# 1 Expert Profile: PHILIP J. ISAAK, PE, P.Eng., DCDC, RCDD, SMIEEE

Philp Isaak, PE, P.Eng., DCDC, RCDD, SMIEEE is a senior engineer and President of Isaak Technologies, Inc. Mr. Isaak is an electrical, network and data center infrastructure engineer, program and project manager with over 25 years of engineering experience. Phil has provided data center design and operations consulting or training to clients located in 28 countries and territories across 6 continents. Phil's engineering experience encompasses data center facilities, network infrastructure, IT platforms, Enterprise, Edge, Outsourced and Cloud data center services. He received his B.S. Electrical Engineering degree from the University of Manitoba, and his Data Center Design Consultant and Registered Communications Distribution Designer designations from the Building Industry Consulting Service International organization.

## 1.1 Degrees, Licenses and Designations

Bachelor of Science in Engineering, Electrical

University of Manitoba, Winnipeg, Manitoba, Canada

May 29, 1996

Professional Engineer (P.Eng.)

Province of Manitoba[1]: License #20893

August 31, 2000 to present

Professional Engineer (PE)

State of Arizona[2]: License #43745

December 20, 2005 to present

Registered Communications Distribution Designer (RCDD)

Building Industry Consulting Service International (BICSI)[3]: Registration #142698

October 27, 1997 to present

Data Center Design Consultant (DCDC)

Building Industry Consulting Service International (BICSI)[3]: Registration #142698

September 19, 2011 to present

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[1] http://www.apegm.mb.ca/Directory.html
[2] https://btr.az.gov/search-for-licensees
[3] https://www.bicsi.org/education-certification/certification/search-verify-credential-holder/verify-credential-holder

## 1.2 Awards and Recognition

International Organization for Standardization, ISO/IEC JTC1 / SC39 / WG3 Sustainability, IT & Data Centres

WG 3 appreciates the dedicated work of Hans-Jürgen Niethammer, Phil Isaak, Gernot Frauscher, Jens Dittrich and Thomas Wegmann during the final publication phases of ISO/IEC 22237-1, -3, -4 and ISO/IEC TS 22237-30.

Institute of Electrical and Electronic Engineers (IEEE)

In recognition of professional standing the Officers and Board of Directors of the IEEE certify that Philip Isaak has been elected to the grade of Senior Member (SMIEEE). (2016)

A not-for-profit organization, IEEE is the world's largest professional association for the advancement of technology. Only 9% of IEEE's approximately 428,000 members hold this grade, which requires extensive experience, and reflects professional maturity and documented achievements of significance.

The Green Grid

Invited Expert (2021 to present) to participate in The Green Grid's Government Engagement Committee's (GEC) Data Center Energy Efficiency Standards (DCEE-S) workgroup and the Data Center Energy Efficiency Technologies (DCEE-T) workgroup.

The Recognition of Contribution Award has been issued to Phil Isaak for his contributions to the data center industry whitepaper, WP#72 ICT Capacity and Utilization Metrics, published by The Green Grid. (2017)

The Green Grid Association is a non-profit, open industry consortium of information and communications technology (ICT) industry end-users, policymakers, technology providers, facility architects, and utility companies that works to improve IT and data center resource efficiency around the world. The Green Grid offers the data center expertise that governments turn to for industry insight and counsel, bringing to bear the combined influence of a diverse body of ICT industry leaders.

1.3    Present Position

President, Senior Data Center Infrastructure Engineer

Isaak Technologies, Inc. (2011 to present)

1.4    Past Positions

Managing Principal, Senior Electrical & Network Infrastructure Engineer,

Reliable Resources (2010 to 2011)

Principal, Senior Electrical & Network Infrastructure Engineer,

Reliable Resources (2004 to 2010)

Associate, Manager of Communications Engineering,

Mazzetti & Associates (2003 to 2004)

Telecommunications/Technology Project Manager,

Arden Technologies International (2002 to 2003)

Electrical/Network Engineer,

Ellerbe Becket (1999 to 2002)

