Global synthesis of 1st wave discussions

Global-Health analysis

In 2023, discussions on what it means to be human in the time of neuroscience (NS) and AI have been facilitated by NHNAI partners in 9 different countries. In each country, 3 lines of discussions have been opened to explore this question in the **3 thematic fields of education, health, and democracy**. Each partner then produced 3 **local syntheses** reporting on the content of discussions in these 3 fields in the corresponding countries.[1] On this ground, the coordination team proposed 3 **global thematic syntheses** (one per field explored, education, health and democracy). Finally, ideas of these 3 global thematic syntheses have been grouped to generate one **global-transversal synthesis**, gathering ideas that were more general and have been expressed in different thematic field.

This document presents **ideas of the global-health synthesis**, together with nexuses in which some ideas emerging from discussions enter in conflict and tension, manifesting possible complexities and delicate points of questions related to the topic of health.

[1] For an exact total of 8*3 + 2 local syntheses. In Canada (Québec), Cégep Sainte-Foy organized discussions focused on Democracy and Education, but not on Health.

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Part 1: Global-health ideas

Being human in the time of NS and AI means …

Preserving human agency and autonomy (in healthcare)

Patients, physicians, and other health professionals and healthcare providers should keep their agency and autonomy. With the support of technologies such as AI empowered precision medicine and through an excessive focus on what can be measured and quantified, medicine and healthcare may become overly prescriptive and coercive (imposing a certain vision of what health means). In the same vein, overdependence on such technologies may prove harmful on the long run (deskilling, loss of resilience in case of technologies unavailability). The risk also exists that technology facilitates illegitimate intrusion of outsiders (governments, administrators, insurers …).

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Improving healthcare and medicine without losing sight of persons
- Improving healthcare and medicine without undermining professionals' agency and autonomy

Corresponding ideas from local thematic syntheses:

4 countries (BE, FR, TW, USA) 5 ideas

- (France – Health) The debate about increasing human capacity through technology raises profound concerns
- (France – Health) Undesirable: Technological domination and algorithm normativity
- (Belgium – Health) The patient's freedom and autonomy are threatened by ever more control
- (Taiwan – Health) Undesirable: AI replacing humans in healthcare
- (USA – Health) AI puts at risk human agency, clarity and distribution of moral responsibility, and autonomy

Never believing we can delegate (moral) responsibility to machines

Only humans can be (morally) responsible for medical decision-making and caregiving. Except in certain specific legal senses (corporate responsibility, legal personhood allowing for instance for monetary compensation), moral responsibility (and criminal one) can never be attributed to machines. Dilution and obfuscation of chains of responsibility is highly problematic.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Improving healthcare and medicine without undermining professionals' agency and autonomy

Corresponding ideas from local thematic syntheses:

6 countries (BE, KE, IT, PT, TW, USA) 7 ideas

- (Belgium – Health) Artificial intelligence increases the efficiency and skills of doctors: responsibility can therefore be attributed to them
- (Belgium – Health) Doctors must not abandon their responsibility so that trust is preserved
- (Italia – Health) AI and Ethical Decision-Making

- (Kenya – Health) Moral judgement
- (Portugal – Health) Desirable: Humans should always be responsible for health decision-making and communication processes
- (Taiwan – Health) Humans are ultimately responsible for healthcare decisions
- (USA – Health) AI puts at risk human agency, clarity and distribution of moral responsibility, and autonomy

Acknowledging some of our limitations and vulnerabilities as inherent to our human nature

Meaning and value of life cannot reduce to efficiency and performance only. Systematically rejecting limits, attempting at overcoming and transgressing all limits by principles can deeply undermine our humanity. Some limits and vulnerabilities (such as being "affectible", and thus susceptible to experience suffering, or being mortal) also are core to what it means to be human. In the same vein, fatigue and weariness are sometimes the sign that something is wrong in one's life, rather than mere limits to overcome (e.g. by using some enhancement technologies). This type of limits deserves acknowledgement and great delicacy when dealt with in the healthcare context.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Distinguishing between care, legitimate improvement and dehumanizing practices

