CHALLENGES AND INNOVATIVE CHANGES IN RESEARCH ETHICS REVIEWS

D2.3: Report on the current ethics review recommendations

Grant Agreement ID	101131683	Acronym	CHANGER
Project Title	Challenges and Innovative Changes in Research Ethics Reviews		
Start Date	01/01/2024	**Duration**	36 Months
Project URL	https://changer-project.eu/		
Contractual due date	30/06/25	**Actual submission date**	27/06/25
Nature	R = Document, report	**Dissemination Level**	PU = Public
Author(s)	Ana Marušić, MEFST Antonija Mijatović, MEFST Lana Barać, MEFST		
Contributor(s)	Alexandra Zorila, UB Constantin Vica, UB Andrada Istrate, UB Alfonso Alfonsi, K&I srls Maresa Berliri, K&I srls Luciano D'Andrea, K&I srls Hella von Unger, LMU Nevien Kerk, LMU Thomas Raucheger, LMU Ioannis Manos, UM Georgia Rina, UM		
Internal Reviewer(s)	Marjo Rauhala, TUW Vasiliki Mollaki, NCSRD		

This project has received funding from the European Commission Horizon WIDERA, under grant agreement No 101131683. Views and opinions expressed are those of the CHANGER consortium only and do not necessarily reflect those of the EU or the European Commission. Neither the EU nor the granting authority can be held responsible for them.

Document Revision History *(including peer reviewing & quality control)*

Version	Date	Changes	Contributor(s)
V1.1	01/06/2025	First Draft	Ana Marušić, MEFST Antonija Mijatović, MEFST Lana Barać, MEFST
V1.2	24/06/2025	Full citations provided instead of shorter versions. Ethics tools analysis moved later in text and explained this was an additional analysis developed during the workshops held in Vienna. All comments from the internal reviewers addressed. Pending Review by EC.	Ana Marušić, MEFST Antonija Mijatović, MEFST Lana Barać, MEFST Marjo Rauhala, TUW Vasiliki Mollaki, NCSRD

Executive Summary

Ethics review systems across Europe face growing pressures from the rapid evolution of research methods, digital technologies, and data-driven science. This deliverable (D2.3) presents an analysis of the current challenges Research Ethics Committees (RECs) and other governance bodies face, and proposes recommendations to improve ethics review practice.

Using a mixed-methods approach, this task combined a scoping review of literature and ethics tools and qualitative insights from 19 interviews and 13 focus groups. The participants included REC members, researchers, policy experts, and science support staff across multiple disciplines.

The analysis showed that traditional ethics review processes struggle to keep pace with emerging fields such as artificial intelligence, genomics, and biotechnologies. RECs often operate with limited resources, rely on volunteer members, and lack access to methodological and technical expertise. Regulatory fragmentation and parallel oversight structures also pose a challenge.

Based on these findings, we identify recommendations to strengthen ethics governance. These include:

- Promoting interdisciplinary collaboration within ethics committees
- Modernizing consent mechanisms
- Increasing public and stakeholder engagement
- Reinforcing ethics infrastructure through training, resourcing, and harmonized standards
- Supporting iterated and ongoing ethics review
- Developing structured decision-support tools
- Enhancing researcher responsibility and ethical literacy
- Fostering a shift in culture to treat ethics as integral and strategic

This deliverable is closely linked to Deliverable 2.2. While D2.2 presents findings from interviews and focus groups, D2.3 builds on those findings to provide practical recommendations. The two deliverables should be read together. This work contributes to the broader CHANGER mission of enabling responsible and inclusive governance for research and innovation in Europe.

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List of Terms & Abbreviations

Abbreviation	Definition
REC	Research Ethics Committee
AI	Artificial Intelligence
WP	Work Package
FG	Focus Group
GDPR	General Data Protection Regulation
H2020	Horizon 2020 (EU Research and Innovation Program)
D2.1 / D2.2	CHANGER Deliverables 2.1 / 2.2 (previous reports)
SyRF	Systematic Review Facility
T	Task
P	Participant

1 Introduction

CHANGER aims to foster changes in research ethics reviews, that strengthen the capacities of researchers to incorporate ethical judgements in the project design and support ethics committees to address new challenges emerging from new technologies and new research practices.

D2.3 reports on the findings by the scoping review, as well as from the cross-country stakeholder interview study and focus group study to formulate recommendations on the way forward to ethics reviews, in order to overcome challenges in evolving research environment. D2.3 builds on the results of D2.2, which collected views and experiences from people involved in ethics reviews. The two deliverables are complementary: D2.2 identifies key challenges, and D2.3 provides ways to address them.

2 Purpose and Scope

This deliverable (D2.3) presents recommendations on the way forward to ethics reviews, in order to overcome challenges regarding emerging technologies, new players, and new forms of collaboration and partnerships. Based on the findings from the scoping review (D2.1), cross-country stakeholder interview study and focus group study (D2.2), it identifies key areas within ethics review systems and offers recommendations framed around the identified barriers and facilitators.

3 Recommendations from the focus groups

3.1 Methodological approach

As detailed in deliverable D2.2 and T2.3 Report, we used a qualitative research design based on 13 focus groups with 57 participants from diverse disciplines and countries across Europe. The participants were recruited through purposive sampling to ensure representation from all major research domains. Focus groups explored experiences with ethics review processes, focusing on emerging challenges, barriers, and facilitators. The sessions were held online or in person, using structured guides and translated when needed. The discussions were audio-recorded, transcribed, pseudonymized, and analysed using thematic analysis (Braun and Clarke, 2006). Four partners conducted the focus groups: University of Split, School of Medicine (MEFST), Ludwig-Maximilians University of Munich (LMU), University of Bucharest (UB), and Knowledge and Innovation Srls (K&I). Each focus group was referenced using a standardized code in the results and discussion sections. These codes indicate the partner institution and the number of the focus group conducted at that site. For example, “LMU-FG1” refers to the first focus group conducted by LMU, while “MEFST-FG6” indicates the sixth focus group conducted by MEFST.

3.2 Results

Focus group participants identified several persistent barriers to effective ethics review, including knowledge gaps and lack of expertise, institutional inertia, resource constraints, fragmented oversight, role confusion, and limited engagement or motivation (D2.2). To address these challenges, participants proposed a range of practical and systemic solutions aimed at improving ethics governance and review practices.

3.2.1 Capacity building and education

There was strong consensus on the need for proactive and continuous ethics education. Participants recommended starting ethics training early, at the undergraduate level, to prepare researchers for emerging challenges emphasizing that current ethics education is often perceived by students as marginal and uninspiring.

> *"I think we need to start talking about these things very early on. I mean education on ethics of emerging technologies should begin early, already at undergraduate level – proactive preparation. Because otherwise we'll keep repeating the cycle of being surprised by new things and not knowing how to handle them."* – MEFST-FG3

An example was a successful transition toward more interactive, case-based methods of teaching ethics.

> *"We stopped just teaching in the traditional sense, with lectures and students taking notes. I divide students into groups, assign them case studies, and have them discuss those cases. From these discussions, we derive the course objectives and explore the content, making the process much more engaging. It's also useful because it encourages critical thinking and dialogue."* – UB-FG2.

They also recommended that ethics and integrity training be embedded explicitly in master's and doctoral programs with a focus on research ethics.

> *"If I had the power, I would require master's and doctoral programs to include specific activities on ethics and integrity, particularly focusing on research ethics. There are some attempts in this direction, but they're inconsistent. Students learn about informed consent in theory, but they don't actually engage with the ethical component in a meaningful way. They treat it as a formality, something to check off the list, rather than understanding its purpose or implication."* – UB-FG2.

Additionally, some researchers from the social sciences and humanities called for training tailored to the needs of REC members and interdisciplinary contexts.

> *"Many RECs rely on part-time or volunteer members, leading to inconsistent reviews and limited professionalization. Tailored training for data ethics, informed consent, and research with vulnerable groups is still lacking. Limited institutional support and high workloads hinder the long-term sustainability of RECs. Short-term contracts for support staff further disrupt institutional knowledge and professionalization efforts."* – LMU-FG1.

Ethics helpdesks and advisory services were also seen as vital supports for researchers navigating ethical issues in real time.

> *"There are some needs of researchers that cannot be met by RECs. Very often, researchers need an ethics helpdesk where they can go on demand to talk to ethics experts about problems that may arise during the research process. Often, they are afraid to use the REC for fear that the response time will be too long or that the continuation of the project itself will be jeopardised. The provision of ethics advice on demand is essential, as many developments in the research process cannot be anticipated in the ethical approval process before the project starts."* – K&I-FG2.

3.2.2 Structural and system-level improvements

The participants emphasized the importance of institutional support through dedicated ethics offices to alleviate administrative burdens and ensure consistency.

> *"Strengthening connections within the social sciences and anthropology can also help develop discipline-specific standards and consolidate best practices. Institutions should invest in dedicated ethics support offices to reduce administrative burdens on RECs and researchers. Embedding ethics training in academic curricula would further cultivate a culture of ethical reflexivity, ensuring that early-career researchers engage with ethical considerations from the beginning of their academic careers."* – LMU-FG1.

Long-term staffing and funding for ethics advisors were also considered crucial.

> *"Efforts should be made to counteract the perception of RECs as regulatory enforcers by emphasizing their role as advisory and collaborative bodies. To ensure the long-term effectiveness of RECs, institutions should secure stable, long-term positions for ethics advisors and administrative staff. Supporting volunteer committee members with targeted training and resources can help reduce reliance on improvisation and enhance the overall quality and consistency of ethics reviews."* – LMU-FG1.

Standardized tools, such as templates, checklists, and decision trees, should be developed to guide ethical analysis, especially for complex technologies.

> *"One idea I had was the development of a decision tree for an issue such as AI to guide researchers—something practical they can use. But it should be designed by an interdisciplinary team, not just ethicists or IT experts alone. That way it reflects the complexity of the issue and is actually usable."* – MEFST-FG3.

The participants also advocated for precedence-based systems to support consistent decision-making.

