ENVIRONMENTAL TESTING OF ABC SYSTEMS

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OUTLINE

- **Environment & ABC systems**

- **ISO/IEC 29197 Evaluation methodology for environmental influence in biometric system performance**

- **PrCEN/TS Environmental influence testing methodology for operational deployments of European ABC systems**
  - ABC System characteristics
  - Environmental test
  - Testing methodology

- **Conclusions**

BIOMETRICS & ENVIRONMENT
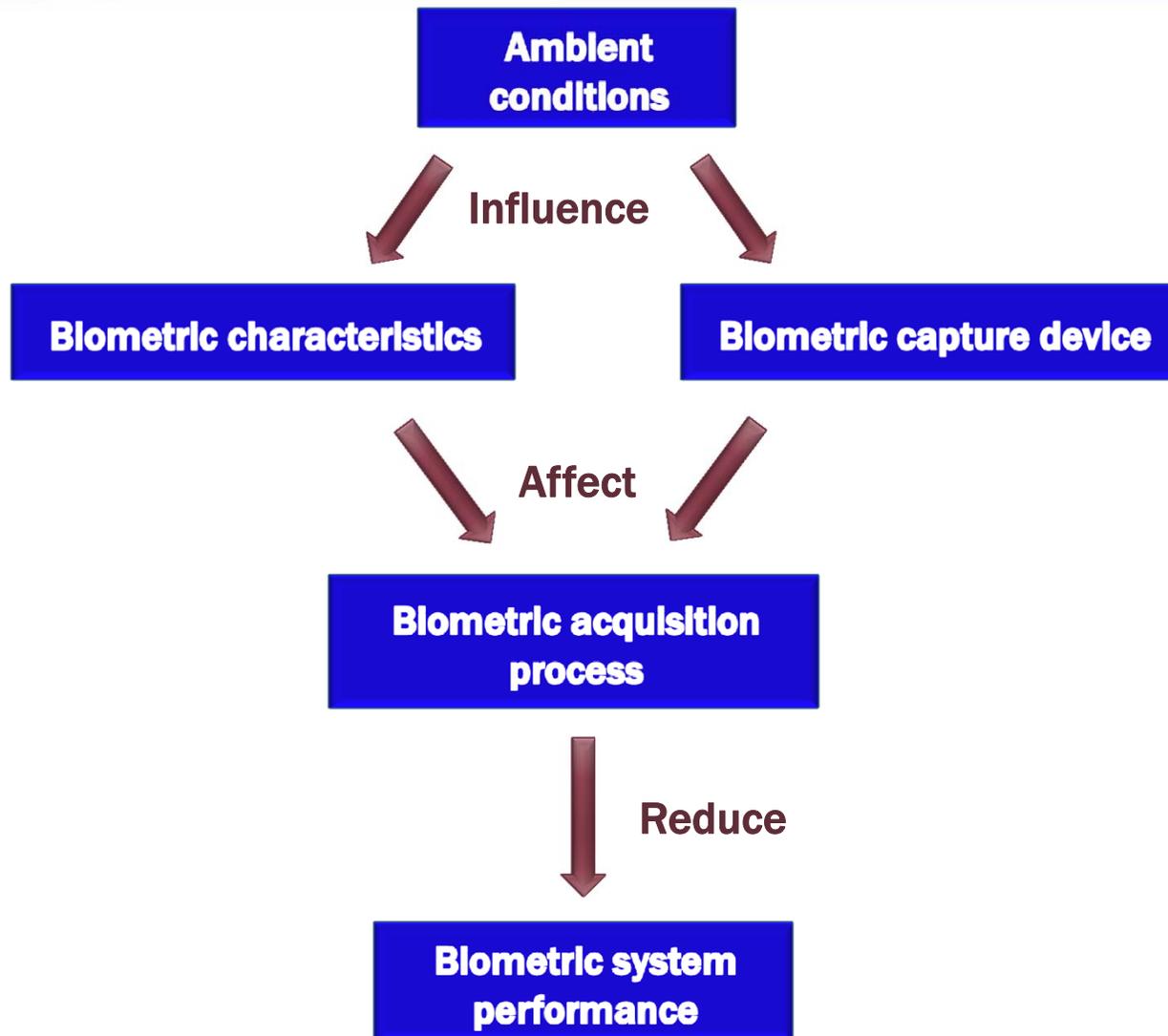
ABC SYSTEMS

- ## ABC (Automated Border Control) Systems
  - Access control system used in a border crossing point
  - Biometrics is used to check that the passenger is the rightful holder of the document
  - Aims:
    - Improve the border crossing process
      - Increasing the security and accuracy
      - Reducing the required time
  - Currently used in borders at the airport
    - Indoor conditions

- ## Biometric performance of ABC systems may be influenced by environmental conditions

ABC SYSTEMS & ENVIRONMENT

- Frontex - Best Practices Technical Guidelines for ABC Systems
  - Temperature:
    - A wide temperature difference between the passenger finger and the fingerprint sensor surface may produce halo effects
  - Illumination:
    - Certain lights may cause reflections on the skin of the face
- Frontex recommendations
  - ABC systems should be tested under certain environmental conditions
- Expansion to other types of borders
  - Land borders
  - Sea borders } Outdoor conditions

TYPE OF BORDERS

- Different conditions of temperature and humidity

- Different conditions of illumination

ISO/IEC DIS 29197 (I)

- ISO/IEC DIS 29197: Evaluation methodology for environmental influence in biometric system performance
- Scope:
  - Requirements for planning and execution of environmental performance evaluations for biometric systems
    - Based on scenario and operational test methodologies addressed by the ISO/IEC 19795
  - Specifications to define, establish and measure specific conditions to assess, including requirements for test equipment
  - A specification of the biometric evaluation including requirements for test population, test protocols, data to record and test results, and
