



FOODINTEGRITY

Ensuring the Integrity of the European food chain

613688: Collaborative Project

Seventh Framework Programme

KBBE.2013.2.4-01: Assuring quality and authenticity in the food chain

Deliverable: D5.5

Consultation Exercise

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Beneficiary(s): The Scotch Whisky Research Institute (Partner 34 in the FoodIntegrity Consortium)

Date of preparation: September 2018

Period covered: January 2017 – September 2018

Status: Version 1

Dissemination level		
PU	Public	X
PP	Restricted to other participants	
RE	Restricted to a group specified by the consortium	
CO	Confidential, only members of the consortium	



The project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement No. 613688.

Deliverable: D5.5 Consultation Exercise

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1 Executive Summary

- A consultation exercise was undertaken to provide feedback on the outcomes of Work Package 5.
- Dissemination of the key project outcomes was achieved via a number of key industry meetings and presentations at scientific conferences.
- The principal means of feedback was via a one-day Spirit Drinks Authentication Workshop attended by 46 representatives from industry, academia, research institutes and government agencies.
- The Workshop included presentations from Work Package 5 partners and collaborators.
- All observations and recommendations from the two feedback sessions conducted during the Workshop have been collated and analysed and are reproduced in this report.
- The feedback will be used to shape the legacy of the FoodIntegrity Project's work on spirit drink authentication and set priorities for further research both within industry and at governmental level to tackle spirit drinks fraud.

2 Description of Deliverable

Deliverables D5.1 to D5.3 developed and evaluated technologies for the quality assurance of European Spirit Drinks and established a suitable legacy platform via which information on analytical methods for spirit drinks analysis and authentication could be communicated. To ensure the best return on the investment following the provision of these deliverables, a consultation exercise was undertaken. This determined how the outcomes of these deliverables could a) be built upon and b) influence any future research and development calls in this area. Following completion of Deliverable 5.4 on the provision of training resources for spirit drinks analysis and authentication, it was decided to expand the scope of the consultation exercise to cover the outputs of this deliverable as well.

The consultation exercise provided an opportunity to discuss the outcomes of Work Package 5 with key stakeholders in spirit drinks authentication (analysts, brand managers, enforcement organisations and regulators) and identify future development opportunities and options for maintaining the legacy information. A gap analysis was undertaken to identify any areas not addressed by the Work Package, and a list of recommendations was made outlining how the outcomes of the work package could be maintained, post project completion, and how the successes could be built upon.

The four deliverables that are the focus of the consultation exercise and the remainder of this document are:

- Deliverable 5.1 - the development of technologies and/or equipment for rapid, in-field a) detection of undesirable/harmful contaminants in spirit drinks and b) authentication of spirit brand/category.
- Deliverable 5.2 - the improvement of laboratory methods for the analysis of spirit drinks in order to confirm in-field reservations about the authenticity, and by implication potential safety, of a suspect product.
- Deliverable 5.3 - the establishment of a legacy platform for dissemination of guidance on spirit drinks analysis methods for safety and authentication assurance. It was recognised that a legacy platform should be more than a collection of documents from the project but should also involve the establishment of a network of people interested in spirit drinks authentication.
- Deliverable 5.4 (as delivered) - the identification and development of routes via which the capabilities and knowledge of non-industry (and industry) laboratories in spirit drink analysis could be improved.

3 The Consultation Exercise

Dissemination and Initial Feedback

The outcomes of the Deliverables 5.1 to 5.4 have been disseminated by a variety of media, including: presentations at conferences and conference proceedings, industry meetings, the dissemination routes of the European Spirit Drinks trade body – spiritsEUROPE – and through the network and website established as part of Deliverable 5.3. Conferences attended and industry meetings where the outcomes of the deliverables have been presented are recorded in Appendix I. Many of these routes provided opportunities for informal consultation on the outcomes of the project.

Feedback from the organised meetings identified in Appendix I, as well as individual discussions with parties interested in the outcomes of the project, were used in the construction of the content of the Spirit Drinks Authentication Workshop. The Workshop was designed to be the formal part of the consultation exercise, whereby consensus opinions could be formulated. Stakeholders wanted an overview, from the work package leaders, on the key conclusions of the work undertaken within Work Package 5. This overview would cover both the technologies and opportunities worthy of further development or adoption, as well as noting the challenges that still need to be addressed in the areas of spirit drinks authenticity and safety. Comments from industry stakeholders also identified a desire to learn more about the wider aims and work of the FoodIntegrity Project, in which two of their membership organisations, SWRI and spiritsEUROPE, had been involved. There was a recognition that the spirit drinks work package had benefitted from collaboration with partners within the FoodIntegrity Project from outside the spirit drinks sector. Consequently, there was an interest in understanding the viewpoints of external experts on technologies and strategies for assurance on authenticity, to provide some context for their development for spirit drinks.

The Spirit Drinks Authentication Workshop – Presentations

As far as possible, the content of the Spirit Drinks Authentication Workshop was designed to address the points raised in prior consultation. Presentations were made by personnel from the Scotch Whisky Research Institute on each of the principal areas of work:

Portable, rapid screening technologies – Shona Harrison

Advances in laboratory authentication methods – Rebecca Eccles

Evaluation of traditional laboratory technologies in smaller formats – Peter Cockburn

Development of a Spirit Drinks Authentication Network – Ian Goodall

Developing Levels of Expertise in Spirit Drinks Assurance – Ian Goodall

Four of the five presentations provided above were accompanied by a complimentary presentation from a non-SWRI speaker.

Dr. David Ellis was asked to provide a presentation on the application of rapid analysis devices for the purposes of food fraud detection to accompany the work reported by Shona Harrison. David is

currently a Senior Experimental Officer at the Manchester Institute of Biotechnology. As well as leading on collaborative work undertaken with the SWRI on Raman spectroscopy as part of the spirit drinks work package, David has published various papers on food authentication, Raman spectroscopy and the use of portable devices to provide rapid information on food integrity (for example, “Point-and-shoot: rapid quantitative detection methods for on-site food fraud analysis – moving out of the laboratory and into the food supply chain”, *Analytical Methods*, 7, 9401-9414. doi:10.1039/C5AY02048D).

Michal Stupák of the University of Chemistry and Technology in Prague was asked to complement Rebecca Eccles’s presentation on advancing the laboratory-based detection of counterfeit spirit drinks. He addressed the large amounts of data that advanced mass spectrometry techniques produce and the complexity in data processing this creates. Michal is currently completing a PhD within Jana Hajšlová’s group at the University of Chemistry and Technology in Prague. As a result of being introduced via the FoodIntegrity Project, Michal collaborated with the SWRI to investigate the benefits that high resolution mass spectrometric techniques could provide to spirit drink authenticity, using Scotch Whisky as the exemplar spirit. As well as successfully identifying a number of marker compounds that can be used for Scotch Whisky authentication, Michal’s work highlighted the manipulation challenges provided by a combination of large sample sets and the compound rich spectra of spirit drinks.

Bryan McCullough, a senior researcher in organic mass spectrometry at the National Measurement Laboratory (NML) at LGC, was asked to speak on the development of direct analysis mass spectrometry for non-laboratory applications. This presentation was a counterpart for Peter Cockburn’s talk on the increased portability of traditionally laboratory-based analytical equipment and its potential use in spirit drink authenticity. The NML had undertaken some proof of concept work on the authentication of whisky sample ASAP-MS, direct analysis using an ASAP (atmospheric solids analysis probe). This collaboration was initiated following a presentation by Shona Harrison in June 2016 which outlined objectives and outputs from the FoodIntegrity Project at the LGC Conference on 'Supporting Trust in Food'.

To compliment the presentation by Ian Goodall on building a Spirit Drinks Authentication Network, Nick Soper, Internal Markets Director of spiritsEUROPE, was asked to speak on the extended networks used by spiritsEUROPE to tackle the use of illicit alcohol in counterfeit spirit drinks. spiritsEUROPE has developed knowledge and evidence about the drivers that lead to the creation of fraudulent spirits and undertakes a programme of work that advocates measures to reduce such fraud. The work undertaken by spiritsEUROPE to reduce the impact of illicit alcohol requires extensive networking with various European and global organisations. spiritsEUROPE has used its own networks to advance the objectives of the FoodIntegrity Project and its work on spirit drinks analysis; this presentation was used to highlight to those more involved in the prevention of fraud via analytical evidence, that alternative routes to reducing fraudulent spirits exist.

