

# Prioritizing Human Well-being in the Age of Artificial Intelligence



**The IEEE Global Initiative for Ethical Considerations  
in Artificial Intelligence and Autonomous Systems**

[standards.ieee.org/develop/indconn/ec/autonomous\\_systems.html](https://standards.ieee.org/develop/indconn/ec/autonomous_systems.html)

 **IEEE**  
*Advancing Technology  
for Humanity*

# Prioritizing Human Well-being in the Age of Artificial Intelligence

## What You Measure Matters.

On 11 April 2017, IEEE hosted a dinner debate at the European Parliament in Brussels called, [Civil Law Rules on Robotics: Prioritizing Human Well-being in the Age of Artificial Intelligence](#).

The event featured experts from [The IEEE Global Initiative for Ethical Considerations in Artificial Intelligence and Autonomous Systems](#) (“The IEEE Global Initiative”) and was hosted by Member of European Parliament (MEP) Mady Delvaux (The Progressive Alliance of Socialists and Democrats, Luxembourg), who served as Rapporteur on the Parliament’s [Civil Law Rules on Robotics](#) report. Among other recommendations, the report proposed a system of registration for advanced robots managed by a potential EU Agency for Robotics and Artificial Intelligence (AI).

The report also suggested autonomous robots be granted the status of [electronic personhood](#) under a liability framework regarding the actions of these devices and their users. This idea has been largely misconstrued as a form of robot rights although the way “personhood” is described in the report is similar to the legal notion of corporate personhood. The confusion and heightened interest surrounding this issue paved the way for an in depth discussion on how to ascribe and measure value for technology and the well-being of the people who use it.

The [Gross Domestic Product created in 1937 by Simon Kuznets](#) has been utilized as the primary metric of value for technology and society for decades. Since its inception, many economists have posited that when the Gross Domestic Product (GDP) increases so does citizen happiness or well-being.

However, in 2007, the European Commission hosted The “Beyond GDP” conference where over six hundred and fifty attendees recognized that the primary metric and paradigm of value for the world measures growth and income but does not incorporate factors like the environment or mental and emotional health in its calculations.

It has also been widely recognized that an increase in GDP does not directly correlate to an increase in citizen well-being, a fact substantiated by [The Measurement of Economic Performance and Social Progress](#) report from 2009 (commonly referred to as “The Stiglitz Report”) that states, “The time is ripe for our measurement system to shift emphasis from measuring economic production to measuring people’s well-being.”

## Prioritizing Human Well-being in the Age of Artificial Intelligence

The GDP goes up in a traffic jam due to increased gasoline consumption, but few would argue that humans feel a sense of increased happiness or well-being when they are in those cars. Similarly, autonomous vehicles, companion robots, or AI-enabled algorithms may increase economic metrics, but their effect on human emotions is not recognized or measured by the GDP.

A primary subject of debate for IEEE's event at the Parliament was to ask how existing Beyond GDP metrics that do measure emotion or other AI-relevant factors could increase the efficacy of these technologies while inspiring ethically driven innovation overall.

In the same way the notion of liability must evolve to best define accountability for a robot and its operator, the hypothesis for the evening was that the world's top metric of value must move Beyond GDP to holistically measure how intelligent and autonomous systems can hinder or improve human well-being.

**“The time is ripe for our measurement system to shift emphasis from measuring economic production to measuring people’s well-being.”**

*The Stiglitz Report*

# Prioritizing Human Well-being in the Age of Artificial Intelligence

## From Material to Multi-Dimensional

MEP Mady Delvaux (The Progressive Alliance of Socialists and Democrats, Luxembourg), opened the evening by welcoming guests and pointed out the challenge that robots, AI, and algorithms are becoming increasingly powerful in our lives: “I believe that everyone agrees we want the technology and research to serve human beings but certainly when it comes to the details things will become more complicated.” She also pointed out there were numerous questions to answer on these subjects, like how best to define well-being and how we can assure that the ethical principles we elucidate around these issues will be implemented.

