



## Deliverable 2.2

### Engagement Workshops (EWs) contributions to the SPIs for OOSC

#### Version 1.5

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## QUALITY ASSURANCE

To ensure the quality and correctness of this deliverable, we arranged an internal review and validation process. The deliverable was drafted by the work package leader ACCC. All partners contributed and reviewed the overall draft. Finally, the final version was submitted to the project coordinator for a final review and validation.

### DISCLAIMER

This deliverable contains original, unpublished work except where clearly indicated otherwise. It builds upon the experience of the team and related work published on this topic. Acknowledgment of previously published material and others' work has been made through appropriate citation, quotation, or both.

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ENJOI - ENgagement and JOurnalism Innovation for Outstanding Open Science Communication

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# 1. SUMMARY

This deliverable has the objective to draft a working list of Standards, Principles and Indicators (SPIs) for an Outstanding Open Science Communication (OOSC) integrating the results and feedbacks coming from the four ENJOI Engagement Workshops (EWs). This working list of SPIs goes to substitute the previous one released with the Inception report described in D2.1 since it includes the science communication producers' and users' significant feedback and views.

This document is, once again, a working version of the ENJOI SPIs that will keep evolving during the remaining months of the project and will be updated on the ENJOI Observatory for OOSC. Recommendations and contributions collected during the four Ews will also subsequently be condensed in the ENJOI Manifesto for OOSC.



## 2. PROJECT OVERVIEW

ENJOI (ENgagement and JOurnalism Innovation for Outstanding Open Science Communication) is exploring and testing engagement as a key asset of innovation in science communication distributed via media platforms, with a strong focus on journalism. Through a combination of methodologies and in collaboration with producers, target users and stakeholders of science communication, ENJOI is co-creating and selecting a set of standards, principles and indicators (SPIs) condensed into a Manifesto for an Outstanding Open Science Communication. This process is the result of research and of co-creation developed through a series of Engagement Workshops (EWs), Labs, field and participatory research, evaluation and testing phases.

ENJOI is also building an online Observatory as its landmark product to make all results and outputs available to foster capacity building and collaboration of all actors in the field.

ENJOI's ultimate goal is that of improving science communication by making it more consistently reliable, truthful, open and engaging. Contextually, ENJOI will contribute to the active development of critical thinking, digital awareness and media literacy of all actors involved in the process.



### 3. INTRODUCTION

#### Analysis of evolving SPIs

During the EWs that took place in spring 2022 in four countries (Italy; Spain; Belgium and Portugal), journalists, science communicators, researchers, science museum experts, teachers, activists, social media experts, editors, and designers co-created Standards, Principles and Indicators (SPIs) in order to improve science communication and journalism by making them more consistently reliable, truthful, engaging and useful. Each EW yielded different results with quite a range of diversity in terms of the principles as well as of the standards and indicators deemed useful to guide the journalistic and communication work.

A temporary long list of SPIs was then assembled and became the basis of the dynamic that was deployed during an ENJOI consensus workshop meeting, with participation of all partners. The dynamic helped to reduce the long list to a subset of 8 principles to be discussed and further analysed, with their relative standards of application and a number of indicators. The current list of principles is as follows:

- **INTEGRITY:** Science journalists must be transparent, honest, and upright as communicators, seeking to maintain their independence and that of their sources.
- **RELEVANCE:** The content of the information must always be relevant to the intended audiences.
- **SOURCES:** The sources of journalism should be of proven scientific quality, rigorous and diverse.
- **RIGOUR:** Science journalism work should be prompted to the maximum of accuracy.
- **ACCESSIBILITY:** Science journalism should be accessible and inclusive for as wide a range of audiences as possible.
- **AUDIENCE-FIRST:** Communication should always be designed and crafted with the target audience in mind.
- **IMPACT:** Science communication should be designed with the goal of generating an impact and the attention to measure it with adequate indicators over time
- **ENGAGEMENT:** Audiences should be engaged not only as final users but also as producers, active thinkers, giving opinions and feedback. Special care should be



put in assessing ways and methods to involve the audiences in the entire production process.

In Section 4.2.7 of this deliverable, we will show how these principles are broken down into detailed standards and indicators. The result shows how the project has moved from an abstract list of criteria, to a matrix that can be used in practice to evaluate, inspire and teach science communication. The criteria based on academic literature and expert opinion have evolved into SPIs that are enriched with the living experience of stakeholders.

Some of them reassert very well-established values of good communication, that are still not fully applied in the real-world practice of science communication, especially in countries with weaker media systems. Others are innovative contributions, that are mostly absent in literature, pointing to emerging trends and challenges, like deep engagement, open science, new technologies, solutions journalism, inclusion, and polarisation. The current SPI matrix is a valuable and original starting point to guide science communicators in the navigation of these complex issues.



## **4. CONTRIBUTION OF THE EWs FOR THE CO-CREATION OF THE SPIs**

This section presents and details the Standards, Principles and Indicators (SPIs) that resulted from the Engagement Workshops (EWs) in Belgium, Italy, Portugal and Spain.

### **4.1. EWs in Belgium, Italy, Portugal and Spain**

More than 50 people attended the EWs that were organised face to face in each country and held in the local language. The first EW took place in Italy, followed by Belgium, Spain and finally Portugal, in the space of 2 months, from March to May 2022. The participants were journalists, science communicators, researchers, science museum experts, teachers, activists, social media experts, editors, and designers.

Following the methodology developed by StickyDot (described in Deliverable 3.2) and the implementation of the EWs coordinated by Science for Change (described in Deliverable 4.1), the workshops were organised in separate sections dedicated to the co-creation of Principles, identification of Standards and definition of Indicators. The four events in Italy, Belgium, Spain and Portugal followed a “cascade” approach. After each event an internal consortium meeting was organised dedicated to the mutual learning in order to contribute to the following one, so that the overall methodology was improved step by step. The information about the materials, dynamics and results will be detailed in the Deliverable 4.2.

### **4.2. Integrating the SPIs EWs results**

This sections details the results coming from each EW, country per country, in a table that lists all the contributions and the feedback and definition proposed during the discussion with the participants.





## 4.2.1 Results from EW in Belgium

	Principles	Standards	Indicators	
Belgium	Evidence-base	Use a variety of scientific sources	Are there at least 2 sources + independent researchers sources used?	
		Informative of where to find additional information	When relevant, are uncertainty, doubts, and the unknown highlighted?	
			When possible, the SciComm piece should prioritize open access and open science	
			Does the SciComm piece provide a read more section to take users deeper into the topic (other publications)?	
		Representative and qualitative sources	Does the SciComm piece show multiple perspectives (multi-disciplinary and contradictory)?	
			Choice of sources: Is the SciComm piece choosing the best experts: recommendations, affiliation, experience, publications?	
			Have the results presented in the SciComm piece been checked/peer reviewed (exceptions: processes, novelty/urgency)?	
	Transparency	Reputation/integrity/code of conduct of a news outlet is important		Are the sources retrievable? (scale from open access, to not retrievable)
				Are there SciComm guidelines? (yes/no)
				Are the credentials of sources with URLs provided? (yes/no)
				Is there a general introduction on the scientific research process provided in the piece? (yes/no)
				Does the author (journalist, etc..) use her/his own quotes? (yes/no)
			Honesty about difficulties	Are the limitations in the scientific research mentioned? (yes/no)
			Experts voice is present (they talk and interact)	Where does the information come from? (Press agency, university, ...)
		Is the SciComm piece mentioning at which stage the research currently is? (yes/no)		