It had been hoped to provide a presentation by a representative of a government agency with experience in spirit drinks analysis for consumer protection purposes. Such a talk would have explored the interaction between industry and external laboratories involved in spirit drinks authentication and the means by which capability in such third-party laboratories could be improved. However, the

identified speaker was unable to attend. Efforts were however made, successfully, to ensure good representation of such professionals at the workshop.

To provide the requested overview to the wider objectives of the FoodIntegrity Project, Professor Paul Brereton, currently Director of Strategic Alliances (Professor of Practice) at Queen's University Belfast was asked to present. As well as being a scientist with over 30 years' experience of applied research in the area of food safety and quality, Paul had also co-ordinated the FoodIntegrity Project since it began.

The final titles of the presentations can all be seen in Appendix II, which provides the agenda for the Spirit Drinks Authentication Workshop on June 20th 2018. Appendix III provides a more complete list of speakers' biographies. All presentations have been uploaded to the Spirit Drinks Authentication Website, barring that provided by Michal Stupák (which will be uploaded following publication of his work in the scientific literature). They can be found on the Spirit Drinks Authentication Website at the following link: <https://secure.fera.defra.gov.uk/foodintegrity/index.cfm?sectionid=78>

The Spirit Drinks Authentication Workshop – Posters

Posters were also used to provide overviews to elements of the work undertaken within Deliverables 5.1 to 5.4. The following subjects were presented in poster/banner form:

- The FoodIntegrity Project - Introduction to the Project
- The FoodIntegrity Project - Overview Figures
- The FoodIntegrity Project - Summary of Achievements
- Common Analytical Techniques to Identify Counterfeit Spirits
- Overview to Spectroscopic Techniques
- Portable GC-MS
- Developing Rapid Analysis Methods to Identify Counterfeit Spirits
- The Development of Methods to Detect the Addition of Flavourings in Counterfeit Whisky

The posters can also be found on the Spirit Drinks Authentication Website, via the link provided above.

The Spirit Drinks Authentication Workshop – Feedback

The Spirit Drinks Authentication Workshop was attended by 46 delegates and speakers on the day. Broken down into 3 general categories, 22 delegates were representatives of spirit drinks producers, 4 delegates were representatives of technology providers and 21 represented other stakeholders including government regulatory/enforcement agencies, universities and research institutes. A full list of attendees can be found in Appendix IV. All attendees were given the chance to feedback thoughts on the information disseminated in the presentations and posters, providing comments on the current state of play with regards to spirit drinks authentication and recommendations as to its development. The mechanism for this process is provided in Section 4 and the summary of this highly informative feedback is provided in Section 5.

The Spirit Drinks Authentication Workshop – Network Building

One additional output from the Spirit Drinks Authentication Workshop was a prior event on the previous afternoon. 8 of the attendees for the Workshop participated in this event. Delegates were given presentations on the SWRI and its activities, including an introduction to the spirit drinks authentication strategies and tests employed by the Institute.

Development of a Summary Report

One of the key comments received from dissemination activities, particularly from representatives attending industry meetings, but also at the Spirit Drinks Authentication Workshop, was that the scope of the Work Package often made identifying significant outcomes difficult. The variety of objectives, the number of analytical methods and technologies evaluated, and the different collaborations instigated made a clear overview of the outcomes difficult. Consequently, a strategic recommendation that has since been delivered is the provision of a summary document highlighting all the major items of work undertaken within the Spirit Drinks Work Package of the FoodIntegrity Project. This has been designed with the needs of spirit drinks industry stakeholders in mind. Depending on the views of this audience, this report, or alternatively an appropriately edited version of the report, will also be made available to non-industry stakeholders, particularly those within the Spirit Drinks Authentication Network.

4 The Consultation Exercise – The Workshop Feedback Sessions

The Spirit Drinks Authentication Workshop was split into two sections. The first section dealt with the technology component of Work Package 5, the outcomes provided by Deliverables 5.1 and 5.2 on portable and laboratory authentication technologies. The second section dealt with collaboration and information resources, such as the Spirit Drinks Authentication Network and Website, the outcomes provided by Deliverables 5.3 and 5.4. Two feedback sessions were designed to establish the opinions of the stakeholder audience as to the outputs provided and the manner in which they should be developed. Such feedback was requested to shape the future direction of spirit drinks authentication within the Scotch Whisky Research Institute and spiritsEUROPE (both partners in Work Package 5). It would also provide the basis for the industry’s position as to funding needs within this area, when challenged by various funding bodies such as the EU Research and Innovation Programmes.

The system used for providing feedback was based on the model employed in one of the workshop sessions of the 3rd FoodIntegrity Conference held in Prague. This is summarised below.

Method of feedback collection for Sessions 1 and 2

Feedback was provided in four phases. In the first phase, attendees were asked to identify key statements relating to the gaps, challenges or issues in specific areas presented to them; these areas related to the Deliverable outcomes presented at the Workshop and the wider context provided by external speakers. This exercise was undertaken relatively quickly and in pairs, to ensure all attendees had an excellent opportunity to contribute to the feedback.

Phase 2 required two pairs to combine to a group of 4, select the top 5 (of the combined 10) key statements and discuss solutions to these issues. Phase 3 required 2 sets of 4 to combine to form a group of 8, discuss the proposed solutions and select the top 5 for presentation to the rest of the stakeholder audience, which was Phase 4.

Figure 1 summarises the process for providing feedback for each group of 8 that presented in Phase 4. Slight adjustments were made to accommodate numbers not divisible by 8, by using SWRI staff as optional contributors.

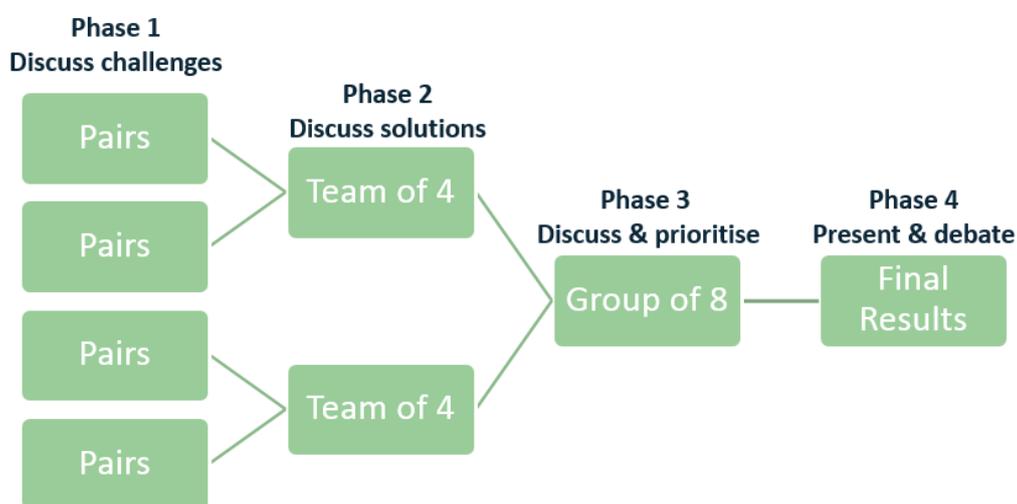


Figure 1. Schematic of Feedback Mechanism

Feedback Session 1 - Summary

Phase 1: Discuss challenges

(5 minutes) In pairs

Identify 5 key statements relating to gaps, status, challenges or issues that come immediately to mind on the following topics:

1. Portable techniques
2. Laboratory techniques
3. 'Shrinking the lab' transportable techniques

Phase 2 – Discuss solutions

(15 minutes) In a group of 4

Share the ideas from each pair and select the top 5 key statements.

Brainstorm solutions to the issues.

Include 'wild' suggestions; make sure all points are noted down.

Phase 3: Discuss & prioritise

(10 minutes) In a group of 8

Through internal discussion and debate, select and highlight the top 5 key statements and solutions within your group.

Identify a representative spokesperson for Phase 4.

