

OPEN MARKET CONSULTATION  
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# THE SHUTTLE TOOLKIT

GENERAL INTRODUCTION  
AND  
REQUIREMENTS

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Weerd



SHUTTLE

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# CONTENTS

- Current procedure
- Limitations
- SHUTTLE toolkit
- SHUTTLE requirements

# FORENSIC PROCESS

General state?

Damages?

Visible traces?

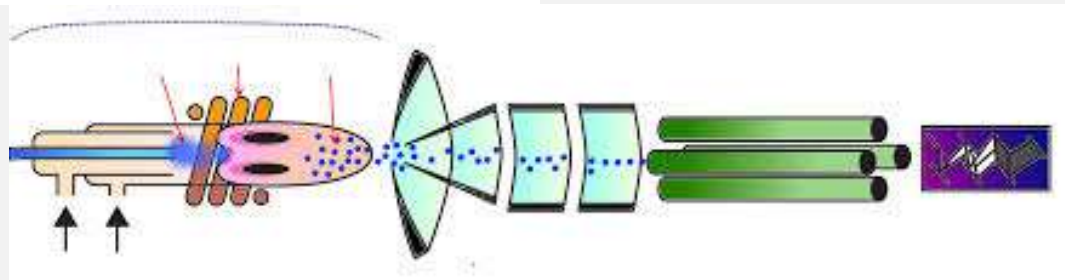
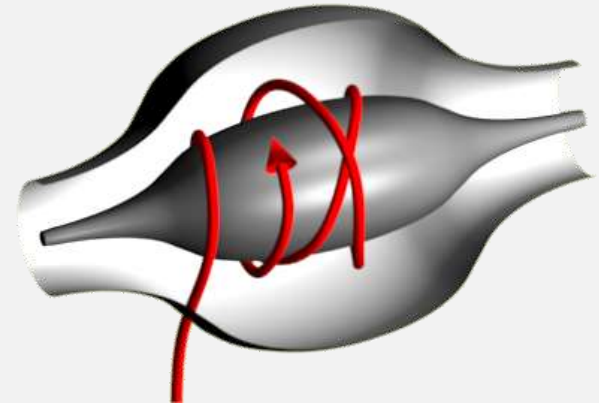
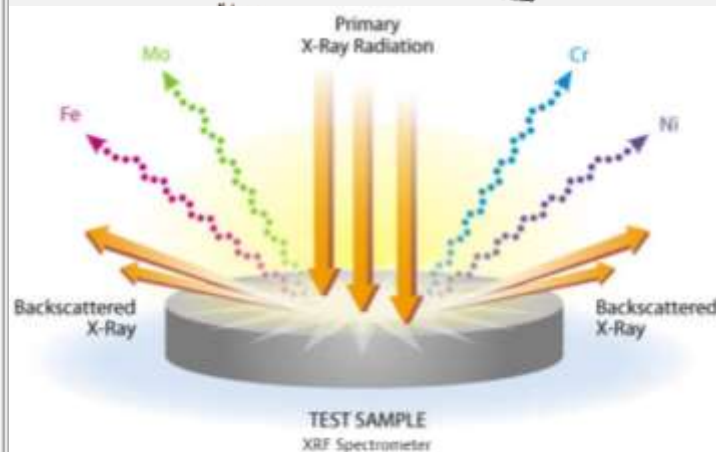
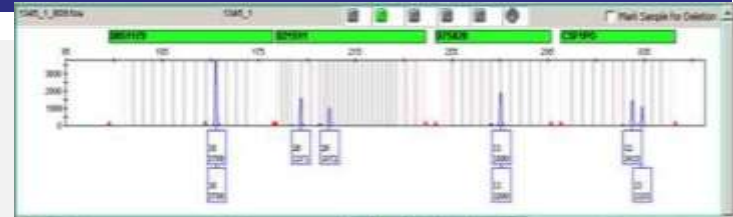
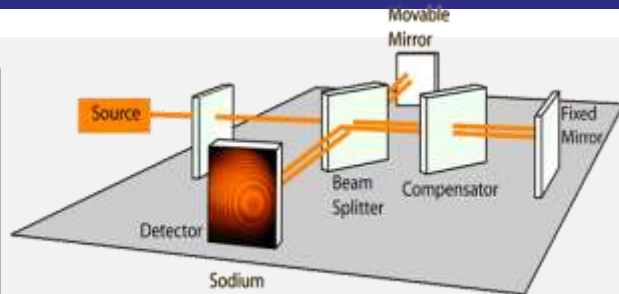
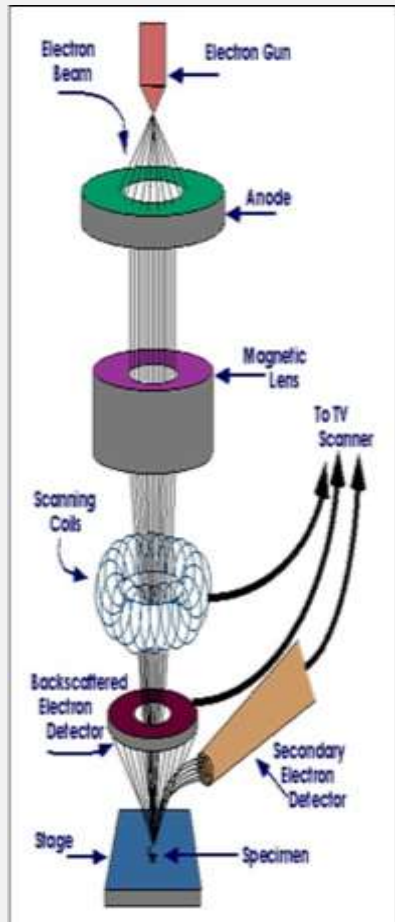
Blood?  
Tufts of fibre?  
Paint?

Small traces?

