


Best Practice

Fingerprint Enrolment Standards

European Visa Information System

Improving performance by improving fingerprint image quality
Experiences from pilot project BioDEVII

Agenda



BioDEVII – Phase 1



Quality Improvements in Phase 2



ProVITA: Technical Evaluation of BioDEVII



**Technical Guideline Biometrics for Public
Sector Applications**

The BioDEV II Project

- Gain experiences with regard to the introduction of VIS
 - Enrolment, Verification and Identification with focus on fingerprints
 - Organizational consequences for consulates and border posts
 - Interoperability of devices, processes and software
 - Ensure compliance with international standards

- 8 participating countries
AT, BE, DE, FR (project manager), LU, PT, ES, UK

- Launched in 2007 and planned until the end of March 2010



Hardware Improvements

- Fundamental: Use high quality capture device
 - Technical Guideline (TR-03104) from BSI (www.bsi.de)
 - Fingerprint scanners certified according to TR-03104
 - Certified single finger scanners (2009)
 - Cross Match, Sagem, Dermalog, Green Bit
 - Certified four finger scanners (2009)
 - Cross Match, L1 Identity

- Feedback monitor for applicants
 - Pro: Support finger positioning by direct feedback
 - Contra: Expensive and space requirement



2 Improved Enrolment Solutions – Main differences

secunet

- Usage of auto-capture
- 3 times putting slaps on scanner
- Always whole slap is captured
- QA Sagem Kit4 included
- Open Source NIST QA & segmentation
- Cross matching used for composite record (3 slaps min.)




NEC

- No auto-capture, NEC QA controls
- Slap stays on scanner
- Switch to single-finger capturing
- QA Sagem Kit4 included
- NEC QA and segmentation algorithms
- NEC QA for composite record



Agenda



BioDEVII – Phase 1



Quality Improvements in Phase 2



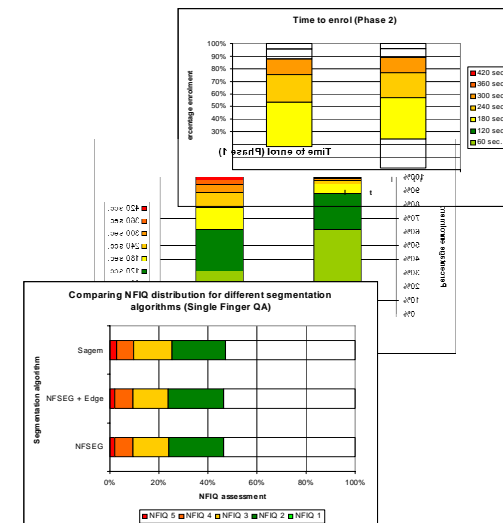
ProVITA: Technical Evaluation of BioDEVII



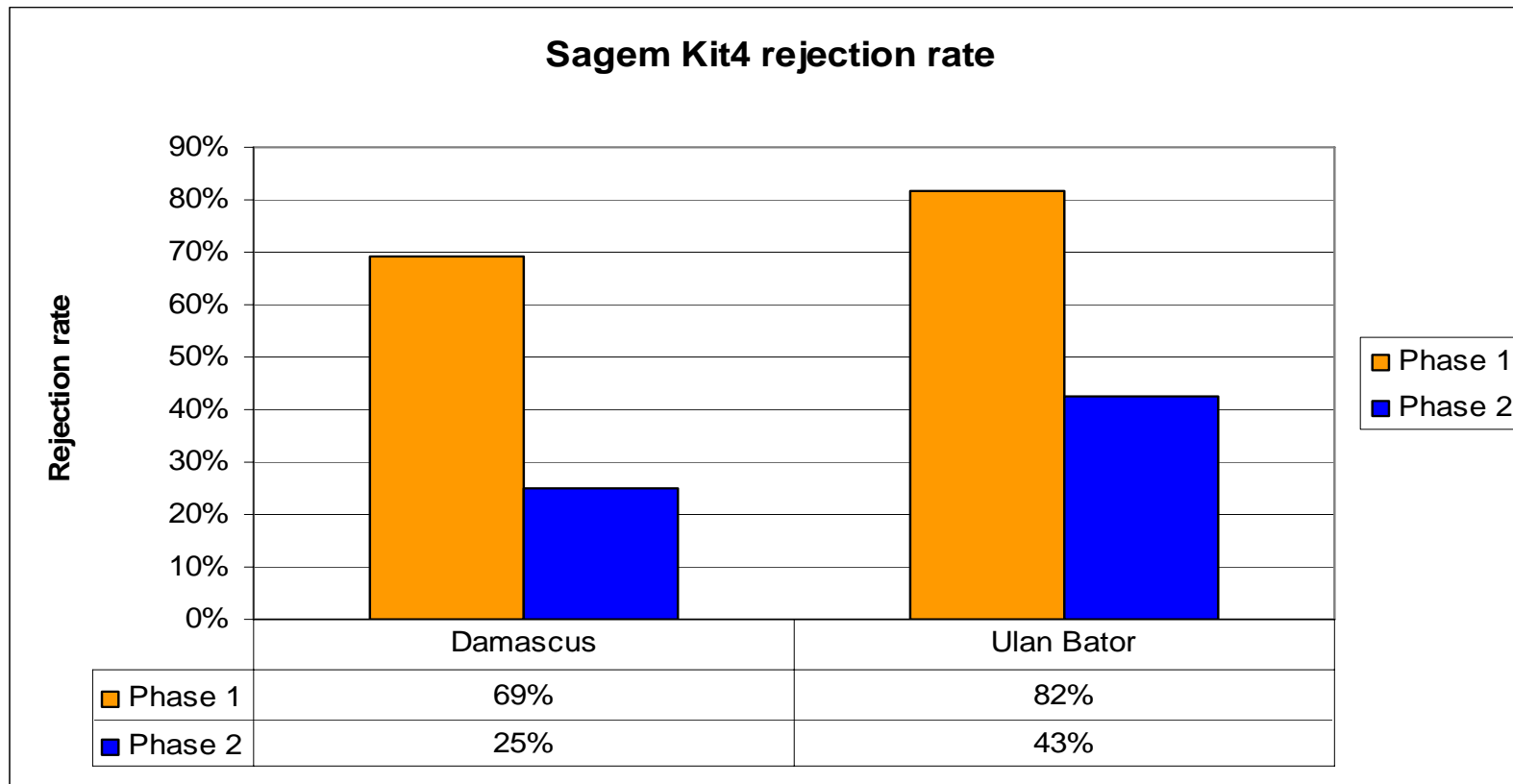
**Technical Guideline Biometrics for Public
Sector Applications**

