



Bundeskriminalamt

Quo vadis, forensic interpretation?

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International conference “Quo vadis, European Forensics?” on the occasion of the ICP’s 60th anniversary

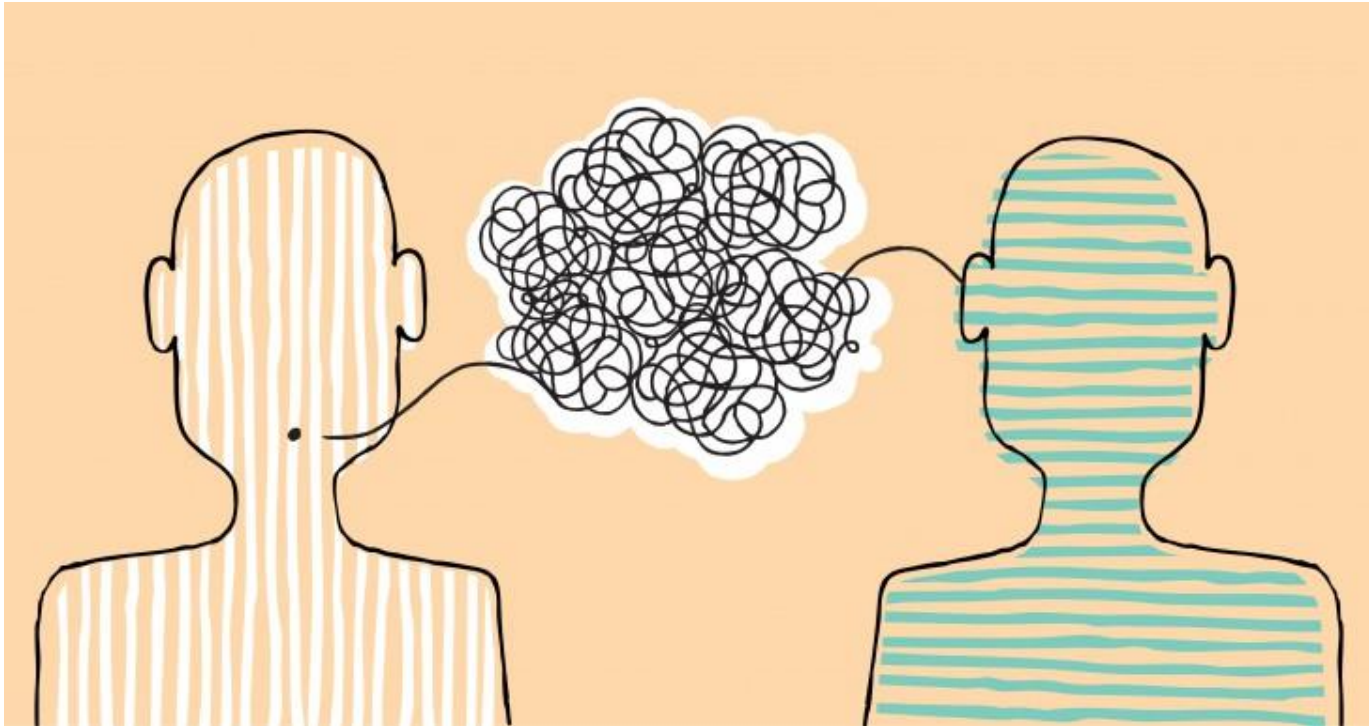
10 - 11 October 2018 in Prague, Czech Republic



1. What is this all about?
2. CAI: 20 years ago
 - On recommendations, shruggie, reservations and barriers
 - Impact of Bayes in law: How far are the (advanced) countries?
3. ISO TC 272, ISO 21043-series, ISO 21043-4
 - 21043-series scheme
 - Justification for the proposal to create an international standard for interpretation (21043-4)
 - Current situation (WDs 21043-4)
4. Quo vadis, forensic interpretation?



What is this all about?





What is this all about?

