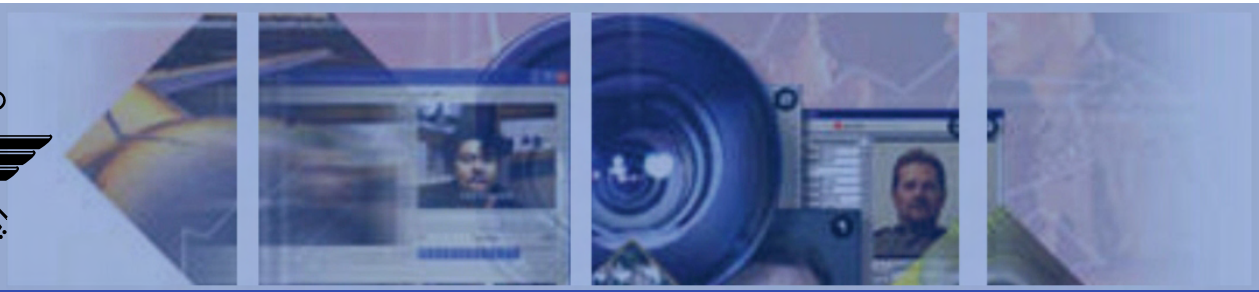


2nd Symposium on ICAO-Standard MRTDs, Biometrics and Security

The Introduction of Electronic Passports in Germany

Dr. Edgar Friedrich

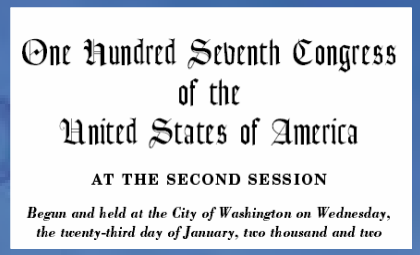
MRTD Symposium
ICAO Headquarters, Montréal
6 – 7 September 2006

Agenda

- National and international legislation
- The German passport system
- The administrative process
- Technical features of the new electronic passport
- Application concepts for the control level
- Summary and Conclusions

Drivers for an enhanced security policy on advanced MRTDs

- **USA**: Patriot Act 2001, Enhanced Border Security and Visa Entry Reform Act 2002
- **UN**: Security Council Resolution of 28 September 2001
- **ICAO**: Machine Readable Travel Documents with Biometric Identification Capability
- **EU**: Action Plan of 21 September 2001, Council of Thessaloniki 2003, Declaration on Combating Terrorism of 25 March 2004, Council Regulation of 13 December 2004
- **Germany**: Act for Combating International Terrorism 2002, new passport provisions in force on 1 Nov 2005



Objectives:

- high quality security features for classical inspection
- capability for usage of modern information and identification technologies
- machine verification of authenticity

European timetable on biometrically enabled MRTDs

- **13/12/2004**: Council Regulation 2252/2004 on standards for security features and biometrics in passports and travel documents
  - Passports and travel documents include a storage medium which contains a facial image and fingerprints in interoperable formats.
  - Storage medium to guarantee integrity, authenticity and confidentiality of the data.
- **28/02/2005:** Commission decision on technical specifications for RF chips and facial images
  - → **Introduction of passports with RF chip and stored facial image until 28/08/2006 (= 18 Months)**

- **28/06/2006:** Final Commission decision on technical specifications for fingerprint images and appropriate security and access control features (EAC)
  - → **Introduction of passports with RF chip and stored facial and fingerprint images until 28/06/2009 (= 36 Months)**

The German Passport System

History:

- Introduction of machine readable ID cards in 1987 and passports in 1988
- since then about 135 million ID cards and 64 million passports produced
- 1997: digital photographic print system
- 2001: introduction of the Identigram®
- November 2005: Introduction of eMRPs (more than 1.5 Mio produced until now)

Infrastructure:

- 16 Federal States
- 5700 local passport offices
- 1 central production site (Bundesdruckerei @ Berlin)
- production of approx. 50,000 documents (passports and ID cards) per day

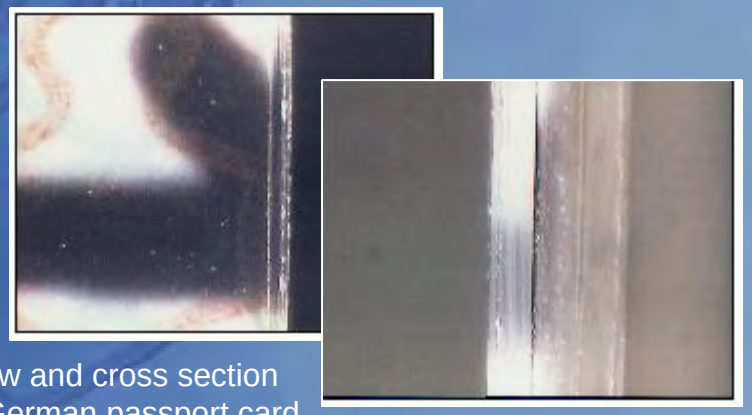
Security features in the German MRP

Concept of four major security aspects:

