Enabling Information Sharing thru Common Services

Using Systems Thinking to Provide Solutions to OGC Data Requirements

Presented To: ATIEC Conference

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Introduction

Overview of the Issues

- What is Systems Thinking?
- Current State
- Desired State
- Developing Systems Thinking Approach
- Identifying Testing and Analysis Requirements
- Systems Thinking to Balance the Result
- Conclusions

What is Systems Thinking?

- **Checkland – Use of non-conventional approaches based on solutions from dis-similar industry successes**
- **Boardman – Development of systemigrams to determine solutions**
- **Buede – Modeling system requirements through modeling software**
- **Farr – Linear system approaches through mathematics**
- **Zachman – Analysis through logical static models (generally referred to as spiral development)**

Systems Thinking

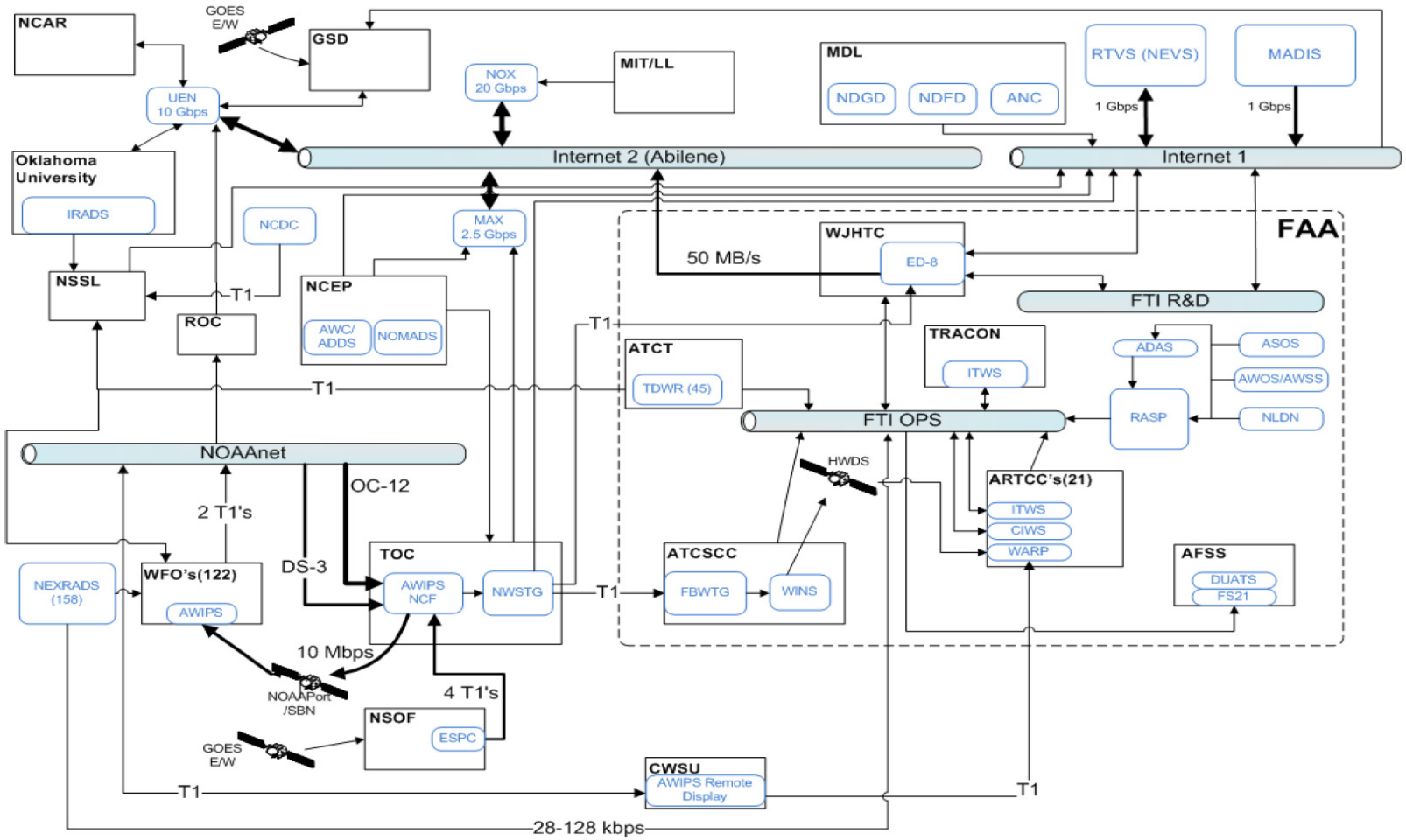
The best method to achieve results using systems thinking involve the following steps:

- **Review all current work performed**
- **Identify the broadest use base possible**
- **Determine the current state**
- **Use Systems Thinking to identify the 'End State'**
- **Gather all data along the value chain to drive to the End State**
- **Describe Vision**
- **Implement Solution(s)**

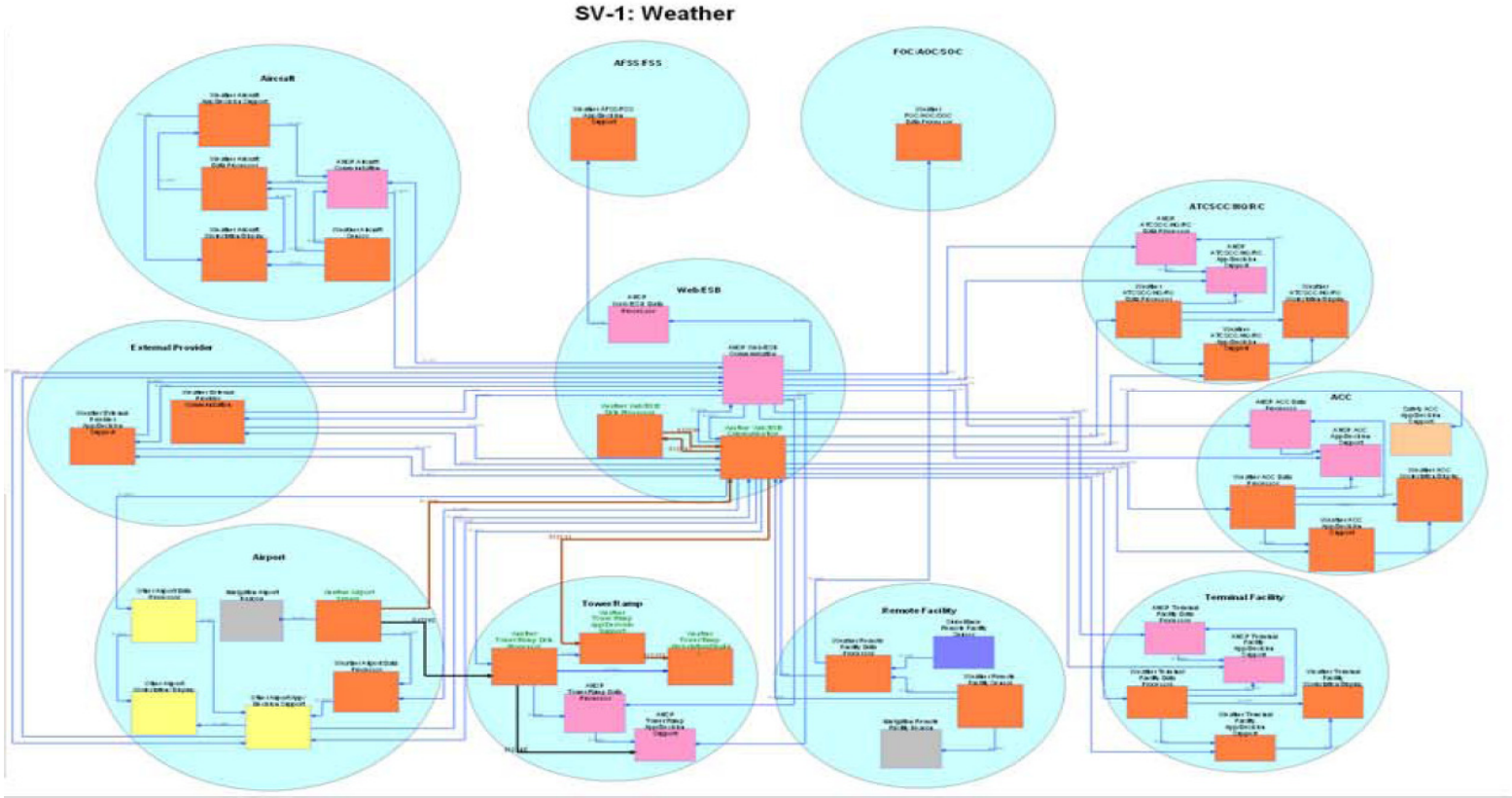
Review all Current Work Performed

- Identify all studies performed, requirements generated and broad user base;
- Consider that work performed prior was done within the boundary of current thinking;
- Re-use what is applicable so there is no duplication of effort