- **Logical and transparent communication of forensic findings to the clients**
- **Comprehension and consideration of evidence by the clients at best**

Assumption

There is room for improvement on both interpretation by forensic practitioners and comprehension by clients, e. g. also by using Bayesian formats.

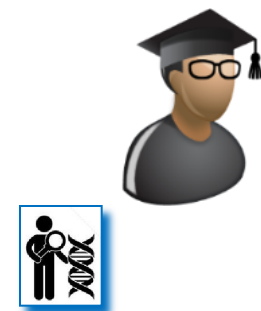
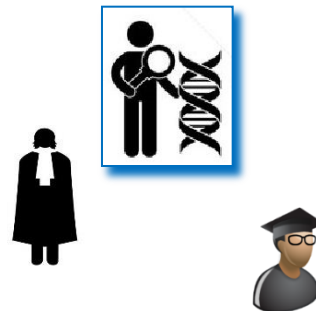
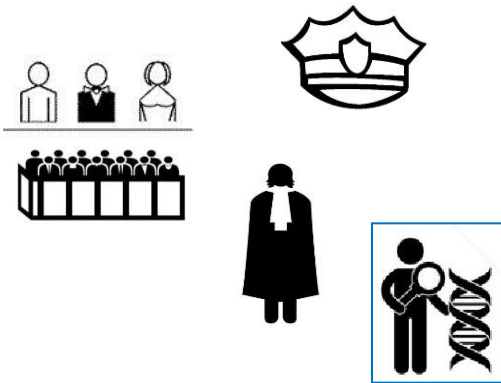
Reactions

- ☐ No, thanks. All is well. 🙄
- ☐ Yes, certainly. But please act with a sense of proportion based on reliable data.
- ☐ Yes, let's get started instantly, in fact forensic service-sided.. 😁



What is this all about?

stakeholders and opinions





Scientific papers and guides

production and reception

History



- **1998** A model for case assessment and interpretation (CAI)



- **2009** Standards for the formulation of evaluative forensic science expert opinion



- **2015** ENFSI Guideline for evaluative reporting in forensic science



MP STEOFRAE M1 (EU ISEC 2010)



- **2017** An introductory guide to Evaluative Reporting





Recommendations



(2017)

Evaluative reporting is a means of dealing with uncertainty and provides a balanced approach to evidence interpretation. Properly applied, cognitive bias can be minimized and opinions can be updated in a logical way on receipt of new information.

**N. Fenton
et al
(2016)**



Proper use of Bayesian reasoning has the potential to improve the efficiency, transparency and fairness of criminal and civil justice systems. It can help experts formulate accurate and informative opinions; help courts determine admissibility of evidence; help identify which cases should be pursued; and help lawyers to explain, and jurors to evaluate, the weight of evidence during a trial. It can also help identify errors and unjustified assumptions entailed in expert opinions.

**M. Schweizer
(2005)**



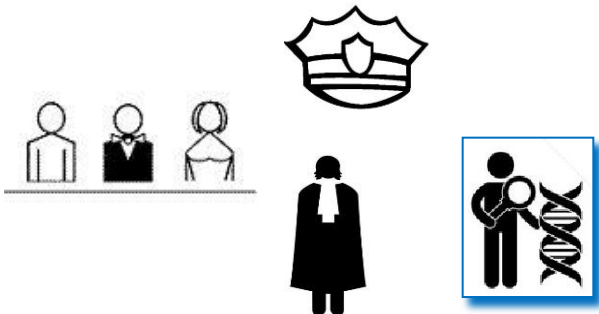
Intuitive statistical thinking often leads to mistakes. Therefore, in court proceedings the Bayes theorem, which allows the coherent integration of new evidence with pre-existing beliefs, should be used increasingly, at least as a heuristic of judgment. This means that judgments must not be "calculated" with apparent mathematical accuracy, but that the reasons for the judgement must take account of the laws of at least verbally. This avoids numerous errors in the assessment of evidence.



Why have the recommendations so far
met with little enthusiasm?



