GSFC Facilities Challenges

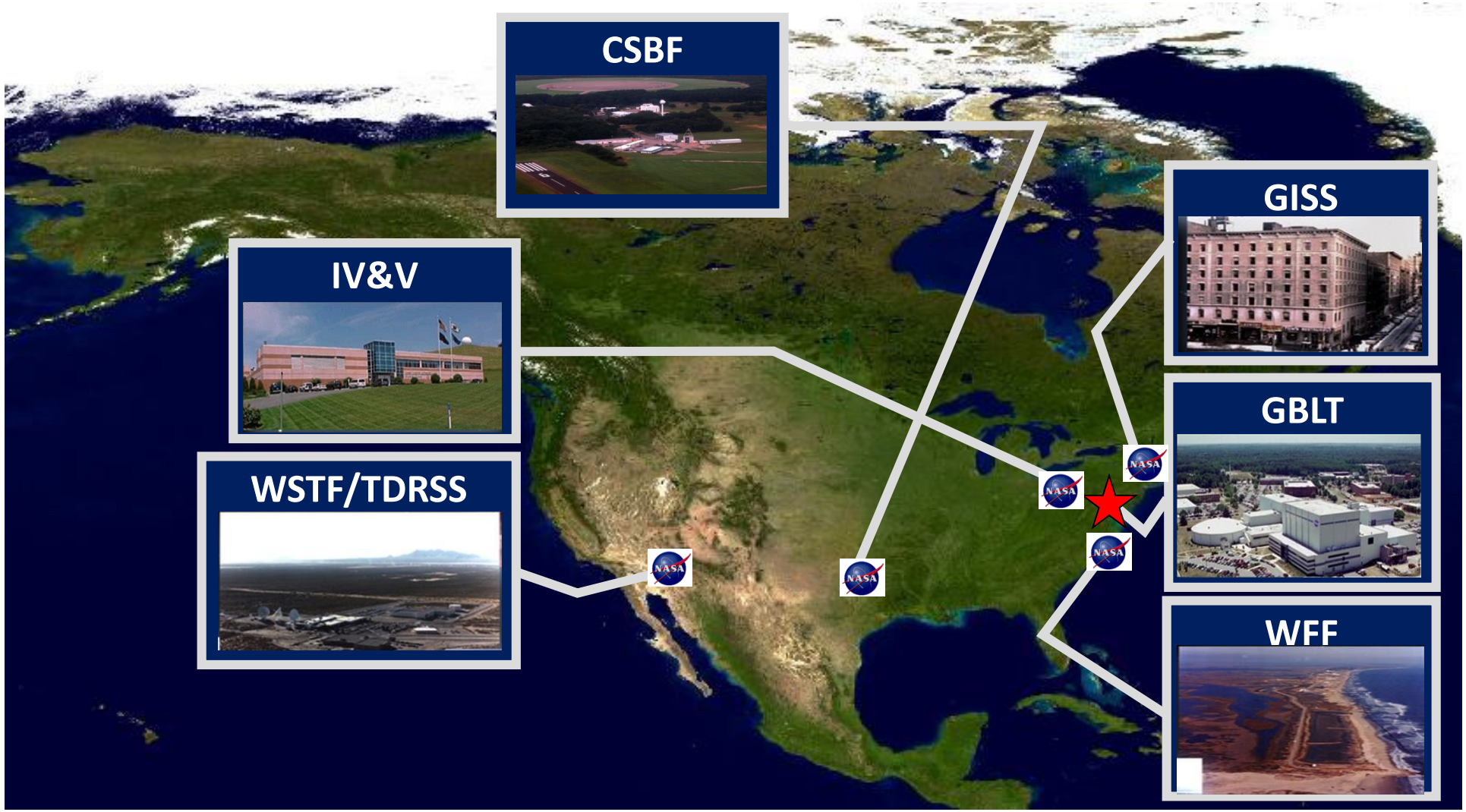
NASA - GODDARD SPACE FLIGHT CENTER

Agenda

- GSFC Facilities at a Glance
- Evolving Mission Requirements
- Challenges

GSFC Facilities at a Glance

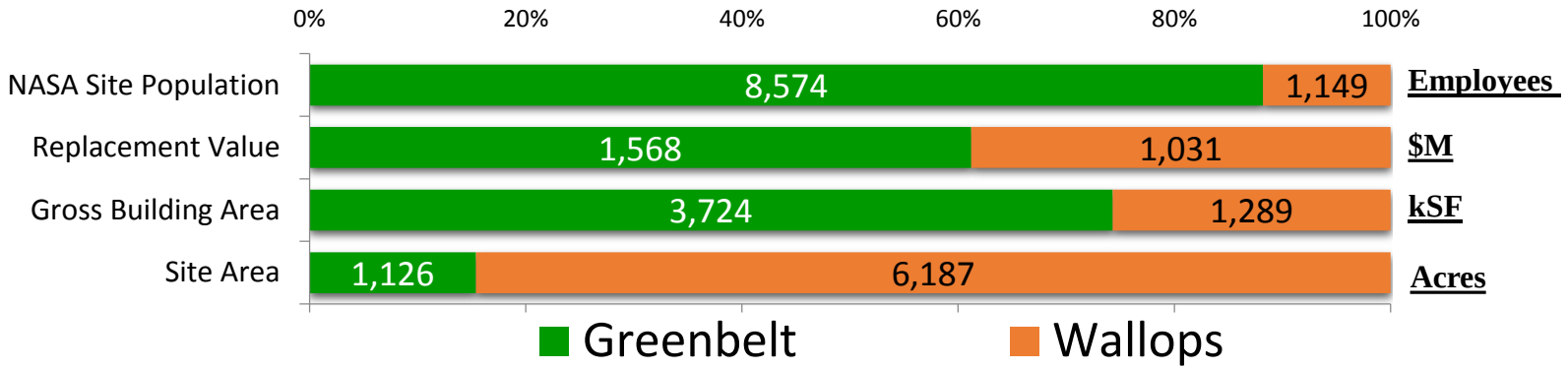
GSFC Facilities



GSFC Facilities

* 6 Continents * 11 Countries * 12 States/Territories

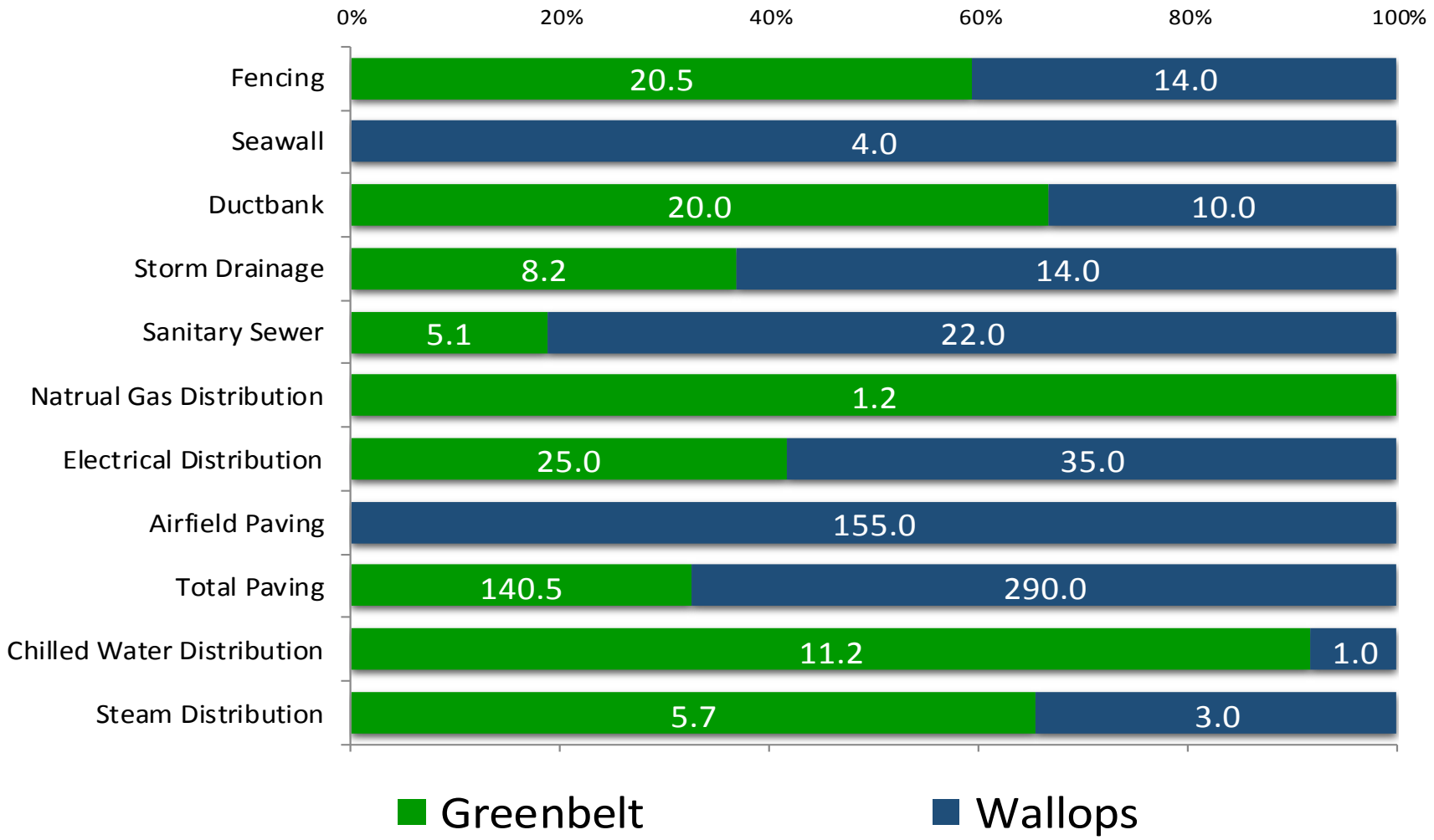
Facilities at a Glance



