



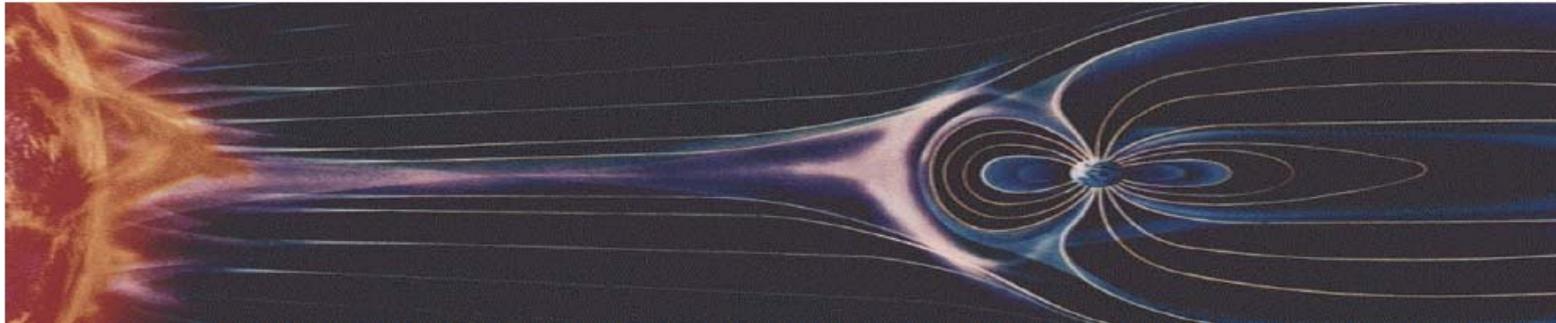
*DoD Operational Space
Weather Requirements
Process
Overview*

19 May 2009

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HQ AFSPC/A5**



Space Weather—System/Service Impacts



Electromagnetic Radiation

EFFECTS

- HF RADIO BLACKOUT
- SATCOM INTERFERENCE
- RADAR INTERFERENCE
- SATELLITE ORBIT DECAY
- GEOLOCATION ERRORS

High Energy Charged Particles

EFFECTS

- SATELLITE DISORIENTATION
- SPACECRAFT DAMAGE
- FALSE SENSOR READINGS
- LAUNCH PAYLOAD FAILURE
- HF RADIO BLACKOUT

Electrically Charged Particle Clouds

EFFECTS

- GEOLOCATION ERRORS
- SATCOM DISRUPTIONS
- SPACECRAFT ANOMALIES
- SATELLITE ORBIT DECAY
- RADAR FALSE TARGETS

Sample Impacts

- SATCOM interruptions
- Worldwide HF comm blackouts
- Lost contacts with Air Force One
- Premature satellite orbit decay
- Hundreds of satellite ops disruptions
- Dozens of failed satellite subsystems
- 1300 orbiting objects lost
- Six million people lost electrical power



