

The Change From Conventional Theatre Design to Full Digital

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Points of discussion

- Conventional Operating Theatre design
 - Design Factors
 - Shortcomings
- Digital Theatre(Digital Operating Room) DOR
 - Design considerations
 - Equipment involved
 - Practical implementation
 - Potential problems



DOR Definition

Digital Operating Room with multiple connected equipment controlled from one central point.

Conventional Operating Theatre design

Design Factors

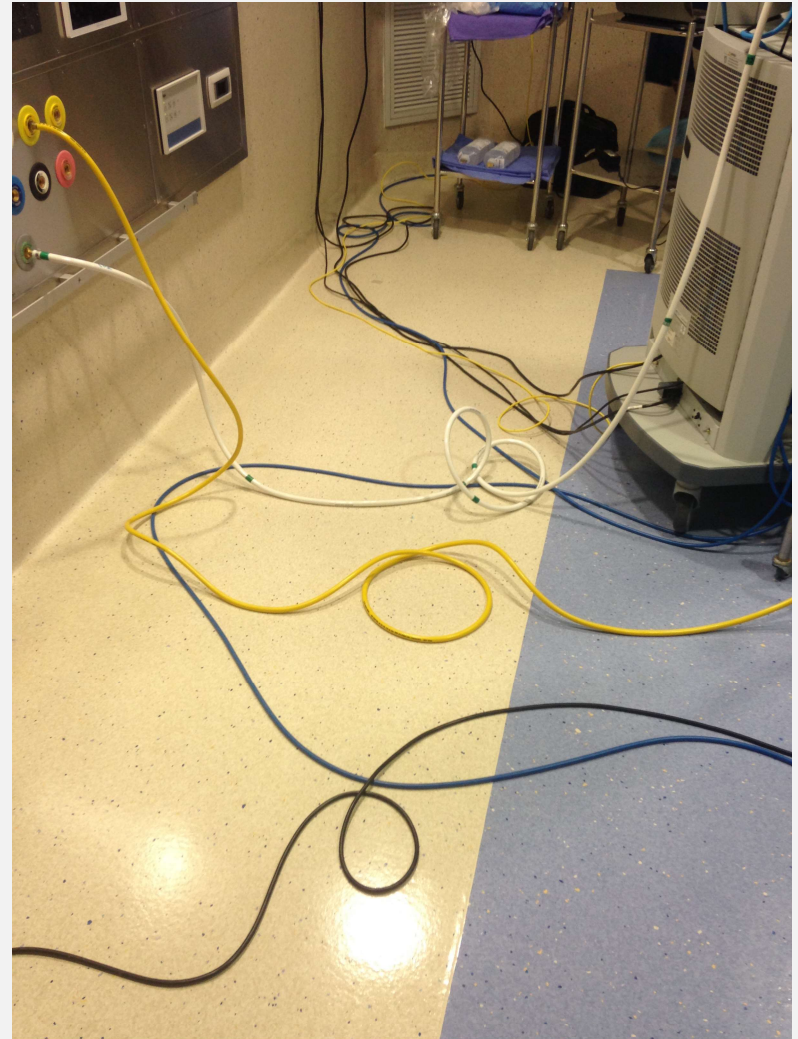
- Functional
- Sterile
- Size
- Modality specific
- Equipment involved
- Work flow.



Conventional Operating Theatre design

Shortcomings

- Increasingly cluttered workspace
- Workflow disruptions
- Devices are not interconnected
- Tripping hazards
- Sterility
- Surgeon strain
- Staff training and technical Ability



