



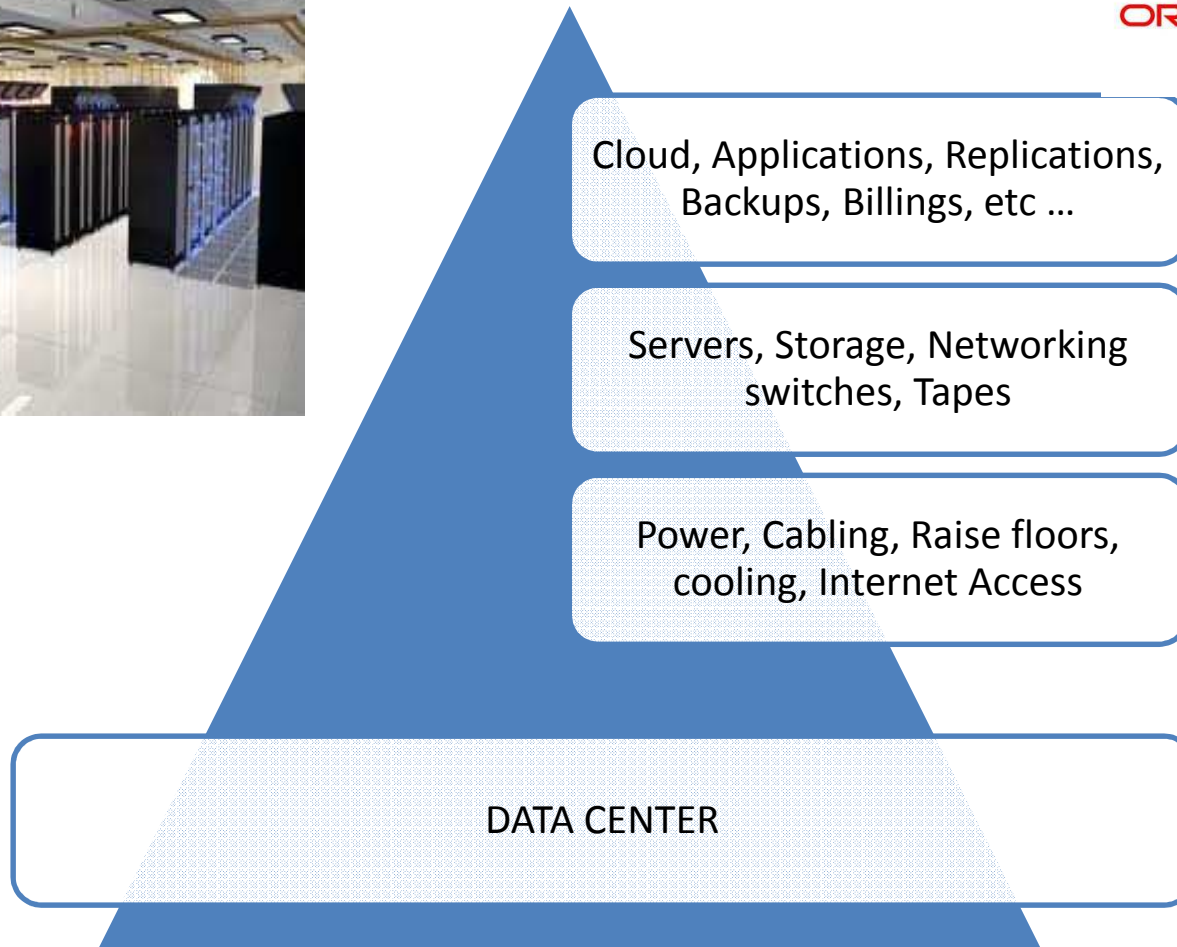
# Data Centers

**Nebiyu Yoseph**

# Data Center

- Data Center @ 10,000 foot view
- Today's challenges with older Data centers Designs
- Requirements for current and future Data centers
  - Site selections and design considerations
  - Resources needed
- Cost of Data Centers
- What's Next?

