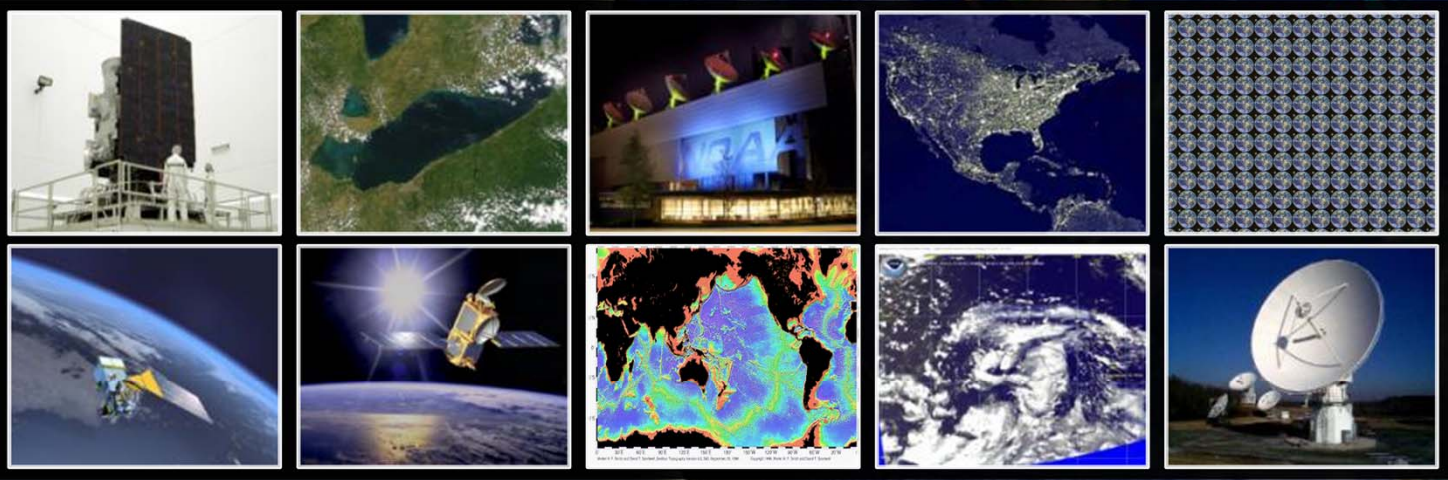
NOAA NESDIS
Independent Review Team



Report

July 20, 2012

Acknowledgements

- The following organizations provided numerous briefings, detailed discussions and extensive background material to this Independent Review Team (IRT):
  - Department of Commerce (DoC)
  - National Oceanic and Atmospheric Administration (NOAA)
  - National Aeronautics and Space Administration (NASA)
  - Geostationary Operational Environmental Satellite R-Series (GOES-R) Program Office
  - Joint Polar Satellite System (JPSS) Program Office
  - NOAA/National Environmental Satellite, Data, and Information Service (NESDIS) IRT Liaison Support Staff:

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- This IRT is grateful for their timely support and quality effort necessary for this assessment

Overview

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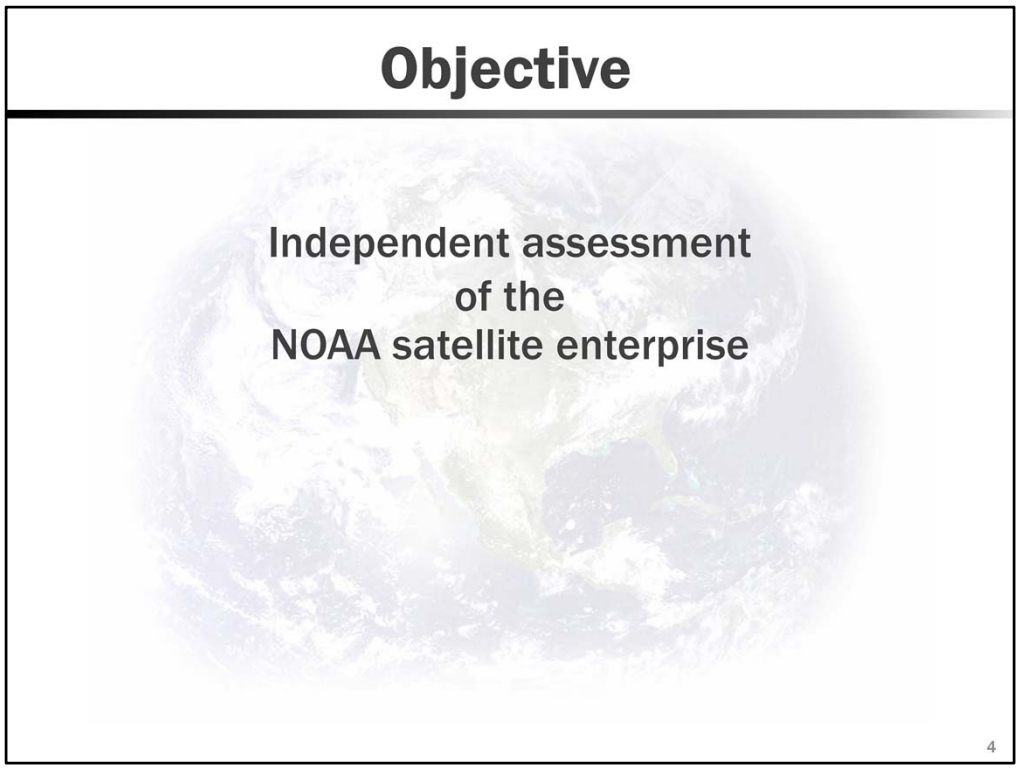
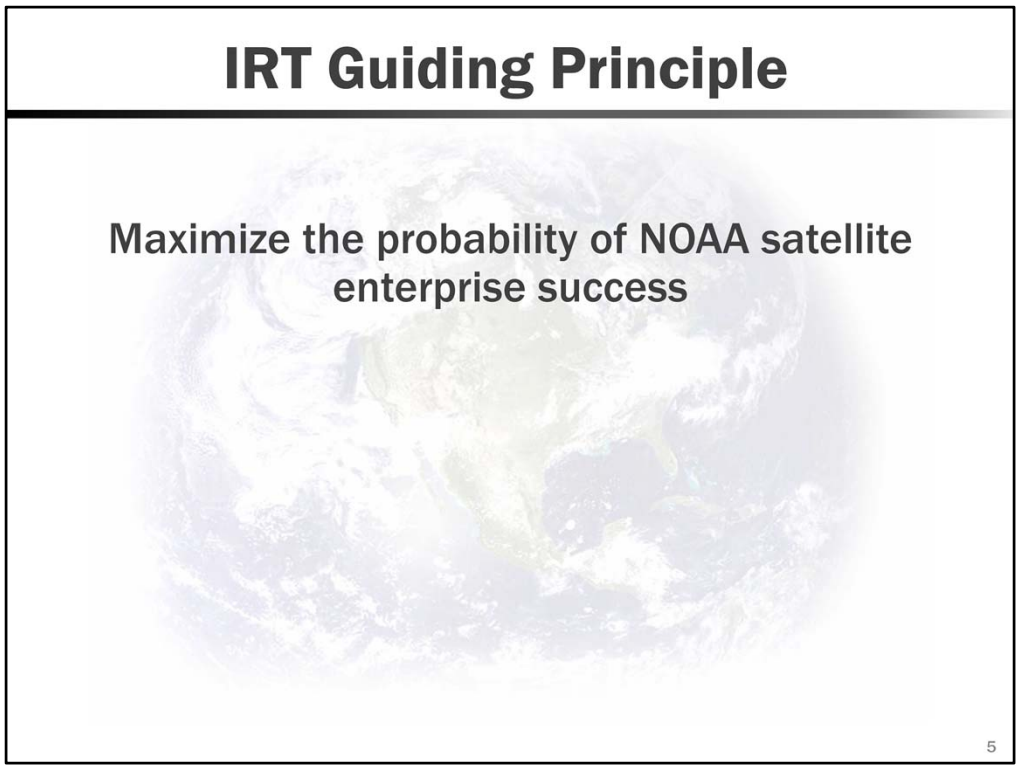
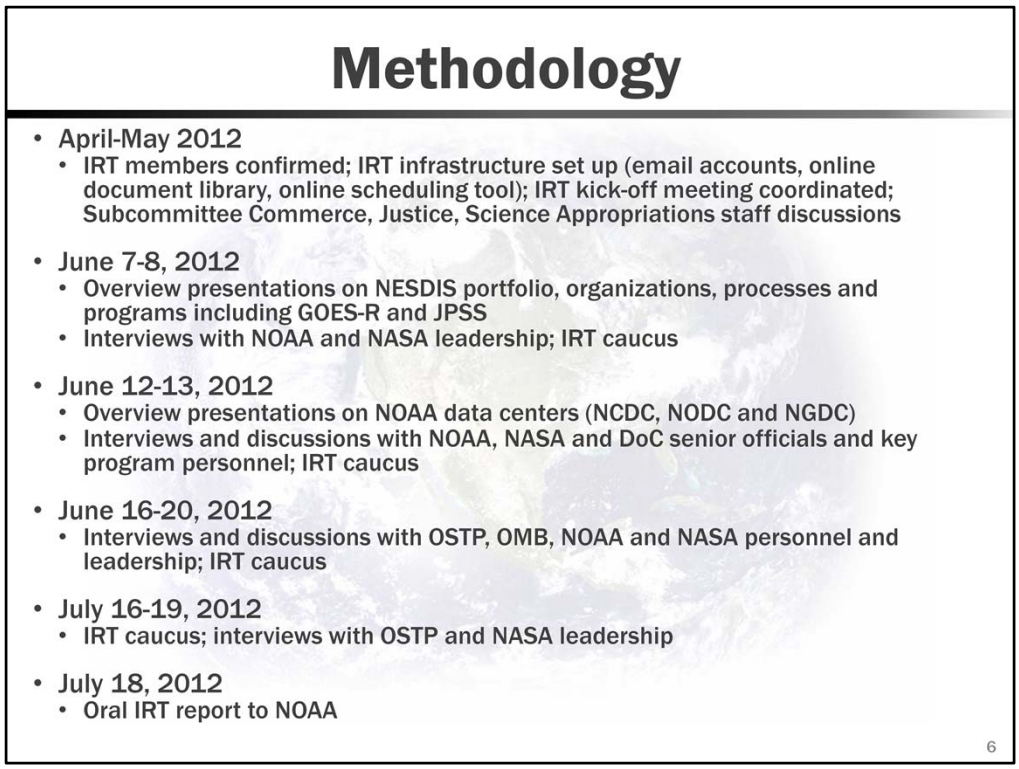


NOAA/NESDIS chartered the IRT to conduct an independent assessment of the total NOAA satellite enterprise. The scope of the assessment was from requirements to product delivery. The IRT assessment did not include an in-depth review of programs since such reviews are the responsibility of Standing Review Boards (SRBs). The SRB Chairs for Geostationary Operational Environmental Satellite – R Series (GOES-R) and Joint Polar Satellite System (JPSS) are members of the IRT. Their involvement facilitated IRT understanding of the status of these major programs.



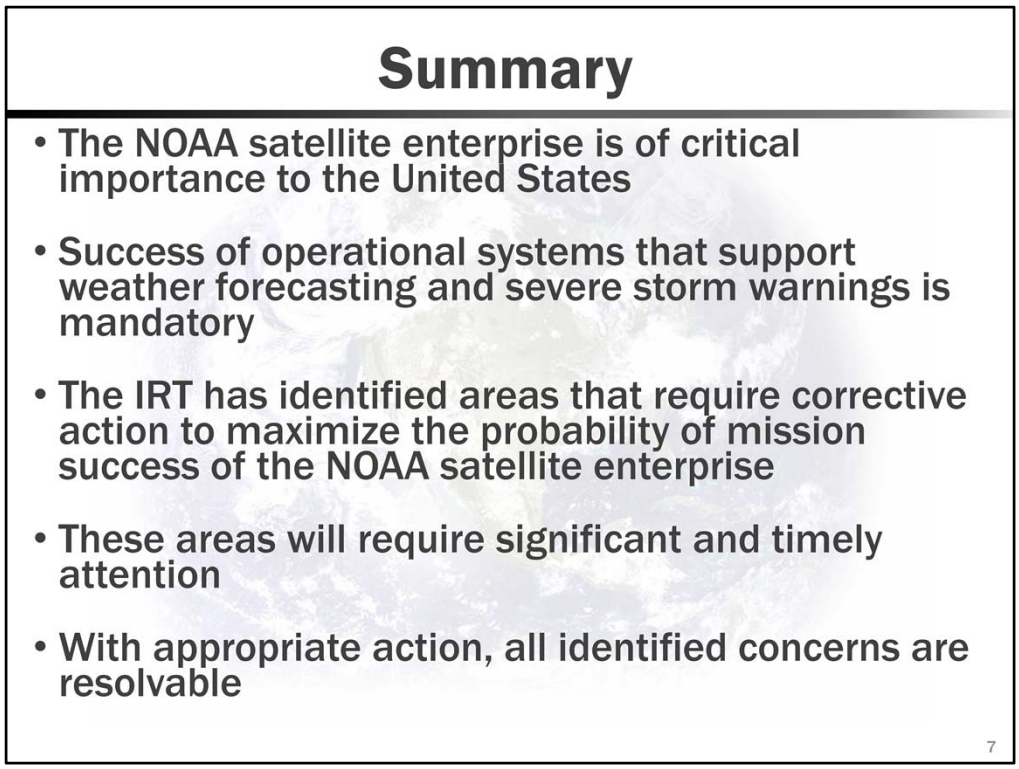
The guiding principle used by the IRT in the conduct of the independent assessment and the development of recommendations was focused upon maximizing the probability of success of the NOAA satellite enterprise. Political and policy issues are clearly involved in such a major national undertaking. The IRT was not insensitive to these issues, however, the “success” criterion was the primary guiding principle.



