# TEEMS Strategy

## Texaco Energy & Environmental Multispectral Spectrometer

### Update – July 31, 2007

# Agenda

1. Highlights of Significant Accomplishments - Events
2. The Team, Advisors & Affiliations
3. The Product – what we should focus on!
4. Pilot projects, proposals, funding
5. Web portal – communications, customer development, remote team coordination
6. Next Steps?

# Significant Developments

- Larry Flournoy, helped acquire lab space for set-up
- Successful set-up and preliminary testing of TEEMS system – Dr. Robert Moss
- Met with Dr. Jack Carnes project lead for TEEMS project at Texaco (5/11) – Exec. Business Advisor
- Met with Dr. Norman Borlaug (5/17) – Andy's Mentor
- Met with Dr. Helen Reed (Dept. Head Aerospace Eng.) and Joe Perez (AggieSat Satellite Lab).
- Larry Flournoy in collaboration with Univ. of Houston, Civil Air Patrol and Air Force possible to fly ARCHER to capture data for free or nominal cost
- Jamshid Gharajedaghi, author of "Systems Thinking" agreed to serve in an advisory capacity 7/23/07

# Significant Developments

**Apr. 28th and 29th, 2007**

TEEMS Device set-up

(left to right)

J.R. Starch

Andy Skadberg

Larry Flournoy

Robert Moss

*Saved approx. 82K from Spectral's bid*

Video

# Board of Advisors – Informally invited – accepted

Dr. Edward Hiler (TAMU – Past TCE and Ag. Experiment Station)
Dr. Wei Zhao (RPI)
Dr. Ron Robinson
Dr. John R. Campbell (Oklahoma State – Pres. Emeritus)

*Special Advisor* Dr. Jack Carnes (Retired Texaco)

Pending invitations for Board of Advisors
– Jack Dangermond (ESRI)

Dr. Norman Borlaug (*Tentative Honorary Advisor*) – Andy's mentor

Other Advisors/consultants
Dr. Jamshid Gharajedaghi – Systems Thinking

# TAMU Affiliations

- **Institute for Scientific Computation** (ISC)
- **Norman Borlaug Institute for International Agriculture**
- **Continuing and Professional Studies Office** (CAPSO)
- **Aerospace Engineering Department - AggieSat Satellite Lab**
- **Academy for Advanced Telecom. and Learning Tech.**
- **Immersive Visualization Center** (IVC)
- **Center for Geospatial Info. Science and Technology** (GIST)
- **Atmospheric Sciences**
- **Dept. of Geography / Geology**

