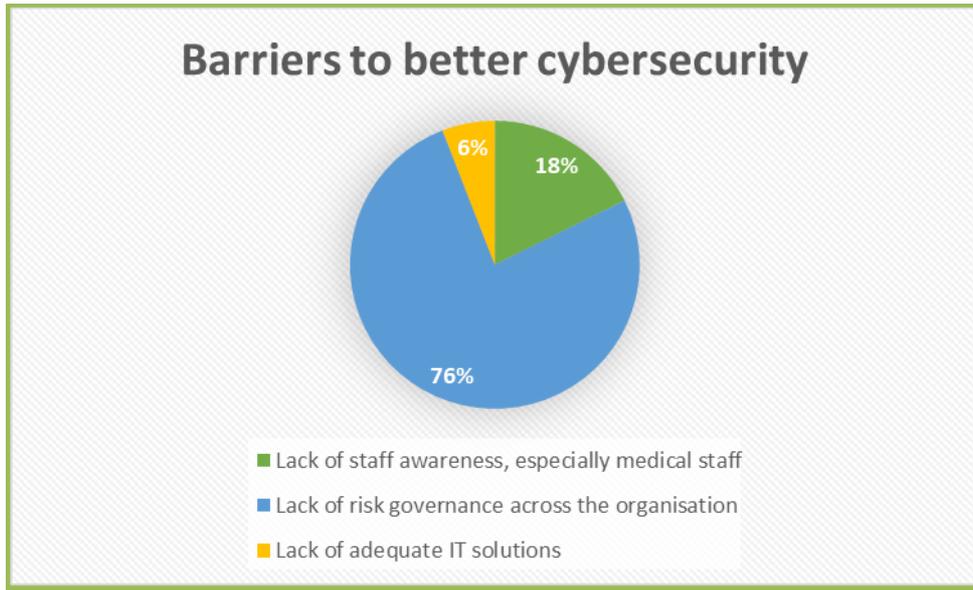
Figure 28: Views on barriers to better cyber security in hospitals
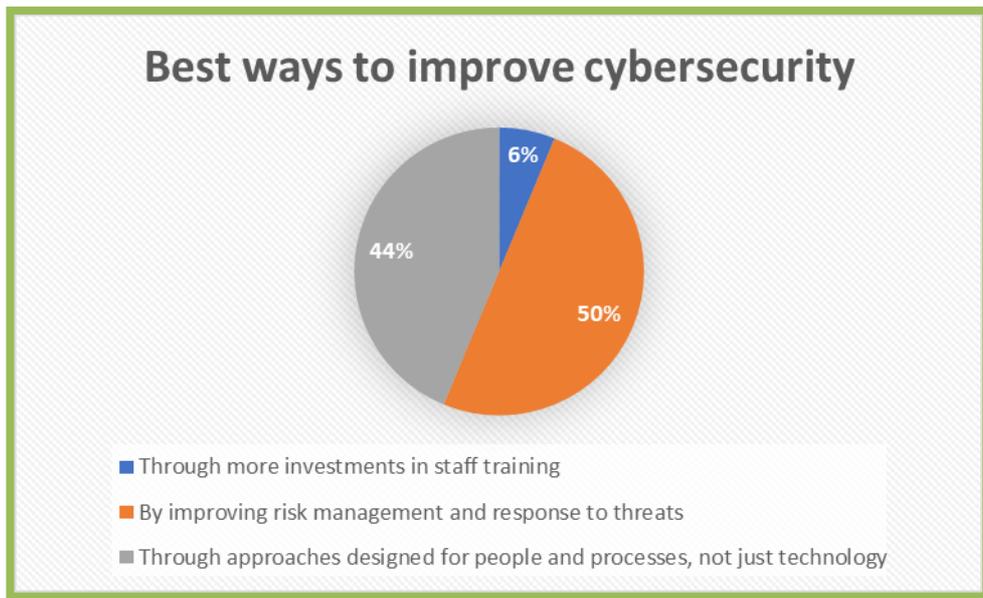
Figure 29: Views on best ways to improve cyber security in hospitals

6.1.2 Impacts from 3rd-Party Events

3rd-party events are a key element of the PANACEA stakeholder engagement plan. However, new measures are being put in place to ensure engagement during the COVID-19 crisis.

The table below lists the 3rd-party events PANACEA has contributed since March 2019, highlighting the stakeholder groups targeted. The last physical events taking place in January 2020, with other events cancelled or postponed and one virtual event taking place in April 2020.

Stakeholder Category	Event Name, Date (Q-Year), Location	PANACEA role(s) and Partners	Main Outcomes and Impacts
Healthcare organisations, Pharma, medical device manufacturers, biomedical research.	Wired Health, 13.03.2019 (Q1-2019), Milan	Participant: RINA-C	Share information on PANACEA with stakeholders in the healthcare sector to stakeholder groups #1 and #3.
Stakeholders from national healthcare sector.	Health IT Conference 2019, 16.04.2019 (Q2-2019), Athens	Speaker: FORTH	Share PANACEA R&I focus with national stakeholders under groups #1 and #3.
Industry, research institutions	APRE event, 22.05.2019 (Q2-2019), Liguria	Pitch presentation: RINA-C	Raising awareness of cyber security initiatives in healthcare presenting PANACEA. Groups: #2 plus #7.
Multi-stakeholder event: research/universities, industry, ENISA.	ENISA-FORTH Summer School on Network and Information Security, Heraklion (Q3-2019), Crete	Co-organiser: FORTH	Contribute to building a cybersecurity culture in Europe through training. Focus on challenges related to AI, 5G, IoT applications. Groups: #3, #4, #7, #8.
Privacy experts at national (IT) and EU level; academia.	Privacy: restrictions or opportunities, exploring the role of IT and healthcare data, (Q3-2019), Pisa	Roundtable panellist: UROME	Share perspectives from PANACEA on tackling patient privacy with stakeholder groups #7, #8.
Cross-/-multi-disciplinary academia and industry.	International Symposium 4-in-1 Integration of Communications, Navigation, Sensing and Services (CONASENSE), (Q3-2019), Herning, Denmark	Presenter. iSPRINT	"Machines that observe and understand – In a secure way": General presentation on PANACEA (institutional slide deck) and preliminary machine to machine secure identification efforts that are now becoming our M2M IMP Healthentia – QTrobot service.
Entrepreneurs, SMEs, citizens, research community.	Maker Faire – The European Edition - Exhibition on IT innovations, (Q4-2019), Rome	Stand Host: UCSC	Presentation of PANACEA innovations to entrepreneurs and SMEs. Stakeholder groups #2, #7
Clinical Risk managers	3rd National Symposium for Clinical Risk Managers, (Q4-2019), Milan	Speaker: FPG	Presenting cyber security in the HC sector from a healthcare professional perspective and showing how PANACEA will contribute. Stakeholder group #1.
Research community focusing on IT-enabled healthcare and medical cures.	Symposium on AI-driven Data Analytics (Q4-2019), Enschede (NL).	Speaker: iSPRINT	PANACEA R&D project pitch. Use of AI in bringing trails closer to the real world. Groups: #7 in relation to healthcare (#1 and #3).
Israeli Ministry of Health and the Home Front Command; professionals around the globe working to advance health system readiness for disasters and emergencies of all types.	IPRED – the 6th International Conference on Preparedness and Response to Emergencies and Disaster, (Q1-2020), Israel	Participant and contributor to session on cyber security: UCSC	Strengthen the links between emergency/disaster response, healthcare and cybersecurity as an emerging topic. Groups: #4, #1 and the public safety community

Stakeholder Category	Event Name, Date (Q-Year), Location	PANACEA role(s) and Partners	Main Outcomes and Impacts
Buyers and suppliers of cybersecurity solutions (SMEs, large companies), policy makers/funders (local, EC)	FIC 2020 (International Cybersecurity Forum), (Q1-2020), Lille	Stand Host with cyberwatching.eu: Trust-IT	Sharing insights on PANACEA to stand visitors. Interactions with stakeholders from groups #2. #4 and #8.
EFN representatives (EU nurses' associations), politicians and policy makers	EFN High-level Meeting on Horizon Europe, Knowledge4Innovation Summit, (Q1-2020), Brussels	Invited participant: RHEA	Share insights on PANACEA, understand perceptions of cyber security within the EFN, which proved to be very low. Groups: #1 and #3.
Stakeholders from healthcare and EU policy makers.	Cybersecurity Health Group – 10th TCON (Q2-2020); virtual.	Presentation on "Front-line experience with healthcare cybersecurity in COVID-19 context": UCSC/FPG	Highlight the growing cyber risks and vulnerabilities with health IT systems during COVID-19, present best practices in EU and globally in tackling such risks and how PANACEA solutions can also reduce them. Groups: #1 and #4.

