

BIOMETRICS FOR SECURE AUTHENTICATION



BIOS E C U R E

Open Source Reference Systems for

Biometric Verification of Identity

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- ▶ **A new methodology for:**
 - conducting
 - reporting
 - comparingexperiments for biometric systems
- ▶ **Based on:**
 - open-source systems
- ▶ **Objectives:**
 - link between published works in biometrics
 - measure real progress achieved with new research algorithms

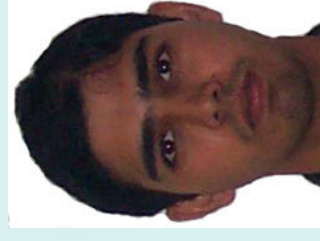
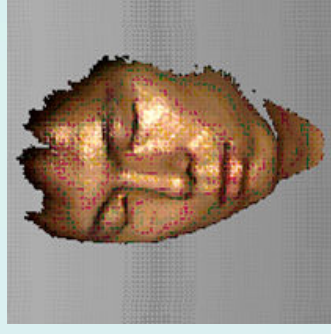
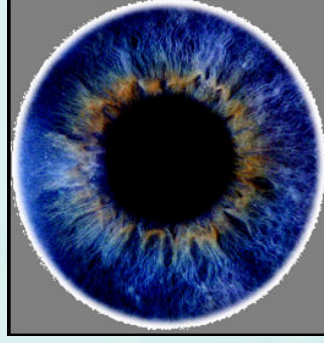
- ▶ **Overview of biometrics + terminology**
- ▶ **Problem:**
 - **How can we fairly compare the performance of two different biometric systems?**
- ▶ **Solution:**
 - **Use of an universal open-source evaluation framework**
- ▶ **Conclusion**

Overview (1)

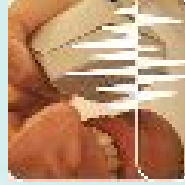
def: *Biometrics refers to technologies that measure and analyze human body characteristics for identification purposes*

2 types of biometric characteristics:

► **Biological** (physiological) characteristics:



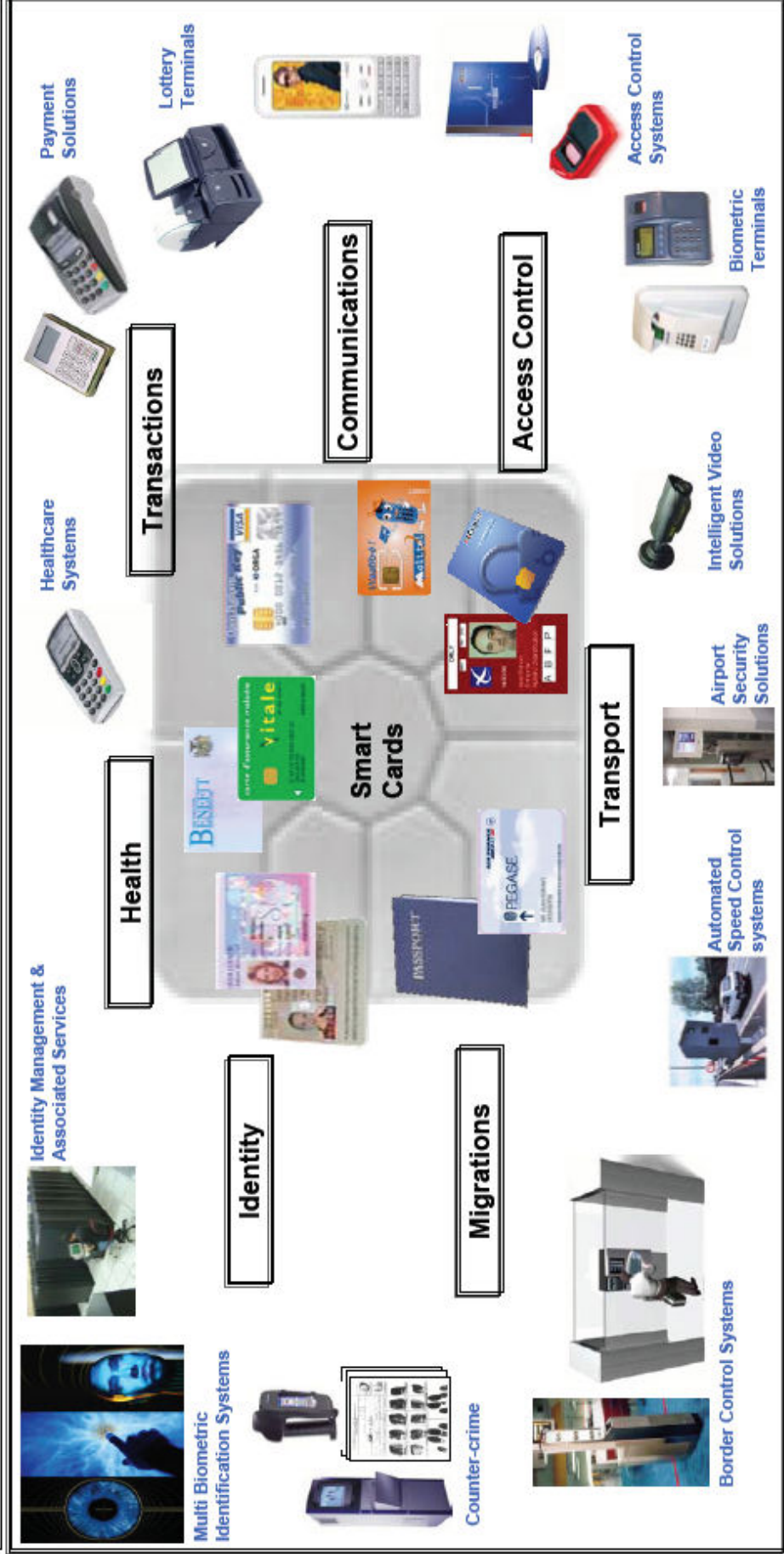
► **Behavioral** characteristics:



Overview (2)

► The identification is necessary to assure security

A Global Vision of Security



Governmental Markets

Corporate & Consumer Markets

- ▶ People are identified by three basic means:
 - Something they **have** (identity document or token)
 - Something they **know** (password, PIN, name)
 - Something they **are** (human body)

- ▶ **Biometrics is used to create a more reliable link between a physical person and corresponding digital identity**

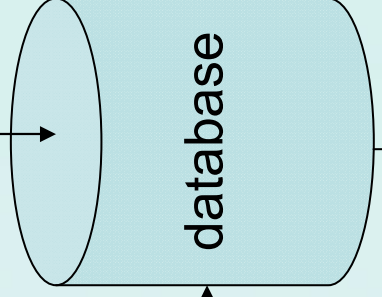
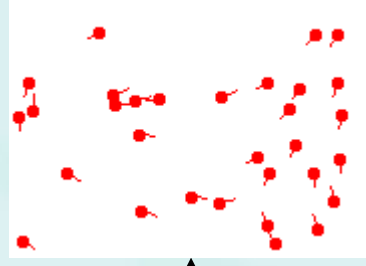
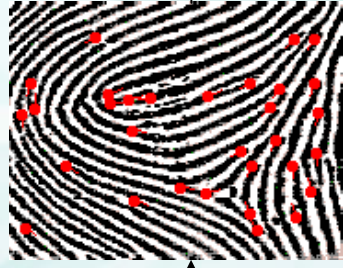
- ▶ **Main Advantage of biometrics:**
 - **Biometrics can replace the ID cards or passwords which are often forgotten, lost or misappropriated**

Terminology (1)

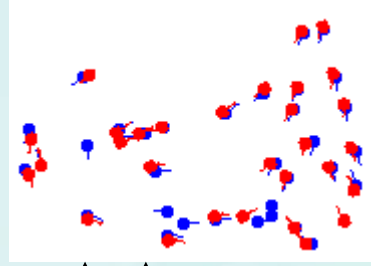
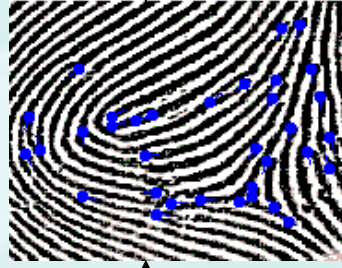
Verification System: Is this person who he claimed to be?

