Focus Area Summaries

Focus Area Team Summary: Observations

R&D Needs & Opportunities

- Optimize observing (obs) architecture for cost-effective service-based outcomes: investigate multi-sensor platforms, gap-filling observations
- Develop adaptive observing capabilities to support downscaled and probabilistic warnings: e.g. Warn on Forecast for severe weather, hurricanes
- Characterize and incorporate observational uncertainty in probabilistic forecast generation

Vision

An integrated observing system, providing accurate, complete and well characterized information of the Earth system; when, where and how needed

Increasing Impact

Current Status:

- Individual Systems: public, private, universities
  - Radar
  - Satellite
  - Surface; in-situ
  - Upper Air
  - Etc

Near-Term:

- Inventory and assess obs architecture, identify gap-filling systems for end-state
- Assess impact of planned architecture (including OSEs, OSSEs)
- Initial capabilities for 4-D national mesonet
- Deploy Dual Pol Radar, NPP, NPOESS, GOES R

Long-Term

- Network of networks
- Integrated Radar
- Observations & metadata accessible through dynamic push-pull, triggering, data mining
- Obs architecture integral to model assimilation supporting risk/ value-based adaptive obs, analysis and predictions

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Observations

Focus Area Team Summary: Data Assimilation and Modeling

R&D Needs & Opportunities

- 4-D data assimilation (4DDA) development
- Common global/regional coupled system with globally consistent grid resolution
- 4DDA based on global ensemble prediction system
- Physics/DA methods for convection resolving models; supporting WoF for severe wx

Vision

A transformed integrated environmental forecast system, serving all customers requirements

Increasing Impact

Current Status:

- 3-D Var DA in GSI
- GFS, NAM, at 27km, 12km respectively
- NOMADS

Near-Term:

- 4D DA: IOC
- 4DVar in testing
- Fully coupled global modeling system; NUOPC
- R2O < 6 mos

Long-Term:

- Hybrid 4DVar implemented
- Grid-based coupled global and regional modeling system with DA
- Convection-resolving physics and DA upgrades to support WoF

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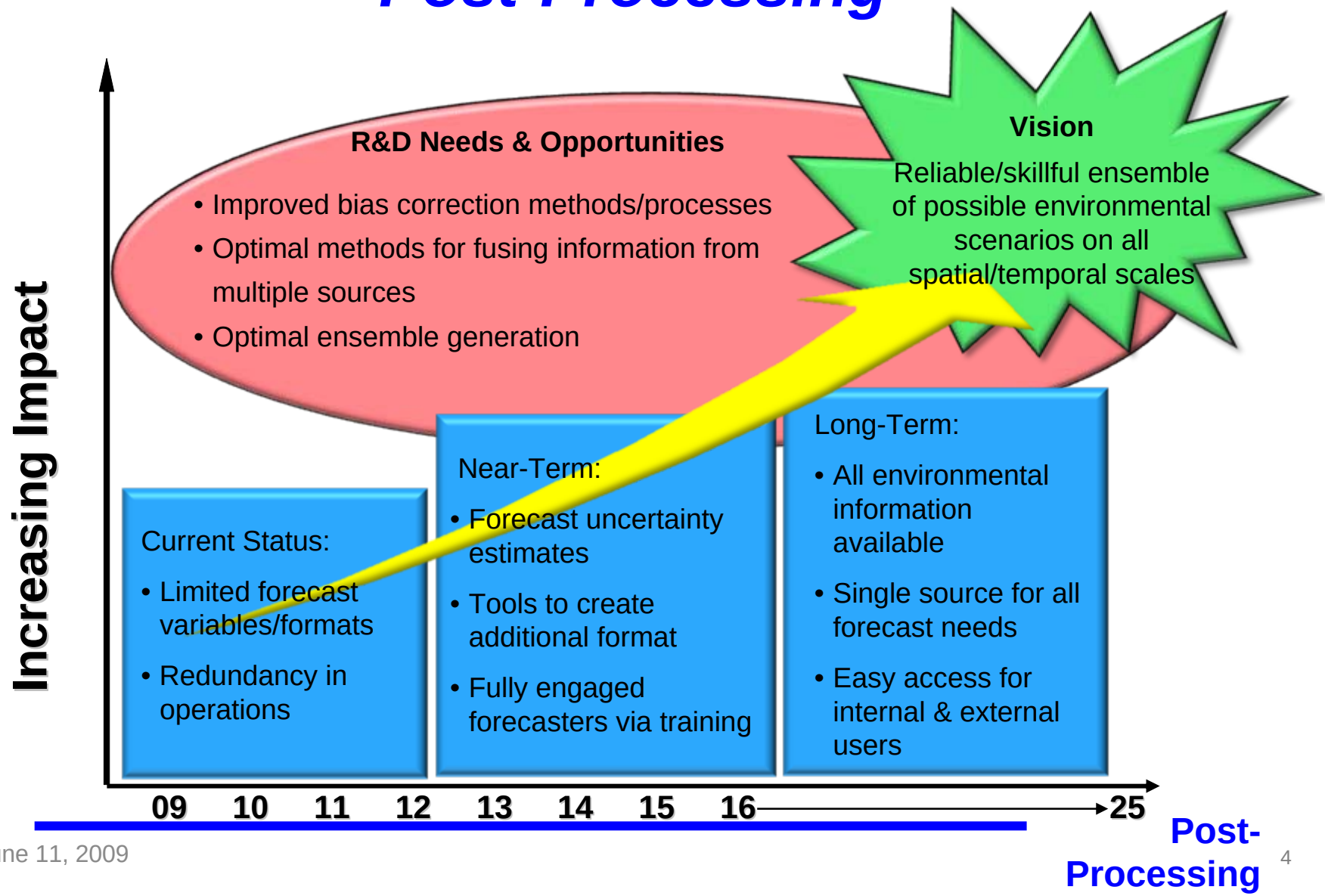
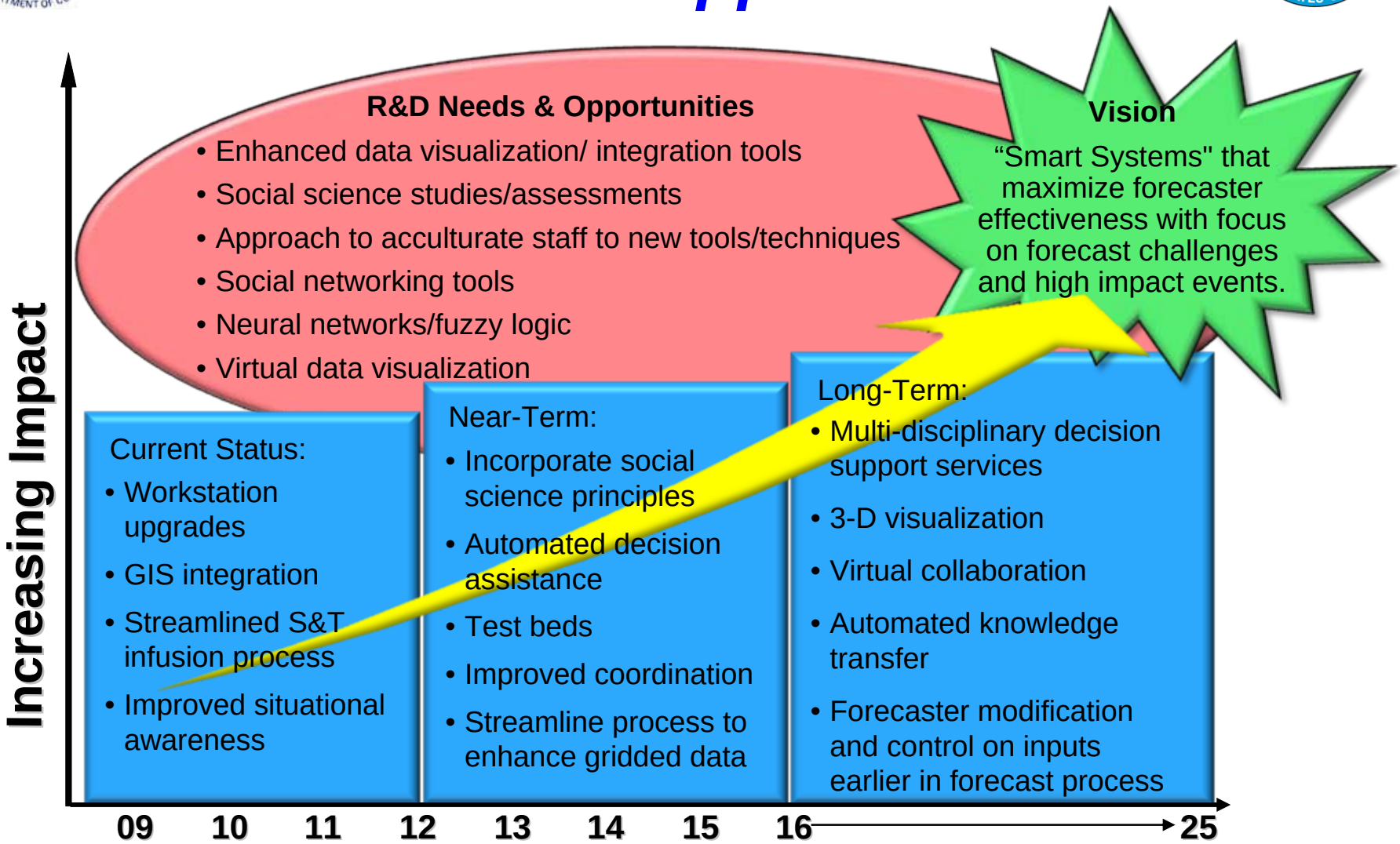
Data Assimilation and Modeling

