The STOA Panel approved this report by written procedure on 5 April 2019.

The Annual Report was submitted to the European Parliament’s Bureau on 5 April 2019.
Statement by Ramón Luis Valcárcel Siso, EP Vice-President responsible for STOA (2017-2019)

Ladies and gentlemen,

Scientific expertise has an important role to play when informing policy-makers dealing with global challenges, from climate change to feeding the world, from an ageing population to energy security. To ensure that policy-making is qualified, scientific advice should be effectively integrated into the decision-making process.

The European Parliament has always had a dual role in its long history: that of a co-legislator, which is playing an increasingly important role in debating, amending and voting on the European Commission’s proposals for new European legislation, and that of overseeing the implementation of European legislation by the European Commission. But the European Parliament has always been much more than that. From the beginning, it has been a meeting place that brings together representatives of society from all the Member States to reflect together about how to shape a better future for Europe.

In line with Parliament’s multiple functions, STOA’s mission is to provide Members of the European Parliament with assessments of existing and novel technologies that are relevant for their legislative work. With the publication of relevant studies and the organisation of high-quality public workshops and conferences, STOA fulfils this crucial advisory function. With the addition of scientific foresight to its methodological toolbox in the course of the 8th parliamentary term, STOA has taken an important step towards integrating citizens’ expectations and concerns in the advice it provides to Members of the European Parliament in anticipation of future techno-scientific developments.

In 2018, the new European Science-Media Hub, operating under the political responsibility of the STOA Panel, started building a platform aiming to create a community of scientists, politicians and journalists in order to ensure that scientific insights are made available not only to policy-makers, but also to the wider public, and that science and technology policy choices are made on the basis of a wide societal debate and the best available scientific evidence, taking into account the impact of those policy decisions on society.

In the current context of fake news and disinformation, there is a growing need for scientific knowledge and expertise to be made available to policy-makers and the public. Therefore STOA will continue to play a crucial role in enriching parliamentary debates and activities, as well as offering a forum for discussion between the Members of Parliament, the scientific community, the media and society at large.

It has been a special honour for me to assume the role of EP Vice-President responsible for STOA and to contribute to supporting STOA’s work in the priority areas of eco-efficient transport and modern energy solutions, sustainable management of natural resources, potential and challenges of the information society, health and new technologies in the life sciences, and science policy, communication and global networking.

I would like to take this opportunity to express my thanks to the Chair, the Vice-Chairs, the Members and the Secretariat of the STOA Panel for their work throughout 2018.

Ramón Luis Valcárcel Siso
Vice-President, European Parliament
Preamble by Eva Kaili, STOA Chair (2017-2019)

STOA has been a cornerstone of policy-making within the European Parliament for over 30 years and has become a trademark for policy advice and debates that bring together Members of Parliament from different committees to reflect on the role of science and technology and how we can best use it to prepare ourselves for the future.

It was a great pleasure for me to take over the Chair of STOA at the beginning of 2017, after having been STOA Vice-Chair since 2014. During these last years, STOA has undergone an ambitious transformation which, in 2018, was also reflected in the change of STOA’s name. In June 2018 the STOA Panel endorsed my proposal to change its name to ‘Panel for the Future of Science and Technology’. This was then endorsed by the Parliament’s Bureau in October 2018. The acronym ‘STOA’ was maintained for historical continuity and easier association with STOA’s rich legacy of studies, events and other activities.

The new name indeed better reflects STOA’s role, methods and aspirations, as they have evolved in recent years, especially through the wider representation of Members (25) and committees (9) on the STOA Panel; the launch of the European Science-Media Hub, a new platform to promote networking, training and knowledge dissemination at the interface between the Parliament, the scientific community and the media; the consolidation and streamlining of STOA’s five priority areas, with increasing attention given to the opportunities and challenges arising from the current developments in big data, artificial intelligence and quantum computing. Moreover, the new name is more appealing when mainstream and specialised media report on STOA, and is easier to understand and associate with for academia, journalists, policy-makers and the wider public alike.

As demonstrated in the present report, 2018 was a very inspiring year for STOA as it carried forward scientific foresight projects on assistive technologies for people with disabilities, and on 3D bioprinting for medical and enhancement purposes, while also preparing the ground for a new project on farming without plant protection products.

In the course of 2018, STOA hosted 10 events, providing important opportunities for interaction between policy-makers, researchers and the public. STOA also continued to bring researchers and Members in close contact through the seventh edition of the MEP-Scientist Pairing Scheme, aiming to promote mutual understanding and to help establish lasting links between the scientific and policy-making communities. In the context of its enhanced co-operation with other European institutions and bodies, STOA also co-organised with the European Research Council (ERC) a workshop on the theme ‘Investing in young researchers - Shaping Europe’s future’.

The 2018 STOA Annual Lecture on ‘Quantum technologies, artificial intelligence, cybersecurity: Catching up with the Future’, raised public awareness about and interest in quantum technologies that offer fascinating possibilities, not yet fully explored.

The European Science-Media Hub, at its kick-off event ‘Communicating science via social media’, gathered a wide variety of stakeholders: scientists, academia, science organisations, European institutions, science journalists and communicators to debate the challenges of communicating science, and start building a network for future contacts and cooperation. This set the stage for the very successful development of the Hub in the course of the year.

Finally, I would like to thank EP Vice-President Ramón Luis Valcárcel Siso and STOA Vice-Chairs Paul Rübig and Evžen Tošenovský, as well as the Scientific Foresight Unit (STOA), for their continued support and commitment to our common work during the course of 2018.

Eva Kaili
STOA Chair
The STOA Bureau (2017-2019)

From left to right:
Evžen TOŠENOVSKÝ, STOA Second Vice-Chair
Eva KAILI, STOA Chair
Paul RÜBIG, STOA First Vice-Chair
Ramón Luis VALCÁRCEL SISO, EP Vice-President responsible for STOA
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<td>ALDE</td>
<td>Alliance of Liberals and Democrats for Europe</td>
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<td>AFCO</td>
<td>EP Committee on Constitutional Affairs</td>
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<td>AFET</td>
<td>EP Committee on Foreign Affairs</td>
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<td>AGRI</td>
<td>EP Committee on Agriculture and Rural Development</td>
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<td>AI</td>
<td>Artificial intelligence</td>
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<td>AT</td>
<td>Austria</td>
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<td>ATs</td>
<td>Assistive technologies</td>
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<td>BE</td>
<td>Belgium</td>
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<td>BG</td>
<td>Bulgaria</td>
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<td>BR</td>
<td>Brazil</td>
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<td>CEI</td>
<td>Call for Expression of Interest</td>
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<td>CITRIS</td>
<td>Center for Information Technology Research in the Interest of Society</td>
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<tr>
<td>CPIFA</td>
<td>Chinese People’s Institute of Foreign Affairs</td>
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<td>CULT</td>
<td>EP Committee on Culture and Education</td>
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<td>CSJ</td>
<td>Science Council of Japan</td>
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<td>CSTI</td>
<td>Council for Science, Technology and Innovation, Cabinet Office, Government of Japan</td>
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<td>CY</td>
<td>Cyprus</td>
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<td>CZ</td>
<td>Czech Republic</td>
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<td>DE</td>
<td>Germany</td>
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<tr>
<td>DG RTD</td>
<td>Directorate-General for Research and Innovation of the European Commission</td>
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<td>DK</td>
<td>Denmark</td>
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<td>ECR</td>
<td>European Conservatives and Reformists</td>
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<td>EFDD</td>
<td>Europe of Freedom and Direct Democracy</td>
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<td>EFSA</td>
<td>European Food Safety Authority</td>
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<td>EGTC</td>
<td>European Grouping of Territorial Cohesion</td>
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<td>EIT</td>
<td>European Institute of Innovation &amp; Technology</td>
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<td>EL</td>
<td>Greece</td>
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<td>EMA</td>
<td>European Medicines Agency</td>
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<td>EMPL</td>
<td>EP Committee on Employment and Social Affairs</td>
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<td>ENVI</td>
<td>EP Committee on Environment, Public Health and Food Safety</td>
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<td>EPP</td>
<td>European People’s Party</td>
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<td>EPTA</td>
<td>European Parliamentary Technology Assessment</td>
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<td>ERC</td>
<td>European Research Council</td>
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<td>ES</td>
<td>Spain</td>
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<td>ESI funds</td>
<td>European Structural and Investment funds</td>
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<td>ESMH</td>
<td>European Science-Media Hub</td>
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<td>ESOF</td>
<td>EuroScience Open Forum</td>
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<td>EU-ANSA</td>
<td>EU Agencies Network on Scientific Advice</td>
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<td>EU-13</td>
<td>European Union Member States joining between 2004 and 2013</td>
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<td>EU-15</td>
<td>European Union Member States joining between 1958 and 1995</td>
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<td>ETAG</td>
<td>European Technology Assessment Group</td>
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<tr>
<td>Acronym</td>
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<td>FI</td>
<td>Finland</td>
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<td>FR</td>
<td>France</td>
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<td>GNSS</td>
<td>Global Navigation Satellite System</td>
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<td>GDPR</td>
<td>General Data Protection Regulation</td>
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<tr>
<td>Greens/EFA</td>
<td>The Greens/European Free Alliance</td>
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<td>GRIPS</td>
<td>Japanese National Graduate Institute for Policy Studies</td>
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<td>HR</td>
<td>Croatia</td>
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<td>HU</td>
<td>Hungary</td>
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<td>ICT</td>
<td>Information and communication technologies</td>
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<td>IE</td>
<td>Ireland</td>
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<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
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<td>IMCO</td>
<td>EP Committee on Internal Market and Consumer Protection</td>
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<td>IT</td>
<td>Italy</td>
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<td>ITRE</td>
<td>EP Committee on Industry, Research and Energy</td>
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<tr>
<td>JEDI</td>
<td>Joint European Disruptive Initiative</td>
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<td>JRC</td>
<td>Joint Research Centre of the European Commission</td>
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<td>JURI</td>
<td>EP Committee on Legal Affairs</td>
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<td>JSPS</td>
<td>Japan Society for the Promotion of Science</td>
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<td>JST</td>
<td>Japan Science and Technology Agency</td>
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<td>LIBE</td>
<td>EP Committee on Civil Liberties, Justice and Home Affairs</td>
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<td>LU</td>
<td>Luxembourg</td>
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<td>MEP</td>
<td>Member to the European Parliament</td>
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<td>MEXT</td>
<td>Japanese Ministry of Education, Culture, Sports, Science and Technology</td>
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<td>MOST</td>
<td>Chinese Ministry of Science and Technology</td>
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<td>NL</td>
<td>The Netherlands</td>
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<td>NYU</td>
<td>New York University</td>
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<td>Portugal</td>
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<td>REGI</td>
<td>EP Committee on Regional Development</td>
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<td>R&amp;I</td>
<td>Research and Innovation</td>
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<tr>
<td>RO</td>
<td>Romania</td>
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<tr>
<td>S&amp;D</td>
<td>Progressive Alliance of Socialists and Democrats</td>
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<tr>
<td>S&amp;T</td>
<td>Science and Technology</td>
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<td>SCJ</td>
<td>Science Council of Japan</td>
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<td>STOA</td>
<td>Panel for the Future of Science and Technology</td>
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<td>STS forum</td>
<td>Science and Technology in Society forum</td>
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<td>TRAN</td>
<td>EP Committee on Transport and Tourism</td>
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<td>UK</td>
<td>United Kingdom</td>
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<td>WEF</td>
<td>World Economic Forum</td>
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Executive summary

In 2018, STOA concluded a total of six Technology Assessment projects on a variety of areas of technological and social importance: ‘Prospects for e-democracy in Europe’, ‘New ways of financing transport infrastructure projects in Europe’, The impact of new technologies on the labour market and the social economy’, ‘Overcoming innovation gaps in the EU-13 Member States’, ‘New technologies and regional policy: Towards the next cohesion policy framework’ and ‘Galileo Satellite Navigation System’, while fifteen such projects were ongoing at year’s end.

Two Scientific Foresight projects were completed in 2018, on assistive technologies for people with disabilities and on 3D bioprinting for medical and enhancement purposes, while the groundwork was prepared for one on farming without plant protection products, to be launched in 2019.

Either as part of projects or as ad hoc events, a total of 10 workshops and conferences were held in 2018, at the request of the Panel. These events focused on a wide range of areas of technological and scientific interest, including ‘Reflections on the use and misuse of technology in electoral campaigns’, ‘Innovative solutions for research in healthcare’, ‘EU mission-oriented R&D Policy, and ‘EIT’s role in strengthening innovation’.

