Building Trust
by Sharing Air Quality Data

Presentation to MBN

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Set Up for Conflict

	Roles and Mandates
BLM	develop federal minerals, manage wilderness
FS	develop federal minerals, protect air quality related values in Class 1 airsheds, manage wilderness
NPS	protect air quality related values in Class 1 airsheds, manage wilderness, manage parks
EPA	oversee NEPA, protect the environment

Mandatory Class I Areas

FS was angry at BLM and EPA

NPS was angry at BLM and FS

FWS was angry at FS and BLM

EPA was angry at BLM and FS

BLM was angry at everyone

Environmentalists were angry at everyone too, but for different reasons

Industry was angry at EPA and at BLM about the slow pace of NEPA and permitting, and the uncertainties

BLM and FS start losing court cases

We didn't fully trust each other ⬅➡ communication wasn't great

Combustion at end-use

Drilling , pads, equipment

Flaring

Compression

Processing, dehydration, transport

Road dust

Pace and scale

Industrializing rural landscapes

Federal Land Managers Tasked to:

Develop federal minerals, lease to industry, complete NEPA EISs, EAs, and APDs <u>quickly</u>

Develop domestic energy, boost industry

Protect the environment

Manage lands according to rules and regs

Energy development, and the growth in emissions and activities over a broad area, complicates air quality management for FLMs and regulatory agencies.

Air quality assessments historically were focused on local issues

Agencies (and industry) spending $millions for isolated air quality analyses – duplicative and of limited utility, not consistent

Pace of development created a need for comprehensive cumulative effects air quality analyses in the Rocky Mountain West
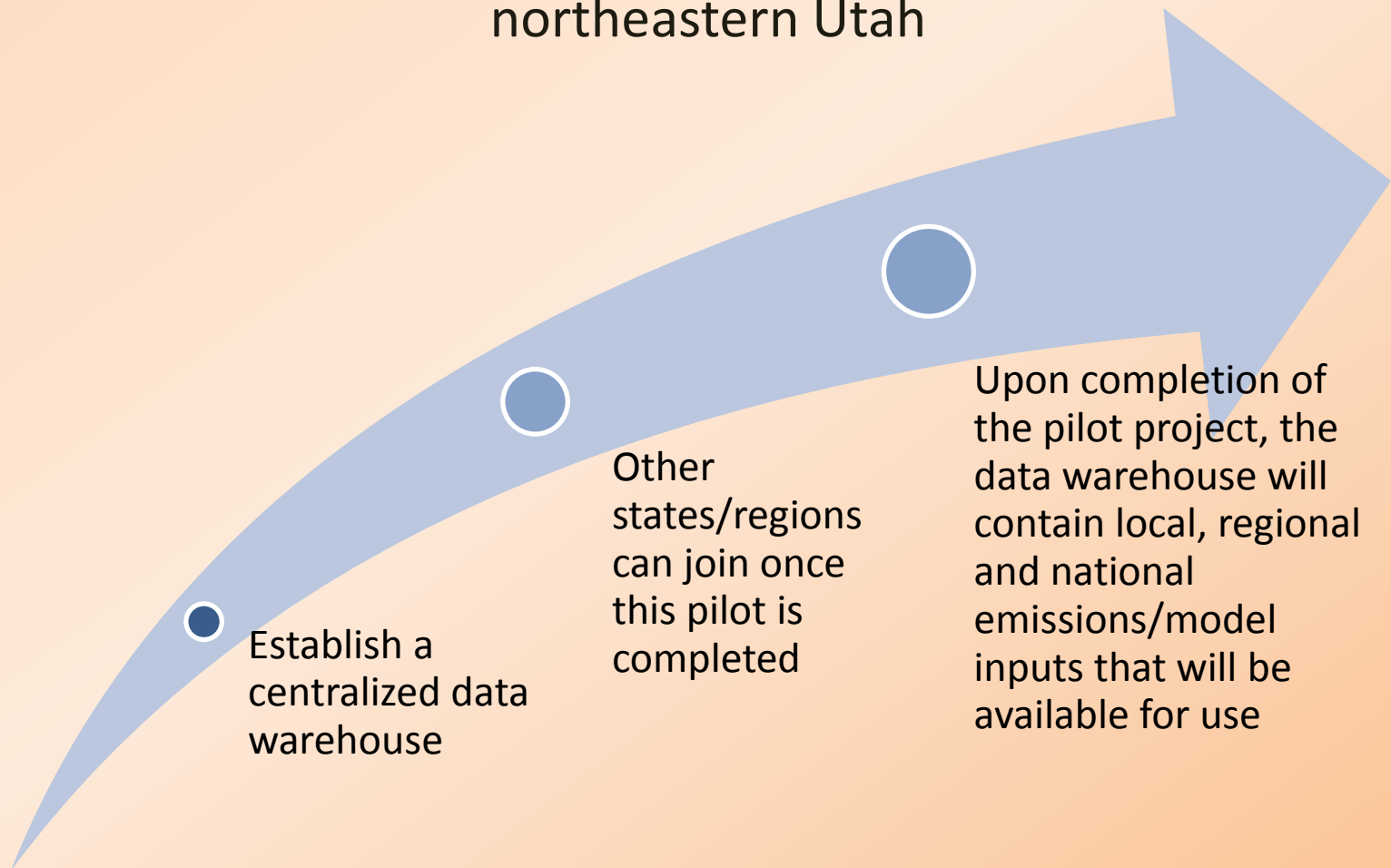
- Need to establish a credible baseline for future air quality estimates
- Can serve as the basis for planning, SIPs, and NEPA analyses

We Agree to do a "Pilot Project"

o **To address these issues:**

  ✓ **Establish a "data warehouse"** for storing, managing and sharing data among state/federal agencies and their contractors

  ✓ **Improve the region's ambient air monitoring network** that can be used to establish present day air quality levels, track air quality trends over time, and is integrated to future air quality modeling efforts

  ✓ **Perform regional scale cumulative effects modeling**

Pilot Project

The regional pilot project will focus on the oil and gas development areas of northwestern Colorado, southwestern Wyoming and northeastern Utah

Establish a centralized data warehouse

Other states/regions can join once this pilot is completed

Upon completion of the pilot project, the data warehouse will contain local, regional and national emissions/model inputs that will be available for use

Pilot Study - Benefits

Coordinated effort to reduce redundancy and save money over the long term

Data warehouse to serve as a centralized "one stop shop" for information for all agencies

Monitoring improvements will help establish baseline conditions and track trends over time

Cumulative effects modeling will provide regionally consistent baseline for future projections

