CONFERENCE ARTICLE

EFSA Journal

APPROVED: 5 June 2019

doi: 10.2903/j.efsa.2019.e170721

Envisioning the expertise of the future*

Svetla Naydenova[1], Lucia de Luca[2] and Selomey Yamadjako[1]

[1]Business Services Department, European Food Safety Authority (EFSA), Italy; [2]Communications, Engagement and Cooperation Department, European Food Safety Authority (EFSA), Italy

Abstract

Envisioning the expertise of the future in the field of food safety is challenging, as society, science and the way we work and live are changing and advancing faster than ever before. Future challenges call for multiple and multidimensional responses, some of which were addressed at EFSA's Third Scientific Conference. The participants indicated that risk assessment bodies involved in food safety such as EFSA must recognise that data, methods and expertise (i.e. people) are the three basic elements underlying risk assessments. These elements need constant consideration and adaptation to ensure preparedness for the future. Moreover, it should be recognised that knowledge and expertise are distributed throughout society and are thus not limited to scientists. Aspects considered during the breakout session included: (1) increased complexity, (2) the crowd workforce, (3) citizen science, (4) stakeholder engagement, (5) talent pools and (7) entrepreneurship. To account for future challenges, behavioural, attitudinal and cultural changes must be implemented successfully. *At a societal level*, people are increasingly going hand in hand with robotics and artificial intelligence in sharing expertise and producing outcome. This needs consideration on ethics and values, both for organisations and individuals. *At an organisational level*, risk assessment bodies will have to tap into new talent pools and new solutions for a more fluid and *ad hoc*-based workforce. Future risk assessment bodies will have to actively engage with stakeholders when performing their assessments. It is expected that the impacts of citizen science and involvement of the crowd will become part of risk assessment practices. Consequently, EFSA will have to continue to invest in massive, ongoing skills development programmes. *At an individual level*, potential recruits will need to be assessed against a whole new set of competencies and capabilities: technical competencies in data science, computational science and artificial intelligence, alongside a large set of soft skills.

Keywords: citizen science, crowdsourcing, expertise, food safety, scientific advice, stakeholder engagement

Correspondence: svetla.naydenova@efsa.europa.eu

* In addition to the references cited on p.9, this article draws on the following sources:
-http://www.independent.com.mt/articles/2016-01-15/local-news/Machines-will-have-the-power-of-a-human-brain-by-2025-Gerd-Leonhard-6736151783
-Kennedy Fitch. If HR Transformation is dead, what is the future of Human Resources? https://www.kennedyfitch.com/if-hr-transformation-is-dead-what-is-the-future-of-human-resources/
-Vikram Bhalla, Susanne Dyrchs, and Rainer Strack. Twelve Forces That Will Radically Change How Organizations Work. The Boston Consulting Group (March 27, 2017)
-Morgan, Gareth (2006). Images of Organization. Sage Publications.
-Morgan, Gareth (2014). Complexity Theory and Change.
-Ruddle, Keith. In Pursuit of Agility: Reflections on One Practitioner's Journey Undertaking, Researching, and Teaching the Leadership of Change in Mapping the Management Journey. Oxford University Press

Acknowledgements: The European Food Safety Authority (EFSA) and authors wish to thank the participants of the breakout session 'Envisioning the expertise of the future' at EFSA's third Scientific Conference 'Science, Food and Society' (Parma, Italy, 18-21 September 2018) for their active and valuable contributions to the discussion. We also thank Alison Brimelow, Ian Cotgreave, Hilary Hanahoe, Djien Liem, Ciarán McGinley, John Palmer, Anna Noel-Storr, Kaoruko Tachibana, Matthew Wood and Alisdair Wotherspoon for their contributions to this publication, and Yann Devos and Hans Verhagen for carefully proofreading it.