Current State



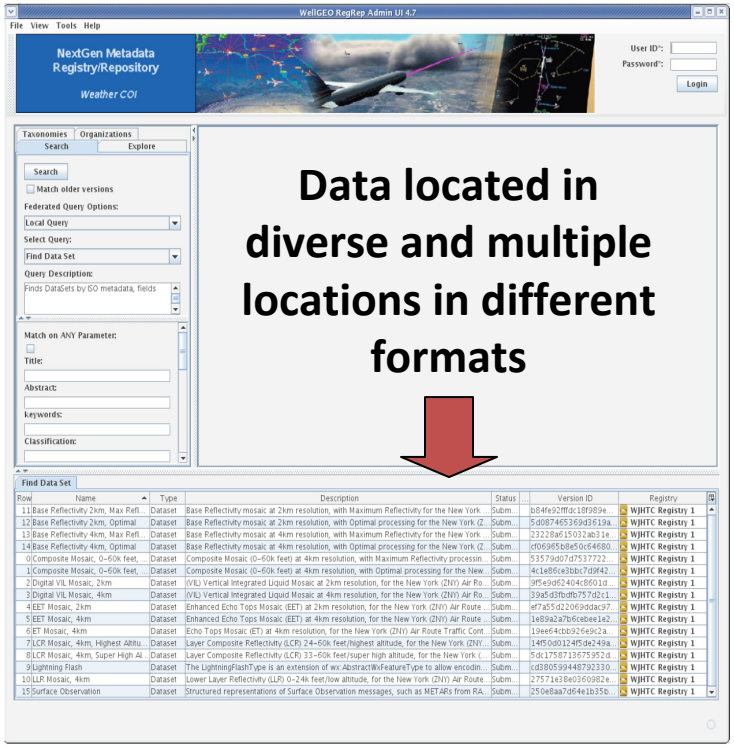
Systems Thinking: Building the Desired State



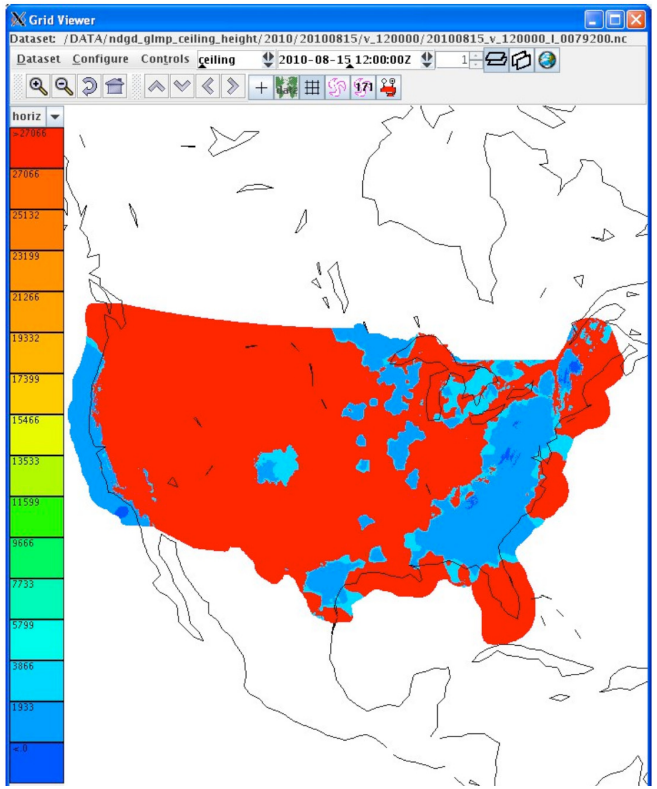
SV-1 Weather Slide from JPDO ConOps. Weather servers more than the FAA

