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# Data Centre Planning Fundamentals

Planning, commissioning and operations basics

A practical run-through

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OVERVIEW

# What this guide covers

## 01 Operations basics

What data centres do day to day and why uptime matters.

## 02 Technical terms

Power, cooling, data halls, switchrooms and controls.

## 03 Commissioning

How power and services are tested before handover.

## 04 Planning risk

Where programme delays come from and how to show them.

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CONTEXT

# Why this matters

- Data centres are systems-led projects - power, cooling, controls and IT - not just building works.
- Critical dates are driven by energisation, plant, procurement and commissioning.
- Small logic gaps can hide major handover or operational risk.

**Lens:** This is a planning and sequencing guide, not an engineering deep-dive.

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THE BASICS

# What is a data centre?

## IT function

Servers, storage and network equipment process information; cloud still relies on physical racks, fibre and power.

## Building function

Structure, plantrooms, switchrooms, fire, security and maintainable access; built for resilience.

## Operational function

Power, cooling, controls and monitoring run 24/7; handover includes operator acceptance.

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WHAT IS A DATA CENTRE

# In plain English

A purpose-built, highly serviced building that protects computer equipment from power loss, overheating, unauthorised access and uncontrolled change.

- It becomes valuable when it is operational - not just when it looks complete.

**Lens:** Ask which systems must be operational before each area can be handed over.

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DELIVERY CLIMATE

# Why clients push for certainty

## Speed to market

They are selling capacity and uptime; partial handover can release capacity earlier.

## Acceleration

Extra shifts and early-handover targets; safety, permits and witness tests still govern sequence.

## Long-lead equipment

Transformers, switchboards, UPS, generators and chillers are rarely off the shelf.

## High interface load

Utility, developer, builder, vendors, operator and tenants all have obligations.

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DELIVERY CLIMATE

# What can go wrong

## Looks complete

A building may look complete before critical systems are usable.

## Critical tests slip

If FAT, delivery, energisation or IST slips, the end date can move quickly.

## Retesting repeats

Retesting can create repeated impacts.

**Lens:** A data centre schedule should show how the building becomes operational, not only how it gets built.

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PART 1

01

# Physical areas, systems and terminology



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PHYSICAL AREAS

# Room types (1 of 2)

## Data halls / white space

Where IT racks live; need clean conditions, access control, power, cooling and containment.

## Grey space

Plantrooms, switchrooms, UPS rooms and generator yards; often drive the programme.

## Meet-me rooms (MMR)

Carriers and external fibre enter; carrier/fibre dates become separate constraints.

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PHYSICAL AREAS

# Room types (2 of 2)

## Switchrooms

HV/LV, UPS rooms and panels; need dust control, clearances, QA packs, fire sealing and permits before energisation.

## Plant decks / roofs

Chillers, generators, tanks and pumps; heavy lifts, weatherproofing and maintenance access.

## Security & operations

Control rooms, spares, loading and NOC/SOC; may gate final acceptance.

**Lens:** Define what each room is ready for - install, energise, test, operate or customer fitout.

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PHYSICAL AREAS

# Key trades & packages

## Electrical & power

Utility connection, substation, HV boards, transformers, LV switchboards, UPS, batteries, generators, busduct.

## Mechanical & cooling

Chillers, pumps, pipework, CRAC/CRAH/PAC, BMS, metering and balancing.

## Builder / fitout

Concrete, slabs, raised floors, containment, acoustic/fire/weatherproofing and access.

## ICT, security & ops

Carrier fibre, MMRs, CCTV, access control, DCIM and O&M manuals.

**Lens:** Make the technical interfaces visible without becoming an engineering document.

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PHYSICAL AREAS

# Power stream basics

External supply → HV boards → Transformers

↓

LV/UPS boards → Busduct / PDU → Racks

## Each step needs

Physical completion, test records, permits and safe energisation.

## Planning risk

Upstream delays can stop downstream rooms from commissioning.

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PHYSICAL AREAS

# Backup & redundant power

## Backup path

UPS batteries cover interruptions while generators start; load banks prove equipment before customer IT connects.

## Redundant streams

A-side and B-side are separate supply paths; redundancy allows maintenance or a fault without dropping IT load.

**Lens:** Ask which path, switchboard, data hall and level of testing is complete for each handover milestone.

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PHYSICAL AREAS

# Resilience & redundancy

## Redundancy

Extra equipment or alternate paths so a failure does not stop the IT load.

## Concurrent maintainability

Maintain one part while the centre stays live - why A/B streams matter.

## Single points of failure

One item that can stop the system; reviews hunt for hidden ones.

## Terms

N, N+1, 2N and availability describe capacity and reliability.

