





This presentation will examine how Enterprise Architects can utilize TOGAF 9 to create a profile for evaluating their architecture activities for ecological and sustainable qualities. The presentation will demonstrate how to create a set of viewpoints that will support stakeholders' concerns about sustainability. Techniques for adapting the TOGAF 9 Architecture Development Method and related content deliverables will also be included.




## Questions

Why do we leave the lights on all the time?  
Why do escalators run when no one is there?  
How much of our compute power is used to drive screen savers?  
Why do we commute to jobs that we could do from home?



“If we want things to stay as they are, things will have to change...”

Source: Tom Friedman "Hot, Flat, and Crowded"



# Sustainability



"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Brundtland Commission, 1983



# Think Globally, Act Locally

Jacques Ellul



# Green IT



## Key Points

- Do you think green?
- Is Sustainability built in to your planning methods?
- Is it just about ROI and TCO?



## Why Go Green?

- Rising Energy Costs
- Limited Energy Availability
- Regulatory Requirements
- Customer Expectations
- It's the right thing to do...



## Green IT

- It's more than just saving power
- Focus on preserving the environment
- Accruing bottom line benefits



## Green Procurement

- Buying Green Products
- Sustainable Product Lifecycles
- Consider End of Life



## The Greening of the Enterprise

- Promoting Open Work
- Improving Datacenter Efficiency
- Improving Building Energy efficiency
- Reducing travel and unnecessary commuting
- Using alternative energy sources



## Focusing on Sustainability

- People
- Operations
- Infrastructure
  - IT
  - Information
  - Facilities



## Approaches

- Virtualization
- Terminal Servers
- Power Management
- Material recycling
  - Advance recovery fee model
  - Producer responsibility model



## Efficiency Metrics

- Data Center Infrastructure Efficiency (DCiE) metric, defined by The Green Grid, as the metric for which data centers in the European Union will be measured for efficiency.
- The DCiE metric helps data center operators clearly determine how much energy is consumed by IT equipment and



## Barriers to Green

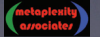
- Issues preventing faster adoption of energy efficient equipment and processes:
  - Defining Efficiency
  - High Initial Cost
  - Split Incentives (electrical supply, cooling, building space)
  - Risk Aversion

Source: U.S. ENVIRONMENTAL PROTECTION AGENCY/ASSET  
2007 "REPORT TO CONGRESS ON SERVER AND DATA CENTERS"  
ENERGY EFFICIENCY PUBLIC LAW 109-431"



## Office Design

- Automatic Lighting/environmentals
- Reducing space per person
- Hoteling facilities
- Shared devices



## Virtualized Desktops

- Athena approach
- Central management
- Global access
- Work anywhere
- Include employees, contractors & vendors



## Open Office Key Metrics:

- System Administration
- Electric Power
- Hardware refresh rate



## Reduction of Hazardous Substances

- EU Directive Adopted 2003, Effective 2006
- Reduce:
  - Lead
  - Mercury
  - Cadmium
  - Hexavalent Chromium
  - Other



## REACH

Registration, Evaluation, Authorization of Hazardous Chemicals

- EU Directive
- Look for similar initiatives in Asia, North America...
- California has a study in progress



## Product Takeback

- Becoming a legislative requirement:
  - Maine Waste
  - California Waste Recycling Act
  - WEEE Returns



## eco DataCenter

- Being Green is good for business
- Avoid underutilized systems (single purpose servers...)
- Hard to manage decentralized infrastructure
- Power and cooling requirements are taking a large share of the budget



## Datacenter Efficiency Metrics

- Power Consumption
- Power Consumption Density
- OPEX/CAPEX
- ecoDC
- OpenECO
- SWaP



