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— 2020

Data center
Commissioning guide

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Why professional commissioning is key for
quality, sustainability and time to market while
maintaining continuous growth in digitalisation

1. Data centers commissioning

Commissioning has now become a business necessity

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When building a new data center, the owner of the data center has no guarantee that the various physical infrastructure subsystems – power, cooling, fire suppression, security, and management – will work together. Commissioning is the process that reviews and tests the data center's physical infrastructure design as a holistic system in order to assure the highest level of reliability.

Traditional commissioning is a daunting task. Since formal system operation doesn't begin until the system is commissioned, the commissioning team experiences intense pressure to complete the commissioning process quickly. Commissioning can involve high expense and requires staffs from different departmental disciplines to work together. For these reasons data center commissioning has almost uniquely been associated with large data centers.

In the recent past, many data center managers chose to roll the dice and perform little or no commissioning, relying only on start-up data to press ahead with launching the new data center. Given the reality of 24x7 operations, however, the alternative of exposure to major system failures and accompanying downtime is no longer an economically viable option. Commissioning has now become a business necessity.

"Commissioning is verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the needs of the owner."

2. **Why do you need a commissioning?**

It is important to know WHY because this focusus on the purpose
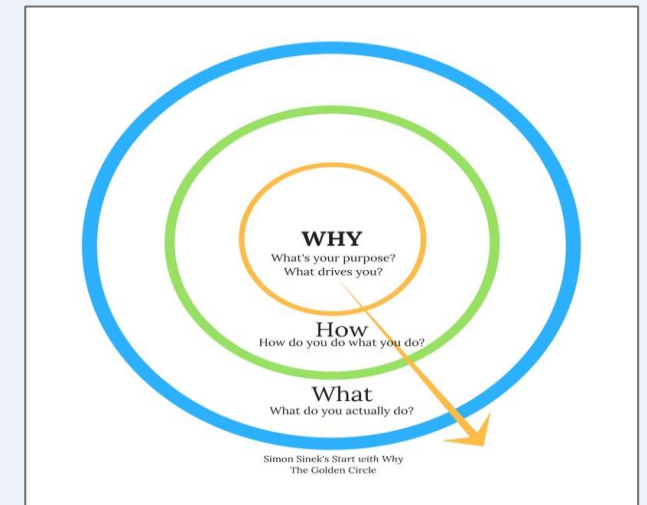
One of the first questions which should be answered is: Why do we need a commissioning and what is the goal of the commissioning? This should translate in how and what we are commissioning. The reasons may vary (multiple answers possible):

o Compliance, Proof of evidence, Guarantee, Liability
o Certifications
o Customer and/or stakeholder driven
o Owners delivery standards
o Stress test / punches
o Local and (Inter-)National regulations
o Hand-over
o Training operational staff

Knowing why helps guiding the overall commissioning process and achieving a clear goal.

The design and construction process is only a limited period in the entire lifecycle of a data center. In most projects we see the pressure cooker is on during this process and commissioning is seen as a bottle neck towards hand-over to operations. The commissioning process is however one of the most critical processes as it will be difficult, not to say impossible to repair a number of punches during the commissioning.

WHY
What's your purpose?
What drives you?

How
How do you do what you do?

What
What do you actually do?

Simon Sinek's Start with Why
The Golden Circle

2. How?

Steps

Step 1: Integration with the design
The ability to commission equipment should be considered at the earliest stage of every project.

Step 2: Planning
Make the testing regime system simple, efficient and standardized - and most importantly transparent.

Step 3: The factory acceptance test
Validation before any product arrives on site can avoid any costly and time-consuming issues.

Step 4: Visual inspections
Make sure that any delivered equipment is visually inspected for signs of damage, defects should be reported.

Step 5: Site acceptance testing
Each product and service should be physically and independently tested on site to verify performance criteria.

Step 6: System operation verification
Data networks are to be independently certified to ensure functional communication between equipment.

Step 7: Integrated system testing
The final integrated system test is the opportunity to observe the performance at maximum design load.

2. What?

Defining the different commissioning phases

Testing components is not enough. Datacenter systems may be simple, but their interaction isn't. Level 5 testing verifies reliability of design and compatibility among all critical systems (Electrical Mechanical, Environmental). You must test in all modes (Failure, Safety, Emergency).

Commissioning items
o General building tests ⌞SEP⌝
o Security and monitoring systems
o Cooling systems
o Power systems ⌞SEP⌝
o Integrated system testing

This question contains the action plan in the different levels resulting in scenarios. Based on the master commissioning plan wherein we have agreed budget, risk, time and minimum requirements are described we carefully plan the different actions or scenarios.

The question that should be answered during the entire commissioning process is often forgotten: When are we successful in achieving our goal?

3. Requirements

Defining the different commissioning requirements

One word: Research! Take time to do the proper research to ensure you build a competent team. Once you have found the right general contractor, design team, commissioning agent and vendors, the likelihood of success has already increased exponentially. The budget should cover all items and personnel needed to support the commissioning. Scheduling should be timely and covers all commissioning activities to avoid any delays. Allow room for flexibility.

o Assemble the right commissioning team

o Involve key stakeholders in the commissioning planning process

o Create the Owner's Project Requirements (OPR) document

o Determine the initial commissioning scope, schedule, and budget

o Define the commissioning plan and implement contingency plans for special circumstances

o Focus on selecting innovative load testing services that improve set-up time, safety, and operational efficiency

o Implement a testing strategy into the commissioning plan that simulates electrical and thermal load characteristics of the equipment used in the data center low ΔT (delta T) load banks for example

o Integrate power quality monitors and connected equipments (sensors, load banks, measurement equipments) to collect more data, reduce reporting time, and consolidate devices

o Effective document control and reporting

For more information please download the ISAT-Commissioning Rapport 2020 on dutchdatacenters.nl/publicaties

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