

Executive summary - NAMS Roadmap (2023)

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Executive summary

Advances in biology, computer science and other related fields are paving the way for major improvements in how we evaluate environmental and public health risks posed by potentially toxic chemicals. The combined advances in discovery and clinical sciences, data science and technology have resulted in toxicity testing which has reached a pivotal transformation point known as the 4th industrial revolution (4IR). One of the major recent scientific advancements is the development of new approach methodologies (NAMs) which includes but not limited to computer modelling strategies for the evaluation of hazard and exposure whilst championing the Replacement, Reduction and Refinement (3Rs) of animals, approach.

The volume of data produced in the world is growing ever more rapidly, from 33 zettabytes in 2018 to an expected 175 zettabytes in 2025 (IDC, 2018) (Food Systems). The Department for Business, Energy and Industrial Strategy (BEIS) white paper on Regulation for the Fourth Industrial Revolution notes that changes in technology are occurring at a "scale, speed and complexity that is unprecedented". The use of such technologies can help improve regulatory processes in several ways such as to improve the efficiency of data collection and to exploit data already held by agencies to support better analysis and risk assessment (BEIS Report-The use of emerging technologies for regulation).

The future of food safety assessment of chemicals depends on our adaptability and flexibility whilst using the best scientific methodologies and strategies available in order to respond to the accelerating developments in science and technology.

The vision is to be able to predict risk more rapidly, accurately and efficiently.

For regulatory agencies to incorporate and implement these new predictive capabilities brings both challenges and opportunities. Moving from research to risk assessment to regulatory setting and beyond, there must be suitable validation and acceptance of these new and emerging technologies.

Using a process via an evidence driven approach to address the data gaps in the risk assessment process will facilitate the acceptance and validity of these NAMs as well as pave the way for alternative methods. Integration of these technologies as part of the risk assessment process will be fundamental in the future of human and environmental safety.

In order to achieve this, the Food Standards Agency (FSA) and Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT) have developed a UK roadmap towards acceptance and integration of these new approach methodologies including predictive toxicology methods using computer modelling into safety and risk assessments for regulatory decision making.

This will not only require the historic 3Rs approach (i.e. replacement, reduction and refinement of animal experiments) and the expansion to the 6R principle: (to also include) reproducibility, relevance, and regulatory acceptance.