

ESA's Space Assets for Demining Assistance: Feasibility Studies

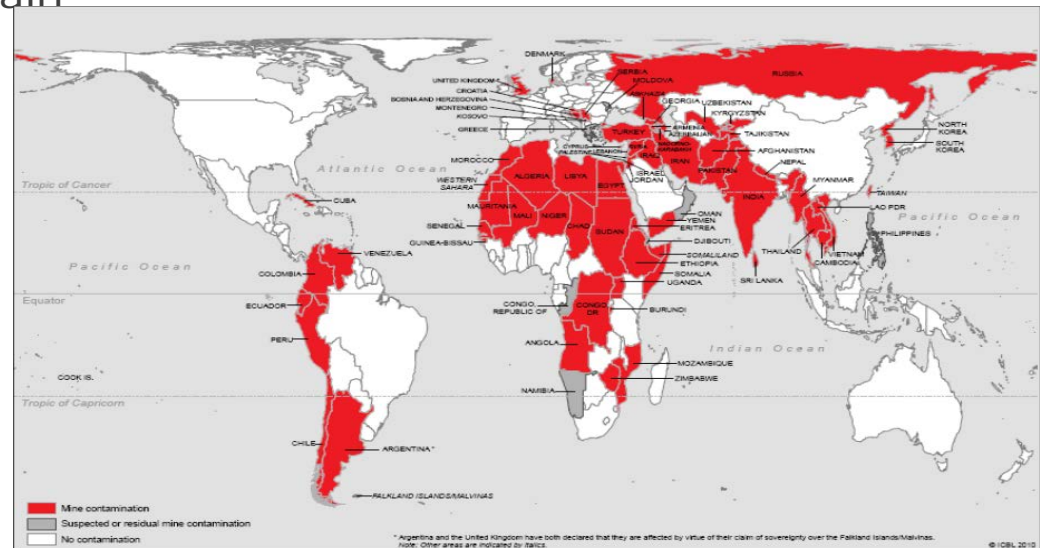
**Perspective of the Geneva Centre
for Humanitarian Demining**

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ARTES APPLICATIONS WORKSHOP, HARWELL UK, 20 April 2012

> The Mine Action challenge

- Mines and explosive remnants of war claim victims even after conflicts
- Arable land, infrastructure, and water etc blocked by **suspected** contamination
- 1997 Mine Ban Treaty : clearance within 10 years after ratification
- No certain or unified statistics
 - 66% remains, ~3000 km² remains contaminated (2009), 100 million mines
 - >100 of million ERW also remain
 - About 4000 victims per year





> Stakeholders

UNMAS & GICHD coordinate standards, information management, technologies

National Mine Action Authority / UNMAS sets up

- National Mine Action Center (NMAC)
- Alternatively UNMAS, UNDP, UNOPS
- Regional MAC

