

# Navy EUL Forum

Broad EUL Opportunities –  
The Data Center Play

Colin M. Coyle, AIA

Principal, US Federal Programs

HP Critical Facilities Services, Delivered by EYP Mission Critical Facilities



# Presentation Outline

- The Data Center Building Type
- Costs and Delivery Models
- Industry Drivers
- The HP Story
- Why DoD Installations as Data Center Locations?

# The Data Center Building Type



# The Three Basic Data Center Types

- Traditional enterprise type data center:
  - Reliability the major driver
  - Typical for financial institutions, corporate data centers and some government facilities
  - Probably not going much beyond 180 W/SF, from the present 75 to 125 W/SF
  - Tier 3 or 4



# Data Center Tiering System\*

## *a Reliability Measure*

- Tier 1 – Car w/out a spare gets flat tire – stop car and wait
  - No Redundancy, Single thread distribution
- Tier 2 – Car w/ spare gets flat tire – stop car and fix flat
  - UPS or Generator Backup Capacity, Single thread distribution
- Tier 3 – Run on flat tires slowly – replace tire when possible
  - Redundant Capacity, Multiple distribution paths
  - Critical load unaffected during routine maintenance
  - Unplanned failures cause data process disruptions
- Tier 4 – Change tires, transmission and engine while driving 60 MPH
  - Redundant Capacity, Simultaneous parallel distribution paths
  - Critical load unaffected during routine maintenance of distribution paths
  - Immune to most unplanned events and expected to function after a disaster

\* Per Uptime Institute

# How Much Redundancy is Enough?



# Availability - How much is too much?

Availability

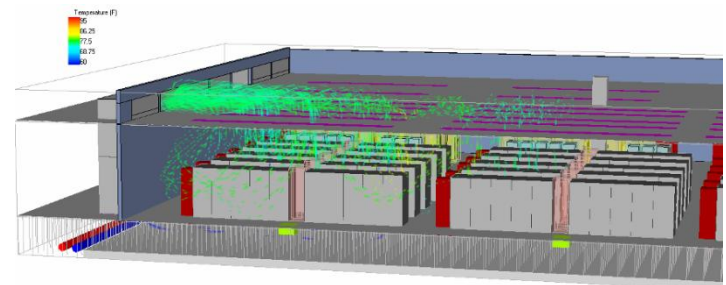


Cost \$

Pushing the limits of complexity means not only Unavailability but also bad capital investment

# The Three Basic Data Center Types

- Internet/Search Engine Facilities:
  - Energy conservation is the main driver
  - Typical densities exceed 200 W/SF
  - Load profile is the 7 to 10 kW/rack, but will often be 12 to 15 kW/rack
  - System topology typically will follow a Tier 2 configuration
  - Examples - Yahoo or Google



# The Energy Efficiency Crisis in Data Centers

Power and cooling costs now equal half of each dollar spent on new servers<sup>1</sup>.

Server density has increased 10X over the past decade<sup>3</sup>; the average server's power consumption has quadrupled<sup>4</sup>.

Upwards of 60% of data center capacity can be wasted due to poorly designed layouts and airflow<sup>6</sup>.

Higher density and the resultant higher operating temperatures spawn increased administration costs and premature systems failure<sup>5</sup>

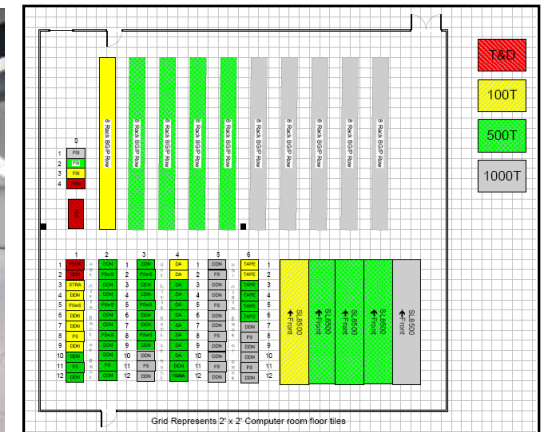
The EPA estimates that energy-management best practices combined with IT consolidation could reduce data center power consumption by as much as 45%<sup>7</sup>

Cooling accounts for 50% of power costs — which means it costs the same to cool as to compute<sup>2</sup>.