The IRT was conducted from April through July 2012 and had a three-part methodology. Presentations were provided to the IRT that covered all elements of the NOAA satellite enterprise. Non-attribution interviews were held with approximately 25 key individuals involved in the NOAA satellite enterprise. The third element of the review was the development of the findings and recommendations. This element involved considerable discussion and debate within the IRT to ensure the integrated convictions of the IRT were incorporated in the results.

Acronyms:

GOES-R:	Geostationary Operational Environmental Satellite – R Series
JPSS:	Joint Polar Satellite System
NCDC:	National Climatic Data Center
NGDC:	National Geophysical Data Center
NODC:	National Oceanographic Data Center
OMB:	Office of Management and Budget
OSTP:	Office of Science and Technology Policy



The success of the NOAA satellite enterprise is critical to the United States. These programs contribute to the economy, national security, safety and quality of life. The IRT has identified corrective actions that are required to ensure an acceptable probability of success of the satellite enterprise. Many of these recommendations require timely action. While the IRT cannot overemphasize the importance of implementing the recommendations included in this report, the IRT believes all identified concerns are resolvable.

Findings and Recommendations

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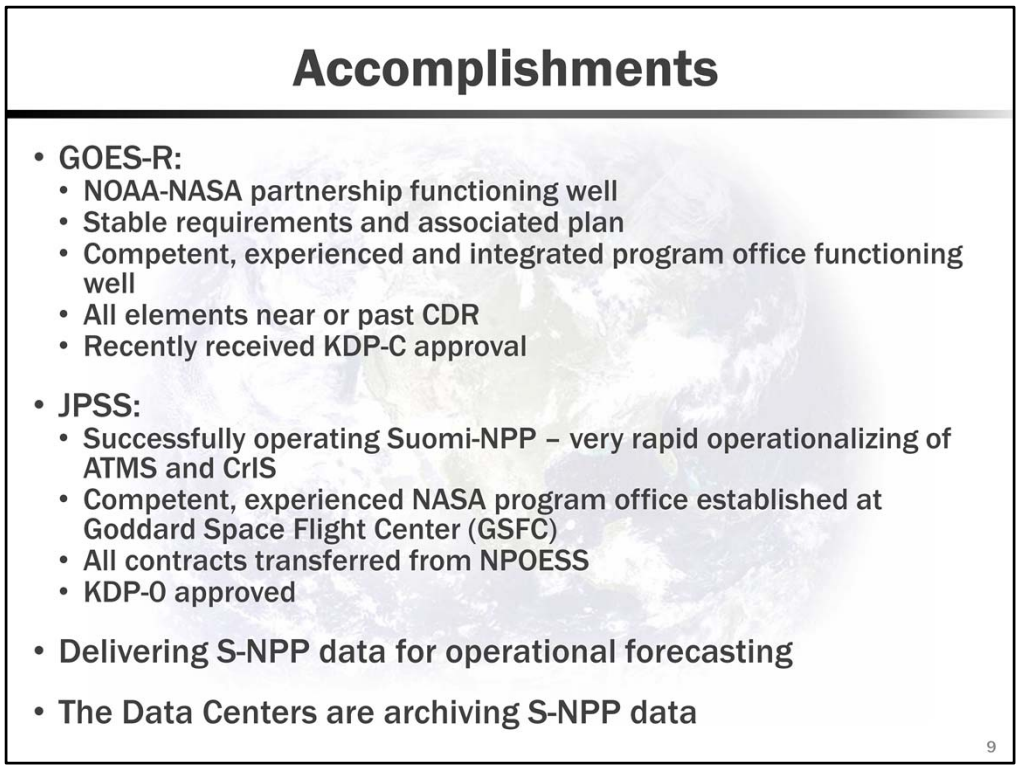
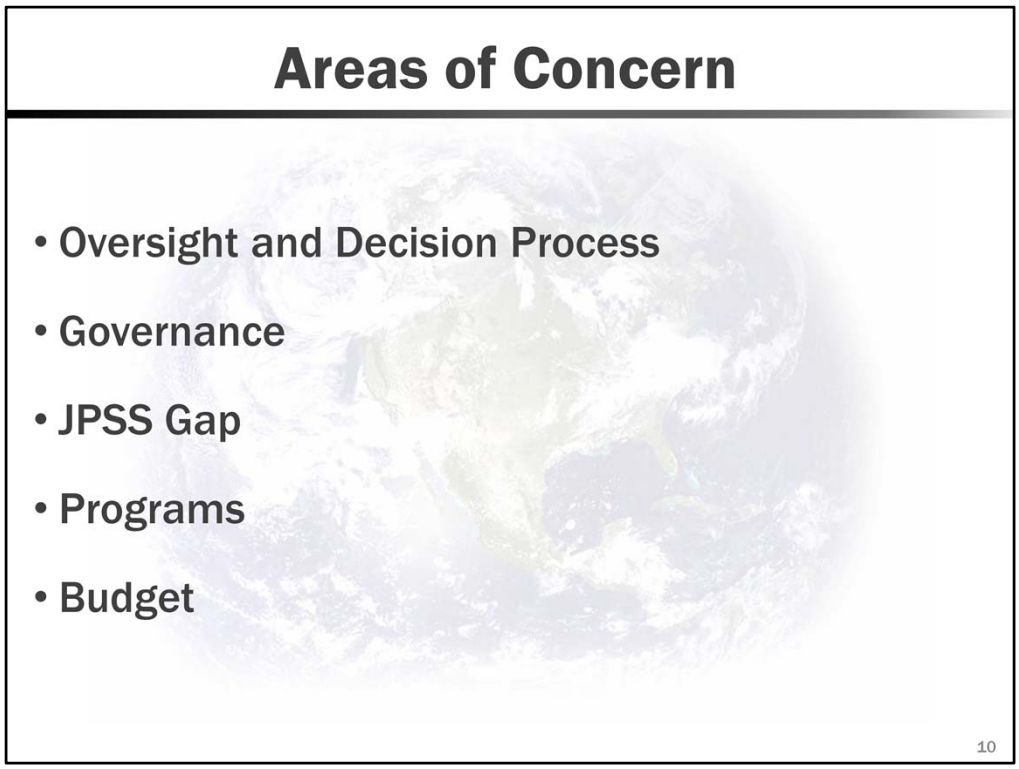


There have been many recent and significant accomplishments across the NESDIS satellite enterprise. The IRT recognizes and values these accomplishments as well as the work and dedication of the NESDIS team.

For GOES-R, the IRT believes the NOAA-NASA partnership is functioning well. The program office team is competent and experienced, and the program has stable requirements. The GOES-R program is progressing, having recently received Key Decision Point (KDP)-C approval with all of its elements near or past Critical Design Review (CDR).

For JPSS, transition has been completed from the National Polar-orbiting Operational Environmental Satellite System (NPOESS), a competent, experienced program office has been established, and all contracts have been transferred. Despite funding challenges, good progress has been made, and KPD-0 approval was received on July 20, 2012. The program has also done a laudable job in operating Suomi-National Polar-orbiting Partnership (S-NPP) and in particular, rapid operationalizing of the Advanced Technology Microwave Sounder (ATMS) and the Cross-track Infrared Sounder (CrIS). All data are now available for public use.

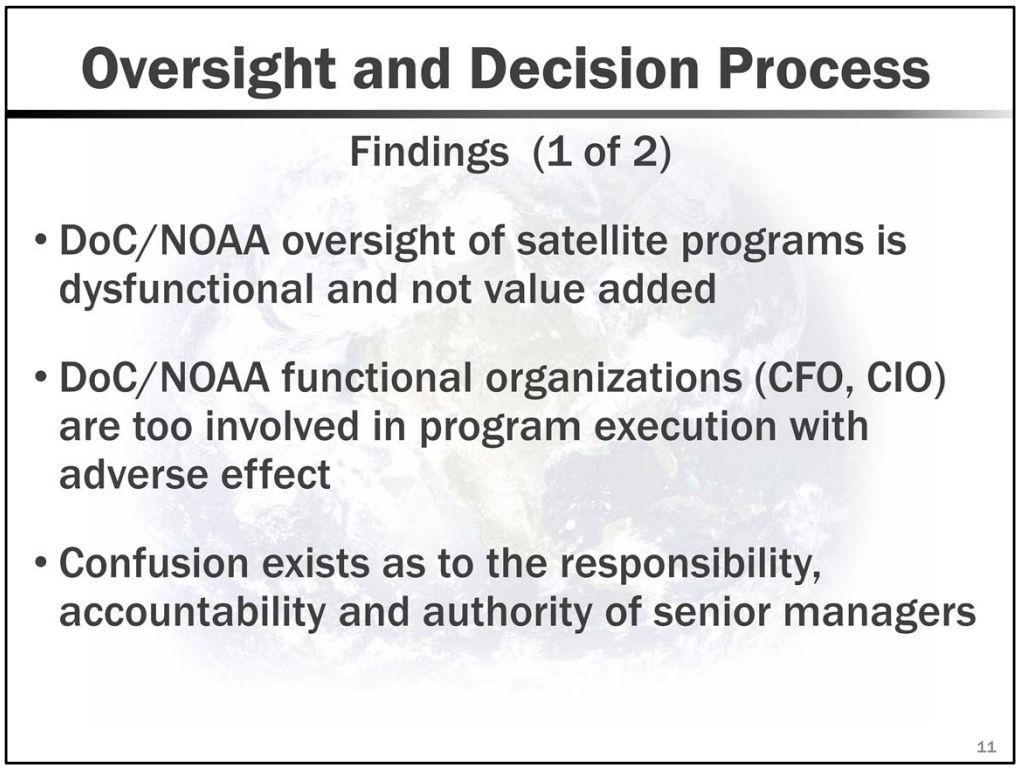
In addition to the JPSS contributions to S-NPP operations, NESDIS is delivering S-NPP data for operational forecasting and the Data Centers are archiving S-NPP data.



While the IRT saw many accomplishments across the NOAA satellite enterprise, the IRT also found several areas of concern. The findings and recommendations developed by the IRT are organized in five major areas:

1) Oversight and Decision Process
2) Governance
3) JPSS Gap
4) Programs and
5) Budget

Each area is discussed in detail in this report.

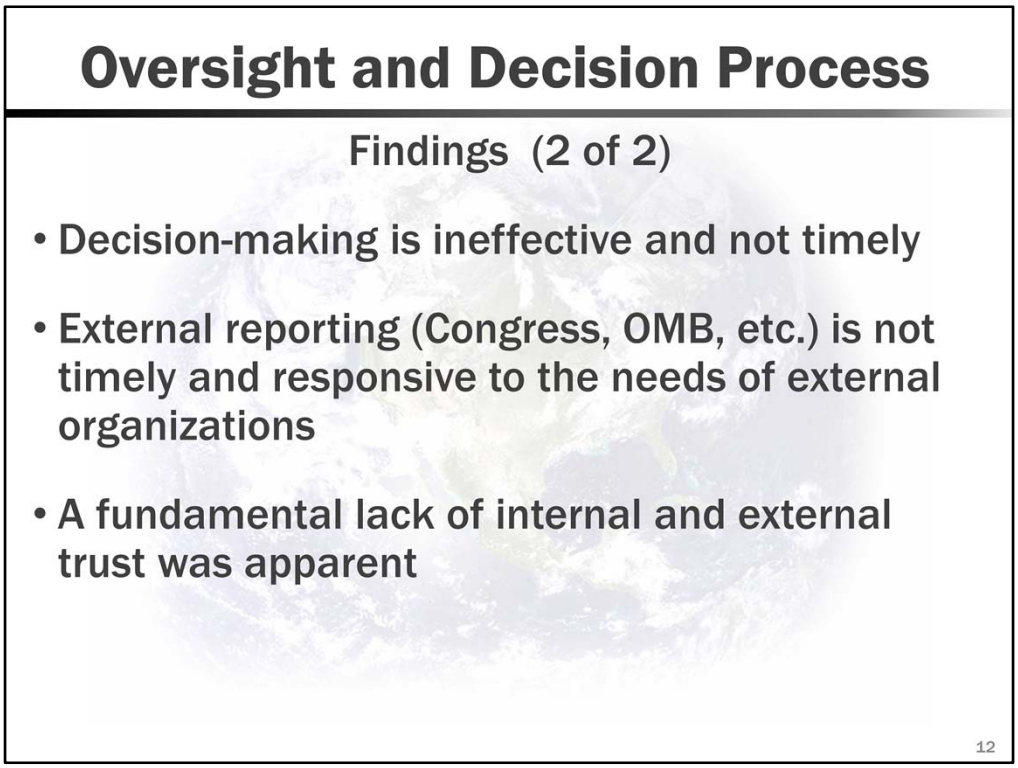


Through multiple reviews and throughout the review process, the IRT found that DoC/NOAA oversight of satellite programs is dysfunctional. Dysfunctional is a strong word and the IRT debated whether it is an appropriate adjective. The IRT concluded that dysfunctional accurately describes the finding. The current oversight process will make the successful execution of GOES-R and JPSS extremely challenging. The sheer volume and detail of information required by all levels about the satellite projects is alarming. Not only does the IRT believe that the volume of information is excessive, it is hard to understand how the status of the projects can be easily and efficiently assessed from such a mass of data. Additionally, the IRT found numerous reviews which appear to have an unnecessarily adversarial character rather than a supportive one that holds NESDIS to a high standard. While checks, balances and holding people accountable are important, it appears that the goal of mission/program success was at times forgotten.

