D4.1: Aligning pedagogical foundations with technical developments

WP4 – Development of training materials

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Abstract
A primary objective of the irecs project is to create new, sustainable materials for research ethics education, training, and awareness raising, related to the investigation of new technologies. The training will be applicable in Europe and beyond, meeting the current and forecast needs of ethics experts, students, and researchers.

Recognising that not all end users of the irecs training will be starting at the same point, our intention is to create a wide range of modules and support materials from which users can 'pick and mix' the steppingstones most suited to support their learning journey. While all modules will be designed for online learning, there will be options for self-directed as well as facilitated learning; online materials for both synchronous and asynchronous delivery; training guides for facilitators; and downloadable materials for people with poor internet access.

This report outlines how the technical developments in irecs will be rooted in sound pedagogical foundations to generate useful, learner-centred and user-friendly training materials.

Document history

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1	18-07-2023	First draft		19-07-2023
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Information in this report that may influence other tasks within the project

Linked task	Points of relevance
T2.1 Scoping, screening and mapping data	Selection of technologies, identification of ethics issues, identification of case studies

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T6.1 Identify and map relevant EU-funded projects and networks	Potential for synergies with other EU projects

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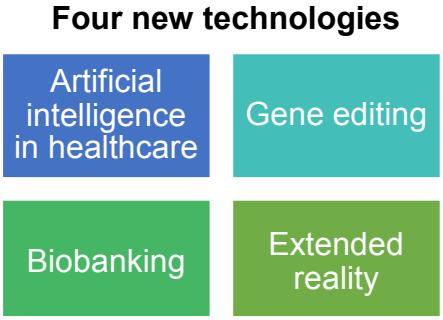
Executive summary



One of the main aims of the irecs project is to create new materials for research ethics education, training, and awareness raising that is applicable in Europe and beyond. The education and training will focus upon ethics issues associated with four new technologies and it will be developed to suit the needs of three target groups of learners.

Given the diverse range of topics and the diverse needs of different learners, it is vital that the training is designed and developed in a coherent manner to ensure good fit with the wide-ranging needs.

Consequently, the irecs training will:

- Be underpinned by a well-regarded model in education proposed by Biggs[1]
- Be designed to address the needs identified by evidence-informed competency profiles for each of the target groups and each of the selected technologies
- Offer a wide range of modules and support materials from which users can 'pick and mix' the steppingstones most suited to support their learning journey
- Offer a range of study modes including self-directed, interactive online learning, study guides for facilitated learning, and downloadable materials.
- Offer general training in research ethics and cross-cutting issues as well as technology-specific ethics
- Offer training in technology basics for each of the four technologies

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This report explains how the technical developments in irecs are rooted in sound pedagogical foundations and how we aim to generate useful, learner-centred, and user-friendly training materials.

[1] Biggs, J., *Teaching for quality learning at university,* SRHE and Open University Press, Buckingham, 2003.

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List of acronyms/abbreviations

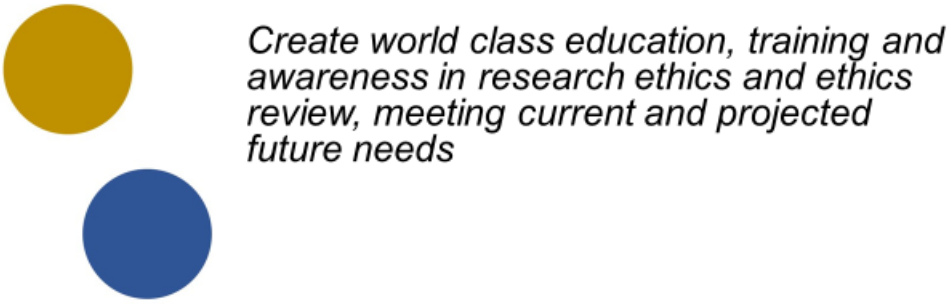
Abbreviation	**Explanation**
irecs	improving Research Ethics Expertise and Competences to Ensure Reliability and Trust in Science
Brigg's 3Ps	Biggs's 3Ps model breaks a programme or a learning event down into three constituent parts: presage, process, product
AI	Artificial intelligence
VR	Virtual reality
XR	Extended reality