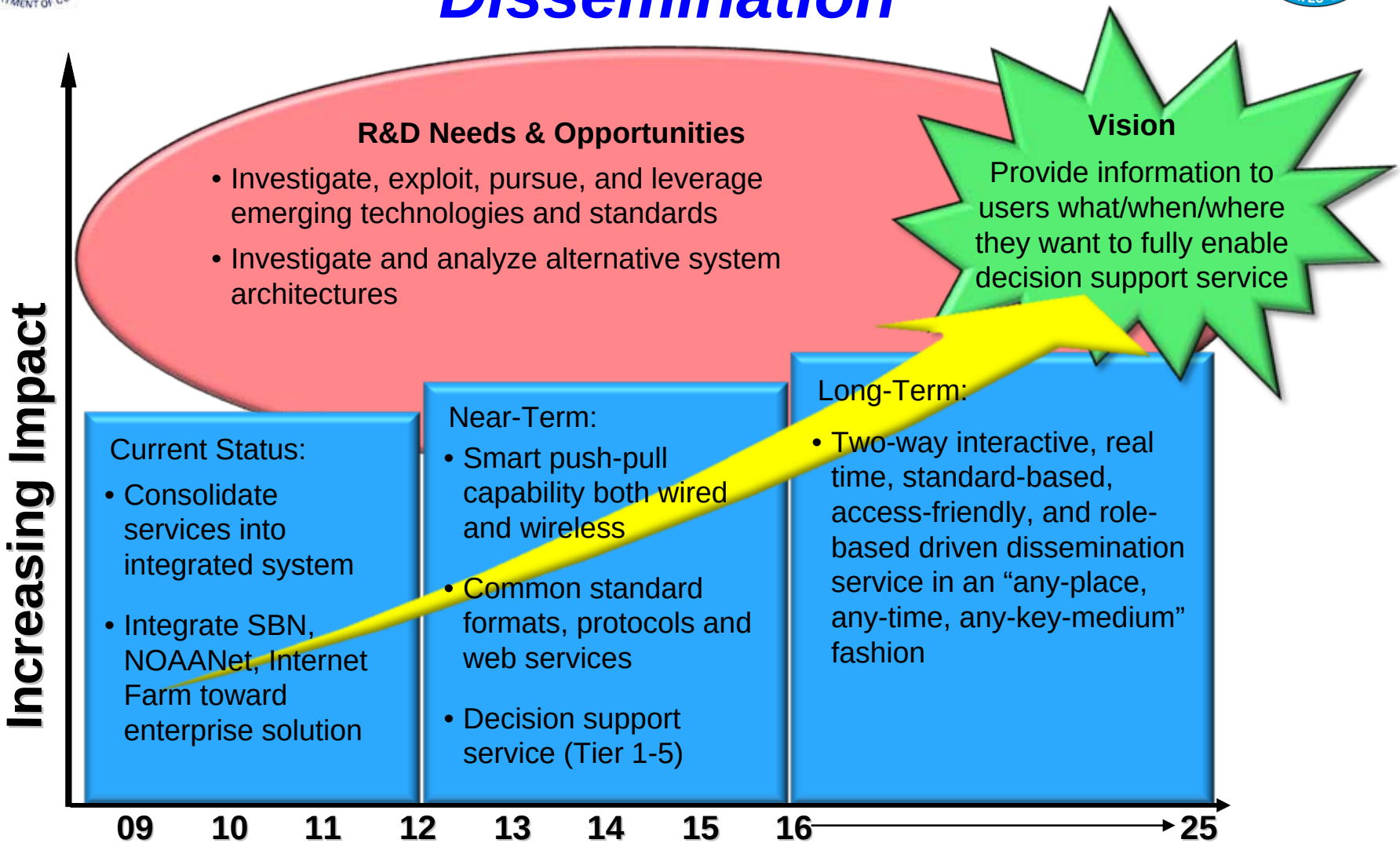
Focus Area Team Summary: Post-Processing



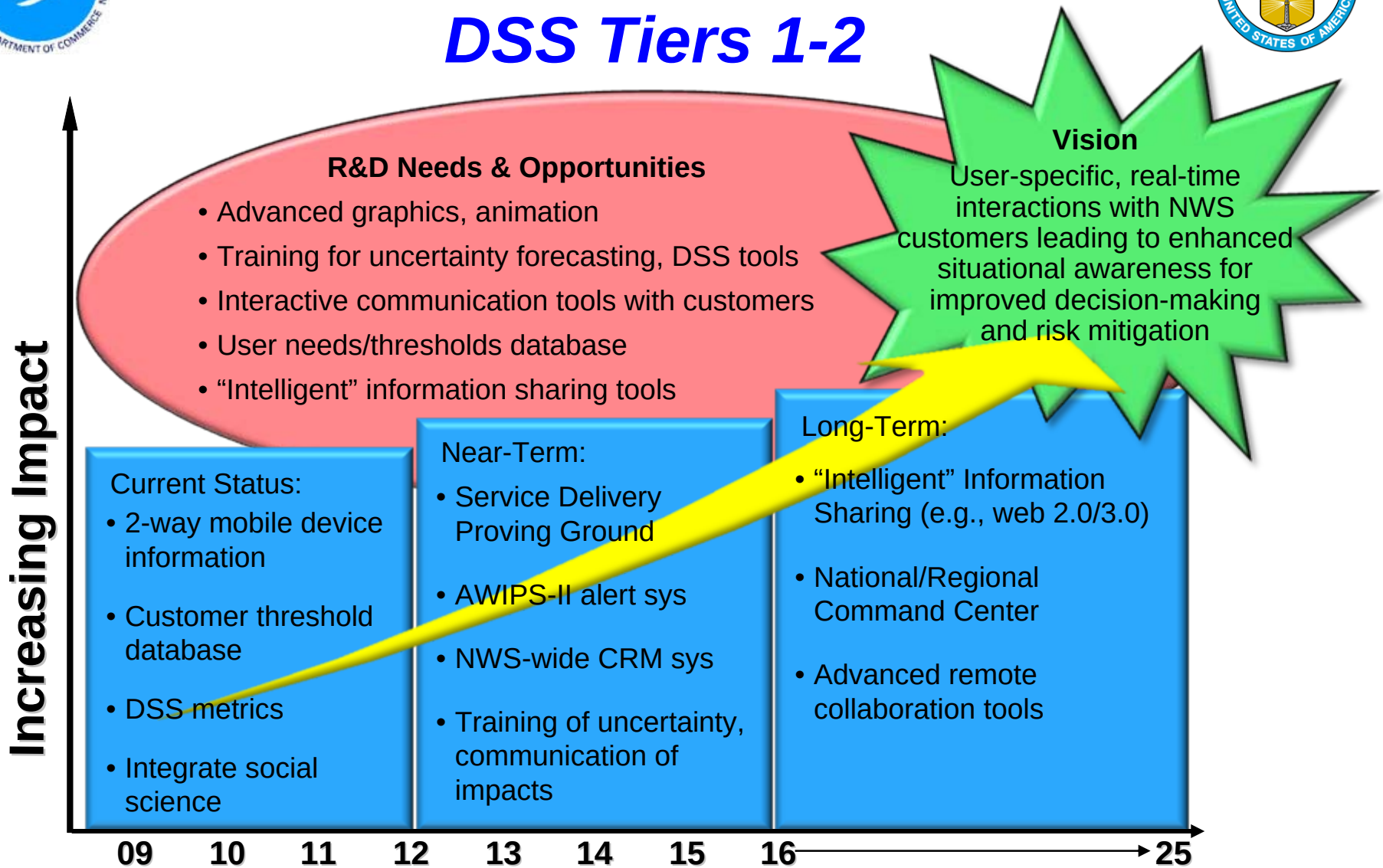
Focus Area Team Summary: Forecaster Applications



