

doi: 10.2903/j.efsa.2016.s0503

Expertise for the future: learning and training in the area of food safety risk assessment

**Arnold Bosman¹, Paul Brent², Pier Sandro Cocconcelli³,
Gráinne Conole⁴, Dominique Gombert⁵, Andreas Hensel⁶,
Dimitra Kardassi⁷, Wolfgang Kneifel⁸, Stylianos Koulouris⁷,
Amadeu M. V. M. Soares⁹ and Johanna Zilliacus¹⁰**

Abstract

EFSA depends on a system of scientific panels, working groups and the expertise of its staff to perform its role in providing high-quality scientific opinions through food safety risk assessment. The centralisation of the evaluation at the EU level not only intends to increase efficiency, but also may represent a challenge with regard to maintaining and developing expertise in the areas of food, feed, plant, animal and environmental risk assessment. The food risk assessment requires a multidisciplinary and interdisciplinary approach: excellence in relevant fields of science is a prerequisite, although knowledge of the full risk analysis process, the EU food law, consumer behaviour, international relations and skills in risk communication is also needed. To handle future challenges regarding food safety risk assessment in an ever-changing and increasingly complex environment, the appropriate expertise needs to be identified and a model of specialised and continuous training is required. The state of the art and the future of education in risk assessment are presented. The following issues are put forward in this special issue: new technologies implemented in risk assessment training; current developments in higher education and training on food safety risk assessment and regulatory science in the EU and worldwide; challenges in training on general risk assessment, food safety risk assessment and environmental risk assessment; best practices and techniques; future developments in capacity building for risk assessment training; and the increased need for training of professionals.

© 2016 European Food Safety Authority. *EFSA Journal* published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

Keywords: E-learning, massive open online courses, open educational resources, risk assessment, food safety, exchange of staff, fellowship

Correspondence: editor-in-chief.efsajournal@efsa.europa.eu

Author affiliations: ¹ European Centre for Disease Prevention and Control, Sweden; ² World Bank Global Food Safety Partnership, Australia; ³ Università Cattolica del Sacro Cuore, Italy; ⁴ University of Leicester, UK; ⁵ ANSES – French Agency for Food, Environmental and Occupational Health & Safety; ⁶ Federal Institute for Risk Assessment (BfR), Germany; ⁷ European Food Safety Authority (EFSA), Italy; ⁸ University of Natural Resources and Life Sciences Vienna, Austria; ⁹ University of Aveiro, Portugal; ¹⁰ Karolinska Institute, Sweden.

Acknowledgements: The European Food Safety Authority (EFSA) thanks the participants of the breakout session 'Expertise for the future' held at the EFSA 2nd Scientific Conference 'Shaping the Future of Food Safety, Together' (Milan, Italy, 14–16 October 2015) for their active and valuable contribution to the discussion.

Disclaimer: The views expressed in this publication are those of the authors and do not necessarily represent the official views or policies of EFSA or the other author institutions. EFSA assumes no responsibility or liability for any errors or inaccuracies that may appear.

Suggested citation: Bosman A, Brent P, Coconcelli PS, Conole G, Gombert D, Hensel A, Kardassi D, Kneifel W, Koulouris S, Soares AMVM and Ziliacus J, 2016. Special issue: expertise for the future: learning and training in the area of food safety risk assessment. *EFSA Journal* 2016;14(S1):s0503, 10 pp. doi:10.2903/j.efsa.2016.s0503

ISSN: 1831-4732

© 2016 European Food Safety Authority. *EFSA Journal* published by John Wiley and Sons Ltd on behalf of European Food Safety Authority.

This is an open access article under the terms of the [Creative Commons Attribution-NoDerivs License](https://creativecommons.org/licenses/by-nd/4.0/), which permits use and distribution in any medium, provided the original work is properly cited and no modifications or adaptations are made.



The EFSA Journal is a publication of the European Food Safety Authority, an agency of the European Union.