- ***Established in 1959***
- ***50+ year-old infrastructure***

- ***Established in 1945***
- ***70+ year-old infrastructure***

Facility Facts

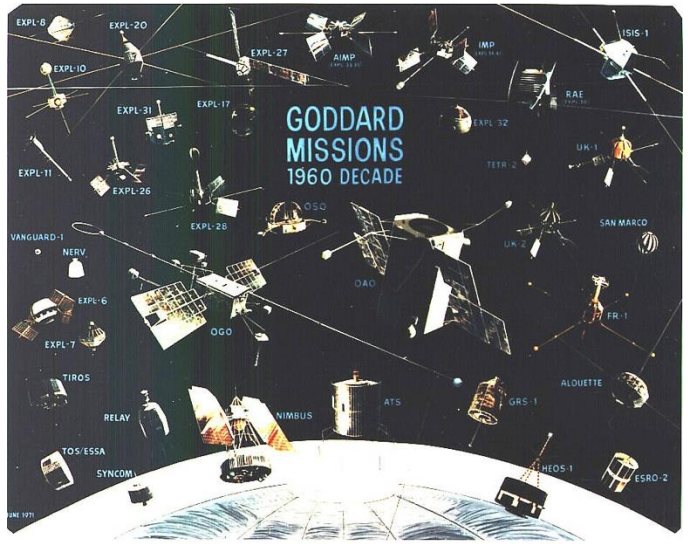


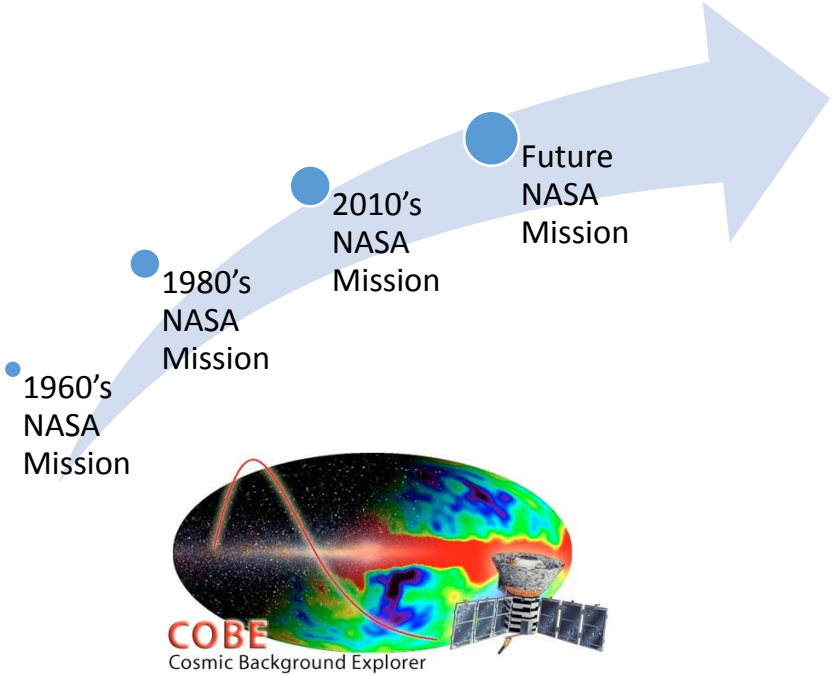
Evolving Mission Requirements

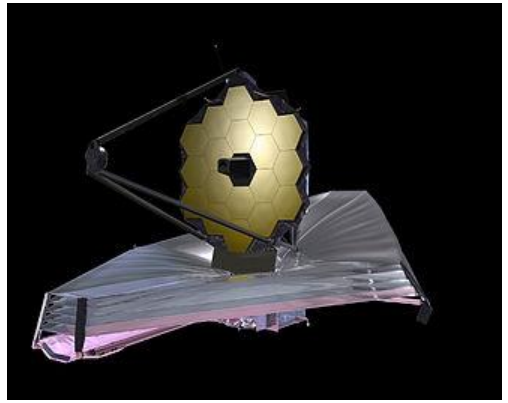
Funding levels and priorities for aging buildings and infrastructure

Building “Suitable” facilities to support future GSFC mission is a challenge due to:

- Evolving Mission Set: Certain activities (such as launches at Wallops) have grown, others have transformed (Mission Communication, Data Centers);
- Configuration: Like-functions and activities are not ideally distributed across a site, which impedes their efficiency and effectiveness.







Technical Requirement Transformation: The Challenge of Staying Ahead of the Mission