			Is the scientific method explained/mentioned (info on sampling, process, representative, reliability)? (yes/no)
	<b>Engagement</b>	Relatable	Was there a vocabulary check? Did the people understand the piece?
			Evaluation: visitor numbers
			Number of likes, shares and clicks
		Engage community around doubts and fears	What is the number of comments related to the SciComm piece (as a sign of controversy and interest)?
			"Draw a scientist" as an evaluation technique
			Quality of the comments
		Think about longevity of articles online	Follow-up with the group: what do users remember?
			Does the SciComm piece provide a link with researchers for follow-up?
		Solutions-oriented (empowerment and agency)	Did the SciComm piece provoke changes in attitude/actions taken by users? (measure changes in attitude and actions people took)
		"Podium" for all stakeholders	
	<b>Clarity</b>	Use the right language for the right target groups	
		Starting from questions (in boxes and things you should know)	
		Explain the context	
	<b>Appealing format</b>	Well written	
		Visually attractive images	
		Diversity, including gender equality	



## 4.2.2 Results from the EW in Italy

	Principles	Standards	Indicators
Italy	Source	Use reliable, trustworthy, verified sources	Coherence with the methodology used (which should be made explicit)
		Include different perspectives	How many and which sources were used
			Level of interdisciplinarity and diversity of fields/topics over time
		Avoid false balance	
		When possible, make the sources available to the public	How many times the same experts were interviewed and on which topics
		Include sources that are "cognitively close" to your audience	
		Assure the quality and completeness of the sources	
	Target	Define who you are talking to	
		Analyse your targets	Target(s): demographics, profiles, etc.
			"Polarization" of readers?
		Choose the right language for the right audience	
	Engagement	Try to build a community around your work	On social media: number of followers, likes, shares, comments, etc.
			Community responsiveness
			Follow these numbers over time (not just one specific moment)
			Subscribers (free + paywall)
			Fidelity level
		Collect inputs from your audience	Number of readers (copies sold)
			Permanence (e.g. for how long do users watch a video?)
			Questionnaires
Develop call to actions			
Listen to your readers, do not try to persuade them		Qualitative interviews to selected readers	
Relevance/Newsworthiness	Ask yourself: "Is it really relevant what I am adding to the communication arena?"		
	Always think about the		



		newsworthiness	
	<b>Clarity</b>	Be clear, but avoid oversimplifications	Number of typos (“If I write badly I think badly”)
		Be simple, not simplistic	
		Use a clear language	
		Communicate data in a clear way	
	<b>Accuracy</b>	Be precise	
		Be exhaustive, not “pachydermic”	
	<b>Rigour</b>	Fact-checking	Peer review and fact checking in the production process
		Always have articles reread before publication	Numbers of revisions
	<b>Concreteness</b>	Make a communication that is concrete, close to the everyday life and to the practical world of the listener	
		Look for cognitive proximity with your audience (e.g., talking about the climate crisis using as example polar bears might feel distant; it would be better to use closer examples)	
	<b>Context</b>	Define the context of your work	
		Include the point of view of different stakeholders	
		Explain the causes of a phenomenon, but also try to talk about its consequences	
	<b>Storytelling</b>	Tell representative stories	
		Use (wisely) emotions to connect with your audience	
		Use infographics	Pertinence of images used
	<b>Ethics</b>	Avoid advocacy	Non-commercial partnerships
		Report the idea of “scientific consensus”, if there is one	
		Be accountable	
	<b>Impacts</b>	Think about the value impact your work can have	Impact evaluation
			Qualitative and quantitative reports (to measure impact)



		Follow-up on your work (circular approach)	Content analysis of contents
			What do our "competitors" say about our work?
			How many times our article/product was cited/reported in other platforms
	<b>Others</b>	Define your communication objectives	Impact evaluation
		Define your communication strategy	Performance
		Define your communication channels	Number of views
		Do not just talk about problems, but try to include solutions	
		Do not take the press releases for granted	
		Avoid rhetoric	
		Form is substance: it should be as carefully crafted as the content	
		Follow-up on your work (keep covering relevant stories)	
		Study!	



### 4.2.3 Results from the EW in Portugal

	Principles	Standards	Indicators
Portugal	<b>Rigour</b>	Verify sources	Does the article/piece include diverse sources (with diverse cultural, socio-economic status, etc.)?
		No extrapolation	How many sources does the article/piece include/cite?
		Diversity of sources	Does the article/piece include specialised/recognised (by the scientific community) and reliable sources?
		Peer-review	Was the scientific article subjected to peer-review?
		Reliable sources	Existence of good practices in science (research) to guarantee scientific rigour
	<b>Relevance</b>	To adequate the topic to the format and to the media	Is the article/piece of interest for the public? (public interest)
			Does the article/piece include (statistical) data?
			Does the article/piece cover a topic of national and/or international interest? Is it subject to debate/scrutiny?
			Has the article/piece promoted social or political changes (nationally or internationally)? (e.g., legislation or new lines of funding)
			Has the article/piece promoted social or political debate?
			Metrics (for evaluation), e.g., indicators of engagement
			Relation to day-to-day (stories)
	<b>Accessibility</b>	Plain language	Is the article/piece comprehensible? "Could you explain it to your granny?"
			Does the article/piece incorporate/use formats that allow inclusive communication (e.g., sign language)?
			Is the article/piece adequate to its target audience?
			Is the language used adequate?
			Usability (web accessibility)



		Analogies	
	<b>Independence</b>	To use and cite several sources	Does the article/piece include diverse sources (minimum of two)?
		Primary sources	Diversity and number of sources: at least two sources, one should be a primary source (minimum) and one should be a specialised and independent source (minimum)
		To adapt/adjust the content to the context/needs (rhythm)	Does the article/piece identify any conflict of interests? Does the article/piece identify any financing source? Is the article/piece sponsored? - identification of sponsored content (content shouldn't be sponsored) Periodical meetings to monitor and assess the work conducted
	<b>Factuality</b>	Validate/verify	Does the article/piece include and/or cite sources for each fact mentioned?
			Is the article/piece based on facts?
			Has the article/piece been reviewed by experts in the field and/or other colleagues (e.g., other journalists)?
		Creativity in the way information is presented	
		Use of multimedia	
	<b>Trust</b>	Clarification	Are the sources official?
			Are the sources identified in the article/piece?
			(If any) Is funding clearly identified in the article/piece? (transparency about / independency of financial sources)
			Does the article/piece or media assess their performance through direct interaction with the audience (e.g., survey, focal groups)?
		Clear infographics	
		Clear language	Avoid use of jargon - accessibility of the information provided
	<b>Transparency</b>	Open methods and reproducibility	Does the article/piece include, cite and/or use/share open source or open data?
		Sources	Reliability of sources