Table of contents

Abstract.....	1
1. Introduction.....	4
2. New forms of training should be incorporated in food safety risk assessment training to reflect the recent technological advances.....	4
3. Multidisciplinary approach is needed in the food safety risk assessment: more than a relevant basic academic asset, a specialisation in aspects of risk assessment is required.....	6
4. Different forms of training for different needs and target groups	7
4.1. Programmes provided by academic institutions.....	7
4.2. Keeping professionals up-to-date.....	7
4.3. Train other stakeholders (food business operators, consumers, associations)	8
4.4. Explaining risk assessment to non-scientists or scientists requiring further training in food safety and food risk assessment	8
4.5. Exchange of staff and on-job training	9
5. Conclusions.....	9
References.....	10
Abbreviations	10

1. Introduction

The European Food Safety Authority (EFSA) depends on a system of scientific panels, working groups and the expertise of its staff to perform its role in providing high-quality scientific opinions through food safety risk assessment. The centralisation of the evaluation at the European Union (EU) level not only intends to increase efficiency, but also may represent a challenge with regard to maintaining and developing expertise in the areas of food, feed, plant, animal and environmental risk assessment.

The food risk assessment requires a multidisciplinary and interdisciplinary approach: excellence in relevant fields of science is a prerequisite, although knowledge of the full risk analysis process, the EU food law, consumer behaviour, international relations and skills in risk communication is also needed.

To handle future challenges regarding food safety risk assessment in an ever-changing and increasingly complex environment, the appropriate expertise needs to be identified and a model of specialised and continuous training is required.

This breakout session aimed to discuss the state of the art and the future of education in risk assessment. The following issues were addressed: training needs in risk assessment; new technologies implemented in risk assessment training; current developments in higher education and training on food safety and regulatory science in the EU and worldwide; challenges in training on general risk assessment, food safety risk assessment, environmental and health risk assessment; best practices and techniques; future developments in capacity building for risk assessment training; and the increased need for life-long training of professionals.

This publication builds upon presentations made and discussions held during the breakout session 'Expertise for the future' at the EFSA 2nd Scientific Conference 'Shaping the Future of Food Safety, Together' (Milan, Italy, 14–16 October 2015).¹

2. New forms of training should be incorporated in food safety risk assessment training to reflect the recent technological advances

The increased importance of technology in society and in everyday life is more than profound. Technology revolutionised the way we live and work and education/learning could not be an exception. After many years of applying traditional forms of education, the innovation in learning has gained wide interest, aiming to make training activities more compatible with the modern way of living and exchange of information. Although the classical forms of training (academic, seminars, conferences, etc.) maintain their importance and relevance, new forms of training, compatible with the modern lifestyle and technological advances are incorporated in education and training. Today's digital technologies offer an unprecedented variety of ways that are essential to interact with rich multimedia, and to communicate and collaborate with others. An overview of today's digital landscape and a taste of emergence technologies are presented here.

E-learning is the learning facilitated and supported through the use of information and communications technology and it is the most renowned form of digital training. Participants are engaged in training via digital modules enabling learners to participate through interaction, communication and collaboration. E-learning can contribute to the development of digital literacy skills, promote different pedagogical approaches, and foster creativity and innovation, and also gives participants the possibility to learn beyond the geographical and time limits of traditional training. Different facets of e-learning encompassed in the learning environment are openness and open practices, mobile learning, social media engagement, the use of digital identity and distributed cognition. However, the lack of literacy skills is recognised among the barriers for the extensive adoption of e-learning (Conole, 2013).

Continuing professional development is more important than ever. Its focus should be to keep professionals up-to-date with developments on their field of work and to assist them in gaining new competencies and the knowledge needed to address new challenges. Today's working environment is increasing complex and changing; we are training people for a future in which they will perform jobs that do not even exist today. Open Educational Resources (OER), Massive Open Online Courses (MOOCs) and social media can ensure the sustainability of continuing professional development. The social aspects of massive open learning are the ease of access devices, the possibility to personalise the learning environment and schedule, the wide use of free resources, and the use of more intuition. The increase in free resource and expertise, via Webinars, blogs, open repositories, journals and social

¹ The scientific programme of the conference is available at <http://www.efsaexpo2015.eu/programme/>. All the conference material of the breakout session (including briefing notes, presentations and videos) is available at <http://www.efsaexpo2015.eu/show-session/?idsession=10>

media is unambiguous and leads to new forms of interaction, learning, communication and collaboration. However, the use of technology has benefits and drawbacks. The technological employments offer transparency, greater reach, equity and social inclusion. However, laying yourself 'bare', surveillance, misuse of data, misinterpretation, issues of quality and accreditation, and ownership, are the main drawbacks. Lots of free resources are available; however, tutors do not always have the time or the skills to make effective use of technologies (lack of literacy skills). Often suitable content is missing in order to make effective use of technologies.