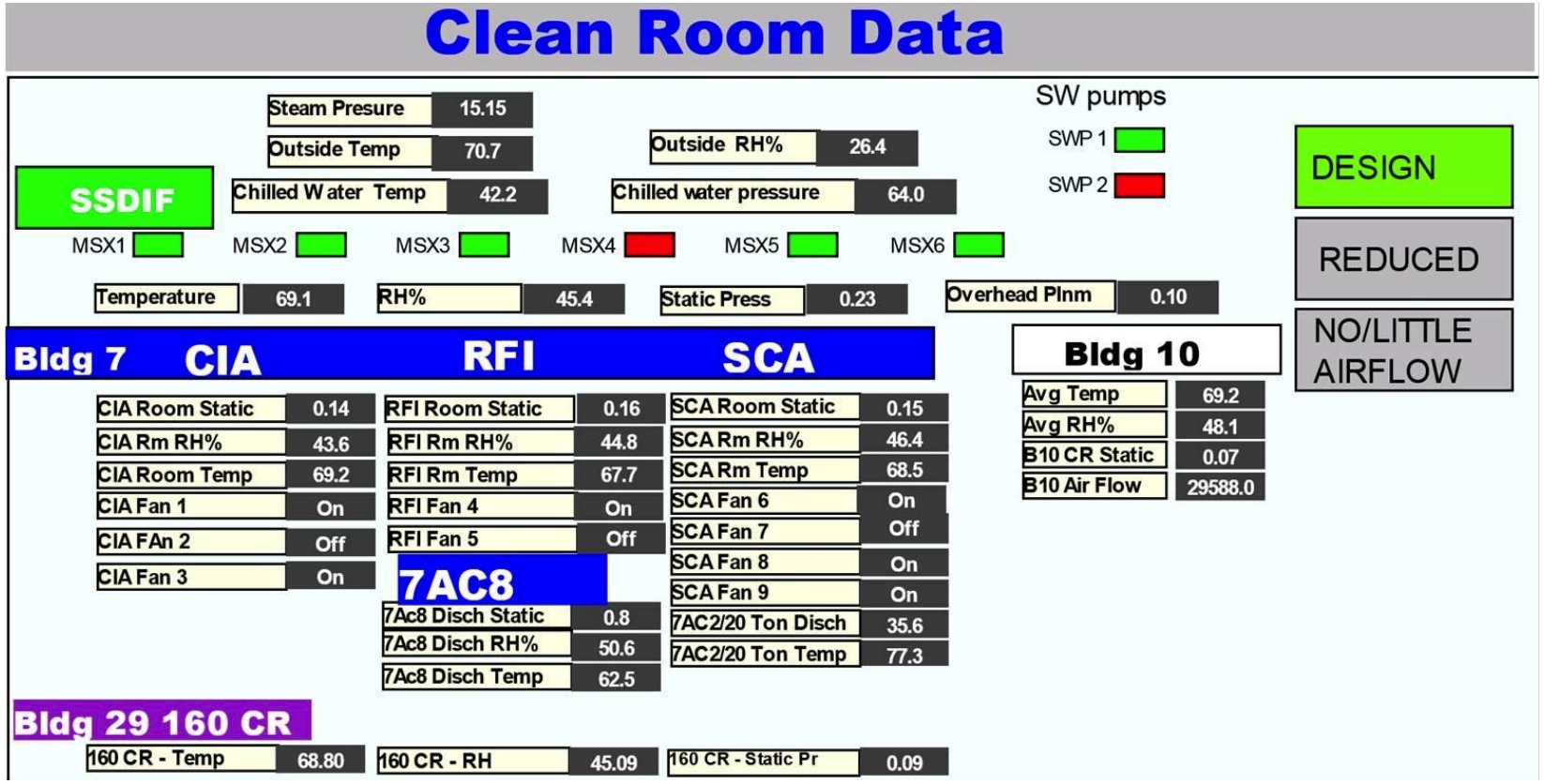
Explorer-1 (1958)
1st US made satellite

JWST (2018)
Seeing the 1st light

	60 Years Ago	Present
Size of Satellite	Tennis Racket	Tennis Court
Temperature Control	+/- 2^0F	+/- 0.5^0F
Electrostatic Control	5,000V	<250V
Molecular Control	N/A	Silicon material