Phase 4 – Present

(20 - 25 minutes, 5 minutes per group)

Each group will stand at the front and the chosen representative will talk through and defend the 5 key statements and solutions identified and prioritised.

Other participants in the group are invited to comment and intervene during the discussion.

Feedback Session 2 – Summary

This followed the same process as Feedback Session 1, barring two differences. The topics on which to develop key statements were, of course, different. In this case they were:

1. Authentication networks
2. Reference methods
3. Sharing of information

In addition, instead of 5 key statements, only 3 were requested. This was to reflect the smaller number of presentations in the afternoon session, compared to the morning session.

Feedback Collection

All the information from the feedback worksheets, presentations and discussions was collated and is presented in Section 5.

For each feedback session, the presentations were recorded. They are reproduced with minor adaptations for readability. These represent the key messages as determined by the final groups of 8.

It was decided that it would be constructive to collate the comments from the forms returned from Phase 1 and 2 to record the *all* key statements and solutions. This would capture useful points neglected in the final summaries but would also be instructive in identifying the relative importance of key statements and solutions. Comments were grouped under themes and the frequency with which these themes were noted on the returned forms collated. Due to the inconsistency of form returns and the subjective nature of grouping the comments, the incidence with which themes were noted can only be indicative. Due to the forms used for the group presentations also being used in the collation of comments, there is, obviously, some repetition.

It should be noted that not all groups presented the full number of points requested in the feedback sessions. Some of the groups skipped points that already been made by preceding presenters. Also, due to a loss of a small number of delegates prior to and during the second feedback session, only 4 groups reported, compared to the 5 in the first session.

5 The Consultation Exercise – Feedback

5.1 Feedback from Session 1 – Presentation from Individual Groups

Topics for key statements and solutions:

1. Portable techniques
2. Laboratory techniques
3. 'Shrinking the lab' transportable techniques

5.1.1 Group 1 – Spokesperson Peter Cockburn, Scotch Whisky Research Institute

1. The presentations had highlighted that there is no one-stop solution for authenticity analysis. However, one way around this would be to add markers to spirits that can all be detected via one common method. Of course, there would be a problem with spirits to which markers cannot be added, such as Scotch Whisky. In this case, the Scotch Whisky definition would need to be changed in order to allow this.
2. Confirmation of authenticity using methods that do not require opening of bottles should be a priority. However, spirit drinks bottles come in different sizes, thickness and colours, potentially causing problems for consistent analysis. All spirit drinks bottles of a certain type could be made to the same specification. For example, a generic whisky bottle could be created. Whilst it may be argued that such a bottle would be easier to counterfeit, bottles can be, and are, counterfeited anyway.
3. Is the use of portable laboratory equipment the correct approach? Undertaking proof of concept trials takes time and costs money. If samples will need to be sent to a laboratory for confirmatory analysis anyway, maybe the focus on portable instruments, or making traditional laboratory-based instrumentation more portable, isn't needed? The reproducibility of these types of machines (i.e. confidence in results) also needs to be considered. If the device says the sample is not authentic then what is next? This leads on to point 4.
4. Local laboratories should be utilised. Sending samples to local laboratories in market for authenticity testing is faster and cheaper than developing portable laboratory methods. Can we avoid the bureaucracy of repeated testing by using third-party laboratories? Would this speed things up?
5. Better ways to share data are required to make it more useful. Encoding protocols may be required. Scientists are generally good at anonymising data, but further up the management line data sharing becomes more problematic; proprietary information concerns act as barriers and slow it down. IT solutions should help solve this issue through encoding the data to maintain confidentiality.

5.1.2 Group 2 - Spokesperson Paul Brereton, Queen's University Belfast

1. Economic models are needed to support investment in new technology for spirit drinks authentication. These technologies should be robust and durable. Timelines are required to avoid redundancy.
2. Consistency of analysis and reference methods is needed.
3. New authentication methods have to be non-invasive, through bottle, analyses; this is a must.

4. Remote devices should be linked to online production monitoring. Management and data storage should be via an i-cloud; such storage would include all associated QC data. Batch models would be downloaded to the handheld device and linked back to production. This would be useful for traceability. It would also have an industry benefit since online measurements can be linked to quality control. This data could also be joined into marketing strategy.
5. The ability for consumer authentication using developed methods should be also be a target. The spirit drinks industry should be thinking of simultaneously authenticating the packaging and liquid. The best protection for the industry would be the consumer having the power to authenticate at the point of consumption.

5.1.3 Group 3 - Spokesperson, Deborah Prunty, Diageo

The first three points relate to the work on portable instrumentation.

1. Cost effectiveness is vital. If the instrument is not cost effective, then it is no use. Work in this area should use economy of scale by piggy-backing onto instrumentation being used in the pharmaceutical and defence sectors. The spirit drinks industry is too niche on its own. Industry commitment is also important; it needs to indicate how many units it will buy, how much it will be spending and how much dedication and commitment it will give to a new technology.
 2. Reliability of results needs to be ensured via properly trained staff. Developed instrumentation could incorporate a built-in training package to aid in this requirement, or training could be a requirement upon delivery.
 3. Portable instrumentation equipment and methods need to be robust.
 - a) Portable screening devices will be dropped down stairs, have liquid spilt on them, go into planes, and will be moved around a lot. Physical robustness of this equipment is therefore essential.
 - b) Instrument warm up time is important for portable equipment. Devices should not work before they are ready or permit the user to cut other corners in correct use. A quality control requirement should be built in that disables the instrument until satisfactory operating parameters are met and a quality control sample has been correctly measured. Ensuring robustness of methodology will prevent samples being measured too early or incorrectly and prevent sample wastage (for destructive techniques).
 4. Liquid analysis using smaller sample sizes should be encouraged within the laboratory. At times, only small volumes of sample (e.g. 25ml) are provided on which to undertake all authenticity testing. This can cause major issues. Whilst through bottle analysis is the “holy grail” technology, a complete, workable solution has not yet been developed, so for now the focus should be on smaller sample sizes for liquid analysis and built in autosamplers.
 5. Better collaboration is required:
 - a) Between laboratories, in the sharing of methods etc.
 - b) Between the spirit drinks industry and equipment manufacturers. Industry users must be forthcoming with limitations in technology – as must the manufacturers. Manufacturers should not upsell if the technology cannot undertake the main task of spirit drinks authentication adequately.
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- c) Collaboration can be achieved through big collaborative projects such as FoodIntegrity or simply by employing NDAs.

5.1.4 Group 4 – Spokesperson Morag Garden, Scotch Whisky Association

1. Cost is an important consideration to developed solutions. Different solutions will attempt to answer different questions, however most developed devices will answer one or both of these questions:
 - a. Is it my product?
 - b. Is it safe?

Solutions need to address these questions, and they need to be able to do this cheaply. Other specifications can be added e.g. process efficiency and flexibility and other ‘bolt-ons’ that link back to quality control.

2. Data reproducibility between devices is important for data sharing, whether the devices are from the same manufacturer, or from different manufacturers using the same underlying technology. Cross calibration through open access cloud-based devices could help with this requirement.
3. The range of analytes that the industry measures within spirit drinks should be increased.
4. The spirit drinks sector should collaborate with universities, aerospace, pharma and new sectors with common goals. Government funding should be targeted to help achieve this.
5. Online storage and data sharing for authentication provides “big data” issues and opportunities:
 - a. Data and results availability.
 - b. Security issues. Companies like Cambridge Analytica made use of data for alternative uses.
 - c. Profiling capability. Could data profiling and data mining of publicly available data be used for identifying counterfeiters in other markets?
6. Intrinsically safe solvents should be investigated for all analytical methods employed for spirit drinks authentication.

5.1.5 Group 5 – Spokesperson Kenny Gray, Scotch Whisky Association

A number of key statements developed by Group 5 had already been presented. The main aspects that had been discussed were focus, collaboration and data sharing through big providers.