- authenticity features of the document material
- security printing
- security techniques against reproduction, particularly optically variable security features
- issuing techniques for data integration into the document material

Leading to the prevention of

- reproduced documents and counterfeits
- falsification of document data
- illegal issuance

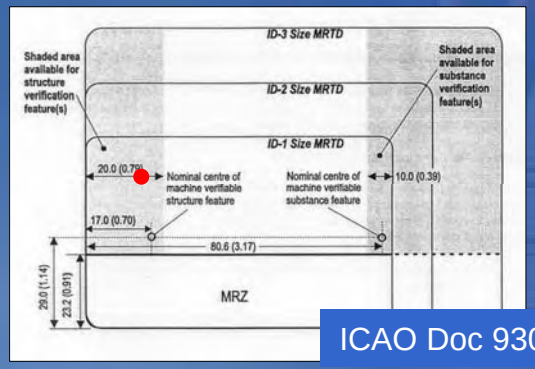


Top view and cross section of the German passport card

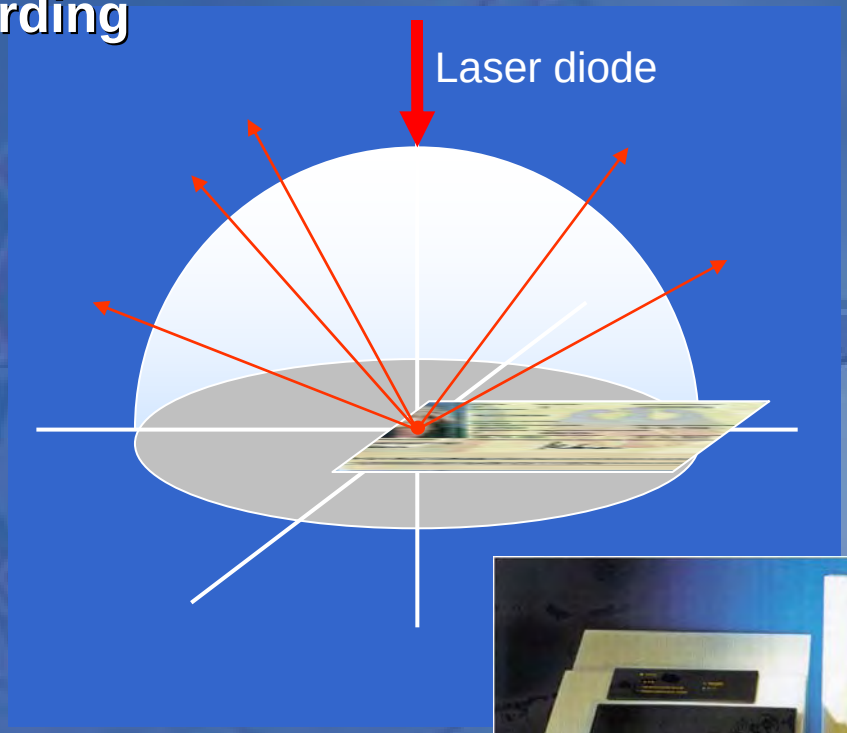
2001: Introduction of the Identigram, the world's first personalised DOVID

