Data Center Certification
Tier Standards

המצגת הוצגה ע"י שמעון כץ
במסגרת תפקידו כמהנדס ראשי בחברת אלקטרה M&E
במסגרת כנס Electricity 2016

Agenda

- Why?
- The Uptime Institute
- TIA 942
- IBM
- ANSI/BICSI 002-2014
- Consulting Firms
  - Syska Hennessy Group
  - Bruns-Pak
- Summary

Why?

- Quality
- Confirmation
- Best Practices
- Design Tool
- Specification tool:
  - Criticality
  - Reliability
  - Redundancy
  - Availability
  - Topology / Architecture
- Integration:
  - Multidisciplinary
  - IT – Facility Infrastructure

Standard

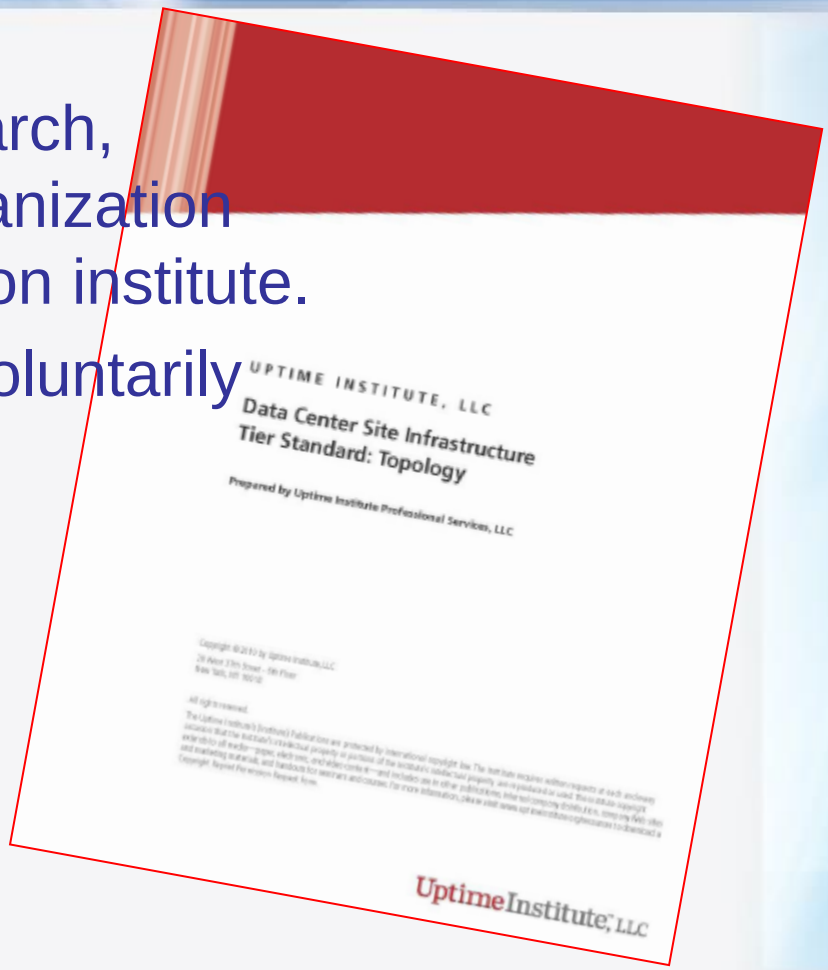
- A level of quality or attainment (Oxford dictionary)
- A standard might simply be defined as 'a set of rules for ensuring quality'.
- A **technical standard** is an established norm or requirement in regard to technical systems. It is usually a formal document that establishes uniform engineering or technical criteria, methods, processes and practices (Wikipedia)

Certification

- The action or process of providing someone or something with an official document attesting to a status or level of achievement. (Oxford dictionary)
- **Certification** refers to the confirmation of certain characteristics of an object, person, or organization. This confirmation is often, but not always, provided by some form of external review, education, assessment, or audit. Accreditation is a specific organization's process of certification. (Wikipedia)

UPTIME INSTITUTE

- The Uptime Institute is a research, education, and consulting organization and not a formal standardization institute.
- The most common standard voluntarily adopted.



