Role of the Space Platform Requirements Working Group (SPRWG) NSOSA Architecture Study

NOAA Satellite Observing System Architecture Study-Part II

10 January 2018

Rick Anthes, President Emeritus of UCAR and SPRWG Chair

SPRWG Charge

- ***To provide analyses for NOAA leadership to determine needs and relative priorities for weather, space weather and environmental remote sensing space-based observations in the epoch of 2030 in support of the NSOSA (NOAA Satellite Observing System Architecture) study***
- ***Priorities are NOAA operational functions***
- ***SPRWG has no decision authority***
- ***SPRWG will provide rigorous analyses in developing the Environmental Data Record (EDR) value model (EVM)***

SPRWG Membership:

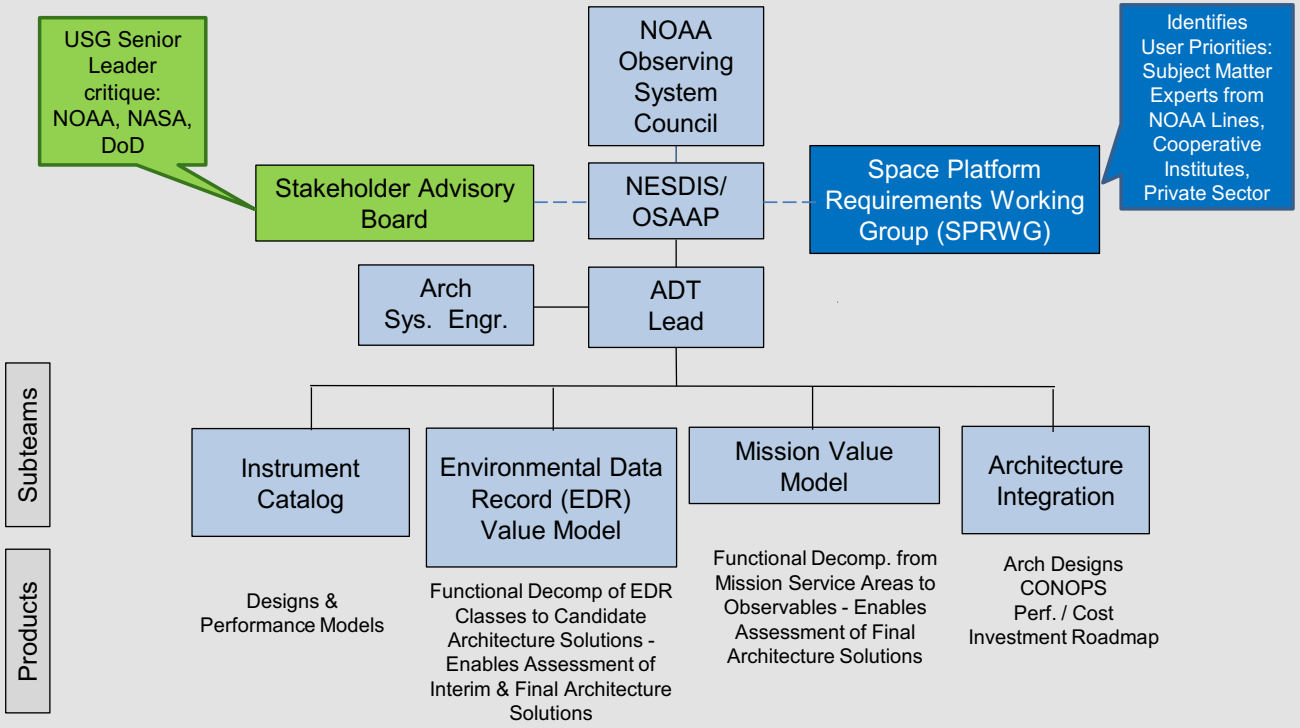
NOAA Line Offices, NASA, Academia, and Private Sector

1. Rick Anthes, Chair (UCAR)
2. Steve Ackerman (U Wisconsin, CIMSS)
3. Bob Atlas (NOAA, AOML)
4. Lisa Callahan (NASA GSFC)
5. Jerry Dittberner (Consultant)
6. Rich Edwing (NOAA, NOS)
7. Pam Emch (Northrop Grumman)
8. Michael Ford (NOAA, NMFS)
9. Bill Gail (Global Weather Corp)
10. Mitch Goldberg (NOAA liaison)
11. Steve Goodman (NOAA liaison)
12. Chris Kummerow (CSU)
13. Terry Onsager (NOAA, NWS, SWPC)
14. Kevin Schrab (NOAA, NWS)
15. Chris Velden (U Wisconsin, CIMSS)
16. Tom Vonderhaar (CSU)
17. Jim Yoe (NOAA, NWS, NCEP liaison)
18. Jeff Reaves (Executive Assistant)