As a final point regarding these emerging technologies she asked, “Is everything that is feasible also desirable and how can we avoid unintended consequences of robotics and Artificial Intelligence?” before introducing the evening’s keynote speaker.

“My starting point is the following,” offered keynote Fabrice Murtin, Senior Economist, Household Statistics and Progress Measurement Division of the [OECD Statistics Directorate](#), “GDP is a good and necessary measure of economic activity, but it is a very poor measure of people’s well-being.” Murtin pointed out there are two fundamental reasons for this:

- The GDP does not reflect the diversity of household situations in a country as there is no inequality component embedded into it.
- It also does not account for the many dimensions of well-being, which go beyond

material conditions. Health, environment, work-life balance are all-important dimensions of human well-being. (See Better Life Index (BLI) diagram).

It is the need to measure multiple factors beyond the material metrics prioritized in the GDP that Murtin emphasized as being so important for governments and organizations to consider. Fortunately this mind-set is being incorporated by multiple organizations: “One could argue that the United Nations through their [Sustainable Development Goals](#) (SDGs) has embraced this multi-dimensional framework that is at the heart of the matter for tonight’s discussion.”

Specifying that using these holistic metrics allows one to reflect the complexity of well-being of a country, he observed how the same kind of multi-dimensional framework could be used to assess the consequences of the transformation our societies are facing due to AI, autonomous systems, and digitalization in general. “The idea,” he noted, “is that the changes that are brought forward by these digital technologies could be monitored across all the various dimensions of human well-being.”

---

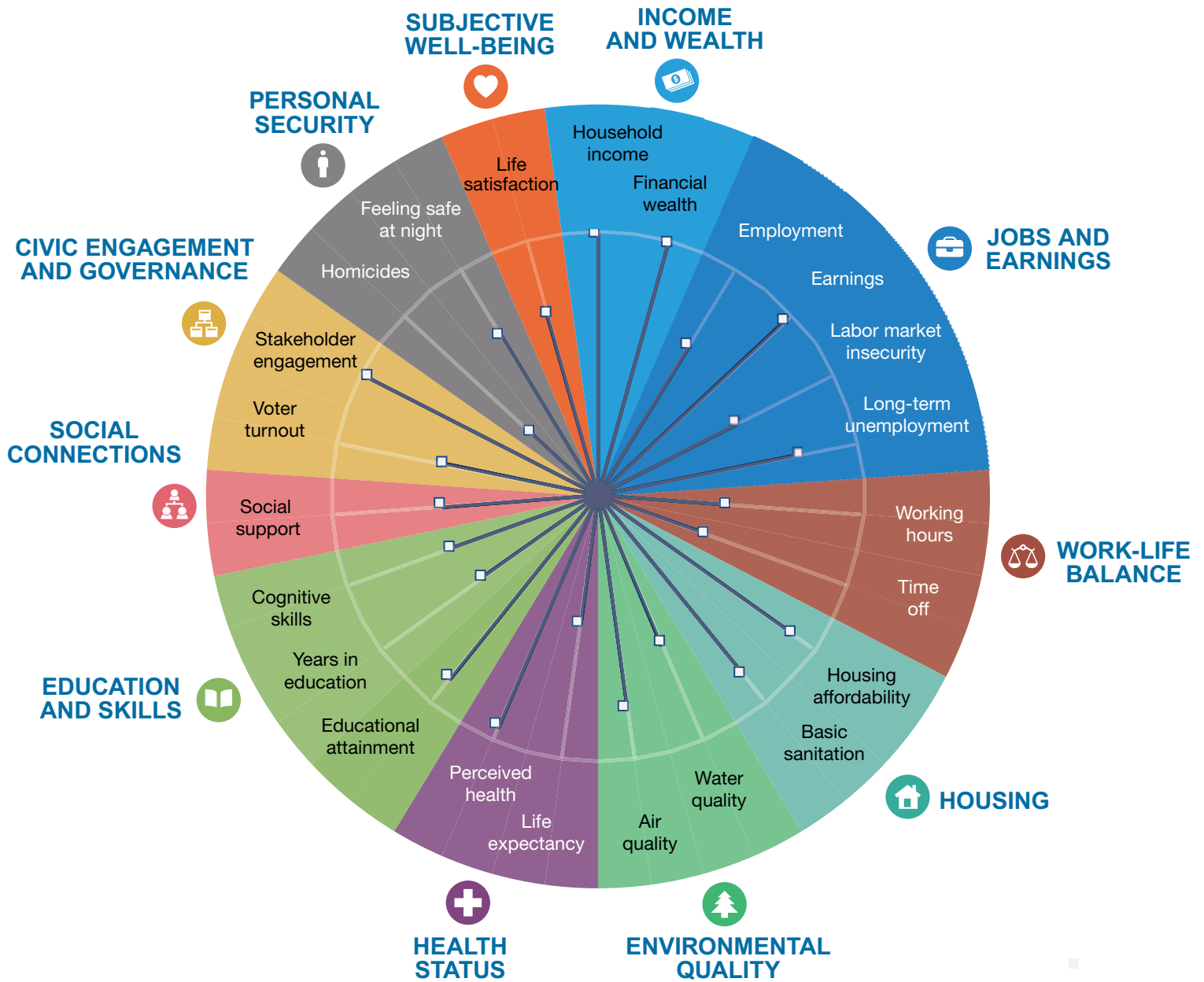
**“The idea is that the changes that are brought forward by these digital technologies could be monitored across all the various dimensions of human well-being.”**

