RESEARCH ARTICLE

MoniQA (*Moni*toring and *Q*uality *A*ssurance): an EU-funded Network of Excellence working towards the harmonization of worldwide food quality and safety monitoring and control strategies–status report 2008

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Abstract

MoniQA (*Moni*toring and *Q*uality *A*ssurance in the total food supply chain) is an EU-funded Network of Excellence that involves experts from around the globe collaborating to harmonize worldwide food quality and safety monitoring and control strategies. The initial network of over 155 scientists from 20 countries has grown to over 400 experts from over 35 countries from five continents in the first 18 months. MoniQA focuses on validation of and performance criteria/requirements for methods used to analyse foods and food products for safety and quality, with the main focus being on rapid methods and their applicability and reliability in routine testing. The work involves validation guidelines, validation studies, design and development of reference materials/testing materials and validation guidelines. MoniQA will play an important role in integrating European and worldwide food quality and safety research by creating a virtual laboratory for joint research, training, dissemination and mobility programmes. It will allow and actively promote sharing of data and knowledge, as well as of equipment, materials and personnel through creation of a global platform for food Q&S researchers. MoniQA will enable shared access to the world's best research facilities, technological platforms, databases, analytical tools and knowledge. MoniQA's harmonized food quality and safety control strategies will add value in the food chain and will improve consumer confidence worldwide. MoniQA's socio-economic impact assessment will enhance the effectiveness and efficiency of new food quality and safety regulations within the EU and worldwide.

Introduction

MoniQA (http://www.moniqa.org) – *Moni*toring and *Q*uality *A*ssurance in the total food supply chain – is an EU-funded Network of Excellence (NoE) that works towards the harmonization of worldwide food quality and safety monitoring and control strategies in the food supply chain. The MoniQA NoE (Contract N0. FOOD-CT-2006-36337) is coordinated by the Vienna-based ICC – International Association for Cereal Science and Technology (www.icc.or.at), – and is set to receive 12.3 Mio EURO by the European Commission for its activities between 2007 and 2012 within the Sixth Framework Programme Topic T5.4.5.1: Quality and safety control strategies for food (NOE).

MoniQA's full title reads: 'Towards harmonization of analytical methods for monitoring food quality and safety

in the food supply chain' and as a NoE it seeks to establish durable integration of leading research institutions, industrial partners and SMEs working in complementary fields of food analysis to assure food quality and safety. MoniQA aims to overcome European and worldwide fragmentation in food diagnostic research by integrating key organizations in an NoE. Benefits through dissemination and joint research will also be available to associated partners. The consortium seeks to establish mechanisms for *coordinating and, where possible, fully merging research activities, personnel and infrastructure*. The *industry* and *SME sector* will benefit through application of harmonized protocols and mutually/globally accepted analytical methods fulfilling defined requirements. Finally, *consumers and international trade* will benefit through high-quality and safe food, which was tested by reliable and accepted methods.

MoniQA will play an important role in integrating European and worldwide food quality and safety research by creating a virtual laboratory for joint research, training, dissemination and mobility programmes. It will allow and actively promote sharing of data and knowledge, as well as of equipment, materials and personnel through creation of a global platform for food Q&S researchers. Integrating activities will enable *shared access* to the world's best research facilities, technological platforms, databases, analytical tools and knowledge. The joint research programme will allow high-quality research directed towards the most pressing issues fulfilling both food quality and safety policies, as well as addressing citizens' concerns. The network will develop common strategies for harmonizing and validating detection methods and technology strategies to set new standards in food quality and safety, initially within production and extending throughout the whole food supply chain.

The MoniQA NoE officially started on 1 February 2007. From the beginning, >155 researchers and scientists, including 40 PhD students, from 33 international partners from 20 countries have been integrated into the MoniQA Network (see Table 1a), which is expanding its activities to other invited institutions around the globe. During the first 18 months of MoniQA, the network has grown to over 400 experts from over 35 countries from five continents. The activities of the various work packages and work groups address analytical challenges, global harmonization and standardization efforts, industry needs for rapid and new analytical methods, ICT – Information and Communication Technologies – in modern HACCP concepts, databases and better future regulations. All MoniQA activities are accompanied by relevant training courses and dissemination activities.

During the first year, the network was extended with a 12-member Advisory Panel consisting mainly of representatives from IGOs (International Governmental Organisations) and INGOs (International Non-Governmental Organisations) included in Table 1b. The Advisory Panel is headed by Andre Pirlet from CEN Research. Advisory Panel members give input for direction and strategic decisions of the work plan of MoniQA, they assure the quality and reliability of MoniQA publications and other outputs by acting as reviewers and they advise the MoniQA Management Board on selected items of strategic concern. They have helped the consortium establish additional links to other organizations and related research projects. As quality control for content-related issues, they have revised all strategic deliverables completed during MoniQA's first year.

Together with the confirmed Associated Partners (non-MoniQA-EU-funded partners with limited rights and selected benefits offered by MoniQA), the MoniQA Network has grown to over 100 institutions from 35 countries (including Europe, Africa, Asia, North and South America, and Australia) in the first year.

Background and motivation

With the rise of globalization, more and more foods and food products are being traded around the world. Ensuring that these foods are of a high quality and safe to eat when they reach the consumer requires reliable food analysis techniques. However, different countries currently use different methods to test foods for the presence of harmful substances. The recent melamine crisis has shown that in a globalized market, local challenges quickly affect the global community and require global solutions. The MoniQA Network supports international collaboration and facilitates exchange of information, training and setting up of monitoring and control strategies for current and emerging food safety and quality issues. The melamine crisis has prompted MoniQA to react swiftly and to provide supporting information and tools to handle analytical and quality management challenges for melamine at the food manufacturing and policy-making levels (http://www.moniqa.org/melamine).