Systems Thinking: Building the Desired State

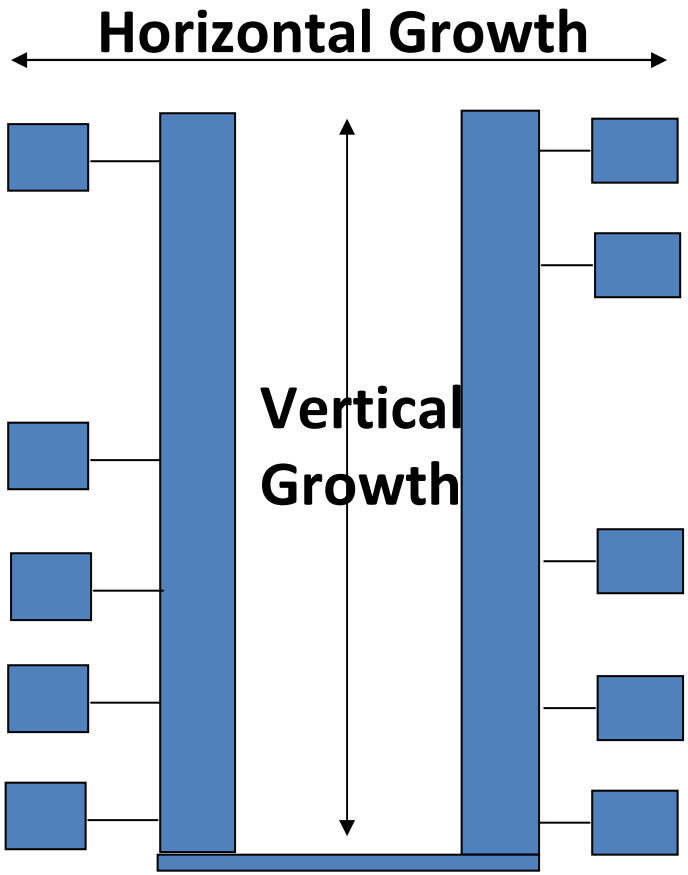
It is desirable for the FAA to have data available in OGC format, available from a central location and use smart push-pull to get those data to and from source and FAA. This same concept is desirable for more users than the FAA, but tey are a great test case and it meets the NextGen mission



Converts to Net-Ready OGC Format and sends to FAA like this



Systems Thinking: Building the Desired State

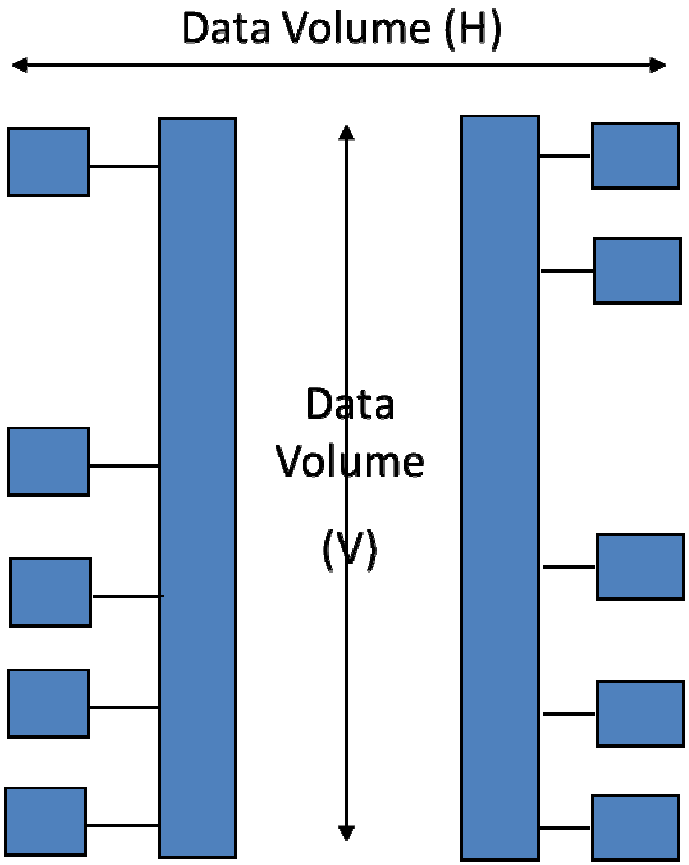


So how do agencies decide what vertical and horizontal growth consist of?

So how do agencies decide if they are able to connect with another agency?

Horizontal and Vertical growth are noted in the DoDAF, but not defined.