*Fabrice Murtin, Senior Economist, Household Statistics and Progress Measurement Division of the OECD Statistics Directorate*



# Prioritizing Human Well-being in the Age of Artificial Intelligence

## BLI in the U.S.



—□— United States

OECD (2015) *How's Life?* OECD Publishing, Paris.

# Prioritizing Human Well-being in the Age of Artificial Intelligence

## From Economics to Ethics

After Murtin's keynote, the first panel of the evening took place featuring:

- **Raja Chatila** – IEEE fellow, Director of the Institute of Intelligent Systems and Robotics, Sorbonne – University Pierre and Marie Curie, Paris and Chair of the Executive Committee for The IEEE Global Initiative;
- **Salla Saastamoinen** – Director, Directorate A, Civil and Commercial Justice, Directorate -General (DG) for Justice and Consumers (JUST), European Commission; and,
- **Juha Heikkilä** – Head of Unit, Robotics & Artificial Intelligence, Directorate -General (DG) Connect for Communications Networks, Content and Technology (CONNECT), European Commission.



Panel One, from left to right: Salla Saastamoinen, Raja Chatila, and Juha Heikkilä

Moderating the panel was John C. Havens, Executive Director of The IEEE Global Initiative, who began the discussion stating that, “Few would argue that ethical considerations for AI should be prioritized for tech policy. But without an underlying shift in our economic measures, ethics provide little resistance to market forces and exponential growth. How can enlightened economists demonstrate new forms of values for technology creation so AI development can prioritize human and environmental well-being?”

Salla Saastamoinen provided the first response to the question with a broad focus on her work within the Commission, highlighting the aims and goals the European Union should advance: “It is the values of human dignity, freedom, democracy, equality, rule of law, and respect of human rights that is the big framework for us.” Referencing the subject matter for the evening she also pointed out that, “One of the first aims of the EU is the promotion of its values and the well-being of its people.”

---

**“One of the first aims of the EU is the promotion of its values and the well-being of its people.”**

*Salla Saastamoinen – Director, Directorate A, Civil and Commercial Justice, Directorate -General (DG) for Justice and Consumers (JUST), European Commission*

## Prioritizing Human Well-being in the Age of Artificial Intelligence

Noting that from the DG Justice angle her work included reviewing the possibilities for accidents that come with any new technology, the question of liability brought up by the Civil Law Rules on Robotics report was highly relevant. This includes aspects of safety for consumers and the challenges robotics and AI pose for human rights. As she noted, “It is about fairness, about privacy, about all aspects of fundamental rights that we aim to look at it, including how these affect the rule of law and democracy.”