Sources noted in speaker notes

# The Three Basic Data Center Types

- Supercomputing Facilities:
  - Research Institutions / DoD
  - 2010 initiatives in supercomputing (1 petaflop and beyond) extrapolate to 40 to 60 kW per rack
  - Ability to cool high density racks is the main driver
  - Significant de-emphasias on the need for high reliability
  - Densities regularly exceed 200 W/SF and can approach 1000 W/SF



# Costs and Delivery Models



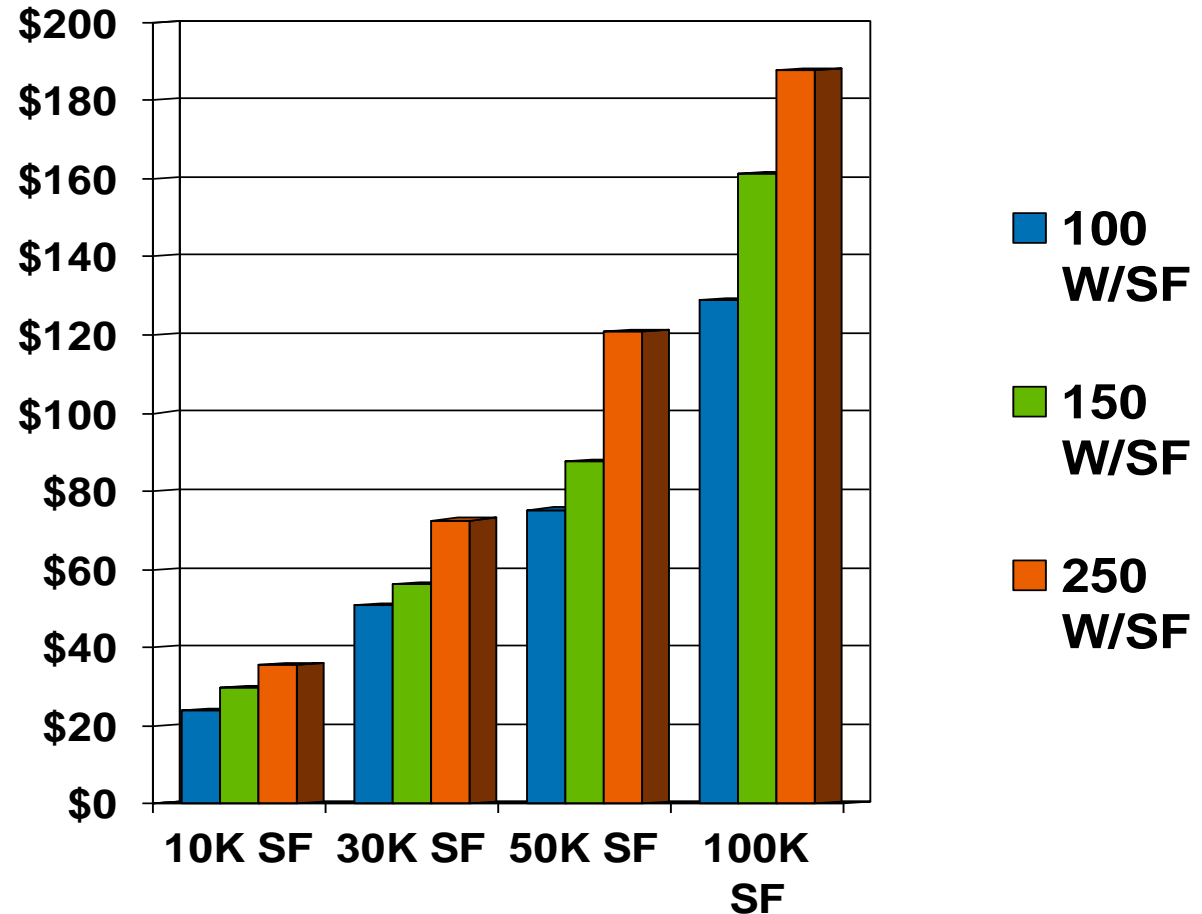
# Data Center Cost Guide:

Costs based on US dollars –Tier III (concurrently maintainable) data centers.

## Cost Drivers:

- Power density drives cost – more power per square foot costs more money
- Redundancy drives cost – reliability is expensive
- Costs range from \$1,450 to \$3,000 per square foot – smaller data centers tend to cost more per square foot
- Square footage measured in “raised floor”, not total building

## Millions



# Who Controls the Capital?



# Capex vs. Opex – How to Purchase?

## Facility



- A Building?
- Raised Floor Space?
- Power (ie. Kw/Hr)?
- Computing & Data Storage?
- A Survivable Enterprise Solution?
- Reliability of the Business/Mission?