  - Procedures for carrying out the overall evaluation

ISO/IEC DIS 29197 (II)

- ISO/IEC DIS 29197 is a general methodology
  - all kind of biometric systems
  - cover the analysis of different environmental parameters
    - I.e. temperature, humidity, atmospheric pressure, illumination and noise
  - considering all possible operational environments

- Requirements needs to be specified considering:
  - the biometric system under test
  - the expected operational environment

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- WD3 PrCEN/TS Environmental influence testing methodology for operational deployments of European ABC systems

- Specification of ISO/IEC 29197 for ABC Systems
  - Environmental parameters that should be tested
    - Based on the biometric modalities that use the ABC systems
  - Recommendations to select the values to assess for these parameters
    - Based on the expected operational environment for ABC systems
  - Requirements and procedures for the biometric performance evaluation
    - Based on ABC biometric functions
    - Based on recommendations given by european organizations regarding the design and operation of ABC systems

ABC SYSTEMS CHARACTERISTICS (I)

- **Biometric modalities (ICAO recommendations)**
  - Face recognition
  - Fingerprint recognition
  - Iris recognition
- **Environmental factors that may affect performance**
  - Temperature and humidity
    - Fingerprint systems
      - Difference of temperature between the finger and the reader
      - Moister level of the user skin
  - Illumination
    - Face and iris systems
    - Fingerprint systems with optical readers
      - Sun light

ABC SYSTEMS FUNCTIONALITY

- **Biometric functions**
  - Sample acquisition
  - Comparison:
    - 1:1 token systems (e.g. passports or eID)
    - 1:N tokenless systems (e.g. frecuent travellers programs)

- **ABC performance testing methodology**
  - Enrolment is out of the scope of the evaluation
  - Test proceduces should cover verification and identification
  - Specific requirements in relation to:
    - ABC system placement and its functionality
    - Border control process application

ENVIRONMENTAL TESTS (I)