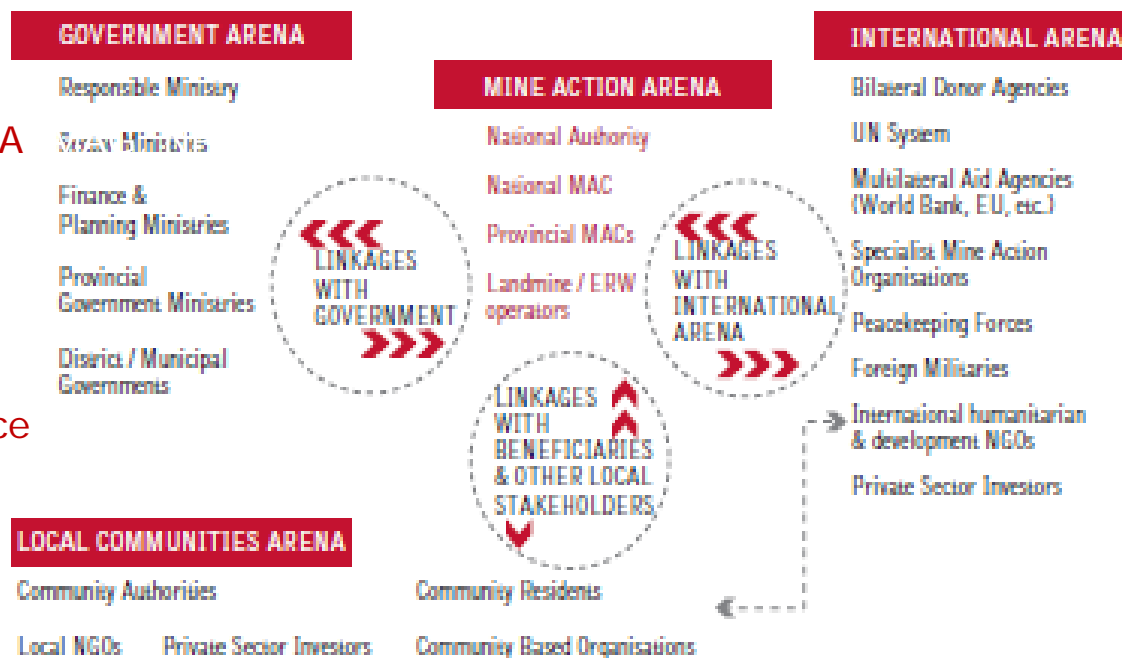
Operations and advise by

- NGO's, e.g. MAG, FSD, NPA, DCA
- Commercial operators
