

SPECIAL COMMITTEE ON ARTIFICIAL INTELLIGENCE IN A DIGITAL AGE

COMMITTEE ON AGRICULTURE AND RURAL DEVELOPMENT

Joint Public Hearing on “Artificial intelligence in agriculture and food security”

Panel I: How can AI promote the transition towards a smarter and more sustainable future agriculture?

Sjaak Wolfert, independent researcher, Wageningen University, the Netherlands

*Francesca Hennig-Possenti, Chair of artificial intelligence, CEMA, senior lawyer, John Deere
GmbH, Germany*

*Steven Davy, Head of Division Programmable & Autonomous Systems (PAS) at Walton
Institute for Information and Communication Systems Science (WIT), Coordinator of H2020
CYBEL*

Pierluigi Lontero, Head of Implementation Support and IACS Unit, Commission

*** * ***

Panel II: How can AI be used in agricultural development and in achieving food security?

*Juan Francisco Delgado, Executive Vice-President, European Foundation on Innovation,
Vice-President, European Commission of Startups*

Mute Schimpf, food campaigner

*Rian Wanstreet, fellow, Berkman Klein Center, Harvard University and Centre for Media and
Data Studies, Central European University*

Matija Zulj, CEO and founder, AGRIVI

BRUSSELS

MONDAY 14 JUNE 2021

1-002-0000

IN THE CHAIR:**DRAGOȘ TUDORACHE***Chair of the Special Committee on Artificial Intelligence in a Digital Age, and***DANIEL BUDA***Vice-Chair of the Committee on Agriculture and Rural Development**(The hearing opened at 13.47)***Opening remarks**

1-003-0000

Chair. – Good afternoon dear colleagues, I understand we are all ready to go. So welcome to this new hearing of the AIDA Committee this time. We do it jointly with our colleagues in DG AGRI, whom I would very much like to welcome.

Let's first get our draft agenda adopted if there are no objections – if you don't raise your hands either virtually or physically then I will consider it adopted. And with that we move on to the substance of our hearing today, which is entitled AI in Agriculture and Food Security, and as I said, it is organised jointly with our colleagues in the AGRI Committee.

Innovation within the European Union's farming and food sectors is crucial. In 2019 there was a declaration to promote an approach towards digitalisation for smart and sustainable agriculture, including through facilitation of use of artificial intelligence. This declaration, signed by 26 European countries, entails a commitment to facilitate the deployment of digital technologies in agriculture and in rural areas.

One of the key proposals included in the 2021 coordinated plan on artificial intelligence is to support AI for sustainable agriculture. The economic values of the AI-enabled precision farming market is estimated to grow and reach EUR 11.8 billion by 2025 globally.

Today we will have two separate panels, each of them (as we always do it) followed after the panellists by a Q&A, which we will organise again, as always, as a ping pong: two minutes for the questions, two minutes for the answers, and as always, I also ask you to be disciplined with your two minutes and also to be precise about who you want to get an answer from, indicating the panellist.

The hearing is webstreamed and translated into 18 languages so also, please make sure that you select your language in the 'audio channel select'. This also stands true very much so for the panellists, just in case you hear a language that you don't speak.

And without further ado, I will give the floor to my colleague, the Vice-Chair of the AGRI Committee, Mr Daniel Buda, for opening remarks and then for taking over the chair for the first panel. And then I will revert for the second panel. Mr Buda you have the floor.

1-004-0000

Daniel Buda (PPE), Vice-Chair AGRI. – Thank you, Chair, for your comments and introduction. I would like welcome all of you to this joint hearing. The special AGRI panel focuses on how artificial intelligence might promote the transition to a smarter, more sustainable agricultural future. Progress in artificial intelligence is shaping all the areas of life in which we operate. Artificial intelligence is gaining more and more attention, and research in

the subject is progressing fast. Artificial intelligence is a subject that is, as I said, gaining more and more attention, especially in agriculture, where its applications can help treat diseases and minimise the environmental impact of farming. That said, we must not forget that the digitalisation of agriculture brings with it new challenges, such as the protection of data security and access to fast broadband internet. To get a more accurate picture of how artificial intelligence can contribute to a smarter and more sustainable agriculture, we have three expert guests today, and I would like to extend warm greetings not only to members of both committees, AIDA and AGRI, but also to our distinguished guests and speakers. I would like to take this opportunity to welcome the three guest speakers from the first panel. One of them is Mr Sjaak Wolfert, an independent researcher associated with Wageningen University & Research, and Senior Scientist at the university. Second we have Ms Francesca Hennig-Possenti, Chair of the artificial intelligence group at CEMA, in-house lawyer at John Deere GmbH & Co in Germany, followed by Steven Davy, manager of the research department, programmable and autonomous systems division, at the Walton Institute for Information and Communications Systems Sciences, and coordinator of the CYBELE project in Ireland. I would like to thank our guests for their participation. I would also like to remind guest speakers from all sections that your initial presentations should not exceed five minutes. Moreover, please respect the agreed time limits, so I can ensure our schedule is followed; please also keep count of your own speaking time. I would also like to remind you that the order of meetings, declarations, comments, questions and answers will follow the schedule, and after the presentations we will begin the question and answer session. Members will ask questions of two minutes maximum, and committee members will respond immediately after this two-minute period. There will be no further questions after that. For this reason I ask that delegates address their questions to a specific speaker, rather than to the whole group. Now, allow me to hand over to our first speaker, Mr Sjaak Wolfert. Go ahead, you have the floor for five minutes.

Panel I: How can AI promote the transition towards a smarter and more sustainable future agriculture?

1-005-0000

Sjaak Wolfert, *independent researcher, Wageningen University, the Netherlands*. – Thanks for giving me the floor. Artificial intelligence is challenging to apply to the domain of agriculture and food security because it requires a paradigm shift that involves new techniques, technologies and ways of working that can take a holistic, multidisciplinary view across different scales.

Moreover, it should not only serve economic purposes but also address grand challenges such as biodiversity, CO₂ reduction or other sustainability-related goals. While conventional farm management systems still leave decisions largely up to people, farmers especially, AI takes them over. This raises a whole range of ethical, societal and legal questions, to which we do not know the answers yet.

In this short speech, I will therefore highlight a responsible innovation approach to AI and agriculture. In our vision, successful application of AI for sustainable food systems can only be achieved if the solutions are, first of all, technically robust, building human-centric AI software and hardware that is fit for purpose, explainable, while implementing adequate screening and auditing of algorithms; secondly, socially, economically feasible for those implementing and using it, including appropriate risk analysis, evaluating possible shifts in power distributions and effects on labour; and thirdly, if it is developed and used in an ethically-desirable and socially-acceptable way, including human-robot relations, inclusive, exclusive or discriminatory algorithms, tracking technologies and so forth. These three pillars are often mutually intertwined, and a trade-off between the pillars can be expected.

A close collaboration of researchers and practitioners of multiple disciplines is therefore required. To that end, we have developed an innovation approach and large-scale innovation actions such as IoF 2020, SmartAgriHubs and agROBOfood. The heart of this approach is formed by US-based projects in which all relevant stakeholders are working together to develop new digital solutions. Together they are going through development cycles of minimum viable products that are tested and evaluated for both technical and socio-economic features, such as usability, costs and benefits.

To make use of state-of-the-art knowledge and technologies, US-based projects should be supported by three groups of disciplines. First, data science, AI and information management to develop smart algorithms and organise sound infrastructures for data exchange.

Secondly, business modelling, governance and ethics to develop solutions that are economically and legally feasible, socially acceptable and ethically desirable.

And third, ecosystem development to bring the right stakeholders together and support demonstrations, communication and dissemination to a wider community.

We believe that only if these multiple disciplines are integrated and innovations on AI in agriculture, successful and responsible AI solutions can be developed. We have already developed several methodologies and instruments for this, but you're welcome to join us from your discipline on this exciting journey. Thank you for your attention.

1-006-0000

Francesca Hennig-Possenti, *Chair of artificial intelligence, CEMA, senior lawyer, John Deere GmbH, Germany.* – Agriculture is facing some major challenges in the years to come. It's not a secret that into the year 2050, we will have to provide food for a very large number of people – up to nine billion.

In order to face this challenge, we need to grow the capability of agriculture. Needless to say, to grow this capability we need the approach or the advantages that artificial intelligence can bring to our sector.

It is clear that even if this is a new technology in agriculture, it can bring the most advantages in order to achieve the objective that we need to achieve. This is also the big difference in relation to other fields: where in other fields, achieving or using AI may be an improvement, for agriculture it is a must. It is a necessity in order to achieve the possibilities to feed the world and to feed humanity.

We know that this is a challenge that is not just present in the developed world, but the increase in changes, the increase in the need for food, the changes in the way food is produced and the requests related to diet and increased population, as well as the increase for other products like fuel, fibres and chemicals, will require applications that have not been here before.

Artificial intelligence provides us with the possibility to reach those objectives by putting together not only applications in the field of machines but also in the field of data analysis. So even being a very new approach, the approach of artificial intelligence also allows us to use this tool for multiple applications.

We understand that those applications and artificial intelligence is also quite a challenge in order to abide to our values and to our ethics. In agriculture, we have the possibility to have a development of this technology, and it's not just in line with our ethical and societal understanding but also allows the greatest advancement.

The issue that we see in the future is also that we are at the beginning of this technology. So that means that to allow further development, we also need in the agricultural field the freedom to use this technology in new applications and develop applications in the field of agriculture and related fields as a producer, as a user, as a user of the applications, but also together with new fields and new start-ups.

So what we see now is also a critical phase of this kind of technology. And being a highly regulated sector, there is also a large need for agriculture to have the freedom to apply this technology in order to achieve those ambitious objectives.

1-007-0000

Steven Davy, *Head of Division Programmable & Autonomous Systems (PAS) at Walton Institute for Information and Communication Systems Science (WIT), Coordinator of H2020 CYBELE*. – Thank you, I'm very happy to be here today. I'm calling from Ireland, with a population of five million – and we have seven million cows. So agriculture in Ireland, and dairy in particular, is of huge importance.