- Most clients are parts of conformist organizations¹ that find it difficult to cope with change.
- Are there specific causes for concern, such as an increasing number of miscarriages of justice, which require a change in practice?
- Many clients and also forensic science providers are suffering from time and cost-cutting pressure (fear additional load).



Conformist organizations²

Characteristics

- Highly formal roles within a hierarchical pyramid
- Stability valued above all through rigorous processes
- Future is repetition of the past

² according to identified organizational types in F. Laloux, Reinventing Organisations, Nelson Parker 2014, Brussels, Belgium



- Conclusions = key element in QM (relevant for accreditation), change of interpretation formats only by mutual agreements with customers

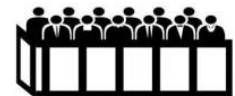


- Scepticism regarding existing data used for activity level LR calculations



- "empirically validated verbal communication scales, and even alternate formulations for expressing likelihood ratios, might not fulfill the purpose of assisting the court or facilitating effective and accurate communication".¹

- country-specific rules as to the scope of juries



¹ Martire and Watkins (2015)



Missing data

on the efficacy of communicating forensic findings

- Are there systematic studies regarding police and judicial miscarriages due to misunderstood expert opinions in Europe?
- Are there systematic studies available on the efficacy of communicating forensic findings in Europe?
- Are evaluations of existing implementations of the LR framework available?



"Understanding Uncertainty in Forensic Science and the Law"

(K. Martire et al): In this project lay, legal and scientific perspectives on the formulation and comprehension of uncertainty are explored in order to improve science communication and criminal justice outcomes. **(ongoing)**
http://www.psy.unsw.edu.au/Understanding_Uncertainty_in_Forensic_Science_and_the_Law



factors worth considering

NAS-Report and PCAST: Are the American conditions transferable to other countries? Is it just a forensic problem or is it not also a stakeholder problem, i. e. law enforcement and courts?



General country-specific variables

- Country size and government system (federal/central, secular, religious)
- Wealth and political stability
- Jurisdiction and procedural tradition
- Number and responsibilities of law enforcement agencies

EFSA 2020 According to the workshop results of the 2016 EU conference on the need for European cooperation in the field of forensics (European Forensic Science Area 2020 : the way forward, May 2016) "Communication between forensic experts and judicial personnel should be improved".
(See all 13 conclusions if necessary.) => auxiliary presentation available !



(missing) data on the impact of forensic evidence

... most criminological studies show that the effectiveness of forensic science on solving or preventing crime is unclear and at best modest.¹



... Overall, it seems investigators' perception of forensic analysis of physical evidence (FAPE) does not match the reality. DNA has been grossly overestimated for all but two crime types (homicide and assault cases) while other forms of FAPE, such as trace evidence or other class-level evidence, has been unduly devalued for property crimes.²



¹ Roux et al. (2018), Forensic science 2020 - the end of the crossroads? Australian Journal of Forensic Sciences; see in particular references when attempting to measure the efficacy of forensic evidence (Baskin & Sommers, 2010, 2011, 2012; Sommers & Baskin, 2011; Roman et al., 2009; King et al., 2013)



² Schroeder and Elink-Schuurman-Laura (2017), The Impact of Forensic Evidence on Arrest and Prosecution, Office of Justice Programs' National Criminal Justice Reference Service, Award Number: 2011-DN-BX-0003



in brief

cons, shruggie and pros



No real need

Additional load

Reservations

with respect to juries,
training effort,
...



Risks of implementation

Proportionality?

Missing data

Considering two (or more hypotheses) is cognitively appropriate, it seems like good practice and further research may reveal whether it also improves decision making. It is a separate issue whether the LR is also a good method for communicating the strength of evidence.



