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Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Federal Department of Justice and Police FDJP  
Federal Office of Police fedpol

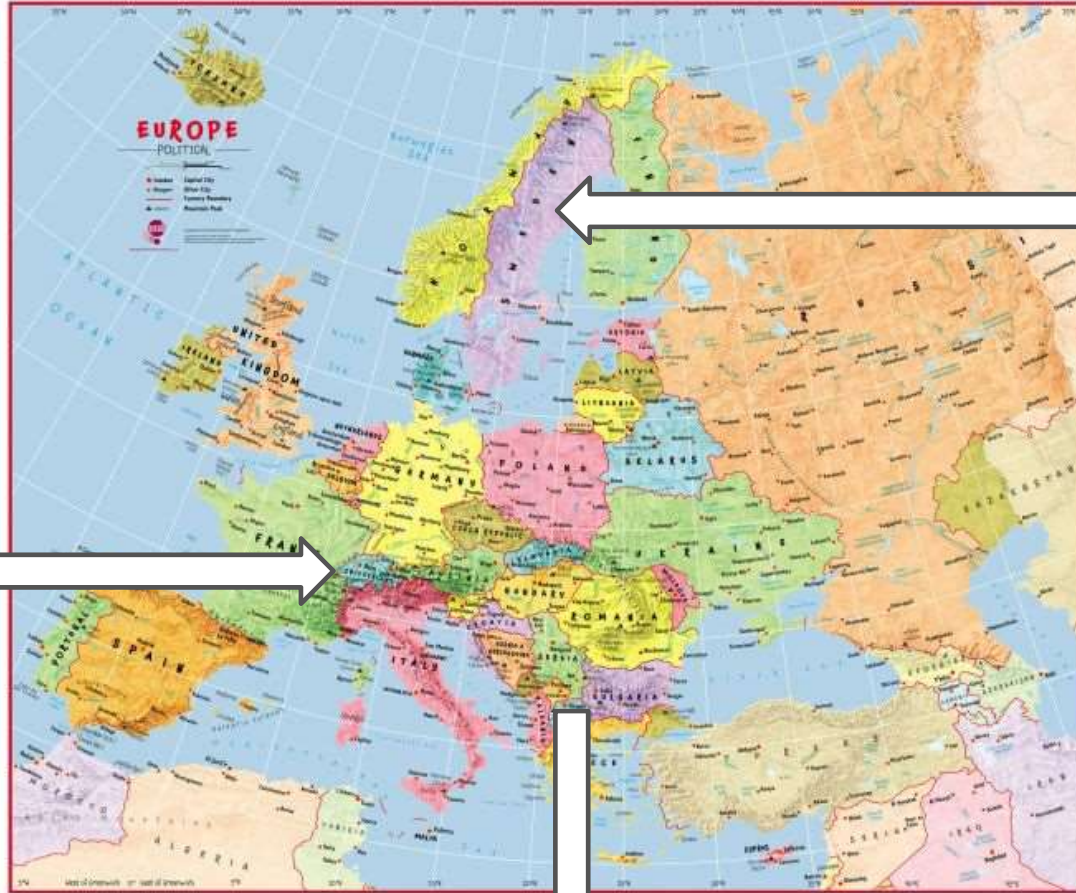
# **ACE-V, LR, verbal scale and 27 interpretations: welcome to Switzerland**

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# Fact & Figure

Switzerland



Sweden

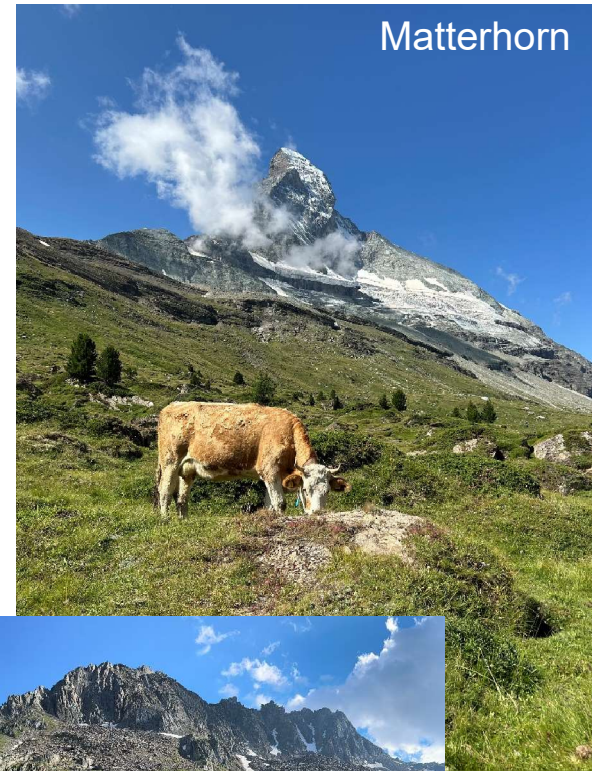
Swaziland



## Facts and figures

### Switzerland:

- ca. 9 million inhabitants
- No EU member, but MS Schengen Area (and Pruem)
- 26 cantons
- 1 international AFIS (+ principality of Liechtenstein)