There's no doubt that the application of AI in agriculture can have tremendous benefit to EU citizens and businesses in the not-too-distant future. AI can bring a more sustainable future to agriculture. However, there are major obstacles that need to be tackled before we can unlock its fullest potential.

I'm the coordinator of a Horizon 2020 Fund, a project called CYBELE. We focus on making AI more accessible to agri-tech businesses to make it easier for them to bring AI-powered products to the market. The project focuses on nine use cases that can reach right across the spectrum of agriculture and we demonstrate how AI can improve productivity, reduce waste, improve yield and improve food safety. For example, we're using drone video imagery to estimate and predict the biomass on wheat farms in Scotland. We're using computer vision models that can process farm images in real time, to help farmers more efficiently run their businesses.

Likewise, we're using video imagery in fish farms in Corfu to ensure that the fish tanks are optimally placed and that they're working properly for the fish farmers, and this is saving them countless hours of manual labour. We use frost prediction models for fruit growers in Spain to help them to take proactive action to protect against frost so that their crops won't be spoiled.

We use AI to process satellite images of soya bean farms so that farmers can selectively harvest higher protein crops and they can earn more revenue based on that higher-grade produce. We're using AI in pig farms to be able to estimate the live weight of pigs and also to monitor pig welfare so that farmers can care for their animals more effectively and increase the quality and quantity of the meat being produced there.

In a wider context, AI is being used to make farming practices more sustainable by cutting the use of fertilisers, making more efficient use of water, increasing the shelf life of produce, speeding up the supply chain and further reducing food waste.

Much of the research and innovation for this is being carried out right across Europe. In projects such as SmartAgriHubs, Horizon 2020's DEMETER, AgRoboFood and of course my own project, CYBELE. Our project fully recognises that AI can bring benefits to EU citizens and EU agri businesses. We also recognise that there are significant gaps in skills and knowledge related to AI in the agrifood sector. Our approach to tackle this problem is to develop software tools that help data scientists harness the power of Europe's high-performance computers and supercomputers and to use them as a platform for AI.

We also recognise that there are hurdles surrounding the adoption of AI in the agri sector. Firstly, there is a lack of concrete return on investment of AI in agriculture. So our project looks to address this by bringing success stories to the fore of AI use. Secondly, there is a reluctance in the agricultural sector to embrace new technologies. This is due primarily to the low margins involved and the cost of adoption. We firmly believe that investment in education in the agri sector on how AI can benefit sustainable and transformative changes in the sector should be prioritised in the short term. Uptake and use of AI-powered technologies should be incentivised by the EU for agri-businesses and not seen as a cost to their bottom line.

We fully acknowledge that the widespread application and adoption of AI in agriculture is still in its infancy and that challenges related to AI techniques themselves also need to be addressed. For example, AI must be responsible, ethical and trustworthy. AI needs to become explainable so that farmers can fully understand the advice that AI algorithms are supplying them. AI needs to become more energy efficient and to reverse the trend of doubling energy usage every three to four months.

Finally, over the next few short years there will be leaps and bounds in advancements in AI. Europe must ensure that these advancements are suitable for adoption in the agricultural sector and that these technologies can bring more sustainable change into food production. Thank you very much.

1-008-0000

Pierluigi Londero, *Head of Implementation Support and IACS Unit, Commission*. – Good afternoon honourable Members of the European Parliament, and thanks for giving the Commission the possibility to speak at this interesting hearing.

I would like to cover an area which has not been discussed. A lot has been said already about applications that could both bring benefit to the environment and climate and to the economic profitability. I will say a few words about the importance of framing as well, the development of digital technologies, including artificial intelligence and the recent and upcoming legislative proposals from the Commission. From the point of view of the Commission of Mrs von der Leyen, one of the six priorities is a Europe fit for the digital age, and in September, in front of the European Parliament, the President of the Commission said that we need to catch up on the delay we have with digital technologies and we need to lead in this area. And we can do that by working on the data, by working on technology, including artificial intelligence, and working on the infrastructure, which is the secure cloud, as has been mentioned, super-computing and faster internet.

But the question here is – because artificial intelligence is a very promising technology, which is already there in our pockets, in our smartphones – but to be taken up by a sector, a primary sector like agriculture, it needs data. And data is at the centre of the piece of legislation which has been adopted by the commission, the Data Governance Act of November 2020, starting to frame the data-sharing rules. We are working on an implementing act of the Open Data Directive on high-value data sets – how public data, which could be very beneficial for farmers, for the service providers, can be made available. And we are preparing as well a data act, which is a proposal for a regulation to frame, to create the rules for the data economy in Europe.

This, of course, was followed in April by the artificial intelligence, both the legal framework, which sets some very light rules to regulate where it is really needed, and a coordination plan on artificial intelligence, which is also very important because it provides the associated funding to boost the development of artificial intelligence.

So there is a sense of urgency, and the co-legislators now have these proposals on the table, and we are sure they will be ready to examine and further improve and agree on this piece of legislation, because I think the European economy, the digital economy, needs this.

Maybe, with the limited time available, I just would like to mention two things. The first one is that the role of a policy like the common agricultural policy is to make sure that this technology, artificial intelligence, but also all the technologies linked to digital, can be useful for farmers to make both ends meet – on one side the economic profitability of the farm, but at the same time, also taking care that the environmental situation doesn't deteriorate or even it improves – and the fight against climate change.

So, we've seen in many cases that the recent technology can make this possible. It seems impossible, but with the new technology that can be achieved.

I would like to mention also with the CAP there are Horizon 2020 projects. There are many on artificial intelligence and there are others in preparation for Horizon Europe. And the previous speaker mentioned that these are really the tools to make the research targeted to agriculture.

And finally, just to mention that even for public administration there is a use for big data satellite imagery to be interpreted by machine learning algorithms to do the controls of the CAP, but also for the future for monitoring of agricultural practices so that indicators on the common agricultural policy are – and especially on environment and climate – robust. And we can monitor also the progress there. Thank you for the opportunity.

1-009-0000

Riho Terras (PPE). – Thank you Chair, and many thanks to the panellists. Artificial intelligence is entering every field of life to simplify and make work processes more efficient. It seems inevitable that precision farming that also includes artificial intelligence, in different forms, will play a more important role in the near future.

My question is to Mr Davy. How do you see the future of artificial intelligence in agriculture? What could be the primary use of AI in farming? And how will the future of AI shape the future of EU common agricultural policies?

1-010-0000

Steven Davy, Head of Division Programmable & Autonomous Systems (PAS) at Walton Institute for Information and Communication Systems Science (WIT), Coordinator of H2020 CYBELE. – Thank you for your question. Yes, so precision agriculture, it's a huge area of growth in technology at the moment. Where I see artificial intelligence and AI growing in that area is bringing in all the different sources of data, such as satellite imagery, computer vision, sensors in the farms as well, to bring all that data together to help farm managers make much more up-to-the-minute and informed decisions. These decisions will have impact on their yield quality, their ability to deliver orders and to more sustainably grow their products.

What I see some of the challenges being is the adoption of the technology to an area that's traditionally very much entrenched in old techniques and old methods. So we need a lot more education in the sector so that these businesses can actually adopt these tools.

How I'd see it impacting on the common agricultural policy as well is essentially as a way of digitising the environment, digitising the sector to incentivise the adoption of these AI technologies. I think it's going to be hugely important so that the CAP can actually have an influence on the sustainability of the sector and to be able to adopt these types of technologies and these tools.

So, finally, AI has huge potential. We're just scratching the surface with many of these projects. And I think it definitely has to be encouraged to be uptaken by these businesses.

1-011-0000

Juozas Olekas (S&D). - Chair, dear colleagues, artificial intelligence and other innovations in technological progress can make a significant contribution to increasing farm productivity, reducing the need for fertilisers and plant protection, and ensuring better farm management. However, it must not be forgotten that these innovations must not only be accessible to the largest and richest farms. My question to the Commission: Are there any measures in place to make these technologies accessible in practice to small and medium-sized farms, and young farmers, i.e., to those sectors of the economy that are particularly in need of the benefits offered by new technologies? Patents, intellectual property protection and data ownership issues tend to lead to high technology prices and limited availability. My question: What can we do to avoid this?

1-012-0000

Daniel Buda (PPE), Vice-Chair AGRI. – Thank you to Mr Olekas for the comment. Ladies and gentlemen, those who would like to comment, let me remind you that if your connection isn't good and we can't see you, if the interpreters can't see you, you cannot be translated, meaning there will be no way for our experts to hear your contribution. Consequently, I will not be able to give the floor to anyone to respond. If necessary, contact our three experts by email. So, we continue with our colleague, Emma Wiesner from the Renew Group, for two minutes. Go ahead – she is here in the room – you have the floor.

1-013-0000

Emma Wiesner (Renew). – Thank you Chair and dear panellists for this interesting panel on what is a very important and timely issue in order to reach the ambitions in the Green Deal, the Farm to Fork and the new CAP.

Artificial intelligence is really crucial, and a larger use of AI in the agricultural sector, from precision farming to management support, is key to reducing the amount of pesticides and gain higher yields and increase the profitability of the sector. So it's a very critical issue.

Another key issue from a farmer's side, when it comes to higher yields, is the performance of the soil. And unfortunately, we know that the development today towards bigger tractors, machinery and equipment have a negative impact on the soil as it increases the soil compaction and therefore the performance of the soil. So with AI, hopefully we can reverse this development towards larger machines and instead start using the smaller connected autonomous tractors.

I would therefore like to ask our expert, Dr Steven Davy, a question. You work with R&D on autonomous systems. When can we expect that farmers can change part of their large and heavy machines to smaller and autonomous field machines? Is this a bright and shiny future or something that will happen in real time? And also machines that can be controlled over distances?