Suggested citation: Naydenova S, de Luca L and Yamadjako S. Envisioning the expertise of the future. EFSA Journal 2019;17(S1):e170621, 9 pp. https://doi.org/10.2903/j.efsa.2019.e170721

ISSN: 1831-4732

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

Table of contents

1. Introduction

According to Gerd Leonhard, 'By the year 2025, machines will have the same power as the human brain and in 2051 they will have the power of the entire global population. Does this sound far-fetched?' (see Mallia, 2016). In his statement, Leonhard is raising an alert on mega shifts rolling over at unprecedented speed and intensity, i.e. robotisation, virtualisation, digitisation, datafication, personalisation, cognification, augmentation, disintermediation and platformisation. At the same time, 60 major trends with four interrelated megatrends were identified (Bhalla et al., 2017). These trends generate dramatic changes in the supply and demand for talent (technological and digital productivity among them), leading to a revolution on how work gets done in organisations.

It is commonly recognised that the global economy, the knowledge society and the technological revolution emerging since the 20th century have resulted in an environment with levels of complexity, uncertainty and dynamism not previously experienced (Hitt et al., 1998; Nadler and Tushman, 1999; Ireland and Hitt, 2005). This new environment is characterised by increased risk and decreased forecast ability, increased ambiguity in industry boundaries, which force a new managerial mind-set focused on flexibility, and an emphasis on strategic response capability as the ultimate source of competitive advantage (Bettis and Hitt, 1995).

Never in human history have so many technologies been moving at such a pace. Disruption is the new norm: new technologies combined with the power of the community force risk assessment bodies like the European Food Safety Authority (EFSA) to embrace new paradigms. The increased prevalence of digital technology and artificial intelligence will lead to new job functions and categories as well as to a new age where the very concept of work is being reinvented. In this new age, instead of owning human resources, it will be about having access to assets, brains and knowledge.

In 2010, the world had 1.2 billion people online globally. By 2020, that number will reach 5 billion. People will be available to work via smartphones, tablets or internet platforms. The capacities that will be unleashed are beyond imagination: this has been defined as 'cognitive surplus' (Shirky, 2010). A new regime of knowledge production is emerging in which academia carries significantly less authority and influence than it did in the past, and broadly legitimate knowledge claims are increasingly developed outside traditional boundaries. These changes carry obvious implications for the future of organisations like EFSA. The ways in which knowledge is vetted and the questions investigated (or ignored) shift the relationship between 'traditional' and extramural knowledge producers.

Along with the above-mentioned developments, new terms or disciplines have emerged, e.g. data science, citizen science, distributed expertise, politics of knowledge. Increasingly, risk assessment bodies and regulatory agencies in the area of food safety will have to reach out for different sets of capabilities: they must look for behavioural or economic insights to better frame their scientific advice, and focus on collective intelligence, large-scale cooperation and (the social aspects of) artificial intelligence (Cavalli et al., 2019; Smith et al., 2019).

Therefore, the following questions were explored at EFSA's Conference:

- How to make risk assessment bodies in the area of food safety more adaptable and responsive to emerging needs? How to make sure they stay relevant and impactful?
- What is needed to better harness expertise, competencies, capabilities and knowledge? How to move from a rather mechanist organisation to a 'brain' one when comparative advantage and added value is all about fluidity, agility, speed and connectedness?
- How to better leverage collaboration, within and between sectors, to rethink and co-design possible responses to the current challenges?

This publication is based on the presentations made and discussions held during the breakout session 'Envisioning the expertise of the future' at EFSA's third Scientific Conference' Science, Food and Society' (Parma, Italy, 18–21 September 2018).[1]

2. Challenges in scientific work and risk assessment

2.1. Increased complexity

Increased complexity characterises the whole of society, including organisations involved in food safety risk assessments. There is a well-pronounced emphasis on establishing'simplicity in complexity', as organisational complexity imposes a high cost, both in terms of managerial ability to meet their goals

[1] All conference materials are available at https://www.efsa.europa.eu/en/events/event/180918

and employee engagement and productivity; this factor is often at the root of an organisation's inability to make quick decisions and innovate rapidly. Complexity makes it harder to meet organisational goals. According to Bhalla et al. (2017), organisations have to learn to manage complexity in new ways if they are to thrive and understand how to get results without adding more layers, processes and silos.