MoniQA aims to make the food chain safer by harmonizing the criteria for methods used to analyse food for safety and quality. The partners form a virtual laboratory highlighting food safety issues and food testing and analysis. Through this, researchers are able to exchange data and knowledge, helping to develop common strategies that could form the basis of new standards in food quality and

Table 1a Participant list

No	Short Name	Organization Full Legal Name	Country
1	ICC	International Association for Cereal Science and Technology	Austria
2	BOKU	Universität für Bodenkultur Wien	Austria
3	ASU	Ain Shams University	Egypt
4	CCFRA	Campden and Chorleywood Food Research Association	UK
5	CER	Centre d'Economie Rurale (CER Groupe)	Belgium
6	Eurofins	Eurofins Analytik GmbH	Germany
7	Gaiker	Centro Tecnologico Gaiker	Spain
8	CSL	Central Science Laboratory	UK
9	Q-Plan	International Quality and Environment Services S.A.	Greece
10	TUBITAK	Tübitak Marmara Research Center	Turkey
11	UFT	University of Food Technologies	Bulgaria
12	VTAG	Vocal Tag Ltd.	Israel
13	VTT	VTT Technical Research Centre of Finland	Finland
14	DSA	University of Naples Federico II	Italy
15	Matforsk	Norwegian Food Research Institute	Norway
16	NTUA	National Technical University of Athens	Greece
17	RIVM	National Institute for Public Health and the Environment	Netherlands
18	SCU	Sichuan University	China
19	INRAN	Istituto Nazionale di Ricerca per gli Alimenti e la Nutrizione	Italy
20	BUTE	Budapest University of Technology and Economics	Hungary
21	ESR	Institute of Environmental Science and Research	New Zealand
23	NFNI	National Food and Nutrition Institute	Poland
24	HCTU	Hacettepe University	Turkey
25	CCOA	Chinese Cereals and oils association	China
26	IPB	Institut Pertanian Bogor	Indonesia
27	HUT	Hanoi University of Technology	Vietnam
28	IFR	Institute of Food Research	UK
29	CNR	National Research Council	Italy
30	RTDS	RTD Services	Austria
31	JRC	JRC – Joint Research Centre	Belgium
32	Uni-Bonn	Rheinische Friedrich-Wilhelms Universität Bonn	Germany
33	ICCR	Interdisciplinary Centre for Comparative Research in the Social Sciences	Austria
34	UNIBO	University of Bologna	Italy

Table 1b MoniQA advisory panel (status 2008-12-31)

Expert	Short Name	Organization Full Legal Name	Country
Andre Pirlet	CEN Research	European Committee for Standardisation	Belgium
Margit Heinrich	CEN TC 275	CEN Technical Committee on Horizontal Methods	Germany
Selma Doyran	FAO/WHO	Codex Alimentarius Commission – Joint FAO/WHO Food Standards Programme	Italy
Samuel Godefroy	HC	Health Canada	Canada
Roger Wood	IAM	Inter Agency Meeting	Hungary
Jan Willem van der Kamp	TNO	TNO – Netherlands Organisation of Applied Scientific Research	The Netherlands
Elke Anklam	JRC-IHCP	Joint Research Centre of the European Commisssion – Institute for Health and Consumer Protection	Italy
Nico van Belzen	ILSI-Europe	The International Life Sciences Institute – Europe	Belgium
Joel Abecassis	INRA	Institut Scientifique de Recherche Agronomique	France
Marie-Noelle Bourguin	ISO TC34	International Standards Organisation, ISO TC 34 Foods	Switzerland
David Lineback	IUFOST	International Union of Food Science & Technology	USA
Richard Cantrill	AOCS	American Oils Chemists' Society	USA

safety assessment. By implementing joint research programmes and promoting exchange between the partners, MoniQA hopes to develop solutions that will be acceptable to consumers, manufacturers and regulatory bodies as well as other groups involved in the food chain.

MoniQA is also investigating the food quality and safety implications of new processing technologies, and identifying future research needs. These needs will be examined along the whole food supply chain, which has become a complex system with crossroads between suppliers and producers, retailers and ultimately the consumer. At each crossing point, some sort of documented quality control is required, which must be acceptable to the supplying and the receiving parties as well as to regulatory authorities and control institutions.

The network members are investigating mechanisms to coordinate and merge research activities, personnel and infrastructure to achieve synergetic affects. The resulting harmonized analytical strategies and methods, databases and training modules will extend beyond the network to associated partners and stakeholders. Food production industries and SMEs will benefit through harmonized analytical methods and technologies, as will the consumer.

Integrating activities will facilitate shared access to the world's best research facilities, technological platforms, databases, analytical tools and knowledge. Joint research is directed towards the most pressing issues to fulfil food quality and safety policies, as well as addressing citizens' concerns. The network will develop common strategies for harmonizing and validating detection methods and technologies to set new standards in quality and safety – within food production and extending throughout the whole food supply chain.

The drivers for MoniQA are:

- New EU Regulations (e.g. food allergens, mycotoxins, other food contaminants).
- Fragmentation of research and standardization (e.g. little or no communication between research centres and standardization bodies, duplication of research and validation work, more collaboration, decreasing costs . . .).
- Limited validity of standardization/validation certificates for analytical methods, in particular for rapid methods, alternative methods and test kits.
- The growing demand for rapid methods for quality and safety monitoring throughout the food supply chain.
- Lack of appropriate validation protocols for new and rapid methods (e.g. qualitative methods) and thus lack of proven confidence in the competence and reliability of these methods.
- Lack of reference methods and reference materials for some analytes (e.g. food allergen detection methods and accepted reference materials).
- Lack of appropriate tools to quantitatively assess the financial impact (costs and benefits) of implementation of legally required and/or voluntary quality assurance scheme requirements in a micro- and a macro-socio-economic setting.