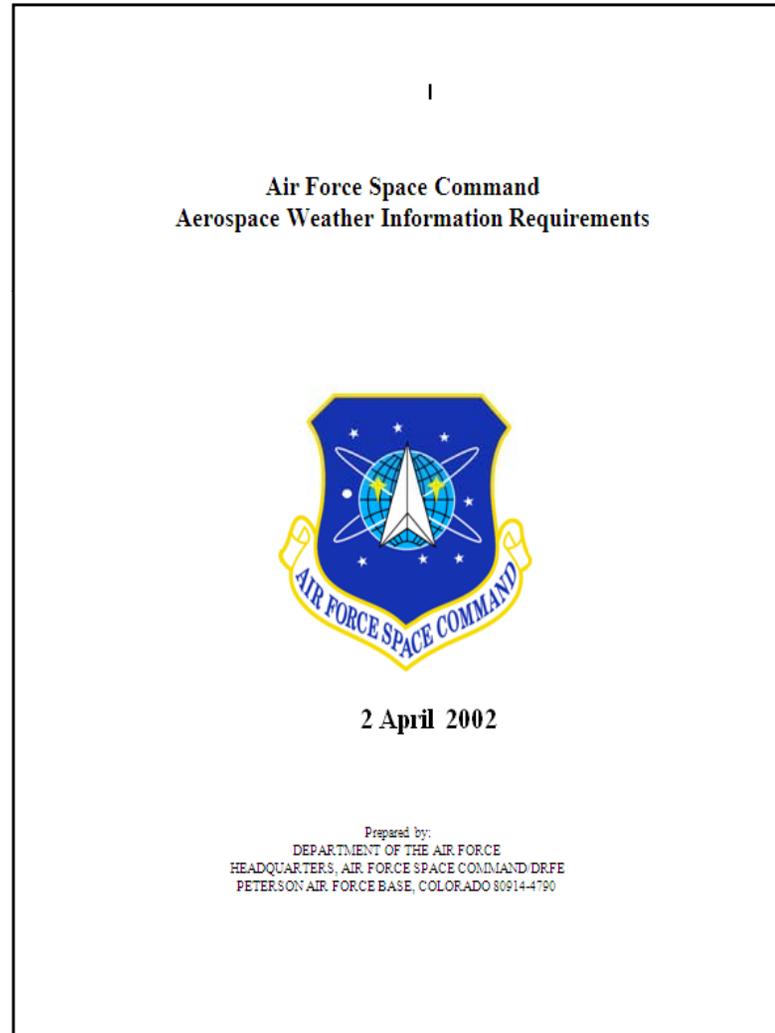
Environmental Space Sit Aware--Components

- **OBSERVE environmental conditions**
 - **Sensors—Provides eyes on the space environment**
- **PROCESS sensor data**
 - **Environmental Models—Actual & forecast picture of the space relevant environment**
- **DETERMINE EFFECTS**
 - **Data Fusion—Environmental impacts on system/mission operations**
- **INTEGRATE EFFECTS**
 - **Via C2 System**



