APPENDIX A

Forensic Accreditation

Massachusetts Forensic Science Oversight Committee

Lucy A Davis

June 6, 2019

Accredited laboratories in Massachusetts ANAB - ISO/IEC 17025

- Massachusetts State Police Crime Laboratory
  - Eight (8) laboratories
- Boston Police Department Crime Laboratory
- Cambridge Police Department Crime Scene Services
- Worcester Police Department Latent Print Unit
- Boston Police Department Firearms Analysis Unit
- Boston Police Department Latent Print Unit
- University of Massachusetts Medical School Drugs of Abuse Laboratory

Accredited laboratories in Massachusetts ANAB - ISO/IEC 17020

- Cambridge Police Department Crime Scene Services
- Worcester Police Department Crime Scene Unit

Accreditation

- Process of formal recognition for **Competence** to perform specific tests
- Conducted by an independent third party using a defined set of standards
- Accreditation is an external validation of methods and standards of performance of testing
- It is a tool that is widely used wherever users need assurance about the acceptability of test results
- Used to ensure that materials, products, processes and services are fit for their purpose

Accreditation Bodies (AB)

Accreditation bodies are independent organizations that provide assessment and formal recognition of a conformity assessment bodies (laboratories) competence to perform specific tests, inspections, etc.

- Accreditation bodies are themselves accredited to ISO/IEC 17011 - *General requirements for bodies providing assessment and accreditation of conformity assessment bodies*
- Forensic Accreditation Bodies – United States
  - ANAB - ANSI National Accreditation Board
  - A2LA

Conformity Assessment

- The process of deciding whether or not a product, service, process, system, person or body conforms to a standard and/or complies with relevant requirements in technical regulations or standards.
- The Assessment comprises of **sampling, testing, and inspection** of the agency's policy and procedures for conformity
  - An assessment team can not look at every document the agency has during the on-site inspection

ISO and IEC standards are **Conformance Standards**

You are either in compliance or

You are not in compliance.

You cannot leave out parts because you don't like them!

Accreditation Process – before on-site assessment

Forensic Service Provider (FSP) develops and implements a Quality System and analysis procedures

Agency submits application to an accreditation body (AB)

AB processes application, forms assessment team, interact with FSP to confirm their readiness for on-site assessment

- Determine the appropriate Standards required to be used during the assessment
- Off-site document review
- Planning visit, Practice Assessment, or Gap Analysis (optional)
- Team size and make-up determined by agency's requested Scope of accreditation
  - Lead Assessor (LA)
  - Technical Assessor (TA)

Accreditation Process – On-site assessment

Assessment

- TAs reviews all aspects of the agency's documents, facilities, personnel, and overall management system
- TA interviews staff and observes an analyst conduct an analytical procedure
- LA reviews all management and quality documents and interviews "top management" including Laboratory Director, Quality Manager, and others who might have influence on the operation of the FSP
- Constant communication between TA, LA, and FSP about status of the process

The assessment team determines if the agency is Conforming or Not Conforming to each requirement on the assessment checklist

- Lead Assessor may accept remediations to minor issues while the team is on site. Although these will not appear on report, it will be documented in the assessment notes.
- The Assessment Team documents everything it reviews and the objective evidence they gather to document how the FSP meets the criteria.

Accreditation Process – After assessment with no Non-conformities

Closing Meeting

- The Lead Assessor will inform the FSP for each standard if they agency was found to be Conforming or Non-conforming with the standard. If the agency is Conforming, but the LA sees that the FSP might benefit adjusting their procedures, the LA my write a "Conforming with Comment".
- All determinations are reviewed by the AB managers to confirm the LA is interpreting the criteria correctly
- The Final Assessment report is left at the laboratory when the team leaves

If there are **No Non-conformities** or only a **Conforming with Comment**

- Within 7 days the final report goes to an AB manager for final review and grammatical editing if appropriate.
- After review, the report is submitted to the AB vice president or designee for Accreditation decision

Accreditation is granted, the final Certificate and Scope of Accreditation is given to the FSP

Accreditation Process – After assessment with Non-conformities

Final Report with Non-conformities (NC) are provided during the Closing Meeting

- The "clock" starts with the closing meeting
- The FSP has 30 days to:
  - Submit to LA Action Plan for how they plan to remediate the Non-conformities
  - If they choose to appeal the Non-conformities to the AB management

Action Plan Review

The LA will review the FSP plan and with the help of the applicable TA, accept or request more information or actions from the FSP to remediate the issue.
The FSP will submit final corrective action

Appeal Review

The AB will form an appeal committee to review the NC and objective evidence from both the LA and FSP supporting the issue.
Clock stops while appeal is processed.

LA final acceptance of remediations to all Non-conformities

Final process described previously now followed

Appeal rejected

The clock restarts and the NC goes through the standard remediation process.

Appeal approved

The NC is removed from Report. No additional requirements.

Accreditation Conformance Monitoring

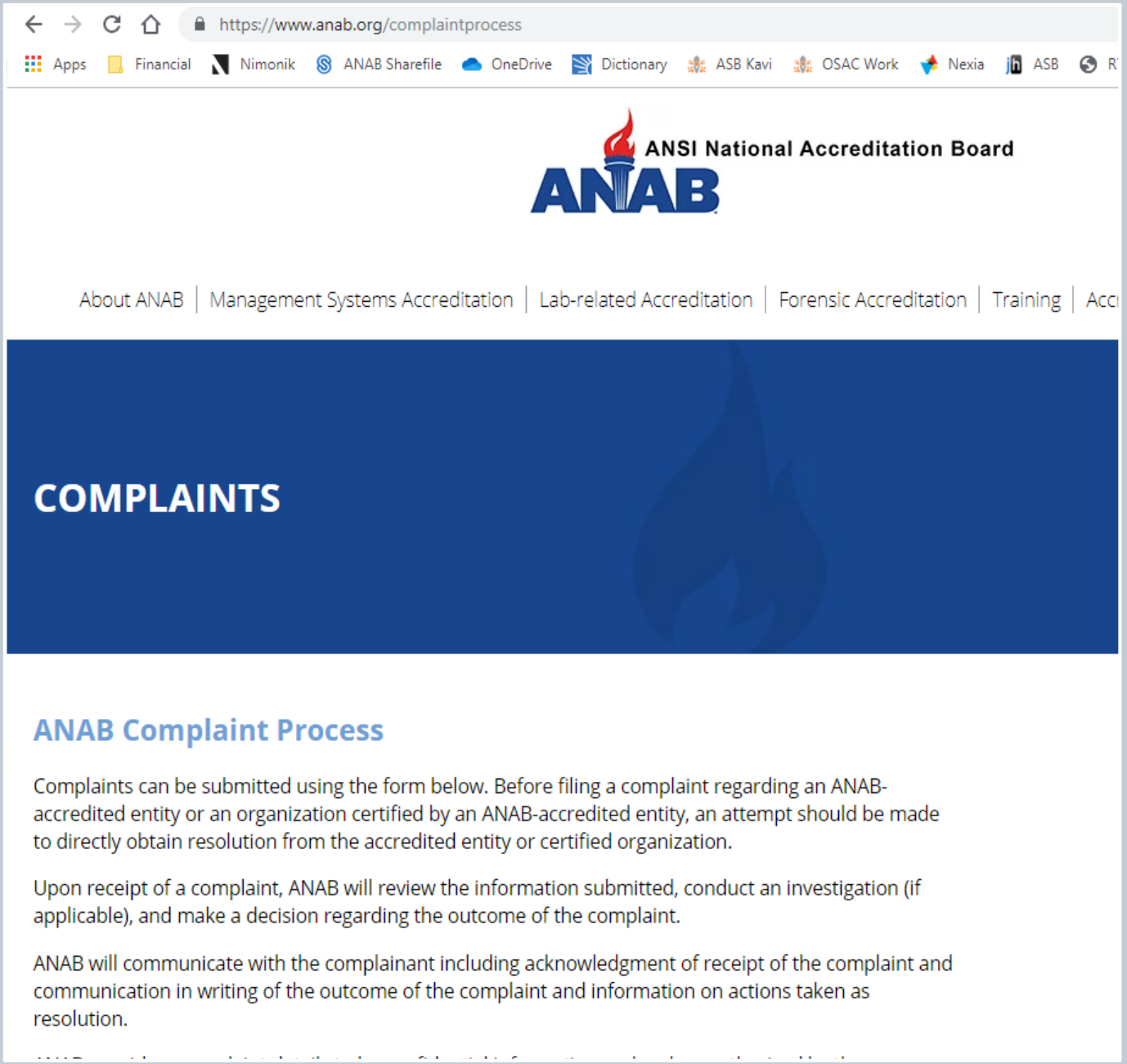
- Generally the ISO/IEC accreditation expiration date is 4 years and ABFT expiration date is 2 years from date on issued certificate.
- During this time the laboratory must demonstrate they are continuing maintaining their Quality System.
- The FSP must “self-report” any significant event or non-conformity to the AB.
- The FSP must provide documentation yearly to the AB proficiency test results