Juha Heikkilä took the floor next noting that there will be jobs created as well as jobs lost in the wake of automation. He also stated that it is important to make the most of the benefits that these technologies can bring: “Society cannot hold progress, and it’s important for Europe to be a part of it. There are tangible economic benefits and we feel it is important for us to be at the forefront of this technology. If we can’t stop its progress we’d better be involved in it to ensure it is not done on the conditions of others based on their values.”

Bringing conversation back to the idea of well-being, Havens asked Raja Chatila how he thought well-being metrics could provide new perspectives or even potential solutions for policy makers regarding the manufacturing of AI and Robotics.

Chatila replied that while research is designed to produce new knowledge, it is often motivated by societal challenges such as health, transportation,

or safety. But when it comes to an individual researcher tasked to develop systems to address these challenges, a primary motivation is often efficiency. In regards to industry, Chatila described that the focus can often be on “general competitiveness and from this point of view the issue is more about economic growth, which means that people may not often explicitly consider well-being issues even if the project is about one of the areas defined by Beyond GDP metrics.”

Saastamoinen raised the concern of how best to evolve existing product liability rules at the European Union level with regards to robotics and AI. She called attention to the challenge to address the difference between a defect in an intelligent or autonomous system versus a new behavior exhibited by such systems, and to which behavior users or consumers are not used to yet. “We need to ensure we have a balanced system for the investors of the industry. Somebody is paying for the development of robotics, so the system must be something that gives them a legal certainty. This is the balance we are focusing on – how to provide clarity and legal certainty.”

Heikkilä shed light on the critical need for “re-skilling,” noting that the subject of providing education and training in automation is often overlooked. He also pointed out that changes at the workplace brought about by automation would

## Prioritizing Human Well-being in the Age of Artificial Intelligence

not always lead to the loss of a given job. Rather, changes in the workplace inspire an evolution in the tasks that people do and there will be more co-working opportunities that will become important. In this scenario training to make the workforce more flexible regarding automation will be critical. Along with re-skilling he declared that “at least some responsible companies will have an interest in taking the well-being aspect to heart because it’s in their best interest to have a satisfied workforce.”

Closing the panel, Chatila observed that until fairly recently while he was aware that well-being metrics existed, he was not convinced that they could be translated explicitly into the development of AI and robotic systems. However, his recent work prioritizing ethical principles with The IEEE Global Initiative led him to reflect on how one could translate such metrics into constraints that are taken into consideration during research or development work for these technologies.

To do this, he said, one needs to think about the stakeholders who are going to use these technologies and ask questions like, ‘does this

product or system have implications on the mental health of the user?’ For instance, he described how people may become confused thinking that robots express emotions whereas they are actually machines and do not have any feeling. And it is by asking these questions that researchers come up with answers that can guide the research process or the development process itself.

“The point is that we really have to follow a reflection,” imparted Chatila at the end of the panel. “On the various recommendations raised you can ask questions about how to address the well-being of the user to come up with concrete solutions. This is the game changer for how we rethink development.”

---

**“On the various recommendations raised you can ask questions about how to address the well-being of the user to come up with concrete solutions. This is the game changer for how we rethink development.”**

*Raja Chatila - Chair of The IEEE Global Initiative*



# Prioritizing Human Well-being in the Age of Artificial Intelligence

## From Ethics to Metrics

Following a short break, the second panel of the evening featured:

- **Virginia Dignum** – Associate Professor, Delft University of Technology;
- **Vincent C. Müller** – Professor of Philosophy at Anatolia College, University Fellow at Leeds, President of the European Association for Cognitive Systems, and Chair of the euRobotics Topics Group on “Ethical, Legal and Socio-economic Issues”; and,
- **Fabrice Murtin** – Senior Economist, Household Statistics and Progress Measurement Division, OECD Statistics Directorate.



