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## Handheld Standoff Mine Detection System (HSTAMIDS) Operational Field Evaluations (OFE's) in Cambodia

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*HD R&D*

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UNITED STATES DEPARTMENT OF DEFENSE

**HUMANITARIAN DEMINING R&D PROGRAM**

# Handheld Standoff Mine Detection System (HSTAMIDS) Operational Field Evaluations (OFE's) in Cambodia



Office of Assistant Secretary of Defense for Special Operations and  
Low-Intensity Conflict (OASD/SOLIC)

Sean Burke, Roger Cresci

U.S. Army RDER-NVC-H

Humanitarian Demining R&D Program



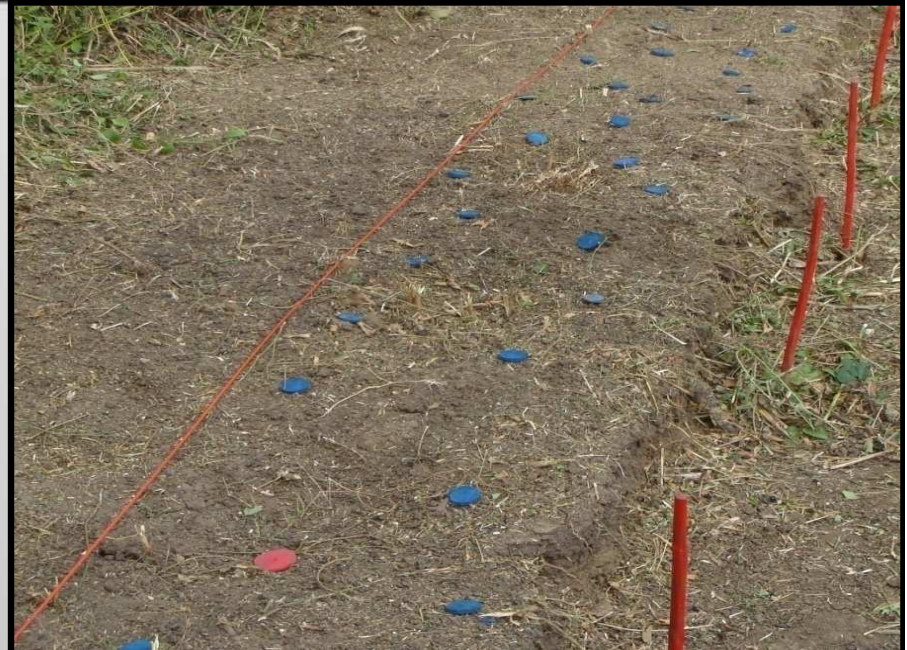


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# HUMANITARIAN DEMINING R&D PROGRAM

## OUTLINE:

- Terminology
- System Overview
- Cambodia Environment
- HALO Trust and MAG OFE's:
  - SOP's
  - Timeline
  - Results
- OFE Developments
- Lessons Learned
- System Improvements
- Conclusion