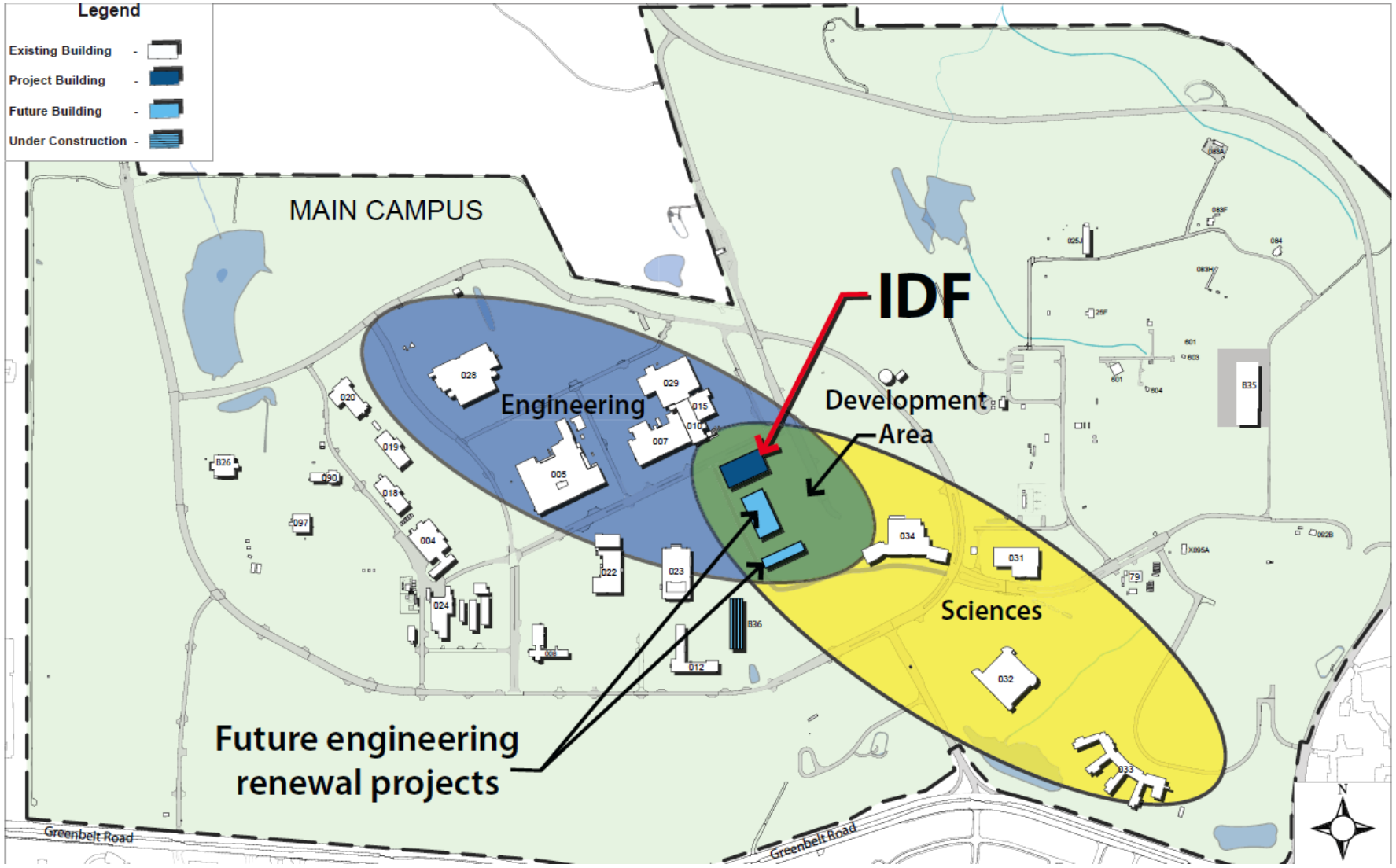
Technical Requirement Transformation

Current clean rooms require tremendous amount of monitoring and control to keep facilities within specification