			Does the article/piece include sources? How many sources are cited?
		Ethics	Does the article/piece (and/or media) identify any conflict of interests?
			Does the media make public their funding/financial information (availability of financial report)?
			Does the article/piece follow the code of ethics?
	<b>No polarization of debates</b>	Diversity (cultural, socio-economic, racial, ethnicity, etc.)	Does the article/piece include diverse sources?
			Does the team incorporate diverse backgrounds (gender, geographies, ethnicity, etc.)?
		Collaboration and cooperation (vs competition)	
		Definition of the target audience and adaptation of the message	Does the article/piece or media assess their performance through direct interaction with the audience (e.g., survey, focus groups)? For instance, to ensure accessibility of the content
	<b>Scientific rigour</b>	Critical thinking	Has the article/piece been reviewed by experts in the field and/or other colleagues (e.g., other journalists)?
			Are the sources cited?
			Is the article/piece based on facts?
			Is the article/piece based on data? (to favour the use of data, in particular in experimental sciences)
		Impartiality	Rigorous use of adjectives (only when necessary)
		Science as a process and adaptation to change (not immutable truths)	





#### 4.2.4 Results from the EW in Spain:

	Principles	Standards	Indicators
Spain	Critical	Reflect all parties involved (make interest explicit)	Reflects any hidden interests?
			Does it include several voices or points of view?
			Declaration of conflict of interest
		Evaluate the outcome and consequences of communication	KPI RRSS- Number of likes, number of interactions
		Be clear about the didactic objective	Include and value basic research, including local research
	Diversity	Include stakeholders	
		Incorporate a diachronic view	Number of countries geographical diversity
			Gender diversity
			Number of different formats
			Number of different platforms
	Reach everyone	Adapt the message to the target audience	
		Enrich with humour and emotion	
		Interdisciplinary	
		Do not stereotype	
	Didactics	Recontextualise and do not simplify	
		Highlighting basic research and local innovation	
	Rigorous and truthful	Review by a collaborating specialist	Peer review
			Proximity (sources that are involved in the issue)
			Yes/no external or peer evaluation of the objectivity of your piece
			Based on up-to-date scientific evidence
			Bibliographic sources
		Multidisciplinary team for quality	



	<b>Empathy and equity</b>	Neutral	Number of actors considered: minimum 4 (helix)
			At least 2 different sources
			At least one voice for and one against on controversial topics (specialist people)
		Inclusive	Incidents
			Visual impairment
			Hearing impairment
			Inclusive gender
	<b>Diversity format</b>	Tailored to the specific audience	Tailoring message to the specific audience
			Number of press releases
			Number of journalists contacting you
		Cognitive diversity	
		Accessibility	
		Attractiveness	How many call you with requests
			That you reach a new medium that has not been reached before
			The number of times you reach media, number of unique media you have reached
		Creative	
		Display the information	Clipping
		Reference the data source	Alignment of objectives and measurement
	<b>Contrasted, reliable and diverse sources</b>	Accreditation and recognition	Work in recognised institutions and organisations
			Data from official organisations
		Conflict of interest (ethics)	
		Independent	
		Specialists	Expert sources
			Specialists in different topics and data
	<b>Transparency</b>	Real data	



	<b>Context/objectivity</b>	Minimum talk to 2 pax, but depends on topic and consensus	Number of sources consulted and types
		If there is controversy assess whether all perspectives should be reflected	
		Be careful with the type of literature	Indicate when pre - print
		Start with systematic reviews then high impact	Journal quality
		Go to official and original sources	Scientific articles
		Allow the info to be correctly assessed	
	<b>Impact (driver of change)</b>	Think about interests and priorities for telling the message	Long-term driver of change: attracting talent that when applying for an offer they know you through social networks
			Conversion funnel
		Visual and cultural references	
		Data visualisation tools are recommended	
	<b>Audience segmentation</b>	Change the language for each age and audience	
		Use the codes of each segment	RRSS algorithms
		Surveys, focus groups and interviews to understand the target audience	
		Stickers on Instagram	
		Surveys on YouTube, twitter likes and RT	Viewing time
			Action trigger of a communication element 'engagement', eg: likes, RT, level of interaction
			The minute they abandon a video
			Average video time (the time until you have half of your entire audience)
			Number of views
			Number of videos (equivalent for other communication products)
		Don't always simplify, define the target audience (user cantered design)	



		Explain it as you have understood it	
	<b>Be informative</b>	Certain value adjectives avoid it	
		Beware of sensationalism	
	<b>Be honest</b>	Referencing everything everywhere (contacts) or admitting that you have no references	Yes/no you have consulted bibliographic sources
			Have you read the scientific article
	<b>Balance between information and opinion</b>	Make opinions of evidence explicit	
	<b>Accessible language</b>	Analogies	
		Explanation of technical terms	
		Links to more info	
		Concise sentences	
	<b>Narrative</b>	Audience identification	
		Helps to maintain interest	
		Keeping proportions (one testimony is not representative of all)	
	<b>Channels</b>	Reading time	Number of visits to the article
			Viewing time
		Tailored to the target audience	Interest by topic
			Visits typology news
		Two-way interaction	Number of comments
			Interactions
		Ease of sharing	Include tools to easily share the content

#### 4.2.5 Integrating the SPIs from the four EWs

In this section, an effort was made to aggregate, integrate and synthesize all the information collected during the four Ews.

This table has become the basis for a further round of selection and discussion within the consortium, starting with an internal ENJOI consensus consortium meeting that took place after the completion of the four Ews. The goal was that of reducing the number of the SPIs and made them a useful and approachable list to be used as a reference framework by all interested parties, from producers in the act of creating a piece of communication to users in the effort to judge the quality of the science communication they are exposed to.

Principles	Standards	Indicators
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<b>Rigorous and truthful</b>	Verify sources	Does the article/piece include diverse sources (with diverse cultural, socio-economic status, etc.)?
<b>Scientific rigour</b>		Is the article/piece based on facts?
<b>Evidence-base</b>		Is the article/piece based on data? (to favour the use of data, in particular in experimental sciences)
<b>Rigour</b>	Impartiality	Rigorous use of adjectives (only when necessary)
<b>Accuracy</b>	Science as a process and adaptation to change (not immutable truths)	
	Review by a collaborating specialist	Peer review
		Proximity (sources that are involved in the issue)
		Yes/no external or peer evaluation of the objectivity of your piece
	Based on up-to-date scientific evidence	
	Bibliographic sources	open access
	Multidisciplinary team for quality	
	Be precise	
	Be exhaustive, not "pachydermic"	
	Fact-checking	Peer review and fact checking in the production process
	Always have articles reread before publication	Numbers of revisions
<b>Relevance</b>	To adequate the topic to the format and to the media	Is the article/piece of interest for the public? (public interest)
		Does the article/piece include (statistical) data?
		Does the article/piece cover a topic of national and/or international interest? Is it subject of debate/scrutiny?
		Has the article/piece promoted social or political changes (nationally or internationally)? (e.g., legislation or new lines of funding)
		Has the article/piece promoted social or political debate?
		Metrics (for evaluation), e.g., indicators of engagement
	Relation to day-to-day (stories)	



	Make a communication that is concrete, close to the everyday life and to the practical world of the listener	
	Look for cognitive proximity with your audience (e.g., talking about the climate crisis using as example polar bears might feel distant; it would be better to use closer examples)	
	Ask yourself: "Is it really relevant what I am adding to the communication arena?"	
	Always think about the newsworthiness	
<b>Accessibility</b>	Plain language	Is the article/piece comprehensible? "Could you explain it to your granny"?
<b>Reach everyone</b>		Does the article/piece incorporate/use formats that allow inclusive communication (e.g., sign language)?
<b>Accessible language</b>		Is the article/piece adequate to its target audience?
<b>Clarity</b>		Is the language used adequate?
		Usability (web accessibility)
	Analogies	
	Adapt the message to the target audience	
	Enrich with humour and emotion	
	Interdisciplinary	
	Do not stereotype	
	Analogies	
	Explanation of technical terms	
	Links to more info	
	Concise sentences	
	Be clear, but avoid oversimplifications	Number of typos ("If I write badly, I think badly")
	Be simple, not simplistic	
	Use a clear language	
	Communicate data in a clear way	
	Use the right language for the right target groups (4)	
	Starting from questions (in boxes and things you should know) (3)	
	Explain the context (2)	
<b>Independence</b>	To use and cite several sources	Does the article/piece include diverse sources (minimum of two)?