Sound theory

**Cognitive bias
can be minimized**

Forensic interpretation

⇒ situation in other countries

England and Wales



Forensic Science Regulator (FSR) Report 2016 re **Interpretation Standard and Data**

- "Development of an interpretation standard is critically important because it will, as an appendix to the Codes, fill a gap whereby some organizations hold accreditation for their analytical work, but have no external assurance regarding their interpretation processes. It also aims to ensure that scientists and courts are aligned regarding the interpretation of evidence. However, this work has been delayed as insufficient resource was available."
- "Despite good work by the Body Fluids Forum of the Association of Forensic Science Providers (AFSP) and by several academic institutes, the published data available to support the evaluative interpretation of forensic evidence are still limited. The data sets that do exist tend to be fragmented between different organizations. This leaves a substantial amount of interpretation based solely on the practitioner's opinion, which risks lack of consistency and reliability."

Forensic interpretation

⇒ situation in other countries

Australia



- **Australian Core Forensic Standards Framework (2013):** In four parts, this standard (AS 5388) covers the recognition, recording, recovery, transport and storage of material (Part 1,) the analysis of material (Part 2), **interpretation (Part 3)**, and reporting (Part 4).
- **NIFS Guide (2017):** An introduction to evaluative reporting in forensic science. It covers the basics of evaluative reporting, including terminology, and uses examples in the appendices to illustrate the concepts. also provides managers with advice on implementing evaluative reporting where they consider it appropriate. It provides a useful list of resources, including where to find relevant books and journal articles, comprehensive guides, and training courses on the subject.
- **R&D "Understanding Uncertainty in Forensic Science and the Law" (K. Martire et al):** In this project lay, legal and scientific perspectives on the formulation and comprehension of uncertainty are explored in order to improve science communication and criminal justice outcomes. **(ongoing)** http://www.psy.unsw.edu.au/Understanding_Uncertainty_in_Forensic_Science_and_the_Law

Forensic interpretation

⇒ situation in other countries

Netherlands

- **Dutch prosecutors and judges have been trained by forensic experts (Berger and Meuwly, 2010)¹ since 2008.** Some say that the NFI had even started training in 1994.²
- According to Henderson³, a Dutch forensic consultant, “Reports from the Netherlands Forensic Institute where the LR scales are uniformly applied amongst the major forensic disciplines reach the courts. Many judges were trained to apply this way of evaluating the evidence and the trainings continue to be available for them. But as it is not an obligatory part of their education program in practice the understanding differs a lot between judges. **It seems that trained Dutch judges can understand LR-based expert conclusions, however, applying these conclusions within the context of the whole criminal case is still a problem, i.e. Bayesian reasoning itself, as a way to evaluate a case, may have not yet found its way in the reasoning of individual judges.**”

¹ Logically correct concluding and rational reasoning in evidence evaluation. *Science & Justice*, **50** (1), 33

² Personal Communication 2018, ³ Personal Communication, 2016

Forensic interpretation

⇒ situation in other countries

Sweden



- Nordgaard et al. (2012)^{1,2} and Kruse (2013)³ report on an established LR-based conclusion scale at the former Swedish National Laboratory of Forensic Science (SKL) for all forensic fields except that of finger prints.
- Sweden seems to be further advanced in teaching, discussing and developing the use and understanding of probabilistic reasoning in the Swedish legal community.
- Unfortunately, evaluation reports are not available so far.
- Very recently a colleague from NFC Linköping told me that she has heard neither from complaints nor of evaluation reports.

¹ Nordgaard / Ansell / Drotz / Jaeger (2012). Scale of conclusion for the value of evidence. *Law, Probability and Risk*, **11**, 1-24

² Nordgaard / Rasmusson (2012). The likelihood ratio as value of evidence - more than a question of numbers. *Law, Probability and Risk*, **11**(4), 303-315

³ Kruse (2013). The Bayesian approach to forensic evidence: evaluating, communicating, and distributing responsibility. *Social Studies of Science*, online version: <http://sss.sagepub.com/content/43/5/65>



Forensic interpretation

⇒ using Bayes in law: situation in Germany

General

- see e. g. Bender/Nack/Treuer (2007)¹, Simmross (2014)², Schweizer (2015)³, Kotsoglou (2015)⁴

