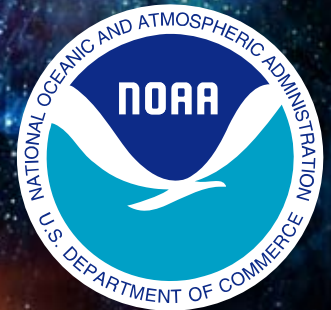


Bridging Research and Operations For Future Environmental Services

Keynote Address

Jack Hayes

*NOAA Assistant Administrator for Weather Services, and
National Weather Service Director*

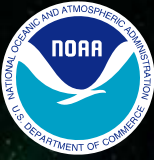


***4th Annual Symposium on Future National Operational Environmental
Satellite Systems***

88th AMS Annual Meeting

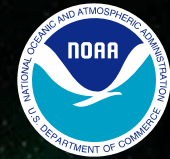
New Orleans, Louisiana

January 22, 2008



Outline

- **A changing world**
- **Where we're headed: Environmental services**
- **Needed advances in capabilities**
- **Earth observations**
- **S&T infusion**
- **Key elements for success**



A Changing World

Population Growth





A Changing World

Sensitive to Weather, Water, & Climate

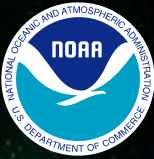


**Future
Environmental
Services**



**Economic needs
Societal needs
Security needs**





A Changing World

Increasingly Complex and Dynamic

1992



Hurricane Andrew

\$ 9 Billion

51 Deaths
80,000 Displaced

2003



California Wild Fire

\$ 2 Billion

5,000 Homes Lost
749,401 Acres Burned

2004



Tsunami Indian Ocean

\$ 15 Billion

> 200,000 Deaths
> 500,000 Displaced

2005



Hurricane Katrina

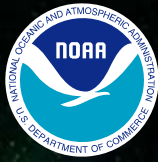
\$ 33 Billion

> 1,300 Deaths
> 300,000 Displaced



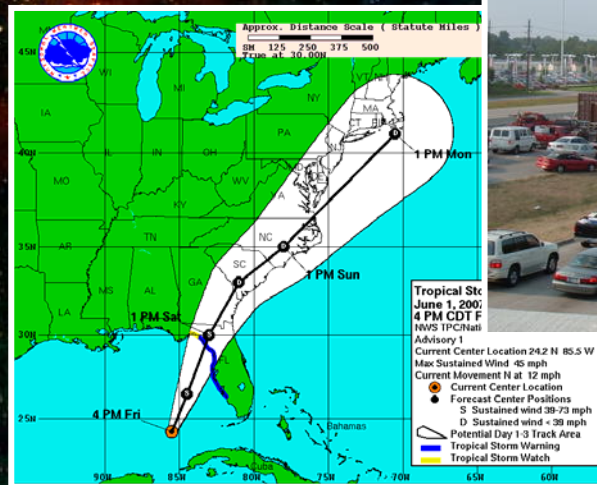
Where We're Headed

Environmental Services

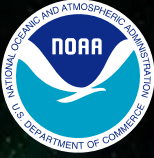


Data, Products, and Services to:

- Greatly reduce loss of life and injury
- Enable communities to mitigate property loss well in advance of threatening conditions
- Alert economic sectors about environmental risks with sufficient lead time to limit or avoid impacts



5-Day Track Forecast cone and Watch/Warning



Where We're Headed

Environmental Services

Tornadoes

- Warning lead times increase from an average of 13 min. to as much as 1 hour
 - Virtually eliminating loss of life from lack of warning



Severe Thunderstorms

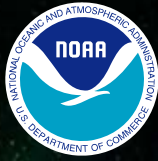
- Warning lead times increase from an average of 18 min. to as much as 2 hrs.
 - Improving air traffic routing
 - Virtually eliminating severe weather-related air traffic delays





Where We're Headed

Environmental Services



Tropical Cyclones

- Warning lead time for landfall increases from less than 24 hours to 3 days
- Provides emergency managers time to conduct orderly evacuations



