

Trends in digital aerial imaging – Part B

***European Activities in  
Camera Cal/Val and Certification***



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# EuroSDR – Who we are ...



## The EuroSDR mission

- to be the **European research** platform for **National Mapping and Cadastre Agencies, Academic Institutes, Private Industry and User's Groups ...**
- ... on issues related to the **implementation of technology** developments in view of **optimizing the provision of reference information** in a geo-information infrastructure context
- **Develop and improve methods, systems and standards** for the acquisition, processing, production, maintenance and dissemination of geospatial reference information
- **Promote applications** of all such data
- **Encourage interaction** between research organisations and the public and private sector



# EuroSDR members and structure



The 17 EuroSDR member states

## Structure

- 2 participants from each country
  - 1 from academia
  - 1 from NMCA
- additional industry participation
- secretariat in Dublin
- 5 scientific research commissions



# EuroSDR research commissions



## 1. Sensors, primary data acquisition and georeferencing

Michael Cramer, Universität Stuttgart (D)

## 2. Image analysis and information extraction

Juha Hyppä, Finnish Geodetic Institute (SF)

## 3. Production systems and processes

Eberhard Gülch, Univ. of Appl. Sciences Stuttgart (D)

## 4. Geospatial reference databases

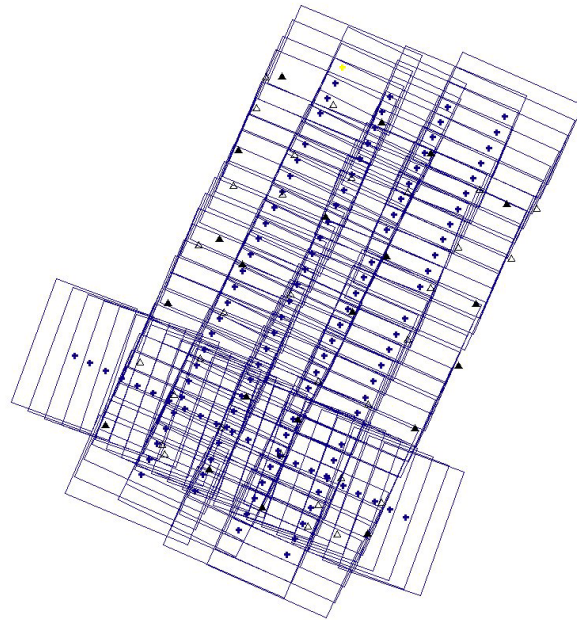
Keith Murray, Ordnance Survey (UK)

## 5. Integration and delivery of data and services

Mike Jackson, University of Nottingham (UK)







# *European Activities in Camera Cal/Val and Certification*

**The EuroSDR digital camera calibration network**



# The EuroSDR Activities in Camera Calibration and Validation



## **Digital Camera Calibration Network**

*Fall 2003 – spring 2007 (scientific project, focus on technical aspects)*

▶ *theoretical **PHASE 1** (finished end of 2004)*

collection of publicly available material to compile an extensive report documenting currently used calibration practice and methods

▶ *empirical **PHASE 2** (finished spring 2007)*

analysis of empirical test flights for (in optimal case) recommendation of best practices for camera calibration / validation

## **European Digital Airborne Camera Certification – EuroDAC<sup>2</sup>**

*Fall 2006 – ongoing*

▶ *initialization and implementation of European wide certification process*

EuroSDR core competence group in close cooperation with National Mapping and Cadastre Agencies (NMCA), system suppliers and others