The 17th edition of the STOA Annual Lecture was thematically linked to the EPTA Conference (see below) and was entitled ‘Quantum technologies, artificial intelligence, cybersecurity: Catching up with the future’. It focused on the opportunities and challenges created by greatly enhanced computing power, as well as other applications of quantum technologies, touching upon issues of cybersecurity and data protection at a time of widespread use of big data, artificial intelligence and data analytics.

In 2018, STOA ran the Member-Scientist Pairing Scheme between Members and scientists for the seventh time. This round attracted a lot of attention, both from the scientific community and Members, with 13 pairs established at the end of the process.

2018 saw STOA changing name. In June 2018 the STOA Panel endorsed the proposal of STOA Chair Eva Kaili to change its name from ‘Science and Technology Options Assessment Panel’ to ‘Panel for the Future of Science and Technology’. The new name was endorsed by the EP Bureau on 1 October 2018. The acronym ‘STOA’ was maintained for historical continuity and easier association with STOA’s rich legacy of studies, events and other activities.

STOA also maintained and developed its links with key communities in science and technology (S&T) policy through the organisation of the EPTA Directors’ meeting in Strasbourg, and of the EPTA Council meeting and EPTA Conference in Brussels in the context of the presidency of the EPTA network which STOA held throughout 2018. STOA also co-organised with the European Research Council (ERC) a major meeting entitled ‘Investing in young researchers – Shaping Europe’s future’ on 31 May 2018 in Strasbourg. Delegations from the STOA Panel attended a number of visits and international meetings related to S&T policy.

In 2018, the European Science-Media Hub (ESMH) became fully operational. It set up its first contacts with around 200 stakeholders from the European institutions and agencies, science organisations, as well as with science journalists and media. In January 2019 the ESMH launched its website, which it has regularly updated with articles on science and new technologies-related topics which provoke a lot of media attention and are important in the European context. Using a media monitoring tool, the ESMH started to produce a bi-weekly press review covering the most prominent science and technology topics in the mainstream media.
1. Scientific evidence for policy-making

The European Parliament’s Panel for the Future of Science and Technology (STOA) was established in 1987 as a scientific advisory body to the institution as a whole. It has a mission to provide Members of the European Parliament (EP) with independent expert assessment of scientific and technological developments and related policy options in the service of informed political decision-making. In parallel, it undertakes a scientific foresight role within the EP in order to provide Members with a more long-term view on techno-scientific developments and their implications across many policy areas affecting society, the economy and the environment in a broad sense.

In the current five-year term (2014-2019), STOA focused on independent scientific evidence and advice for decision-makers in the following five priority thematic areas, all with a view towards a world of close to 10 million people in 2050:
- Eco-efficient transport and modern energy solutions;
- Sustainable management of natural resources;
- Potential and challenges of the information society;
- Health and new technologies in the life sciences;
- Science policy, communication and global networking.

Projects

STOA projects aim to provide scientific evidence to underpin policy decisions in the EP, based upon a state-of-the-art overview of cross-cutting topics that have a scientific or technological dimension, such as security and privacy on the internet, harnessing the resources from the seas, technologies for education and training, the collaborative economy, secure and sustainable energy supply, waste management, and precision agriculture.

Technology Assessment projects assess the impacts of current scientific and technological advances and identify their mid- to long-term consequences. The main outcomes of these projects are extrapolated scientific and technological trends, together with their impact on society. They allow Members to get a better understanding of the consequences of new and emerging trends.

Scientific Foresight projects put the emphasis on identifying a variety of desirable or less desirable future scenarios, and then focus on identifying present-day policy options that allow us to steer developments in one or other direction. They aim at giving Members a better understanding of the means they have at their disposal to influence developments in accordance with their particular political agenda. The foresight approach used by STOA since 2015 is further detailed in an updated briefing published in September 2017.

The various STOA projects are mostly carried out in collaboration with external experts, such as research institutes, universities, laboratories, consultancies or individual researchers, under strict contractual agreements. This allows for independent expert assessment of legislative, technical, economic, environmental and societal aspects of techno-scientific developments. The publications resulting from these projects are available on the STOA website for everyone with an interest in the topic, thus disseminating information to the wider public and encouraging a dialogue between citizens and legislators.

Events

STOA also works to bridge the gap between the scientific community and decision-makers in a more direct way. This is done by organising discussion fora, mostly in the form of workshops and working breakfasts, on emerging topics with relevance for the EP. These events bring together diverse stakeholders, including representatives of specialist organisations, institutes, other European institutions, industry, NGOs and external experts in the scientific field. These events are open to the public and information about them is published on the STOA website.
The STOA Annual Lecture provides the high point of STOA activities every year. This event gives Members, officials, researchers, students and other interested stakeholders an opportunity to listen to eminent scientists – often Nobel Prize laureates – speak on subjects high on the political agenda, such as the information society, an oil-free future, sustainability, and advances in medical research, or major discoveries in fundamental science. In 2018, the STOA Annual Lecture focused on topics related to ‘Quantum technologies, artificial intelligence, cybersecurity’.

**MEP-Scientist Pairing Scheme**

The development of a close relationship between experts and policy-makers is essential for improving the flow of information from the research and development arena to decision-makers and vice versa. STOA is committed to developing and expanding such relationships and interactions, notably by running the MEP-Scientist Pairing Scheme. This initiative, first organised in 2007 in cooperation with the European Commission (EC), aims to establish long-term, intensive cooperation between Members and researchers and serves as a tool for enhancing knowledge-based decisions, facilitating better public awareness of European Union (EU) policies and fostering a greater mutual understanding. The scheme brings potential mutual advantages for all participants:

- Members gain greater awareness of scientific processes and a better understanding of scientists' consideration of policy issues. The Pairing Scheme facilitates the process of bringing scientific advice into EU policy discussions.

- Scientists learn about the role of science in the policy-making process in the EU, which should enable them to interact more effectively with politicians. Additionally, they can contribute to the dissemination of information to universities and other scientific institutions on the structure and implementation of relevant European policies and programmes, e.g. Horizon 2020.

In 2018, STOA ran the Pairing Scheme for the seventh time. This round attracted a lot of attention, both from the scientific community and Members, with 13 pairs established at the end of the process. The pairs met in February 2019 in Brussels (See Chapter 6 for the details of this project).

**Networks and collaborations**

In 2018, STOA continued to play a role in S&T policy networks at an international level. STOA is a founding member of the European Parliamentary Technology Assessment network (EPTA), and during 2018 it held the rotating EPTA presidency. This involved the organisation of the EPTA Directors’ meeting in May/June (Strasbourg), and the EPTA Council meeting and the annual EPTA Conference in December (Brussels), with a strong focus on democracy in the era of artificial intelligence, quantum technologies and blockchain.

STOA also maintains strong connections and actively cooperates with European institutions and organisations, including notably the EC’s Joint Research Centre (JRC) and the Directorate-General for Research and Innovation (DG RTD). On a global scale, STOA regularly participates in the EuroScience Open Forum (ESOF), the Science and Technology in Society (STS) forum and the World Science Forum (WSF). In 2018, members of the STOA Panel took part, as members of delegations, in a number of visits and international meetings related to S&T policy (see Chapter 9).
The STOA Panel

The STOA Panel is politically responsible for STOA’s work. It is composed of 25 Members:

**The STOA Panel composition**

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<tr>
<th>Role</th>
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<tr>
<td>Vice-President of the European Parliament responsible for STOA</td>
<td>1</td>
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<tr>
<td>Members appointed by the Committee on Industry, Research and Energy</td>
<td>ITRE 6</td>
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<tr>
<td>Members appointed by the Committee on Employment and Social Affairs</td>
<td>ENPL 3</td>
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<td>Members appointed by the Committee on the Environment, Public Health and Food Safety</td>
<td>ENV 3</td>
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<tr>
<td>Members appointed by the Committee on Internal Market and Consumer Protection</td>
<td>IMCO 3</td>
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<td>Members appointed by the Committee on Transport and Tourism</td>
<td>TRAN 3</td>
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<tr>
<td>Members appointed by the Committee on Agriculture and Rural Development</td>
<td>AGRI 3</td>
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<tr>
<td>Member appointed by the Committee on Legal Affairs</td>
<td>JURI 1</td>
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<td>Member appointed by the Committee on Culture and</td>
<td>CULT 1</td>
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<td>Member appointed by the Committee on Civil Liberties, Justice and Home Affairs</td>
<td>LIBE 1</td>
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The members of the STOA Panel are appointed at the beginning of each parliamentary term for a renewable two-and-a-half-year period. A constituent meeting is held at the beginning and the middle of each parliamentary term, in which the Chair and two Vice-Chairs are elected by Panel members. The Panel meetings are held in Strasbourg during the EP plenary sessions. The meetings are open to the public and can be followed via web-streaming. All Members may participate, but only Panel members can vote.

The STOA Bureau prepares the Panel meetings. The Bureau is composed of four Members, namely the EP Vice-President responsible for STOA, the STOA Chair and the two Vice-Chairs. During the first half of the current, eighth legislative period, the members of the Bureau were EP Vice-President Mairéad McGuinness, Paul Rübig, STOA Chair, and Eva Kaili and Evžen Tošenovský, First and Second Vice-Chairs, respectively. At the beginning of the second half of the legislative term, Vice-President Ramón Luis Valcárcel Siso succeeded Mairéad McGuinness as the new EP Vice-President responsible for STOA. On 16 March 2017, Eva Kaili was elected as STOA Chair, with Paul Rübig and Evžen Tošenovský elected as First and Second Vice-Chairs, respectively, for the second half of the legislative term.

The STOA Secretariat is managed by the Scientific Foresight Unit (STOA) of the European Parliamentary Research Service (EPRS). It runs the everyday business and executes the decisions of the STOA Panel, with the assistance of external experts and trainees when appropriate (see Chapter 13).

In 2018, meetings of the STOA Panel and Bureau took place on the following dates in Strasbourg: 18 January, 8 February, 15 March, 19 April, 14 June, 5 July, 13 September, 25 October, 15 November and 13 December.

Agendas and minutes of the STOA Panel meetings are available on the STOA website at: [http://www.europarl.europa.eu/stoa/cms/home/panel_meetings](http://www.europarl.europa.eu/stoa/cms/home/panel_meetings).
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<td>Mady DELVAUX (S&amp;D, LU)</td>
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<td>Andrzej GRZYB (EPP, PL)</td>
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<td>Renata BRIANO (S&amp;D, IT)</td>
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Panel Member | Committee | Panel Member | Committee
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Anthea McINTYRE (ECR, UK) | AGRI | Virginie ROZIERE (S&D, FR) | IMCO
Momchil NEKOV (S&D, BG) | AGRI | Claudia SCHMIDT (EPP, AT) | TRAN
Marijana PETIR (EPP, HR) | AGRI | Kay SWINBURNE (ECR, UK) | ENVI
Georgi PIRINSKI (S&D, BG) | EMPL | Neoklis SYLIKIOTIS (GUE/NGL, CY) | ITRE
Michèle RIVASI (Greens/EFA, FR) | ITRE | Kosma ZŁOTOWSKI (ECR, PL) | TRAN

AGRI Agriculture and Rural Development
CULT Culture and Education
EMPL Employment and Social Affairs
ENVI Environment, Public Health and Food Safety
IMCO Internal Market and Consumer Protection
ITRE Industry, Research and Energy
JURI Legal Affairs
LIBE Civil Liberties, Justice and Home Affairs
TRAN Transport and Tourism
2. STOA activities in relation to eco-efficient transport and modern energy solutions

2.1. STOA Technology Assessment project | New ways of financing transport infrastructure projects in Europe

Lead Panel Members: Paul Rübig, Boguslaw Liberadzki, Claudia Schmidt
Project duration: Started in December 2016; presented to the STOA Panel in September 2017; study published in March 2018.
Relevant to EP committees: IMCO, ITRE, REGI, TRAN
Relevant EP file: Framework to facilitate sustainable investment - 2018/0178(COD) - Co-Rapporteurs: Sirpa Pietikäinen (EPP, FI) and Bas Eickhout (Greens/EFA, NL)

The study assesses a range of mechanisms to finance transport infrastructure projects in cross-border regions and analyses the strategic role that European Groupings of Territorial Cohesion (EGTC) could play in the planning and implementation of cross-border investments. Special attention is given to often neglected small-scale projects, where investment is under €1 million. Building on an in-depth literature review, and supported by interviews with various regional cooperation structures and an experts' workshop, the study analyses the current situation regarding the availability of financing tools for new technologies that enhance transport infrastructure in cross-border regions. It also outlines sources of financial support that could meet investment needs and assesses technological challenges and trends in the field of Intelligent Transport Systems (ITS), with a focus on regional interoperability. The study concludes with suggested policy options to facilitate and accelerate cross border transport infrastructure projects. Read the related blog post.