I have one more question. As we heard today, AI needs a lot of data from several sources, such as on-field sensors, sensors on machines, satellites, price signals from the market, to enable it to function properly – and a large share of this data comes directly from the farmers' activities. However, as things stand today, farmers do not usually get paid to share the data and share the data with the platform, even if the platform then sells the data to a third party. So if farmers were to be paid for the data, I'm quite sure that the uptake of AI in this sector will be higher.

My question to Mrs Francesca Hennig-Possenti of John Deere. How does your company work to reward the farmers when they share the data with you? Can we increase the incentives on sharing data?

And finally, to all of you, rolling out censoring technique and data collection, that is a critical element to get this started, and research is clear on that. What would you say – the entire panel – are the critical elements of policy change that we can do in order to roll out the censoring and measurement techniques already today?

1-014-0000

Daniel Buda (PPE). Once again, ladies and gentlemen – just a moment – please address questions to a single expert, so that he or she can respond. I now give the floor to Mr Davy for one minute, followed by Ms Hennig-Possenti for one minute. Mr Davy, you have one minute to respond.

1-015-0000

Steven Davy, Head of Division Programmable & Autonomous Systems (PAS) at Walton Institute for Information and Communication Systems Science (WIT), Coordinator of H2020 CYBELE. – Thank you, yes, you mentioned autonomous systems, so actually there is a lot of research and development going on at the moment in autonomous systems, in agriculture, and it's very much in the area of adding autonomous technology to tractors. For example, they can spray intelligently around the field. There are robots as well that can go around and that can sample and examine crops if you're looking for weeds or if you're looking for a disease on leaves as well. So some of these technologies are in the market already. If you're looking to kind of change and to fully go autonomous across the farm, I'd imagine we're still quite a little bit away from that as well. And you could imagine, even self-driving cars are still quite a way off in the future.

But the technology is definitely going in the right direction and it's being used specifically in different places. So thank you for very much for that.

1-016-0000

Francesca Hennig-Possenti, Chair of artificial intelligence, CEMA, senior lawyer, John Deere GmbH, Germany. – So I would add that this is exactly what is happening. We're now looking into a very fast developing sector where precision agriculture is already a reality. We are already providing equipment and machines that allow, for example, to have precise spraying, and this is to the advantage of the farmer and the environment. So it's not using AI, it's not something new. It enhances the capability of the technology that we have. And the education that we are spreading or needing to do in the field is also related to the acceptance of those new technologies. But farmers start to understand the advantages that those new technologies bring to them and are starting to apply those technologies because they see an effective advantage for their businesses as well as for their production, together with an optimisation of fuel consumption, of machine usage, as well as pesticides or fertiliser usage.

Also, not to forget the increased labour that we need here and how AI and automation can help to reduce or to enhance the available labour, that is diminishing in the agricultural sector. So it's not just about sharing the data.

1-017-0000

Sjaak Wolfert, independent researcher, Wageningen University, the Netherlands. – Yes, thanks for giving me the floor. I agree that sharing data is not the only issue, and it's sometimes easier said than done to pay farmers for their data. I think it's much more important to look for shared business models in this case. So that's what I try to emphasise: to work together with all the relevant stakeholders and to see if everybody, every stakeholder, can get a stake of the pie, so to say. So that is, I think, very important.

But at the same time, it's also important not only to focus on what is the added value in terms of economy but also, at the same time, look at all the other issues that are relevant in this development.

1-018-0000

Zbigniew Kuźmiuk (ECR). – Chair, I'd like to start by thanking all the previous speakers for their extremely interesting contributions.

Based on what you have said, the European Union has an opportunity to take the lead on building trustworthy artificial intelligence. This is a major challenge for both the Member States and ordinary citizens, however, and so I'd like to ask Mr Daily the following question: even large corporations encounter problems when implementing artificial intelligence. Why should this be any different for small agricultural holdings that often lack high-speed Internet access, and perhaps also the necessary level of digital literacy? What is your take on this matter?

I'd like to put my second question to Mr Londero; although he did in fact comment on this topic, the meaning of his comments could perhaps have been clearer, and so I'll ask the question in very direct terms. Do you think that the use of artificial intelligence solutions to monitor and control CAP expenditure might be viable from the European Commission's perspective, without imposing an excessive burden on farmers as beneficiaries? What would the timescale be for the introduction of solutions of this kind? Can you specify a date by which the European Commission might be ready to implement them?

1-019-0000

Steven Davy, Head of Division Programmable & Autonomous Systems (PAS) at Walton Institute for Information and Communication Systems Science (WIT), Coordinator of H2020 CYBELE. – My understanding of the question was: how can small businesses adopt AI where potentially large costs are involved? And perhaps I can give an example of the very practical use of AI. In this example, farmers would be equipped with a smartphone device. So a device like this, which has a camera in it, has quite a lot of processing power as well. And they can use the camera to maybe perhaps take photos of the crops or to do a scan of their field. And the algorithms on it will can process those images on the device. The difficulty is coming up with those algorithms for the device. So that's where the research is required. And potentially, if they have low connectivity, they would have to transport those images to a location where they could access an internet connection. So sometimes the deployment could be very easily done, it could be low cost, but the development of those technologies can be quite expensive and requires a lot of data and a lot of processing power. Of course, if you're talking about more autonomous systems, which would be much more costly, that's when there would be a need for some kind of business incentives to be able to take on those technologies.

But the initial adoption of some of these AI techniques can be quite lightweight and quite entry-level. That's what we're seeing as well with some farmers here in Ireland in particular. They're very much interested in adopting technologies that would suit their lifestyle, so apps on mobile phones and using the tools that they have at their disposal. So I hope that answers your question.

1-020-0000

Pierluigi Londero, Head of Implementation Support and IACS Unit, Commission. – The common agricultural policy is one of the biggest policies in terms of budget, and of course we pay a lot of attention that the money is spent well. And as you know, the CAP, the common agricultural policy, has an error rate below 2%, so below materiality level.

So besides that, I wanted to say that we saw the potential of these technologies to play a role also with some control. I alluded to that before. Basically since 2018 we introduced legislation and so now it's possible to do controls using an approach, which we call checks by monitoring. Basically, we know that the Copernicus satellite takes pictures of each parcel every five days. So we have this regular flow of information. We getting that.

We then have machines that are reading these pictures continuously and they are assessing if the activity on the field, which has been declared by the farmer, is taking place or not. And

based on that, there is an interpretation of this flow of information and it goes to payment or not. So this is really a practical implementation of this technology. It takes place today in 2021; eleven Member States are using this approach. It covers 100% of the farmers, not only a 5% sample, and the farmers, in a way, need to pay nothing for that; on the contrary, they can be warned if a claim doesn't fit with what is seen from the sky. He can modify because maybe he made a mistake; he can modify and withdraw the claim. So I think there we have an example of how this technology is really used.

1-021-0000

Petros Kokkalis (The Left). – Thank you Chair, and thank you to all the speakers for these very interesting interventions.

I have three questions. One would be for Mr Londero from the Commission, regarding the spread of broadband connectivity, because I think that when we talk about AI solutions, one of the major challenges is this gap – in my country, Greece, only 40% of households benefit from broadband, which is below the 59% EU average, which is already very low.

However, the CAP budget is definitely not enough to cover it. So the Member States have to support such infrastructure through the cohesion policy or their recovery and resilience plans. And also the role of the private sector should be encouraged.

So in reviewing the recovery and resilience plans of the Member States, are you seeing this happen? What are your views on bridging the digital gap?

And I would also like to ask Dr Davy, regarding the adoption of digital schemes by small-scale farmers and farmers in *(inaudible)*: what is his experience in the role of digital agri-hubs in filling that gap?

And a third question, for whoever would like to pick it up, is what they expect from the reform of the statistical...

(connection interrupted)

1-022-0000

Pierluigi Londero, Head of Implementation Support and IACS Unit, Commission. – Yes, indeed, it's one, I would say for a long time, ensuring that broadband in rural areas develops, because very often it's not a question of distance, it's a question of economic profitability for the operators to deploy fibre in rural areas. So that's why the Commission for many years has been funding this effort. We observe, as the honourable Member mentioned, Member States paying a lot of attention to this aspect when they prepare their recovery plan, where a part of their activities needs to focus on digital. So we look positively at that. And I think it's been said that the resources are not a lot inside the common agricultural policy, cohesion policy as well, but now with the recovery and reconstruction after the crisis, I think with a focus there, we will be seeing some good progress.

And we are here having this digital meeting. This is the way we work in the future. We have digital controls: for example, auditors could not go in the field in 2020, so they did that by digital means, and therefore good broadband is essential.

1-023-0000

Steven Davy, Head of Division Programmable & Autonomous Systems (PAS) at Walton Institute for Information and Communication Systems Science (WIT), Coordinator of H2020 CYBELE. – So your question was related to the adoption of digital skills for farmers. I think it's extremely important to be able to educate young farmers and get to traditional farmers as well, on how technology and artificial intelligence can actually help them. One of the things, one of the projects – the SmartAgriHubs project – it works a lot by building these kind of pilot projects

with lots of different agri-food businesses across Europe, really to tease out what are the benefits to farmers and to be able to communicate that across to farmers as well.

And what I have noticed as well is that the kind of younger farm managers, – let's say they could have inherited the farm – they're much more tech savvy. They're much more inclined to take on new technologies and to invest in new technologies. But there's still quite a way to go to have the larger community educated. So a lot more investment needs to go into that.

1-024-0000

Marlene Mortler (PPE). – I would like to thank all the experts and also the Commission.

My question is for Francesca Hennig-Possenti. You said that we need to grow the capability of agriculture, with a global population of nine billion people in mind. You also said that the sector is highly regulated and you indirectly called for greater freedom for the agricultural sector. Question: Will this regulation disappear again automatically as a result of AI or will it still apply?

Secondly, with regard to data analysis: Is it a contradiction to talk of data sovereignty for the farmer, on the one hand, and data analysis, on the other?

Thirdly: As use of AI increases, this will surely lead to the boundaries between conventional farming and organic farming becoming increasingly blurred.

A question about small-scale farms: Do they need financing programmes to facilitate the transition towards smart agriculture?