Corresponding ideas from local thematic syntheses:

2 countries (FR, PT) 2 ideas

- (France – Health) Some participants explore the notion of human vulnerability and the implications of technological enhancement
- (Portugal – Health) Humans have physical and mental limitations

Constantly seeking for self-improvement and progress

Humans tend to seek for self-improvement and progress, for maximizing their efficiency. Those are strong objective for most of us (which can lead to use cognitive enhancers or other enhancement technologies).

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Distinguishing between care, legitimate improvement and dehumanizing practices
- Enhancement technologies: finding the right balance between innovation and safety

Corresponding ideas from local thematic syntheses:

1 country (PT) 1 idea

- (Portugal – Health) Humans are highly motivated to improve and achieve more

Recognizing patients in their singularity and diversity (within a comprehensive approach)

Patients must be acknowledged as singular being, and treated accordingly, in a comprehensive way resisting any reduction (notably to measurable and quantifiable aspects or to what can be accounted for and addressed through technological means), doing justice to their diversity. The information about healthcare technologies that are provided to them should respect the needs, context and specificities of each person. Patients are not reducible to their medical condition. AI technologies should not lead to an excessive and exclusive focus on biological dimensions or dimensions covered by natural sciences (thereby excluding in principle traditional and alternative medicines).

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Improving healthcare and medicine without losing sight of persons

Corresponding ideas from local thematic syntheses:

3 countries (BE, CH, FR) 5 ideas

- (Belgium – Health) The patient's freedom and autonomy are threatened by ever more control
- (Belgium – Health) Technology leads to discrimination between medical practices
- (Chile – Health) Adaptation to Patient Diversity
- (France – Health) Participants explore the complex relationship between artificial intelligence, neuroscience and human nature
- (France – Health) Undesirable: Technological domination and algorithm normativity

Maintaining empathy and human relationship at the core of healthcare

Human contact and relationship are indispensable, especially for those that are ill (role of empathy, emotional support and counseling). The quality of doctor-patient relationship (with trust it allows establishing) is central. More than a side dimension, it is a key factor in healthcare and caregiving. AI and automation can undermine this humane dimension of healthcare. Trust can be damaged by uses of health data perceived as illegitimate (such as by outsiders like company insurances or governments). The surrounding context can reinforce this risk of degrading the quality of human contact in healthcare, for instance in time of crisis (pandemics but also in ICU) or because of the exhaustion of healthcare systems. This importance of human relationship should also be preserved in medical training (especially when more and more digital tools are involved, e.g. virtual reality).

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Improving healthcare and medicine without losing sight of persons
- Ensuring fairness and equity with AI and health technologies

Corresponding ideas from local thematic syntheses:

7 countries (BE, CH, FR, KE, PT, TW, USA) 17 ideas

- (Belgium – Health) Technology should not decide the fate of a patient by replacing human relationships
- (Belgium – Health) Doctors must not abandon their responsibility so that trust is preserved
- (Belgium – Health) Human relationships risk being sacrificed for the benefit of AI techniques
- (Chile – Health) Empathy and Patient Respect
- (Chile – Health) Challenges of Humanization in Health Crises

- (Chile – Health) Workload and Health Crises
- (Chile – Health) Humanization in Intensive care
- (Chile – Health) Dehumanization of Medical Practice
- (Chile – Health) Technological Innovations in Medical Training
- (France – Health) Democratic issues are also shifting to health
- (Kenya – Health) AI in the Health in the African context
- (Kenya – Health) Human disconnection in the health care
- (Portugal – Health) Human contact and physical touch are basic human needs
- (Portugal – Health) Relationships with similar beings are crucial to humans
- (Portugal – Health) Desirable: Health should be promoted by stimulating social contact
- (Taiwan – Health) Undesirable: AI replacing humans in healthcare
- (USA – Health) AI risk to the doctor-patient relationship

Using health technologies to better the conditions of life of the most vulnerable persons

AI and health technologies should be used to facilitate access to healthcare (notably through telemedicine and) to the most vulnerable (poor persons, refugees). They may also empower persons with disabilities to help them becoming more independent. To work in that direction, trust and acceptance should be fostered among vulnerable communities (notably through their involvement in the development process).