AR	Augmented reality
TL	Transformative learning

Table 1. List of acronyms/abbreviations

1. Introduction

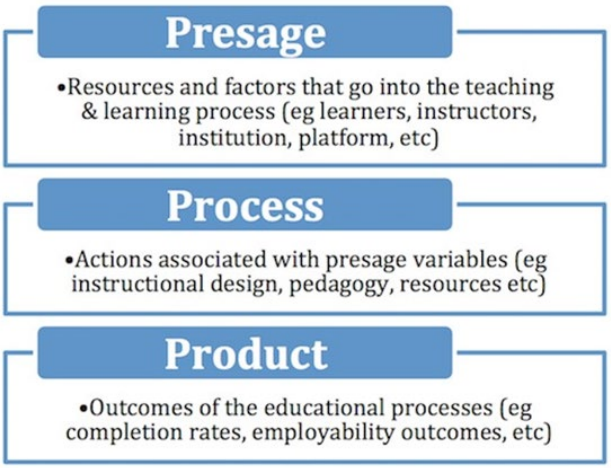
A primary objective of the irecs project is to create new, sustainable materials for research ethics education, training, and awareness raising, related to the investigation of new technologies. The training will be applicable in Europe and beyond, meeting the current and forecast needs of ethics experts, researchers, and students.



This will include both online and downloadable materials developed around a modular format that can be replicated, translated, and delivered in a variety of formats. Creating training for different target groups, each with different learning needs, that is culturally sensitive, relevant around the world and that can be adapted to different learning environments, is a complex undertaking that requires a sound pedagogical foundation. A well-conceived pedagogy can improve the learning experience and encourage deeper learning, and learners should be able to leverage their preferred learning styles through a process that supports them and the way they like to learn.

The pedagogical foundation for the development of training materials in irecs is structured around a well-regarded model in education proposed by Biggs[2], which maps learning-related factors at three points in time relevant to the learning event(s):

- *Presage (before learning takes place)*
- *Process (during learning)*
- *Product (the outcome of learning).*



Biggs's 3Ps model breaks a programme or a learning event down into its

[2] Open University Press, Buckingham, 2003.

constituent parts to map how each part relates to the other and how together they form a coherent learning experience.[3] As shown in Figure 1, this model provides a helpful structure to ensure that all necessary factors are considered when planning teaching and learning.

Figure 1. *Hood & Littlejohn's adaptation of Biggs's 3P model (2016:31)*

Biggs[4] compares the 3Ps model to an ecosystem where all components must be aligned with one another to work properly. This requires *constructive alignment* between learning activities, assessments, and the intended learning outcomes. It is considered a holistic system of teaching in which all aspects of the curriculum are an integral part of the whole. Alignment provides maximum consistency throughout the teaching system as the curriculum has clear objectives stating the necessary level of understanding; teaching/learning methods are adapted to realise the objectives, and assessment (evaluation/activity) tasks are designed to test whether the students have achieved the designated objectives[5]. This system provides consistency across all aspects of the training so that '*the students are 'entrapped' in this web of consistency, optimising the likelihood that they will engage the appropriate learning activities, but paradoxically leaving them free to construct their knowledge their own way*.'[6]

This report explains the pedagogical foundations of the proposed training and how this will be aligned to the technical development of the modules to generate learner-centred and user-friendly training materials. In the following chapters, each of Biggs's 3 Ps is explored further within the context of the irecs project.

2. Presage

Presage factors are of two kinds, personal – relating to the learners, and situational – relating to the context in which teaching/learning takes place.

2.1 Personal presage factors: the learners

In irecs we are targeting a wide range of potential learners, including students, researchers (especially early career researchers) and research ethics experts. Hence the knowledge and

[3] Hood, N. and A. Littlejohn, "MOOC quality: the need for new measures", *The Journal of Learning for Development* Vol 3, Issue 3, 2016, pp. 28-42. https://doi.org/10.56059/jl4d.v3i3.165
[4] Biggs, op. cit., 2003.
[5] Ibid.
[6] Ibid., p. 27.

experience of the topics covered is likely to vary across a continuum from beginner to expert in both research ethics and in the types of technologies we are aiming to cover.

To address different learning needs, it has, therefore, been necessary to develop evidence-informed competency profiles that we aim to address with the irecs-training for each of the target groups and each of the selected technologies. This is critical because the development of competencies equips learners not only to solve current problems, but also gives them the potential to 'deal with problems that are unknown and unpredictable at the time when the competence in question is acquired'[7]. Alignment between the competency profiles with the learning aims and objectives, and the curricula will ensure that the training has real-world applicability.

The competency profiles are informed by five different sources:

1. The synthesis and analysis of the findings from other work packages, especially Tasks 2.1, 2.2 and 6.1
2. Input from across the entire consortium via a workshop at the kick-off meeting to identify generic core competencies. The findings from this meeting are summarised in Annex 1
3. Input from technology experts within the consortium
4. The ResearchComp Framework[8]: Applying research ethics and integrity principles (see Annex 2)
5. The Digital Education Action Plan 2021-2027[9]

2.1.1. Core competencies needed by students and researchers

While we recognise that students and researchers may bring vastly different levels of experience and understanding, for the purpose of the irecs training, the core competencies for both groups are considered the same. Both need an understanding of research ethics and integrity in general, as well as cross-cutting ethics issues and the ethics issues associated with their field of work. The core competencies that we have identified for students and researchers are shown in Table 2 together with the planned module for addressing those competencies. The specific competencies for the technology ethics issues have been drawn from tasks 2.1, 2.2 and the technology experts in the irecs consortium.