While staff positions are an important and necessary element of an oversight process, the IRT found staff functions to be too involved in program execution. This observation was particularly true for the Chief Financial Officer (CFO) and Chief Information Officer (CIO) functions. Three CIOs – NESDIS, NOAA, DoC – are involved. The volume of reports and reviews stimulated by the CIO function was viewed by the IRT as excessive with a negative impact upon project success.

Similar observations were made relative to the CFO functions. Specifically, the IRT believes the level and scope of involvement of the DoC and NOAA CFOs is significantly out of line with the appropriate level of oversight necessary to be informed of program status and to exercise management responsibility.

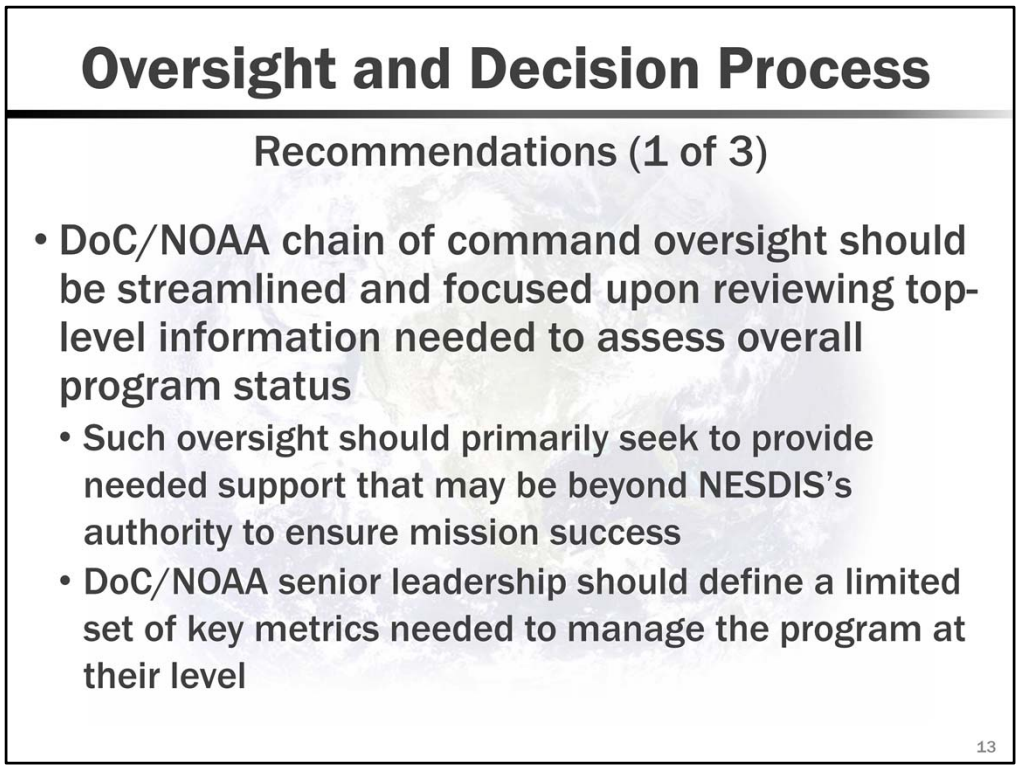
The IRT found some confusion as to the responsibility, accountability and authority of senior managers.



The IRT found decision-making to be neither effective nor timely. This finding was observed at all levels. A primary cause is the failure to empower key individuals to make decisions and report results without excessive review and approval at numerous levels. Project success is greatly compromised by slow and ineffective decision making. The cumbersome and inefficient decision process will at best make it extremely difficult to minimize the gap in weather data and will more likely increase the gap.

Important external organizations view NOAA and its satellite programs negatively because their need for information is not satisfied in a responsive and timely manner. Poor communication seriously and negatively impacts the relationships with these organizations. The cause is much the same as the organizational decision-making process – lack of empowerment of key officials to make decisions and report status.

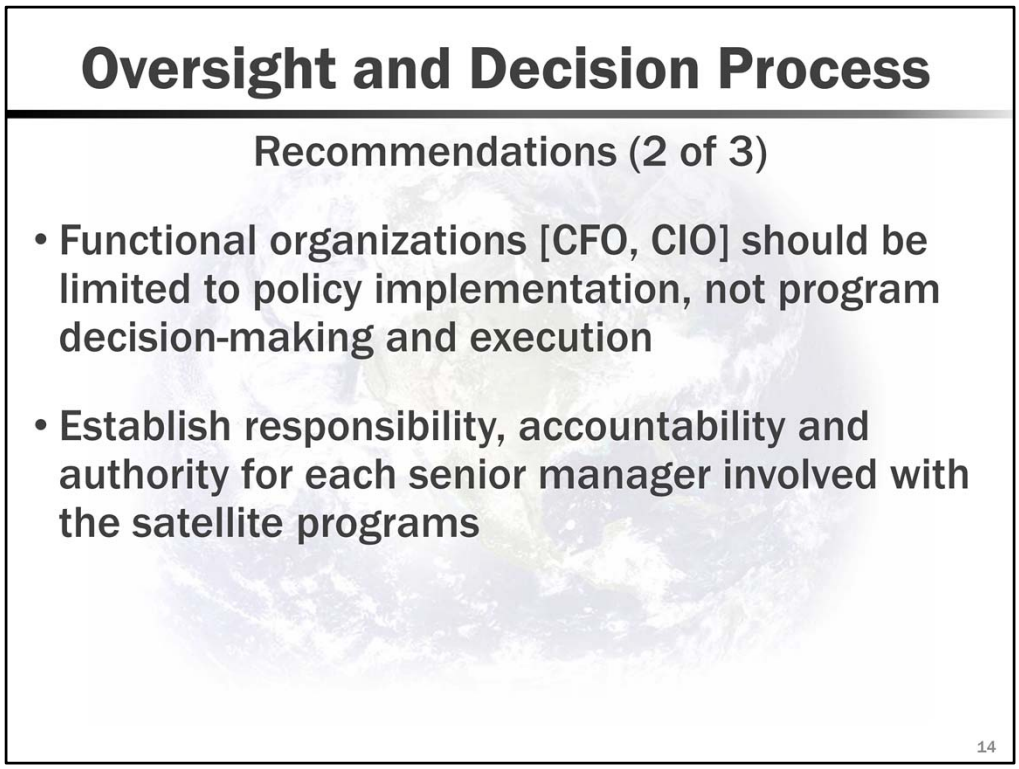
The IRT believes the root cause of the deficiencies found in the oversight and decision-making process is a lack of internal and external trust. The lack of trust is partially the result of the tempestuous experiences during the NPOESS development period. While there is recognition that there is an understandable and legitimate basis for the distrust, the success of the critical NOAA satellite enterprise is dependent upon moving beyond the NPOESS experience and reestablishing a culture of trust.



The IRT finding that the DoC/NOAA oversight is dysfunctional and not value added requires urgent attention. This oversight and decision-making process MUST be corrected. The IRT both understands and supports the need for understanding program status at all levels, including up to the Secretary of Commerce. The current process fails to accomplish this objective efficiently and effectively. The process needs to be streamlined to provide top-level information that concisely communicates program status.

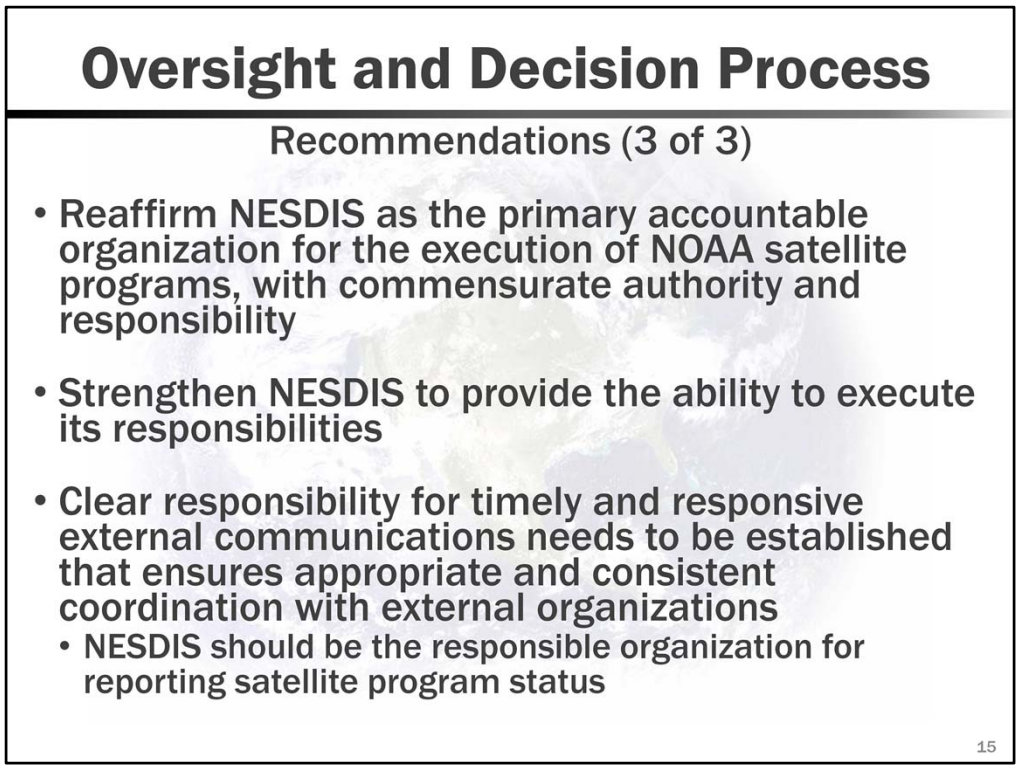
Additionally, some of the oversight reporting has a tone similar to an adversarial audit activity. Instead of reporting that resembles supporting data for an audit, streamlined oversight reporting should seek to support NESDIS to enhance mission success.

DoC/NOAA senior leadership need to define what the streamlined reporting would encompass by identifying a limited set of key metrics that they need to have in order to execute their oversight and management responsibilities.



Functional organizations such as the CFO and CIO are important to an organization but can be intrusive in the implementation and execution of a project. The IRT found this intrusion in GOES-R and JPSS to be excessive. Functional organizations need to be limited to policy implementation and not program decision-making, acquisition and execution.

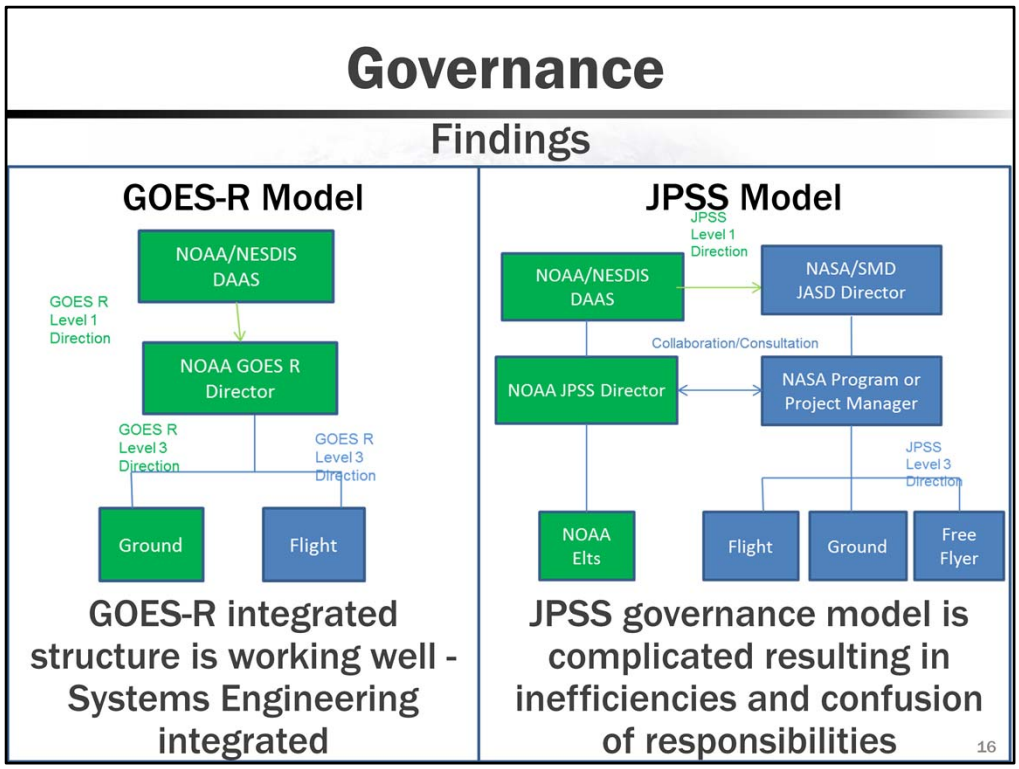
Responsibility, accountability and authority for senior management positions should be clarified and reestablished.