ProViTA: Technical evaluation of BioDEV II

- Data from October 2007 to August 2009
- Qualitative **performance analysis** of the enrolment solutions
- Simulation of alternative **QA and segmentation algorithms**
- Derivation of **best practices** while considering the interests of all stakeholders
- Solid foundation for the **Technical Guideline Biometrics**

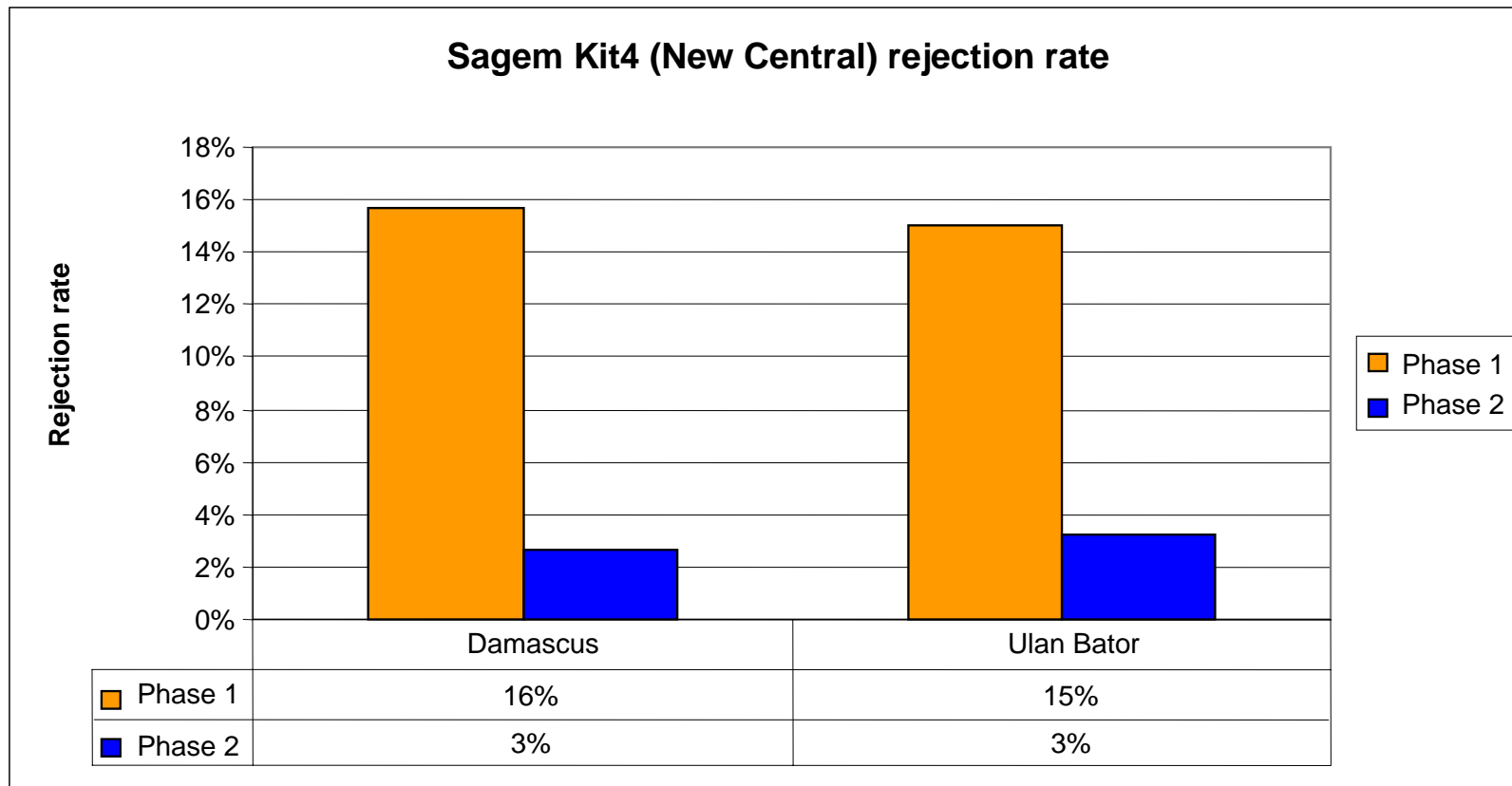


Results: Fingerprint Quality - Classic Rejection Rate



■ Significant decrease of Kit4 rejection rate in Phase 2 (up to one third)

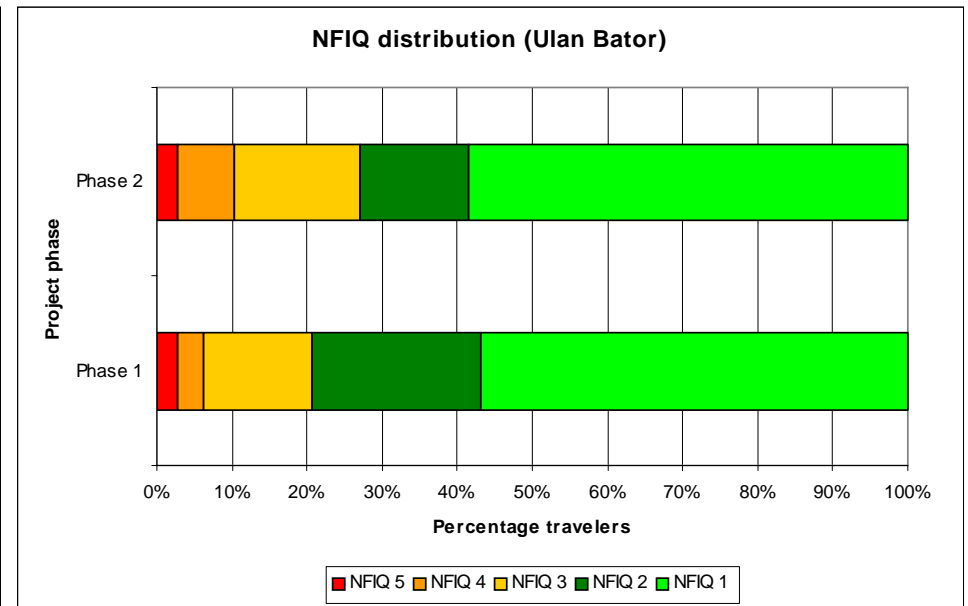
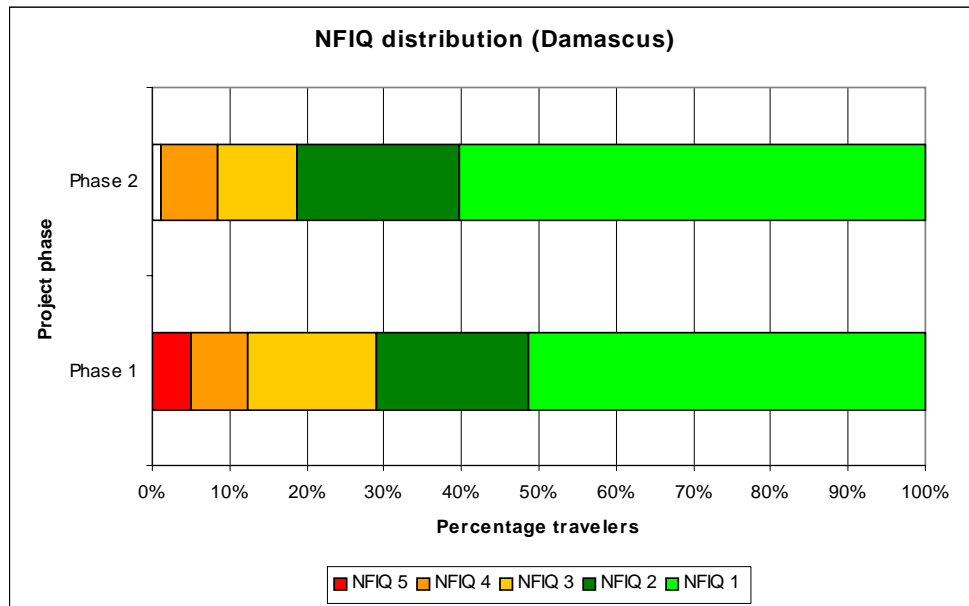
Results: Fingerprint Quality - New Central Rejection Rate