Requirements Flow—Environmental SSA

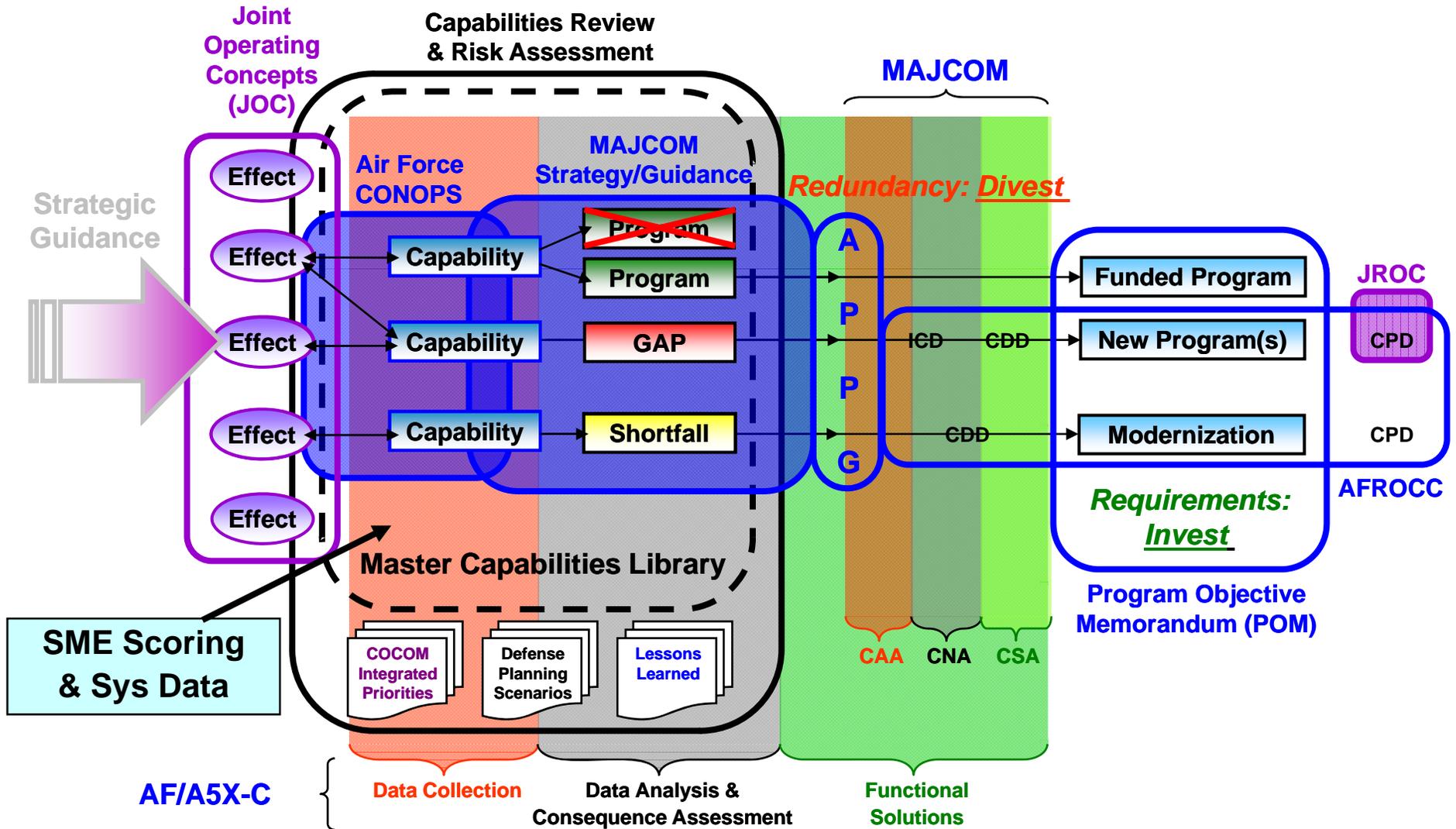
•SSA Environmental Effects Enabling Concept