DNA evidence

- "A set of national recommendations is presented to support DNA-experts in terms of the evaluation process, the choice of the calculation approach and the verbal expression of statistical outcomes." (2016)⁵ According to the recommendation of the ENFSI-Guideline and the International Society for Forensic Genetics (ISFG) preferentially a LR should be calculated provided that reasonable and plain hypotheses could be determined.
- The national recommendations were developed independently.
- It seems that the ENFSI-Guideline is of less importance for German DNA-experts, the activity-level calculations find little enthusiasm in particular.
- Seminar for judges & public prosecutors at the German Judicial Academy (once a year).

¹Tatsachenfeststellung vor Gericht, C.H. Beck, 173-174 ² On Winds of Change and Coexisting Formats, Law, Probability and Risk 13(2): 105-115

³ Beweiswürdigung und Beweismaß - Rationalität und Intuition. Siebeck ⁴ Forensische Erkenntnistheorie, PhD Thesis ⁵ Rechtsmedizin 26(4): 291-298

⇒ using Bayes in law: situation in Germany

Trace evidence

- **Paint and Glass:** LR-approach does not matter up to now
- Two domestic working groups has already addressed this subject for more than 15 years with poor success. A LR-approach-related project group has been established in 2014. In 2016 a seminar for interested German paint and glass experts was conducted with professional lecturers from Lausanne (focus on understanding and possibly making use of the ENFSI-Guideline for Evaluative Reporting in Forensic Science using specific examples). The project group has now an official status and is chaired by a Bavarian colleague. **Recently the project group's official comment on the Guideline for Evaluative Reporting in Forensic Science was finalized and it is currently under discussion at national level.**
- **Fibres:** LR-approach does not matter up to now
- **Gunshot Residues (GSR):** LR-approach does not matter up to now
- Consider the differentiated conclusion of the final report of the ENFSI MP2010-M5-Project "Application of the Bayesian Approach in Gunshot Residue Investigation". (unsuitable for many cases) Consider the fact that the two presented GSR-case examples of the ENFSI-Guideline were not concerted with the ENFSI EWG Firearms/GSR.

Forensic interpretation

⇒ situation in other countries



USA (trace evidence)

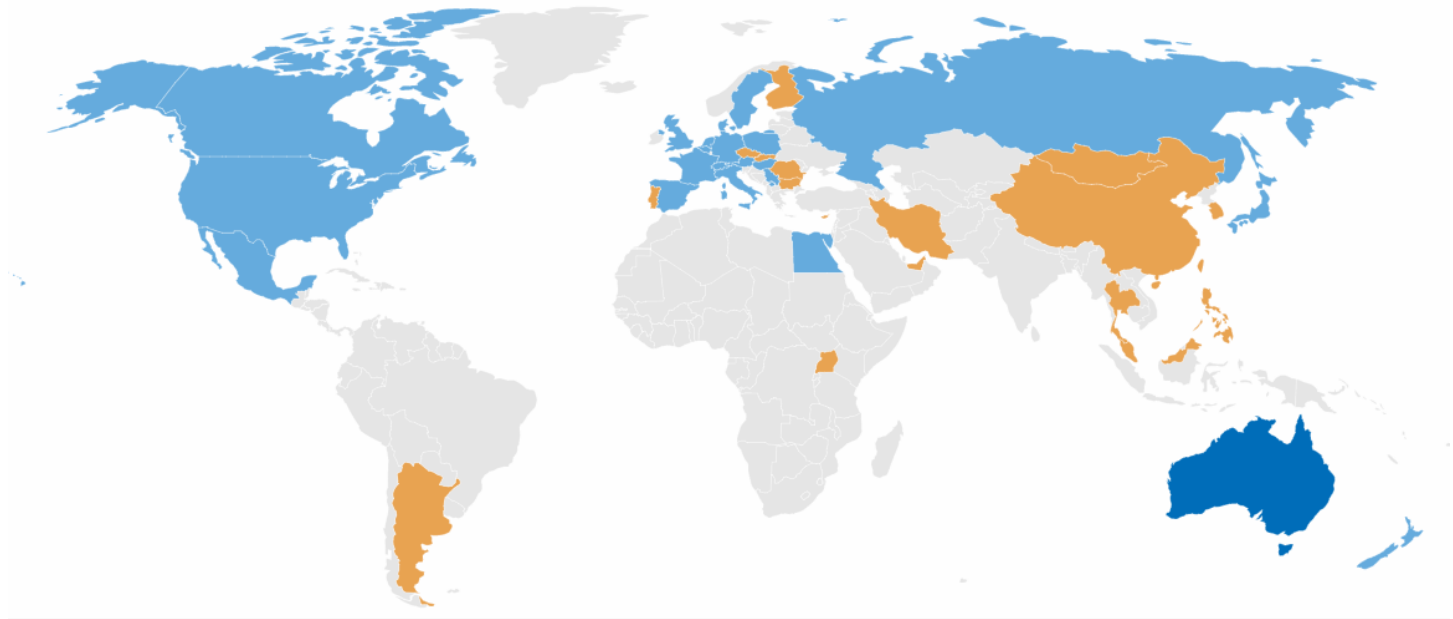
- Following OSAC among others it seems that there is a lot going on, however, trace evidence does not rank foremost. Some apparently perceive that Europe has already moved to use Bayes in law. Two recent papers (LRC memorandum and an article from David H. Kaye³) support a real debate between forensic and legal practitioners.