	Primary sources	Diversity and number of sources: at least two sources, one should be a primary source (minimum) and one should be a specialised and independent source (minimum)
	To adapt/adjust the content to the context/needs (rhythm)	Does the article/piece identify any conflict of interests? Does the article/piece identify any financing source? Is the article/piece sponsored? - identification of sponsored content (content shouldn't be sponsored) Periodical meetings to monitor and assess the work conducted
<b>Factuality</b>	Validate/verify	Does the article/piece include and/or cite sources for each fact mentioned?
<b>Contrasted, reliable and diverse sources</b>		Is the article/piece based on facts?
<b>Context/objectivity</b>		Has the article/piece been reviewed by experts in the field and/or other colleagues (e.g., other journalists)?
<b>Source</b>	Creativity in the way information is presented	
	Use of multimedia	
	Clarification	Are the sources official?
		Are the sources identified in the article/piece?
		(If any) Is funding clearly identified in the article/piece? (transparency about / independency of financial sources)
		Does the article/piece or media assess their performance through direct interaction with the audience (e.g., survey, focal groups)?
	Accreditation and recognition	Work in recognised institutions and organisations
		data from official organisations
	Conflict of interest (ethics)	
	Specialists	Expert sources
		Specialists in different topics and data
	Minimum talk to 2 pax, but depends on topic and consensus	Number of sources consulted and types
	If there is controversy assess whether all perspectives should be reflected	
	Be careful with the type of literature	Indicate when pre - print



	Start with systematic reviews then high impact	Journal quality
	Go to official and original sources	Scientific articles
	Allow the info to be correctly assessed	
	Use reliable, trustworthy, verified sources	Coherence with the methodology used (which should be made explicit)
	Include different perspectives	How many and which sources were used
		Level of interdisciplinarity and diversity of fields/topics over time
	Avoid false balance	
	When possible, make the sources available to the public	How many times the same experts were interviewed and on which topics
	Include sources that are "cognitively close" to your audience	
	Assure the quality and completeness of the sources	
	Use a variety of scientific sources (4)	Is there at least 2 sources + independent researchers sources used?
	Representative and qualitative sources (3)	Does the SciComm piece show multiple perspectives (multi-disciplinary and contradictory)?
		Choice of sources: Is the SciComm piece choosing the best experts: recommendations, affiliation, experience, publications?
		Have the results presented in the SciComm piece been checked/peer reviewed (exceptions: processes, novelty/urgency)?
<b>Transparency</b>	Open methods and reproducibility	Does the article/piece include, cite and/or use/share open source or open data?
<b>Be honest/Integrity</b>	Ethics	Does the article/piece (and/or media) identify any conflict of interests?
<b>Ethics</b>		Does the media make public their funding/financial information (availability of financial report)?
		Does the article/piece follow the code of ethics?
	Referencing everything everywhere (contacts) or admitting that you have no references	Yes/no you have consulted bibliographic sources
		Have you read the scientific article
	Real data	
	Avoid advocacy	Non-commercial partnerships





	Report the idea of “scientific consensus”, if there is one	
	Be accountable	
	Reputation/integrity/code of conduct of a news outlet is important (4)	Are the sources retrievable? (scale from open access, to not retrievable)
		Are there SciComm guidelines? (yes/no)
		Are the credentials of sources with URLs provided? (yes/no)
		Is there a general introduction on the scientific research process provided in the piece? (yes/no)
		Does the author (journalist, etc..) use his/her own quotes? (Yes/no)
	Honesty about difficulties (4)	Are the limitations in the scientific research mentioned? (yes/no)
	Experts voice is present (they talk and interact) (2)	Where does the information come from? (Press agency, university, ...)
		Is the SciComm piece mentioning at which stage the research currently is? (yes/no)
		Is the scientific method explained/mentioned (info on sampling, process, representative, reliability)? (yes/no)
<b>No polarization of debates</b>	Diversity (cultural, socio-economic, racial, ethnicity, etc.)	Does the article/piece include diverse sources?
<b>Diversity</b>		Does the team incorporate diverse backgrounds (gender, geographies, ethnicity, etc.)?
	collaboration and cooperation (vs competition)	
	Include stakeholders	
	Incorporate a diachronic view	Number of countries geographical diversity
		Gender diversity
		Number of different formats
		Number of different platforms
		Number of visual resources used
<b>Critical</b>	Reflect all parties involved (make interest explicit)	Reflects any hidden interests?
		Does it include several voices or points of view?
		Declaration of conflict of interest
	Evaluate the outcome and consequences of communication	KPI RRSS- Number of likes, number of interactions



	Be clear about the didactic objective	Include and value basic research, including local research
<b>Diversity format</b>	Tailored to the specific audience	Tailoring message to the specific audience
<b>Appealing format</b>		Number of press releases
		Number of journalists contacting you
	Cognitive diversity	
	Accessibility	
	Attractiveness	How many call you with requests
		That you reach a new medium that has not been reached before
		The number of times you reach media, number of unique media you have reached
	Creative	
	Display the information	Clipping
	Reference the data source	Alignment of objectives and measurement
	Well written (4)	
	Visually attractive images (3)	
	Diversity, including gender equality (2)	
<b>Impact (driver of change)</b>	Think about interests and priorities for telling the message	Long-term driver of change: attracting talent that when applying for an offer they know you through social networks
<b>Engagement</b>		Conversion funnel: track how hard or how much effort the (in workelink they do apply it)
	Visual and cultural references	
	Data visualization tools are recommended	
	Try to build a community around your work	On social media: number of followers, likes, shares, comments, etc.
		Community responsiveness
		Follow these numbers over time (not just one specific moment)
		Subscribers (free + paywall)
		Fidelity level
	Collect inputs from your audience	Number of readers (copies sold)
		Permanence (e.g. for how long do users watch a video?)
		Questionnaires
	Develop call to actions	
	Listen to your readers, do not try to persuade them	Qualitative interviews to selected readers