Competency (understanding and application)	To be addressed in module:
Research ethics and integrity basics	
Ethics basics/ethical decision-making	Ethics in 45 minutes
Ethical research	Research ethics and integrity basics
Requirements for research integrity	Research ethics and integrity basics/Research

[7] Illeris, K., "Transformative learning in higher education", *Journal of Transformative Learning,* Vol. 3, Issue 1, 2015, p. 46.
[8] https://research-and-innovation.ec.europa.eu/jobs-research/researchcomp-european-competence-framework-researchers_en
[9] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0624.
For instance: 'High quality and inclusive digital education, which respects the protection of personal data and ethics, needs to be a strategic goal of all bodies and agencies active in education and training.'

Competency (understanding and application)	To be addressed in module:
	ethics and integrity processes
Applying for ethics approval	Research ethics and integrity processes
Thinking skills	
Critical thinking	Critical thinking and ethics
Reflective awareness	Critical thinking and ethics
Cross cutting issues	
Ethics dumping	Ethics dumping
Research with vulnerable populations	Research with vulnerable populations
Gene editing: Ethics issues	
• Risk-benefit calculation of the different forms of gene editing and the different fields • Possible alternatives • Informed consent (e.g. difficult to obtain in germline gene editing or prenatal editing) • Autonomy • Safety and efficacy of the technique • Responsibility of the researcher • Justice → allocation of resources • Dual use/misuse • "Slippery slope" • Pressure to enhance • Genetic selection • Gene drive • Food safety	Gene editing – Ethics issues Gene editing – Case study
AI in healthcare: Ethics issues	

• Data related issues:
  ○ Privacy, security, bias; accuracy, ownership and control, informed consent
• Transparency and explainability
• Social values and related issues
  ○ Trust, justice and fairness. autonomy, accessibility and inclusivity, dignity, environmental impact
	AI in healthcare – Ethics issues
	
	AI in healthcare – Case study

Biobanking: Ethics issues	
• Consent models ○ Dynamic, broad • Privacy and confidentiality	Biobanking – Ethics issues Biobanking – Case study

Competency (understanding and application)	To be addressed in module:

• Deidentification, personal data processing, respect for rights
• Data sharing/benefit sharing
  ○ International aspects, commercial aspects, LMIC involvement
• Information ownership
  ○ Rights of participants/data subjects
• Incidental findings	

Extended reality: Ethics issues	
• Autonomy and manipulation • Privacy concerns, including new types of biometric data, and the issue of informed consent • Dignity issues (e.g. harassment, hate speech) • Violence in XR, by projection • Issues related to health or mental health • Educational or developmental effects • Energy and resource consumption (including Rare Earth Elements)	Extended reality – Ethics issues Extended reality – Case study

Table 2. Core competencies for students and researchers

2.1.2 Core competencies needed by ethics experts

The core competencies for ethics experts include all the competencies mentioned for students and researchers in Table 2 However, it is assumed that they will already have (at least most of) the ethics-related competencies. Further skills for the ethics appraisal of proposals and projects will be developed via adaption of the case study modules as described in Section 3. Additionally, ethics experts may not have enough understanding of the technologies in question to make informed decisions about the ethics issues. Hence, there will be technology basics modules specifically for the ethics experts. The core competencies in Table 3 have been identified by technology experts in irecs.

Competency (understanding and application)	Addressed in module:
Ethics appraisal	
Moral imagination	Adapted technology case studies
Working in ‘grey zones’	Adapted technology case studies
Assessing consequences	Adapted technology case studies

Competency (understanding and application)	Addressed in module:
Where to look for relevant legal and ethics requirements	Technology ethics issues modules
Gene editing: technology basics	
• Different types of gene editing • Function of each type • Comparisons between methods • Risks associated with the methods • Possible fields of human application (gene therapy, enhancement, what is already possible, what will possibly be possible in five years, what will almost certainly never be possible) • Difference between somatic gene editing and germline gene editing • Possible fields of non-human application (de-extinction, gene modified crops, protection of species, eradication of illness-carrying organisms)	Gene editing – technology basics
AI in healthcare: technology basics	
• What is AI? How are AI systems built? • What are some key applications of AI-based systems in the healthcare domain? • Impact of the deployment of AI in healthcare on the status and protection of health data • AI and the patient-doctor relationship • Entry of new actors in the healthcare domain	AI in healthcare – technology basics
Biobanking: technology basics	
• What is a biobank? • Types of biobanks • What they are used for (applications) • Biological samples – types and uses • International cooperation and sharing • Information management systems • Scope, sources, storage	Biobanking – technology basics
Extended reality: technology basics	