Accreditation Conformance Monitoring

- The AB will do a “surveillance” assessment at a minimum of every 2 years
- The AB can conduct an additional on-site surveillance of the FSP at any time the AB feels it is required
- The AB also retains the right to monitor the on-going performance of a forensic service provider through all reasonable means available
- The AB will respond to any Compliant it receives concerning an accredited laboratory
  - Within the Standard criteria there are specifications of how the FSP must respond to complaints.

Anyone can file a Complaint concerning an accredited laboratory. The AB will review the information submitted, conduct an investigation (if applicable), and make a decision regarding the outcome of the complaint.

Most AB compliant process can start on their website.



Forensic Disciplines routinely accredited

- Forensic Science Testing (ISO/IEC 17025)
  - Covering the 25 OSAC defined sub-committees: Biology/DNA, Chemistry/Instrumental Analysis, Physics/Pattern Interpretation, Crime Scene/Death Investigation, Digital/Multimedia
- Forensic Science Calibration (ISO/IEC 17025)
  - Breath alcohol instruments
- Forensic Science Inspection (ISO/IEC 17020)
  - Anthropology, Bloodstain Pattern Analysis, Crime Scene Investigation, Digital Evidence, Document Examination, Facial Recognition, Firearms/Toolmarks, Friction Ridge, Footwear/Tire, Speaker Recognition, Video/Imaging Technology and Analysis, Medicolegal Death Investigation, Fire/Explosive Investigation

Standards

- Documented agreements routinely described as "Consensus Standards"
- Developed by Standards Development Organizations (SDO)
  - ISO is an international SDO
- Specific statutory or legal requirements
  - 42 U.S.C. § 14132 – DNA Identification Act of 1994
    - FBI Quality Assurance Standards
- May contain technical specifications or other precise criteria

International Standard Development Organizations

International Organization for Standardization (ISO)

- An independent, non-governmental membership organization that develops voluntary, consensus-based International Standards covering almost every industry, from technology, to food safety, to agriculture and healthcare

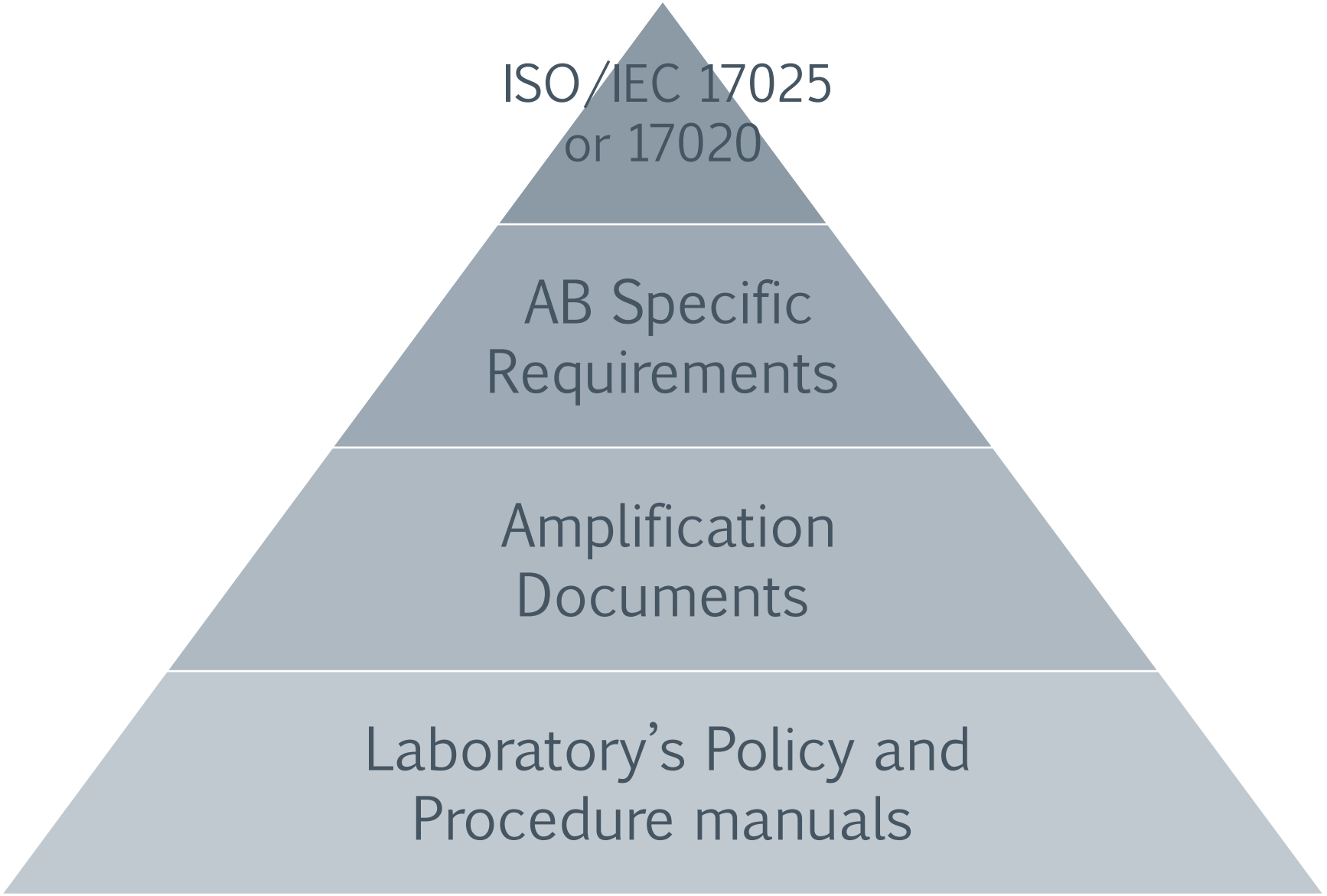
International Electrotechnical Commission (IEC)

- World's leading organization for the preparation and publication of International Standards for all electrical, electronic, and related technologies

Assessment Terminology

- ANAB 8.2.1.1 - Has the laboratory required the following words (to include forms of the same word) used in ISO/IEC 17025:2017 or in this document to be addressed in writing?
  - agreed, appoint, authorize, define, instructions, method, plan, procedure, program, record, schedule, specify
- Notes - guidance material, not requirements

Hierarchy of Standards



What is ISO/IEC 17025 & ISO/IEC 17020

ISO/IEC 17025 - Describes best practices for **testing and calibration laboratories**

> "Developed with the objective of promoting confidence in the operation of laboratories. Contains requirements for laboratories to enable them to demonstrate they operate competently, and are able to generate valid results. Laboratories that conform to this document will also operate generally in accordance with the principles of ISO 9001."

ISO/IEC 17020 - Describes best practices for **inspection processes**

> Covers the activities of inspection bodies whose work can include the examination of materials, products, installations, plants, processes, work procedures or services, and the determination of their conformity with requirements and the subsequent reporting of results of these activities to clients and, when required, to authorities. Such work normally requires the exercise of professional judgement in performing inspection, in particular when assessing conformity with general requirements."