From left to right: Fabrice Murtin, Virginia Dignum, Raja Chatila, Mady Delvaux, and Vincent Muller

Havens opened the second panel stating that “The [Beyond GDP Initiative](#) of the EU Commission and the [OECD’s Going Digital Initiative](#) provide specific metrics for technologists

to utilize in the creation of Artificial Intelligence. The real question now is how can AI be best implemented in order to address the pressing issues of autonomy, job loss, and personal data concerns for EU citizens and beyond?”

Virginia Dignum answered first, relaying how her work with corporate clients involving AI ethics was directly related to the focus of the evening: “What companies are realizing is that well-being and human value is the central motivation for their innovation.”

---

**“What companies are realizing is that well-being and human value are the central motivation for their innovation.”**

*Virginia Dignum - Associate Professor, Delft University of Technology*

Positing that shareholder satisfaction and similar economic ideals are not the only ways to innovate any longer, Dignum expressed that the drivers of innovation should focus on the human side of things. “We are working on methodologies in which we help companies identify and investigate the role of ethical values in their companies and how the technology they develop can have those traits embedded to be used as a driver for innovation. To be very black and white, companies see money in values.”

Vincent Muller took the floor next and described his thoughts on the importance of redistributing the gains from the introduction of these emerging

## Prioritizing Human Well-being in the Age of Artificial Intelligence

technologies to the widest spectrum of people in society as possible. He noted the multi-dimensional aspects of well-being that Fabrice Murtin had described earlier in the evening, saying these were likely useful for the issue of distribution. In his role as a philosopher, he shared that this shift towards distribution required not only a focus on consequentialism (or what the outcome of certain actions would be), but also a mandate to ensure the outcome of those actions would be achieved in proper ways. The ends cannot justify the means.



*Vincent Muller*

Furthermore, Müller asserted, just because we could achieve significant economic progress via the introduction of intelligent and autonomous technologies does not mean it should be done in a way where some people are disadvantaged while others achieve gain. “That might be progress, but it would still be unfair,” he said. “The transition towards these progress targets has to be according to our values, in particular in this case, fairness. That’s going to be the crucial consideration for these issues.”

---

**“The transition towards these progress targets has to be according to our values, in particular in this case, fairness. That’s going to be the crucial consideration for these issues.”**

*Vincent Muller - Professor of Philosophy at Anatolia College, University Fellow at Leeds*

Speaking on the subject of privacy, Virginia Dignum depicted how legislation like the EU’s [General Data Protection Regulation](#) (GDPR) will begin to help society realize how data is the most valuable asset we have on an individual and societal level. Dignum added that, while automation may replace certain jobs, she felt convinced that many new roles would be created around the governance, analysis, and handling of data. In that sense, data is not only a personal asset but also a societal one.

This is why Dignum was also advocating an idea she referred to as ‘the ART of AI,’ which stands for Accountability, Responsibility and Transparency. While algorithms and systems need to be transparent, Dignum affirmed data sources also need to remain transparent so people know where data comes from, who owns it, and what’s done with it. In this sense, the accountability for safety regarding AI and robots moves beyond technologists. As Dignum attested, “We are all responsible. It’s not only the researchers and developers and manufacturers but also users and society at large. We all are responsible for the directions in which we want AI development to go.”

## Prioritizing Human Well-being in the Age of Artificial Intelligence

To close the panel, Havens asked Murtin what he had learned during the evening about AI and robotics that would help evolve his work with the OECD. Murtin reiterated that well-being frameworks could be useful for society to reflect on the desirability of specific AI and autonomous

technologies. “I think there is a true need for the private sector to go technology by technology to try and assess the various products that could be introduced or not by applying a well-being framework.”

### Tasks Versus Work and The Value of Well-Being

Once the second panel finished, the audience was asked for their responses on the ideas raised during the event. An initial question came from MEP [Seán Kelly \(European People’s Party, Ireland\)](#), who asked what types of jobs would be lost due to automation and if employing robots in the near future was a genuine possibility.