Electrical/Network Engineer,

Scouten, Mitchell, Sigurdson & Associates, Ltd (1996 to 1999)

## 1.5 Current Industry Committee and Work Group Participation

Co-Author, ASHRAE HVAC Applications Handbook, Chapter 20 "Data Centers and Telecommunication Facilities", ASHRAE TC 9.9 (2022 to present)

Project Leader / Editor, ISO/IEC 30134-2, Data Centres – Key Performance Indicators, Part 2: Power Usage Effectiveness (PUE)
International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), ISO/IEC JTC1 / SC39 / WG1, Resource Efficient Data Centres (2022 to present)

Project Leader / Editor, ISO/IEC Technical Specification 8236-1, Information technology — Provisioning, Forecasting & Management – Part 1 : Data Centre IT Equipment (in development)
International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), ISO/IEC JTC1 / SC39 / WG1, Resource Efficient Data Centres (2019 to present)

Project Leader / Editor, ISO/IEC Technical Specification 8236-2, Information technology — Provisioning, Forecasting & Management – Part 2 : Data Centre Facility Infrastructure (in development)
International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), ISO/IEC JTC1 / SC39 / WG1, Resource Efficient Data Centres (2019 to present)

Co-Editor, ISO/IEC 22237-3, Data Centre Facilities and Infrastructures Part 3: Power Distribution
International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), ISO/IEC JTC1 / SC39 / WG3 Sustainability, IT & Data Centres (2018 to present)

Co-Editor, ISO/IEC TS 20125, Digital Services Eco-design (in development)

> International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), ISO/IEC JTC1 / SC39 / WG4 Eco-Design of Digital Services (2023 to present)

Chair, BICSI Data Center Operations and Maintenance Best Practices Standard Work Group

> Building Industry Consulting Service International (BICSI), (2015 to present)
> Chair, Author and Editor of BICSI Standards Work Group responsible for developing the BICSI 009 Data Center Operations Standard

Member, BICSI Data Center Design and Implementation Best Practices Standard Work Group

> Building Industry Consulting Service International (BICSI), (2004 to present)
> Author and Editor of BICSI Standards Work Group responsible for developing the ANSI/BICSI 002 Data Center Design Standard

Chair, International Committee for Information Technology Standards (INCITS)

> INCITS/IT and Data Center Sustainability, USA Technical Advisory Group (TAG) to ISO/IEC JTC1 / SC39, (2021 to present)

Invited Expert, The Green Grid, an affiliate membership level of the Information Technology Industry Council (ITI), (2020 to present)

> Responsible to lead, and primary editor of, The Green Grid review and comments for submission to ISO/IEC JTC1 SC39 liaison, providing insight and coordinate ISO commenting.
> Member of:

- Government Engagement Committee's (GEC) Data Center Energy Efficiency Standards (DCEE-S) workgroup.
- Data Center Energy Efficiency Technologies (DCEE-T) workgroup.
- ITE – Energy Efficiency Metric workgroup.

Expert, International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC), ISO/IEC JTC1 / SC39, Sustainability, IT & Data Centres (2018 to present)