What is ISO/IEC 17025 & ISO/IEC 17020

- Developed by ISO Council Committee on Conformity Assessment (ISO/CASCO)
  - Prepares international guides and International Standards relating to the practice of testing, inspection and certification of products, processes and services, and to the assessment of management systems, testing laboratories, inspection bodies, certification bodies, accreditation bodies and their operation and acceptance
- Written broadly for general application
- Reviewed/Revised every 5 years. Current version 2017. Previous v 2005. Labs are required to update to 2017 during their next assessment.

ISO/IEC 17025:2017
ISO/IEC 17020:2012

- The Forensic Service Provider (FSP – forensic laboratory or police agency) must comply will all standards in this document
- There may be specific standards that does not apply to the FSP and graded as “not applicable”

Accreditation Body Specific Requirements

- Narrows the focus to field specific criteria or guidelines
- Provide interpretation for the field of testing and the techniques applicable to the specific scope of accreditation
  - AR 3055 ISO/IEC 17020:2012 Forensic Inspection Bodies Accreditation Requirements
  - AR 3125 ISO/IEC 17025:2017 Forensic Testing and Calibration Laboratories Accreditation Requirements

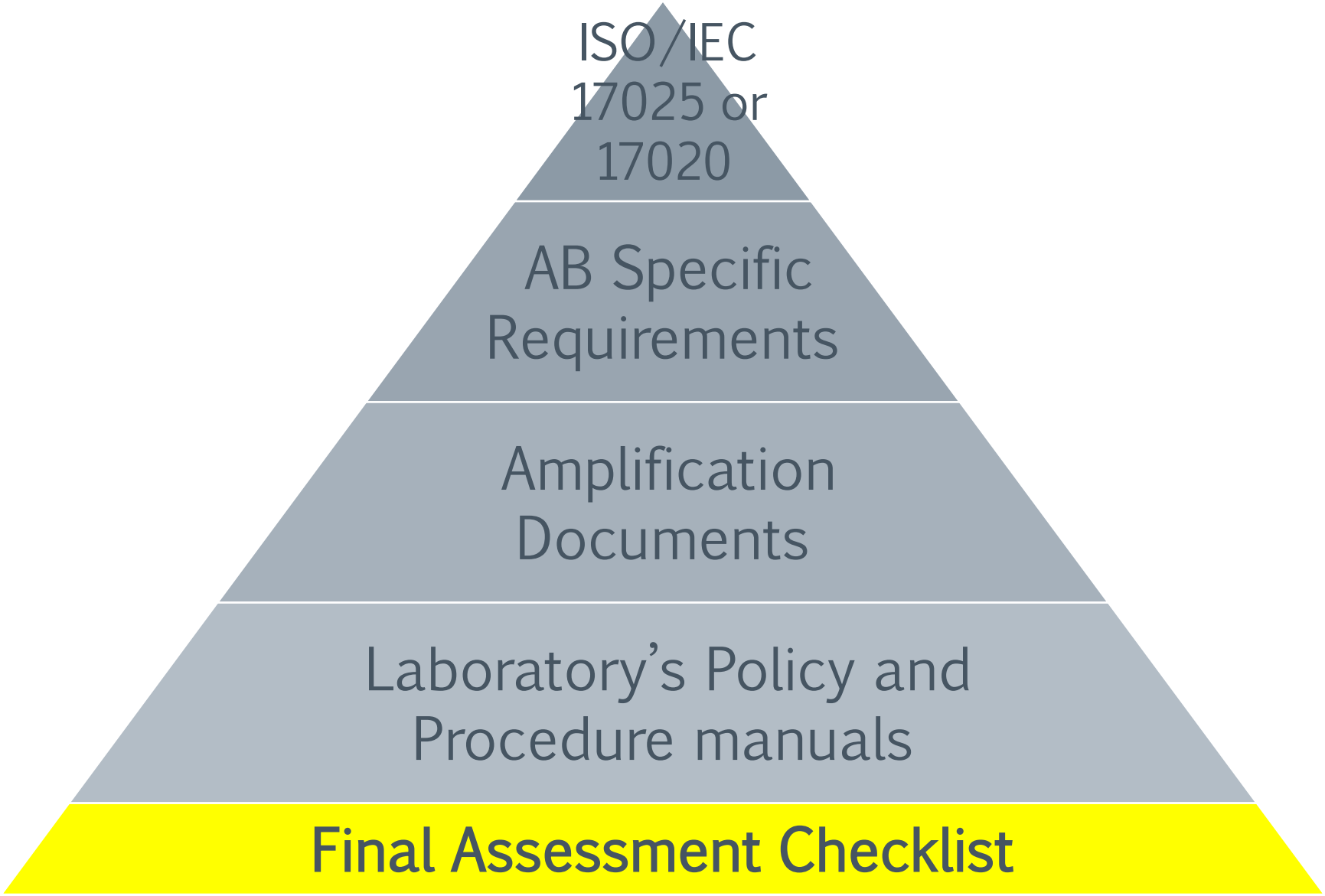
Amplification Documents

- Specific criteria that may be required by either Accreditation Body or local governmental requirements
  - In the United States forensic DNA testing laboratories must be accredited to the FBI Quality Assurance Standards
- FBI Quality Assurance Standards
  - Testing, Databasing, RapidDNA
- American Board of Forensic Toxicology (ABFT) Forensic Toxicology Laboratory Accreditation Checklist

Laboratory's Policies and Procedures

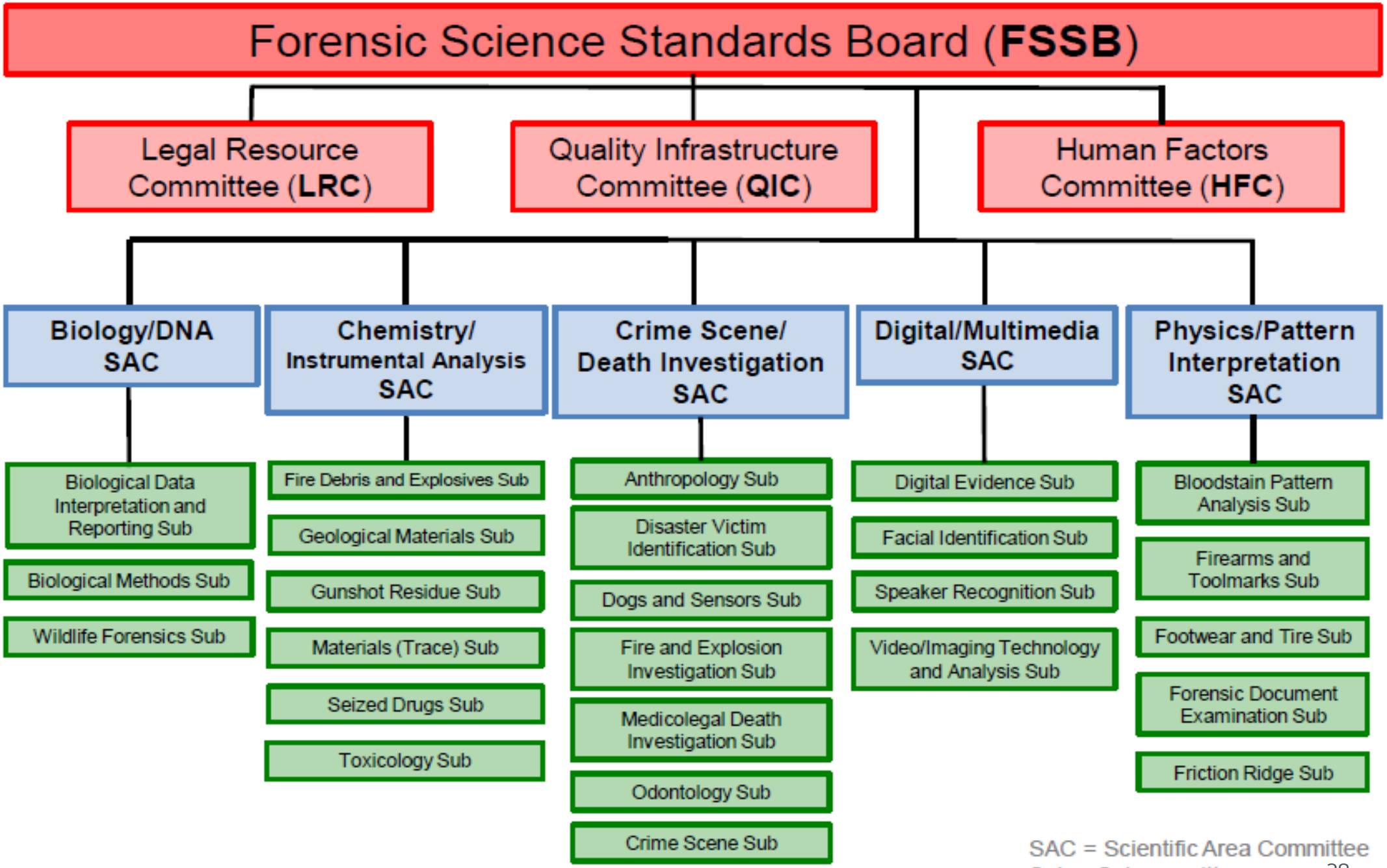
- Not Standards per se
- Developed by the FSP to describe how they comply with accreditation standards
  - Can add to the higher requirements, but can't conflict with them
- Agency conformance with their own Policy and Procedures will be evaluated and a Non-conformities are issued if the agency is not in compliance with their own defined processes