> *"What could also help researchers is to build up a list—what is AI, for example, and what applications are more or less ethically questionable. Because not all AI is the same. Some uses are quite benign, others raise serious concerns. But right now, researchers are not always sure where their work falls."* – MEFST-FG3.

In addition, committee members highlighted the need for ethics infrastructure to reflect disciplinary differences. They stressed the necessity of trained faculty-level experts and interdisciplinary collaboration.

> *"At the committee level, there is also an ethics expert who conducts an initial formal review, identifying any missing elements and providing ethical guidance to faculty experts who may not have specialized training in ethics or philosophy. At the third level, the process moves to the president of the committee, who makes the final decision. [...] Additionally, we have colleagues with expertise in various domains, such as a theology researcher and a public administration specialist. Through interdisciplinary discussions, we gradually refine and develop our shared understanding of ethics."* – UB-FG2.

3.2.3 Processing reforms and monitoring

To ensure continuous ethical oversight, participants recommended iterated ethics reviews that extend beyond initial approval.

> *"A participant noted that participatory research is inherently more ethical than other forms of research. There was consensus that participatory projects require continuous ethical reflection, rather than a one-time review at the beginning. Institutional and administrative constraints often hinder the integration of participatory methods into ethical approval processes."* – LMU-FG3.

Monitoring during and after project implementation was also seen as essential.

> *"I think there needs to be more post-grant award monitoring of projects. There is so much emphasis on the application and ethics screening, but then very little follow-up. More emphasis should be on what happens when projects are awarded—how ethics requirements are actually implemented in practice."* – MEFST-FG4.

Improving internal communication between reviewers and committees was highlighted as a way to resolve conflicts more efficiently.

> *"Since we are a small institution, we can be very quick. We don't have to go through many layers of bureaucracy. That means questions are resolved faster and researchers get timely feedback, which they really appreciate. It helps build trust in the ethics process too."* – MEFST-FG5.

3.2.4 Stakeholder engagement and culture shift

The participants from the clinical settings called for greater inclusion of laypeople, patients, and diverse stakeholders in ethics reviews to broaden perspectives and ensure relevance to different cultural contexts.

> *"Involvement of laypeople can provide a fresh perspective on what ethics issues are actually perceived as relevant, not just what we as experts think is important. And cultural context can be relevant too—what is sensitive or problematic in one country might not be in another. So it's good to include diverse viewpoints."* – MEFST-FG2.

A cultural shift is also needed to position ethics as an integral part of research rather than a bureaucratic hurdle.

> *"Embedding ethics training in academic curricula would further cultivate a culture of ethical reflexivity, ensuring that early-career researchers engage with ethical considerations from the beginning of their academic careers. A broader cultural shift is needed to position ethics reviews as an integral part of the research process rather than as a bureaucratic hurdle. Efforts should be made to counteract the perception of RECs as regulatory enforcers by emphasizing their role as advisory and collaborative bodies."* – LMU-FG1.

Embracing co-creation and participatory design was viewed as inherently more ethical than the other forms of research.

> *"Some participants shared positive experiences with RECs that were open to dialogue and provided detailed feedback, while others reported challenges due to a lack of expertise in participatory methodologies among committee members. A participant noted that participatory research is inherently more ethical than other forms of research. Because the questions that arise in participatory projects – who involves whom, when, in what, to what*

degree, and with what goal – are actually questions that could be asked of any project." – LMU-FG3.

The role of ethics as a strategic function was also articulated. Participants emphasized that ethics should go beyond compliance and act as a guiding principle in shaping institutional strategies. For example, aligning with EU funding requirements, universities have adopted gender equity plans and integrated ethical considerations into strategic planning to access research funding and ensure long-term societal impact.

> *"Ethics plays a strategic role, particularly in shaping working tools and projections, especially in areas such as gender equity, data governance, and digital innovation. It's not just about compliance anymore—it becomes a foundational element that helps guide institutional development and research design."* – UB-FG1.

These insights underscore the need for comprehensive, inclusive, and flexible ethics governance frameworks that are responsive to both institutional realities and the evolving ethical demands of emerging technologies.

Table 1. Summary of focus group recommendations for strengthening ethics review

Goals	**Recommendation**
Capacity building and education	Proactive, continuous education on ethics
	Training tailored to REC members and interdisciplinary fields
	Interactive and case-based ethics training for students and staff
	Ethics helpdesks and advisory services
	Strengthen ethics literacy on digital and AI issues
Structural and system-level improvements	Dedicated ethics support structures and offices
	Stable and long-term institutional support for ethics
	Standardized but flexible tools (checklists, templates, decision trees)
	Precedent-based systems for ethical decision-making
Process reforms and monitoring	Iterated ethics reviews (partial, ongoing, post-project)
	Monitoring and post-grant review

	Improve internal reviewer communication and reduce silos
	Build mechanism for follow-up after initial ethics assessment
Stakeholder engagement and culture shift	Involving laypeople, patients, and diverse stakeholders in reviews
	Create a culture of ethics as integral, not bureaucratic
	Co-creation and participatory ethics design
	Promote ethical awareness beyond compliance culture in academia
	Support ethics integration across all disciplines (incl. social sciences, humanities)

4 Recommendations from the expert interviews

4.1 Methodological approach

As detailed in deliverable D2.2, we used a qualitative research design based on 21 semi-structured interviews with stakeholders involved in RECs across seven European countries. The aim was to explore decision-making in ethically complex cases, the role of ethics experts, and to identify best practices and potential risks.

Participants were recruited through purposive sampling by five project partners: NORSUS, University of Bucharest (UB), Knowledge and Innovation Srls (K&I), Ludwig-Maximilians University of Munich (LMU), Maastricht University (UM), and Vienna University of Technology (TUW). Most interviews followed a common interview guide developed by NORSUS, though one partner adopted a more open-ended format focused on ethics in social sciences and AI.

Interviews were conducted either online or in person, audio-recorded, transcribed, and pseudonymized. Some interviews conducted in local languages were translated into English using DeepL. Transcription tools such as Cuckatoo were used, with manual verification for accuracy. All data were pseudonymized, and identifying details were removed. The interview transcripts were analyzed thematically using the qualitative analysis software Dedoose, with a shared coding framework developed by the lead partner.

Participants (P) included 21 individuals (7 female, 14 male) with professional experience in or related to RECs. Their disciplinary backgrounds were primarily in the Social Sciences (15), with additional representation from the Humanities (2), Medicine and Health Sciences (2), and Engineering and Technology (2). Interview references in the results section follow a standardized code indicating the partner institution and interview number (e.g., “K&I-INT3” refers to the third interview conducted by K&I).

4.2 Results

The recommendations presented below summarize recurring insights from 21 expert interviews conducted across seven European countries. Participants identified both systemic and practical challenges in current ethics review processes and proposed concrete improvements. Key themes include the need to strengthen the advisory role of RECs, diversify committee composition, improve training, share practical tools, enhance collaboration between RECs, and better address emerging research challenges such as AI and participatory methods.

4.2.1 Strengthening the advisory role of RECs

Interviewees broadly advocated for a shift in RECs' functions -from issuing formal approvals to playing a more sustained, consultative role. Rather than serving only as regulatory checkpoints, RECs should be equipped to offer ongoing ethical guidance throughout the life cycle of research projects.

> *"Whereas what we in [REC] are attempting to promote is a continuous reflection on ethical issues throughout the lifetime of the research project, the ethical issues that come to the fore will change as the project develops, or the researchers will become aware of issues that they weren't aware of at the outset of the project."* – P#2
>
> *"[If] I were to approach a Research Ethics Committee with an ongoing project and I had some open questions or found myself navigating grey areas, my expectation, or maybe more of a hope, would be that the committee's approach would be: How can we help make this project more ethical? So rather than giving a kind of blanket judgment, like "this is ethical" or "this is unethical", I'd hope they would help identify problematic aspects and suggest ways to address them."* – P#12
>
> *"We have the structure of the Ethical Advisor. It's a somewhat strange structure. We advise the projects. And at the same time, we also have a supervisory role towards the EU or the project officers involved. And to make it clear to them that they are effectively undermining the very research they are funding when they impose certain mandatory steps, referred to as deliverables in the EU, that can bring the research to a complete standstill."* – P#6

4.2.2 Promoting multi-disciplinarity in REC composition

Many respondents emphasized that RECs should reflect the diversity of research disciplines they are tasked with reviewing. A multi-disciplinary composition ensures a more nuanced and context-sensitive assessment of ethical issues, particularly in complex or non-traditional research formats.

> *"Committees... should generally continue to be staffed by people from many different disciplines, specialisations. I think that's good; it helps bring pluralism of perspectives and sheds light on an issue from different viewpoints. I very much believe—not so much in automation, let's not go there—but in the systematisation of documents, policies, and procedures. That is, there should be a process that reviews all the documents and all the procedures used by an ethics committee every year, to update them once, and then those should serve as the guide, the framework, for all research evaluated in a given year."* – P#20
>
> *"A basic proposal is that, precisely because of the scientific competence expected from committee members, it would be good if they received some compensation. In Greece, this work is unpaid at public universities, among the many duties a professor has to balance. Perhaps there should be collaboration, a network among the various university ethics committees, and a report or record of what is happening in each committee, so that the*

committee members can exchange views. Of course, law has different needs, medicine has others, theology, informatics, and so on. However, the sharing of knowledge among ethics committee members should become a priority. P#18

4.2.3 Improving training and professionalization

A consistent concern was the limited training available for both REC members and researchers. Participants called for more structured ethics education, continuous professional development, and institutional support to enhance the quality and consistency of ethics reviews.

"All complained the lack of training for the work in the RECs." – Summary, Section 10

"However, designing and adopting such systems—especially in the absence of a broad consensus on what constitutes disinformation or the ethical meaning of certain actions—may provoke social resistance, particularly if perceived as an attempt to control expression or limit civil rights. On the ethics side, training programs and seminars could contribute to a better understanding among researchers of what constitutes ethical practice in the research process. We should move in that direction since we now have the technological means for direct dialogue within the global scientific community on such matters." – P#19

"It's each researcher's responsibility to self-educate, to some extent, in this area: to do their own research and understand basic principles like integrity, confidentiality, and autonomy. All of these are things they need to know, not only to shape their research but also to prepare their application, so the application is easily understandable by committee members, aligns with key principles, aligns with the rules, and so on. As for other specific tools or solutions… I don't know, nothing else comes to mind right now, yes" – P#20

4.2.4 Developing and sharing practical ethics tools

Respondents identified a clear need for concrete tools and frameworks to aid assessing research from the perspective of research ethics. Tools such as ethics matrices, Delphi methods, and scenario-building exercises were mentioned as valuable resources --though not yet widely adopted or implemented.