## IT Solution

# Three Basic Data Center Delivery Types

- Own or Lease
  - Pro - Full Control of Facility & Infrastructure
  - Con - Long Development Cycle – High Capital Investment
  - Players –PowerLoft, COPT
- Host or Colocate
  - Pro – Low Facility Capex, Highly Scalable
  - Con – Control Technology, but not Facility
  - Players – DRT, Teremark, Equinix
- Managed Service
  - Pro – No Capex, More Technology Refresh
  - Con – High Opex, Little Control
  - Players – CSC, EDS, IBM

**Real Estate**



**Solution Driver**

**CIO/IT**



# Industry Drivers



# The Case for Data Center Transformation

- Aging data centers
  - 85% of facilities built before 2001 are obsolete
  - By 2010 50% of all data centers will have to relocate to new facilities
  - More than 40% of data centers will be replaced within 10 years
- High Energy costs – electricity cost for a typical high density facility is 42% of OPEX
- Business continuity – 1 out of every 4 data centers will experience a business disruption due to power failures
- Resource Shortage - Pool of qualified and senior technical management will shrink by 45%.
- With Virtualization – server management costs are increasing 4 times faster than new server spending

# New Data Center Growth Drivers

- Information explosion/internet
- Globalization
- Uptime and resiliency demands
- Continued deterioration of the Power Grid reliability
- Increased government regulation for maintaining the viability of business operation and information
- Cost of servers
- Faster technology refreshes
- Higher load densities
- Energy efficiency & energy cost as a major concern

# The HP Story



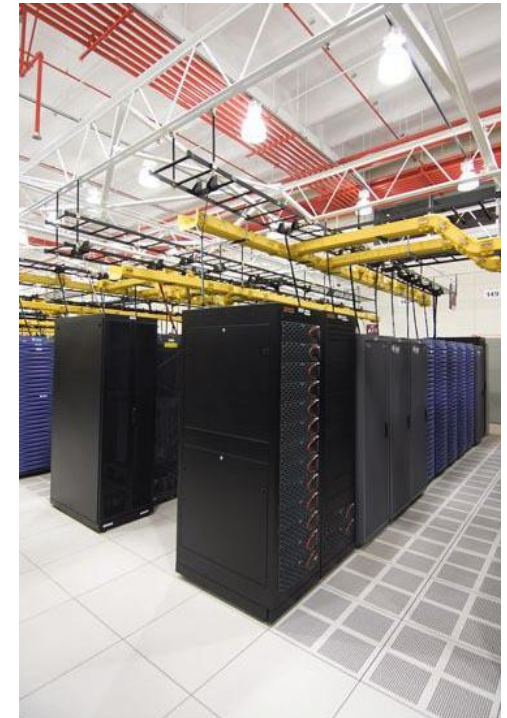
# Who is HP Critical Facilities Services?

- EYP MCF, a company of HP is focused on the strategic planning, design, and operations of critical facilities
- Designed 32 million sq. ft. of data centers
- Planned and designed 50+ Greenfield data centers
- Designed fifteen 15MW+ data centers, inc. five 35MW+ data centers
- 200,000 tons of critical cooling design
- 23 million sq. ft. of data center risk, reliability & feasibility assessments
- Commissioned 15 million sq. ft. of critical facilities
- Ranked one the Top Firms Worldwide Specializing in Data Center & Telecommunications Facilities  
(Engineering News Record)