Machine-assisted security feature verification

Identigram verification according to ICAO Recommendations



ICAO Doc 9303



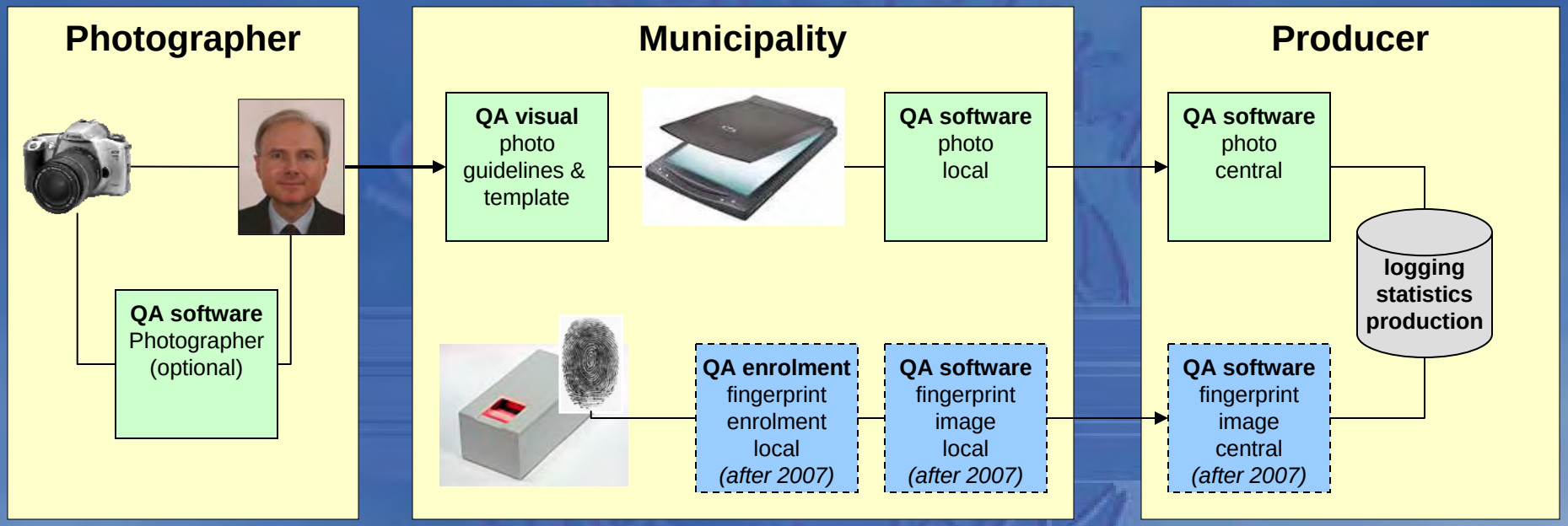
Verifier Technology:

- illumination of holographic structure by laser diode
- detection of signal response pattern
- identification by comparision with reference pattern for authentic document

e-Passport – Facts and Figures

- Applicants who filed their application on and after 01/11/2005 receive an electronic passport, containing a RF-chip.
- The chip contains DG1 (MRZ), DG2 (facial image) and EF.SOD (security object) according to ICAO Doc 9303. In 2007, newly issued passports will also contain two fingerprints in DG3.
- The e-Passport costs 59 € (previous passport: 26 €).
- Earlier issued passports remain valid, the e-Passport has a validity of 10 years.
- There are new photo requirements in place.
- Electronic ID-cards with RF-Chip, facial image and fingerprints planned for 2008