- UN bodies
- Military

Capacity building, victim assistance

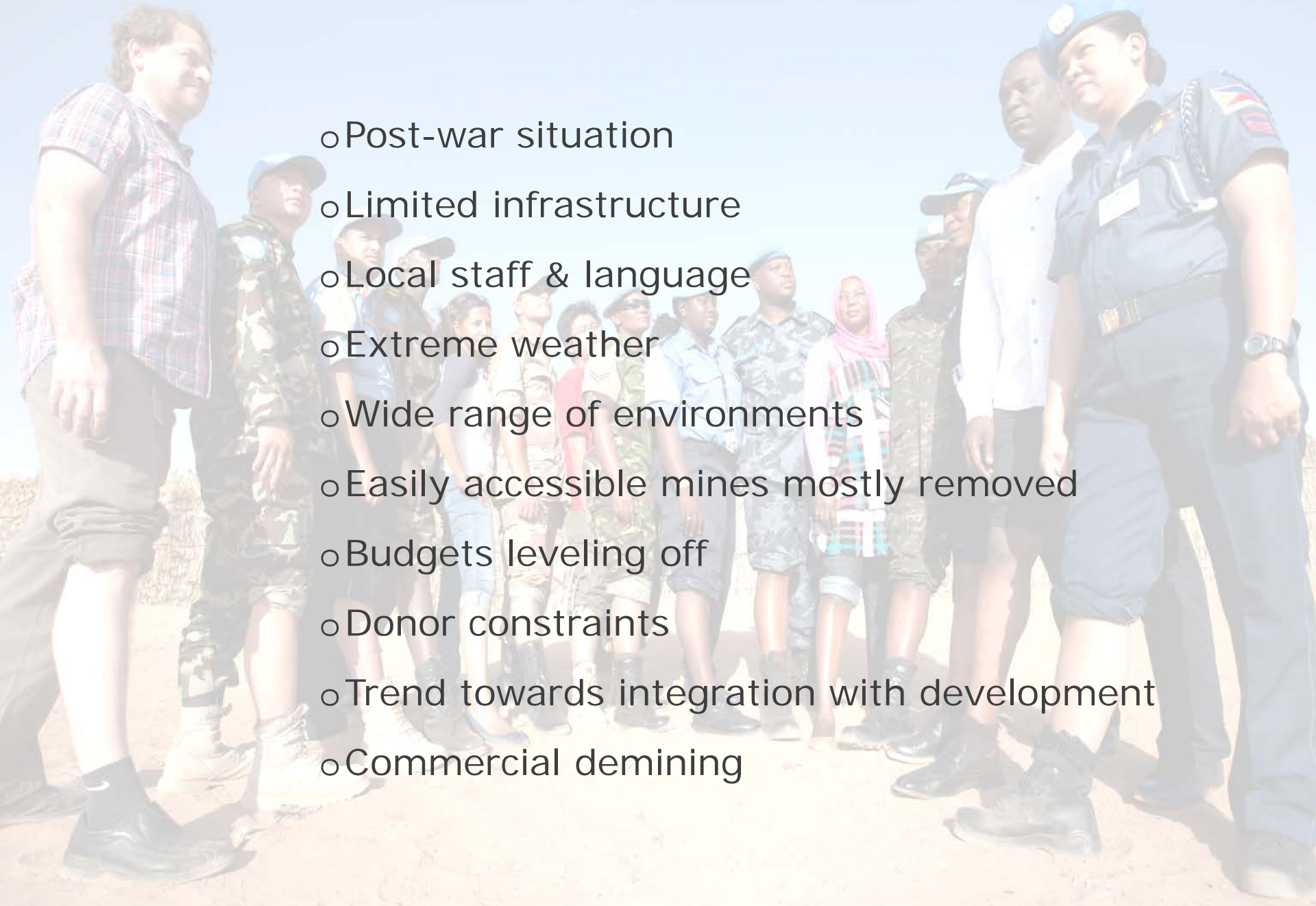
Paid for by donors:

- Red Cross
- ITF
- DoD



> Mine Action constraints

- Post-war situation
- Limited infrastructure
- Local staff & language
- Extreme weather
- Wide range of environments
- Easily accessible mines mostly removed
- Budgets leveling off
- Donor constraints
- Trend towards integration with development
- Commercial demining



> Current practise in detection & clearance

Survey & Demarcation

- GPS
- Laser ranging
- Relative positioning
- Staff maps
- Google Earth
- GMS, VHF, HF, Satellite Phone



Detection

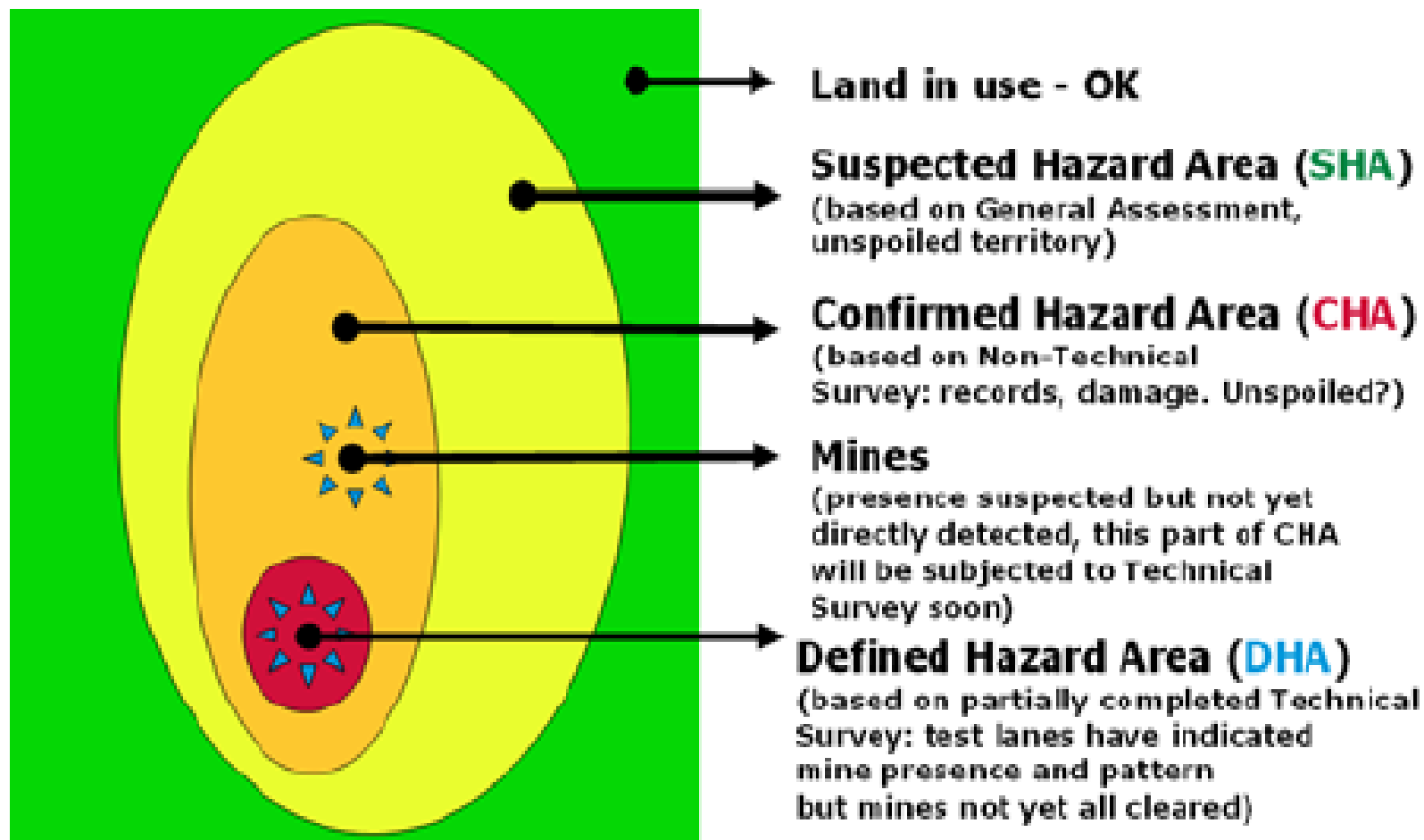
- Remove vegetation
- Prodders
- Metal detectors (& GPR)
- Tillers
- Mine action dog teams