Hierarchy of Standards



Organization of Scientific Area Committee (OSAC) for Forensic Science

- OSAC's mission is to strengthen the nation's use of forensic science by facilitating the development of scientifically sound forensic science standards, and by promoting the adoption of those standards by the forensic science community.
- The National Institute of Standards and Technology (NIST) has primary responsibility to coordinate and facilitate OSAC and maintenance of the Registry of those Standards
- Currently there are 15 forensic specific standards on the Registry and over 300 draft standards at various steps within the process.



SAC = Scientific Area Committee
Sub = Subcommittee

Chapter 69
Section 184A

c) Not more than 6 months following the appointment of its membership, the board shall conduct a comprehensive audit of the facilities and practices being utilized for criminal forensic analysis in the Commonwealth and the operation and management of the Massachusetts state police crime laboratories

Such audit shall include, but not be limited to:

Open ISO/IEC 17025, AR 3125, and FBI Standards

Chapter 69
Section 184A Section c)

Evaluating the **capabilities** of the state police crime laboratory and **ability** to process evidence necessary to comply with the MA general laws

- ISO/IEC 17025 – 5.3, 5.4, 5.5c, 5.6, 6.2, 6.3.1, 6.3.3, *6.4*, 7.1.1b, 7.2.1.1, 7.2.1.5, *7.2.2*, *7.4*, 7.8.1.2, 7.8.4.1, 8.1.1, **8.8.1, 8.9.1**
- AR 3125 - 6.2.3.1, 7.2.1.1.1, *7.7.4*, *7.7.5*, 8.8.1a).1
- FBI QAS – 5.2, 5.3, 5.4, 5.7, 6.1, *8*, 9.1, 10.1, 13.1

Chapter 69
Section 184A Section c)

Condition and accuracy of testing **equipment**

- ISO/IEC 17025 – 6.4, 6.5, 6.6, 7.7.1
- AR 3125 – 6.5.1.1
- FBI QAS – Section 10

Chapter 69
Section 184A Section c)

Handling **processing, testing and storage of evidence** by such facilities

- ISO/IEC 17025 – 6.3.1, 6.4.1, **7.4,** 7.11
- AR 3125 – 6.3.4.1, **7.4.1.1**
- FBI QAS – 6.1, **7.1, 7.1.1, 7.1.2, 7.1.3, 7.1.4**

Chapter 69
Section 184A Section c)

Establishing **professional qualifications** necessary to serve as the head of the state police crime laboratory

- ISO/IEC 17025 – 6.2.2, 6.2.3, 6.2.6, 7.8.7.1, 8.2.1
- AR 3125 – 6.2.2.1, Annex 1
- FBI QAS – 5.2, 5.3, 5.4, 5.7, 6.1, 9.1, 13.1

Chapter 69
Section 184A Section c)

Licensure and oversight of laboratory personnel

- ISO/IEC 17025 – 4.1.1, 4.1.3, 4.1.5, 4.2.1, 7.10.1, 7.10.3, 8.2.2, 8.7
- AR 3125 – 4.1.3.1, 7.7.4, 8.8.2.b).1
- FBI QAS – 5.1.3, 5.2.1.4, 5.2.2,

Accreditation versus Certification

- **Accreditation** – the formal recognition by an independent body (accreditation body) that **an agency** operates according to international standards
- **Certification** – the formal recognition by an independent body of written assurance (a certificate) that **individual people** meet specific requirements

Chapter 69
Section 184A Section c)

Determining the proper entity to control the crime laboratory and whether it would be appropriate to transfer such control to another executive agency or to an independent executive director

› ISO/IEC 17025 – 5.1, 5.2, 5.5, **5.6,** 5.7b

› AR 3125 – 5.2.1

Chapter 69
Section 184A Section c)

- Feasibility of creating a board to sect an independent executive director of the crime laboratory
- Setting term limits and reappointment standards applicable to the head of the state police crime laboratory

Chapter 69
Section 184A Section g)

The board shall develop, implement and periodically review a system to evaluate laboratory accreditation and professional licensing processes, including securing and maintaining such accreditation, and shall ensure that every facility is actively accredited and in compliance with standards promulgated by the International Organization of Standardization.

› ISO/IEC 17025 – 5.3, 5.4, 8.1.1, 8.1.3, **8.2.3**, 8.8, 8.9

› AR 3125 – 8.8.1a).1

› FBI QAS – 15.5.1, 17.7.1, 17.7.2

Other Criteria

ISO/IEC 17025

- 7.5 Technical Records
- 7.8 Reporting Results
- 7.9 Complaints
- 7.10 Nonconforming work
- 8.5 Actions to address risks and opportunities
- 8.7 Corrective Actions
- 8.8 Internal Audit
- 8.9 Management Review

Other Criteria

AR 3125

- 4.1.3.1 Code of Ethics
- 7.5 Technical Records
- 7.8 Reporting Results

Cognitive Bias in Forensic Expert Decision Making: Recommendations for Action for the Massachusetts Forensic Science Oversight Board

9 July 2019

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Cognitive Bias in Forensic Expert Decision Making: Recommendations for Action for the Massachusetts Forensic Science Oversight Board

A few preliminary points, to be clear:

- Yes, going to put on the table some things for the Board to consider.
- No, not replacing/re-inventing/re-doing/etc. the ISOs
- (in fact, I think we should set a timeline for all labs for ISO accreditation)
- They are general international laboratory standards (right Lucy?) -- (ISO/IEC 17020, standard for “Requirements for the operation of various types of bodies performing inspection”)
- Not specific to forensic science

Cognitive Bias in Forensic Expert Decision Making:

Recommendations for Action for the Massachusetts Forensic Science Oversight Board

A few preliminary points, to be clear:

- Yes, going to put on the table some things for the Board to consider.
- These recommendations (if the Board likes & adopts them…), then I suggest will be put forward to the Mass State Crime Lab for feedback:
  - Doing it already
  - Not doing it, but 'like' it
  - Not doing it, and don't like it

Doing it already

- Great ! ☺
- Include in our audit
- Set as standard/expectation to other labs

Not doing it, but ‘like’ it

- Like it, ‘as is’ (& implementation details…)
- Needs modification (e.g., too cumbersome, needs ‘triage’)
- Agree on timeline

Not doing it, and don’t like it

- Hear why, and then for us to decide whether or not to ‘impose’ on them, and a timeline.