- Tests for analysing the influence of one environmental parameter
  - To analyse the influence of an environmental parameter on biometric system performance separately
  - Test suitable when the ABC system location is unknown
  - 3 types of test: temperature, humidity and illumination
  - Environmental conditions specification
    - Parameter to assess: temperature, humidity or illumination respectively
    - Parameters to control (optional): the rest of them
    - Values:
      - Measuring points: it is recommended to study extreme conditions
      - Set points: standard conditions
  - Scenario performance evaluation

- Tests for analysing the influence of a specific environment
  - To analyse the influence of a combination of environmental parameters or a specific operational environment
  - Test suitable when the expected operational environment of the ABC system is known
  - Environmental conditions specification:
    - × Parameters to assess: at least two of the most relevant
    - × Parameters to control: any other parameter (e.g. noise)
    - × Values according to the expected operational environment
      - ❖ In situ measurements
      - ❖ Season variations (e.g. winter, summer, rains season)
      - ❖ Daily variations (e.g. day and night)
  - Scenario or operational performance evaluation

TESTING METHODOLOGY

- **Environment**
  - Biometric capture device placement
    - × Face and Iris: frontal image in a height between 140 to 200 cm
    - × Fingerprint: at the elbow height

- **Test subjects**
  - Guidance and training: similar to the border crossing process
    - × E.g. It is recommended to give feedback to the users

- **Testing procedures**
  - Enrolment is not required
    - × If it will be necessary, it should be conducted at standard conditions.
  - Impostor transactions
    - × Comparison with the biometric samples of the last 10 users temporarily and anonymously stored in a dynamic list

CONCLUSIONS

- Biometric performance of ABC system may be influenced by environmental conditions

- It is recommended that ABC systems should be tested under certain environmental conditions
  - Face and Iris: Illumination
  - Fingerprint: Temperature and humidity

- WD3 PrCEN/TS Environmental influence testing methodology for operational deployments of European ABC systems
  - Specification of ISO/IEC 29197 for ABC Systems

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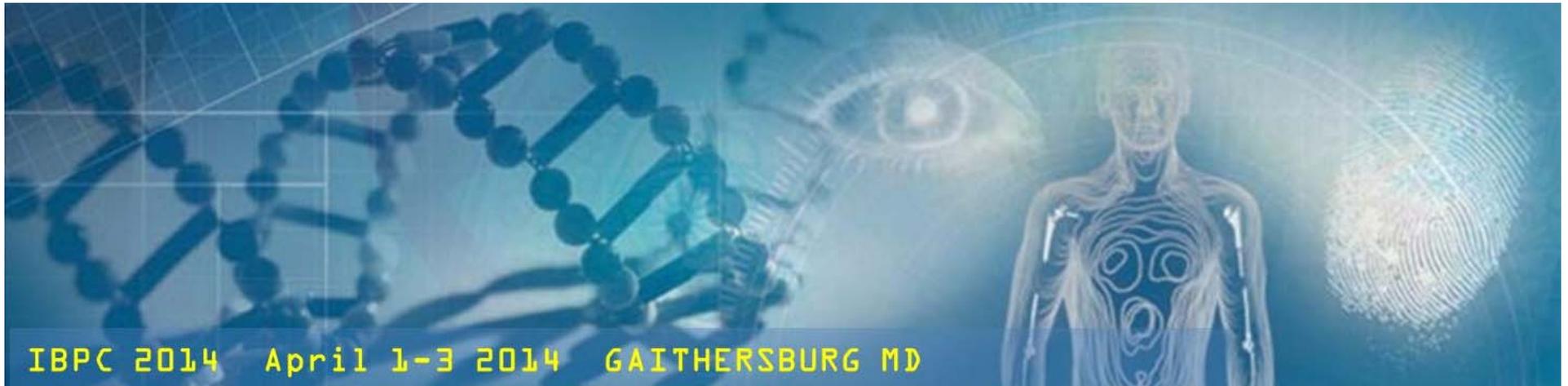
THANK YOU
FOR YOUR ATTENTION

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