- Work Group 1 "Resource Efficient Data Centres"
    - ISO/IEC 21836, Data Centres – Server Energy Effectiveness Metric
    - ISO/IEC 21897, Data Centres – Impact of the ISO 5200 series on energy performance of buildings
    - ISO/IEC 23050, Data Centres - Impact on data centre resource metrics of electrical energy storage and export
    - ISO/IEC 23544, Application Platform Energy Efficiency (APEE)
    - ISO/IEC 30132-1, Information technology sustainability - Energy efficient computing models – Part 1: Guidelines for Energy Effectiveness Evaluation
    - ISO/IEC 30133, Guidelines for Resource Efficient Data Centres
    - ISO/IEC 30134-1, Data Centres – Key Performance Indicators
      Part 1: Overview and General Requirements
    - ISO/IEC 30134-2, Data Centres – Key Performance Indicators
      Part 2: Power Usage Effectiveness (PUE)
    - ISO/IEC 30134-3, Data Centres – Key Performance Indicators
      Part 3: Renewable energy factor (REF)
    - ISO/IEC 30134-4, Data Centres – Key Performance Indicators
      Part 4: IT Equipment Energy Efficiency for servers (ITEEsv)
    - ISO/IEC 30134-5, Data Centres – Key Performance Indicators
      Part 5: IT Equipment Utilization for servers (ITEUsv)
    - ISO/IEC 30134-6, Data Centres – Key Performance Indicators
      Part 6: Energy Reuse Factor (ERF)
    - ISO/IEC 30134-7, Data Centres – Key Performance Indicators
      Part 7: Cooling Efficiency Ratio (CER)
    - ISO/IEC 30134-8, Data Centres – Carbon Usage Effectiveness (CUE)
    - ISO/IEC 30134-9, Data Centres – Water Usage Effectiveness (WUE)
    - ISO/IEC TS 8236-1, Data Centre IT Equipment Provisioning (in development)

- Work Group 3 "Sustainable Facilities and Infrastructures"
    - ISO/IEC 22237-1, Data Centre Facilities and Infrastructures

      Part 1: General Concepts
    - ISO/IEC 22237-2, Data Centre Facilities and Infrastructures

      Part 2: Building Construction
    - ISO/IEC 22237-3, Data Centre Facilities and Infrastructures

      Part 3: Power Distribution
    - ISO/IEC TS 22237-31, Data Centre Facilities and Infrastructures

      Part 31: Key performance indicators for resilience
    - ISO/IEC 22237-4, Data Centre Facilities and Infrastructures

      Part 4: Environmental Control
    - ISO/IEC 22237-5, Data Centre Facilities and Infrastructures

      Part 5: Telecommunications Cabling Infrastructure
    - ISO/IEC 22237-6, Data Centre Facilities and Infrastructures

      Part 6: Security Systems
    - ISO/IEC 22237-7, Data Centre Facilities and Infrastructures

      Part 7: Management and Operational Information
    - ISO/IEC 22237-30, Data Centre Facilities and Infrastructures

      Part 30: Earthquake risk and impact analysis
    - ISO/IEC 22237-31, Data Centre Facilities and Infrastructures

      Part 31: Key performance indicators for resilience
    - ISO/IEC 8236-2, Data Centre Facility Provisioning (in development)
- Work Group 4 "Eco-Design of Digital Services"
    - ISO/IEC TS 20125, Digital Services Eco-design (in development)

## 1.6    Previous Industry Committee and Work Group Participation

Member, International Committee for Information Technology Standards (INCITS) ITS39 IT Sustainability, USA Technical Advisory Group (TAG) to ISO/IEC JTC1 / SC39 (2018 to 2020)

Individual Member, The Green Grid, an affiliate membership level of the Information Technology Industry Council (ITI), (2012 to 2020)

- AR#15-002 ICT Capacity and Utilization Metrics Workgroup (2015 to 2017) Co-contributor of ICT Capacity and Utilization Metrics White Paper #72
- AR#16-001 Open Standard for Data Center Availability Workgroup (2016 to 2018) Co-contributor of Open Standard for Data Center Availability (OSDA) tool algorithms
- Chair, AR#17-002 Power Metrics for ITE Workgroup (2017) Editor of Power Metrics for ITE White Paper #76

Member, TIA TR-42 Telecommunications Cabling Systems, Telecommunications Industry Association (TIA), (2001 to 2002)
Author and Editor of TIA Standards committee responsible for developing the TIA-942 Telecommunications Infrastructure Standard for Data Centers

## 1.7    Publications

*ASHRAE Handbook - HVAC Applications*, Chapter 20 "*Data Centers and Telecommunication Facilities*", ASHRAE TC 9.9, Revised edition to be published in 2023.[4]

> The […] ASHRAE Handbook—HVAC Applications comprises 65 chapters covering a broad range of facilities and topics, written to help engineers design and use equipment and systems described in other Handbook volumes. Main sections cover comfort, industrial, energy-related, general applications, and building operations and management. […] [Chapter] 20, Data Centers and Telecommunication Facilities, includes updates to reflect the current ASHRAE Datacom series, and text updates to reflect changes in the industry and new technologies such as PoE lighting and lithium-ion batteries.[5]
> Mr. Isaak has been invited to contribute to the revisions of the standard with 20 other data center industry experts.