Projections of future conditions then become possible to inform NEPA, SIP and general planning processes
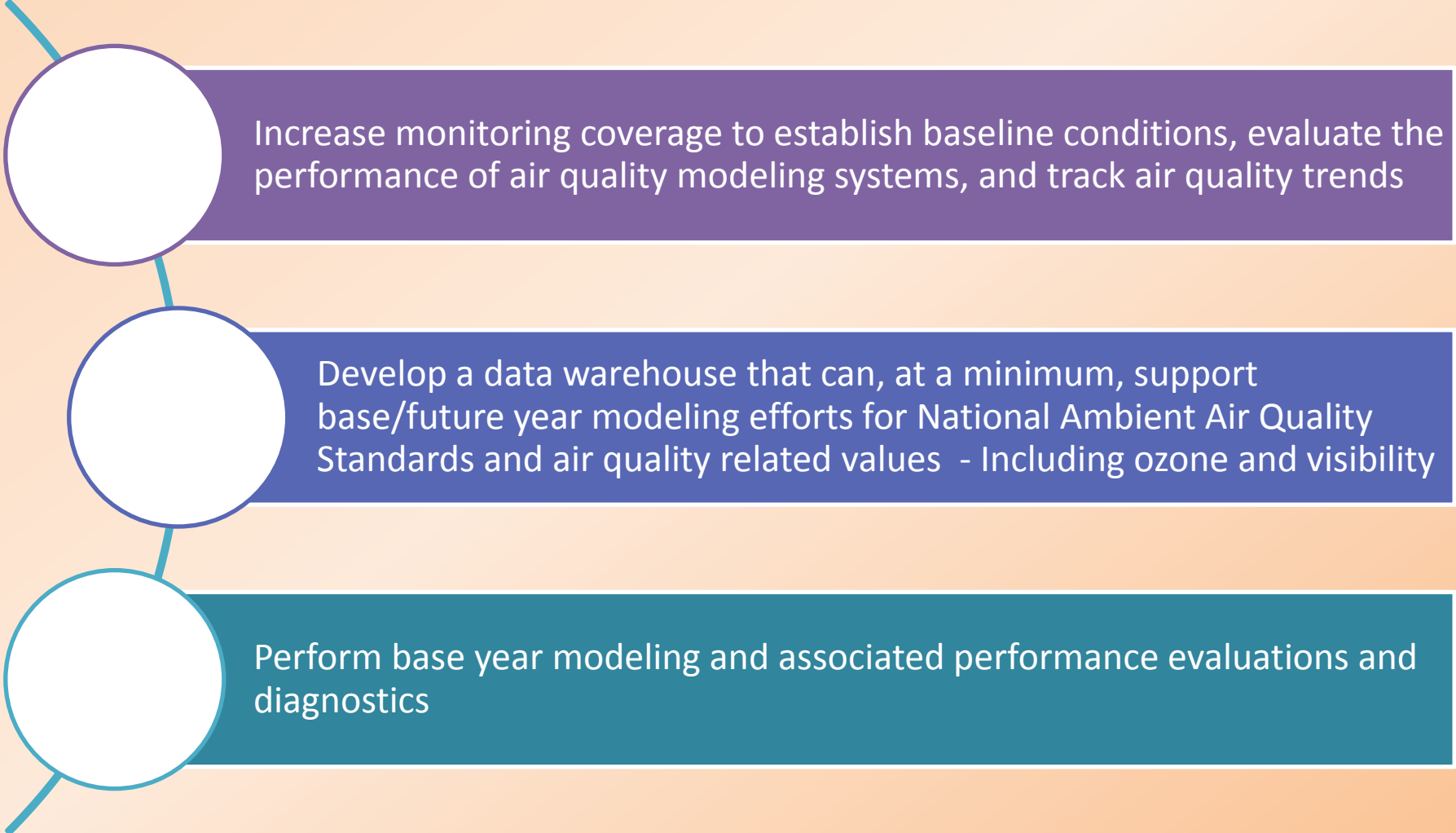
Agree to Guiding Principles
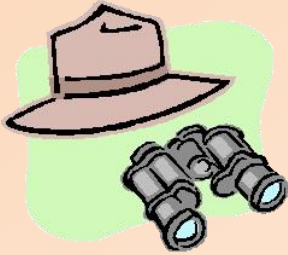
- **All must agree to participate** by supplying all of their data to a modeling center/data warehouse.

- Primary purpose is **information sharing and use** of consistent information across agencies.

– Ideally, Land management agencies would agree to use data for NEPA analysis; States would agree to use information for air quality planning

– Seek consensus on what type of analyses should be done or how results might be interpreted

– All participants reserve the right to participate in the process after the analysis - i.e. comment on SIPs, EISs or other projects.

Pilot Study Components

Increase monitoring coverage to establish baseline conditions, evaluate the performance of air quality modeling systems, and track air quality trends

Develop a data warehouse that can, at a minimum, support base/future year modeling efforts for National Ambient Air Quality Standards and air quality related values - Including ozone and visibility
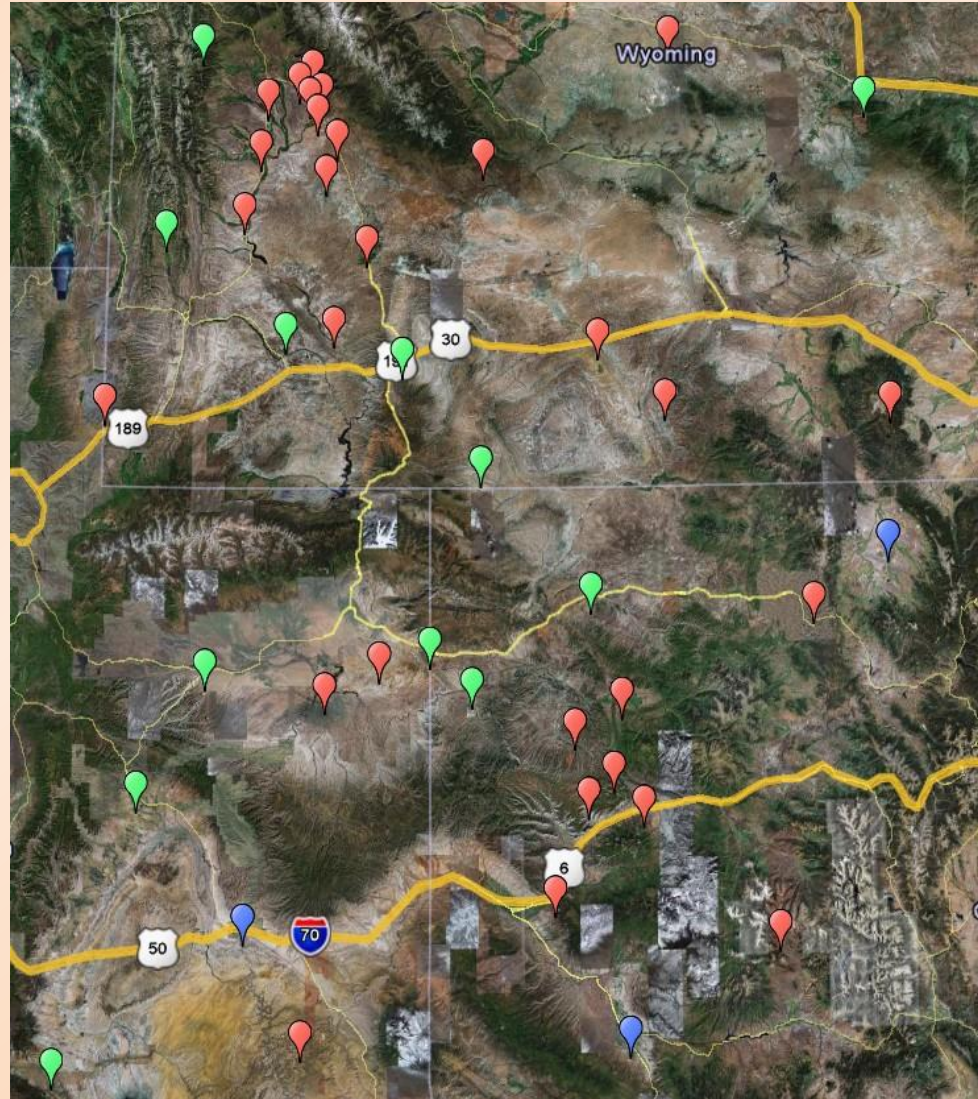
Perform base year modeling and associated performance evaluations and diagnostics