→**Dialogue**

Cognitive Bias in Forensic Expert Decision Making:

Recommendations for Action for the Massachusetts

A few preli ar:

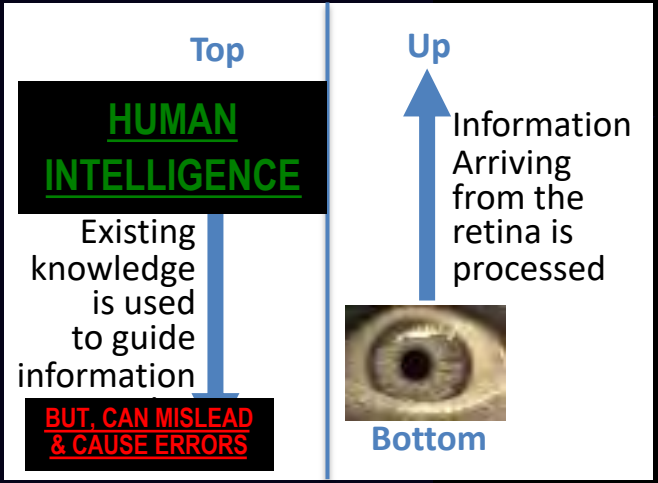
So, what do you need to know?

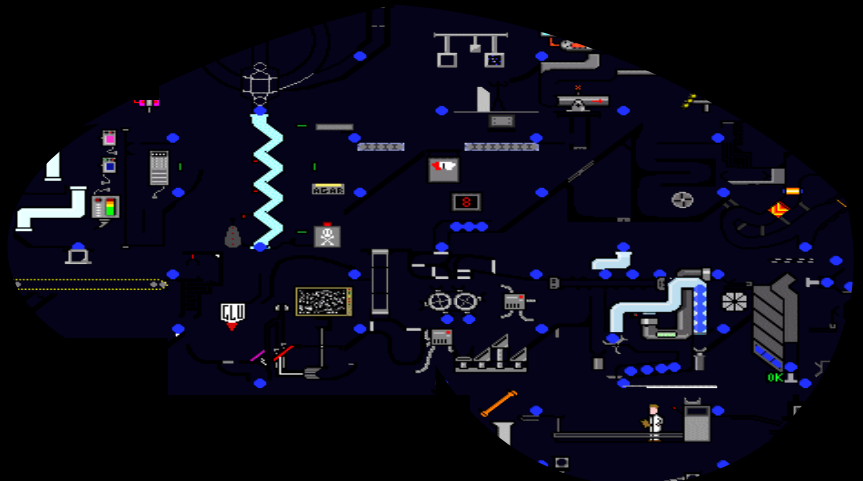
So, what do you need to know?

- Information gets into the brain, the 'input', the 'data' → "Bottom-up information"

VS.

- What is already 'in the brain' (e.g., experiences, knowledge) → "Top-down information"
- These 'top-down' & 'bottom up' interact → The Human Mind is Not a Camera.

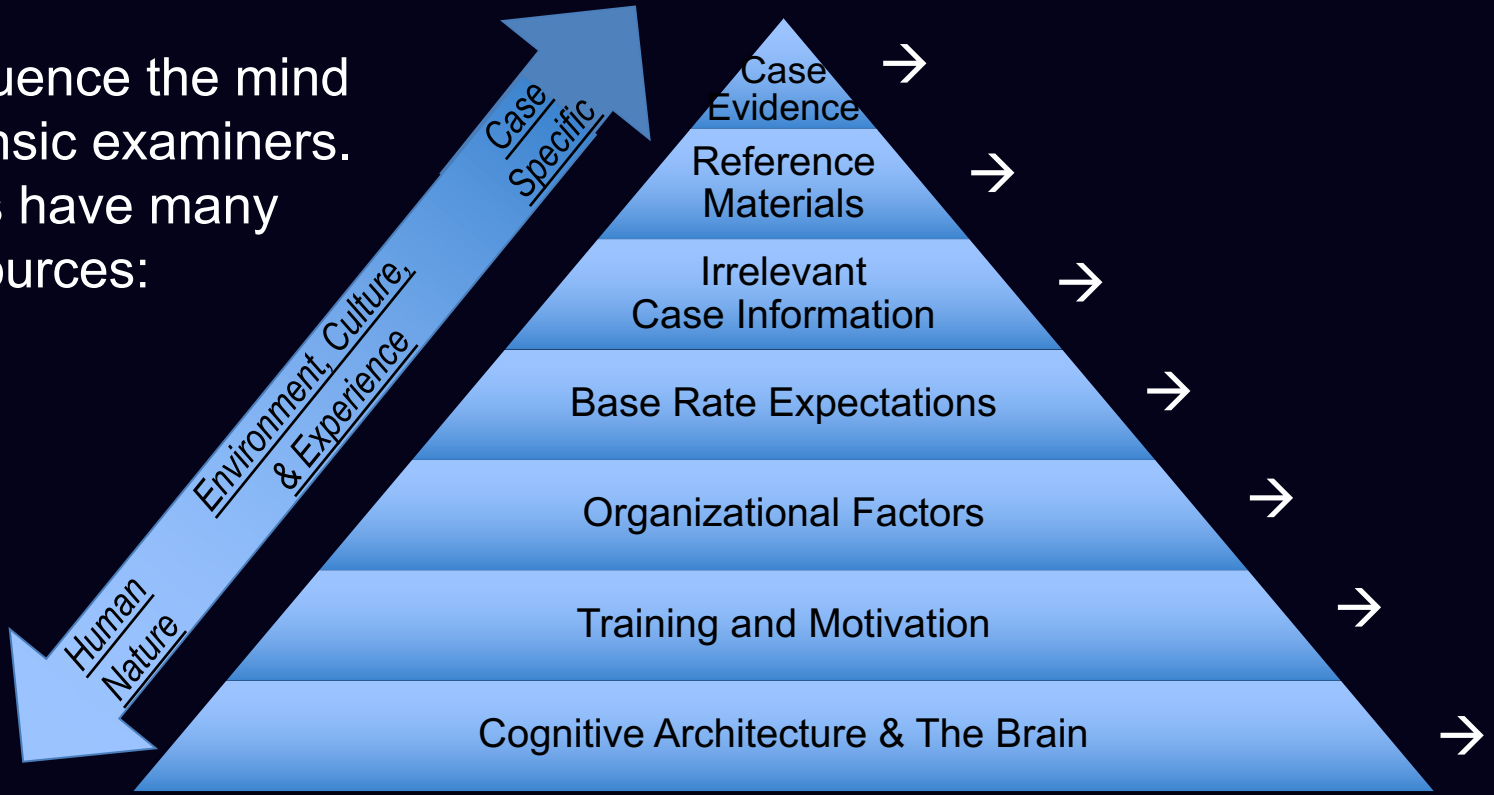




Each source has specific countermeasures

SO, WHAT DO YOU NEED TO KNOW?

Biases influence the mind of the forensic examiners. The biases have many different sources:

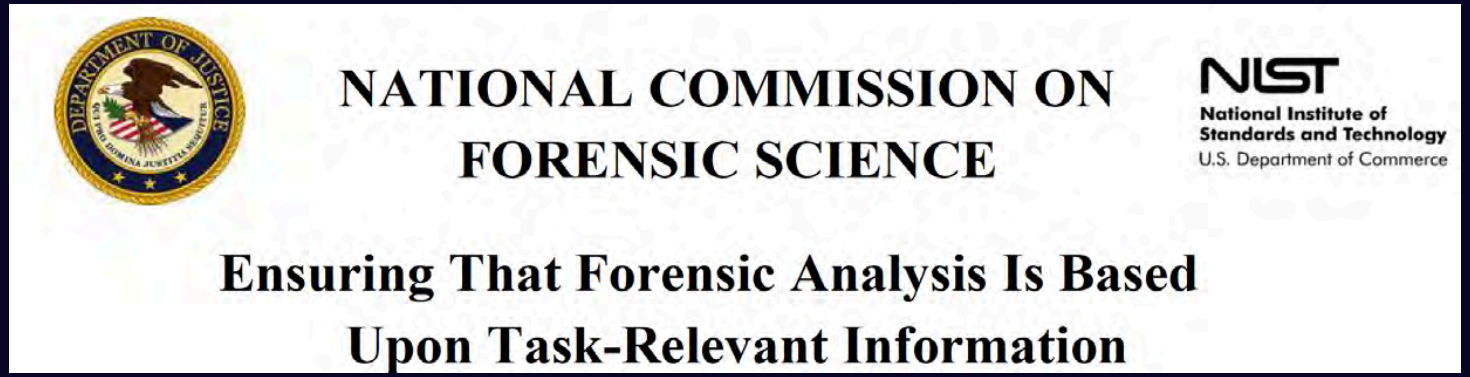


A few preliminary points, to be clear:

- Not a matter of competence, motivation, proficiency, etc.
- NOT an ethical issue
- Hard working, dedicated, professional experts.

