EU Tape, Paint, Glass Data Sets

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Central Analytical Services, Materials Analysis & Trace Evidence

Gaithersburg, July 19th-20th 2016
structure

- ENFSI
- EU
- EPG
ENFSI
17 Expert Working Groups

- Animal, Plant and Soil Traces
- Fingerprints
- Fire and Explosions Investigation
- Marks
- Textile and Hair
- Digital Imaging
- Firearms/GSR
- Forensic Information Technology
- Paint and Glass
- DNA
- Drugs
- Explosives
- Handwriting
- Scene of Crime
- Documents
- Road Accident Analysis
- Forensic Speech and Audio Analysis
ENFSI has been identified by the European Commission as a body in a de facto monopoly situation as it is the only network of Forensic Science Institutes of the Member States in Europe.

Monopoly projects
2009-2014: \[\sum \text{over 4.3 Mio } \varepsilon\]
## MP 2013 Monopoly projects

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Project Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1. Creation and shared use of an international database of ignitable liquids and substances.</td>
<td>NFI-The Hague, NL</td>
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<tr>
<td>T2. Development and implementation of new analytical methods and databases for the detection of additives in fuels and fire debris.</td>
<td>BKA-Wiesbaden, DE</td>
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<tr>
<td>T3. Proficiency tests for the fingerprint domain.</td>
<td>RaCIS-Rome, IT</td>
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<tr>
<td>T4. SmartRank: Likelihood ratio software for searching national DNA databases with complex DNA profiles.</td>
<td>NFI-The Hague, NL</td>
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<tr>
<td>T5. DNAActivity: International cooperation in activity level interpretation of forensic DNA evidence.</td>
<td>NFI-The Hague, NL</td>
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<tr>
<td>T6. The development of a statistical software package for likelihood ratio calculations.</td>
<td>NFI-The Hague, NL</td>
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</tbody>
</table>
**MP 2014 Monopoly projects**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Project Leader</th>
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<tbody>
<tr>
<td><strong>Towards the Development of Pan-European Databases in Forensic Science (TDPEDFS)</strong></td>
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<tr>
<td>N1. Towards Big Forensic Data (TBFD)</td>
<td>LKA-Berlin, DE</td>
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<tr>
<td>N2. Geographical distribution of firearms and gunshot residue throughout Europe: databases that help experts to report beyond the source level.</td>
<td>BKA-Wiesbaden, DE</td>
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<tr>
<td>N3. European Smoke and Ink Staining System Plus (EuSiSS+)</td>
<td>INPS-Lyon, FR</td>
</tr>
<tr>
<td>N4. Forensic Substance Database on Explosives (FoSDE)</td>
<td>NFI-The Hague, NL</td>
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<tr>
<td>N5. Data platform for the combination of various existing databases and research-projects in the field of forensic document examination</td>
<td>LKA Stuttgart, DE</td>
</tr>
</tbody>
</table>
EU
COUNCIL OF
THE EUROPEAN UNION

Council conclusions on the vision for European Forensic Science 2020 including the creation of a European Forensic Science Area and the development of forensic science infrastructure in Europe

3135th JUSTICE and HOME AFFAIRS Council meeting
Brussels, 13 and 14 December 2011

The Council adopted the following conclusions:

"THE COUNCIL OF THE EUROPEAN UNION"
To foster cooperation between police and judicial authorities across the EU by suggesting 10 activities:

- accreditation
- best practice manuals
- proficiency tests/collaborative exercises
- minimum quality standards for scene-of-crime
- minimum competence criteria
- forensic awareness
- equivalence of forensic activities
- forensic databases
- research and development
- use of advances in forensic science
Council Conclusions decided VI 2016

Action plan for the way forward for the creation of a European Forensic Science Area with six core activities:

Action 2: Stimulating exchange of forensic information from databases, for example in the areas of weapons and ammunition, explosives and drugs
EPG
EPG materials of interest

Paint

Tape

Glass

Security Dyes
**EUCAP:**

*European Collection of Automotive Paints*

- Founded by European Paint Group in 1995
- EPG - Expert Working Group of ENFSI
EU civilian mission under the Common Security and Defence Policy (CSDP)
European Collection of Automotive Paint (EUCAP)

History

1985:
Establishment of central collection of automotive paints at BKA/ Germany (ZALS)

1995:
Establishment of EUCAP by members of the European Expert Working Group Paint (EPG)
PDQ/ FBI-EUCAP collaboration legal issues / data exchange

- Cooperation RCMP/ BKA:
  1995 MoU

- Cooperation FBI/ BKA:
  1997 Contract of non-disclosure

- Data transfer RCMP/ PDQ: annual PDQ-update per USB-stick for EPG members which have signed the RCMP agreement of n-d and confidentiality

- Data access EPG/ EUCAP: permanent access for FBI and RCMP to the EPG website to download the latest spectral libraries
PDQ/ FBI - EUCAP collaboration sample exchange

- **FBI**: paint samples from the U.S.-market for EUCAP
- **EUCAP**: Annually, new EUCAP paint samples are send to RCMP/ FBI
Members from 28 European Countries as well as from U.S.A., Canada, Singapore, South Korea, South Africa and Morocco have access to EUCAP.

⭐ EUCAP - member

European Collection of Automotive Paint (EUCAP)
Aim:
Identification or characterisation of paint systems

Application:
Hit & run cases, all cases in which paint systems occur as trace evidence
Use of EUCAP:

- **Characterisation**
  
  Hit & run cases; determination of:
  
  Colour, car make, model, year of production

- **Comparison**
  
  Cases in which trace evidence from suspect & scene of crime are available
Sample collection at BKA Wiesbaden/ Germany

~20,000 samples
Database hosted by IRCGN Pontoise/ France

62,000 IR spectra and corresponding sample properties from almost 20,000 paint samples
The novel possibilities offered in the recent versions of the KnowItAll®/Bio-Rad software are used to estimate the validation parameters of the EUCAP database system (sensitivity, specificity, false rejection rate and false acceptance rate).