# Data Center @ 10,000 foot view



ORACLE®

vmware®



BROCADE

IBM



CISCO™

hp  
invent



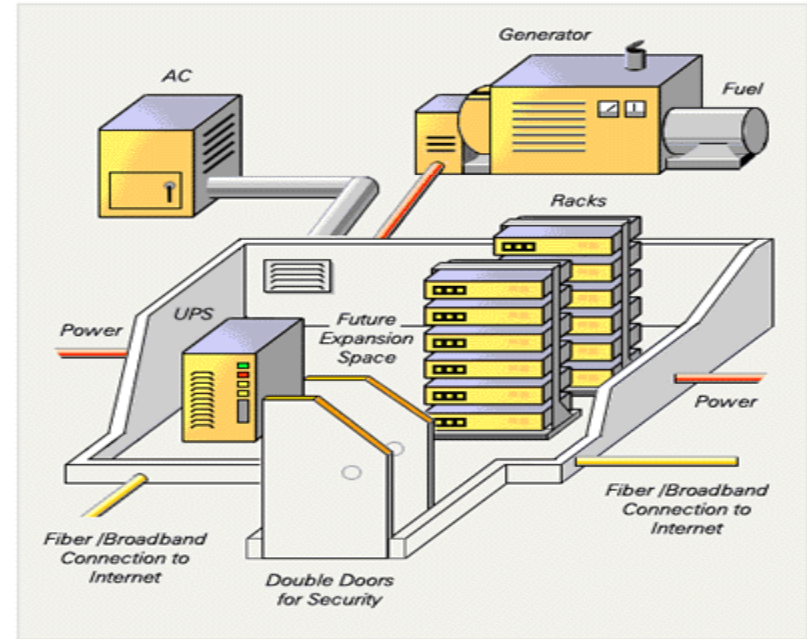
EMC<sup>2</sup>  
where information lives®