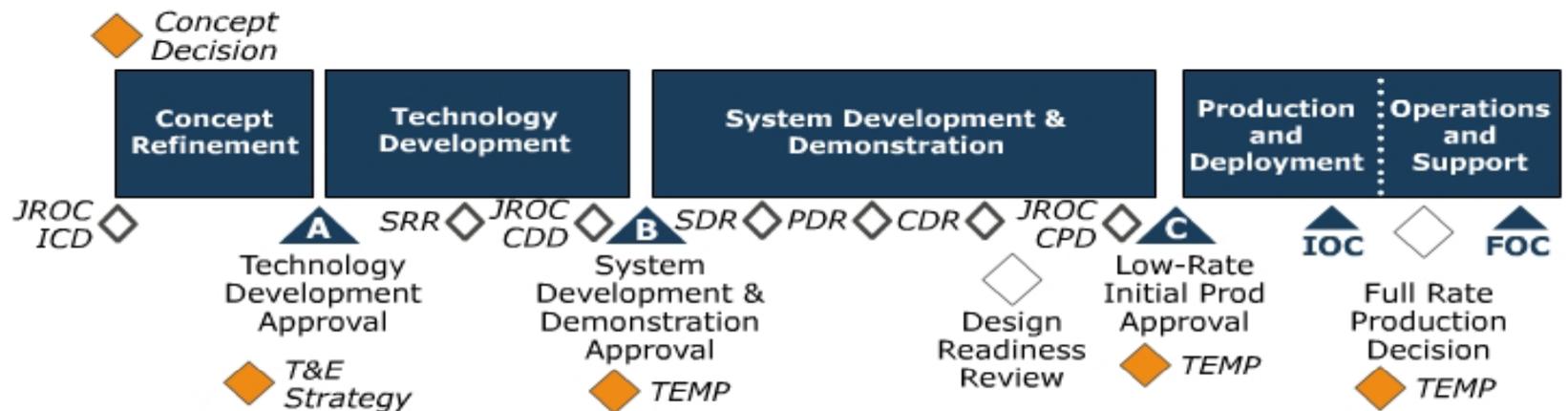
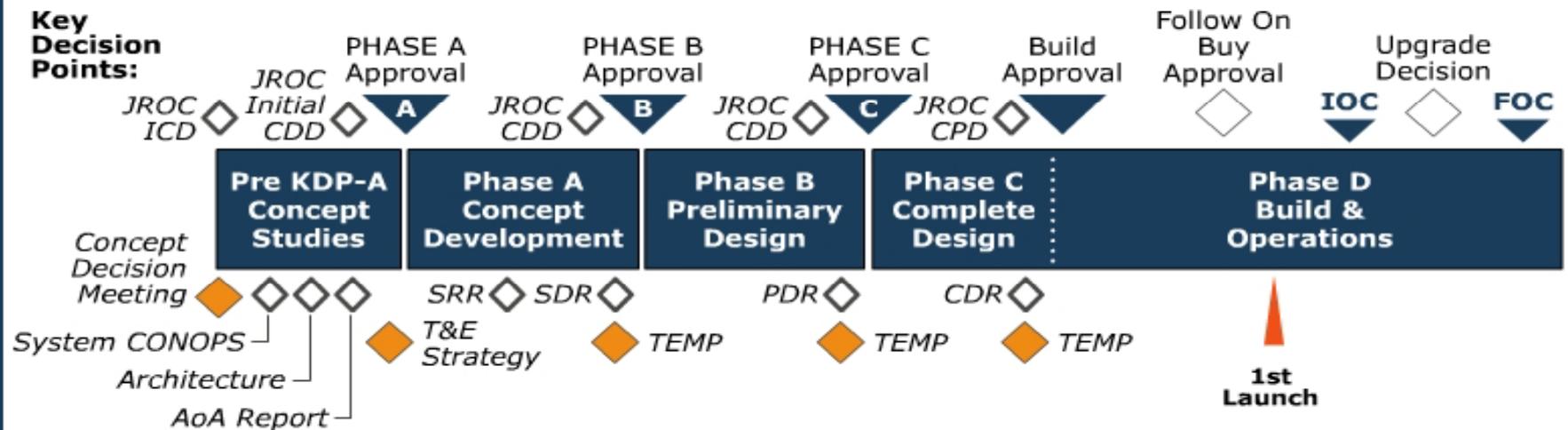
AF Capability Based Planning (CBP)

Our Mechanism for Focusing on What's Important





NSS Acq Policy 03-01 (December 2004)



DoDI 5000.2 (May 2003)