Enrolment process and data flow

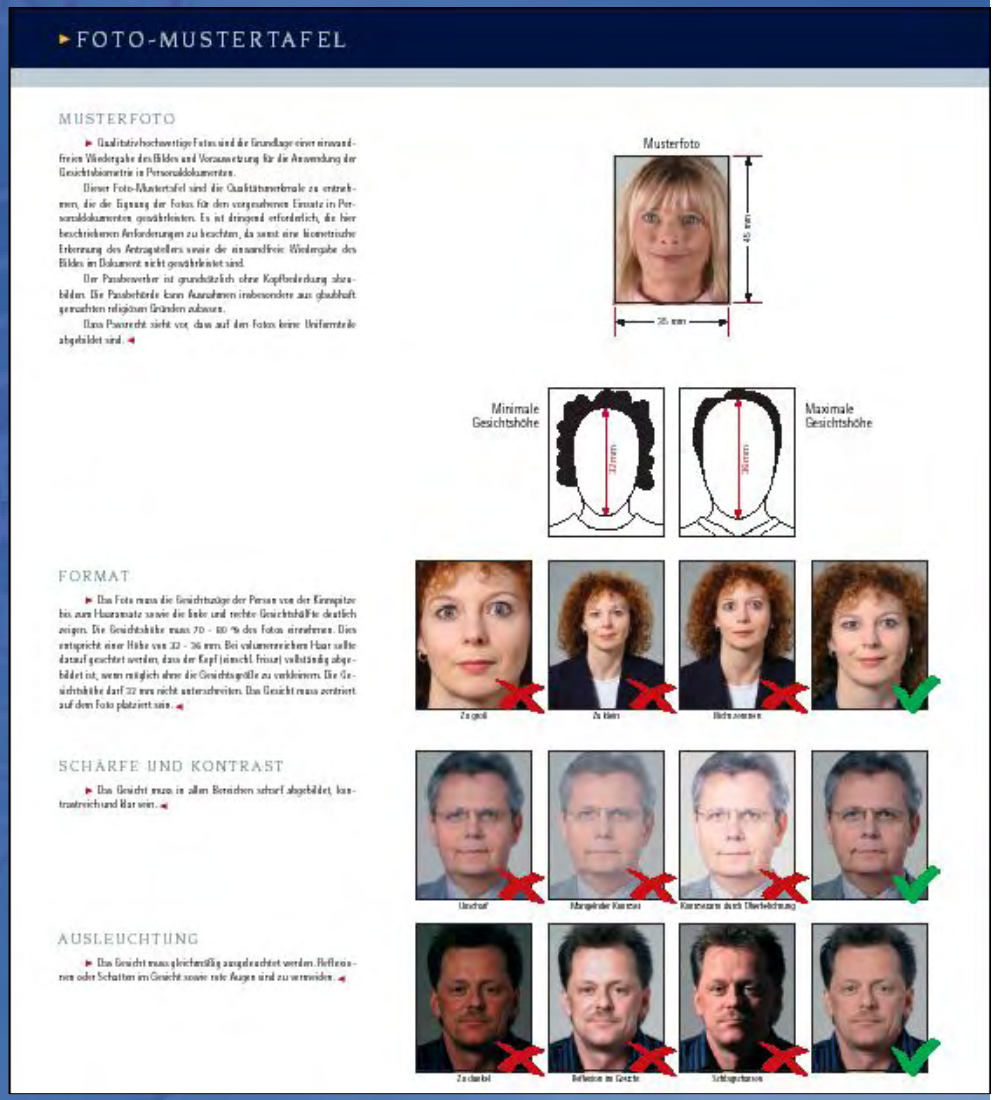


- In order to ensure interoperability, the portrait (and later, the fingerprints) shall be compliant to international standards set by ICAO.
- A 3-step quality assurance process is established for all 5700 passport offices
  - new photo guidelines
  - photo template
  - quality assurance software

New photo guidelines for visual QA

Criteria:

- photographic image properties (portrait size, position of eyes, etc)
- technical image properties (sharpness, contrast, resolution, etc)
- image composition (illumination, frontal pose, facial expression)
- properties affecting biometric performance (headwear, glasses, etc)

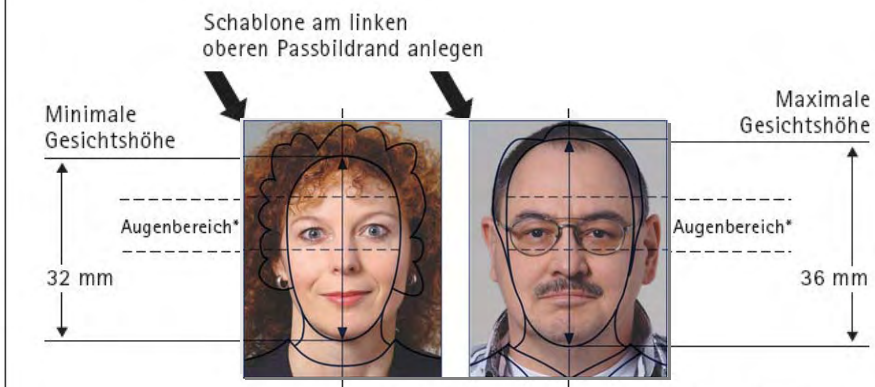


New photo template for visual QA

SCHABLONE ZUR PRÜFUNG DER BIOMETRIETAUGLICHKEIT VON PASSBILDERN

BUNDESDRUCKEREI

PASSBILD-SCHABLONE



Hinweis: Bei Kindern bis zum vollendeten 10. Lebensjahr sind Abweichungen bei der Gesichtshöhe und im Augenbereich zulässig.

