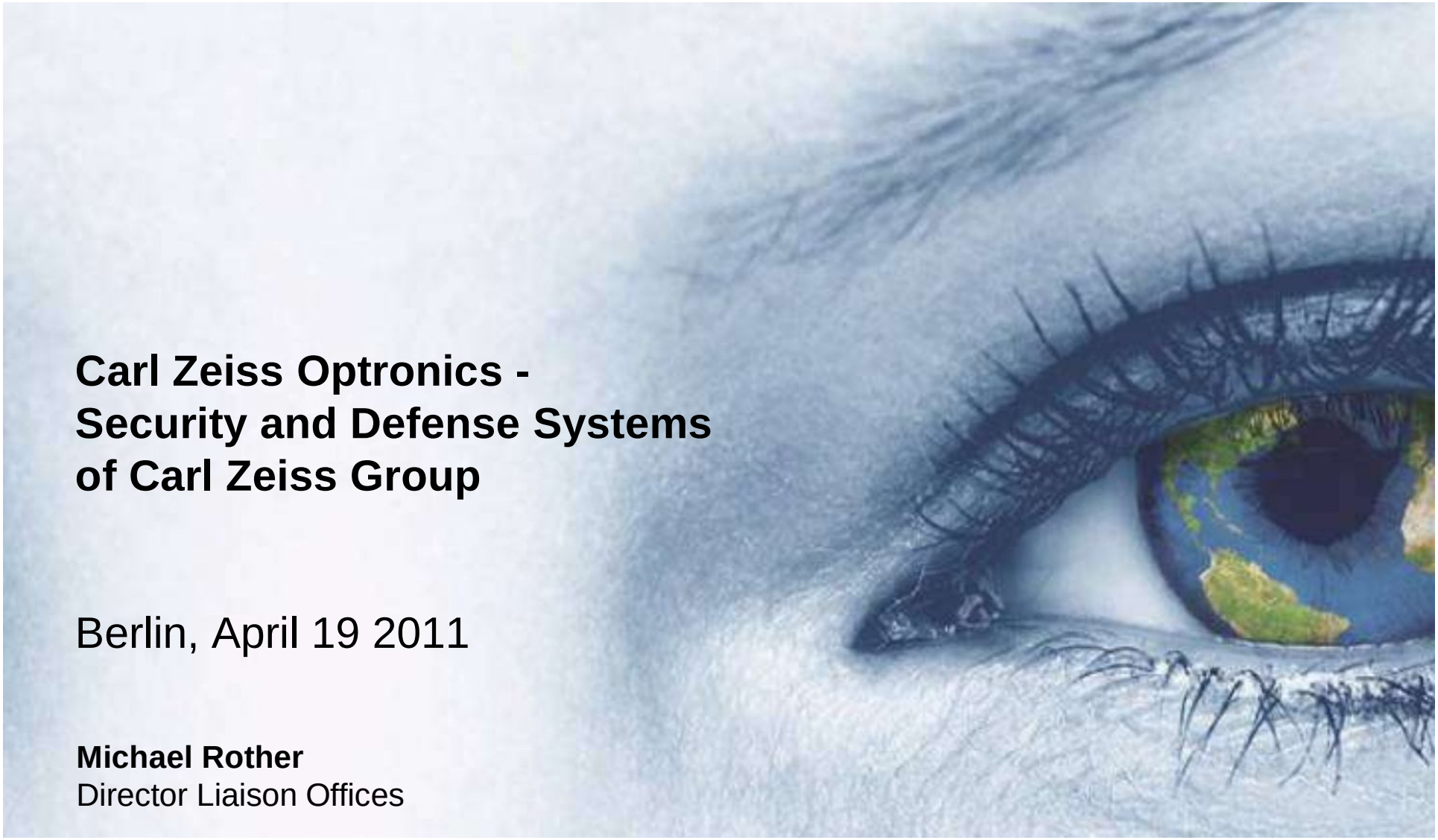
2nd ODC Industry Day



Carl Zeiss Optronics - Security and Defense Systems of Carl Zeiss Group

Berlin, April 19 2011

Michael Rother
Director Liaison Offices

Systems for Security and Defense

Same Core Capabilities: Imaging Sensors, Laser Applications, Integrated Solutions

