

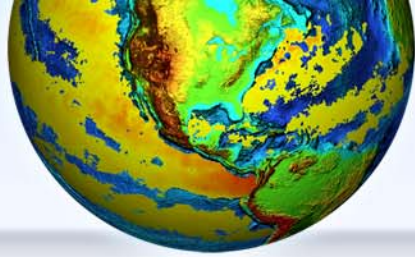
Published NOAA Defined Index – A Maturity Matrix

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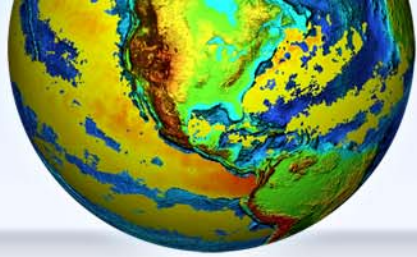
CEOS WGClimate





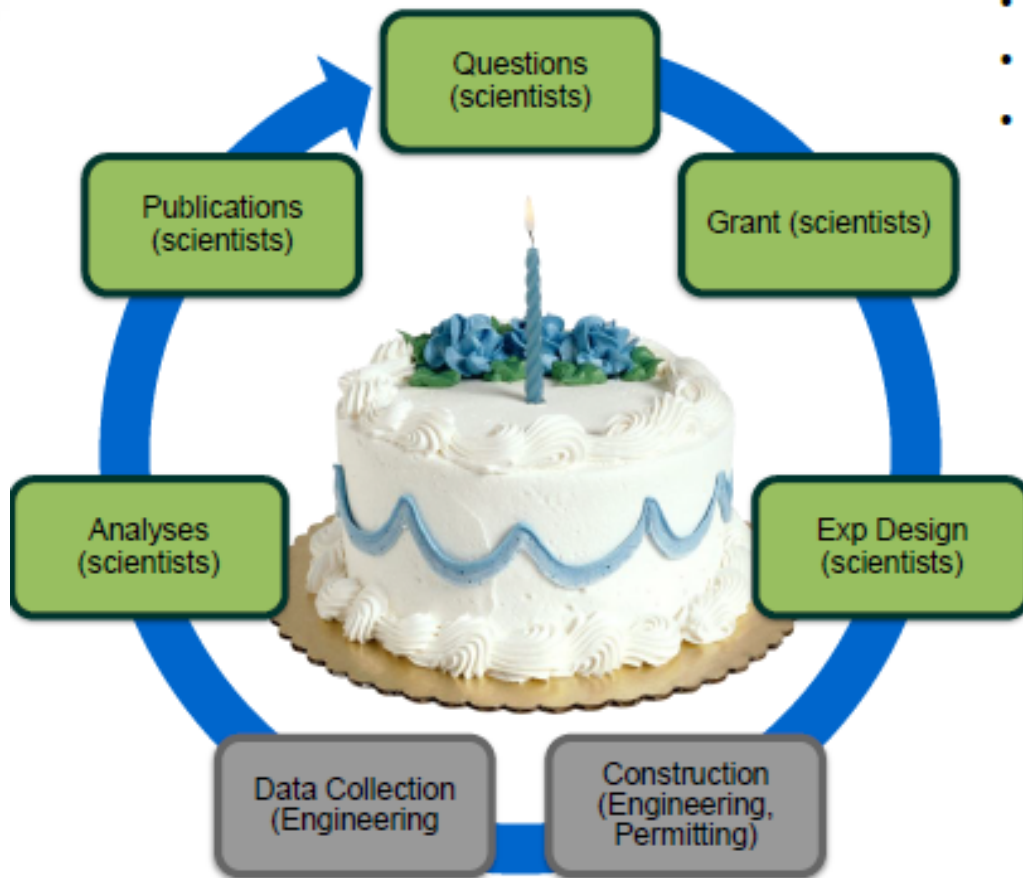
Viewing CEOS as a Climate Observatory

- Grand Challenge science problems have often been addressed by creating and using international observatories
- Climate variability and change is a Grand Challenge that requires very broad collaboration
- Space Agencies are wrestling with how to collaborate effectively across a range of activities
- Metrics are needed to assess where we are and what progress need to be made
- Tension remains between the traditional Principal Investigator approach and Observatory needs



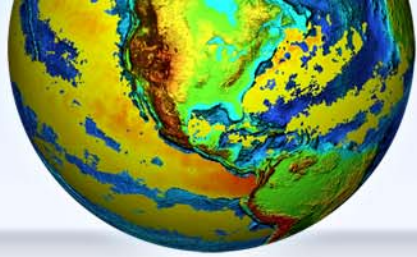
Adopting Systems Engineering Approach Demands Metrics to Assess Progress

