



NWS Science and Technology Roadmap

Post-Processing Team



Team Composition

- **David Ruth, MDL/NWS – Team Leader**
- **Zoltan Toth, EMC/NCEP/NWS (OAR/GSD) - Team Leader**
- **Russ Schneider, SPC/NCEP/NWS - Contributor**
- **Kenneth Johnson, ER/NWS – Contributor**
- **Doug Hilderbrand, OST/NWS – Contributor**
- **Pedro Restrepo, OHD/NWS – Contributor**
- **Kathy Gilbert, OST/NWS - Contributor**

- **Acknowledgements to:**
 - Matt Peroutka, OST/NWS



Vision/Benefits/Impacts

- **Team Vision:**

- Provide reliable/skillful information on possible future environmental scenarios on all spatial/temporal scales, in multitude of formats, for use in all socio-economic decision making

- **Benefits**

- Improved ensemble-based forecast guidance for most NWS forecast operations
 - Most likely scenario
- Quantitative assessment of forecast uncertainty on all scales
 - Range of possible environmental scenarios
- Seamless ensemble guidance database
 - All forecast information derived from/consistent with database

- **Impacts:**

- Improved emergency management procedures based on quantified risks
 - Decisions to best protect life, property, & the environment in harm's way based on likelihood of various forecast scenarios
- Improved economic decisions considering all possible forecast scenarios
 - Optimal decision making to maximize efficiency related to uncertain future environmental conditions
- Weather Enterprise fully engaged with NWS forecast process
 - Research effort to quantify full impact



Goals/Targets: Customer Needs



Goal	Outstanding Issues
Reliable & skillful guidance for all relevant environmental variables	Proxy for truth/Bias correction/Downscaling/Derivation of additional variables
Ensemble scenarios consistent with Authoritative Guidance	Establish single source for forecast information



Goals/Targets: Emerging Science & Technology

Goal/Target	Outstanding Issues
Multivariate statistical post-processing methods	Ensure consistency of guidance with proxy for truth across time, space, variables
Optimal combination of information from observations and various sources of numerical guidance, incl. higher resolution unperturbed and lower resolution ensemble forecasts	Provide seamless weather, water, climate, and other environmental information on user relevant grid
High quality Real Time Mesoscale Analysis (RTMA) & Analysis of Record (AOR)	Combination of quality controlled observational & short range numerical forecast information with uncertainty estimates possibly in form of ensemble
Enhance guidance with reanalysis/hind-cast information	Improve guidance for high impact, extreme events



Key Information Gaps

Gap	Solution Alternative	Impact
1. Improve statistical methods	1.1 Multi-variate calibration, combining info from multiple sources	Seamless guidance across space and time scales & variables
2. Generate representative sample	2.1 Generation of reanalysis & hind-cast data	Improved guidance for high impact & extreme events
3. Improve ensembles	3.1 Generation of improved ensemble content, resolution	Improved quantification forecast uncertainty
4. Data mining/interrogation/manipulation tools	4.1 Develop unified software package	Access/display/modify forecast guidance data
5. Training	5.1 Develop/maintain training modules with forecaster input	Empower workforce to utilize/interpret new guidance data
6. Storage of & access to guidance database	6.1 Build on emerging Information Technology opportunities	Distribution of comprehensive guidance database
7. Analysis of Record	7.1 Execute RTMA in delayed and also in reanalysis mode	Same reference for truth used in calibration and verification



Research Needs and Opportunities



- **Short-term**
 - Bias correction method development
 - Derived variables/downscaling methods
 - Collection/generation of representative sample
- **Long-term**
 - Multi-variate calibration methods
 - Optimal methods for fusing information from multiple sources
 - High-resolution observationally based analysis
- **Additional outstanding research needed**
 - Needs & opportunities wrt convective-scale forecasting
 - Real time extraction & pre-processing of information



