



Public dialogue in science and technology: an international overview

Sonia Bussu
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Executive summary

This policy paper carries out an international review of public engagement in science and technology. Drawing on policy documents, academic articles and seven expert interviews, it maps international approaches to public engagement which have a variety of different purposes and intensity levels, and considers the strengths and weaknesses of a number of different models.

The paper mainly focuses on a particular form of public engagement called public dialogue. Public dialogue involves facilitated deliberation between citizens, experts and policy makers, and has been the principal mode of engagement for the Sciencewise programme. We compare Sciencewise's model of engagement to similar organisations in other countries (e.g. Danish Board of Technology, Norway's Board of Technology, the Netherlands' Rathenau Instituut, and TA-Swiss), to highlight differences, similarities and learning points:

- All these organisations use a broad range of engagement methods including focus groups, citizen panels and consensus conferences.
- Unlike other organisations, Sciencewise supports government departments to carry out public dialogues linked to their own policy agendas, and co-funds those public dialogues.
- Other organisations tend to have a broader agenda and work with other actors at home and abroad around local, national and, increasingly, international agendas.

In today's complex societies expertise and knowledge are increasingly contested. From genetically modified organisms (GMOs) to nuclear energy, a number of recent developments in science and technology have tested public confidence. In this context, public dialogue, and public engagement more broadly, plays a crucial role in:

- Informing the public about controversial science and technology issues;
- Ensuring that policy is more socially informed, making it more robust and credible with a lower chance of negative social impacts.
- Ensuring that policy is more publicly acceptable, by being developed with an understanding of how and why the public is likely to react, and where they would 'draw the line'.
- Ensuring that policy is more effective in the long term, because implementation issues are anticipated in advance and the risks of future conflict is foreseen, planned for and avoided where possible.

While there is diversity in their approaches, a large number of the UK's international partners and competitors are seeing value in public engagement on science and technology. It is an arena where the risks of not engaging the public often significantly outweigh the costs of doing so, and we recommend that policy makers carefully consider the potential for public engagement and dialogue in key developments around science and technology.

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1. Different types of public engagement

There are different approaches and ways of understanding engagement in science and technology in different countries, which often vary according to the local cultural and political context. Based on the literature and seven expert interviews (see Appendix), we can identify five types of public engagement in science and technology, each of which are suitable for different purposes:

1. **Science communication** (e.g. science festivals; science museums' activities etc.);
2. **Discussion** between researchers and the general public (e.g. the work of the Swiss National Science Foundation; ¹ science cafés² etc.);
3. **Involvement** of lay people to assess new science and technologies (e.g. online and offline user panels and focus groups);
4. **Dialogue** to gauge the opinions of the public, deliberate and inform policy making (e.g. Sciencewise's public dialogues;³ the Danish Board of Technology's consensus conference;⁴ TA-Swiss' *publifocus*⁵);
5. **Co-production of knowledge and/or development of solutions** through collaboration between different stakeholders, including service users and affected people (e.g. the work of the Risk Dialogue Foundation in Switzerland;⁶ Mind-Lab in Denmark⁷ and the UK equivalent, Nesta's Innovation Lab⁸).

These different types imply different degrees of public agency and input, as well as different engagement methods. No single method is a gold standard: they are each suitable for different purposes, at different times. **Table 1** (Appendix) illustrates how, based on the literature and cases examined here, some countries appear to be more focused on methods designed to inform the public (e.g. communication; science cafés), rather than methods that ask their opinions. Other countries undertake activities across the full range of the engagement spectrum. There is a list of international case studies on public engagement in the Appendix.

Following a brief comparative analysis of the state of play of public engagement in science and technology in Section 2, this paper focuses on the fourth type of engagement and specifically public dialogue – a deliberative method which entails facilitated discussion between citizens, experts and policy-makers. Section 3 compares Sciencewise's model of engagement to similar organisations in other countries (e.g. Danish Board of Technology, Norway's Board of Technology, the Netherlands' Rathenau Instituut; and TA-Swiss), highlighting differences, similarities and learning points.