2.2. The crowd workforce

To respond and manage complexity, a new kind of workforce has emerged. Risk assessment bodies find themselves dealing with a completely new kind of contributors, namely'the crowd', which thrives on motivation and engagement (Noel-Storr, 2019). Rapidly expanding access to information and ideas is giving rise to crowdsourcing and the sharing economy. The most innovative solutions are currently being developed globally by people in online communities, internet platforms, and digital ecosystems. This disrupts the traditional models of solution finding, decision-making and product development. Society is starting to play a more active role than before in the risk assessment process and in the evaluation of scientific research and evidence. Engagement has become the new mantra in the quest to interact with communities and crowds (Smith et al., 2019). It is about building bridges and leveraging the potentialities of the digital age to transcend the boundaries of traditional disciplines, of institutional and professional silos. It is also about involving volunteers and'exploiting' the fact that the current and future generations are primarily purpose driven. Citizen science and working with diverse disciplines such as social science have also grown rapidly – there is an expansion of communities working on various tasks by sharing a common platform and producing scientific evidence together.

2.3. Citizen science

Risk assessment bodies such as EFSA need to recognise that knowledge and expertise are not limited to professional scientists but are distributed throughout society. Making use of existing knowledge/ expertise and databases, data-sharing and database integration can support the development of methodologies and address data gaps. Citizen science is one of the most recurring solutions proposed by many at EFSA's Conference (Noel-Storr, 2019; Smith et al., 2019). Citizen science may have an increasingly important role to play when it comes to handling big data, making sense of information overload and turning it into meaningful scientific opinions and knowledge. The public, or the so-called 'crowd', has developed a strong interest in health and food safety and, now more than ever, they are looking for meaningful ways to contribute to scientific research, and risk assessment and decision-making processes (Noel-Storr, 2019). Recently established citizen science platforms, such as Cochrane Crowd Community, offer the crowd a range of microtasks designed to either identify or describe health research. Such platforms thus enable individual contributors to become part of a larger community, taking on a task in their preferred domain and helping identify health evidence and then describing it according to the PICO (Population, Intervention, Comparator, Outcome) methodology (Noel-Storr, 2019). Before getting into the actual work and tasks, contributors undergo some initial training modules and agreement algorithms to help ensure collective decision-making.

Citizen science has proven to be extremely effective in certain domains such as astronomy, ecology and plant health. This type of voluntary contribution is based on the need and desire of the crowd to learn and be part of something bigger. Even if there are risks with the accuracy of the work, when done correctly and properly it can bring numerous advantages, e.g. cost savings. Another similar initiative, making extensive use of the communities and infrastructures to enhance responsiveness, is the Research Data Alliance (RDA). Made up of nearly 7,000 volunteers from all over the world, this alliance and its individual contributors work together to achieve the collective vision of researchers and innovators to openly share data across disciplines, technologies and countries. Exploiting the full potential of citizen science would mean organisations operate within a reality of temporary and virtual teams; consequently, this requires that leaders have to deal with increasingly blurred boundaries between employees and contractors. They will also need to rethink the way they engage with talent and how they get their work done.

2.4. Stakeholder engagement

Strongly linked to the concept of citizen science is the way in which risk assessment bodies interact and engage with their key stakeholders. Today, any private company or government risk assessment body seeking to do business or to publish any type of scientific advice needs to interact with an increasing number of stakeholders. Risk assessment bodies like EFSA need to be very attentive to how stakeholders and the wider public view their work in terms of credibility and reputation. Stakeholder involvement, or