	Relatable (5)	Was there a vocabulary check? Did the people understand the piece?
		Evaluation: visitor numbers
		Number of likes, shares and clicks
	Engage community around doubts and fears (4)	What is the number of comments related to the SciComm piece (as a sign of controversy and interest)?
		"Draw a scientist" as an evaluation technique
		Quality of the comments
	Think about longevity of articles online (3)	Follow-up with the group: what do users remember?
		Does the SciComm piece provide a link with researchers for follow-up?
	Solutions-oriented (empowerment and agency) (3)	Did the SciComm piece provoke changes in attitude and actions taken by users? (measure changes in attitude and actions people took)
	"Podium" for all stakeholders (3)	
<b>Audience segmentation</b>	Definition of the target audience and adaptation of the message	Does the article/piece or media assess their performance through direct interaction with the audience (e.g., survey, focal groups)? For instance, to ensure accessibility of the content
<b>Channels</b>	Change the language for each age and audience	
<b>Target</b>	Use the codes of each segment	RRSS algorithms
	Surveys, focus groups and interviews to understand the target audience	
	Stickers on Instagram	
	Surveys on YouTube, twitter likes and RT	Viewing time
		Action trigger of a communication element 'engagement', e.g.: likes, RT, level of interaction
		The minute they abandon a video
		Average video time (the time until you have half of your entire audience)
		Number of views
		Number of videos (equivalent for other communication products)
	Don't always simplify, define the target audience (user centered design)	
	Explain it as you have understood it	
	Reading time	Number of visits to the article
		Viewing time



	Tailored to the target audience	Interest by topic
		Visits typology news
	Two-way interaction	Number of comments
		interactions
	Ease of sharing	Include toots to easy share the content
	Define who you are talking to	
	Analyze your targets	Target(s): demographics, profiles, etc.
		"Polarization" of readers?
<b>Narrative</b>	Audience identification	
<b>Storytelling</b>	Helps to maintain interest	
	Keeping proportions (one testimony is not representative of all)	
	Tell representative stories	
	Use (wisely) emotions to connect with your audience	
	Use infographics	Pertinence of images used
<b>Relevance/News-worthiness</b>	To adequate the topic to the format and to the media	Is the article/piece of interest for the public? (public interest)
<b>Concreteness</b>		Does the article/piece include (statistical) data?
		Does the article/piece cover a topic of national and/or international interest? Is it subject to debate/scrutiny?
		Has the article/piece promoted social or political changes (nationally or internationally)? (e.g., legislation or new lines of funding)
		Has the article/piece promoted social or political debate?
		Metrics (for evaluation), e.g., indicators of engagement
	Relation to day-to-day (stories)	
	Ask yourself: "Is it really relevant what I am adding to the communication arena?"	
	Always think about the newsworthiness	
	Make a communication that is concrete, close to the everyday life and to the practical world of the listener	
	Look for cognitive proximity with your audience (e.g. talking about the climate crisis using as example polar bears might feel distant; it would be better to use closer examples)	



#### 4.2.6 Drafting a working list of SPIs

The above list resulting from the effort of integrating the SPIs resulted during the four Ews was still far too long and detailed.

An important condensation step was undertaken during an ENJOI internal consensus workshop held online on June 21st 2022, to align the results from the EWs and achieve a more practical and effective list of principles, standards and indicators. The partners worked in a dynamic designed by Science for change using the Miro tool, as can be appreciated navigating [this Miro canvas](#).

The discussion yielded a much more compact set of basic principles, with their relative standards and a redundant number of indicators that can be used to evaluate the adherence to one or another principle. In other words, there is no strict linear correspondence between one principle and its relative standard with a single indicators, since the consortium felt that more indicators might be used to measure different dimensions of the principles and standards applied in the communication work.

Anyway, the consortium feel that a further round of internal discussions and of refinement is needed to further distill the final list of SPIs to propose to the stakeholders and participants that have been involved up to this point. A further contribution is also expected to be coming from the evaluation research undertaken within WP5, whose results will be condensed in a deliverable to be produced in the coming months.

Therefore, the present list of SPIs is to be considered still as a working list, due to be integrated and further improved in the coming months.



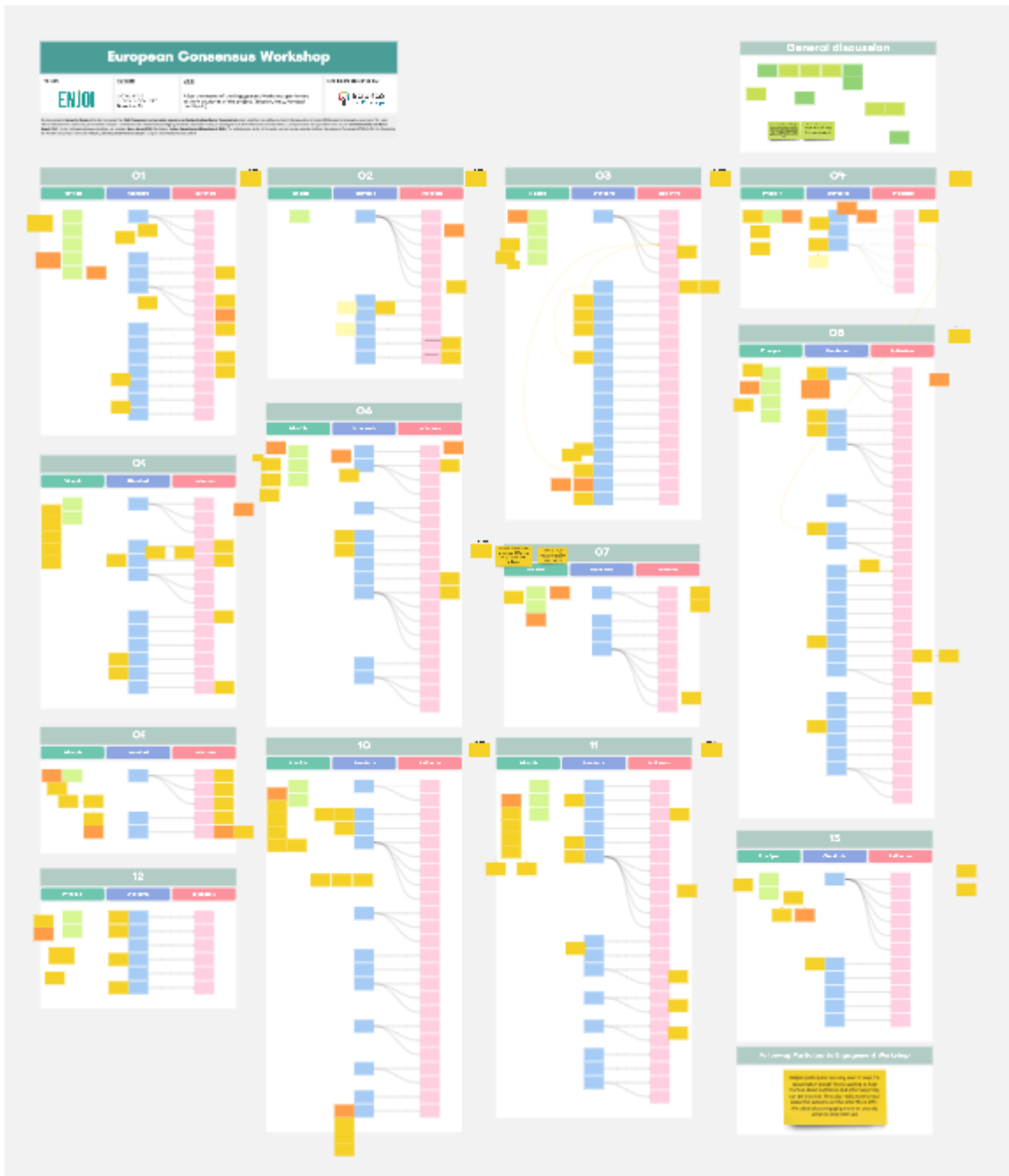


Image 1. This image describes the dynamic of the process used by the ENJOI consortium during the consensus workshop to distill the SPIs. Technology: Miro.