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Ensuring fairness and equity with AI and health technologies

Corresponding ideas from local thematic syntheses:

1 country (KE) 4 ideas

- (Kenya – Health) Improving access to quality healthcare service for refugees
- (Kenya – Health) Telemedicine
- (Kenya – Health) Empowerment of PWDs to become independent
- (Kenya – Health) Building trust for acceptance of AI and better health outcomes

Ensuring fairness and equality in opportunities for living a good life

AI and health technologies may deeply transform healthcare practices and offer possibilities for human (cognitive) enhancement. This can create or reinforce inequalities. It is necessary to ensure that benefits and difficulties raised by these transformations are fairly distributed (fairness in access to non-dehumanized healthcare and to positively contributing innovations, or in protection against dangers and unwanted effects). Inequalities can be in terms of access (skills and literacy, financial means, material infrastructures) as well as in terms of power or benefit-sharing asymmetries.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Ensuring fairness and equity with AI and health technologies

Corresponding ideas from local thematic syntheses:

6 countries (BE, CH, FR, IT, KE, PT) 12 ideas

- (Belgium – Health) Technology is a source of economic exclusion
- (Belgium – Health) Technology causes discrimination due to its non-neutrality and the high skills it requires
- (Chile – Health) Democratization of Healthcare
- (Chile – Health) Technological Innovations in Medical Training
- (France – Health) Social inequalities arising from access to technological improvements on human beings through AIs and neurotechnologies
- (Italia – Health) Fair and non-biased AI
- (Kenya – Health) Improving infrastructure for better accessibility of healthcare service
- (Kenya – Health) Human history
- (Kenya – Health) AI - Vulnerable people
- (Portugal – Health) Undesirable: The demands regarding human performance and productivity may increase to unrealistic levels
- (Portugal – Health) Undesirable: There may be inequality regarding access to scientific and/or technological health innovations
- (Portugal – Health) Desirable: Universal access to scientific and/or technological health innovations should be fostered

Fostering literacy and critical thinking

Concerned actors (patients, health professionals, caregivers, users of health technologies) should be aware of the nature, limits and risks of technologies they are using, or they are confronted with. More broadly, fostering awareness about health issues and ethical literacy is key. In addition, it is important to adapt information provided to contexts and specific needs of each person.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Improving healthcare and medicine without undermining professionals' agency and autonomy

Corresponding ideas from local thematic syntheses:

4 countries (CH, IT, KE, PT) 4 ideas

- (Chile – Health) Importance of Health Education
- (Italia – Health) Ethical Literacy
- (Kenya – Health) Individual differences
- (Portugal – Health) Desirable: Increasing literacy is necessary to foster the best use of scientific and/or technological health innovations

Ensuring privacy protection (protection of sensitive health information and mind privacy)

Health data collected by AI or digital tools should only serve medical and healthcare purposes. Digital solutions should not imply intrusion of outside organizations (like insurance companies). With the convergence of NS and AI, mind privacy should be protected.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Developing AI and Health technologies without undermining persons' privacy and integrity

Corresponding ideas from local thematic syntheses:

4 countries (CH, IT, KE, USA) 5 ideas

- (Chile – Health) Patient Privacy
- (Italia – Health) Ethical Boundaries in Neuroscience-AI Integration
- (Kenya – Health) confidentiality/privacy when using AI
- (USA – Health) AI risk to the doctor-patient relationship
- (USA – Health) AI puts at risk privacy and opens patients to harm from powerful organizations