Table 16: Summary of 3rd-Party Events and Stakeholders

In summary. PANACEA has taken part in thirteen 3rd-party events with the following stakeholder coverage:

- 6 events targeting healthcare organisations, supply side and associations (groups 1, 2, 3) spanning healthcare organisations, pharma, clinical risk managers, medical device manufacturers, biomedical research, national policy makers, EU policy makers, associations (e.g. EFN), as well as emergency services.
  - o The event hosted by the European Federation of Nurses Association (EFN) was a direct impact of a PANACEA LinkedIn post of the Face-to-Face Meeting in Dublin (January 2020) spotted by an organiser.
- 1 event with a multi-stakeholder approach. 1 was co-hosted with a major policy stakeholder group (ENISA-FORTH Summer School). This event a focus on tackling cyber security challenges related to technologies like AI, 5G, IoT.
- 2 exhibitions: One targeting a mixed audience, including citizens, entrepreneurs and other innovators (Maker Faire) and one focused on the cybersecurity and privacy supply and demand sides (FIC2020), helping to reinforce the synergy with cyberwatching.eu.
- 2 events targeting the research community focusing on IT-enabled healthcare and medical cures and AI.
- 1 event sponsored by IEEE (Conasense) on innovation and its commercialisation through partnerships between industries and academia, cross-/multi-/inter-disciplinary areas such as social science, technology and a Business Canvas.
- 1 small-scale event with experts and academia on privacy issues related to healthcare.

The figures below show a sample of the impacts achieved for engagement across the diverse stakeholder groups. Of these, the ENISA Summer School attracted the highest number of views on LinkedIn during the period covered.
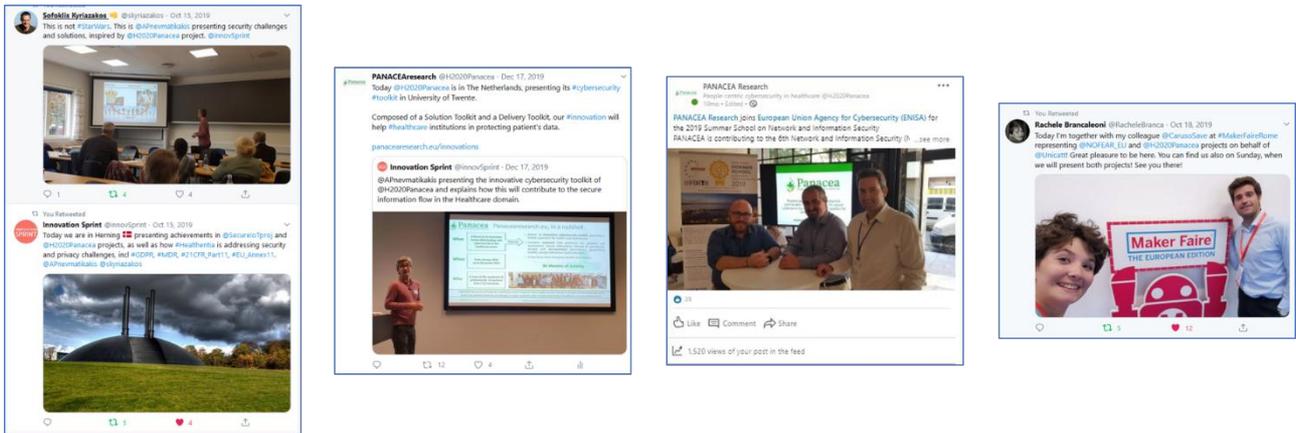
Figure 30: Sample A of 3rd-Party Event Impacts

Figure 31: Sample C 3rd-Party Events - Privacy Issues in Healthcare
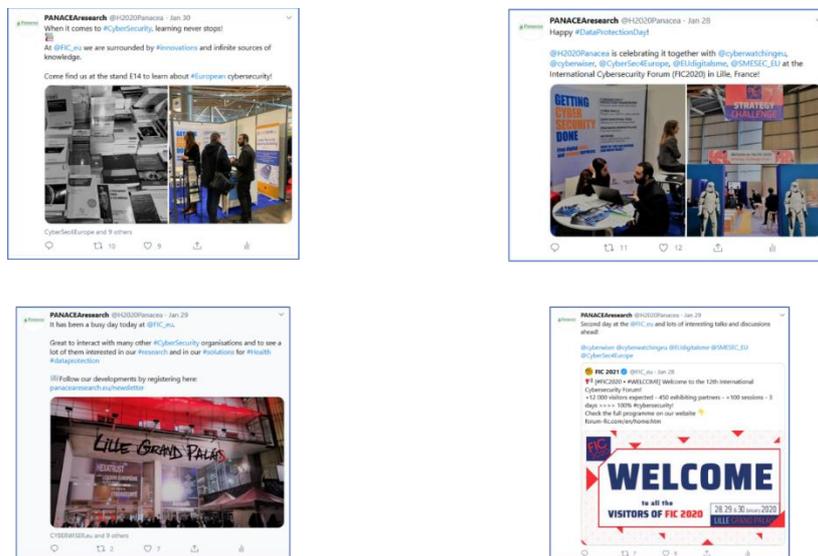
Figure 32: Sample C - PANACEA at FIC2020

PANACEA Technical Meetings

PANACEA has also promoted its partner and technical meetings across its networks, as illustrated in the images below, sharing core messages about the challenges it is tackling. The Dublin General Assembly (January 2020) also included a visit to the Irish National Operations Centre Ambulance Service, thus ensuring interaction with front-line workers.
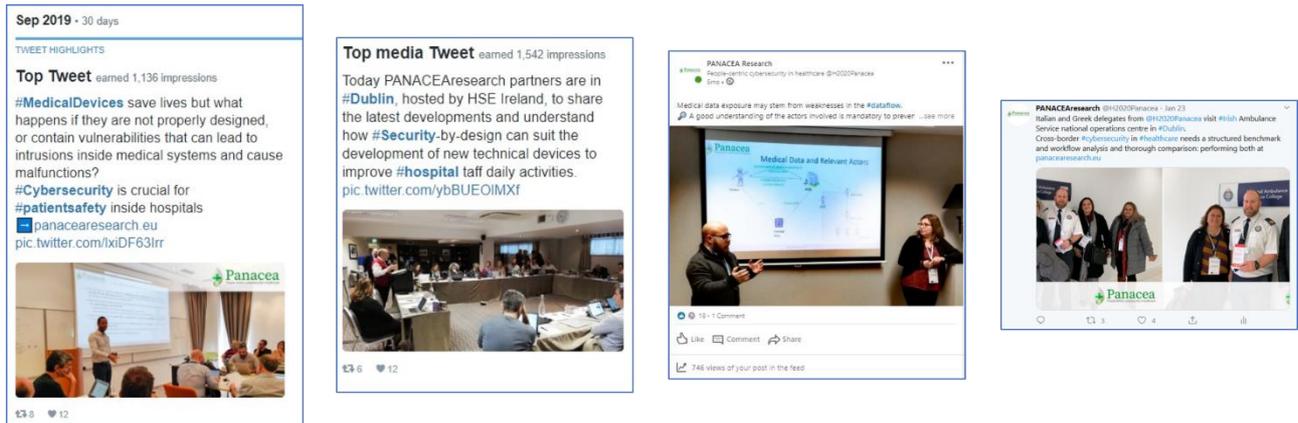
Figure 33: Impacts of PANACEA Meetings

Synergies

Examples of interactions with peer projects include the SPHINX blog on the 1st PANACEA Stakeholder Workshop, which led to the project's involvement in the workshop entitled Cybersecurity Situation Awareness for Health Organisation (CyberSec4Health) on 10 July 2019 in Brussels. The workshop was also featured on the Digital Single Market website.