Typical clean room monitoring system display in I&T Complex

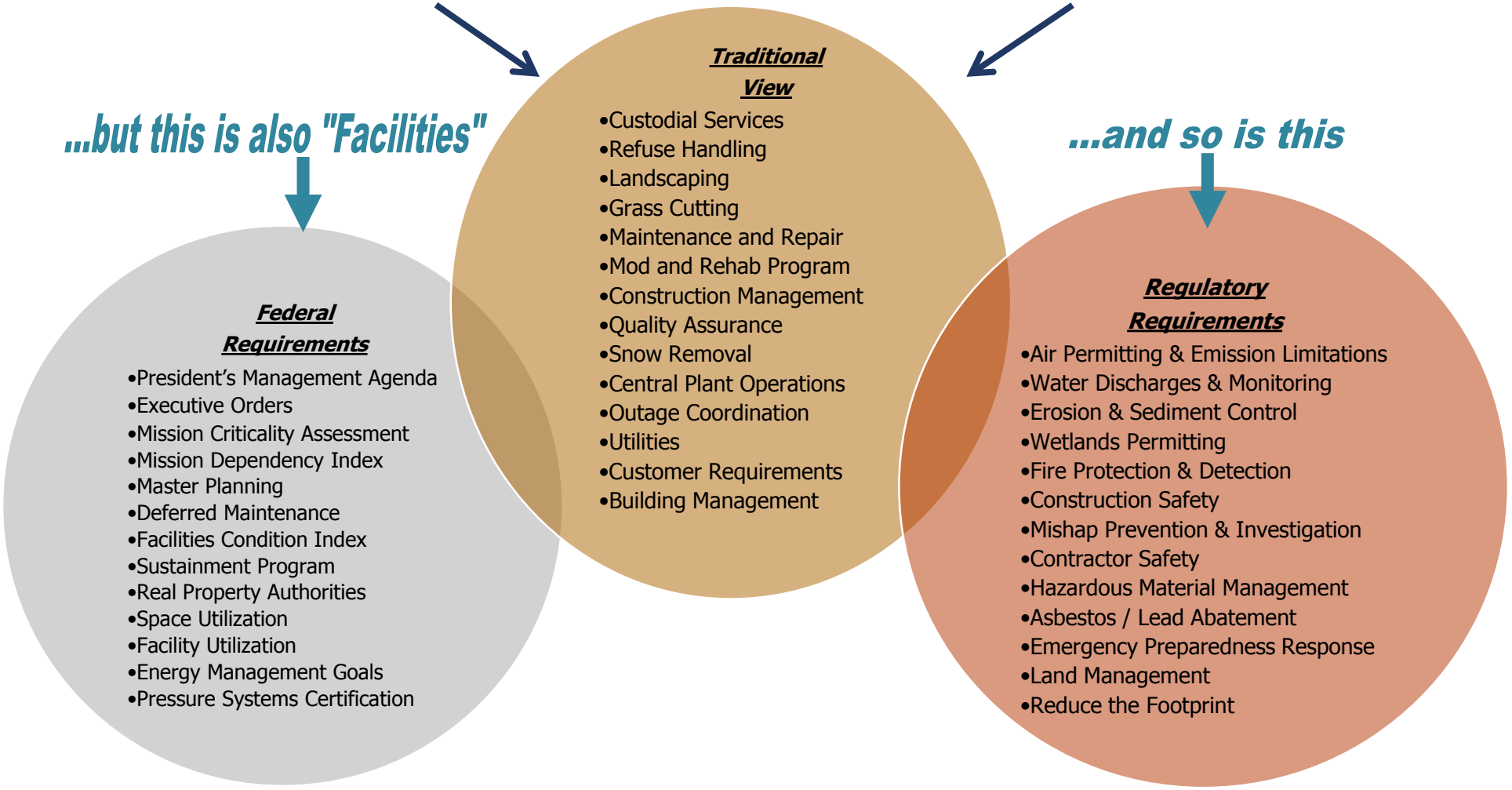
GSFC Master Plan Neighborhoods



Facility Challenges