1. Focus.

It is very easy to discuss problems and limitations like expense, specificity, potential, and solutions to different analytical challenges. However, focus is exceptionally important. For through bottle analysis, should development target safety, counterfeit detection, or the detection of adulterants? Is a simple yes/no answer all that is required for a portable device? Since, suspect bottles will always be sent back to a laboratory, a yes or no answer, is probably all that is required, and quantification of compounds is unnecessary. Is it beneficial for the laboratory techniques to be adapted into “in-field” devices? If they are not going to be able to replace their laboratory equivalents, is it something that should be pursued?

A separate group could be put together to assess the different solutions considered as part of the FoodIntegrity Project. Collaboration is required to ensure that the relevant questions are answered.

2. Security.

Cloud-based solutions have been put forward as key components of spirit drinks authentication solutions. Whilst there is concern about sharing information, it is clear that this technology, and industry buy-in, is required. Using a major provider, for example IBM, could mitigate any risk.

5.2 Feedback from Session 1 – Additional Feedback from Collected Forms

The following principal themes were identified by an analysis of all the feedback forms collected from Feedback Session 1 on portable techniques, laboratory techniques and ‘Shrinking the lab’ transportable techniques. The relative frequencies with which these areas were raised in the collated feedback is summarised in Figure 2. Complete detail, much of which is a re-organisation of the information in 5.1 can be found in Appendix V.

Principal Themes of Feedback Session 1

1. Ease of analysis
2. Issues with current screening techniques
3. Cost effectiveness of portable devices
4. Lack of focus regarding portable devices
5. Lack of investment from the industry in new technology and staffing
6. Inadequate collaboration
7. Confidentiality of data sharing
8. Production of online production brand databases
9. Lack of specificity of techniques
10. Detection of more counterfeits

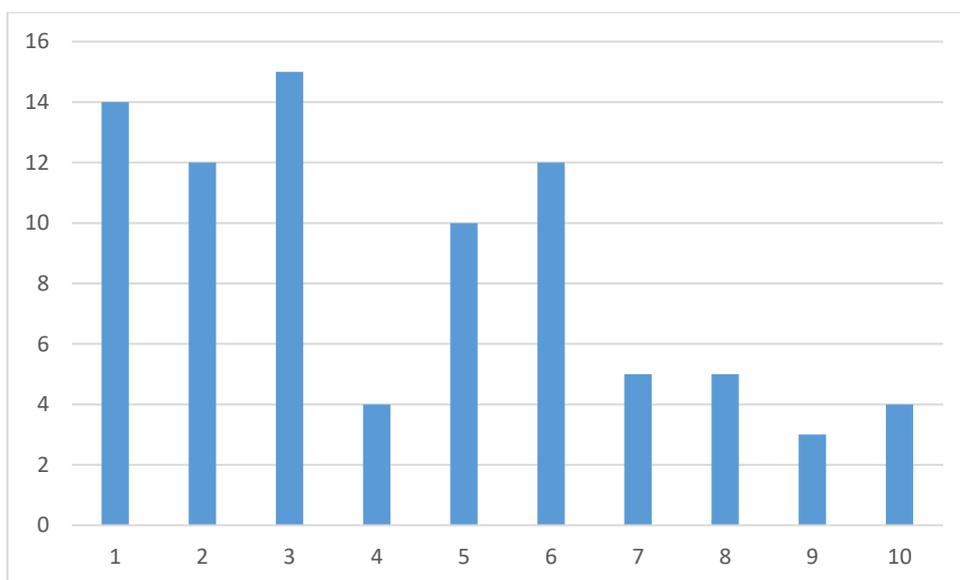


Figure 2. Frequency with which Identified Themes Were Mentioned in Feedback Session 1

The themes most often referred to within the feedback related to portable, screening devices, specifically cost, ease of use, and issues with current screening techniques. Inadequate collaboration and lack of investment were also commonly raised themes.

5.3 Feedback from Session 2 – Presentation from Individual Groups

Topics for key statements and solutions in this session were:

1. Authentication networks
2. Reference methods
3. Sharing of information

5.3.1 Group 1 – Spokesperson Ian Goodall, Scotch Whisky Research Institute

1. It is necessary to raise awareness of the work completed on spirit drinks authentication in wider networks. Better penetration of knowledge into both industry and external laboratories is required. Sector brand managers should also be targeted. Currently the visibility of information is poor.
New information needs to be easily accessible and easy to find. In addition to improving the knowledge available, wider dissemination to, and involvement of, the spirit drinks industry is desired. Relevant websites, for example those of spiritsEUROPE and SWRI, should provide obvious links to the relevant data. Repeated workshops such as the one put on today would also be useful at promoting available information. Inter and intra company communication on the subject of spirit drinks authentication should be encouraged (for example, discussion between industry brand managers). Improved communication would help the industry create and present a united front on the subject of spirits authenticity.
2. Data sharing with laboratories external to the industry could be improved.
A verification scheme for third-party laboratories could be initiated for data sharing. This could generate a list of accredited and competent laboratories. Professional schemes such as DAPS could be used to ensure capability and participants could be required to provide adequate details to specific audit-type questions. The laboratory would then be approved to supply information or results to brand owners, or SWRI or BNIC etc. for category-based authentication. The brand owner or sector laboratory would then give an opinion on authenticity from the results presented.
3. Reference methods need to be reviewed and updated as many are currently out of date.
The industry should identify common methods used within the spirit drinks industry for profiling products. Where necessary, products should be collated, analysed by competent laboratories and methods validated (there is a requirement for the participating laboratories to be selected for this process). Resulting reference methods should then be promoted. There should not be too much collaboration on the review and updating of reference methods, since this slows down progress. The methods are designed to support the industry's products and should simply reflect what the industry requires from reference analyses.

5.3.2 Group 2 – Spokesperson Stephen McDonald, Diageo.

1. Reference methods need to be repeatable and shareable, not specialist or niche.
Accreditation is required for trust in data obtained.

2. The benefits of sharing data should be realised.
Individually, the companies within the spirit drinks sector all have the same authenticity issues, so why not benefit from economy of scale. The industry should anonymise and share data to use it more powerfully. Such a scheme could work along the same lines as the Scotch Whisky Association's model for sharing data on environmental sustainability. More momentum in counterfeit detection will be gained from data sharing.
3. The industry should use its trade organisations, such as the SWA and the SWRI, more. This will alleviate the challenges from commercial pressures.

5.3.3 Group 3 – Spokesperson Geoff Kirk, Edrington.

1. Information should be shared on counterfeit occurrence within the spirit drinks industry using an anonymised database.
Propriety information can be ignored within such a database, thus preventing concerns about confidentiality. Having to share information on known counterfeit occurrences and hotspots should be an obligation and would aid in finding the sources of counterfeits and determining risk in markets. The output of the database does not need to identify what product was counterfeited, merely that counterfeiting had occurred.
2. Common standards and proteomic approaches to data analysis should be developed for industry data sharing databases.
The mechanism to share sources of counterfeit, as well as the funding and running of the database, will be facilitated by using standardised information from each company, via common data formats and standardised units.
3. Reference methods should be developed, supported and placed into EU law in the same way as they are for the wine industry (by the OIV). The spirit drinks industry should try and achieve the same targets. Spirit drinks reference methods should also be standardised beyond the European Union. A wider shared perspective on spirit drinks analysis is required to help achieve consistency, ease of trade and improved authentication.

5.3.4 Group 4 – Spokesperson Andrew Condie, Photonics & Analytics Limited

1. The cloud could be used to provide a database of analytical information relating to the authentication of products (for example, spectral data, congener data). The focus of the database could be on brands *or* issues.
Using the cloud, subject folders with general, publicly available information on spirit drinks authentication could be open to all. Other folders with more confidential information, e.g. brand profile data, could allow authorised access (given by brand owners) for external laboratories as required and for a limited time, e.g. by once only authorisation. The authentication network would require each participating company to provide 2 or 3 named contacts, to ensure continuity of database support is maintained (should one contact leave the company).

5.4 Feedback from Session 2 – Additional Feedback from Collected Forms

The following principal themes were identified by an analysis of all the feedback forms collected from Feedback Session 2 on authentication networks, reference methods and sharing of information. The relative frequencies with which these areas were raised in the collated feedback is summarised in Figure 3. Complete detail, much of which is a re-organisation of the information in 5.3 can be found in Appendix VI.

Unlike for Session 1, the detail provided in Appendix VI grouped easily under the three main themes. However, the following sub-themes were identified.