In this context, many researchers have been focusing on the notion of 'learning design' in recent years as a way of helping educators and trainees to make more effective design decisions that are pedagogically based and make appropriate use of digital technologies. Learning design is about providing teachers and educators with the guidance and support they need in their design practices, visualisation of the design process and sharing with others. The conceptual framework of learning design can be summarised as an integrated set of resources for technology-enhanced learning design across disciplines. The 7Cs of learning design comprise a toolkit for teachers, academics, lecturers, trainers and learning technologists responsible for designing, developing and teaching technology-enhanced learning programmes. The aim is to enable the design of deep, engaging and enjoyable learning experiences for learners. The toolkit contains a set of e-activities (activities to be performed online or with the help of online technologies), which will help teachers and other members of course design teams to create deep, enjoyable and engaging courses for learners in all disciplines. The resources are organised around the 7Cs, which means conceptualise, capture, create, communicate, collaborate, consider and consolidate. The accreditation of non-formal learning is another very challenging issue in this area because many learners wish to have formal transferable recognition of their knowledge and skills. Nowadays, there are initiatives to implement the recognition of OER-learning through a Learning Passport, as a formal way of accrediting the non-formal learning (i.e. VM-PASS²). Learning passport for accreditation will combine information from all actors: OER provider, learner and assessing/certifying institution, and the documentation of the non-formal learning, assessment and accreditation will be provided in a way that may be considered as learning qualification.

The vision of education in 2020 is more on the MOOCs, which is a model for delivering learning content online to any person who wants to take a course, with no limit on attendance. MOOCs have been classified as either xMOOCs or cMOOCs. cMOOCs are weekly centred, participant reflective spaces that enable social and networked participation and use of a range of social media (peer-supported learning, learning through others). xMOOCs is more a linear learning pathway, mainly text and video, with formative feedback through multiple choice questions and individually focused (more didactic in nature). The rich taxonomy of MOOCs, in terms of 12 dimensions, includes the degree of openness, the scale of participation (massification), the amount of use of multimedia, the amount of communication, the extent to which collaboration is included, the type of learner pathway (from learner centred to teacher centred and highly structured), the level of quality assurance, the extent to which reflection is encouraged, the level of assessment, how informal or formal it is, the autonomy and the diversity Downes (2010). MOOCs can then be measured against these 12 dimensions (EFQUEL MOOC Blog; <http://mooc.efquel.org/>).

Mobile learning is another form of distance learning. Mobile technologies mean that learning anywhere, anytime is now a real possibility. Mobile devices are part of the mobile technologies or M-technologies. Smart phones and tablets are almost ubiquitous, feasible and affordable because of a good size, weight, screen, battery life and cost, as well as the range of excellent Apps that are available to support communication, productivity, curation and learning. The drawbacks include dependency, information being exposed in the Cloud, limited battery life of some devices and need of digital literacy to be used effectively. However, flexibility and mobility are the predominant features of this technology.

Social media are also used in learning and education. In social media, new aspects are incorporated, such as a shift from a passive web to a participatory, interactive and social web. A range of tools to communicate and collaborate, and more importantly being part of a global community of peers, are used in social media. Again, there are advantages in learning, such as the rich and multiple ways to communicate and collaborate, the opportunity to be part of a global community of peers, to reach vast amounts of information, to benefit the rapid dissemination of information, and the

² VM-PASS is an EU-supported project designed to facilitate and increase the volume of recognition of virtual mobility experiences (including Open CourseWare) around Europe.

possibility of using crowdsourcing. However, addiction, lack of privacy, negative digital traces, possible misuse data, cyber bullying and trolling cannot be disregarded. A lot of attention is needed to avoid identity misuse, misinterpretation, cyber-stalking (harassment via electronic communication) or identity theft from perpetrators that act on the Internet and stalk users.