HITACHI  
Inspire the Next



# Data Center @ 10,000 foot view continues ...

Soccer Field = 110m x 75m = 8,250 sq m  
 OR  
 ~ 88,806 sq ft



# Today's challenges with older Data Centers Designs

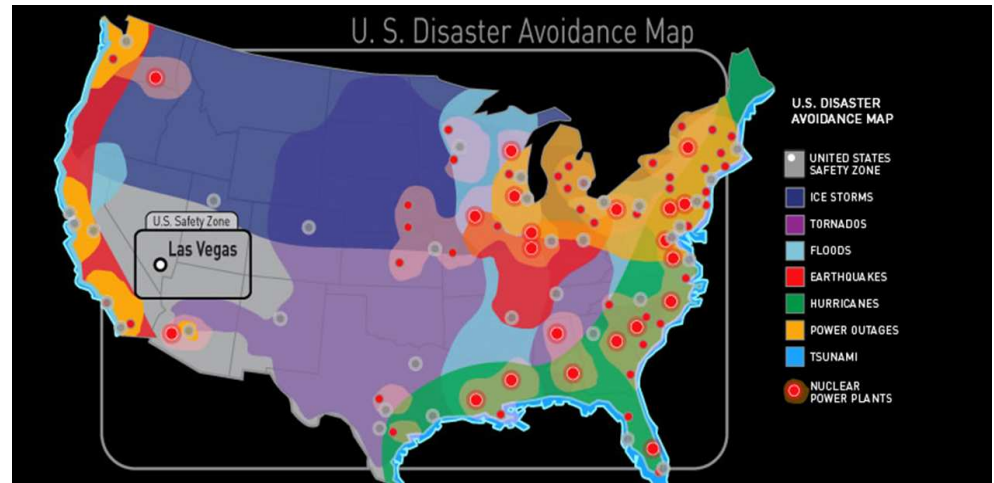
NO POWER



NO SPACE



NO COOLING



# Requirements for Current and Future Data centers

## Data Center Selection

- Site selections

- Avoid

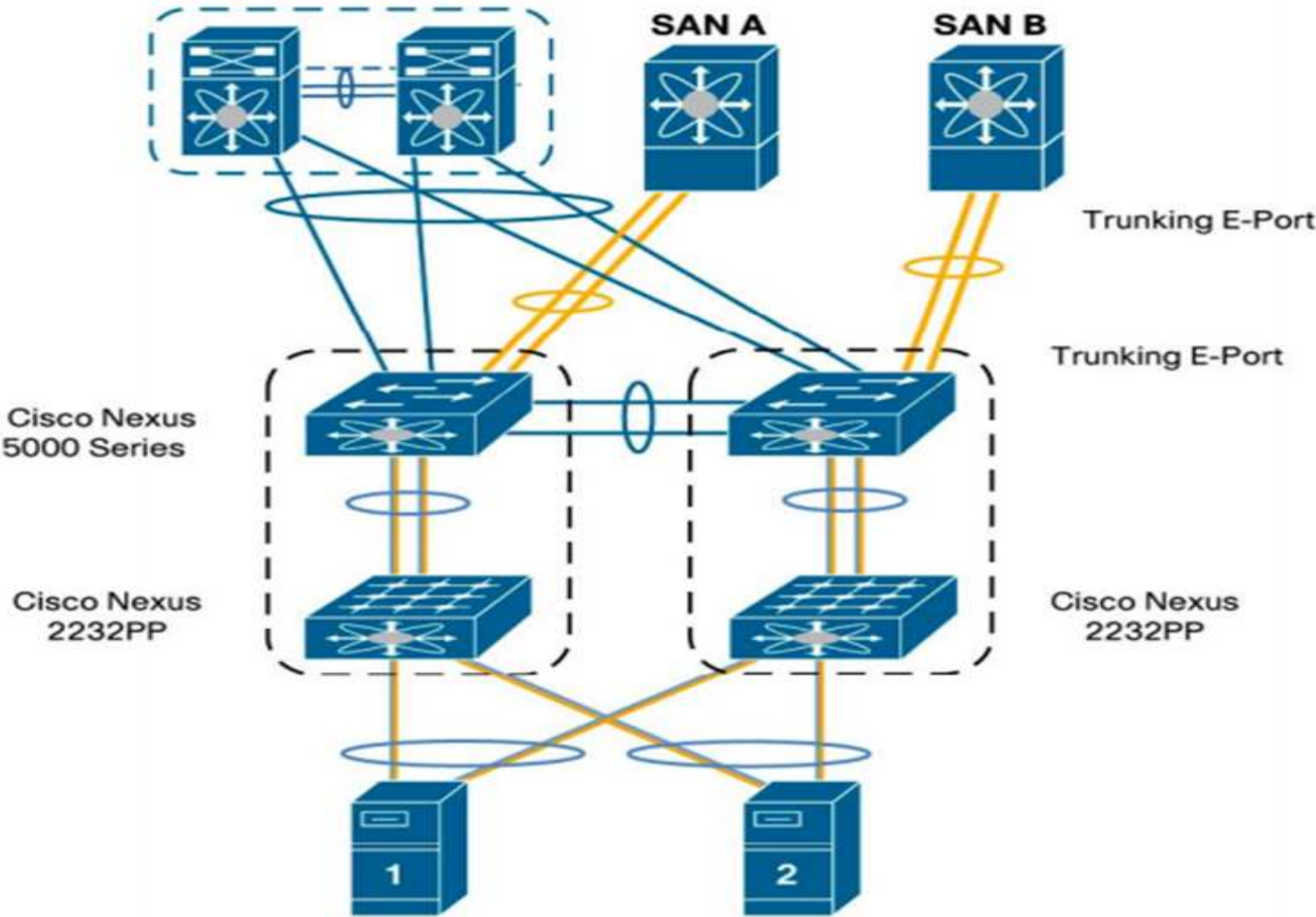
- Rivers or flooding zones
    - Tornado Alley
    - High frequency areas ( Radio or TV stations)
    - Airports and Major traffic areas
    - Active volcano areas
    - Most frequent Power outages areas