Authentication networks

1. Wider network of interested parties
2. Ease of access to knowledge on spirit drinks authentication
3. Centralised contact points

Reference methods

4. Increased recognition of industry methods/issues
5. Improved database of reference methods

Sharing of information

6. Anonymised analytical database
7. Sharing of fraud incidents
8. Laboratory verification schemes
9. Learning from other industries on data sharing approaches

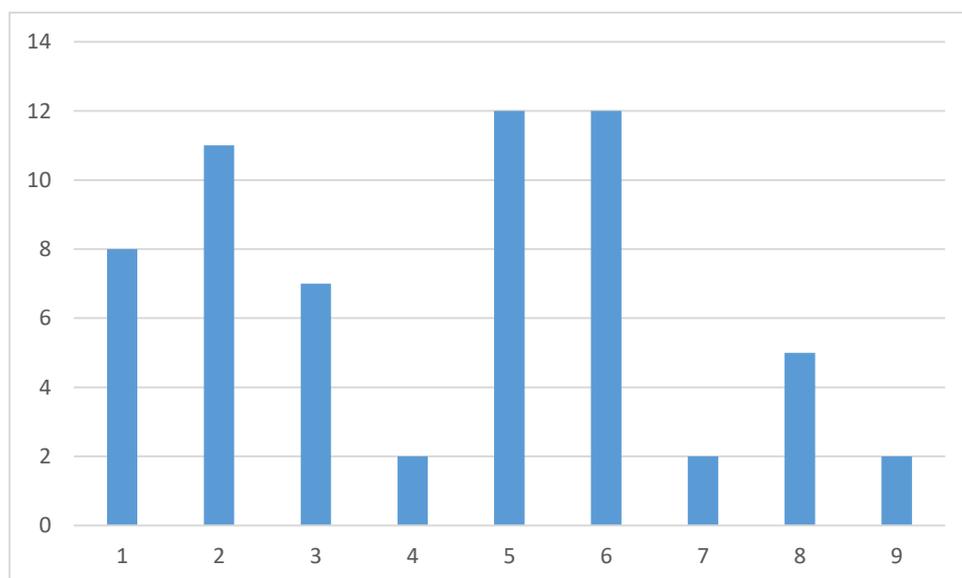


Figure 3. Frequency with which Identified Themes Were Mentioned in Feedback Session 2

The themes most often referred to within the feedback related to establishing and maintaining a list of industry approved reference methods, working on sharing analytical data between industry and third-party stakeholders and improving access (through a network) to information on spirit drink authentication.

6 Conclusions from Feedback

The feedback sessions from the Spirit Drinks Authentication Workshop were attended by a range of stakeholders. All participants engaged actively in the exercise. Feedback provided opinions as to the current state of play of spirit drink authentication technology, in its variety of formats, and the collaboration between spirit drink authentication stakeholders. Research and development targets and recommended approaches were put forward. Not all solutions were mutually compatible, but there was general agreement on key points. This will make the development of future research and development projects more focussed and can be used to inform external organisations, such as funding bodies, as to the authentication needs of the spirit drinks sector.

Authentication Technologies

The clear focus of the feedback was the capability of rapid, portable screening devices. The benefit of such applications to limit the number of suspect samples that need to be analysed using authoritative laboratory-based technologies was often stated. Such technologies need to be easy to use (or offer appropriate training), robust, cost effective and demonstrably reproducible. Non-invasive measurement should obviously be the key driver for future development for liquid analysis, but this can be combined with authentication of the packaging at the same time. The use of cloud-based platforms to store and secure authentic spirit models against which authorised users can confirm the authenticity of a sample needs to support such technologies.

It was clear that the stakeholders felt that the industry needed more leverage in progressing the development of desired authentication technologies. Collaborative projects such as FoodIntegrity are useful in raising awareness and undertaking proofs of concept, but a firm commercial case is needed to encourage technology providers to develop solutions specifically for the spirit drinks sector. Otherwise, the industry may need to recognise its limitations. In this case, there is potential to leverage technologies and solutions being developed for other sectors such as the pharmaceutical or defence industries. Irrespective of approach, the benefit of collaboration and collaborative events such as the Spirit Drinks Authentication Workshop was stressed.

Laboratory-based techniques received less attention than the rapid, portable approaches. Improvements in expanding the range and sensitivity of analytes commonly measured, and thus improving the number of counterfeits detected, were supported. Aside from these continued improvements to laboratory-based capability in method performance, the key drivers for laboratory analysis were ensuring the availability of trained analytical staff, both within and external to the industry, and the sharing of analytical data for spirit drinks measured in accordance with reference methods. Once again, the use of cloud-based platforms was suggested to allow analytical data sharing for laboratory techniques; the need for well-established reference methods was also noted. Both these themes were further explored in the second feedback session.

The application of traditionally laboratory-based analytical techniques in a portable/transportable format did not receive support. The feeling was that current technologies being looked at were still too large and expensive. Whilst expensive in some cases, the portable screening devices offered greater potential for fast, rapid, and non-invasive authentication, even if they were failed to provide traditional quantitative results that are often presented in a court of law. Although not noted on the

feedback forms, comments made on the day of the workshop suggested that future testing of traditional laboratory instrumentation in a transportable format should be with the aim of supporting quality control in production, rather than authentication.

It was recognised that no single technology could tackle all types of counterfeit. The use of markers that can be varied to provide multiple unique analytical signatures can potentially alleviate this problem, for spirit categories that allow the addition of markers. Due to project scope, markers were not extensively explored within the FoodIntegrity Project.

Collaboration and information resources

The benefits of sharing data/information to increase its power was a key point in both feedback sessions. This seemed to signal a shift in thinking compared to the industry position presented in Deliverable 5.4, which identified a reluctance on the part of the spirit drinks sector to share information outwith individual companies. There was a recognition of the industry's reticence in this area, but a desire that it should be altered. Various approaches were suggested: small scale trials, exercises to better define the issues involved, use of trusted IT partners that would ensure required confidentiality of company data, and anonymised data. Sharing of analytical data with third parties, a particular obstacle raised within Deliverable 5.4, was considered possible provided strictly controlled access could be enforced and the analytical credentials of the third-party could be ensured. In addition to sharing analytical data, improving communications within and between companies was also a priority, with a recommendation that a fraud incident database is established for spirit drinks.

There was a clear appreciation of the resources that had been developed within the FoodIntegrity Project on the authentication of spirit drinks. However, there were a number of recommendations made about maintaining these resources and developing their legacy: ease of availability should be increased, awareness of these resources should be promoted, momentum in resource creation and updating should be maintained post-project. One of these resources was the database of recommended authentication methods for spirit drinks, created as part of a larger knowledge base on food authentication techniques. Another was the collection of documents providing best practice recommendations for spirit drinks analysis and other supporting information, available on the Spirit Drinks Authentication Website.

Concerns raised about reference analysis methods were ease of access, relevancy, performance (e.g. repeatability and reproducibility) and global harmonisation. A key recommendation was the development of an industry-based group to develop and promote spirit drink analysis reference methods worldwide.

Appendix I – Dissemination of Deliverables for Work Package 5

List includes significant dissemination events within the 2 years previous to the Workshop

2016

June 21st to 22nd

Laboratory of the Government Chemist (LGC) Conference - 'Supporting Trust in Food'.