# TERMINOLOGY:

- Minefield Markings
  - Stake/color designation





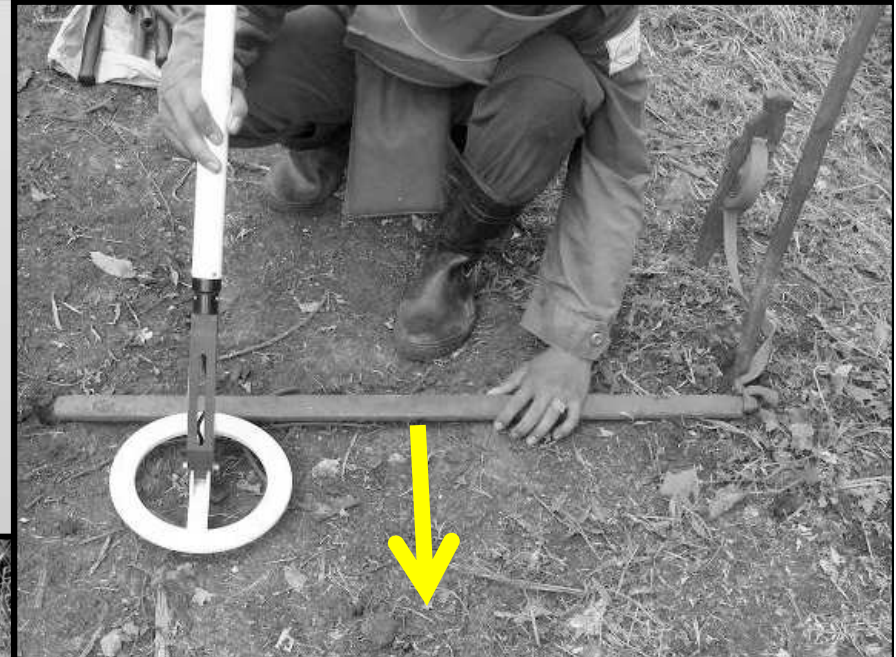


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# HUMANITARIAN DEMINING R&D PROGRAM

## TERMINOLOGY:

- Minefield Markings
  - Stake/color designation
- HSTAMIDS Section Clearance
  - Bound







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## HUMANITARIAN DEMINING R&D PROGRAM

### TERMINOLOGY:

- Minefield Markings
  - Stake/color designation
- HSTAMIDS Section Clearance
  - Bound
- Chip Emplacement







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## HUMANITARIAN DEMINING R&D PROGRAM

# HSTAMIDS: Dual Sensor Mine Detector

- **Developed for the U.S. Army**
  - **Combines Metal Detector and ground penetrating radar (GPR)**
  - **Real-time data algorithms fuse data enabling discrimination between mines and clutter**
  - **Highly accurate metal vs. mine discrimination**
  - **Vast improvements in clearance rates**
- **Over 9300 systems deployed with the U.S. armed forces**
- **Cambodia: HALO Trust & MAG conducting OFE's**