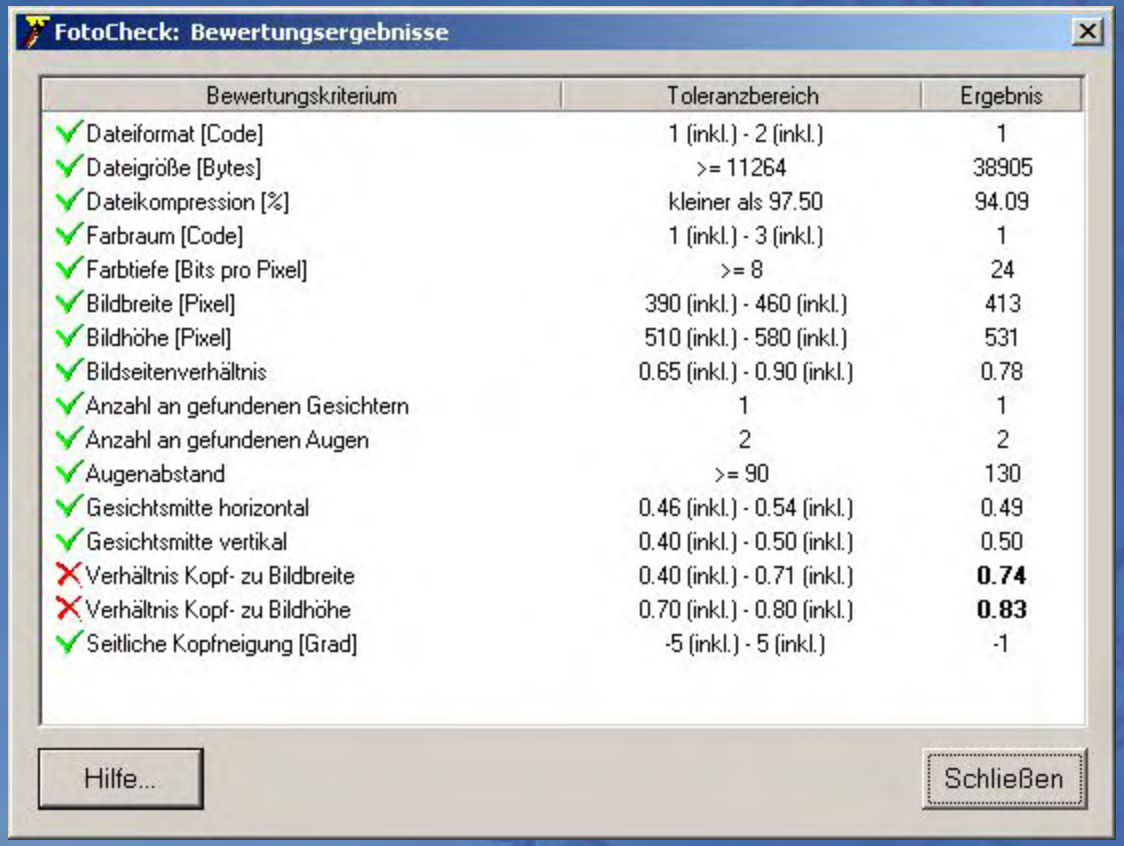
CHECKLISTE ZUR BILDBEURTEILUNG
Bitte prüfen Sie das Passbild anhand der Fotomustertafel und der folgenden Kriterien:

- **FORMAT**
  1. Bildgröße 35 x 45 mm?
  2. Gesichtshöhe 32 - 36 mm vom Kinn bis zum Haaransatz?
- **KOPFPOSITION UND GESICHTSAUSDRUCK**
  3. Kopfhaltung gerade (nicht geneigt, gedreht oder gekippt)?
  4. Nase etwa auf der gekennzeichneten Mittellinie?
  5. Frontalaufnahme?
  6. Gesichtsausdruck neutral?
  7. Lippen geschlossen?
- **AUGEN UND BLICKRICHTUNG**
  8. Augen innerhalb des markierten Bereichs auf gleicher Höhe?
  9. Augen offen und deutlich sichtbar?
- **SCHÄRFE UND KONTRAST**
  10. Foto scharf und kontrastreich?
- **AUSLEUCHTUNG**
  11. Ausleuchtung gleichmäßig (keine Schatten)?
- **HINTERGRUND**
  12. Hintergrund einfarbig?
- **FOTOQUALITÄT**
  13. Natürliche Hauttöne?
  14. Keine Knicke und Verunreinigungen?
- **BRILLENTRÄGER**
  15. Augen erkennbar und nicht verdeckt?

BITTE BEACHTEN SIE:
Nur wenn alle Fragen mit „JA" beantwortet wurden, ist das Bild biometrietauglich.

HINWEIS:
Bei Säuglingen und Kleinkindern sind bei 3./4./6./7./8./9. aus altersbedingten Gründen Abweichungen zulässig.

QA-Software for computer-aided QA



- ✈ software guided QA of the applicants passport photo
- ✈ evaluation of image properties according to ICAO specs:
  - for the printed photo
  - after digitisation

Transparency for citizens: the e-Passport Reader

- Passport holders can read out data stored on the chip of the e-Passport.
- The devices are available in all municipalities across the country.