The IRT believes it is mandatory to streamline the oversight and decision-making process in order to have an acceptable probability of success for the NOAA satellite enterprise. The organization responsible for the execution of the satellite enterprise is NESDIS. Currently there is ambiguity and confusion as to the responsibility and authority of NESDIS, particularly because of the onerous oversight. It is of paramount importance that DoC and NOAA reaffirm NESDIS as the primary accountable organization with commensurate authority, responsibility and resources.

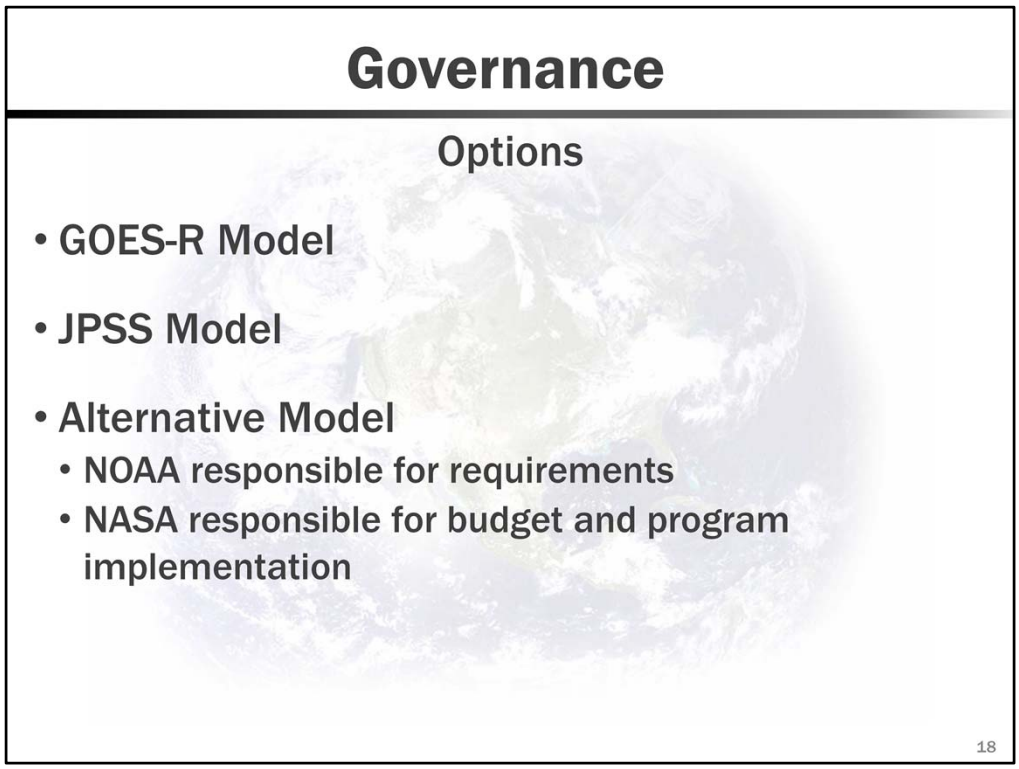
Two major programs, GOES-R and JPSS are being developed at the same time, resulting in significant demands upon NESDIS resources. Currently, NESDIS is not staffed commensurate with the large development responsibilities. NESDIS must be strengthened with the addition of at least two to three experienced project management professionals.

Poor external communications is a major problem that affects NOAA credibility and impacts relationships with critical external organizations. Focusing upon quality versus quantity in response to questions would be a good first step. A crisp, direct and timely response is much preferred to volumes of information delivered late. Limited review of communications will enhance responsiveness. Multiple staff reviews result in significant delays with questionable value added. Reporting on the execution of satellite programs should be the responsibility of NESDIS. If a properly resourced and staffed NESDIS cannot be trusted to responsibly communicate with critical external organizations regarding satellite programs, then there is a major flaw in the DoC/NOAA organization that senior leadership must immediately address.



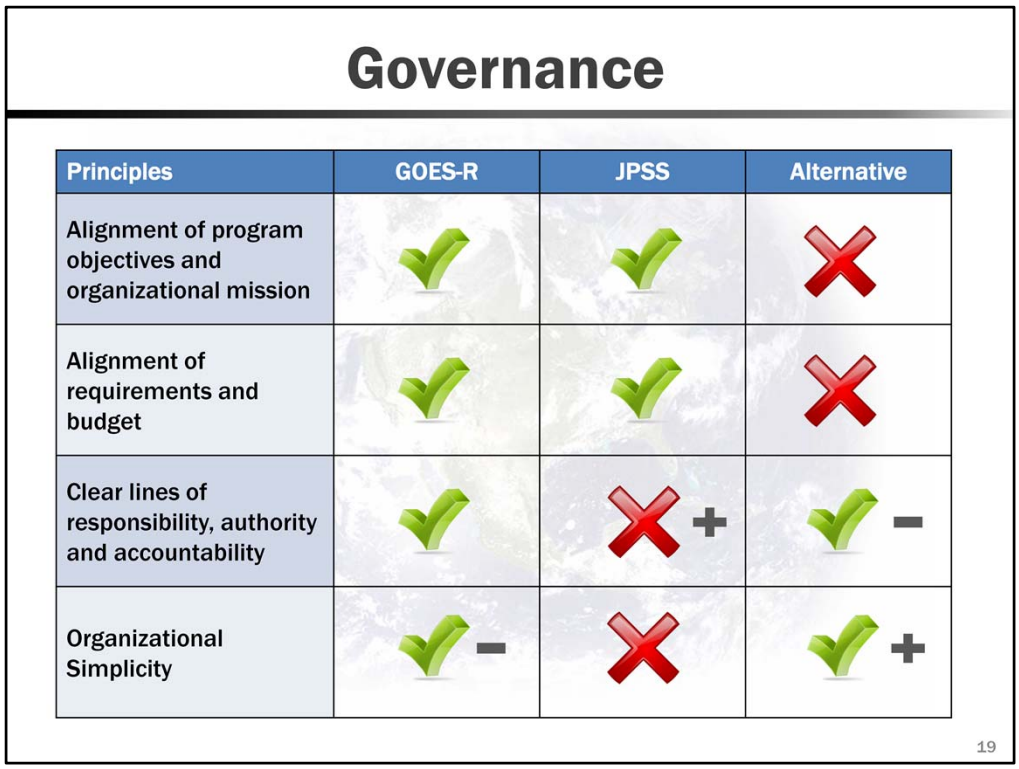
NOAA/NESDIS provided these diagrams (in "Governance discussion for IRT v3") to help describe the differences in the governance models that are used in GOES-R and JPSS. The GOES-R model is an integrated structure, with an integrated Systems Engineering element (not shown) and is working well. The JPSS governance model is more complicated with two parallel structures, including two Systems Engineering elements (not shown). This more complex model increases the amount of communication needed within the team, is not conducive to fostering a "one-badge" team, muddies the roles and responsibilities across the two structures, unnecessarily increases management costs and decreases the probability of mission success.

The IRT believes that there are four attributes or principles that should be considered when establishing a governance concept for a project.



The IRT considered three governance models: the GOES-R model, the JPSS model and an Alternative model.

The GOES-R and the JPSS models were described earlier on slide 16. The Alternative model holds NOAA responsible for requirements and gives NASA the responsibility for budget and program execution.



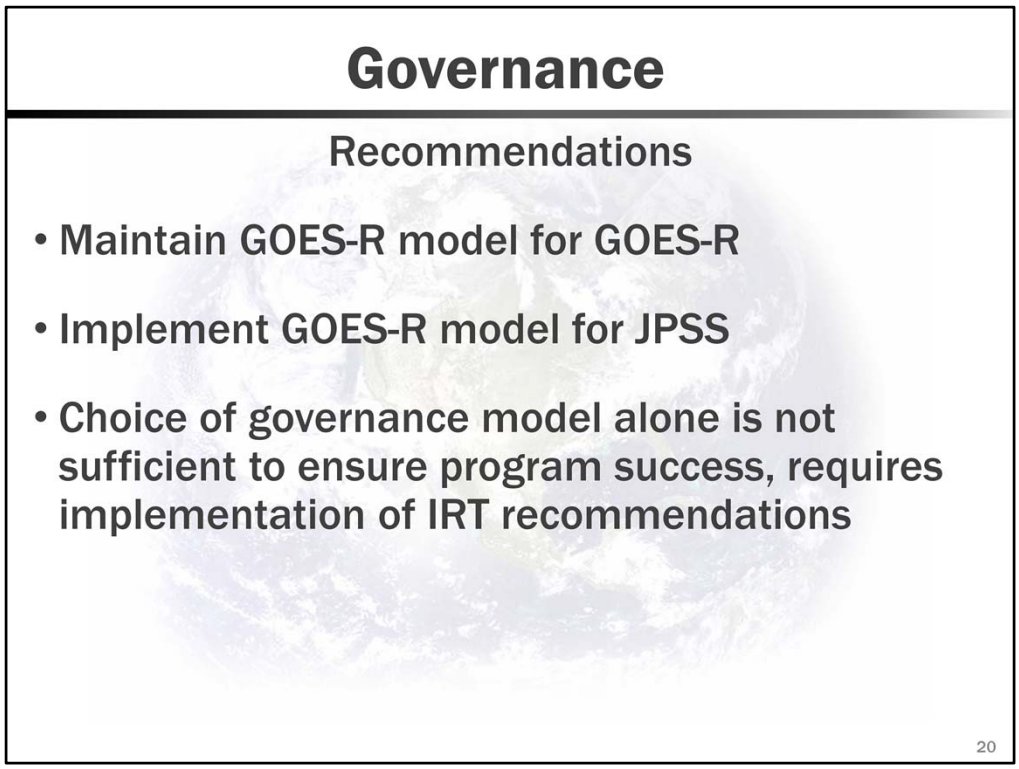
This table illustrates how these three governance models (GOES-R, JPSS and Alternative) either meet or do not meet the principles of success for a governance model.

For the first principle – alignment of program objectives and organizational mission – both the GOES-R and JPSS models meet this principle. In this case, program objectives (e.g., satellite program objective to collect weather data) are aligned with the responsible organization's mission (NOAA's mission to provide weather data). The Alternative model does not meet this principle because program objectives (e.g., satellite program objective to collect weather data) are not aligned or consistent with NASA's organizational mission.

In a similar way, the second principle – alignment of requirements and budget – is also met by the GOES-R and JPSS models. NOAA is responsible for both the requirements and the budget to meet these requirements. The Alternative model falls short in meeting this second principle. The responsibility of the requirements and the responsibility for the budget are organizationally separated.

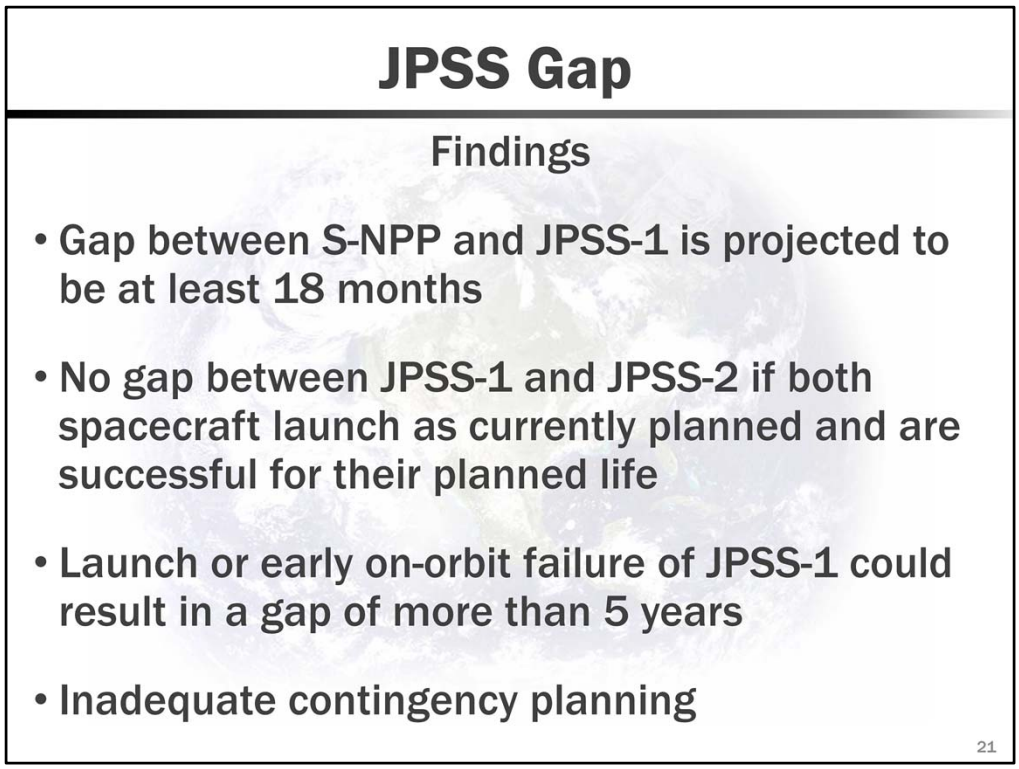
For Principle 3 – Clear lines of responsibility, authority and accountability – the GOES-R model has only one person (NOAA Deputy Assistant Administrator for Systems - DAAS) that provides Level 1 direction to only one Program Director. The GOES-R model meets this principle for success. The JPSS model has the DAAS providing Level 1 direction to the NASA Joint Agency Satellite Division (JASD) Director and the NOAA JPSS Director. The NASA JASD Director then passes down the Level 1 direction to the NASA Program Manager who also coordinates with the NOAA JPSS Director. While the JPSS Management Control Plan attempts to define and describe their respective roles and responsibilities, the JPSS governance structure is not consistent with Principle 3 to provide clear lines of responsibility. For the Alternative model, Principle 3 will largely be met with the program implementation being executed entirely within NASA. With NOAA's responsibility for the requirements, however, it is possible that the Level 1 direction can still come from NOAA (DAAS), but it would probably flow to the JASD Director and then to the NASA Program Director.