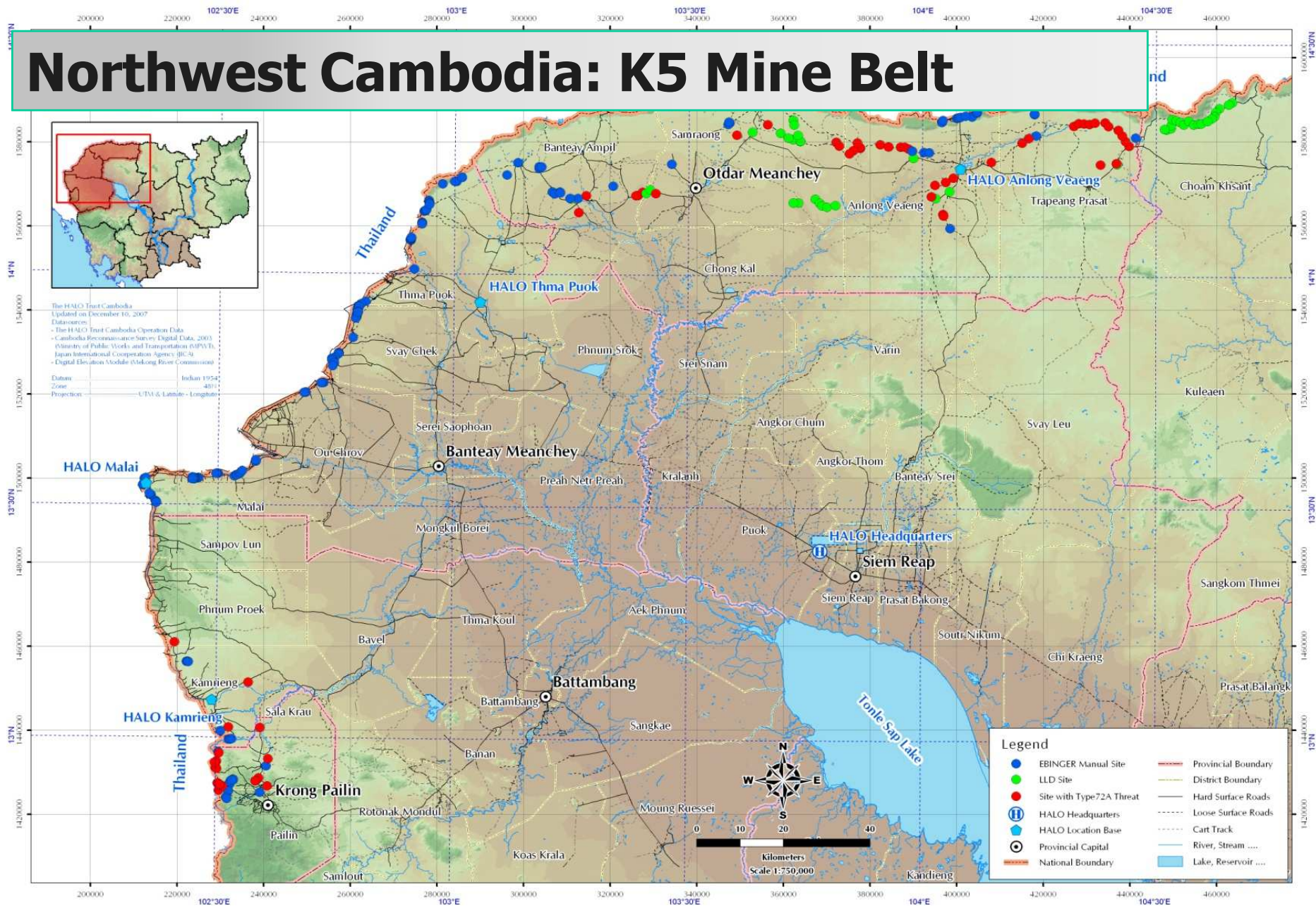






# UNITED STATES DEPARTMENT OF DEFENSE HUMANITARIAN DEMINING R&D PROGRAM

## Northwest Cambodia: K5 Mine Belt

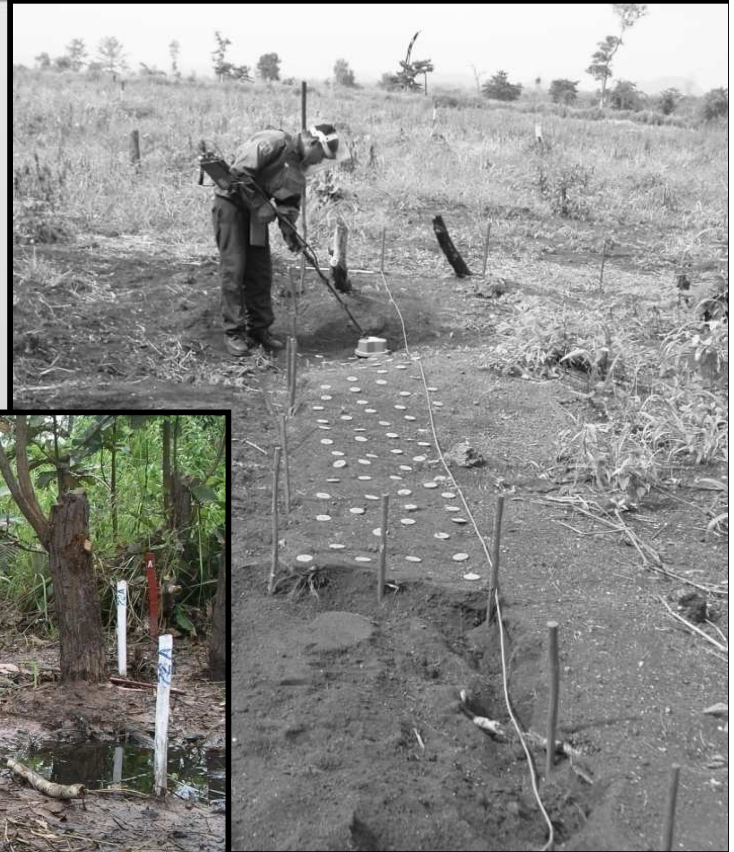






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# CHALLENGING CONDITIONS







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**HSTAMIDS SOP's**

**Choam Market 1 Minefield**





# HALO TIMELINE



Mar-06  
1st Training  
Course



1/1/2007

1/1/2008

1/1/2009

3/1/2006

8/31/2009





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# HUMANITARIAN DEMINING R&D PROGRAM