Summary

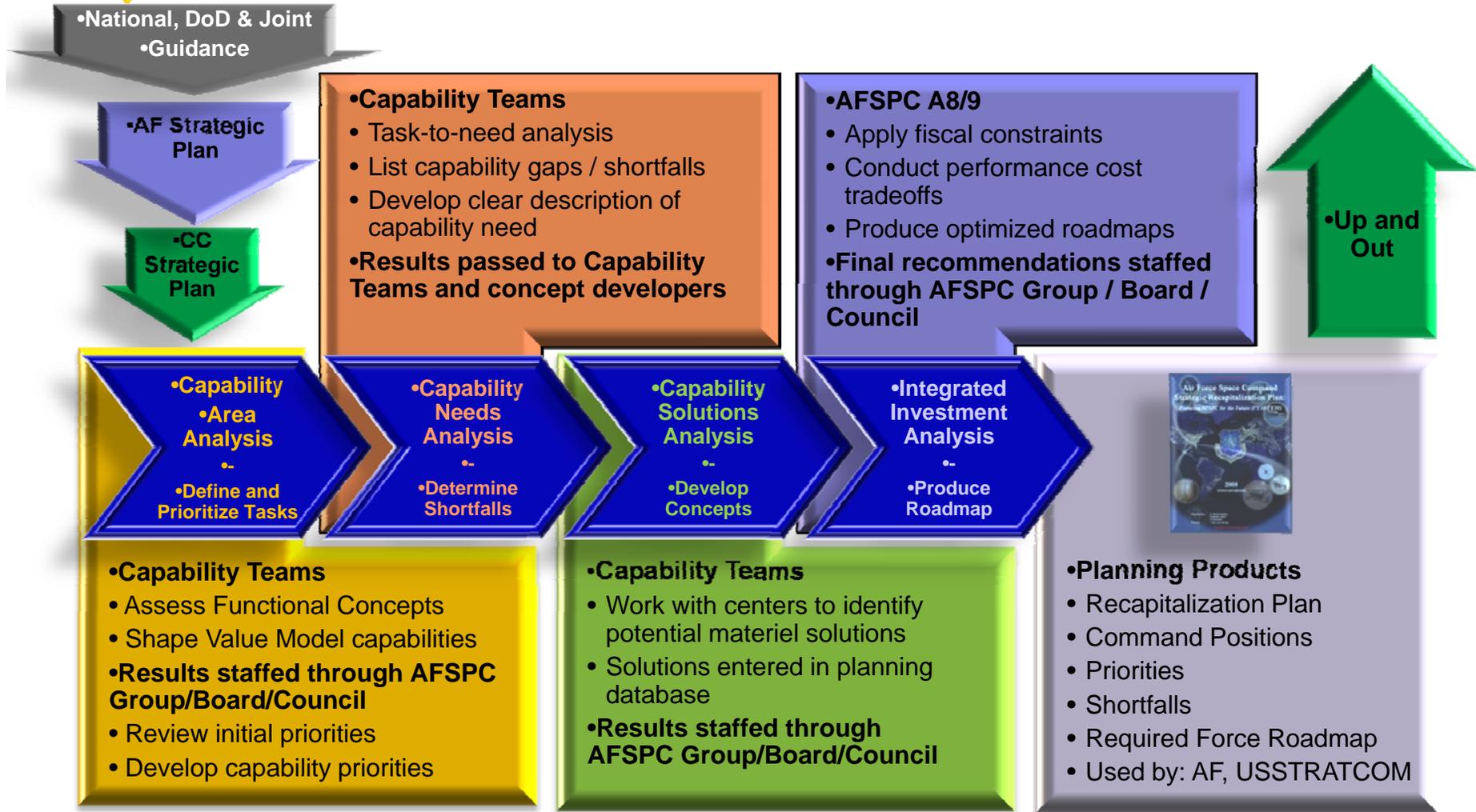
- **Environmental Space Situational Awareness (SSA) is critical to protecting space systems and providing assured space services—military, civil, and commercial**
- **Need for robust environmental SSA infrastructure**
- **DoD has a disciplined reqts/planning process to assure gaps identified/filled—several examples**
- **Opportunities: Effective Partnerships—Cross Agency, Academia, and International**