Acknowledging the positive contribution of health technologies to healthcare

Health technologies (including AI) can support health professionals in medical decision making (they may even perform better in some tasks). Similarly, automating certain tasks may give more time for the human dimensions of caregiving and healthcare. AI and digital technologies can facilitate access to healthcare and health related information (especially in more isolated or poorer areas). They may also improve medical training, as well as preventive care and health prevention. It would be harmful to reject such positive contributions to healthcare. More broadly, AI and NS progresses may contribute to improve the understanding we have of ourselves and of the other, to refine the understanding we have of ourselves as human being.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Improving healthcare and medicine without losing sight of persons
- Improving healthcare and medicine without undermining professionals' agency and autonomy
- Ensuring fairness and equity with AI and health technologies
- Developing AI and Health technologies without undermining persons' privacy and integrity

Corresponding ideas from local thematic syntheses:

5 countries (BE, CH, KE, PT, TW) 16 ideas

- (Belgium – Health) New technologies are favorable to human relations by saving time and increasing efficiency
- (Belgium – Health) Artificial intelligence increases the efficiency and skills of doctors: responsibility can therefore be attributed to them
- (Belgium – Health) There is no reason to suspect technologies of coming into conflict with the "freedom" of patients
- (Belgium – Health) If a technology is medically beneficial, it should be used
- (Chile – Health) Prevention and Technologies
- (Chile – Health) Technological Innovations in Medical Training
- (Kenya – Health) Automation of some tasks
- (Kenya – Health) AI Application in the Healthcare Sector
- (Kenya – Health) Application of AI in disease treatment
- (Kenya – Health) Application of AI in medical (early) diagnosis
- (Portugal – Health) Desirable: In health contexts, specific tasks may be delegated to machines
- (Portugal – Health) Desirable: Technology is an important resource for patients and informal caregivers
- (Portugal – Health) Desirable: Technology is an important resource for health professionals
- (Taiwan – Health) AI can improve the efficiency of healthcare workers
- (Taiwan – Health) Desirable: Human-AI cooperation in healthcare
- (Taiwan – Health) Desirable: Care-giving robots

Exploring the potential contributions of health technologies to humans' self-improvement

Health technologies can increase physical and mental abilities. They could also prevent their decrease when aging. As we already have health practices with the same goal (e.g. knee or hip replacement), more recent options, such as brain technologies, may become acceptable.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Distinguishing between care, legitimate improvement and dehumanizing practices
- Enhancement technologies: finding the right balance between innovation and safety
- Ensuring fairness and equity with AI and health technologies
- Developing AI and Health technologies without undermining persons' privacy and integrity

Corresponding ideas from local thematic syntheses:

2 countries (FR, PT) 2 ideas

- (France – Health) The debate on the integration of cyborgs into society raises ethical, legal and philosophical questions
- (Portugal – Health) PT-UCP: Desirable: Scientific and/or technological health innovations may increase physical and/or cognitive abilities

Privileging AI cooperation and support instead of human replacement

AI and health technology should contribute to a more humanized healthcare system. In general, machines should not replace humans. In particular, tasks pertaining to medical decision-making, communication and care giving should remain human. Although it is true that health professionals and caregivers often lack time and are exhausted, and that healthcare systems are under high pressure, AI technologies may not constitute the right or primary answer to these major issues.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Improving healthcare and medicine without losing sight of persons
- Improving healthcare and medicine without undermining professionals' agency and autonomy

Corresponding ideas from local thematic syntheses:

8 countries (BE, CH, FR, IT, KE, PT, TW, USA) 16 ideas

- (Belgium – Health) New technologies are not necessarily the solution to the lack of time in medicine
- (Belgium – Health) Human relationships risk being sacrificed for the benefit of AI techniques
- (Belgium – Health) Technology should not decide the fate of a patient by replacing human relationships
- (Chile – Health) Impact on the Doctor-Patient Relationship
- (Chile – Health) Ethical Limits in Care
- (France – Health) Democratic issues are also shifting to health
- (Italia – Health) Humanism and Human-Centric AI Development
- (Italia – Health) Ensuring Human Control
- (Kenya – Health) Human/non human collaboration for better health outcome

- (Kenya – Health) Human replacement by machines
- (Kenya – Health) Enhancement
- (Portugal – Health) Desirable: Humans should always be responsible for health decision-making and communication processes
- (Portugal – Health) Desirable: Humans have an essential role in caregiving tasks
- (Taiwan – Health) Undesirable: AI replacing humans in healthcare
- (USA – Health) AI automating healthcare risks dehumanizing the healthcare system
- (USA – Health) Undesirable: AI that replaces humanity in healthcare, rather than supporting humanity in healthcare

Withstanding the overvaluation of performance, efficiency or productivity

Overvaluing (valuing only) human performance, efficiency and productivity may prevent accounting for other important human values (solidarity, meaning of life, happiness, …). It could lead to massive use of enhancement technologies, with issues of inequalities and of loss of meaning in one's life. It may also lead to focus on measurable and quantifiable aspects alone, at the cost of acknowledging persons experiences and feelings.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Distinguishing between care, legitimate improvement and dehumanizing practices

Corresponding ideas from local thematic syntheses:

4 countries (CH, FR, PT, USA) 4 ideas

- (Chile – Health) Ethical Limits in Care
- (France – Health) The debate about increasing human capacity through technology raises profound concerns
- (Portugal – Health) Undesirable: The demands regarding human performance and productivity may increase to unrealistic levels
- (USA – Health) AI puts at risk privacy and opens patients to harm from powerful organizations

Regulating AI and health technologies in healthcare

There is a strong need for regulation and norms to ensure AI and health technologies deliver positive outcomes in healthcare. Norms and regulation are key to allow for trust building and for persons protection when deploying new technologies in healthcare. AI should comply with human values (fairness, non-bias, …) and should be human-centric (aiming at human flourishing). AI and health technologies should beneficiate to all (it is crucial to fight against the exclusion of poor and vulnerable persons). This need for regulation is even stronger as AI systems come with a lot of uncertainty, notably about their performance and the possibilities of progress in the future. Patients, healthcare professionals, caregivers, citizens and economic/industrial actors should be involved in regulation processes.

Corresponding ideas from local thematic syntheses:

4 countries (CH, IT, PT, USA) 6 ideas

- (Chile – Health) Ethical Reflections on Technological Integration
- (Italia – Health) Humanism, Human values, Human Rights and Ethical Standards
- (Italia – Health) Call to Action
- (Portugal – Health) Desirable: It is necessary to establish limits regarding the use of scientific and/or technological health innovations

- (Portugal – Health) Undesirable: Scientific and/or technological health innovations may pose physical risks
- (USA – Health) AI needs regulation to protect health care norms such as consent, and by extension trust in healthcare

Limiting the use of health-enhancement technologies

Some technologies may have consequences difficult to forecast (like brain technologies), may pose physical or mental risks. While the use of health technologies in a medical context to overcome disabilities and cure seems possible, enhancement practices raise strong ethical concerns (overdependence, deskilling, cyborg social status, …). Patients, healthcare professionals, caregivers, citizens and economic/industrial actors should be involved in regulation processes.