Figure 34: Peer Project Interactions

Other forms of collaboration have been postponed due to COVID-19. However, PANACEA intends to take part in the upcoming cyberwatching.eu concertation meeting expected in October 2020 (further details pending). PANACEA also contributed to the cyberwatching.eu application for the ICT2020 Exhibition, which, if successful, will showcase demos from selected projects and the tools and services of the cyberwatching.eu Coordination and Support Action.

6.2 Community: Quantitative Analysis

PANACEA stakeholders are profiled members pooled into a common tracking sheet and recruited through the LinkedIn professional network, webinar registrations, newsletter subscriptions and relevant networks of consortium partners.

The graph below shows the PANACEA community across the eight stakeholder groups, that is, the six core groups and the two complementary groups as of end June 2020.
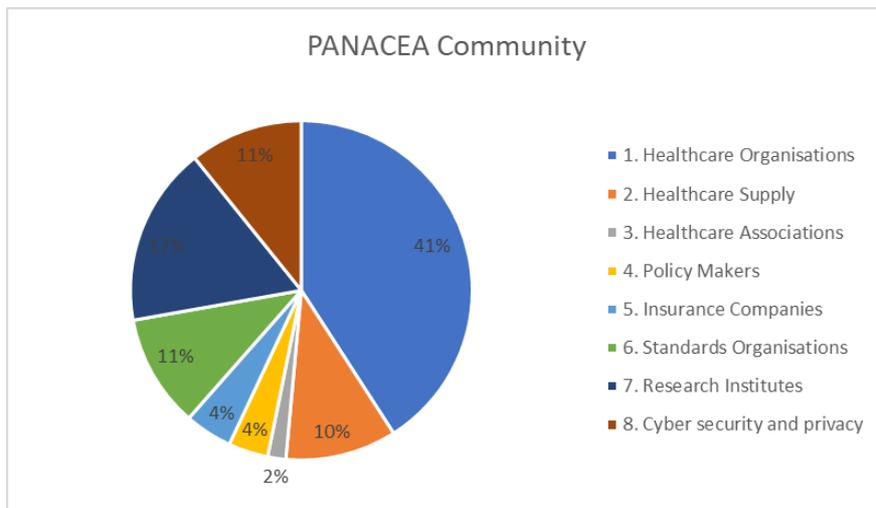
Figure 35: PANACEA Community at M18

The breakdown is as follows with some brief remarks on which targets have already been reached so as to pursue a highly focused engagement plan over the next phase of PANACEA.

Stakeholder Group	Community Members and Remarks
#1: Healthcare organisations (hospitals, care/medical centres, etc.)	381 members (42%). Very high priority group for M19-36, for general feedback, and especially for testing and validating the toolkit.
#2: Medical devices and applications, IT supply ("Healthcare supply" is used for brevity in the figure above)	98 members (10%). Very high priority group for M19-36.
#3: Healthcare Associations	16 members (2%), counting 11 associations with some having multiple connections. This is a key stakeholder group for extending coverage of groups #1 and #2, calling for intensified engagement.
#4: Policy Makers and Regulators	35 members (4%). Coverage spans healthcare, cyber security, data protection. While the number is quite low, it is qualitatively significant.
#5: Insurance Companies	42 members (4%). This has been a low priority for M1-18 but will become increasingly important over the next 18 months, drawing on the Aon other relevant networks on IT risk management.
#6: Standards Organisations	100 members (11%). The consortium has access to a very large pool of standards specialists into which it can tap over the 2nd phase of the project.
#7: Research Institutes	159 members (17%). Typically, this is an easy target group, especially when pooling together connections across multiple, relevant networks. The target can be

Stakeholder Group	Community Members and Remarks
	considered reached, with the next period focusing on universities and research centres working on healthcare- and cybersecurity-related research for knowledge exchange and joint dissemination wherever feasible.
#8: Cyber security and privacy supply	100 members (11%). PANACEA started with a pool of companies and experts in this field. The target can be considered reached with focus on engagement through synergies (e.g. cyberwatching.eu) and engagement of the most relevant stakeholders in future webinars and workshops (virtual/face-to-face).

Table 17: Community Overview

6.3 Community: Qualitative Assessment of Core Stakeholders

The tables below give examples of the PANACEA community across the four of the priority groups in this period (M1-18). This mid-term qualitative assessment is important to define the short-, mid- and long-term goals of the project's engagement strategy, pinpointing strong points and gaps that need filling to ensure full overage of key stakeholder groups. This assessment shows the importance of broadening the scope when it comes to healthcare associations, enabling PANACEA to potentially reach a more extensive pool of stakeholders (demand and supply).

Community Sample for Healthcare Organisations: Priority Stakeholder Group #1	
Hospitals, university hospitals, medical and care centres, including national and regional health authorities	(DE): Helios Park Klinikum.
	(ES): Barcelona Hospital Clinic; Granada University Hospitals; Hospital Universitario Germans Trias i Pujol; Hospital Santas CIMA, Hospital Universitario de Bellvitge; Institute of Biomedicine.
	(GR): General Hospital of Chania Agios Georgios; University General Hospital of Thessaloniki (AHEPA); University Venizelio Hospital Heraklion.
	(IT): Gruppo Ospedaliero San Donato; San Giovanni Calibita Fatebefratelli; Policlinico Umberto I; Humanitas Research Hospital; Istituto Ortopedico Galeazzi; Mater Olbia Hospital; Complesso Integrato Columbus; Ospedale Sant'Eugenio; San Carlo Borromeo Hospital; San Raffaele hospital; Padua University Hospital; Ospedale Clinicizzato Chieti; Istituto Ortopedico Rizzoli; Ospedale Sacro Cuore Don Calabria; Ospedale Sant'Eugenio; Pro Infantia SpA – Ospedale Koelliker.
	Regional/local health authorities: Milan (ATS Milan); Valle-Olona (ASST); Rome, North-West Tuscany (USL); Veneto Region (ULSS); Sette Laghi (ASST); A.S.R.E.M. Regional Health Authority of Molise
	(UK): Dartford NHS hospital.
	(EU): European InterBalkan Medical Center.
	Governmental: Croatia Ministry of Health, Head of eHealth.
Sample of professional roles	Management (IT, Procurement, Data Protection): Head of IT and Cyber; CEO; Head of Health Technology (U.O.C.); Procurement Officer; Data Protection Officer.