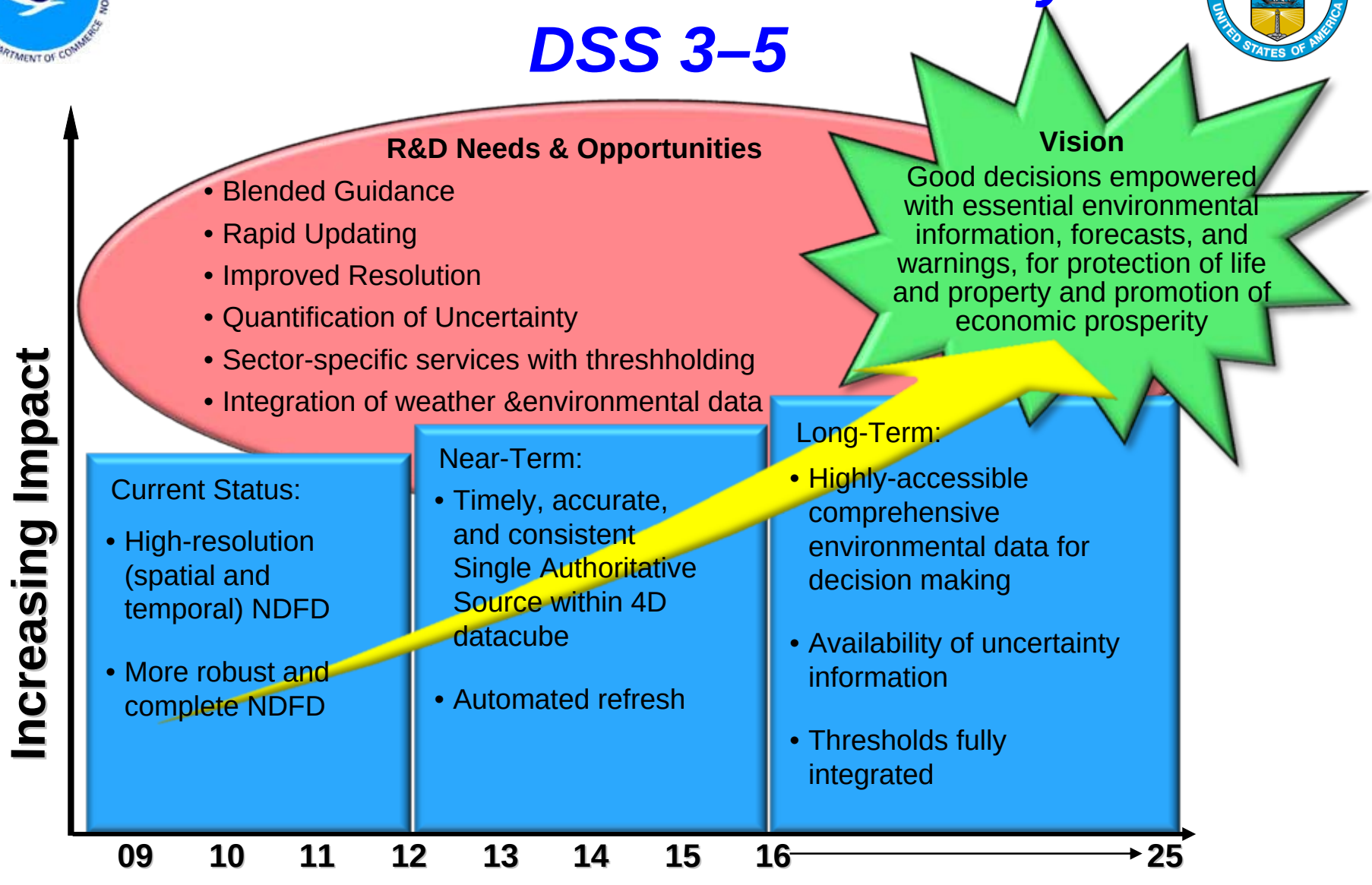
Focus Area Team Summary: Dissemination



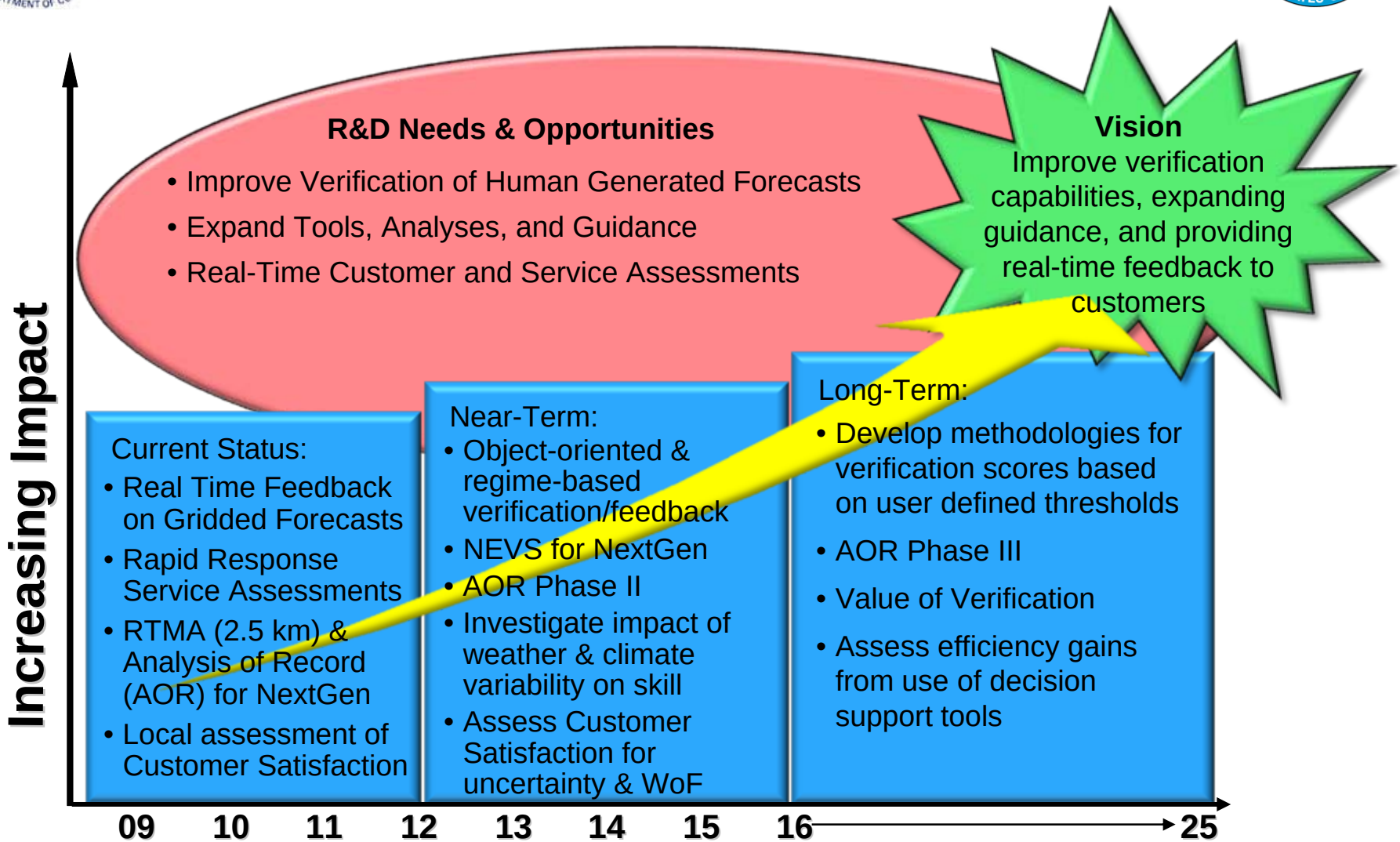
Focus Area Team Summary: DSS Tiers 1-2



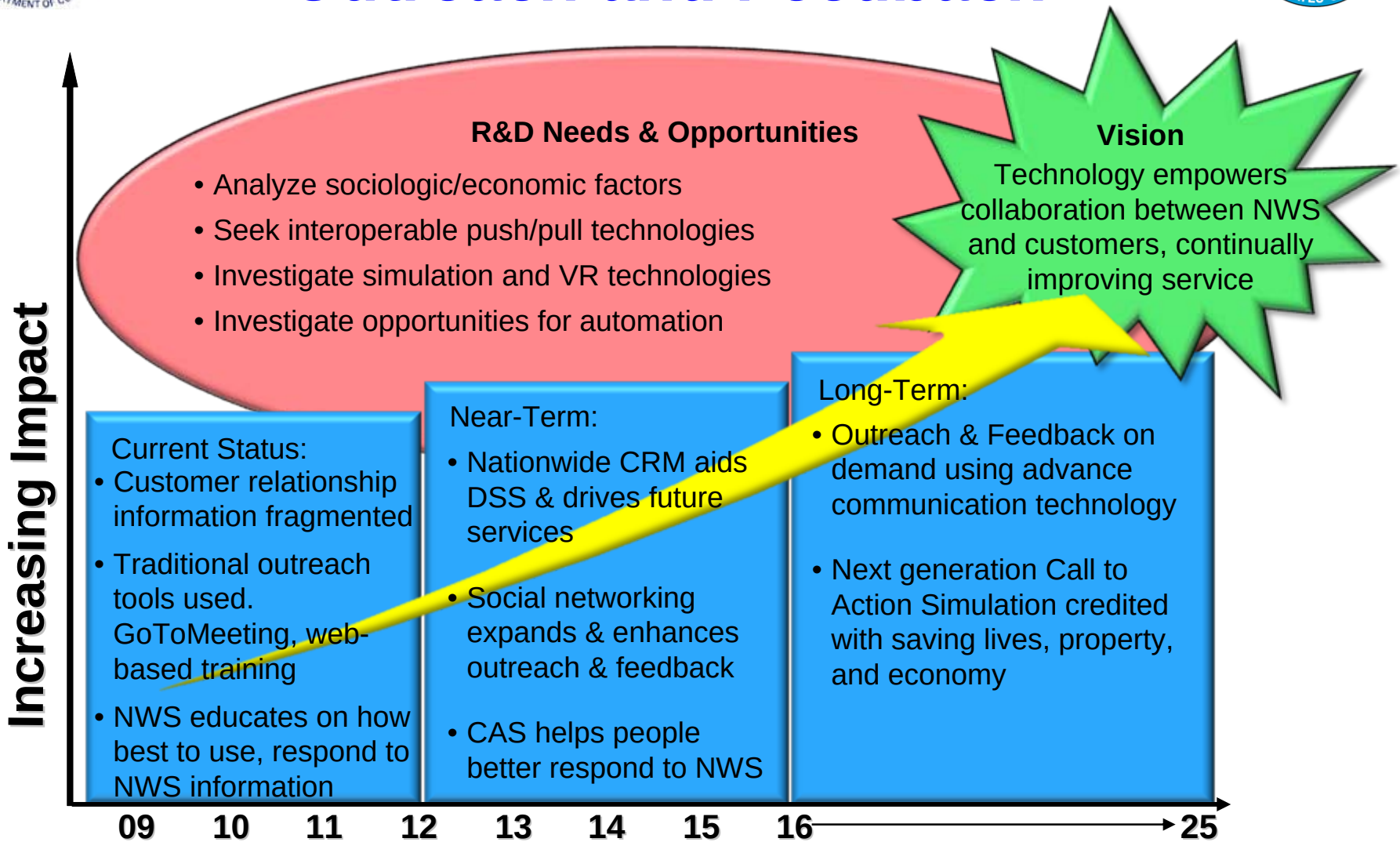
Focus Area Team Summary: DSS 3–5



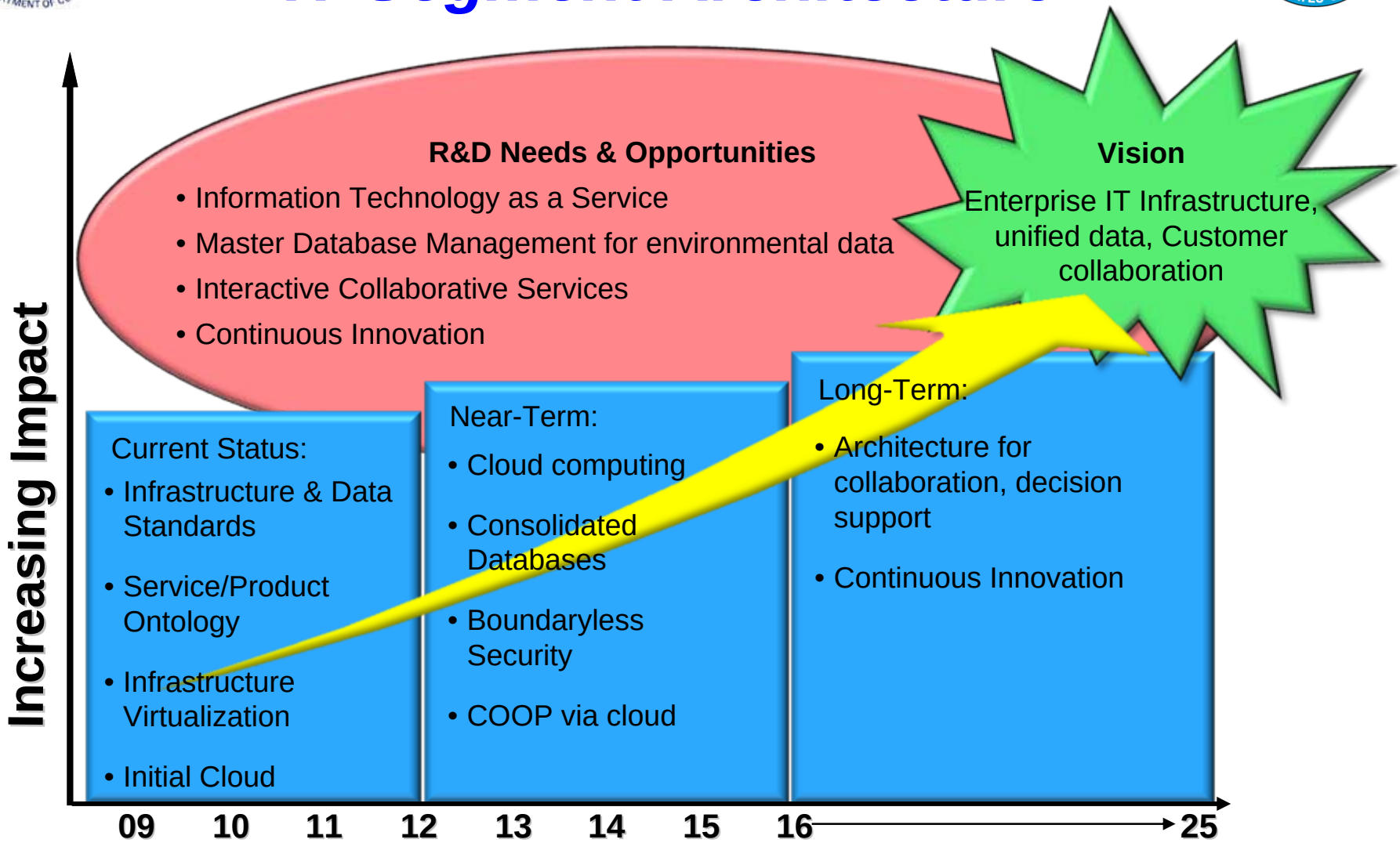
Focus Area Team Summary: Verification



Focus Area Team Summary: Outreach and Feedback



Focus Area Team Summary: IT Segment Architecture



Focus Area Team Summary: Social Science

R&D Needs & Opportunities

- Social Science Assessments to quantify impact of NWS information
- Advanced decision support system tools addressing user needs & social science aspects
- Determination/integration of efficient uncertainty/ probabilistic information into DSS

Vision

Integrate social science methodologies into NOAA's information services to evoke the most appropriate societal responses and guide investments in service improvements to maximize their value to the Nation

Increasing Impact

Current Status:

- Initial integration of social science into overall operations and mitigation activities to enhance DSS
- Improvement of situational awareness
- Initial social science performance metrics

Near-Term:

- Operational Proving Ground testing social science principles
- More training in R2O; sociological impact
- Social networking expands, enhanced outreach & feedback
- Training on uncertainty and communication of impacts