In the long-term, the consortium hopes that the project will form the basis of a network of food safety and quality experts, which will continue to serve the analytical community and the involved stakeholders after the initial project funding by the EU has ended. The network works on establishing a 'virtual laboratory' (e.g. this will result in some sort of Competence Center with legal entity status) to provide sustainable services and products for the food industry, analytical control laboratories, society and policy makers.

Project objectives

The objectives for the network have been formalized in a ten-point plan and are as follows:

The ten-point programme of specific objectives for the full duration of the MoniQA NoE

For Durable Integration – Programme Leader: VTT – Technical Research Centre of Finland, FIN

1. Merge partner strengths through shared use of infrastructure into a portfolio of synergetic research to meet emerging food quality and safety challenges on a global scale.
2. Establish a mobility programme to promote the exchange of personnel for both short-term secondments and full relocation within the network of participant institutions.
3. Achieve a sustainable network to ensure durable integration of international research institutions through development of joint economic models, research programmes and intellectual property.

For Joint Research – Programme Leader: CSL – Central Science Laboratory, UK

4. Develop harmonization guidelines for risk assessment and standardization of detection methods and technologies in food safety and quality.
5. Assess implications of advanced processing and monitoring technologies implemented in modern HACCP systems. Identify and prioritize gaps and needs for future food quality and safety research.

Table 2 Programmes and Work Packages of MoniQA: Programme 1: Integration (WP 1–3); Programme 2: Joint Research (WP 4–7); Programme 3: Training and Dissemination (WP 8+9); Programme 4: Management (WP 10); Programmes follow Objectives, the correlating Work Packages describe Activities

Integration Objective – VTT	**Integration Activities**
To overcome fragmentation of research activities by coordinating and merging research portfolios in terms of infrastructure, personnel and joint economic models to achieve a sustainable network.	WP 1: Coordinating and merging research infrastructure WP 2: Personnel exchange and mobility WP 3: Achieving network sustainability
Joint Research Objective – CSL	**Joint Research Activities**
To develop collective knowledge of the network by producing common tools such as guidelines for harmonization of detection methods and technologies, Good Traceability Practices, databases for food quality and safety assessment and socioeconomic impacts of new EU food quality and safety regulations	WP 4: Harmonization and standardization of analytical methods WP 5: Advanced processes and ICT technologies WP 6: Development of database for food safety hazards WP 7: Socioeconomic impact and cost efficiency
Spreading of Excellence Objective – Q-Plan	**Spreading of Excellence Activities**
To promote results generated by the network to targeted stakeholder groups, as well as to facilitate and foster a knowledge sharing and learning culture within the network through educational programmes and training courses	WP 8: Dissemination and knowledge management WP 9: Joint education programmes and training tools
Management Objective – ICC	**Management Activities**
To establish an efficient management structure with independent quality assurance that can be sustained beyond the EC funding	WP 10: Consortium activities Management

6. Develop a database of food quality and safety issues and corresponding analytical tools for food production and supply chain including information on the validation level and a thesaurus of the terms and definitions used in the standardization/validation of analytical methods.
7. Analyse new EU food quality and safety regulations with respect to industry, control and regulatory bodies and regarding their socio-economic impacts in terms of efficiency, effectiveness and consistency, their administrative costs and their impact on international trade.

For Spreading of Excellence – Programme Leader: Q-Plan – International Quality and Environment Services S. A., GR

8. Facilitate knowledge sharing within the network and dissemination to food production and supply chain and other relevant stakeholder groups for harmonization of and compliance with food quality and safety standards.
9. Define requirements for, and set-up training programmes to achieve harmonized levels of know-how and skills, along with mutual recognition of academic and industrial qualifications.

For Consortium Management – Programme Leader: ICC – International Association for Cereal Science and Technology, AT

10. Establish an efficient management structure with quality assurance that can be sustained beyond the EC funding.

According the 10-point plan, MoniQA's original work plan is organized into four Programmes (P) and 10 Workpackages (WP) (see Table 2). Each Programme addresses a specific strategic objective of the MoniQA NoE and is further detailed by various Workpackages, which address specific activities. WP 1–3 will deal with consortium building and integration activities, WP 4–7 will focus on joint research activities, WP 8+9 will establish training and dissemination pathways and tools and WP 10 will work on a functional management system, which will be sustainable beyond the project funding by the EU. Expected results generated by the MoniQA project are summarized in Table 3. Further issues will be tackled if priorities change or new challenges arise.

Work in progress and future activities

Thematic priorities

The possible topics concerning food safety and quality assessment are diverse and manifold. After evaluating various reliable sources of information, the thematic priorities within MoniQA NoE have been defined by weighting Rapid Alert System for Food and Feed (RASFF) data, European legislation (e.g. new and upcoming Regulations and Directives), available data on official and new/rapid methods for food hazards, active working groups in CEN, especially CEN TC 275 on horizontal methods and Codex Alimentarius (Joint Programme of WHO and FAO), recently published methods by organizations represented in IAM (Inter Agency Meeting) and of course by the input from the MoniQA partners, Stakeholders (interested parties outside the Core Consortium) and the MoniQA Advisory Panel. The thematic priorities for the MoniQA consortium and six

Table 3 Summary of expected results generated by the Moni*QA* project

Expected Result	Main beneficiaries outside of the Network
Durable integration	Authorities, standardization bodies, industry/SMEs, consumers
Workshops, conferences	Associates, Industry, SMEs, interest groups, consumers
Mobility programme	Researchers, PhD students, academic teaching personnel especially INCO and Third countries
Guidelines for validation and presentation of results	Associates, standardization bodies, authorities, providers of analytical methods and technologies, SMEs
Database for food safety and quality analytical methods	Associates, food manufactures, control laboratories, authorities, providers of methods, SMEs
Follow up research projects	Research institutions, SMEs
Better Regulations	European Commission, Food Manufactures, Consumer
Research Agenda 2010	Research institutions, SMEs, European Commission