Full Digital Design

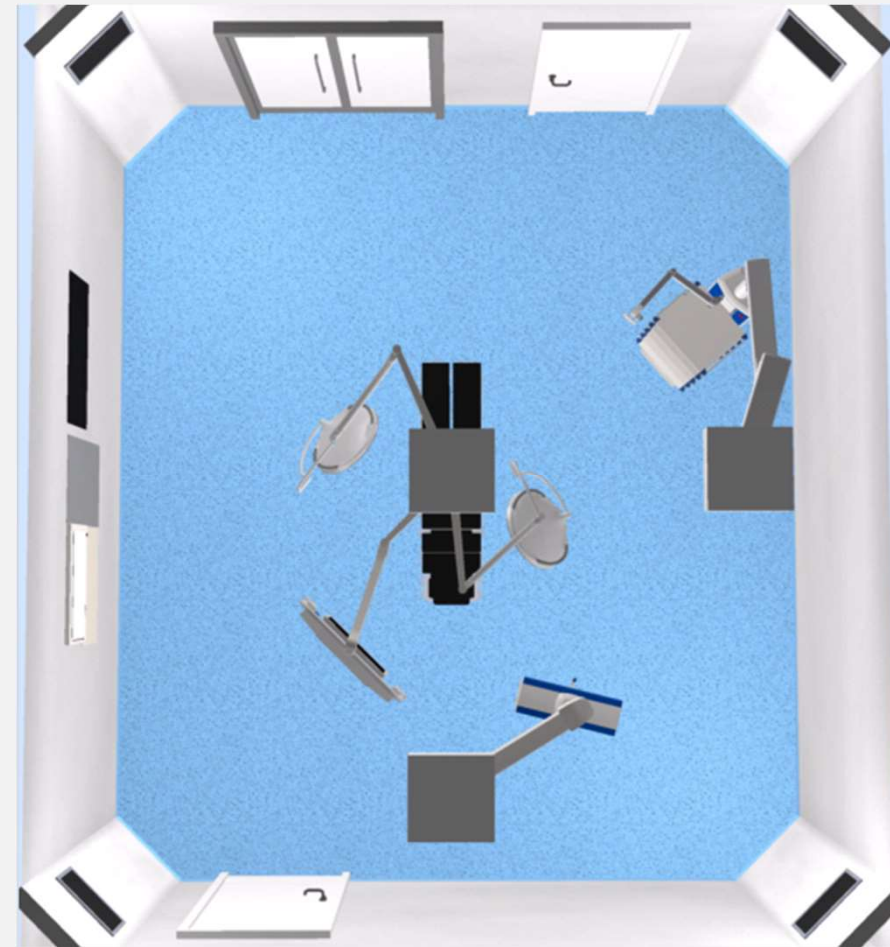
- Design Considerations
- **Knowledge of the Cost and Equipment Involved**
 - Know what is all involved and the pricing
 - Pendants – Surgical, Anaesthetic, Equipment and Central Monitor Pendant
 - Monitors - Medical Grade , 3D, 4k, Size 24"-32"
 - Cabling
 - Theatre Control system
 - Theatre Control Panel
 - Audio and video Equipment, Conferencing Equipment
 - Support & Servicing – Service Level Agreement
 - Any Extras
- **Theatre Layout**
 - Multi or single Modality
 - Placement of pendants – Modality Specific
 - Gasses, Plug sockets, amount of pendants (left and right)
 - Collision Management
 - Static Endoscopy equipment – on a Pendant or Mobile Equipment.
 - Amount of Monitors – Modality Specific – Information required and placement.
 - Amount of light heads – Modality Specific. - Remember Ceiling Height
 - Involve a dedicated surgeon or the matron
 - **Get surgeon to sign off on a dedicated Design !**



Full Digital Design

Design Considerations (Cont.)

- **Workflow**
 - Setting room
 - Scrub room
 - Main doors
 - Digital Theatre Control Panel – Accessible and visible
 - Digital – Connections involved with Services
 - HVAC
 - Lights
 - Gas
 - Alarms



General rule: If you have a monitor on a Pendant, it needs some sort of connection to it, Remember cabling and Integration.

Full Digital Design

Design Considerations (Cont.)

- **Digital Control System video Integration solution**
 - DOR Vendor Selection
 - Installation and design experience and references
 - Technical Support - Theatre knowledge
 - Quality Management system – ISO9001 or ISO13485
 - In SA – registered with SAHPRA / Registered with medical device Regulatory Body.
 - Local or International
 - Reliability and Redundancy
 - Capable to integrate with?
 - HVAC
 - Lighting – Ambient and Surgical
 - Gas alarms
 - Electrical Alarms
 - Device Control
 - PACS, HIS, RIS
 - Graphic User interface (GUI)
 - User friendly
 - Customizable
 - Reliable
 - Ease of Use



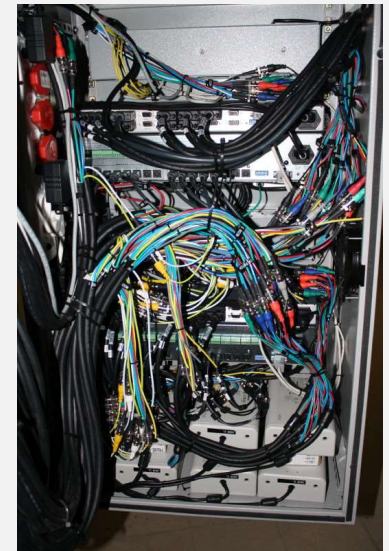
Full Digital Design

Design Considerations (Cont.)