## HALO TIMELINE



Apr-06  
1<sup>st</sup> Minefield  
Deployment

Mar-06  
1st Training  
Course







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# HUMANITARIAN DEMINING R&D PROGRAM

## HALO TIMELINE



Mar-06  
1st Training  
Course

May-06  
1<sup>st</sup> Minefield  
Deployment

Aug-06  
Rapid  
Excavation  
R&D Begins



3/1/2006

1/1/2007

1/1/2008

1/1/2009

8/31/2009





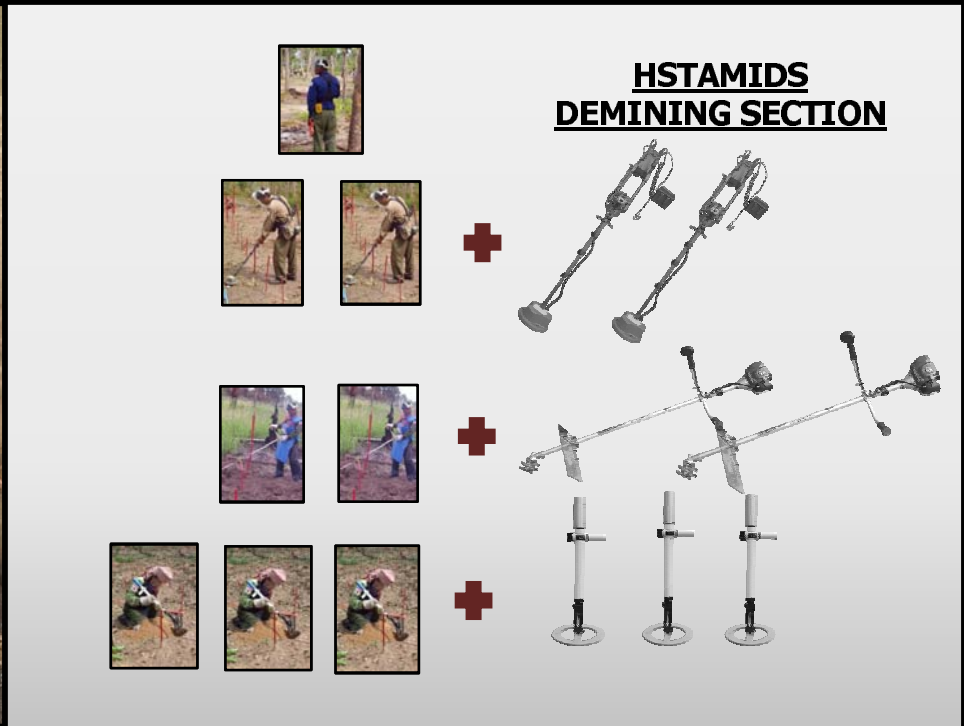
# HALO TIMELINE







# HALO TIMELINE



Mar-06  
 1st Training Course

May-06  
 1st Minefield Deployment

Aug-06  
 Rapid Excavation R&D Begins

Mar-07  
 Clutternator Introduced

Oct-07  
**Formalized  
 HSTAMIDS  
 Sections**



1/1/2007

1/1/2008

1/1/2009

3/1/2006

8/31/2009





# HALO TIMELINE







# HALO TIMELINE

**2008**



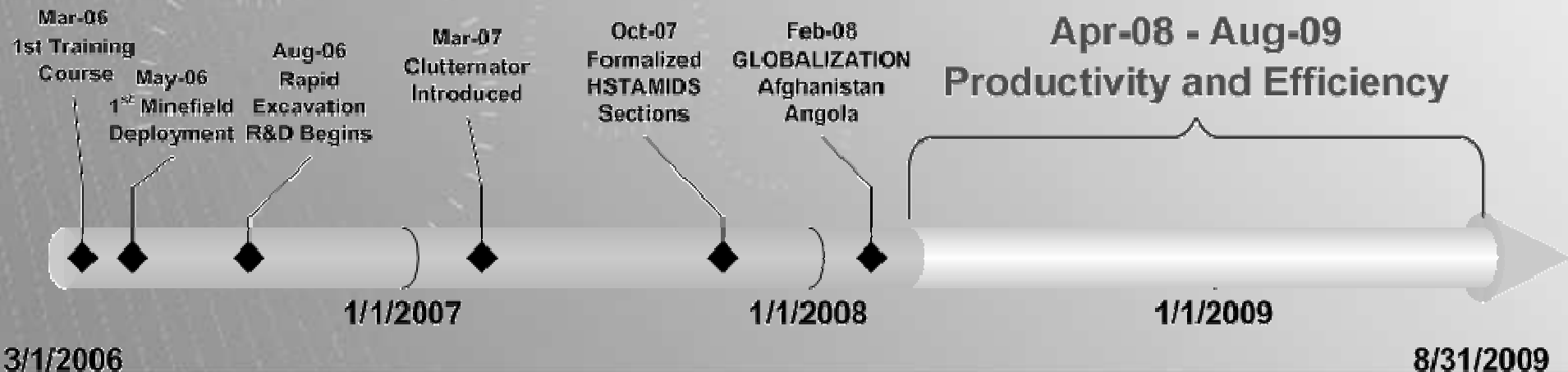