*Discover the New BICSI 009-2019 Data Center Operations Standard*, BICSI ICT Today, May/June 2019, Volume 40, Number 3[6]

> This article provides an overview of data center availability and reliability, and a summary of the content within the BICSI 009 Data Center Operations standards published by BICSI in May 2019.  As Chair of the BICSI Data Center Operations standard sub-committee, Mr. Isaak guided the development of the standard with other data center industry experts from 17 countries across 5 continents.

*Data Center Operations & Maintenance Best Practices* Standard, *BICSI 009-2019, 2019*[7]

> As Chair of the BICSI Data Center Operations Standard Work Group, Mr. Isaak contributed to, and guided the development of, the standard with other data center industry experts from 17 countries across 5 continents. Mr. Isaak continues to chair the BICSI 009 Standard Work Group, editing content and providing new content to be included in future editions.

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[4] "ASHRAE Handbook - HVAC Applications", ASHRAE, 2019, § 20.
[5] "Description of 2019 ASHRAE Handbook - HVAC Applications", ASHRAE, https://www.ashrae.org/technical-resources/ashrae-handbook/description-2019-ashrae-handbook-hvac-applications, accessed April 2022.
[6] https://www.e-digitaleditions.com/i/1107553-ict-today-may-june-19/29?
[7] https://www.bicsi.org/standards/available-standards-store/single-purchase/bicsi-009-2019-data-center-operations-and-maintenance

*Case Study, Individual Member Seizes Opportunity to Influence the ICT Industry, 2017*[8]
The Green Grid, an affiliate membership level of the Information Technology Industry Council (ITI)

> Upon interviewing Mr. Isaak, The Green Grid published the case study highlighting the contributions that The Green Grid and its members make to improve energy efficiency within the data center and broader ICT industry.

*Power Metrics for ITE*, Whitepaper #76, 2017[9]
The Green Grid, an affiliate membership level of the Information Technology Industry Council (ITI)

> This paper describes the outcome of an initiative undertaken by The Green Grid in early 2017 (WI #17-002) to define a set of metrics that can quantify the power demand and energy consumed of ITE platforms within a data center. The ITE systems are defined as the compute processing, storage and network hardware within the data center. Trending the power demand over a multi-year timeframe can serve as a useful indicator for future capacity requirements (capital expenditures), while trending energy over a multi-year timeframe can serve as a useful indicator for future operational expenditures. Mr. Isaak wrote the Power Metrics for ITE data center industry whitepaper in collaboration with the other work group members.

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[8] https://www.thegreengrid.org/file/695/download?token=WTb6dkMx
[9] https://www.thegreengrid.org/en/resources/library-and-tools/494-WP#76---Power-Metrics-for-ITE

*Open Standard for Data Center Availability Tool*, 2017[10]
The Green Grid, an affiliate membership level of the Information Technology Industry Council (ITI)

> The Open Standard for Datacenter Availability (OSDA) was kicked off by The Green Grid early in 2016 to create an availability classification and rating system that is intended to promote innovation in energy efficiency and sustainable designs of data centers. The published tool, currently only available to members of The Green Grid, allows users to compare data center designs using the OSDA scale. The OSDA score will give a relative comparison of designs and NOT an absolute value for availability and reliability. This is intentional, since predicting actual design performance is fraught with complexity and assumptions. Mr. Isaak co-developed the OSDA algorithms in collaboration with the other work group members.