"Yes, the Delphi method, the ethics matrix, the consensuns conferences, and... ethical future scenarios? Yes, scenarios. All of these can be found in a book by the late Professor Valentin Mureșan, the founder of the Center for Applied Ethics Research. It's called Management of Ethics in Organizations, and it explains all these methods, developed for the Romanian context. … In fact, we were the ones who introduced that tool to University XX. We discussed it and promoted it. The ethics matrix. There's also another tool called the "consensualization

conference," which is used alongside the ethics matrix. So yes, we've used these tools and actively promoted them at the university.– P#4

"Nevertheless, tools for ethical evaluation of research proposals are beginning to emerge, such as FERMI (Fake News Risk Mitigator), which offers guidelines and methodologies. However, designing and adopting such systems—especially in the absence of a broad consensus on what constitutes disinformation or the ethical meaning of certain actions—may provoke social resistance, particularly if perceived as an attempt to control expression or limit civil rights. On the ethics side, training programs and seminars could contribute to a better understanding among researchers of what constitutes ethical practice in the research process. We should move in that direction since we now have the technological means for direct dialogue within the global scientific community on such matters." – P#19

" I'm not against these tools, but I think we are not at all in the process of developing those for use across the various research communities that we deal with, which include like child protection services, the police, social sciences and humanities. But it's a very diverse field. … Well, as a PI of an ERC project, for European funded projects, as I'm sure you're aware, formulas that you need to go through at several steps in the research process. So I'm aware of such tools." – P#2

4.2.5 Fostering networking and exchange among RECs

Interviewees supported greater collaboration and knowledge sharing among RECs. Structured exchange of experiences, standardized documentation, and peer learning were seen as ways to improve consistency and raise standards across institutions and countries.

"A basic proposal is that, precisely because of the scientific competence expected from committee members, it would be good if they received some compensation. In Greece, this work is unpaid at public universities, among the many duties a professor has to balance. Perhaps there should be collaboration, a network among the various university ethics committees, and a report or record of what is happening in each committee, so that the committee members can exchange views. Of course, law has different needs, medicine has others, theology, informatics, and so on. However, the sharing of knowledge among ethics committee members should become a priority." – P#18

"But particularly in the northern countries, the Scandinavian countries, we have a long tradition of having clear roles for different types of ethics committees. And very often the secretaries of the ethics committees of different disciplines are on the same floor, which means that the members or the administrative staff of these ethics' committees are very likely to be able to talk to each other and have a good exchange about common issues and problems".– P#9

4.2.6 Enhancing researcher responsibility and ethical literacy

Ethical decision-making is never outsourced solely to committees. Identification and addressing of ethical issues may be - but even that should not be outsourced. Several respondents stressed that researchers must take personal responsibility for ethical reflection, which requires both individual initiative and institutional support in the form of accessible guidance and resources.

> *"It's each researcher's responsibility to self-educate, to some extent, in this area: to do their own research and understand basic principles like integrity, confidentiality, and autonomy. All of these are things they need to know, not only to shape their research but also to prepare their application, so the application is easily understandable by committee members, aligns with key principles, aligns with the rules, and so on. As for other specific tools or solutions… I don't know, nothing else comes to mind right now, yes."* – P#20

> *"I can't suggest specific tools. What I always say is that what helped me was to take and enter keywords based on my field — for example, "ethics and special education" — and look it up, because there are lots of articles on that. Focus on that to understand the logic: what ethics means in the field of special education, what it means when addressing socially vulnerable groups, and what you need to consider. Also, very important in all this is the language part — the inclusive language you should use' — and look it up..."* – P#17

4.2.7 Recognizing ethical complexity in new research formats

New research areas, including artificial intelligence, participatory methods, and studies involving vulnerable populations, pose ethical challenges that are not easily addressed by existing procedures. Respondents emphasized the need to update frameworks and capacities of ethics reviewers to account for these complexities.

> *"Questions will arise, such as: Are we allowed to analyze data with AI? Can we use it for transcription? Can AI-generated content be considered research output? Are we allowed to write with it? I assume these issues will be clarified at some point."* – P#8

> *"Another issue, which is closer to my own field, is that we often use eye trackers, face readers, that is, technologies that record the participant's face. So afterwards, we have recordings, videos, emotions—even if they don't tell us their name, which most of the time they do, we essentially have the person recorded. So, this is definitely a challenge: how do we manage to be ethical and follow deontological standards when we go into such depth, meaning we have the person recorded, their emotions, and how they reacted to particular situations?"* – P#15

> *"As a result, we also had private phone cards so that they could use a different number and of course absolutely no communication via WhatsApp, which was of course a huge challenge for everyone involved, because that was the most popular app. Oh, those were really big arguments, which made life more or less difficult for us."* – P#10

4.2.8 Streamlining and standardizing procedures—without over-bureaucratization

While greater consistency and procedural clarity were welcomed, several interviewees cautioned against turning ethics review into a rigid, checkbox-driven exercise. Instead, efforts should focus on improving transparency, coherence, and adaptability of the REC processes.

> *"I would say that committees—at least at [name of university], which does this quite well—should generally continue to be staffed by people from many different disciplines, specialisations. I think that's good; it helps bring pluralism of perspectives and sheds light on an issue from different viewpoints. I very much believe—not so much in automation, let's not go there—but in the systematisation of documents, policies, and procedures. That is, there should be a process that reviews all the documents and all the procedures used by an ethics committee every year, to update them once, and then those should serve as the guide, the framework, for all research evaluated in a given year."* – P#20

> *"We already need this kind of communication about what are the standards, how should we deal with dialogues between ethics committee members and researchers, and should there be some kind of clearinghouse or ombuds office when there are conflicts between ethics committees and researchers?"* – P#9

> *"I very much believe—not so much in automation, let's not go there—but in the systematisation of documents, policies, and procedures. That is, there should be a process that reviews all the documents and all the procedures used by an ethics committee every year, to update them once, and then those should serve as the guide, the framework, for all research evaluated in a given year... but systematisation of documents, policies, and procedures—yes."* – P#20

Table 2. Summary of recommendations from the interviews for strengthening ethics review

Goals	**Recommendation**
Strengthen the advisory role of RECs	Shift from one-time approvals to ongoing ethical guidance throughout the research life cycle
Promote multi-disciplinarity in REC composition	Include members from diverse disciplines to ensure context-sensitive ethical evaluations
Improve training and professionalization	Provide structured training, ongoing education, and institutional support for both REC members and researchers
Develop and share practical ethics tools	Encourage the use and dissemination of tools like ethics matrices, Delphi methods, and scenario-building

Foster networking and exchange among RECs	Facilitate collaboration, standardization, and peer learning across committees and institutions
Enhance researcher responsibility and ethical literacy	Encourage researchers to take active responsibility for ethical reflection, supported by institutional guidance
Recognize ethical complexity in new research formats	Update ethics frameworks to address challenges in AI, participatory methods, and vulnerable populations
Streamline and standardize procedures, without over-bureaucratization	Improve clarity and consistency of ethics review while avoiding rigid, checkbox-style processes

5 Recommendations from the scoping review

5.1 Methodological approach

As explained in detail in D2.1, the objective of the scoping review was to identify legal and ethical challenges in research arising from emerging technologies, new form of partnerships and collaborations, and novel dilemmas, and to offer evidence-based guidance for improving ethics review frameworks. Sources included academic literature from PubMed, Web of Science, Scopus, and grey literature from EU Horizon 2020 and Horizon Europe projects in the CORDIS database. The Systematic Review Facility (SyRF) platform was used for screening. For the content analysis, we used GPT-4o, a Large Language Model (LLM), applying a three-step approach: 1) initial testing and refinement of the LLM prompts and output validation; 2) identification and extraction of ethical and legal issues, technologies, new forms of collaborations, and regulatory frameworks for each document; 3) systematic categorization of extracted data and binary coding across all documents to allow comparative analysis. The results of this analysis served as the basis of the Evidence and Gap Map (EGM).

5.2 Results

A total of 756 academic articles, 65 documents from 46 H2020 projects, and 13 documents from Horizon Europe projects were analysed. The EGM visualized the frequency with which 18 ethical and legal issues are discussed across 9 major technological domains (Figure 7 in D2.1). Bubble size indicated the number of articles. EGM analysis showed that AI dominates ethical discussions, with key concerns in privacy, bias, accountability, and transparency. Biomedical and digital health fields also focus on consent, data ownership, and security. Ethical gaps exist in areas like anonymization, commercialization, equity, and public trust, especially in Big Data, Interne of Things, and emerging technologies.

For this deliverable, we specifically analysed the recommendations in the context of barriers and facilitators of ethics review processes for emerging challenges. The analysis focused on identifying structural, procedural, and contextual factors that influence the effectiveness of ethics assessments. The findings provide insight into how current review mechanisms can be improved to better address emerging ethical challenges and support responsible research.

5.2.1 Persistent barriers in ethics review processes

The barriers to effective ethics governance included several critical issues.

Fragmented and outdated regulatory frameworks

Regulatory frameworks governing ethical oversight are frequently fragmented, outdated, or inconsistent across jurisdictions and disciplines. This results in variable standards and confusion among researchers, especially in fast-evolving domains like AI, genomic research, and reproductive technologies (Vermeulen et al., 2017; Li and Faulkner, 2017; Rizzo et al., 2023). Moreover, national-level ethics governance is often lacking, particularly in low-resource settings (Zhou, 2021). Ethics committees may find themselves marginalized by regulatory shifts, such as those introduced by EU Regulation 536/2014, which gives more control over clinical trial oversight to national regulatory agencies. This reduces the role of ethics committees in approving and monitoring research, and limits their ability to ensure ethical standards are met (Lanzerath, 2023).