Community Sample for Healthcare Organisations: Priority Stakeholder Group #1	
	Medical/Clinical (Management): Health Manager; Director of Hospital Infrastructure and Biomedical Engineering; Head of multi-speciality department (U.O.C); medical director
	Medical/Clinical (Staff): Critical Care Specialist; Biomedical and clinical engineer; General Director; General Practitioner; Resident Doctor (General Surgery); Surgeon (e.g. neurology); Pharmacist; Pathologist; Radiologist.
Potential new short-term targets (2nd-degree connections): sample	(CH): University Hospital of Geneva, including its Innovation Centre
	(UK): University College London Hospitals NHS Foundation Trust; Oxford University Hospitals; Ipswich and Colchester Hospitals

Table 18: Healthcare Organisations in the PANACEA Community

Community Sample for Medical Devices and Applications: Priority Stakeholder Group #2	
Medical Devices, Applications, IT supply and supply chains, including pharmaceuticals	BE: Agfa Healthcare (Hospital IT, digital radiography, integrated care); MedTech Europe (N-F-P; personalised healthcare). DE: Euro Gulf Med GmbH (medicine, healthcare)
	GR: Bausch Health (pharmaceuticals)
	IT: medea s.r.l. (health and wellbeing, telemedicine, mHealth); Angelini Pharma (pharmaceuticals); Software Centric s.r.l. (medical software systems; clinical data monitoring and computerised hospital management); Videomed s.r.l. (medical devices)
	LU: LuxAI (Robotics, AI, healthcare, autism therapy)
	UK: Aladdin Healthcare Technologies (AI); Vectura Group Plc (medical devices and inhalers).
	India: Healthware Private Ltd (medical devices).
	Japan: NTT DOCOMO – Healthcare Business Planning.
	The community also includes a pool of EU cloud providers and cyber security companies and experts (e.g. EC Cluster on Data Protection, Security and Privacy (DPSP), e.g. OVHcloud (FR); Cloud and Heat (DE), CloudStreet Oy (FI); Atos cloud (ES); Fintonic (ES); CGI (UK); Cloud Security Alliance; Cloud Industry Forum. A large pool of telecommunications companies with cloud and virtualisation services.
LinkedIn Groups	Medical Devices Startups.
	Related groups (stakeholders #1, 2, 3): Global Digital Health Collaborators; Health 2.0.

Table 19: Medical Devices and Supply Side Members of the PANACEA Community

Community Sample for Healthcare Associations – Priority Stakeholder Group #3	
Association of Young Medical Doctors[30]	Supporting young doctors around the world with opportunities to work together for the improvement of public health, offer networking opportunities between young doctors for professional collaboration and recreation, and improve the general environment of young doctors in their place of practice.
	Calogero Casà

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[30] https://www.wydo.org/partners/.

Community Sample for Healthcare Associations – Priority Stakeholder Group #3	
COCIR[31]	European Trade Association for medical imaging, health ICT and electromedical industries. non-profit association headquartered in Brussels. Koen Cobbaert
European Connected Health Alliance (ECHAlliance)[32]	Encompasses healthcare providers (hospitals, and regional services), patient associations, start-ups, SMEs, VCs, links to WHO. Brian O'Connor, Chair and Bleddyn Rees, Co-chair.
European Federation of Nurses Associations (EFN)[33]	Voice of the nursing profession and European institutions, spanning over one million nurses from over 36 national nurses' associations at the EU level. Paul De Raeve, Secretary General.
European Federation for Medical Informatics (EFMI)[34]	Members include universities, research organisations, federations, industries and organisations. Carlos Luis Parra-Calderon, Institute of Biomedicine of Seville
HIMSS[35]	Global organisation for the transformation of the health ecosystem through ICT, with a membership of 80,000 individuals, 470 not-for-profit partners and 650 health service organisations. Community members include VP EMEA; VP International; Digital health policies and stakeholder engagement; Chair Europe Governing Council.
Personal Connected Health Alliance[36]	Produces guidelines specifying an end-to-end ICT framework for personal connected health solutions based on recognised open standards, to create a secure and interoperable health data exchange. Community members include PCHA specialists from the telecommunications industry.
World Health Organisation (WHO)[37]	Promote health, keep the world safe, and serve the vulnerable. Working through offices in more than 150 countries, alongside governments and other partners to ensure the highest attainable level of health for all people. Digital Health Expert on Member Roster: Alberto Lazzero
Patient Associations	Greek Union for the Treatment of multiple Sclerosis in Western Hellas (GUTS in Western Hellas); Panhellenic Federation of Alzheimer's Disease and Related Disorders; Alzheimer's Society of Ireland.

Table 20: Healthcare Associations and Groups in the PANACEA Community

This next table shows PANACEA connections to policy makers, including EC officials, ECSO and ENISA as key players in the policy landscape for cyber security and privacy.

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[31] https://www.cocir.org/.
[32] https://echalliance.com/.
[33] http://www.efn.be/.
[34] https://efmi.org/.
[35] http://www.himss.org/.
[36] https://www.pchalliance.org/.
[37] https://www.who.int/.

Community Sample for Policy Makers and Regulators: medium-high priority	
ENISA	Marnix Dekker (NIS Directive); Dimitra Liveri (digital health); Adrian Belmonte Martin (Network Information Security).
ECSO (Partner members: Trust-IT)	Roberto Cascella (Senior Policy Manager); Nina Olesen (Senior Policy Manager; Mark Miller (Vice Chairman; expert in public sector strategies).
EC and DG CONNECT	ERN IT Coordination; Dir. General for Health and Food Safety; Unit B3 - European Reference Networks and Digital Health; DG Research and Innovation (digital health, medical devices, MDR, AI); Cloud Security Programme Coordinator DG JUST: Officials in Data Protection Unit and International Data Flows and Protection. European Data Protection Supervisor (EDPS): several connections
World Economic Forum	Chairman of the Board of the World Economic Forum Centre for Cybersecurity; experts across several technology domains.

Table 21: Policy Makers and Regulators in the PANACEA Community

6.4 Dissemination of Results and Knowledge Sharing

Dissemination and knowledge sharing includes publications (e.g. peer-reviewed papers), technical conferences, as well as deliverable summaries, where PANACEA gives a concise overview of its main research findings, and the PANACEA profile on cyberwatching.eu.

6.4.1 Publications and Technical Conferences

As an essential element of H2020 dissemination of results, publications help to demonstrate advances beyond the SoTA and validate research findings. During the COVID-19 pandemic all physical events have been cancelled or postponed though several journals/technical conference organisers have expressed their intention to publish proceedings.

The table below lists the papers accepted for publication, including peer-reviewed, open-access and non-peer-reviewed papers.

Journal Name and Publisher	Author(s) by Affiliation(s)	Title	Publication Type and references
Proceedings of the 13th International Conference on Theory and Practice of Electronic Governance (ICEGOV2020). New York: ACM Press, 2020.	7HRC, FPG, FORTH, RHEA, UCSC	Public and Private Healthcare Organisations: A Socio-Technical Model for Identifying Cybersecurity Aspects.	Peer-reviewed. International Conference Proceedings Series. ISBN: 978-1-4503-7674-7.
Annals of Disaster Risk Sciences (Proceedings of CYSEC 2020 conference), University of Applied Sciences, Croatia	UNAN, FPG, 7HRC, UCSC	Your hospital needs you: Eliciting positive cybersecurity behaviours from healthcare staff using the AIDE approach	Peer-reviewed. Open Access. International Conference Proceedings Series
Lecture Notes in Computer Science, Springer	UNAN, UCSC, 7HRC, FPG	Cyber-risk in healthcare: Exploring facilitators and barriers to secure behaviour	Peer-reviewed. Open Access. International Conference Proceedings Series

Proceedings of the "Cybersecurity of Critical Infrastructures" international conference, 29-30 April 2020. (CYSEC 2020)	UCSC, FPG, FORTH, RHEA	Abstract: Cyberthreats to Hospitals: PANACEA a toolkit for Cybersecurity	Non-scientific/Non-peer-reviewed. International Conference Proceedings

Table 22: Summary of Accepted Papers

Below, an example of partner promotion of accepted papers.