Clearance is not an issue

No silver bullet technology



> Current practise in Land release and IMAS





> SADA Feasibility Studies

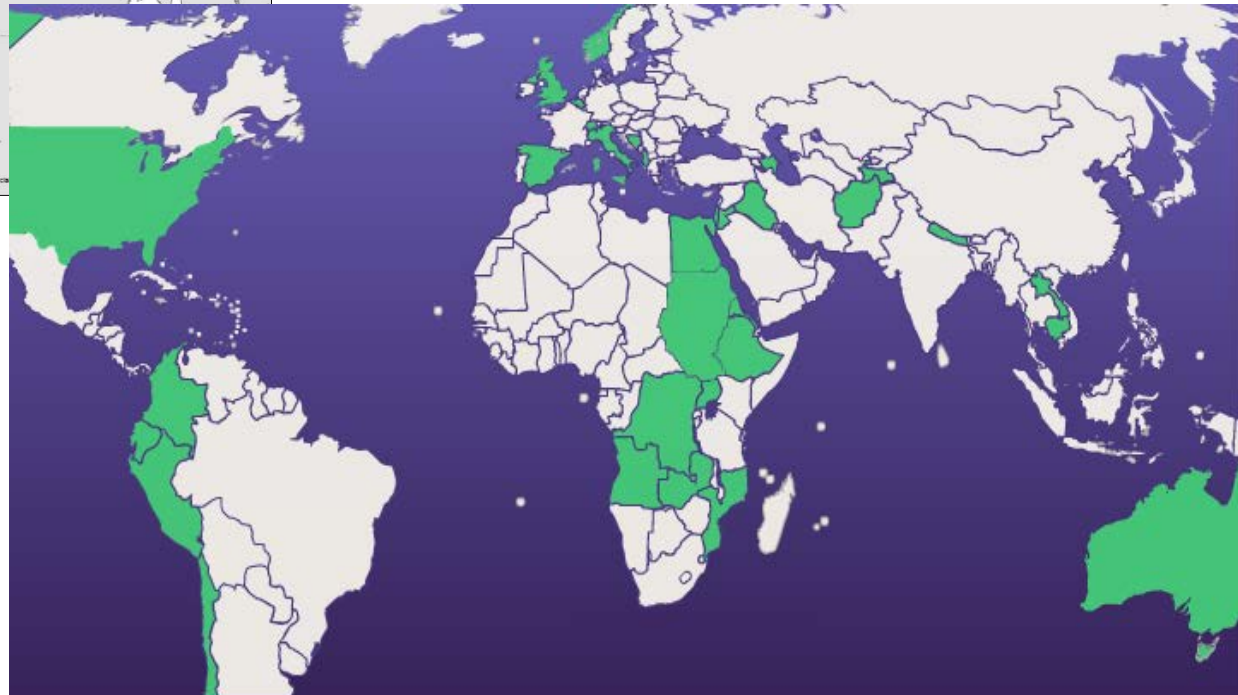
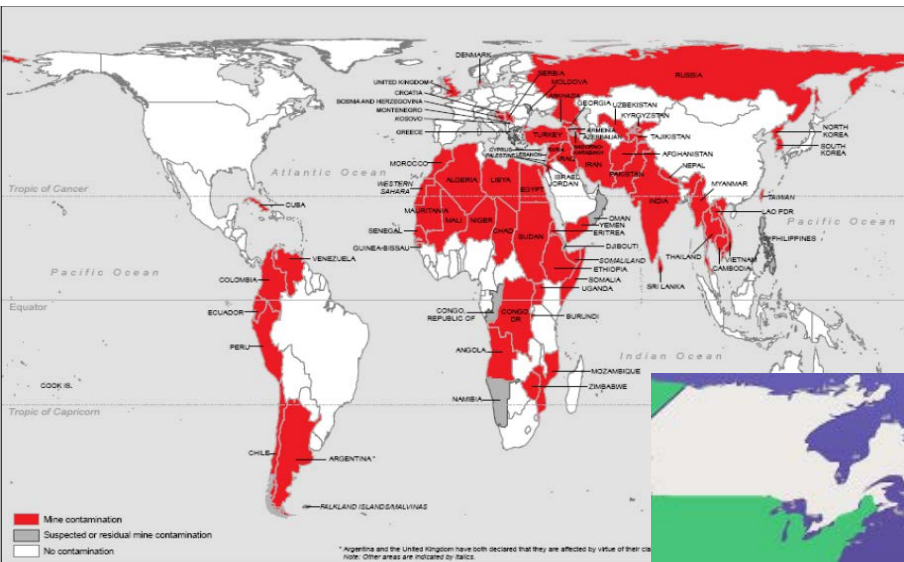
- **Objective** : can self-sustained services be defined that better integrate existing demining operations with space assets and aerial observation (Earth Observation, satellite navigation, satellite communication)
- **GICHD** as neutral observer & advisor to ESA
- **3 Feasibility Studies** (Jan. 2011 – April 2012): Infoterra [UK], Radiolabs [IT] and INSA [E]
- **User needs analysis** by GICHD, FSD, ESA (Mine Action Directors Meeting & survey), consortia
- Two service types targeted: **decision support** (for NMAC) and **field operation support** (for operators)

> Mine action needs users involved

GICHD | CIDHG



- o Over 30 user organizations in 20 countries involved
- o PoC performed: BH, Afghanistan.
- o Validation also with other users





> Mine Action Key Needs

1. Prioritise the most threatening and impacting minefields
2. Only clear where the contamination is.
3. Improve quality of detection and clearance per unit of land area (by planning, mapping, procedures, communication, detection, reporting).
4. Enhance metrics and monitoring of efficiency in all processes