Long-Term:

- Products & services that better convey risk and uncertainty
- Increased economic productivity and efficiency
- Improved preparation/risk mitigation, response, and recovery during high impact events
- Increased trust/credibility with general public, key partners, and decision makers

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Focus Area Team Summary: Fire Weather

R&D Needs & Opportunities

- On-demand, movable, high-res integrated fire and smoke behavior model
- On-demand, indexed Red Flag WWA DSS
- Long range fire weather outlooks
- Tools for fire detection and tracking
- Analysis of social science for fire weather support

Vision

High-resolution fire weather information/services providing impact-oriented, integrated improvements of fire predictions that save lives and reduce impact to property

Increasing Impact

Current Status:

- 1-3 day Red Flag Warning
- 12-km Smoke Forecasts
- 20-km wx models
- Wx-centric data analysis
- RAWS, balloon, satellite obs

Near-Term:

- 14 day Red Flag WWA
- Fire scale, 1km, hourly fire/smoke forecasts
- 100mres 30-min, coupled fire wx & behavior forecast
- GIS, mobile system
- UAS, radar, RAWS

Long-Term:

- 90-day Red Flag WWA
- 500m fully coupled smoke behavior forecast
- 10m res fire/behavior forecast
- Mobile WFO
- Hazardous Wx observing system
- GOES-R VIIRS, Rapid Scan
- ISI fire weather outlooks