In response, [Dr. Christina J. Colclough](#) of UNI Global Union said, “I will answer a bit surprisingly and provocatively and say any type of job can be replaced by AI depending on how AI develops.” She took the stance that AI as it is today may not be able to replace all jobs but that based on its potential development it could do so, also noting that it is better to talk about what tasks or aspects of a role might be replaced versus just specific jobs. She concluded, “A last little trade union word here – let’s stop talking about how many jobs may be lost and how many jobs may be created. I don’t really care how many jobs are created if they are bad jobs, if they are precarious work or if they are paid under the living wage. That is nothing we should celebrate.”

---

**“I don’t really care how many jobs are created if they are bad jobs, if they are precarious work or if they are paid under the living wage. That is nothing we should celebrate.”**

*Dr. Christina J. Colclough, UNI Global Union*

MEP [Mary Honeyball](#) (The Progressive Alliance of Socialists and Democrats, UK), spoke next, commenting on the fact that well-being is a complicated issue. “It strikes me,” she related, “that over the past forty years or so that as technology has increased exponentially people in general terms do not seem to feel better about their lives and may even feel worse because they aren’t reaching the levels they had hoped to achieve. I see AI on part of that continuum and I feel we have to start addressing this and what people want and expect out of their lives versus what they actually get.”

In response, Fabrice Murtin pointed out that the OECD had recently held a conference called [Business Impacts on People’s Well-Being](#). At the event the CEO of Danone spoke and explained that issues regarding people’s satisfaction will be reflected in the paycheck of business leaders. “In the future,” Murtin expressed, “managers will need to improve the well-being of all people involved in production all along the value chain and not only within their team.” If this trend were to extend to all businesses it could greatly help to improve societal well-being in the wake of automation to help deal with the issues described by MEP Honeyball.

# Prioritizing Human Well-being in the Age of Artificial Intelligence

## From Information to Impulse

A few important announcements were made at the event, beginning with Raja Chatila who provided an update on [Ethically Aligned Design: A Vision for Prioritizing Human Well-being with Artificial Intelligence and Autonomous Systems](#) created by The IEEE Global Initiative. He explained that the document was the work of over one hundred people coming to consensus over the course of eight months, published in December of 2016, and that version two of the document would be available in November of 2017. He also revealed that The IEEE Global Initiative had recommended multiple ideas for Standards to the IEEE Standards Association based on Ethically Aligned Design, resulting in the approval of numerous Standards Working Groups currently open for anyone to join.

Pétia Georgieva introduced herself as part of the IEEE European Public Policy Initiative (EPPI) that was created in 2013. She noted that EPPI's major mission is to foster dialogue and collaboration between the European information and communications community and European public authorities and they recently created a new draft paper on Artificial Intelligence. In regards to the draft paper, Georgieva put to the audience that, "We are calling for the leading role of the European institutions and Member states public bodies to define a long-term strategy for AI. Our major message to the public bodies in Europe is that we need to go further in the direction of AI development, but only by following the strategic way we want to go versus just by focusing on how fast we are getting there."

---

**"We are calling for the leading role of the European institutions and Member states public bodies to define a long-term strategy for AI. Our major message to the public bodies in Europe is that we need to go further in the direction of AI development, but only by following the strategic way we want to go versus just by focusing on how fast we are getting there."**

*Pétia Georgieva, IEEE European Public Policy Initiative*

A special presentation was given by Claude de Ganay, Member of the French National Assembly, about his recent report, [Toward a Controlled, Useful and Demystified Artificial Intelligence](#). Quoting directly from the document, he listed a number of questions raised by AI including:

What are the opportunities and risks that are emerging? Are France and Europe well positioned in the world race that has started? What respective places for public research and private research are there? What kinds of cooperation exist between the two sectors? What are the priorities for investment in artificial intelligence research? What ethical, legal, and policy principles should guide these new technologies? And finally, should regulation take place at the national, EU, or international level?