Inadequate informed consent mechanisms

Informed consent procedures are often too static, complex, and poorly tailored to diverse populations, including those with cognitive impairments or limited digital literacy (Williams et al., 2015; Kennedy et al., 2021). Ethics committees face additional challenges in ensuring transparency, documenting consent adequately, and resolving ambiguity about participants' preference, especially in complex areas like embryo use and genetic data (Ethics Committee ASRM, 2023; Matrana & Campbell, 2020). Key challenges also include managing consent for secondary data use, communicating risks, and navigating therapeutic misconception (Tromp & Vathorst, 2018).

Lack of public and community involvement

Effective ethics governance suffers when affected communities, especially marginalized groups, are not meaningfully involved. This leads to mistrust, perceived exploitation, and ethical blind spots in biobank, reproductive, and genomic research (Garrison et al., 2020; Guerrero, 2015). According to the authors, ethics committees should address concerns such as donor-conceived individuals' right to know, equitable access to technologies, and group-level harm in indigenous and psychiatric genetics research (Lázaro-Muñoz et al., 2019; Ethics Committee ASRM, 2018).

Limited and inconsistent oversight for emerging technologies

The speed of technological advancement, especially in AI, neurotechnology, and bioprinting, has outpaced existing ethical review structures (Tang, 2020; Torous and Nebeker, 2017). According to the authors, ethics committees often lack the technical expertise, resources, or regulatory clarity to evaluate complex risks in fields like big data research or AI-generated medical content. Further, they face ambiguity in evaluating novel risks, inconsistent review processes, and conflicting pressures from scientific innovation and industry interests (Segarra et al., 2017). Inconsistencies across institutions and countries, particularly in Europe, also hinder effective and equitable governance, especially in clinical research (Muurling et al., 2023; Lanzerath, 2023).

Operational and structural weaknesses of ethics committees

Ethics committees themselves face internal challenges that undermine their ability to ensure ethical oversight. These include lack of training, inadequate resources, variability in ethical standards, low confidence in specific domains, and inconsistent application of review protocols (Pysar et al., 2021; Zhou, 2021). In many regions, ethics committees operate without formal supervision or certification, with significant discrepancies in the quality and rigor of reviews (Vries et al., 2015). Additionally, committees struggle with conflicts of interest, terminology misunderstandings, and disagreements over legal status in reproductive ethics (Ethics Committee ASRM, 2013, 2016).

5.2.2 Facilitators in ethics review processes

The identified facilitators of effective ethics governance include the following key factors:

Standardization and harmonization of ethical frameworks

Some authors suggest that effective ethics governance can be enhanced when legal and regulatory frameworks are standardized across jurisdictions. Harmonization minimizes fragmentation, facilitates international collaboration, and ensures that ethical oversight does not vary arbitrarily between regions or institutions. This is particularly critical for multi-site clinical trials, where disparities in ethical review approaches can undermine consistency and fairness (Muurling et al., 2023; Lanzerath, 2023).

Ongoing training and capacity-building for ethics committees

Ethics committees operate more effectively when members are regularly trained in emerging technologies, evolving ethical dilemmas, and complex regulatory environments. Studies identified the lack of expertise and training as a major barrier, particularly in areas like AI, psychiatric genetics, and reproductive ethics. Facilitators include providing ongoing education, certification programs, and interdisciplinary exposure for committee members (Pysar et al., 2021; Zhou, 2021).

Transparent, adaptive, and inclusive consent mechanisms

Transparent and participant-centered consent processes could foster trust and support ethical governance. Adaptive tools such as dynamic consent, e-consent systems, and computer-based aids help address linguistic, cognitive, and literacy barriers (Williams et al., 2015; Kennedy et al., 2021). Further, clear legal guidance on secondary data use, broad consent models, and ongoing communication with participants could help ensure autonomy and minimize misuse of sensitive data, especially in the context of biomedical research (Matrana and Campbell, 2020; Tang, 2020).

Community engagement and participatory governance

Ethical governance improves significantly when affected communities are meaningfully involved in research design, implementation, and oversight. This includes indigenous populations, marginalized groups, and vulnerable communities who may face disproportionate risks (Lázaro-Muñoz et al., 2019).

Interdisciplinary collaboration and ethical-by-design systems

Governance structures that promote collaboration among legal, medical, technical, and social science experts are better equipped to handle ethical complexities. Ethics-by-design approaches embed ethical considerations into the early stages of research and technology development, especially in AI, bioprinting, and neurotechnology (Lanzerath, 2023; Tang, 2020).

Strengthened infrastructure and institutional support for ethics committees

Appropriate administrative and financial support enables ethics committees to function effectively. This includes access to staff, digital systems for protocol review, adequate meeting frequency, and infrastructure to handle complex multi-site reviews (Zhou, 2021).

Transparency, trust-building, and ethical leadership

Ethical governance depends on transparent procedures, accountable decision-making, and public trust. Committees that clearly document and communicate their decisions, especially around complex areas like embryo usage, AI research, and data privacy, build legitimacy and reduce perceptions of bias or arbitrariness (Ethics Committee ASRM, 2023; Torous and Nebeker, 2017).

5.2.3 Recommendations

Drawing from the findings from synthesized literature, the following recommendations can address current gaps and enhance the quality of ethics governance:

1. **Implementing regular training programs** for ethics committee members focused on current and emerging ethical challenges, especially in AI, genomics, and reproductive health (Pysar et al., 2021; Zhou, 2021; Torous and Nebeker, 2017).
2. **Developing and adopting harmonized ethical standards** at national and international levels to reduce fragmentation and promote consistent oversight (Lanzerath, 2023; Muurling et al., 2023; Segarra et al., 2017). Update outdated systems by aligning them with current technologies and human rights principles, and close existing regulatory gaps.
3. **Expanding the use of dynamic and e-consent tools** to ensure accessibility, transparency, and participant autonomy in both traditional and digital health research contexts (Kennedy et al., 2021; Matrana and Campbell, 2020; Ethics Committee of the ASRM, 2023).
4. **Engaging communities in the co-design of governance frameworks**, particularly in genomics, biobanking, and data-intensive research, to build trust and accountability (Garrison et al., 2020; Lázaro-Muñoz et al., 2019; Ethics Committee of the ASRM, 2018).
5. **Ensuring structural and financial support for ethics committees**, including digital infrastructure, trained staff, and evaluation systems to uphold review quality (Zhou, 2021; Vries et al., 2015; Lanzerath, 2023). Promote the use of shared ethics review infrastructures, simulations, and workshops to support harmonized practices and continuous learning.
6. **Creating interdisciplinary and specialized review panels** that can assess complex proposals involving novel technologies or vulnerable populations (Tang, 2020; Ellacuria, 2021; Ethics Committee of the ASRM, 2016).
7. **Promoting a culture of transparency and ethical leadership** by requiring public-facing documentation of committee decisions and establishing mechanisms for community feedback (Takashima et al., 2019; Torous and Nebeker, 2017; Ethics Committee of the ASRM, 2013).
8. **Encouraging global collaboration** on ethics governance reform to tackle shared challenges like cross-border data sharing, AI safety, and equitable access to innovation (Rainey et al., 2021; Lanzerath, 2023; Zhou, 2021).

6 Ethics tools for emerging challenges to ethics review

This section presents an additional activity that was not originally included in the Description of Action (DoA). It was developed during co-creative workshops held in Vienna in January 2025, where participants highlighted the need to look more closely at tools that support ethics review processes. Based on this input, we carried out a separate search and analysis to identify useful tools, frameworks, or methods for addressing new challenges in ethics review. Although not planned from the start, this extra step adds value by helping to better understand practical approaches used in the field.

6.1 Methodological approach

To identify specific literature on ethics tools for improving ethics review processes, we conducted an additional database search in Scopus and Web of Science (WoS), targeting peer-reviewed academic articles, conference proceedings, chapters, and reviews. Our aim was to identify tools, frameworks, or methods that incorporate scenario-based or anticipatory components for ethics review. Detailed search strategy can be found in Appendix (**Table A1**).

6.1.1 Screening and selection process

We identified 737 articles in total. All retrieved records were exported into a reference manager, where duplicates were removed first automatically and then manually. We then imported the cleaned dataset into the Systematic Review Facility (SyRF) platform for title and abstract screening. Three independent reviewers participated in the screening process and each title was screened in duplicate. Eligible articles were selected based on their description of a tool, protocol, or framework designed to facilitate ethical review processes, yielding a total of 40 articles (**Figure 1**).

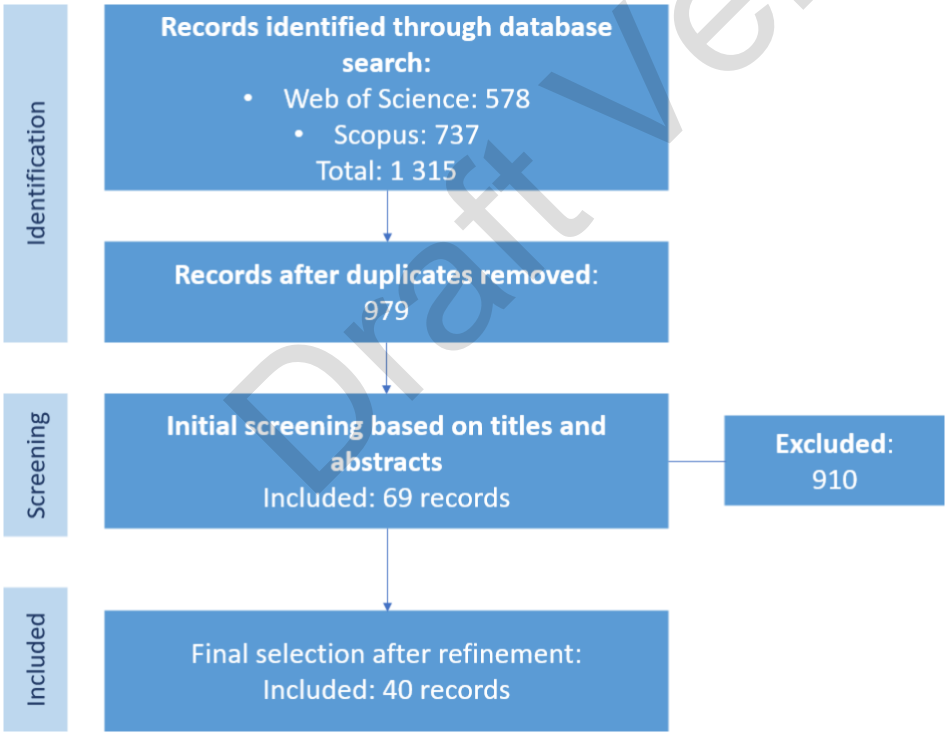

Figure 1. PRISMA flowchart for identifying literature on ethics tools and scenarios.