ENJOI - ENgagement and JOurnalism Innovation for Outstanding Open Science Communication

This project received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement n°101006407

[www.enjoiscomm.eu](http://www.enjoiscomm.eu)

## 4.2.7 Current working list of SPIs

Finally, the image below shows the current state of the art of the working list of SPIs resulted by the European Consensus Workshop held within the consortium.

EUROPEAN CONSENSUS WORKSHOP

**Project:** ENJOI

**Session:** 21/06/2022  
11.00-12.00h CET  
**Duration:** 1h

**Goal:** Align the results of the Engagement Workshops performed in the 4 countries of the project (Belgium, Italy, Portugal and Spain).

**Miro board designed by:** Science for Change

Event organized by Science for Change within the framework of the ENJOI (Engagement and Journalism Innovation for Outstanding Open Science Communication) project, which has received funding from the European Union's Horizon 2020 research and innovation programme. This event reflects the view of the authors only and neither the European Commission nor the Research Executive Agency can be held responsible for any use that may be made of the information contained therein. Conceptualisation and organization of the session: **Katerina Matzevich and Blanca Gascón (PNS)**. Design of the participatory methodology and materials: **Blanca Gascón (PNS)**. Facilitation: **Katerina Matzevich and Blanca Gascón (PNS)**. The methodological design of this session has been carried out under the "Three Questions" grant for contracts PTC2021-012154, financed by the Ministerio de Ciencia e Innovación (MCINN) (PI3/2019/021002/001) and by the European Union NextGenerationEU/PRTR.

### 1. ETHICS

Principle	Standards	Indicators
Ethics is fundamental. We must be transparent, honest, and assign responsibilities, writing to maintain our own independence and that of our readers.	We must be critical and skeptical regarding sources and information.  We must explain the methodology used in our work process.	Sources should be clearly stated in the piece of communication.  We must explicitly state our relationship with sources or conflicts of interest.

### 2. RELEVANCE

Principle	Standards	Indicators
The content of the information must be relevant to the audience.	The content should fit the context and needs of the moment with a diachronic perspective.	The subject matter is of international interest, useful for subject to discussion or society.  The communication piece explains why the topic is important to the audience.  Basic research, including local research, is highlighted.

### 3. SOURCES

Principle	Standards	Indicators
The sources we rely on must be rigorous and diverse.	Sources must be verified.  The selected sources must be diverse.  Among the sources we will include the stakeholders related to the information to be presented.	Sources must explicitly declare their conflicts of interest.  We must not allow the polarization of the debate.  The scientific literature on which the information is based must be up to date.
	We will avoid false balance.  The information of the sources must occur with the aim of being collaborative and cooperative, not competitive.  If possible, we should choose sources available to the public.  The bibliographic sources must be reliable and of quality, based on systematic reviews and original scientific articles.	The sources have been reviewed or fact-checked or are recognized by other members of the profession.  80% of the bibliographic sources must not be more than 5 years old.  The sources are diverse in culture, socio-economic, ethnic, geographic, gender, etc. terms.  The bibliographic sources come from high-impact journals.  The sources must have experience and publications on the subject to be treated.  The bibliographic sources have gone through a peer-review process or are an explicit invitation or an invitation to a working group.  It must be indicated if the information is based on a pre-print.
		At least, two sources must be included: a primary source and a secondary source, the latter being a specialized and independent source.  Several multidisciplinary sources will be included, experts in different fields related to the topic to be discussed, who will contribute with different voices and perspectives.

### 4. RIGOUR

Principle	Standards	Indicators
We must communicate with scientific rigour.	Scientific information must be presented as a process of adaptation to change, not as an immutable truth.  The team must be multidisciplinary.  The information must be presented in an impartial and objective way.	The piece of information is based on facts and data.  The piece cites a source for each fact mentioned.  Adjectives and other forms of evaluative language are used only when necessary.
	We must report accurately, trying to be exhaustive.  The information on multiple sources from interviews is not being given as a single and independent statement about a specific view on the subject to be dealt with.	The reviewer has a reasonably diverse cultural, geographical, and/or gender background.  The number of reviews is a good indicator of the process.  Regular meetings are held to monitor and evaluate the information presented.

### 5. AUDIENCE

Principle	Standards	Indicators
We must communicate with our target audience in mind.	The audience must be previously defined or segmented in order to adapt the message.  We must use narrative to convey the message to the target audience.  We must use different formats, platforms and multidisciplinary resources, adapted to the audience to be shared.  The audience must be able to share the content easily.	The piece is written in a way that is accessible to the target audience.  Engaging images, data visualizations and infographics are used.  The algorithm of the different social networks has been taken into account.  The communication piece conveys emotions.  The communication piece maintains the interest of the audience.  The communication piece includes tools that allow the content to be easily shared.
	We must use different, relevant, and multidisciplinary resources, adapted to the audience to be shared.	The reviewer uses the audience to help them select or adapt the content to the target audience.  Engaging images, data visualizations and infographics are used.  Visual and cultural references with which the target audience identifies are used.  The reviewer or language of the channels is taken into account in which the information is transmitted is used.

### 6. ACCESSIBILITY

Principle	Standards	Indicators
We must ensure that our communications are accessible to as wide a range of audiences as possible.	We must use clear, simple and accessible language to communicate data to the target audience.  We must avoid oversimplification.  Communication must be inclusive.  We must include links to access more information.	The communicative piece makes explicit the questions to which it responds.  Technical concepts are explained.  Analogies are used.  There are not a large number of errors, including orthographic or syntactic, grammatical errors, which hint at poor or simplistic thinking.
	It is accessible via the Internet, not just on paper.  There is no use of stereotypes.  It takes into account the gender perspective.	It adapts to different cognitive abilities.  It incorporates sign language.  The audience understands the communication piece correctly and is able to explain it to others.

### 7. IMPACT

Principle	Standards	Indicators
Our communication must generate an impact on the public as a result of their emotional, which must be measured through engagement, the results of which must be included over time.	A real and explicit concern only has been established to ensure that the communication work with which a two-way dialogue is established.  The action or communication piece must be maintained over time.  The communicative action must become a loudspeaker for other stakeholders.  Communicative action should generate action-oriented problem solving.	The target audience includes all relevant stakeholders, including those who are most vulnerable or at risk of being excluded.  Community members speak from the first instance to the last instance of the communication work with which a two-way dialogue is established.  The communicative piece has an online version that is accessible indefinitely.  The public remembers the message over time.
	The communicative piece includes the contact of the sources for monitoring.  The communicative action has brought visible changes in the attitude or behaviour of the target audience.  Social and political debate on the issue has been promoted.  The communicative action has generated visible prior/relevant changes in the target audience's thinking.	The communicative piece includes the contact of the sources for monitoring.  The communicative action has brought visible changes in the attitude or behaviour of the target audience.  Social and political debate on the issue has been promoted.  The communicative action has generated visible prior/relevant changes in the target audience's thinking.

Image 2. The integrated list of the SPIs. Technology: Miro.



The main Principles resulted as common definitions from the four EWs are described in the following table. Besides each principle, there is a relative set of Standards and a number of potential indicators to be used to evaluate their application.