Competency (understanding and application)	Addressed in module:
• Definitions (virtual reality (VR) vs. augmented reality (AR), metaverse; extended reality) • The hardware: headsets, haptic devices, internet, servers • Metaverse • Immersion and immersive experience • Presence • Interaction • Interoperability	Extended reality – technology basics

Table 3. Additional core competencies for ethics experts

2.2 Situational presage factors: the teaching context

There are multiple models of learning styles, and one of the most commonly used is the VARK (Visual, Aural, Read/write, Kinaesthetic) model.[10] However, there is debate around the usefulness of learning styles[11]; critics of the various approaches cite a lack of evidence to support their use, and highlight that there is often overlap between people's preferences for how they access and process learning, rather than clear-cut fixed divisions into one learning style or another.[12]

Some courses construct adaptive learning environments wherein students' individual learning styles are evaluated via a quiz before the start of the course and then accommodated through options available within the e-learning environment. Considering criticisms of the learning styles models and given the need to also address cultural and geographical diversities, we will take a pro-active approach as adopted by many Higher Education Institutions in which we provide materials and activities that are suitable for a range of learning styles and other diversities rather than a reactive approach catering to individual needs.

We are aiming to develop modules and learning support materials to address the learning needs for the target group whilst ensuring that they are responsive to a range of environments.

Recognising that not all end users of the irecs training will be starting at the same point, our intention is to create a wide range of modules and support materials from which users (ethics reviewers, researchers, students, educators, trainers, funders etc.) can 'pick and mix' the steppingstones most

[10] Fleming, N. D. and C. Mills, "Not another inventory, rather a catalyst for reflection", *To Improve the Academy*, Vol. 11, 1992., p. 37.
[11] Wilson, R.T. "The Emperor's New Clothes: Learning Styles and Multiple Intelligences", *Colleagues*, Vol. 8, Issue 2, 2002, Article 7. https://scholarworks.gvsu.edu/colleagues/vol8/iss2/7
[12] Coffield, F., D. Moseley, E. Hall and K. Eccleston, *Learning Styles and Pedagogy in post 16 learning: A systematic and critical review,* Learning and Skills Research Centre, London, 2003.

suited to support their learning journey. While all modules will be designed for online learning, there will be options for self-directed as well as facilitated learning; online materials for both synchronous and asynchronous delivery; training guides for facilitators, and downloadable materials for people with poor internet access.

All materials will first be developed as stand-alone, online learning modules that are open access and suitable for self-directed learning. They will be available via the ENERI Classroom and the Embassy of Good Science platform.

To increase accessibility and relevance of the learning materials, the following adaptions will be made:

1. The module materials will be downloadable in PDF format for people who prefer this format or do not have the facilities for online learning.
2. Training guides will be produced for each session to help facilitate the use of the materials in face-to-face teaching environments. These will include recommendations for further and deeper learning.
3. Core materials will be translated into a range of different languages.

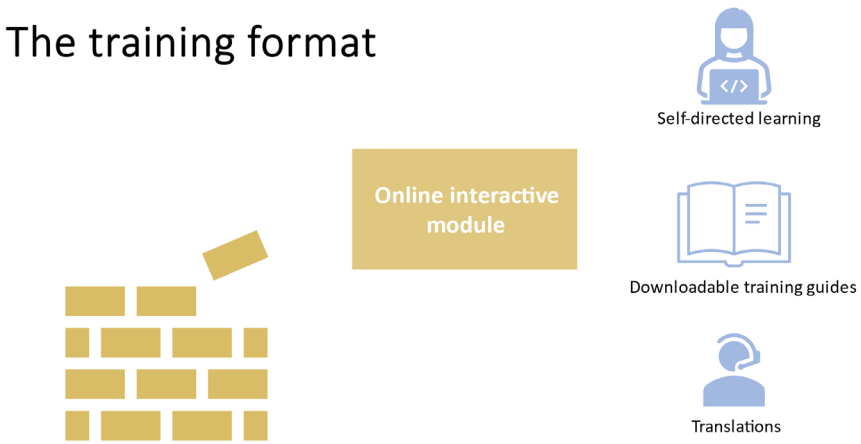


Figure 2. The training building blocks and adaptions

3. Process

The pedagogical foundations and instructional design of the programme are an important facet of the teaching context.