25-minute presentation on 'Developing rapid analysis methods' to approximately 80 delegates

October 20th

Dissemination updates at spiritsEUROPE's GP.TS Meeting (technical/scientific group) to 10 attendees

October 25th

Dissemination updates at SWRI's Product Protection Technical Liaison Group Meeting to 8 external attendees

November 7th to 9th

RME 2016, 11th conference in Amsterdam - 'Food Feed Water Analysis, Animal Human Diagnostics'

Presentation to approximately 200 attendees on 'Developing rapid analysis methods in the spirit drinks sector'

November 23rd

Presentation at SWRI Board meeting to 10 senior industry personnel (SWRI Board Members)

November 29th

Dissemination updates at SWRI's Research Management Committee Meeting to 10 attendees

December 6th

Dissemination updates at 1-to-1 meeting between SWRI and one of its member companies

2017

April 11th

Dissemination updates at SWRI's Product Protection Technical Liaison Group Meeting to 9 external attendees

May 5th

Dissemination updates at spiritsEUROPE's GP.TS Meeting (technical/scientific group) to 10 attendees

May 9th to 11th

'4th Annual FoodIntegrity Conference: Assuring the integrity of the food chain: Turning science into solutions'

Demonstration of rapid, screening devices by SWRI and Ocean Optics

3 Poster Presentations – 'Developing Rapid Analysis Methods to Identify Counterfeit Spirits'; 'Non Target Screening Strategy Based on GC-Q-TOF for Scotch Whisky Authentication'; 'The Development of Methods to Detect the Addition of Flavourings in Counterfeit Whisky'

May 11th

Technology Scotland Workshop - Edinburgh, Scotland – 'Enabling Technologies for Product Authentication: Addressing the Global Counterfeit Challenge'

Presentation on 'Uncovering Scotch Whisky Authentication'

May 29th to June 1st

'6th Worldwide Distilled Spirits Conference - Local Roots; Global Reach: Delivering Distilling Expertise to the World'. Approximately 400 delegates from the distilled spirits industry and its suppliers.

One oral presentation on 'Protecting the Global Reach of European Spirits: Learnings from the EU FoodIntegrity Project'; 2 Poster Presentations – 'Developing Rapid Analysis Methods to Identify Counterfeit Spirits'; 'The Development of Methods to Detect the Addition of Flavourings in Counterfeit Whisky'.

September 27th

Dissemination updates at SWRI's Product Protection Technical Liaison Group Meeting to 11 external attendees

November 7th to 10th

8th International Symposium on Recent Advances in Food Analysis, Prague. Approximately 800 attendees

Demonstration of a multispectral camera, miniature spectrophotometer configured for spirit measurement, mobile phone connected spectrometer

Poster: 'Providing Assurance in the Spirit Drinks Sector'

November 7th

Dissemination updates at spiritsEUROPE's GP.TS Meeting (technical/scientific group) to 10 attendees

2018

May 9th

Dissemination updates at SWRI's Product Protection Technical Liaison Group Meeting to 12 external attendees

June 4th to 8th

'NMISA Africa Food Safety Workshop'

Presentation on 'The Authenticity and Safety of Spirit Drinks' to at least 170 delegates

Appendix II - Final Agenda for the Spirit Drinks Authentication Workshop



FoodIntegrity Spirit Drinks Authentication Workshop

Wednesday 20th June 2018, 09:00 – 16:00

Review of Work Undertaken in the FoodIntegrity Project to Improve Distilled Spirits Authentication and Safety

Morning Session:

- 09.00 - 09.30 *Arrival and Coffee*
- 09.30 - 09.35 *Welcome and Introduction to SWRI and this Authentication Seminar* – James Brosnan, SWRI
- 09.35 - 09.55 *An Overview of FoodIntegrity.eu* – Paul Brereton (Lead of FoodIntegrity), Queen’s University Belfast
- 09.55 - 10.10 *Portable Applications* – Shona Harrison, SWRI
- 10.10 - 10.30 *Rapid Detection Methods* – David Ellis, University of Manchester
- 10.30 - 10.45 *Laboratory Based Achievements* – Rebecca Eccles, SWRI
- 10.45 - 11.05 *A Novel Approach to Assess Quality and Authenticity of Scotch Whisky Based on GC-QTOF* – Michal Stupák, UCT Prague
- 11.05 - 11.25 *Coffee*
- 11.25 - 11.40 *Shrinking the Lab* – Peter Cockburn, SWRI
- 11.40 - 12.00 *Direct Analysis Mass Spectrometry for Non-Laboratory Environments* – Bryan McCulloch, LGC
- 12.00 - 13.00 *Feedback Session 1 – Developing Analysis*
- 13.00 - 13.45 *Lunch*

Afternoon Session:

- 13:45 - 14.00 *Development of a Spirit Drinks Authenticity Network* – Ian Goodall, SWRI
- 14.00 - 14.20 *Identification, Regulation and Control* – Nick Soper, spiritsEUROPE
- 14.20 - 14.35 *Developing Capability in Spirit Drinks Authentication* – Ian Goodall, SWRI
- 14.35 - 15.35 *Feedback Session 2 – Developing Networks*
- 15:35 - 15.45 *Summary of the Day* – James Brosnan, SWRI

Appendix III – Biography of Speakers



Dr James Brosnan

James is the Director of the Scotch Whisky Research Institute (SWRI), the research and technology organisation for the UK distilling industry. He entered the distilling industry in 1991 as a Management Trainee and Process Development Scientist with Diageo. James joined SWRI in 1994 as a Cereals Research Scientist where his work focused on engaging with the supply chain and academia to improve the quality of barley and wheat for Scotch Whisky production. In 2007, he was made Research Manager with overall responsibility for the SWRI research programme “from barley to bottle”, which provided plenty of scope to enjoy both the scientific challenges and precompetitive camaraderie of Scotch Whisky production. James was appointed Director of SWRI in 2015 and has continued his interest in collaboration with the wider world of science to benefit the Scotch Whisky industry. He currently sits on several industry, academic and government related science committees and Chairs the International Barley Hub Research & Innovation Group. Prior to employment in the Scotch Whisky industry, James was trained as a plant biochemist with a PhD on beetroot from the University of York - a subject he notes was harder to engage with socially than whisky!



Professor Paul Brereton

Paul is Director of Strategic Alliances (Professor of Practice) at Queen’s University Belfast. A senior scientist working at science-policy interface, he has over 30 years’ experience of applied research in the area of food safety and quality. As well as leading numerous national activities, Paul has co-ordinated two of the world’s largest research projects in the area of food authenticity and traceability: the €20M TRACE project (tracing the origin of food) and currently FOODINTEGRITY, a €12M EU sponsored research project that aims to address, at a European level, many of the gaps identified during the recent horsemeat incident. He has published over 70 peer reviewed papers on food safety and quality and edited the book “New analytical approaches for verifying the origin of food” (Elsevier). He has close links with the food industry, UK Public sector, academia and the European Commission.



Shona Harrison

Shona joined the Scotch Whisky Research Institute (SWRI) in 2007 as an Analytical Chemist having completed a BSc in Chemistry at the University of Glasgow. Since joining SWRI, Shona has developed her knowledge of Scotch Whisky production and successfully completed the Institute of Brewing & Distilling's Diploma in Distilling. After a period working in the Analytical Services Group, Shona expanded her activities across several research areas and specialises in Product Protection. In her current role as Analytical Services Manager, Shona is responsible for managing the service analyses undertaken for SWRI's member companies as well as the analyses used to support the internal research programme of the Institute. Shona is the main point of contact for external anti-counterfeiting work and has been called upon as an expert witness in cases relating to counterfeit Scotch Whisky.



Dr David Ellis

David was educated on the Welsh coast at the University of Wales, Aberystwyth, obtaining a BSc (Hons) in Environmental Science and a PhD in Analytical Biotechnology/Microbiology. His research involving the rapid and quantitative detection of foodborne bacteria using FT-IR spectroscopy and machine learning has been widely publicised, featuring on BBC TV and radio, at the Science Museum in London, as well as in the national and international press. More recent work on the through-container detection of multiple chemical markers of counterfeit alcohol using handheld SORS is also being widely [publicised](#). He has been a Guest Editor for themed-collections in RSC journals such as *Analyst*, and a reviewer for over 30 academic journals including *The Lancet* and *Chemical Society Reviews*. He is a Senior Experimental Officer working in Roy Goodacre ([biospec.net](#)) and Douglas Kell's groups ([dbkgroup.org](#)) in the School of Chemistry, Manchester Institute of Biotechnology (MIB), The University of Manchester, UK.



Rebecca Eccles

Rebecca is a Research Scientist at the Scotch Whisky Research Institute (SWRI). She is a member of the Royal Society of Chemistry, has a BSc(Hons) and completed the Institute of Brewing & Distilling's Diploma in Distilling. She has been with SWRI for 7 years, and in her current role within the Product Protection team since 2012. Her main responsibilities are in undertaking Product Protection research projects, using and developing methods for detecting adulterated and counterfeit whisky. Rebecca has been heavily involved in the Spirit Drinks Work Package of the European Union FoodIntegrity Project over the last few years and she coordinates the SWRI Bottlers Group meetings. She also provides technical expertise and consultancy to member companies in relation to Product Protection research and related service work such as authenticity reporting, where her expression of opinions is accredited by UKAS.