BACK UPS

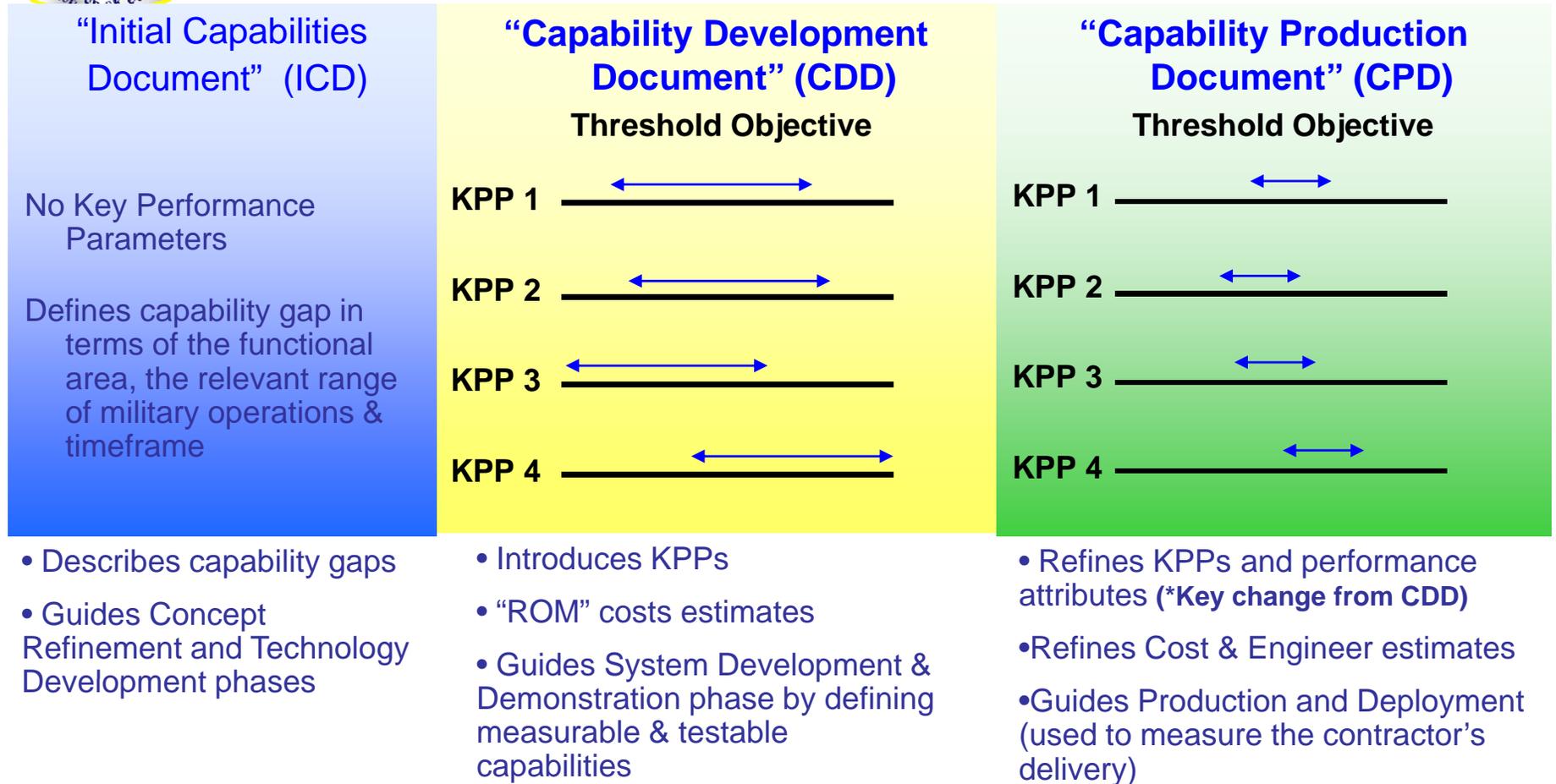


Integrated Planning Process (IPP) Quick-look





Capability Documents





SSA Definition

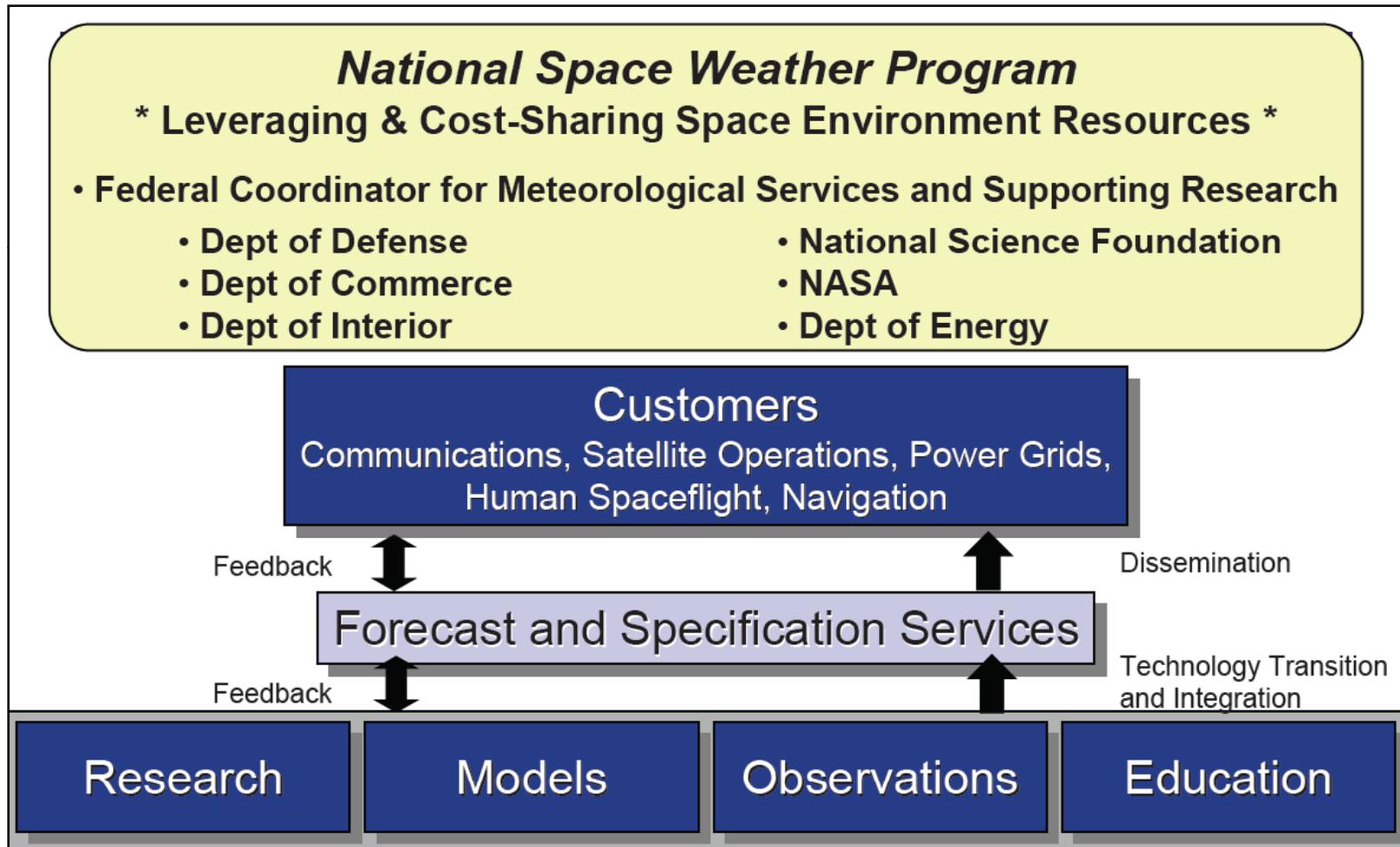


- SSA: “...SSA involves characterizing, as completely as necessary, the space capabilities operating within the terrestrial environment and the space domain. It includes components of ISR; environmental monitoring, analysis, and reporting; and warning functions....”

- Environmental Monitoring: “... includes the characterization, analysis, and prediction of space weather (e.g., solar conditions), terrestrial weather near important ground nodes, and natural phenomena Operators must be able to differentiate between natural phenomena interference and an intentional attack on a space system in order to formulate an appropriate response.”