- Preferable

- Cooler areas
    - Away from major cities but accessible to power and cable infrastructure
    - At the minimum of 2-3 soccer field space availability for future growth
    - Easy access for shipping and delivery
    - Non-window buildings
    - Disaster Recovery site not more than 40-50km
    - Dual Power Source
    - Dual Internet Access point

# Requirements for Current and Future Data centers

Networking Infrastructures ( SAN, IP, FCoE)



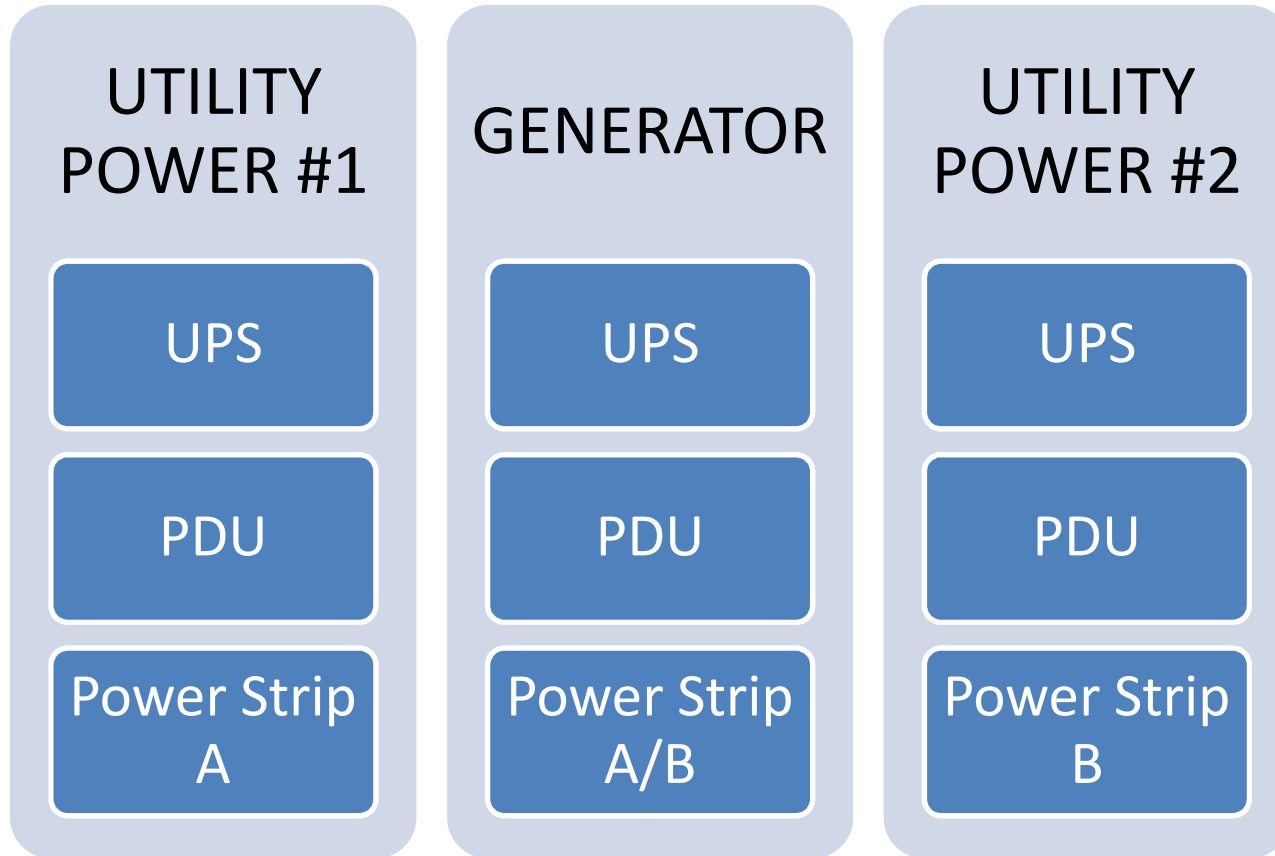
# Requirements for Current and Future Data centers