Michal Stupák

Michal is a PhD student in the Department of Food Analysis and Nutrition at the University of Chemistry and Technology in Prague. His PhD study is focused on the application of gas chromatography coupled to various types of mass spectrometric detectors for the quality, safety and authenticity evaluation of foodstuffs. He also works in the metrology and testing laboratory as a specialist analyst in the determination of pesticides residues, persistent pollutants and the targeted and non-targeted analysis of volatile and semi-volatile compounds in food by gas chromatography with mass spectrometry. Recently, he has been working on the analysis of process contaminants and the authentication of Scotch Whiskies.



Peter Cockburn

Peter joined the Scotch Whisky Research Institute (SWRI) in 2013 as the Institute's Technical Manager. Peter graduated from Heriot Watt University in 2002 with a BSc(Hons) in Pharmaceutical Chemistry prior to spending 10 years developing his skills as an analytical chemist in the pharmaceutical sector. Peter has the responsibility of running the Institute's analytical laboratory. He contributes to a number of the Institute's key research projects including Maturation, Raw Materials & Processing and Product Protection. Peter's contribution to the FoodIntegrity Project has involved working closely with technology providers in developing new applications for spirit drink authenticity as well as developing new in-house methods that have expanded the Institute's capabilities in spirit counterfeit identification.



Dr Bryan McCullough

Bryan completed an undergraduate degree in Chemical Physics with Industrial Experience at the University of Edinburgh in 2003, after which he continued at the same institution to study for a PhD in Chemistry under the supervision of Prof. Perdita Barran. His PhD work focussed on the development of an ion mobility mass spectrometer for gas phase structure analysis of protein ions. Following the completion of his PhD in 2006, he took up a post-doctoral position in Prof. Simon Gaskell's group at Manchester University, working on the development of an ion trap mass spectrometer for gas phase x-ray scattering studies of proteins as part of a joint project with the synchrotron facility at the Daresbury Laboratory and Shimadzu. In 2009, Bryan moved to the National Measurement Laboratory (NML) at LGC in Teddington to work as a researcher in organic mass spectrometry; he remained at the NML until early 2012 when he moved to Microsaic Systems in Woking to work as an applications engineer for their miniaturised mass spectrometers. In mid-2013, Bryan returned to LGC in his current role as a senior researcher in organic mass spectrometry. His current research is largely focussed on the development and assessment of novel ionisation techniques, and the combination of these techniques with transportable mass spectrometers for applications such as security screening, quality control, substance identification, product authentication and point-of-care testing.



Dr Ian Goodall

Ian gained a degree in Natural Sciences at Cambridge and followed this with a PhD in Chemistry at the University of East Anglia. His PhD looked at how the analytical profiles of carbohydrates could be used in food authentication, particularly that of orange juice, and was based at the MAFF Food Science Laboratory. From non-alcoholic beverage research, Ian progressed to spirit drinks, with a move to the Scotch Whisky Research Institute (SWRI) in 1996. Ian is now the Senior Scientist at the Institute responsible for Product Protection research. He is also the lead for the Spirit Drinks Work Package of the European Union FoodIntegrity Project.



Nick Soper

Nick has been involved in the spirits sector since 1994, having spent the previous decade at the British Embassy in Paris. He spent over 20 years in various roles at the Scotch Whisky Association, before moving to Brussels in 2015 to assume his current role as Internal Market Director in spiritsEUROPE. In addition to trying to ensure the EU legislative framework for spirits takes account of the needs of the sector, and that intra-EU trade barriers are challenged, Nick has long sought to find ways to tackle the many difficulties from illicit alcohol in EU Member States.

Appendix IV – Attendance List**FoodIntegrity Spirit Drinks Authentication Workshop****Wednesday 20th June 2018, 09:00 – 16:00****Attendance List**

Name	Company
Susan Black	Aberdeen Scientific Services Laboratory
Guillaume Snakkers	BNIC
Joe Arciero	Chivas Brothers Ltd
Shelley Thomson	Chivas Brothers Ltd
Fiona Whitelaw	Chivas Brothers Ltd
Alan Kennedy	Diageo
Stephen McDonald	Diageo
Douglas Murray	Diageo
Deborah Prunty	Diageo
Steven Skelton	Diageo
Kevin Handley	Distell International Ltd
Lewis Aitken	Edinburgh Scientific Services
Sue Shaw	Edinburgh Scientific Services
Elaine Campbell	Edrington
Geoff Kirk	Edrington
Craig Owen	Edrington
Cheryl Traversa	Edrington
Ian Eastwood	Eluceda Ltd
Kasia Kazimierczak	Food Standards Scotland
Lynsey Scullion	Food Standards Scotland
Nikolaos Zoulis	General Chemical State Laboratory of Greece
Jack Stoddart	Glasgow Scientific Services
Martin Fletcher	The Glenmorangie Company
Karen Fullerton	The Glenmorangie Company

Charles Descoins	Hennessy
Pamela Robertson	John Dewar & Sons Ltd
Chris Hopley	LGC
Bryan McCullough	LGC
Colin Nichol (AM only)	Metrohm UK Ltd
Neville Davies	Ocean Optics
Andrew Condie	Photonics & Analytics Limited
Paul Brereton	Queen's University Belfast
Morag Garden	The Scotch Whisky Association
Kenneth Gray	The Scotch Whisky Association
James Brosnan	The Scotch Whisky Research Institute
Peter Cockburn	The Scotch Whisky Research Institute
Rebecca Eccles	The Scotch Whisky Research Institute
Andrew Forrester	The Scotch Whisky Research Institute
Ian Goodall	The Scotch Whisky Research Institute
Shona Harrison	The Scotch Whisky Research Institute
Mark Patterson	The Scotch Whisky Research Institute
Nick Soper	spiritsEUROPE
Michal Stupak	UCT, Prague
David Ellis	University of Manchester
James Pryde	Whyte & Mackay Ltd
Jane Millar	Wm Grant & Sons Ltd
Liz Orr	Wm Grant & Sons Ltd

Appendix V – General Themes from Feedback for Session 1

The following headings group all the feedback from Session 1 - on portable techniques, laboratory techniques and 'Shrinking the lab' transportable techniques - into general themes.

1. Ease of Analysis

- Non-invasive analysis is either a priority, or a must, depending on respondent. It was suggested this could be made easier by standardising all bottles.
- In the absence of a delivered non-invasive portable solution, focus should be on small sample volumes, autosamplers and safer solvents for laboratory techniques.

2. Issues with current screening techniques

- *Safety and security of portable devices*
Data for models, and the models themselves, should be stored in the cloud, rather than on-device, for security.
- *Screening techniques require additional analyses for suspect samples*
It costs time and money to develop screening devices and laboratory analyses still have to be undertaken on suspect samples. The industry could improve speed and cost by using local laboratories instead of screening devices. It could also ensure accuracy and precision of developed devices to remove need for laboratory analyses.
- *Confidence in the accuracy and precision of the portable devices*
Training and clear operating procedures are required for the use of screening devices. For example, a built-in training package on the instrument, or separate training sessions included with the purchase of the instrument (e.g. upfront training and service level agreement).

Screening instruments should have built-in checks to prevent incorrect use of instruments (e.g. the wasting of samples by taking measurements too early, such as when the instrument is warming up). QC samples and checks should be built into the measurement protocol to ensure operating parameters are met before suspect samples can be analysed. This issue and solution combination was mentioned several times.

Manufacturers should target repeatability and reproducibility of portable devices. Cross-calibration through cloud-based technology could be used to help align devices from different manufacturers.

- *Size*
Weight of portable instrumentation is critical – 2 to 3 kilos should be a target maximum. (This was mentioned several times as a current deficiency with the deployable, rather than portable, MS techniques that were discussed in the morning sessions.)