rather stakeholder engagement, is no longer a question about solely mastering communication, but rather a whole series of novel activities that regulatory agencies need to take into consideration and undertake/embrace/integrate in order to gain the continuous trust and loyalty of customers and stakeholders. A risk assessment body seeking to engage with its audience, essentially needs to go beyond the traditional communication channels: they need to innovate their outreach strategies to ensure that their scientific work gets traction and legitimacy (Smith et al., 2019). The breakout session provided plenty of examples of good practices around stakeholder engagement, one of which is the approach followed by the International Plant Protection Convention (IPPC). In this particular case, the IPPC is running a highly innovative and collaborative management tool called the Phytosanitary Capacity Evaluation (PCE), which provides a common framework for national strategic planning with the entire process being under the control of each state. The PCE was set up to ensure that stakeholders have a complete and common understanding and ownership of the phytosanitary capacity development strategy (and legislation when necessary) that they have developed together. This activity allows for efficient operations of the IPPC's activities and is implemented through a consensus-driven and confidential process amongst the stakeholders. Together, they identify the strengths and the weaknesses of the phytosanitary system through deep dialogue (Hartley and Kokotovich, 2018).

2.5. Talent pools

Stakeholder engagement activities are also essential to increase the attractiveness of the organisation for future talents and hires; if risk assessment bodies want to tap into the future workforce, expand their expertise and horizon, they need to open up to new pools of talent and especially to the larger crowd, which will come to play a far greater role than in the past. Organisations will have to find new ways to attract, retain and develop talent across diverse locations and age groups in response to certain demographic shifts. Programmes designed for academia will become increasingly ineffective in building the skills required for the modern workplace. Instead, organisations, including risk assessment bodies like EFSA, are turning to resources that provide training for employees working full-time such as Udacity, edX and Coursera.

Talent is increasingly mobile and workers are prepared to cross borders and cultures to improve their career prospects. There is a growing preference for independent work instead of dedicated corporate careers (Bhalla et al., 2017). Three specific areas are increasingly being emphasised: diversity and inclusion, individualism and entrepreneurship, and well-being and purpose (Bhalla et al., 2017). Employees want to avoid doing the same kind of work for long periods of time and see more flexible careers. Increasingly, potential employees are choosing entrepreneurship and self-employment over traditional corporate employment, supported by digital platforms and ecosystems. Well-being and the social impact of a career are increasingly being considered, above and beyond competitive compensation. As a result of these important changes in attitude, employers will be obliged to make job offers that go far beyond traditional benefits and compensation and offer a more comprehensive set of flexible work and development opportunities that appeal to the personal aspirations and values of staff members. Leaders will have to tailor their leadership style to the hyperindividualised environment, finding new ways to empower and inspire individuals and teams in their dispersed organisation. In that context, human resources will increasingly become an enabler in guiding leaders to rethink organisational structures, to build and promote new organisational values and to facilitate and manage the nexus of technology and people, where virtual and physical communities come together.

2.6. Multidisciplinary approach

Collaboration and adoption of a cross-disciplinary approach are widely known to be the driving forces in shaping future research agendas. Regulatory agencies could tap more into networking as a tool to increase preparedness for the future and to avoid diverging interpretations of risk assessment methodologies and data. The International Liaison Groups in which EFSA participates are examples of how risk assessment bodies, through networking, can cooperate and ensure best quality science in their risk assessment, such as the International Liaison Group for Methods on Risk Assessment of Chemicals in Food (ILMERAC), the International Food Chemical Safety Liaison Group (IFCSLG), the International Microbiological Food Safety Liaison Group (IMFSLG), and the International Risk Communication Liaison Group (IRCLG) (EFSA Advisory Forum and Scientific Cooperation Unit, 2017). In a similar manner, the Food Safety Commission of Japan is trying to promote data sharing and mutual data references amongst the different food safety regulatory agencies. The emphasis here also lies in cross-cutting databases and re-using certain data from one specific domain in another.