Figure 36: Promotion of accepted papers

6.4.2 Deliverable summaries

PANACEA Deliverable Summaries refer to concise reports on key findings with longer versions available in public deliverables. The aim is to keep the community informed on priorities to improve cyber security in healthcare pending the official approval of deliverables while also offering a more digestible format for time-pressured professionals.

The Summaries have their own branding (PANACEA Research Findings), as shown below, with the topic added to each report.

Figure 37: Branding for PANACEA Deliverable Summaries

The table below shows a sample of deliverable summaries produced.

Deliverable and Summary Information	
Deliverable Number & title	*D1.1 – User and technical requirements and scenarios* (task 1.1)
Dissemination level	Public (EC approved)
Link to www.panacearesearch.eu	https://www.panacearesearch.eu/news/panacea-research-result-cyber-security-models-health-services-and-medical-device-life-cycles
Deliverable Number & title	*D1.2 – PANACEA User Requirements* (task 1.2)
Dissemination level	Public (EC approved)
Link to www.panacearesearch.eu	https://www.panacearesearch.eu/news/key-findings-panacea-research-people-centric-approach-cyber-security-hospitals

Table 23: Overview of PANACEA Deliverable Summaries

Each summary goes through a SMART campaign to create awareness of the research results. For example, one campaign coincided with the 2019 Cyber Security Month.

Figure 38: Impacts of the Deliverable Summaries

6.4.3 Cyberwatching.eu page

PANACEA is part of the cyberwatching.eu "R&I Project Hub" in the "Research Hub" section of its website, where visitors can browse by research area (e.g. human aspects of cyber security, secure systems and technology) and sector: https://cyberwatching.eu/projects.

The PANACEA page is directly accessible through a registered user name and password, enabling the project to regularly update its outcomes: https://cyberwatching.eu/projects/1270/panacea.
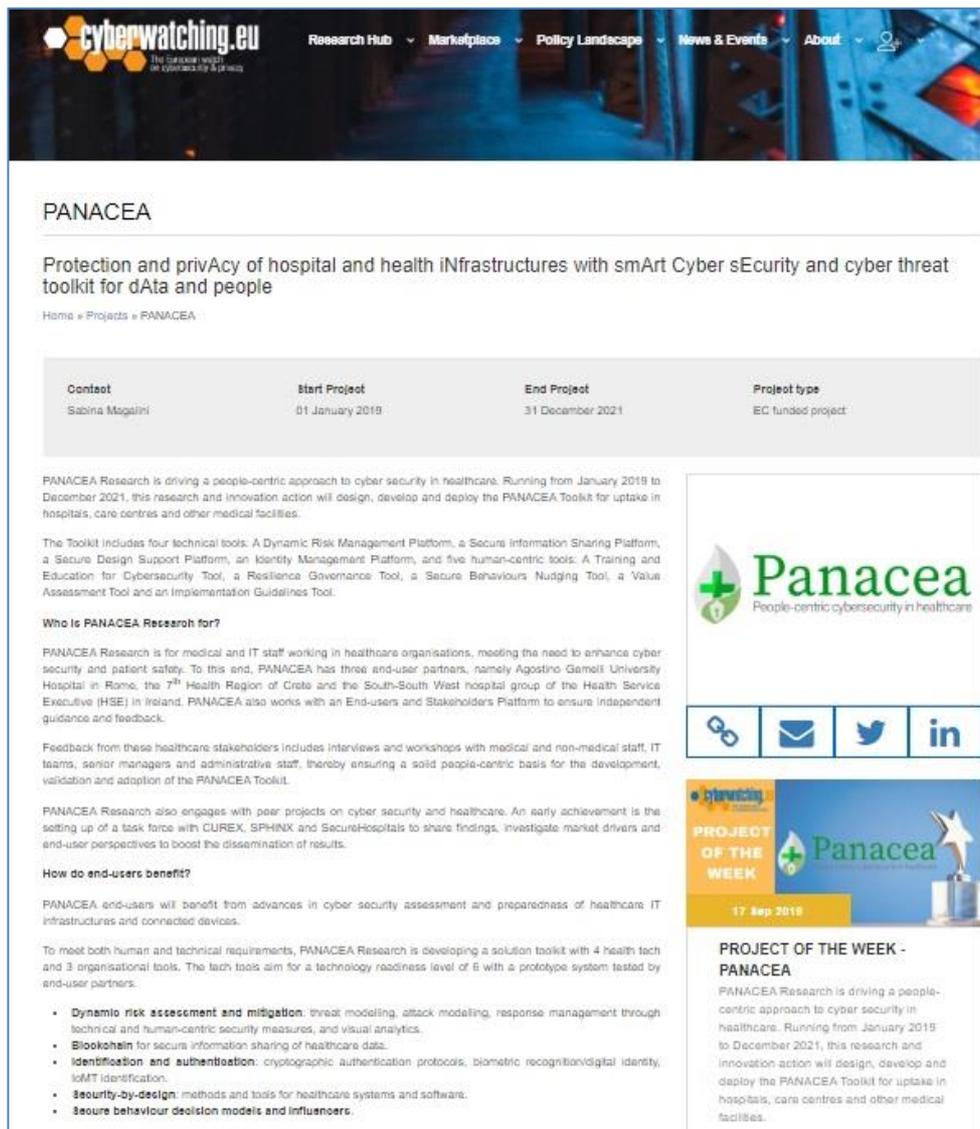
Figure 39: PANACEA Entry on the cyberwatching.eu R&I Project Hub

6.5 Summary of KPI Achievements

The table below summarises the applicable KPI achievements in the period M6-18. The same reference numbers are used for the KPIs defined in Section 3.3 (KPIs not yet applicable are not included).

KPI Category	Description	Total Project KPI	Target for M19-36	Achieved by M18
Communication Kit: CK KPI #1 (website)	Monthly web content – regular updates with SEO-driven approach/content-rich articles	180	Min. 66 pieces of content by M36.	114 items published
Communication Kit: CK KPI #2 (website)	Monthly visits to https://www.panacearesearch.eu/,	1000 av.	Av. 1000/month by M36	Av. 400 visits/month

KPI Category	Description	Total Project KPI	Target for M19-36	Achieved by M18
Communication Kit: CK KPI #3 (social media)	Animating Twitter and LinkedIn, tracking of visual impacts.	432-576 on both channels (24-32/m)	Min. 6-8 posts/month. Min. 1 SMART campaign/month on priority actions.	205 Tweets (av. 11.38/month)
Communication Kit: CK KPI #4 (newsletter)	In-house newsletter production and circulation to subscribers	20	Monthly from January 2020 (M12) except for holiday periods. Total: 13	7 newsletters produced and circulated
Communication Kit: CK KPI #5 (newsletter)	Tracking of newsletter subscribers and actions taken to boost recruitment.	200	Min. 74 new subscribers by M36.	126 newsletter subscribers
Communication Kit: CK KPI #6 (promotional banners and images)	Graphically designed promotional banners for use on the website and social media, including toolkit components.	97	Min. 4/month (72). by M36.	25 graphically designed banners
Communication Kit: CK KPI #7 (promotional material)	Graphically designed fliers and brochures.	15	Min. 2 updated project fliers. Min. 1 flier on each Toolkit component (min 8). Total 15 by M36.	3 updated fliers
Communication Kit: CK KPI #8 (videos)	Professional, in-house videos on the Toolkit (1-minute video pills).	14	Min. 2 on the toolkit plus 1 on each component (Min. 10 by M36.	4 videos produced from project meetings
KPI Category	**Description**	**Total Project KPI**	**Target for M19-36**	**Achieved by M18**
Stakeholder Engagement and Community Building: ENG KPI#2 (webinars)	PANACEA Webinars: Organisation and Promotion	6	Min. 6 by M36, including min. 1 with peer project(s).	2 webinars (1 co-hosted with cyberwatching.eu)
Stakeholder Engagement and Community Building: ENG KPI#4 (profiled communities)	PANACEA profiled community ("Community Tracker": quantitative and qualitative analysis).	2000	2000 by M36 (increase of 1069). Over 50% from healthcare organisations.	931 profiled community members
Stakeholder Engagement and Community Building: ENG KPI#5 (3rd-party events)	3rd-Party Events (positive and negative scenarios based on evolution of COVID-19).	10 virtual/25 physical	Min. 12 physical events by M36 (positive scenario). Min. 9 virtual events (negative scenario).	13 events attended (1 virtual)
Stakeholder Engagement and Community Building: ENG	Engagement with peer projects for joint dissemination of results, e.g. cyberwatching.eu Concertation Meetings.	3 (virtual/physical	Min. 2 virtual or physical events by M36.	1 workshop organised by the SPHINX project