1-025-0000

Francesca Hennig-Possenti, *Chair of artificial intelligence, CEMA, senior lawyer, John Deere GmbH, Germany.* – If I correctly understand your question, you're looking into a sector like the agriculture and the agricultural machine sector, that it's strongly regulated. That is a fact. So we have increasing costs in order to meet the objectives that are required. And of course, for the producer, it is a question about how much increasing costs the new regulation will bring to our sector, particularly because we want to make this technology affordable for small farmers and for all farmers.

So the question here is: do the small farmers need support in order to use this technology and have the possibility to join this technology? Probably, yes. This is a way that we can follow. And regarding the data protection, all the producers are very attentive to providing data protection to the farmers. The data is for farmers and to be used by farmers. So what we want to provide is for the farmers the advantages of this technology by giving them the key to use their own data or the data they didn't know they could have on the field. So in this sense, data analysis is a must to allow AI to find a solution that we need for the future.

And regarding agriculture: classical, agricultural versus biological, organic agriculture. This distance between the two applications will diminish, because the more sustainable and the more precise we can structure or we can use the technology in the current classical agriculture, the more healthy and the more sustainable the products will be, so that at the end, the distance between organic and classic will at least diminish.

1-026-0000

Sjaak Wolfert, *independent researcher, Wageningen University, the Netherlands.* – Specifically concerning this question of traditional versus organic agriculture, I do not completely follow the previous speaker, Ms Hennig-Possenti. I think, therefore, it's also important to distinguish the different systems, which are at some point fundamentally different. And that's what I meant with developing the right AI for the right assistance and to be inclusive

for specific systems. So I think organic agriculture has different needs also for AI, and that needs to be taken into account when developing the algorithms.

And also, concerning the uptake by small scale farmers, I think it's important to stress this element of what I call ecosystem development. I think small scale farmers need specific attention, but they should be adopted or included into a larger ecosystem where also larger farmers and larger corporates are having their role.

So it's not wise to focus on a specific budget/project, for example only on small-scale farms, but to look at the whole ecosystem.

1-027-0000

Ivo Hristov (S&D). – The Farm to Fork Strategy and the Biodiversity Strategy highlight the role of precision farming in limiting the use of pesticides and reducing costs for farmers. These are the obvious benefits of artificial intelligence. In my view, over and above the benefits, efforts must also be made to tackle the challenges posed by the digitalisation of agriculture.

As rapporteur, I focused on several key dimensions, including the need to provide coverage with next-generation broadband access networks in rural areas, create new jobs, because many jobs will be lost, ensure a fair transition and apply a socially responsible approach to the workers in the sector, in addition to ensuring equal access to the technological advances driven by artificial intelligence for all agricultural producers and livestock breeders, regardless of the size and location of their farms.

I would like to ask Mr Pierluigi Londero a question. The increasingly wide application of artificial intelligence in the farming industry creates the conditions for pernicious use of farm data, such as price-based discrimination. What specific measures can be taken to combat such practices, which are harmful to the majority of farmers?

1-028-0000

Pierluigi Londero, Head of Implementation Support and IACS Unit, Commission. – The presence of unfair practices that have been affecting farmers has been a subject of discussion – commercial practices, in particular with processors and retailers. A couple of years ago, the Council and Parliament were able to adopt a directive on that front – the digital dimension was not included at that stage. There were other, more important and urgent practices, which we needed to ban.

In this area, I think the protection of individual information is guaranteed like for me and for you by the GDPR (General Data Protection Regulation). So the rules are there that individual information is not used and abused. There are contractual relations. The sector itself set up a code of conduct. How the data is shared is a code of conduct based on a contract basis. And with the Data Governance Act and in the future with the Data Act, we will try to address this to clarify the ownership of data, the sharing of the data and the remuneration in case of this data.

So all this is dear to our hearts and we pay attention to it and we are working on legal proposals to address it.

1-029-0000

David Cormand (Verts/ALE). – Good morning. Sorry, I am in the street and I haven't got a translation because I haven't got video. My English is not very fluid. I will try to speak. I hope you understand my question.

First question. I'm not sure to understand why the industrial agriculture will become green agriculture with AI. My matter is, for the moment, we have a look about AI to make the conventional agriculture with AI become green. I don't think that. We need evaluation, a study

to evaluate if, for the future, AI makes more jobs in agriculture, makes more protection for the environment, etc.

My second question is about the data. With AI we build up a lot of data in agriculture. Who has the propriety of this data? I'm not sure it's a good thing to have data without a guarantee to know who has the propriety of the data.

1-030-0000

Sjaak Wolfert, *independent researcher, Wageningen University, the Netherlands*. – The quality of the sound was not very good, but I think I got your question. So indeed, like in any other sector outside agriculture, AI will somehow in the future replace jobs, if we have more autonomous systems. But I think also other jobs will be created. But we need to be ready for that. So we also need to take care of educating the other people for other types of jobs. I think, like many other digital technologies, also AI can help to protect the environment in a better way. So just following the development already of precision agriculture, it is possible to reduce pesticides, to be more efficient, etc. So I don't think that AI in that sense will be very new.

Concerning data and data ownership, we already worked a lot on that in our projects like IoF 2020, and we concluded that it's not good to focus on data ownership as such. It's much better to focus on who has access to the data and then also referring to the business model, who is having profit from it.

So I think it's better to focus on that question. And of course, it should be embedded in a legal framework. And like the previous speaker also referred to, first steps were made to making this code of conduct and also legal frameworks are in the making now. So that will really help. But I think you should approach it in a not-too-negative way but look at how can we share data in such a way that everybody can profit from it.

1-031-0000

Pierluigi Londero, *Head of Implementation Support and IACS Unit, Commission*. – Very little to add, the previous speaker replied to both questions, and I agree with what was said. I think that often the new technologies are in general more accessible, even to small-scale farmers. I mentioned there's the smartphone we have in our pocket. It's a concentrate of technology and it is in the pocket of everybody. So I think there is a lot which is developed in terms of applications accessible to most.

Therefore, this technology and this data can allow farmers to do things differently. So it's not more of the same, but to reflect and on the basis of this knowledge to do things differently, including deciding to change agricultural practices and move to more sustainable agricultural practice, for example. So for me it is an enabler of that transition but certainly not a guarantee that it happens.

1-032-0000

Daniel Buda (PPE), *Vice-Chair AGRI*. – Yes, thank you from me too for the explanations. Now, as we still have two minutes, with your permission I will take the floor to ask a question to Mr Steven Davy regarding efficient use of chemical fertilisers in agriculture. You are very familiar with the environmental objectives and ambitions the European Commission has put forward regarding the use and consumption of chemical fertilisers in agriculture, and I would like to ask if you have developed, or intend to develop, applications that allow chemical fertilisers to be applied according to the needs of the plant – this is one question. My second is whether or not you plan to invest in or research the field of irrigation. Today we are facing a serious problem in terms of climate change and irrigation is an important element in fighting it: I would like to ask if you have developed, or have plans to develop, smart systems for crop irrigation. Thank you. I hand you the floor, Mr Davy, for two minutes.

1-033-0000

Steven Davy, *Head of Division Programmable & Autonomous Systems (PAS) at Walton Institute for Information and Communication Systems Science (WIT), Coordinator of H2020 CYBELE*. – Thank you so much for your question. Looking at fertilisation and the more accurate or targeted use of fertiliser is definitely an avenue that is being explored. I mentioned earlier a kind of autonomous systems attached to tractors. What they have is a very kind of intelligent fertiliser spraying so that the fertiliser can turn on or turn off based on the crop that it's looking at. This could be informed from cameras that are potentially attached to the vehicles as well as to the tractor so it could spray much more effectively. Ultimately as well, what we're looking at is using AI to almost try to reduce even the need for fertiliser. There are other activities that could be used, potentially mixing different crops together or combining it with a bit more kind of intelligent planting of the crop.

With regards to irrigation, there's a lot of research going on at the moment as well, looking at examining the soil and the water run-off of farms to see if there are nutrients potentially being lost in the water. It's interesting: if there are nutrients in the water, then it's not going to be in the soil or in the plants. And so there's different kind of sensor technologies around that can be put around farms to be able to understand how much nutrients are actually getting into the plants.

But again, my primary area of expertise is on the technology AI algorithm side. We would be partnering with other research institutes that would be much more effective or more specialised in fertiliser makes or irrigation technologies. But definitely that's kind of high on the agenda, to be able to understand how AI can actually play a role in more efficient fertilisation, more efficient irrigation.

1-034-0000

Daniel Buda (PPE), *Vice-Chair AGRI*. – Thank you very much for the explanations and I wish you and the other panellists the best of luck in this mission, to find the best ways and mechanisms for using artificial intelligence. Nowadays we cannot have high-performance agriculture without efficient use of artificial intelligence in the sector, even if we sometimes say that the technology is expensive and difficult to adapt for farmers. Let's not forget what Ms Possenti said, that in 2050 there will be many billions of mouths to feed globally and, I would add, with the same amount of land. These reserves cannot be extended and that is why we must move to a more advanced stage of agricultural efficiency. On that note, we bring the first panel to a close and will reconvene for the second panel at 15.15. So, a quarter of an hour's break.

Panel II: How can AI be used in agricultural development and in achieving food security?

1-035-0000

Chair. – Good afternoon dear colleagues, we resume the workings of our hearing with a second panel: 'How can AI be used in agricultural development and in achieving food security?' Same rules apply; I will not repeat them. We have four speakers – four panellists: Mr Juan Francisco Delgado, Executive Vice-President of the European Foundation on Innovation (INTEC) and the Senator for the European Parliament Union of the World Business Angels Forum and Vice-President of the European Commission of Startups. The second panellist is Ms Mute Schimpf, a food campaigner; then Ms Rian Wanstreet, PhD candidate at the University of Washington; and then the fourth speaker is Ms Matija Zulj, CEO and Founder at AGRIVI, an agtech company. Five minutes for each panellist and then we move on to the Q&A with our members. So without further ado, Mr Delgado, you have the floor for five minutes.