# Fannie Mae Technology Center

Urbana, MD

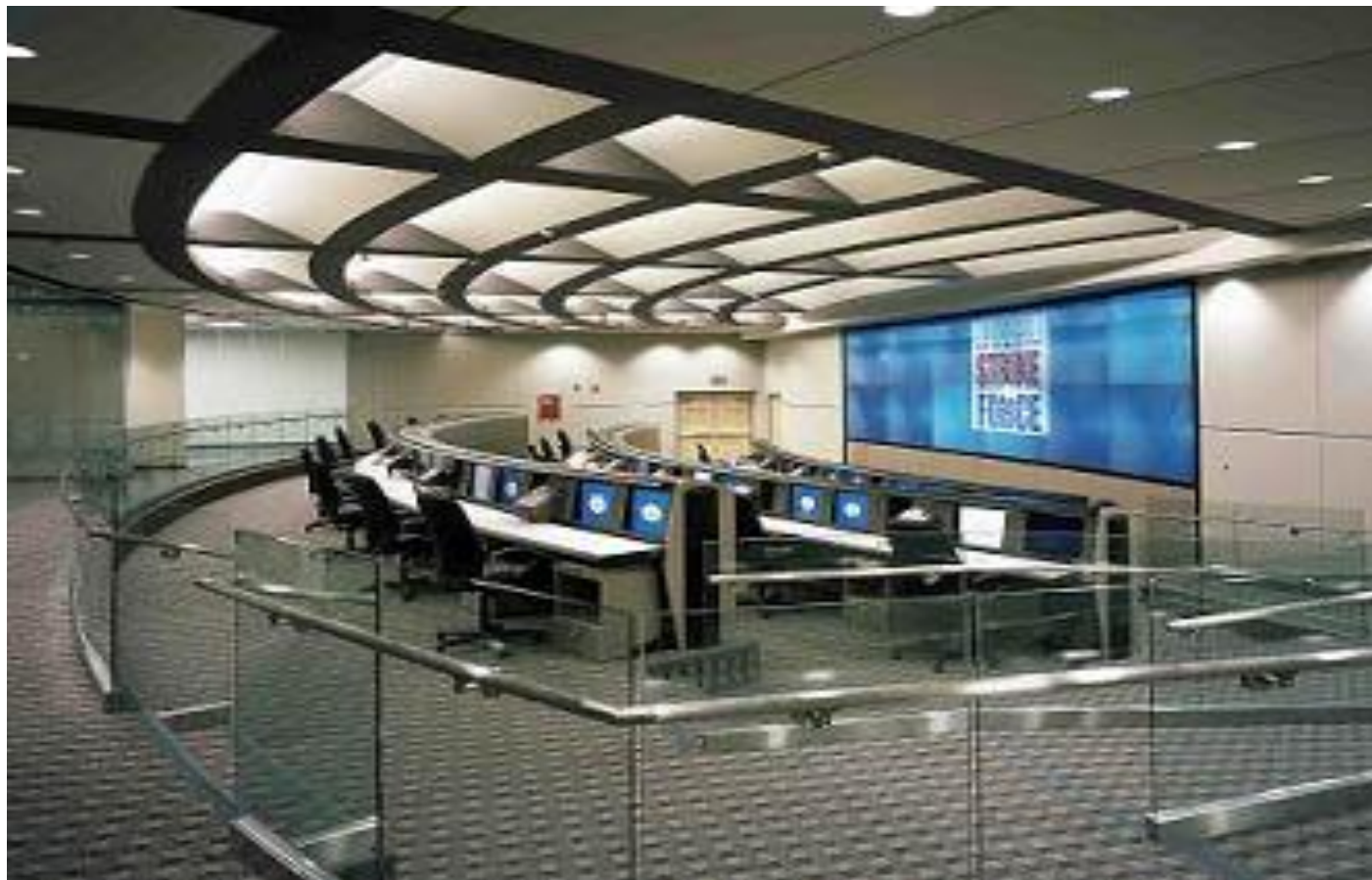
First LEED Certified Data Center in the US



Data Center / Office Building / Operations Center  
250,000 SF

# Navy Marine Corps Internet (NMCI) Program

## Nationwide



Largest Government IT Contract Ever at the Time  
Over 40 Facilities Nationwide

# NOAA Satellite Operations Center

Suitland, MD



GSA "Design Excellence"

Certified LEED Gold

218,000 SF

40,000 SF Raised Floor

# C2/CNT Headquarters Relocation

## Aberdeen Proving Ground, MD



500,000 sf Headquarters for this Critical C4ISR Agency  
Project Results From BRAC Movement From Ft. Monmouth to Aberdeen  
Contracted Through U.S. Army Corps of Engineers, Philadelphia  
EYP MCF As Engineering Design Consultant to A/E Firm, Ewing Cole

# Why Navy/DoD Installations as Sites?



# Why Place Data Centers on DoD Sites?

- Available & Planned Infrastructure
  - Average Requirement of 5MW+ of Power
  - Inherent “Survivability” of Infrastructure – Reliability / Availability
  - Robust Utility Distribution and Backup Power
- Inherent Security on Military Installations
  - “Behind the Fence”
  - Force Protection measures
- Attractive locations for end users, particularly DoD and defense contractors users
  - Colocation with DoD research tenants
  - Inherent security & Skilled O&M Staff
  - Secure telecom distribution
- Potential for Low Power Rates For Federal Tenants and EUL partners
  - Some installations achieve 6 cents/Kwh
- LEED Data Centers
  - Entitlement process with LEED designs expedited
  - DoD directive to green existing and upcoming Data Centers

# Why Now?

- Two inter-related real estate products poised for robust growth :
  - Data Centers
  - Energy related projects
    - Traditional
      - Co-Gen, Natural Gas, Coal
    - Non- Traditional
      - Solar, wind, geothermal, biomass
- Dynamic of Data Center Marketplace
  - Expansions, Upgrades, Refreshes, & Consolidations/Transformations
  - Federal Acquisition not conducive to “Speed to Market,” but “Just in Time”
  - Industry move from traditional real estate ownership, to varied forms of off-sheet financing (Leasing, Hosting, Outsourcing, MSAs)
- Value Proposition to Installations
  - Increase renewable generation on installation
  - Secure on-site power generation and micro grids
  - To achieve economies of scale energy developers are looking to high energy users datacenters, manufacturing and industrial applications

# And the #1 Reason for Data Centers as Navy EUL Projects ...



# Beat ARMY!

- First Army EUL w/ Data Center Use – Watervliet Arsenal
  - HP Critical Facilities Services part of team Negotiating Lease MOU
  - Planned 100K SF data center, powered by new Cogeneration Plant



- Four to Five Additional Sites Being Contemplated

Technology for better business outcomes