Lastly, the distributed cognition has been widely applied in the field of distance learning. In distributed cognition, the development of knowledge is attributed to the system of thinking agents interacting dynamically with artefacts (tool to enhance cognition). Again, the benefits are the possibility of exploiting vast amounts of information, the allowance of tools to curate, manage and filter the enhanced capacity through computational technologies, and greater cognition. The drawbacks could be a lack of digital literacy skills, the ease of becoming lost and confused, a lack of permanency, and over dependency. Overall, the new forms of innovative learning tools offer technological advantages and can be used in a more open, social and interactive way. New technologies engage more people and enable interaction, and the rapid sharing of information while promoting learning. Future challenges are the disaggregation of education, the need for new digital literacies, the gap between digital skills and jobs capabilities, and the new business models and pedagogies evolved, as well as the blurring of boundaries.

The reliability of data in open resources environment is questioned. It is acknowledged that, in scientific papers, the quality is ensured through peer-review process. However, with open data, the nature of the community will drive the kind of the platform network used and ensure the accuracy of the data shared.

Overall, the importance of using new technologies in training including risk assessment is widely acknowledged. EFSA is already developing its own e-training courses and is experimenting with many other technological advanced forms of training. EFSA should invest more in innovative training activities to enable openness, sharing of knowledge and interactive communication, with the aim of attracting a new generation of expertise into the area of risk assessment and harmonising methodologies in performing Risk Assessment (EFSA, 2014). The new technologies should allow openness and interactive communication among new scientists with a high level of expertise and good literally skills. EFSA has already incorporated a lot of technological features in the way of communicating with stakeholders, the Member States, etc. (i.e. corporate spaces); however, much remains to be accomplished with respect to engaging new digital technologies in training with the aim of enhancing capability and expertise in food risk assessment knowledge.

3. Multidisciplinary approach is needed in the food safety risk assessment: more than a relevant basic academic asset, a specialisation in aspects of risk assessment is required

Food safety risk assessment is a very broad scientific field where a multidisciplinary approach is essential due to the high complexity and diversity of the food chain. In this context, problems often are multifaceted and factors, such as outbreaks of food- and feedborne diseases, local incidents, mass production, criminal fraud, and also changing trends in nutrition and consumer food habits, may play some important role. Importantly, several internationally linked control measures, as well as surveillance and alert networks, have been established based on official regulations aiming at the protection of markets from (potentially) contaminated, mislabelled or unhealthy food. Undoubtedly, there are several aspects that need to be further cross-linked and harmonised. These can only be achieved if experts possessing sound knowledge of the different scientific and technological fields are involved. Hence, well-educated and trained food safety specialists (either employed by the food industry or by inter/national authorities) are needed to assess, control and monitor all relevant issues contributing to food safety and quality. Ideally, such experts have to possess, in addition to their basic academic training in a related field, some degree of interdisciplinary knowledge because they usually have to deal with medical, toxicological, microbiological, chemical and technological issues and often need to assess the risks and to re-assemble fastidious puzzles encountered with outbreaks. Thus, professionals in this area should not only have basic academic training in relevant scientific fields (i.e. BSc level in Chemistry, Food Science, Food Technology, Biology, Toxicology), but also a specialisation and deep knowledge of aspects related to the Risk Assessment methodology (at a postgraduate level or via on-job specialisation). These competencies are extremely important, especially for maintaining and developing expertise in the areas of food, environmental or health risk assessment. Addressing the question of what expertise is needed in food safety and food risk assessment is important for building capacity and developing the appropriate educational cooperation programmes and university curricula.

4. Different forms of training for different needs and target groups

To cover the different needs and target groups, several forms of training should be developed and delivered in parallel.

4.1. Programmes provided by academic institutions

The current need for trained risk assessors with a strong scientific background and familiarity with the current legislative framework in Europe is well identified. Members of the European Commission's Scientific Advisory bodies, independent scientists, the Member States and societal stakeholders have repeatedly voiced their concern over the shortage of trained risk assessors in Europe and the potential effects this may have on the long-term sustainability of risk assessment advice to the EU and national bodies, as well as the private sector. Key factors contributing to the short supply of risk assessors include the limited training opportunities in the field of risk assessment, and the lack of training schemes and opportunities for practical, on-the-job training concerning the risk assessment approach. An increasing interest for acquiring competence in risk assessment has been recognised. Many Master programmes in toxicology, food science, pharmacology, veterinary medicine or PhD programmes exist nowadays in academia. European universities or other academic institutions provide specific programmes at Bachelor and Master's levels, as well as doctoral education in food science, toxicology or other related areas that cover aspects of Food Safety and Food Risk Assessment (Kneifel, 2012). Around 60 programmes in Europe (education programmes and training) explicitly mention 'Food Safety' in their curriculum names. International master programmes for the safety in food chain have been established as well (Euroleague of Life Science Universities).