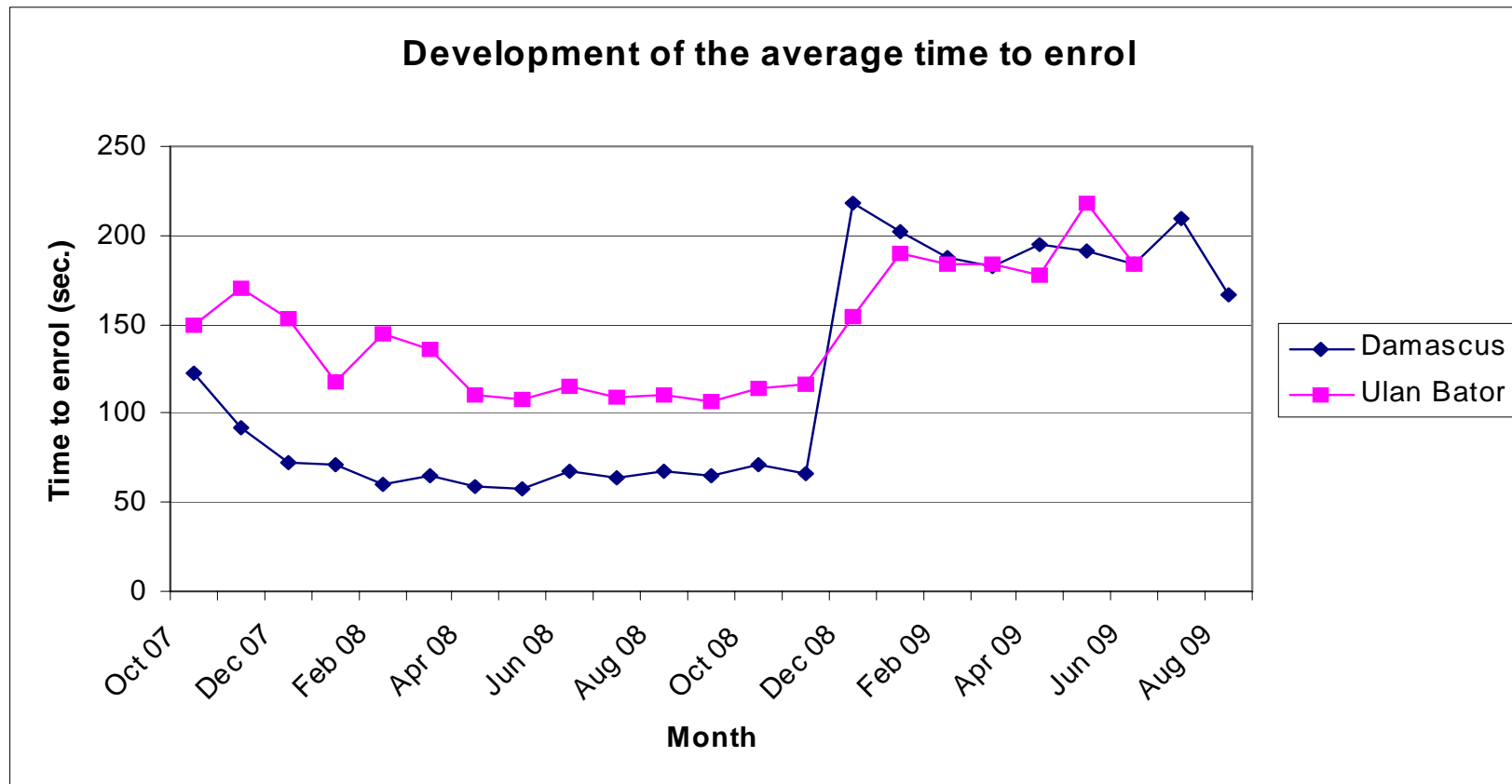
■ Much lower rejection rate for new Central Kit4