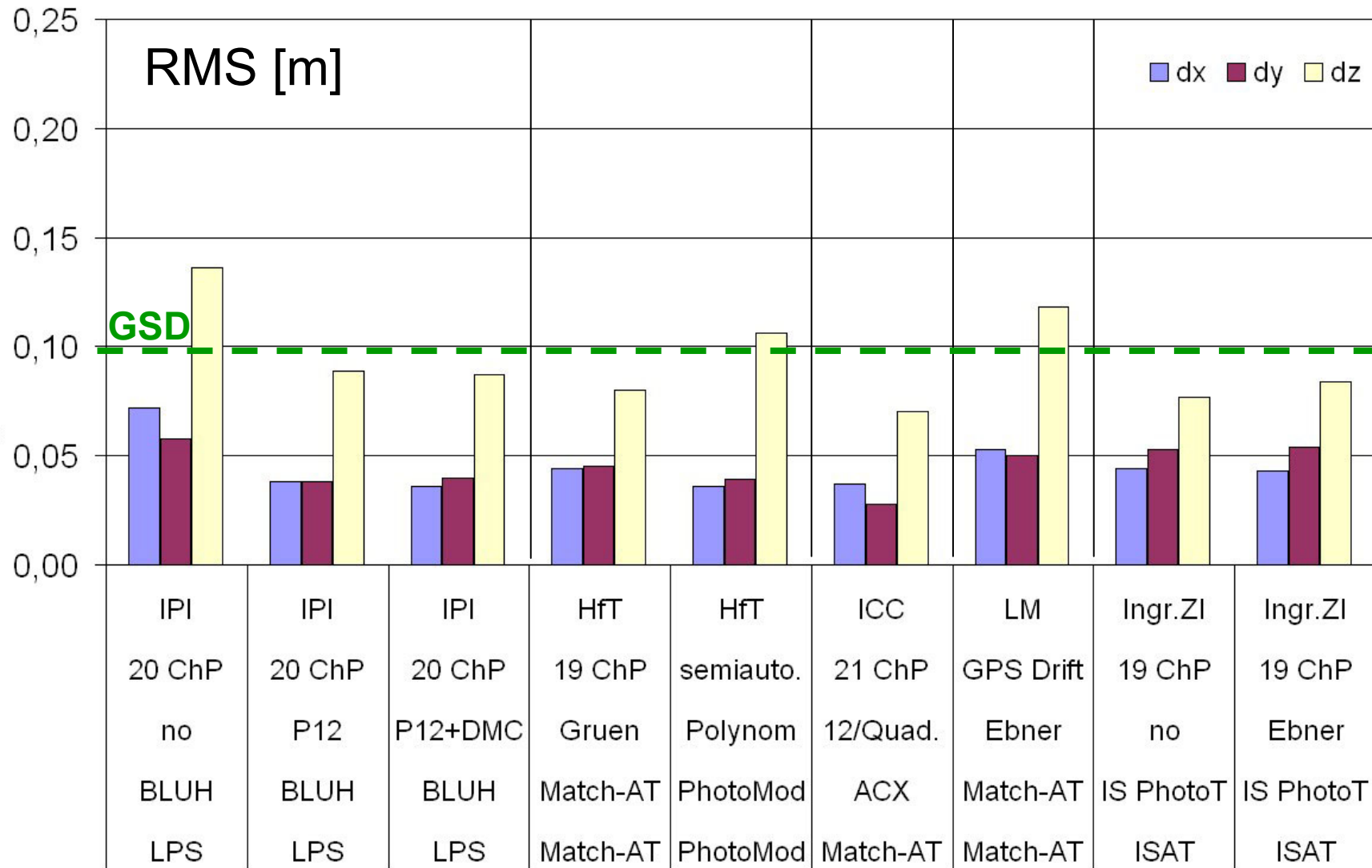
# EuroSDR Network on Digital Camera Calibration and Validation

| #                        | Group                  | Institutions / Systems   | #  |
|--------------------------|------------------------|--|----|
| 1                        | Camera manufacturers   | ADS, DiMAC, DMC, DSS, Ultracam, Starimager, 3-DAS-1, DigiCAM                               | 12 |
| 2                        | AT software developers | BLUH, ORIMA, inpho, dgap   | 5  |
| 3                        | Other companies        | Vito, ISTAR, Geosys, OMC   | 4  |
| 4                        | Science                | ETH, OSU, Glasgow, Stuttgart (2x), IdeG, Rostock, DLR (2x), Berlin, Nottingham, Aas, Pavia | 28 |
| 5                        | NMCAs                  | ICC, OrdSurv, IGN, FGI, Lantmäteriet, Swisstopo, BEV, ICV, itacyl, USGS                    | 13 |
| $\Sigma$ representatives |                        |  | 62 |



# DMC block (low-flying height)

$h_g$  950m, GSD 0.10m







## *European Activities in Camera Cal/Val and Certification*

**EuroDAC<sup>2</sup>** - a concept for future certification of  
digital airborne cameras in Europe

# European camera certification



- EuroSDR decided to **initiate and coordinate** a project on the Certification of Digital Airborne Cameras in an international European context (**EuroDAC<sup>2</sup>**)
- Europe has to identify its **needs** for digital airborne camera certification and based on that a certification process has to be defined **not only in single countries but European wide**
- it might be problematic if other quality assurance concepts (like USGS approach) are **adopted as a quasi-standard** from European countries almost automatically, although such approach might be partially non optimal for European environments
- European certification process must be available quite **soon**, must be **acceptable** and **operational**, must have a **broad support**, otherwise only national individual solutions