1-036-0000

Juan Francisco Delgado, *Executive Vice-President, European Foundation on Innovation*. – Firstly, I would like to thank the Chair for inviting me to speak.

I would like to start by saying that this new paradigm, which is what artificial intelligence has come to be known as, requires determination and speed. This is because we are aware that Europe is involved in a global race to make its agriculture more competitive, but above all to ensure that it damages the environment as little as possible, or not at all, and in addition that it helps combat hunger in the world, which is heading towards a population of 9 billion people.

Artificial intelligence is becoming established as a new paradigm for helping with decision making. With regard to this there has been a great deal said, including in the previous panel, about the job losses that could be caused on the ground for farmers and in the livestock industry by the introduction of robotics and artificial intelligence. We believe that this is a very significant time, because through the NextGenerationEU projects, a system of incentives is being introduced for qualified, quality employment, so that those tasks that can be done mechanically by a machine, are done by a machine.

The ethics of the application of artificial intelligence are also very important. We need to place a great deal of emphasis on this.

In addition, training for farmers is a fundamental element. There needs to be a sufficient budget for mass training of farmers in the basic use of artificial intelligence so that it can provide them with technical assistance.

Moreover, the governance of artificial intelligence is very important. This has already been said in many parts of the world: Europe needs to establish global governance. Perhaps the United Nations is the place where a series of rules needs to be established for using artificial intelligence.

Data is the fuel for artificial intelligence. The advances in the IoT and the new approaches to food quality evaluation are, of course, generating a large quantity of data for the food and agriculture industry, from farm to fork. This data represents the biggest fuel for artificial intelligence.

We need to have someone who knows how to drive this new vehicle, which will not, of course, take 40 years to revolutionise our agriculture sector as it did to revolutionise our streets. On the contrary, in four years, and perhaps when the machines learn, in two years, we will have the use of artificial intelligence before our panel. That is why governance is so important.

5G is also important: the implementation of 5G projects, 5G infrastructure and support for start-ups and entrepreneurs. I think that this is very important.

On the second slide, you can see something that I would like to make very clear: this is the fact that the use of sensors for crops *in situ* or for animals on farms, for monitoring the use of water and plant protection products, for monitoring waste and rubbish using spectral imaging, and drones and satellites to monitor the ripening of fruit are some of the examples that are already working. This is already a reality in our agriculture sector. If we move on, we can also see how this reality, which is interacting across our agri-food sphere, and all the way along the agri-food chain, also has a great deal to do with the application of blockchain technology.

Traceability and blockchain technology are fundamental. Everyone will remember the cucumber crisis which arose in Germany with *E. coli* and Spanish cucumbers. It took several years to discover that the problem had arisen in a German refrigerator. Meanwhile, farmers exporting cucumbers lost more than EUR 500 million in exports. If there had been blockchain

technology, this could have been known that very minute, and we could have avoided that crisis, which led to so many losses.

Because we want to see that it is now possible for the agri-food chain to be connected from farm to fork: for processing, manufacturing, quality control, logistics, sellers and consumers, it is therefore very important that we are clear that traceability and security come with blockchain technology.

420 000 people die every year due to food contamination, which affects one in ten people worldwide. Children under five are most at risk, and, moreover, according to WHO, 125 000 children die every year due to a lack of food security.

Blockchain technology is now a reality. There are chains such as Carrefour that have implemented this process. Walmart has done the same.

I think that this is an increasingly emerging reality, and that artificial intelligence is going to provide farmers with information in real time, and is going to enable them to identify the crops that need irrigation, fertilisation or pesticide treatment, and even, with the help of the CAP eco-schemes, reduce the use of these items, using the real-time data about what is happening.

Consumers are, of course, at the centre of the chain, which is what artificial intelligence brings: the arrival of robotics to the food sector will also revolutionise the restaurant industry. This is something that we need to pay attention to.

1-037-0000

Mute Schimpf, *food campaigner*. – Thanks a lot for the invitation to this hearing. I'm working for Friends of the Earth Europe. We are the biggest grassroots environmental organisation in Europe. And since a few years we have been following the debate on digital farming and we have now started a new project assessing how digital farming is developing. It's a capacity-building project that we want to see that farmers get more involved in the debate, have a stronger say and have a better awareness of what's happening in artificial intelligence.

What I want to discuss here today is the approach of our project. If you look on the European high-level group on ethics, they came up with some recommendations on trustworthy AI. I just want to have a look at three of the principles and explain a bit how we see this.

One of the ethical principles (*inaudible*) by the high-level group was privacy and data governance, and they describe some of the key criteria. And if you look at farming, the first question for us is: how can we ensure that data sovereignty is ensured for farmers with all the mixed data that we already heard in the first panel? You have data produced by the farmers, public data, data produced by machineries and personal data from the farmers.

The second question is: what is adequate governance for this? How do we ensure transparency? How do we ensure that farmers can actually give consent or withdraw their consent?

And the third question is about how ensuring access to data – the question is who can access the data, who can collect the data and who can aggregate the data, and what happens if they're transferred to third parties?

So these are some questions that we think definitely we need to have an exchange on. And then we also have affordable, we have one criterion defined for (*inaudible*) you have societal and environmental well-being, but also technology robustness of AI.

So if we have a concrete proposal – the Farm to Fork strategy of the European Commission clearly says that we want to reduce pesticides by 50% – the question is, who sets up the AI for the farming sector? If it's a pesticide-producing company, the parameters set up, the criteria applied would look very different than if you have a research group where you have organic researchers in it – then you would think about very different methodologies.

We heard already in the first panel that sometimes maybe it's not the machinery that actually has the biggest role. Maybe just having a better crop rotation or better mix of plants can be found to reduce pesticides.

So we really think we have a technology-open approach. We want to have a look at what artificial intelligence can contribute, but we also want to keep in mind that sometimes other solutions might be better approaches to achieve aims.

If you go to think about fairness and the diversity in the design of artificial intelligence systems, you really need to take account of all requirements. So it's not only who is the tech developer, who is the corporation, who is the think tank, who is developing it; we really want to ensure that the whole farming community – the agriculture chain – is able to trace, to see the results, to see the decisions, so it's not happening behind closed doors. So I think we need more transparency for artificial intelligence.

So to conclude, we see an urgent need for wider debate about the societal, economic and environmental impacts on food safety and on agriculture in general. We think that a more bottom-up approach is needed. We need to ensure data sovereignty for the farmers and a more democratic approach. We really think that innovation and technology development should happen with farmers and they should not be only seen as receivers of the technology and apply them. We are very aware that artificial intelligence has a lot of potential but that whatever has potential can also pose risks and can cause considerable harm. It can be high-energy consumption. It can be that we are not ambitious enough about the use of AI. We really think we need to have a wider debate in the society: this is what is needed.

One of our specific concerns is that if you look at the different sectors in agriculture, there is a division of power – sometimes farmers are in a very weak bargaining position. So a code of conduct is not always enough to ensure really that farmers have the right to say what's happening with their data. It's also not enough to ensure that they are proactively involved in the development of artificial intelligence.

And the answer to the risk – it was mentioned in the first panel already that specific groups of farming – it can be small-scale farming, it can be the food sector who focus on short food supply chains – could be further marginalised and excluded from the technology. And therefore we really want to see evidence how AI can contribute to the Farm to Fork, to the (*inaudible*) deal, instead of just assuming that this will be the case.

1-038-0000

Matija Zulj, *CEO and founder, AGRIVI*. – Hello, good afternoon ladies and gentlemen, thank you for inviting me. I'm honoured to participate in this important discussion. I have been working on the digitalisation of agriculture for the past decade. And my standpoints come from real-life experiences gathered by working with farms of all sizes and with other stakeholders of the agricultural value chain across the world.

Artificial intelligence plays a crucial role for securing development of agriculture and ensuring food security. To clarify the importance of AI, I would like to explain three drivers of digitalisation in agriculture. The first driver is the business environment of the traditional open field agriculture that brings a low profit margin to farms, leaving no space for mistakes. Farmers

need to make decisions in real time based on the actual state of their fields. Wrong decisions produce significant losses. For example, being late with spraying of crop protection often results in a 1% yield loss for each day of being late.

Artificial intelligence supports farmers in analysing real-time conditions on every single field and providing actionable insights to farmers to be able to make timely decisions.

The second driver is customer preferences, traceability and sustainability requirements that require farms to apply agronomic practices that bring specific quality and annotative parameters in the product while applying climate smart practices. Farmers do not have the knowhow about such practices and don't have access to knowledge. So it is a challenge if they want to look for knowledge on the internet as it is overcrowded with unstructured information and a lot of opinions that do not rely on scientific confirmations.

On the other hand, universities do not produce enough agronomists to ensure a sufficient number of advisors to ensure education for all farms. So artificial intelligence helps farms by there being digital agronomists available to them for advice every day, at each moment, at each location, and it brings aggregated knowledge based on learnings from data of all farms. So it is empowering farmers from their aggregated knowledge.

And the third driver is lack of labour. Farms cannot find sufficient workforce, and this is a major problem in labour-intensive types of production. Covid impacted the seasonal workforce migration additionally, and farms are at risk to not have the capacity to execute activities where needed.

So automation and AI have advanced strongly in areas of grain production and robots that do weeding or harvesting, and especially in the food production where it is more labour intensive to execute activities in a timely and proper manner without being so dependent on the human labour.

At AGRIVI, we focus on helping farmers to make timely decisions with real time insights from fields based on satellites, IoT and other data we gather about each field while ensuring full crop production traceability required by regulatory and market-driven standards.

Technology and artificial intelligence are crucial for identifying best practices for sustainable production and understanding what those things are that bring the best yield in a sustainable way and to ensure that it is fully compliant with all the standards needed by the market.

Artificial intelligence is key for disseminating knowledge to all farms in a fast and efficient way, minimising losses that occur and delay decision-making and ensuring that the automated workforce is here to execute the work.