## The plan

The situation in lophoscopy (or dactyloscopy if you wish) in Switzerland:

- In general
- Concerning ACE-V
- LR and verbal scale (evaluation of findings)





## In general

The situation in Switzerland:

- We have 26 cantons.
- We have a federal system. The national AFIS has no right to give instructions (in police matters).
- Principality of Liechtenstein joins sometimes the club.
- We have different languages (4).
- Tiny cultural differences...



## ACE-V

The current situation in Switzerland:

- A
- C
- E
- V



## ACE-V

### Analysis

#### *National AFIS*

- All in the system
  - No GYR(O)
  - No quality mapping
  - Rarely: notes taken
- 
- PiAnoS or CSIpix only if very complex and questioned latents, or for training.



# ACE-V: CSIpix

CSIpix 6 - Comparator mode

File Edit Calibrate Resample Enhance Annotate Rotate Crop Dewarp Matcher Split\_10print AFIS Zoom Measure Left Right Compare Swap Help License

Grid  Ghost  NIST File  Smooth  Load Left Image  Lock Zoom  Lock Pin  Load Right Image  Smooth

7250003169-160000695P

cde58b94-94bf-41e3

Annotation Options

- Dot
- Circle
- Pen/Ridge Tracing
- Text
- Magnified View
- Core
- Delta
- Arrow
- Straight Line
- Ridge End
- Bifurcation
- Logo
- FRStat
- Core (Round)
- Count

Pen Options

Pen Size (pixels): 5

Pen (%): 50

Opacity: 100

Save Options Selected Color: [Color]

Draw mode  Edit mode  Pan mode

Erase Minimize  Hide Annotations

Undo Last Draw Undo All Draw

Add Border

Percent of Image Width: 20 %

Apply Undo Add Border

Left Image zoom=78 %

02:Trace 6686.tif

1086 x 1230 x 24 bits Res: 1000 px/inch

[x,y]: 0, 0, 0

Right Image zoom=145 %

VR\_F1\_1.pik

800 x 750 x 8 bits Res: 500 px/inch

[x,y]: [674, 218] [R,G,B]: [255,255,255]

Left Palm Right Palm F1 F2 F3 F4

Pin\_Le\_Low\_1.pik\_RL\_Low\_2.pik VR\_F1\_1.pik VR\_F2\_2.pik VR\_F3\_3.pik VR\_F4\_4.pik

Tip: Draw mode "Shift D" Undo Draw "Ctrl Z" Edit mode "Shift E" Pan mode "Shift P" Ridge End "Shift R" Bifurcation "Shift B"





# ACE-V: PiAnoS

The screenshot displays the PiAnoS software interface. The main window shows a fingerprint image with several regions highlighted in red and orange. The interface includes a toolbar on the left with various tools like 'Q', 'M', 'R', 'O', 'ESLR', and 'Marker size'. The central image area shows a fingerprint with red and orange annotations. The right panel shows a 'Results' list with various 'anonymous' entries, and a 'Layers' section with 'Images' and 'Quality' checked. The bottom status bar shows 'Ready', 'Progress', 'Mark values', and 'Decisions'.

It's free of charge: <https://ips-labs.unil.ch/doc/index.html>



## ACE-V

### Analysis

#### *Cantons*

- Forms to document are available (forms nor use standardized)
- Procedures not standardized as well (application of GYRO or quality mapping; different procedure for easy or complex latents, etc.)



# ACE-V



Interkantonale Kriminalpolizeiliche Arbeitsgruppe **Kriminaltechnik**  
 Groupe de travail intercantonal Police Judiciaire **Police Scientifique**  
 Gruppo di lavoro intercantonale Polizia Giudiziaria **Polizia Scientifica**



## Recertification en dactyloscopie niveau III 2024 – partie 2

### Trace n° 6686 – formulaire d'analyse

#### Des crêtes papillaires à la surface

##### 1. Considérations anatomiques

Doigt paume phalange autre .....  
 Quel doigt? ..... Quelle zone palmaire .....