Enrollment

claimed ID



feature extraction



similarity score

matching

Verification

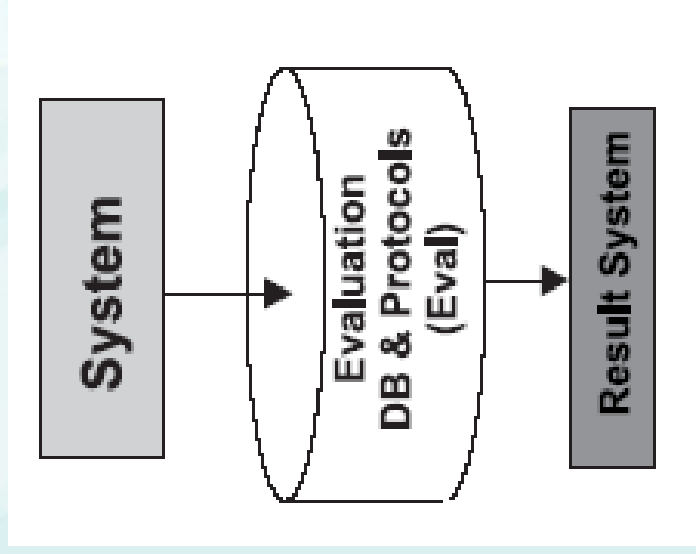
decision:
true or
false

Evaluation:

- ▶ **Database (DB):**
 - Contains the biometric data

- ▶ **Evaluation protocol:**
 - How you test the system
 - Client and impostor tests

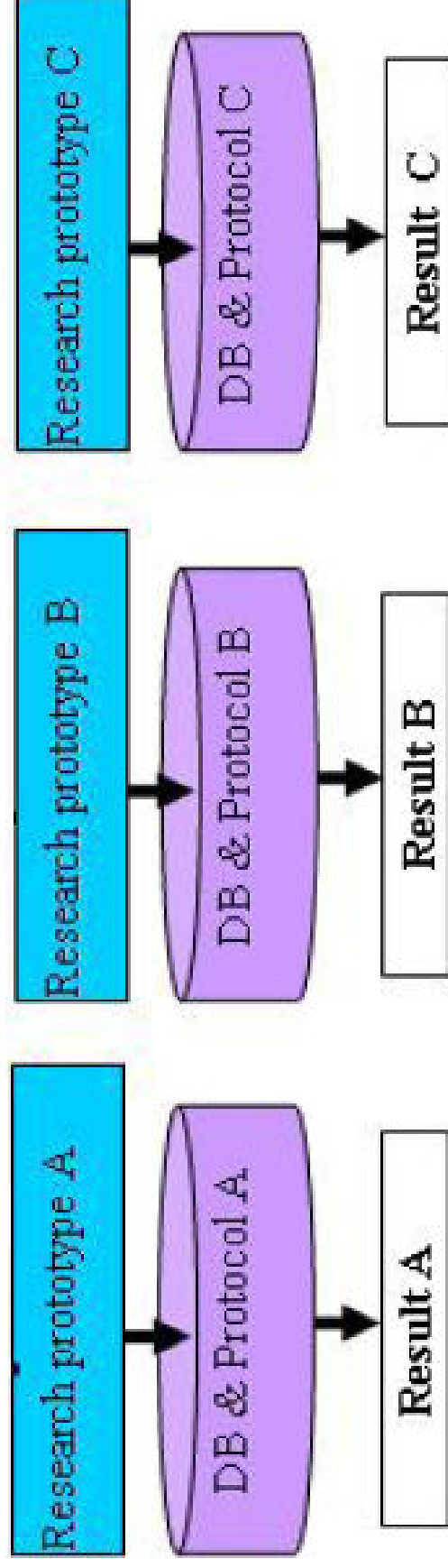
- ▶ **Result:**
 - FAR: False Accept Rate
 - FRR: False Rejection Rate