3.1 Pedagogy

Two pedagogical approaches underpin the module development in irecs. The first, knowledge-based learning, is aimed at facilitating understanding and the application of knowledge. This is especially important for the rules and principles-based elements of research ethics whereby persons must comply with certain principles, codes, guidelines, processes and frameworks. The second, transformative learning (TL), is aimed at motivating, challenging embedded notions, and developing confidence when faced with *disorienting ethical dilemmas*. This type of deep learning is especially important for engendering a sense of personal responsibility and accountability in research ethics. Transformative learning cannot be taught[13,14], but programmes may be designed to provide opportunities for transformation. This is particularly effective when authentic dilemmas are embedded within real-world case studies. In irecs, case studies will be used to stimulate TL. While two pedagogical approaches are utilised, most modules will incorporate both. For instance, there will be knowledge elements in the case study modules and examples from real-world/realistic cases will also inform the primarily knowledge-based modules.

Underpinning the design of the irecs modules is recognition that learners should not be viewed as passive receptors of knowledge. When learners are actively engaged in their learning, this promotes student engagement and has a significant impact on experience and outcomes.[15] Learners create their own meanings and understanding as they interact with bodies of knowledge, making adjustments to their existing meaning schemes.[16,17] Evidence that active learning approaches help students learn more effectively than transmissionist approaches, in which instructors rely on "teaching by telling", is robust and stretches back more than thirty years.[18]

In a classroom, active learning can involve group activities, and other practical and facilitated task-based work, which is not always an option for an online, self-directed course. For online learning, the most effective means of facilitating active learning is via inbuilt interactive activities that require higher order thinking (for instance, application, analysis, and reflection). Even in the online learning environment, there are numerous mechanisms that can foster student engagement[19] as has become starkly evident during the coronavirus pandemic. For instance, online teaching might include interactive games, quizzes, feedback, animations, audio and video of various types. The irecs consortium will draw upon leading edge research and experience in online teaching to guide the development of learning materials that are both visually and intellectually stimulating.

The technique of *scaffolding*, which arises from the cognitivist perspective of a graduated progression in learning development[20], involves providing stepping-stones in the form of resources and tasks which aim to lead students to increasingly higher levels of learning, development, or understanding.

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[13] Cranton, P. and M. Roy, "When the bottom falls out of the bucket: Toward a holistic perspective on transformative learning", *Journal of Transformative Education, Vol.* 1, Issue 2, 2003, pp. 86-98.
[14] Illeris, K., "Transformative learning in higher education", *Journal of Transformative Learning, Vol.* 3, Issue 1, 2015, pp. 46-51.
[15] Khan, A., O. Egbue, B. Palkie and J. Madden, "Active learning: Engaging students to maximize learning in an online course", *Electronic Journal of E-Learning*, Vol. 15, Issue 2, 2017, pp. 107-115.
[16] Rogers, A., *Teaching adults* (3rd edition), Open University Press, Maidenhead, 2002.
[17] Scales, P., *Teaching in the lifelong learning sector*, Open University Press, Maidenhead, 2008.
[18] Brame, C., *Active learning*, Vanderbilt University Center for Teaching, *2016*.
https://www.oaa.osu.edu/sites/default/files/uploads/nfo/2019/Active-Learning-article.pdf
[19] Centre for Teaching and Learning, *Online teaching,* University of Oxford, 2021.
https://www.ctl.ox.ac.uk/online-teaching#/
[20] Holmes, B. and J. Gardner, *E-learning: concepts and practice,* Sage, London, 2006.

The use of scaffolding techniques is eminently suitable for the online learning environment, as single modules can be selected to address a particular learning need, or they can be packaged together to form an entire course to support a progression of learning at increasingly higher levels.

This is not a straightforward task; effective online training requires constructive alignment between the aims, objectives and testing of knowledge within the modules, understanding of the latest developments in online delivery, and close collaboration with skilled designers, technical developers and end users. Nevertheless, members of the irecs consortium have a strong track record of developing successful training programmes[21], including widely used online training materials for research ethics.

3.1.1 Instruction and design

A wide variety of delivery methods will be embedded within each module to promote student engagement with materials. For instance: short text passages can be interspersed with video, animation, and interactive elements which ensure active participation and help to embed learning. Additionally, there will be a range of interactive activities and games such polls, multiple choice, matching games, and decision trees. There will also be a range of visual materials such 2D and 3D animations, slide shows, documentaries, and talking heads videos. In the real-world/realistic case study modules, learners will be guided through exploration of the 'facts' from differing perspectives, engage in critical reflection upon their own assumptions, and deal with challenging ethical norms.