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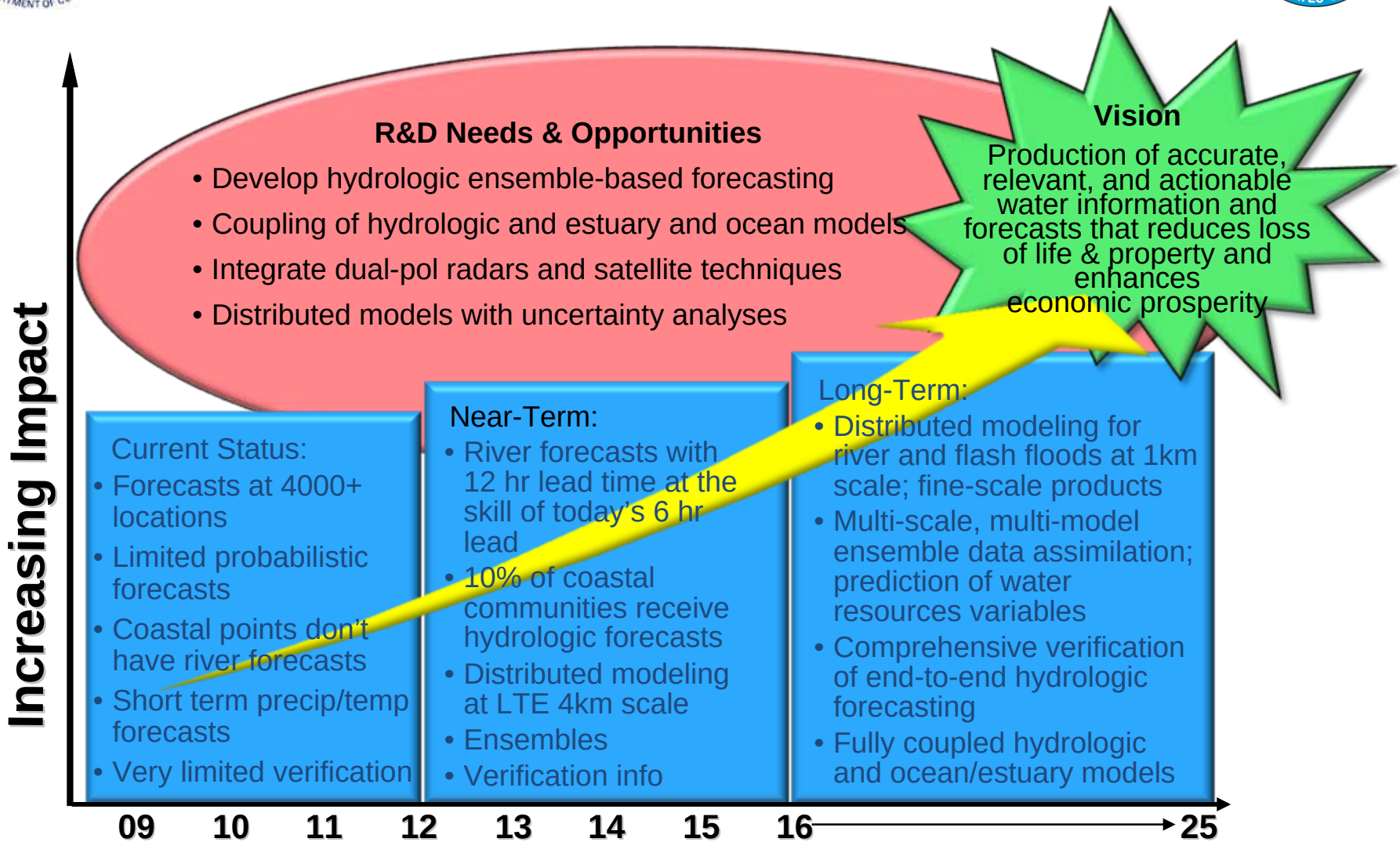
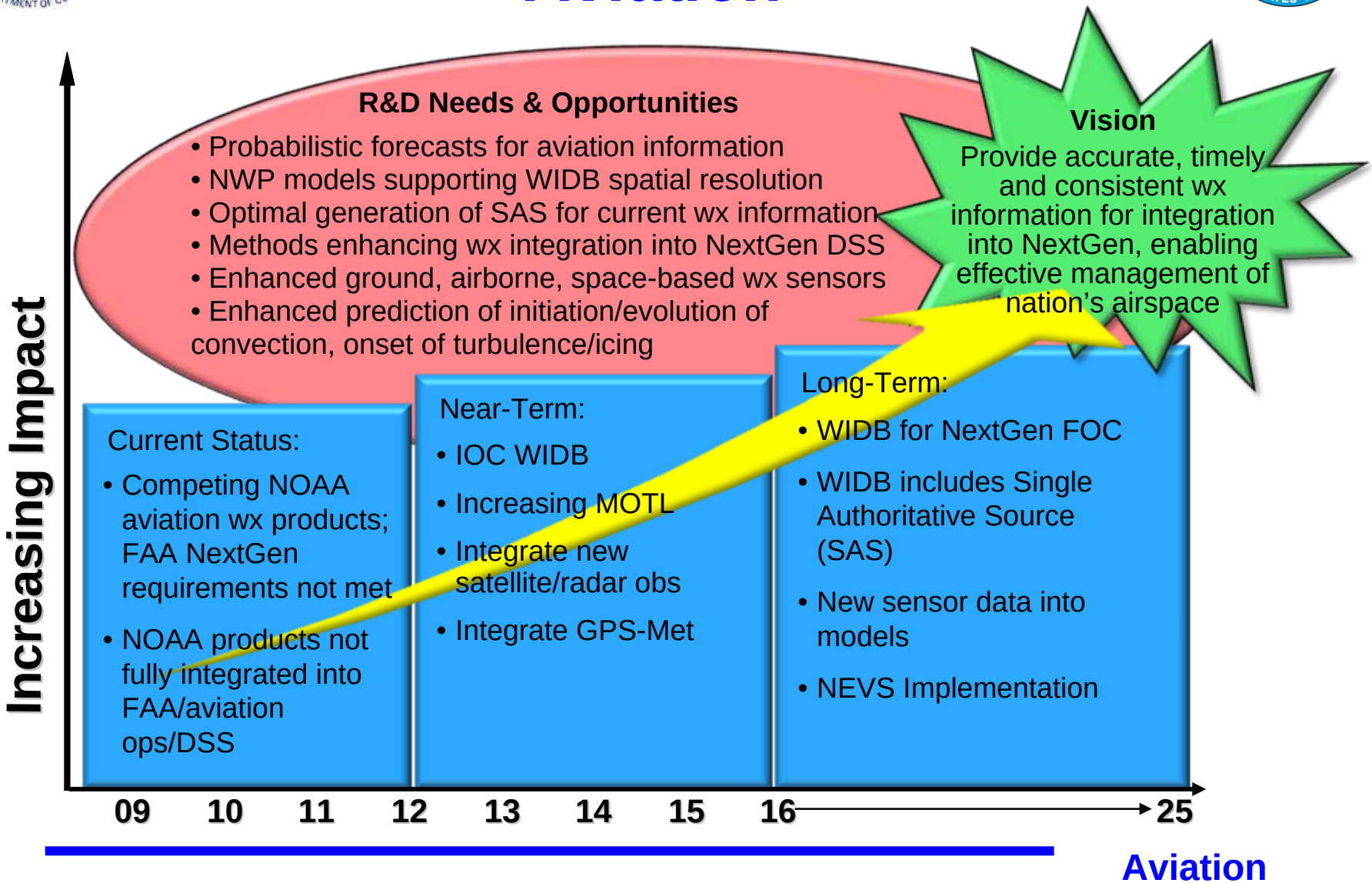
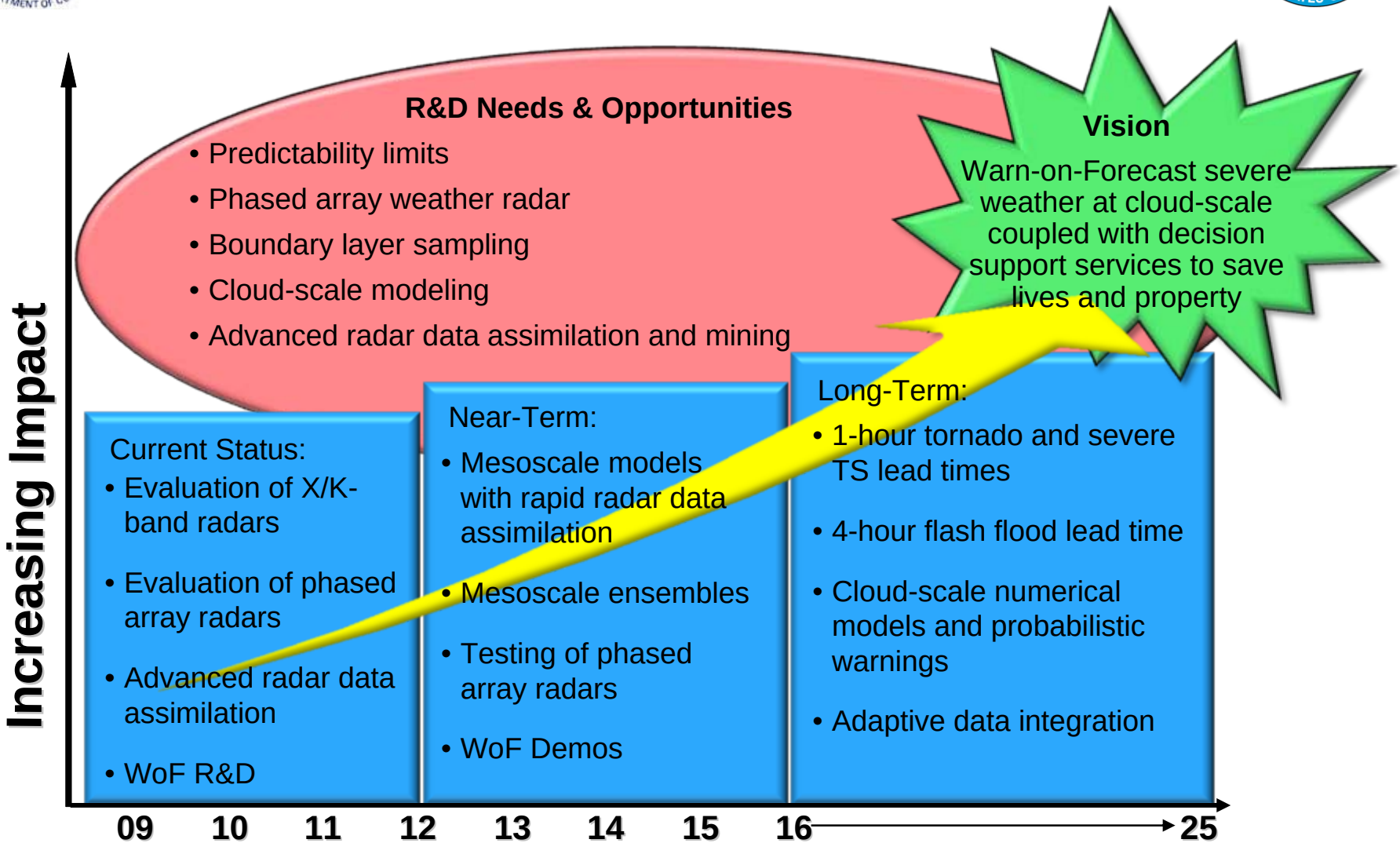
Focus Area Team Summary: Hydrology