Ozone Monitoring in Study Area
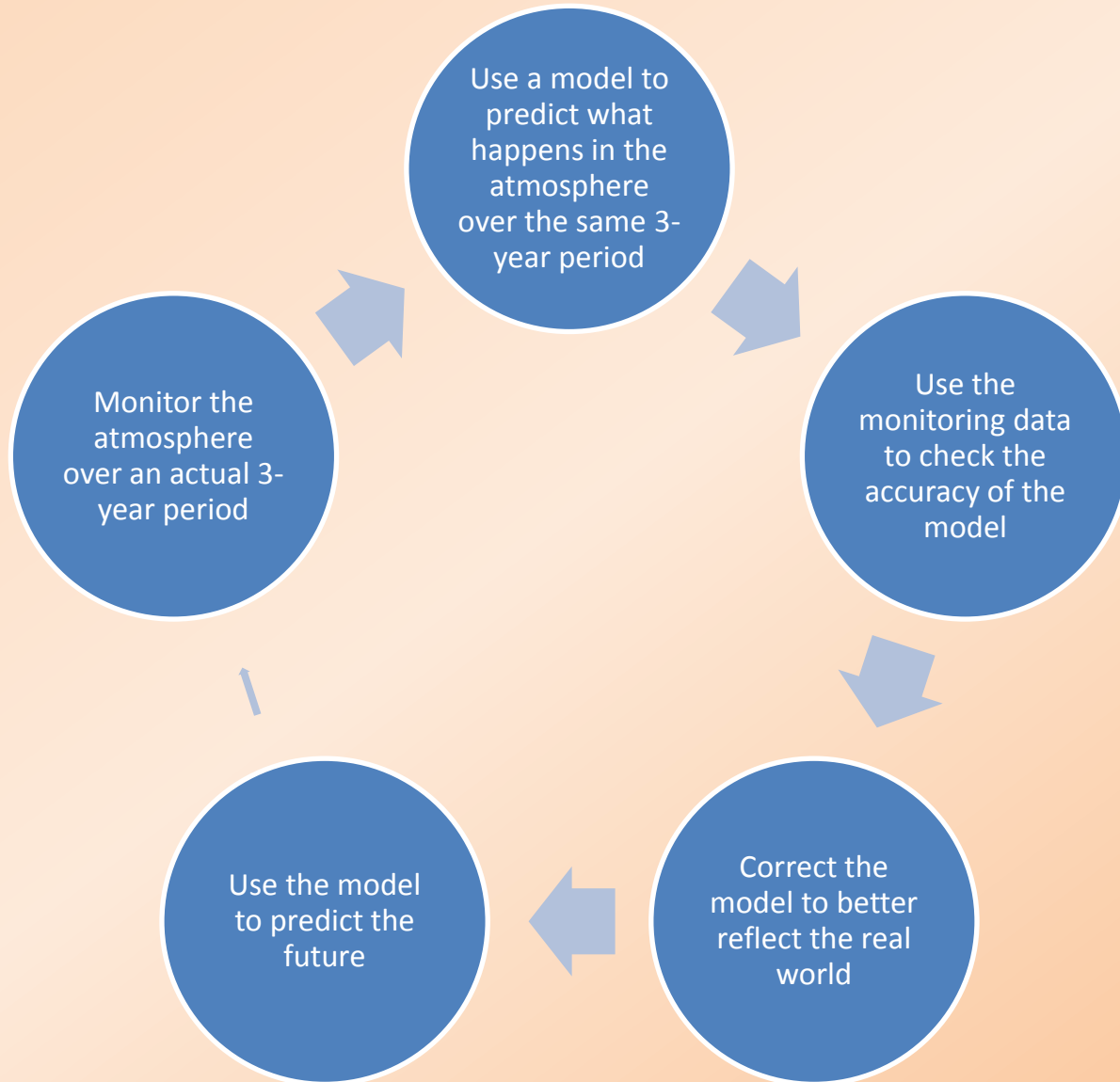
Red balloon = existing sites

Green balloon = proposed minimum additional sites for adequate network

Blue balloon = proposed ideal additional sites for robust network

The Monitoring / Modeling Connection

Monitoring is also used for real-time decision-making (adaptive management)

Use a model to predict what happens in the atmosphere over the same 3-year period

Use the monitoring data to check the accuracy of the model

Correct the model to better reflect the real world

Use the model to predict the future

Monitor the atmosphere over an actual 3-year period

| NPS | USFS | BLM | EPA | Colorado | Utah | Wyoming |

Guidance, Requirements, Feedback, Funding

NPS — WGA — CIRA

Architecture, Design, Implementation, Management, and Operation

Monitored
- Aerosol
- Deposition
- Gaseous

AQS, VIEWS

Modeled
- Emissions
- Met
- Air Quality

WestJump, future modeling, etc

3SDW

Website — Raw Data
FTP Site — Tools
Services — Documents
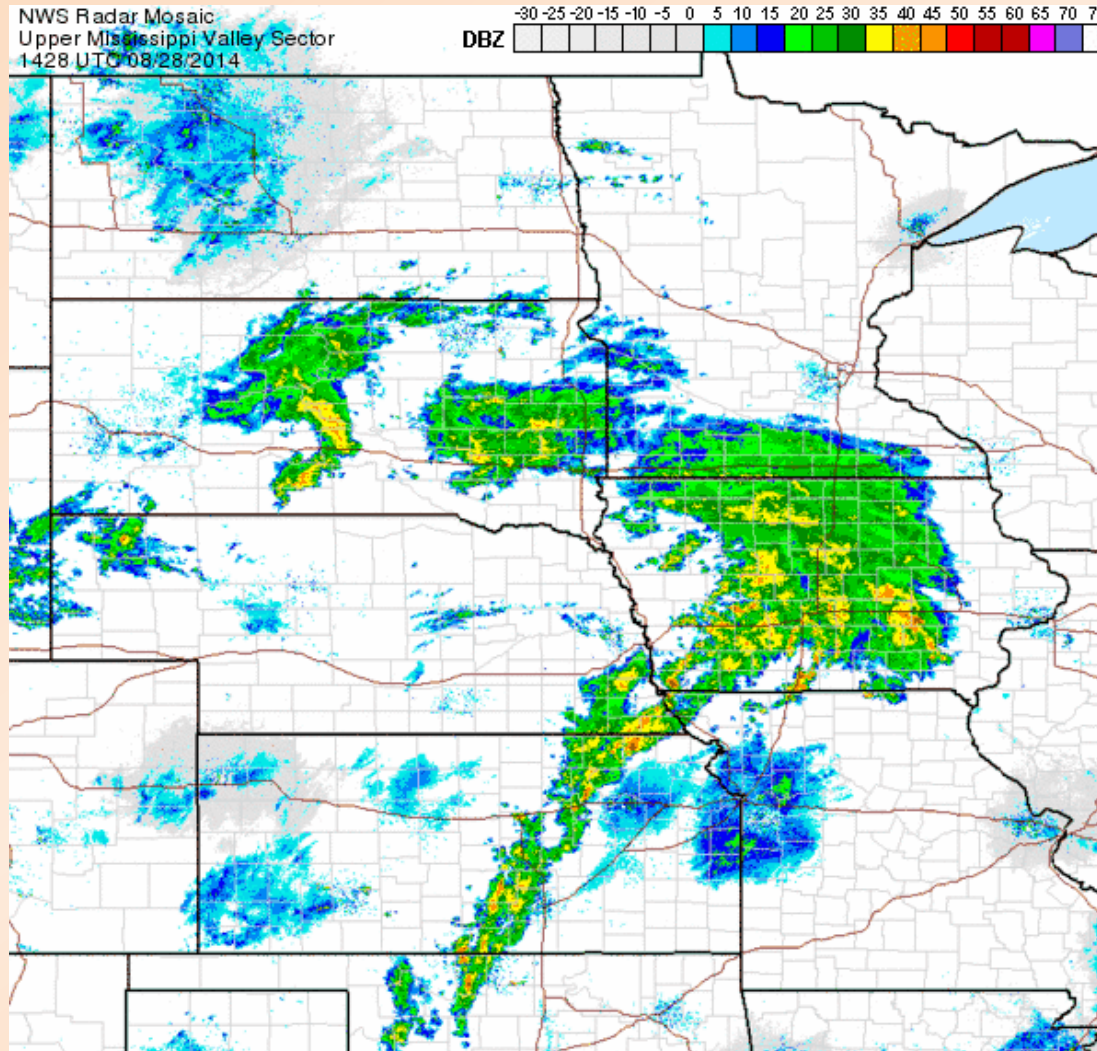Database — Results