6.2 Results

We identified a diverse set of ethics tools developed to address emerging ethical, legal, and societal challenges. These tools encompass both conceptual frameworks and practical methodologies, including scenario-based planning, ethical matrices, anticipatory governance models, participatory deliberation frameworks, formal logic-based models, and typification models for machine ethics (Khoshroo, 2022; Rainey, 2024; Aarons, 2019). Additional tools employ educational games and narrative-based learning, multi-method stakeholder engagement processes, and structured ethical decision protocols (Marsico, 2002; Kurt & Duquenoy, 2012).

Novel approaches were applied in contexts such as artificial intelligence, human genome editing, conservation, biotechnology and food systems, public health and bioethics, and engineering ethics education (Vermeulen et al., 2017; Li & Faulkner, 2017; Rizzo et al., 2023).

Many tools use structured, iterative methods to identify stakeholder values, address value conflicts, and guide ethical outcomes. Scenario planning stands out for enabling anticipatory ethical reasoning amid uncertainty. These approaches reflect interdisciplinary and they emphasize the need to embed ethics early and throughout research. The tools and their respective applications are detailed in **Table A2** in the Appendix.

Several key recommendations can be put forward from recent developments in ethics methodologies and frameworks to enhance current ethics review practices, especially those related to emerging challenges to ethics review.

Incorporating scenario-based and anticipatory approaches

Tools like the ISE Model (Khoshroo, 2022), Anticipatory Technology Ethics (Rainey, 2024), and EGAIS scenario methods (Kurt & Duquenoy, 2012) demonstrate how future-oriented, imaginative scenarios can foresee ethical challenges before they arise. Ethics review boards should adopt scenario-based assessments to better anticipate long-term and emergent ethical impacts of new technologies.

Embedding ethics throughout the innovation lifecycle

Frameworks such as Embedded Ethics (Bonnemains et al., 2018) and stress the need for integrating ethical reflection from the very beginning of a project and maintaining it throughout design, development, and deployment. An ethics review process conducted in stages (iterated), beginning at project inception and continuing through key milestones, can ensure sustained ethical accountability (Bonnemains et al., 2018).

Promoting interdisciplinary and participatory engagement

Approaches like EGAIS and the E-ETHICCS project (Kurt and Duquenoy, 2012; Shilton, 2015) advocate for inclusive, deliberative processes that bring together a range of stakeholders, including members of the public, to reflect a diversity of perspectives. Ethics reviews should incorporate this broader input to better address societal concerns and recognize value pluralism.

Using structured decision-support tools

Decision aids such as the Ethical Matrix and ethical flowcharts (Biasetti & de Mori, 2021) provide consistent, systematic methods for evaluating ethical implications. Incorporating these tools into review processes can strengthen analytical rigor and help minimize subjective bias.

Explicitly addressing ethical dilemmas and value conflicts

Ethics models developed for AI, neurotechnology, and genomics frequently highlight tensions between competing values, such as privacy and performance (Juengst, 2021). Ethics review documentation should be required to identify and critically assess such value conflicts and the trade-offs involved.

Preparing for ethical uncertainty

Recognizing that ethical evaluation often involves dealing with incomplete or evolving knowledge, some tools focus on "uncertainty management" (Rainey, 2024; Shilton, 2015). Ethics boards should be trained in methods of uncertainty analysis and required to incorporate them, particularly in the review of high-risk or speculative technologies.

Investing in ethics training and capacity building

Initiatives like E-ETHICCS (Wright et al., 2014) have produced interactive tools, such as dilemma games, to enhance ethical reasoning skills. Continuous training and professional development for researchers and ethics board members, grounded in contemporary ethics education, are essential to building long-term capacity for ethical oversight.

7 Conclusions

This deliverable synthesizes findings from literature reviews, stakeholder interviews, and focus groups to propose actionable recommendations for strengthening ethics review systems in response to evolving research challenges. Our analyses reveal that ethics governance is under pressure from the rapid development of technologies such as AI, genomics, and digital health, as well as from fragmented regulations, capacity gaps, and limited stakeholder involvement.

From this process, we identified approximately 34 distinct recommendations. Among these, 9 key recommendations recur across multiple sources, highlighting them as priorities. These include:

- Embedding anticipatory and scenario-based tools early in research planning
- Promoting interdisciplinary collaboration within ethics committees
- Modernizing consent mechanisms
- Increasing public and stakeholder engagement
- Reinforcing ethics infrastructure through training, resourcing, and harmonized standards
- Supporting iterated and ongoing ethics review
- Developing structured decision-support tools
- Enhancing researcher responsibility and ethical literacy
- Fostering a shift in culture to treat ethics as integral and strategic

Together, these measures advocate for a shift from reactive, compliance-based review to a proactive, flexible, supportive and inclusive ethics governance model. This transformation will help ensure that ethics review processes remain responsive, transparent, and equipped to uphold ethical standards in increasingly complex and global research environments.

The recommendations presented here lay the groundwork for further policy development and capacity-building under WP2, supporting the future of responsible research and innovation in Europe.

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Appendix

Table A1. Database search strategy for Scopus and WoS to identify literature on ethics tools.

Database	**Search Strategy**
Scopus	(ABS ((situation* OR scenario*) W/2 (protocol* OR guideli* OR tool* OR framework* OR matrix OR instrum* OR scale*)) AND ABS (ethic* OR moral*)) OR (TITLE (scenar* AND ethic*) OR TITLE (anticip* AND ethic*) OR TITLE (scenar* AND moral*) OR TITLE (anticip* AND moral*) OR (TITLE (scenar* AND develop*) AND ABS (ethic* OR moral*)) OR (TITLE (scenar* AND build*) AND ABS (ethic* OR moral*))) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ch") OR LIMIT-TO (DOCTYPE , "re"))
WoS (all databases)	# Entitlements: 21: WOS: 1955 to 2025; BCI: 2012 to 2025; CCC: 1998 to 2025; DRCI: 2012 to 2025; DIIDW: 2012 to 2025; GRANTS: 1953 to 2025; KJD: 1980 to 2025; MEDLINE: 1950 to 2025; PCI: 1950 to 2025; PPRN: 1991 to 2025; PQDT: 1637 to 2025; SCIELO: 2002 to 2025; ZOOREC: 2012 to 2025 # Searches: 21: TI=(SCENAR* ETHIC*) OR TI=(ANTICIP* ETHIC*) OR TI=(SCENAR* MORAL*) OR TI=(ANTICIP* MORAL*) OR (TI=(SCENAR* DEVELOP*) AND AB=(ETHIC* OR moral*))OR (TI=(SCENAR* BUILD*) AND AB=(ETHIC* OR moral*)) 22: AB=((situation* OR scenario*) NEAR/5 (ethic* OR moral*) NEAR/3 (protocol* OR guideli* OR tool* OR framework* OR matrix OR instrum* OR scale*)) 23: (#22 OR #21) 24: #22 OR #21 and Preprint Citation Index (Exclude – Database) and Article or Dissertation Thesis or Review Article (Document Types)

Table A2. Ethics tools and their application.

Article	Ethics tool	Tool description	Area of application
Marsico, G. A research scenarios for ethical committees. Giornale Italiano di Farmacia Clinica. 2002.	Scenario-based ethical tool	A structured tool for ethical committees that uses hypothetical research scenarios to examine and interpret ethical issues arising in clinical trials. By simulating realistic research proposals, committees can assess how ethical principles apply in practice, improving consistency and transparency in their evaluations. This tool facilitates critical thinking, contextual analysis, and helps bridge the gap between abstract ethical standards and real-world decisions.	Clinical research ethics, regulatory decision-making
Khoshroo, B. M. A Scenario-Based Model for Analyzing the Ethical Requirements of Intelligent Autonomous Systems. 5th International Conference on Intelligent Autonomous Systems (ICoIAS). 2022. https://doi.org/10.1109/ICoIAS56028.2022.9931287	ISE Model (Identification, Specification, Exploration)	The ISE Model (Identification, Specification, Exploration) is a scenario-driven framework designed to elicit, analyze, and refine the ethical requirements of intelligent autonomous systems throughout their development lifecycle. It enables requirements engineers and stakeholders to collaboratively engage in moral reasoning by constructing and iteratively refining ethical scenarios—hypothetical or realistic situations in which a system is expected to behave in morally significant ways. Identification Stage: Engineers identify high-level, ethically relevant situations where a system's behavior could have moral consequences. These are tied to broad ethical principles (e.g., prevention of harm, respect for autonomy) and serve as the conceptual starting points for deeper analysis. Specification Stage: Identified scenarios are refined into more concrete instances with well-defined parameters (e.g., number of stakeholders, urgency, potential harm). This helps uncover morally relevant variables and guides clearer understanding of context-dependent expectations. Exploration Stage: Engineers analyze what the system is expected to do in each scenario and the reasoning it should use. This includes applying ethical theories such as: Deontology (rules or duties), Consequentialism (outcomes and consequences), and Virtue Ethics (traits	Autonomous intelligent systems (e.g., AI in autonomous vehicles, judicial decision-making, medical robotics)