2.7. Entrepreneurship

Those EU agencies that embrace entrepreneurship and reach out to stakeholders beyond their core remit are much better positioned to achieve normative criteria for democratic legitimacy (Wood, 2018). Such agencies also tend to be perceived more positively by key stakeholders. This means that a scientific elite, which is concentrated and isolated in small centres of knowledge, is highly unlikely to survive in the society today. Leveraging technology would lead to accelerating organisational growth and performance and would give way to a new type of structure, i.e. the exponential organisation with a massive transformative purpose, meaning a constantly evolving value proposition (Ismail et al., 2014). The exponential organisation will be characterised by a set of renewed and redefined attributes: fluid design, lines of communication, decision-making, information infrastructure. All of the above could be summarised as a 'nexus of forces', i.e. the convergence and mutual reinforcement of social, mobility, cloud and information patterns that drive new business scenarios (Plummer et al., 2012).

Taking a slightly different perspective on the nexus of forces, the three variables, already in effect and underway, which will continue to influence the nature of the future of work are technological change, learning evolution and talent mobility (World Economic Forum and The Boston Consulting Group, 2018). These three stand out as the most volatile, impactful and uncertain variables:

- Technological change in the context of artificial intelligence, robotics and big data analytics. As a result, whole occupations will be displaced, tasks will be shifted, new skills in demand will emerge and new jobs will be created;
- Learning evolution is related to a major shift and reform in the educational system, i.e. developing agile curricula, retraining opportunities for the current workforce, mind-set towards lifelong learning;
- Talent mobility is all about availability of economic opportunity, job growth, knowledge transfer, demand and supply of talent, capacity of local vs international labour markets.

To be able to anticipate and zoom into the expertise of the future, we need a solid understanding of this nexus as it will shape the future organisational models in terms of structure and relationship with talent and technology, producing value. In parallel, a new breed of leader will be called for who can 'ride the wave' and discover new ways of organising, performing, and leading and with new approaches to recruiting, developing and engaging employees. organisations with limitless data, open boundaries, employees and machines working side by side, and rapidly evolving employee value propositions.

3. Conclusions

The future is turbulent and uncertain, and risk assessment bodies in the area of food safety will face major challenges, i.e. resource constraints and cuts and growing societal demand for fit-for-purpose scientific risk assessments (Devos et al., 2019).

The changes and shifts will eventually result in the formation and transformation of organisations into more fluid structures with a greater emphasis on cooperation, collaboration, communication, convening power, sharing of expertise, co-design and co-production of services and scientific output. This shift will enable organisations and people to see and experience collaboration from a new perspective.

At a societal level, technology and the emergence of robotics and artificial intelligence are upgrading all aspects of reality and also changing behaviours and expectations from people and organisations around us. Consequently, the debate on artificial intelligence, on its societal and economic benefits and the need to integrate these technologies into the world of work without devaluing the role of people will remain high on the agenda. Combining human talent and machines will lead to improved decision-making and to significant efficiency gains and improvements in output. The workforce of the future will be able to move from more operational tasks (which can be done by a robot) to more meaningful and strategic tasks. There are, however, concerns regarding the obvious impact of robotics and artificial intelligence on ethics and on our values, both as organisations and as individuals. Inherent value judgements are embedded in all those tools and processes, but artificial intelligence and algorithms could also be used to mitigate and compensate for confirmation bias and/or framing bias.

At an organisational level, risk assessment bodies will have to tap into new talent pools and new solutions for a more fluid and ad hoc based workforce. Enhanced learning solutions will be needed for individuals to put them in the condition to live up to the demands of society. Discovering and retaining these new pools of talent will require a whole new approach to engagement, interaction and branding activities. The risk assessment bodies of the future will have to actively engage its stakeholders in the