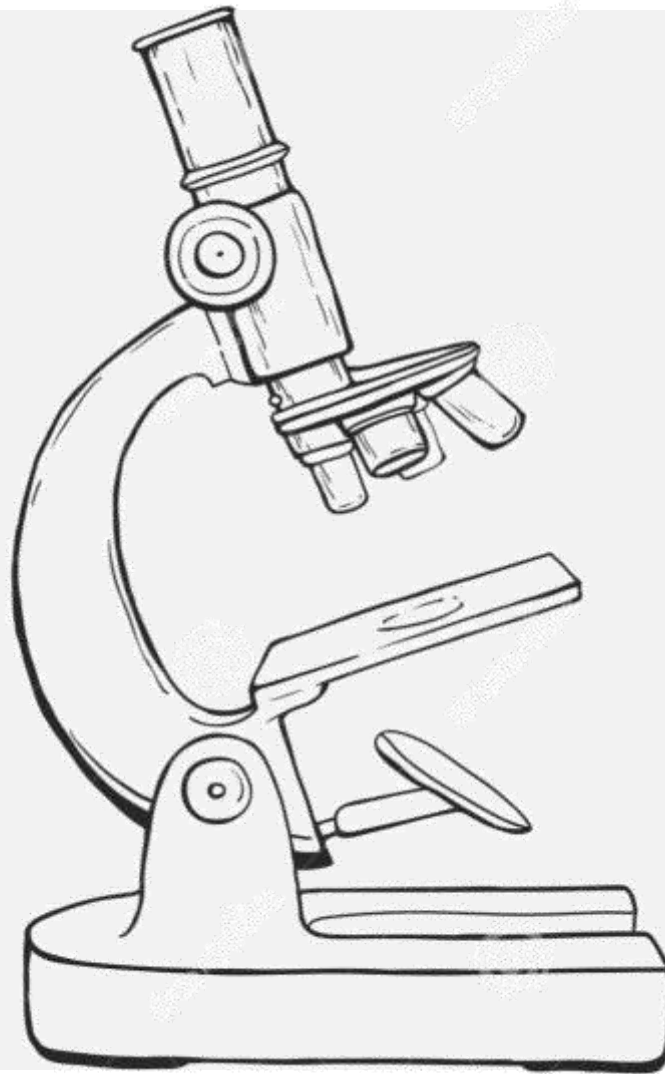
Known  
material



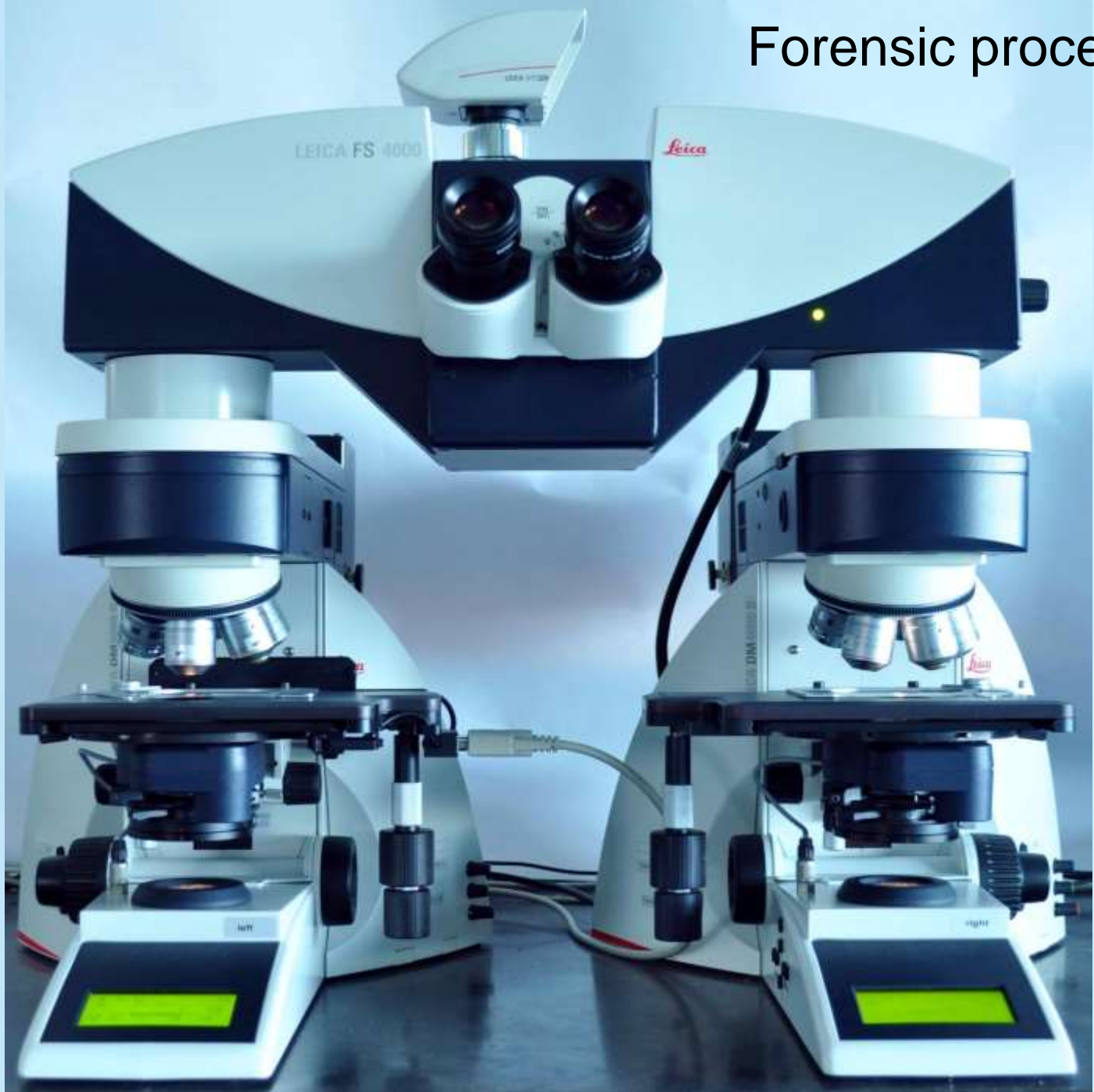
# TECHNIQUES



# MICROSCOPE



# Forensic process





# DNA SKIN CELLS?



# FIBRES?









Tape lift



Isolation and preparation



Isolation and preparation



Tape scanning



Comparison microscopy



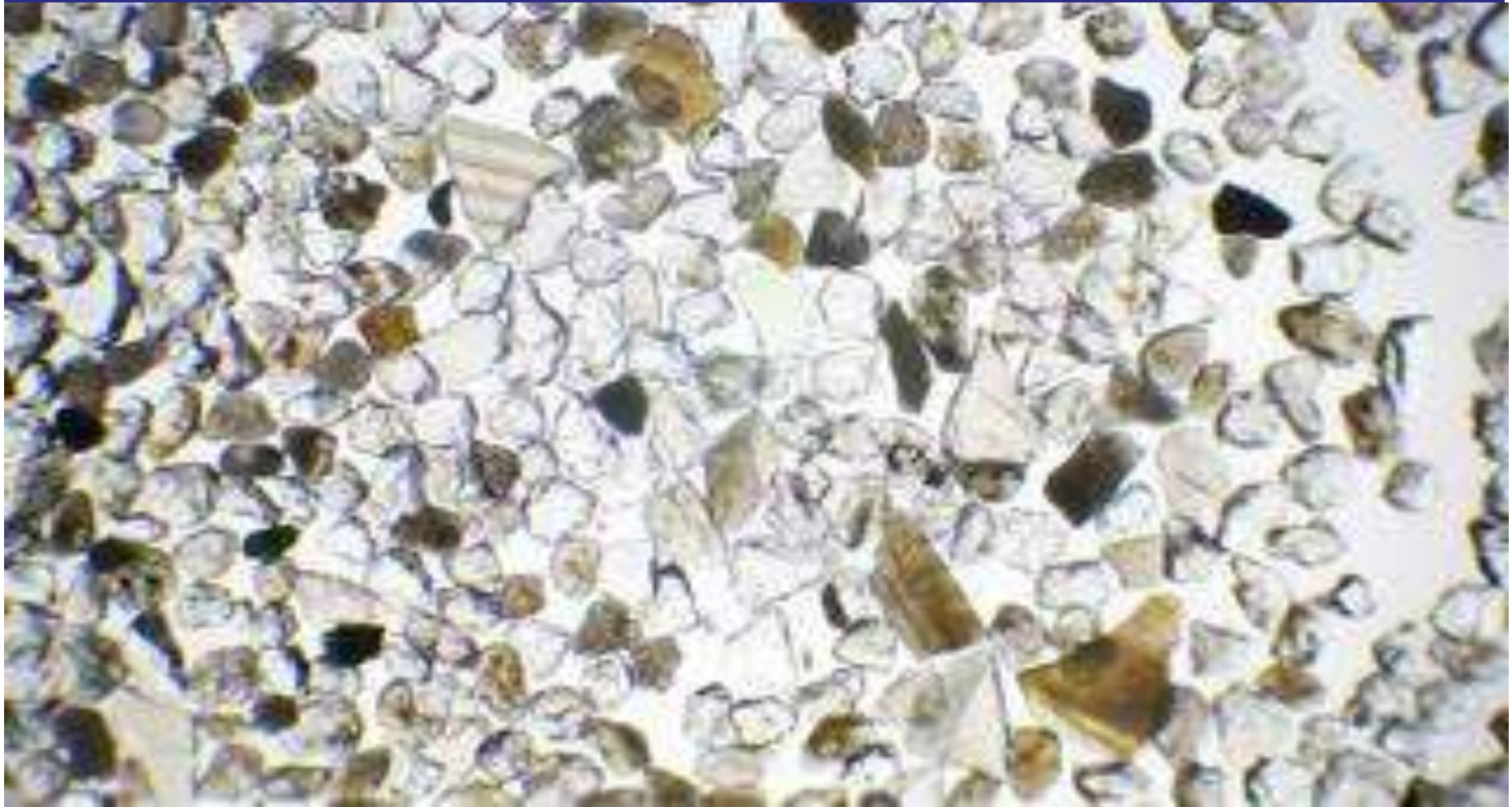
UV/Vis Microspectrometry

# GLASS?





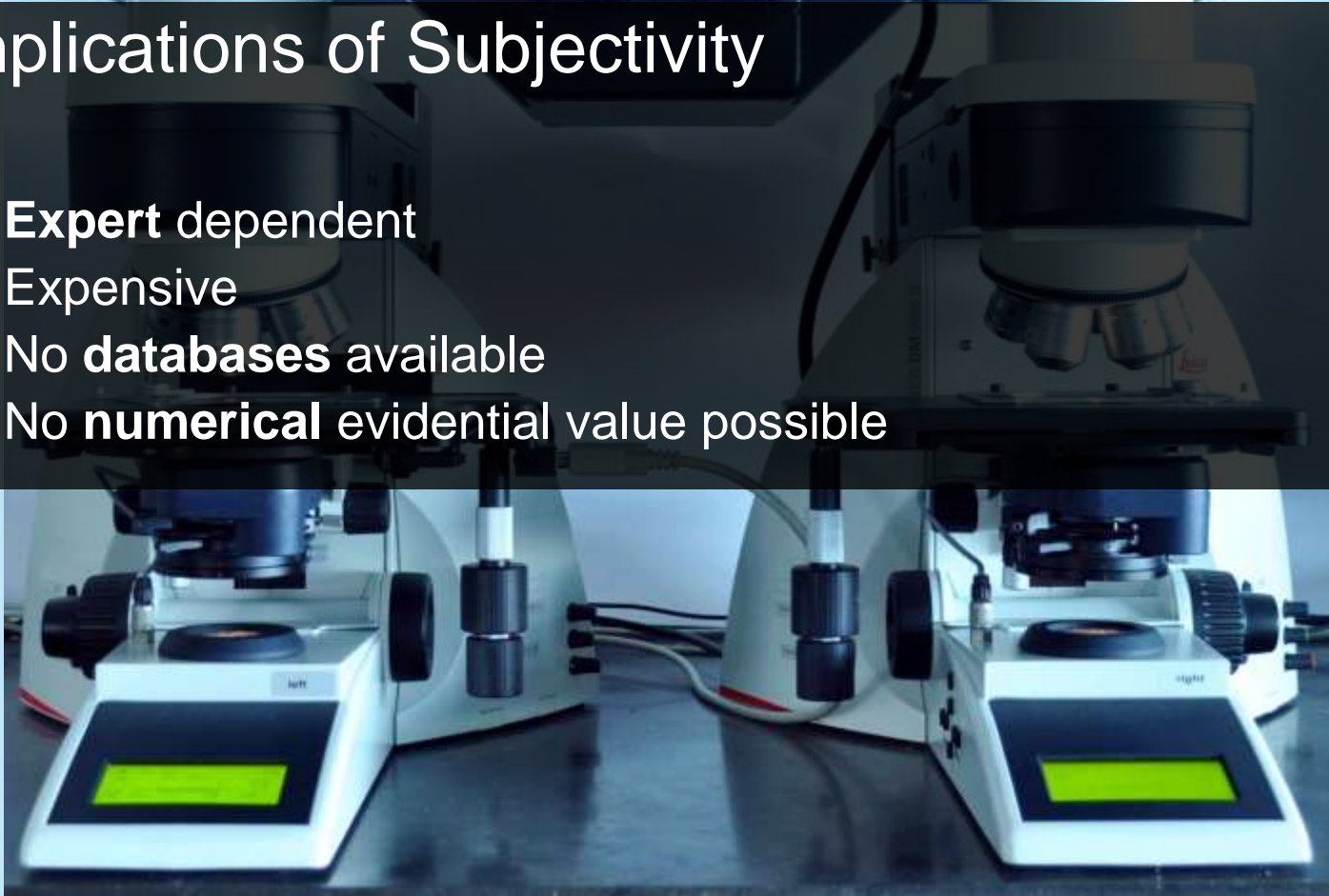
# FIND GLASS



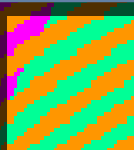
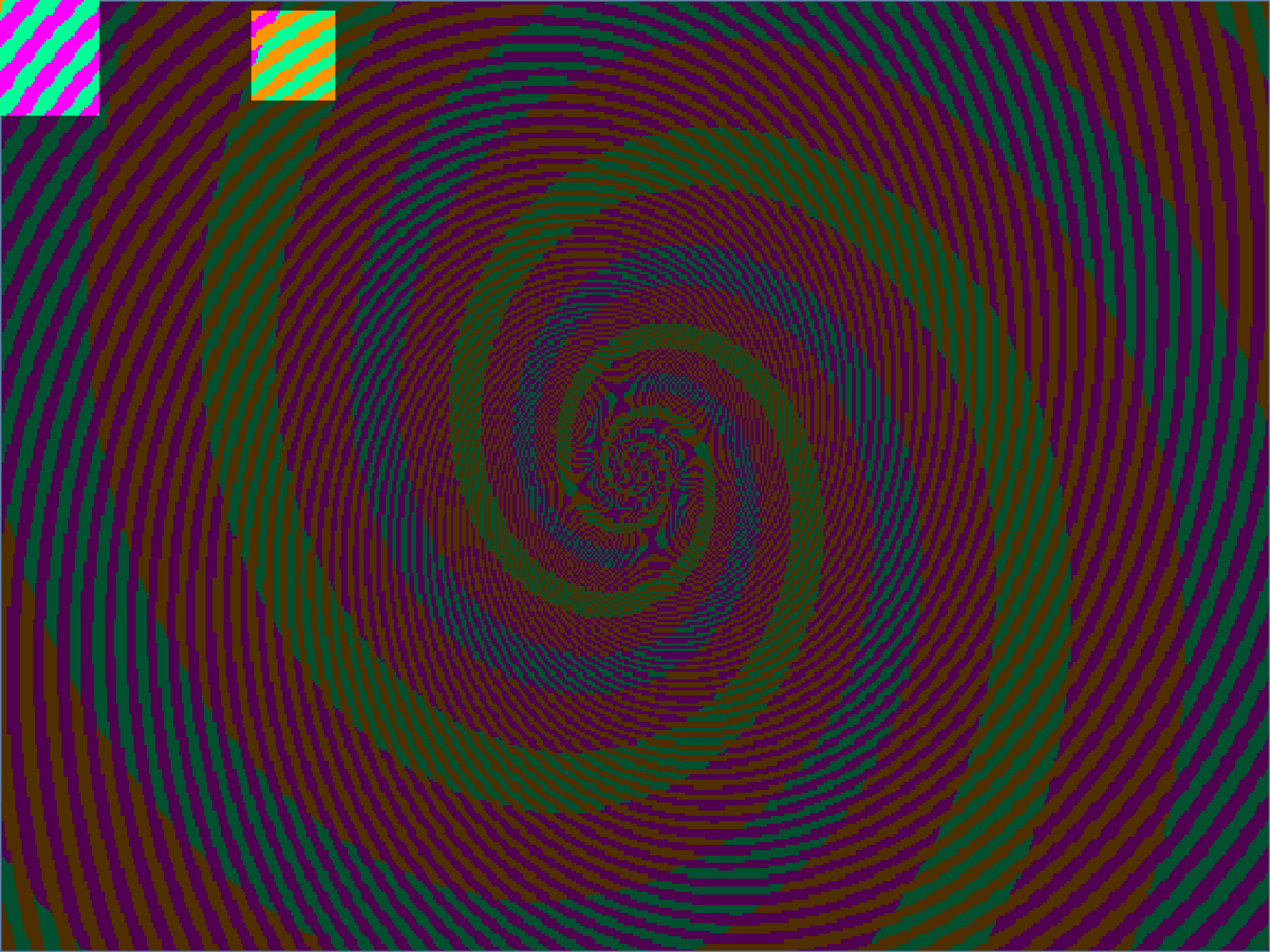


## ■ Implications of Subjectivity

- **Expert** dependent
- Expensive
- No **databases** available