*ICT Capacity & Utilization Metrics*, Whitepaper #72, 2017[11]
The Green Grid, an affiliate membership level of the Information Technology Industry Council (ITI)

> This white paper describes the outcome of an initiative undertaken by The Green Grid in early 2015 to define a metric or set of metrics that can quantify the maximum volume of information and communications technology (ICT) services that can be delivered by a data center for a given investment ("ICT capacity") and provide an indicator of the share of that capacity that is actually utilized ("ICT utilization"). Mr. Isaak co-wrote the ICT Capacity & Utilization Metrics data center industry whitepaper in collaboration with the other work group members.

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[10] https://www.thegreengrid.org/en/resources/library-and-tools/473-Open-Standard-for-Datacenter-Availability-Tool
[11] https://www.thegreengrid.org/en/resources/library-and-tools/436-WP#72---ICT-Capacity-and-Utilization-Metrics

*Data Center Design & Implementation Best Practices* Standard, ANSI/*BICSI 002, first published in 2010 ed*[12]*, latest publication 2019 ed*[13]

Mr. Isaak authored or co-authored original content listed below, which was initially published in the ANSI/BICSI 002-2011 Data Center standard upon completing peer review by the other BICSI 002 Work Group members. Mr. Isaak continues to work within the ANSI/BICSI 002 Standard Work Group, editing content and providing new content to be included in future editions.

| Section | Title |
|---|---|
| Section 1 | Introduction |
| Section 5 | Site Selection |
| Section 6 | Space Planning |
| Section 9 | Electrical Systems |
| Section 10 | Mechanical |
| Section 14 | Telecommunications Cabling, Infrastructure, Pathways and Spaces |
| Section 15 | Information Technology |
| Appendix A | Design Process |
| Appendix B | Reliability and Availability |
| Appendix C | Alignment of Data Center Services Reliability with Application and System Architecture |
| Appendix D | Data Center Outsourcing Models |
| Appendix E | Multi-Data Center Architecture |

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[12] https://web.archive.org/web/20101229021341/https://www.bicsi.org/book_details.aspx?Book=BICSI-002-CD-v2&d=0
[13] https://www.bicsi.org/standards/available-standards-store/single-purchase/ansi-bicsi-002-2019-data-center-design

*Data Center Handbook,* John Wiley & Sons, Inc., Hoboken, NJ, 2014[14]
*Data Center Handbook, 2ND Edition,* John Wiley & Sons, Inc., Hoboken, NJ, 2021[15]

The Data Center Handbook is a collective representation of an international community with scientists and professionals from eight countries around the world. Fifty-nine experts from the data center industry, R&D, and academia have contributed to this book, and reviewed by fifteen members of the Technical Advisory Board.

The Data Center Handbook instructs readers to:
- Prepare strategic plan that includes location plan, site selection, roadmap and capacity planning
- Design and build "green" data centers, with mission critical and energy-efficient infrastructure
- Apply best practices to reduce energy consumption and carbon emissions
- Apply IT technologies such as cloud and virtualization
- Manage data centers in order to sustain operations with minimum costs
- Prepare and practice disaster recovery and business continuity plan

The book imparts essential knowledge needed to implement data center design and construction, apply IT technologies, and continually improve data center operations. The specific section authored by Mr. Isaak is the chapter on Architecture Design: Data Center Rack Floor Plan and Facility Layout Design.

*Telecommunications Infrastructure Standard for Data Centers, TIA-942,* 2005 ed[16]
Telecommunications Industry Association (TIA)

This TIA-942 Standard specifies the minimum requirements for telecommunications infrastructure of data centers and computer rooms including single tenant enterprise data centers and multi-tenant Internet hosting data centers. Mr. Isaak was one of six editors who co-wrote the standard along with other members of the TR42 Engineering Committee.