Winter Storms

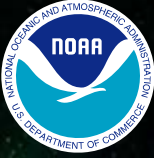
- Warning lead time increases from an average of 18 hours to days
- Improving commerce and transportation sectors





Where We're Headed

Environmental Services



Air Quality

**— Warnings about poor air quality
4-6 days in advance for
metropolitan areas**

- Power companies shift to alternate fuels
- Alerts individuals at risk and health care professionals

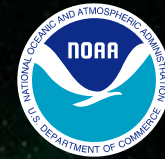


Climate

**— Enhance current climate products
and services with climate change
information**

- Mitigation and adaptation for climate change
- Communities and weather-sensitive industries reduce risk





Where We're Headed

Environmental Services

Next Generation Aviation Services

- ▣ ***Aviation forecasts to exceed 80% accuracy***
- ▣ ***Provide support through NextGen***
 - **4D weather cube**

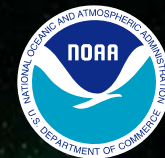
Space Weather

- ▣ ***Provide real-time monitoring and forecasting of solar and geophysical events***
 - **Understand needs of fast-growing customer base**



Where We're Headed

Environmental Services



Water Resource Information

- **Provide high-resolution water quantity, quality, and soil moisture forecasts**
 - Emergency and resource managers mitigate losses for conditions ranging from droughts to floods



Ecosystem Impact Information

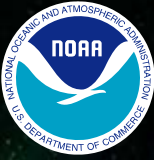
- **Provide forecasts of weather, water, and climate impacts for management decisions**
 - Management decisions reflect relationships among humans, non-human species, and the environments in which they live





Where We're Headed

Environmental Services



Forecast Uncertainty Information

- Integral and essential part of all forecasts
- Enterprise-wide partnership to generate and communicate forecast uncertainty to decision makers and public
- Expressed in terms of probabilities

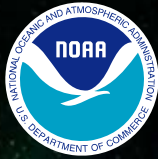


- Users decide whether to take action and appropriate level of response
- Thresholds unique to decision maker – based on mission risk



Needed Advances in Capabilities

Getting Real Results



Advances

- ***Earth Observations***
- ***Data Assimilation***
- ***Models***
- ***Forecasting Techniques***
- ***Information Technology***
- ***Dissemination Methods***



Results

Improved:

Hurricane Track, Intensity and
Precipitation Forecasts

Tornado and
Flash Flood Forecasts

Aviation, Fire, Marine, and
Space Weather Forecasts

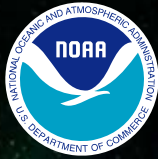
Flood, River, and Ocean
Predictions

Seasonal Climate Forecasts for
Energy, Agriculture, Etc.



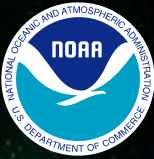
Needed Advances in Capabilities

Focus on Earth Observations



- **Improve temporal, spatial, and spectral resolution at all scales**
- **Obtain observations of new environmental parameters**
- **Sustain data quality and timeliness**
- **Integrate multi-purpose observing systems and networks**