Land

Sights

Air

Sea

Optronics for Defense and Security
Technology with Tradition at Carl Zeiss

Some Inventions since Carl Zeiss and Ernst Abbe started this company

1892	Development of telescopic sight
1893	Prism field-glasses / periscopes / stereoscopic rangefinder
1903	Periscope for first German submarine (“Trout“)
1911	Balloon chamber (camera for airborne reconnaissance)
1944	Thermal bearing&tracking device
1962	Laser rangefinder
1969	Stabilized panoramic periscope
1971	High-resolution thermal imager
1987	Eye-safe laser rangefinder with RAMAN frequency shift
1993	Optronic Mast System for submarines
1998	Eye-safe laser rangefinder with OPO frequency shift
2005	3nd generation thermal imager ATTICA
2008	Submerged Laser communication

Carl Zeiss Group – Where we work!

Carl Zeiss Foundation
Heidenheim and Jena

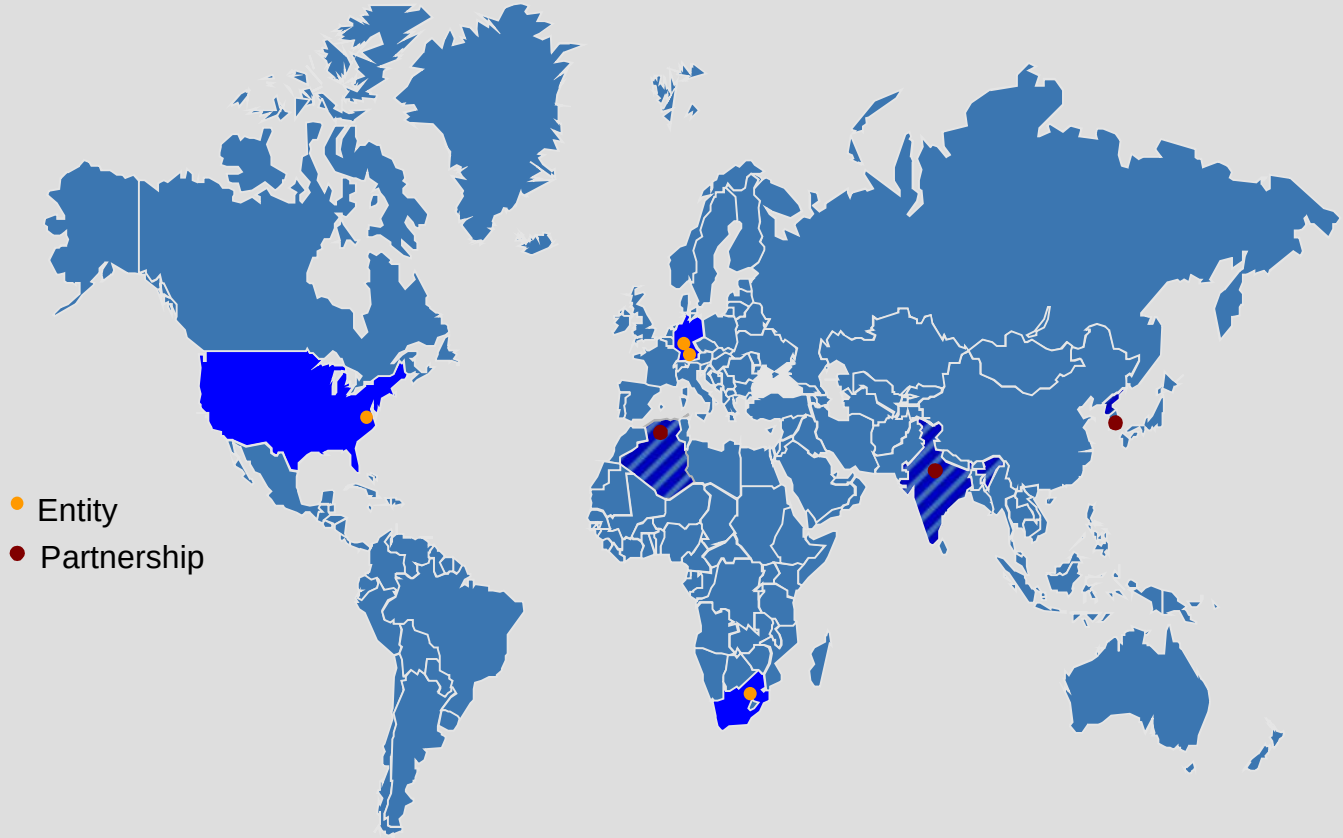
Carl Zeiss AG
Oberkochen
Revenues FY2009/10: ~EUR 3Bn