Modelers
Planners
Managers

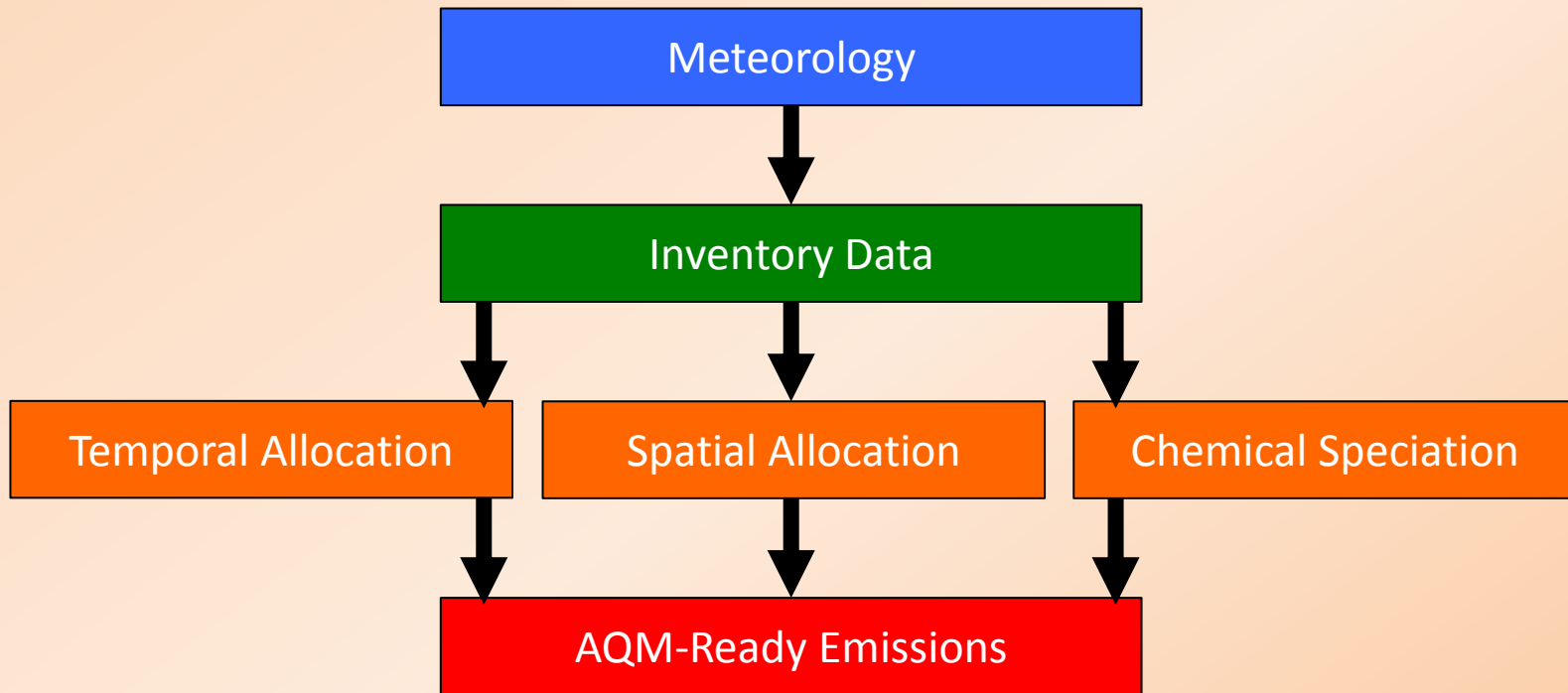| Acquisition	Integration	Management	Distribution	Presentation
Identification, Acquisition, Pre- and Post-processing, Extraction	Verification, Validation, QA/QC, Mapping, Flagging, Tranformation	Storage, Backup, Restore, Security, Summarizing, Statistics	Searching, Querying, Filtering, Aggregating, Formatting, Packaging	Charting, Graphing, Mapping, Analyzing

3 years of hourly weather data CONUS

# Pollutant Sources, Transport, Transformation, Deposition, and Effects

Winds

Transport / Transformation

Legend

fires sources
(nitrogen oxides) pollutants
lakes affected areas
[acidification] effects
Deposition atmospheric action

clouds
[acid rain, snow, fog]

Gas and Particulate Emissions

Dry Deposition (particles)

Wet Deposition (rain, snow)

Deposition (wet and dry)

volcanoes and other area sources
(sulfur dioxide, nitrogen oxides)

lightning
(nitrogen oxides)

industry, power plants
(sulfur dioxide, nitrogen oxides, mercury)

snow pack
[episodic acidification]

fires
(organic carbon)

urban **and mobile sources**
(volatile organic carbon, nitrogen oxides)

views
[dimished]

stream

alpine lake

Effects

alpine tundra

livestock
(ammonia, amines)

lakes
[acidification of surface waters]

forests, vegetation, soils
(ammonia, nitrogen oxides)
[ozone and acid damage to soils and forests, leaching of mercury and heavy metals]

subalpine forests

mobile sources
(volatile organic carbon, nitrogen oxides)

oil and gas production
(nitrogen oxides)

fish and birds
[mercury and acid exposure, loss of aquatic and other wildlife]

river

visitors
[particulates: respiratory effects; toxins (mercury): nervous system, kidney, and brain function effects]

fertilizer
(ammonia)

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Emissions Data and
3SDW Improvement Priorities