Fingerprint Quality Distribution for third party QA algorithms

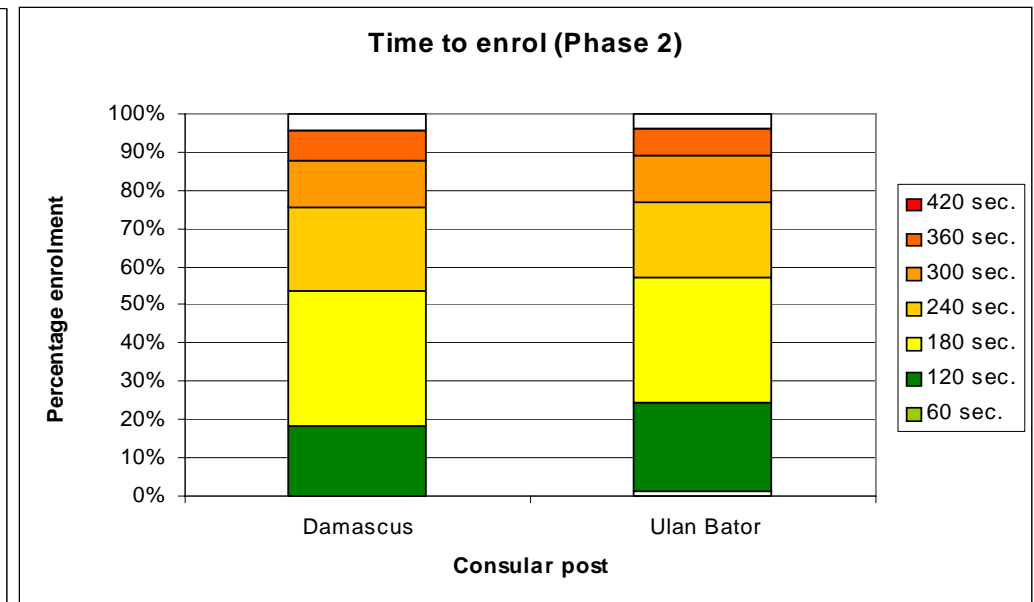
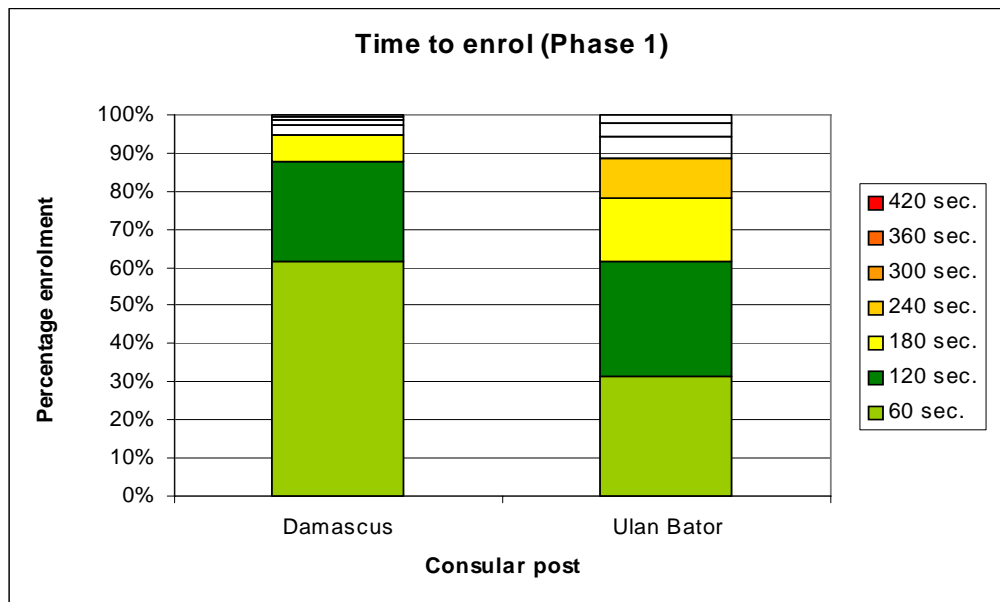
- Quality assessment on all enrolled fingerprints was performed using NFIQ, Sagem Kit4, NEC QualityTool, Aware SequenceCheck
- Damascus records noticeable quality improvement of captured fingerprints for all algorithms. In Ulan Bator, the opposite is consistently the case.



