

## Language in the 'Human-Machine Era': Researchers from all continents join forces to predict how new technologies will change our languages and communication



Concept photo of the 'Human-Machine Era'. © dragonstock - Adobe Stock

**The 'human-machine era' is coming soon: a time when technology is integrated with our senses, not confined to mobile devices. It means that the hardware will move from our hands into our eyes and ears. Intelligent eyewear and eyewear will be able to translate another person's words, and make it look and sound like they were talking to you in your language. But not only will technology mediate what we see, hear and say in real time – it will be having increasingly complex conversations with us.**

A newly formed research network '**Language in the Human-Machine Era**' (**LITHME**), with members from 52 countries, explores how such technological advances are likely to change our everyday communication, and ultimately language itself. As a first major step on the way, LITHME has published an [open access report](#) that brings together insights from dozens of specialists in the fields of language technology and linguistic research.

'LITHME is about the future. It's about new technologies just around the corner, which will change the way we use language – the way we talk together, find information, and interact with computers,' says Dave Sayers (University of Jyväskylä, Finland), Chair of the network.

Based on current and foreseeable developments in technology, two imminent changes to human communication can be outlined: speaking *through* technologies and speaking *to* technologies.

The former implies that wearable devices will actively participate in our conversations. 'Soon we will not stare at mobile phones in our hands; that information will appear in front of our eyes from tiny eyepieces. Combined with new intelligent earpieces, we will see and hear extra information about the world around us: basic stuff like travel directions, and more advanced content like auto-translations of people

speaking other languages. Our own words will be amplified, clarified, translated and subtitled as we speak; and other people will see and hear that in their eye and ear tech,' Sayers explains.

'We will also speak to chatbots on screens, and to lifelike characters in next-generation virtual reality. These will be far smarter than chatbots today, ready for complex conversations – helping think through problems, discussing plans, consoling disappointments and celebrating successes,' Sayers states, adding: 'All this has huge implications for language.'

What will these changes in communication mean for how people identify with specific languages or take turns in a conversation? How will they affect the way we learn languages, translate texts or the way laws are written and interpreted? Could a high reliance on real-time language technologies change the structure of language? Longer term, could developments in brain-machine interfaces complement or even supersede language? These are some of the questions addressed by LITHME.

### **Unique collaboration of linguists and technologists**

The 4-year networking project, funded by the European Cooperation in Science and Technology (COST), started in October 2020 and currently has members from all 27 EU states plus 25 other countries from every continent. LITHME seeks to bridge the gap between linguists and technology experts, so the former can benefit from better technological foresight, and the latter from better understanding of potential linguistic and societal consequences of emerging technologies.

There are eight working groups that represent different areas of language research: 'Computational linguistics', 'Language and law', 'Language rights', 'Language diversity, vitality and endangerment', 'Language learning and teaching', 'Ideologies, beliefs, attitudes', 'Language work, language professionals', and 'Language variation'. Members from each working group have contributed to the forecast report titled '**The Dawn of the Human-Machine Era**', published on May 19, 2021.

The report describes the current state and probable future trajectories of various language technologies – for written, spoken, haptic and signed modalities of language. It is a result of unique collaboration, claims Sviatlana Höhn (University of Luxembourg), the Vice-chair of LITHME, a co-author and editor of the report. 'LITHME brings together people from different directions in language work who would normally not speak to each other. We see the first results of this exchange of ideas in our forecast report: we were able to collect a variety of opinions and facts into one document produced by researchers who would otherwise never work together on one publication. It helps us to learn from each other, from other communities.'

### **Technology will progress unequally for different languages**

The publication is intended to be both authoritative and accessible, aimed at language and technology professionals but also policymakers and the wider public. 'We show how a range of new technologies will soon transform the way we use language. We discuss the software powering these new advances in the background, as well as consumer devices like augmented reality eyepieces and immersive virtual reality spaces. We hope to give a clear picture of how all this adds up to a huge change in the way we communicate,' says Dave Sayers who also co-authored and co-edited the report.

But with exciting possibilities, challenges will come too. The report shines a light on critical issues such as inequality of access to technologies, privacy and security, and new forms of deception and crime.

'We will face the usual issues over who can afford the latest upgrades. These devices may also work less well in some languages, or not at all in others,' Sayers cautions. 'We want to challenge people to think carefully about future tech. Not everyone will benefit equally from these advances, and some of us will be left far behind. Progress is usually fastest in the world's bigger languages, like English or

Chinese. Meanwhile, sign languages are much more complicated for machines to understand, so progress will be much slower still. We are hoping to encourage our readers to keep an eye out for inequalities as they see these fancy new gadgets appear – to sense inequalities amid the marketing buzz.'

The report 'The Dawn of the Human-Machine Era' can be accessed here: <https://lithme.eu/publications>.

It was authored by 45 researchers and edited by LITHME's Chair Dave Sayers (University of Jyväskylä), the Vice-chair Sviatlana Höhn (University of Luxembourg), and the Chair of LITHME's Computational Linguistics working group Rui Sousa Silva (University of Porto, Portugal).

Find out more about LITHME's activities: <https://lithme.eu>.

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