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[14] https://www.wiley.com/en-us/Data+Center+Handbook-p-9781118937570
[15] https://www.wiley.com/en-us/Data+Center+Handbook%3A+Plan%2C+Design%2C+Build%2C+and+Operations+of+a+Smart+Data+Center%2C+2nd+Edition-p-9781119597506
[16] https://global.ihs.com/doc_detail.cfm?&csf=TIA&item_s_key=00414811&item_key_date=960613&input_doc_number=TIA%2D942&input_doc_title=#abstract

## 1.8    Presentations

**Aligning the Data Center Facility Infrastructure with Technology**
Data Center Summit – "the Green Reset"
Guatemala (Virtual), November 16, 2022
Data Center Consultores

**Climate Change: Impact on the Data Center Now and Future**
Data Center Summit – "the Green Reset"
Costa Rica (Virtual), August 11, 2022
Data Center Consultores

**Climate Change: Impact on the Data Center Now and Future**
Operations & Maintenance – Data Center Net Zero
Costa Rica (Virtual), March 24, 2022
Data Center Consultores

**Aligning the Data Center Facility Infrastructure with Technology**
Data Center Summit – "the Green Reset"
-    El Salvador (Virtual), November 25, 2021
-    Guatemala (Virtual), September 23, 2021
Data Center Consultores

**Expert Panel – High Performance Data Center, Essential to Insert Central America Region in the 4th Industrial Revolution**
Co-panelists –Uptime Institute, TIA-942, Green4T
Data Center Summit – "the Green Reset"
-    El Salvador (Virtual), November 25, 2021
-    Guatemala (Virtual), September 23, 2021
Data Center Consultores

**Data Center Provisioning**
Storage Networking Industry Association (SNIA) – Green Technical Work Group (GTWG), Virtual, April 21, 2021

**How COVID-19 has Impacted DR/BC**
BICSI Japan District Conference & Exhibition, Tokyo, Japan (Virtual), November 25 & 26, 2020

**Data Center & Edge Architecture: Topology or Infrastructure? Who's Driving the Bus**
Minneapolis, MN, February 12, 2020
AFCOM Minnesota Chapter, Minneapolis MN

**Colocation Data Center Market Analysis**
@Tokyo, Tokyo, Japan, May 21, 2019

**Data Centers Operations**
BICSI Japan, Tokyo, Japan, May 20, 2019

**Proposed Data Center IT Provisioning Standard**
ISO/IEC JTC1 SC39, Yokohama, Japan, May 14, 2019

**Expert Panel – Edge Data Centers, An Alternative to the Vulnerabilities of the Cloud**
Co-panelists –Schneider Electric, APC, Cisco, Huawei, GBM, Electrotecnica
Data Center Summit Conference, San Jose, Costa Rica, August 9, 2018
Data Center Consultores

**Expert Panel - Characterizations of Green Data Center Hubs**
Co-panelists –Government of Costa Rica Vice Minister of Science and Technology, Director of Climate Change at the Ministry of Environment and Energy MINAE Government of Costa Rica, ICE, EPI, United States Green Building Counsel
Data Center Summit Conference, San Jose, Costa Rica, August 9, 2018
Data Center Consultores

**Edge Data Centers - Where is the Edge? What does it Look Like?**
Data Center Summit Conference, San Jose, Costa Rica, August 9, 2018
Data Center Consultores

**Panel Discussion - Impact of Standards on Data Center & Building Facilities**
Co-panelists –Panduit
Consultants Forum, Marrakesh, Morocco, September 18, 2017
Panduit Corporation

**Standards and the Future of the Data Center**
Consultants Forum, Marrakesh, Morocco, September 18, 2017
Panduit Corporation

**Who's in Charge - Data Center Network Architecture, Topology or Infrastructure**
Consultants Forum, Marrakesh, Morocco, September 18, 2017
Panduit Corporation

**How Data Center IT and Facility Operations Can Improve Energy Efficiency**
Data Center Summit Conference, San Jose, Costa Rica, August 10, 2017
Data Center Consultores

**Applying ICT Capacity and Utilization Metrics to Improve Data Center Efficiency**
Global Member and Non-Member Webinar, March 16, 2017
The Green Grid

**BAS-BMS-DCIM-CMMS-CFD: What Are We Supposed to Measure and How Do We Measure It**
Data Center Summit Conference, San Jose, Costa Rica, August 30, 2016
Data Center Consultores

**Data Center Disaster Recovery Site Selection**
Data Center 1-day Seminar, San Jose, Costa Rica, December 11, 2015
Data Center Consultores