Results: Enrolment Duration



Results: Enrolment Duration



■ Phase 1

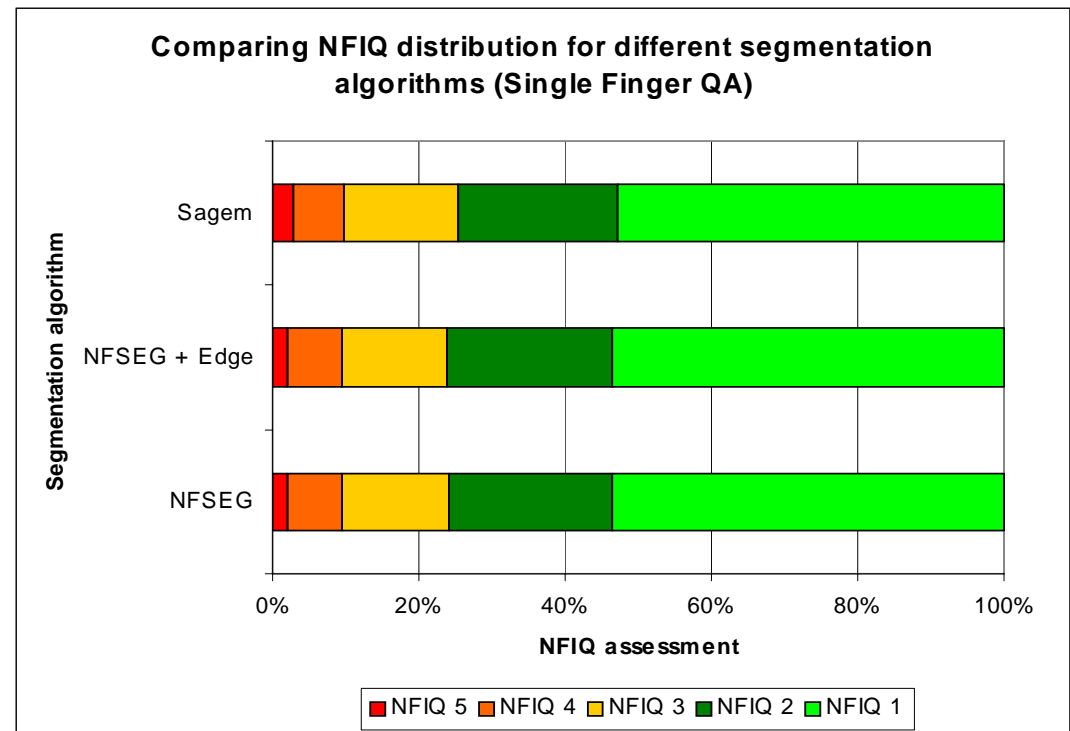
- 90% / 60% of enrolments in less than 120 sec.

■ Phase 2

- 75% of enrolments in less than 240 sec.
- Almost no enrolment in less than one minute

Results: Influence of Segmentation algorithm

- Slaps were segmented using different algorithms
 - NFSEG, parameterized NFSEG, Sagem Morphos
- QA on resulting fingerprint images
 - NFIQ, NEC QualityTool, Aware SequenceCheck, Sagem Kit4
- Result: segmentation has little to no impact on image quality
- Open source solutions offer equal or better performance



Interoperability of Segmentation algorithms

- 4-Finger-Slap captured with Cross Match LSCAN Guardian Sensor



Interoperability of Segmentation algorithms

NFSEG



BMS-VIS
USK3




Lessons Learned

- **Quality assurance** has a **large impact** on the overall process
- Good quality can only be achieved as a **combination of operational and software-based** quality measures
- **High quality** comes at a price (**enrolment time**)
- You can learn how your system works if you have enough **logging data!**
- Need for specifying **best practices** for high quality enrolment processes



Agenda



BioDEVII – Phase 1



Quality Improvements in Phase 2



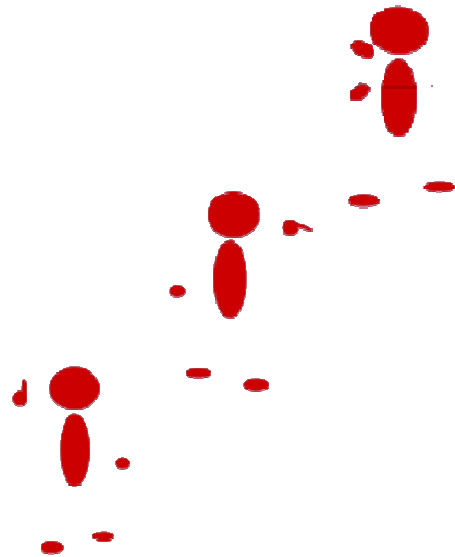
ProVITA: Technical Evaluation of BioDEVII



**Technical Guideline Biometrics for Public
Sector Applications**

Why a Technical Guideline?