- No **numerical** evidential value possible









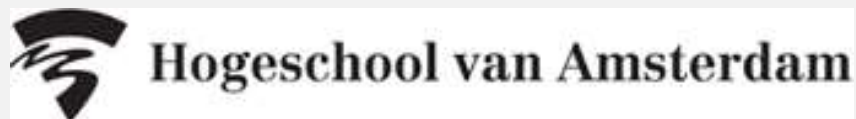
# REQUIREMENTS



Too busy to improve?  
Need more slack in your system!



# SHUTTLE





# SHUTTLE



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# Pre-Commercial Procurement

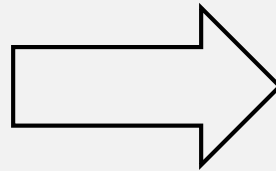
Pre-Commercial Procurement (PCP) challenges industry from the demand side to develop innovative solutions for public sector needs and it provides a first customer reference that enables companies to create competitive advantage on the market. PCP enables public procurers to compare alternative potential solution approaches and filter out the best possible solutions that the market can deliver to address the public need.

Public procurers can drive innovation from the demand side by acting as technologically demanding customers that buy the development and testing of new solutions. This enables European public authorities to modernize public services faster and to create opportunities for companies in Europe to take international leadership in new markets. Creating a strong European market for innovative products and services is an important step towards creating growth and jobs in quickly evolving markets such as ICT.