Useful aspects for future programmes provided by academia/institutions are collected here:

- Interuniversity comparability of fundamental training and education in food science at the highest level.
- Cooperation between academic institutions in order to supplement each other and combine their excellence in different topics related to food risk assessment.
- Modular training to be provided where best practice and expertise exists.
- Versatility, soft and language skills are a must (demonstration, communication, argumentation).
- Traineeship at (inter)national authority is useful.
- Regional as well as global perspectives are to be covered.
- Implementation of curricula at international level (e.g. joint degrees), regulatory issues are a drawback in implementing this.
- Staff exchange and on-the-job training could be particularly valuable especially for professionals already involved in Food safety.
- At an era where unemployment among young scientists is a growing issue, promotion of the relationship between advanced training on Food Risk Assessment and future employment.

4.2. Keeping professionals up-to-date

The food safety risk assessment is a relatively new scientific field that is constantly developing and advancing and, as such, the relevant professionals should be kept up to date with suitable lifelong training programmes on different forms.

A lot of programmes have been developed recently with a focus on keeping professionals informed. These include summer schools, short term in class training and e-training, on-job training and staff exchange programmes. The aim is to offer those scientists already working in the field the best up-to-date knowledge in the areas of food risk assessment or in more specific areas (environmental risk assessment, ecotoxicology, emerging pollutants, health risk assessment), or to assist them in building soft skills needed in their work. Training in risk assessment was previously based on practical experience and learning by doing but, currently, more and more training programmes and courses in risk assessment are organised. Most of the training includes face-to-face courses and include practical exercises and case-studies (Karolinska Institutet, online).

A very successful example is the training initiatives of the Bundesinstitut für Risikobewertung (BfR). These include the Summer Academy on Risk Assessment that aims helping the participants gain a deeper insight into the concept of food safety with focus on risk assessment and risk communication, the 1st BfR Academy Training School on Nanotechnologies for Risk Assessors and the 'FoodChain-Lab' training in cooperation with EFSA on an open-source software on traceability analysis for outbreak

investigations. Another example is the international training courses in risk assessment for authorities, industry and academia at the Institute of Environmental Medicine that have been developed within the EU-funded projects.

In this context, Better Training for Safer Food initiative of DG SANCO has provided a comprehensive training for the Member States competent authorities' officials (TrainSaferFood, 2016). EFSA has played an important role in setting the specifications of the relevant to risk assessment courses. The main goal of the programme is to train experts that already work in a competent authority in a member state in order to expand their theoretical knowledge and practical skills on principles and methods of food risk assessment and the relevant legislation. Using case studies, the training helps to upscale experts on the principles and methods of food risk assessment, to enable them to undertake or understand risk assessments, and to serve as members of various scientific committees and bodies at (inter-)national level. One of the main goals was also to indirectly contribute to the harmonisation of risk assessment approaches, as well as to building trust among the Member States' authorities in each other's risk assessments.

Similar training programmes mostly in advanced and specialised topics of food risk assessment are also organised by EFSA with the target participants comprising the experts in EFSA's panels and working groups and EFSA's scientific staff (EFSA, 2016). Training programmes also include the development of soft skills, such as in risk communication in order for scientist to be able to communicate the risk assessment outputs to non-scientists, which, in most cases, are the risk managers.

The training of professionals provides, among other factors, a useful tool for making networks of experts, and helps the competent agencies to share knowledge and expertise. The involvement of risk assessment agencies in training activities shows explicitly that the organisations responsible for risk assessment should take the necessary initiatives to educate risk assessors. The possible legal limitations of the education system (i.e. not exactly under the organisation's remit) could be solved by collaborating with universities and other academic institutions.

4.3. Train other stakeholders (food business operators, consumers, associations)

Although training activities should primary aim at food risk assessment professionals, there should also be suitable training, in both content and format, for all relevant stakeholders, including food risk managers, industry, NGOs and consumers.