For Principle 4 – Organizational Simplicity – the GOES-R model is compliant. However, the integrated nature of the GOES-R team adds some complexity. The JPSS model, with its parallel structure and two Systems Engineering elements is significantly more complex and not consistent with Principle 4. The Alternative Model is the simplest construct of the three, with NASA as the sole organization for program implementation and execution.



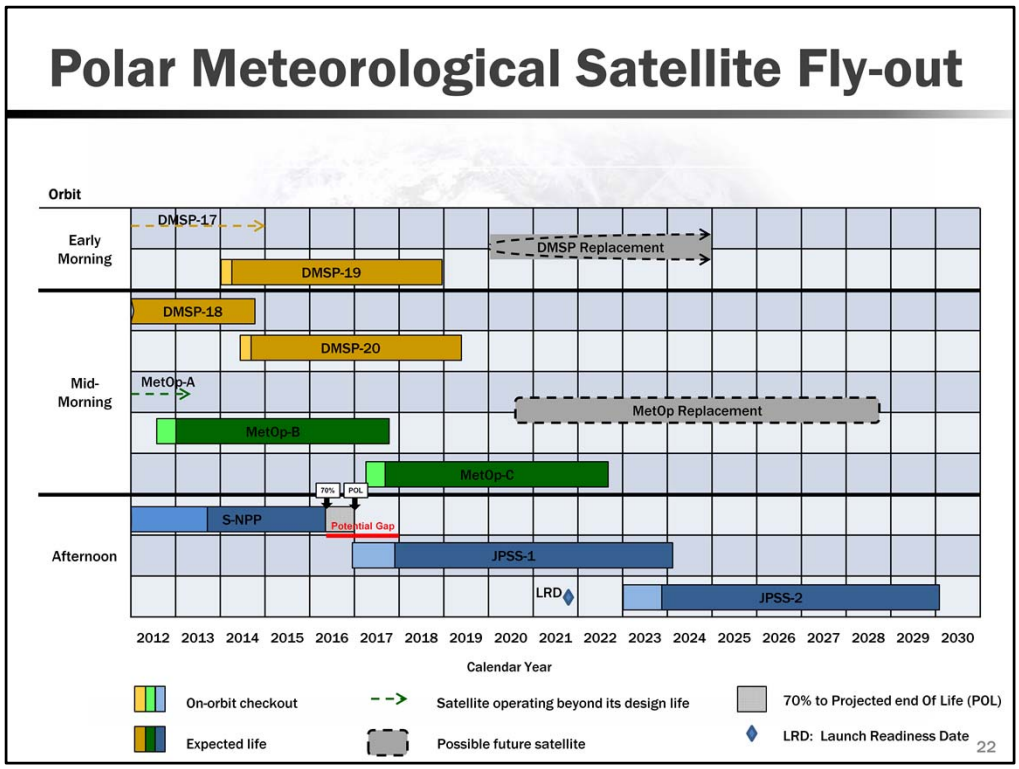
Because the GOES-R model for governance is the most consistent with the principles for success, the IRT recommends not only maintaining its use for the GOES-R program, but also implementing the same model for JPSS. The IRT recognizes that changing the JPSS governance model has some impact; however, the positive benefits are assessed to be significantly greater than the impact.

The IRT strongly emphasizes however, that a governance model alone is not sufficient to ensure program success. A well-structured governance model can enable and enhance the probability for success, but for the NOAA/NESDIS satellite enterprise, success will require the implementation of the IRT recommendations as well.



Gaps in the fundamental observations for weather are a threat to our operational weather forecast system. These gaps threaten life and property. This threat was recognized in the Polar Operational Environmental Satellite (POES) program and Defense Meteorological Satellite Program (DMSP), and these programs were structured to minimize that threat. The current JPSS program is facing two potential gaps. In the current planning schedule, if JPSS-1 were to suffer a launch failure or premature on-orbit failure, then the potential gap between JPSS-1 and JPSS-2 could be multiple years long. This threat must be reduced. The other threat of gap is between the end-of-life on S-NPP and the launch of JPSS-1. Because S-NPP is a new spacecraft that was not designed as an operational mission, and because several of the instruments are new and on their maiden flight, calculation of the S-NPP expected lifetime is difficult. However, any acceleration of JPSS-1 would decrease the possibility of a gap and the length of that gap. Furthermore, if S-NPP is operating well when JPSS-1 is launch ready, then JPSS-1 could be stored on the ground or on orbit and thereby reduce the potential for a gap between JPSS-1 and JPSS-2.

Because of the criticality and the duration of the gaps in operational coverage, NESDIS needs to have aggressive plans to mitigate and reduce the gap lengths, as well as conduct robust contingency planning in the event the gaps occur. The IRT did not see adequate mitigation or contingency planning, and the lack of planning leads the IRT to believe that NESDIS and the JPSS Program Office does not give sufficient priority to reducing these two gaps.



The magnitude of potential gaps is illustrated by the afternoon section of the above chart.

Acronyms:

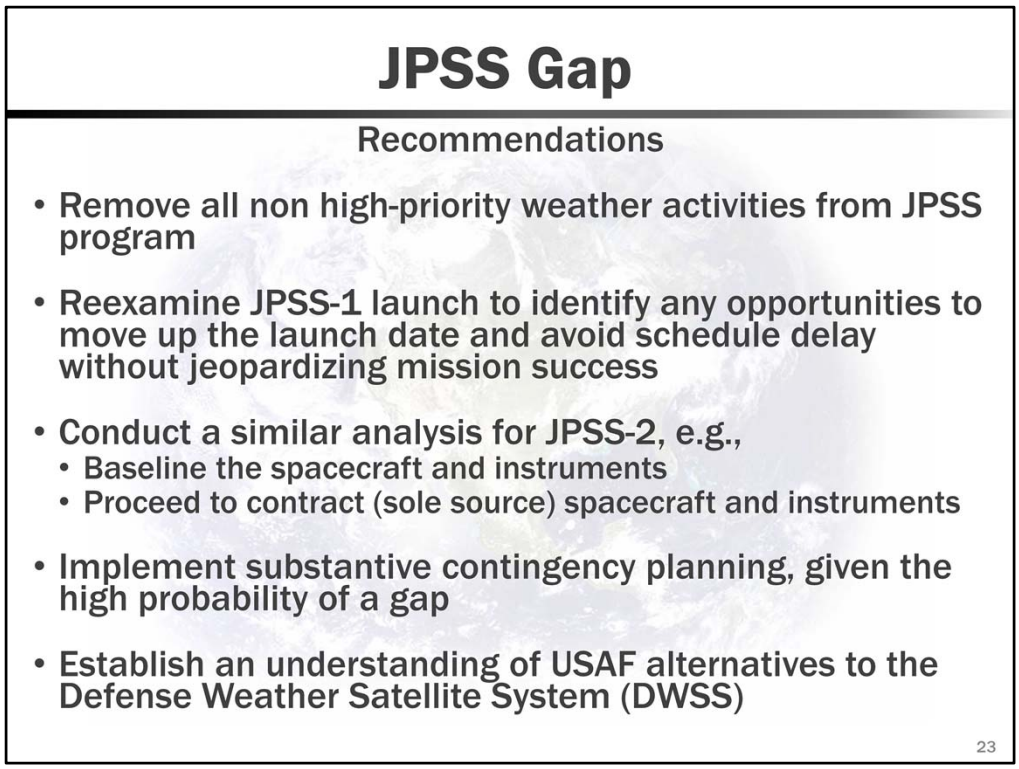
DMSP: Defense Meteorological Satellite Program

MetOp: Europe's operational polar-orbiting weather satellites dedicated to operational meteorology

Sources:

Dates for MetOp, NPP and JPSS satellites are from the JPSS Program office (NESDIS_IRT_JPSS_Presentation_r6 charts)

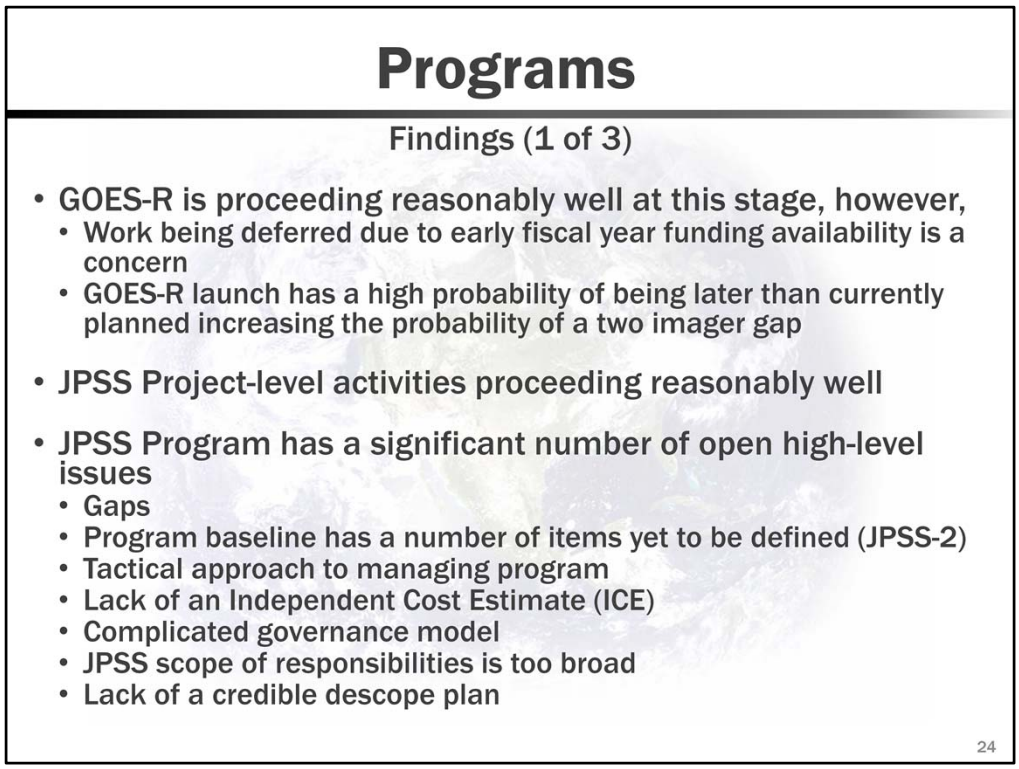
Dates for DMSP satellites are from the Government Accountability Office (GAO) report from June 2012 on JPSS entitled *POLAR-ORBITING ENVIRONMENTAL SATELLITES: Changing Requirements, Technical Issues, and Looming Data Gaps Require Focused Attention*



Launch readiness dates for JPSS-1 and particularly for JPSS-2 need to be advanced. This must be a driving priority. However, resources are limited, and therefore they must be concentrated on this driving priority even at the expense of other elements in the JPSS program. High-risk items that threaten launch date must be aggressively addressed including descoping requirements or using alternatives.

NESDIS and the JPSS program must implement substantive contingency planning given the high probability of a gap in coverage. Alternative methods of obtaining polar weather data should be investigated, including looking at alternative architectures that NOAA could also implement. Additionally, the on-orbit management of S-NPP needs to implement operational procedures to increase its expected lifetime.

Finally, if there is a gap, then the National Weather Service will be ever more dependent on on-orbit capabilities regardless of orbit. However, the capabilities that will be provided by the United States Air Force (USAF) in the early morning orbit beyond DMSP are in question and since these capabilities are important to the forecasts of the National Weather Service, their development and resulting priorities must be carefully monitored and understood by NOAA senior management.

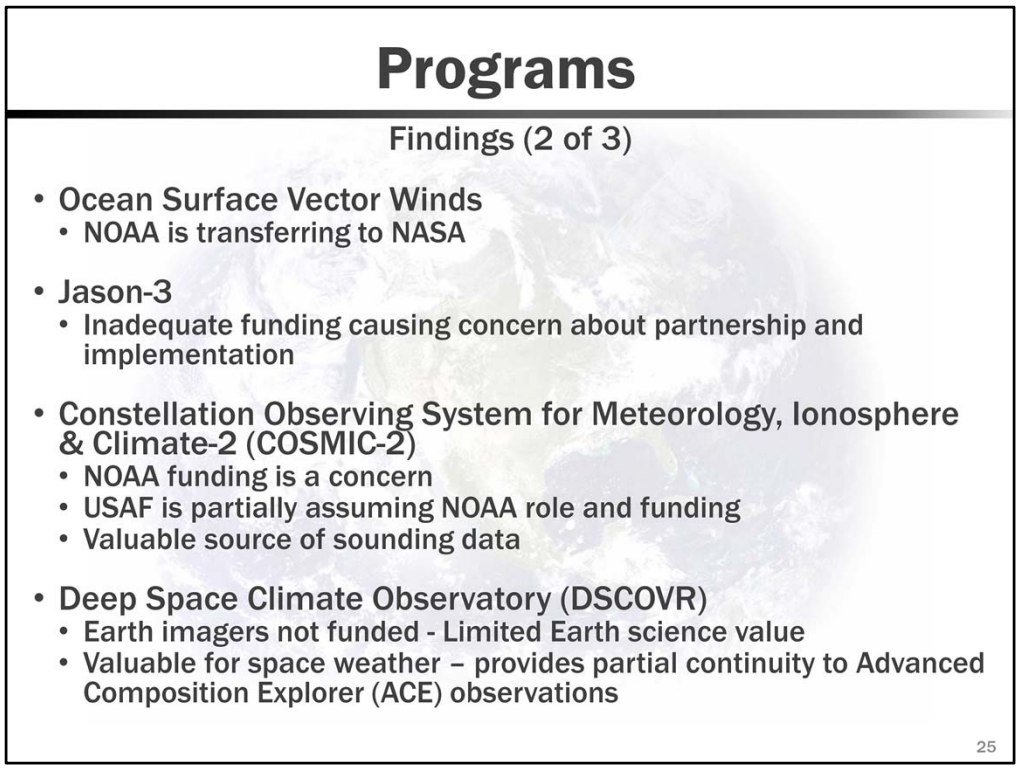


GOES-R is progressing reasonably well and has recently passed KDP-C with all of its elements past the Critical Design Review (CDR). However, because of funding shortfalls in FY12 and FY13, work planned for these years is being moved to later in the project. Deferred work not only increases cost, but increases schedule risk which is a concern.