KPI Category	Description	Total Project KPI	Target for M19-36	Achieved by M18
KPI#6 (peer projects)				
KPI Category	Description	Total Project KPI	Target for M19-36	Achieved by M18
Dissemination of results: DISS KPI #1 (in-house publications)	Production and Promotion of Essential Guides and Light Reading on PANACEA insights (graphically designed).	8	Min. 3 Essential Guides; Min. 3 Light Reading publications. Total 6 by M36.	2 Essential Guides
Dissemination of results: DISS KPI #4 (cyberwatching.eu entry)	Updates of the PANACEA results and achievements on the dedicated cyberwatching.eu entry.	5	Min. 4 updates by M36 (M19; 24; 30; 36).	1 update
Dissemination of results: DISS KPI #4 (standards)	Inputs to working groups/technical committees in relevant standards organisations.	4	Participation in Min. 2 TCs/WGs. Min. 2 inputs.	4 TCs identified as relevant for PANACEA
Dissemination of results: DISS KPI #6 (research papers)	Acceptance of research papers (peer reviewed and/or open access).	9	Min. 5 by M36.	4 papers accepted (3 peer-reviewed)
KPI Category	Description	Total Project KPi	Target for M19-36	Achieved by M18
Exploitation of Results: EXP KPI #1 (demos)	Production and promotion of technical demos (PANACEA in Action series).	10	Min. 1 per Toolkit component. Total 8 by M36.	Toolkit demos for Technical Review (April 2020)
Exploitation of Results: EXP KPI #2 (testers)	Recruitment of stakeholders to test and validate the Toolkit.	8	Min. 1 per Toolkit component. Total 7 by M36.	1 (Webinar, June 2020)
Exploitation of Results: EXP KPI #6 (exploitation plans)	Updated exploitation plans, with the 1st update in M16.	4	Min. 4 by M36 (M16; M23; 30; M36. Total 4.	1 complete set of updated exploitation plans

Table 24: KPIs Achieved by M18

7. Roadmap for M19-36

The Roadmap defines the short-, and long-term actions for PANACEA communications, stakeholder engagement, dissemination and exploitation of results. Further targets for the exploitation of assets are defined in D8.5 (December 2020) with a draft ready for the Project Review (September 2020).

Community member profiling updates will take place regularly with KPI checkpoints at M20; M24; M30 and M36. Similarly, periodic calls will track the status of participation in and contributions to standards organisations and related dissemination actions.

7.1 Short-term Goals: M19-24

Short-term goals cover the period July to December 2020 (M19-24). Major activities are outlined below.

Virtual Stakeholder Workshop

The PANACEA 2nd Stakeholder Workshop will take place in the second half of September as a virtual event. Recruitment of participants will prioritise stakeholders fitting the profiles from the toolkit component owners for testing and validation. However, the workshop will also target other stakeholder groups interested in the topic to ensure multi-stakeholder perspectives.

Key activities include:

- Definition of goals and expected outcomes.
- Agenda development.
- Setting up the platform for the event, registration form and speaker slots.
- Creation of dedicated web page with links to online marketing kits.
- Plan for participant recruitment and the SMART campaign, including save-the-date and event speaker banners, teasers, options to sign up for the newsletter.
- Personalised invitations by email and via LinkedIn.
- Monitoring of event registrants.
- Liaison with speakers, panellists and moderators to ensure smooth running.
- Definition of interactive features, e.g. polls and Q&As.
- Online post-event report and SMART campaign.

Plan for Website Revamp and other priority actions

The PANACEA website will undergo a full update with enhanced branding visuals, homepage refresh and content updates. The table below summarises the main actions.

Website Section and Other priority actions	Plan
Website: About PANACEA	Updated texts throughout the section, including partner contributions to PANACEA. New PANACEA stakeholder image.
Website: Use Cases	Updated texts reflecting the revised core use-case requirements and a template guiding partners on creating compelling texts. New banners for each use case, also for promotional purposes.

Website Section and Other priority actions	Plan
Website: Innovations	Updated texts on the Toolkit and solutions for COVID-19. New enhanced branding visuals for all Toolkit components. New social media banners.
Website: Marketing Kit	Updated fliers on the Toolkit and SMART campaigns. Updated general flier. Linked from the virtual stakeholder workshop page and downloadable as individual and joint packs.
Website - Media: Blog	Creation of new content, including min. 2 essential guides and min. 1 light reading related to PANACEA, healthcare and cyber security, including policy measures.
Website - Media: Newsletters	Monthly newsletters (excluding August but with a special edition on the virtual workshop). Min. 6 by M24.
Website - Media: Videos	Production of short in-house video pills on the Toolkit and its components.
SMART campaigns	Min. 2 campaigns per month on updates and insights with banners, tracking of impacts.
Communications	Min. 2 press releases, one targeting healthcare media channels, one for IT/cyber security media.
Stakeholder Engagement: Webinars	Min. 1 webinar by M24.
Stakeholder Engagement: Podcasts	1 podcast on hot topic in cyber security related to healthcare.
Stakeholder Engagement: Peer Projects	Cyberwatching.eu concertation meeting (expected October 2020), ICT2020 Exhibition (expected December 2020).
Community Building	LinkedIn: Recruitment Campaign of 2nd degree connections across core stakeholder groups. Recruitment on newsletter subscriptions. Converting subscribers and other contacts into community members.
Dissemination of Results	CORDIS Wire article (M19); updated entry of cyberwatching.eu page (M19)
Dissemination of Results	Project achievements: Showcase video.
Dissemination of Results	Tracking of paper submissions and acceptance.
Joint Activities with peer projects via cyberwatching.eu	Lightweight synergies on (MTRL) Market and Technology Readiness Levels through a cluster of projects with similar MRL scores: PANACEA, FENTEC, CYBER-TRUST, SealedGRID, BPRGDPR, PAPAYA, DEFeND, GUARD, SAPPAN: Joint calls, webinars, outreach activities based on the example of the Trustee Cluster on Cloud Privacy and Security. Project cluster activities could include ICT2020 and Twenty2X in 2021.

Table 25: M19-24 Plans

Lookout Watch: Content and Branding Enhancements

Creation of new, graphically designed banner on the Lookout Watch and for each section:

- **EU Policy**: Legislation/directives on cyber security and healthcare, good practice guidelines and guides on existing and upcoming directives, e.g. MDR. Examples of light reading include GDPR and NIS Directive – Legal and Technical Requirements.