## Resources Availability

- Requirements
  - POWER
  - COOLING
  - FIBER CONNECTIONS
  - GENERATORS
  - WATER
  - Space
  - Cabling
  - Security (software and physical )
  - Network Infrastructure
  - Tools ( capacity planning ( power/cooling/alerts/( servers, storage, and network utilization reports), mapping, tagging, hardware and software inventory ( asset managements), and more ...
  - Good Electricians, cabling, and Security

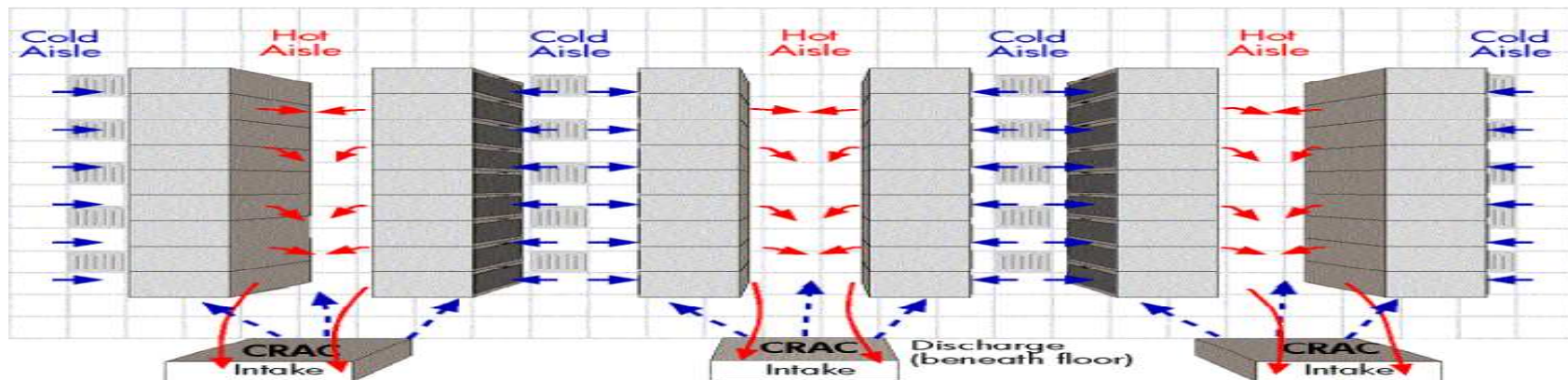
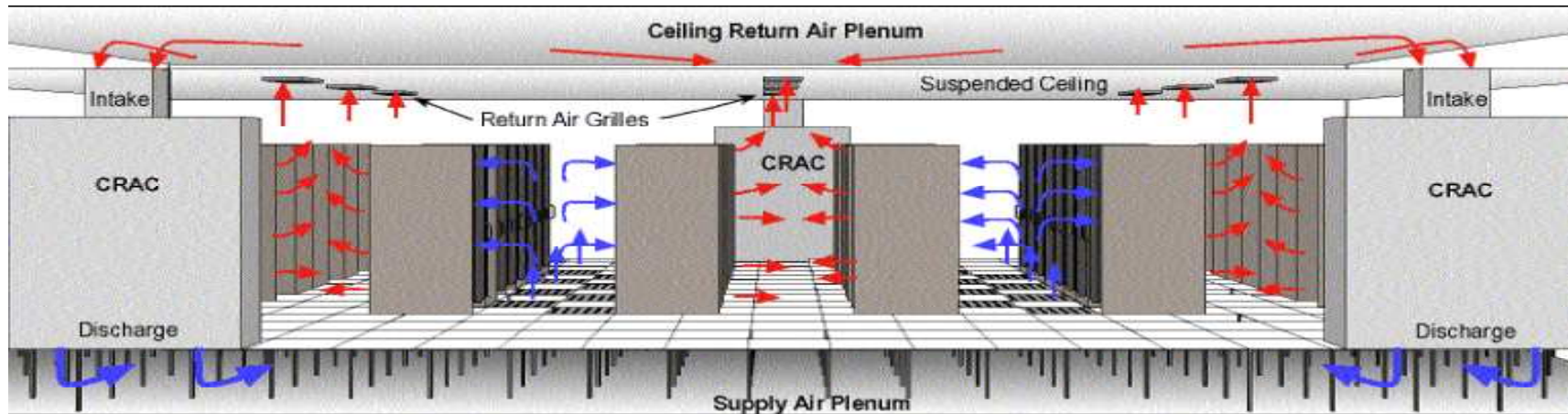
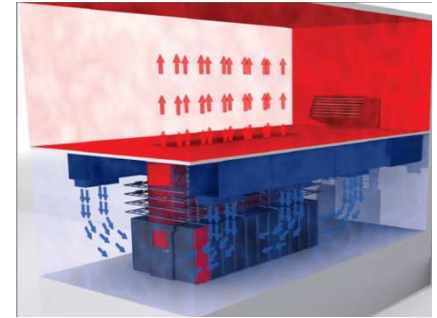