Focus Area Team Summary: Aviation



Focus Area Team Summary: Severe Weather



Severe Wx

Focus Area Team Summary: Winter Weather

R&D Needs & Opportunities

- Advanced decision support system tools
- Specified winter wx forecasts with universal access
- Concentration on CSI and snow band formations
- Integration of multi-phase radar data
- Improved modeling to address precip types and weather/climate patterns

Vision

NWS forecasts minimize impact of winter weather on decision makers & public: saving lives, property & enhancing the nation's economy

Increasing Impact

Current Status:

- County based WWA
- Staff has strong science background/ experience
- Standardized products, Internet and media-filtered dissemination

Near-Term:

- Storm-based WWA
- Additional training in research to operations, and sociological impact
- Push relevant information to users who have need.
- User-defined criteria

Long-Term:

- No watches or warnings- detailed forecast data available
- All meteorologists have detailed understanding of winter weather impact
- Universal and customized information to all partners and customers (push/ pull)

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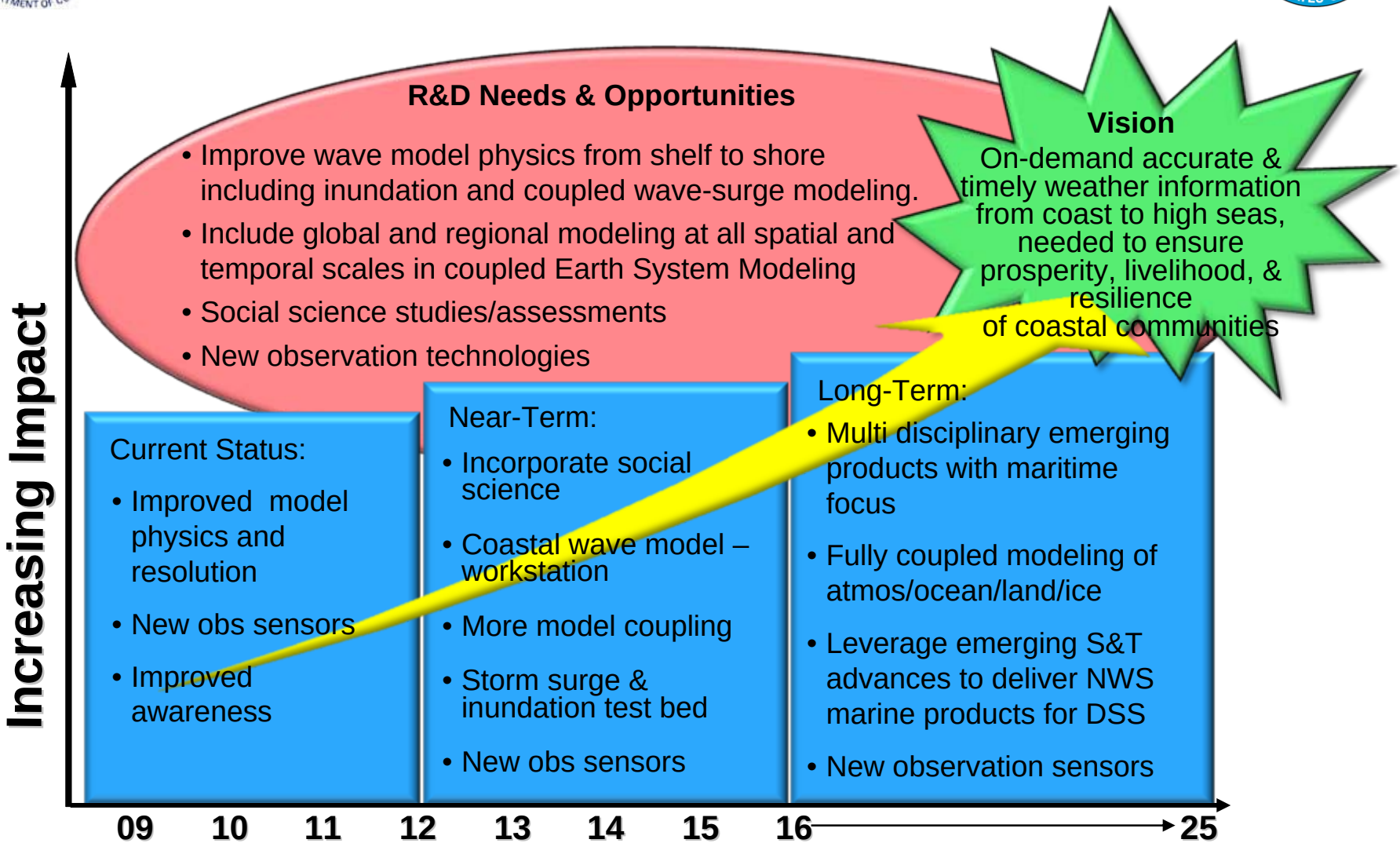
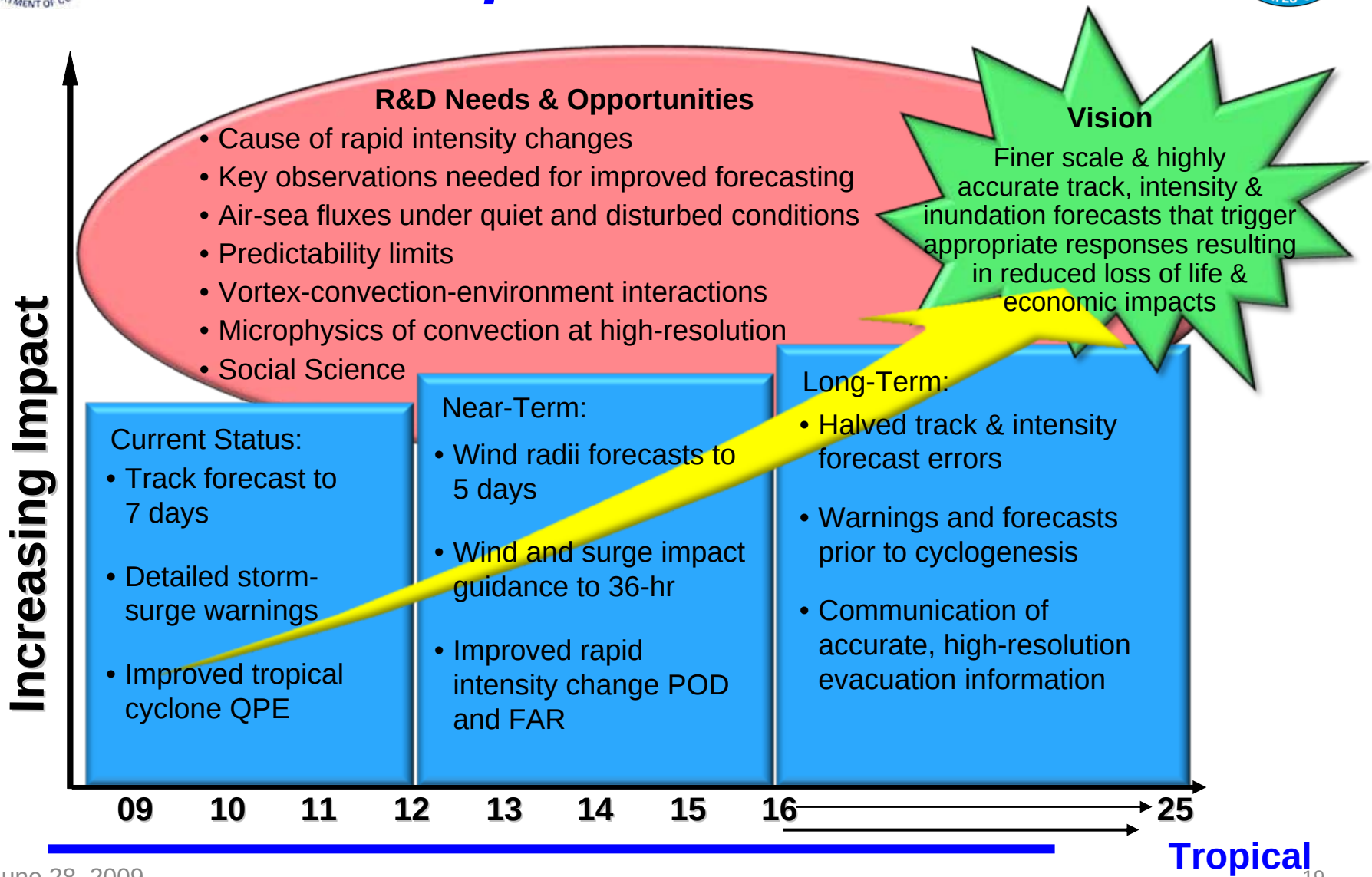
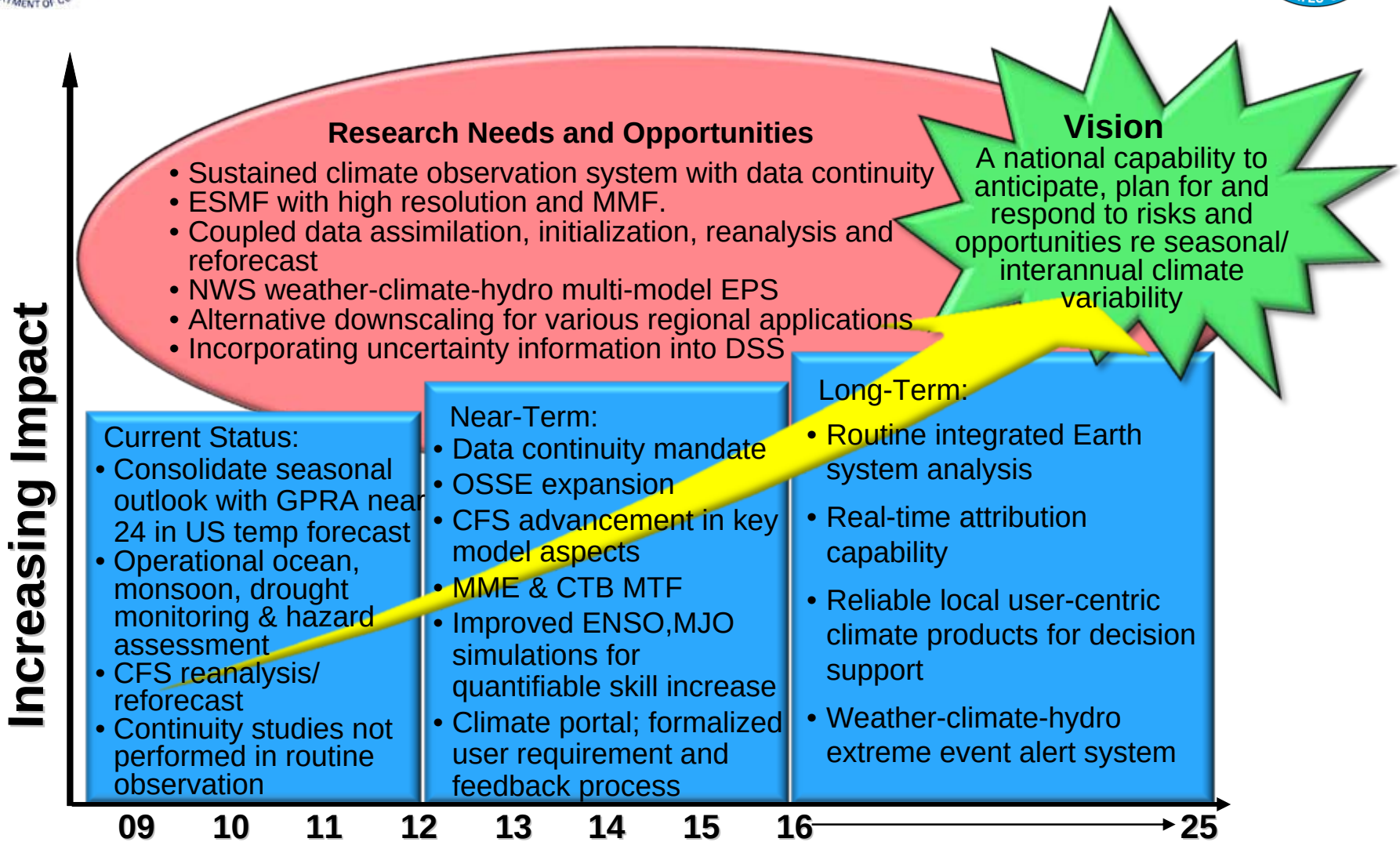
Focus Area Team Summary: Marine Services