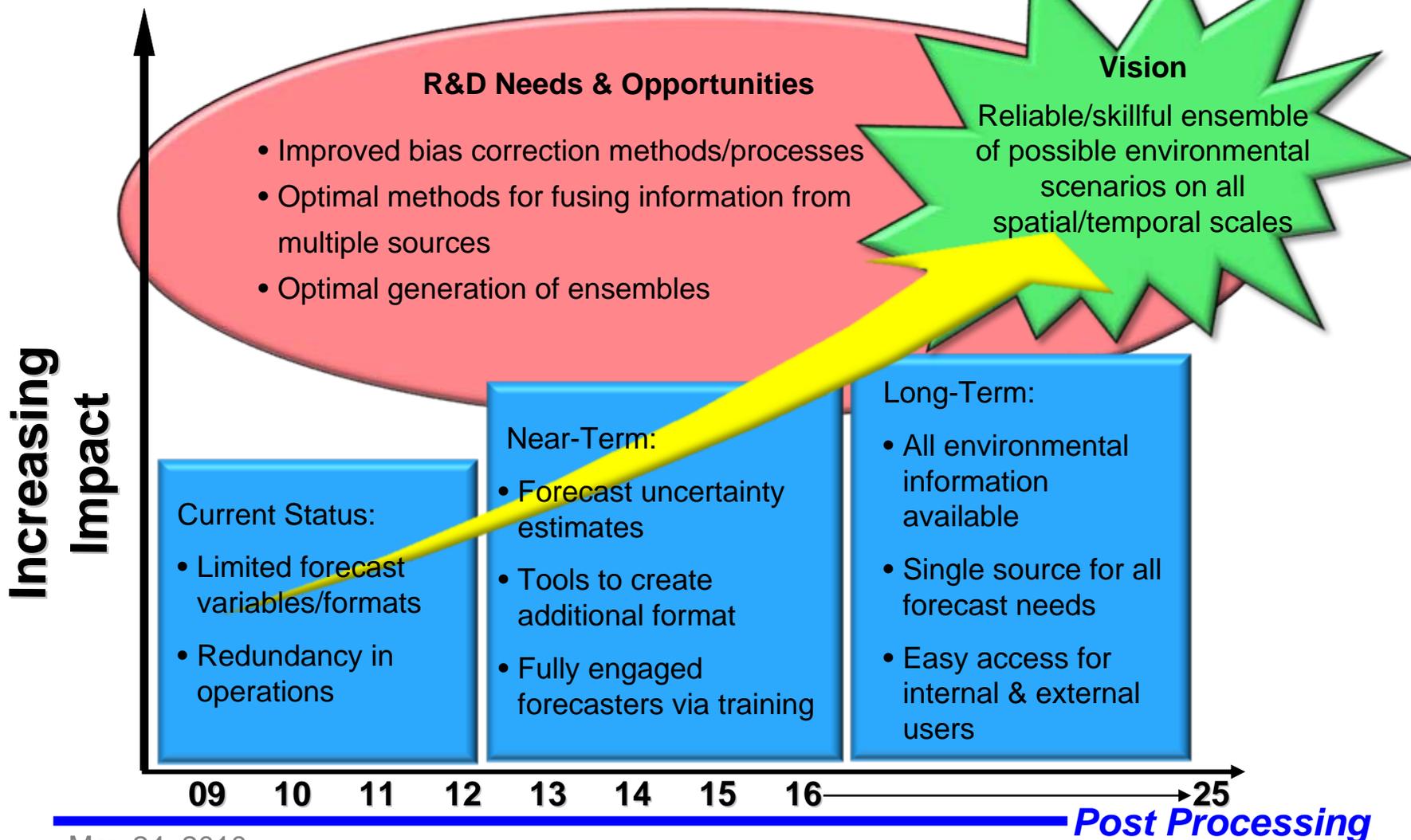
Enabling Capability Linkage Issues



- **Forecast uncertainty program**
 - Overall planning/coordination
- **EMP**
 - Analysis of observations for AOR
 - Observing system needs for AOR
- **Decision Support Services**
- **Verification/Metrics**
- **ACUF**
 - Outreach to enterprise regarding external requirements
- **CIO**
 - IT planning for storage, data flow, etc