Carl Zeiss Optronics Security and Defense Systems
Employees today: ~800
Revenues FY2009/10: ~EUR 180M

Carl Zeiss Optronics GmbH
Oberkochen/Wetzlar
Germany

Carl Zeiss Optronics (Pty) Ltd.
Irene, South Africa

Carl Zeiss Optronics USA, Inc.
since 2008, Project Mgmt, Sales
Wake Forest, North Carolina



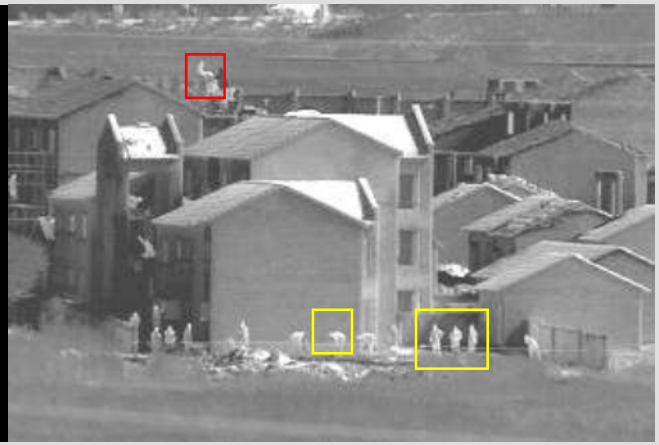
Imaging Sensors Capabilities and Functions