1-039-0000

Chair. – OK, well, we'll start with the Q&A, I guess, and Ms Wanstreet, if you manage to connect, then I will try to squeeze you in between some of the interventions. We'll start with the first question from our members, for the EPP Group. I understand there is a swap and therefore we'll start with Mr Vandenkendelaere. You have the floor for two minutes.

1-040-0000

Tom Vandenkendelaere (PPE). – Thank you very much, Mr Chairman, and thank you to the panellists. In fact, I'm very interested in hearing Ms Wanstreet speak so I hold my fingers crossed for her intervention also.

I think the presentations and interventions have shown the great potential of artificial intelligence in agriculture. I think, based on the technology, we will be able to eradicate weeds

but also to indeed successfully map out all kinds of plant diseases through which we will then be much more efficient in our daily work. In a first phase, as I see it, I expect a lot of problem detection and mapping thanks to artificial intelligence, whereas in a second phase, it obviously will play a bigger role in the farm management and in the work on the field itself.

The central question for me here is how those big volumes of data will be interpreted, and those would be my two questions also to Mr Delgado on the one hand and Mr Zulj on the other hand. It's about data, because the first question to Mr Zulj is, obviously, we cannot underestimate the importance of data collection by even increasing the use of sensors and cameras on machines or on farm sites. But the sharing of the data throughout the whole agro-food chain – that will, of course, be crucial for successful AI.

And here's the question to Mr Zulj: how do you see that we will be able to collect enough data, but then also that the data indeed will be successfully shared through the whole chain? Would you have any insights there in terms of or on the basis of any pilot projects or other, how this can happen?

My question to Mr Delgado: obviously we see a great deal of possibilities with artificial intelligence, but I do wonder for whom those technologies will be reserved. I often hear people saying, oh, artificial intelligence, that will only be possible, let's say, for the big farms, for very intensive models. Is this a feeling you also share? And indeed, how can we make it also available for small-sized family farms? Do you see potential there for cooperatives or any other forms of corporation to make sure that this AI technology and the knowledge is being successfully shared?

1-041-0000

Matija Zulj, *CEO and founder, AGRIVI*. – Thank you for the very good question. Data sharing between technologies is one of the crucial topics within the industry itself. With the rise of agriculture technologies, a lot of technology arose and initially they were done each in their own standards. With industry growing to maturity, currently there are a lot of initiatives that come from the private or public sector and consortiums of the producers of technology to have the data exchange platforms, and currently on one side there is a lot of standardisation happening in the exchange of machinery data in the collection of weather station data or different kinds of (*inaudible*).

So currently, the trend is positive. We can see that very soon – today we already have the capability to actually access the data from various manufacturers of weather stations through hubs, and we can see that in a very short time this will be a standard. We will be able to cross-exchange data across all the technology, and there are different initiatives like a eGateway in the States and Agrirouter in Europe for this.

1-042-0000

Juan Francisco Delgado, *Executive Vice-President, European Foundation on Innovation*. – Yes, I think that sharing data is a very interesting idea. As I said, data is the fuel for artificial intelligence. Therefore not only does it have a price, it also has a value.

It has been done with other products and in other business models. For example, Airbnb did it for accommodation and Uber did it, by also sharing vehicles. So we need to find some way of sharing.

I am linking this to the other question which was also put to me, which I am grateful for, because it is a very interesting one: I do not think that only large farms can benefit from artificial intelligence, of course not! You hit the nail on the head when you mentioned cooperatives - they are an extraordinary tool for implementing this system for sharing data.

There is experience of this. There are already platforms operating in Europe to share all this data, which can help us; open data and data that the whole world can benefit from. Artificial intelligence also has to be very corporate and shared.

1-043-0000

Rian Wanstreet, *fellow, Berkman Klein Center, Harvard University and Centre for Media and Data Studies, Central European University*. – Hi, thank you for allowing me to speak. I actually think the problems with the computer kind of goes well with my testimony. The question put to me was how AI can be used in agricultural development and in achieving food security – and I don't think it's the appropriate technology to rely upon for either. I want to caveat this by saying that I use the term AI as a shorthand to encompass the suite of technologies, which undergird the programming and data collection of artificial intelligence and machine learning – so sensors, drones, satellites, etc.

Traditional definitions of food security look at access and production, but we need to start equating food security to national security and think about our food systems as critical infrastructure. Many are likely aware of the recent ransomware attacks on meat corporation JBS Foods, but cyber attacks have been happening in agriculture for years. In 2016, the US Federal Bureau of Investigation began warning farmers that the adoption of internet-connected devices made them vulnerable to hackers. Weather stations have been on the receiving end of DDOS attacks. Two of Monsanto's subsidiaries and the corporation itself have been hacked. Smart water pumps have been hijacked. We're also starting to see evidence of parties remotely altering or deleting data for various reasons, including getting around environmental regulations. Commodity brokers are attempting to get a hold of yield data, ostensibly for the purpose of market manipulation. Indeed, it is commonly said that there are only two types of institutions: those that have been hacked and those that will. This applies to any entity. But the potential for harm in agriculture is endless. Food has always been used as a weapon in war, and with the increased reliance upon ever more sophisticated technologies, we are handing ammunition to avaricious parties and malicious actors. In a world where resources are under increasing threat due to climate change, the introduction of AI technologies will only magnify these problems.

I worry most about the inevitable hacks on smart irrigation, HVAC and autoclaves systems. To its credit, the EU and the Commission recognises the acute threat of climate change. The rural development goals specifically prioritise conservation, sustainability, increasing biodiversity and risk mitigation, which is why I find it somewhat perplexing that so many are keen to adopt AI technologies. It takes vast amounts of energy to collect, store and transfer data, to say nothing of the expenditures it requires to train these models. Advocates promise that eventually the incorporation of AI and AG will help reduce our carbon footprint. Eventually, it will help us to minimise the damage of industrialised farming.

In the meantime, in order to get to this eventual future, we must accept that AI technologies are making our problems worse in the present, not just in energy consumption but in entrenching monoculture. The training of AI requires consistent, clear, precise, unambiguous and clean data sets. But AG conditions are very unpredictable. This means that current AI technologies have generally only been successful in places with rigidly-controlled environments. This has resulted in, as Future Farmer Magazine articulates, 'a suite of technologies which can help farmers plant, weed, seed, etc. just not on farms with hills or that have wet fields or that are too small or that are not symmetrical'. Essentially, in order to get to a place where we can effectively use our technologies in agriculture, we must first redesign agriculture to be AI-friendly. As the current director of UC Berkeley Robotics Lab noted, AI is incredibly complex, but when faced with the complexity of just a single polyculture garden, it's meeting its match. Now, even if AI technologies suddenly didn't consume a tremendous amount of energy or miraculously became intelligent enough to deal with complexity, AI is a mirror of the world as it is. It reflects the data it learns from and the people who programme it.

So if AI is only being trained on monoculture datasets, it will see polyculture or intercropping as errors. And if AI is programmed by entities who believe in the veracity of input-heavy productiveness-based farming, the AI programme will see inputs as the solution to problems. Ultimately, there is a belief that AI in agriculture will be a net good, that it empowers farmers, increases food production, decreases use of inputs and cuts emissions. In fact, I believe the opposite to be true. The current political economy of agriculture is driven by business and proprietary interests, and the introduction of AI technologies will likely lead to decrease farmer agency, the growth of large or industrial farms and greater specialisation, which in my experience means monoculture, increased input, loss of topsoil and diminished biodiversity.

This seems to run counter to the goals outlined by the EU and the Commission in regards to rural development and food security.

1-044-0000

Alin Mituța (Renew). – Chair, at first glance it seems that agriculture and artificial intelligence come from different worlds. We usually associate agriculture with manual labour, with very physical, tangible tools and produce, in contrast with the tools of artificial intelligence, which are highly abstract. This does not mean that artificial intelligence cannot help the agricultural sector; on the contrary, I believe it can bring extraordinary opportunities. Artificial intelligence can provide solutions by automating many of agriculture’s repetitive processes, and this reduces the amount of manual labour and hard, physical work. Artificial intelligence can help us use the right nutrients in the right quantities; it can help us to monitor yields and soil quality, to protect crops and better manage the risks associated with climate change. The result of this precision farming may result in crops that are safer and better quality, with fewer resources invested, making bigger profits for farmers and a reduced environmental impact. However, unfortunately we still have some way to go before we reach that point. In many Member States, as we were saying earlier, artificial intelligence is still seen as something very foreign and far removed. Rightly so, when we consider that 40% of rural areas in the European Union do not have high-speed internet access, which is one of the basic conditions for accessing AI tools. This is an even bigger problem for small, subsistence farmers. Therefore, I think if we want the digital transformation to be successful in agriculture too, we need substantial support from the EU and its Member States in providing access to the technological infrastructure, and in explaining and promoting these new technologies. So, my question to the guests is: How can we ensure there is equitable access to these new technologies and how can we promote them effectively to stakeholders in the farming world?

The question is to Mr Zulj.

1-046-0000

Matija Zulj, CEO and founder, AGRIVI. – Thank you very much for the question. I’m happy to see that the question is actually about the ecosystem and how all stakeholders of the value chain can contribute to bringing technological farms and making them adopt better. We see with our own customer base and on the market that the entire value chain is included in collaboration and exploration of technology. So food companies are exploring the farm management systems to manage their agriculture supply chains and they are taking the burden of the cost of the technology and bringing the technology completely to their growers for free. So growers get the technology for use where they get the best practices based on R&D research from food companies. So they put the knowhow, the best practices to the platform. They disseminate the knowledge through the platform. They ensure that the growers get real-time insights for best risks to protect their crops timely, etc. So different benefits and they ensure traceability that is needed for certification and for food safety standards.

So altogether we see similar approaches being done by input manufacturers who are giving economic advice to help farmers to apply precision agriculture technologies. We see similar

statements by governmental advisory services that are trying to utilise as well farm management technologies and AI technologies, in learning from the farmer data and providing better advice.

So overall, it is very important that the entire ecosystem is working on bringing digital agriculture technology to growers. And I see that as the only way.