development of its risk assessment, which consequently will lead to trust in the delivered scientific opinions. The future EFSA will be increasingly focused on the contextual environment (Devos et al., 2019), making it necessary for the structure of the organisation to become more fluid and lighter, with a small core of on-payroll employees, surrounded by multiple layers of physical and virtual communities. These communities will be the structure through which ideas, innovation, products, manufacturing and financing are sourced through the crowd; it will be the structure where algorithms and dashboards will play an important role, a place where collaboration happens through social technologies in a culture of autonomy and iterative experimentation. The impact of citizen science is widely discussed. As the crowds will be used for inputs, creativity, innovation, scientific validation or funding, this might generate more deep-rooted concerns related to privacy, accuracy and personal data protection. There is an inevitable challenge for independence, objectivity, credibility and legitimacy while securing scientific excellence and impact. From a risk assessment perspective, more attention will need to be paid to the effect of citizen science on the operation of technical systems (e.g. fake news on hazards, dangers and opportunities), which could deviate mass behaviour. Integration of these aspects in the risk and resilience assessment and management frameworks will become more and more necessary, and will require effective integration of different disciplines and competencies. Organisations, including EFSA, will be challenged to invest in large-scale skill development programmes. Alongside this, executives must be comfortable leading in a digital world; the latter is a challenge as good digital skills are often associated with younger individuals and there may be significant differences in working styles compared with the leadership cadre. Employee management and engagement can be enhanced by good analytics, with additional benefits for staff retention and leaders' understanding of team dynamics. It can be anticipated that analytics will transform the management of human resources and other business functions and will facilitate the delivery of high-quality services to both internal and external customers (Bhalla et al., 2017).

At an individual level, the people to be recruited will need to be assessed against a whole new set of competencies and capabilities. Technical competencies will be more concentrated around data science, computational science and artificial intelligence. Soft skills, on the other hand, will require an upscaling of collaboration, combinational capabilities, courage, creativity, curiosity but also, what-if thinking, adaptive intelligence, listening skills, complex problem solving, diversity intelligence, networking, entrepreneurship and, of course, technical savviness. While it is commonly agreed that machines will meet men at work and outside, and possibly take over certain professions and tasks, we cannot forget the importance of the human factor; the power of human imagination and ability to co-create as a community will ultimately be the factors we need to increasingly focus on in order to stay relevant as individuals.

Changing the way in which we work to deliver scientific risk assessments cannot happen in a vacuum. We have to stay alert and have a profound understanding of the external drivers which shape today's reality. Organisations should not disregard the need of connecting with society and key stakeholders in new, more innovative ways. These adaptive challenges will require behavioural, attitudinal, and cultural changes to be successfully implemented.

Society is at the brink of a transformative change in work and the concept of work and organisations. These disruptions require a completely new approach to human resources and to the concept of expertise. Extrapolating the past is no longer sufficient and will quickly lead to obsolescence. A key feature of the successful organisations of the future will be agility and inclusion to reflect the importance of communities and to actively reach out and engage stakeholders in the development of scientific outcomes and trusted science.

4. Recommendations

- *At a societal level*, humans and machines, developed through robotics and artificial intelligence, will work hand in hand more to share expertise and produce outcome. This needs consideration on ethics and values, both for organisations and individuals.
- *At an organisational level*, risk assessment bodies will have to tap into new talent pools and new solutions for a more fluid and ad hoc-based workforce. The risk assessment body of the future will have to actively engage its stakeholders in the development of its risk assessment. The impact of citizen science and involvement of the crowd will enrol into our risk assessment practices. EFSA will have to invest in large-scale skill development programmes.
- *At an individual level*, potential recruits will need to be assessed against a whole new set of competencies and capabilities: technical competencies on data science, computational science and artificial intelligence, alongside a large set of soft skills.

Overall, EFSA and its experts needs to consider many challenges. These will require behavioural, attitudinal and cultural changes to be successfully implemented.

References

Bettis RA and Hitt MA, 1995. The new competitive landscape. Strategic Management Journal, 16(S1), 7–19.

Bhalla V, Dyrchs S and Strack R, 2017. Twelve forces that will radically change how organisations work. Available online: https://www.bcg.com/publications/2017/people-organization-strategy-twelve-forces-radically-change-organizations-work.aspx [Accessed 24 May 2019]

Cavalli E, Gilsenan M, Van Doren J, Grahek-Ogden D, Richardson J, Abbinante F, Cascio C, Devalier P, Brun N, Linkov I, Marchal K, Meek B, Pagliari C, Pasquetto I, Pirolli P, Sloman S, Tossounidis T, Waigmann E, Schünemann H and Verhagen H, 2019. Managing evidence in food safety and nutrition. EFSA Journal 2019 in press.