Systems Thinking: Building the Desired State

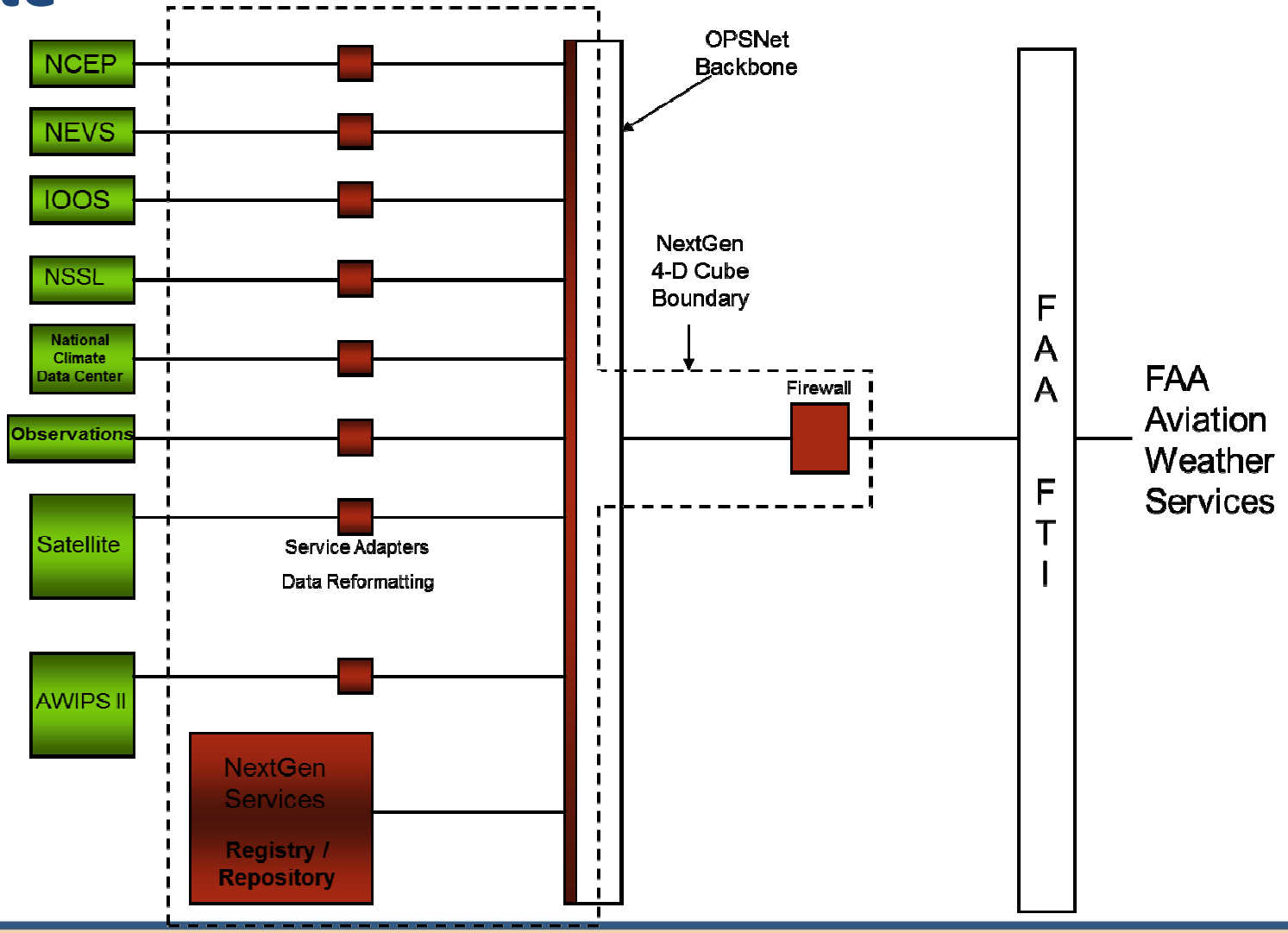


- A common elements for size is data volume
- Baseline data volume currently being handled
- Establish Relationship of