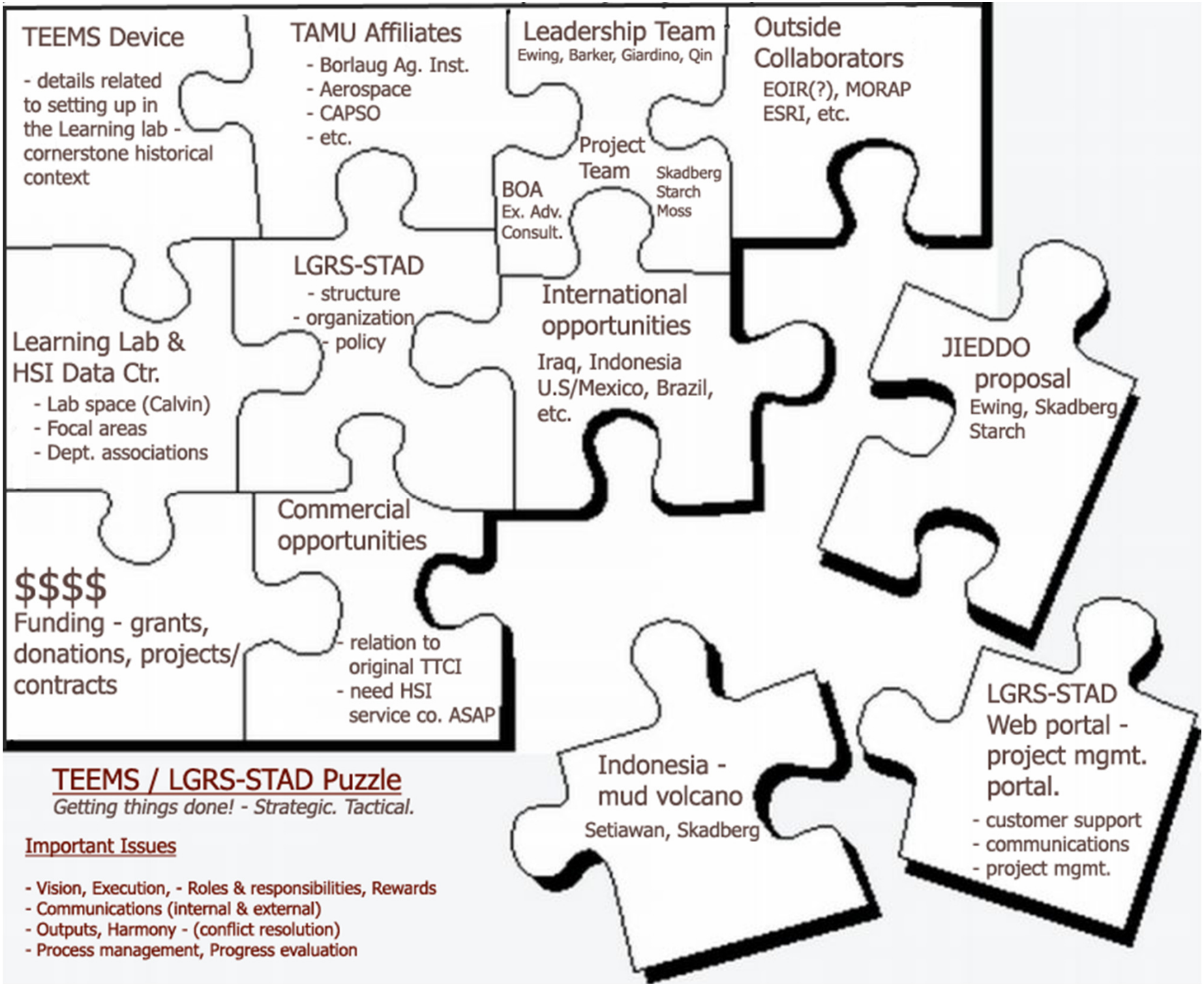
# Value Proposition for Hyperspectral – First step

Per Jack Carnes & Robert Moss

- Water Resource Mgmt
- Military / Homeland Security
- Forest Management
- Urban Planning
- Agriculture
- Mineral Exploration
- Environmental Assessments
- Geological Assessments
- Satellite Simulation
- Resource Management
- Soil Survey
- Mine Site Monitoring
- Landfill / Waste Management
- Hazards
- Etc.

## Conversion of Data into Products

- **Utilize existing available data sets**
  - ***TEEMS – prior captured data***
  - ***Landsat***
  - ***Collaborate with Civil Air Patrol***
- ***Aquire Hyperspectral Sensor***
- **Texas Landfill** – James Vaughan - TECQ
- **Pursue Pilot Projects**
- **Begin customer prospecting** – Babcock Ranch, EPA (Nick Carbone), "Ambulance Chasing", Austin Energy




## TEEMS / LGRS-STAD Puzzle

*Getting things done! - Strategic. Tactical.*

**Important Issues**

- Vision, Execution, - Roles & responsibilities, Rewards
- Communications (internal & external)
- Outputs, Harmony - (conflict resolution)
- Process management, Progress evaluation

# Norman Borlaug Formula – Our Key to Success

Primary Attributes:

Vision! Spirit! Humility! Persistence!

- Examine primary issues in problem – within context.
- Develop common sense solution – create action plan.
- Implement plan - no matter what it takes.
- Recruit young scientists, specialization secondary, teach about context – instill Spirit of the cause!
- Grow effort, deal with obstacles, adopt – diffuse.
- Never lose sight of end objective!

# LGRS-STAD – HSI / Systems Approach – Pilot Projects

- JIEDDO - $37 million(?) – waiting to be sent in the next week or two

- Indonesia mud volcano problem (Aristo Setiawan $?)