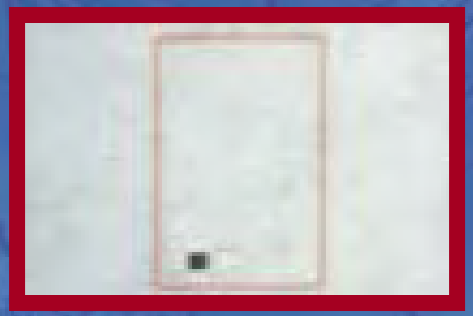
The electronic passport (e-Passport) – a dual document

- **Physical Document**
  - data page
  - machine readable zone
  - Physical security features remain unchanged

- **Digital Document**
  - RF-Chip
  - MRZ and biometrics
  - Digital (cryptographic) security features

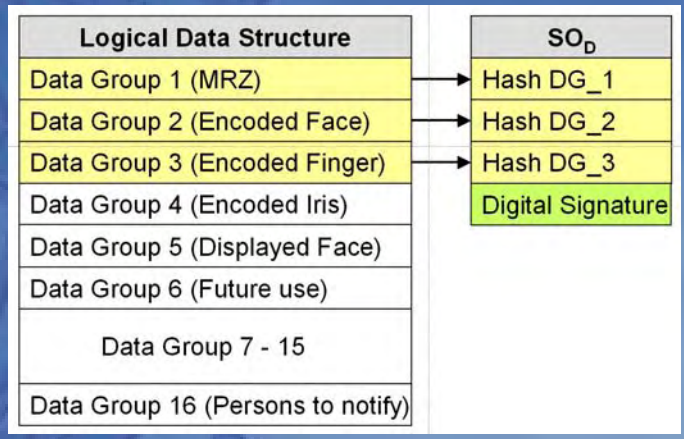
Technical features: mechanical construction

- processor chip module (Philips Smart MX 72 Kbytes) with ID1 antenna securely embedded into plastic inlay
- chip inlay positioned within traditional stiff cover of the German passport
- durability tested according to international draft standards
  - functional testing
  - bending
  - flexing
  - stamping
  - climate
  - X-ray/UV-retention



Digital security features of the German e-Passport

- Passive Authentication (ICAO mandatory)
  - ECDSA signature / SHA-1 hashing algorithm
  - 224 bit base point order for document signing key
  - 256 bit base point order for country signing CA key
- JPEG2000 encoded facial image, size approx. 15 Kbyte



- Basic Access Control (BAC): mandatory for EU passports
- 2007: Extended Access Control (EAC) for advanced fingerprint protection according to EU requirements
  - Chip Authentication + Terminal Authentication

Interoperability

- Interoperability between RF chips and readers is the key issue for the international application of ICAO compliant e-Passports.
- Since 2004, various interoperability trials were carried out in Sydney, Morgantown, at Baltimore airport, in Tsukuba, Singapore and Berlin.
- Due to the collaborative effort of governments and industry, these events showed significant progress in interoperability and reading speed.
- Results for the German e-Passport:
  - the German e-Passport could be read by 95% of all readers within approx. 5 seconds including the BAC protocol

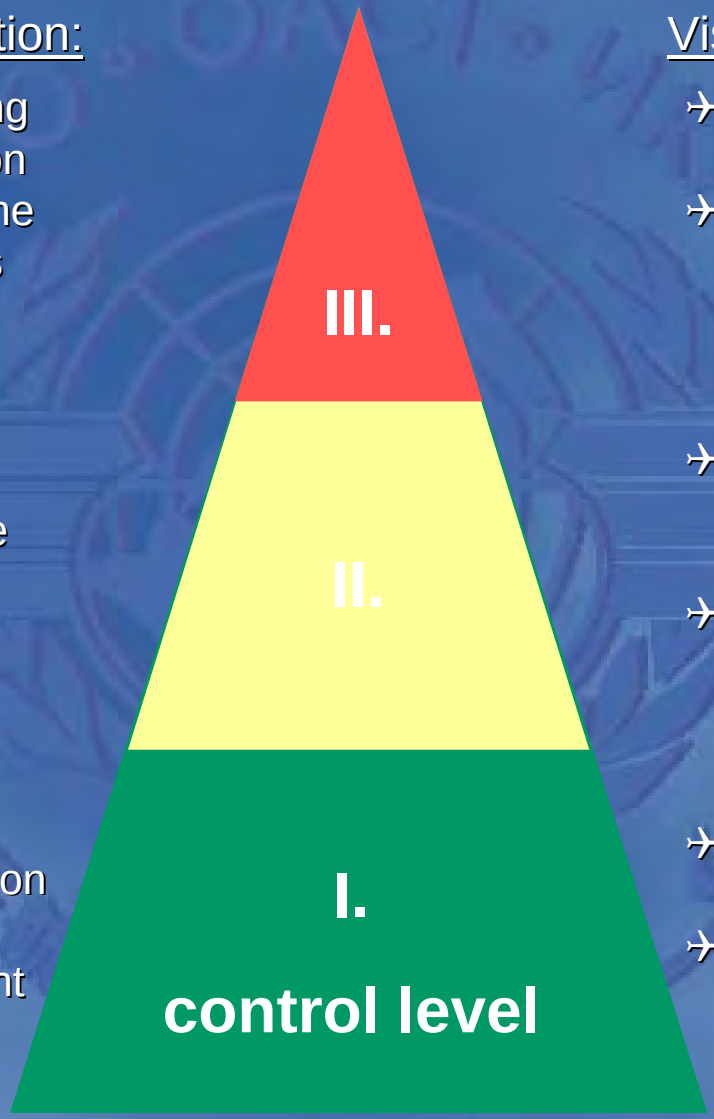
Extended inspection concept

Machine-assisted inspection:

- Forensic analysis regarding authenticity or manipulation of IT-functions and machine verifiable security features

- Automated document analysis by technical comparison with reference standards
- Multiple biometric identification / comparison with search files

- Machine reading of document data / comparison with search files
- Authentication of document security features
- Verification of biometrics



Visual / human inspection:

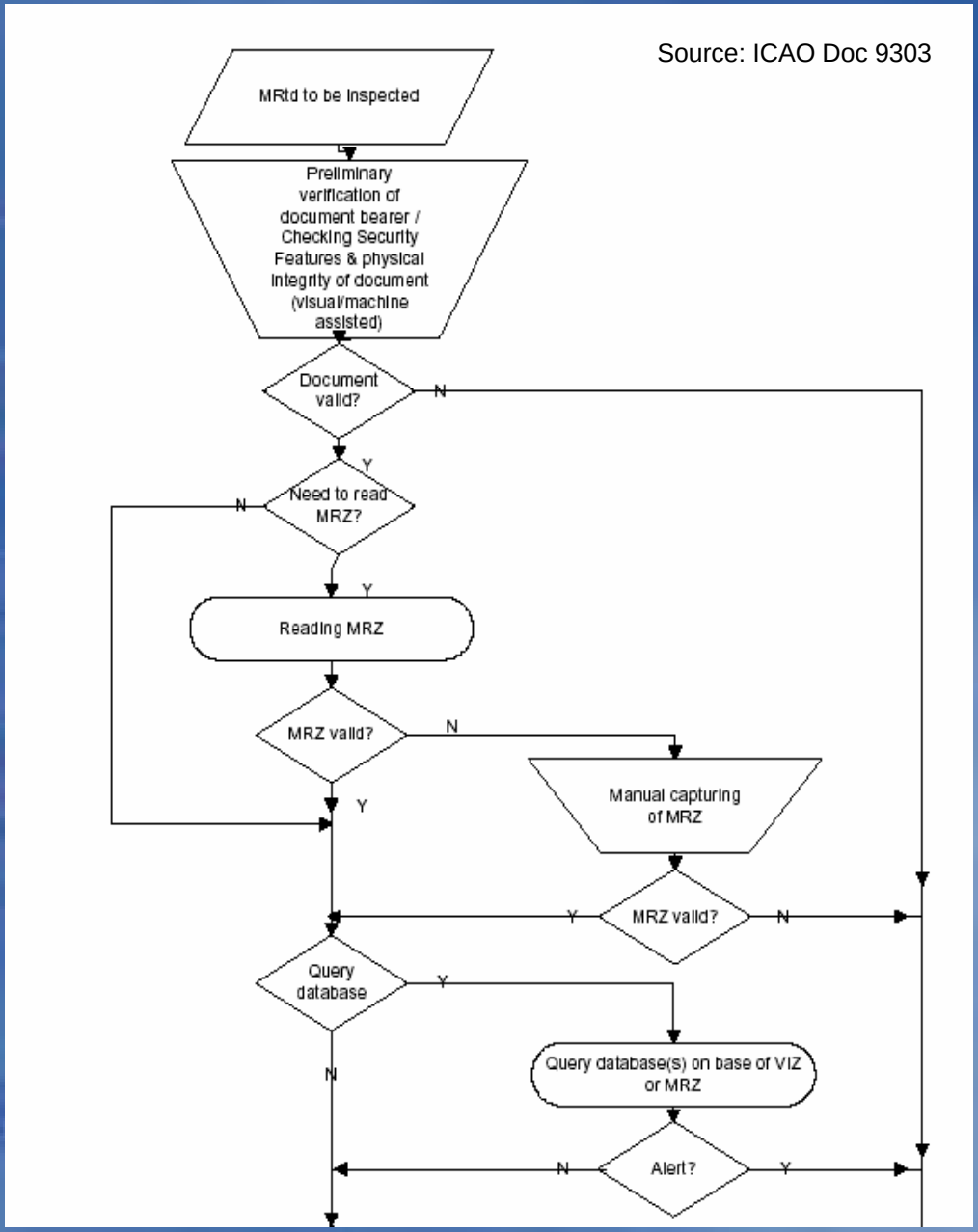
- Document examination in forensic laboratory
- Presentation of evidence and tracing of background connections / criminal investigation