The first GOES-R scheduled launch date is reported to have a probability of 48% of occurring as planned. It is also important to note that the GOES-R schedule is dependent on planned budget increases in FY13 and FY14. Any impact on this plan by actions such as a "continuing resolution" or further reductions in FY13 and FY14 will have a major program impact. The GOES-R launch availability date has a high probability of being later than currently planned increasing the probability of a two-imager gap.

At the Project level, JPSS is doing reasonably well, in spite of a challenging "governance environment and model," which was discussed earlier. However, there are a significant number of Program-level issues. The first issue is the potential for gaps, which has been addressed.

There are several other issues that need resolution. JPSS-2, for example, has yet to be defined. There is a need for an Independent Cost Estimate (ICE). More discussion on this topic is contained in the budget area of concern. Focus on the entire enterprise has been on overly tactical execution issues while major issues are left open to be closed sometime in the undefined future. The mission and the scope of responsibilities of JPSS are too broad and distracts their attention away from the weather mission. The JPSS program needs to be pruned in scope and be intently focused on the weather mission and on avoiding or minimizing the damaging gaps in continuity of weather-related observations. There is no credible descope plan with significant cost reductions and schedule benefits.



There were constructive actions outside of GOES-R and JPSS but within the satellite enterprise of NESDIS. Following the recommendation of the National Research Council (NRC) Earth Science and Applications Decadal Survey, NESDIS has worked hard to secure funding for an ocean surface vector winds mission. Unfortunately, NESDIS was caught in a very challenging budget environment, and it was unsuccessful in achieving funding support for this mission, consequently NOAA is wisely transferring the mission back to NASA.

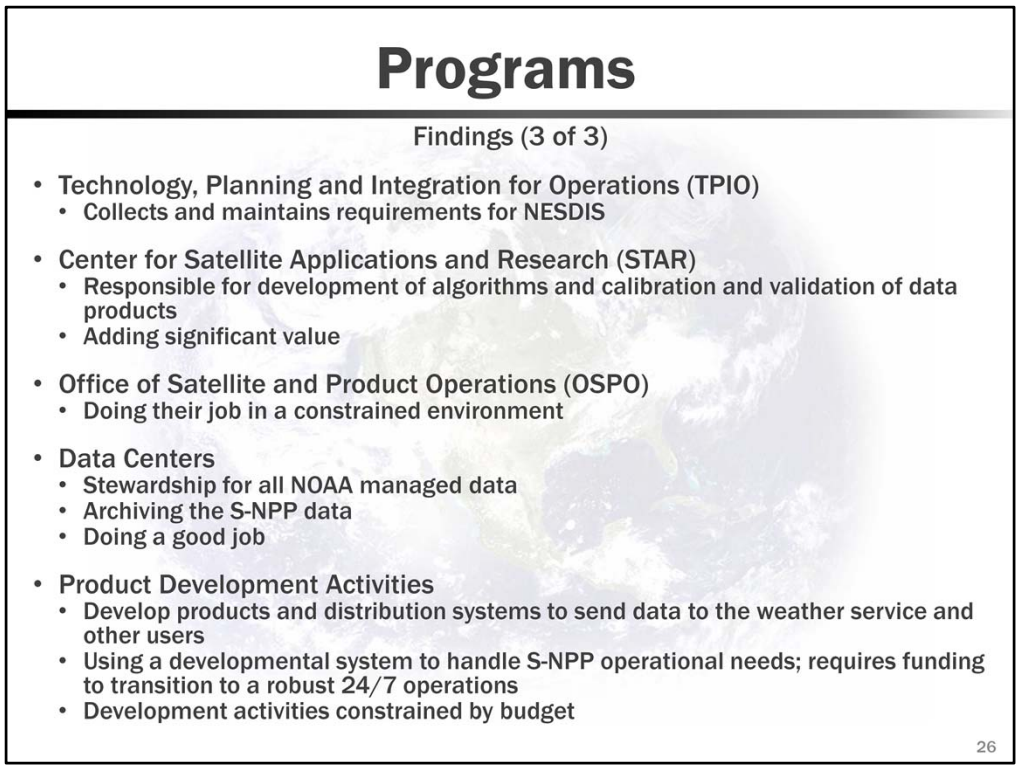
NESDIS has also been assigned responsibility for the sea surface topography mission (Jason-3 and beyond), under the relatively longstanding policy that NASA does not do monitoring missions, but rather once the technology has been demonstrated, then the on-going Earth observing mission responsibility is transferred to NOAA. This transfer of responsibility is not logical. Earth science increasingly requires long time-series and hence monitoring missions will be a fact of life for NASA Earth sciences. Just because the technology has been demonstrated does not automatically make it "operational" nor is there an automatic responsibility for it to transfer to NOAA.

Given a very difficult budget climate, together with the broad scope of NESDIS missions, the IRT does not believe that NESDIS will be able to sustain sufficient funding for Jason-3 which puts it on a high-risk path for launch in 2014.

The Constellation Observing System for Meteorology, Ionosphere & Climate-2 (COSMIC-2) mission offers the potential for relatively inexpensive vertical profiles of temperature and moisture across the globe with high spatial and temporal resolution. These measurements are important, but unfortunately, COSMIC-2 is not funded in the President's proposed FY13 budget for NOAA. Fortunately, the USAF is providing additional development resources and remains committed to the mission.

NOAA is refurbishing the DSCOVR spacecraft, originally developed by NASA for an Earth science mission, to

host a suite of space weather sensors to help forecast geomagnetic storms, which can disrupt power grids, communications, navigation services and endanger astronauts in space. The Solar Heliospheric Observatory (SOHO) and the Advanced Composition Explorer (ACE) satellites, which currently provide space weather forecast services, are operating well beyond their design lifetimes. The USAF is providing a rocket for DSCOVR for a launch readiness date in mid-2014. There is a likelihood that the Earth sensors need to be rebuilt, however, there are no funds available at NOAA or NASA. Funds are not available for processing and distributing the Earth observing data. On the other hand, the DSCOVR mission offers only limited scientific value for Earth science.



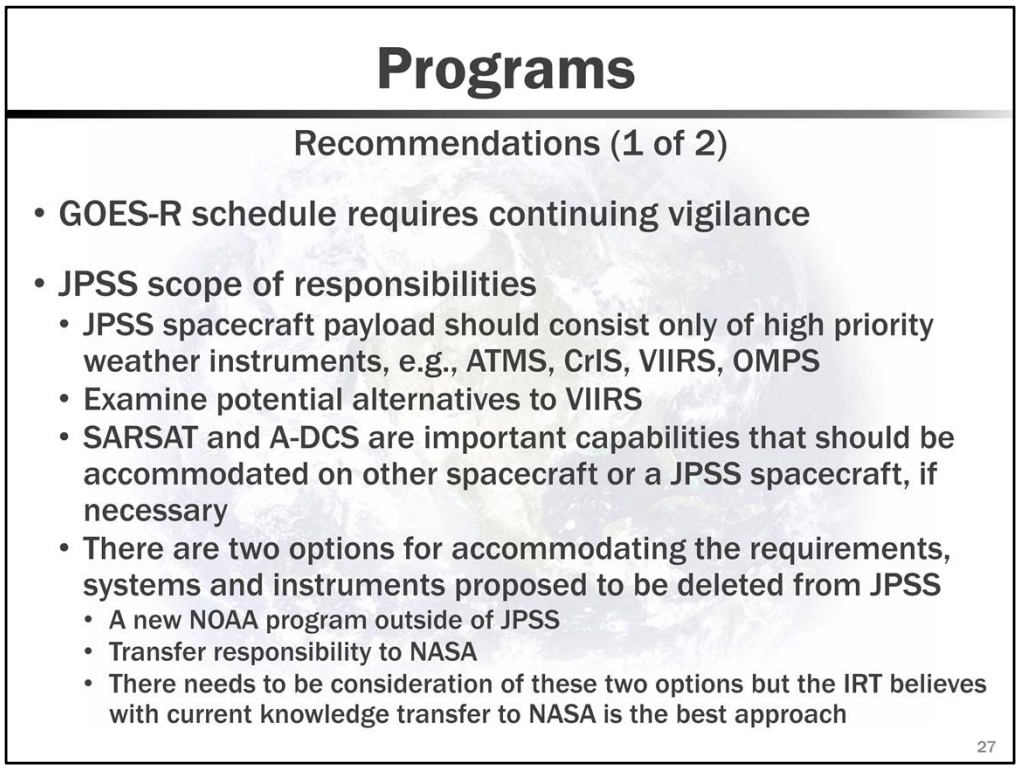
The Technology, Planning and Integration for Operations (TPIO) office manages a validated list of requirements (independent of platform) that are approved by the NOAA Observing Systems Council (NOSC). TPIO does not appear to be involved in requirements trades (within or among requirements) when requirements are allocated to platforms, or when requirement elimination or modification is contemplated.

The Center for Satellite Applications and Research (STAR) validates algorithms that are coded into operational systems, and performs calibration and validation of mission products, for observatory checkout and routinely over the life of a mission. The center provides timely and valuable support to mission success.

The Office of Satellite and Product Operations (OSPO) operates all NOAA environmental satellites and distributes data and derived products to domestic and international customers. OSPO also operates Jason-2 and DMSP and will assume management responsibility for S-NPP in 2013. OSPO coordinates with other weather providers for exchange of data, and manages NOAA's Search and Rescue Satellite Aided Tracking (SARSAT) system. OSPO faces the constant challenge of a constrained budget, and must juggle 24/7 operations with the demands of IT security vigilance, and integration of new missions.

The Data Centers (NCDC, NGDC and NODC) are the stewards of climate, geophysical and oceanographic data from many sources, and distribute data to NOAA and other national and international users. The centers maintain the science integrity and long-term utility of scientific records. Most recently the centers have begun archiving S-NPP data. The centers are agile and well-regarded, and face the challenges of budget reductions.

Product development activities: The Office of Systems Development (OSD) builds systems that create environmental products and distribution systems for delivery of data (including MetOp data) to the National Weather Service, other users and to the Data Centers for archival. Generally, the systems are operated by OSPO. Currently, an OSD developmental system is being used to distribute S-NPP products for use in weather forecasting because of OSPO funding constraints (with consequent slowdown of ongoing development). OSD also provides sustainment for legacy missions.



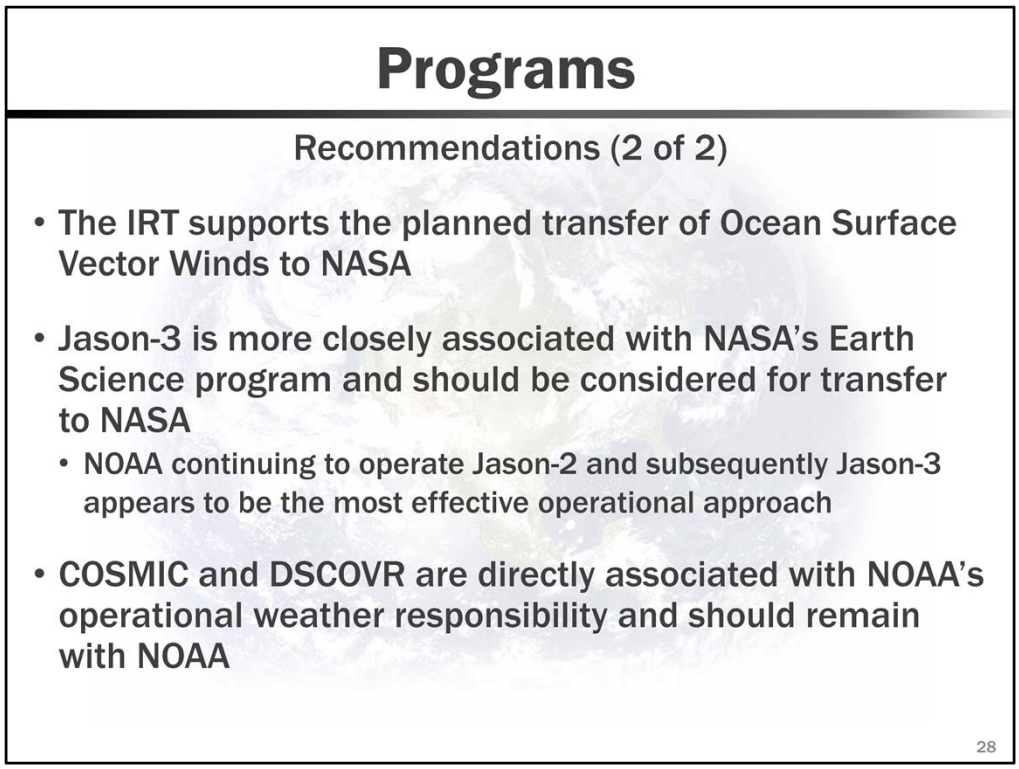
As currently planned and budgeted, the GOES-R launch schedule has a high probability of delay. Given the planned need for significant ramp up of funding in FY13 and 14 and a challenging budget environment, constant vigilance of the GOES-R schedule is required. A later launch date will increase the probability of a two-imager gap, thus it is important to be prepared for this possibility with contingency planning.