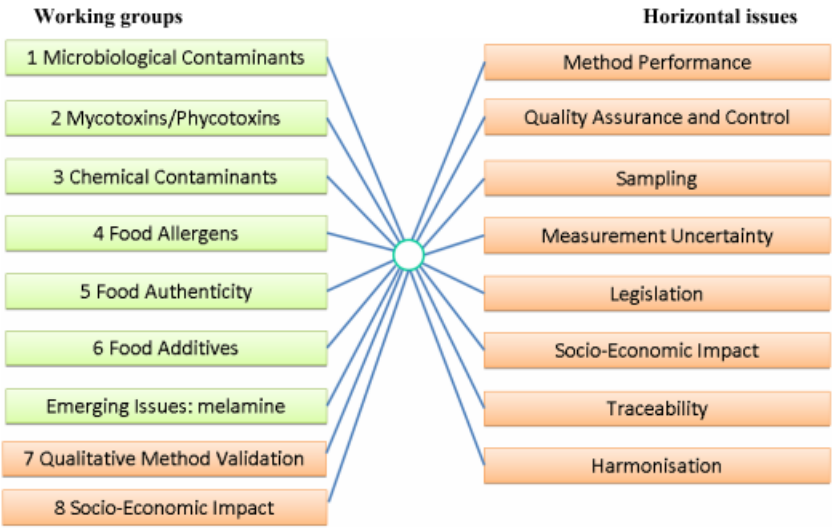

Figure 1 Working groups and horizontal issues to be covered by the MoniQA project.

analyte-specific Working Groups were established to tackle the analytical issues of various analytes and eight horizontal issues (see Figure 1). This activity was mainly achieved within WP4 with the consultancy of the entire MoniQA consortium, the Advisory Panel and some stakeholder input. The WGs are coordinated within WP4. The Working Groups offer the scientific and informal collaboration point between the MoniQA consortium and external stakeholders. For specific offers, requirements and benefits, a stakeholder package has been established, where additional services – as more of them will become available during the lifetime of MoniQA – will be added to the package (see the last paragraph).

Focusing more on the implementation side of analytical methods, WP5 assesses the needs and potential for improvement and modernization of existing HACCP systems in the food supply chain. For this, the situation in Europe and elsewhere has been looked at and gaps are being identified for future action and a research agenda for the years to come. The evaluation of present challenges and future needs is assessed in close collaboration with the European food industry by MoniQA questionnaires and interviews.

MoniQA working groups

According to the identified thematic priorities (see above), six analyte-specific Working Groups (WGs) were established within MoniQA, which work horizontally across the 10 Workpackages and will involve input from stakeholders and members of the MoniQA Advisory Panel. In addition to these WGs, two horizontal WGs have been established: (1) WG Validation of Qualitative Methods and (2) WG on socio-economic impact addressing the costs and benefits of quality assurance schemes and method validation on a micro-, meso- and macro-level. Recently, a Working Group on Emerging Issues was established with the first priorities seen in the risk/benefit communication related to the melamine crisis and the emerging use of nano-particles in food products.

The major goal of MoniQA and thus of the Working Groups dealing with special analytes is to reach a consensus for validation procedures and standards in food analysis. To protect our health, we need reliable tools and methods to assess whether the food we eat is safe and of high quality. New analytical methods are emerging that offer high throughput and easy handling solutions for industry and control authorities. Complementing traditional methods, these new rapid methods allow on-site testing of food quality and safety. However, they are not widely established and the short lifetime of test kits means new cost and efficiency issues as well as different validation procedures.

Indicative questions that the MoniQA Working Groups aim to answer for some specific analytes are as follows:

- Do methods fulfil performance criteria?
- Has uncertainty been calculated?
- Have sampling procedures been defined?
- Are methods sufficient for Q&S control in terms of traceability?
- Do detection limits cover legislation requirements?
- Has the cost of the method been estimated?

Each WG follows a flexible workplan by identifying the needs, difficulties and gaps in their respective areas of research and application. For this consultation, the Working Groups have been involving stakeholder groups within and outside the MoniQA NoE. The outputs of the WGs will feed into a comprehensive database generated within WP6 and the socioeconomic impact assessment managed by WP7. Furthermore, the WGs organized technical sessions and discussion round tables at the First MoniQA International Conference entitled 'Increasing Trust in Rapid Analysis for Food Quality and Safety', which was held in Rome, Italy, 8–10 October 2008, which provided an important stimulus for future activities and anticipated challenges for the food industry and regulatory regime.

Microbiological contaminants

The MoniQA Working Group on Microbiological Contaminants deals with the presence of bacteria, fungi, viruses, parasites and other microorganisms that cause deterioration of food products and may have health implications for consumers.

Campylobacter, *Salmonella*, *E. coli*, *Norovirus*, *Vibrio*, *Bacillus cereus*, *Listeria*, *Staphylococcus*, *Clostridium perfringens* and *Yersinia* are a major issue in food quality and safety. New rapid and alternative methods for such contaminants are needed throughout the food supply chain. However, market acceptance is a major problem because of complicated, time-consuming and expensive validation and standardization protocols, different validation requirements and official standardized methods.

MoniQA is assessing the current status of new and rapid methods for microbiological contamination, defining the discrepancies and determining how these disadvantages may be overcome in the future. The overall aim is to provide a comprehensive pool of information and offer solutions that simplify and speed up validation of new methods.

Leader: Wolfgang Kneifel (BOKU), Austria
Co-Leader: Sue Paulin (ESR), New Zealand

Mycotoxins and phycotoxins

The MoniQA Working Group on Mycotoxins and Phycotoxins deals with toxic metabolites of filamentous fungi and toxins produced by algae – both may contaminate foods. MoniQA will provide guidelines for the evaluation of analytical methods, with particular reference to rapid test kits, suitable for mycotoxins and phycotoxins. The guidelines will address:

1. The Stakeholder Environment including general legislative considerations, the law concerning mycotoxins and phycotoxins specifically and consequences for stakeholders;
2. Sampling in the context of the stakeholder, sample collection and sample handling in the laboratory; and
3. Method performance including parameters for method validation and parameters required by accreditation bodies as well as measurement uncertainty.