³ D. H. Kaye, Hypothesis testing in law and forensic science.: a memorandum. Harvard Law Review Forum. Forensic Commentary Series. Vol. 130, March 2017, No. 5



ISO 21043-1 to 21043-5

ISO/TC 272 Forensic Sciences



Participating Member Countries

Observing Member Countries

Secretariat

Source: http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee_participation.htm?commid=4395817



We have experienced a strong advocacy for the LR-framework.

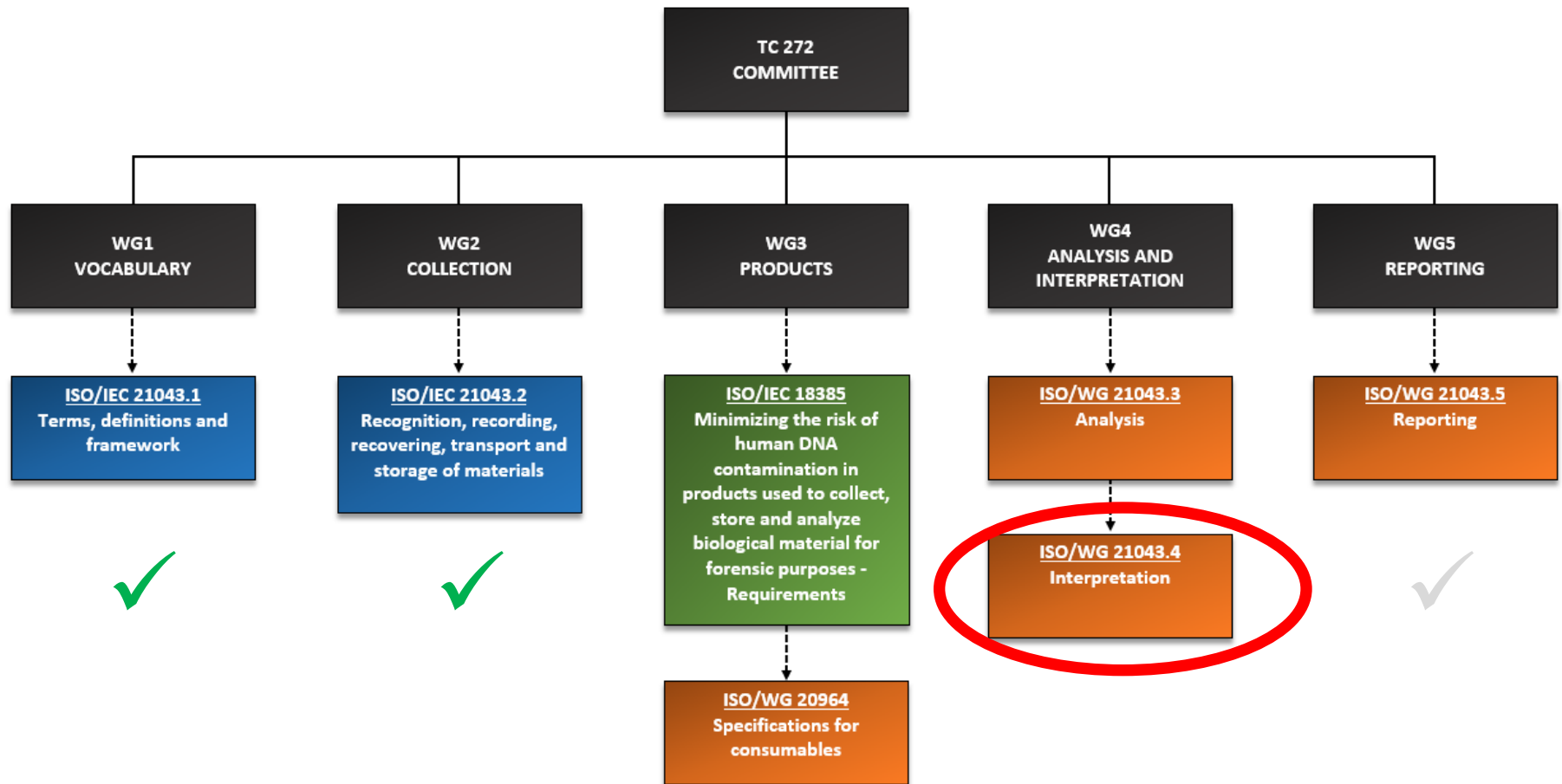
In the meantime the approach has made it onto the ISO agenda (TC 272).

The TC will develop a set of core standards that detail critical requirements common to all disciplines. Given the impact of recording/sampling on downstream analysis, that standard was commenced as the first body of work. This standard was already published early 2018. The following Standards have now been commenced: Part 3 - Analysis and examination of material, **Part 4. - Interpretation**, Part 5. - Recording.

Australian standards 5388 have been used as initial drafts for the standards. Use of these documents will significantly reduce the time and effort to reach the DIS stage for each standard. These standards have some level of overlap. Multiple working groups have been established under the TC to work concurrently on these standards. This should enable all of the core process standards to be completed within a shorter period of time.



ISO 21043-1 to 21043-5



Source: ISO TC Strategic Business Plan TC272 version 9 from 2018-07-25



Justification for the proposal to create an international standard for interpretation (according to ISO/TC 272 N237)

1. **"Forensic science has come under significant criticism over the last decade."** *This may be true if one refers to the USA with regard to the NAS report, among other things.*
2. **"Although the report was US based, the criticisms were applicable world-wide."** *That's a hypothesis. There is no convincing evidence available.*
3. **"There have been moves at the country level to develop forensic standards. For example Standards Australia has published AS5388 Forensic Analysis, the United Kingdom Forensic Science Regulator has developed a Codes of Practice, the European Committee for Standardization (CEN) is currently developing a draft standard for the collection of forensic evidence and the American Society for Testing and Materials (ASTM) has developed a series of guides for specific areas of forensic testing and has invested federal funds in the establishment of the Organisation of Scientific Area Committees (OSAC) to develop further standards."** *This list could also be interpreted in that countries with adversarial legal systems in particular have a need.*



Justification for the proposal to create an international standard for interpretation (according to ISO/TC 272 N237)