1-047-0000

Alessandra Basso (ID). – Dear Chair, dear colleagues, I thank the rapporteurs and refer this question to Matija Zulj or to any other rapporteur who wishes to respond.

Smart hydroponics, that is the use of artificial intelligence in the hydroponic agriculture sector, promises to overcome many of the limitations of ordinary agriculture, maximising agricultural production and minimising land use. This is done by combining the hardware, as we might call it, of vertical cultivation and the use of fertilisers or chemicals with precision agriculture, which uses sensors and applies...

(the connection is very unstable, the Chair interrupts the speaker, decides to reset the connection and return to the current speaker after the next speaker)

1-048-0000

Chair. – Ms Basso, I will revert to you right after the next speaker. I will take the next member and then I will come back to you, OK? You have time to refresh the connection.

Mr Zulj, stand by, as you saw, Ms Basso has a question for you.

We now move to the Greens: Mr Benoît Biteau.

1-049-0000

Benoît Biteau (Verts/ALE). – Dear Chair, the protocol is back in place; as of a week ago the members of the Verts/ELA Group – which now has more members than the ID Group – are eligible to speak first. Things have been restored to their previous order.

I was a research scientist in my former life, and so I have the utmost respect for feats of technological advancement allowing us to make progress that benefits the common interest, for example by making work less arduous. We must nevertheless pay close attention to these developments, and ensure that they really do reflect the common interest and that everyone is clear on that point.

As far as AI is concerned, it is clear to me that there is a significant tension between the concepts of dependency and autonomy. One of the main problems we face today in the field of agriculture is the fact that farmers are increasingly and perhaps even excessively dependent on what are known as inputs, for example pesticides, artificial fertilisers and so on. In turn, this dependence deprives them of something that is vitally important in agriculture – the autonomy to take decisions. My biggest concern is that artificial intelligence will exacerbate the difficulties involved in restoring this decision-making autonomy.

Something else I'm concerned about – and I'd like to thank Ms Wanstreet for her comments in this connection – is the challenge of applying an agro-ecological approach that allows us to respond to problems such as climate change, biodiversity and health. This is a major challenge facing the farmers of tomorrow, who are engaged in an activity that is of vital importance not least because of the sheer amount of land it occupies. Yet AI does not help us to progress towards agro-ecology; on the contrary, it creates a headlong rush towards agricultural practices designed by those wishing to cling to the old and the familiar, while what we should really be doing is rediscovering the virtues of agro-ecology in harmony with living systems.

I would like to put a question to Ms Wanstreet, who said that these agricultural practices might become entrenched; applying this logic to AI, is there not a risk that AI will release farmers from a certain form of dependence – by enabling them to use fewer pesticides and fewer artificial fertilisers – merely to trap them in another form of dependence that will ultimately result in them resorting once again to solutions that deprive them of their autonomy, in particular their autonomy to take decisions?

I would also like to say to Mr Žulj that if this dependence were to prove too costly for farmers, they would struggle to hire workers because they would no longer have the financial means to pay them a decent wage, let alone to pay enough to make these jobs an attractive option for prospective agricultural workers.

1-050-0000

Rian Wanstreet, *fellow, Berkman Klein Center, Harvard University and Centre for Media and Data Studies, Central European University*. – The question is: will there be new types of dependencies? And I think the answer to that is unequivocally ‘yes’, whether it’s financial dependencies, whether it’s new types of input dependencies. There’s been a kind of a transition from talking about fertiliser or chemical dependency to biological inputs. There will also be a dependency on increasing reliance upon trusting the prescriptions that are being handed out. But why do we trust these prescriptions? Particularly, why do we trust the prescriptions that are coming out of biochemical companies, for example? So I think you can say we’re increasing our dependencies in other areas to potentially decrease our dependencies in fertiliser and chemicals. But our energy resources, our energy requirements will increase. Our dependencies on technology, on biologicals, etc., will definitely increase, yes.

1-051-0000

Matija Zulj, *CEO and founder, AGRIVI*. – I’m just not sure that I understood the question right completely, so I’m not sure whether I can address it quite well. But just to reflect on the usage of data-sharing currently and dependency, I don’t believe that being a farmer myself and knowing how I am personally involved with the other stakeholders of the value chain, so farmers that – we see that my other customers, if farmers see that somebody is trying to manipulate them, they move away to other vendors, other producers. And this is where all the company’s stakeholders in the value chain apparently take huge caution in how to address farms in the very transparent way about the motives in bringing the digital solutions to them.

And about the price – at the moment, the price of the technology is showing that the return on investment usually happens within one or two years. When you compare it to the return on investment into a new tractor or something, some other technologies, then the return on investment is much larger. So at the moment – and it is again quite an OK return in those technologies. So a return on investment in currently – building capacity among farms, making them to make better decisions is showing great timing. And I believe that this will be a very OK business model for farms.

1-052-0000

Alessandra Basso (ID). – **Alessandra Basso (ID)**. – Dear Chair, dear colleagues, I thank the rapporteurs and refer this question to Matija Zulj or to any other rapporteur who wishes to respond.

Smart hydroponics, that is the use of artificial intelligence in the hydroponic agriculture sector, promises to overcome many of the limitations of ordinary agriculture, maximising agricultural production and minimising land use. This is done by combining the hardware, as we might call it, of vertical cultivation and the use of fertilisers or chemicals with precision agriculture, which uses sensors and applies AI to the data.

In an ever more populous world in which we still need to protect natural habitats, do you think that this solution could be useful for reducing land use on the one hand, and increasing the production of high quality food for human sustenance on the other?

1-053-0000

Matija Zulj, *CEO and founder, AGRIVI*. – Thank you for the question. This is a truly great question. And I fully agree that AI hydroponic farming and in general, vertical eco-production is the future. It will bring a lot to food security and we definitely will see strong growth towards hydroponic farming altogether. It is already normal actually – it is present in a lot of countries already.

But we need to take care – currently one billion people are employed in agriculture and overall, 500 million farms worldwide have their livelihood secured by it and they don't have the financial capacity currently to step in to hydroponic farming. So we will see (*inaudible*) slowly towards vertical farming, hydroponic farming and other technologies. But in the meanwhile, we need to secure that current producers are capable of producing in a sustainable way and that they simply have their livelihoods secured.

1-054-0000

Bert-Jan Ruissen (ECR). – Thank you, Chair, and thanks also to the experts for their very interesting contributions. It is clear that we need smart solutions and innovative technologies, and that precision agriculture definitely has potential and is important if we are to make our food production more efficient and more sustainable.

I have a question for Mr Delgado. My question is: are we doing enough in the EU to stimulate precision agriculture? We have the CAP, Horizon Europe and interesting examples such as IoF2020 and SmartAgriHubs, of course, but is our current approach within the EU not in fact too fragmented? And what can we do to coordinate development and implementation even more effectively? Would it be a good idea to have an action plan for precision agriculture, for example?

I also have a question for Mr Zulj from AGRIVI. We need early adopters of digitalisation who can play a clear leading role. However, it appears to be difficult for European farms to make major investments. I think the reasons for this include the fact that medium-sized farms in the EU are relatively small players, when compared with the United States and Australia. Do you agree with me that Europe very much needs its medium-sized farms as it makes the transition towards greater digitalisation and innovation? And how do you view developments in the EU in this respect, by comparison with the United States, Australia and other third countries?

My last question is for Ms Schimpf. You talked about capacity building and directly involving farmers. I think these are very important points. My question is: what role do you think farmers' cooperatives could play in the development of data platforms? Should the EU perhaps make more money available for bottom-up approaches, for example via producers' organisations and cooperatives?

1-055-0000

Juan Francisco Delgado, *Executive Vice-President, European Foundation on Innovation*. – For the first question on fragmentation, it is important to have a framework on which to work.

I think the 'Farm to Fork' Strategy enables funding projects to be gradually brought under that umbrella, so to speak, acting as a hook on which each of the projects can be hung. In order for this to happen, it is fundamental that national governments also align this strategy so that it is fragmented as little as possible, because we have indeed seen that at times there have been many projects that have been very fragmented. It is therefore true that there does perhaps need to be greater centralisation. In addition, the projects should, of course, involve a model of cooperation

between the public and private sectors, so that there is also a transfer of innovation to business, which is a key element.

So far I think that there has been a good transfer of technology, but it is also true that we need greater speed. What we can see is that artificial intelligence demands greater speed in what is done, taking into account all the determining factors that we have already discussed.

I also believe, of course, that the volume of businesses is fundamental. Partnerships between businesses and second degree cooperatives play a very important role in this.

1-056-0000

Matija Zulj, *CEO and founder, AGRIVI*. – Thank you for the question. So with SME farms definitely we need early adopters, and I'm glad to say that we have them, because currently we already have across Europe a very, very big amount of farms that are using digital agriculture technologies. We have great showcases. We have great proof that it works. What is very important is that education and incentives are available for all farmers to help them adopt technology better. We see fear, lack of training, lack of education as the biggest barrier actually for adoption of technology, and research shows that as well. (*inaudible*) the other one but for the SME segment we see that the value chain is taking the burden off technology and we see a lot of subsidies being brought for technology adoption. At the moment, the figure in the States is that 38% of farms are using digital agriculture technologies. Europe is a bit behind it that.

1-057-0000

Mute Schimpf, *food campaigner*. – Thanks for the question. Yes, I definitely think that cooperatives can have a crucial role in the development and the design, especially of artificial intelligence systems, because especially for the design, because they know their members, they know the challenges. They also have an understanding what's happening also at local level and not only at national level, so I think they're quite well equipped. And I think, as regards to digital farming in some Member States, they are already quite active to develop own systems, own data models and own designs that support their members, and I think it's a quite interesting approach.

1-058-0000

Karlo Ressler (PPE). – My question is for Matija Zulj. It's been really a pleasure having him here.

(Bad connection - Mr Ressler requested by Chair to refresh the connection.)

1-059-0000

Adrián Vázquez Lázara (Renew). – Chair, the appearance of artificial intelligence has been especially promising when tackling challenges such as climate change, optimising resources and information for consumers.