Focus Area Team Summary: Tropical Weather

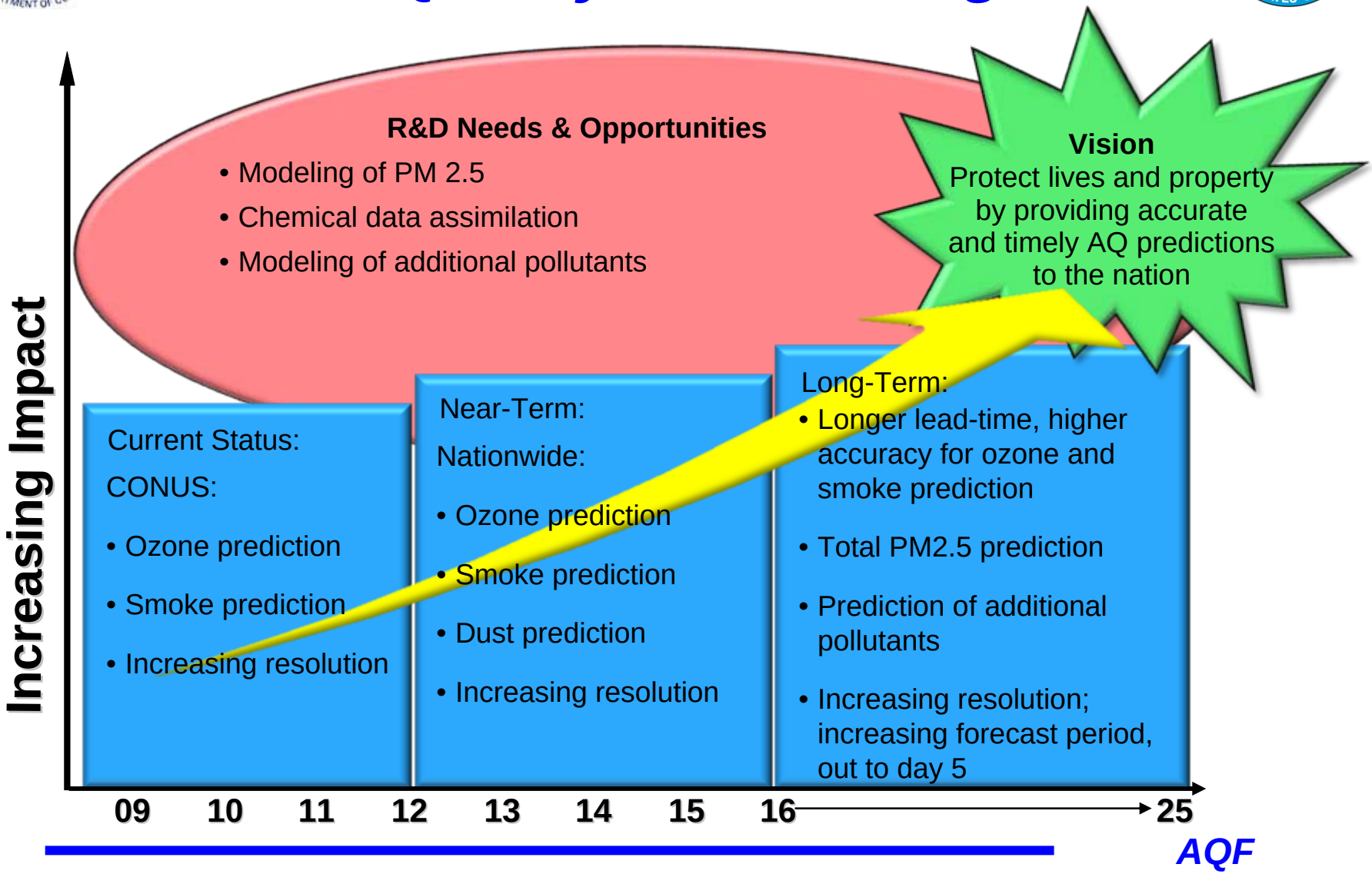


Focus Area Team Summary: Climate

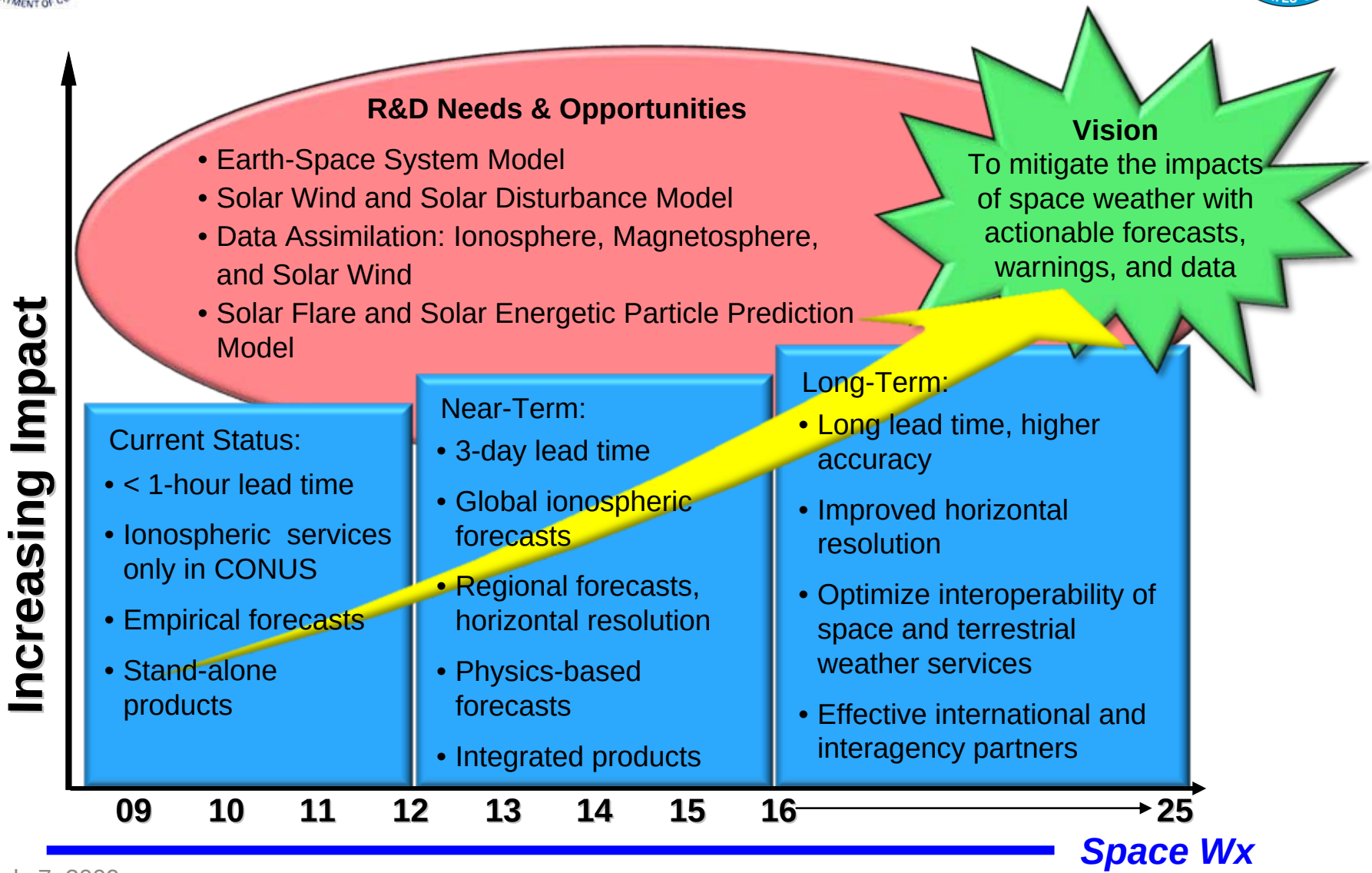


Climate

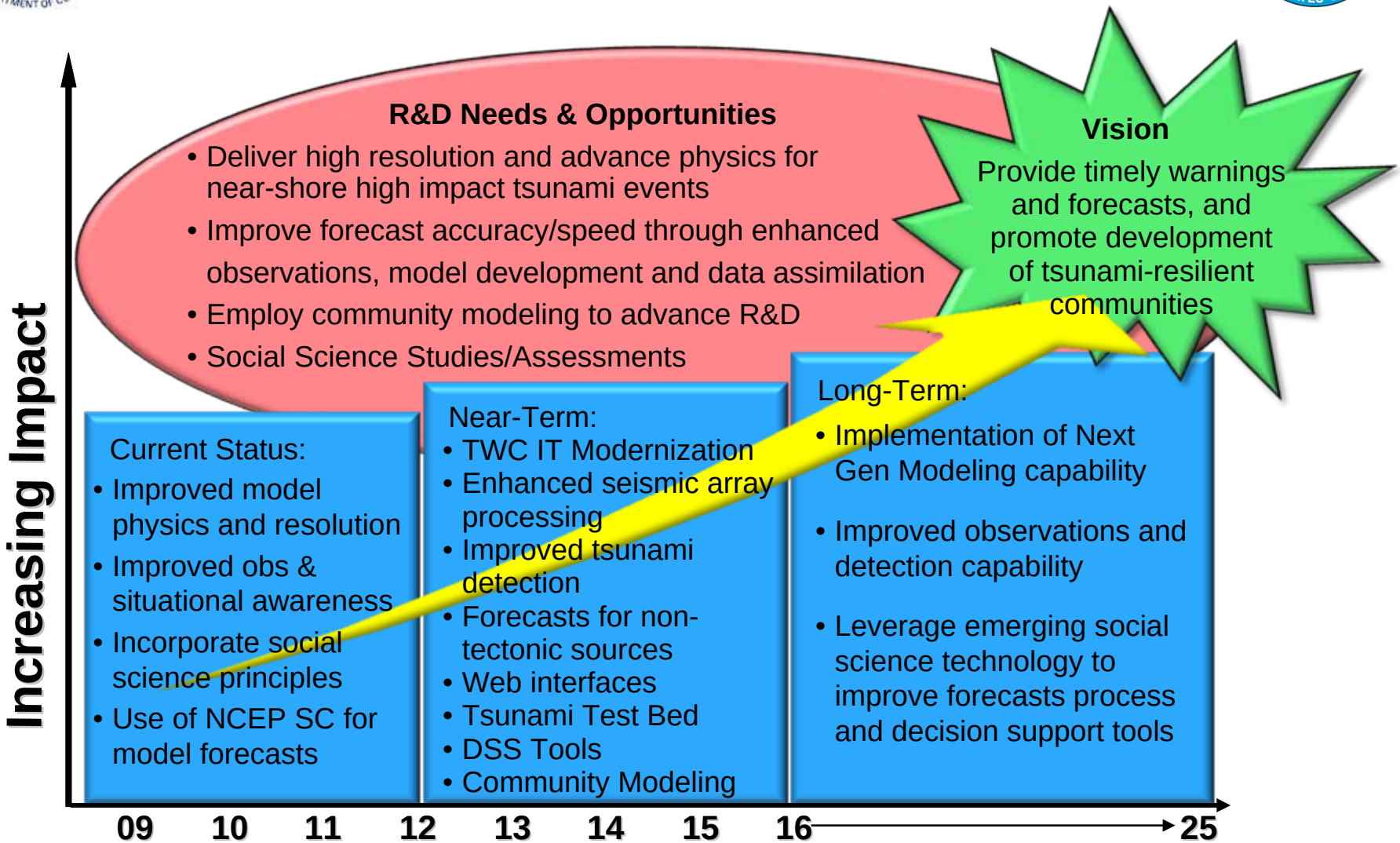
Focus Area Team Summary: Air Quality Forecasting:



Focus Area Team Summary: Space Weather



Focus Area Team Summary: Tsunami



Focus Area Team Summary: Emerging Areas

Ecology & Energy

R&D Needs & Opportunities

- Grid-based coupled physical/hydrodynamic, biogeochemical, and ecological regional earth system modeling system
- Ensemble prediction from short-term to climate scale
- Physical backbone for marine ecological and renewable energy forecasts, projections and scenarios.
- Physical and biogeochemical 4-D data assimilation

Vision
Provide the Nation's most advanced environmental forecasts, projections, and scenarios to inform and transform decision making that promotes healthy ecosystems and available energy.

Increasing Impact

Current Status:

- Limited integrated regional observations, DA, trans-disciplinary science
- Limited regional coupled numerical modeling

Near-Term:

- Prototype Chesapeake Bay and Great Lakes ecological short-term forecasts
- Prototype long-term scenario system
- Improve boundary layer winds, offshore wind-waves/tides, and solar prediction

Long-Term:

- High-resolution network-of-networks obs, coupled-model validation, DA with seamless suite of regional downscaled models
- Short-term forecasts & long-term projections of regional resource quantity & conditions
- End-to-end environmental probabilistic predictions for marine/coastal conditions & renewable resources

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Emerging Areas