##### 2. Direction du touché

Forme de la trace .....  
 Direction, mouvement? .....

##### 3. Distorsion latérale ou longitudinale (glissement)

En accord avec une certaine direction ou prise particulière de l'objet ?  
 .....

##### 4. Pression lors de la déposition

Pression d'apposition: faible moyenne forte excessive  
 Surface en jeu .....  
 Largeur des crêtes .....  
 Largeur des vallées .....

##### 5. Matrice (résidu)

Type: eccrine sébacée sang indéterminé autre  
 Quantité: faible moyenne importante en excès

##### 6. Méthode de révélation

Type: poudre ninhydrine cyanacrylate inconnu autre  
 Quantité: faible moyenne importante en excès

##### 7. Support des traces

Nature du support (décrire celui-ci si connu)  
 .....  
 Bruit de fond: faible moyen important en excès  
 Ondulé ou plat ? .....

#### Les crêtes papillaires

8. <b>Qualité de l'image</b>	1	2	3	4	5
Déterminer les tolérances	.....				
9. <b>Quantité de caractéristiques</b>	1	2	3	4	5
Détails Niveau 1	oui non				
Détails Niveau 2	oui non				
Détails Niveau 3	oui non				
Caractéristiques rares ou occasionnelles	oui non				
10. <b>Contraste</b>	1	2	3	4	5
11. <b>Nombre de points de focalisation</b>	1	2	3	4	5
12. <b>Suivre les crêtes et les vallées</b>					
13. <b>Signaux d'alarme</b>					
Lignes en erreur	.....		Forme en "V" .....		
Apposition multiple	.....		Rotation ou effet de pression .....		

#### Annexe

Joindre une documentation photographique.  
 Celle-ci doit comporter le n° et nom/prénom du/de la participant/e, ainsi que le n° de la trace analysée.



## ACE-V

### Comparison & Evaluation

#### *National AFIS*

- Documented in form of markers, chart
- No (GYR)O
- If needed: latent related notes
- We know Noldent, Inconclusive, Ident
- Message sent to the customer with chart





## ACE-V

### Comparison & Evaluation

#### *Cantons*

- No standardization
- Sometimes documented (Photoshop, CS!pix, FCS, ....)
- Sometimes documented depending on the complexity
- Sometimes (GYR)O
- If needed: latent related notes
- Noldent, Inconclusive, Ident; verbal scale, LR... later more!



## ACE-V

### Verification

#### *National AFIS*

- If latents involved, always 2 fingerprint examiners
- No blind verification (only if 3rd examiner needed)
- Depends on the first examiner's decision
  - If Noident: ACE
  - If Inconclusive, Ident: CE



## ACE-V

### Verification

*Cantons (AFIS not involved)*

- No standardization (if, how)



## ACE-V

### Verification

#### *Cantons (AFIS involved)*

- From 0 to hardcore
- 0 = printing our message = the identification report
- Hardcore = new set created by one of two persons of the latent unit (1 latent, 3 tenprint cards), distributed to two different fingerprint examiners in the same time, blind)
- Discussion on-going what kind of verification has/should/should not be done in that case





ACE-V

## First conclusion

Paradise looks different...



ACE-V

## **First conclusion**

Paradise looks different...

Countermeasures?



ACE-V

## Countermeasures

- Declaration of Solothurn  
(meeting of the heads of the CSI units and Principality of Liechtenstein)
- Working group 'Dactyloscopy' (national)
- Working group 'Evaluation of findings' (national, again)



### **Declaration of Solothurn**

*The training of specialists in dactyloscopy and the development of their skills take place within the framework of a 3-stage system, which is reviewed periodically. The dactyloscopic identification process and decision is based on a probabilistic approach, i.e. it is based on both a qualitative and quantitative assessment of the elements to be compared and not on a minimum number of Galton points. The identification process provides for a hierarchical approach to verification and a control of the dactyloscopic comparisons, whereby a distinction is made in the analysis phase between simple and complex cases. This approach is based on the ACE-V method (Analysis, Comparison, Evaluation - Verification). The process is coordinated by the committee of the dactyloscopy working group.*

Declaration of Solothurn, version 2014 (first version: 2007)





## ACE-V

### Declaration of Solothurn

*The training of specialists in dactyloscopy and the development of their skills take place within the framework of a 3-stage system, which is reviewed periodically. The dactyloscopic identification process and decision is based on a **probabilistic** approach, i.e. it is based on both a qualitative and quantitative assessment of the elements to be compared and not on a minimum number of Galton points. The identification process provides for a hierarchical approach to verification and a control of the dactyloscopic comparisons, whereby a distinction is made in the analysis phase between simple and complex cases. This approach is based on the **ACE-V** method (Analysis, Comparison, Evaluation - Verification). The process is coordinated by the committee of the dactyloscopy working group.*