Systems Engineering Approach



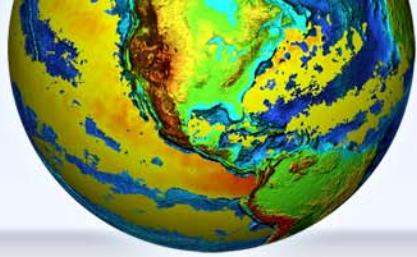
- Formalized hierarchical requirements
- Asks 'what must be done?'
- Measurements are considered baseline
- Steps are parsed out (see diagram)

Pro	Con	
✓		New roles for scientists, both internally and externally
✓		Clearly defines scope, budget, schedule, risks
✓		Complexity is inherently planned for
✓		Develops planning horizons for Program Officers/Sponsors
✓		Fosters long term sustainability
✓	✗	Requirement approach does not necessarily impose a single unique solution



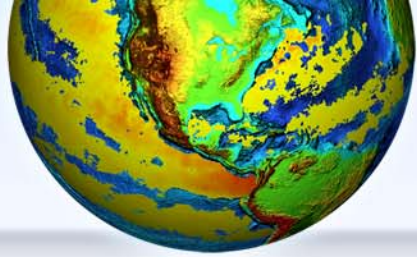
Concept of Maturity

- The concept of measuring maturity of technical and software processes has arisen in several different industries
 - NASA technical readiness levels
 - Software Capability Maturity Model Integration
- The rapid advances in climate observations by Space Agencies over the last several decades has been accompanied by a recognition of the need to capture best practices
- The Maturity Matrix attempts to capture these best practices from scientists, software engineers and the information preservation communities