		like empathy or helpfulness). The model fosters transparency, anticipates value conflicts, and mirrors the role of philosophical thought experiments, making complex ethical deliberations contextual and collaborative.	
Kurt, A., Duquenoy, P. Addressing Governance and Ethics in European Technology Development Projects through Scenarios. IFIP Advances in Information and Communication Technology. 2012. https://doi.org/10.1007/978-3-642-31668-5_22	Scenario-based ethical reflection in governance (EGAIS Framework)	This approach is rooted in the EGAIS project, aiming to bridge the gap between technical and ethical domains in European technology development by embedding ethics through reflexive governance. The method uses scenarios as prompts in interdisciplinary workshops to stimulate ethical awareness and critical discussion among stakeholders. The tool relies on the concept of "ethical reflexivity", where participants reflect on their own cognitive framings and disciplinary biases to identify ethical issues embedded in the context of technology design. Through interactive exercises, such as the ATM surveillance case, stakeholders examine assumptions, assess governance mechanisms, and collaboratively redefine norms in light of technology's social impact. It emphasizes context-sensitive, participatory, and deliberative methods for ethics integration from project inception.	European co-funded research, ambient intelligence, privacy-by-design, socio-technical systems, ethics in ICT design
Aarons, D. Addressing the Challenge for Expedient Ethical Review of Research in Disasters and Disease Outbreaks. Bioethics. 2019. https://doi.org/10.1111/bioe.12543	Ad hoc Research Ethics Committee (REC) Model	This model addresses the need for efficient and context-sensitive ethical review processes during emergencies like disease outbreaks and natural disasters, especially in low- and middle-income countries (LMICs). Drawing from fieldwork in the Caribbean, the tool proposes creating ad hoc ethics committees comprising REC chairs, health officials, and community representatives. These smaller, agile units can rapidly review research proposals without compromising ethical standards. The model critiques existing CIOMS Guideline 20, offering practical alternatives to pre-screening protocols, which may be unrealistic for many RECs. It also emphasizes clear pre-planning, inter-jurisdictional collaboration, and maintaining participant protection amid urgency. Importantly, the tool distinguishes responsibilities: RECs focus on	Public health emergencies, disaster research, epidemic response ethics, LMIC ethics governance

		protecting participants, while sponsors must plan for researcher safety.	
Rainey, S. An Anticipatory Approach to Ethico-Legal Implications of Future Neurotechnology. Science and Engineering Ethics. 2024. https://doi.org/10.1007/s11948-024-00482-4	Imaginative Scenario Planning for Co-responsible Governance	This anticipatory ethics tool employs imaginative, constrained speculation to explore legal and ethical questions that may arise from emerging neurotechnologies. Two detailed scenarios (a car accident involving BCIs and a data-sharing controversy from mood-regulating devices) illustrate potential issues of legal responsibility, consent, privacy, and data governance. It advocates for institutionalizing co-responsibility by involving multiple disciplines (law, neuroscience, philosophy, consumer voices) in scenario-driven workshops. These sessions aim to preempt regulatory and policy gaps, inform standards, and foster ethically-informed innovation pathways.	Consumer neurotechnology, brain-computer interfaces, data ethics, anticipatory governance
An Ethical Perspective on the Internet of Things (<NA>)	Ethics Layer in IoT protocol stack	A proposed design approach introducing a dedicated "ethics layer" in the protocol stack of IoT devices to embed ethical reasoning into system architecture. This includes socio-cultural norms, responsibility management, and avoidance of discrimination or harm. It supports development of "ethical homes/offices/cities," ensuring devices act responsibly at individual and systemic levels. Pre-emptive in addressing racism, bias, and unintended social consequences of AI/IoT technologies.	IoT systems, AI governance, smart technologies
Tunçalp, D., Fagan, M. H. Anticipating Human Enhancement: Identifying Ethical Issues of Bodyware. Global Issues and Ethical Considerations in Human Enhancement Technologies. 2014. https://doi.org/10.4018/978-1-4666-6010-6.ch002	Agential Realist + Anticipatory Technology Ethics Approach	This tool combines agential realism and anticipatory technology ethics to analyze ethical implications of bodyware—ICTs integrated into human bodies via non-traditional interfaces. It emphasizes how bodyware reshapes identity, social norms, and organizational life by blurring boundaries between human and machine. Illustrated through the RFID-based Student Locator case, the method invites reflection on issues like surveillance, autonomy, embodiment, and digital citizenship. It discourages technological determinism by focusing on intra-action (mutual shaping) of humans and devices, and supports	Human enhancement, wearable tech, surveillance ethics, workplace augmentation, identity and embodiment

		proactive ethical analysis before widespread deployment.	
Juengst, E. T. Anticipating the ethical, legal, and social implications of human genome research: An ongoing experiment. American Journal of Medical Genetics Part A. 2021. https://doi.org/10.1002/ajmg.a.62405	ELSI Program (Ethical, Legal, and Social Implications)	The ELSI Program is a pioneering initiative by the NIH and DOE that institutionalized ethical, legal, and social implications research into the Human Genome Project (HGP). It allocates 3–5% of research funding to studies addressing societal issues that might arise from genomic discoveries. Unlike conventional ethics commissions, ELSI operated as an "un-commission," encouraging diverse, investigator-initiated projects across philosophy, law, sociology, medicine, and public health. It fostered proactive, interdisciplinary horizon scanning and policy-oriented research to anticipate risks like discrimination, privacy violations, and inequity in genomic medicine. ELSI's model of anticipatory governance has since influenced global genomics initiatives and broader science policy domains.	Genomics research, biomedical policy, public health ethics, science governance
Anticipatory Ethics and the Use of CRISPR in Humans (<NA>)	Anticipatory Ethics Framework for CRISPR	This anticipatory ethics framework, proposed by Nestor and Wilson, applies foresight and scenario planning to the governance of human gene editing via CRISPR. The framework emphasizes interdisciplinary collaboration between ethicists, scientists, and policymakers to explore future consequences, such as gene drives, kill switches, off-target effects, and social justice concerns. It connects philosophical ethics (e.g., phenomenology) with policy discussions, promoting inclusive governance, equity, and responsible innovation. Key focus areas include access to CRISPR technologies, identity and personhood, unintended modifications, and international regulatory gaps.	Human genome editing, CRISPR policy, bioethics, anticipatory governance
Shilton, K. Anticipatory Ethics for a Future Internet: Analyzing Values During the Design of an Internet Infrastructure. Science and Engineering Ethics. 2015. https://doi.org/10.1007/s11948-013-9510-z	Anticipatory Values Analysis in Internet Design	This tool applies anticipatory ethics by identifying and analyzing the values held by engineers during the early design of the Named Data Networking (NDN) architecture—a proposed alternative to current Internet protocols. Through document analysis and qualitative coding, the method uncovers how values like privacy, trust, security, anonymity, efficiency, and	Internet infrastructure, privacy-by-design, information ethics, future Internet governance

		democratization are intentionally embedded in network design. The approach creates a taxonomy of values: (1) responding to technical pressures (efficiency, innovation), (2) protecting personal liberties (privacy, anonymity), and (3) supporting collective concerns (trust, equity). This empirical ethics method helps assess the future social impact of network design decisions before deployment.	
Brey, P. A. E. Anticipatory Ethics for Emerging Technologies. NanoEthics. 2012. https://doi.org/10.1007/s11569-012-0141-7	Anticipatory Technology Ethics (ATE)	ATE is a comprehensive framework that addresses the ethical analysis of emerging technologies in the R&D phase, where uncertainty about future uses and consequences is high. It integrates insights from futures studies, ethical technology assessment (eTA), techno-ethical scenarios, and the ETICA approach. ATE advocates for combining generic ethical issues (e.g., privacy, fairness) with speculative forecasting of specific applications and social consequences. It uses tools like expert consultation, scenario analysis, and ethical checklists to analyze not only likely public controversies but also overlooked normative issues. The method supports iterative ethical reflection during the tech development lifecycle, aiming to guide both R&D practices and policy interventions before ethical concerns become entrenched.	Emerging technologies, ethics in R&D, foresight and policy, speculative ethics
Biasetti, P., et al. Application of Decision Tools to Ethical Analysis in Biodiversity Conservation. Conservation Biology. 2023.	Integrated Ethical Decision Tools (Ethical Matrix, Decision Tree, Bateson's Cube)	This framework integrates three decision tools—Ethical Matrix (EM), Decision Tree (DT), and Bateson's Cube (BC)—to assess ethically complex decisions in biodiversity conservation. The EM identifies stakeholder-specific ethical demands based on principles like well-being, autonomy, and fairness. DTs help compare action paths based on ethical desiderata under uncertainty, while BC visualizes the acceptability of decision outcomes across three ethical dimensions (biodiversity protection, animal welfare, and social impact). The tools were applied in a participatory process on whether to continue harvesting biomaterial from the last northern white rhino. The integration enabled structured discussion, ethical pros/cons	Biodiversity conservation, wildlife ethics, participatory decision-making, endangered species management

		identification, stakeholder engagement, and transparent, justifiable decision-making.	
Karger, C. R. Citizen Scenarios for the Future of Personalized Medicine. International Journal of Interdisciplinary Social and Community Studies. 2013. https://doi.org/10.18848/2324-7576/CGP/v07i02/53466	Participatory scenario method	A participatory foresight method that engages stakeholders—especially young adults—in building structured, plausible future scenarios to explore the social, ethical, and policy implications of emerging health technologies. It includes identifying key driving forces, mapping their interactions, creating scenario narratives, and assessing outcomes. The tool is designed to foster anticipatory governance, stimulate ethical reflection, and generate informed recommendations for future health care planning and regulation.	Personalized medicine, public health policy, bioethics
York, E., Conley, S. N. Creative Anticipatory Ethical Reasoning with Scenario Analysis and Design Fiction. Science and Engineering Ethics. 2020. https://doi.org/10.1007/s11948-020-00253-x	CAER (Creative Anticipatory Ethical Reasoning)	A structured educational approach that integrates scenario analysis, design fiction, and ethical frameworks to help STEM students anticipate the societal implications of emerging technologies. Students engage in creative exercises imagining plausible futures and critically analyze them through ethical reasoning. The tool develops moral imagination, promotes understanding of stakeholder perspectives, and fosters anticipatory governance.	STEM education, responsible innovation, tech foresight
Huang, W., Lee, G. T. T., Zhang, X. Dealing with Uncertainty: A Systematic Approach to Addressing Value-Based Ethical Dilemmas in Behavioral Services. Behavioral Interventions. 2023. https://doi.org/10.1002/bin.1969	Step-by-step Ethical Deliberation Protocol for Value-Based Dilemmas	This tool provides ABA practitioners with a six-step ethical deliberation protocol designed to resolve morally ambiguous, value-based dilemmas that arise during clinical decision-making. Rooted in both deontological and consequentialist ethics, the protocol helps identify conflicting values (e.g., autonomy vs. nonmaleficence), assess ethical and factual implications of potential actions, and justify the most ethically sound decision. Steps include: (1) identifying the dilemma, (2) formulating at least two action options, (3) listing ethical/factual pros for each, (4) evaluating cons and compromised principles, (5) selecting and justifying the best course of action, and (6) mitigating any negative consequences of rejected options. The tool is especially useful in telehealth and multicultural behavioral contexts.	Applied behavior analysis, behavioral ethics, telehealth, multicultural behavioral services