CCD camera

IR camera

Image superimposition

IR and CCD camera fusion



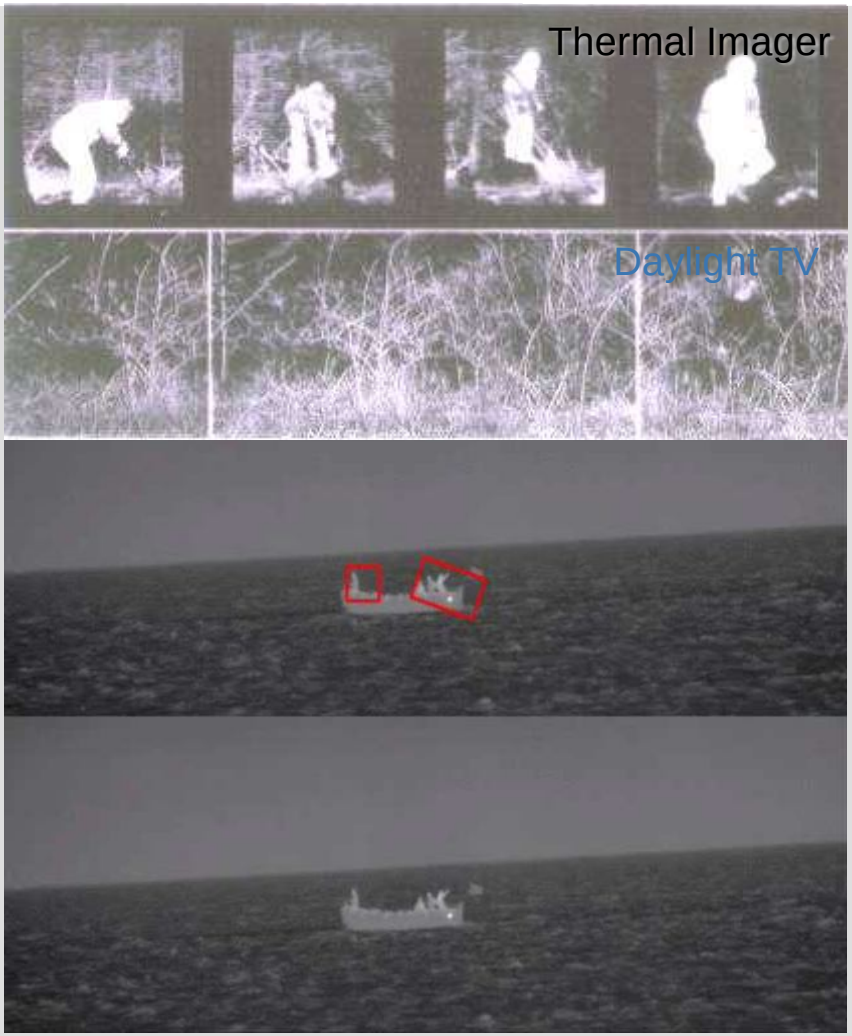
Tracking

Demands for Surveillance Sensor Systems

- Passive Sensors
- Long range detection and recognition of suspicious targets
  - Image generating sensors
  - Detection and recognition of (camouflaged) targets
- Operation at day and night and under difficult environmental conditions

- Situation recording
- Target localisation and fire control system
- Information transfer with metadata
- Sensor automation (automatic target and movement detection, tracking etc.)

→Situation Awareness



Current U.S. Projects

Active contracts/serial deliveries from ZEISS

- M1 MBT Laser Rangefinder (ELRF) for USMC (590EA) *
- M1 MBT ELRF for US Army (Second Source) *
- M1 MBT ELRF via US Army as FMS *
- LRF for KEOTS AAV with Raytheon
- Optronic mast OMS100 for „Virginia-class“ Subs *
- Sniper/Spotter Scope for US SOF
- Rifle Scopes and Optronics via GSA contracts

* = Success via FCT Programmes

Other U.S. Projects

Development/Concept Efforts

- Laser Rangefinder+Designator for M1 MBT, future M1 topics, Elbow-Sight/Peri for Stryker-Upgrade
- Stabilized mobile laser communication (1GBit/s +), Submerged laser communication terminal
- Integration of ZEISS Periscope/Optronic Sights knowledge from PUMA IFV in GCV tender
- “DynaHawk” Fire Control System for AirBurst RPG (Dynamit Nobel Defence)
- PSR Precision Sniper Rifle Scope with Ballistics Calculator

Evolution+: From M1 ELRF to M1 LRF/D

Concept → Development → Demonstrator

- Idea: Adding Laser Target Designator Capability to ZEISS ELRF for M1 MBT
- Result: Upgraded MBTs (or other IFV) can act without JFST for precision ammunition targeting
- Details:
  - Sharing of optical channel allows integration in same housing
  - No hardware modifications to platform necessary
  - Laser energy > 80mJ, pulse rate 20pps
  - Modes switchable: LRF / Designator
- Customer/Launcher: USMC.
  - US Army interested

See without being seen: Optronics Mast OMS 100

FCT success through strong support of BWB

- ZEISS: 108 years of experience in submarine periscopes
- Optronics mast system, no penetration of pressure hull needed
- Developed for German U212A 2nd batch
- Details:
  - 2009/10: first integration in Virginia Class Sub
  - Customer/User satisfied, follow-up orders
  - No modifications to platform necessary
  - Innovative construction and serviceability
  - Growth potential: LaserCom Terminal, Quick Look-around, HDTV