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Data center site infrastructure Tier Standard: topology

	Tier I	Tier II	Tier III	Tier IV
Active Capacity Components to Support the IT Load	N	N+1	N+1	N After any Failure
Distribution Paths	1	1	1 Active and 1 Alternate	2 Simultaneously Active
Concurrently Maintainable	No	No	Yes	Yes
Fault Tolerance	No	No	No	Yes
Compartmentalization	No	No	No	Yes
Continuous Cooling	No	No	No	Yes

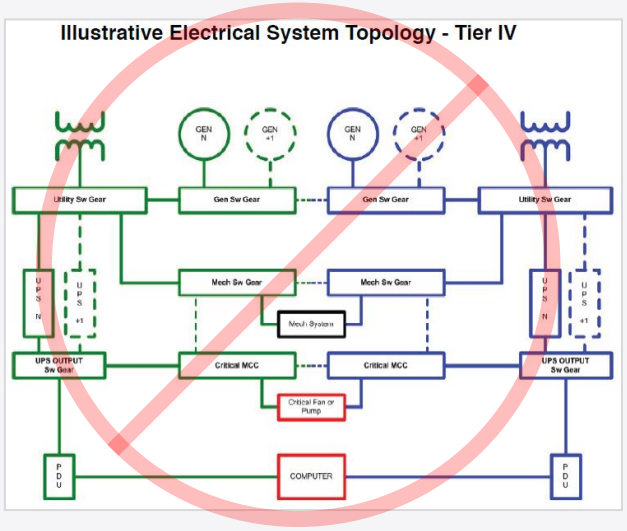
UPTIME INSTITUTE

Data center site infrastructure Tier Standard**:**
operational sustainability (2010)

- Levels: Gold, Silver, Bronze
- Aspects:
  - Staffing & Organization
  - Maintenance
  - Training
  - Planning
  - Building & Infrastructure
  - Operating
  - Natural and Man-Made Disaster risks

UPTIME INSTITUTE

- Chronology of TUI papers:
  - 1996 - 2008 - White papers - Tier classifications define site infrastructure performance
  - 2009 – 2012 - Data center site infrastructure tier standard: Topology



UPTIME Vs. TIA 942

- TIA 942 ANNEX G - DATA CENTER INFRASTRUCTURE TIERS:

  'This Standard includes four tiers relating to various level of availability of the data center facility infrastructure. The tier ratings correspond to the industry data center tier ratings as defined by The Uptime Institute, but the definitions of each tier have been expanded in this Standard'.

- TIA & UTI Press Release - March 18, 2014 :

  TIA will revise the ANSI/TIA-942/TIA-942A Standard to remove the word ***'Tier'***

TIA

- The Telecommunications Industry Association (**TIA**) represents manufacturers and suppliers of global **communications** networks through standards development, policy and advocacy, business opportunities, market intelligence, and events and networking.

TIA 942 Standard

- Standard Contents
  - DATA CENTER CABLING SYSTEM INFRASTRUCTURE
  - DATA CENTER TELECOMMUNICATIONS SPACES AND RELATED TOPOLOGIES
  - DATA CENTER CABLING SYSTEMS & PATHWAYS
  - DATA CENTER REDUNDANCY
  - ANNEX F **(INFORMATIVE)** SITE SELECTION
  - ANNEX G 1 **(INFORMATIVE)** DATA CENTER INFRASTRUCTURE **TIERS**

Tiers: 1 to 4

TIA 942 Standard

- Standard Contents
  - **TELECOMMUNICATIONS**
  - **ARCHITECTURAL**
    - ***Site selection***
    - ***Parking***
    - ***Security***
  - **ELECTRICAL**
    - ***UPS***
    - ***Computer Room Emergency Power Off***
    - ***(EPO) System***
    - ***Rotating UPS System Enclosures (With***
    - ***Diesel Generators)***
  - **MECHANICAL**

1

Table 10: Tiering reference guide (Electrical)

	TIER 1	TIER 2	TIER 3	
ELECTRICAL				
General				
Number of Delivery Paths	1	1	1 active and 1 passive	
Utility Entrance	Single Feed	Single Feed	Dual Feed (600 volts or higher)	Dua from
System allows concurrent maintenance	No	No	Yes	
Computer & Telecommunications Equipment Power Cords	Single Cord Feed with 100% capacity	Dual Cord Feed with 100% capacity on each cord	Dual Cord Feed with 100% capacity on each cord	D
All electrical system equipment labeled with certification from 3rd party test laboratory	Yes	Yes	Yes	
Single Points of Failure	One or more single points of failure for distribution systems serving electrical equipment or	One or more single points of failure for distribution systems serving electrical equipment or	No single points of failure for distribution systems serving electrical equipment or mechanical	No di