Leader: Hans van Egmond (RIVM), the Netherlands
Co-Leaders: Michele Solfrizzo (CNR-ISPA), Italy
Anton Alldrick (Campden BRI), UK

Chemical contaminants

The MoniQA working Group on Chemical Contaminants covers a wide range of methods and individual contaminants that fit broadly into three groups:

1. Pesticide residues,
2. Veterinary drug residues and
3. Environmental contaminants.

The MoniQA consortium has agreed on a set of priorities for comparison of selected methods including method performance, quality assurance and control, sampling, uncertainty, legislative aspects, traceability and harmonization

(horizontal issues). Other priorities, relevant to specific classes, will also be investigated.

The major challenge is the vast size and range of the chemicals covered. Therefore, a general approach will be used so as not to exclude any methodological approaches or classes of chemicals.

Leader: Martin Rose (CSL), UK
Co-Leaders: Richard Fussell (CSL), UK
Saskia Sterk (RIVM), the Netherlands
Philippe Delahaut (CER), Belgium
Claudia Schulz (Eurofins), Germany

Food allergens

Food allergies and adverse reactions are a major concern for allergic consumers, the food industry and enforcement authorities.

Reliable detection and quantification of allergens are essential in order to comply with labelling regulations. In collaboration with all stakeholder groups, the MoniQA Working Group on Food Allergens is compiling information about the most important food allergens, prioritizing gaps, identifying requirements and developing harmonization guidelines.

The search for adequate allergen detection tools faces several challenges and issues including:

(1) The lack of certified reference material.
(2) The matrix dependence of antibody recognition of allergens in processed foods (matrix dependence).
(3) The need for improved validation procedures.
(4) The lack of defined clinically relevant thresholds for cross-contact allergens to set limits of quantification for analytical methods.

MoniQA intends to develop ways to close these gaps and harmonize approaches suitable for all the stakeholder groups concerned.

Leader: Bert Popping (Eurofins), Germany
Co-Leader: Clare Mills (IFR), UK

Food additives and processing toxicants

The MoniQA Working Group on Food Additives and Processing Toxicants deals with food additives that are typically added to foods for technological purposes and processing toxicants or contaminants that are substances formed during food processing (e.g. heating).

'Hot issues' among food additives include colours, preservatives, antioxidants and sweeteners. Carbon monoxide and hydrogen peroxide, which are used as processing additives, will be examined because they constitute a serious hazard. Among processing toxicants, acrylamide, trans-fatty acids and nitrosamines will be reviewed because they attract high scientific and consumer interest.

MoniQA will focus on the definition and evaluation of

(1) Rapid, screening and/or high-throughput methods;
(2) Methods for multi-component analysis; and
(3) Methods using state-of-the-art instrumentation for better accuracy and selectivity, as well as lower detection limits.

Other issues include additives of commercial interest, those that are in use despite restrictions (e.g. colours) and those for which there is no upper limit (quantum satis) or acceptable daily intake defined. Development of short courses on food additives will also be considered.

Leader: Vasso Oreopoulou (NTUA), Greece
Co-Leader: Kim Anh To (HUT), Vietnam

Food authenticity

This term refers to whether the food purchased by the consumer matches its description (often defined by legislation). Tradition and identity play an important role in the definition of food authenticity. Thus, while a food might be safer if produced with modern methods, the traditional method of producing the food is what makes it authentic. Consumers think of authentic foods as safe and often as a synonym for positive quality.

Guidelines on food authenticity include information about tools for measuring authenticity parameters, guidelines for food legislators and dissemination of information to the consumer.

Some indicators of food authenticity may derive from genetics, territory (soil, climate, pollution, etc.), harvesting and post-harvest treatment, processing conditions and other functional ingredients affecting quality.

MoniQA wants to establish how authenticity can be measured and how we can distinguish between authentic and non-authentic foods.

Leader: Marina Carcea (INRAN), Italy
Co-Leader: Halina Turleskja (NFNI), Poland

Emerging issues – melamine and nano-particles

The MoniQA Working Group on Emerging Issues deals with the prioritizing of topics arising after the initiation of the various MoniQA Working Groups at the beginning of the project. MoniQA realized that unforeseen and emerging

issues need pro-active preparation and swift reaction in times when a crisis arises. This recently established Working Group identified two current hot topics: melamine as a contaminant/illegal food additive and nano-particles used in novel foods.

The melamine issue was extensively discussed during the recent MoniQA consortium meeting and at the First MoniQA International Conference in Rome, Italy, 8–10 October 2008, with presentations about the first-hand experience from MoniQA's Chinese partners and a regulator's perspective from MoniQA's Advisory Panel member from Canada.

First outputs of MoniQA's activities on melamine were:

- A MoniQA webpage on melamine and related issues, including a news repository, decision support and information resource http://www.moniqa.org/melamine
- A Press release on melamine
- Various presentations on melamine
- Listing of new regulations on melamine maximum limits
- Listing of available and validated methods
- Extending the MoniQA Database
- Training course on the use and validation of analytical methods for melamine

Leader: Miles Thomas (CSL), UK
Co-Leaders: Roland Poms (ICC), Austria
Maria Saarela (VTT), Finland
Bert Popping (Eurofins), Germany

Qualitative method validation

Qualitative methods are understood to be those that do not provide a measurable answer to a given question. Typically, they render only a 'yes/no' answer, if testing for the presence of a substance at a certain cut-off limit is carried out. MoniQA aims to establish guidelines for the validation of qualitative methods and the performance of validation studies. Two topics will be addressed:

(1) Method performance characteristics of qualitative methods,
(2) Specific challenges for the validation of qualitative methods including:

(a) purely qualitative method (evaluation of results based on a purely qualitative evaluation – yes/no decisions) and
(b) qualitative methods based on a quantitative measurement.