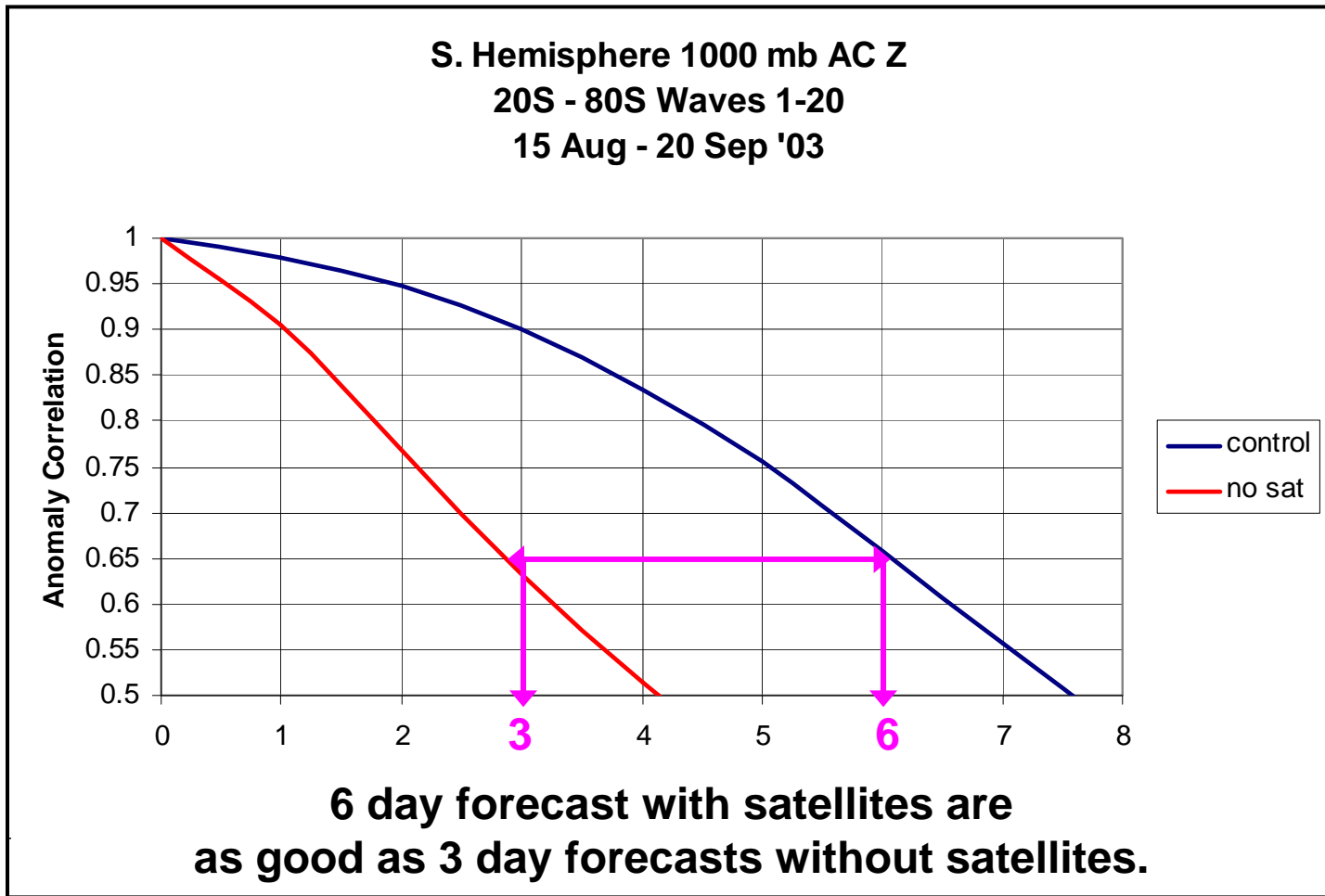


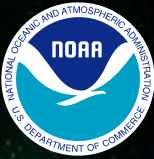


Earth Observations

Operational Use of Satellite Data

Important in the Past

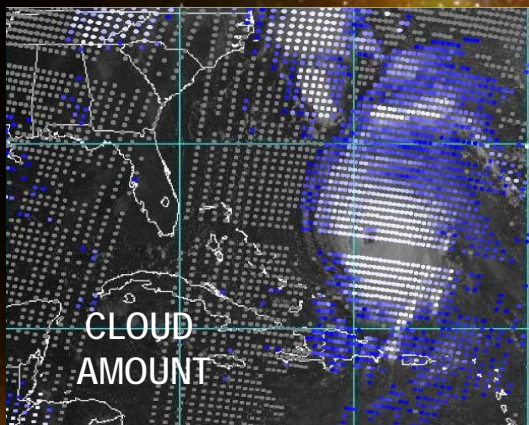