- **International Policy**: Legislation like the US HIPAA, extending this section to cover countries other than the U.S. where best practices can be identified, including the examples given in the June 2020 webinar.
- **Market Reports**: New analyses from work on D8.5 and other reports sourced over time, e.g. Deloite: Medtech and the Internet of Medical Things - How connected medical devices are transforming healthcare.
- **Standards Scape**: Summary of relevant standards for cyber security and healthcare.
- **Research Papers**: Selected papers in the context of PANACEA and peer projects.

Open Call Campaign

The date for launching the Open Call has yet to be defined but is expected within this time-frame.

The campaign will involve the following steps.

- Co-definition of Open Call goals and stakeholders targeted.
- Pre-recruitment of prospective Open Call applicants (building on existing contacts, already starting in M18).
- Graphically designed banners for use on the website, Twitter and LinkedIn pre-announcing the Open Call (2-3 weeks before the official start date).
- As above, for the official Open Call start date, posting across social media and relevant LinkedIn groups.
- Support of associations that are already part of the community, e.g. COCIR, European Connected Health Alliance in promoting the Open Call to their members (*See Section 6.3 on the healthcare associations*).
- Press Release produced and circulated to relevant media channels. Announcement submitted to CORDIS Wire as a popularised channel.
- Personalised emails/messages to prospective candidates, including deadline reminders, with monitoring of applications received.
- Short impact report on outcomes of the Open Call and the SMART campaign.

7.2 Long-term Goals: M25-36

Long-term goals cover the period January to December 2021 (M25-36). Major activities are outlined below.

Stakeholder Workshop and Final Showcase Events

Activities are similar for the virtual workshop with a few other actions if the events can take place physically, e.g. choice of venue; logistics and catering; event budget tracker; place names, badges etc. Scripts for the recording of live interviews and panel discussions.

The Showcase event will also feature the outcomes and impacts of the Open Call, user and tester testimonials.

PANACEA Security Framework for Hospitals and care centres

Core activities include:

- Dedicated web page on the website.
- Graphically designed, downloadable publication of the framework.

- Dedicated SMART campaign, highlighting the main findings and best practices.
- Concise impact report.

Plan for Priority Actions

The table below summarises the main actions planned.

Website and priority actions	Plan
Website Updates	Updated sections and new banners, SEO analysis; av. SERP position vs CTR (click-through rate) per keyword
Website: lookout watch	Continuous sourcing of relevant sources, upload and promotion.
Communications: Marketing Packages	Design and graphic production of professional packages to support uptake.
Website - Media: Blog	Min. 1 Essential Guide; Min. 2 Light Reading publications.
Website - Media: Newsletters	Monthly newsletters (excluding August and other holiday periods but with special editions on the PANACEA workshops). Min. 6 by M36.
SMART campaigns	Min. 3 campaigns per month on updates and insights with banners, tracking of impacts.
Stakeholder Engagement: Webinars	Min. 2 webinar by M36.
Stakeholder Engagement: Podcasts	Min. 1 podcast on hot topic in cyber security related to healthcare and/or PANACEA insights.
Community Building	LinkedIn: Recruitment Campaign of 2nd degree connections across core stakeholder groups. Recruitment on newsletter subscriptions. Converting subscribers and other contacts into community members.
Dissemination of results	Project achievements: CORDIS Wire article (M35); updated entry of cyberwatching.eu page (M36).
Dissemination of results	Project Achievements: Showcase video.
Dissemination of results	Project Findings: Policy Brief.
Dissemination of results	Final project press release.
Dissemination of results	Tracking of paper submissions and acceptance.
Exploitation of results	Technical demos, campaigns and venues for live demos.
Exploitation of results	Adoption Kits as practical implementation guides.
Exploitation of results	Number of testers recruited and outcomes.

Table 26: M25-36 Plans

8. Conclusions and Next Steps

D8.3 reports on the achievements up to M18 and defines plans for M19-36 across communications, stakeholder engagement, dissemination and exploitation of results.

- Review of strategic goals in view of COVID-19 and lessons learned in months 1 to 18 on effective measures.
- Review of KPIs with clear definitions, targets, references and impact reporting.
- Coverage of the policy context for PANACEA from the viewpoint of EU policy measures, guiding engagement with policy makers and regulators, inputs to the Lookout Watch and future policy briefs.
- Positioning PANACEA in the standards landscape with priorities for participation in and inputs to relevant standards organisations. PANACEA can also draw on a large pool of standards specialists in EU and globally for key insights into Standards Scape through the Lookout Watch and awareness-raising campaigns.
- Revision of targeted PANACEA stakeholder groups, defining a core set of stakeholders key to successful exploitation, uptake and the open call, with a set of complementary groups and synergies. This new focus allows PANACEA to focus on the quality and relevance of its community rather than on numbers alone.
    - o Quantitative analysis of all stakeholder groups.
    - o Qualitative assessment of four of the core stakeholder groups.
- Impact analysis of the PANACEA Communications Strategy, including website analytics, SMART campaigns, videos and newsletters.
- Impact analysis of the stakeholder engagement plan.
    - o Social Media campaigns and impacts.
    - o Visibility and knowledge sharing at 3rd-party events.
    - o Outcomes and impacts of webinars.
- Impacts for the dissemination of results and knowledge sharing through research papers, deliverable summaries and cyberwatching.eu, including very recent steps to create clusters of projects around joint dissemination and common approaches to the exploitation of results.
- Summary of KPI achievements at M18 with respect to the newly defined targets.
- Concrete KPI-driven plans for M19-24 and M25-36.
    - o The outcomes of these plans will be reported in D8.4 - Communication and Dissemination Strategy and Achievements, Final version (June 2021) with a summary of impacts in D9.6: Technical Report 2 (June 2021).
    - o Final Project Review Updates.

9. Ethical and Data Privacy aspects

No issue related to ethics in general or to gender, discrimination, or data privacy applies to the production of D8.3.

Annex 1 – Comparative KPIs: GA and D8.2

The table below compares the new D8.3 KPIs with the original targets in the GA KPIs and the sub-set of KPIs in D8.2.

- Column 1: The D8.3 KPI category and reference number.
- Column 2: The original GA description.
- Column 3: The GA Target. Includes N/A if KPI is newly defined in D8.3.
- Column 4: The D8.2 Target if different or not included. Includes N/A if KPI is newly defined in D8.3.
- Column 5: Concise motivation for revisions or inclusions in D8.3.

A few KPIs will be defined in D8.5 as they directly related to exploitation plans and can therefore be contextualised.

For internal purposes, 2 spreadsheets have been produced: 1 with the KPIs from the GA and D8.2; 1 with the new KPIs to track progress towards targets.

D8.3 KPI Category and Reference	GA Description	GA Target (M24; M36)	D8.2 Target (M24; M36)	D8.3 Target (M36)	Reason for change
Communication Kit: CK KPI #1 (website)	Monthly web content – regular updates with SEO-driven approach/content-rich articles	36 / 3 monthly/ 48 / 4 monthly	108	Min. 66 new pieces of content by M36.	Increase overall target with clear targets.
Communication Kit: CK KPI #2 (website)	Monthly visitors	2000/monthly-3000/monthly	Not included	1000/month by M36 (800/month by M30).	Target too high.
Communication Kit: CK KPI #3 (social media)	Tweets and LinkedIn Posts & articles	N/A	720 and 1080 Twitter posts; 480-720 on LinkedIn	Min. 8 posts/month. Min. 1 SMART campaign/month on priority actions.	Merge activities and track SMART campaign impacts.
Communication Kit: CK KPI #4 (newsletter)	Produce and circulate monthly newsletter based on stakeholder targets.	Yr. 1: 6; Yr. 2: 8; Yr. 3: 10 (24)	As in GA.	Monthly from December 2019 (M12) except for holiday periods. Total: 20	Revise and lower target.
Communication Kit: CK KPI #5 (newsletter)	Tracking of newsletter subscribers and actions taken to boost recruitment.	N/A	N/A	Min. 200 subscribers by M36.	Add as new target
Communication Kit: CK KPI #6 (promotional banners)	Generic promotional material // Promotional & marketing material	+6	Not included	Min. 4/month. Total 72 by M36.	Make KPI more specific

