

Data Centre Infrastructure Upgrades

# INTEGRATED End-to-End Delivery

*Managing Risks and Assuring Outcomes*




Mark Mitchell  
A.G. Coombs Group

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## Agenda

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End to End Delivery  
*Managing Risks  
Assuring Outcomes*

1. Introduction
2. What is Data Centre Infrastructure?
3. Upgrade Drivers
4. Traditional Upgrade Model
5. Common Issues & Shortcomings... "The Risks"
6. Integrated End-to-End Delivery
7. Case Studies
8. Benefits of the Delivery Model
9. Summary
10. Conclusion





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## Introduction

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- The A.G. Coombs Group
- Data Centre Upgrade Experience
  - ANZ, NAB, Nextgen, Primus, Coles Myer
- Infrastructure Upgrade Features
  - Services to deliver power and cooling
  - Upgrades within live, operational facilities
  - Services = majority of upgrade scope


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## Infrastructure


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Generators




UPS Systems




Electrical Switchboards and Power Distribution Cabling



Chilled Water Systems



Process Cooling (CRAC Units)



Fire Protection Systems

SYDNEY 2000 ENGINEERING STRATEGIES AECOM

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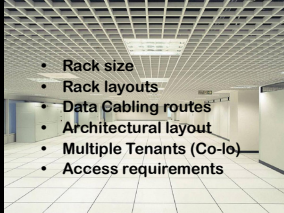
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## Infrastructure

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- Mechanical Services
- Electrical Services
- Fire Protection Services
- Other Services:
  - Control Systems
    - PLC
    - Building Automation
  - Security Systems
    - Card Access
    - CCTV
  - Hydraulic Systems
    - Drains
  - Building Works
    - Raised floor
    - Structural works
    - Acoustic enclosures

All needs to be integrated & coordinated.  
... between Services ...  
... but also with "core" components ...



- Rack size
- Rack layouts
- Data Cabling routes
- Architectural layout
- Multiple Tenants (Co-lo)
- Access requirements

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## Upgrade Drivers

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- Increased capacity (kW/m<sup>2</sup>) requirement
- Increased reliability / availability requirements
- Improved sustainability / reduced Carbon footprint
- Reduced operating costs
- Increase IT floor space
- End of Service Life (obsolescence)
- Response to tenant / market opportunities

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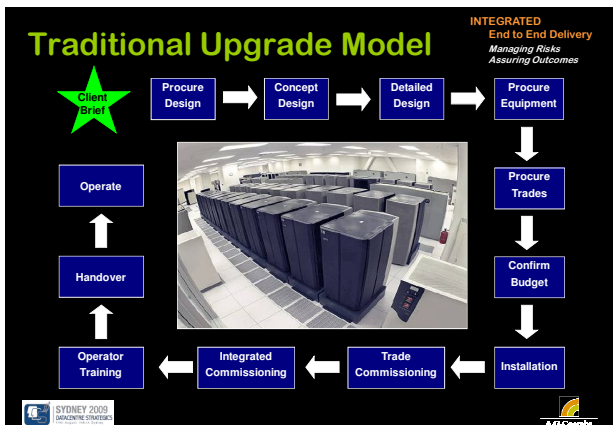
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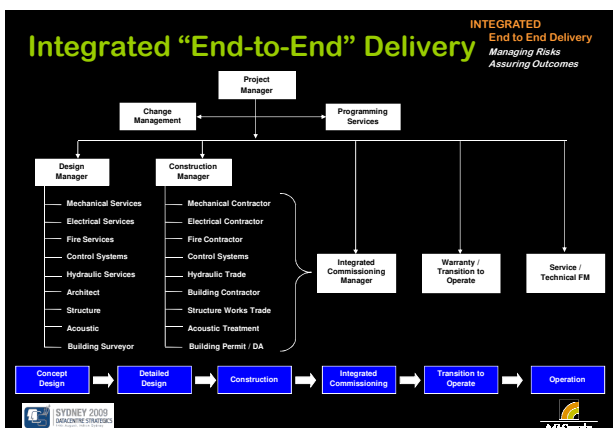
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## Case Study No. 1

### Major Financial Data Centre

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- Project value \$28M
- Transactions \$100B/day
- New electrical, A/C and fire systems (45 subcontractors)
- 1,100 change submissions
- 80 sub-system shutdowns
- 22 month programme
- 9 stages of handover
- Maintained 99.999% availability & defect-free handover




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## Case Study No. 2

### Major Network Operator / Co-locate Provider

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- Project value \$18M
- 2,500m<sup>2</sup> new floor space, 500 to 1000 W/m<sup>2</sup>
- Services design, architectural layout
- Installation and integrated commissioning of all services: Mech, Elec, Fire, BAS, Security, Hydraulic.
- All building works: raised floor, office fit out



*From these experience, there are real benefits of the end-to-end approach...*




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## Integrated Delivery Model