Last preliminary point…:

- These biases are now well accepted
- E.g., a recent review paper: (Cooper & Meterko "Cognitive bias research in forensic science: A systematic review" Forensic Science International) identifies dozens of primary source (research) studies.



- These biases are now well accepted
- Also by governmental bodies and expert working groups
- And, now also by the courts (including in Massachusetts!)

Cognitive Bias in Forensic Expert Decision Making:

Recommendations for Action for the Massachusetts Forensic Science Oversight Board

A few preliminary points….

Now down to business (5 bias focused recommendations to you today):

1. The evidence should be driving the forensic work, not a ‘target’ suspect

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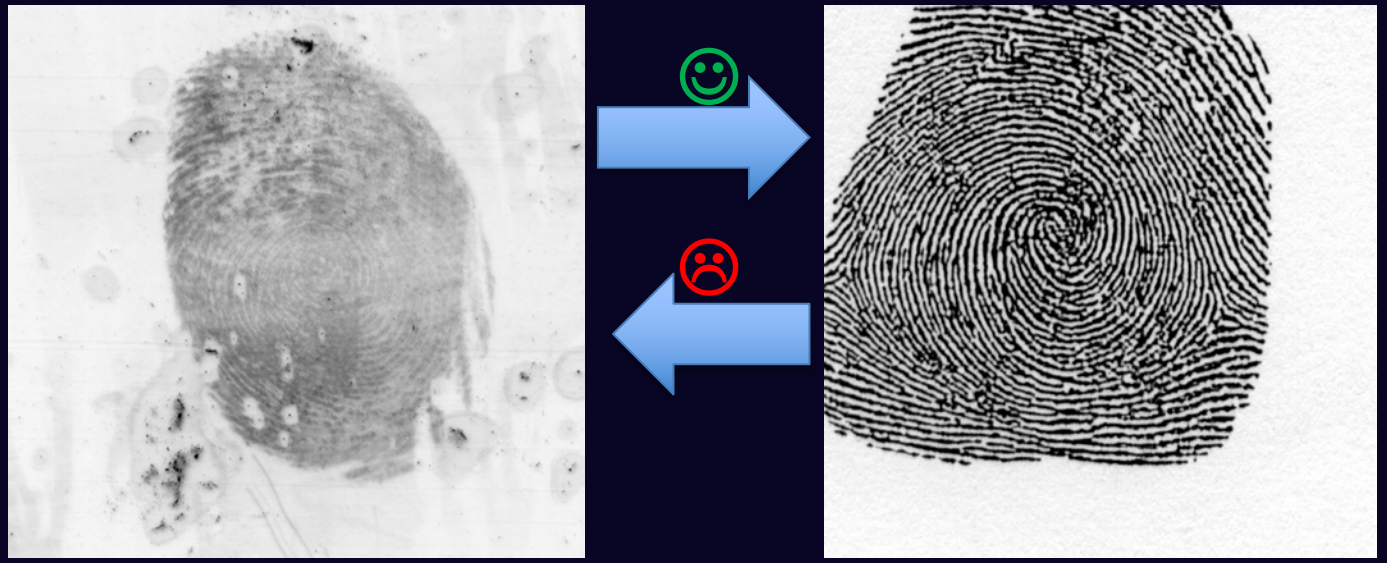

The evidence should be driving the forensic work, not a ‘target’ suspect

DNA… same story:

Go from the profile of the biological material collected from the crime scene, to the profile of the suspect.

→ Do not see/know/develop the suspect’s DNA profile, before you fully developed and characterized the DNA profile from the crime scene.

Why? So you do not (unintentionally) interpret the evidence to fit the suspect (e.g., concluding allelic drop-out, etc.).

Washington DC DNA Crime Lab external audit found exactly such bias, and the lab was shut down…!

The evidence should be driving the forensic work, not a ‘target’ suspect

DNA… same story

Firearms… same story, etc., etc.

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.

.

Simple solution:

➔ Start with the evidence!

Linear Sequential Unmasking (LSU)

→ Context Management Toolbox

JOURNAL OF FORENSIC SCIENCES

J Forensic Sci, July 2015, Vol. 60, No. 4
doi: 10.1111/1556-4029.12805
Available online at: onlinelibrary.wiley.com

Context Management Toolbox: A Linear Sequential Unmasking (LSU) Approach for Minimizing Cognitive Bias in Forensic Decision Making

Contents lists available at ScienceDirect

Science and Justice

journal homepage: www.elsevier.com/locate/scijus

Strengthening forensic DNA decision making through a better understanding of the influence of cognitive bias

Linear Sequential Unmasking (LSU)

→ Context Management Toolbox

JOURNAL OF FORENSIC SCIENCES

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Science and Justice

journal homepage: www.elsevier.com/locate/scijus

Implementing context information management in forensic casework:
Minimizing contextual bias in firearms examination

THE SOLUTION

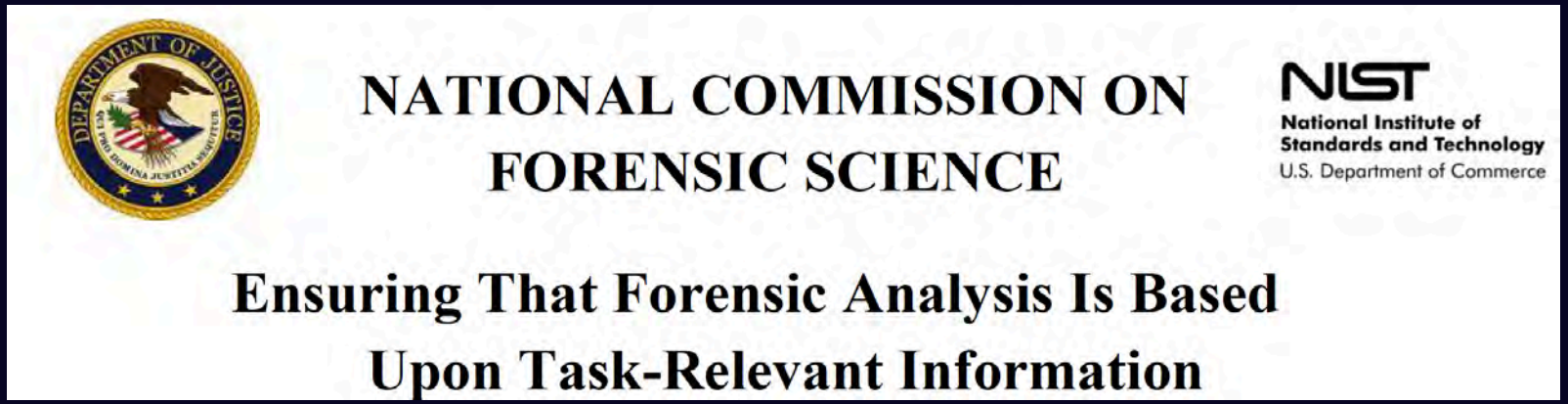
Linear Sequential Unmasking (LSU)

- LSU is aimed:
  - To make sure the data/evidence drives the forensic decision making process.
  - To avoid ‘suspect/target driven bias’
  - To avoid working backward, circularly
  - Start with the evidence, document, then exposure to the suspect
  - (allows to go back to evidence, but with documentation and restrictions)

Cognitive Bias in Forensic Expert Decision Making:

Recommendations for Action for the Massachusetts Forensic Science Oversight Board

1. The evidence should be driving the forensic work, not a 'target' suspect
2. Minimize exposure (as much as possible) to task irrelevant contextual information –Decisions should be based on the relevant information!

