

DataSys 2019 International Expert Panel on Digital Society:
Digital Investigations and the Reliability of Evidence - Digital (Un)certainties

Information Science and Formalisation – Fundaments for Digitisation and ‘Reasoning’

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Status:

- Investigations on digital base are often *missed to be integrated into holistic context*.
- *Digitisation is a post-abstraction-reduction-formalisation-process*.
- Evidence and forensic material are mostly *not standardised internationally*.
- Documentation and possibilities *limited to the conditions of mathematical machines' implementations*.
- Forensic procedures and file formats (Expert Witness Format, Advanced Forensic Format, raw dd, ...) *represent formalisation*.
- The term *evidence is not defined in a formal (however legal) context*.
- *Uncertainties are associated with formalisation not with digital nature. 'Reasoning' is post-formalisation, not real reasoning*.
- There is *nothing 'uncertain' executed by a mathematical machine as long as used as designed*.
- Common (national) standardised documentation, well defined processes, auditing ... *sometimes is not enough*.

Vision:

- Recognise the fact: **Any computer is a mathematical machine, which are strictly based on formalisation.**
- **Require solid education of information science fundamentals, esp., in legal informatics, its context and practice.**
Information science can **clearly describe the complements of knowledge.**
Information science can **clearly separate knowledge, information, and data.**
- **Let the discipline requiring reliability of evidence for reasoning create their (fixed) formalisation, within their discipline, within their context.**
Formalisation and context should not and cannot be works of discipline-external hire.
- Have **well defined processes based on the respective formalisation.**
- **Increase holistic knowledge and expertise in participating disciplines.**
- **Reliability further requires diligence within the discipline in order to create a formalisation within their contexts. ...**

Conclusions: Reliability of Evidence is a Matter of Formalisation

- **Always remember Archimedes of Syracuse when requiring repeatability of measurement!**
- **Have in mind that the term “forensis” means “of or before a forum” and not ‘evidence’!**
- **Read Aristotle’s ‘Ethics’, especially about logic!**
- **Understand mathematical machines and formalisation!**
- **Have solid education of information science fundamentals!**
- **Disciplines requiring reliability of evidence for reasoning have to create suitable formalisation within their disciplines and contexts.**
- **Have well defined formalisation-conform processes.**
- **Increase holistic knowledge and expertise in participating disciplines.**



DIGITAL INVESTIGATIONS AND
THE RELIABILITY OF EVIDENCE –
DIGITAL (UN)CERTAINTIES

Lasse Berntzen
University of South-Eastern Norway

Reliability of Evidence

- Keynote by Dirk showed how video evidence can be manipulated by AI techniques
- The same manipulations can be done for audio recordings
- It can be very difficult to prove if a audio/video recording is genuine or fake
- Meta-data may easily be manipulated

Reliability of Evidence

- It is possible to embed encrypted metadata into audio recordings and videos to make sure the content is genuine
- Invisible digital watermarking (changing pixels to contain a secret message)
 - <https://imatag.com/demo/watermarking/>
- Steganography

Reliability of Evidence

- Security monitoring
- Black box computer security (cyber black box)
- Stores information that can be used for forensics
- Passive component – no way for hackers to get access

Reliability of Evidence

- Information Systems Security
- Trusted third-party
- Keeps track of communication

Fake and Generated Information

Fake is not necessarily the same as generated!

- Generated photographs
- Generated texts
 - Conference papers
- Chatbots
- Voicebots

Legal System

- Question to panel:
- Beyond reasonable doubt!
- Can reasonable doubt be computed?