MoniQA will focus only on qualitative methods using real-world examples of method validation studies to apply statistical assessments. Special emphasis will be focused on estimation of the prediction error of the percentage rate of correct results at the estimated level of dosage.

Leader: Christoph von Holst (JRC/IRMM), Belgium
Co-Leader: John Erik Haugen (Matforsk), Norway

Socioeconomic impact assessment

The MoniQA Working Group on Socio-economics contributes to the systematic assessment of new EU food quality and safety regulations with respect to industry, control and regulatory bodies and regarding their socioeconomic impact (in terms of efficiency, effectiveness and consistency), their administrative costs and their impact on international trade. The working group provides an open forum for discussing these issues among the partners. Additionally, the working group is a channel for the participation of external experts whose views are solicited on various issues (such as modelling) and incorporated into the output of WP7. The Working Group deals with the evaluation and extension of the MoniQA Database and a cost evaluation model. Where appropriate, the Working Group will be linked to supportive work groups in other initiatives as, e.g., of the European Technology Platform 'Food for Life'.

Leader: Gerhard Schiefer (UniBonn), Germany
Co-Leader: Melanie Fritz (UniBonn), Germany

Building the network

The aim is to build a database on the individuals participating in MoniQA, available skills and competencies of all consortium partner institutions as well as the available infrastructure. The availability of methods and specific relevant appliances, research interests and information on future strategies will help establish close collaborations and evaluate potential merging of activities or whole research groups/departments. Currently, the Consortium Database (CData) is filled with relevant information gained from online questionnaires within the MoniQA consortium.

The datasets include an inventory of research infrastructure (equipment, facilities, analytes and methodologies) of the network members, as well as skills and competencies, and will contain information on legal constraints and limiting factors due to national legislation or company policy concerning sharing personnel and infrastructure (e.g. personnel contracts and use of publicly funded infrastructure). These legal constraints, e.g. health and safety, insurance, etc. as well as any other identifiable limiting factors were investigated and described in a report and will be fed into the database in the second year of MoniQA.

Building the network requires detailed information about the partners and their respective partner institutions, and a working management structure.

Initiating new research co-operations

The MoniQA project aims to establish a scientific network and provide the necessary infrastructure to boost international research co-operations in the area of food quality and safety assessment. Within the consortium, various partners have started setting up research proposals to be funded by national and/or international sources. MoniQA partners have responded to several calls for proposals for collaborative research projects and other EU-funded projects within Framework Programme Seven (FP7). Several MoniQA partners outside the EU, e.g. New Zealand and China, have submitted proposals for national funding of complementary national research activities involving international partners from within the MoniQA network. Various partners within MoniQA with skills and experience with large collaborative projects have assisted less-experienced partners and training for soft skills in preparing research proposals and in managing research projects and networks has been offered to MoniQA partners in the first year. These activities have been addressed either by members of the MoniQA consortium individually or in a more concerted manner through WP3 managing MoniQA's Sustainability Programme.

Constructing databases

The construction of two sets of databases has been initiated within MoniQA: (1) a Consortium Database and (2) a Research Database (see Figure 1).

The CData consists of various categories of datasets to allow a rapid search for experts and individuals within the MoniQA consortium, stakeholder groups, competences, special appliances and other infrastructure, training courses and eventually, sustainable outputs of MoniQA (projects, publications, products and services). The CData is an important tool to build the network and to grant rapid access to expert opinions and competencies to deliver outputs and services to the consortium and stakeholders.

MoniQA is developing a series of user-friendly databases for various hazards in food, based on standardized data, which can be accessed through one entry point, the MoniQA Database. The MoniQA Database allows a fast search on relevant analytical methods for specific analytes, including information on the degree of validation, legal requirements, legal limits and availability of specific methods for specific analytes. The database is extended and updated continuously. Moreover, links to reliable sources of information and to established databases provided by other organizations, e.g. DG SANCO's RASFF for recalls of contaminated food and feed products in a limited area or the whole of the EU and EFSA position papers, the USA's CDC, WHO's INFOSAN, etc., are established and where possible will be integrated into the overall database and related search functions. The databases will also include data necessary for HACCP-based quality management as an information resource and guideline, as well as cost evaluation. Furthermore, references to the published validation studies and standardization bodies will also be included to give an indication of the level of geographical acceptance and (global) harmonization of various analytical methods.

The databases will be useful for food authorities, for installing alert systems both internally within a food manufacturing plant, but also on a wider scope including national and international alert and action procedures (e.g. American System: CDC, comparable) and by working closely with EFSA and other relevant European agencies. The resulting internet database will serve the food manufacturing industry and food safety control laboratories/authorities by identifying hazards and selecting relevant analyses and corresponding analytical methods. It will provide information on the performance (criteria) of the method of concern and allow development of response strategies – which can be a race against time when highly toxic contaminants or terrorist acts call for fast action (e.g. total recall) to prevent outbreaks. SMEs, which are usually not able to develop and maintain their own database, will be the major beneficiaries of the database. Furthermore, the database will provide the user with up-to-date information on new developments/technologies and their validation/standardization status, including their geographical recognition (ideally worldwide) and can potentially serve as an online tool for modern analytical online methods and ICT. For the latter, it is important to use a harmonized 'open' protocol, allowing feeding of data into a wide range of interfaces and online supported appliances. As analytical methods for food quality and safety are standardized by various international and national organizations, the database will allow for direct comparison and support the international harmonization or mutual recognition of various methods.

The MoniQA Database is searchable by

- National food regimes,
- Reliable information,
- Commodity,
- Contaminants,

- RASFF and
- Methods used.