Biometric *Lessons Learned* exist: they have to be made reusable



Project Leaders: preparing a call for tender

End Users: requesting Quality

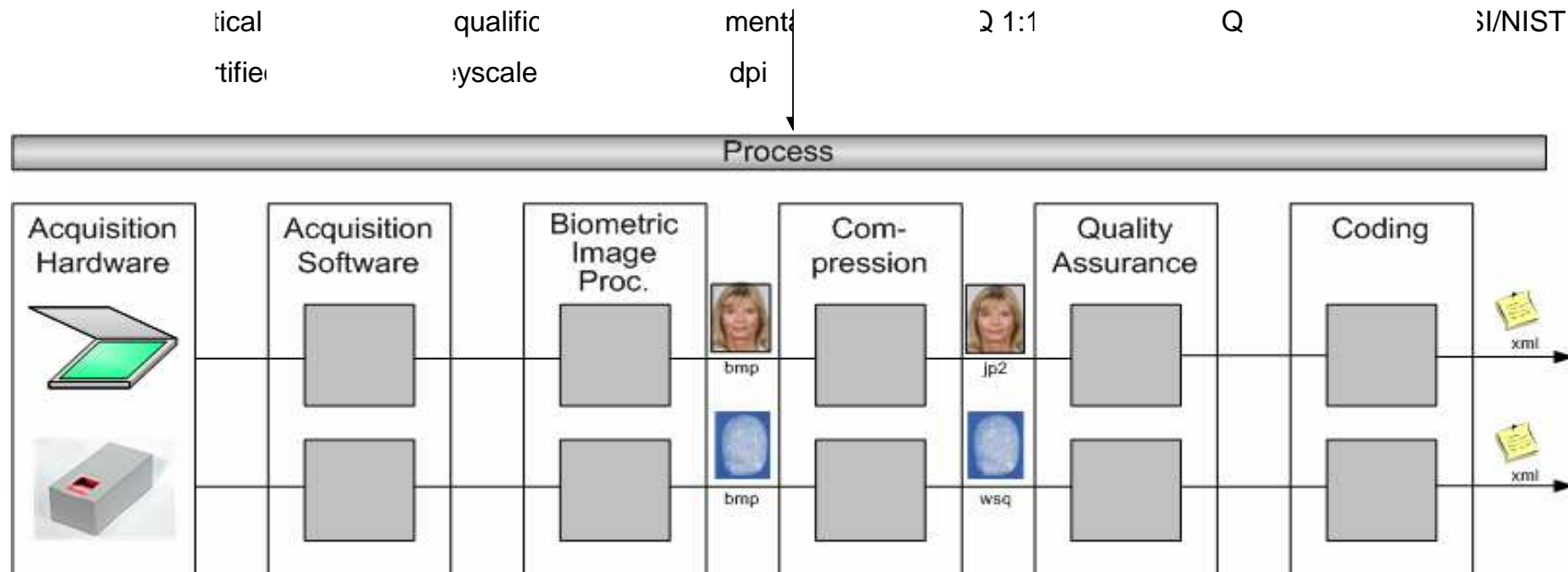
Companies: general requirements and standards

All biometric processes are – roughly – the same

Typical Enrolment Workflow (e.g. for VISA)