Declaration of Solothurn, version 2014 (first version: 2007)



## ACE-V

### Evaluation: current state

- Declaration of Solothurn: probabilistic (paper)
- National papers concerning 'evaluation of findings' (paper)
- National AFIS: Noldent, Inconclusive, Ident
- Cantons: AFIS, verbal scale (different ones, indeed; trained defense and prosecution, investigators), LR (never reported)



## ACE-V

### Evaluation: future

- National AFIS + cantons: applying the 'evaluation of findings' promoted in the papers of the working group
- Based on ENFSI's 'Guideline for Evaluative Reporting in Forensic Science'
- All forensic disciplines (same verbal scale)



## Evaluation: future

- 2 hypotheses, Bayes, source level (not: activity, offence)
- Verbal scale:

still with identification and exclusion in dactyloscopy

Verbaler Ausdruck	LR
Die Ergebnisse sprechen äusserst stark für eine Hypothese im Vergleich zur jeweiligen Alternative.	>1'000'000
Die Ergebnisse sprechen sehr stark für eine Hypothese im Vergleich zur jeweiligen Alternative.	>10'000 – 1'000'000
Die Ergebnisse sprechen stark für eine Hypothese im Vergleich zur jeweiligen Alternative.	>100 – 10'000
Die Ergebnisse sprechen mässig stark für eine Hypothese im Vergleich zur jeweiligen Alternative.	>10 – 100
Die Ergebnisse sprechen leicht für eine Hypothese im Vergleich zur jeweiligen Alternative.	<10
Die Ergebnisse sprechen nicht substantiell für die eine oder für die andere Hypothese.	Ungefähr 1

Values* of likelihood ratio	Verbal equivalent (two options of phrasing are suggested)
1	The forensic findings do not support one proposition over the other. The forensic findings provide no assistance in addressing the issue.
2 - 10	The forensic findings provide weak support** for the first proposition relative to the alternative. The forensic findings are slightly more probable given one proposition relative to the other.
10 - 100	...provide moderate support for the first proposition rather than the alternative ...are more probable given...proposition...than proposition...
100 - 1000	...provide moderately strong support for the first proposition rather than the alternative ...are appreciably more probable given... proposition...than proposition...
1000 - 10,000	...provide strong support for the first proposition rather than the alternative ...are much more probable given... proposition...than proposition...
10,000 - 1,000,000	...provide very strong support for the first proposition rather than the alternative ...are far more probable given... proposition...than proposition...
1,000,000 and above	...provide extremely strong support for the first proposition rather than the alternative ...are exceedingly more probable given... proposition...than proposition...

\* Likelihood ratios corresponding to the inverse (1/X) of these values (X) will express the degree of support for the specified alternative compared to the first proposition.

\*\* Forensic practitioners or their reports should avoid conveying the impression that a statement of the kind: "the forensic findings provide weak support for the first proposition compared to the alternative" is meaning that the findings provide (strong) support for the stated alternative. It just means that the findings are up to 10 times more probable if the first proposition is true than if the stated alternative is true. This is also the reason why the alternative should be explicitly stated. In cases where the reader could be misled as described above, forensic practitioners shall add additional comments.



# ACE-V

Scale	Meaning	Verbal expression PUNT-MessageHandler English	LR
Identification (ID)		Identification	Expert opinion (tends towards infinity)
5	Extremely strongly	The results extremely strongly support the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	> 1,000,000
4	Very strongly	The results very strongly support the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	10,000 - 1,000,000
3	Strongly	The results strongly support the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	100 – 10,000
2	Moderately strongly	The results moderately strongly support the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	10 - 100
1	Lightly	The results lightly support the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	1 - 10
0	Neither nor	The results neither support the hypothesis that the latent with PCN XXX originates from the person with PCN YYY nor the hypothesis that it originates from another person.	1
-1	Slightly against	The results speak slightly against the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	0.1-1
-2	Moderately strongly against	The results speak moderately strongly against the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	0.01-0.1
-3	Strongly against	The results speak strongly against the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	0.0001-0.01
-4	Very strongly against	The results speak very strongly against the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	0.000001-0.0001
-5	Extremely strongly against	The results speak extremely strongly against the hypothesis that the latent with PCN XXX originates from the person with PCN YYY and not from another person.	< 0.000001
Exclusion (Ex)		Exclusion of one or more candidates, which is communicated to the client.	Expert opinion (tends towards 0)



How was it received?