IBM Reliability Matrix

- **GENERAL IT CENTER RELIABILITY REQUIREMENTS**
- **Levels 1 to 4:**
- Matrix Contents
  - LOCATION + CIVIL & STRUCTURAL
  - ARCHITECTURAL
  - ELECTRICAL
  - INSTRUMENTATION & CONTROL (I&C)
  - MECHANICAL
  - IT CENTER FACILITY OPERATIONS REQUIREMENTS

Uptime Institute Tier III Vs. Tier IV and IBM Recommendations

- UTI Tiers – fractional or incremental Tier Classification is prohibited
- IBM Recommendations - Tier III^{+} / No certification
  - Compartments as required for risk reduction - less cabling pipping and space
  - Reduction in equipment sizes n=20 years considering IT tolerances and load profile.
  - Continuous cooling as required for meeting load density not per UTI
  - Generator selection: Continuous/Prime Power/Limited running power/standby power
  - Autonomous operation where appropriate, less complex system
  - Benefits - Reduction in Capex (initial and replacement) and Opex

ANSI / BICSI 002-2014

- ***Data Center Design and Implementation Best Practices***
- ***Classes 0 to 4***
  - *Five Availability Classes - reflects the interaction between the level of criticality and the availability of operation time.*
  - ***Higher Class -*** *Data center that meets the requirements of either Class 3 or Class 4.*
  - Mandatory requirements - ***shall***;
  - advisory recommendations - ***should***, ***may***, or ***desirable***

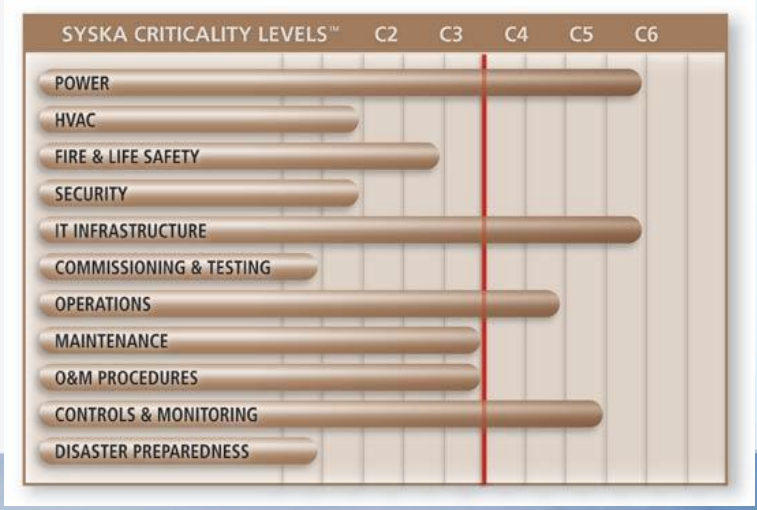
ANSI / BICSI 002-2014

- Contents
  - Site Selection
  - Space Planning
  - Architectural
  - Structural
  - Electrical Systems
  - Mechanical
  - Fire Protection
  - Security
  - Data Center Management and Building Systems
  - Telecommunications Cabling, Infrastructure, Pathways and Spaces
  - Information Technology
  - Commissioning
  - Data Center Maintenance

Consulting Firms

- **BRUNS-PAK - *Data Center Reliability Ranking – 1 to 10***
  - 1 - Unreliable
  - 3 - Unreliable - Improved Power /Cooling
  - 7 - Reliable
  - 8 - Reliable / Redundant
  - 9 - Highly Reliable
  - 10 - Geographically Hardened & Redundant

- Syska Hennessy Group
  - Criticality levels 1 to 7



Summary

- In Israel:
  - physical protection might change standards
  - Some criteria are not applicable
- Standardization should match project expected performance

	UTI Infrastructure	UTI Operation	IBM	TIA	BICSI	BP	SH
Levels	Tier	Rating	Level	Tier	Class	Reliability	Criticality
Site		+	+	+	+	+	+
Building	+/-	+	+	+	+	+	+
MEP systems	+		+	+	+	+	+
Operations & Maintenance		+			+	?	+
IT & Communication Infrastructure	+/-		+	+	+		+
Commissioning		+			+	?	+

References & Acknowledgments

- The Uptime Institute:
  - Data center site infrastructure Tier Standard: topology
  - Data center site infrastructure Tier Standard: operational sustainability Tier classifications define site infrastructure performance
- *ANSI / TIA-942/TIA-942A*
- IBM - Reliability Matrix
- ANSI / BICSI 002-2014
- BRUNS-PAK - *Data Center Reliability Ranking*
- *APC* - Guidelines for Specifying Data Center Criticality / Tier Levels

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