4. **"However, standards relating to the delivery of forensic science at an international level do not exist. As a result there remains a risk that country level divergence may limit the exchange of forensic evidence and intelligence across international borders."** *I am of a different opinion. Exchange of forensic evidence can be done on factual level without too much interpretation, in particular to consider national conventions. That is domestic law enforcement's business. Even external experts must comply with local law and regulations in criminal proceedings if they - officially instructed - assist foreign law enforcement authorities.*
5. **"The lack of standards may also result in evidence being ruled inadmissible in some jurisdictions."** *This expressed claim visibly overtakes the way to the goal. One can hardly expect that an international interpretation standard can take into account admissibility rules of different jurisdictions.*
6. **"Consistent and accepted standards within the forensic community will benefit all users of the judicial system including members of the public as well as legal and forensic practitioners. The establishment of Standard procedures would reduce the risk of miscarriages of justice, ..."** *It is a formulated hope, but does not contain any justification. It is not scientifically proven that the implementation of let's say the LR-framework in various jurisdictions will reduce the risk of miscarriages of justice.*



Summary and assumption

The justifications remind of the objectives of the business plan for the complete standard series, such as among others

- Establish consistent work practices that facilitate forensic laboratories/agencies from different jurisdictions to work collaboratively in response to cross border investigations.
- Enable agencies from different jurisdictions to support one another in the event of a catastrophic event that exhausts a jurisdiction's capabilities.
- Allow for the exchange of forensic results, information and intelligence including the sharing of databases.
- Allow mobility of forensic professionals.

Considering this, it seems that some general arguments for the 21043-series fit well for many parts, but do not really work on the subject of interpretation.



ISO 21043-4

current situation

During the last TC272-Meeting in Stockholm in May 2018 as a result the lead editors were asked to redraft the 1st official working draft according to the discussions on scope, structure as well as wordings and to take the noted comments into account.

Since last month a 2nd draft is available for the next commentary round in Nov2018. **This draft appears to be much better than the last. However, it still places propositions (hypothesis) in the center of the document as structure-giving characteristic. So the application of the LR-framework appears more compelling, even if LR and scale only appear in the appendix.**

Not least for practical reasons I'm hoping for a passage of text regarding proportionality, i. e. that will **shed light on the merits of plain interpretation and the risks of modern interpretation concepts**. Furthermore, I hope for an understanding that not uniform scales will be prescribed recklessly across all forensic fields. Finally, the boundary between factual reporting and evaluative reporting would have to be clearly drawn for lay people.



Quo vadis, forensic interpretation?

- Each country will need its appropriate time for change/implementation
- ISO 21043-4: hopefully minimum requirements instead of a certain HOW
- The LR-framework and its further development is and has always been accessible for everyone in the forensic business who actively strives for
- I hope that we will see progress on the basis of
 - evaluated implementation examples,
 - fundamental/theoretic challenges of the LR-framework,
 - new interpretation aids for increasing explicitness (easier to understand)
 - the study "Understanding Uncertainty in Forensic Science and the Law“,
 - an ENFSI-project on the doubts of theory and practice as proposed.

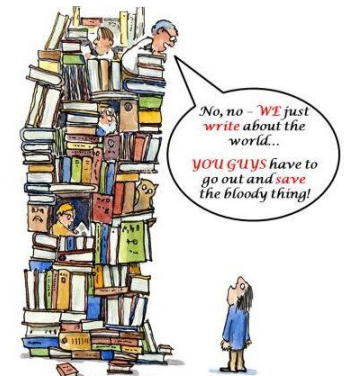


Life goes on with or without an interpretation standard.

Overall, the 21043-series is a very useful thing. If interpretation has to be part of it, then it has to be with a special sense of proportion, because the justification seems to be rather thin! When the interpretation standard comes, procedural routine may become more complex and time-consuming for all stakeholders in the forensic process.

The frequent writers can continue to publish and feel good and recognized. And attentive stakeholders have always benefited from scientific progress.

In the meantime we can focus on other topics, issues that are at least as relevant as interpretation, for example enhancing the awareness of SoC experts regarding trace evidence.





Thank you for your attention!

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