**Expert Panel, Cloud Services for the World**
Co-panelists –Ministry of Science and Technology MICITT, Costa Rican Coalition of Development Initiatives CINDE, Microsoft
Data Center Summit Conference, San Jose, Costa Rica, August 18, 2015
Data Center Consultores

**Data Center Operations and Maintenance**
Data Center Summit Conference, San Jose, Costa Rica, August 18, 2015
Data Center 1-day Seminar, San Jose, Costa Rica, June 11, 2015
Data Center Consultores

**How to Ensure Your Design Will Meet the Future Demand of the Data Center**
BICSI Fall Conference and Exhibition, ½ Day Seminar, Anaheim, CA USA, September 29, 2014
Building Industry Consulting Service International (BICSI)

**BICSI 002, TIA-942, Uptime – Which One to Use**
BICSI South East Asia Conference, Singapore, November 25, 2013
Building Industry Consulting Service International (BICSI)

**Data Center Commissioning – Lessons Learned**
Data Center Summit Conference, San Jose, Costa Rica, October 22, 2013
Data Center Consultores

**Building Best in Breed Data Centers – Cloud and Data Center Track**
The Future of the Network Conference, Washington, DC USA, October 10, 2013
Telecommunications Industry Association (TIA)

**The Most Common Errors in the Design and Implementation of Data Centers & How to Avoid Them**
BICSI Central America & Latin America District Webinar, August 21, 2013
Building Industry Consulting Service International (BICSI)

**ANSI/BICSI 002-2011 Data Center Design and Implementation Best Practices**
BICSI South East Asia District Board Meeting, Singapore, April 26, 2013
Building Industry Consulting Service International (BICSI)

**Data Center Redundancy and Reliability, Analyzing the Facility and the Enterprise**
BICSI Canadian Conference and Exhibition, Niagara Falls, ON Canada, April 30, 2012
Building Industry Consulting Service International (BICSI)

**Data Center Reliability – How Much is Needed & How to Validate You Got It**
Minnesota Chapter Meeting, Minneapolis, MN USA, August 10, 2012
Association for Computer Operations Managers (AFCOM)

**Data Center Services Reliability**
Interop "The Future of IT" Conference, New York, NY USA, October 6, 2011

**Expert Panel, Natural Disasters - Impact on Data Center Infrastructure and Telecommunications**
Co-panelists –The Green Grid, Uptime Institute, EMC, ICREA
Data Center Summit Conference, San Jose, Costa Rica, August 30, 2011
Data Center Consultores

**ANSI/BICSI 002-2011 Data Center Design and Implementation Best Practices**
Data Center Summit Conference, San Jose, Costa Rica, August 29, 2011

**High Reliability in Data Center Design**
Data Center Summit Conference, San Jose, Costa Rica, August 29, 2011
Data Center Consultores

**Keynote Address - From the Server Closet to the Data Center**
Small Business Virtual Web Conference, October 21, 2010
Information Week / bMighty

**ANSI Standards - Beyond the Technology Life Cycle**
Data Center World Conference, Atlanta, GA USA, March 21, 2006
Association for Computer Operations Managers (AFCOM)

**Data Center Standards Review**
Data Center World Conference, Chicago, IL USA, October 11 and 12, 2005
Association for Computer Operations Managers (AFCOM)

**Ask the Experts Panel**
Co-panelists –Intel, Raritan, Rosendin Electric
Data Center World Conference, Chicago, IL USA, October 12, 2005
Association for Computer Operations Managers (AFCOM)

**Mission Critical Operations – Trends and Best Practices**
Data Center World Conference, Las Vegas, NV USA, April 21, 2005
Association for Computer Operations Managers (AFCOM)

**Physical Constraints within Networking**
Masters in Telecommunications, Adjunct Instructor, February 20, 2004
Saint Mary's University of Minnesota

**Design Best Practices for Critical Facilities**
The American Institute of Architects – Minnesota Chapter, Minneapolis, MN USA, May 16, 2000