## Power Utilization Efficiency

- $PUE = \frac{\text{Total Facility Power}}{\text{IT Equipment Power}}$



## Data Center Infrastructure Efficiency

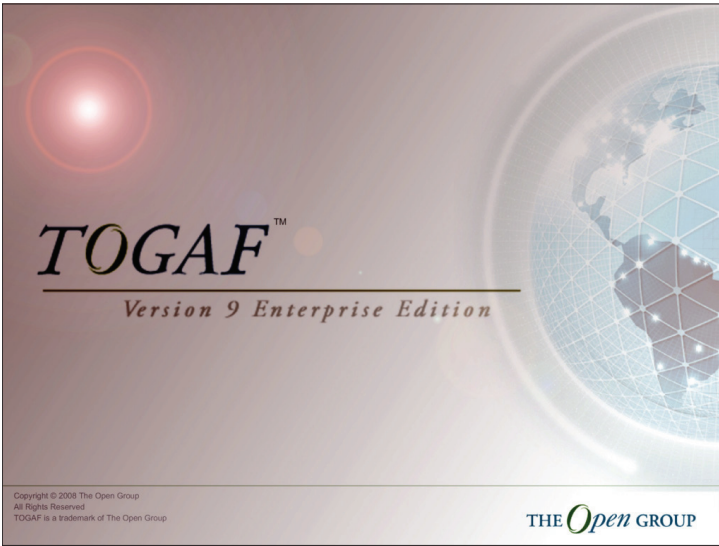
- $DCiE = \frac{1}{PUE} \times 100\%$
- 100% DCiE is maximum efficiency
- Typical datacenter operate at about 30% or less (estimated)
- Could approach 62 %



## The Challenge


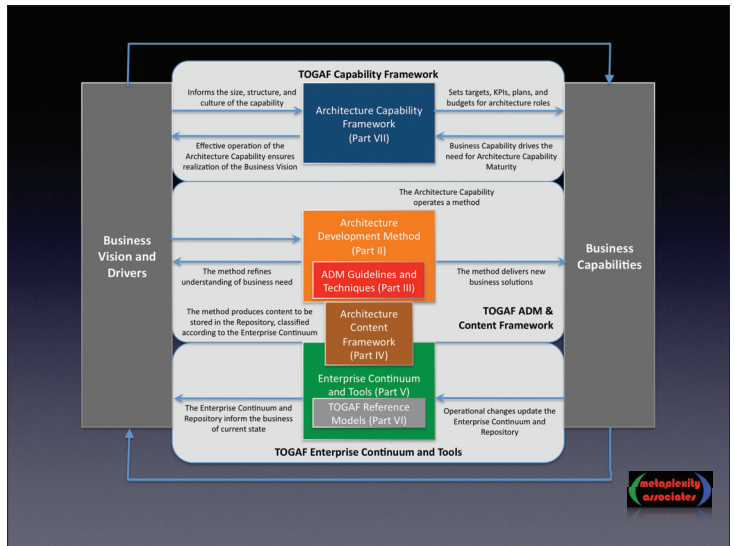
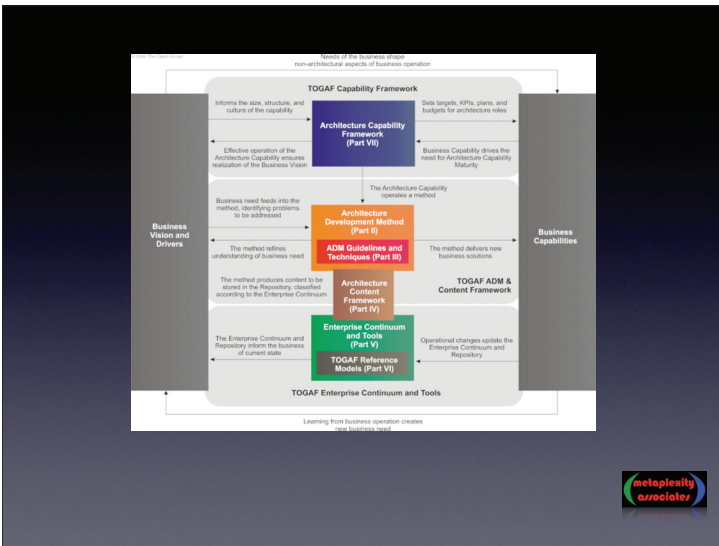
Defining Sustainable Enterprise Architectures