Involvement in nexuses of complexity (see below Part 2: Global-health nexuses of complexities):

- Distinguishing between care, legitimate improvement and dehumanizing practices

Corresponding ideas from local thematic syntheses:

4 countries (CH, FR, IT, PT) 9 ideas

- (Chile – Health) Ethical Limits in Care
- (France – Health) The subject of human enhancement raises complex ethical considerations
- (France – Health) The debate on the integration of cyborgs into society raises ethical, legal and philosophical questions
- (France – Health) The debate about increasing human capacity through technology raises profound concerns
- (France – Health) Undesirable: Some enhancement abilities are desirable
- (Italia – Health) Ethical Boundaries in Neuroscience-AI Integration
- (Italia – Health) Call to Action
- (Portugal – Health) Desirable: It is necessary to establish limits regarding the use of scientific and/or technological health innovations
- (Portugal – Health) Undesirable: Scientific and/or technological health innovations may pose physical risks

Being aware of challenges regulation raises

Some technologies may have consequences difficult to forecast (like brain technologies). Risks may prove difficult to assess. It may be difficult to delineate cure from enhancement in some cases. It may be difficult to judge whether a pathology requires / justifies the use of a given health technology.

Corresponding ideas from local thematic syntheses:

2 countries (PT, TW) 2 ideas

- (Portugal – Health) Undesirable: It is difficult to establish limits regarding the use of scientific and/or technological health innovations
- (Taiwan – Health) Undesirable: Uncertainty over the future of AI

Part 2: Global-health nexuses of complexities

Being human in the time of NS and AI implies to carefully explore nexuses of complexities where valid ideas are nonetheless in tension, manifesting subtleties and challenges one should not overcome. Here are below some examples of **nexuses of complexities** in the field of **health**, identified based on **local and global syntheses**.

Distinguishing between care, legitimate improvement and dehumanizing practices

Some participants in the discussions pointed out that it is in the nature of humans to constantly seek to progress and improve. Advances in AI and neuroscience in the healthcare field may enable us to increase our physical and mental capacities (notably with neurological prostheses or implanted brain-machine interfaces). These technologies could also prevent the loss of capacity associated with aging. Similar practices (with hip or articular prostheses) are already widely accepted in society. We can therefore imagine that more recent possibilities linked to AI and neuroscience (such as brain implants) could also eventually become acceptable.

Nevertheless, the discussions also reveal a concern about the motivations and significance of such augmentation practices. While it seems acceptable to many participants to use health technologies in a curative context (to combat disabilities or degenerative diseases), practices aimed at unlimited increases in longevity or brain capacity, or even military applications, are viewed with more caution, and are even often criticized.

Emphasis is also placed on the risk of overvaluing performance, efficiency and productivity, with an excessive focus on measurable and quantifiable aspects alone, to the detriment of taking into account questions of meaning and values, people's feelings and life experiences.

So, for example, it's not clear that the right response to severe fatigue or a feeling of weariness is to increase resistance through health technologies (such as drugs or brain implants). We need to consider the possibility that such fatigue or weariness may also signal deeper problems in a person's life. Similarly, the discussions lead us to question the very idea of augmentation by technology, which could in some cases degenerate into dependence on technology and loss of competence (do I really become more "powerful" if a brain implant makes me capable of greater cognitive performance? What happens if I no longer have access to this technology, or if it malfunctions?)

On a more global level, some contributions criticize the idea of a systematic desire to surpass and reject all forms of limit, a desire that could go so far as to threaten our very humanity.

Certain limits and vulnerabilities (such as being affectable and therefore susceptible to suffering and death) are at the heart of what it means to be human.

Ideas from local and global synthesis mobilized in this nexus of complexity:

- Potential positive outcomes of enhancement technologies:
  - (Global – Health) Constantly seeking for self-improvement and progress
  - (Global – Health) Exploring the potential contributions of health technologies to humans' self-improvement
- Concerns about overvaluing performance and about systematic rejection of any limits
  - (Global – Health) Withstanding the overvaluation of performance, efficiency or productivity
  - (Global – Health) Acknowledging some of our limitations and vulnerabilities as inherent to our human nature
- Risks of overdependence and deskilling, worries about augmentation practices: (Global – Health) Limiting the use of health-enhancement technologies

Improving healthcare and medicine without losing sight of persons

Participants largely acknowledge that health technologies (including AI) can support health professionals in medical decision making (they may even perform better in some tasks). Similarly, they highlight that automating certain tasks may give more time for the human dimensions of caregiving and healthcare (for instance with care-giving robots). Some participants also point that AI and digital technologies can facilitate access to healthcare and health related information, notably for preventive care and health prevention (especially in more isolated or poorer areas). The idea also emerges that digital technologies can improve medical training (e.g. with virtual or augmented reality).