2. Public engagement with Science and Technology: the international context

There is a growing recognition across countries of the complexity of the relation between science and society, as well as an understanding of how science is necessarily embedded in a broader cultural and political context. This awareness has given rise to new modes of science and technology (S&T) policy making across several countries. The EU-funded project **Global Ethics in Science and Technology** (GEST) identified more than 100 public engagement processes that have been organized in Europe on a national level. These have focused on Genetically Modified Food (20 processes), on emerging technologies such as Nanotechnology (90) and on Synthetic Biology (15).⁹

¹ <http://nfp.snf.ch/E/current/SNFIInfo/communication-transfer/Pages/default.aspx?NEWSID=1891&WEBID=F6B532FB-64ED-466F-8816-193D4DE8DC94>

² <http://www.sciencecafes.org/>

³ <http://www.sciencewise-erc.org.uk/cms/sciencewise-dialogue-projects/>

⁴ <http://co-intelligence.org/P-ConsensusConference1.html>

⁵ <https://www.ta-swiss.ch/en/publifocus-ehealth/>

⁶ <http://www.risiko-dialog.ch/overview-in-english>

⁷ <http://mind-lab.dk/en/cases/>, <http://mind-lab.dk/en/cases/>

⁸ <http://www.theiteams.org/case-studies/nesta-innovation-lab-0>

⁹ http://www.uclan.ac.uk/research/explore/projects/global_ethics_science_technology.php

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The European Commission supports and funds a number of public engagement projects and initiatives.¹⁰ Horizon 2020¹¹, the EU framework programme for research and innovation, puts great emphasis on building capacities and developing innovative ways of connecting science to society.¹² The 2014 Rome Declaration states that “early and continuous engagement of all stakeholders is essential for sustainable, desirable and acceptable innovation”.¹³

When looking at national-level practice, there are deep differences in terms of institutionalisation of public engagement. Both the Sciencewise-commissioned IZWE study (2010)¹⁴ and the MASIS report (2012)¹⁵ find that **Nordic and Scandinavian countries** have a strong tradition of engagement and formal procedures for involving citizens. By contrast, countries such as France, Germany and Japan tend to be very deferential towards scientific expertise. The USA’s formal channels tend to involve organised stakeholders, and citizen engagement generally happens through lobbying and campaigning.

However, regulatory issues and public backlashes¹⁶ have started to place pressure on scientists and policy makers across borders. For instance, in recent years Japan has organised a number of consensus conferences,¹⁷ such as the 2006-7 consensus conference on genetically modified (GM) crops (see IZWE 2010). In 2008, South Korea organised its first citizens’ jury to deliberate on the national pandemic response system (Lee and Jin 2014).

In emerging economies such as **China** and **India**, a major driver for engaging members of the public seems to be the need to influence the career path of young people to ensure that the science and technology sector grows at a national level.¹⁸

Table 2 (Appendix) offers an overview of public engagement case studies from different countries.

Overall, the context in which participatory developments take place and country-specific understanding and application of democracy, dialogue and decision-making inevitably shape the methods of engagement. Political systems that are ‘actively inclusive’ such as Denmark, Norway or the Netherlands have well-developed mechanisms for engagement, and have sustained political commitment to dialogue at different levels. Countries such as the US might be termed ‘passively inclusive’, as although US political processes are potentially open to public input, the onus of looking for available channels of participation is on the citizens, e.g. through lobbying and campaigning. France’s political system can be described as ‘exclusive’, where participatory initiatives tend to be initiated mainly for instrumental reasons, rather than a commitment to participatory policy-making (IZWE 2011).

The issue of ensuring and evaluating the impact of public dialogues and other engagement processes remains a challenge across borders. The policy process is complex and often fragmented and public engagement tends to happen as a one-off set of activities. The literature review shows that:

- Having a clear “addressee” or owner of the recommendations and working on existing policy agendas is crucial to increase impact;
- Evaluation can help assess whether the process was adequate for the purpose of the engagement exercise;
- The subjective satisfaction of citizens involved can be more easily measured and is an important indicator of success;
- Media visibility can also be interpreted as an indicator of success.

¹⁰ European Commission, Research and Innovation, Science with and for society, “Public Engagement” <http://ec.europa.eu/research/swafs/index.cfm?pg=policy&lib=engagement>

¹¹ This is a programme that will invest €80 billion into research and innovation between 2014 and 2020.