### Assumptions:

- **RAPID EXCAVATION:** Maximum Time/Excavation = 1½ min.
- **MANUAL EXCAVATION:** Average Time/Excavation = 20 min.
- Time required for rapid excavation of total clutter calls = 2,772,516 mins
- Time required for manual deminer to isolate and investigate clutter calls = 36,966,880 mins

**Therefore, it could be concluded that HSTAMIDS has saved the HALO Cambodia Programme the following:**

Manual isolation and investigation – Time spent clutternating  
 = 36,966,880 – 2,772,516 mins  
 = 34,194,364 mins  
 = 569,906 demining hours  
 = 103619.3 demining days (@5.5 hours/day)  
 = 12,952 section days (@ 8 man section)  
 = 47.97 sections for 12 months

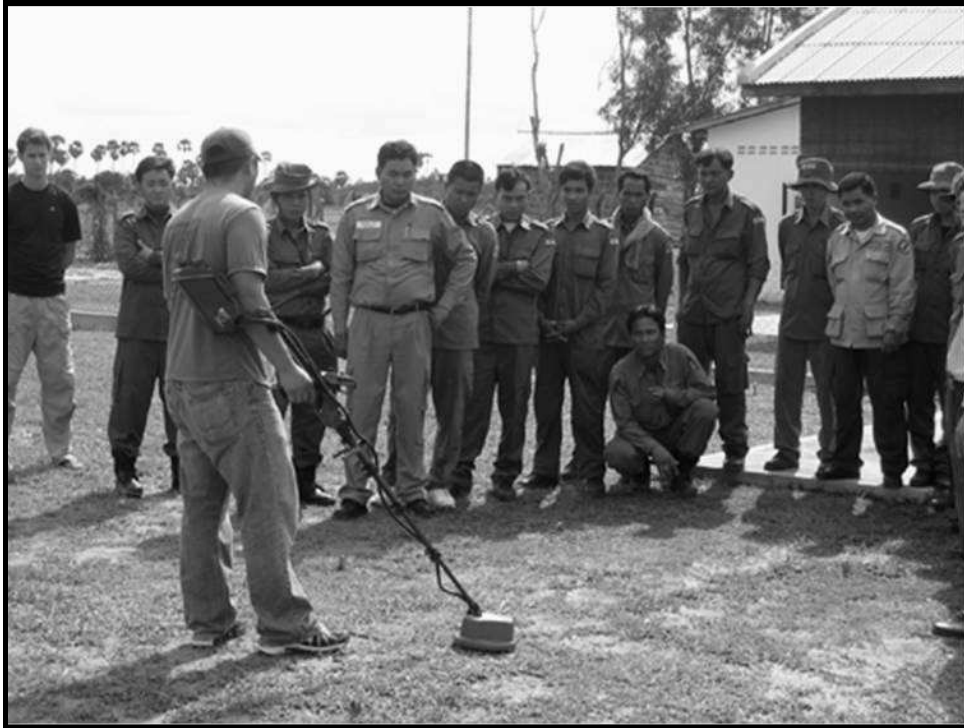
**2008 Savings = \$2,878,313 (@ \$60,000 per section/year)**