The databases will be extended and updated continuously. For all databases developed within MoniQA, various test users are assigned, who will assess the user-friendliness of handling and the usefulness of information. The CData is currently only open for MoniQA consortium internal use; the RData will become publicly accessible on the basis of defined terms and conditions shortly and can be accessed via the MoniQA website http://www.moniqa.org.

Working for better regulations

The MoniQA NoE deals with the systematic assessment of new regulations in the field of food quality and safety. MoniQA will set evaluation criteria (e.g. effectiveness, efficiency and consistency) and it will compare the impact of different options in qualitative, quantitative and monetary terms. The project will also assess the administrative costs imposed by new regulations in the field of food quality and safety. This socioeconomic assessment at the macro level is mainly assessed by WP7A.

In this respect, members of the MoniQA consortium and representatives from the European Commission's Secretariat General, DG Enterprise, DG SANCO, DG Environment and DG Finance met for a workshop in Brussels, 23 March 2007, to co-ordinate collaborations between the MoniQA NoE and the various Directorates of the European Commission for better and more cost-effective regulations in the future. In a follow-up meeting at the University of Bonn, Germany, 5 June 2007, input from EU and US experts in socio-economics and new regulations was sought. A major output of this work within WP7B will be a predictive assessment tool to evaluate the costs and benefits of using new quality assessment schemes and/or new food safety regulations on a meso- and a micro-socioeconomic basis. The Working Groups managed by WP4 will be closely linked to the socioeconomics WG, which will meet the challenges of communication between scientists and experts in the life sciences area and socioeconomics.

Establishing a mobility programme and initiating student exchanges

Mobility of researchers and students is promoted by setting up of a mobility programme, which has – initially – only been available to MoniQA partners, but that should be extended to associated partners and invited experts in the future. The mobility programme includes templates for bilateral contracts and schemes to receive research grants for short-term and long-term research visits.

Within the first year of MoniQA, the Mobility Programme focused on students' bursaries to attend meetings and participate at MoniQA workshops, such as the established MoniQA FST (Food Scientist Training) workshops, which usually consist of a theoretical and practical training session in a certain field of the identified priorities mentioned above, and held at a partner's site. Typically, they are conducted for 2–3 days and many are organized in co-operation with other EU-funded projects or international organizations.

Additionally, PhD students' and researchers' exchanges for at least a week's duration are offered in MoniQA. The MoniQA mobility programme and students' bursaries were developed by WP2 based on the experience from other NoEs such as EUROFIR and NUGO. The bursaries and grants are given on a selective and competitive basis after formal application.

MoniQA FST – Food Scientist Training

As part of the CData, training courses already offered or to be offered by MoniQA partners have been entered into a database during the first year of MoniQA together with courses available at partners' sites (mainly university courses related to MoniQA activities). This activity was achieved by WP9 in collaboration with WP1 and WP2. The information will support the network-building process and will be the basis for personnel exchanges and grants, as well as for the MoniQA training courses.

The first MoniQA FSTs – food scientist training – was held in Prague, CZ, 6 November 2007, in connection with the 'Recent Advances in Food Analysis' Conference. Since then, about half a dozen MoniQA FSTs have been organized in different parts of the world, e.g. in Austria, Turkey, Italy, China and New Zealand. The topics of the MoniQA training courses held in the first year and under preparation for the second year address were:

- Scientific content such as development and validation of new analytical methods for food safety and quality assessment;
- Soft skills such as presenting scientific data and managing research projects,
- European Commission Services and Research Framework Programmes FP6 and FP7;
- EU legislation, Food and Agricultural Policies;
- Use and design of rapid methods and test kits; and
- Emerging issues such as the melamine crisis.

In the mid-term and long-term planning, the establishment of mutually recognized and externally rated educational programme is foreseen. Currently, an international post graduate programme building on existing European initiatives is still under discussion. As a basis for a future certified university programme, a module-based training concept is being established in MoniQA. The training courses offered by MoniQA are managed by WP9 with the support of WP10, and they are set up with lecturers and trainers from various MoniQA partners.

As a global network, e-learning tools will help to provide access to training to a broader audience and at the same time this strategy helps to save on money and time, and it is environmentally friendly. A first test version of a MoniQA e-Learning Course should become available the middle of period three (July 2009).

Consortium Meetings and stakeholder events

Meetings are an integral part of the MoniQA Network. After the kick-off Meeting in Vienna, Austria, 20–22 March 2007, the MoniQA organized consortium meetings every 6 months to strengthen co-operation and integrate all partners in MoniQA's workplan and network activities. MoniQA's network meetings during the first 2 years were organized in partner countries:

- 20–22 March 2007, Kick-off Meeting in Vienna, Austria;
- 5–7 September 2007, First Half Term Meeting in Glasgow, UK;
- 12–14 February 2008, First Annual Meeting in Athens, Greece;
- 6–10 October 2008, Second Half Term Meeting and MoniQA's First International Conference in Rome, Italy; and
- 20–22 January 2009, Second Annual Meeting in Sharm El Sheikh, Egypt.

In addition to various work package and working group meetings during the year, MoniQA also offers training to its partners e.g. MoniQA Workshops in Vienna, Austria and Guangzhou, China. For knowledge transfer and networking with non-partners of MoniQA, workshops and conferences as well as specific MoniQA sessions at international events were initiated. Some examples are given below:

(1) Technical session on food safety at the 13th International Conference for Grain & Oil Science and Technology, Guangzhou, China, 20–22 June 2007;
(2) ICC Workshop on animal feed and its contribution to human health in Glasgow, UK, 2–5 September 2007;
(3) Consensus Conference on Bulk Sampling of Grains in Seattle, USA, 14–17 May 2008;
(4) Joint Training workshop for Codex Alimentarius 'Measurement Uncertainty' Budapest, Hungary, 9 March 2008 and in Seattle, USA, 18 May 2008;
(5) BA Festival of Science, Liverpool, UK, 7 September 2008;
(6) MoniQA International Congress on 'Increasing Trust in Rapid Food Quality and Safety Assessment, Italy, 8–10 October 2008;
(7) Joint MoniQA/EuroFir exhibition booth at IUFOST Congress, Shanghai, China, 19–23 October 2008;
(8) Technical session at EFFOST Conference, Lublijana, Slovenia, 5–9 November 2008;
(9) Additionally, food safety presentations at various intentional conferences were given and funded by MoniQA.