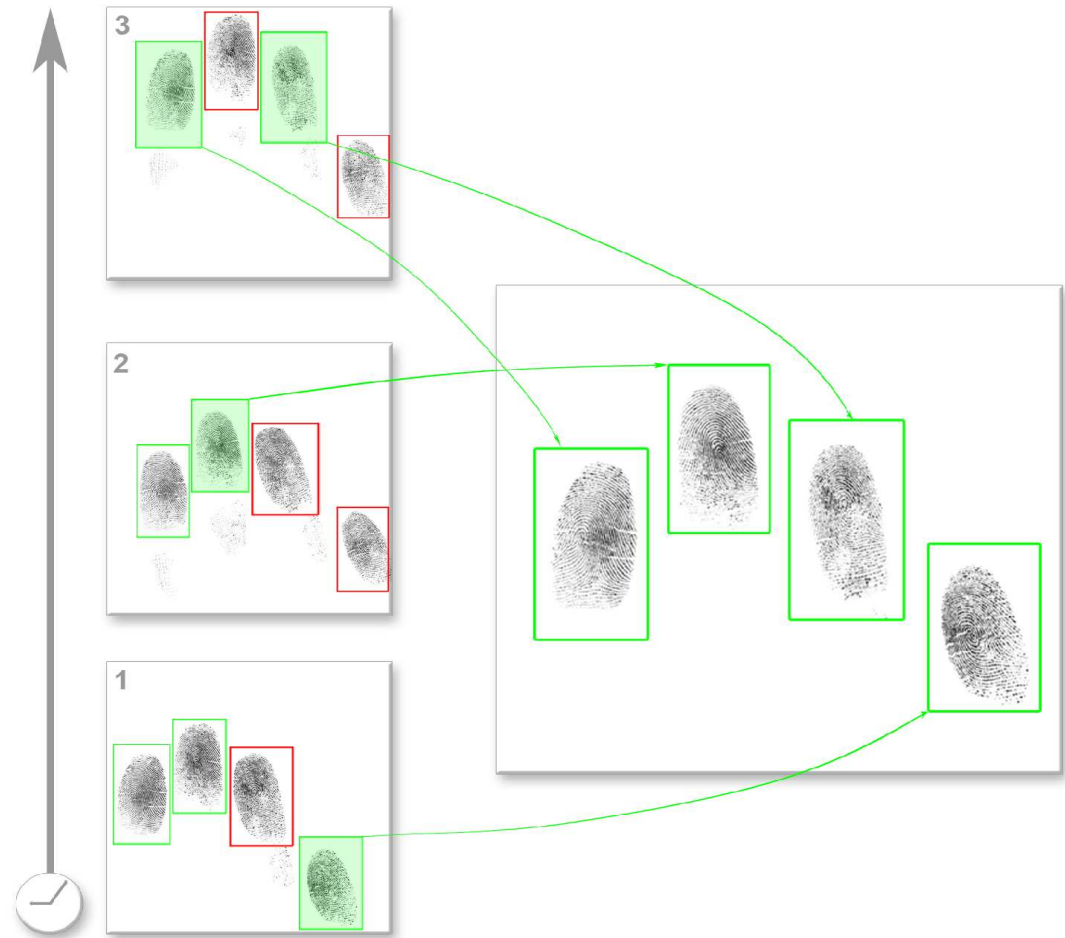
■ Specify distinct requirements

- Process description for high quality fingerprint enrolment



VISA Enrolment Profile: Fingerprint process requirements

- Based on composite records
- Several QA mechanisms possible
- Proposed QA is a 3-way crossmatching of fingerprints
- re-capture of single fingers possible, if necessary



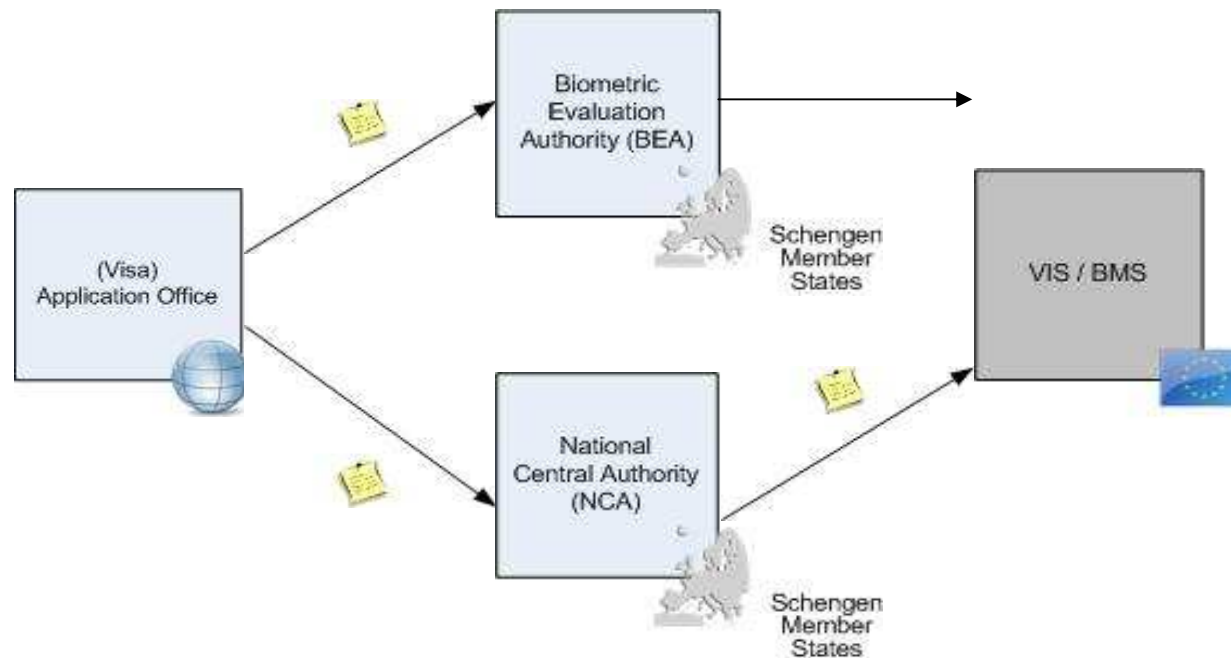
VISA Enrolment Profile: Other aspects

- Collection of recommendations that were established while running the BioDEV II project
 - User guidance
 - Operator guidance
- The guideline has information on the coding
 - of the biometric data itself plus additional data
- Data to collect (Function Module **Logging**)
 - Quality values, HW/SW information, timing information if possible, errors, demographic data
- Only **Logging data** provides information
 - Analyse failures, increase of the rejection rate etc.
 - Discover possible optimisations
 - Monitoring system performance in quality and time



VISA Enrolment Profile: Data Flow Overview

- Biometric data is collected for the VIS through the NCA
- Additional quality data is collected for evaluation purposes by the Biometric Evaluation Authority (BEA)



Currently Available Specifications

- Visit the Homepage of the
Federal Office for Information Security
Bundesamt für Sicherheit in der Informationstechnik - BSI
- <http://www.bsi.bund.de/ElektronischeAusweiseTR> | TR-03121
- Version 1.0.1
 - Enrolment profile German Identity Card
- Version 2.0
 - Additional enrolment profile VISA enrolment
 - Available as release candidate
- Version 2.x
 - More application profiles



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Thank you for your attention!