# MAG TIMELINE



Sep-07  
1<sup>st</sup> MAG  
Training Course



9/1/2007

1/1/2008

1/1/2009

8/31/2009





# MAG TIMELINE



9/1/2007

8/31/2009



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# HUMANITARIAN DEMINING R&D PROGRAM

## MAG TIMELINE



Sep-07  
1<sup>st</sup> MAG  
Training Course

Nov-07  
1st MAG  
Minefield  
Deployment

Oct-08  
Rapid  
Excavation  
Begins



1/1/2008

1/1/2009

9/1/2007

8/31/2009





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# HUMANITARIAN DEMINING R&D PROGRAM

## MAG TIMELINE

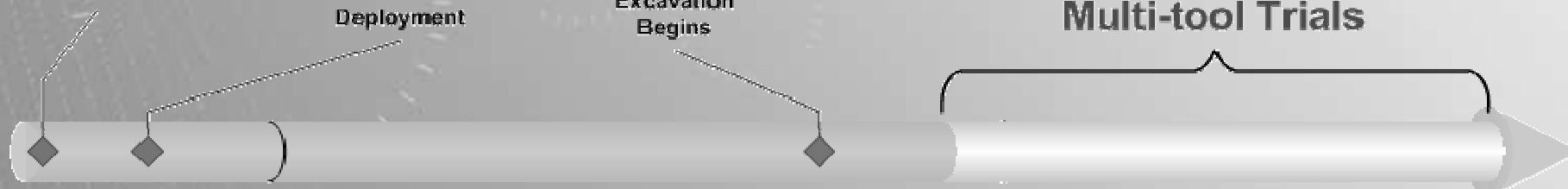


Sep-07  
1<sup>st</sup> MAG  
Training Course

Nov-07  
1st MAG  
Minefield  
Deployment

Oct-08  
Rapid  
Excavation  
Begins

Dec-08 - Aug-09  
Productivity and Efficiency  
Multi-tool Trials



1/1/2008

1/1/2009

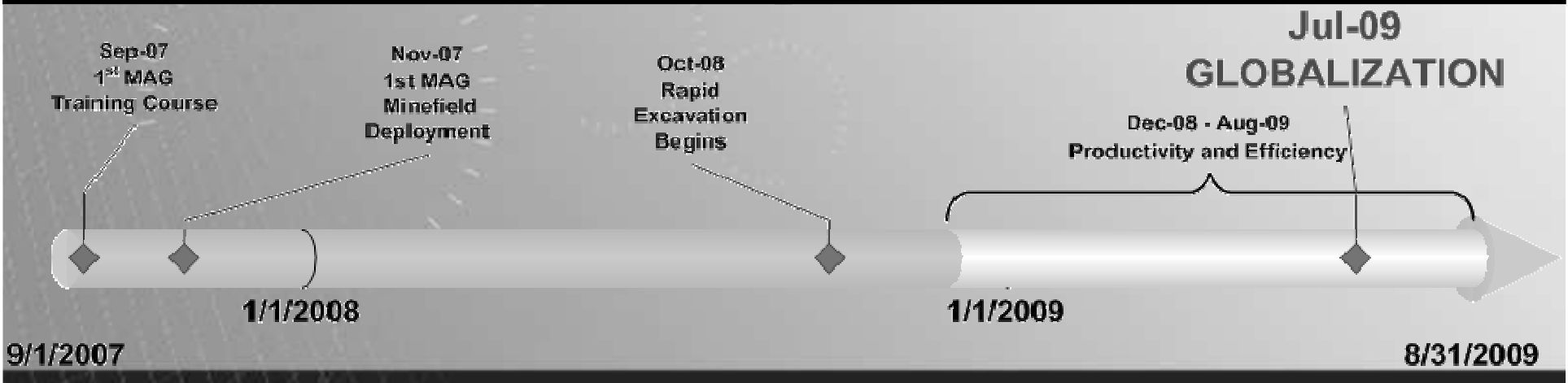
9/1/2007

8/31/2009



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# MAG TIMELINE