¹² <http://ec.europa.eu/research/swafs/index.cfm?pg=about>

¹³ http://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf

¹⁴ <http://www.sciencewise-erc.org.uk/cms/assets/Uploads/Publications/International-Comparison-of-Public-Dialogue.pdf>

¹⁵ http://ec.europa.eu/research/science-society/document_library/pdf_06/monitoring-policy-research-activities-on-sis_en.pdf

¹⁶ See the case of the controversial Stuttgart 21 station project <http://www.railway-technology.com/news/newsdeutsche-bahn-backs-stuttgart-21-project-despite-cost-increase>

¹⁷ The consensus conference is a method designed by the Danish Board of Technology in the 1980s and is one of the earliest attempts to include the input of ordinary citizens on decision-making <http://www.esrc.ac.uk/funding-and-guidance/impact-toolkit/what-how-and-why/public-engagement/guide/consensus-conference.aspx>

¹⁸ “Renn et al. Public Understanding of Science in Non-European Countries” (forthcoming)

2.1 How does the UK compare?

The IZWE report (2010: 37) finds that “while the UK was for a long time 'lagging behind' countries such as Denmark or the Netherlands, it is now viewed by many to be at the forefront of public dialogue on science and technology, especially in terms of innovative approaches, with a wide variety of actors and initiatives driving public participation in areas of science and technology.” The experts interviewed for this paper agreed that the UK’s innovative engagement practice is increasingly leading the way for other countries.

The establishment and continuing support of Sciencewise itself reflects wider cross-government commitment to greater use of public dialogue. The UK can also count on a range of diverse actors that often act as champions of public engagement more broadly, e.g. research councils, independent research organisations, science museums, universities, civil society organisations, trusts and think tanks.

3. Public dialogue in a comparative perspective

This section describes the main features of institutional organisations in Europe working on public engagement in science and technology matters. Like Sciencewise, they all use dialogues, as well as other similar engagement activities.

1. The Danish Board of Technology (DBT) was established in 1986 and has since become a pioneer of public engagement. It has developed widely recognised methodologies such as the *consensus conference*¹⁹ and *World Wide Views*.²⁰ Initially funded through parliamentary budget, it is now a corporate foundation, which means it is largely project-funded. Funding comes from a variety of sources including municipalities, regions, governmental agencies, the EU Commission and the European Parliament, and charity foundations.²¹ In 2012, the annual expenditure of the DBT was around 9 million DKK (€1.2 million) (EPTA 2012). Each year the board makes a call for project proposals to be submitted by MPs, organisations, corporations or citizens and a limited number of these are selected as ‘full scale’ projects. The DBT then undertakes these projects independently and disseminates the results with policy makers.

2. The Norway’s Board of Technology or *Teknologiraadet* (NBT) is a public, independent body advising both parliament and government around public debate on technology, society and politics. The NBT is funded by government, but to ensure its independence the Norwegian Research Council acts as the supervising authority. It has a budget of approximately €1,1m per year. The 15 members of the board are appointed by government for 4-year terms and come from academia and business.

The board’s main tasks are:

- To identify and analyse major technological challenges and contribute to a humane and sustainable technological development;
- To actively stimulate public debate on technology related issues;
- To explore the potential benefits and consequences of specific technologies for both individual citizens and the society at large;
- To communicate the results of its work to parliament, governmental authorities and the wider society (EPTA 2012).

The board decides independently which projects are adopted and in the final phase these are presented to the relevant parliamentary standing committee, often in combination with an open meeting in parliament.

¹⁹ <http://www.esrc.ac.uk/funding-and-guidance/impact-toolkit/what-how-and-why/public-engagement/guide/consensus-conference.aspx>

²⁰ This method can foster more coordinated cross-country dialogues around international agendas to enhance influence on policy-making - <http://www.views.org/>

²¹ Österreichische Akademie der Wissenschaften, Institute for Technology Assessment. Available at: http://www.oew.ac.at/ita/fileadmin/epta/chapters/02_organization.html

3. The Rathenau Instituut (RI) is the Netherland's key research and debate centre for science, technology and society²² and organises deliberative activities across a broad range of technology domains.²³ According to EPTA's report (2012),²⁴ the RI has 55 employees and a budget of €5.23m, making it possibly the largest programme of its type globally (IZWE 2011). The large share of RI's funding comes from the Ministry of Education, Culture and Science, and, in order to guarantee its independence, it cannot receive more than 25% of its funding from external clients.²⁵

The RI has two main objectives:

- To stimulate a public and political debate on the social, ethical and political implications of modern science and technology; and
- To increase understanding of how the science system works, by collecting, integrating and analysing data to inform scientifically grounded policymaking.