The JPSS mission should focus upon observations needed for weather forecasting and the operational monitoring of ozone. Given the experience of cost and schedule growth of the Visible Infrared Imager Radiometer Suite (VIIRS) and the fact that the POES Program had imaging capability, an alternative imaging capability should be explored in case a descope is necessary. SARSAT and the Advanced Data Collection System (A-DCS) are important operational capabilities, which should be maintained. All flight options should be explored; flight on JPSS should only be utilized if there is no impact on schedule. The IRT does not favor a NOAA-provided flight on a free flyer for A-DCS and/or SARSAT.

The Clouds and the Earth's Radiant Energy System (CERES) is currently manifested for JPSS-1 but it is not needed for the operational weather mission, nor is the Total Solar Irradiance Sensor (TSIS), which is in the JPSS Program, and potentially manifested for flight on a free flyer. Flight of CERES and TSIS should be addressed by either a new NOAA flight program, outside of JPSS, or by transfer of flight responsibility to NASA. The IRT favors the latter. CERES and TSIS in combination of some aspect of the Climate Absolute Radiance and Refractivity Observatory (CLARREO) mission could be the foundation for an Earth radiation mission, which would be best accomplished within NASA.

Program savings from these recommendations should be used to reduce programmatic gaps and to address any JPSS funding shortfalls.

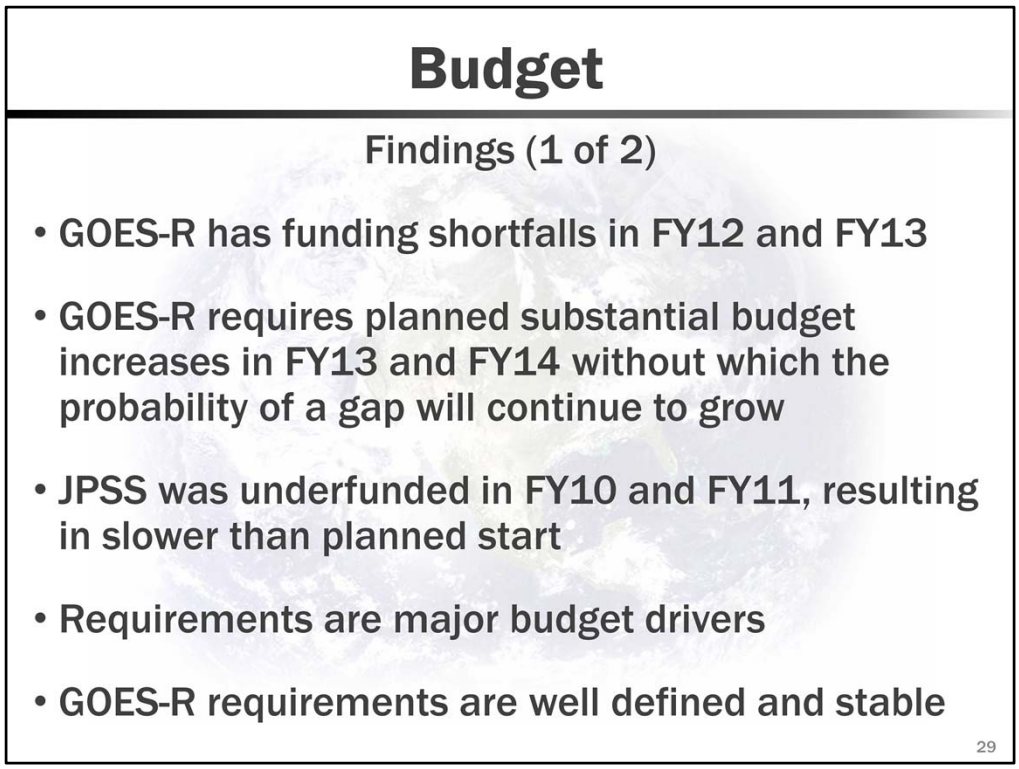
Acronyms:
OMPS: Ozone Mapper Profiler Suite



The IRT supports the positive response from NASA on the proposed transfer of an Ocean Surface Vector Winds mission.

The transfer of Jason-3 to NASA should be strongly considered; however, satellite operations would stay with NOAA (in continued collaboration with European Organisation for the Exploitation of Meteorological Satellites – EUMETSAT) and utilize the current system for Jason-2. The potential transfer should also be done in a manner that reinforces the foreign partnerships with National Centre for Space Studies (CNES) and EUMETSAT. The launch vehicle is currently under contract through a reimbursable agreement with NOAA. Given the short time horizon, this contractual relationship should be retained.

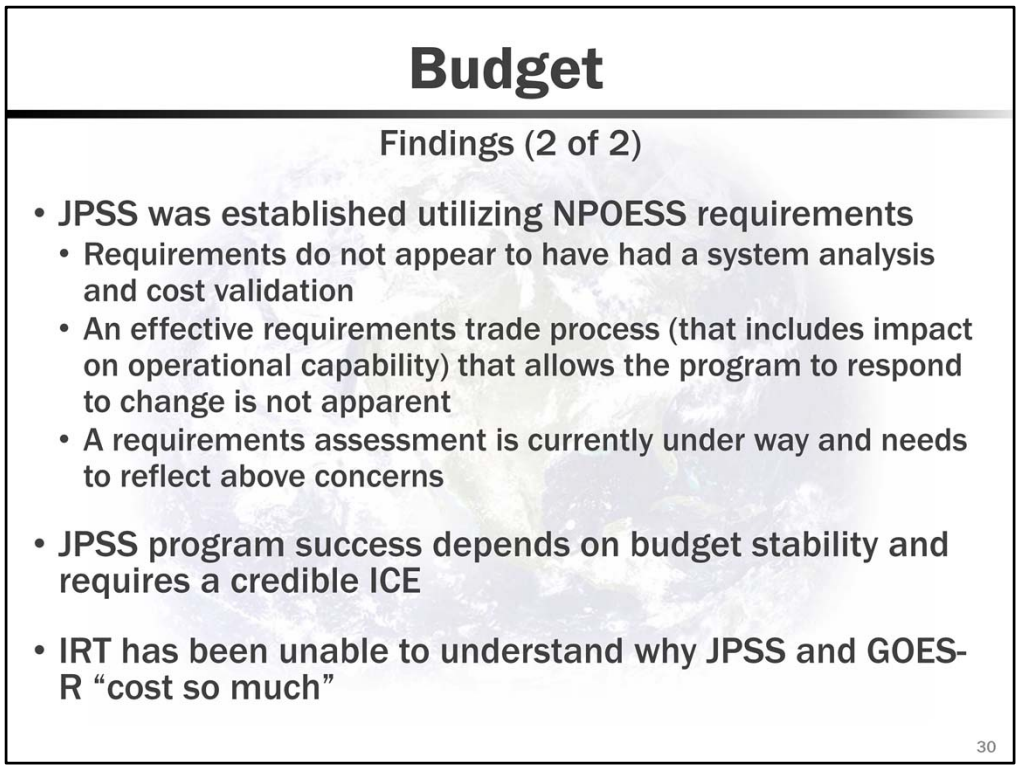
The challenge associated with COSMIC-2 and DSCOVR for NOAA is one of adequate budget and the pressure to accommodate the Earth science aspect of DSCOVR, including any refurbishing of the Earth science instruments and supporting the ground processing. Close collaboration with the USAF on COSMIC-2 will be important as well as its inclusion in the FY14 NOAA budget. For DSCOVR, the focus should be on its space weather capabilities. Any funding from either NASA or NOAA for the Earth science applications should be limited.



Establishing budgets that are consistent with most probable total cost of a project and the most probable cost in each fiscal year is one of the most fundamental bases of a successful project. The IRT did not validate budgets, however, observations of the status of budgets provided some insight. GOES-R has funding shortfalls in FY12 and FY13. These shortfalls moved work planned for these years to later in the project. Cost will increase due to this action at the rate of approximately three dollars for each dollar of work deferred. Additionally, launch dates will be impacted.

The first GOES-R scheduled launch date is reported to have a probability of 48% of occurring as planned. This, in combination with the practice of deferring work to later years is a cause for concern. A later launch date will increase the probability of a two-imager gap, thus it is important to be prepared for this possibility with contingency planning. It is also important to note that the GOES-R schedule is dependent on planned budget increases in FY13 and FY14. Any impact on this plan by actions such as a "continuing resolution" will have a major program impact.

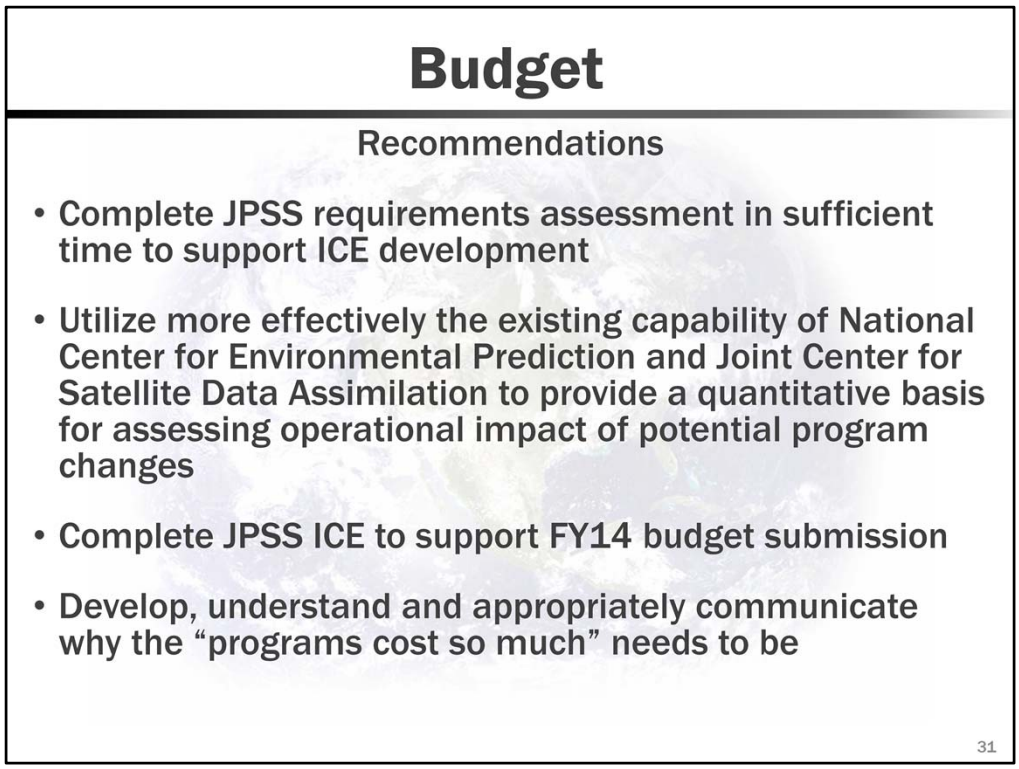
JPSS is in an earlier phase of its development when compared to GOES-R. The program had a slower than planned start due to the FY10 and FY11 budget constraints. Consequently, the JPSS program slipped the planned launch readiness date.



JPSS was established utilizing NPOESS requirements without a substantive systems analyses and cost validation. In fact, JPSS-1 is essentially a clone of S-NPP, with a few upgrades and replacement of obsolete parts. There is much attention to the total life cycle cost of JPSS and actions are being taken with the assumption that these JPSS costs are credible. This may be true, however, history on many other programs including GOES-R is that cost credibility, as well as cost confidence and budget stability cannot be realized until a credible Independent Cost Estimate (ICE) is developed. The IRT believes caution needs to be exercised because appropriate, grounded decisions cannot be made until a credible ICE is completed and understood. It should be noted that the IRT does not know if the current $12.9B is high, low or exactly correct.

In preparation for the ICE process, a requirements assessment is a necessary prerequisite and a requirements trade process is necessary to support potential decisions.

A common question is why JPSS cost so much. This question also applies to GOES-R. The IRT also believes this question is appropriate. Considerable attention was given to this question during the review, with a total lack of success in achieving an understanding as to the answer.