**Lens:** Redundancy creates separate construction, testing and handover logic.

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PART 2

02

# Commissioning, energisation and operations



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COMMISSIONING

# Commissioning terminology

## Cx1 / FAT

Factory Acceptance Test - factory witness before delivery.

## Cx2 / SAT / QA

Site Acceptance Test and installed quality checks.

## Cx3 / Start-up

Equipment starts safely under controlled conditions.

## Cx4 / FPT

Functional Performance Test for individual systems.

## Cx5 / IST

Integrated System Testing across power, cooling and controls.

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COMMISSIONING

# Why split commissioning

## What it proves

Equipment is safe to energise, systems function as designed, alarms report correctly, changeover sequences are understood, and evidence is ready for sign-off.

## Why planners split it

Test stages have different prerequisites and witnesses; failed tests need retesting; broad activities hide delay.

**Lens:** Do not rely on one activity called commissioning.

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COMMISSIONING

# Power commissioning journey

## Before energisation

Room completion, safe access, fire/egress/permits, IR/megger tests, QA packs and switching programme.

## During energisation

Controlled switching, permit control, protection/alarm checks and live electrical access rules.

## After energisation

Load bank testing, UPS/generator changeover, defect rectification and MOP/SOP handover.

### WHERE IT BITES

Cx is often compressed at tender but retesting, witness availability and operational acceptance become the real critical path.

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COMMISSIONING

# Planning power commissioning

## Common blockers

Late authority/network approval, blocked plantroom access, controls/BMS not ready, scripts/witness points not agreed, defects not closed.

## Controls

Separate load bank, energisation, IST and retest allowances; permit/switching milestones; A/B sequences.

What exactly is preventing the next energisation, FPT or IST - and who owns that prerequisite?

## WHERE IT BITES - EOT

Commissioning shown as one block at the end won't reflect the real staged sequence. That's where forecasting, EOT and client-reporting risk hides.

**Lens:** Commissioning logic should include enabling works and room readiness, not just test duration.

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COMMISSIONING

# Cooling & airflow

## Goal

Stable temperature/humidity, separate hot and cold air, remove IT heat and alarm abnormal conditions.

## Equipment

CRAC/CRAH/PAC units, chillers, pumps, pipework, sensors and BMS.

## Containment

HAC and CAC; raised floors, ceilings and grilles affect airflow.

## Why it matters

Cooling tests rely on power and controls; late valves/sensors delay IST.

**Lens:** A powered data hall without working cooling is not operational.

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# Controls, monitoring & alarms

## BMS

Monitors and controls plant - cooling, pumps, alarms, temperatures and status; central to visibility.

## DCIM

Tracks capacity, power, cooling and infrastructure performance for operators.

## Alarms & metering

Prove the operator can see abnormal conditions and capacity.

## Common issue

Controls are installed across packages then integrated late; missing points or wrong alarm logic delay FPT/IST.

**Lens:** Controls are often a late-stage critical path item.

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COMMISSIONING

# Day-to-day operations

## Monitoring

BMS/DCIM track alarms, plant status, temperature, power and capacity.

## Operations teams

Facilities, security, technical ops and client reps; 24/7, with access and evidence requirements.

## Change control

Approved process for works near live areas.

## Procedures

MOP, SOP and EOP; NOC/SOC monitor network and security.

**Lens:** Procedures and operations readiness often gate testing, access and final acceptance.

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COMMISSIONING

# Live site & change control

## Before live areas

Easier access, but protect clean conditions, containment, security and equipment access.

## After energisation

Permits, isolations, authorised persons and strict access; some work moves out-of-hours.

## After customer handover

Change approval, screening, method statements, notification and rollback plans.

## Impact

Lower productivity, longer permit lead times, limited access windows and formal QA/evidence.

**Lens:** Once areas go live, access and change control become programme constraints.

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PART 3

03

# Construction sequencing and programme risk

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PROGRAMME RISK

# Typical programme structure

Design freeze → Procurement → Construction → Energisation → Cx / handover

## Design basis

Authority, utility and client requirements, reviews and vendor drawings; freeze allows manufacture.

## Procurement

Long-lead plant, FAT witness dates, shipping, delivery and cranage; track as milestones with owners.

## Construction & test

Room readiness, services, controls integration, energisation, commissioning and handover.

## Planning lens

The programme should explain what is ready for commissioning, not just when construction finishes.

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PROGRAMME RISK

# Common complications (1of 2)

## Authority & utilities

Connection offers, easements, permits and energisation windows; outside builder control but on the critical path.

## Long-lead equipment

Design freeze, shop drawings, manufacture, FAT, shipping, customs, delivery and cranage.