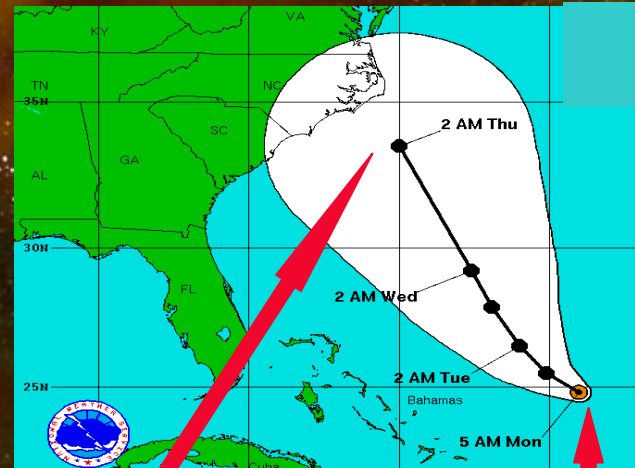
Earth Observations

Operational Use of Satellite Data

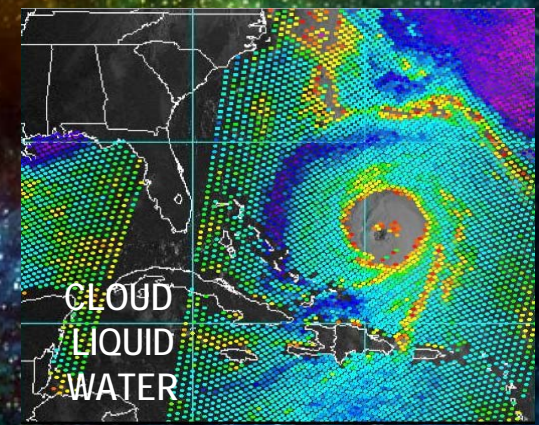
Important Now



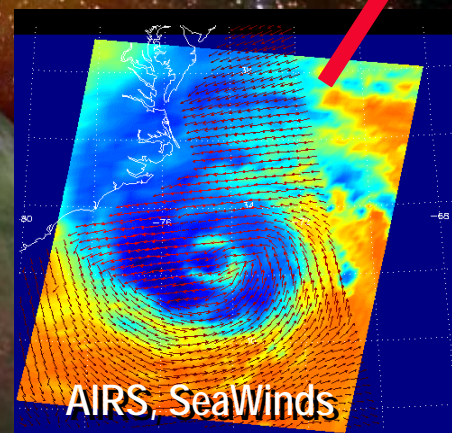
ATOVS, NOAA 15
Superimposed on GOES
15 Sep 03