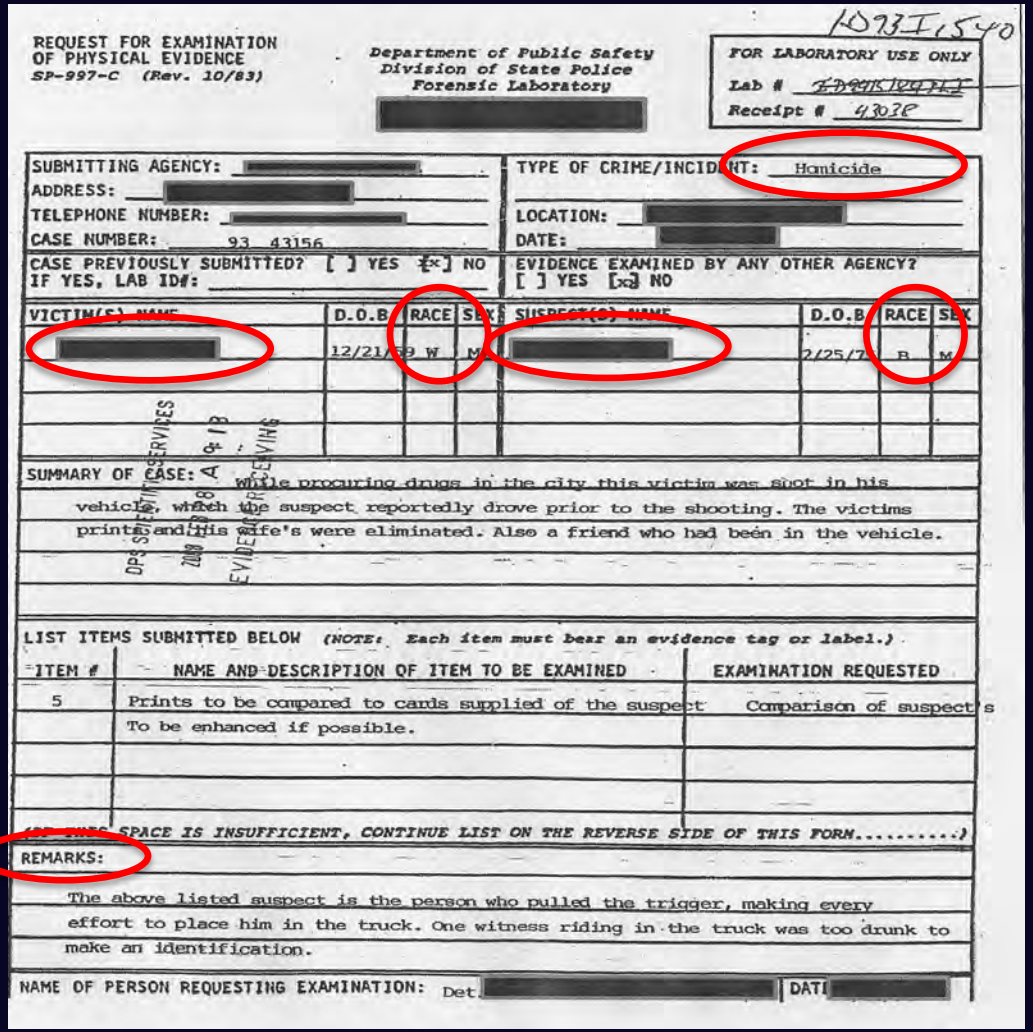


Decisions should be based on the relevant information

Information	Task relevant	Task irrelevant
Biasing		☹
Not biasing		

What is irrelevant?…
For lab to decide… (we will audit it)
But some things are obviously, never relevant:
E.g., whether the suspect confessed to the crime, whether the detective believes the suspect is guilty, etc.
More details/examples:

- Past criminal convictions?
- …
- …
- …



REQUEST FOR EXAMINATION OF PHYSICAL EVIDENCE
SP-997-C (Rev. 10/83)

Department of Public Safety
Division of State Police
Forensic Laboratory
[redacted]

1073-I-540

FOR LABORATORY USE ONLY
Lab # [redacted]
Receipt # 43038

SUBMITTING AGENCY: [redacted]
ADDRESS: [redacted]
TELEPHONE NUMBER: [redacted]
CASE NUMBER: 93 43156

TYPE OF CRIME/INCIDENT: Homicide
LOCATION: [redacted]
DATE: [redacted]

CASE PREVIOUSLY SUBMITTED? [ ] YES [x] NO
IF YES, LAB ID#:

EVIDENCE EXAMINED BY ANY OTHER AGENCY?
[ ] YES [x] NO

VICTIM(S) NAME	D.O.B.	RACE	SEX	SUSPECT(S) NAME	D.O.B.	RACE	SEX
[redacted]	12/21/59	W	M	[redacted]	2/25/7[illegible]	B	M

DPS STATE SERVICES A & B 2000 EVIDENCE RECEIVING

SUMMARY OF CASE: While procuring drugs in the city this victim was shot in his vehicle, which the suspect reportedly drove prior to the shooting. The victims prints and his wife's were eliminated. Also a friend who had been in the vehicle.

LIST ITEMS SUBMITTED BELOW (NOTE: Each item must bear an evidence tag or label.)

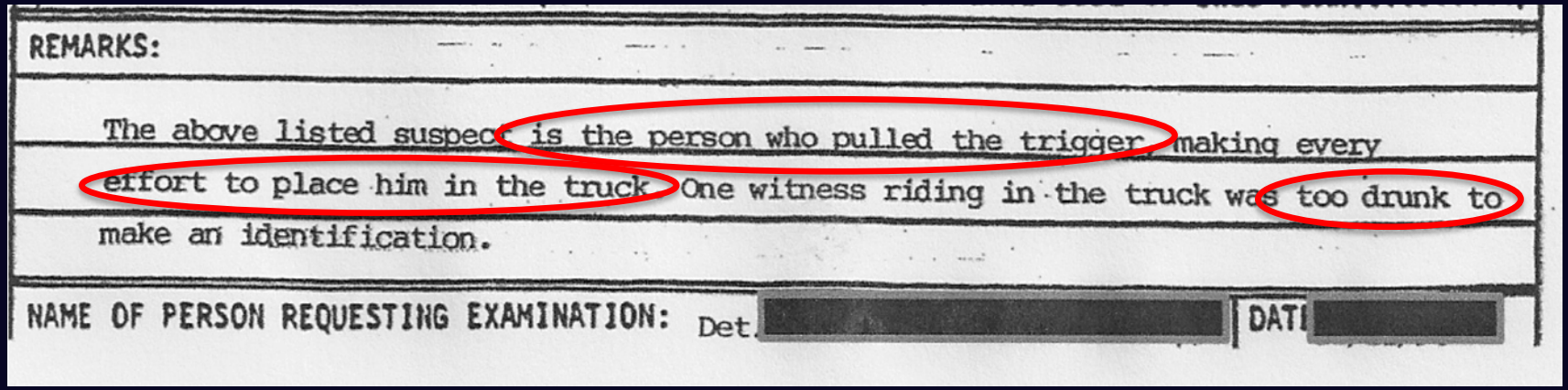
ITEM #	NAME AND DESCRIPTION OF ITEM TO BE EXAMINED	EXAMINATION REQUESTED
5	Prints to be compared to cards supplied of the suspect To be enhanced if possible.	Comparison of suspect's

(IF THIS SPACE IS INSUFFICIENT, CONTINUE LIST ON THE REVERSE SIDE OF THIS FORM.....)

REMARKS:

The above listed suspect is the person who pulled the trigger, making every effort to place him in the truck. One witness riding in the truck was too drunk to make an identification.