SPRWG Meeting 20 June 2017 NCAR

SPRWG Role in NSOSA Study

NSOSA Study Team Structure & Products



History of SPRWG Activities

- October 2015-Terms of Reference and appointment of SPRWG members
- Dec 2-3 2015-First meeting of SPRWG in Silver Spring Md.
- January 12-13 2016-Town Hall meeting at AMS Annual meeting and second meeting of SPRWG
- Feb 4-5 2016-Third meeting of SPRWG in Silver Spring Md.
- March-May 2016-Many conference calls with Group A and B leaders and Mark
- May 24 2016-SPRWG Cycle 1 Report
- July 13-14 2016 Fourth meeting of SPRWG Boulder
- October 31 2016 SPRWG Cycle 2a Report
- Jan 11-12, 2017-Fifth SPRWG meeting in Boulder
- May 15, 2017-SPRWG Final Report
- June 20-21, 2017 Sixth SPRWG meeting in Boulder

SPRWG was an “in the weeds committee”-details are very important!

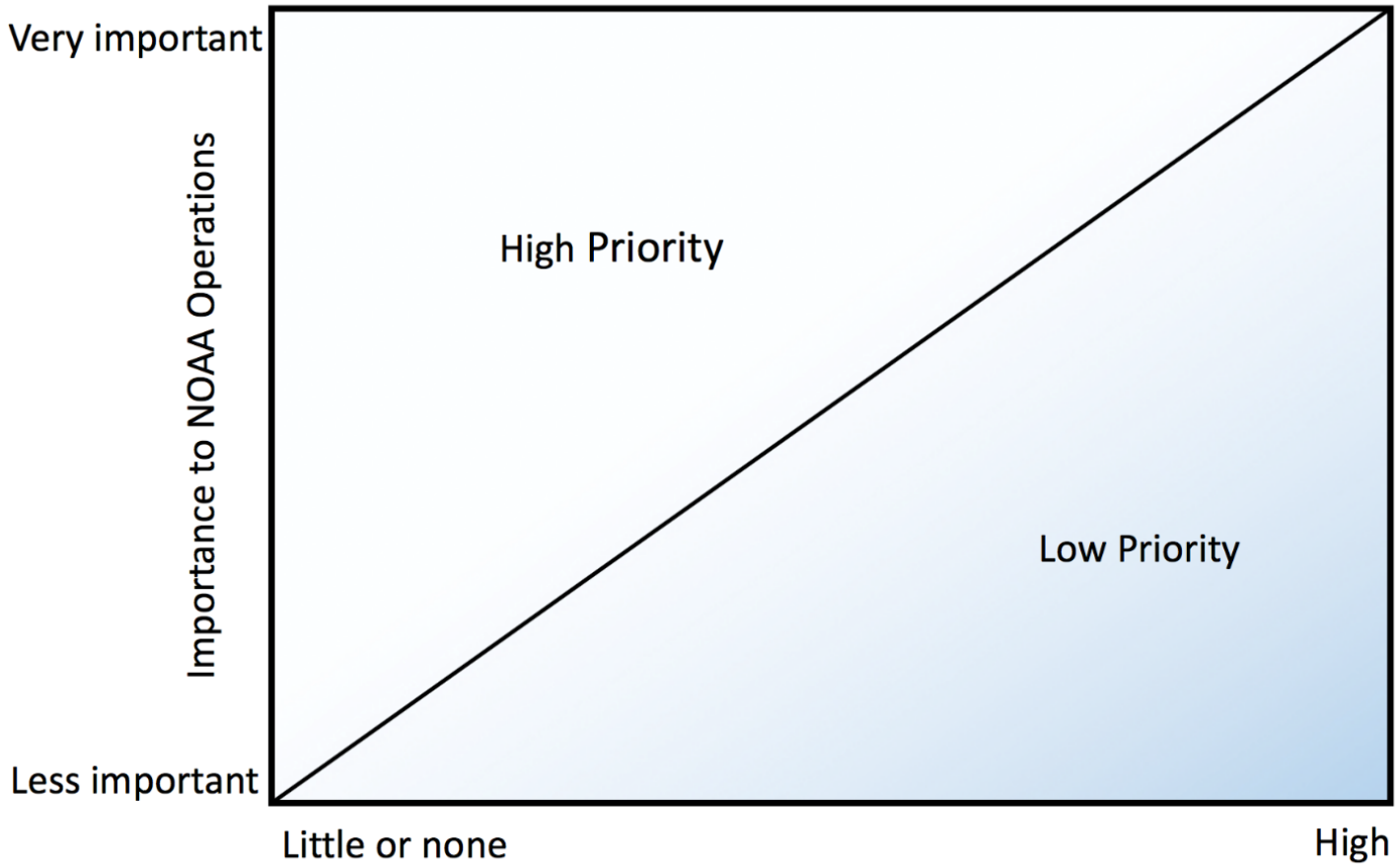
Developing the EVM (Environmental Data Record (EDR) Value Model)