Its science policy studies are directed at government, parliament and science organisations to help them assess how the science system responds to scientific, social and economic change.²⁶

The biannual Work Programme guides the RI's activities. This is the result of regular consultation with the Institute's Programme Council whose members come from academia, business, politics and the media. The RI uses a variety of tools and methods to engage with the public, including: focus groups, citizen panels, statistics, database analysis, questionnaires, interviews, visualisations, debates and presentations (EPTA 2012).

Interviewees that have worked closely with the RI noted how, unlike other institutes that approach dialogues and debates with a neutral position, the Institute often takes a stand to provoke a debate and put a given issue on the media agenda. The Institute's studies and policy briefs often set the agenda for politicians, policymakers and the media, and most of its projects are quoted in parliamentary documents, the national media and stakeholder websites (EPTA 2012).

4. The Swiss Centre for Technology Assessment (TA-Swiss) has operated since 1992, initially as a pilot project with limited resources. Since 2000 it has been established as an independent unit, funded by government as well as by third party independent organisations (EPTA 2012); it is also partly project-funded. Since 2000 the annual budget has been unchanged at around 1,380,000 CHF (ca. £850,000), with approximately 20% dedicated to public dialogue and engagement activities (IZWE 2010). It has a small staff of eight people, with only about six on a full-time basis. Scientific studies and evaluation are often outsourced to external academics.

TA-Swiss identifies new themes by monitoring new scientific and technological developments as well as through consultation with external experts or members of the TA-Swiss steering committee. The steering committee of elected members, including scientists, journalists, unionists and other stakeholders, sets the final agenda and monitors the Institute's work. Project managers develop specific proposals and the TA-Swiss steering committee prioritise those to be taken forward.

The institute employs a variety of participatory methods (such as citizens' panels and focus groups).

3.1 Key features of these organisations

- **Governance:** These organisations generally develop their work programmes independently following consultations with different stakeholders and then submit to parliament for approval. Once specific projects are chosen, they initiate public engagement activities and later present their recommendations to parliament and government. DBT and, partly, TA-Swiss are project-funded.
- **Methods:** These organisations tend to use a broad range of public engagement methods, beyond just public dialogues.

²² Koninklijke Nederlandse Akademie van Wetenschappen (KNAW), Rathenau Institute. <https://www.know.nl/en/institutes/rathenau-instituut>

²³ Sykes, K & P, Macnaghten (2013) "Responsible Innovation – Opening Up Dialog and Debate", Chapter 5, Responsible Innovation, First Edition. Edited by Richard Owen and John Bessant. John Wiley & Sons

²⁴ <http://www.oew.ac.at/ita/fileadmin/epta/epta-booklet.pdf>

²⁵ Rathenau Instituut, "Who we are, About the institute". Available at <http://www.rathenau.nl/en/who-we-are/about-the-institute.html> (Accessed 20 January 2015)

²⁶ Koninklijke Nederlandse Akademie van Wetenschappen (KNAW), "Rathenau Institute". <https://www.know.nl/en/institutes/rathenau-instituut>

- **Media visibility:** The legitimacy of these organisations derive from their perceived neutrality and rigorous methodology, but also from visibility in the media.
- **Cooperation with other actors:** These organisations often work in co-operation with other actors in their country and abroad.
- **A broad agenda:** All these organisations have a broad agenda, which also look at the local and international level, often through **cross-country cooperation** under the EU umbrella.

3.2 How does Sciencewise compare?

Compared with the organisations described above, Sciencewise presents a number of innovative features.

- The process of initiating projects is one of the most obvious differences between Sciencewise and the other organisations. Under the Sciencewise programme, government departments are encouraged and offered support to undertake public dialogue themselves, on their own specific policy areas.²⁷
- Unlike other organisations, Sciencewise has a co-funding element to support government departments in carrying out public dialogue.
- There are no comparable examples of government-funded programmes that operate within this cross-departmental space.