Communication on food safety and risk assessment issues is one of the main components of risk analysis concept. It is worth considering that criteria such as 'quality', 'safety', 'threats' and 'crisis' are perceived differently by consumers and experts. Different knowledge, different ranking of hazards and different confidence and perception are identified (i.e. calculated (predicted) risk vs perceived risk). This requires that the target audiences should be well educated and informed to understand food safety issues by giving clear messages, and even change established behaviours. It is also essential that the education in food safety should start from quite early stages (food safety games at school, educational campaigns, food safety education incorporated into science/nutritional programmes at schools, television or video educational programmes, etc.).

Training of an appropriate format and level should be developed for all other stakeholders, including food business operators, trade associations, industry and manufacturers, and NGOs, via fit-for-purpose tools (online training, videos, on-job training, etc.), especially regarding the assessment of regulated products.

4.4. Explaining risk assessment to non-scientists or scientists requiring further training in food safety and food risk assessment

It is well understood that there are a considerable number of professionals involved in food safety and risk assessment with a non-scientific background (legal, communications, risk managers, etc.). These professionals are mainly working in the area of food safety or food risk assessment; however, they lack the clear knowledge of even fundamental scientific aspects. Training programmes especially addressed to non-scientists who work in food safety and food risk assessment should be developed in order to understand the basic risk assessment concepts.

There is an ongoing demand to build capacity in food safety risk assessment in developing countries. The globalisation of the food supply and trade market underlies risks with an international impact. It is of utmost importance that scientists in developing countries dealing with food safety and

food risk assessment acquire the most recent and comprehensive knowledge in risk assessment. There is a need for a new and simple approach that can be used by a general audience or scientists who require more training in food safety and food risk assessment.

The specific challenge for any food chemical risk assessment training, especially when addressed to non-specialist, is to find a balance between basic training on principles and procedures, the application of those general issues and techniques to specific examples, and the need to enable the scientists to apply the general elements of the training to contemporary food safety issues. A need has been identified to develop projects to built-in capacity in the area of risk analysis tailored for developing countries. In this context, the World Bank, the Global Food Safety Partnership (GFSP) has taken the initiative to develop a stand-alone capacity building module on food chemical risk assessment, with global applicability through the GFSP. The module includes both face-to-face interaction and e-learning mechanisms for participants.

The project developed and facilitated by the GFSP is primarily intended to be used by developing countries' food regulatory agencies when reviewing food chemical risk assessments, and by professionals preparing food chemical risk assessments for food regulatory agencies. It is also intended to be of assistance to a broader audience seeking information about the processes of food chemical risk assessment globally, including food industry scientists. For implementation of the module, a tiered approach was applied, starting with general high level principles and drilling down to greater levels of complexity as needed to accomplish the training objectives. A similar approach can be used in the future to develop similar training programmes in other aspects of food risk assessment for a specific or broader target group of the non-EU countries.

4.5. Exchange of staff and on-job training

The exchange of staff and on-work learning, especially between competent authorities, is a very effective way of advancing knowledge, acquiring hands-on experience and harmonising methodologies across different countries.

The European Centre for Disease Prevention and Control (ECDC) hosts, from 2006, two fellowship programmes for public health epidemiologists and public health microbiologists (ECDC, online). The European Programme for Intervention Epidemiology Training (EPIET) is a two-year fellowship programme to build the core competencies for public health epidemiologists. The curriculum of EPIET focuses on surveillance, outbreak investigation, field epidemiology research and communication. Since 2008, the ECDC also hosts the European Programme for Public Health Microbiology Training (EUPHEM). The primary objective of the EUPHEM is to provide good practice and training in public health microbiology, enabling its fellows to apply microbiological methods to a wide range of public health problems in Europe. The European Fellowship Programmes have been engaged in international outbreak investigations and surveillance. Improving surveillance and increasing response capacity in and beyond the EU are key objectives.

EFSA is currently developing a similar fellowship programme addressed to young and middle career scientists with the aim of advancing the scientific background and methodologies in Food risk assessment, to strengthen scientific cooperation between EFSA and the Member State academic institutions and to harmonise the risk assessment practices across Europe. During its cycle of the programme, 15 fellows coming from all the EU countries will be placed in the competent authority of another country for 1 year and, by a combination of learning by doing and learning modules, they will be trained in advanced aspects of food risk assessment. The programme is expected to start in September 2017.