NAME OF PERSON REQUESTING EXAMINATION: Det [redacted] DATE [redacted]



REMARKS:

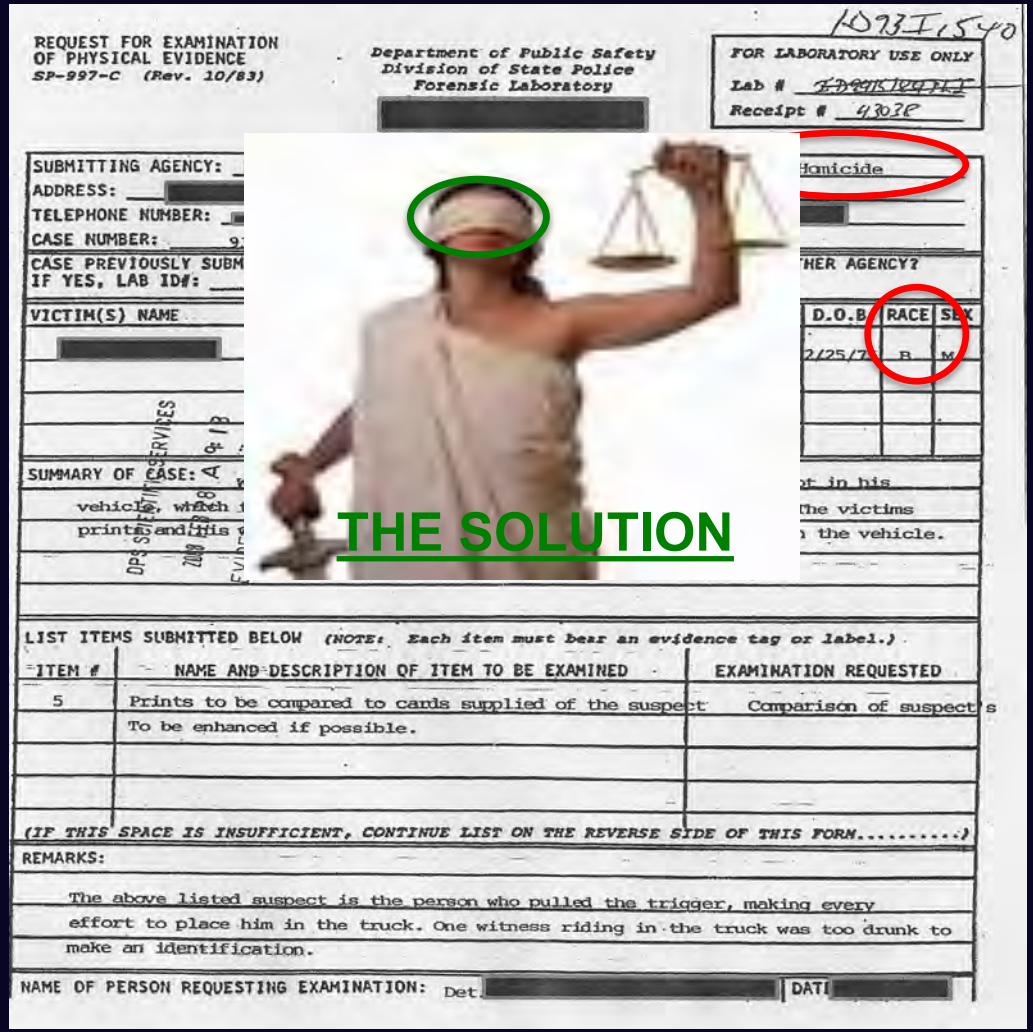
The above listed suspect is the person who pulled the trigger, making every effort to place him in the truck. One witness riding in the truck was too drunk to make an identification.

NAME OF PERSON REQUESTING EXAMINATION: Det [redacted] DATE [redacted]

Just as effort and attention is taken to minimize 'physical contamination',

→ Effort & attention should also be given to minimize 'cognitive contamination'

- Minimize exposure (as much as possible) to irrelevant information
  - E.g., submission forms
  - E.g., avoid bias cascade (A-A B-B → A-B B-A)
  - Case managers
  - Etc., etc.
- **Document!!! (if/when there is exposure, document and include in Report! – transparency!)**



Cognitive Bias in Forensic Expert Decision Making:

Recommendations for Action for the Massachusetts Forensic Science Oversight Board

1. The evidence should be driving the forensic work, not a ‘target’ suspect

2. Minimize exposure (as much as possible) to task irrelevant contextual information – Decisions should be based on the relevant information!

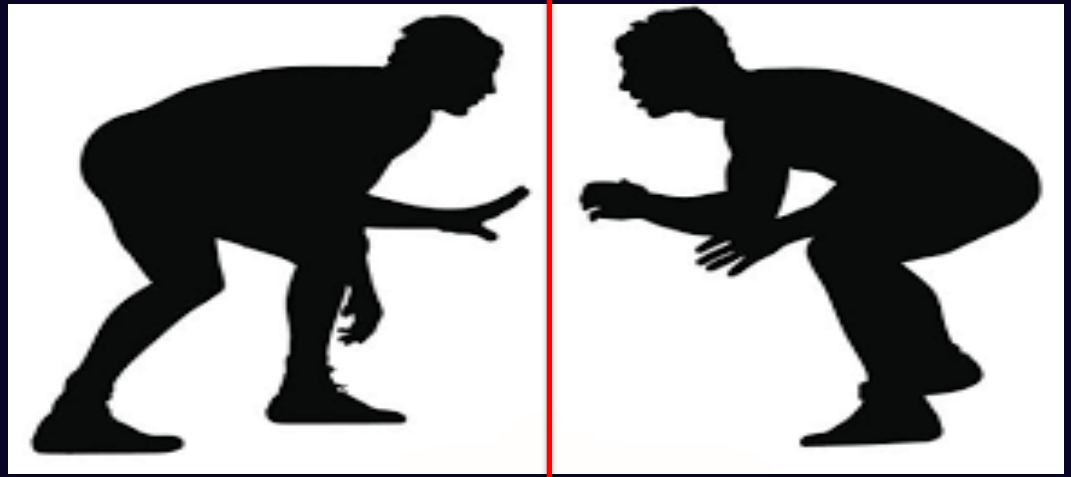
3. State Crime Laboratory to:

    Give full access to defense (‘forensic disclosure’).

    Take work for defense.

Experts

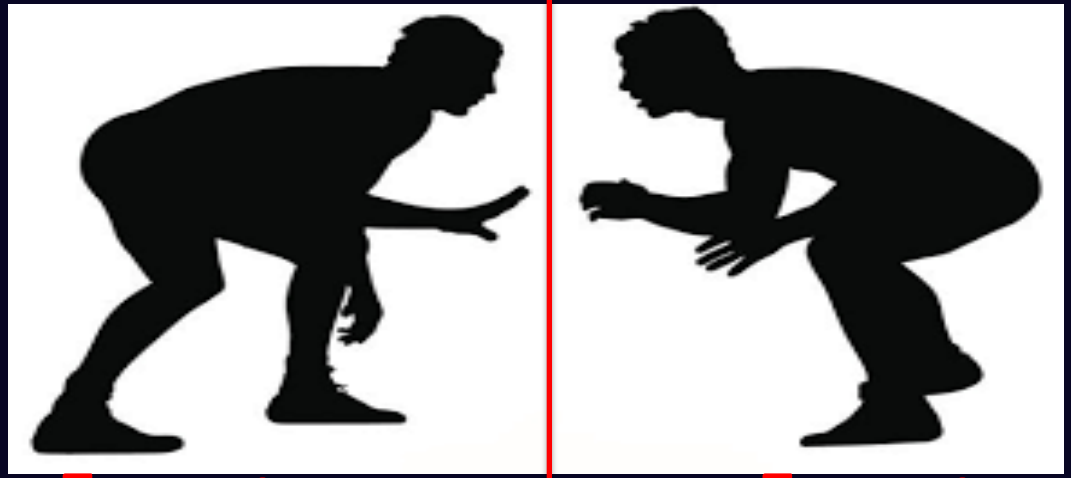
Prosecution | Defense



Impartiality

Prosecution

Defense



Experts

Experts

The Myth of Impartiality

→ Allegiance effect

General Article

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Are Forensic Experts Biased by the Side That Retained Them?

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4. All forensic reports should specify: weaknesses, limitations, scope, exposure to irrelevant information, potential for error and bias, etc.

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5. Verifications should be as blind as possible.

Verifications should be as blind as possible

What do verifiers know…. (better not to know…):

- Who did the initial analysis
- What they did, how they reached their conclusions
- What was decided (only verify IDs)
-
-

→ The more the verification is blind, the better!

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Just as effort and attention is taken to minimize 'physical contamination',

→ Effort & attention should also be given to minimize 'cognitive contamination'

Cognitive Bias in Forensic Expert Decision Making: Recommendations for Action for the Massachusetts Forensic Science Oversight Board

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Thank you very much!