- Brazil sustainable development / forestry / coffee (per Norman Borlaug)

- U.S. / Mexico border – West Texas, in collaboration with Michael Orshan – past Ex-Dir. New Mexico Dept. Economic Dev. & Technology

- Texas Land Fills – James Vaughan, Southwest Texas State – Managed Texas Landfill Inventory Project for TECQ

# IED pilot application of HSI and Systems Approach

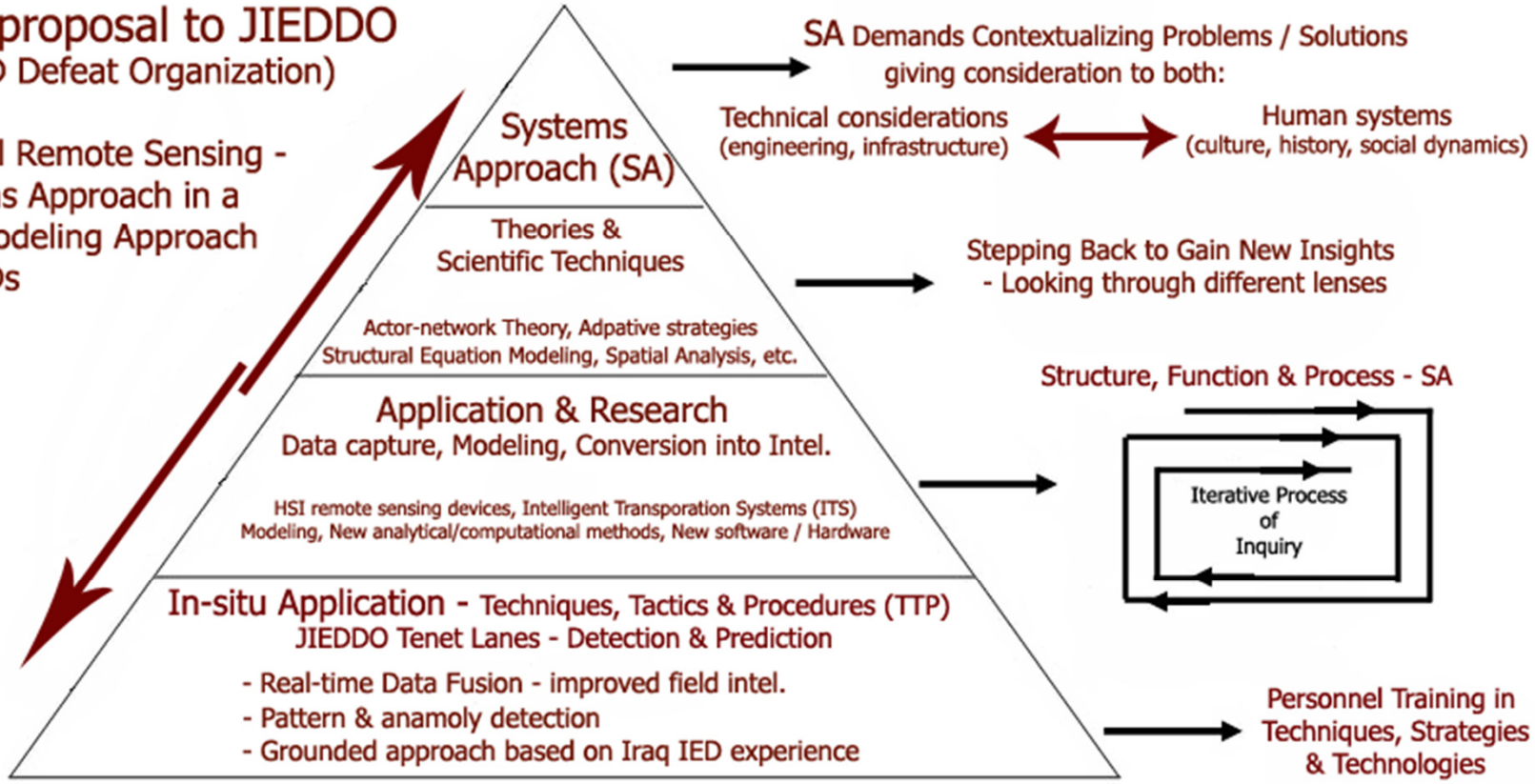
## Significant events

- March 6, met Jack Dangermond (ESRI) – “seed-fund TEEMS with IED!”
- March 7, J.R. Starch calls, Pilot trained in hyperspectral (CAP), ran crews of marines in Iraq to eliminate IEDs, developed “moving map” used by COE in Iraq
- March 8, received invitation email to attend JIEDDO briefing.
- May 24, Met Helen Reed and Joe Perez – UAV and satellite
- Jamshid Gharajedaghi (Systems Thinking) agrees to collaborate
- July 30, important feedback about proposal from Robert Moss