Moody, L., et al. Development of an Online Scenario-Based Tool to Enable Research Participation and Public Engagement in Cystic Fibrosis Newborn Screening. Journal of Participatory Medicine. 2025. https://doi.org/10.2196/59686	Interactive Scenario-Based Online Engagement Tool	This tool is a co-developed, web-based platform titled "Cystic Fibrosis Newborn Screening: You Decide" that uses interactive scenario-based storytelling to engage the public in policy deliberations about the ethical implications of incorporating next-generation sequencing (NGS) into CF screening. It combines real-life narrative vignettes, filmed scenarios, gamified elements, and an interactive workbook to facilitate understanding of complex topics like sensitivity vs. specificity in genetic screening, implications of inconclusive results, and potential family impacts. The tool was iteratively developed with diverse stakeholders and enables users to explore scenarios, reflect on ethical trade-offs, and submit their policy preferences through embedded surveys.	Genetic screening, public engagement, health policy, cystic fibrosis, next-generation sequencing ethics
Bonnemains, V., Saurel, C., Tessier, C. Embedded Ethics: Some Technical and Ethical Challenges. Ethics and Information Technology. 2018. https://doi.org/10.1007/s10676-018-9444-x	Formal Ethics Modeling for Autonomous Agents	This tool provides a formal framework for embedding ethical reasoning into autonomous agents such as robots, drones, and autonomous vehicles. It integrates three ethical theories—utilitarianism, deontological ethics, and the Doctrine of Double Effect—into computable models that allow an agent to make and justify ethical decisions in complex scenarios. The tool is illustrated through a case study called the "drone dilemma," where the system simulates different ethical outcomes. The framework includes functions for modeling facts, consequences, preferences, proportionality, and judgments, allowing agents to explain their actions in ethically sensitive contexts. It also identifies limitations, such as formalizing subjective concepts and managing conflicting rules.	Autonomous systems, AI decision-making, drone ethics, formal logic in ethics, human-machine interaction
Streiner, S., et al. Engineering Ethics Through High-Impact Collaborative/Competitive Scenarios (E-ETHICCS). ASEE Annual Conference and Exposition. 2021.	Game-Based Ethics Learning Tools (E-ETHICCS Suite)	The E-ETHICCS project developed a suite of game-based learning tools to improve ethical reasoning among first-year engineering students. Tools include: (1) Cards Against Engineering Ethics (a satirical card game mimicking "Cards Against Humanity"); (2) Toxic Workplaces, a card game focused on ranking ethical responses in collaborative scenarios; and (3) Choose	Engineering education, ethics pedagogy, game-based learning, first-year curriculum, ethical

		Your Own Adventure: Mars, a narrative role-play game that evolves weekly around engineering dilemmas on Mars. These tools encourage situated learning, discussion, and reflection on professional ethics. Evaluated using concept maps, group interviews, and instruments like DIT-2 and EERI, the games demonstrated potential to shift ethical understanding and student engagement.	decision-making in STEM
Beekman, V. et al. Ethical Bio-Technology Assessment Tools for Agriculture and Food Production. 2006. https://www.researchgate.net/publication/40110288_Ethical_Bio-Technology_Assessment_Tools_for_Agriculture_and_Food_Production#full-text	Ethical Bio-TA Toolbox	Developed under the EU-funded Ethical Bio-TA Tools project, this toolbox offers a structured approach for assessing ethical issues related to new technologies in agriculture and food production. It categorizes tools into three domains: (1) Decision-making frameworks (e.g., ethical matrix, stakeholder analysis, multi-criteria mapping), (2) Public consultation and involvement (e.g., consensus conferences, citizens' forums), and (3) Food chain value communication (e.g., ethical accounting, stakeholder dialogue). These tools aim to improve the transparency and inclusiveness of ethical deliberation processes across regulatory, corporate, and public contexts. The toolbox highlights the importance of matching tools to stakeholder needs, provides guidance for their application, and advocates training to ensure quality use.	Agri-food biotechnology, GMO policy, ethics in EU regulation, stakeholder engagement
Dubbaka, S. et al. Ethical Decision-Making for Social Robots in Elderly Care Scenario. Lecture Notes in Computer Science. 2024. https://doi.org/10.1007/978-981-99-8715-3_13	Computational ethical decision-making framework	A computational framework using supervised learning to guide social robots in ethical decisions during object-fetching tasks in elderly care. It incorporates established ethics (e.g., Asimov's laws, medical ethics), value-sensitive design, and novel concepts like "greet or beat" decision modeling. The framework trains robots to align with principles of safety, dignity, autonomy, and justice, enhancing responsible human-robot interaction in caregiving settings.	Roboethics, elderly care, human-robot interaction
Wright, D. et al. Ethical Dilemma Scenarios and Emerging Technologies. Technol. Forecast. Soc. Change. 2014. https://doi.org/10.1016/j.techfore.2013.12.008	Ethical Dilemma Scenario Method	Developed under the EU-funded PRESCIENT project, this method creates "what if" ethical dilemma scenarios that provoke discussion and ethical reflection around new and emerging technologies. These scenarios are	Emerging tech assessment, AI & biometrics ethics, stakeholder engagement,

	(PRESCIENT Project)	structured across four quadrants—dark scenarios, push-back, sunny futures, and unintended consequences—and tackle issues like surveillance, human enhancement, biometrics, and big data. The tool is used to stimulate stakeholder consultation and feed into privacy and ethical impact assessments. It emphasizes orthogonal scenario construction, narrative storytelling, and multidimensional ethical analysis (privacy, equity, accountability).	European tech policy
Gonzalez Arencibia, M., Martinez Cardero, D. Ethical Dilemmas in the Artificial Intelligence Scenario. Revista Economia y Sociedad. 2020. https://doi.org/10.15359/eys.25-57.5	Multidisciplinary Ethical Reflection Model	This conceptual model highlights the importance of addressing ethical dilemmas related to artificial intelligence from a multidisciplinary and culturally grounded perspective. It encourages public debate on how malicious or unethical uses of AI can erode democratic processes, infringe privacy, and amplify social inequality. The article examines ethical theories (consequentialism, deontology, virtue ethics) and argues for prioritizing epistemological and social considerations over purely technical ones. It emphasizes the need for proactive ethical education among AI developers and societal consensus on values, promoting digital empathy and responsibility.	Artificial intelligence, tech ethics, social impact, digital governance, public policy
Valaitas, J., Screnock, T. Ethical dilemmas: scenario 6 results. WMJ: official publication of the State Medical Society of Wisconsin. 2004.	Ethical scenario evaluation tool	A case-based analysis method where participants evaluate ethically challenging scenarios (e.g., patient care situations). Responses are compared across medical professionals, showing divergence in moral judgment and decision-making under pressure. This tool reveals the practical tensions in applying ethical guidelines, providing insight into how ethics is interpreted and practiced in clinical settings.	Clinical ethics, healthcare training, medical judgment
Leikas, J., Koivisto, R., Gotcheva, N. Ethical Framework for Designing Autonomous Intelligent Systems. J. Open Innov.: Technol. Mark. Complex. 2019. https://doi.org/10.3390/joitmc5010018	Scenario-Based Ethical Design Framework	This framework, proposed by Leikas et al., supports ethical reflection during the concept and system design of autonomous intelligent systems. It emphasizes early integration of ethical principles—beneficence, non-maleficence, autonomy, and justice—into system requirements through co-design with stakeholders. The process uses usage scenarios to identify value conflicts and guide ethically informed	Autonomous systems, AI design, human-centered technology, value-sensitive design, robotics

		technical decisions. It draws from value-sensitive design, life-based design, and responsible research and innovation, combining these with casuistry to examine context-specific ethical issues. The framework aims to embed ethics into every design decision across the lifecycle of AI systems.	
Kohno, T., Acar, Y., Loh, W. Ethical Frameworks and Computer Security Trolley Problems. 32nd USENIX Security Symposium. 2023.	Trolley-Scenario-Based Ethical Reflection Tool	This tool presents a structured method for engaging in moral reasoning around security research by adapting classic ethical dilemma formats—particularly trolley problems—to real-world digital security contexts. It uses both consequentialist and deontological frameworks to examine moral tensions faced by security researchers (e.g., disclosing vulnerabilities, using leaked data, reviewer conflicts). The method provides a common language for program committees, researchers, and educators to explore the moral implications of research decisions. It builds on the Menlo and Belmont Reports and encourages informed, transparent debate rather than prescriptive outcomes.	Computer security research, ethics in cybersecurity, vulnerability disclosure, academic integrity, responsible tech development
Mepham, B. et al. Ethical Matrix Manual. 2006. https://edepot.wur.nl/216589	Ethical Matrix	The Ethical Matrix is a decision-support tool designed to facilitate ethical reflection and discussion on new technologies in agriculture and food production. It aligns prima facie ethical principles—well-being (utilitarian), autonomy (deontological), and fairness (justice)—with affected interest groups such as producers, consumers, animals, and the environment. Users populate matrix cells with qualitative or semi-quantitative assessments of how a technology affects each group in terms of each principle. The matrix supports structured deliberation, helps identify value conflicts, and clarifies ethical reasoning, without prescribing specific decisions. It can be used in both top-down expert-led analyses and bottom-up participatory settings like public forums and workshops.	Agricultural biotech, GMOs, food systems, public policy, stakeholder engagement
Cotton, M. Ethical Tools (from Ethics and Technology Assessment). 2014. https://doi.org/10.1007/978-3-642-45088-4_4	Ethical Matrix, Ethical Grid, Ethical	A set of participatory ethical analysis tools designed to support deliberative decision-making in technology and policy contexts. The Ethical Matrix uses normative ethical principles (e.g.,	Technology policy, bioethics,