2.2. STOA Technology Assessment project | New technologies for Eastern Mediterranean offshore gas exploration

Lead Panel Member: Neoklis Sylkiotis
Project duration: Started in December 2017; presented to the STOA Panel in June 2018; study published in April 2019.
Relevant to EP committees: ENVI, ITRE, REGI

This study examines the evolution of technologies in the offshore exploration and production of hydrocarbons in the Eastern Mediterranean, and their future environmental impact for the region. It offers an analysis of technological developments in the upstream offshore gas domain, with special considerations for the environment, health and safety in the Eastern Mediterranean, operating in an area of rapid technological, geographic and geopolitical developments. This is accomplished by assessing as accurately as possible the main environmental and safety risks of offshore gas exploration.
and extraction in the waters in the area through the construction of an appropriate risk assessment framework.

The study reviews the existing literature and draws on the expert opinion of various business, policy and academic insiders. It finds that the main risks come from accidental discharges to the sea by well blowouts, chemical releases and the associated greenhouse gas emissions. It also finds that new technologies move this stage of natural gas development into increasing digitalisation, better designs for safety equipment, and increased automation. The study proposes a number of policy measures on collaboration, data sharing, environmental baseline surveys, open digital platforms, as well as better monitoring for fugitive greenhouse gas emissions. All these will aid in improving the environmental credentials of offshore operations, but they must be accompanied by closer cooperation and collaboration amongst the countries that surround the East Mediterranean.
3. STOA activities in relation to the potential and challenges of the information society

3.1. STOA Technology Assessment project | Prospects for e-democracy in Europe

Lead Panel Member: Tiziana Beghin. Other Members involved: Isabelle Adinolfi (EFDD, IT)
Project duration: Started in June 2016; presented to the STOA Panel in October 2017; study published in February 2018.
Relevant to EP committees: AFCO, LIBE

In recent years, citizens' increasing distrust and disaffection towards representative institutions, recorded by a plurality of political surveys and studies and coupled with an alarming fall in electoral turnout in many EU Member States, appear to signal a major crisis in the representation system as a whole. Insofar as the strength of a democracy is the direct result of the widespread, confident support of citizens, objectively expressed by trust and participation, these trends weaken democratic society.

On the other hand, the growing diffusion of ICT tools and social media increases opportunities for citizen involvement in decision-making processes and, more generally, in political life. The concept of democracy is constantly evolving and can no longer be solely reduced to the instant when the elector casts his or her vote.

A STOA study on the prospects for e-democracy in Europe identifies the most important factors for successful e-participation as establishing a close and clear link between e-participation processes and the formal decision-making process; making the participatory process and the contribution of its outputs to the overall decision-making process clear to participants from the start; providing feedback to the participants about what has been made possible by their contributions, as an indispensable feature of the process; embedding the participative process in an institutional 'culture of participation', rather than limiting participation to one event; accompanying e-participation with an effective mobilisation and engagement strategy, involving communication instruments tailored for different target groups. Read the related blog post.
3.2. STOA Technology Assessment project | New technologies and regional policy: Towards the next cohesion policy framework

Lead Panel Member: Ramón Luis Valcárcel Siso. Other Members involved: Lambert Van Nistelrooij (EPP, NL), Constanze Krehl (S&D, DE)

Project duration: Workshop kicking-off the study in October 2017; presented to the STOA Panel in February 2018; presentation of the study to the REGI Committee in May 2018; study published in July 2018.

Relevant to EP committees: REGI, ITRE.

Relevant EP file: European Regional Development Fund (ERDF) and Cohesion Fund 2021–2027 - 2018/0197(COD) - Rapporteur: Andrea Cozzolino (S&D, IT)

A STOA study and a briefing, based on a proposal by the EP Committee on Regional Development (REGI), provide policy options offering new directions in cohesion policy for the post-2020 period. The publications focus on scientific and technological priorities and means for policy implementation aimed at enhancing regional economic strengths and thereby building confidence in the EU’s added value. The study and briefing stem from a workshop organised by STOA, and draw upon follow-up interviews, and recent research and policy evaluation reports. Their draft versions were presented to the STOA Panel and the REGI Committee. The study puts forward the following policy options:

- **New technologies for improved productivity:** In the next stage, cohesion policy should promote ‘excellence in innovation’ in the regional economic context, as a new EU policy instrument.

- **Knowledge for innovation-led growth through smart specialisation:** An ‘impact-focused’ approach is recommended in designing future cohesion policy initiatives, to make innovation-led growth more relevant and achievable.

- **Better governance through technology and big data:** Digital technology represents an opportunity to make cohesion policy initiatives more effective and transparent.

- **Bringing the regional authorities back in:** Cohesion policy should allow for a wider variety of management practices and operational programmes to help EU funding of innovation-led growth to succeed in any type of region.

- **Dynamic positioning as a fast and flexible approach:** A dynamic strategic approach by the regional authorities can be achieved by: (a) an ongoing regional ‘economic diagnosis’, which defines and explains principal and practical challenges; (b) a flexible guiding policy dealing with both obstacles and opportunities; and (c) a set of coherent actions needed to address the ever-changing regional circumstances.

- **Revising the current framework of regional innovation policy:** Mission-oriented innovation policy could become an important complement to other development policies.

- **Shaping markets through mission-oriented investments:** EU cohesion policy needs to embrace the evolution towards more active public-sector involvement in innovation-led growth in various regions and promote conditions for evolving business ecosystems that generate growth.

- **‘Outside-in’ approaches to innovation-led growth:** European and global production networks, in particular in manufacturing, are potential assets for promoting innovation-led growth in a region, serving as catalysts for advancing new industrial capabilities in the region.
– **Science parks as nodes of innovation**: Cohesion policy could support science and technology parks as effective nodes in networks that foster business development, particularly small, knowledge-intensive enterprises with growth potential.

– **Tapping the potential of the digital platform economy**: Cohesion policy must help the EU’s regional economies to increase value by availing of existing digital platforms and by building new ones.

Read the related blog post.

### 3.3. STOA Technology Assessment project | Galileo Satellite Navigation System

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<th>Lead Panel Member: Evžen Tošenovský</th>
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<td>Project duration: Started in November 2017; presented to the STOA Panel in October 2018; study published in October 2018.</td>
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<td>Relevant to EP committees: ITRE, ENVI, TRAN, AFET, AGRI</td>
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<tr>
<td>Relevant EP file: Space programme 2021–2027 and EU Agency for the Space Programme - 2018/0236(COD); Rapporteur: Massimiliano Salini (EPP, IT)</td>
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The study was carried out by experts from the Institute of Flight Guidance of the Technical University Braunschweig, Germany, under STOA management. A list of sources complements the study, which draws on information and feedback collected during 13 interviews with various experts in the field of Global Navigation Satellite System (GNSS). Based on the key advantages provided by Galileo and some of the challenges identified, the study offers a set of policy options to maximise the impact of the European satnav system both in the near future and in the long term.

Satellite navigation (satnav) helps us locate ourselves based on signals provided by a constellation of satellites. Probably the best-known satnav is the American GPS, but China (BeiDou) and Russia (GLONASS) have also developed their own global GNSS. All these systems are under military control.

Since the early 1990s, the EU has been exploring the potential of developing its own satnav. Setting up the foundation of the Galileo programme in 1999 achieved this ambition. After years of drawbacks, delays and increased costs, Galileo started providing what are known as ‘initial services’ in December 2016, and is set to become fully operational for 2021.

Satnav and other services enabled by GNSS, like Galileo, have found their way into a large number of applications in our daily life, in areas such as aviation; Location Based Services (LBS); timing and synchronisation (e.g. for mobile phone networks); surveying; road, rail and maritime transport; agriculture; and public authority and military operations. For land surveys and civil protection, particular advantages stem from combining Galileo and Copernicus, the EU’s earth observation programme. Besides the benefits to European citizens and public authorities, Galileo enables innovation, contributing to the creation of new products and services, creating jobs and allowing Europe to own a greater share of the €175 billion global GNSS market.

Developed as a civil system under the civil governance of the EU, Galileo allows Europe to remain autonomous, compared to relying on foreign-owned satnav, whose signals could be shut down or degraded for civil and/or foreign use (for example during conflicts). Civil governance also allows an open communication policy on system design specifications, which enables development of additional applications and technologies, and facilitates their certification.

On the other hand, Galileo also faces a number of challenges. On the technical side, for example, the susceptibility of GNSS to radio frequency interference is a major threat for all domains.
3.4. STOA Technology Assessment project | The impact of new technologies on the labour market and the social economy

Lead Panel Member: Georgi Pirinski
Relevant to EP committees: EMPL, IMCO, ITRE
Relevant EP file: InvestEU programme 2021–2027; 2018/0229(COD) - Co-Rapporteurs: José Manuel Fernandes (EPP; PT), Roberto Gualtieri (S&D; IT)

This study investigates the potential employment effects of new information and communication technologies (ICT), by examining the relationship between innovation, new technologies, employment and inequality. It reviews the existing literature and experiences of previous technological revolutions, and argues that the race between job creation through new products and job destruction from process innovation has been won in the past by the job-creating effects of innovation.

The study concludes that there is an uneven distribution of the costs of digitalisation, because of the skills-biased nature of technological change – so the challenge of the future lies in coping with rising inequality from technological change. The study also proposes a set of policy options for dealing with the employment effects of digitalisation. Read the related blog post.

3.5. STOA/ESMH workshop | How to win elections: Reflections on the use and misuse of technology in electoral campaigns, 7 November 2018

Lead Panel Member: María Teresa Giménez Barbat
Relevant to EP committees: AFCO, LIBE, AFET

Until recently, discussions of technology and elections focused primarily on e-voting. Controversies highlighted the potential for modernising the voting system, as well as the security flaws that open opportunities for interference and manipulation. Now, the role of technology in elections is much broader – and so are the controversies.

At the workshop ‘How to win elections: Reflections on the use and misuse of technology in electoral campaigns’, organised by STOA and the European Science-Media Hub (ESMH), a full house of parliamentarians, journalists and citizens heard a panel of distinguished scholars and practitioners discuss the role of technology and analytical techniques in contemporary election campaigns. While many criticisms of these technologies have been discussed since the Cambridge Analytica scandal, it is important to remember that technology has also

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made more direct communication possible between politicians and citizens and that, in theory, the internet could provide the building blocks for greater transparency, accessibility and accountability.

The workshop opened with a welcome address from STOA Chair Eva Kaili and an introduction from the workshop’s chair and Lead Panel Member María Teresa Giménez Barbat, followed by presentations from Jeroen van den Hoven (Delft University of Technology), Sophie Lecheler (University of Vienna), Inès Levy (Liegey Muller Pons) and David Stillwell (University of Cambridge). An interesting discussion and Q&A followed. While the discussion highlighted some red lines that should be respected – most notably in human rights, the rule of law, transparency and accountability – it also recognised the potential of these often maligned technologies. The challenge is to mobilise them to foster more meaningful deliberation and deeper democratic engagement. Read the related blog post.

3.6. STOA Technology Assessment project | Understanding algorithmic decision-making: Opportunities and challenges

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<td>Relevant EP file: Comprehensive European industrial policy on artificial intelligence and robotics - 2018/2088(INI) - Rapporteur: Ashley Fox (ECR, UK)</td>
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The expected benefits of Algorithmic Decision Systems (ADS) may be offset by the variety of risks for individuals (discrimination, unfair practices, loss of autonomy etc.), the economy (unfair practices, limited access to markets etc.) and society as a whole (manipulation, threat to democracy etc.).

The study reviews the opportunities and risks related to the use of ADS. It presents ways to reduce the risks and explain the limitations of ADS, and sketches some policy options for overcoming these limitations to be able to benefit from the tremendous possibilities of ADS while limiting the risks related to their use. Beyond providing an up-to-date and systematic review of the situation, the study gives a precise definition of a number of key terms and an analysis of their differences. The main focus of the study is the technical aspects of ADS. However, other legal, ethical and social dimensions are considered to broaden the discussion.