90-97.5% of suspected land proves to be uncontaminated



Not just about clearance or demining

>THE MINE ACTION PROCESS



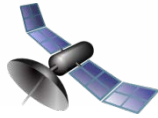
Suspected
Area 2

Suspected
Area 1

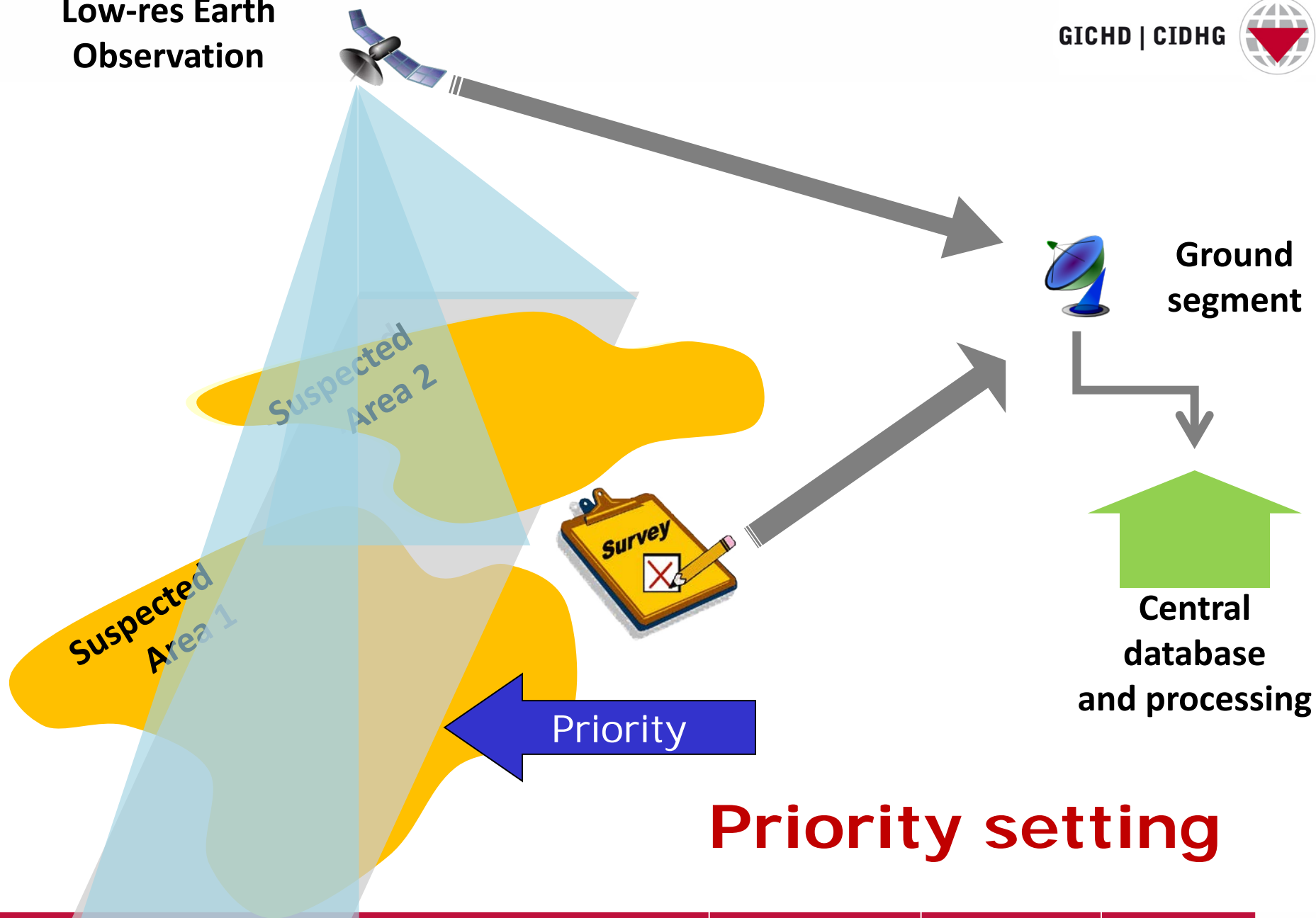


Central
database
and processing

Priority setting



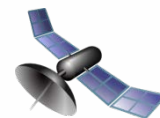
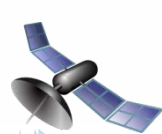
Low-res Earth
Observation



**Hi-res Earth
Observation**

**Positioning
(GPS, Galileo)**

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**Unmanned
aerial vehicle**



**Ground
segment**



**Central
database
and processing**

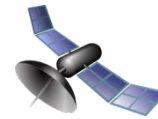
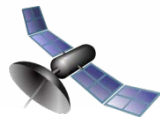
**Suspected
Area 1**