	Delphi Method	autonomy, wellbeing, fairness) applied across stakeholder groups to map ethical implications. The Grid and Delphi methods provide structured stakeholder inputs to form transparent, multi-perspective ethical evaluations. Tools are adaptable and designed for non-experts as well.	stakeholder engagement
Lauritzen, E. M. Ethics in Action: Situational Scenarios Turning the Keys to the Code of Ethics. Museums, Ethics and Cultural Heritage. 2016.	Fictional scenario-based ethics training	A participatory ethics education method using tailored fictional narratives (called "Ethical Fables") to train museum staff in applying the ICOM Code of Ethics to real-life-like dilemmas. This approach fosters inclusive, multi-role discussions and practical interpretation of codes, avoiding top-down lectures and encouraging active problem-solving. The method supports ethics awareness across diverse cultural contexts and roles in heritage institutions.	Museum ethics, cultural heritage training
Lepoire, D. J. Exploring Ethical Approaches to Evaluate Future Technology Scenarios. J. Inf. Commun. Ethics Soc. 2005. https://doi.org/10.1108/14779960580000268	Ethical Scenario Evaluation with Rawlsian Principles	This paper develops a conceptual model for evaluating future technologies by focusing on the delay between technological innovation and societal adaptation. It integrates Rawls' "veil of ignorance" and fairness principles into scenario planning to assess ethical risks of inequality and unintended consequences from accelerating technological progress. The tool emphasizes the importance of ethical foresight and sustainability, evaluating whether social mechanisms can balance or lag behind tech-driven disruptions. It applies discount rates to compare future vs. current values and highlights ethical tension between innovation incentives and equitable diffusion.	Technology foresight, inequality, tech policy, ethics of innovation, sustainability
Stemerding, D., Swierstra, T., Boenink, M. Exploring the Interaction Between Technology and Morality in Genetic Testing. Futures. 2010. https://doi.org/10.1016/j.futures.2009.12.001	Techno-ethical scenario approach	A method for anticipating ethical issues in emerging technologies by mapping potential future interactions between technological developments and societal moral frameworks. Uses scenario-building to explore consequences of genetic susceptibility testing, incorporating historical ethical patterns (NEST-ethics) and societal values (autonomy, justice). Helps stakeholders anticipate shifts in the ethical landscape and develop responsive governance strategies.	Genomics, public health ethics, technology foresight

Umbrello, S. et al. From Speculation to Reality: Enhancing Anticipatory Ethics for Emerging Technologies (ATE) in Practice. Technol. Soc. 2023. https://doi.org/10.1016/j.techsoc.2023.102325	Enhanced Anticipatory Technology Ethics (ATE) Framework	This enhanced ATE framework, developed under the TechEthos project, refines Brey's original Anticipatory Technology Ethics approach to better assess the ethical, legal, and social impacts of emerging technologies. The updated model introduces new elements: (1) clearer levels and objects of ethical analysis (e.g., from technology families to specific use cases); (2) replacement of "likelihood" with "plausibility" to address ethical uncertainty and foster richer reflection; (3) incorporation of narrative ethics and moral opacity to better represent lay perspectives and cultural meaning; and (4) stronger inclusion of non-expert stakeholders. It integrates tools from value-sensitive design, futures studies, and participatory governance to inform ethics-by-design processes, particularly for technologies like climate engineering, digital XR, and neurotech.	Emerging technologies, TechEthos policy design, ethics-by-design, stakeholder foresight, climate/XR/neurotech governance
Wege-Rost, T. Medizinisch-ethische Entscheidungsfindung. Med. Klin. Intensivmed. Notf.med. 2023. https://doi.org/10.1007/s00063-022-00974-w	Clinical ethics consultation & ethical guidelines	Clinical Ethics Committees (KEK) offer structured support for complex decisions in medical practice through ethics consultations and ethical guidelines. Based on principles from biomedical ethics (autonomy, beneficence, non-maleficence, justice), these tools help balance medical indications with patient will. Guidelines provide flexible orientation corridors to improve decision quality and reduce ethical/legal burdens, while preserving physician responsibility.	Clinical ethics, intensive care, patient autonomy
O'Mathúna, D. P. Nanotechnology Scenarios: Ethics and Science Fiction. Nanotechnol. Percept. 2010.	Ethics via speculative scenarios	A scenario-based tool that employs science fiction narratives to explore ethical questions raised by nanotechnology. The approach facilitates public and expert engagement by imagining future situations where ethical boundaries may be challenged or shifted. Encourages critical thinking about emerging tech's societal implications.	Nanotechnology, ethics foresight, speculative tech
Vodonick, J. Neo-pragmatism: An Ethical Anticipatory System. European J. Futures Res. 2017. https://doi.org/10.1007/s40309-017-0112-x	Neo-Pragmatic Ethical Anticipation Model	This framework draws from neo-pragmatism and anticipatory systems theory to propose an ethics model that connects decision-making to future-oriented justification of actions. Building on Robert Rosen's theory of	Futures studies, ethics in foresight, philosophical ethics, anticipatory

		anticipatory systems and Richard Rorty's neo-pragmatism, the tool interprets ethics as a dual-faced system: one adjudicating past actions and one anticipating future outcomes. Rather than prescribing rigid ethical rules, it emphasizes language, values, and context in predicting and justifying actions. It challenges Hume's is/ought divide and positions ethics as a living system that evolves with societal narratives.	governance, policy framing
Melin, A., Magnusdottir, G. L., Baard, P. Participatory-Deliberative Ethics Assessments of Energy Scenarios. Ethics Policy & Environment. 2024. https://doi.org/10.1080/21550085.2024.2409025	Participatory-Deliberative Ethics Assessment (PDEA)	This method combines theories of deliberative democracy, reflective ethical mapping, and participatory technology assessment to evaluate the consequences of energy scenarios. Through stakeholder workshops in Sweden, the tool facilitates authentic dialogue focused on justice issues in regional and national energy planning. Inspired by Habermas and Innes & Booher's theories of communicative and collaborative rationality, it encourages participants from diverse sectors to explore the ethical implications of different scenarios using principles like fairness, autonomy, and well-being. The process fosters mutual learning, helps reveal stakeholder values, and builds ethical legitimacy into scenario planning.	Energy policy, sustainability transitions, participatory governance, climate justice, scenario planning
Selin, C. et al. Researching the Future: Scenarios to Explore the Future of Human Genome Editing. BMC Med. Ethics. 2023. https://doi.org/10.1186/s12910-023-00951-8	Anticipatory Governance Scenario Planning	This method, developed by Selin et al., employs anticipatory governance and scenario planning to explore ethical futures for human genome editing (HGE). Through expert interviews and a two-day deliberative workshop, participants built four distinct future scenarios using a 2×2 matrix framework: "Wild Frontier," "Slow and Steady," "Safety First," and "Winner Takes All." Scenarios were based on critical uncertainties (e.g., distribution of power, public vs. private drivers). The process incorporated STEEP analysis, storytelling, and stakeholder diversity to uncover systemic value tensions, ethical risks, and policy implications. The method emphasizes plausible—not predictive—futures and supports inclusive, forward-looking governance of emerging biotechnologies.	Human genome editing, bioethics, scenario planning, anticipatory governance, public policy foresight

Biasetti, P., de Mori, B. The Ethical Matrix as a Tool for Decision-Making Process in Conservation. Front. Environ. Sci. 2021. https://doi.org/10.3389/fenvs.2021.584636	Ethical Matrix (Conservation-specific revision)	This revised version of the Ethical Matrix is tailored for conservation contexts and expands the matrix to include three main stakeholder classes: ecological entities, individual animals, and people. It maps value demands (well-being, autonomy, fairness) for each class and facilitates the evaluation of trade-offs in ethically complex conservation decisions. The matrix encourages transparent, pluralistic ethical deliberation and accounts for value-laden priorities like species charisma, naturalness, and animal welfare. It supports decision-makers in anticipating conflicts, evaluating consequences, and negotiating fair compromises in contentious conservation settings.	Conservation ethics, wildlife management, biodiversity planning, animal welfare, stakeholder engagement
Dolan, T. C. The Need for Ethical Scenario Playing. Healthc Exec. 2005.	Ethical Scenario Playing	A forward-looking strategic tool where healthcare leaders collaboratively imagine and analyze potential future ethical challenges (e.g., funding cuts, tech adoption dilemmas). By rehearsing responses to hypothetical but plausible scenarios, leaders prepare to make value-aligned, ethically responsible decisions.	Healthcare management, clinical leadership
Al-Fedaghi, S. S. Typification-Based Ethics for Artificial Agents. 2008 IEEE Int. Conf. on Digital Ecosystems and Technologies (IEEE-DEST). 2008. https://doi.org/10.1109/DEST.2008.4635149	Ethical Situation Typification Model	This tool proposes a typified classification model to evaluate moral actions involving artificial agents (robots, software, etc.). Based on a basic agent-patient schema, it classifies ethical scenarios by identifying who the agent and patient are (human, organization, or artificial entity) and their ethical attributes (good, evil, neutral). The model produces 81 distinct ethical categories, allowing tailored rules for different types of ethical relationships. It refines Asimov's Laws and supports reasoning in digital ecosystems where machines act as both moral agents and patients. The typification allows modular ethical evaluation and can be extended as AI systems evolve.	Robot ethics, AI governance, machine responsibility, digital ecosystems, autonomous systems

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