# Summary diagram for TAMU proposal to JIEDDO

(Joint IED Defeat Organization)

Hyperspectral Remote Sensing - Using Systems Approach in a Geospatial Modeling Approach to Defeat IEDs




SA Demands Contextualizing Problems / Solutions giving consideration to both:

Technical considerations (engineering, infrastructure) ⟷ Human systems (culture, history, social dynamics)

Stepping Back to Gain New Insights - Looking through different lenses

Structure, Function & Process - SA

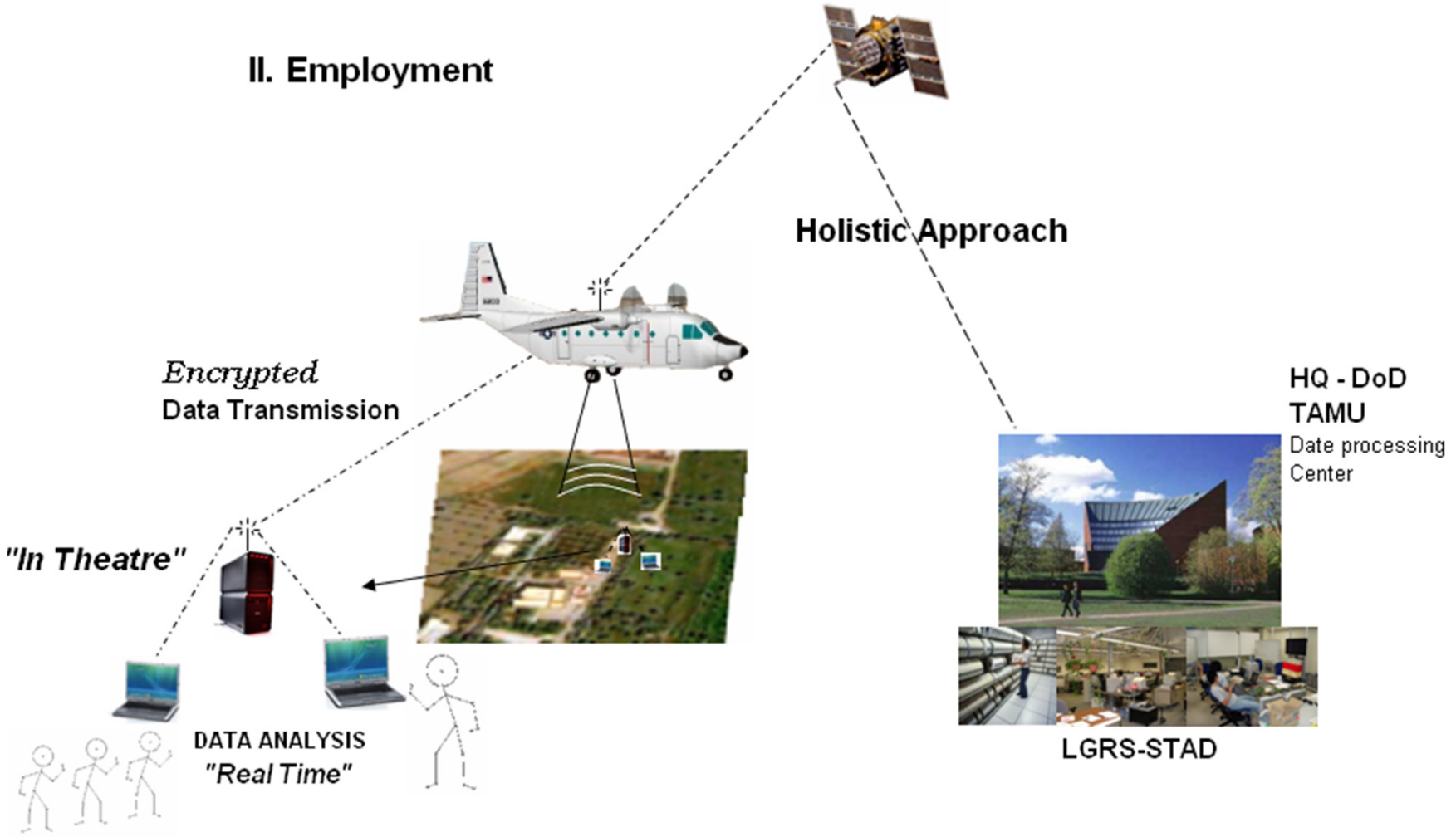



Personnel Training in Techniques, Strategies & Technologies

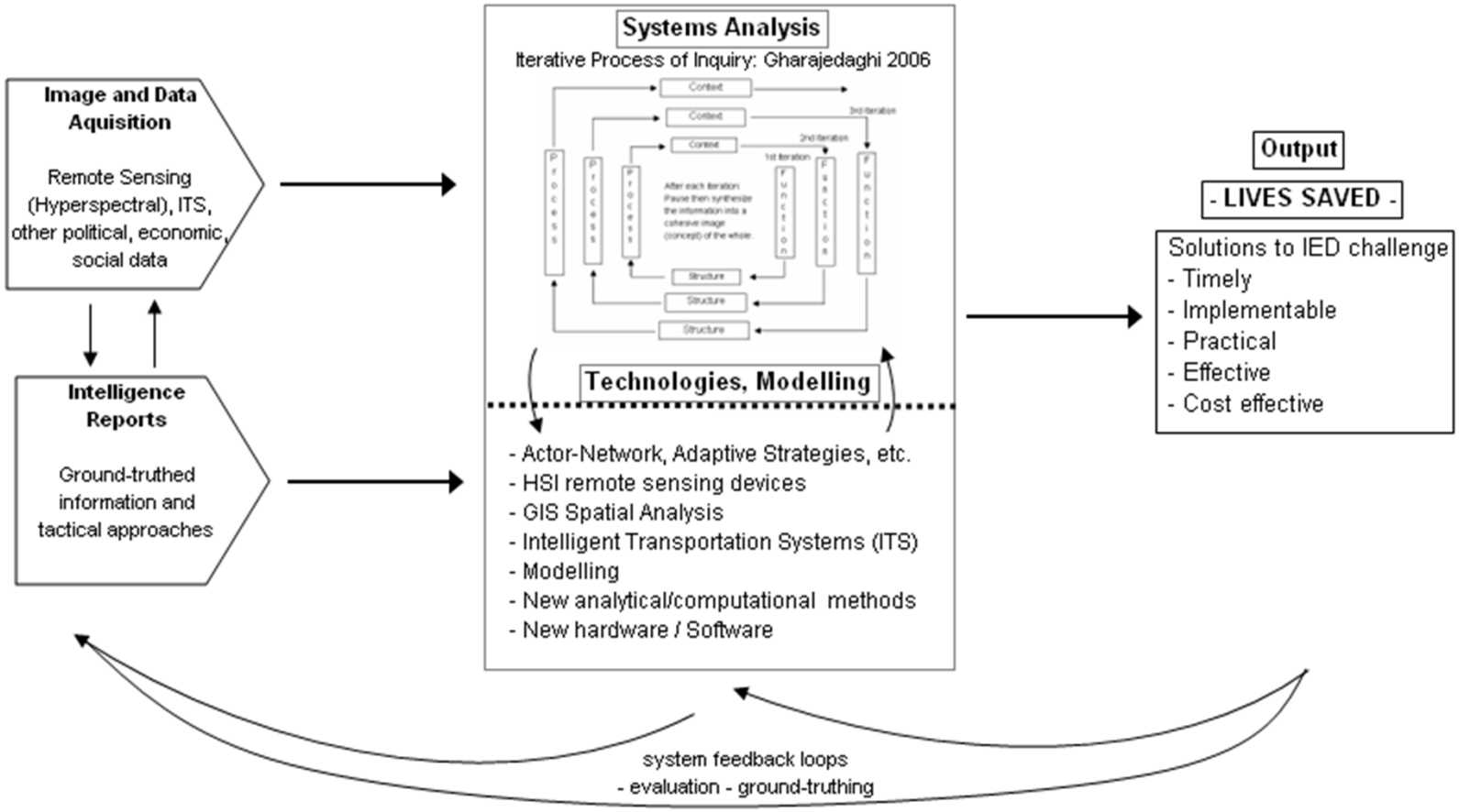
## Saving Soldiers Lives!