## Prioritizing Human Well-being in the Age of Artificial Intelligence



*Claude de Ganay, Member of the French National Assembly and Member of the OPECST*

Following de Ganay's speech were a number of Impulse Statements prepared by guests about the nature of well-being, ethics, and AI:

- MEP [Heidi Hautala](#) (Greens/European Free Alliance, Finland) began her statement by sharing that "Even those of us who are not engineers understand that engineers can discuss human values and perspectives, and I'm full of admiration for that." She said the starting point of the evening's discussion was very helpful, where AI and robotics could be used to help increase the well-being of people and the planet. She also stated,

"I bet no technology is completely neutral, and I think we have to understand that it has a political nature, and that we need philosophers of technology to discuss this with us." Finally she raised the possibility of a Universal Basic Income to deal with the potential outcomes of machine automation.

- [Catelijne Muller](#), a member of the European Economic and Social Committee (EESC) coined a new phrase in preparation for her Impulse Statement, "Human in Command." Covering all relevant issues like ethics, safety, privacy, and accountability, she said the term relates to automation and labor and the effects we want it to have – "We can decide if we want certain jobs to be done by AI or not. It is a decision we can make. My point is that technology doesn't overcome us. We can manage it and I think we have made a great start of doing that here tonight."
- Following Petia Georgieva's intervention, [Christina J. Colclough](#) read her submission of a fictional story about a trade union worker named Mary who benefitted from a future world where the global adoption of Beyond GDP measures positively guided humanity.



# Prioritizing Human Well-being in the Age of Artificial Intelligence

## The Measure of a Society

As the evening drew to a close, John C. Havens pointed out how Beyond GDP metrics provide a form of societal introspection by examining aspects of our lives we may often overlook. While we assume that people are multi-dimensional and have value beyond their fiscal worth, it can be easy to only focus on our material success versus the deeper aspects of what makes us human.

In terms of looking deeper at our humanity in relation to autonomous and artificial technologies, Havens ended the content portion of the evening by providing the following challenge to policy makers, technologists, and society in general:

*How will machines know what we value, if we don't know ourselves?*

Thanking speakers, panelists, and attendees for their participation, Delvaux then ended the evening as the host of the event by saying:

- If a big organization like IEEE is considering well-being to be an important principle in the design of AI, I am very optimistic that you have succeeded to convince others to join you.
- Secondly, if OECD has new metrics on proposing benchmarks that are different from only GDP, this also makes me optimistic.

- Furthermore, collaboration regarding research between different universities and academia from the member states is perfect, very good. I think we should make some efforts to develop this cooperation between all Member States and agencies of the European Union.

What we measure matters.

Now we can move Beyond GDP and start measuring, together.

---

**“If a big organization like IEEE is considering well-being to be an important principle in the design of AI, I am very optimistic that you have succeeded to convince others to join you.”**

*Mady Delvaux, The Progressive Alliance of Socialists and Democrats, Luxembourg*



*John C. Havens, Executive Director,  
The IEEE Global Initiative for Ethical Considerations  
in Artificial Intelligence and Autonomous Systems*

# Prioritizing Human Well-being in the Age of Artificial Intelligence

## Special Thanks

Special thanks to Knowledge4Innovation for their partnership in helping drive this event.

### For More Information

Download [Ethically Aligned Design](#) or learn more about [The IEEE Global Initiative for Ethical Considerations in Artificial Intelligence or Autonomous Systems](#) via [The Initiative's web page](#).



The IEEE Global Initiative contributes to a broader effort at IEEE to foster open, broad and inclusive conversation about ethics in technology, known as the [IEEE TechEthics™](#) program.

**“I think there is a true need for the private sector to go technology by technology to try and assess the various products that could be introduced or not by applying a well-being framework.”**

*Fabrice Murtin, Senior Economist, Household Statistics and progress Measurement Division of the OECD Statistics Directorate*