In the primary sector it has already been proven that, for example, precision farming based on data, through the use of sensors and drones, enables the optimisation of the use of pesticides, herbicides and water, among other things. However, the use of these new technologies represents a major challenge for many of our livestock and arable farmers for various reasons. These may be due to the generational divide, a lack of training or ignorance of the positive impact they could have on their farms.

I would like to ask Mr Delgado, who commented on this in relation to the NextGenerationEU funds, how we can promote and encourage training programmes at European level, and make them attractive to our farmers. I would also like to know if he is aware of any success stories that he could tell us about.

1-060-0000

Juan Francisco Delgado, *Executive Vice-President, European Foundation on Innovation*. – Yes there are success stories, especially in agriculture and livestock farming, but also in fisheries, which we haven't mentioned. Artificial intelligence plays a very important role there.

I think that what is needed is for this training, this education for farmers to be done through digital skills cooperation and education centres, such as the one recently created at the University of Córdoba, with the support of the Ministry of Agriculture. It is very important that we do this in all countries through, for example, digital innovation centres, which are a very interesting Commission initiative.

Businesses, and especially cooperatives, also have to be involved with this, because we must not forget that we also have a problem with generation renewal. Generation renewal is also linked to the use of technology: the younger farmers are, the more likely it is that they will naturally use technology. This encouragement of the use of platforms and the use of data tools will also come with younger generations and generation renewal.

As I said, I believe that what is needed is the creation of education centres that are close to where people are, close to farmers, in towns, so that they are easy to access. With regard to the digital area, in which so much has been achieved in recent years, I think that there can be a large-scale programme of immersion in digital transformation for the agriculture sector. And we should allocate funds for this. I have mentioned before that the NextGenerationEU programmes are a great hope for meeting this challenge.

1-061-0000

Karlo Ressler (PPE). – My question is for Mr Zulj. It basically is on the significant gaps between the (*inaudible*) in e-agriculture and food security on one side and also on the other side on the technological as well (*inaudible*) capacities of traditional farmers. And although this issue is obviously primarily of interest in the public sector, I believe that the private one can also contribute. And I would be really interested to hear Mr Zulj's own experience. Basically, how does he see the role also of the developers of new technological solutions in encouraging European farmers to use modern digital technologies in a sector that is traditionally perceived as a traditional one?

1-062-0000

Matija Zulj, *CEO and founder, AGRIVI*. – Thank you Mr Ressler for the very good question. When we speak about digital technologies in agriculture, it is very important that we put them as a supporting tool. Technologies as such are here to support real-life processes. And what we see is that where the gaps are minimised, in terms of farmers adopting the technology, making good use of technology, there is interaction with other stakeholders, or where they have a very strong interaction between themselves, which means that processes that happen in real life are being supported directly with digital technology.

To elaborate on that, maybe shortly we will have a great project with the food companies that work with farms, and they are bringing technology to growers and they had a lot of food waste happening on the quality control when they were identifying on the maximum residual level in products. And what they have done, they brought the technology to farms to track spraying records – when they happen, how they happen – and to calculate when is the right timing, when it's safe to harvest, and they reduced completely the food waste altogether. This food waste was, when it happened, it was a loss of food for everybody, but it was a financial loss for both the food company and it transferred to farms. So farms were happy with the food company bringing technology to them, and this is where the interaction of digital technology into the real-life process where it happens is a crucial one for the adoption. So I always encourage real-life experience and bringing real-life processes into action with digital technologies.

1-063-0000

Chair. – Thank you Mr Zulj. This was actually the last speaker, the last Member on my list, so since we are good with time, I will also give the opportunity for two minutes each to the other three speakers to present some concluding thoughts or remarks if they have them. I will start with Mr Delgado.

1-064-0000

Juan Francisco Delgado, *Executive Vice-President, European Foundation on Innovation.* – There are eight issues that need to be taken into account when applying artificial intelligence to agriculture.

The ‘field to fork’, ‘farm to fork’, or ‘sea to fork’ strategies need to be supplied, in the case of artificial intelligence, with open data to which everyone has access. The data needs to be valued and farmers need to benefit from that value, so that we can learn how to use AI, as well as working on training, which obviously needs to be brought closer to where the needs are.

You all need to take into account a very important issue: if farmers find that they make more profits with the least possible environmental impact, while also saving money on energy and water, they will adopt this artificial intelligence technology quickly. This is what our experience in the field has shown us.

We can also see how experience can be acquired through tools such as private businesses – of course, why not? It can also be acquired through cooperative models, which also generate significant added value for small farms.

However, the ethics of using that data and the monitoring of artificial intelligence are also very important, and in a sector such as this one, which is so regulated, it is really important to take this into account. There are tools for this which are already working, such as blockchain technology. There are tools which are already working and education centres that are operating too, as we have already said.

It should also be said that it is important to have another approach – different from funding – to all the investment and machinery involved in agriculture and livestock farming. The approach needs to move towards shared models, because in agriculture, for example, all that machinery is used for very little time throughout the year, and it can be used on a shared basis. Those models are going to gradually emerge, more and more, and are going to enable machinery to be used in a much more economical way for farmers.

Also, of course, great progress is being made with monitoring pesticides, water usage and precision agriculture. We have mentioned this before in relation to vertical farming, which is another tool, and many start-ups and entrepreneurs are emerging who are making progress on this.

We already have a deep flow of around one thousand start-ups which are working globally on this. Europe cannot be left behind. We are the third of the large blocs, so to say, behind the United States and China, which are working on promoting start-ups. This is fundamental.

1-065-0000

Mute Schimpf, *food campaigner.* – My conclusion is we need independency and we need democracy for artificial intelligence in farming. It’s a strong development that it’s run by some big tech companies from the Silicon Valley of some global corporations, (*inaudible*) agriculture machinery sector, the fertiliser industry, the pesticide industry. And if this development continues, we cannot harvest the potential benefits of having more efficient systems.

My second conclusion is: we need an AI system that actually reflects the diversity of the European farming system. It is so different if you go from Scandinavia to the south of Spain, and I think one approach – it's not something that actually will help us to deliver the best solution that I can have. And as we heard before, if we want to focus on organic farming, if we want to focus on agriculture, if we want to focus on small-scale farmers, a really bottom-up approach is needed in the design of technology, in the criteria of how you aggregate the data, how you assess the data. So it's not enough to say, yes, we have a sharing of the data and a sharing of the benefits from the first step of the development of the technology – farmers, local communities should have a say in it. If not, we are very concerned it would lead to a further concentration in the agriculture sectors. More farmers in Europe would lose their income and it will not actually contribute to the aims of the European Green Deal and of the Farm to Fork strategy.

1-066-0000

Rian Wanstreet, *fellow, Berkman Klein Center, Harvard University and Centre for Media and Data Studies, Central European University*. – Yes, I concur. I think that currently, the way that things are being set up, we're using our own data, like public data, to serve the interests of capital, particularly for empowering those that are already empowering and disenfranchising others. Currently, the promise of AI is owning the future at the expense of the present. We already have solutions in hand for how to conduct agriculture sustainably. Agroecology solutions have been around for hundreds of years and we just failed to implement them. So I would encourage the Commission to think about what the cost of implementing these technologies currently is.

1-067-0000

Chair. – Thank you very much. That brings us closer to the end. I will now give the floor for some concluding remarks to my co-Chair today, the Vice-Chair of the AGRI Committee. Thank you very much Mr Buda, you have the floor.

Concluding remarks

1-068-0000

Daniel Buda (PPE), *Vice-Chair AGRI*. – Chair, thank you very much, and thank you again to the experts for today's hearings. They came with information that was relevant and vitally needed for developing the agricultural sector, and while our colleague Mr Mituța said at one point that we are at different poles – agriculture, which we had imagined as physical labour, and artificial intelligence – we now see that today, thanks to new technological 'conquests' – so to speak – new research and innovation, we can talk of agriculture and AI as being inextricably linked: because, as I said in my last comment, we cannot discuss efficient, high-performance agriculture without mentioning the presence of AI in this sector. I did take note of what the last speaker said about the costs, and another concern of AGRI Committee colleagues regarding the cost of implementing AI in agriculture: I would say that when it comes to meeting the need for quality food at accessible prices for European consumers – and not just Europeans – nothing is too expensive. Lastly, I would once again like to say a big thank you to all of our experts and MEP colleagues. I am glad this debate has been such a good one, and it must continue this way because, as I said, food safety is more important than anything.

1-069-0000

Chair. – Thank you very much Mr Buda. On my behalf, I can tell you that across the hearings and workshops that we've organised in AIDA over the last months – nine months by now – we've heard a lot of testimony about the impact of artificial intelligence on many walks of life, on many sectors of our economies. And I didn't know precisely what to expect out of today's debate, whether it could be different, whether there would be commonalities with some of the findings that we've heard, findings and conclusions that were drawn from other conversations. My takeaway is that there are a lot of commonalities in the concerns and challenges that I think AI brings also to the agriculture and food security sectors, starting from adoption of technology,

awareness, education of those that are supposed to use it, access by small and medium-sized enterprises to the technology data security, ensuring diversity in the way technology is being played out. So all these are themes that we have also discussed and dealt with in previous hearings on artificial intelligence and its impact.

And I think lastly, also, artificial intelligence is, in fact, like any other technology I suppose and is an instrument, a blunt instrument. It's a neutral piece of technology and its efficiency in the direction that we give it is something that is in our hands. And clearly here and from what I've heard today, I think we all agree that we have to use it for increasing efficiency of agriculture in this particular case that we discussed today, but also in increasing our strategic resilience and also in reducing our environmental footprint. And these are also things that apply equally in terms of how AI impacts other sectors of our societies and economies.

So with that, thank you very much. Thanks to the colleagues in AIDA, to the colleagues in AGRI for this very interesting debate and for the AIDA colleagues, our next hearing is on 1 July. Thank you. Have a nice afternoon.

(The hearing closed at 16.31)