Emissions processing schematic

Emissions Data Refinements:
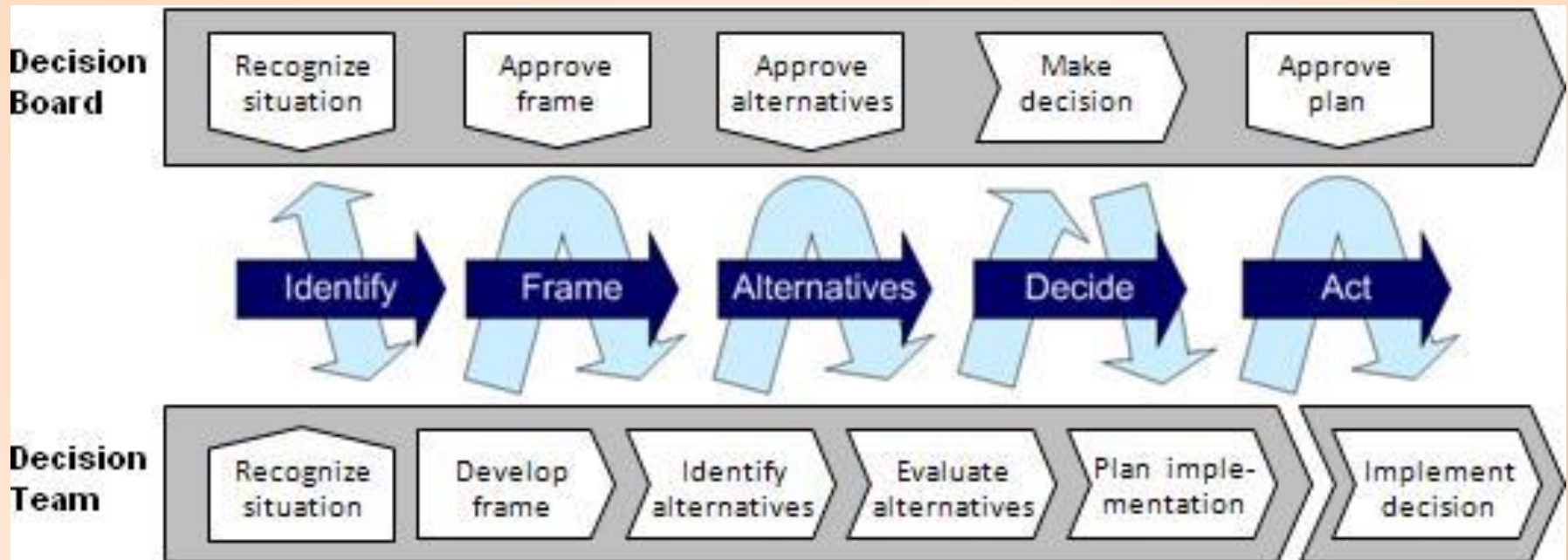## Spatial Allocation
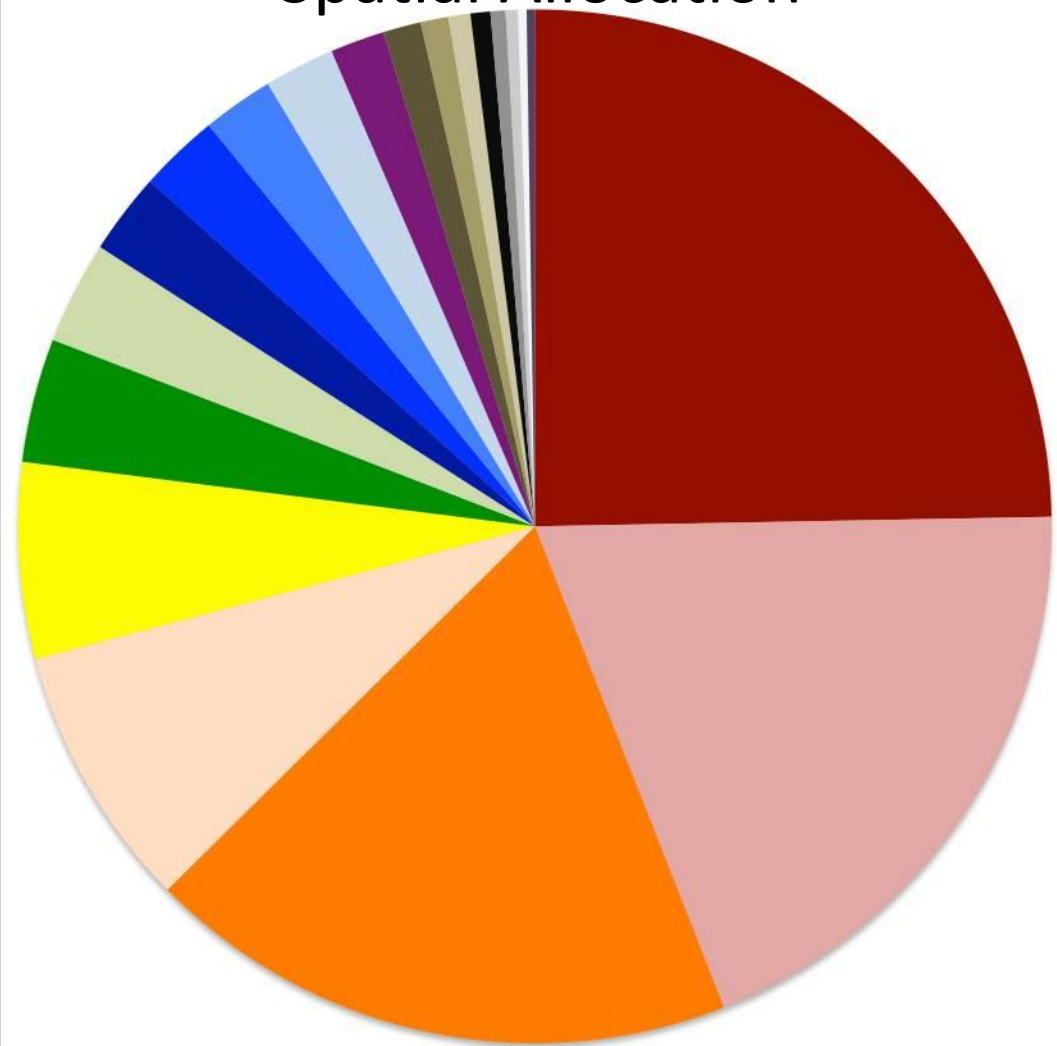
Legend:
- Spud count
- Rural Primary Road Miles
- Well count - all wells
- Urban Primary Road Miles
- Class 1 Railroad Miles
- Population
- Rural Population
- Housing Change and Population
- Rural Secondary Road Miles
- Urban Secondary Road Miles
- Urban Primary plus Rural Primary
- Urban Population
- Residential Heating - Natural Gas
- Total Agriculture
- Rural Land Area
- Industrial Land
- Commercial plus Industrial
- Commercial plus Industrial plus Institutional
- Residential Heating - LP Gas
- Class 2 and 3 Railroad Miles

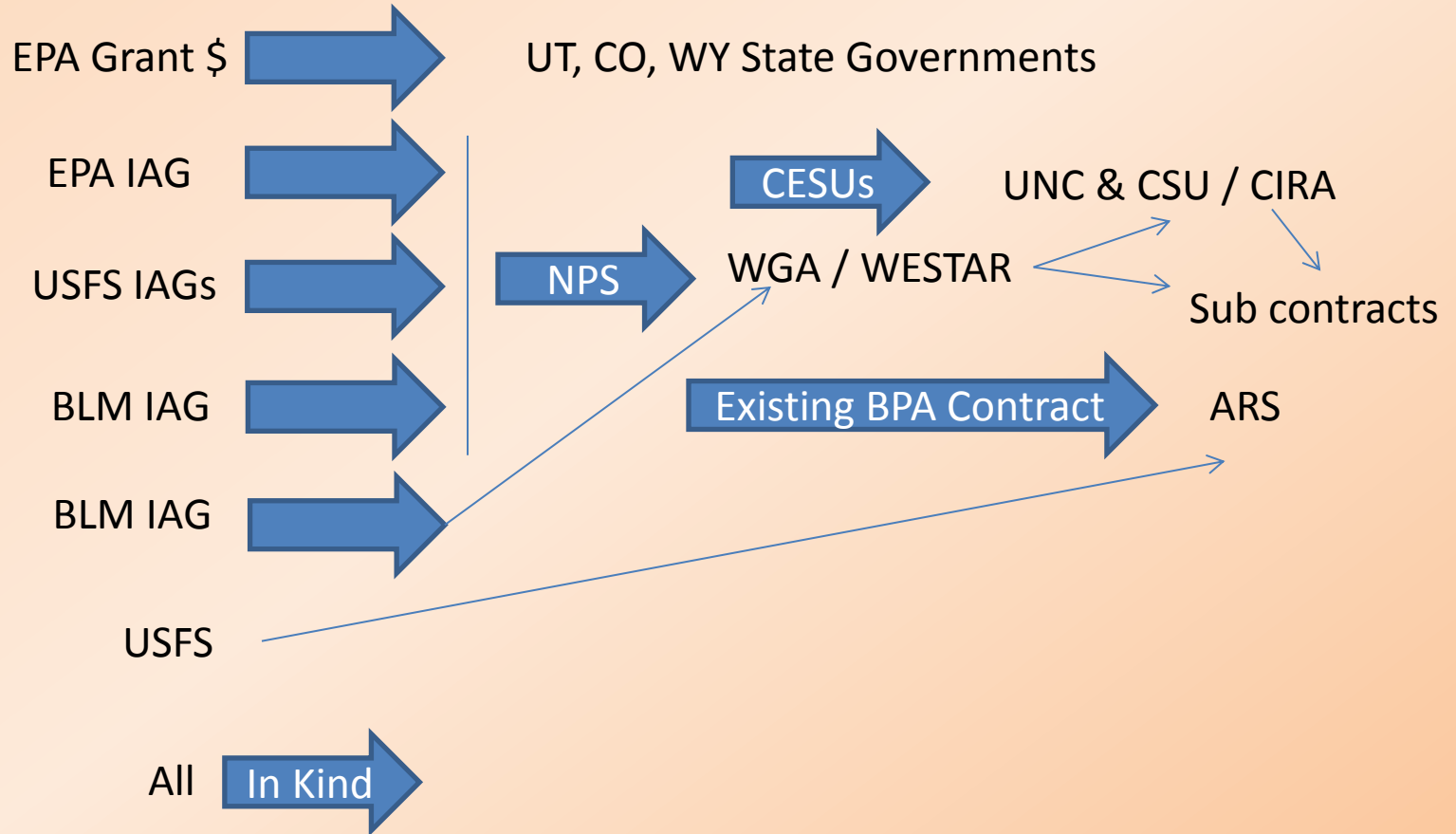Weld County, CO – Spatial Surrogates for Total Anthropogenic NOx Emissions