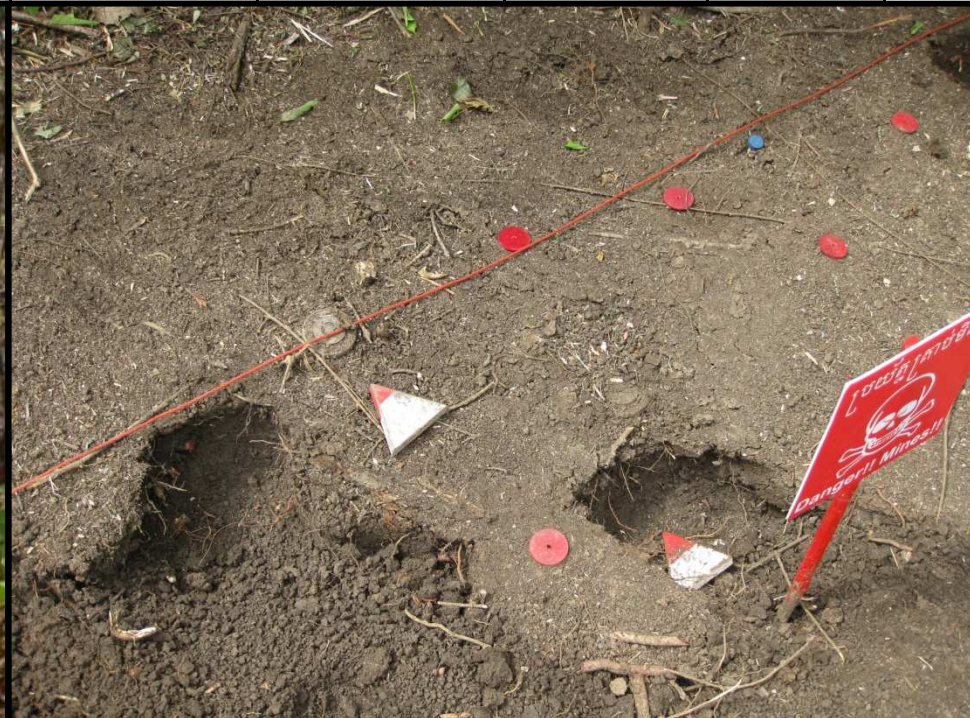


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# HUMANITARIAN DEMINING R&D PROGRAM

## HSTAMIDS OFE RESULTS:

Organization	Dates	Area Searched (m <sup>2</sup> )	Mine Calls	Clutter calls	Total Detections	Clutter Rejection (%)	Mines found
HALO Trust	Apr '06- Jul '09	1,396,672	180,057	3,478,194	3,658,251	95.08%	10,036
MAG	Nov '07 – Jul '09	115,618	29,710	187,086	216,796	86.30%	1616
<b>TOTALS</b>		<b>1,512,290</b>	<b>209,767</b>	<b>3,665,280</b>	<b>3,875,047</b>	<b>94.57%</b>	<b>11,652</b>







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## HUMANITARIAN DEMINING R&D PROGRAM

### OFE DEVELOPMENTS:

- **Training :**
  - **Methods**
  - **Targets**
    - **Sims, Mine Condition, Density**
  - **SOP's & Area Preparation**



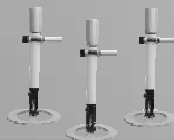
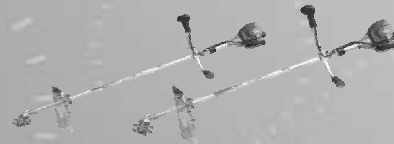
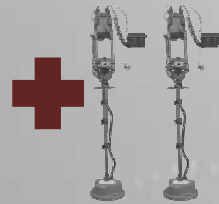