3.2 An overview of the course structure

The irecs training will consist of a range of modules that can be selected according to need. The identification of competencies indicated that three types of modules are required, and the pedagogical approach demands two types of learning as shown in Figure 3.

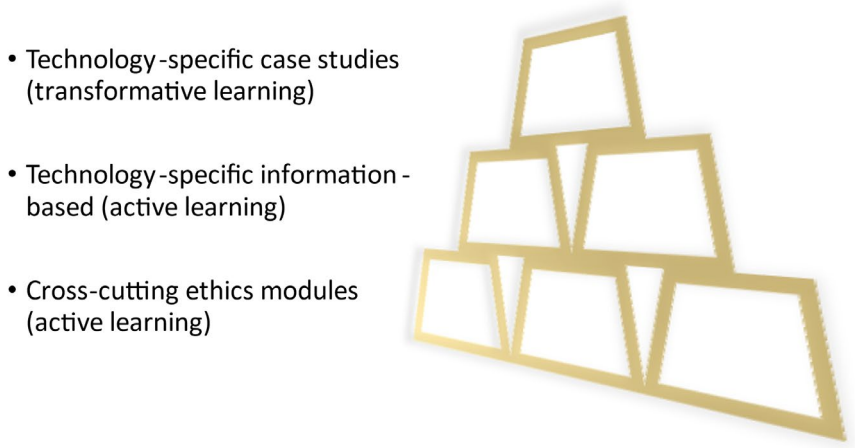

Figure 3. Three types of modules: two types of learning

[21] For instance: *Ethics for research ethics committee members*, developed for the Health Research Authority UK, *Becoming an Ethical Researcher* **and** *Research Ethics in Practice* for Epigeum UK, Ireland, Australia.

The cross-cutting modules (Figure 4) will be aimed primarily at students and researchers to improve their understanding and appreciation of ethics, research ethics and integrity. It is assumed they will be too basic for ethics appraisers. Nevertheless, some may be relevant for appraisers too, for instance, 'ethics dumping'.

Figure 4. Cross cutting module examples

For the online, self-directed learner, the most effective means of facilitating active learning is via the use of inbuilt interactive activities that require higher order thinking (for instance, application, analysis and reflection). For engaging and effective active learning, a variety of interactive exercises (such as quiz, poll, pair matching, multiple choice, or other games) can be interspersed with a variety of knowledge/information delivery methods (such as text, video, animation, interviews etc.). Based on these pedagogical techniques, a module might take this sort of format shown in Figure 5.

Module format	Role
Introductory text	*Knowledge delivery*
Interview	*Knowledge delivery*
Interactive activity: Quiz	*Application*
Feedback	
Animation	*Knowledge delivery*
Interactive activity: Drag and drop	*Application*
Feedback	
Slide show	*Knowledge delivery*
Interactive activity: Poll	*Reflection*
Feedback/ end text	*Consolidation*
Links to other relevant training / regulatory information; Downloadable PDF version; Further reading	

Figure 5. Active learning online (not passive information delivery)

For each technology there will be two modules, underpinned by active learning as shown in Figure 6. The technology basics modules will include the essential information about the technology, research and development, use and impacts for the ethics appraisers who may not have any prior knowledge.

(It is assumed that students and researchers already have at least a basic understanding.) The technology ethics issues modules need to be relevant to all three groups. It may not be possible to include every potential ethics issue, so focus will be upon the primary challenges.

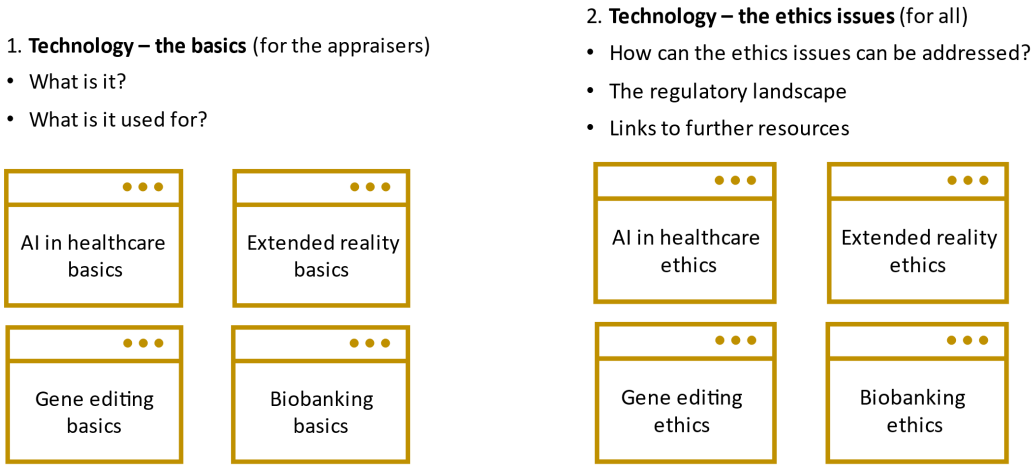

Figure 6. Two knowledge-focused (active learning) modules for each of the technologies