3.7. STOA Technology Assessment project | A governance framework for algorithmic accountability and transparency

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Based on an extensive review and analysis of existing proposals, the study develops policy options for the governance of algorithmic transparency and accountability, based on an analysis of the social, technical and regulatory challenges posed by algorithmic systems. It proposes a set of four policy options each of which addresses a different aspect of algorithmic transparency and accountability: (i) awareness raising: education, watchdogs and whistleblowers; (ii) accountability in public sector use of algorithmic decision-making; (iii) regulatory oversight and legal liability; (iv) global coordination for algorithmic governance.

3.8. STOA Technology Assessment project | Automated tackling of disinformation

The currently ubiquitous online mis- and disinformation poses serious threats to society, democracy and business. This study first defines the technological, legal, societal and ethical dimensions of this phenomenon and argues strongly in favour of adopting the terms misinformation, disinformation and malinformation, instead of the ill-defined ‘fake news’.

Next, it discusses how social platforms, search engines, online advertising and computer algorithms enable and facilitate the creation and spread of online misinformation. It also presents current understanding of why people believe false narratives, what motivates their sharing, and how they impact offline behaviour (e.g. voting). Further, it maps and analyses current and future threats from online misinformation, alongside currently adopted socio-technical and legal approaches. The challenges of evaluating their effectiveness and practical adoption are also discussed.

Drawing on existing literature, the study also summarises state-of-the-art technological approaches to fighting online misinformation in relation to detecting, containing and countering online disinformation and propaganda campaigns. It follows the AMI conceptual framework (Agent, Message, Interpreter), which considers the origin(s) and the impact of online disinformation alongside the veracity of individual messages. Drawing on and complementing existing literature, the study summarises and analyses the findings of relevant journalist and scientific studies and policy reports. It traces recent developments and trends, and identifies significant new or emerging challenges. It also addresses potential policy implications of current socio-technical solutions for the EU.

This is complemented by a brief overview of self-regulation, co-regulation and classic regulatory responses, as currently adopted by social platforms and EU countries. User privacy and access to data for independent scientific studies and development of effective technology solutions are also discussed. In addition, the study summarises civil society and other citizen-oriented approaches (e.g. media literacy).

A roadmap of initiatives from key stakeholders in Europe and beyond has been included, spanning the technological, legal and social dimensions. It is complemented by three in-depth case studies on the utility of automated technology in detecting, analysing and containing online disinformation.
The study concludes with policy options including support for research and innovation on technological responses; improving transparency and accountability of platforms and political actors over content shared online; strengthening media and improving journalism standards, as well as supporting a multi-stakeholder approach involving civil society.

3.9. STOA Technology Assessment project | Regulating disinformation with artificial intelligence

Members involved: Isabela Adinolfi (EPP, IT), Stelios Kouloglou (GUE/NGL, EL)
Project duration: Started in July 2018; presented to the STOA Panel in December 2018; study published in March 2019.
Relevant to EP committees: IMCO, JURI, ITRE, LIBE, CULT

This study looks at the consequences of the increasingly prevalent use of artificial intelligence (AI) disinformation initiatives upon freedom of expression, pluralism and the functioning of a democratic polity.

The study examines the trade-offs in using automated technology to limit the spread of disinformation online. It presents (self-regulatory to legislative) options for regulating automated content recognition (ACR) technologies in this context. Special attention is paid to the opportunities for the EU as a whole to take the lead in setting the framework for designing these technologies in a way that enhances accountability and transparency and respects free speech. The study reviews some of the key academic and policy ideas on technology and disinformation, and highlights their relevance to European policy.

Chapter 1 introduces the study background and presents the definitions used. Chapter 2 scopes the policy boundaries of disinformation from economic, societal and technological perspectives, focusing on the media context, behavioural economics and technological regulation. Chapter 3 maps and evaluates existing regulatory and technological responses to disinformation. In Chapter 4, policy options are presented, paying particular attention to interactions between technological solutions, freedom of expression and media pluralism.

3.10. STOA Technology Assessment project | Technology and the arts: Past, present and future synergies

Lead Panel Member: Eva Kaili
Project duration: Two studies started in July and September 2018 respectively; presented to the STOA Panel in January 2019; studies to be published in 2019.
Relevant to EP committees: ITRE, CULT, IMCO
Technology and the arts are generally considered as distinct sectors of contemporary society, albeit with some important links akin to those between commercial, industrial and legal sectors. However, technology and the arts have a long and special relationship that permeates all stages of human development. Indeed, this relationship is invoked with every mention of the word technology, which has its origins in the Ancient Greek tékhnē, meaning art.

In 2018, STOA began a project on the mutually beneficial relationship between technology development and artistic activities. STOA launched two studies, one focusing on historical developments and another on the digital era. Interim findings were presented at the STOA Panel meeting of January 2019 and both studies will be completed and published along with a STOA Options Brief in 2019.

3.11. STOA Technology Assessment project | Technology and social polarisation

Lead Panel Member: María Teresa Giménez Barbat
Project duration: Two studies started in July 2018; presented to the STOA Panel in March 2019; studies published in March 2019.
Relevant to EP committees: ITRE, IMCO, JURI, LIBE

In 2018, STOA launched two studies to explore whether technology development caused social polarisation. The first, conducted by Richard Fletcher and Joy Jenkins of the Reuters Institute for the Study of Journalism at the University of Oxford, considered the effects of technology on news production and consumption across Europe and their potential to lead to more polarised societies. The second was conducted by Lisa Maria Neudert and Nahema Marchal of the University of Oxford, and focused on trends in political campaigning and communication strategies. Hasty policy action that attempts to control communications directly - for example by restricting some media content or political expression - could do more harm than good, and could even have ‘chilling effects’ on democracy. Both studies were published, along with a STOA Options Brief, in March 2019, and were presented at the STOA Panel meeting of 14 March 2019.

3.12. STOA Technology Assessment project | Understanding the impact of the General Data Protection Regulation (GDPR) on technological innovation

Lead Panel Member: Eva Kaili
Project duration: Three studies started in December 2018; studies to be published in 2019.
Relevant to EP committees: ITRE, LIBE, JURI

The implementation of the General Data Protection Regulation (GDPR) brings a series of challenges, especially having in mind the importance of data in science and everyday life in general. The main idea behind this series of studies is to investigate these challenges with a focus on the impact of the new
rights and obligations that the GDPR enshrines upon: (i) the design and conduct of scientific research, (ii) the deployment and use of blockchain technologies, and (iii) the deployment and use of artificial intelligence.

The first study, ‘Understanding the impact of the General Data Protection Regulation (GDPR) on scientific research,’ will examine the adequacy of the GDPR exceptions for scientific research in terms of safeguarding scientific freedom and technological progress.

The second study, ‘Understanding the impact of the General Data Protection Regulation (GDPR) on technological innovation: the case of blockchain technologies,’ is expected to address the interface between the GDPR and the ongoing scientific and technological innovation process with a particular focus on blockchain technologies.

The third study, 'Understanding the impact of the General Data Protection Regulation (GDPR) on artificial intelligence,' investigates the challenges associated with the implementation of the GDPR in the area of artificial intelligence taking into account the new rights and obligations that this piece of EU legislation enshrines upon this particular technological trajectory.

3.13. STOA Technology Assessment project | Improving internationalisation of research organisations in the EU

Lead Panel Member: Christian Ehler
Project duration: Started in July 2018; presented to the STOA Panel in February 2019; study to be published in 2019.
Relevant to EP committee: ITRE

Research and innovation is a fast-evolving sector, heavily influenced by trends such as the globalisation of the economy or the digitalisation of industry. Research and innovation are increasingly globalised and international cooperation has currently become a strategic priority to access the latest knowledge. It allows research actors to face global societal challenges more effectively and to boost industrial competitiveness.

International research collaboration has captivated the imagination of the academic profession and determines the research policy decisions taken by governments worldwide. Policy-makers and funding agencies encourage international research cooperation, in the expectation that it will produce higher impact rates in science and technology, foster publications, and improve the quality of training.

International research cooperation provides opportunities for research organisations to acquire additional financial resources and access to new scientific knowledge. Strong evidence shows that the best research and technology centres are those with a strong level of international cooperation. In Europe, the realisation of the European Research Area requires a higher level of international cooperation of the Research and Innovation (R&I) system. While the world seems to collaborate in research mostly on a nation-by-nation basis, Europe is exceptional in terms of its long-term, large-scale regional research collaborations. Although international research cooperation has several positive
aspects, it involves a number of risks and challenges, including legal and institutional barriers, the relatively high costs and a number of obstacles due to higher level of competition.

This STOA study will identify and analyse a set of motivations and drivers behind the will to internationalise in research, the different barriers that are faced by research organisations in their international activities and the strategies they adopt to make the best of the opportunities and costs linked to research internationalisation processes.
4. STOA activities in relation to health and new technologies in the life sciences

4.1. STOA Scientific Foresight project | Assistive technologies for people with disabilities

Member involved: Ádám Kósa (EPP, HU)
Project duration: Started in February 2016; presented to the STOA Panel in February 2016; study published in January 2018.
Relevant to EP committees: IMCO, EMPL, ITRE, JURI, LIBE
Relevant EP file: Accessibility requirements for products and services - 2015/0278(COD) – Rapporteur: Morten Løkkegaard (ALDE, DK)

Assistive technologies (ATs) are designed to improve the functional capabilities of people with disabilities. Some are relatively low-tech and very familiar, such as reading glasses, crutches and hearing aids. Others are more advanced, using cutting-edge science and technology, with future ATs under development that could have a huge impact on all our lives. In January 2018, STOA published the results of its study on ATs for people with disabilities. The study was requested by Ádám Kósa (EPP, Hungary) and carried out by the European Technology Assessment Group (ETAG), under the management of STOA.

The key results of the study are presented in a video, and are further summarised and developed in an In-Depth Analysis, also published by STOA. This highlights that many current and future ATs could have a substantial positive impact on the inclusion of people with disabilities in society, education and employment and concludes with several key messages. First, a proactive approach should be taken to ensure that current and future ATs respond to the needs and challenges of society. Second, a ‘one size fits all’ approach to promoting ATs may be inappropriate, as individuals have different needs, desires and preferences, and live in different social, economic and infrastructural contexts. Third, technology alone is not enough and should be combined with social and regulatory action. Fourth, actions should not exclusively focus on individuals with disabilities, because broader attitudinal and organisational change is required. Practical steps could include co-creation and the enhanced involvement of people with disabilities from the earliest stages of technology development, and support for the emergence of a range of AT professionals who could help people with disabilities, technology developers and other citizens to maximise the benefits of ATs. Fifth, and finally, the study calls for more effective use of current technologies and regulations, combined with social action against discrimination and stigma, which could have a profound positive effect on all of our lives. Read the related blog post.
4.2. STOA Technology Assessment project | Harmful use of the internet

Lead Panel Member: Mady Delvaux
Project duration: Started in December 2017; presented to the STOA Panel in September 2018; study published in January 2019.
Relevant to EP committees: ENVI, CULT

The STOA study ‘Harmful use of the internet’ covers harms associated with internet use that concern the health, well-being and functioning of individuals, and the impact on social structures and institutions.

**Part I** of the study focuses on generalised internet addiction, online gaming addiction and online gambling addiction. The clinical presentations, patients’ profiling, comorbidities, instruments, interventions and prognosis are different across these three potential addiction disorders. The study states that the individual, cultural and media-use context significantly contributes to the experience and severity of internet addiction.

The study proposes a set of preventive actions and evidence to support future policies. It argues that it is beneficial to offer information, screening tools and campaigns to students in secondary schools and at universities regarding internet-use-related addiction problems. This will require research and resources for schools, their staff and for families.

**Part II** of the study identifies a number of different types of social and cultural harm associated with internet use. Some of these are briefly described below:

- **Information overload.** Information overload is the condition of having too much information to adequately understand an issue or make effective decisions.
- **Harm to social relationships.** Extensive internet use, in particular social media use, is correlated with loneliness and social isolation.
- **Harm to public/private boundaries.** Harm is done by the way in which the internet and smartphones blur the distinction between private and public, and between the different spheres of life, including work, home life and leisure.
- **Harm to cognitive development.** Empirical evidence suggests that internet use can have both positive and negative impacts on cognitive development, depending on the person and the circumstances. As far as harm is concerned, there is evidence that children can be harmed in their cognitive development by prolonged internet use.
- **Harm to communities.** Many offline communities are being harmed because of the partial migration of many human activities - shopping, commerce, socialising, leisure activities and professional interactions - to the internet.