Flow diagram of a generic biometric experiment

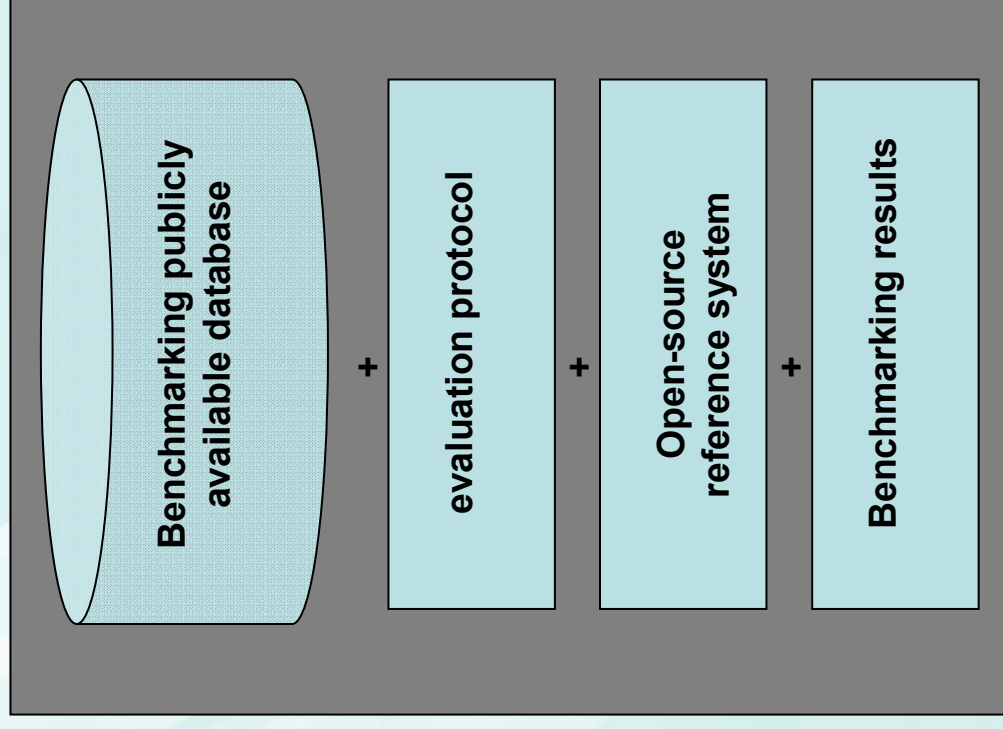
Problem

Suppose 3 universities have developed their own biometric verification system:



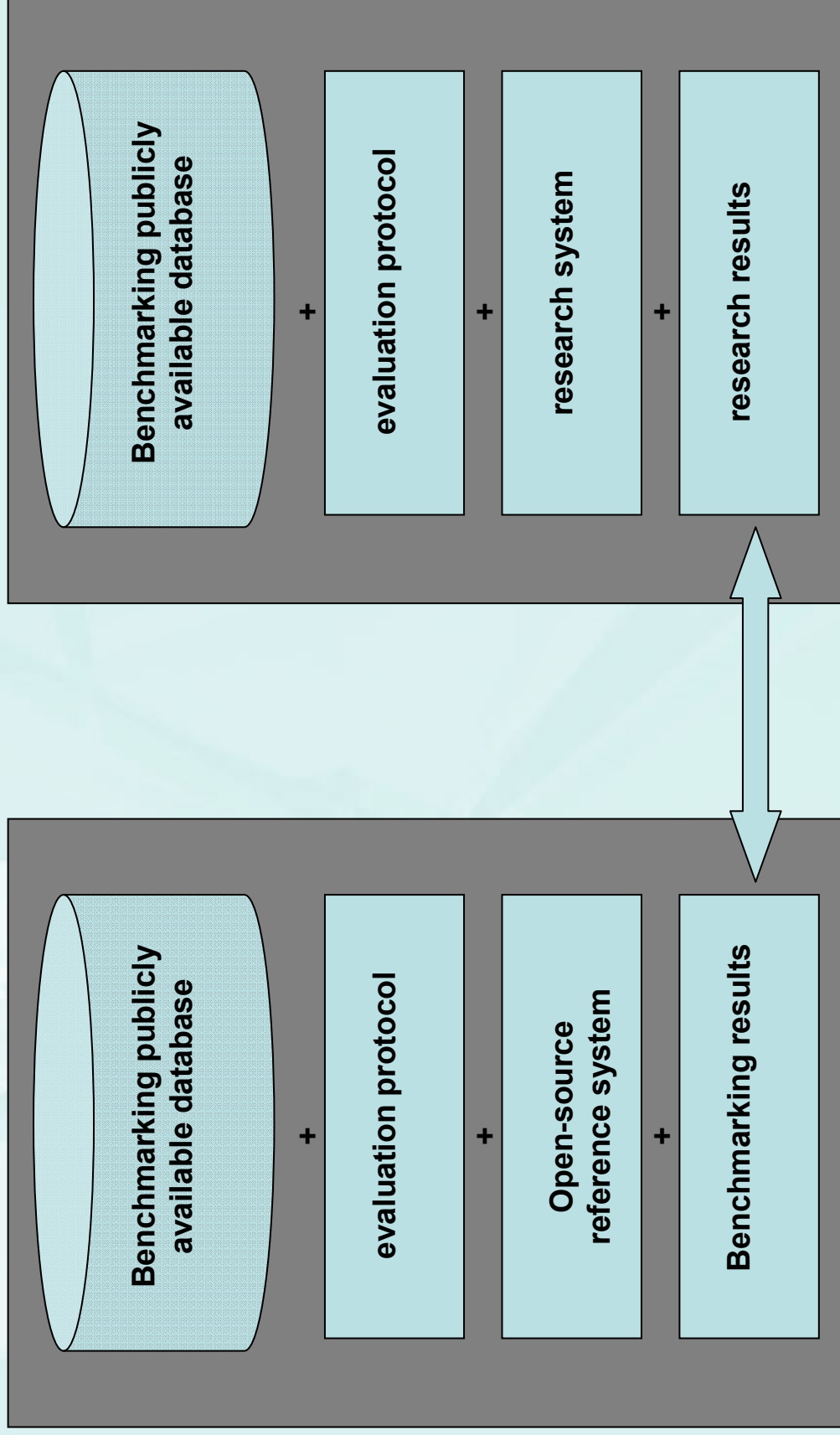
- ▶ The reported results of the 3 biometric results are **not comparable**