## What is Pre-Commercial Procurement?

[Policies](#)[Blog posts](#)[News](#)[Events](#)[Projects](#)[Funding](#)[Consultations](#)[Reports and studies](#)

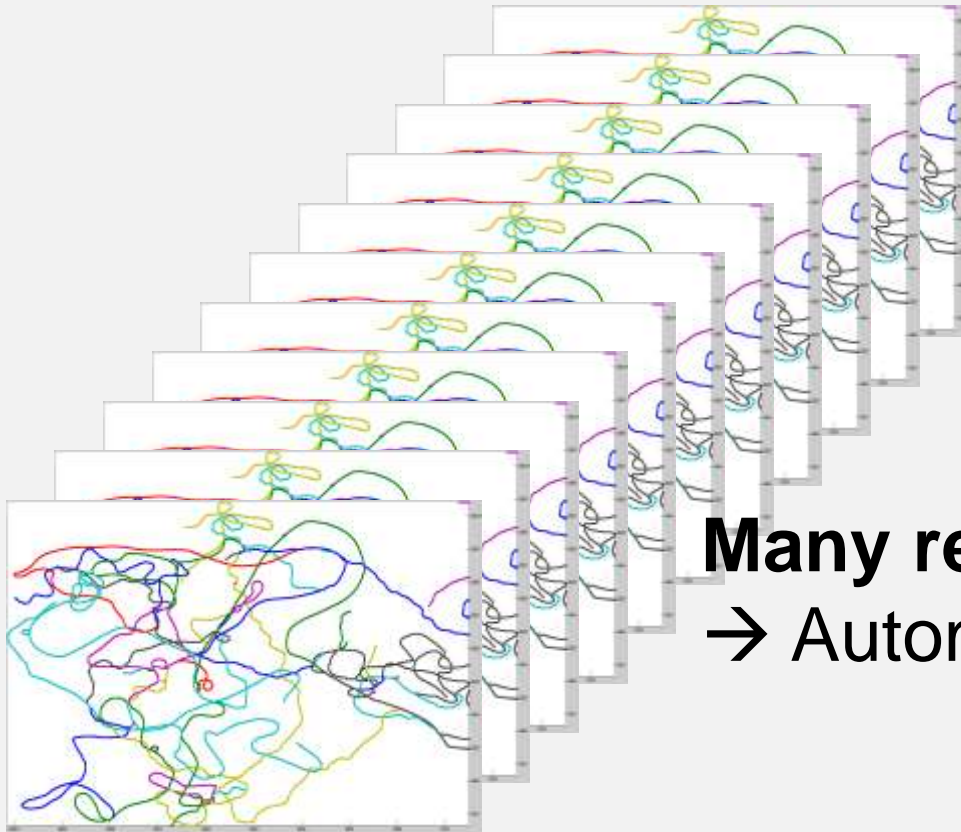
# INITIAL IDEA



automation



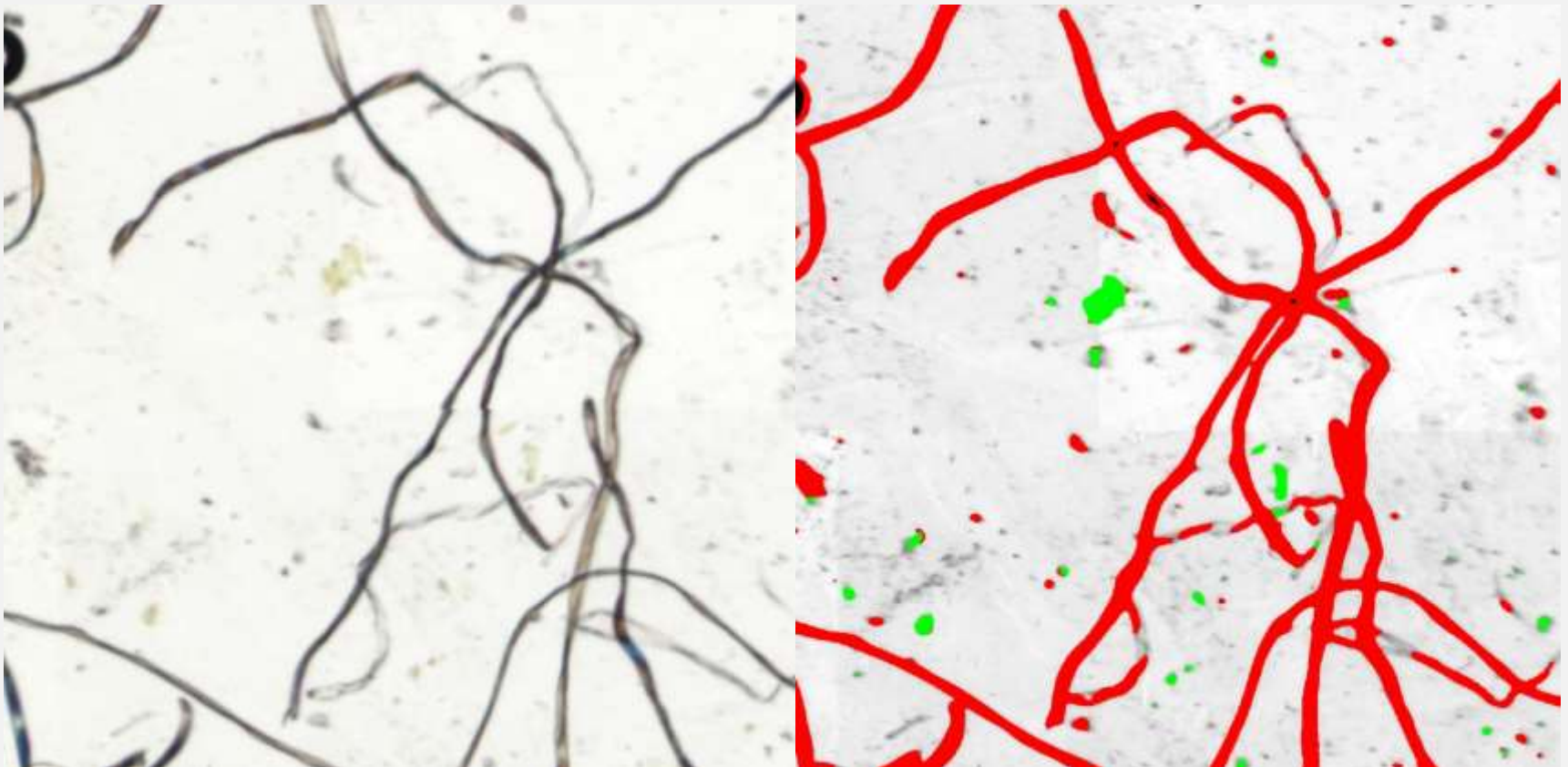
# CHALLENGES & OPPORTUNITIES



**Many results!**

→ Automate processing as well

# IMAGE PROCESSING





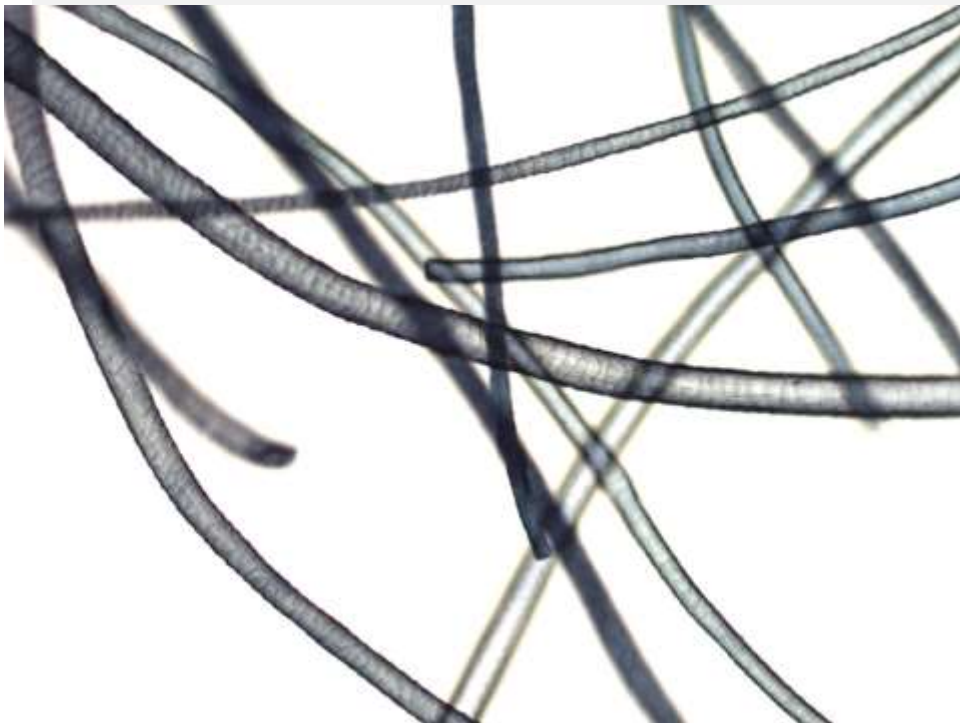
# CHALLENGES & OPPORTUNITIES



**Large area scanning**  
→ Tape must be  