A number of broad policy options are identified for preventing and mitigating these types of harm. They include, among other things: (i) promoting technology that better protects social institutions; (ii) education about the internet and its consequences; (iii) strengthening social-services support for internet users; (iv) incentivising or requiring employers to develop policies that protect workers against harms of work-related internet use; (v) establishing governmental units and multi-stakeholder platforms at EU level.
4.3. STOA Technology Assessment project | Innovative solutions for research in healthcare

Lead Panel Member: Paul Rübig
Project duration: Started in September 2018; presented to the STOA Panel in March 2019; STOA workshop on 10 January 2019; study to be published in 2019.
Relevant to EP committees: ENVI, ITRE

This project, started in September 2018, consists of a workshop and a study to be completed in 2019.

The aim of the workshop was to provide patients, clinicians, payers (entities other than patients that finance or reimburse the cost of health services), Health Technology Assessment (HTA) agencies, regulators, pharmaceutical companies, researchers, policy-makers and the public at large with an opportunity to discuss the implementation of an 'innovation-centred' system, exploring a truly 'patient-centred' approach that harmonises applied clinical research with the drug development process, and to present their point of view and their innovative suggestions for future drug development in Europe.

The purpose of the STOA study is to understand the major bottlenecks existing nowadays in the field of drug development in Europe, identifying new ways to make treatment optimisation a standard step in medicine development.

4.4. STOA Scientific Foresight project | Farming without plant protection products: Can we grow without using herbicides, fungicides and insecticides?

Member involved: Mairead McGuinness (EPP, IE)
Project duration: Started in September 2018; STOA workshop on 6 March 2019; study to be launched in summer 2019.
Relevant to EP committees: AGRI, ENVI

The first phase of the project consisted of a research paper for the STOA workshop ‘Farming without plant protection products: Can we grow without using herbicides, fungicides, insecticides?’

The workshop, as an intermediate response to the request for a foresight study by Mairead McGuinness, was organised to collect views from conventional and from organic farming experts, based on a scientific background paper prepared by a team of three scientists, including a presentation and debate on consumers’ perceptions.

As a follow-up to the well-attended workshop, the STOA Panel decided to continue as requested with an in-depth foresight study. This would make it possible to put the scientific evidence in the context of the views of civic society.
4.5. STOA Scientific Foresight project | 3D bioprinting for medical and enhancement purposes

Member involved: Dario Tamburrano (EFDD, IT)
Project duration: Started in October 2016; presented to STOA Panel in May 2018; study published in July 2018.
Relevant to EP committees: ITRE, IMCO, EMPL, ENVI, JURI

3D printing refers to the production of physical artefacts by the gradual addition of layers of material. Scientists are now exploring methods of 3D bioprinting, whereby biological and ‘biologically relevant’ materials are produced for medical and human-enhancement purposes. Beyond headline-grabbing speculative developments, the sector offers many realistic opportunities. This includes the production of surgical tools and instruments, such as drilling and cutting guides and knives that can be designed for specific one-off procedures, allowing surgeons to work with greater precision and speed. Anatomically accurate models of patients could also be produced, which could allow doctors to practise for a specific operation, or make it possible to train medical students and facilitate discussions with patients in advance of procedures. 3D printing also has substantial development potential in the production of personalised prosthetic limbs, which could offer improved functionality, aesthetics and fit.

In 2018, STOA published the results of its study on 3D bio-printing for medical and enhancement purposes, which was requested by Dario Tamburrano and carried out by the European Technology Assessment Group (ETAG), under the management of STOA. Three key challenges are identified in the approach to regulation, managing the distribution of costs and benefits, and the role of citizens in technology development. The study offers two distinct sets of policy options in response to each of these three challenges. The whole study is described in detail in a report, which is complemented by a further analysis of legal and ethical issues. The key insights of the study are summarised and developed in an In-Depth Analysis, which offers concluding remarks on three key trends (the decentralisation of supply chains, mass customisation of devices, and the rise of ‘maker movements’ operating outside traditional laboratories), the ambiguous boundary between medical recovery and human enhancement, responsible research and innovation, managing expectations of the technology, and how to develop socially acceptable technologies.
4.6. STOA Technology Assessment project | Should we fear artificial intelligence?

Lead Panel Member: Maria Teresa Giménez Barbat
Project duration: Started in November 2017; STOA workshop on October 2017; study published in March 2018.
Relevant to EP committees: ITRE, JURI
Relevant EP files: Comprehensive European industrial policy on artificial intelligence and robotics - 2018/2088(INI) - Rapporteur: Ashley FOX (ECR, UK)

Artificial intelligence (AI) is one of the most hotly debated technologies on the horizon. This horizon is getting closer and, in some application areas, AI is already here. This has prompted debates about what AI means for the future of humanity, which occasionally includes extreme predictions on employment (such as a job-free society), and existential threats (such as a human-free earth). Most of the time, however, experts can imagine a range of possible outcomes of AI development, and are calling for more serious reflection on how we can meet the challenges and opportunities it presents and ensure a responsible development path.

Spaces for this kind of observation, reflection and debate need to be created actively, ensuring that adequate attention is given to all relevant perspectives. This needs to include the perspectives of different scholarly disciplines, because no discipline has a monopoly on wisdom. For example, the science and engineering community holds a prominent role in the debate, because it is well positioned to reflect upon the boundaries of technical possibility and the limits of control mechanisms. On the other hand, social scientific expertise is essential to understand how technology develops in society. When disagreements emerge between scholarly disciplines, it is important to create cross-disciplinary spaces where scholars can bring valuable far-ranging insights into a topic that could have a great impact on our future.

Following the 2017 STOA workshop on the subject of AI in the context of rational optimism - in which four academics from four different disciplines presented their perspectives on the future of AI - the speakers refined their perspectives into contributions to a collection of individual position papers. The authors - Peter J. Bentley, a computer scientist from University College London, Miles Brundage, a technology policy researcher from the University of Oxford, Olle Häggström, a statistician from Chalmers University, and Thomas Metzinger, a philosopher from Johannes Gutenberg University of Mainz - were free to set out their arguments on their own terms and in their own style. Published in 2018, the collection provides a stimulating entry point to debates about the future of AI for interested parties in the parliamentary community and beyond.
5. STOA activities in relation to science policy, communication and global networking

5.1. STOA Technology Assessment project | Overcoming innovation gaps in the EU-13 Member States

Repeated reports point to the issue of ‘underperformance’ of the so-called ‘new Member States’ that joined the EU in 2004 (Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia), 2007 (Bulgaria, Romania) and 2013 (Croatia) – referred to as EU-13 – in the EU Framework Programmes (FPs) for R&I.

The EU-13 first participated in FP5 (1998 – 2002), so they have already more than 20 years of experience with the FPs. However, there is still a gap between the participation of the EU-13 and that of Member States that entered the EU well ahead of 2004 – Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, The Netherlands, Portugal, Spain, Sweden and the UK – referred as EU-15. This study aimed to understand why EU-13 countries participate less in the FPs, why they are less successful and what could be done to increase their participation in future FPs.

The study confirmed four main reasons and factors for the relatively low participation: (i) the EU-13’s R&I systems are weaker, with lower expenditure and lower innovation performance. According to European Innovation Scoreboard data, all EU-13 Member States rank lower in indicators measuring research systems, although they have improved their positions between 2008 and 2015; (ii) the proposals that involve participants from the EU-13 are of a lower quality; (iii) researchers applying to participate in FPs from the EU-13 have weaker European research collaboration networks; (iv) the EU-13 have a low level of collaboration with the top European research organisations.

A number of policy options were formulated: (i) Creating national and regional hubs for European R&I collaboration. National and EU structural funding should be used as a leverage to attract FP funding; increased contributions should create modern and well-equipped infrastructure leading to better integration in European research networks; it is also necessary to improve organisational capabilities. (ii) Improving the governance of national R&I systems. This would involve strengthening the strategic management of research organisations, introducing periodic evaluations of research organisations and moving towards greater international collaboration. (iii) Better understanding and use of FP outputs: displaying useful outputs can be an important motivating factor for research teams to apply for other projects. This could be done through national proof-of-concept schemes.
In this meeting, strategies for building a mission-oriented approach in EU R&I policies and designing a mission-oriented approach in the future EU Framework Programme were explored from different perspectives.

In the last twenty years, two thirds of economic growth in industrialised countries is attributed to R&I. The STOA workshop called on the European institutions to launch a wide stakeholder debate among citizens, scientists and innovators on potential future R&I missions for Europe that address global challenges and mobilise researchers and innovators to realise them.

During the event, several speakers argued that, to become an innovation leader and maximise the impact of its intervention, the EU should not spread its investments in R&I too thinly. Instead, it should prioritise investing in areas where the EU added value is greatest in terms of the degree of risk involved and where the benefits of economies of speed, scale and scope can be reaped. Other sectorial policies – in areas such as industry, agriculture, energy, transport, ICT, culture – should be fully engaged with innovation policy-making.

The post-2020 EU R&I framework programme should thus translate global societal challenges (social, economic, environmental etc.) into a limited number of large-scale R&I ‘missions’. These would define expected impacts across an entire portfolio of activities, rather than at the level of individual call topics. The UN Sustainable Development Goals should serve as a global reference framework for defining Europe’s R&I missions.

Missions should have a breakthrough or transformative potential for science, technology, industry or society. It should be possible, within the appropriate timeframe, to ascertain to what extent a mission has been accomplished. Having set the direction and expected impact, missions should be underpinned by non-prescriptive calls for proposals that allow applicants to choose the funding instrument they need; for instance research projects, co-funded activities, prizes, financial instruments or public procurement.

The workshop identified some potential missions for the post-2020 EU R&I programme, namely: (i) achieving a Europe free of plastic litter by 2030; (ii) understanding and enhancing the brain by 2030; (iii) producing steel with zero carbon in Europe by 2030; (iv) building and operating the first quantum computer in Europe.
5.3. STOA-ITRE conference | Science and innovation – open to the world – Strengthening cooperation between the STS forum and the EU through Horizon Europe, 17 May 2018

Lead Panel Member: Paul Rübig
Relevant to EP committee: ITRE

‘Science and innovation - open to the world’ was the theme of an exchange of views held by the ITRE Committee, together with STOA and the Tokyo-based Science and Technology in Society (STS) forum, on 17 May 2018. This was the third in a series of annual events, whose previous editions were co-organised by STOA and the STS forum on 4 May 2016 (‘Adapting to the changing world through science, technology and innovation’) and 30 May 2017 (‘The future of mobility’), helping to consolidate the close relationship that STOA has built with the STS forum over the years.

In 2018, participants were welcomed by ITRE Chair Jerzy Buzek and STS forum Founder and Chairman Koji Omi, followed by Research, Science and Innovation Commissioner Carlos Moedas, who outlined the main features of the new Horizon Europe research framework programme published in June 2018. A lively debate ensued, with Members of the European Parliament raising issues such as openness in science, research funding, reciprocity in scientific cooperation with third countries, linkage to sustainable development goals and cooperation in specific areas (e.g. quantum technologies).

Yoichi Ito, Deputy Minister of Education, Culture, Sports, Science and Technology (MEXT), and Fumikazu Sato, Deputy Director-General in the Ministry of Economy, Trade and Industry, talked about Japanese S&T policy and future perspectives of EU-Japan S&T cooperation. During the subsequent exchange of views, several guests from the European Commission, Japanese S&T supporting organisations, international corporations and academia took the floor, expressing their views on current scientific challenges and how Horizon Europe could enable scientific breakthroughs.
5.4. STOA-ERC conference | Investing in young researchers – Shaping Europe’s future, 31 May 2018

Lead Panel Member: Eva Kaili
Relevant to EP committee: ITRE

Scientists and Members of the European Parliament got together with the aim to showcase Europe’s research and innovation efforts through programmes such as Horizon 2020 and one of its most successful initiatives, the ERC. The event also featured stimulating exchanges on the role of fundamental research in designing the future of Europe. The conference was very timely, as it took place just a week before the European Commission (EC) announced its proposal for Horizon Europe, the next research and innovation framework programme, due to start in 2021.

The event attracted 14 Members (including Industry, Research and Energy Committee Chair Jerzy Buzek) and 22 researchers funded by the ERC, Research, Science and Innovation Commissioner Carlos Moedas and three Nobel Prize winners, among other participants. In addition, EP President Antonio Tajani, EC Vice-President Andrus Ansip and the Bulgarian Minister of Education and Science Krassimir Valchev took part in the high-level science-policy debate organised the day before. Read the related blog post.
One wonders how innovation policy should be in view of the new multiannual financial framework. STOA held this workshop to assess whether there is sufficient coordination between all the stakeholders in the context of the new integrated innovation strategy of the EU. The event was opened by the first STOA Vice-Chair, Paul Rübig, emphasising that, with over 40 hubs across the continent, the European Institute of Innovation & Technology (EIT) plays a major role in European innovation, with the full support of the Parliament.