A universal evaluation framework:



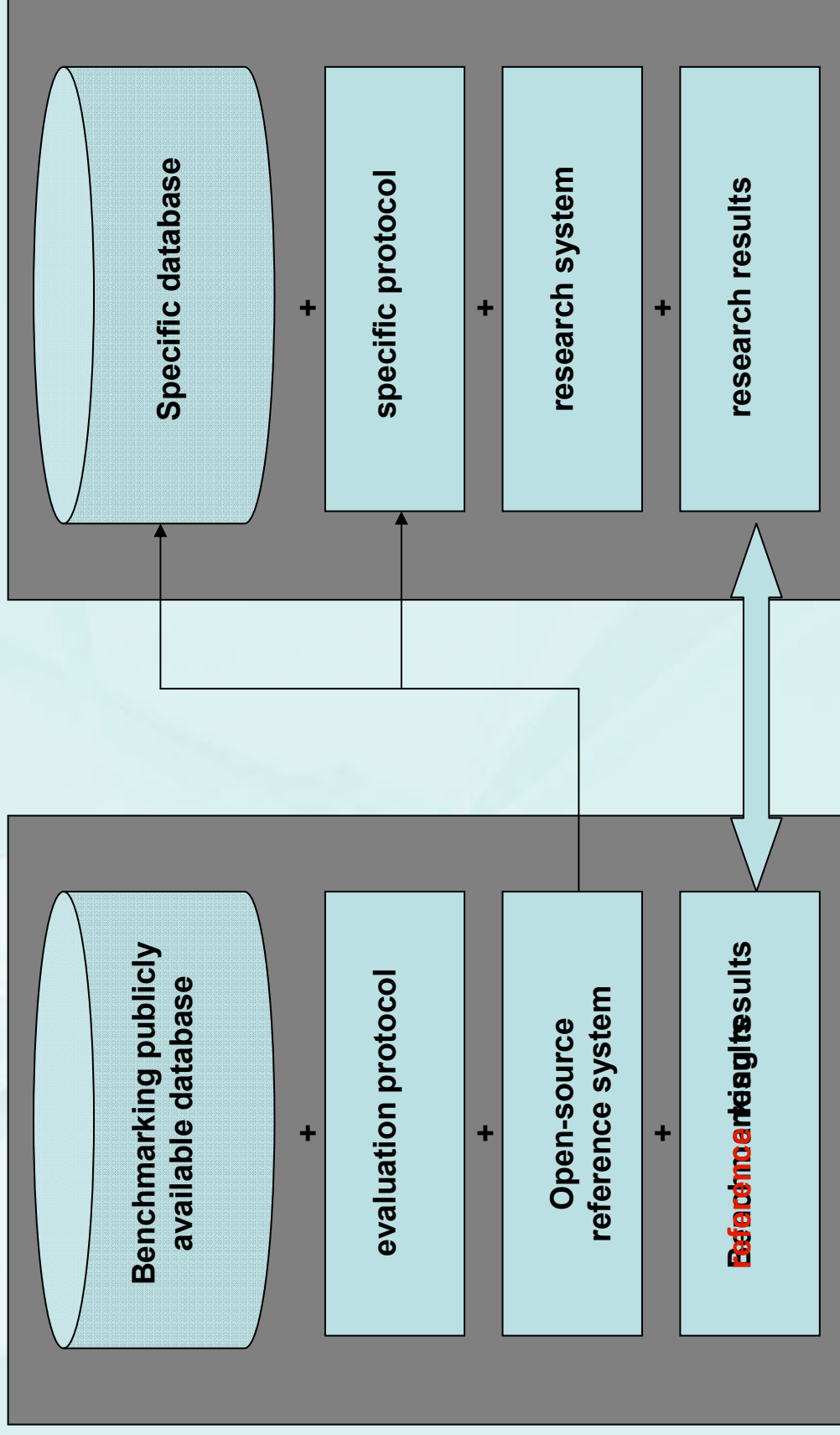
Solution (2)