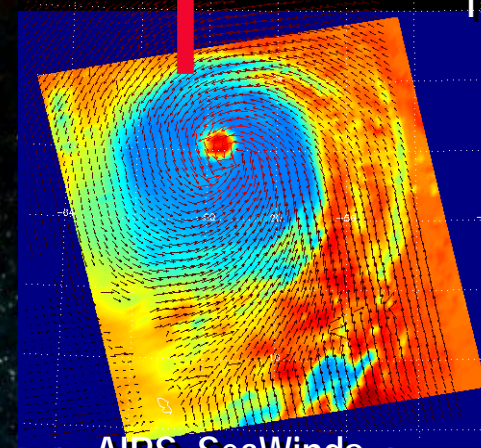
Hurricane Isabel
15 Sep 03



AMSU-B, NOAA 15
Superimposed on GOES
15 Sep 03



AIRS, SeaWinds
18 Sep 03

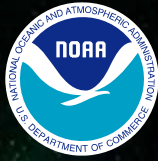


AIRS, SeaWinds
13 Sep 03

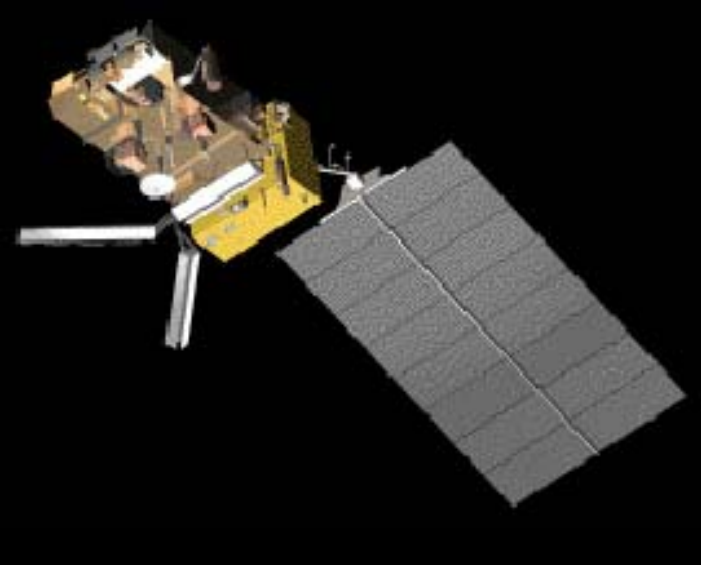


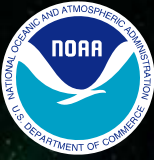
Earth Observations

Operational Use of Satellite Data



Important in the Future



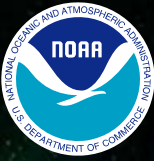


S&T Infusion

Challenges and Opportunities

- Gaining resources – IT and people
- Staying customer focused
- Staying abreast of opportunities
- Keeping pace with technology
- Planning for success – build in operational needs early





S&T Infusion

Key Elements for Success

Bridging the Valley of Death

R

&

D

Vision - Process - Architecture - Teamwork - Investment Plan

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Improved Tech Infusion



Key Elements for Success

Vision



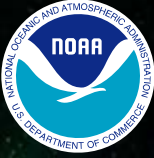
- **Provide best satellite solutions**
- **Maximize use of data sets**
- **Maximize return on investment**
- **Minimize transition time and cost**





Key Elements for Success

Process



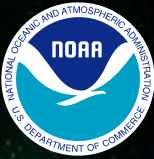
Planning

- ***Establish coordinated “thread” to operations early***
- ***Develop joint plans – R&D to Operations***

Execution

- ***Scheduled and frequent communication and coordination***
- ***Agreed upon decision points and criteria***