It is however also largely consensual in discussions that AI and health technology should contribute to a more humanized healthcare system. They should not lead lose sight of the fact that patients are persons that should be treated with a comprehensive approach making room to all relevant dimensions and firmly rooted in empathy and human relationships. The latter are key for the healing process and the doctor-patient relationship. In general, machines should not replace humans. In particular, tasks pertaining to medical decision-making, communication and care giving should remain human. Although it is true that health professionals and caregivers often lack time and are exhausted, and that healthcare systems are under high pressure, AI technologies may not constitute the right or primary answer to these major issues.

In this perspective, many participants warn against the danger of overfocusing on what can be measured and quantified and of reducing patients to their data (with the risk of medicine and healthcare becoming overly prescriptive and coercive). Patients must be recognized in their singularity and diversity.

Ideas from local and global synthesis mobilized in this nexus of complexity:

- (Global – Health) Acknowledging the positive contribution of health technologies to healthcare
- AI and health technologies should not lead to dehumanization of healthcare and medicine:
  - (Global – Health) Privileging AI cooperation and support instead of human replacement
  - (Global – Health) Maintaining empathy and human relationship at the core of healthcare
  - (Global - Health) Preserving human agency and autonomy (in healthcare)
- (Global – Health) Recognizing patients in their singularity and diversity (within a comprehensive approach)

Improving healthcare and medicine without undermining professionals' agency and autonomy

Participants largely acknowledge that health technologies (including AI) can support health professionals in medical decision making (they may even perform better in some tasks). Similarly, they highlight that automating certain tasks may give more time for the human dimensions of caregiving and healthcare (for instance with care-giving robots). Some participants also point that AI and digital technologies can facilitate access to healthcare and health related information, notably for preventive care and health prevention (especially in more isolated or poorer areas). The idea also emerges that digital technologies can improve medical training (e.g. with virtual or augmented reality).

It is however also largely consensual in discussions that AI and health technology should contribute to a more humanized healthcare system. In general, machines should not replace humans. In particular, tasks pertaining to medical decision-making, communication and care giving should remain human. Although it is true that health professionals and caregivers often lack time and are exhausted, and that healthcare systems are under high pressure, AI technologies may not constitute the right or primary answer to these major issues.

Participants also insists upon the fact that health professionals and caregivers should remain in charge of decision making and that overdependence on such technologies may prove harmful on the long run (deskilling, loss of resilience in case of technologies unavailability). Importantly, (moral) responsibility of medical decision making should remain in the hand of humans.

Ideas from local and global synthesis mobilized in this nexus of complexity:

- AI and health technologies can improve medicine and health care: (Global – Health) Acknowledging the positive contribution of health technologies to healthcare
- AI and health technologies should not lead to dehumanization of healthcare and medicine: (Global – Health) Privileging AI cooperation and support instead of human replacement
- Risk of overdependence and of problems with responsibility:
    - (Global – Health) Preserving human agency and autonomy (in healthcare)
    - (Global – Health) Never believing we can delegate (moral) responsibility to machines
    - (Global – Health) Fostering literacy and critical thinking

Ensuring fairness and equity with AI and health technologies

Participants largely acknowledge that health technologies (including AI) can support health professionals in medical decision making (they may even perform better in some tasks). Similarly, they highlight that automating certain tasks may give more time for the human dimensions of caregiving and healthcare (for instance with care-giving robots). Some participants also point that AI and digital technologies can facilitate access to healthcare and health related information, notably for preventive care and health prevention (especially in more isolated or poorer areas). The idea also emerges that digital technologies can improve medical training (e.g. with virtual or augmented reality).