microscopically clear

# Die Sicherung von Mikrospuren mit Klebband

Von Dr. Max Frei-Sulzer, wissenschaftlicher Mitarbeiter der Stadtpolizei Zürich



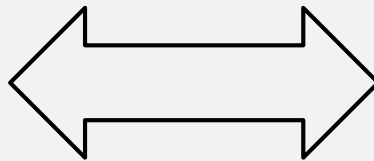
Glass slide



Clear tape

# CHALLENGES & OPPORTUNITIES

Relation expert  
and toolkit?

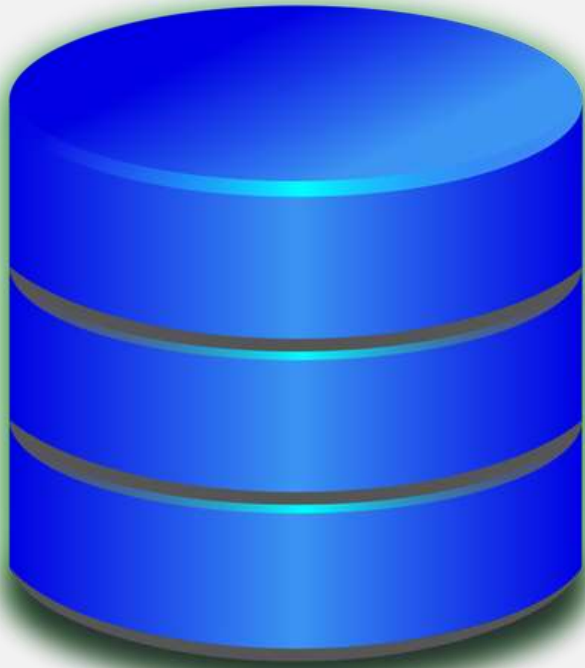


Competition?  
**Support!**



**Acquisition vs interpretation**

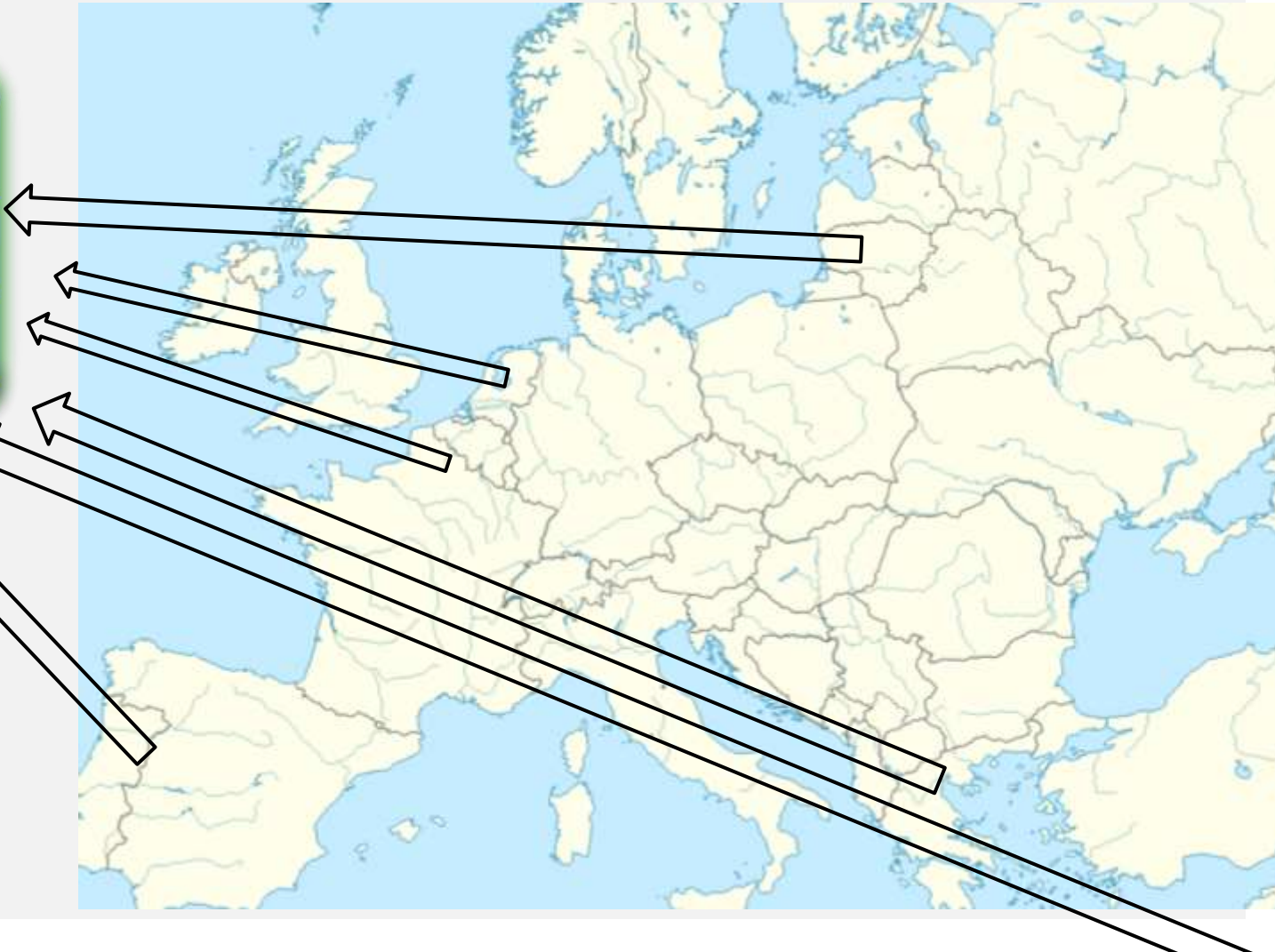
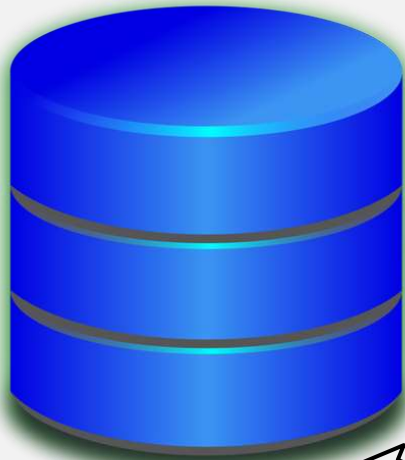
# CHALLENGES & OPPORTUNITIES