## Fitout sequencing

Ceilings, floors, containment, busduct, fire, security and controls compete for the same space.

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PROGRAMME RISK

# Common complications (2 of 2)

## Access & logistics

Heavy lifts, road permits, restricted routes, live-site rules, screening and clean-room controls.

## Commissioning defects

Failed scripts, controls/plant/BMS faults, retesting and delayed witness sign-off.

## Operational acceptance

O&M manuals, training, spares, procedures, asset registers and sign-off.

**Lens:** A strong programme shows interfaces and ownership, not just trade durations.

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PROGRAMME RISK

# Long-lead procurement

01
**Approve**

02
**Release**

03
**Manufacture**

04
**FAT**

05
**Ship**

06
**Deliver**

07
**Install**

08
**Pre-commission**

## Design & submittals

Coordinated design, equipment schedules, vendor submittals and client reviews.

## Manufacture & FAT

Manufacture slots, supplier QA, FAT with client witness and defect closeout before shipping.

## Delivery & logistics

Shipping, customs, road permits, cranage, storage and specialist install teams.

**Lens:** Ask who owns each milestone and what evidence is needed before the next step.

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PROGRAMME RISK

# Room readiness & handover

## Data hall

Cleanliness, access floor, containment, fire, security, labelling and environmental baseline.

## Switchroom

Dust control, safe access, fire sealing, egress, clearances and permits.

## Plant area

Weatherproofing, structural completion, crane removal, fuel systems and maintenance clearances.

ready for services rough-in · energisation · functional testing · IT fitout

**Lens:** Define what "ready" means for each milestone so status is measurable.

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PROGRAMME RISK

# Programme setup (1 of 2)

## Structure & coding

WBS by building, level, system, data hall, power stream and Cx stage; activity codes for A/B streams and owners.

## Logic clarity

Separate procurement, construction, energisation and commissioning logic; link to readiness milestones.

## Reporting focus

Status by critical systems, not just trade; highlight hold points, owner decisions, utility dates and procurement risk.

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PROGRAMME RISK

# Programme setup (2 of 2)

## Calendars & access

Shift calendars, shutdowns, restricted windows, permits, isolations and witness availability.

## Lookaheads

Room readiness, permit prerequisites, test-script approval, witness dates and client-supplied items.

## Delay-analysis readiness

Keep baseline, progress evidence, change records and logic from the start.

**Lens:** A good programme tells a non-engineer how the facility becomes operational and where the risk sits.

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PROGRAMME RISK

# Kickoff & status questions

## Commercial / scope

Who owns utility, substation, carrier and client-direct procurement? What are the staged handover and access dates? Any acceleration assumed? Who signs off operational acceptance?

## Technical / sequencing

What rooms must be ready before energisation and Cx4/Cx5? Are A and B streams independent and separately tested? What scripts, witness points and retest allowances apply?

### ASK AT EVERY STATUS

What Changed? What's needed to hold the next energisation/handover date? Which prerequisites aren't closed? Who owns each action - by when?

### WATCH-LIST

Utility dates • long-lead plant • room readiness • scripts • witnesses • defects/retests • sign-offs.

**Lens:** Use these at tender, baseline review and the first status meeting.

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PROGRAMME RISK

# Glossary (1 of 2)

**HV/LV**
High / Low Voltage

**UPS**
Uninterruptible Power Supply

**PDU**
Power Distribution Unit

**Busduct**
Enclosed power distribution

**FAT/SAT**
Factory / Site Acceptance Test

**IST**
Integrated System Testing

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PROGRAMME RISK

# Glossary (2 of 2)

**CRAC/CRAH/PAC**
Data hall cooling units

**HAC/CAC**
Hot / Cold Aisle Containment

**BMS**
Building Management System

**DCIM**
DC Infrastructure Management

**Load bank**
Temporary test load

**NOC/SOC**
Network / Security Operations Centre

**MOP/SOP/EOP**
Operating procedures

**PUE**
Power Usage Effectiveness

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PROGRAMME RISK

# Key takeaways

## 01 Operational asset

Value comes when power, cooling, controls and procedures are reliable.

## 02 Power critical path

Power is usually the critical path.

## 03 Visible commissioning

Separate Cx stages, prerequisites, witnesses, retesting and evidence.

## 04 Interface ownership

Procurement, approvals, access, controls integration and acceptance need clear ownership.

THE STANDARD WE PLAN TO

A strong programme explains how construction, technical systems and operations come together - not just when each trade finishes

**Readable · Statusable · Defensible**

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# Let us talk through your programme.

We plan data centre builds with developers and builders across Australia.

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