Organization Structure
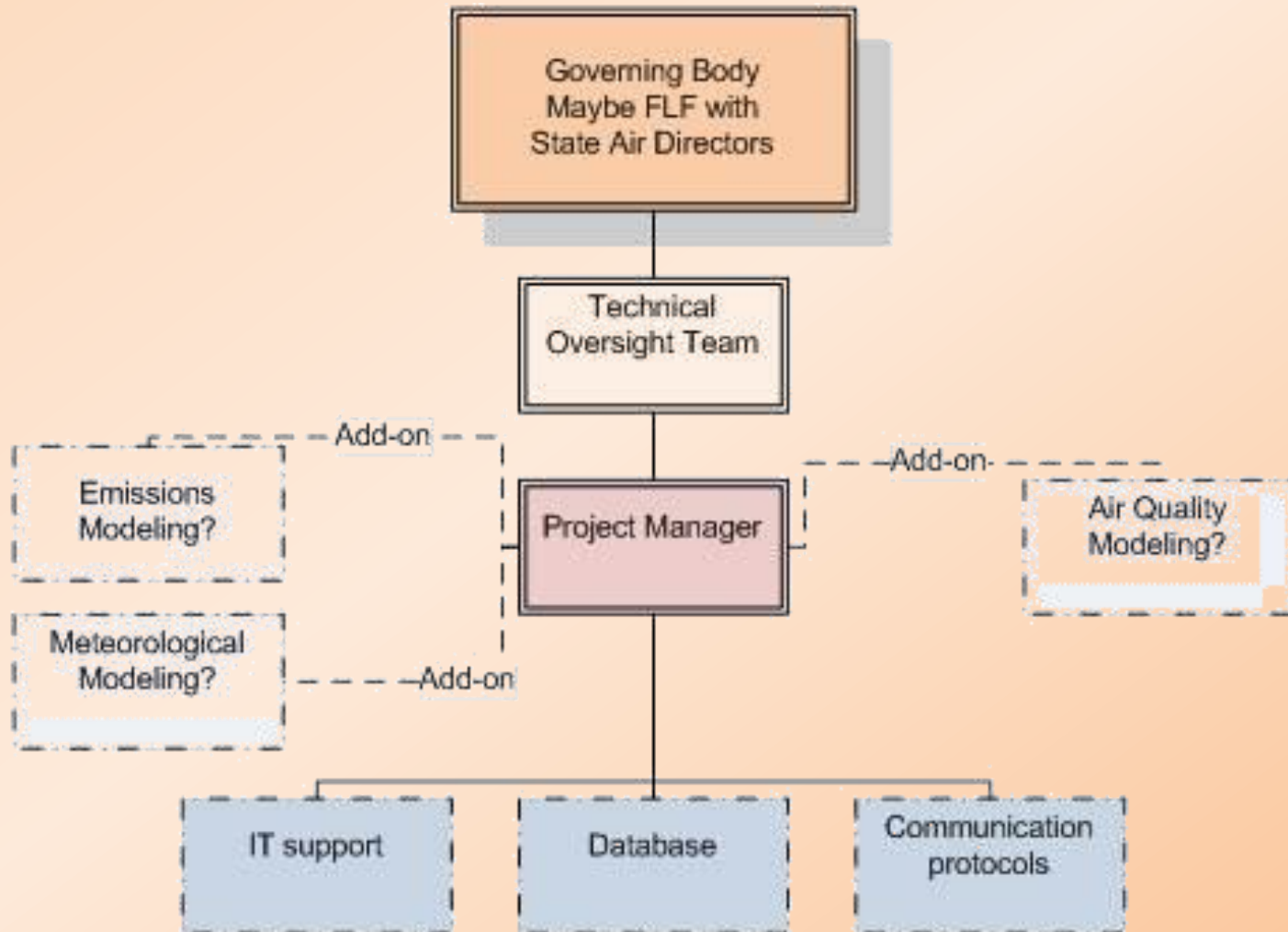
How Decisions Work:
Agency staff (steering committee) dialogue with decision board (SES or designates).

Decision Board: Recognize situation | Approve frame | Approve alternatives | Make decision | Approve plan

Identify | Frame | Alternatives | Decide | Act

Decision Team: Recognize situation | Develop frame | Identify alternatives | Evaluate alternatives | Plan implementation | Implement decision

How Funding Works

Example of In-Kind Contributions

All Agencies	Continued operation of existing sites Support for identifying new site locations and other related activities Efficiencies via collaboration using existing resources
BLM	Operation of Fruitland, Data analysis, UARMS, CARMS
CDPHE	Contributions to moving Lay Peak, technical assistance, QAQC
UDAQ	Continued operation of Price Partial contributions to Escalante audits Rent/utilities/data link for Fruitland and Price
USFS	Operation of all new USFS sites (Douglas Pass, Kremmling, Medicine Bow, Holy Cross, Deadman Pass, Snowbird)

3SDW Website: http://views.cira.colostate.edu/TSDW

3SDW
Three State Data Warehouse

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The Three State Data Warehouse (TSDW) Website

This website serves as the primary source for the ground-based monitoring data, emissions and air quality modeling results, model input data, and associated project documents for the Three State Data Warehouse (TSDW), a collaboration between the states of Colorado, Utah, and Wyoming to manage and assess the impacts to air quality of the oil and gas development currently taking place within the three-state region.

QUICK LINKS

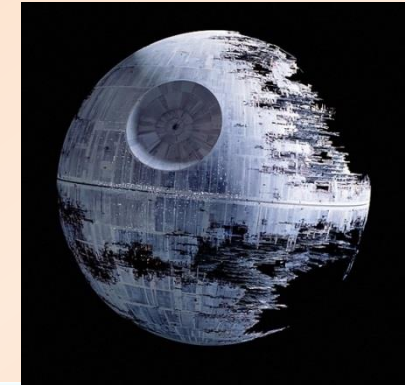- Query Wizard
- Model Data
- File Explorer

Query Wizard
The Query Wizard provides direct and interactive access to the integrated relational database.

Model Data
Search and find model-ready input data for use in your air quality modeling.

File Explorer

>> Vivamus lectus sapien

Integer nunc nisi, venenatis quis ultricies et, ornare nec ipsum. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos himenaeos. Morbi laoreet velit vitae ipsum luctus vel aliquet velit auctor. Vivamus blandit, ligula a pulvinar venenatis, libero nulla accumsan nibh, ac tincidunt magna magna eget ipsum. Nullam nulla elit, pulvinar vel placerat non, condimentum sed dui. Curabitur blandit dapibus faucibus.

>> Maecenas nec placer

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>> Vivamus lectus sapien

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>> Maecenas nec placer

Donec vel lacus nec ipsu sit amet diam et turpis f tellus. Duis et tortor era nisi, at auctor felis tristi sapien, a lobortis dui. S volutpat quis ornare aug justo ut scelerisque rutr sapien, eu gravida est e

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3SDW
Three State Data Warehouse

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Database Query Wizard

The query wizard allows you to selectively download data and metadata from the integrated database by specifying datasets, sites, parameters, date ranges, data quality flags, and other criteria. You can request raw data and graphical reports in variety of output formats, including delimited text files, Excel files, charts, graphs, and maps. Click on the tabs below to select the data you want.