5. Conclusions

Food risk assessment requires a multidisciplinary and interdisciplinary approach: not only is excellence in relevant fields of science a prerequisite, but also a detailed knowledge of different aspects of food risk assessment, the EU food law, consumer behaviour, international relations and skills in risk communication is needed. To handle future challenges regarding food safety risk assessment in an ever-changing and increasingly complex environment, appropriate expertise and competences need to be identified, and a model of specialised and continuous training activities supplementing each other should be developed. The breakout session discussed the state of the art and the future of education in risk assessment. Although the classical forms of training (academic, seminars, conferences, etc.) maintain their importance and relevance, new forms of training, compatible with the modern lifestyle

and technological advances, should be incorporated in risk assessment trainings. This is also the case for many programmes addressed to developed countries, or professionals where e-learning modules are predominantly used. Current developments in higher education and training on food safety risk assessment and regulatory science in the EU and worldwide were discussed and best practices and training programmes were presented. Future developments in capacity building for risk assessment training include, among other factors, the harmonised implementation of widely agreed guidelines on the establishment of a risk assessment training programme to provide individuals with appropriate academic backgrounds with the knowledge and practical training required to understand and participate in the risk assessment process. Harmonised guidelines should focus on identifying the profile and training requirements of risk assessors in order to design a training programme covering a range of disciplines needed for risk assessment and providing a model to establish guidelines for the training and recognition of risk assessors in accordance to a well-defined and properly acknowledged training standard. A 'training passport' for Risk Assessment experts could be established in collaboration with universities and other institutions to better display and support the life-long training strategy. EFSA and other organisations responsible for conducting food safety risk assessment are encouraged to invest in capacity building and methodology development and harmonisation activities, and to maintain excellence in performing risk assessment activities. International organisations, such as EFSA, should play their role in identifying and determining the expertise and competencies needed from professionals, predicting also the future needs and participating in establishment of the curriculum and the organisation of relevant training programmes of various levels and forms.

References

- Conole G, 2013. *Designing for learning in an open world*. Springer-Verlag, New York. 324 pp. doi:10.1007/978-1-4419-8517-0
- Downes S, 2010. Fairness and equity in education. Huffpost Education. Available online: http://www.huffingtonpost.com/stephen-downes/democratizing-education_b_794925.html
- ECDC (European Centre of Disease Prevention and Control), online. European Programme for Public Health Microbiology Training (EUPHEM). Available online: http://www.ecdc.europa.eu/?en/activities/training_activities/EUPHEM/Pages/index.aspx [Accessed: 18 December 2015]
- EFSA (European Food Safety Authority), 2014. Scientific Cooperation Roadmap 2014–2016. 24 pp. Available online: <http://www.efsa.europa.eu/en/corporate/pub/scientificcooperationroadmap1416>
- EFSA (European Food Safety Authority), 2016. External Scientific Report: Specialised courses on advanced aspects of risk assessment for EFSA Panel members and staff. Available online: <http://www.efsa.europa.eu/en/supporting/pub/866e>
- Karolinska Institutet, online. Advanced International Training Programme in Health Risk Assessment. Available online: <http://ki.se/en/imm/international-training-in-health-risk-assessment> [Accessed: 18 December 2015]
- Kneifel W, Apprich S and Kleboth J, 2012. The MSc Programme: Safety in the food chain. Available online: http://www.dlwt.boku.ac.at/fileadmin/data/H03000/?H75000/lehre75/SIFC_Pra%CC%88sentation_22.05.12_screen.pdf
- TrainSaferFood (European Training Platform for Safer Food), 2016. Risk assessment. Available online: <http://www.trainsaferfood.eu/trainings/riskassessment.aspx>

Abbreviations

BfR	Bundesinstitut für Risikobewertung (The Federal Institute for Risk Assessment in Germany)
DG SANCO	European Commission Directorate General Health and Consumers
ECDC	European Centre for Disease Prevention and Control
EFQUEL	European Foundation for Quality in e-Learning
EPIET	European Programme for Intervention Epidemiology Training
EUPHEM	European Programme for Public Health Microbiology Training
GFSP	Global Food Safety Partnership
MOOCs	Massive Open Online Courses
NGO	Non-governmental organisation
OER	Open Educational Resources