### BENEFITS

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- Programme Management
- Cost Management
- Minimal impact on Operations
- Design Management
- Procurement Strategy
- Scalability
- Integrated Commissioning
- Knowledge Capture & Management




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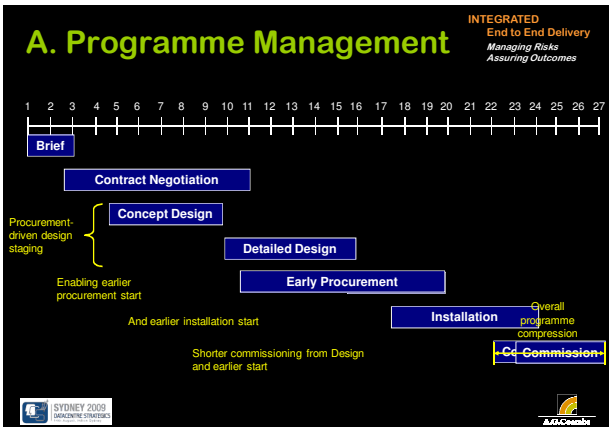
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- ## B. Cost Management
- INTEGRATED  
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Managing Risks  
Assuring Outcomes
- Open Book, "Cost Plan" approach*
- **Transparency**
    - Sub-contractor & Equipment tendering
    - Agreed exposed overhead, profit & rates
  - **Earlier Surety of Outcome**
    - Fixed price at concept stage
    - Exposed contingency or alliance
  - **Value Management**
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- ## C. Impact on Operations
- INTEGRATED  
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Assuring Outcomes
- **Change Management Systems**
    - Dedicated role within team
  - **Services Outages**
    - Eliminate unplanned
    - Minimise planned shutdowns
  - **Early Operator Involvement**
    - Engagement opportunity!
  - **Operator Training**
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## D. Design Management

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- **Design Manager:**
  - Dedicated function
  - Experienced in multi-services
  - Operational understanding.
- **Ensures:**
  - Design for Construction
  - Design for Commissioning
  - Design for Operation
- *Integrates* services
- Staged design to optimise procurement programme



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## E. Procurement Strategy

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- **Designer and trade contractor selection**
  - Consideration of technical capability, resource capacity and cost
- **Independent equipment / vendor selection**
  - Best for project solution
- **Market-tested and benchmarked**
- **Early identification of long lead time items**



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## F. Scalability

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- **Data centres a dynamic environment through upgrade**
- **Management of scope changes through D&C process**
- **Rapid handling of design alternatives (e.g. scope & budget)**



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## G. Integrated Commissioning

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- Starts early – *Design for Commissioning*
- *Commissioning Management* as a dedicated function
- *Commissioning Plan* across services packages
- Commissioning of each new component and sub-system, then *Integrated System Testing* across services
- BMS *functionality* test
- Commissioning as first part of Transition to Operation phase




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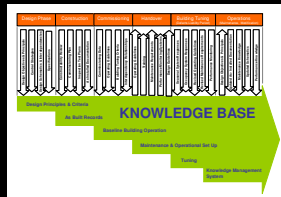
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## H. Knowledge Management

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- Often poorly done
- Design records
- As-Built records
- Commissioning and Test Plans
- Operator Training




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## Integrated Model Assures Outcomes & Reduces Risks

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UPGRADE RISK	INTEGRATED END-TO-END DELIVERY MODEL
Lack of in-house expertise	<ul style="list-style-type: none"> <li>• Single Point of Responsibility (SPR)</li> <li>• End-to-end plan, experienced resources</li> </ul>
Programme overrun	<ul style="list-style-type: none"> <li>• Integrated D&amp;C programme, owned by single point</li> <li>• Concurrent works packaging</li> </ul>
Budget overrun	<ul style="list-style-type: none"> <li>• Transparent, open book, market tested cost plan</li> <li>• High level of costing accuracy <i>early</i>, then refined</li> </ul>
Uncertain future site expansion plans	<ul style="list-style-type: none"> <li>• Scalability through D&amp;C integration = rapid response</li> <li>• Project delivery resources part of design team</li> </ul>
Unplanned Outages / Downtime	<ul style="list-style-type: none"> <li>• Change management: dedicated role &amp; scheduled</li> <li>• Operator engagement throughout</li> </ul>
Uncertain Outcome	<ul style="list-style-type: none"> <li>• Across-services, integrated commissioning</li> <li>• Design for construction, commissioning &amp; operation.</li> </ul>




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## Conclusion

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- Data centre infrastructure upgrades are complex = real risks and challenges.
- Need an expert, experienced team and a delivery model that addresses each.
- The Integrated End-To-End Delivery model has proven to:
  - Provide certainty of project outcome: time, quality and cost.
  - Mitigate risks to centre operation.



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## Further Information

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