1st Use: If someone publishes results using the benchmarking database and protocol, the benchmarking results can be used as a way of calibrating the performance

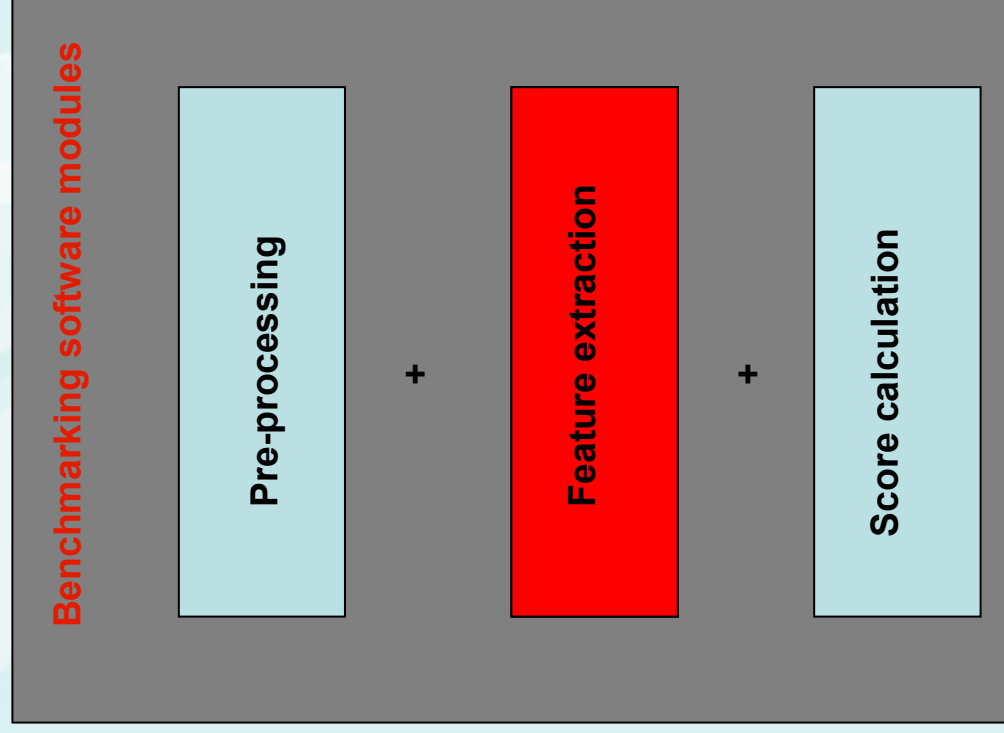


Solution (3)

2nd Use: If someone publishes results on a specific database according to a specific protocol, experiments using the reference system have to be added as a way of calibrating the difficulty of this particular task



Open-source reference systems



- ▶ Assess the contribution of each module

► **8 biometric modalities:**

- 2D face
- 3D face
- fingerprint
- hand
- iris
- signature
- speech
- talking-face

► **download:**

<http://share.int-evry.fr/svnview-eph/>

► **repository:**

- Open-source systems
- Documentation which
 - describes database
 - describes protocol
 - reports benchmarking results

Conclusion

- ▶ **New evaluation framework:**
 - Fair comparison of biometric systems
- ▶ **Open-source systems:**
 - Comparison point for performance calibration
 - Assess the contribution of each module
 - Time saving
- ▶ **Use for the BMEC 2007:**
 - <http://biometrics.it-sudparis.eu/BMEC2007>