Guiding Principles: Timely, Implementable, Practical, Effective, Cost effective

# In-situ Employment of TAMU IED solution



# Flow-chart for TAMU Systems Approach to IED challenge



# Indonesia Mud Volcano Disaster – potential pilot project for HSI – Systems Approach

Project lead: Aristo Setiawan

- Adapt IED-SA approach
- Identify other technology tools and scientific perspectives
- Seek funding from Indonesia govt, company paying for damages, Int'l orgs, etc.

Human Costs: July 4, 2006

| Displaced | Total | Child | Temp. Shelter | Hosted |
|---|---|---|---|---|
| | 6915 | 1382 | 5664 | 534 |

| Health issues | Total | In-patient |
|---|---|---|
| | 11494 | 215 |

The Mud is Still Fowing!!!

# Project lead – Aristo Setiawan – contacts in Indonesia

- Bambang Istadi, Sr. Vice President - Technical Services, EMP - He has direct connection with BPLS (the Sidoarjo Mudflow Mitigation Agency)
- Bueno Yurnalis, Lapindo's lawyer (handling payments to villagers)
- Suwito Anggoro, CEO of Chevron Indonesia (direct contact) swa.anggoro@chevron.com
- Michael Chandra, Aggie Entrepreneur in Oil Industry
- Oka Setiawan, Schlumberger, my brother
- Chandra Suria, BP Indonesia
- Puguh Sugiharto, Vice Chairman of Strategic Initiatives for the Indonesian Renewable Energy Society (direct contact)
- Karsani Aulia, General Manager of BOB, a province-owned oil company
- Dr Ridwan DJAMALUDDIN - Head,
  Marine Survey Technology Center Agency for the Assessment & Application of Technology (BPPT)
- Dr Wahyu W PANDOE
  Marine Survey Technology Center Agency for the Assessment & Application of Technology (BPPT)
- Rudi Rubiandini, member of BPLS
  SEAMEO BIOTROP: Southeast Asian Regional Centre for Tropical Biology: http://www.biotrop.org/
- Rindy Tanhindarto, Scientist at IPB (an institute that has relationship with Texas A&M)

# HSI / Rainforest with Sustainable Practices & ED - Pilot - Brazil


Location: Rio de Janeiro state, Brazil
Approach: Community-based conservation
Reserve: Serra da Concordia Wildlife Sanctuary – 150 Km from Rio de Janeiro
Ecosystem: Atlantic Forest - 7% remains
Traditional Land Use: coffee plantation and cattle ranching


Green Corridor of the Concordia Hills

# Project Lead – Collaborations – Challenges

Project leads:

Fernanda Pegas, TAMU, Recreation, Park & Tourism Sci.
Native Brazilian

Roberto Lamego, Salveaserra, 15 years on-site

Collaborate with the Norman Borlaug Institute for International Agriculture

Adapt PEARL (Rwanda) model – under Borlaug Inst. & recommended by Jack Dangermond - ESRI

- Deforestation
- Socioeconomic problems
  - Poverty
  - Limited access to education and training opportunities
- Limited infrastructure
- Limited financial resources

**Goals: Sustainable development through:**

Sust. Agriculture, Reforestation, Ecotourism, Training

# LGRS-STAD - TAMU

laboratory for geospatial remote sensing sciences
technology & application development

**Converting Light Into Knowledge**

1.979.845.5098 LGRS-STAD Program Director
Office of the Vice President for Research
Texas A&M University

TEXAS A&M SYSTEM




RESEARCH TOOL-BOX FOR THE 21st CENTURY

Hyperspectral sensors provide new digital imaging capabilities allowing us to see way beyond the visible light spectrum.

The LGRS-STAD Team views it as a new "tool-box" for natural resource management and environmental decision-making.

This technology combined with a systematic and collaborative network of people and organizations empowers this cooperative to do Great Works! See more here. . .

## TEEMS Donation


Chevron/Texaco's generous donation of the TEEMS device to TAMU made this project a reality.

## Hyperspectral Application by Industry

Hyperspectral technology has vast applictions, from Homeland Security to wetland conservation . . .

## LGRS-STAD Pilot Projects

LGRS-STAD is excited about six pilot projects that are demonstrating the power of technology and cooperation.

## The Big Picture

The LGRS-STAD has a bright vision toward the future . . . learn more, or better yet - JOIN US!