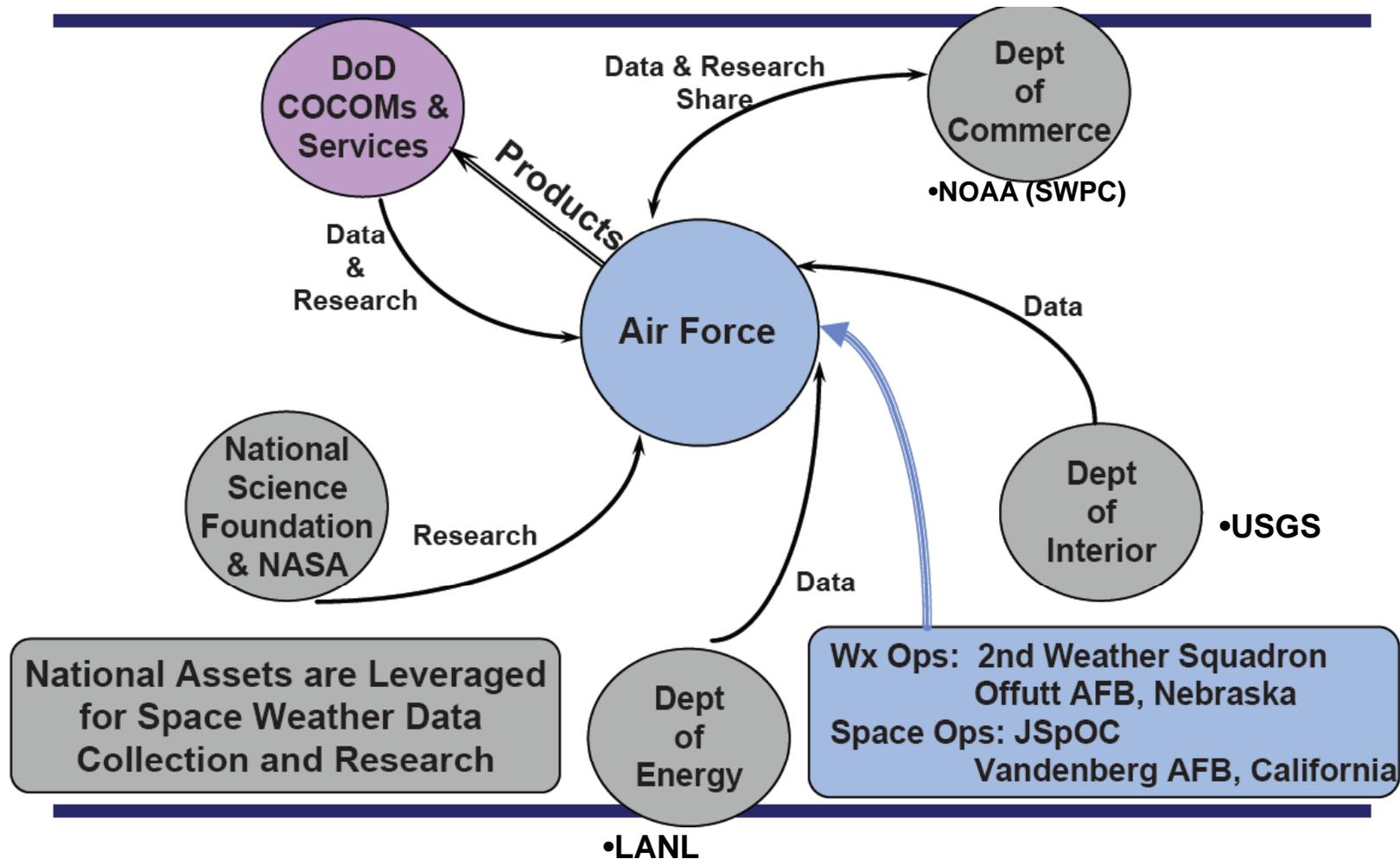


National Cooperative Efforts





DoD Space Operations





Current Capabilities