Lack of skills, lack of infrastructure and poor investments; these are the main factors that, according to EU Commissioner Tibor Navracsics, responsible for the EIT, hinder innovation in Europe. Horizon 2020 and its successor should be integrated, where possible, with national, regional and local resources. Martin Kern, Interim Director of the EIT, represented the institute at the workshop and shared its achievements. With a strong portfolio of projects including Volocopter, Advantis and Alina, the future of the EIT looks promising. Martin Kern explained that the EIT would like to engage in increased collaboration with EU bodies, such as the European Innovation Council (EIC), in the same way it has already worked with the Joint Research Centre (JRC). During the workshop, Boris Dimitrov, CEO of Checkpoint Cardio, a medical start-up which has benefited from the services of EIT Digital, presented the key advantage presented by the EIT as being the access provided to consolidated funding across different European regions.

Jean-David Malo, Director for Open Innovation and Open Science, DG Research and Innovation at the European Commission, referred to the Commission’s call for national and regional authorities to develop smart specialisation strategies for research and innovation. The Commission communication on ‘Strengthening Innovation in Europe’s regions: Strategies for resilient, inclusive and sustainable growth’ takes stock of the progress made so far in the area of decentralised innovation. According to Lambert van Nistelrooij, this communication is largely descriptive and limits itself to ESI funds, Horizon 2020 and its successor, Horizon Europe.

Christian Ehler, STOA Panel member, discussed the integration of the EIT into broader programmes, such as the international dimension of European innovation policy. The European Parliament will be requesting an increase in the framework programme budget and Mr Ehler would like to see this go towards the third pillar of the Horizon Europe programme, from which the EIT can benefit. According to Mr Malo, for the first time it will be possible to strengthen the sectors of science and technology and transform research into business opportunities due to the planned budget of €100 billion. The EIT will play a key role in these initiatives, together with the EIC and the European innovation ecosystem, covering the sectors of raw materials, energy, climate, food, health and digital innovation. Read the related blog post.
6. MEP-Scientist Pairing Scheme

For many years since its launch in 2007, the MEP-Scientist Pairing Scheme has been recognised as a valuable tool for enhancing knowledge-based decisions, between scientists and policy-makers, facilitating a better public awareness of EU policies and fostering a greater mutual understanding. Apart from an improved mutual visibility, the advantages and the added value of this project for the participants are:

‒ *For Members of the European Parliament:* By introducing them to a network of experts, their awareness of scientific processes and discovery is enhanced, along with a better understanding of the scientists' point of view on policy issues. The pairing scheme facilitates the process of bringing scientific advice into EU policy discussions.

‒ *For scientists:* They learn how to effectively interact with politicians and how to proactively inform them in fields of mutual interest. Additionally, they could contribute to the dissemination of information to universities and other scientific institutions on the structure and implementation of relevant European policies and programmes, e.g. Horizon 2020.

The 2018 edition of the pairing scheme, like those of 2015, 2016 and 2017, was managed entirely by STOA. The scheme involved in this round scientists who were on the reserve list of the STOA 2015 open call but not selected by a Member yet, but also ERC grant recipients, Marie Skłodowska-Curie fellows, and scientists working at the Joint Research Centre or an agency of the EU-ANSA network.

Furthermore, in 2018 the STOA Panel decided to organise a series of scientific events under the name of ‘Science Week at the European Parliament’, in co-operation with the European Commission’s Joint Research Centre (JRC), and the European Research Council (ERC).

The ‘Science Week at the European Parliament’ encompassed the ‘Brussels Week’ of the MEP-Scientist Pairing Scheme (5-7 February 2019), the JRC ‘Science meets Parliaments’ event (6-7 February 2019), an ESMH workshop on ‘Tackling misinformation and disinformation in science’ (6 February 2019), and a STOA/ESMH - ERC Conference (7 February 2019). The aim of these events was to strengthen the structured dialogue between scientists and policy-makers, so as to raise awareness about politically relevant, cutting-edge scientific issues and about the importance of science for evidence-informed policy-making.

During the ‘Brussels Week’, paired scientists had an opportunity to follow their Member counterparts in their daily political activities, and gain an understanding of the EU science, technology and research policy framework, including, in particular, EP work in this area. The visit included the following activities:

‒ attending various meetings with Members, EP staff and science journalists, and presenting their research work and outcomes;
‒ receiving an introduction to the work of the EP, by the Member and his/her assistants, as well as by EP officials;
‒ participating in ‘pitching sessions’ between science journalists and scientists, organised by the new European Science-Media Hub (ESMH);
‒ when not attending meetings organised by STOA, the scientists were invited to ‘shadow’ their Member at various political group or other meetings, on the basis of the Member’s availability;
‒ a last meeting, attended by scientists, Members or their assistants, and EP officials, assessed the week and identified its positive aspects, as well as elements for improvement.

**Science meets Parliaments, 6-7 February 2019**

In order to promote a culture of evidence-informed policy-making, the JRC together with STOA launched the ‘Science meets Parliaments’ initiative at the European Parliament in Brussels in September 2015. The objective of the initiative was to build closer links between scientists and policy-
makers at EU, national and regional levels and enhance the role of science in policy through regular
dialogue. This year’s event was the fourth in the series and marked the official opening of the EU pilot
project ‘Science meets Parliaments/Science meets Regions’ which brings the initiative to Member
States and supports the joint efforts of scientists and policy-makers to find local solutions.

ESMH workshop ‘Tackling misinformation and disinformation in science’, 6 February 2019

The purpose of the workshop was to exchange good practices in tackling misinformation and
disinformation in science, via the presentation of ‘case studies’, illustrating existing relevant initiatives
touching upon different science disciplines. The format of the workshop was participatory, as the
audience was actively involved in the debate of the case studies and engaged in the topic.

STOA/ESMH-ERC Conference, 7 February 2019

The STOA/ESMH-ERC conference ‘Investing in researchers - Shaping Europe’s future’ brought policy-
makers and ERC-funded grantees together with the aim of supporting evidence-informed policy-
making and underlining how Europe’s future can be shaped by fundamental research on topics
ranging from smart agriculture and food to CRISPR-Cas9, as well as migration and demography.
### List of 2018 Member-Scientist pairs

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Origin</th>
<th>Host University / Research institution</th>
<th>Discipline</th>
<th>STOA policy area</th>
<th>Selected by Member</th>
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<tbody>
<tr>
<td>1</td>
<td>ARANGO Celso</td>
<td>STOA 2015</td>
<td>Universitario Gregorio Marañón (Madrid)</td>
<td>Psychiatry, mental disorders</td>
<td>Health and life sciences</td>
<td>BECERRA Beatriz (ALDE, ES)</td>
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<td>BURKHART Gregor</td>
<td>ANSA</td>
<td>European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), Lisbon</td>
<td>Addiction prevention</td>
<td>Health and life sciences</td>
<td>WARD Julie (S&amp;D, UK)</td>
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<td>3</td>
<td>CARDOSO Ana-Cristina</td>
<td>JRC</td>
<td>Joint Research Centre, EC</td>
<td>Marine biology</td>
<td>Sustainable management of natural resources</td>
<td>RÜBIG Paul (EPP, AT)</td>
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<td>4</td>
<td>CHICO Tim</td>
<td>STOA 2015</td>
<td>University of Sheffield</td>
<td>Cardiovascular Medicine</td>
<td>Health and life sciences</td>
<td>FARIÁ José Inácio (EPP, PT)</td>
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<td>5</td>
<td>CRAGLIA Massimo</td>
<td>JRC</td>
<td>Joint Research Centre, EC</td>
<td>Digital Society, Social Inclusion</td>
<td>Potentials and challenges of the Information Society</td>
<td>BONI Michał (EPP, PL)</td>
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<td>6</td>
<td>DI COSMO Valeria</td>
<td>MSC</td>
<td>Fondazione Enrico Mattei (FEEM), Economic and Social Research Institute and Trinity College, Italy</td>
<td>Economics of public utilities Energy</td>
<td>Eco-efficient transport and modern energy solutions</td>
<td>EHLER Christian (EPP, DE)</td>
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<td>7</td>
<td>FONTARAS Georges</td>
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<td>Joint Research Centre, EC</td>
<td>Mechanical Engineering</td>
<td>Eco-efficient transport and modern energy solutions</td>
<td>PAPADIMOUSIS Dimitrios (GUE/NGL, GR)</td>
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<td>8</td>
<td>HOWE Amanda</td>
<td>STOA 2015</td>
<td>University of East Anglia, Norwich</td>
<td>Medical sciences</td>
<td>Health and life sciences</td>
<td>MAYER Alex (S&amp;D, UK)</td>
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<td>9</td>
<td>MARTTONEN-AROLA Salla</td>
<td>MSC</td>
<td>University of Sunderland (UK)</td>
<td>Engineering and management</td>
<td>Potentials and challenges of the Information Society</td>
<td>SZANY Tibor (S&amp;D, HU)</td>
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<td>10</td>
<td>RODRIGO German</td>
<td>STOA 2015</td>
<td>Universitat de València</td>
<td>High-energy physics</td>
<td>Science policy, communication and global networking</td>
<td>MOISÁ Sorin (EPP, RO)</td>
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<td>11</td>
<td>SCHWIEDRZIK Caspar Martin</td>
<td>ERC</td>
<td>European Euroscience Institute, Göttingen</td>
<td>Neuroscience</td>
<td>Health and life sciences</td>
<td>DELVAUX Mady (S&amp;D, LU)</td>
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<td>12</td>
<td>SIMONOV Mikhail</td>
<td>JRC</td>
<td>Joint Research Centre, EC</td>
<td>Artificial Intelligence, energy</td>
<td>Potentials and challenges of the Information Society</td>
<td>KAILI Eva (S&amp;D, GR)</td>
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<td>13</td>
<td>ZACHARIADIS Theodoros</td>
<td>STOA 2015</td>
<td>Cyprus University of Technology</td>
<td>Environmental Science and Technology</td>
<td>Sustainable management of natural resources</td>
<td>SPYRAKI Maria (EPP, GR)</td>
</tr>
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7. STOA Annual Lecture, 4 December 2018

To raise public awareness of and interest in science and technology issues, every year STOA hosts an Annual Lecture. The event features eminent speakers - often Nobel Prize laureates - who are invited to talk about subjects placed high on the political agenda. This year’s 17th STOA Annual Lecture was thematically linked to the EPTA Conference (see Section 9.1.2) and was entitled ‘Quantum technologies, artificial intelligence, cybersecurity: Catching up with the future’. The event focused on the opportunities and challenges created by greatly enhanced computing power, as well as other applications of quantum technologies, touching upon issues of cybersecurity and data protection at a time of widespread use of big data, artificial intelligence and data analytics.

The speakers were world-renowned personalities of great authority and influence on these developments:

- Professor Anton Zeilinger, Professor of Physics and President of the Austrian Academy of Sciences, introduced the audience to the quantum world and its important applications through a presentation entitled ‘From quantum puzzles to quantum communication’.

- Esther Wojcicki, American technology educator and journalist at the Palo Alto High School Media Arts programme, highlighted the challenges that new technologies pose for the education system, and how we could best put them at the service of developing new approaches to education, through a presentation entitled ‘Preparing students for a world dominated by quantum technologies, artificial intelligence, cybersecurity and media’.

Read the related blog post.
8. Presentations to the STOA Panel

8.1. Presentation of projects

During their meetings in Strasbourg, the members of the STOA Panel hear presentations of the preliminary results of ongoing STOA projects and provide feedback and further guidance for completing the reports.

The following projects were presented to the STOA Panel during its meetings in 2018:
- ‘Overcoming innovation gaps in the EU-13 Member States’ (18 January)
- ‘New technologies and regional policy - Towards the next cohesion policy framework’ (8 February)
- ‘Galileo satellite navigation system: return on investment of space applications on earth’ (19 April)
- ‘New technologies for Eastern Mediterranean offshore gas exploration’ (14 June)
- ‘Technological innovation for humanitarian aid’ (5 July)
- ‘Harmful use of the internet’ (13 September)
- ‘Algorithmic transparency and accountability’ (25 October)
- ‘Technological responses to fake news and their impact on freedom of expression and media pluralism’ (13 December).