Key Elements for Success

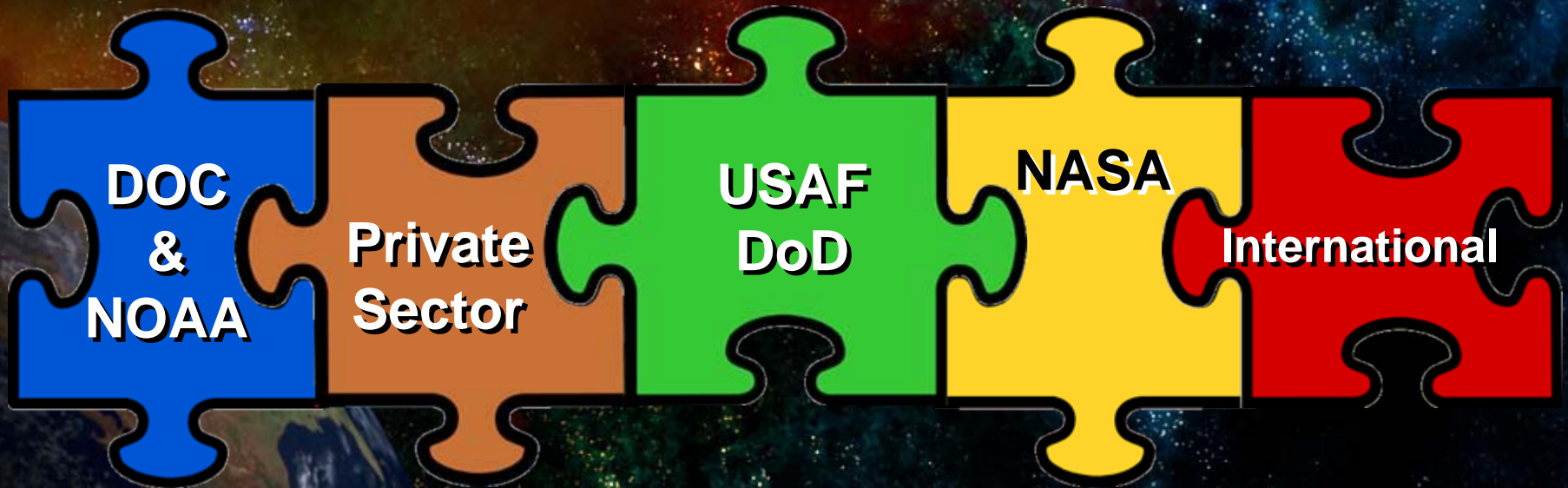
Teamwork

Research

Orients research strategies to facilitate transition

Operations

Orients operations to receive research

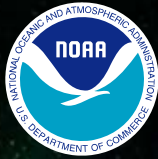


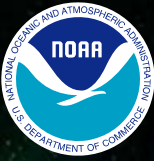


Key Elements for Success

Architecture

- IT infrastructure – Comms, formats
- Common models and diagnostics
- Standard test cases
- Testbeds – JCSDA



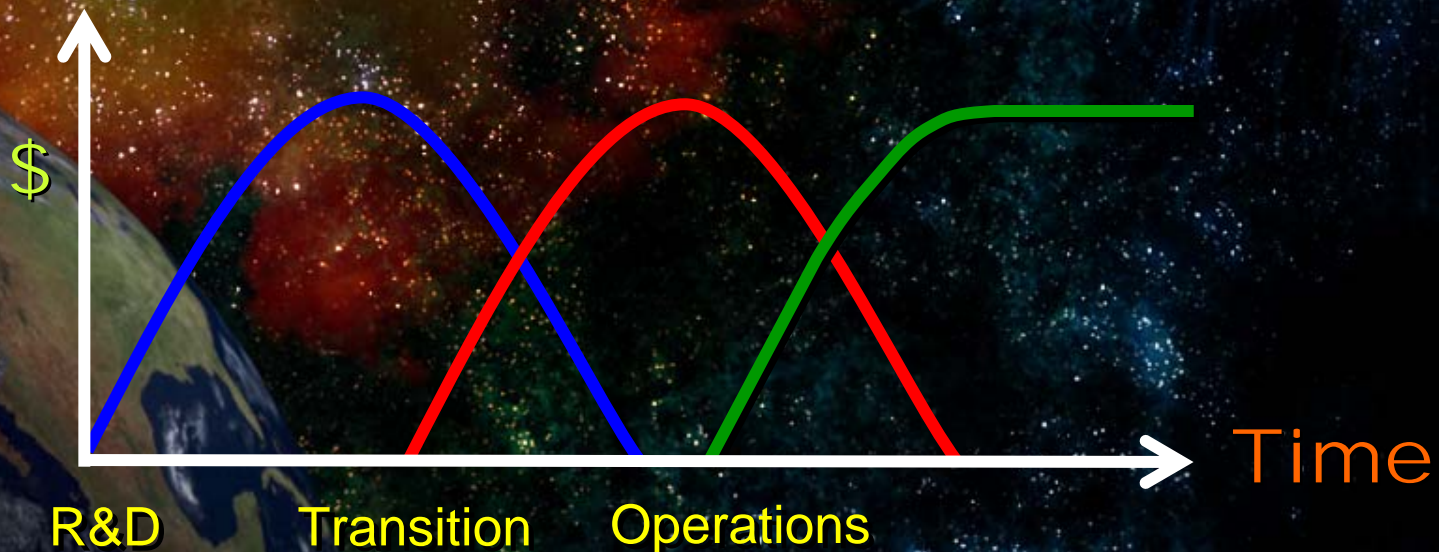


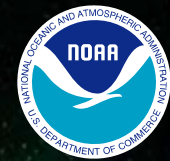
Key Elements for Success

End-to-End Investment Plan

Need coordinated lifecycle investment plan including

- **All key players**
- **Prioritization of activities**
- **“End-to-end” and phased investment strategy**
 - With clearly identified leads and major milestones





Your Challenge Today:

Identify new real world benefits NPOESS will deliver that you didn't consider before.

We're working together to save lives!