As indicated in Figure 3, the third type of module, case studies, will be designed to stimulate transformative learning. The focus is upon deeper learning rather than additional knowledge. Transformative learning is aimed at motivating, challenging embedded notions, and developing confidence when faced with *disorienting ethical dilemmas*.

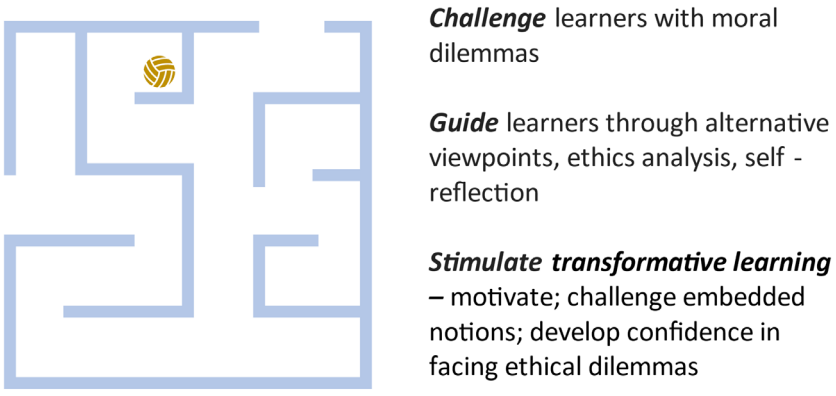

Figure 7. Case studies for deeper, transformative learning

These topics shown in Figure 8 are those that have been agreed for five of the irecs case studies. The sixth case study will be decided later but will likely address a cross-cutting issue. For instance, we could include a case that relates to biobanking, gene-editing and ethics dumping.

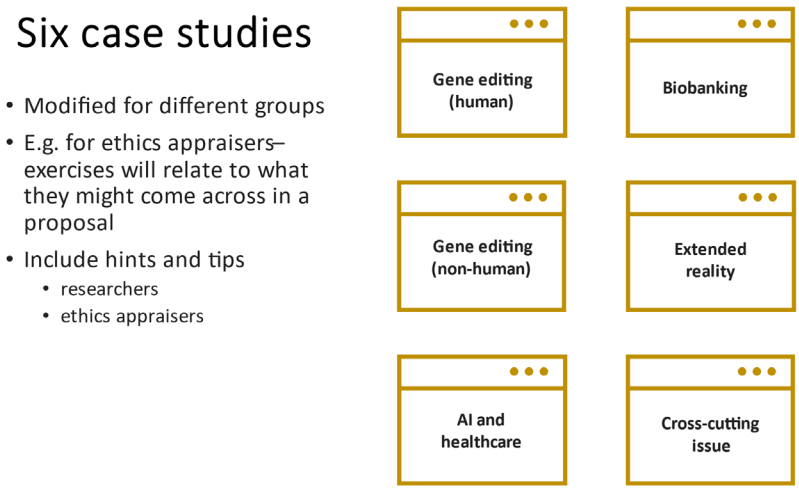

Figure 8. The irecs case studies

4. Product

It is imperative that the training is acceptable and useful to the three target groups and hence is:

i. useable either with or without major modifications, as required

ii. clear and understandable, and without associated intellectual property rights or access complications

iii. successful with trainees, which means training must be able to keep trainees' attention, i.e. is interactive, integrates fun elements and feels relevant and useful, and

iv. implementable within a variety of settings and taking into account inclusiveness and diversity, which means that where needed, it is easily adjusted to local situations and the embedding in different local curricula using diverse platforms and delivery methods.

To ensure real-world relevance, learning outcomes will be clearly set out for each modular component of the course, which will link to overarching learning outcomes identified for the irecs programme. While it will not be possible to test all users for achievement of the learning outcomes, all developments will be piloted with small groups of the relevant end users in an iterative fashion before being tested on a wider scale within WP5.