## **Store results**

- Statistics/evidential value
- Link cases
- provenance

# CHALLENGES & OPPORTUNITIES



**Privacy  
issues!**



# SHUTTLE Process

Tapes lifts



Automated microscope



Image processing



Database formation

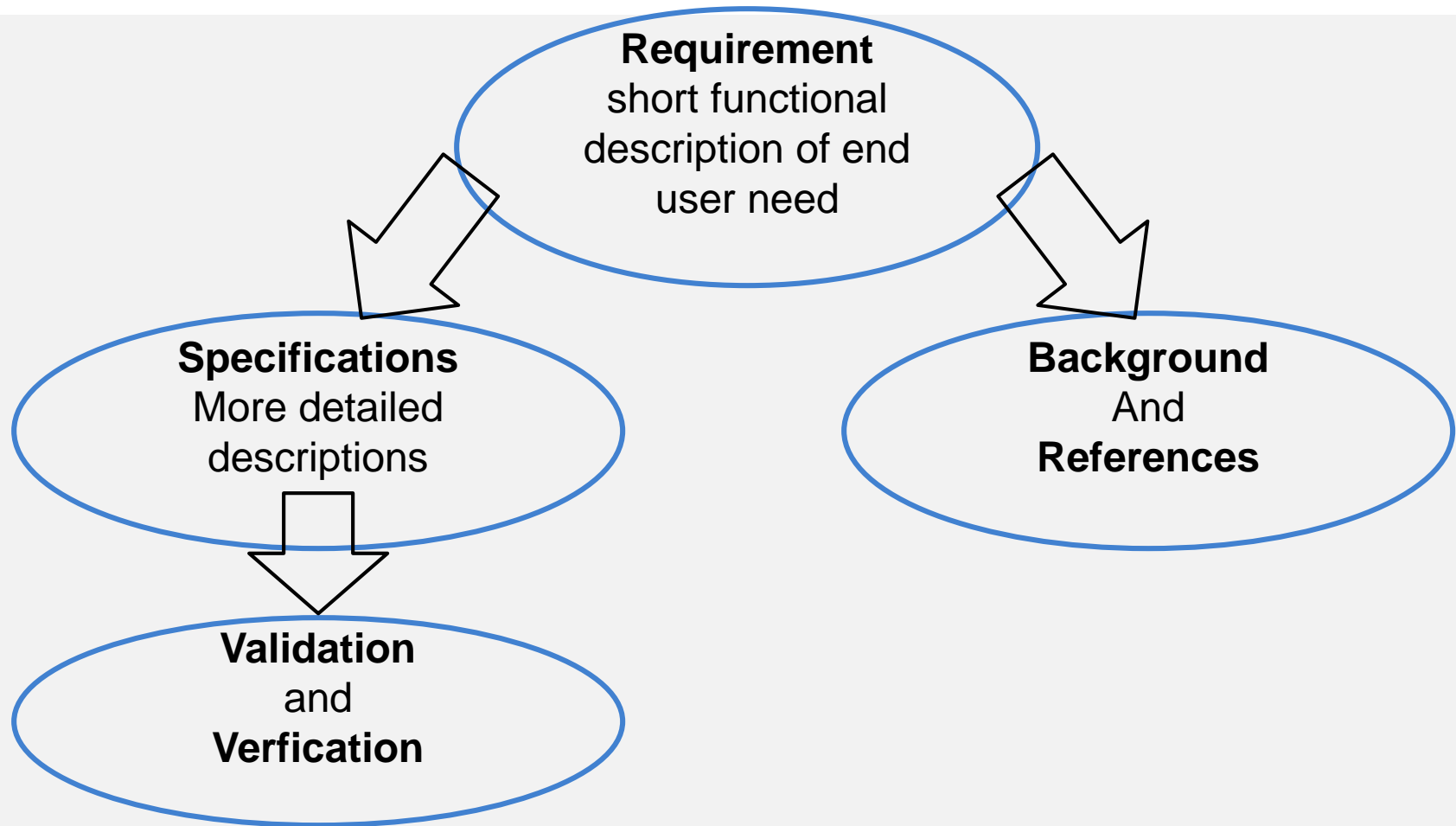


Pattern recognition  
procedures

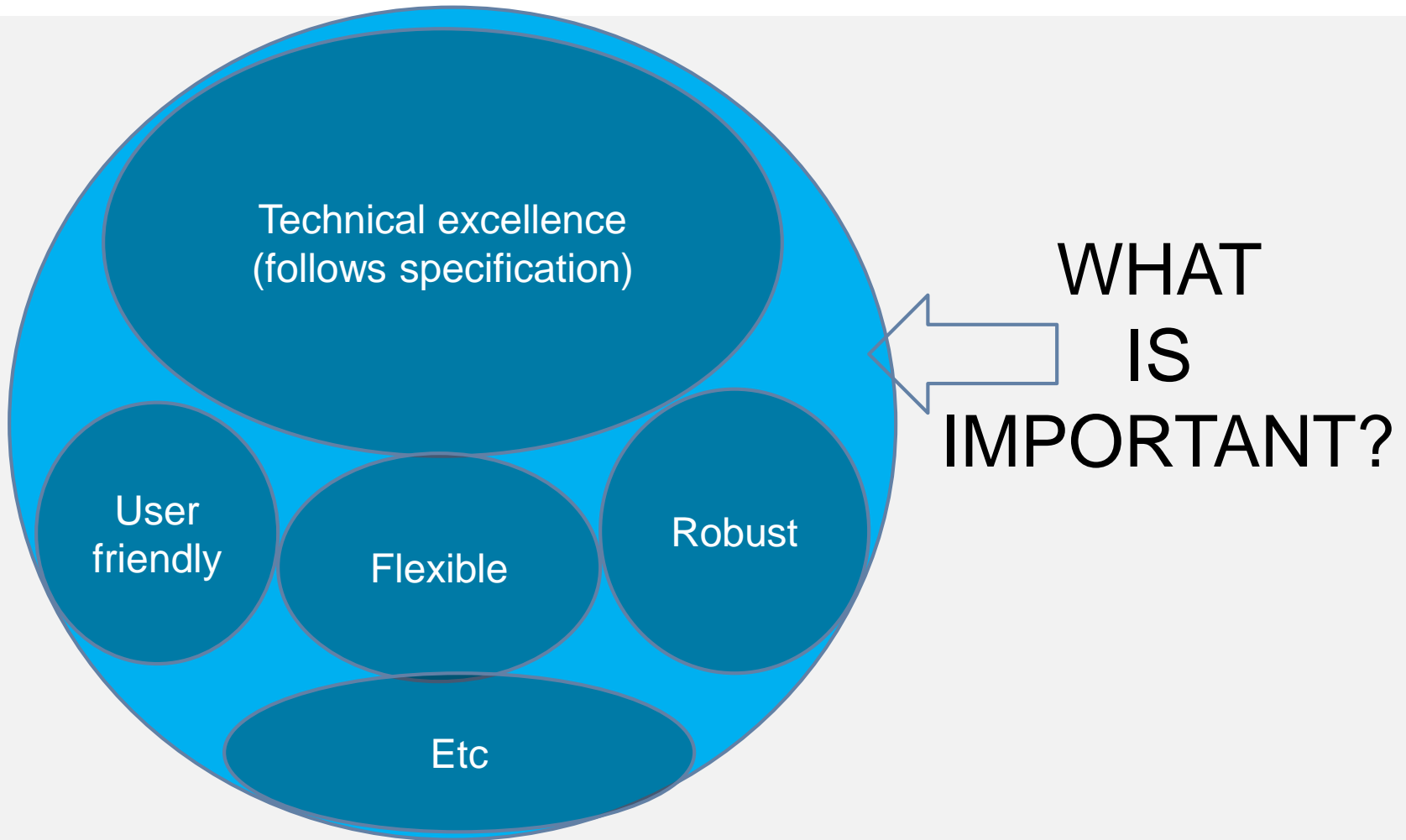


Further specific analyses  
( DNA, RAMAN, FTIR, GRIM and ICP-MS (glass), SEM/X )

# REQUIREMENTS



# REQUIREMENT AND KPI



# REQUIREMENTS

1. The Toolkit provides a tape system to recover traces efficiently using tape lifts.
2. The Toolkit allows further analysis of recovered traces
3. The Toolkit contains an automated microscope that provides images in various illumination modes
4. The Toolkit converts acquired images to information
5. The Toolkit stores and queries data and helps in its interpretation
6. Overall Toolkit requirements

# SAMPLE OF SPECIFICATIONS

NB:

Specifications to be mentioned  
are **not** complete, and  
may be altered



# REQUIREMENT 1

**The Toolkit provides a tape system to recover traces efficiently using tape lifts.**

- Earlier research shows that many current tapes can recover traces efficiently
- Ease of use important, flexible, not too flimsy

# REQUIREMENT 2

## **The Toolkit allows further analysis of recovered traces**

Further analysis within the tape:

- Conventional microscopy
- Raman