# Why European camera certification ?



EuroSDR in general agrees and underlines the high relevance and impact of the USGS quality assurance plan **but**

- **different requirements** in flight project parameters and accuracy
  - projects are of smaller extension, more regional sized, more stringent requirements in resolution and accuracy
  - different accuracy classes are required for European users
  - Type certification vs. individual sensor (serial number) certification
- new technology of digital airborne imaging mainly **originated in Europe**, i.e.
  - ADS40 (CH), DMC (D), UC-D/X (A), DiMAC (L), JAS-150 (D), HRSC (D), AIC-Rolleimetric (D), DigiCAM (D), IGN-Camera (F)
  - **accepted use of those systems throughout Europe** should be based on their European wide certification
- Europe has already defined its own solutions for other projects of larger impact (i.e. Galileo GNSS). Not only as competition but also **to support / complement each other**. Same might be possible for different certification approaches.



# The EuroDAC<sup>2</sup> process



| # | Process steps   |
|---|---|
| 1 | Evaluation of users needs / expectations<br><i>Action:</i> (mainly) <b>NMCAs</b> and others                     |
| 2 | Input from camera manufacturers<br><i>Action:</i> (mainly) <b>system suppliers</b> and others                   |
| 3 | Definition of EuroDAC <sup>2</sup> process<br><i>Action:</i> (mainly) <b>EuroDAC<sup>2</sup> core group</b>     |
| 4 | Acceptance of EuroDAC <sup>2</sup> process<br><i>Action:</i> (mainly) <b>NMCAs, system suppliers</b> and others |
| 5 | Implementation (in Europe) of EuroDAC <sup>2</sup> process  |





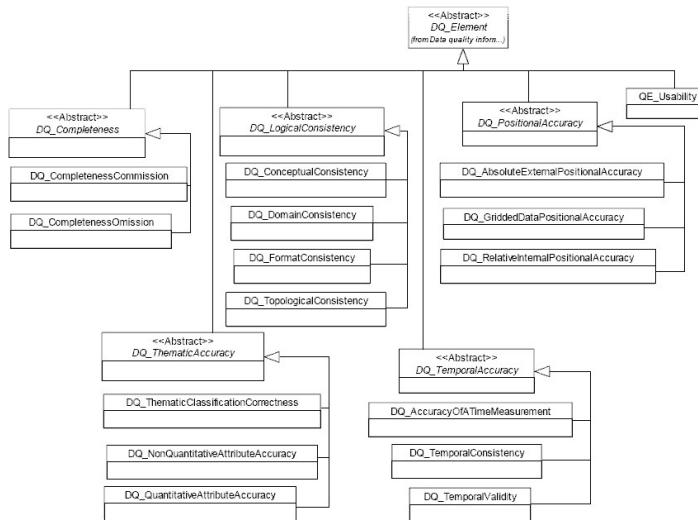
## EuroDAC<sup>2</sup> current status



- **Position paper** (available as draft version) for first information on certification process (motivation and future steps)
- **Acquisition of core competence team** members, not yet completed, representatives from
  - national mapping and cadastre agencies
  - companies
  - standardisation organisations
  - science
- **financial aspects** to be discussed
- next step: **EuroSDR Science and Steering committee meeting in Rotterdam / The Netherlands**, end of May 2007



# European Activities in Camera Cal/Val and Certification



Some remarks on new German standards in digital airborne imaging

# Standards in Germany



- Some activities in **defining standards** on national base (DIN organization in Germany)
- standard series **DIN 18740 – Photogrammetric Products** (Part 1 – 4)
  - Requirements for aerial survey flight and analogue photograph (11-2001)
  - Requirements for the scanned aerial photograph (02-2005)
  - Requirements for the orthophoto (10-2003)
  - **Requirements for digital aerial cameras and digital aerial photographs** (Draft, 02-2006)
    - digital aerial camera
    - aerial survey flight
    - digital aerial photograph



## German standard DIN 18740 – 4



- Focus digital aerial cameras includes
  - general requirements on camera and its components
  - camera calibration (geometry and radiometry)
  - sensors for positioning and attitude determination

... the quality related to the image product has to be documented in a **manufacturer certificate** ... the camera system and its subsystems have to be **geometrically and radiometrically calibrated** ... calibration of camera has to be documented by **manufacturer calibration certificate** ... the validity of geometrical calibration at the time of flight has to be proven by **validation test** (less than **one** year ago) or **new calibration** (less than **two** years ago) ... the accuracy from validation test has to be within the quality specs given in the manufacturers certificate (max. difference allowed <25%)