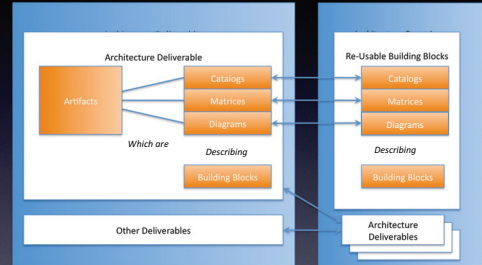
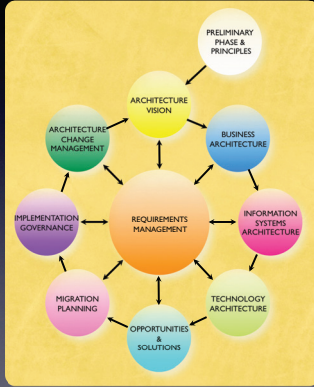
# TOGAF 9

- A Better TOGAF
- Improves existing content
- Adds new features

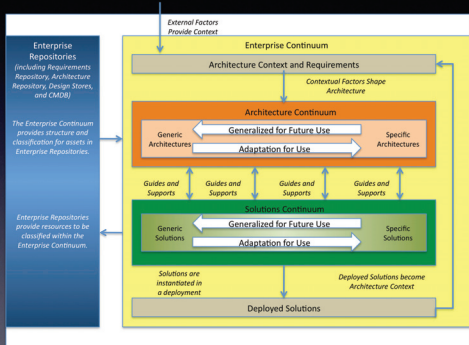





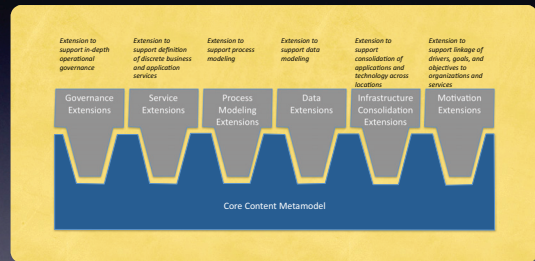
# Architecture Development Method



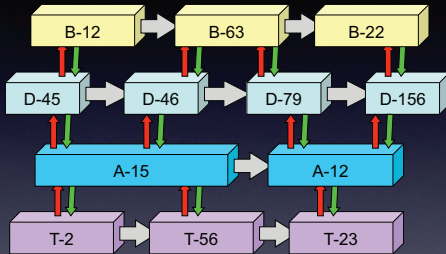
# Enterprise Continuum



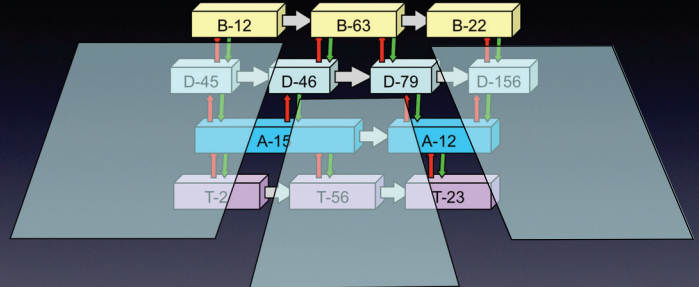
# Extending TOGAF 9



## Building Blocks



## Architecture Models



## Example Custom View



Give the CIO the Power Bill



## How Can TOGAF 9 Help?

- Architecture Principles
- Architecture Roadmaps
- Architecture Landscape
- Sustainability viewpoints
- Sustainability as a Capability



## Architecture Principles

- Define Principles related to Sustainability
  - Virtualization
  - Infrastructure Centralization
  - Hardware Takeback and Recycling
  - Telecommuting
  - Wastestream Management



## Architecture Roadmaps

- Shows the evolution of architectures from Baseline to Target
- Can be used to analyze achievement of capability increments



## Architecture Landscape

- Architecture Landscapes enable cross architecture impact analysis



## Custom Viewpoints

- TOGAF suggests several standard viewpoints that support the concerns of primary stakeholders
- Additional viewpoints can and should be defined to support other stakeholders or other concerns



## Sustainability as a Capability

- Sustainability can be embraced as a strategic capability
- Capability Increments can be used to model the attainment of the capability
- Transitional Architectures envision the elements needed to achieve the capability
- Work packages implement the architectures



Summary



Thank You!

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