Tabs: Reports · Datasets · Sites · Parameters · Dates · Aggregations · Fields · Options

Select a Report

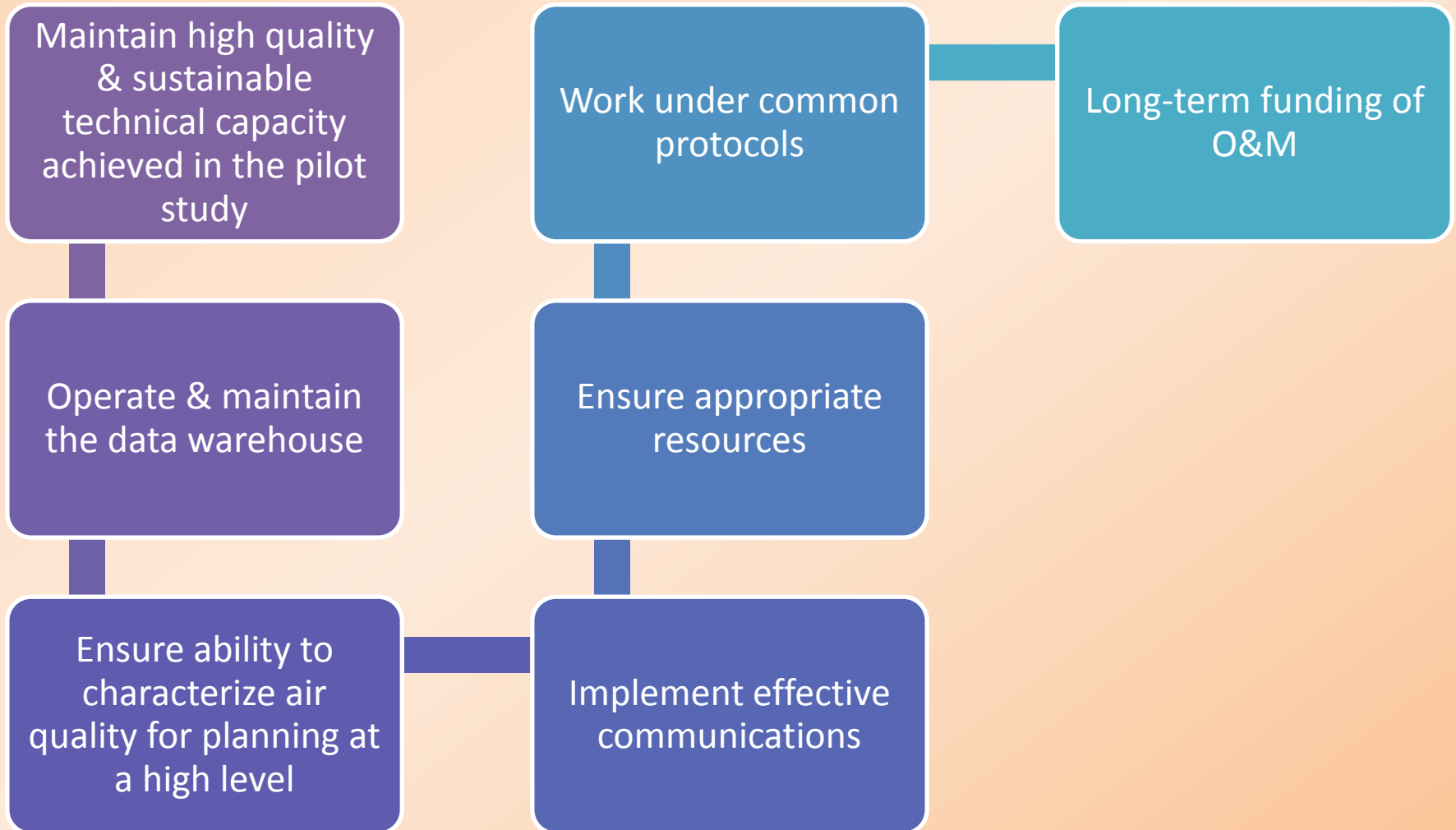| Title	Description
Raw Data	Access raw data from the Integrated Database. You can select fixed width or delimited columns, date/time formats, missing data values, and wide or skinny output. This report is the best choice for downloading the most recent data in a consistent format.
Interactive Charts	View data charts for each selected Site. Each Site chart will show data for all selected Parameters. For example, if you select two Sites and four Parameters then two charts will be displayed, each with four data (parameter) series.
Site Data Statistics	This is an interactive tool for exploring the summary statistics for the data at individual monitoring sites. Various statistical measures for each parameter measured at a site are shown, such as the minimum, maximum, and average data value, as well as the standard deviation and variance.
Contour Maps	Contour (isopleth) maps of network-wide parameter concentrations. You can choose from several interpolation algorithms.
Aerosol Composition	View data charts for each selected Site. Each Site chart will show data for all selected Parameters. For example, if you select two Sites and four Parameters then two charts will be displayed, each with four data (parameter) series.
Aerosol Trends	View data charts for each selected Site. Each Site chart will show data for all selected Parameters. For example, if you select two Sites and four Parameters then two charts will be displayed, each with four data (parameter) series.
Frequency Distribution	View a simple frequency distribution of data values at selected monitoring sites. This report is currently implemented so that one chart is generated per selected site. If multiple Parameters are selected their data values are combined in the distribution (i.e. they are not shown as separate distributions/charts).

Submit...

One important result so far: relationships are much improved

New Goals

Maintain high quality & sustainable technical capacity achieved in the pilot study

Operate & maintain the data warehouse

Ensure ability to characterize air quality for planning at a high level

Work under common protocols

Ensure appropriate resources

Implement effective communications

Long-term funding of O&M

Very Important to keep your perspective!