4. Conclusion

This review has highlighted innovation in public engagement practice across countries and at the EU level. In today's complex societies, public engagement and public dialogue plays a crucial role in:

- Informing the public about controversial science and technology issues;
- Ensuring that policy is more socially informed, making it more robust and credible with a lower chance of negative social impacts.
- Ensuring that policy is more publicly acceptable, by being developed with an understanding of how and why the public is likely to react, and where they would 'draw the line'.
- Ensuring that policy is more effective in the long term, because implementation issues are anticipated in advance and the risks of future conflict is foreseen, planned for and avoided where possible.

Government-funded institutions play a vital role in organising and supporting actively a wide range of engagement activities, often in collaboration with other actors at home and abroad. Where these institutions are well-resourced and have a clear mandate, they can provide direct channels to decision-making and are able to develop strong links with the media.

While the organisations presented here all have many strengths the UK can learn from - from media visibility and high legitimacy with parliament and government institutions, to cooperation with other actors and using a broad range of engagement methods. However, the Sciencewise model of supporting government departments on their own policy agendas is especially effective in ensuring there is a clearer "addressee" for the recommendations of the public dialogue exercise.

While there is diversity in their approaches, a large number of the UK's international partners and competitors are seeing value in public engagement in science and technology. It is an arena where the risks of not engaging the public often significantly outweigh the costs of doing so, and we recommend that policy makers carefully consider the potential for public engagement and dialogue in key developments around science and technology.

²⁷ BIS/Sciencewise-ERC (2010) "International Comparison of Public Dialogue on Science and Technology" <http://www.wilsonielsen.com/wp-content/uploads/2011/05/International-Comparison-of-Public-Dialogue.pdf> (Accessed 20 January 2015)

Appendix

Table 1: Different Types of Institutional Engagement

Type of institutional Public Engagement in S&T	<i>Communication</i>	<i>Discussion between researchers and the public</i>	<i>User involvement for assessment</i>	<i>Public dialogue</i>	<i>Co-production</i>
Denmark	✓	✓	✓	✓	✓
Finland	✓	✓	✓	✓	✓
Netherlands	✓	✓	✓	✓	✓
Norway	✓	✓	✓	✓	✓
Switzerland	✓	✓	✓	✓	✓
UK	✓	✓	✓	✓	✓
Canada	✓	✓	✓		✓
Germany	✓	✓		✓	
Bulgaria	✓	✓			
Japan	✓			✓	
South Korea	✓			✓	
France	✓				
US	✓				

Table 2: International Case Studies

Case Studies	Country	Engagement Type	Brief description
Montréal's Office de consultation publique	Quebec/ Canada	Dialogue	Independent public organisation whose mission is to carry out public consultations on behalf of Montréal's city council or its executive committee, around a number of policy areas, including environmental issues and major infrastructure projects.
" New GM Crops – New Debate " consensus conference (2005)	Denmark	Dialogue	16 citizens were assembled for 5 days, to deliberate with 22 experts from different disciplines. Participants developed their arguments and recommendations regarding GM crops. Participants were not required to reach a consensus.
MindLab	Denmark	Co-production	Cross-ministerial innovation unit owned by the Danish Ministry of Business and Growth, the Ministry of Employment and the Ministry of Education. The rationale is to contribute to and facilitate better and more effective services, by involving different stakeholders, including service users and affected people. This approach requires a more holistic view of public service systems. New ideas are prototyped and tested in practice before being developed into new strategies, service concepts, policy proposals or implementation plans.
Bürgerdialog Zukunftstechnologien (Citizens' Dialogue on Future Technologies)	Germany	Dialogue	The Federal Ministry of Education and Research (BMBF) has established a consortium consisting of ITAS (Institute for Technology Assessment and Systems Analysis), IFOK (Institute of Communication and Organization) and ZIRIUS (Center for Interdisciplinary Risk and Innovation Studies) to carry