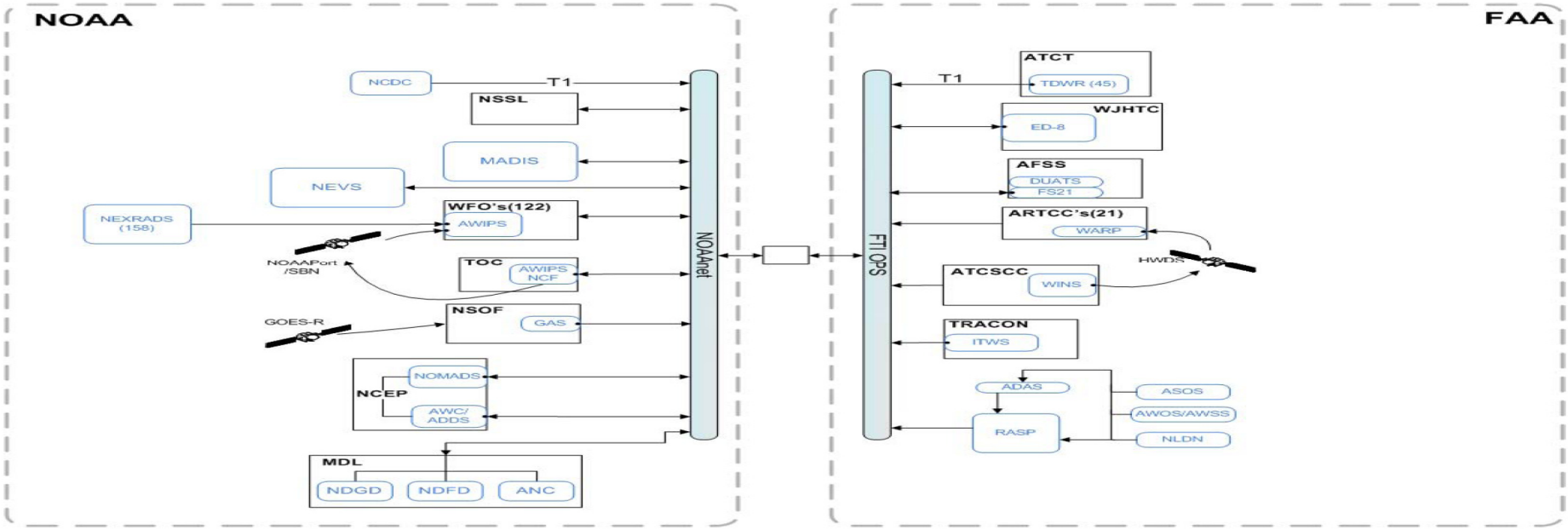
$$\frac{V_h}{V_v} = 1$$

Once balance is established, it becomes apparent the additional hardware and comms needed to maintain balance