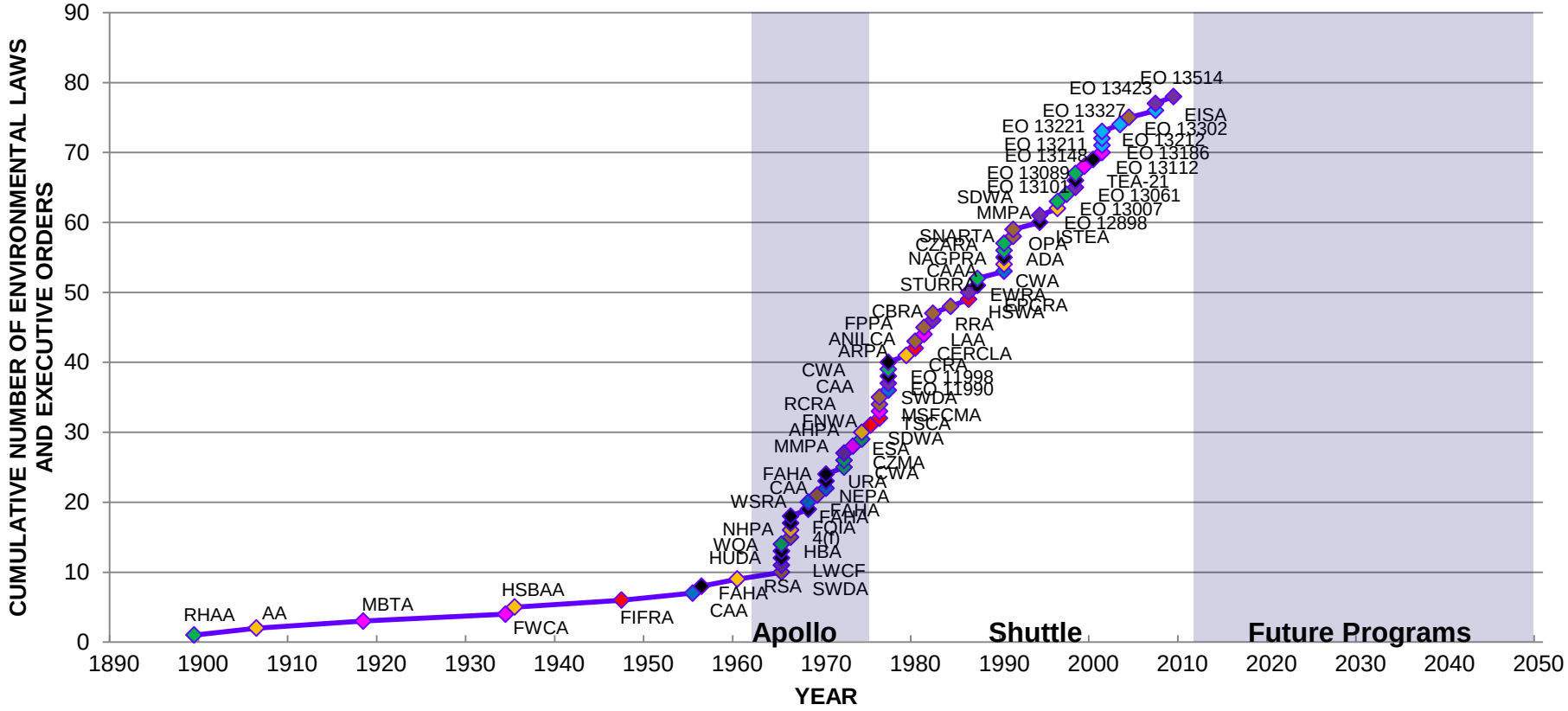
Facility Services

This is what people usually think of when you mention the word "Facilities"...