## Highlight of Sponsors & Affiliates

Norman Borlaug Institute for Intl. Agriculture Texas A&M Univ.

Chevron/Texaco TEEMS Donation

ESRI - GIS and Mapping Software

* click above for more info

EDUCATION
RESEARCH
OUTREACH

THE LAND-GRANT MISSION
Drivers for New Knowledge and its Application

Office of the Vice President for Research
Texas A&M University

Team Member Log-in
Username:
Password:

# NEXT STEPS - Dreams

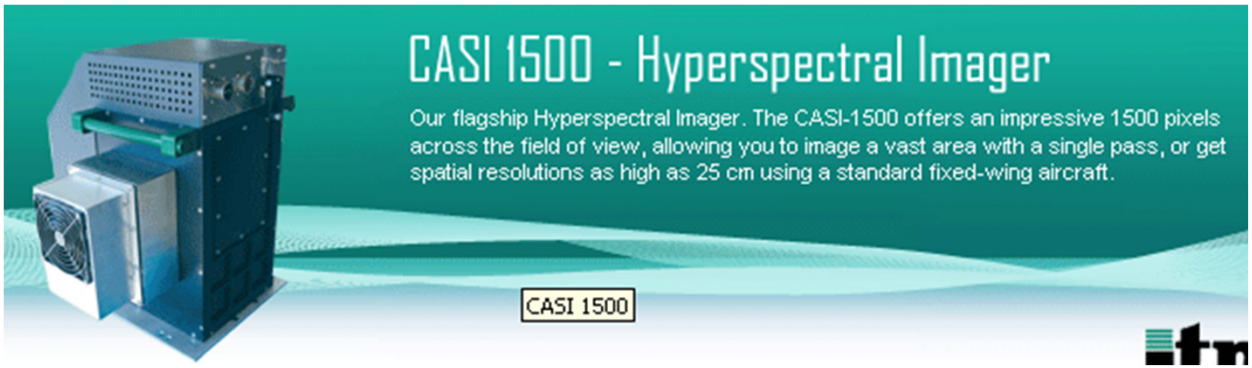
- Get pilot project proposals out the door
- Get Website / project mgmt. portal up
- Find HIS/Data Center lab space and create
- Invite Alfredo Prelat to TAMU, speak on Hyperspectral
- Start-up HSI “Service” company
- Begin corporate / donor fundraising campaign
- Develop marketing / business plan

## Dreams - People to Hire/Recruit

– Budget (300k – previously Spectral)
– J.R. Starch ½ time Project Collaborator (TAMU grad. student)
– Robert Moss – would love to build hardware here!
– James Vaughan – TEEMS /HSI lab director
– Clayton Blodgett (Missouri) to lead team for conversion

# Off the shelf sensors

## itres – CASI 1500 – $543,644




## SpecTIR – Specim Eagle Hawk – $465,086

The **HyperSpecTIR** suite of instruments have a spectral range of 450nm to 2450nm and consist of 227 spectral channels. These instruments can be operated in the ground static-horizontal operation mode, as well as in airborne mode is used to support very high resolution visible, near infrared, and short wave infrared hyperspectral data products. The spatial resolution ranges from 0.1 -3m in the static ground collections to 0.25-5m from airborne collections.