- MSP

Further analysis after isolation from the tape

- FTIR
- ICPMS
- DNA

# REQUIREMENT 3

**The Toolkit contains an automated microscope that provides images in various illumination modes**

- A spatial resolution of 2  $\mu\text{m}$  or better
- The microscope has different illumination modes, included at least transmission (T), Reflection (R), Fluorescence (F) and Polarisation (P).
- Spectrometric Imaging

# REQUIREMENT 4

## The Toolkit converts acquired images to information

- GUI and Algorithm
- Discriminate and visualise different types of traces
- Output as an overview

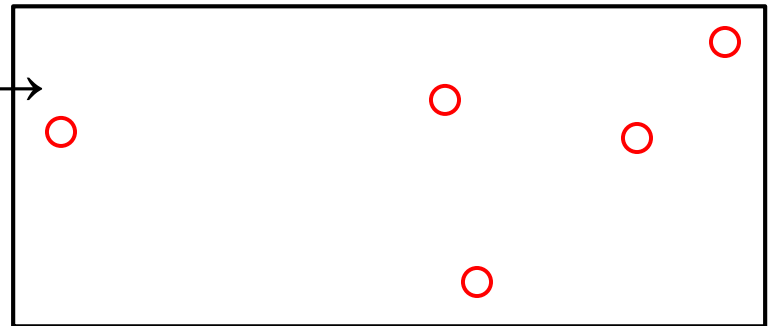
Trace	Coordinates	Properties	classification
1	(xy, xy)	(T, P, R, UV)	blood
2	(xy, xy, xy)	(T, P, R, UV)	fibre
3	(xy, xy, xy, xy)	(T, P, R, UV)	unknown



# REQUIREMENT 5

**The Toolkit stores and queries data and helps in its interpretation**

- Database and database search
- Link data to data obtained from other sources
- Size and maintainance of database
- Exchange and collaboration
- Number of representations, e.g.



# REQUIREMENT 6

## Overall Toolkit requirements

- Quality Assurance and traceability
- Modularity and integration
- Size of tapes
- Speed



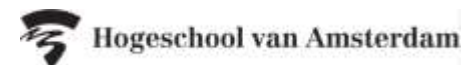
# QUESTIONS



# THANK YOU



Netherlands Forensic Institute  
*Ministry of Justice and Security*



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