# POWER



# COOLING

## Hot Aisle - Cold Aisle



- Institute floor plans and standard practices that maximize rack and aisle cooling
- Maximize power and cooling capabilities at the component level

# Cost of Data centers @ 50%

### Data center environment

Location of data center: Africa | Ethiopia

Data center design capacity: 3000 kW

Average power density: 4 kW/Rack (1595 W/m<sup>2</sup>)

Installation labor rate: Very Low ( Br 4.22 per hour )

Cooling system: CRAH with chiller/tower

Air distribution type: Row-based cooling

UPS architecture: Traditional, non-scalable UPS

### Redundancy levels

Power: Distribution to load (2N), UPS (N+1), Generator/ switchgear (N+1)

Cooling: CRAH (N+1), Chilled water pumps (N+1), Chiller (N+1), Heat rejection (N+1)

### Include in cost

- IT enclosures
- Standby generator
- Raised floor
- Switchgear / panelboards
- Fire suppression / detection

### Data center values computed

Design rack quantity: 750

Design data center size: 1,881 m<sup>2</sup>

### Capital cost summary

Local currency

Data center cost: **Br 188,000,000**

Data center cost per watt: **Br 62.77**

Deployed capacity: 50%

### Cost by system

Cost by system

- Power
- Cooling
- Other

### Other costs

Other

- Fire
- Raised floor
- IT enclosures
- Mgt & security
- Lighting
- Project Mgt./Facility Eng.



# Cost of Data centers @ 100% Part I

## Data center environment

Location of data center: Africa | Ethiopia

Data center design capacity: 3000 kW

Average power density:  4 kW/Rack (1595 W/m<sup>2</sup>)

Installation labor rate: Very Low ( Br 4.22 per hour )

Cooling system: CRAH with chiller/tower

Air distribution type: Row-based cooling

UPS architecture: Traditional, non-scalable UPS

## Redundancy levels

Power: Distribution to load (2N), UPS (N+1), Generator/ switchgear (N+1)

Cooling: CRAH (N+1), Chilled water pumps (N+1), Chiller (N+1), Heat rejection (N+1)

## Include in cost

- IT enclosures
- Standby generator
- Raised floor
- Switchgear / panelboards
- Fire suppression / detection