Systems Thinking: Desired State



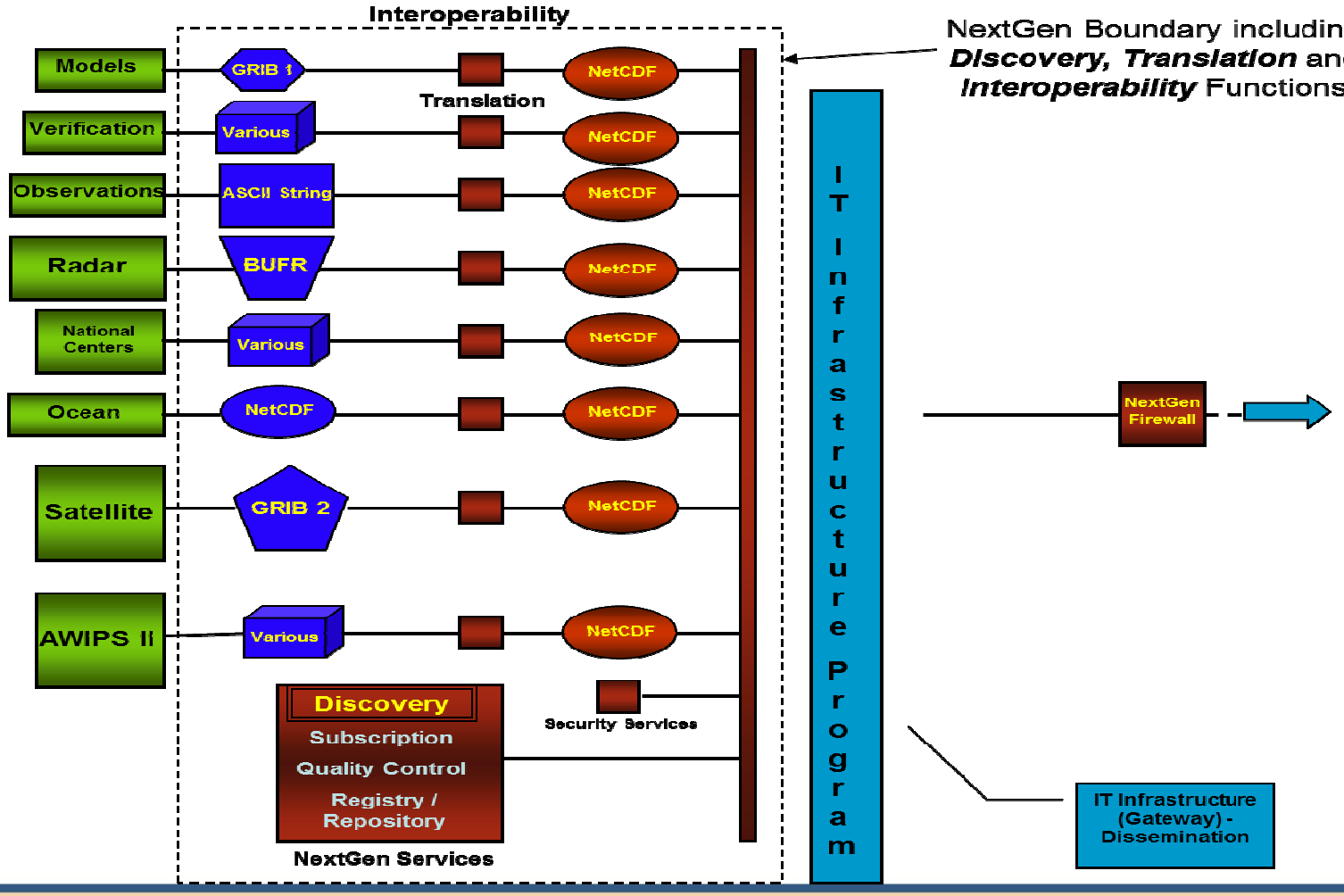
Systems Thinking: Desired State



CEArch_v3.png

Following this model, the NOAA / FAA test bed was constructed to simulate this situation. Currently, the mass balance is almost 1 with saturation of the system at 125 users. Using systems thinking provided the basis for the testbed and eventually for the vision using NextGen 4-D Data Cube as a discovery, translation and dissemination capability

Systems Thinking: Desired State



Systems Thinking: Balancing the Results

- Next, a data map with complete touch points now becomes imperative;

- Also, a full data dictionary containing all source data products, their formats, frequency of update, file size and current formats was developed;

- The Data Map and Data Dictionary become the baseline for the vision to keep the new solution at a ratio of 1

Systems Thinking: Seeing the Future

- **Model data volumes**
  - Model data disseminated today: **703GBytes/day**
  - NCEP produces more data than it disseminates:
    - Some models too large in native resolution, are disseminated at lower resolution
    - Intermediate model results/outputs are not being disseminated

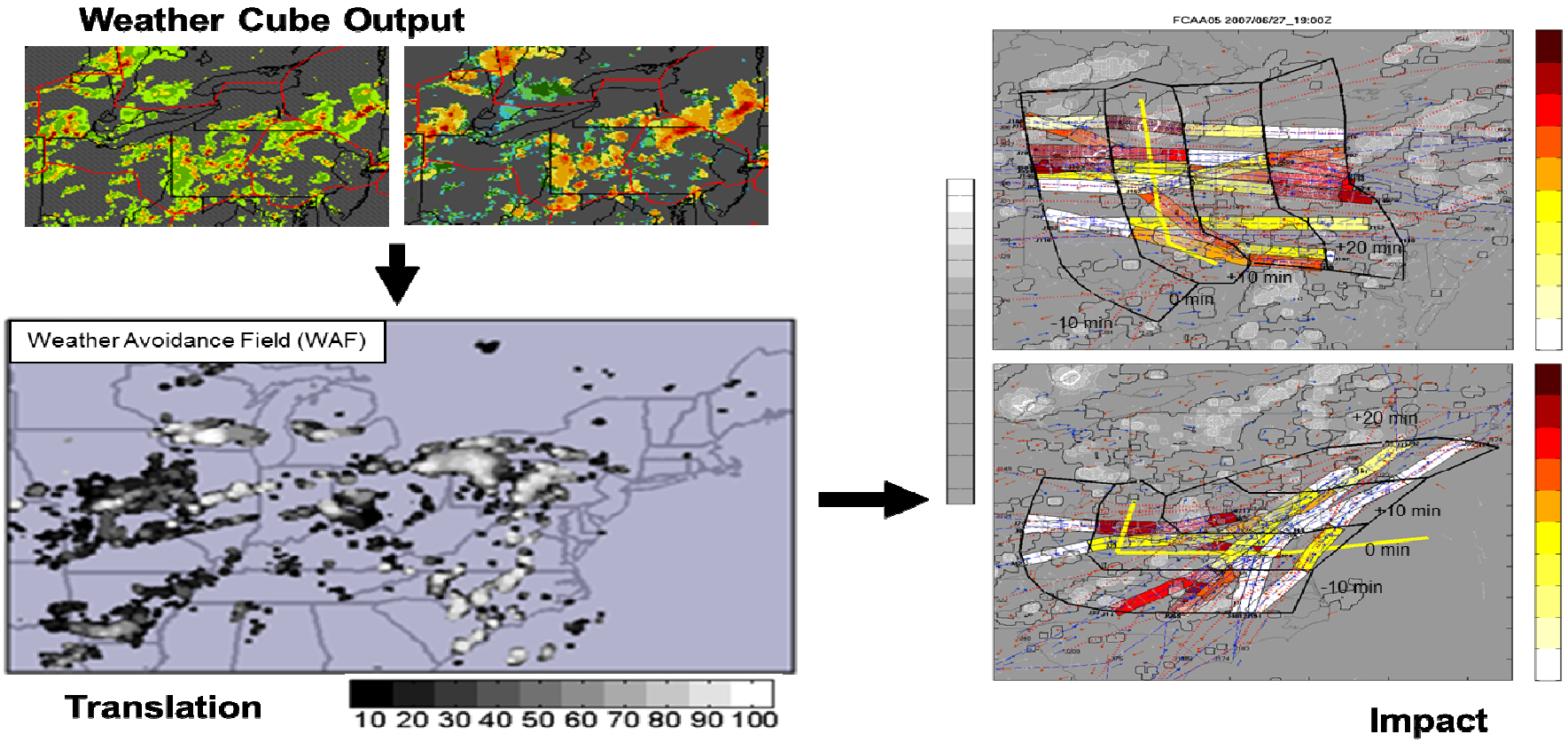
Model Data - Dissemination Method	Volume (Gbytes/day)	% of Available data
SBN Broadcast	22.3	3.16%
NWSTG	23.5	3.34%
NWSTG FTP	169	24%
WOC	703	100%