- ***SPRWG broke into two subgroups***
  - *Group A for terrestrial weather, climate, oceans and atmospheric chemistry*
  - *Group B for space weather*
  - *Each subgroup consulted outside subject matter experts as needed. This was especially important for Group B, which was underrepresented in the SPRWG.*
- ***Each Group developed a list of objectives based on known user needs and many WMO, ESA, NRC and NOAA documents. By coincidence, each group defined 19 objectives.***
- ***Each Group explicitly considered whether user needs and/or science/technology would radically change from today by 2030. Answer was "no," fundamental needs (images, NWP initial data, solar and upper atm obs) will be same.***
- ***SPRWG members determined the ST, EXP, and ME levels performance of each quality attribute of each Objective though personal knowledge of SPRWG subject matter experts (SME), discussions with outside SME, and with consideration of external independent references, notably WMO OSCAR and NOAA COURL.***

Developing the EVM, continued

- *SPRWG members ranked the objectives in each Group according to their impact on the NOAA operational mission of improving the performance from the ST to the ME level. Preliminary rankings were debated extensively and changed in a number of cases based on the debate. In the end there was consensus on the ranking within Groups A and B.*
- *We did the ranking based on the general agreement that the items near the top were significantly higher priority than those near the bottom, but that the swing weights of items grouped closely together should be close in magnitude because it was difficult to distinguish, for example, between the 10th and 11th ranked objective. This led to a hyperbolic tangent form for the swing weights. Sensitivity tests of the impact of small changes in ordering on architecture designs and scoring supported this philosophy (the results were not sensitive to minor re-ordering of priorities).*
- *SPRWG members wrote "two pagers" for each Objective, justifying their importance to NOAA and why they were ranked in priority the way they were. References were provided to support each objective and its relative importance for improvement in capability.*
- *SPRWG members worked closely with the NSOSA Architecture Development Team throughout study*

Priorities-based on improvement over ST level of capability, NOT only intrinsic priority to NOAA



Major References

- *ESA, 2014: The Earth Observation Handbook 2015. 47 pp. [Available online at http://database.eohandbook.com]*
- *WMO, 2013c: Observing Systems Capability Analysis and Review (OSCAR) Tool. [Available online at http://www.wmo.int/oscar/] OSCAR Version 2015-12-12.*
- *NOAA Consolidated Observing User Requirements List (COURL); Version dated Dec 8, 2015. Spread sheet title: "COURL Request 12-08-15_loc.xls" . Most of the space weather objectives used an updated and revised version titled "SWX CORL_SWX_mods20151021.xlsx".*
- *Many other WMO, ESA, ECMWF, NRC and peer-reviewed references*

SPRWG Final Report (May 2017)

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Assessment of the SPRWG Process

Positives

- *Process was objective and thorough and worked well*
- *Iteration through 3 cycles very important*
- *SPRWG independence respected by NOAA*
- *SPRWG members cooperated and argued respectfully and constructively*
- *The EVM process of ranking improvements over existing capability was new to all SPRWG members-took some getting used to.*
- *Working with Mark Maier and NESDIS leadership was a pleasure*

What could be improved

- *Peer review of SPRWG draft report*
- *Nature of process required detailed-oriented subject-matter experts. Membership was a bit uneven in this regard.*
- *Space Weather was underrepresented-mitigated by involving outside experts as needed.*

Acknowledgments

- ***Mark Maier (Aerospace)-exceptional technical leadership and patience in working with SPRWG***
- ***Monica Coakley (MIT Lincoln Labs)-worked closely with SPRWG in scoring the EVM objectives***
- ***Steve Volz, Karen St. Germain, Frank Gallagher (NOAA/NESDIS)-overall leadership and support of this study***