In addition, researchers and experts from different institutions and organisations are invited to give presentations and participate in discussions on techno-scientific topics and related policy issues of interest to the Panel.

The following sections summarise other presentations and discussions that took place during the Panel meetings in March and November 2018.

8.2. Presentation by Bernhard Url, Executive Director, European Food Safety Authority (EFSA), 15 March 2018

Bernhard Url, Executive Director of EFSA, was invited as part of the continuous dialogue that STOA sustains with the scientific agencies of the EU. He presented the work of his agency and the efforts it makes to ensure scientific impartiality and independence from economic interests.

Mr Url explained the challenge of having to work with a restricted budget, dealing with an increasingly complex agro-food system, managing the ongoing data revolution, communicating with a wider public that has become increasingly concerned with these issues, and engaging in the wider societal debate about how to deal with risks and emerging threats.

The independence of EFSA is very important and for EFSA scientists it is fundamental not to have conflicts of interest (e.g. contracts for research in the private industry). For this reason, Mr Url stressed the importance of openness, going beyond transparency, and of engaging civil society in scientific endeavour.

After presenting EFSA’s scientific principles, such as impartiality, transparency, methodological rigour and engagement, he summarised its key challenges for the future: funding issues and dealing with societal issues, the complexity of the agro-food system and emerging risks.

Science is not the only input into political decisions, but it is necessary for addressing competitiveness, equality, employment and growth that more resources be given to research and the translation of research into innovation, particularly in food safety and precision agriculture, which would help to provide safe, wholesome food to 10 billion people. He concluded that EFSA’s role involved science and communication, and that it was important that the agency stayed out of politics, but at the same time, gained political trust.
8.3. Discussion on disruptive innovation in Europe, 15 November 2018

The presentations offered participants an opportunity to hear about various approaches to supporting disruptive innovation in Europe from representatives of the European Institute of Innovation & Technology (EIT), the European Commission’s Directorate-General for Research & Innovation (DG RTD) and the Joint European Disruptive Initiative (JEDI).

The first speaker, Mathea Fammels, Head of the Brussels Liaison Office of the EIT focused on three recent EIT activities, all of which offered substantial disruptive potential in the field of transport:

- ‘Hardt Hyperloop’, a Dutch start-up which was developing a high-speed intercity mass-transport system.
- ‘Lilium’, a German start-up which had developed the first zero-emissions electric jet that could carry up to five passengers and could revolutionise private transport.
- ‘Navya’, a French company which had developed a driverless shuttle bus for up to 15 passengers.

The second speaker, Luis Sanchez Álvarez, from the ‘Investments and SMEs’ Unit in DG RTD, gave an overview of the initiatives in Horizon 2020 and Horizon Europe, related to disruptive innovation. Horizon 2020 did not address disruptive technology specifically, but had succeeded in supporting breakthrough, market-driven, disruptive innovation, particularly through its SME Instrument. He also explained how the Horizon Europe programme would support breakthrough and disruptive innovations that were too risky for private investors through its Pathfinder and Accelerator programmes. The Pathfinder programme targeted early-stage technologies by providing grants to develop pre-commercial products, while the Accelerator programme provided grants and financing to help innovators bring their products to market and scale-up their activities.

The third speaker was André Loesekrug-Pietri, spokesperson for JEDI, a Franco-German civil-society initiative supporting disruptive innovation. In his view, disruptive innovation was particularly important nowadays because Europe was falling behind China and the US in crucial digital technology markets, and was losing the technological battle. He highlighted his point by showing that seven of the world’s ten largest companies were technology focused, and none of them were European. He therefore argued that Europe had to adopt new methodologies for supporting innovation, inspired by the Defense Advanced Research Projects Agency (DARPA) of the United States, which emphasised the need to establish bold priorities, invest in early-stage innovation, and ensure that projects that were not developing well were either forced to change or allowed to fail.
9. Networks and collaborations

9.1. STOA attendance at EPTA meetings

9.1.1. EPTA Directors’ meeting, 30 May - 1 June 2018, Strasbourg

The meeting took place from 30 May to 1 June 2018 in Strasbourg under STOA’s presidency of the EPTA network. During the three days some important topics were discussed and decided upon, such as:

- improving the communication channels among EPTA members;
- defining the objectives and topic of the EPTA Conference 2018, and confirming the important decision of linking it to the 17th STOA Annual Lecture;
- giving an overview of the ‘silos and pipes’ strategy of STOA, which aspires to overcome the existence of silos within the EU and national administrations, usually defined in terms of policy areas.

9.1.2. EPTA Conference 2018: Towards a digital democracy – Opportunities and challenges, 4 December 2018

Technologies permeate all levels of modern society and economy, and the internet and electronic devices are basic tools in our everyday lives; we are increasingly dependent on technologies. Some of these technologies – such as quantum technologies, artificial intelligence and blockchain, to name the newest and most dynamic – are now entering the democratic process.

The conference, thematically linked to the STOA Annual Lecture 2018, featured contributions from technical/scientific experts from the EPTA member organisations addressing the interplay between democracy, on the one hand, and artificial intelligence, blockchain and/or quantum technology, on the other. Read the related blog post.

9.2. Visit to Silicon Valley and New York, 6-10 May 2018, USA

A delegation of Panel members visited Silicon Valley and New York City from 6 to 10 May 2018. It was led by STOA Chair Eva Kaili, and comprised STOA First Vice-Chair Paul Rübig and Second Vice-Chair Evžen Tošenovský, as well as Panel members Danuta Jazłowiecka and Claudia Schmidt.

On 7 May the delegation visited the University of California (UC) Berkeley campus, with meetings at:

- the Innovative Genomics Institute, whose Executive Director, J. Doudna, is renowned for having co-developed the CRISPR-Cas9 genome-editing technology;
- the Center for Long-Term Cybersecurity; and
- CITRIS, an interdisciplinary UC institute for science and innovation, where they met with leading CITRIS staff, including Director C. Spanos and Deputy Director C. Crittenden.
The Members then had a meeting with S&T Counsellors from EU and associated countries, and participated in a roundtable discussion on ‘Privacy, data and technology policy’, co-organised, among others, by the Bay Area Council Economic Institute and EIT Digital.

On the second day, the delegation visited various high-tech companies, starting with the Tesla Factory, Fremont, and Xilinx, San Jose, a company that designs, develops and markets programmable logic products. They went on to visit Intel, Santa Clara, the world’s second highest valued semiconductor chip maker, and Facebook, Menlo Park, in the wake of the Cambridge Analytica scandal.

On its final day on the West Coast, the delegation visited the World Economic Forum (WEF)’s Center for the Fourth Industrial Revolution in San Francisco, a hub for global, multi-stakeholder cooperation to develop policy frameworks and advance collaborations that accelerate S&T benefits. They met with R. Samans, member of WEF’s Managing Board, and listened to presentations on artificial intelligence (AI) & machine learning, digital trade & cross-border data flows, and precision medicine.

On their first day on the East Coast (10 May), the Members met with staff of the New York Genome Center, an independent research institution translating genomic research into new treatments for human disease, and moved on to New York University (NYU), where they met with NYU staff led by Professor K. Becker, Tandon School of Engineering, and comprising representatives of the AI Now Institute and the NYU Future Labs. Finally, they visited the corporate office of IEEE in New York City and discussed IEEE activities, especially those linked to education in the engineering sciences, developing industry standards for a wide range of technologies and the ethical implementation of intelligent technologies.

9.3. STS forum Council meeting, 15 May 2018, Frankfurt

The STS forum, founded in 2004 by Koji Omi, a former Minister of Finance and former Minister of State for Science and Technology Policy, has become a global movement embracing the scientific community and beyond, forming networks among leaders from around the world to share collective knowledge and realise its full potential. It aims to provide a new mechanism for open discussions on an informal basis, and to build a human network that would, in time, resolve the new types of problems stemming from the application of science and technology. The work of the STS forum is being led by its Council, which includes scientists and policy-makers from around the globe.

Following the first 2018 Council Meeting in Washington D.C. on 8-9 January 2018, the members of the STS forum Council gathered in Frankfurt and discussed the programme and the speakers of the upcoming 15th Annual Meeting in October in Kyoto. This meeting was an opportunity especially for the STS forum Council members based in Europe to discuss emerging trends in science, technology and society that should be highlighted at the forum’s annual meeting (see point 9.6 of this report). Paul Rübig, STOA first Vice-Chair and member of the STS forum Council, participated in this event to convey the perspective of the discussions that had taken place over the last 12 months in STOA and the European Parliament in general.
9.4. EuroScience Open Forum (ESOF), 12-14 July 2018, Toulouse

STOA First Vice-Chair Paul Rübig and Panel Members Maria Teresa Gimenez Barbat and Danuta Jazłowiecka participated in a STOA delegation to the biennial EuroScience Open Forum (ESOF) conference in Toulouse. ESOF is the largest interdisciplinary science meeting in Europe, gathering over 4,000 researchers, students, educators, business actors, social actors, policy-makers, science writers and journalists to discuss science, technology and innovation, and their impacts on society. For the 2018 edition of ESOF, the organisers adopted the motto ‘Sharing Science: towards new horizons’, which allowed participants to learn more about future iterations of the European Commission’s Framework Programme for Research and Innovation while maximising the opportunities for insights to be shared across disciplinary and geographical divides.

As part of the programme, Paul Rübig made a presentation in a panel entitled ‘The politics of science: funding social sciences & humanities around the world?’ and María Teresa Giménez Barbat gave a presentation in a panel entitled ‘The ethics of science and new technologies: who guides EU decision-making?’. In addition to participating actively in these and other debates, Members had the opportunity to attend the wider ‘Science in the city’ festival, held throughout Toulouse, which, as host of ESOF, embraced its title of ‘European City of Science’.

9.5. World Economic Forum New Champions, 17-21 September 2018, Tianjin, China

The World Economic Forum (WEF) engages the world’s top leaders in collaborative activities to shape the global, regional and industry agendas. As part of the Davos System, this annual meeting gathers the most innovative creators, scientists and researchers worldwide, in one of the most innovative regions of the world.

A three-member delegation composed of STOA Chair Eva Kaili, First Vice-Chair Paul Rübig, and Panel member Danuta Jazłowiecka had the opportunity to attend plenary and breakout WEF sessions, as well as hold various bilateral meetings, side events and visits to nearby science parks.

There is a significant overlap between the 14 Davos System ‘Shaping the Future of …’ initiatives and the five STOA priority areas. STOA’s presence at the forum contributed to establishing closer links between the European Parliament and internationally recognised, influential policy-makers, significantly extending STOA’s existing global links.

A series of bilateral meetings took place on the sidelines of the WEF event, inter alia with Ms Martina Larkin, WEF Head of Europe and Eurasia, journalists, scientists and innovators. Then the STOA delegation headed to Beijing to hold bilateral talks with the Chinese Ministry of Science and Technology (MOST) and the Chinese People’s Institute of Foreign Affairs (CPIFA).
9.6. STS forum & EU-Japan Science Policy Forum, 6-9 October 2018, Kyoto

A delegation comprising STOA Chair Eva Kaili and First Vice-Chair Paul Rübig attended the 15th meeting of the STS (Science and Technology in Society) forum from 7 to 9 October 2018 in Kyoto. They played an active role in the forum itself and had an opportunity to discuss important issues concerning international S&T cooperation with leading policy-makers.

Ms Kaili’s main contribution to the forum consisted of participating as a speaker in:
- the 9th EU-Japan Science Policy Forum, entitled ‘Boosting innovation: Policy initiatives and measures in the EU and Japan’ and organised by the EU Delegation to Japan and the Japanese National Graduate Institute for Policy Studies (GRIPS), on 6 October 2018, on the sidelines of the STS forum;
- the concurrent session ‘Artificial intelligence and society’ on 7 October.

Mr Rübig participated as a speaker in the concurrent session entitled ‘Smart and Resilient Cities’ on 8 October. Moreover, as member of the STS forum Council, he participated in a general meeting of the Council, which plays a crucial role in planning the activities of the forum.