# Visualizing the LGRS-STAD

**Customers -**
Industry & Natural Resource Management Sectors

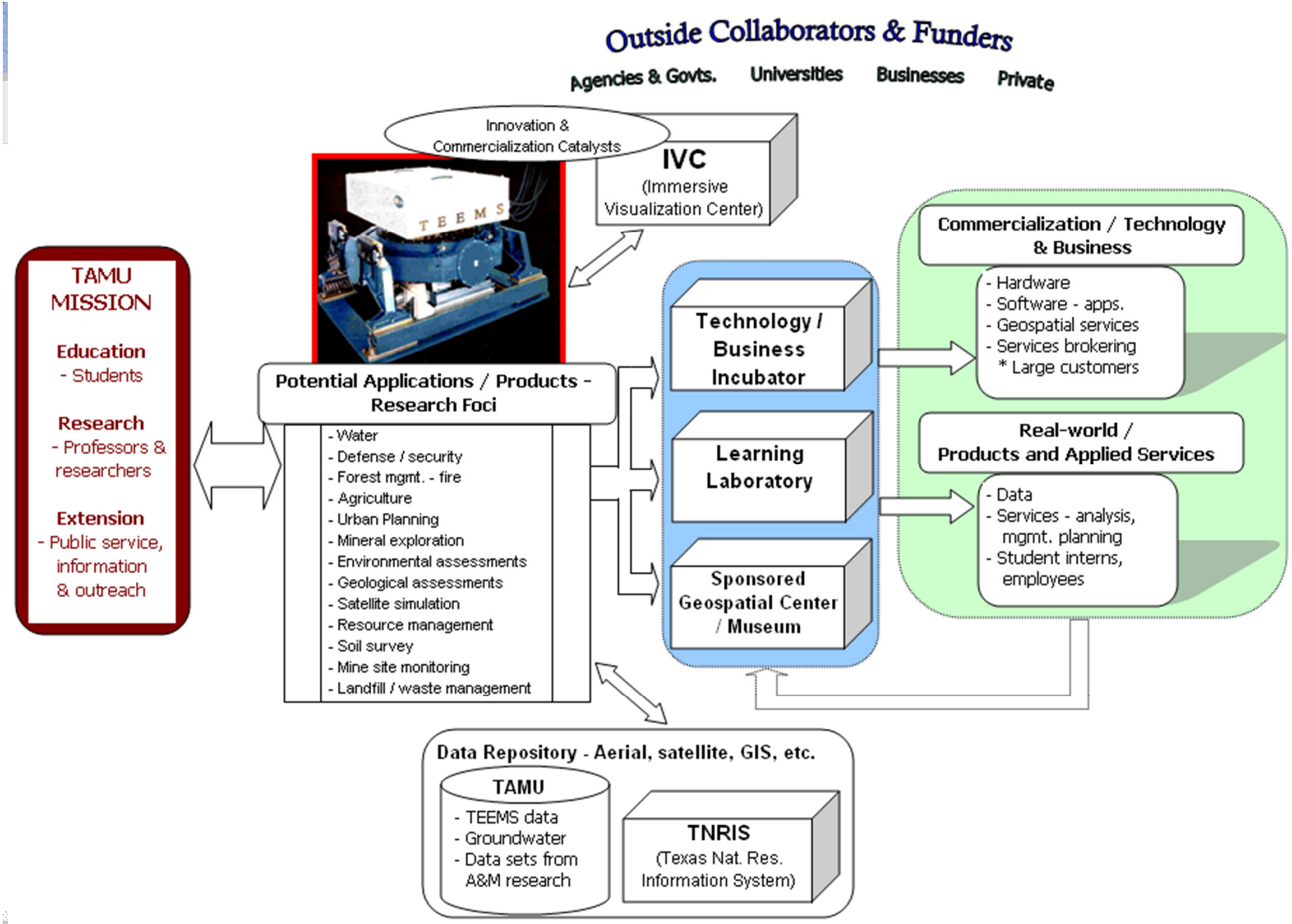
LABORATORY FOR GEOSPATIAL AND REMOTE SENSING SCIENCES,
TECHNOLOGY AND APPLICATION DEVELOPMENT (LGRS-STAD)

Data Repository

Technology Skunkworks

Science, R&D Laboratory

Products
Services
Technologies


Outside Collaborators & Funders
Agencies & Govts.
Universities
Businesses
Private
Innovation & Commercialization Catalysts
IVC
(Immersive Visualization Center)
TEEMS
TAMU MISSION
Education
- Students
Research
- Professors & researchers
Extension
- Public service, information & outreach
Potential Applications / Products - Research Foci
- Water
- Defense / security
- Forest mgmt. - fire
- Agriculture
- Urban Planning
- Mineral exploration
- Environmental assessments
- Geological assessments
- Satellite simulation
- Resource management
- Soil survey
- Mine site monitoring
- Landfill / waste management
Technology / Business Incubator
Learning Laboratory
Sponsored Geospatial Center / Museum
Commercialization / Technology & Business
- Hardware
- Software - apps.
- Geospatial services
- Services brokering
* Large customers
Real-world / Products and Applied Services
- Data
- Services - analysis, mgmt. planning
- Student interns, employees
Data Repository - Aerial, satellite, GIS, etc.
TAMU
- TEEMS data
- Groundwater
- Data sets from A&M research
TNRIS
(Texas Nat. Res. Information System)