- Document examination with basic inspection devices / reference material
- Classical criminal identification of suspect person

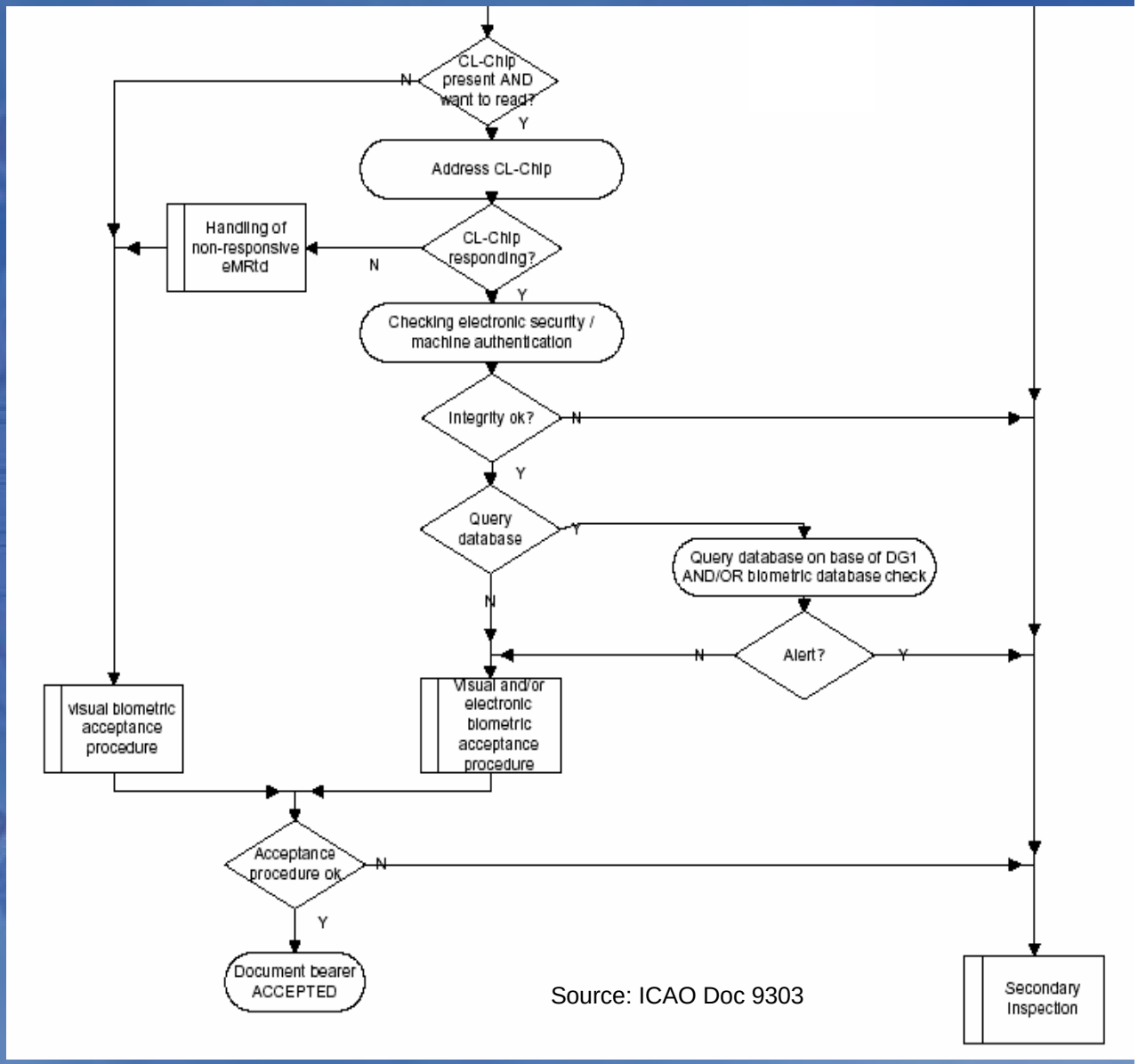
- Authenticity check of document
- Correlation with holder of the document

Inspection process with MRTDs: (1) Reading of MRZ

Source: ICAO Doc 9303



Inspection process with MRTDs: (2) Reading of chip data and biometric verification



Source: ICAO Doc 9303

The German e-Passport - Summary

chip & antenna integrated in front cover

facial image JPEG2000 compression in DG2

Basic Access Control

EF.SOD: ECDSA signature

2007: fingerprints & Extended Access Control

Contribution to a globally interoperable framework to ensure facilitation and security of international travel

End

Thank you for your attention

www.ePass.de