	including banner adverts				
Communication Kit: CK KPI #7 (promotional material)	Promotional material specific for IT audiences and Promotional material specific for healthcare audiences	Yr 1: min. 1 (IT audiences) ; Yr 2: min. 2 and Yr 3 min. 2 (healthcare)	As in GA	Min. 3 updated project fliers. Min. 1 flier on each Toolkit component. Total 10 by M36.	Focus on toolkit
Communication Kit: CK KPI #8 (videos)	Awareness videos	2+	2+	Min. 1 on the toolkit plus 1 on each component. Total 8 by M36.	Create more targeted videos, including 2 to boost dissemination of results.
Communication Kit: CK KPI #9 (press releases)	Press Release	2+	6+	Min. 2 press releases. Min. 1 to healthcare media and min. 1 to IT/cyber security channels. Total 2 PRs + 1 TV/radio interview by M36	Realistic target + interview
Communication Kit: CK KPI #10 (open call campaign)	Open Call promotion	min 1 PR, 1 flier, 1 save-the-date flier. Support from min. 2 media partners and 5 EU/national synergies	As in GA.	1 pre-call advertising banner (save the date). 1 flier. 2 healthcare associations recruited for support. 1 press release.	Make KPI more specific
Communication Kit: CK KPI #11 (SERP)	Brand recognition through appearance on 1st page of main search engines (SERP) with the relevant keywords	1st page SERP (not included in D8.2)		KPI to be defined in D8.5.	Not sufficiently quantified. Needs specific timing
Stakeholder Engagement and Community Building: ENG KPI#1 (PANACEA workshops)	End-users PANACEA workshops (annual) and Final Showcase event in M35	3 workshops + Final event	As in GA	Total 3 by M36, with min. 1 virtual event.	Merge into one KPI highlighting testing and showcasing toolkit
Stakeholder Engagement and Community Building: ENG KPI#2 (webinars)	Webinars (1 Zooming in on overview of what PANACEA's assets in 2018. 3 webinars concentrate on the individual 3 pilots, (3 in 2019). 1 Final webinar on end-achievements to coincide with the final event from the Open call (1 in 2020).	3 (Note: erroneous reference to 3 pilots: -2)	As in GA	Min. 6 by M36, including min. 1 with peer project(s).	Increase target and tailor topics
Stakeholder Engagement and Community	PANACEA Podcasts, with 1-3	N/A	N/A	Min. 2 by M36.	New KPI

Building: ENG KPI#3 (podcasts)	panellists, zooming in on a specific topic.				
Stakeholder Engagement and Community Building: ENG KPI#4 (profiled community)	Entries in opted-in in DB of the PANACEA Community (LinkedIn + website + events & webinars)	1000+; 3000+	Not included	2000 by M36. Over 50% from healthcare organisations.	Revise KPI with priority on profiling and qualitative metrics
Stakeholder Engagement and Community Building: ENG KPI#5 (3rd-party events)	Visibility at 3rd party events	50+	50+	Min. 25 physical events by M36 (positive scenario). Min. 10 virtual events (negative scenario).	Revise in light of COVID-; add KPIs not dependent on physicals events
Stakeholder Engagement and Community Building: ENG KPI#6 (peer projects)	Synergies established at national and EU level	10+	5+	Min. 2 virtual or physical events by M36.	Make KPI more specific but not necessarily quantified in terms of project numbers
Dissemination of results: DISS KPI #1 (in-house publications)				Min. 3 new Essential Guides; Min. 3 new Light Reading publications. Total 6 by M36.	
Dissemination of results: DISS KPI #2 (popularised channels)	Articles on PANACEA Achievements submitted to CORDIS Wire.	N/A	N/A	Min. 2 by M36 (1 at M19; 1 at M35).	New KPI to boost dissemination of results
Dissemination of results: DISS KPI #3 (videos)	Videos on PANACEA Achievements (professional; in-house).	N/A	N/A	Min. 2 videos by M36 (1 at M24; 1 at M35).	New KPI to boost dissemination of results
Dissemination of results: DISS KPI #4 (cyberwatching.eu entry)	Updates of the PANACEA results and achievements on the dedicated cyberwatching.eu entry.	N/A	N/A	Min. 4 updates by M36 (M19; 24; 30; 36).	New KPI to boost dissemination of results
Dissemination of results: DISS KPI #5 (standards)	Inputs to working groups/technical committees in relevant standards organisations.	No change to GA target.			
Dissemination of results: DISS KPI #6 (partner end-user interviews)	Written or filmed interviews with end-user partners, e.g. 7HRC, FPG, HSE, ICEM on impacts of PANACEA.	N/A	N/A	Min. 1 per partner by M36. Total 4 (min.).	New KPI to boost dissemination of results
Dissemination of results: DISS KPI #7 (research papers)	Conference presentation / refereed publications	10+; 20+	Not included	Min. 5 new research papers/technical publications by M36.	Specific KPI on papers; reduced target
Dissemination of Results: DISS KPI #8 (joint dissemination)	Joint dissemination with peer projects coordinated via cyberwatching.eu on MTRLs, e.g. webinars on common topic; demo or other type	N/A	N/A	Min. 5 peer projects. Min. 2 concrete outputs by M36	New KPI to boost dissemination of results

	of exhibition stand; workshop session				
Dissemination of Results: DISS KPI #9 (deliverable summaries)	Extracts from deliverables	Not specified	Not specified	1 in-house publication of deliverable summaries from PU deliverables by M36	New, specific KPI for PU deliverables
Exploitation of Results: EXP KPI #1 (demos)	Production and promotion of technical demos (PANACEA in Action series).	N/A (generic reference to demos)	N/A	Min. 1 per Toolkit component. Total 7 by M36	KPI focusing on the toolkit and its adoption.
Exploitation of Results: EXP KPI #2 (testers)	Recruitment of stakeholders to test and validate the Toolkit.	N/A	N/A	Min. 1 per Toolkit component. Total 7 by M36.	New KPI to support feedback on Toolkit.
Exploitation of Results: EXP KPI #3 (testimonials)	Testimonials on PANACEA Toolkit (on graphically designed banners).	N/A	N/A	Min. 4 by M36. Total 4 (min.)	New KPI to increase interest and incentivise uptake.
Exploitation of Results: EXP KPI #4 (adoption kits)	Production and promotion of Adoption Kits (Practical, "How to implement Toolkit component").	N/A	N/A	Min. 2 by M36 (1 at M30; 1 at M36). Total 2 (min).	New KPI to support implementation.
Exploitation of Results: EXP KPI #5 (marketing packs)	Customisable marketing packages (videos, how-to-demos, press kit etc.)	10+ produced and 50+ distributed	No included	Min. 2 by M36 (1 at M30; 1 at M36). Total 2 (min.).	Revised KPI with focus on toolkit uptake
Exploitation of Results: EXP KPI #6 (exploitation plans)	Updated exploitation plans, with the 1st update in M16.	N/A	N/A	Min. 4 by M36 (M16; M23; 30; M36. Total 4.	New KPI to map project R&I results with partner exploitation.
Exploitation of Results: EXP KPI #7 (demo webinar series)	Customers formally engaged by means of signed MoU	25+ customers formally engaged (by means of signed MoU) from 5+ European Member States	Not included	8 webinars by M36.	Revised KPI: cost-effective and achievable output to boost uptake.