Principles	Standards	Indicators
<p><b>INTEGRITY:</b> Journalists and communicators must be <b>transparent, honest, and upright</b>, seeking to maintain their own <b>independence</b> and that of their sources.</p>	<ul style="list-style-type: none"> <li>Communicators should be <b>critical and skeptical</b> regarding sources and information.</li> <li>They must explain the <b>methodology</b> used in our work process.</li> </ul>	<ul style="list-style-type: none"> <li><b>Sources</b> should be clearly stated in the product of communication.</li> <li>Journalists/communicators must explicitly state their <b>relationship with sources or conflicts of interest</b>.</li> </ul>
<p><b>RELEVANCE:</b> The content of the information must be <b>relevant</b> to the audience.</p>	<ul style="list-style-type: none"> <li>The content should fit the <b>context and needs</b> of the moment with a <b>diachronic perspective</b>.</li> </ul>	<ul style="list-style-type: none"> <li>The subject matter is of <b>international interest</b> and/or subject to <b>discussion</b> or scrutiny.</li> <li>The communication piece explains <b>why the topic is important</b> to the audience.</li> <li>The communicative piece explains why the content constitutes a <b>novelty</b>.</li> <li>Basic research, including <b>local</b> research, is highlighted.</li> </ul>
<p><b>SOURCES:</b> The <b>sources</b> journalism/communication rely on must be rigorous and diverse</p>	<ul style="list-style-type: none"> <li>Sources must be <b>verified</b>.</li> <li>The selected sources must be <b>diverse</b>.</li> <li>Among the sources communicators will include the <b>stakeholders</b> related to the information to be presented.</li> <li>Sources must explicitly declare their <b>conflicts of interest</b>.</li> <li>Journalists must <b>not allow the polarization</b> of the debate.</li> <li>Journalists should always <b>avoid false balance</b>.</li> </ul>	<ul style="list-style-type: none"> <li>The sources must be <b>official</b>.</li> <li>They must be part of <b>recognized</b> institutions or organizations.</li> <li>They must have <b>experience and publications</b> on the subject to be treated.</li> <li>The sources are <b>diverse</b> in cultural, socio-economic, ethnic, geographic, gender, etc. terms.</li> <li>At least, <b>two sources</b> must be included: a <b>primary source</b> and a <b>secondary source</b>, the latter being a specialized and independent source.</li> <li>Several <b>multidisciplinary sources</b> will be included, experts in different fields related to the topic to be discussed, who will contribute with different voices and perspectives.</li> </ul>





	<ul style="list-style-type: none"> <li>• The intervention of the sources must occur with the aim of being <b>collaborative and cooperative</b>, not competitive.</li> <li>• If possible, journalists should choose <b>sources available</b> and accessible to the public.</li> <li>• The bibliographic sources must be <b>reliable</b> and of <b>quality</b>, based on systematic reviews and original scientific articles.</li> <li>• The scientific literature on which the information is based must be <b>up to date</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• The sources have been interviewed or have appeared in the media <b>several times</b> discussing their subject matter of expertise.</li> <li>• The bibliographic sources come from <b>high-impact journals</b>.</li> <li>• The bibliographic sources have gone through a <b>Peer Review process</b> (except if it is an ongoing investigation, an innovation or an emergency).</li> <li>• It must be indicated if the information is based on a <b>pre-print</b>.</li> <li>• 80% of the bibliographic sources must not be more than 5 years old.</li> </ul>
<p><b>RIGOUR:</b> Journalists must communicate with <b>scientific rigour</b>.</p>	<ul style="list-style-type: none"> <li>• Scientific information must be presented as a <b>process</b> of adaptation to change, not as immutable truths.</li> <li>• The team must be <b>multidisciplinary</b>.</li> <li>• The information must be presented in an <b>impartial and objective</b> way.</li> <li>• Journalists must report <b>accurately</b>, trying to be exhaustive.</li> <li>• The information must be reviewed (<b>Peer Review</b>) in a <b>Fact-Checking</b> process by an expert and independent</li> </ul>	<ul style="list-style-type: none"> <li>• The piece of information is based on <b>facts and data</b>.</li> <li>• The piece <b>cites</b> a source for each fact mentioned.</li> <li>• <b>Adjectives</b> and other forms of evaluative language are used only when necessary.</li> <li>• The reviewer has a relationship of <b>proximity</b> (cultural, geographical, etc.) with the subject to be dealt with.</li> <li>• The <b>number of reviews</b> is a good indicator of the process.</li> <li>• Regular meetings are held to <b>monitor</b> and evaluate the information presented.</li> </ul>



	<p>collaborator who is a specialist in the subject to be dealt with.</p>	
<p><b>ACCESSIBILITY:</b> Communicators must ensure that their work is <b>accessible</b> and <b>inclusive</b> for as wide a range of audiences as possible.</p>	<ul style="list-style-type: none"> <li>Journalists must use <b>clear, simple and accessible</b> language to communicate data to the target audience.</li> <li>Journalists must avoid <b>oversimplification</b>.</li> <li>Communication must be <b>inclusive</b>.</li> <li>Communicators must include links to access <b>more information</b>.</li> </ul>	<ul style="list-style-type: none"> <li>The communicative piece makes explicit the <b>questions</b> to which it responds.</li> <li><b>Technical concepts</b> are explained.</li> <li><b>Analogies</b> are used.</li> <li>The audience <b>understands</b> the communication piece correctly and is able to explain it to others.</li> <li>Attention should be put to avoid <b>errors</b>, including <b>ortho typographical</b> or <b>syntax-grammatical</b> errors, which hint at poor or <b>simplistic</b> thinking.</li> <li>It is accessible via the <b>Internet</b>, not just on paper.</li> <li>There is no use of <b>stereotypes</b>.</li> <li>It takes into account the <b>gender perspective</b>.</li> <li>It adapts to different <b>cognitive abilities</b>.</li> <li>It incorporates <b>sign language</b>.</li> </ul>
<p><b>AUDIENCE:</b> Journalists must communicate with their target audience in mind.</p>	<ul style="list-style-type: none"> <li>The audience must be <b>previously defined or segmented</b> in order to <b>adapt</b> the message.</li> <li>Journalists must use <b>narrative</b> to convey the message to the target audience.</li> <li>Communicators must use <b>different formats, platforms and multimedia resources</b> adapted to the audience to appeal to them.</li> <li>The audience must be able to <b>share</b> the content easily.</li> </ul>	<ul style="list-style-type: none"> <li>Audience segmentation has been carried out taking into account the <b>evaluation of previous</b> results through direct interaction, such as surveys, interviews or pilot groups through the most appropriate channels.</li> <li>The <b>profile</b> of the audience has been taken into account: their interests, priorities, the type of content they consume, their demographics, their polarisation, etc.</li> <li>The <b>algorithm</b> of the different social networks has been taken into account.</li> <li>The communicative piece conveys <b>emotions</b>.</li> <li>The communicative piece maintains the <b>interest</b> of the audience.</li> </ul>