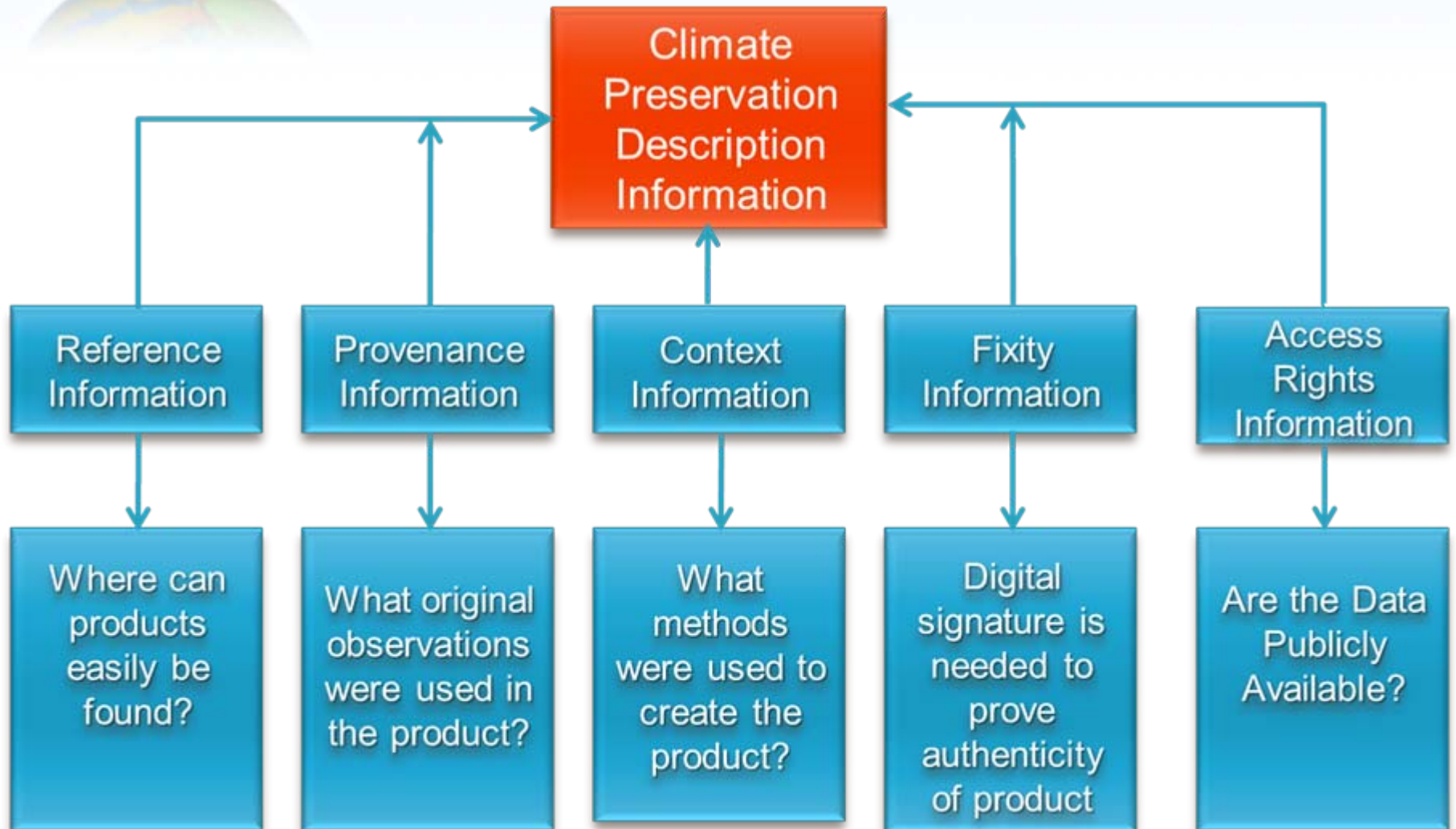


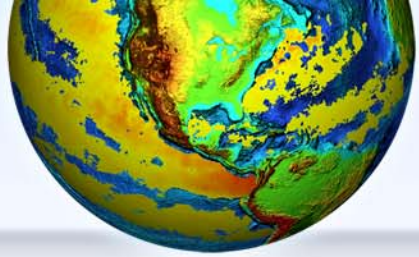
Evolution of a Climate Data Record (CDR) Maturity Index

- A Maturity index was first proposed for satellite CDRs in 2006 by Bates and Barkstrom
- Informal feedback was obtained from several space agencies
- WOAP Workshop in Frascati 2011 led to a more rigorous assessment and feedback (published as GCOS-153) as well as specific recommendations
- Recommendations and feedback were included in a version-controlled Maturity Matrix V4 by NOAA's Climate Data Records Program
- This version was published by Bates and Privette in EOS Transactions AGU in the Fall of 2012 (DOI: 10.1029/2012EO440006)



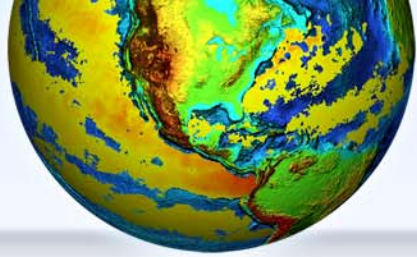
The Maturity Index Addresses These Questions





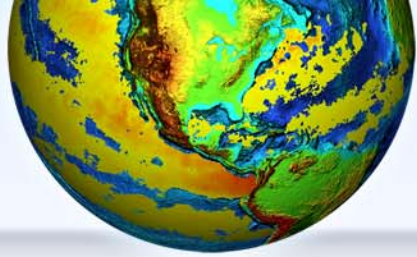
Application of the Maturity Index – Self Evaluation

- Several Agencies/Programs are currently conducting self evaluations of their ECVs/CDRs using the Maturity Index
- This is an important process as:
 - The index is still new and terminology needs to be refined
 - Application of the index will always be (somewhat) subjective
 - Goals of different Programs varies and the Index may need slight modifications to ensure those goals are met
- Being applied or in discussion at NOAA CDR Program, Eumetsat CDRs, and ESA CCI



Application of the Maturity Index – Independent Validation

- Eventually there must be an independent evaluation of ECVs/CDRs using the Maturity Index
- I have started some validation exercises and found the following:
 - We need to define a validation status proposed as: 1) Green – can be validated using publicly accessible information, 2) Yellow – contact with a subject matter expert is required to validate, or 3) Red – Insufficient information available to validate
- For future assessments, data sets should be required to be validated and above a minimum maturity to be included in the Summary for Policymakers



Conclusions

- The Maturity Index responds to the 2012 Joint WCRP/GCOS Letter
 - (to develop a...) systematic international approach to ensure transparency, traceability and sound scientific judgment in the generation of climate data records across all fields of climate science and related Earth observations...
- Community feedback has led to refinements and improvements in the Maturity Index
- I recommend that we not let ‘...the perfect be the enemy of the good...’ and adopt the Maturity Index as an interim standard