Collusion and falsification of results in proficiency testing

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Abstract: Proficiency testing is used internationally to provide objective evidence of testing laboratories testing competence. This paper covers the requirement in ISO/IEC 17043 regarding preventing collusion between participants and falsification of results in a proficiency testing program. Collusion between participants and falsification of results if this does occur will diminish the confidence from other participating laboratories and their customers and also other interested parties such as regulators and laboratory accreditation bodies in the proficiency testing process. This paper outlines some practical examples that a proficiency testing provider can use to reduce the chance of collusion between program participants and falsification of results.

1. Introduction
Interlaboratory comparisons are widely used for a number of purposes and their use is increasing internationally. The main purpose for an interlaboratory comparison for proficiency testing is to provide an evaluation of the performance of laboratories for specific tests or measurements and to monitor laboratories’ continuing performance.

By the very nature of the design of proficiency testing these comparisons involve the participation in a short space of time by multiple laboratories working in the same scientific field. Where common samples are sent by the proficiency testing provider to the participating laboratories in the form of a ‘test’ then this may lead to a change in laboratory operations. To provide a true evaluation and monitoring of performance then the overall design of the programs should be to encourage the participating laboratories to treat the proficiency testing samples as routine samples received from a commercial client.

2. ISO/IEC Technical Requirements
ISO/IEC 17043 details the technical requirements for the design of proficiency testing programs including details for information to be included in the documented plan before the commencement of the program. Section 4.4.1.3 j) states - “reasonable precautions to prevent collusion between participants or falsification of results, and procedures to be employed if collusion or falsification of results is suspected.”

This requirement may be considered to place an unfair load of responsibility on the proficiency testing provider to attempt control the ethical and professional behaviour of organisations that have registered to participate in their proficiency testing programs.

3. Collusion
Collusion in proficiency testing may be considered to mean a form of cheating from the participating laboratory. There may be a situation where two or more people from two or more participating laboratories work together in a deceitful way to submit results for their benefit in the evaluation of their testing performance.

When a proficiency testing program is planned the aim is to provide an evaluation for the individual participating laboratory testing or measurement performance. Within the individual laboratory there may be one or multiple staff involved in the sample preparation, testing and submission of the results to the proficiency testing provider. In this case, this is quite acceptable as proficiency testing programs do not
generally restrict participation to one staff member from the laboratory. So therefore collusion cannot be considered if all people involved in the participation are from the one individual laboratory.

In proficiency testing programs there may be multiple laboratories from the same organisation participating in the same round of the program. In this case the participating laboratories from the same organisation would likely be using the same quality system and laboratory procedures. Therefore if two or more people from two or more laboratories from the same organisation are working together to submit results should this be considered as collusion?

In another case there may be two or more people from two or more laboratories from different organisations working together to submit results. As each laboratory are from different organisations they would unlikely to be sharing any staff and also each organisation would be using a separate quality management system and laboratory procedures. Can this case then be considered as collusion?

4. Falsification of Results
The falsification of results in proficiency testing may be considered to mean the submission of results are stated untruthfully or are being misrepresented as being from the participating laboratory.

The detection of falsification of results in a proficiency testing program may be quite difficult for the organiser of the program. Results from programs are commonly submitted by the participant to the proficiency testing provider either in hard copy or electronically. The submitted results are identified by the laboratory code issued by the proficiency testing provider to ensure confidentiality of results. The submitted results may also include either a signature from the laboratory staff and/or some form or unique laboratory identification such as address or organisation logo. So the assumption taken by the proficiency testing provider is that the results are from the laboratory identified.

If the falsification of results is due to collusion then this may be detected quite easily if the results are identical. If the results reported were similar to other participants reported results then the falsification of results in this case would be quite difficult or impossible to detect.

A way that a participating laboratory be involved in falsification of results is to sub-contract the testing to another laboratory and then to submit these results as their own to the proficiency testing provider. In this case this would be impossible for the proficiency testing provider to detect unless he was advised of this practice by a third party.

5. Detection of suspect results
A typical proficiency testing program involves many laboratories reporting many test and measurement results in a defined range of quantified values.

To detect suspect results due to collusion or falsification of results then the main feature could be identical results reported by two or more laboratories. The physical location of the laboratories may also be considered as it would be unlikely that participants operating in different economies would be sharing information.

If there is a narrow range of expected values for a test then there is a high probability that results reported between some participants may be identical. The probability of identical results being reported as coincidence lessens when the reporting accuracy increases and lessens further upon replicate reporting for single or multiple samples. In addition to the reported value other reported information may also be considered such as measurement uncertainty and methods to check if this is common between the suspected results.

Suspect results may be quite easier to detect if in the form of duplicated results between laboratories in a small data compared to a large data set.

If there is obvious duplication of reported results between participants in a published proficiency testing program final report then if identified by the proficiency testing provider then this would surely also be
noticed by the other program participants which would seriously diminish the credibility of the final report and also could damage the reputation of the proficiency testing provider’s services.

6. Program design to prevent collusion or falsification of results
Proficiency testing programs may be designed to prevent collusion or falsification of results if there has been evidence of suspect results in completed rounds of the program. If there are a large number of participants in a program then the participants could be randomly divided into two or more groups with each group receiving a unique set of samples. Each group in the program would need to have a minimum number of participants to allow the reported results to be statistically evaluated for testing performance. The samples could be labelled the same between each group or the samples could be labelled differently between each group. If it was suspected that participants from within one organization were in collusion to report results then the proficiency testing provider could purposely decide to split the participants into different groups that would receive the unique sample set.

For programs where there are a small number of participants the program design could be to provide unique sample identification for common samples in the program that are sent to each participant. This design could apply to programs involving either single program samples or multiple program samples sent to participating laboratories for testing.

7. Action for suspect results
The reported results produced in an established proficiency testing program can usually show by the historical data if suspect results have been reported. If there has been no evidence of collusion or falsification of results in an established program then the program design would not need to be changed to prevent this future possibility. At the time of a current program is there was evidence the challenge faced by the proficiency testing provider is what actions should be undertaken. This is quite a difficult process as it could involve the proficiency testing provider incorrectly accusing the participant of dishonest reporting. A subtle approach could be to highlight the suspect reporting in the commentary in the published final report.

In an extreme case the proficiency testing provider could refuse request for participation in the program by the suspected laboratory.

However in most cases where the proficiency testing provider may believe that there is enough not evidence to suggest that suspect results have been reported that there has been no action taken.

8. Conclusion
The requirement as stated in ISO/IEC 17043 remains a challenge for the proficiency testing provider to identify evidence of collusion or falsification of results have actually occurred in the program. The immediate actions following detection of the suspect results are limited and the prevention may be restricted to changes in the design of the program.

9. References
[1] ISO/IEC 17043: 2010 General requirements for proficiency testing