Working for sustainability

The MoniQA NoE is funded by the European Commission for a duration of 5 years. Within the funding period, consortium/network management and infrastructure, collaborative services and products are being developed and established, which will be marketed and will thus support the sustainability of the network and its outputs beyond the EC funding. For this, strategies and business models including monitoring and eventual exploitation of intellectual property have been initiated to secure future financing and to ensure durability of the network. The sustainability activities of MoniQA within the first 2 years focused on (1) identifying and defining possible network outputs, such as training workshops, publications and method validation studies, (2) handling of intellectual property rights and agreements, (3) planning for a sustainable MoniQA legal entity and (4) a corporate stakeholder interaction strategy.

So far, several services are under preparation; some have been established and are being offered via MoniQA already:

(1) MoniQA Database(s),
(2) Joint ICC/MoniQA Journal 'Quality and Safety Assurance of Crops & Foods' published by Wiley-Blackwell, and
(3) Validation protocols and guidelines (jointly elaborated with IUPAC, AOAC, ICC and/or CEN TC 275 WG0) as a pre-requisite to initiate validation services for test kits.

Sustainability services and activities are mainly managed by WP3, but MoniQA outputs are generated in collaboration with all MoniQA partners and delivered through the 10 MoniQA NoE work packages.

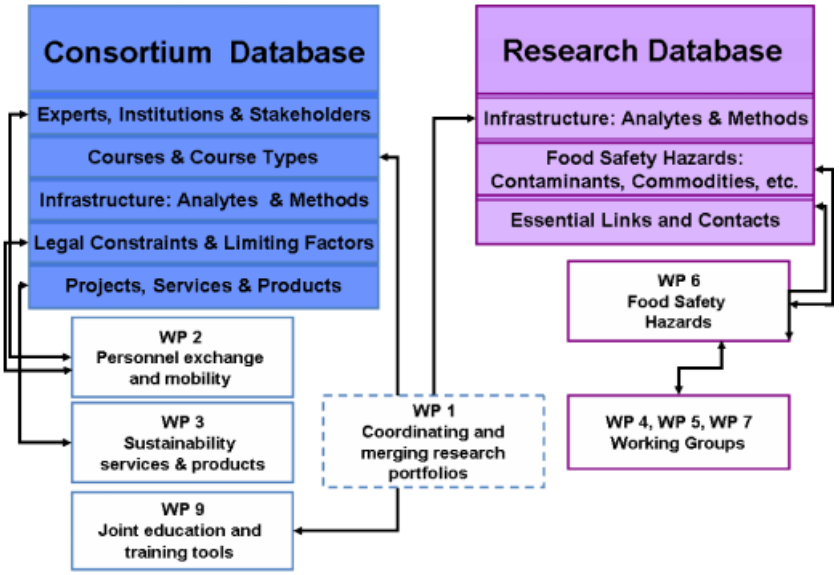

Figure 2 MoniQA Databases: (1) Consortium Database (CData) generated for MoniQA consortium's internal use, for network building and collaboration. (2) Research Database (RData) developed for public use as an information resource, such as existing analytical methods for specific analytes, validation level, legal situation in various countries, infrastructure, etc. (a): Stakeholders and beneficiaries of MoniQA. (b): Stakeholders needs/interests and offers of MoniQA.

Extending the network – How to get involved in MoniQA

The MoniQA Network has established links to relevant other Research Projects within EU's FP 6 and also globally to exchange information and initiate international collaborations. In a second step, the MoniQA Network has invited various stakeholders (see Figure 3a) as Associated Partners to express their interest in MoniQA. Anticipated interests of the various stakeholder groups are shown in Figure 3b. In fact, the WGs represent the classical entry point for non-funded Associated Partners to contribute to the consortium goals and benefit from some selected services.

The terms and conditions of Associated Membership were discussed and decided during the First Half Term Meeting in Glasgow, UK, 5–7 September 2007, and will remain as a relatively loose involvement in MoniQA activities until new services are offered or special skills and inputs are required and are not available in the current consortium.

For the time being, the Associated Partnership in MoniQA is free and no fees apply. In the future – when more services and outputs of commercial value become available – a membership fee or a service fee is foreseen. These fees will then contribute to the sustainability of the MoniQA Network. At this time, Associated Partners need to arrange for their own funding to participate in MoniQA activities.

MoniQA offers Associated Partners the following benefits with currently no access fee:

- Participation in selected MoniQA meetings (free or at reduced rates).
- Collaboration and involvement in Working Groups' activities.
- Consideration for partnering in new projects.
- Involvement and selective invitation to expert panels.
- Participation in the 'Dissemination' programmes.
- Signing of a Memorandum of Understanding, including a non-disclosure agreement.
- Access to the MoniQA Database until further notice.
- Discounts on registrations for MoniQA training and dissemination events.
- Future offers may include (subscriber fees are likely):

  - participation in exchange and mobility programmes and
  - additional discounts on publications and other MoniQA services.

To become involved with and to join the MoniQA network, it is necessary to apply for Associated Membership via ICC – the International Association of Cereal Science and Technology, which is coordinating the project and is the direct contact point to the MoniQA Consortium and to the European Commission's DG Research. For more details on MoniQA and to download the application form, one can contact the project website at http://www.moniqa.org.

Figure 3 MoniQA Net

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