What - why? are you bored?? is it  
to justify your salary???





ACE-V

## The why: the reality







ACE-V

## The why: black&white





ACE-V

## The why: grayscale





## ACE-V

### Evaluation: next steps

- Training on national level, starts early 2025
- Internal trainings starting in two months as first step of the introduction, focused on the verbal scale



## ACE-V

Evaluation: oh, yes, the LR

- Currently never officially reported
- To confirm the procedure, examiner's feelings, for borderliner
- Project AFIS2026: customers were asking for LR values as part of the answer
- Now: requirement (robustness? validation? model?)



# ACE-V

Evaluation: stuff with numbers at the end

- FRStat (USA)
- Xena (CH, ESLR, SLR, in PiAnoS)



General pattern										
Finger	Whorl		Left Loop		Right Loop		Arch		All	
1	$33.39 \times 10^{+6}$	(48'201)	$8.35 \times 10^{+12}$	(280)	$973.00 \times 10^{+3}$	(46'591)	$15.87 \times 10^{+9}$	(2'436)	$4.76 \times 10^{+6}$	(94'693)
2	$29.89 \times 10^{+6}$	(34'841)	$411.84 \times 10^{+6}$	(23'379)	$1.68 \times 10^{+6}$	(31'556)	$4.41 \times 10^{+6}$	(12'673)	$11.28 \times 10^{+6}$	(91'046)
3	$2.86 \times 10^{+6}$	(20'318)	$1.21 \times 10^{+6}$	(2'699)	$637.16 \times 10^{+3}$	(71'226)	$211.81 \times 10^{+3}$	(7'415)	$836.98 \times 10^{+3}$	(94'564)
4	$3.06 \times 10^{+6}$	(49'193)	$12.75 \times 10^{+6}$	(1'377)	$644.25 \times 10^{+3}$	(47'961)	$520.72 \times 10^{+3}$	(2'816)	$1.32 \times 10^{+6}$	(94'238)
5	$1.34 \times 10^{+6}$	(21'260)	$2.44 \times 10^{+6}$	(551)	$637.79 \times 10^{+3}$	(77'650)	$11.50 \times 10^{+6}$	(2'481)	$737.15 \times 10^{+3}$	(93'704)
6	$39.67 \times 10^{+6}$	(37'195)	$61.09 \times 10^{+6}$	(56'625)	$3.79 \times 10^{+6}$	(251)	$65.55 \times 10^{+6}$	(3'581)	$46.15 \times 10^{+6}$	(94'409)
7	$12.34 \times 10^{+6}$	(32'021)	$77.23 \times 10^{+6}$	(37'648)	$2.46 \times 10^{+6}$	(20'604)	$759.18 \times 10^{+3}$	(12'361)	$9.55 \times 10^{+6}$	(91'111)
8	$7.85 \times 10^{+6}$	(19'810)	$5.03 \times 10^{+6}$	(70'059)	$87.65 \times 10^{+3}$	(3'742)	$63.63 \times 10^{+3}$	(9'347)	$3.07 \times 10^{+6}$	(94'198)
9	$111.22 \times 10^{+6}$	(36'983)	$58.30 \times 10^{+6}$	(60'297)	$773.65 \times 10^{+3}$	(968)	$539.51 \times 10^{+3}$	(3'465)	$56.88 \times 10^{+6}$	(94'309)
10	$97.37 \times 10^{+6}$	(16'236)	$44.92 \times 10^{+6}$	(81'039)	$58.80 \times 10^{+3}$	(546)	$559.77 \times 10^{+3}$	(3'565)	$41.09 \times 10^{+6}$	(93'278)
All	$12.45 \times 10^{+6}$	(316'058)	$30.96 \times 10^{+6}$	(333'954)	$596.16 \times 10^{+3}$	(301'095)	$650.01 \times 10^{+3}$	(60'140)	$4.18 \times 10^{+6}$	(935'550)



## ACE-V

### Conclusions

- Same analysis nationwide? Well...
- Same comparison&evaluation nationwide? Some hope...
- Same verification nationwide? Well...
- A lot of training, discussions and work has to be done.  
And that takes time.



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## Thanks for your presence!

In case of any questions, complaints, comments,  
suggestions, insults, feel free to contact me  
today or later:

**Federal Office of Police Switzerland**  
**Biometric Identification**

Kurt Aebersold: [kurt.aebersold@fedpol.admin.ch](mailto:kurt.aebersold@fedpol.admin.ch)

I apologize for the lack of quality in that presentation. It was not reviewed and it could be that there are some strange texts.