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			out this dialogue process. The rationale behind this project is to gauge people's fears and expectations on nanotechnology, synthetic biology, sustainable consumption, etc.
<u>Wissenschaft im Dialog</u> (Science in Dialogue, WiD)	Germany	Communication	Private organisation whose shareholders are the major scientific organisations in Germany. WiD promotes general debates and organises dialogue events, exhibitions and competitions, as well as developing new formats for science communication.
<u>Consensus conference on GM foods in Hokkaido, 2006-07</u> (see IZWE 2010)	Japan	Dialogue	Part of the "risk communication" programme with which to ensure the safety and reliability of food.
<u>"Small technology - Big consequences' on nanotechnology"</u> (2004)	The Netherlands	Dialogue	Large public meeting on nanotechnology in the Netherlands, following research and smaller-scale meetings, focus groups and workshops organised by the Rathenau Institute, to debate the expectations on nano-science and technology.
<u>"You decide!"</u> (started in 2007)	Norway	User Involvement	Developing teaching material on privacy and use of the internet; this project has since been adapted to 16 countries, which is used by almost 1 million pupils all over the world.
Citizens' Jury on the Korean National Pandemic Response (Lee and Jin 2014)	South Korea	Dialogue	First Korean citizens' jury discussing the National Pandemic Response System, organised by the Democracy in Science and Technology (CDST) in Korea in 2008. The evaluation found that "through a systematic deliberation process, citizens with no expert knowledge can develop deliberative ability to make judgments on somewhat complex technical issues." (Lee and Jin 2014: 35).
The <u>Risk Dialogue Foundation</u> dialogue on	Switzerland	Co-production	Involving different stakeholders in the

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<u>geo-thermal energy (2013)</u>			development process of geothermal projects.
<u>TA-Swiss' publifocus on nanotechnologies</u>	Switzerland	Dialogue (with organised stakeholders)	Interested members of civil society were sought out and invited to attend the <i>publifocus</i> events in the form of moderated evening debates.
<u>Foundation Science et Cité</u>	Switzerland	Communication	Science festivals, events, exhibitions and science cafes.
<u>HFEA's mitochondrial replacement public dialogue</u> (supported by Sciencewise)	UK	Dialogue	This public dialogue was an important test of the public's ability to engage over complex ethical issues and regulatory frameworks. The recommendations were put out to consultation, brought before parliament, and informed a House of Commons vote in February 2015, which gave the nod to legislation allowing mitochondrial replacement for fertilisation purposes.
<u>Nesta's Innovation lab</u>	UK	Co-production	Inspired by MindLab and the Living Lab philosophy - see above.
The <u>VOICES project</u>	EU	Dialogue	Voice used small citizen focus groups (no more than 10 participants per group) in pan-European consultation on urban waste research across 33 locations in 27 EU countries. Around 1,000 European citizens were engaged in total and the results of the exercise fed directly into the new Horizon 2020 Framework Programme for Research and Innovation. The non-profit organisation Ecsite (The European Network of Science Centres and Museums) overlooked the project.

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List of interviewees:

- Dr Danielle Bütschi, External employee, **TA-Swiss**,²⁸ Bern Switzerland
- Zoya Damianova, Programme Director, **Arc Fund** (Applied Research and Communication Fund),²⁹ Sofia, Bulgaria
- Dr Leonhard Hennen, Scientific Expert, **KIT-ITAS** (Karlsruhe Institute for Technology Assessment and Systems Analysis),³⁰ Germany. Coordinator of the European Technology Assessment Group ETAG
- Marie Louise Jørgensen, Project Manager **Danish Board of Technology**,³¹ Copenhagen, Denmark
- Ventseslav Kozarev, Project Officer **Arc Fund** (Applied Research and Communication Fund),³² Sofia, Bulgaria
- Professor Ortwin Renn, Director of **Dialogik**,³³ Stuttgart, Germany. Professor Renn was also part of the committee reviewing Sciencewise's 2015 evaluation report.
- Dr Christina Tobler, Scientific Collaborator, **TA-Swiss**,³⁴ Bern Switzerland

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²⁸ <https://www.ta-swiss.ch/en/>

²⁹ <http://www.arcfund.net/>

³⁰ <http://www.itas.kit.edu/english/>

³¹ <http://www.tekno.dk/>

³² <http://www.arcfund.net/>

³³ <http://www.dialogic-expert.org/en/>

³⁴ <https://www.ta-swiss.ch/en/>