Participants also recognize that advances in AI and neuroscience in the healthcare field may enable us to increase our physical and mental capacities (notably with neurological prostheses or implanted brain-machine interfaces). These technologies could also prevent the loss of capacity associated with aging.

However, participants also warn against the risk that the benefits and disadvantages of AI and health technologies may be unfairly distributed. While the potential to better the life of the most vulnerable is enormous, many participants worry about the risk access inequalities (because of lack of financial resources, but also of digital literacy or of reliable infrastructures). Notably, human contact and relationship in healthcare should not become a luxury, access to would be denied for the less favored. The same type of questions arises with respect to access to enhancement technologies.

Ideas from local and global synthesis mobilized in this nexus of complexity:

- AI and health technologies can improve medicine and health care: (Global – Health) Acknowledging the positive contribution of health technologies to healthcare
- Potential positive outcomes of enhancement technologies: (Global – Health) Exploring the potential contributions of health technologies to humans' self-improvement
- Need for fairness and equitable benefit sharing:
    - (Global – Health) Ensuring fairness and equality in opportunities for living a good life
    - (Global – Health) Using health technologies to better the conditions of life of the most vulnerable persons
    - (Global – Health) Maintaining empathy and human relationship at the core of healthcare

Enhancement technologies: finding the right balance between innovation and safety

Some participants in the discussions pointed out that it is in the nature of humans to constantly seek to progress and improve. Participants also recognize that advances in AI and neuroscience in the healthcare field may enable us to increase our physical and mental capacities (notably with neurological prostheses or implanted brain-machine interfaces). These technologies could also prevent the loss of capacity associated with aging. Similar practices (with hip or articular prostheses) are already widely accepted in society. We can therefore imagine that more recent possibilities linked to AI and neuroscience (such as brain implants) could also eventually become acceptable.

Nevertheless, discussions also highlight risks of addiction, or other side effects such as changes in personality, or impaired decision-making abilities.

It is important to properly assess the benefits-risks balance.

Ideas from local and global synthesis mobilized in this nexus of complexity:

- Potential positive outcomes of enhancement technologies:
    - (Global – Health) Constantly seeking for self-improvement and progress
    - (Global – Health) Exploring the potential contributions of health technologies to humans' self-improvement
- Worries about risks and side effects:
    - (Portugal – Health) Desirable: It is necessary to establish limits regarding the use of scientific and/or technological health innovations
    - (Portugal – Health) Undesirable: Scientific and/or technological health innovations may pose physical risks.

Developing AI and Health technologies without undermining persons' privacy and integrity

Participants largely acknowledge the benefits one can get from developing AI and health technologies in healthcare and medicine as well as in the domain of human enhancement (improved medical decision making, automation of certain tasks, enhanced access to healthcare and health related information, enhancement of physical and mental capacities, …).

At the same time, participants also worry about the risk that sensitive health information are collected for non-medical uses. Health data collected by AI or digital tools should only serve medical and healthcare purposes. Digital solutions should not imply intrusion of outside organizations (like insurance companies).

Moreover, with the convergence of NS and AI, data could be used to enhance prediction power over persons behaviors and thought, as well as the possibilities for cognitive manipulation. Therefore, mind privacy should be protected.

Ideas from local and global synthesis mobilized in this nexus of complexity:

- AI and health technologies can improve medicine and health care: (Global – Health) Acknowledging the positive contribution of health technologies to healthcare
- Potential positive outcomes of enhancement technologies: (Global – Health) Exploring the potential contributions of health technologies to humans' self-improvement
- Importance of (mind) privacy protection: (Global – Health)Ensuring privacy protection (protection of sensitive health information and mind privacy)