John Huddelston, **60** (1952-2012)
Lead Developer, Air Data Expert

Scott Archer, **57** (1954–2011)
Air Program Lead - BLM

Angela Zahniser, **37** (1976-2013)
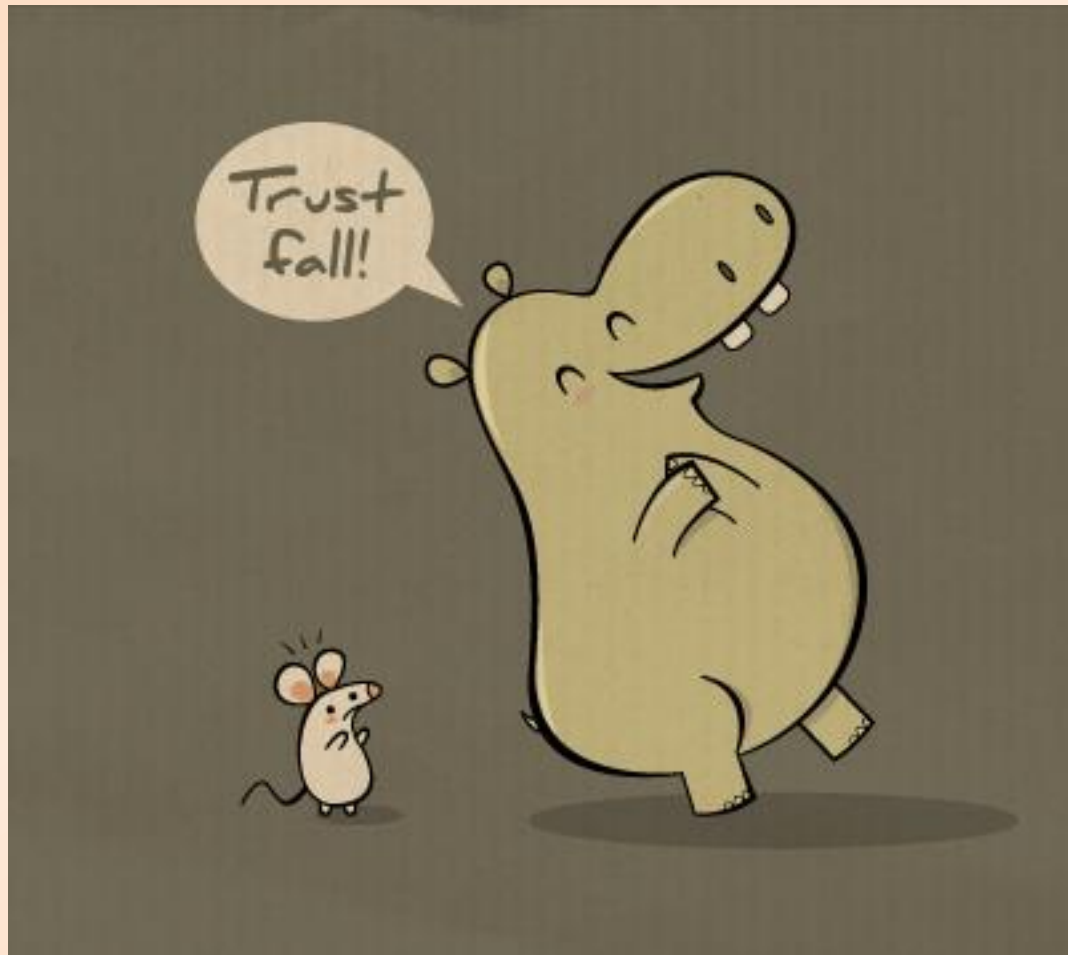Air Program Lead - BLM
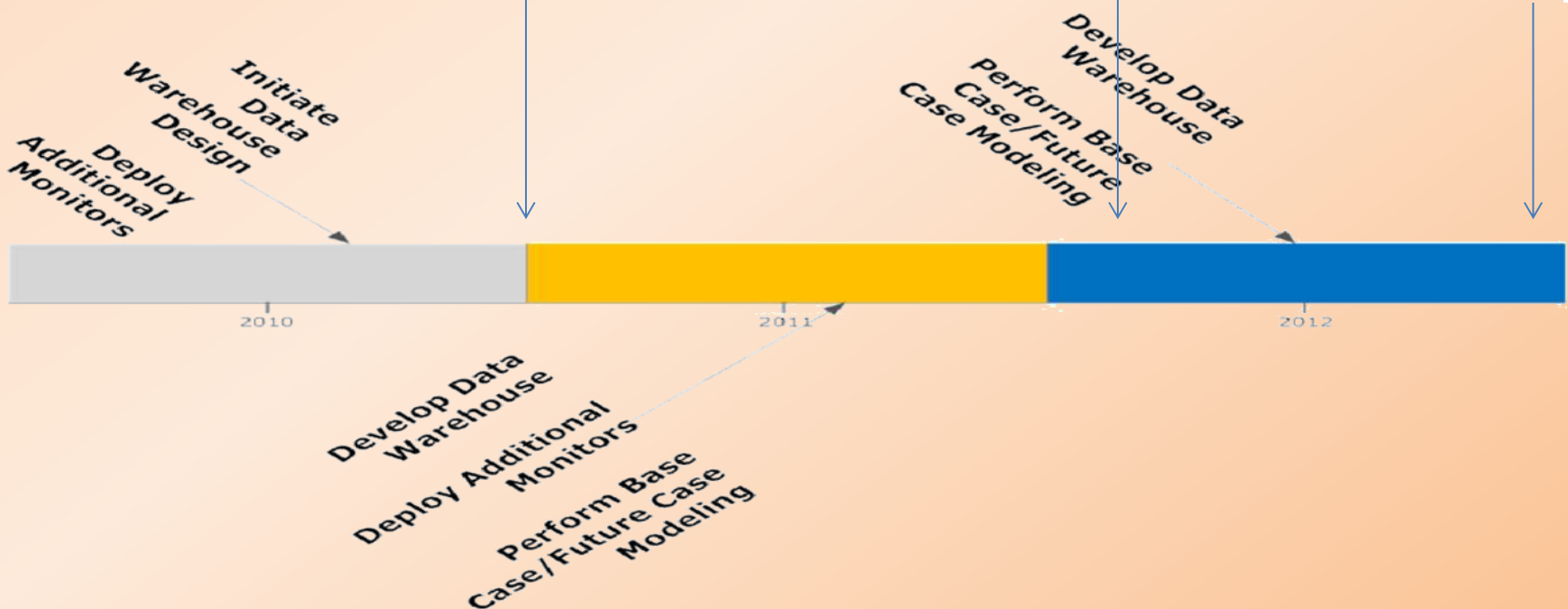
A lighter side of perspective…

Build trust through solving common problems

If you have frustrated energy, it is better for everyone to focus it on solving common problems than blaming each other.

**Get moving in the same direction
and you can achieve great things together!**

Use stressors as opportunities
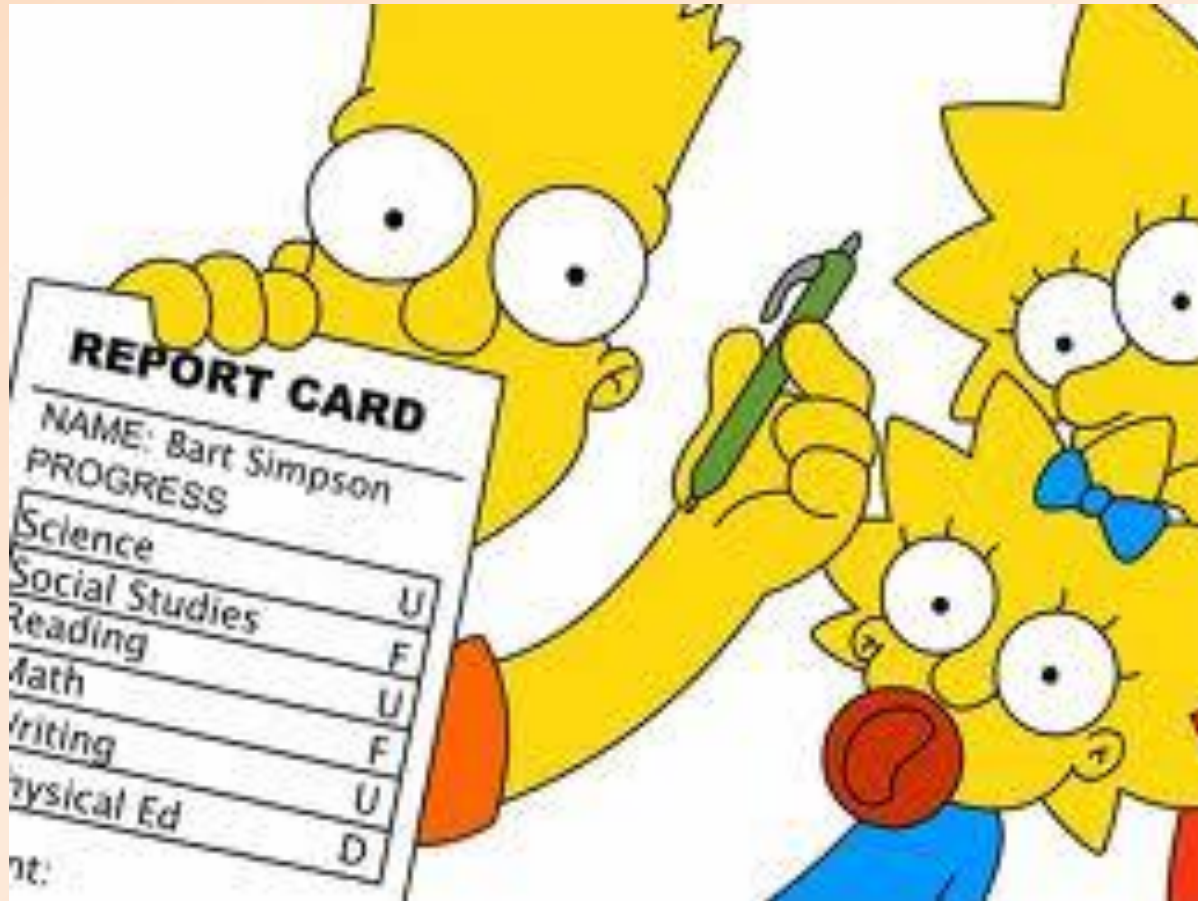
Take small steps while aiming high

Share risk, fund it first

"We've considered every potential risk except the risks of avoiding all risks."

HARDIN

Celebrate interim successes

Demonstrate your success
with real examples