Table 4

  - SBN broadcasts only a small percentage of available model data
  - NWSTG takes in only a small percentage of available model data
  - NWSTG FTP (non switched) takes in less than a quarter of available model data
  - By 2015, it is anticipated that available model data will grow from **703GBytes/ day** to **7,448GBytes/day**, representing an increase of **over 10x**.
  - Note: the increase in data volume is attributed only to NCEP models, while international models are assumed to have constant data volume.

By 2015, model data capacity will be 10x greater than they are today

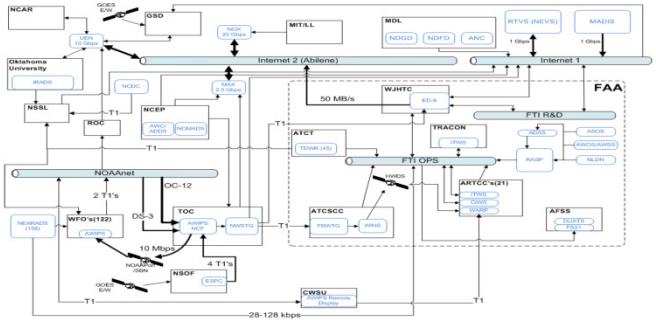
Systems Thinking: Seeing the Future



Weather → **Estimated Airspace Availability**

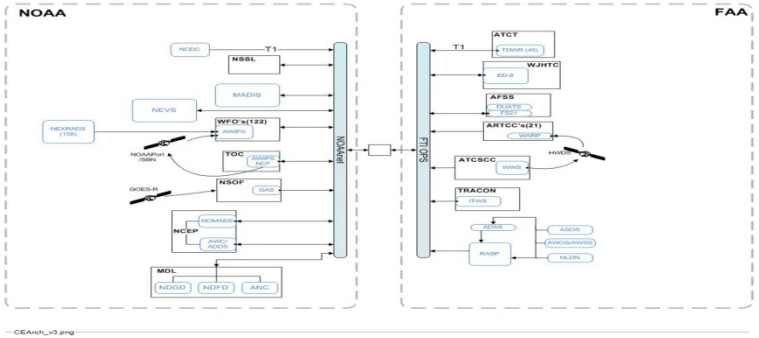
Systems Thinking

It takes a lot to get from this:



- Not readily expandable
- Expensive with needless complexity
- Multiple and incompatible data formats

To this:



- Improved Efficiency
- Consolidation of data lines
- Reduced operating costs
- OGC data format

Thank You

Questions please email

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