Furthermore, the delegation had several bilateral meetings with leading S&T policy-makers from Japan, including high-level representatives of CSTI, MEXT, JST, SCJ, JSPS and the STS forum, as well as the S&T Advisor to the Japanese Foreign Minister. The Members also attended the ERC-JST Implementing Arrangement signing ceremony, and Mr Rübig met Her Royal Highness Princess Sumaya Bint El Hassan, President of the Royal Scientific Society of Jordan. Most of these meetings were organised by the EU Delegation to Japan. Jean-Eric Paquet, Director-General of DG RTD and ERC President Jean-Pierre Bourguignon were also present at the meetings. These exchanges were appreciated by all sides, who confirmed their interest and commitment in pursuing their contacts.
10. Communication

Communication is very important for maximising the impact of STOA’s work and showcasing its depth, scope and relevance, while reaching an ever wider audience. Communicating about STOA’s activities is also a way of encouraging feedback from STOA partners and stakeholders. STOA welcomed a total of 1,070 external participants at the 10 events it organised in 2018 and attracted 116,338 views of its website.

10.1. ‘Silos and pipes’ strategy

STOA is aware that specialised communities develop around specific areas of knowledge or expertise to the extent that it is difficult for members of these communities to communicate or work with members of other communities (the ‘silo effect’). This may be because of the specialist language used, community norms, organisational politics, professional barriers to individuals transcending ‘silos’, or simply because of insufficient communication channels (a lack of ‘pipes’). ‘Silos’ are often identified in traditional academic disciplines, affecting research and education, and are also present in institutions and organisations at various levels. For example, there are good reasons for structuring these organisations with reference to policy areas, and such organigrams frequently change in response to emerging issues. However, there are often difficulties in fostering horizontal dialogue between these specialist hubs. Emerging techno-scientific issues do not always fit neatly into one ‘silo’, which can negatively affect the adequacy of any response.

According to its ‘silos and pipes’ strategy, STOA seeks to continue benefiting from the current organisational structures and working practices that foster specialisation, while recognising and addressing some of the drawbacks that are associated with this segmentation, in order to better collaborate with its intra- and inter-institutional, as well as external, partners. It will continue to contribute to wider efforts among the global research, policy and knowledge management communities to respond to the challenges presented by ‘silos’, for example by committing to interdisciplinary initiatives and participating in debates and movements that seek to identify deficiencies in, or total absence of, communication; and also by building ‘pipes’, supporting innovative approaches to communication, and fostering the creation and maintenance of pipes between silos.

In addition to disseminating its own work by various means, increasingly including new media, STOA facilitates the communication, sharing and discussion of the work of researchers from other institutions and communities, for example through presentations to the STOA Panel (Chapter 8) and the activities of the STOA network (Chapter 9).

10.2. Publications

STOA’s publications are studies and briefings related to individual projects. STOA studies report on project methodologies and findings, and assess a number of options for policy-makers to consider. Short, concise and to-the-point ‘Options Briefs’ summarise the assessed policy options in 2-4 pages. A study and its findings may also be summarised in a ‘Study summary’ of a maximum of 20 pages.

In addition, since 2015, the Scientific Foresight Unit (STOA) has regularly published two-page ‘At-a-glance’ notes. These are intended as awareness-raising and thought-provoking overviews of current and relevant techno-scientific trends, as suggested by their titles, always in the form of questions starting with ‘What if …?’ Each publication in the series concerns one trend and consists of four sections: trend description, exploration of ongoing developments and expected impacts, consideration of unexpected impacts if the technology becomes embedded in society, and anticipatory law-making. In 2018 the Scientific Foresight Unit (STOA) published eight STOA studies, one study summary, five Options Briefs, five In-Depth Analyses and fourteen ‘What if …?’ notes.
STOA also produces blog posts preceding and following its events and publishes them at the European Parliament's Think Tank (EPRS) webpages (see also next section). An Annual Report on the STOA activities and achievements of the preceding year is available on the STOA website.

10.3. Other dissemination channels

STOA is increasingly using new media and other channels to communicate about its activities. This includes blog posts (29 in 2018), published on the EPRS blog, which announce STOA events and report on news, projects and workshops in an easily accessible manner. In 2018, the Scientific Foresight Unit (STOA) continued to regularly produce podcasts (11 released in 2018), based on its short awareness-raising publications ('What if …?’ notes). STOA events are regularly webstreamed and supported with live tweeting from @EP_ScienceTech, enabling interaction with stakeholders, experts and citizens engaged and interested in following the debate on the topic.

Overview of STOA’s online presence

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STOA Twitter account

Social media presence is a new efficient way of disseminating information and building a community of stakeholders. STOA has established its own Twitter account for promoting STOA publications, events, video clips, podcasts and blog posts. Twitter is also often used during events for engaging with the online audience (live-tweeting). Before each live-tweeted event, STOA develops a communication plan to maximise effectiveness of the social media activities. As part of this, Twitter is researched to identify relevant accounts (handles @ of speakers, stakeholders), labels (hashtags #), and to launch discussion already before the event.
STOA Panel

@EP_ScienceTech

High-quality, independent, objective analysis of S&T issues and policy options.

Bridging science, media & policy-making.

Making sound science accessible to all.
11. The European Science-Media Hub (ESMH)

11.1. ESMH kick-off event | Communicating science via social media, 27 June 2018

The European Science-Media Hub (ESMH) officially began its activities on 27 June 2018, with a stimulating debate on the challenges of communicating science via social media.

More than 50 representatives of the scientific community, European research organisations and journalists joined a lively discussion about different aspects of science communication in the digital world. STOA Chair Eva Kaili and First Vice-Chair Paul Rübig opened the debate and were joined by speakers who included Cary Funk, Director of Science and Society, PEW Research Centre; Mico Tatalovic, Journalist, Chair of the Association of British Science Writers; Michael Peters, CEO of Euronews; Nicolas Wöhrl, physicist, and Hashem al Ghaili, science communicator.

The event’s main message was the need to bring together science journalists, scientists and policymakers to propose different options for better science communication to citizens – the central aim of the ESMH.

Creating and maintaining a network of stakeholders is one of the ESMH’s main tasks. The network of stakeholders will play a crucial active role, not only in providing inputs to the Hub, such as collaborative events, joint initiatives and best-practice sharing, but also in potentially multiplying the results of the different ESMH projects.

In 2018 the ESMH set up its first contacts with around 200 stakeholders from the European institutions and agencies, science organisations, as well as with science journalists and media.

11.2. ESMH training for journalists, 6 November 2018

During the two-day event, organised by the ESMH and STOA, together with the EP’s Directorate-General for Communication, the ESMH offered a first training for journalists on tools to tackle disinformation. Journalists attended from all 28 EU Members States.

The debate on disinformation was opened by EU Pavel Telicka, EP Vice-President, who highlighted that disinformation affects each Member State differently and that the EU is still behind with tackling this issue.

Eva Kalli, STOA Chair, highlighted the need for smart regulations that respond to challenges without curtailing freedoms. She argued that, while it is important that citizens understand the implications of highly customised newsfeeds, if some people want to receive tailored information based upon their profiles, then they should be free to do so.

Paul Rübig, STOA First Vice-Chair underlined: ‘What is the added value of this communications revolution? We need journalists to help us understand how we can enhance our democracy while fighting disinformation.’
Carl Miller, Research Director of the Centre for the Analysis of Social Media at Demos, took a look into the ‘fake news industry’ in Kosovo.

Kajsa Falasca, Assistant Professor in Media and Communication Science, Centre for the Study of Democracy and Communication, Mid-Sweden University, made a presentation on recent election campaigns in Sweden concluding with the statement: ‘The election did not suffer much influence from disinformation.’

In addition to the workshop, the ESMH organised a training event for the journalists, provided by the First Draft project, on how to fight mis- and disinformation on-line. The trainers Eoghan Sweeney and Phoebe Arnold explained techniques for verification of online information and debunking of false news on the web, including essential verification exercises on tracing sources, geolocation and reverse image searches.

11.3. ESMH webpage

The European Science-Media Hub finalised the development of its website, based on WordPress, which became public in early January 2019. The website is regularly updated with articles on science and new technologies-related topics that attract media attention and are important in the European context.

The articles are written in collaboration with science journalists and offer the opinion of one or more scientists. The articles are accompanied by a selection of links to related information, with a focus on European research and knowledge in the field. STOA activities and studies are particularly highlighted.

Another main product of the website (also distributed via e-mail) is the ESMH press review. The website also contains a section for previous and future events of the Hub.

At the end of 2018, the ESMH team started the preparation of a Call for Expression of Interest (CEI) to establish a list of experts in science journalism and other domains, to support the team in writing articles for the ESMH website. The CEI will be published in 2019 on the EP website.

In the meantime, the ESMH established and applied a provisional procedure to start contracting out those external communication services for the publication of the first articles in 2018.
11.4. ESMH media monitoring tool

One of main tasks of the Hub is to develop techniques and methodologies for improving the ability of journalists to identify and disseminate trustworthy sources in the fields of science and new technologies. In order to fulfil these tasks, the ESMH purchased media monitoring and online verification tools: Europe Media Monitor technology (an extension of the EP Media Monitoring platform (EPMM)) developed by the JRC, the Tools for Innovation Monitoring (TIM), also provided by the JRC, and the tools for verifying content on social media Truly Media and TruthNest by the Athens Technology Centre (ATC).

Using the media monitoring tool EPMM, the ESMH was able to start producing a bi-weekly press review covering the most prominent science and technology topics in the mainstream media. The press review is published every two weeks (on the ESMH website and sent via e-mail) and contains seven reading sections, based on the STOA priorities. Scientific topics are clustered into five main areas, four thematic areas (transport & energy, information society, agriculture & environment, food & health), and one overarching theme (science policy & communication). The sixth section covers the presence of scientific news related to the ESMH, the European Parliament and other EU institutions in the media. The seventh and final section gathers ‘curious stories’ that could call for some scientific attention. The opening section – ‘In the spotlight’ – includes information identified as ‘prominent’ in the wider flow of news and offers various perspectives, opinions and reading angles to the audience.
12. Implementation of STOA budget

In 2018 STOA established a new framework contract which should cover the following four years (2018-2022). The new framework contract was signed with 18 contractors within five different policy areas (eco-efficient transport and modern energy solutions; sustainable management of natural resources; potentials and challenges of the information society; health and new technologies in life sciences; global communication and networks).

Due to the tight timeframe between the signing of the contract and the European elections, only two new studies were launched within this framework contract. As a result, the STOA 2018 expertise budget was used for direct contracts, which require a simplified procedure and less time for implementation.

In 2018, STOA committed €204 438 (66 % of the expertise budget available) to conduct 12 different projects and organise workshops, while €14 737 (98 % of its reception and representation budget) was committed to the organisation of various events, including the STOA Annual Lecture.
13. STOA administration

Since 15 September 2014, the STOA Secretariat and the Scientific Foresight Service constitute two services within the Scientific Foresight unit (STOA), which is part of the Directorate for Impact Assessment and European Added Value within the Directorate-General for Parliamentary Research Services (EPRS). The staff members of the unit are listed below. As from 2018, the European Science Media Hub (ESMH) team is also part of the unit.

Scientific Foresight unit (STOA)
Directorate for Impact Assessment and European Added Value
Directorate-General for Parliamentary Research Services (EPRS)
European Parliament
Rue Wiertz 60
B-1047 Brussels
Tel. +32 2 284 1629
E-mail: stoa@ep.europa.eu

Director-General, EPRS
Anthony Teasdale

Director, Impact Assessment and European Added Value
Wolfgang Hiller

Head of Scientific Foresight Unit (STOA)
Theo Karapiperis

STOA Secretariat
Zsolt G. Pataki, Head of Service
Mihalis Kritikos
Nera Kuljanic
Gianluca Quaglio

Scientific Foresight Service
Lieve Van Woensel, Head of Service
Philip Boucher
Christian Kurrer

European Science-Media Hub (ESMH)
Svetla Tanova-Encke, Coordinator
Emilia Bandeira Morais
Vitalba Crivello
Eszter Fay
Silvia Polidori

Assistants
Serge Evrard
Rachel Manirambona
Damir Plese
Vanda Nobre Da Silva
STOA trainees

STOA actively uses the Schuman scholarship scheme to offer vocational training to high-potential and recent university graduates. In addition, the unit accepts those who seek a traineeship as part of their studies or for the advancement of their careers. Each trainee works closely with an administrator and so becomes involved in most of the tasks and challenges they face: participating in meetings with Members and other stakeholders, and organising workshops and studies on science and technology topics. They are also able to travel to the EP in Strasbourg to attend one plenary part-session. Trainees thus become acquainted with the whole EU policy-making process.

During 2018, the following trainees worked with STOA:

Karina Bittar Britto Arantes (BR, March 2018 - July 2018)
Evangelia Marie Thoukidides (CY, March 2018 - July 2018)
Riccardo Molinari (IT, October 2018 - February 2019)
Jens Van Steerteghem (BE, October 2018 - February 2019)