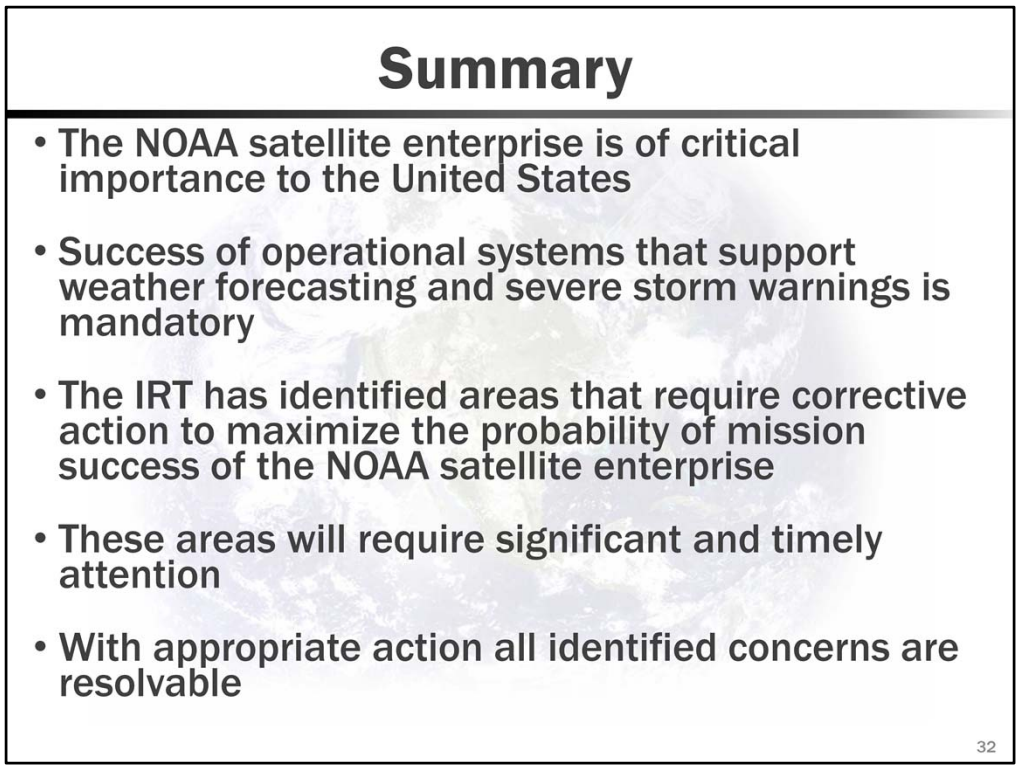


The IRT also believes the JPSS requirements assessment is necessary as an input to the ICE process.

The IRT was introduced to an existing capability at the National Center for Environmental Prediction (NCEP) and the Joint Center for Satellite Data Assimilation that maybe useful for assessing the operational impact of potential program changes. The IRT suggests this capability be investigated to assess its potential utility.

The current plan for developing an ICE is in calendar 2013 which is after the FY14 budget submission. It is also after many JPSS programmatic decisions are made. The IRT believes this is too late and an ICE is needed as soon as possible.

The IRT believes that the question of "Why the programs cost so much" is an important issue that affects credibility of the program and NOAA. Understanding the answer is also important for cost trades that may be necessary in future budget deliberations. The IRT recommends a small ad hoc group be established to determine the answers to this important question first for JPSS and subsequently for GOES-R.



The success of the NOAA satellite enterprise is critical to the United States. The program contributes to the economy, national security and to safety and quality of life. The IRT has identified corrective actions that are required to assure an acceptable probability of success of the total program. Many of these recommendations require timely action. While the IRT cannot over emphasize the importance of implementing the recommendations included in this report, the IRT believes all identified concerns are resolvable.

Appendix A

IRT Members and Support

IRT Members and Support

• A. Thomas Young	IRT Chair
• Dr. William F. Ballhaus, Jr.	Member
• Maj Gen (ret) Donald G Hard	Member
• Dr. Berrien Moore III	Member
• Gen (ret) Thomas S Moorman	Member
• Dolly Perkins	Member
• Dr. Joseph H. Rothenberg	Member
• Dr. John Schaake	Member
• Dr. Joe M. Straus	Member
• William Townsend	Member

IRT Secretariat Staff:

• Curt Munechika	Executive Secretary
• Aaron Johnson	Executive Support
• Danielle Mansour	Executive Support

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IRT Member Biographies

IRT Member	Previous Experience
A. Thomas Young	• President, Martin Marietta Corporation • Director, Goddard Space Flight Center • Chairperson of numerous IRTs for civil and national security sectors
Dr. William F. Ballhaus, Jr.	• President & CEO, Aerospace Corporation • Corporate VP Engineering & Technology, Lockheed Martin Corp. • Director, NASA Ames Research Center
Donald G. Hard, Maj Gen, USAF (Retired)	• Director of Space and Strategic Defense Initiative Programs • Vice Director, Secretary of the Air Force Office of Special Projects • Commander, Air Force Satellite Control Facility
Dr. Berrien Moore III	• VP For Weather & Climate Programs, University of Oklahoma • Executive Director, Climate Central • Director, Institute for the Study of Earth, Oceans and Space, University of New Hampshire
Thomas S. Moorman, General, USAF (Retired)	• Vice Chief of Staff, United States Air Force • Commander, Air Force Space Command • Recipient of Space Foundation Lifetime Achievement Award
Dolly Perkins	• Deputy Director, Technical, Goddard Space Flight Center • Director, Flight Projects, Goddard Space Flight Center
Dr. Joseph H. Rothenberg	• Associate Administrator for Space Flight, NASA HQ • President & Board Member, Universal Space Networks • Director, Goddard Space Flight Center
Dr. John Schaake	• Deputy Director of the Hydrologic Research Laboratory, NWS • Deputy Director of the Office of Hydrology, NWS • Office of Hydrological Development, NWS
Dr. Joe Straus	• Executive Vice President, Aerospace Corporation • Chair, Space Communications and Navigation Committee, International Astronautical Congress • Standing Review Board Chair, JPSS
William Townsend	• Standing Review Board Chair, GOES-R • VP, Exploration Systems, Ball Aerospace & Technologies Corp. • Deputy Director, Goddard Space Flight Center

Appendix B

Interviews Conducted

Interviews Conducted

Name	Org	Title
Mary Kicza	NESDIS	Assistant Administrator
Greg Mandt	NOAA	GOES-R System Program Director
Chris Scolese	NASA	Director, Goddard Space Flight Center
Jane Lubchenco	NOAA	Under Secretary of Commerce for Oceans and Atmosphere; Administrator, NOAA
Suzanne Hilding	NESDIS/OSD	Director, Office of Systems Development (OSD)
Simon Szykman	DOC	Chief Information Officer (CIO) of the Department of Commerce
Charles Baker	NESDIS	Deputy Assistant Administrator; Former Acting Deputy Under Secretary for Operations, NOAA
Joe Klimavicz	NOAA	NOAA CIO and Director for High Performance Computing and Communication
Harry Cikanek	NESDIS/JPSSO	JPSS Director
Maureen Wylie	NOAA	Former Chief Financial Officer; Chief, Resource and Operations Management
Mitch Ross	NOAA	Director, NOAA Office of Acquisition and Grants
Hari Sastry	DOC	Deputy Assistant Secretary for Resource Management
Barry Berkowitz	DOC	Senior Procurement Executive and Director of Acquisition Management
Scott Quehl	DOC	Chief Financial Officer and Assistant Secretary for Administration
Kathryn Sullivan	NOAA	Assistant Secretary of Commerce for Environmental Observation & Prediction; Deputy Administrator and Acting Chief Scientist, NOAA

Interviews Conducted

Name	Org	Title
Rebecca Blank	NOAA	Acting Secretary of Commerce; Deputy Secretary of Commerce
Mary Glackin	NOAA	Former Deputy Under Secretary for Operations
Greg Robinson	NASA	Former NOAA Deputy Assistant Administrator for Systems; Deputy Chief Engineer NASA
Preston Burch	NASA	NASA JPSS Program Manager
David Schurr	NASA	NASA Joint Agency Satellite Division Deputy Director
Michael Freilich	NASA	Director, Earth Science Division
George Morrow	NASA	Director, Flight Projects Directorate
Louis Uccellini	NOAA	Director of the National Weather Service, National Centers for Environmental Prediction (NCEP)
RADM David Titley	NOAA	Deputy Under Secretary for Operations (DUS/O) at NOAA

Appendix C

Acronyms

Acronyms

ACE	Advanced Composition Explorer
A-DCS	Advanced Data Collection System
ATMS	Advanced Technology Microwave Sounder
CDR	Critical Design Review
CERES	Clouds and the Earth's Radiant Energy System
CFO	Chief Financial Officer
CIO	Chief Information Officer
CLARREO	Climate Absolute Radiance and Refractivity Observatory
CNES	National Centre for Space Studies
COSMIC	Constellation Observing System for Meteorology, Ionosphere & Climate
CrIS	Cross-track Infrared Sounder
DAAS	Deputy Assistant Administrator for Systems
DMSP	Defense Meteorological Satellite Program
DoC	Department of Commerce
DSCOVR	Deep Space Climate Observatory
DUS/O	Deputy Under Secretary for Operations
DWSS	Defense Weather Satellite System
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
GOES-R	Geostationary Operational Environmental Satellite – R Series
GSFC	Goddard Space Flight Center
ICE	Independent Cost Estimate
IRT	Independent Review Team
JASD	Joint Agency Satellite Division
JPSS	Joint Polar Satellite System
KDP	Key Decision Point
LRD	Launch Readiness Date
MetOp	Europe's operational polar-orbiting weather satellites dedicated to operational meteorology

NASA	National Aeronautics and Space Administration
NCDC	NCDC: National Climatic Data Center
NCEP	National Center for Environmental Prediction
NESDIS	National Environmental Satellite, Data, and Information Service
NGDC	NGDC: National Geophysical Data Center
NOAA	National Oceanic and Atmospheric Administration
NODC	NODC : National Oceanographic Data Center
NOSC	NOAA Observing Systems Council
NPOESS	National Polar-orbiting Operational Environmental Satellite System
NRC	National Research Council
OMB	OMB: Office of Management and Budget
OMPS	Ozone Mapper Profiler Suite
OSD	Office of Systems Development
OSPO	Office of Satellite and Product Operations
OSTP	OSTP: House Office of Science and Technology Policy
POES	Polar Operational Environmental Satellite
POL	Projected end Of Life
SARSAT	Search and Rescue Satellite Aided Tracking
S-NPP	Suomi-National Polar-orbiting Partnership
SOHO	Solar Heliospheric Observatory
SRB	Standing Review Boards
STAR	Center for Satellite Applications and Research
TPIO	Technology, Planning and Integration for Operations
TSIS	Total Solar Irradiance Sensor
USAF	United States Air Force
VIIRS	Visible Infrared Imager Radiometer Suite

Appendix D

Back-Up Charts

JPSS and GOES-R Governance

Differences Chart – Flow of Level 1 Direction, Need for NASA Program

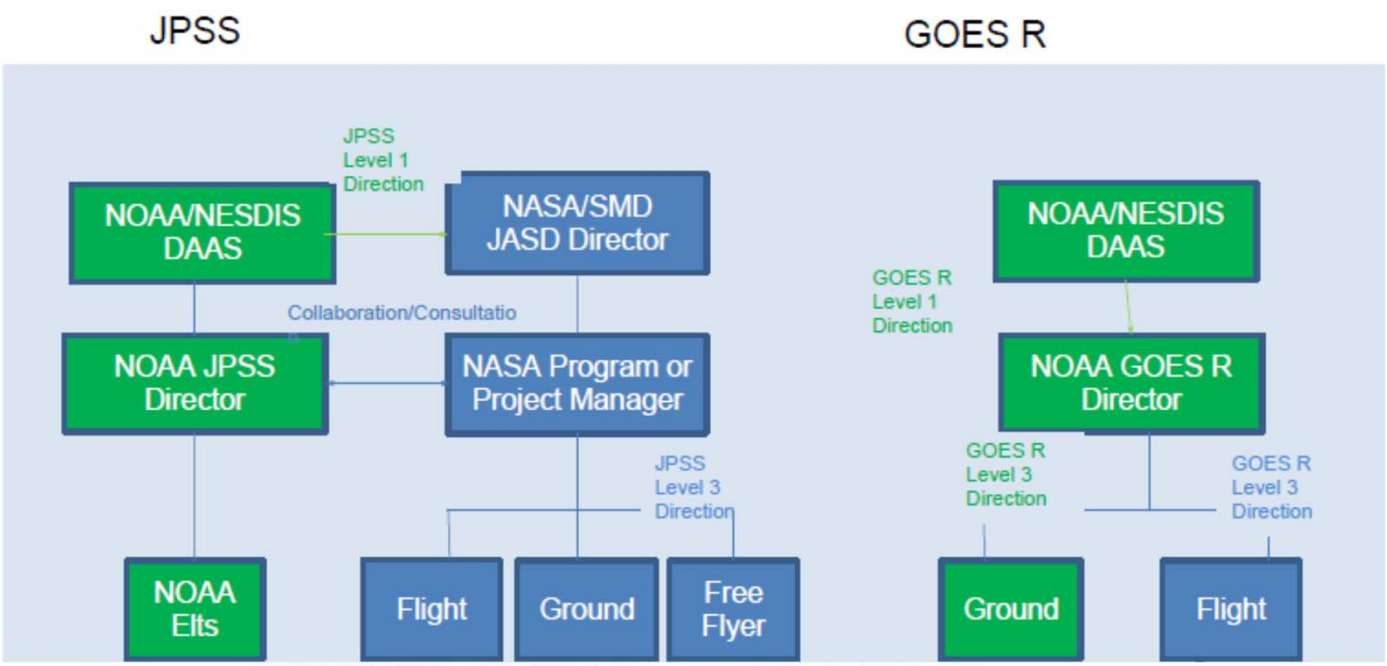

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Chart from "Governance discussion for IRT v3" provided by NOAA/NESDIS