Focus Area Team Summary: Post-Processing





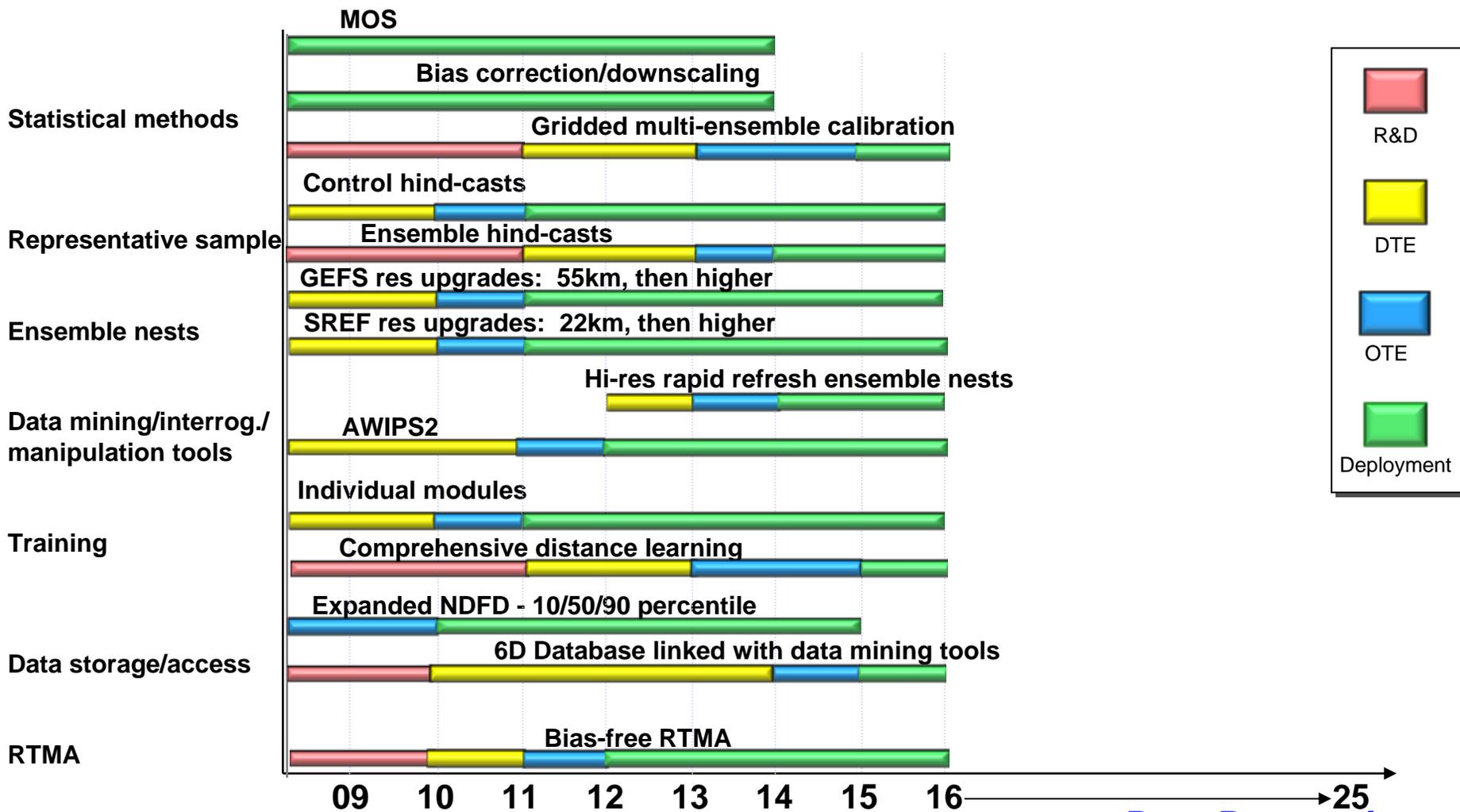
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Post-Processing Team Additional Information



Post-processing Alternative Solutions

Improvements implemented on continuing basis



Post Processing



Targeted Performance Measures: Post Processing



Proposed	Current (2009)	FY 2016 Target Example	FY 2025 Target Example
QUALITY MEASURES			
Potential Economic Value (POV) for user relevant variables (TBD)	TBD	10% increase	20% increase
Continuous Rank Probability Skill Score for user relevant variables	TBD	5% increase	10% increase
MEASURES RELATED TO UTILITY			
Spatial & temporal resolution of ensemble/probabilistic guidance	5km	2.5 km	1 km
Number of user relevant variables	4	50	200