Especially, the multi-layer search is applied.
Evaluation is based on a selection of 123 samples considering the model years 2000 until 2015 and as much car makes and models/production plants as possible.

The samples are taken from casework which has been done over the years.

The spectra of the selected samples have been made anonymous and distributed to the five participating laboratories as a blind test.
IR spectral libraries:
- Spray Paints: 1019 spectra
- Tool Paints: 446 spectra
- Dyes and Pigments: 649 spectra
- Miscellaneous from casework: 3218 spectra
- Adhesives/Adhesive Tapes: 6007 spectra

Raman spectral libraries:
- Dyes and Pigments: 2753; Inorganics: 178 spectra
The significance of EUCAP is different for the various countries and even among the forensic institutes within one country because of:

- differences in jurisdiction about hit-and-run,
- different significance given to material analysis
- different strength of the network between the forensic science institutes and the investigating police officers/SOC officers.
Positive Effects of Common Databases

- Harmonization of analytical methods and procedures in casework
- Availability of the same databases as a knowledge base for the EPG community
- Coordinated training to keep a standard of competence
- Availability of a database for PT/CE
- Quality control is done by all users
- Contribution by all participants helps to keep the content diversity
- Contribution by all participants helps to keep databases up-to-date
EPG materials of interest

Paint

Tape

Glass

Security Dyes
BKA Tape collection

- Established 2003
- 2,900 tape samples with physical properties, FT-IR spectra
- Most samples off the shelf, few samples direct from production line, no casework samples
- Sample input mainly by BKA, support from various European FSI
Tape

BKA Tape collection

- Service of BKA for EPG & German FSI
- Knowledge pool for studies
- Quick link to manufacturer
- Reference samples (e.g. for additional comparison of processing features)
BKA Tape collection

- IR-spectra (backing, PSA)
- Color data (Lab)
- Pictures of product & package
- Thickness & width data
- Date of purchase & origin
- MS Access
EPG materials of interest

Paint

Tape

Glass

Security Dyes
- Harmonized method; “eleven laws” of RI measurement
- Common external std glass BKA-K5 with high homogeneity (Schott AG)
- Collection of RI data from German/ Switzerland FSI
- Organized/ hosted by federal state lab Stuttgart/ Germany

Regelkontrollmessungen am Referenzglas K5
Zusammenstellung

<table>
<thead>
<tr>
<th>Untersuchungsstelle</th>
<th>Anzahl der Messtage</th>
<th>Mittelwert</th>
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<td>2,03E-05</td>
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</tbody>
</table>
Klassenhäufigkeiten Brechungsindex

Vergleichsproben
(n= 3454)

neg. Tatspuren
(n= 3560)
Glass – elemental analysis

1995-97 Collection of float glasses of intl. sources
1997 Solution ICP-MS data of 64 glasses, chemometrics to determine discriminating element
2001/02 SCHOTT AG production of BKA FGS 1 & 2
2001-03 Development of a protocol for glass analysis
2005 Optimized method: JFS, vol. 50(6) 1327-41
2009-13 EAWG activities
2011 Match criterion: JAAS, 26, 1273
2013 ASTM E2927 – 13 (ASTM E2926-13)
LA-ICP-MS dataset in forensic casework

### LA-ICP-MS measurements on 62 different float glasses from the BKA glass collection

<table>
<thead>
<tr>
<th>Date</th>
<th>Glass Type</th>
<th>Manufacturer/Region</th>
<th>Origin Country</th>
<th>Origin Region</th>
<th>Company</th>
<th>Type</th>
<th>Reference</th>
<th>Location</th>
<th>Color</th>
<th>Notes</th>
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<td>Aichi 2</td>
<td>Japan</td>
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<td>Europe</td>
<td>Saint Gobain</td>
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</tbody>
</table>
Match criterion within sample variability

Commercial window pane (FBI glass group)

FBI: sample prep., GRIM, ICP-OES    BKA: LA-ICP-MS
Glass case data collection

- Started in 2007
- Each data set consisting of 18 elemental concentrations
- Non matching traces and control samples from casework
- 362 samples (May 2016)
  65341 pairwise comparisons
  16 random matches
Recent activities within the EPG

Paint
Tape
Glass
Security Dyes
Challenges with Common Databases

- Readiness of key companies to support databases by procuring samples and information is required.
- Sufficient resources (staff, money, time) for continual database updating/maintenance is needed.
- Participants have to show a disciplined approach by complying with rules for building up databases.
- The more participants, the more coordination is required.
Suggestion for Common Databases

- The possible benefit of a database must be evaluated and proved in advance.
- An agreement about the rules for building up the databases should be formulated by the experts and signed by the directors of the participating institutes.
- Continuous availability of sufficient resources (staff, money, time) for the updating/maintenance process must be guaranteed.
- The more complex a database the more a central coordinating lab should be in charge for the updating/maintenance process – samples and info can be delivered by the database users.
- A validation process, regular tests and surveys should be done to evaluate the benefit of the database.
Thanks & acknowledgements

Wolfgang Langer
Dr. Ulrich Simmroß
Esther Balzer
Dr. Peter Weis
Dr. Stefanie Stoll, all BKA Wiesbaden
Dr. Kornelia Nehse /
State Criminal Police Office Berlin