3. Cost effectiveness of portable devices

- Developed devices must be cost effective and address the key issues of product safety and identity. Other capabilities, for example, an ability to monitor quality control, should be regarded as added extras.

4. Lack of focus regarding portable devices

- The spirit drinks sector needs to identify its key requirements for portable technologies. Product safety? Counterfeit detection? Detection of adulteration? Quantification of compounds or pass/fail responses? Given the superiority of laboratory-based quantification, is portable device-based quantification necessary?
- Further collaboration is required to define the focus of the sector in this area. The industry could put together an appropriate group to assess and prioritise the range of solutions.

5. Lack of investment from the industry in new technology and staffing

- Economic models with timelines should be developed to address lack of investment and help ensure new technologies are robust and durable. Industry commitment is required to support these new technologies. The sector needs to indicate how many units it will purchase and the level of backing and enthusiasm it will provide.
- Economy of scale should be employed. The sector should piggyback on the drive and spend from the pharmaceuticals and defence sector in sample authentication.
- Trained staff are required to undertake authentication analysis to the standards required.
- More investment in public analysts (and other such analytical experts used by enforcement agencies) is required.

6. Inadequate collaboration

- The spirit drinks sector should continue its involvement in large collaborative projects such as FoodIntegrity, but also use NDAs on an individual level, to improve trust.
- There should be increased collaboration with universities as well as the aerospace, pharmaceutical and other industry sectors; government funding should be used to encourage this.
- There is a need for well-established reference methods for spirit drinks that are developed, maintained, publicised and shared between laboratories.
- Training and knowledge transfer events should be encouraged and arranged. Communication should be improved between analysts and suppliers: suppliers should not exaggerate the capabilities of their instruments; analysts need to provide appropriate feedback on the limitations of technologies.

7. Confidentiality of data sharing

- Barriers slow down data sharing both within and between spirit drinks companies. An IT solution is needed to help facilitate this process. Data can be encoded (anonymised).

- Trust should be increased between stakeholders by sharing databases and results, but access control would be required based on stakeholder function.
- There is a concern about sharing information, but this should be addressed, rather than used as an excuse not to do anything. Stakeholders need to be convinced as to safety of data sharing. Use of a major provider (e.g. IBM) to migrate shared data to a cloud platform would mitigate risk and increase confidence.

8. Creation of online production brand databases

- Online production monitoring databases should be developed that tie in with rapid, handheld devices via cloud technology with remote access. Such an approach provides specific batch authentication and traceability back to the bottling hall. Also, online measurements can be linked to quality (preventing bottling hall errors) and marketing. Such a system could eventually be developed as a consumer-based tool as well. This would involve the authentication of packaging in combination with a scan of the liquid, for example via a consumer-based app on a phone. Blockchain was suggested as a potential mechanism for supporting such an approach (although lack of knowledge in this area was apparent).

9. Lack of specificity of techniques

- Markers that can be detected by one technique only could be added to spirit drinks (and definitions could be changed for those spirits that have a no-additives rules). Note that this received two separate mentions.

10. Detection of more counterfeits

- Analytical methods could be improved by expanding the range and sensitivity of analytes detected.
- Databases that profile counterfeiting incidents could be shared to improve the detection of counterfeiting operations in other countries.
- Information analysis could be used to identify priority markets for spirit drinks counterfeiting and specific issues within those markets.

Appendix VI – General Themes from Feedback for Session 2

The following headings group all feedback from Session 2 - on authentication networks, reference methods and sharing of information - into general themes.

1. Increased awareness of available information on spirit drinks authentication (networks)

- Knowledge of spirit drinks analysis/authentication and the number of people accessing this information should be increased. Penetration into external laboratories should be targeted via websites such as those belonging to spiritsEUROPE and the SWRI. However, communication between and within spirit drinks companies should also be a target. Shared common knowledge helps the spirit drinks sector present a united front in the authentication arena.
- The spirit drinks sector needs to learn from the best practice of other industries.
- The momentum initiated by the Spirit Drinks Authentication Website and Network needs to be built upon and maintained. Suggestions for achieving this include:
 - Communication of incidents, new papers, relevant news from interested organisations such as spiritsEUROPE and IFSP.
 - Identifying and involving the correct industry personnel charged with brand protection responsibilities.
 - Running further workshops, with an aim of achieving a better spread of relevant contacts (rebalancing the current bias to whisky authentication).
 - A recognition that everyone in the spirit drinks industry is busy. Solutions and information availability need to be made as easy as possible.
 - The Spirit Drinks Authentication Website should act as an information point for spirit drinks analysis methods and contacts (i.e. experts).

2. Improved, authoritative reference methods

- Reference methods should be identified and reviewed (N.B. identification has already taken place within the Spirit Drinks Work Package and Work Package 2). Key methods for spirit drinks authentication should be the focus. Methods should be specific in terms of analytes. This process should be led and driven forward by industry (in order to reduce bureaucracy by involving too many stakeholders).
- A reference body should be established for the maintenance of spirit drink methods (ASTM and OIV were two individual comparisons). Appropriate methods should be identified, and a subset of reference methods created. Minimum quality standards would need to be defined for acceptable performance capability. All methods would need to be validated.
- Government organisations should be encouraged to recognise approved industry methods by appropriate pathways. Methods should be harmonised in countries outside the EU. Within the EU, it was stated that all reference methods should be established within EU Law and a similar trust relationship established between the EU and a spirits drinks body, as the EU has with the wine industry organisation the OIV (which identifies, validates and maintains wine and wine-based spirits methods).

- A database of “accredited” laboratories should be identified that can perform reference methods on spirit samples.

3. Sharing of data/information

A variety of solutions to improve data sharing between the industry and other stakeholders were put forward. The suggested level of commitment to the sharing of data, as generated by industry, varied. However, there was a firm recognition that there *should* be improvement.

It was recognised that shared data could focus on either brands or specific industry issues, and statements on data sharing addressed both sharing of analytical data and incidents of detected fraud. Recommendations were also put forward relating to data sharing platforms; where such recommendations were more general in nature (i.e. not specifically related to analytical or fraud incident data) these are reported separately.

Analytical Data Sharing

- Industry should ensure that enforcement agencies have a better knowledge of brands and their profiles. Third parties working for government agencies often have to make up brand databases themselves, or beg for the information from brand owners.
- Cloud-based systems could be used to make use of industry supplied analytical data. This would be anonymised (a point noted several times) via appropriate protocols. A response to an approved online request from a third-party laboratory would be given, based on the profile uploaded against the reference method. Thus, the results of a suspect sample could be tested without visibility of the data.
Confidentiality of industry data could be achieved via authorised access on a restricted (e.g. one time only) basis; this would help prevent repeated authentication attempts that could be used to test the limits of the stored data. Protocols should be established to enable ease and increased comfort in sharing such data.
- Industry would need to commit to supporting developed databases; this would require several contacts at each company to act as gatekeepers and contact points for external parties.
- A verification scheme for third-party laboratories could be established to verify their analytical capabilities. When verified, the third-party laboratory could submit their analytical data to an appropriate industry expert (or database) for authentication (e.g. brand owner, trade association, industry laboratory).
- An independent third-party could be identified to hold and share data/information. This would help protect individual brand data. Data would be offered via a common platform.
- If companies are reluctant to share analytical data for brands, the possibility of a shared database for a spirit drink *category* was suggested (e.g. for Scotch Whisky). Can the sector learn from the example of other industries in this area?

Counterfeit Incidence Database

- Identified fraud incidents should be shared via a collaborative industry database. This can be appropriately anonymised. This will be beneficial in identifying fraud hotspots and sources of counterfeit product/packaging (i.e. making more use of information collected from different sources by identifying trends and communalities).

Data Sharing Platforms

- Industry should anonymise and share data (recognising shared concerns). Shared data is more powerful for identifying trends (see SWA Environmental Strategy as an example of data sharing in action for a common goal).
- Data sharing could be facilitated by the involvement of appropriate industry member organisations (e.g. SWA). This would help reduce individual commercial challenges for companies in supporting such a system.
- A gradual approach to data sharing may be beneficial to demonstrate worth. This should be based on transparent, sustainable and neutral data controllers.
- A database of stakeholder concerns regarding data sharing could be generated to gain a better understanding of surrounding issues.