## Data center values computed

Design rack quantity: 750

Design data center size: 1,881 m<sup>2</sup>

## Capital cost summary

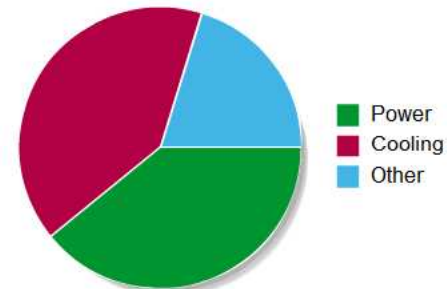
Local currency

Data center cost: **Br 293,000,000**

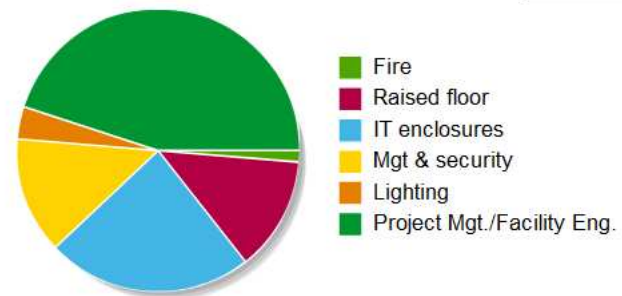
Data center cost per watt: **Br 97.76**

Deployed capacity:  100%

## Cost by system



## Other costs



# Cost of Data centers @ 100% Part II

## Data center environment

Location of data center: Africa, Ethiopia

Data center design capacity: 3000 kW

Average power density: 4 kW/Rack (1595 W/m<sup>2</sup>)

Installation labor rate: Very Low (Br 4.22 per hour)

Cooling system: CRAH with chiller/tower

Air distribution type: Row-based cooling

UPS architecture: Traditional, non-scalable UPS

## Redundancy levels

Power: Distribution to load (2N), UPS (N+1), Generator/ switchgear (N+1)

Cooling: CRAH (N+1), Chilled water pumps (N+1), Chiller (N+1), Heat rejection (N+1)

## Include in cost

- IT enclosures
- Standby generator
- Raised floor
- Switchgear / panelboards
- Fire suppression / detection

## Data center values computed

Design rack quantity: 750

Design data center size: 1,881 m<sup>2</sup>

## Capital cost summary

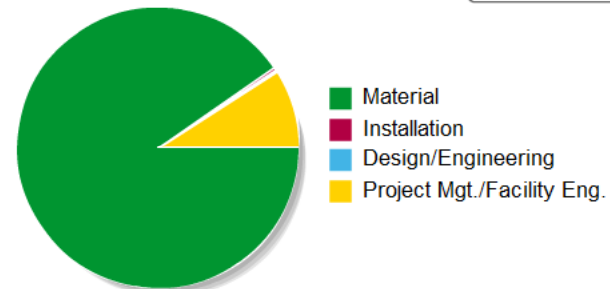
Local currency

Data center cost: **Br 293,000,000**

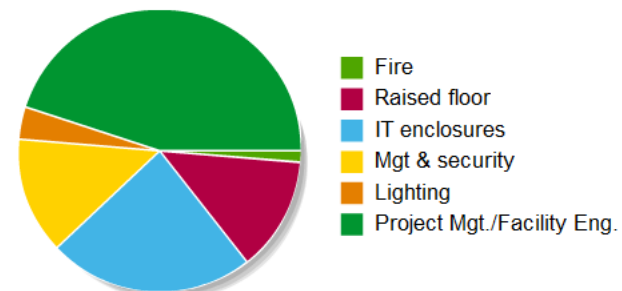
Data center cost per watt: **Br 97.76**

Deployed capacity: 100%

## Cost by type



## Other costs



## WHAT'S NEXT?

- Workshops / Mentoring
- Business Opportunities
- Data Center Case studies
- iDataCenter ( Cloud, and Virtualizations)

Q & A

THANK YOU