## OFE DEVELOPMENTS:

- Training
- **Section Based Demining**

**HALO Trust: '07 – Mar '08**



**HALO Trust: Present**





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# HUMANITARIAN DEMINING R&D PROGRAM

## OFE DEVELOPMENTS:

- Training
- Section Based Demining
- Rapid Excavation







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## HUMANITARIAN DEMINING R&D PROGRAM

### OFE DEVELOPMENTS:

- Training
- Section Based Demining
- Rapid Excavation







## LESSONS LEARNED

- **Management Intensive**
- **Condition of Mines:**
  - **Double tone/broken bands**
  - **Double Chipping**
  - **GPR Only Signals**
- **Environmental Factors:**
  - **Laterite soils**
  - **moisture laden soils**
  - **Clutter density**
- **Sustainability:**
  - **Cables, knobs, etc.**







# SYSTEM IMPROVEMENTS

## Military Batteries

- **Nickel Metal Hydride (Retain Memory); \$400 ea**
- **2-port charger: condition and charge time > 8 hours; \$2,500 ea**
- **\$4500/HSTAMIDS**



## HD-Developed Chargers

- **16 port charger: Charges all batteries < 3 hours**
- **8 port charger: Internal lithium ion battery ; Capable of charging 24 Sony batteries without generator power.**
  - **Internal battery charge time < 3 hours**
- **4 port charger: Internal lithium ion battery ; Capable of charging 12 Sony batteries without generator power**

## Commercial Solution

- **Sony Camcorder Batteries (Lithium Ion); \$100 ea**
- **2-port charger: charge time ≈ 5 hours; \$150 ea**
- **\$550/HSTAMIDS**

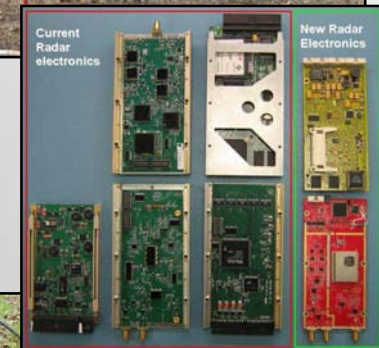
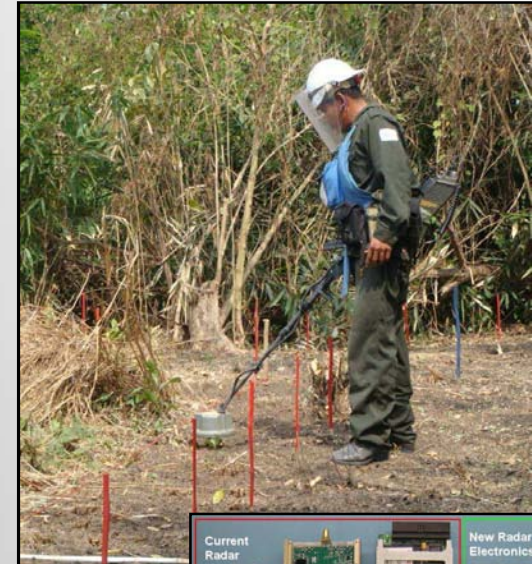




# SYSTEM IMPROVEMENTS

## Improving Army model hardware & software:

- **New search head:**
  - Improved Antennas
  - low profile
  - Lightweight
- **Fewer circuit boards:**
  - New electronics design
  - Reduced power, cost, weight
- **Integrate improved Minelab COTS metal detector**
- **System Goals:**
  - Overall weight reduced to 8 lbs
  - Overall costs reduced to \$10K







## CONCLUSION:

<b>Organization</b>	<b>Dates</b>	<b>Area Searched (m<sup>2</sup>)</b>	<b>Mine Calls</b>	<b>Clutter calls</b>	<b>Total Detections</b>	<b>Clutter Rejection (%)</b>	<b>Mines found</b>
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- **Significant time & cost savings achieved by organizations**
  - **Manage effectively**
  - **Deploy in correct environments**
- **Directly benefit the U.S. Military**
  - **Valuable lessons learned**
  - **System improvements**
- **Significant benefit to indigenous population**



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## HUMANITARIAN DEMINING R&D PROGRAM

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