Land reduction

**Hi-res Earth
Observation**

**Positioning
(GPS, Galileo)**

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**Unmanned
aerial vehicle**



**Ground
segment**



**Central
database
and processing**

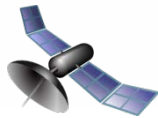


Land reduction

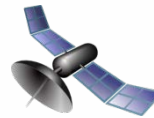
**Suspected
Area 1**

**Confirmed
areas**

**Earth
Observation**



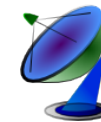
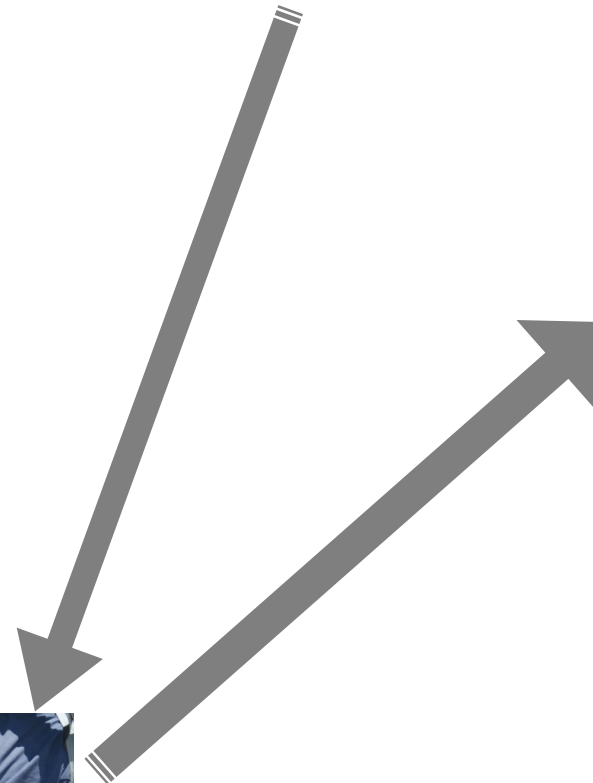
**Positioning
(GPS, Galileo)**



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**Suspected
Area 1**



**Ground
segment**



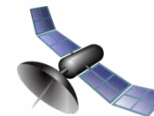
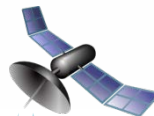
**Central
database
and processing**

**Clearance and
Land release**

**Earth
Observation**

**Positioning
(GPS, Galileo)**

GICHD | CIDHG



**Ground
segment**



**Central
database
and processing**

**Released
Area 1**

Reporting



> THE ROLE OF THE SADA PROJECT

> SADA Services

GICHD | CIDHG



1. **GeoBI** – Geospatial Business Intelligence – decision support at national level, Mine Action Information Management plug-in (GICHD)
2. **Non-Technical Survey support** - identification support for suspected & confirmed hazard areas and land reduction, through fusion of geographical mine action data with features, risks and changes derived from radar, optical, IR/thermal.
3. **Post Clearance Survey** for donors (various MAC)
4. **Hi-res cartography** (radar, optical, UAV) and site access and hazard mapping for operators (MACs, FSD)
5. **Affordable**, accurate, available **DGPS** with integrity for operators.
6. **Field kit** integrating the above for operators (GICHD evaluation)



> Conclusions and way forward

Space asset benefits targeted:

- > **improved socio-economic impact**: planning, prioritization
- > **improved land release process**: identification & fusion of indicators, better maps, more automated reporting, less margins on georeferencing, improved quality
- > **cost reduction**: better procedures, operations

Next step - **demonstration** of benefits and sustainability

- > Development of (pre-)operational service
- > Demonstration with MACs (BH, N-Iraq, Mozambique, Vietnam, Tajikistan) and other stakeholders (FSD, GICHD)
- > Monitoring of Key Performance Indicators