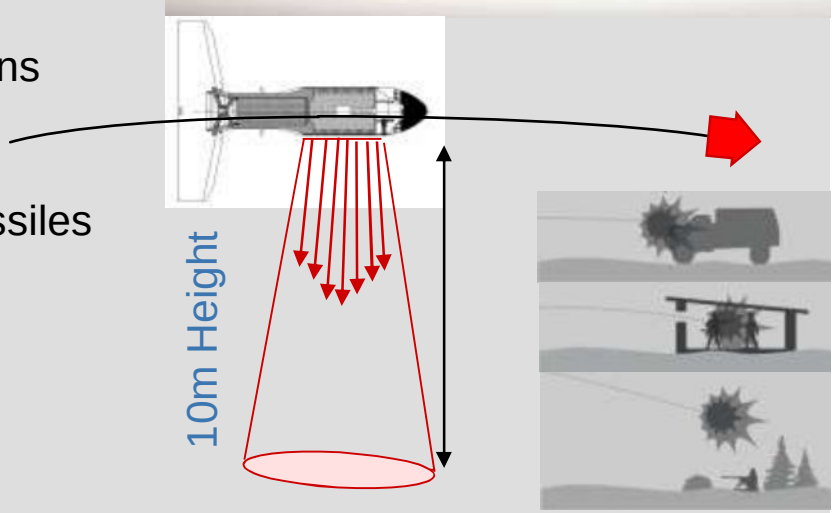
Germany
Italy
Denmark
Turkey
Indonesia
Peru
Argentina
Colombia
South Korea
USA
Portugal
Norway
India
Taiwan
Venezuela
Chile
South Africa
Ecuador
Greece

Eyes on Target: Scopes for Spotter/Sniper

- ZEISS is HENSOLDT®
- Scopes, Night Vision attachments
  → modular concept for combat
- Co-operation with Nivisys for integration of 3rdGen I^2-tubes in the U.S. (NSV80, 600, 1000)
- Competitions/Sales Success
  - GSA Contract = direct customers
  - Spotter 60/45, TLS40 to SOF
  - High-End uncooled Thermal Imaging Attachment IRV600/900 for MIL/POL

„DynaHawk“ Air Burst Effector 1200m

- A new class of RPG
  - developed by Dynamit Nobel Defence and ZEISS
  - ZEISS ballistic calculator/laser range finder clip-on
  - DND Air Burst Warhead/Direct Impact/Multi Purpose
  - Lethal coverage: 16x8m
  - Non-lethal warheads possible
  - Possible to shoot from confined spaces
- Modular Concept
  - One re-useable aiming device for all applications
  - Night vision through ZEISS I^2/TI-attachments
  - Disposable shells (different types)
  - Smaller, lighter, much cheaper than guided missiles
  - Development with BWB, SOF
- Effective
  - Permanent thrust for precision in flight
  - Accuracy through ballistic calculator clip-on
  - Superior effective range max. 1200m



Partnering with the U.S.
A major need for an independent company

Main Motivations for Strategic Partnering:

- Carl Zeiss Optronics is interested in acquiring U.S. top level technology components (e.g. TI-detectors, I^2-tubes).
  Key users: German MIL/POL SOF, ISAF forces
- But: invincible hurdles (i.e. I^2-tubes>FOM1600, ITAR).
  Full cooperation and efforts with German MoD and U.S. ODC and US supplier still with no success
- Carl Zeiss Optronics acts as an independent sub-system house on optics and optoelectronics
- Carl Zeiss Optronics is highly interested in cooperation with U.S. customers and partners – directly or through Carl Zeiss Optronics USA Inc. We are willing to partner in development and procurement and to transfer key technologies on a fair basis

Partners add value

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