		<ul style="list-style-type: none"> <li>• The content relates to the audience's daily life and their world on a practical level through <b>representative stories</b> and examples of <b>cognitive proximity</b>.</li> <li>• Engaging <b>images, data visualizations and infographics</b> are used.</li> <li>• Visual and cultural <b>references</b> with which the target audience identifies are used.</li> <li>• The <b>resources or language of the channels</b> in which the information is transmitted are used.</li> <li>• The communication piece includes <b>tools</b> that allow the content to be easily shared.</li> </ul>
<p><b>IMPACT:</b> Communications must generate an <b>impact</b> on the public as a result of the communication, the results of which must be evaluated <b>over time</b>.</p>	<ul style="list-style-type: none"> <li>• The action or communication piece must be <b>maintained over time</b>.</li> <li>• The communicative action must become a <b>loudspeaker for other stakeholders</b>.</li> <li>• Communicative action should generate <b>action-oriented problem solving</b>.</li> </ul>	<ul style="list-style-type: none"> <li>• The target <b>metrics or KPIs</b> have been achieved on the platforms, social networks or media used in the communication: number of followers, reach, interactions, Likes, shares, number and quality of comments, number of visits, unique views, viewing or reading time, conversions through a Funnel, responses to the sending of the press release and the number of impacts in the media or other platforms not achieved so far collected in Clipping, etc.</li> <li>• The communicative piece has an <b>online</b> version that is accessible indefinitely.</li> <li>• The public <b>remembers</b> the message over time.</li> <li>• The communicative action has brought about <b>changes in the attitude or behavior</b> of the target audience.</li> <li>• <b>Social and political debate</b> on the issue has been promoted.</li> <li>• The communicative action has promoted national and/or</li> </ul>



		<b>international changes</b> in areas such as <b>legislation or funding</b> .
<p><b>ENGAGEMENT:</b> Journalists should try to <b>engage</b> their audience not only at the final step of their work but rather collecting opinions and <b>feedback</b> and when possible evaluating the impact on the public of our work.</p>	<ul style="list-style-type: none"> <li>• A loyal and <b>engaged community</b> has been established around the communication work with which a <b>two-way dialogue</b> is established.</li> </ul>	<ul style="list-style-type: none"> <li>• Community members switch from the free version to the <b>paid version</b> of the communicative services or products.</li> <li>• The target audience <b>responds to the Call to Action</b>; for example, they respond when you require feedback from them through questionnaires or interviews addressed to specific people.</li> <li>• The communicative piece includes the <b>contacts</b> of the sources for <b>monitoring</b>.</li> </ul>



## 4.2.8 How the EWs have transformed Criteria into SPIs

In the Inception report described in D2.1, we drafted a set of criteria for outstanding open science communication, based on a review of academic and grey literature and on experts' consultation. Those criteria were the input of the EWs, in which a broad set of stakeholders in different countries discussed, analysed, modified, and complemented the criteria, while they also broke them down into the three categories of principles, standards, and indicators (SPIs). A consensus meeting processed the output of the EWs in order to align the results and condense them in the current working list of SPIs.

The process described above resulted in a major reworking of the initial criteria, aggregating some of them, disaggregating others, and re-wording and enriching their description. With respect to the succinct list of abstract criteria presented in the inception report, the working list is a much broader matrix, separated in the S, P, and I categories. This is an operative tool, that can be used to guide and evaluate actual actions of science communication, and training in science communication.

More importantly, the process allowed us to move from criteria based on past literature and experts' opinions, to SPIs that are validated by the real-world, live experience of a broad set of stakeholders. This citizen validation is an important added value of the EWs process and is the source of many of the innovative aspects contained in the SPIs.

## 4.2.9 Reasserted ideas and innovative trends

By definition, a list of SPIs must contain certain basic criteria that are widely known and shared by the communication community. These ideas were reasserted by the stakeholders, not only because they are deeply rooted, but also because they are still not completely fulfilled in the science communication arena, especially in certain countries.

Science communication is affected by a relation with science that has been defined as "too close for comfort"<sup>1</sup>. It is often conceived as a byproduct of science, aimed at promoting its results, rather than as an independent, critical activity. As a result, some practices that are considered as indispensable in other areas of communication are still lacking in many science communication acts.

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<sup>1</sup> Rensberger, B. Science journalism: Too close for comfort. *Nature* 459, 1055–1056 (2009).  
<https://doi.org/10.1038/4591055a>



For example, it is not uncommon to read science journalism stories with a single, partial source; or with different sources belonging to the same stakeholder group (for example, stories based only on contributions of scholars from a single discipline, without inputs from researchers of other branches or other stakeholders like patients, affected communities, companies, workers, etc.). These shortages are felt more intensely in Southern European countries, according to what we have seen in the EWs and collected by interviews with experts, possibly due to the fragility of their media system.

However, the process of the EWs went well beyond reasserting well-established ideas. A careful reading of the SPIs shows that stakeholders have raised a set of new points that relate to **innovative trends** and **emerging challenges in science communication**. It is especially significant that some of these points are perfectly aligned with the topics of the Focus reports we have been developing in parallel (D7.1, D7.2, D7.3, D7.4). This alignment reinforces the importance of deepening the knowledge of those topics. Innovative aspects include:

- **Deep engagement:** (see “Engagement” principle). Engagement is not seen as a step in the communicative process, or a tool to increase its impact, but as a key-ingredient from the inception of the process. This challenges habits of science communication, questioning who should set the agenda of communication (whether scientists and communicators, or the audiences) and how actions should be designed (one-way or two-ways). This topic is strongly aligned with the Digital Engagement Focus Report (D7.1), that provides additional strategies and examples of engagement.
- **Open science:** (see “Sources” and “Accessibility” principles). The current SPIs reflect the impact of the open science movement on science communication. This is reflected not only in a special attention to open access sources, but also in a broader commitment towards making science communication open itself. This topic is strongly connected with the Analysis report on the use of data and open science results (D7.2), whose case studies may inspire a more open science communication.
- **New technologies:** (see “Audience” principle). Algorithms, social networks, virality, digital metrics, KPIs and other concepts related to communication technologies have appeared as a clear concern for science communication during the EWs. This is reflected in an effort to systematise SPIs related to these issues in the current list, with a special focus on the impact of social networks in science communication. This resonates with the Focus Report On Innovative Digital Formats (D7.3), which provides guidance and examples in this rapidly emerging field.



- **Solutions:** (see “Impact” principle) EWs have shown a drive in the science communication community towards a stronger commitment with problem-solving, possibly influenced by the urgency of the pandemic and climate crises. Communication is seen less as a passive portrayal of facts and more as a trigger of action. Tackling the “so what?” question - that is, exploring the range of actions society and individuals can take to solve a problem - is increasingly seen as an essential tool of science communication actions. This issue is clearly connected with the topic of the Focus Report On Solution Journalism (D7.4) which showcases a set of successful examples.
- **Inclusion across the board:** (see “Sources” and “Accessibility” principles). Inclusion has emerged as an indispensable feature of open outstanding science communication. This perspective cuts through all aspects of communication, from content to form. For example, diversity is considered essential in all its dimensions (gender, culture, ethnicity, socio-economic background, cognitive abilities, etc.) from the choice of sources, to the way contents are cast and distributed to a diverse audience. This aspect has an enormous potential of reshaping science communication in the future, given the high homogeneity that has dominated it in the past.
- **Polarisation:** (see “Audience” principle) EWs and the resulting SPIs reflected a strong concern about the rampant polarisation experienced in many countries. How can science communication take it into account, without incurring neither in partisanship nor in false balance? How much should messages be shaped to avoid the trap of polarisation? The current SPIs try to provide some guidance to navigate this complex issue.

In summary, the EWs process has enriched criterias coming from literature and experts with a whole range of topics coming from the live experience of stakeholders. The resulting SPIs contain a guidance to approach these emerging issues, that we believe have a great value for future science communication and science communication training.