Devos Y, Elliott KC, Macdonald P, McComas K, Parrino L, Vrbos D, Robinson T, Spiegelhalter D and Gallani B, 2019. Conducting fit-for-purpose food safety risk assessments. EFSA Journal 2019, in press.

EFSA Advisory Forum and Scientific Cooperation Unit, 2017. International Scientific Cooperation Work Plan 2017–2020. Available online: http://www.efsa.europa.eu/sites/default/files/event/AF171205-ax8.2_ISC_2017-2020.pdf [Accessed 3 June 2019]

Hartley S and Kokotovich A, 2018. Disentangling risk assessment: new roles for experts and publics. In: Nerlich B, Hartley S, Raman S, and Smith A (eds.)., Science and the politics of openness. Here be monsters. pp. 176–194. Manchester University Press, Manchester, UK.

Hitt MA, Keats BW and DeMarie SM, 1998. Navigating in the New Competitive Landscape: Building Strategic Flexibility and Competitive Advantage in the 21st Century. Academy of Management Executive, 12, 22–42.

Ireland RD and Hitt AM, 2005. Achieving and maintaining strategic competitiveness in the 21st century: The role of strategic leadership. Academy of Management Executive, 19, 63–78.

Ismail S, Malone MS and Van Geest Y, 2014. Exponential Organizations: Why new organizations are ten times better, faster, and cheaper than yours (and what to do about it). Diversion Books, New York, USA.

Mallia M, 2016. Machines'will have the power of a human brain by 2025' - Gerd Leonhard. Available online: http://www.independent.com.mt/articles/2016-01-15/local-news/Machines-will-have-the-power-of-a-human-brain-by-2025-Gerd-Leonhard-6736151783 [Accessed: 24 May 2019]

Nadler DA and Tushman ML, 1999. The organization of the future: Strategic imperatives and core competencies for the 21st century. Organizational Dynamics, 28, 45–60.

Noel-Storr AH, 2019. Working with a new kind of team: harnessing the wisdom of the crowd in trial identification. EFSA Journal, Special Issue July 2019, Third EFSA Conference on Science, Food and Society.

Plummer D, Genovese Y, Mann J, Smith D, Willis D and Howard C, 2012. The Nexus of Forces: Social Mobile Cloud and Information. Available online: https://www.gartner.com/resources/234800/234840/the_nexus_of_forces_social_m_234840.pdf [Accessed 24 May 2019]

Shirky C, 2010. Cognitive surplus. Creativity and Generosity in a Connected Age, Penguin, London, UK.

Smith A, Parrino L, Vrbos D, Nicolini G, Bucchi M, Carr M, Chen J, Dendler L, Krishnaswamy K, Lecchini D, Löfstedt R, Patel M, Reisch L, Verloo D, Vos E, Zollo F and Gallani B, 2019. Communicating to and engaging with the public in regulatory science. EFSA Journal, Special Issue July 2019, Third EFSA Conference on Science, Food and Society.

Wood M, 2018. Develop new approaches to the use of future scientific evidence: A must? In: Advancing risk assessment science: Break-out session - Envisioning the expertise of the future. EFSA Conference, 20 September 2018.

World Economic Forum and The Boston Consulting Group, 2018. Eight Futures of Work. Scenarios and their Implications. Available online: http://www3.weforum.org/docs/WEF_FOW_Eight_Futures.pdf [Accessed 23 May 2019]

Abbreviations

IFCSLG	International Food Chemical Safety Liaison Group
ILMERAC	International Liaison Group for Methods on Risk Assessment of Chemicals in Food
IMFSLG	International Microbiological Food Safety Liaison Group
IPPC	International Plant Protection Convention
IRCLG	International Risk Communication Liaison Group
PCE	Phytosanitary Capacity Evaluation
PICO	Population, Intervention, Comparator, Outcome
RDA	Research Data Alliance