Achieving Federal Sustainability Requirements

Growth of Environmental Requirements Applicable to Federal Agencies



Facilities Challenges

- Funding levels and priorities for aging buildings and infrastructure
- Staying ahead of mission
- Achieving Federal Sustainability Requirements
- Adapt to climate change (not only environmental but also policies)

Funding levels and priorities for aging buildings and infrastructure

- Approximately 75 percent of GSFC facilities are more than 50 years old and need significant maintenance and upgrades to preserve the safety and continuity of operations for critical missions;

- In FY15 GSFC spent $22.7M (58%) out of $39M of Facilities funding on annual maintenance, yet still retained a maintenance backlog of $18.8M. This includes $3.4M in major repairs (<$25K), and $15.4M in routine maintenance;
  - At these current maintenance funding levels, facilities will continue to degrade – leading to a “run to failure” philosophy;
  - Even if current risk is considered acceptable, failures will increase over time without an increase in maintenance funding.

- Obsolescence of facilities and supporting infrastructure makes it difficult to support latest technology flight systems and maintain state of the art technical capabilities;

- Current Agency policy to ‘Reduce the Footprint’ requires a greater than 1:1 ratio on new construction.

Staying ahead of the Mission

You can't go here…

Moon

Mars

or even think about here…

Gamma Ray Burst

unless you first support it ***here***.

Greenbelt

Wallops Flight Facility

Achieving Federal Sustainability Requirements

New Executive Orders such as 13693, *Planning for Federal Sustainability in the Next Decade*, shape the metrics of the Federal government sustainability goals, which in turn has required GSFC to:

- Update Master Plans and Capital Improvement Plans to inform construction and demolition investments;

- Recognize operational and mission risks, such as: direct mission risks (schedule, cost, technical); safety, security and health; legal requirements; and climate risks (short term, long term, and extreme events) in all facility designs;

- Assess climate change vulnerabilities with partners in the local community and state and federal neighbors; and

- Design NET Zero buildings for all new construction
  - A building that is design, constructed, and operated to require a greatly reduced quantity of energy to operate, meet the balance of energy needs from sources of energy that do not produce greenhouse gases and be economically viable. (Executive Order 13514 definition of zero-net-energy building).

Achieving Federal Sustainability Requirements, con't

- Adaptability: decisions at the inception of project design to incorporate elements and concepts that will assist with future adaptations to a building can facilitate change in the future;
  - Building to readily facilitate horizontal and vertical expansion;
  - Analyzing the building structural concept, i.e. structural grid, dimensions, and floor-to-floor heights that allow for flexibility in internal layouts; demountable walls;
    - Functional Quality: decisions to incorporate the use of hard walls for offices and workspaces vs. flexible 'furniture' systems have a significant impact on functionality of a building;

- Buildings support multiple functions: office/laboratory/server rooms;

- Existing buildings are not optimized for energy efficiency;
  - Older buildings with HVAC systems designed in 1960's;
  - Laboratories or server rooms adjacent to office areas;
  - Offices that used to be laboratories or server rooms.

Adapt to climate change – Challenges

Energy

- Climate change has the potential to create new and unaccounted energy demands on an already challenged facilities system;

- Bringing climate change into facility capital investment discussions provides a potential catalyst for empowering decision makers on Center to engage the problem and solutions.

Water

- Goddard needs to develop a strategic vision for water management and sustainable site design for the next 20 years and utilize it to leverage resources to implement the Center vision – Chesapeake Bay.

Sea Level Rise

- Models predict sea level rise poses a real risk to Wallops Island infrastructure and assets within the next 100 years;
- Structures and equipment will be elevated, as practicable, to as much as 13 feet above sea level.

Wallops Island Shoreline Before and After Restoration

Wallops Island Shoreline Restoration In Action

Adapt to climate change - Challenges

Other Climate Change Effects

- Communication, appreciation, and cooperation of operational and cultural changes to Center personnel are critical to meet the facilities demands for future missions;
  - End users needs sometimes are in conflict with the need to find ways to reduce energy load, increase efficiency, and maximize the use of renewable energy sources in federal facilities;

- The strategic vision must include providing resources for maintenance of structures once they have been installed. These costs are expected to have significant impacts on the CM&O budget.

QUESTIONS?