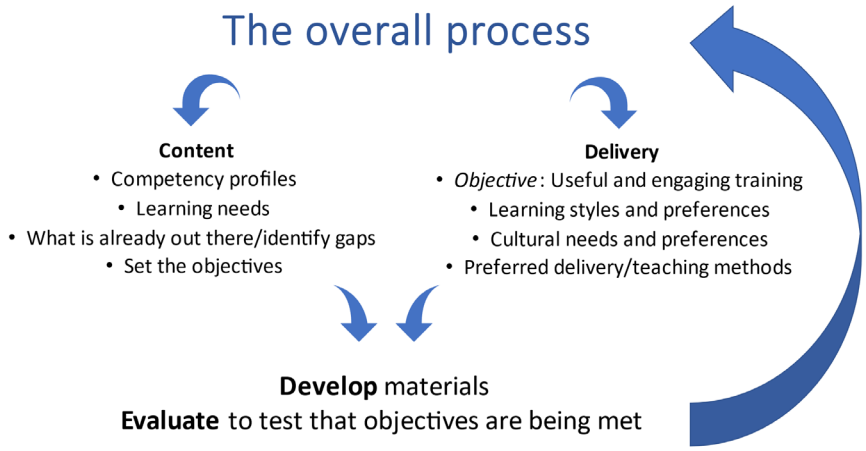

Figure 9. The overall process of training development

Hence, the 'product' of irecs will be tested in an iterative manner during development. Evaluation will be used to test whether the training is meeting the learning objectives, but also whether it is sufficiently acceptable and engaging. Findings from the evaluations be fed back into development for refinement where needed.

ANNEXES

Annex 1 Findings from workshop to determine competency profiles and training needs

Researchers	Students	EC experts
Competency profiles		
Why we consider something ethical Descriptive / normative ethics Cultural differences Reflection skills Keeping an open mind Capacity to develop moral compass Examples of good / bad practice How to apply concepts to their research Sense of responsibility Awareness of their impact Capacity to adapt Recognition that others face the same problem Awareness of existing networks Knowledge of existing resources Knowing it is ok to ask Awareness of role of ethics Understanding of ethics Understanding research ethics	Combining basics of two RCR perspectives Research Integrity Research ethics (e.g., human rights, RE principles) Trust creation Critical thinking Open-mindedness Transdisciplinary perspective (awareness of social sciences/humanities for science students and vice versa) Long-term thinking	Moral imagination Capacity to envisage consequences of project During implementation and long-term Sensitivity and reflective awareness Cultural In context Independence Receptivity, emotional engagement Communication and writing skills Know protocols and formats of ethics assessment Know tech and science Know current societal debates Know key stakeholders Know whom to consult with Know how to find reliable and relevant information Respect mandate and carefully address “grey zone” issues Respect guidelines and codes
Considerations for engaging training		
Make ethics less scary Environment that motivates them to engage Certificate? Mandatory for PHD Self-paced MOOCs Discussion opportunities Format: role plays with other researchers Heterogeneity / homogeneity of group Level of seniority Gender Culture Diversity of interpretations of material Fits into career structures and expectations Workshops with case studies	Clear-cut cases versus grey area cases Interesting topics, e.g. brain organoids, ethics dumping, neuroscience ethics Easy access Provide context Make it enjoyable Use own cases to motivate Dilemma games Interactive Get feedback on course	Adapt training to: • Objectives • Contents • Tech family Balance dialogical and debating methods. Use exercises with different degrees of confrontation, from seeking consensus to analyzing dilemmas. Identify and discuss dilemmas, including the ones introduced by participants. Address cross-cutting issues that arise for many technologies Use real-life case studies that are specific to technology area Use scenarios to train moral

Case studies and dilemmas Include experts from different fields Duration Modular structure Different levels of training (student ECR, experts) Choice of level Engagement with existing research ethics training		imagination Provide historic perspective and place the ethics evaluation of current technologies within the bigger picture Provide background reading and information When possible, use videography or other feedback methods Use visual or sound illustrations

Annex 2 ResearchComp

ResearchComp, the European Competence Framework for Researchers, is a tool to assess and develop researchers' transferable skills and foster career development. ResearchComp has this to say about competencies in ethics and integrity in Section 5:

5. Apply research ethics and integrity principles

Apply fundamental ethical principles and legislation to research and innovation, including issues of research integrity. Perform, review, or report research avoiding misconducts such as fabrication, falsification, and plagiarism.

- Has a basic understanding of ethical conduct of research and of integrity principles.
- Asks for expert advice when in doubt about ethical decisions.

- Is well versed in the ethical conduct of research.
- Provides advices about ethical issues of research to peers.
- Is alert and attentive to falsification and plagiarism

- Engages actively in the works of various ethical committees.
- Promotes public understanding of the ethical issues raised by research.
- Helps less experienced researchers in the ethical conduct of research

- Actively contributes to develop ethical guidelines and systems to ensure ethical conduct of research in academia.
- Advises policy makers on policies and procedures of own research/academic/professional sector.