- **Digital Control System video Integration solution (Cont.)**
 - System Design
 - Vendor to provide the best solution in conjunction with the following:
 - Number of total Theatres
 - Modalities
 - Technology - Be ready for the future- everchanging technology
 - Upgradability
 - Grow on your initial capital investment
 - Modular
 - Reliable
 - Fibre based
 - Support for future developments in the medical field
 - HD
 - 3D
 - 4K
 - 8K



13 x Digital Theatre cabling



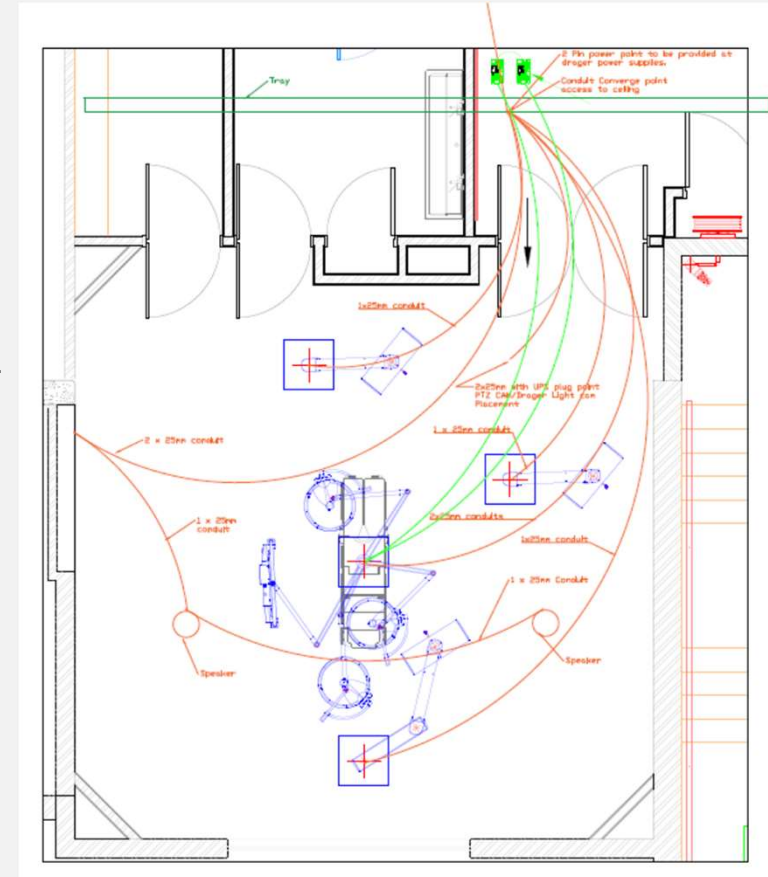
2 x Analogue Theatre Cabling

Full Digital Design

Design Considerations (Cont.)

• Digital Control System video Integration solution (Cont.)

- Vendor to aid in the following:
 - Electrical and reticulation requirements to electrical consultant.
 - Conduit runs – make provision for future upgrades
 - Power requirements – UPS Power – Integrated to the Theatre environment.
 - IT Requirements in Theatre – Internet access, DR's network access, Security
 - Positioning of equipment - Server/ Equipment rack
 - Special room required? Protect Your investment
 - Clean
 - Climate control
 - Preventative maintenance schedule
 - Remote support



Full Digital Design

Equipment involved

- Pendants fixed or moveable.
 - Anaesthetic Pendant – Close to location of the Patients Head.
 - Anaesthetic machine Gasses
 - Electrical Sockets
 - Vital Sign connection/ Auxiliary Connections
 - Surgical Pendant - Close to general position of any Auxiliary equipment
 - General gasses
 - More Electrical Sockets
 - Auxiliary Connections
 - Equipment Pendant –
 - used in some fixed modality theatres – positioned to have the most flexibility in reach to both sides of patient.
 - Gas and electrical Sockets
 - Central Light Pendant
 - Number of light Heads, and single or double screen brackets.
 - Note: Height of ceiling – Length of central axis
 - Note: Position of Monitor Bracket – Top or bottom
 - Note: Spring arm Carry weight - compare to Monitor weight!!!



Full Digital Design

Equipment involved

- **Visualisation equipment**
 - Monitors
 - 24"-26" most common, 32" also becoming popular.
 - On Pendants in sterile field – Medical Grade
 - Surgically calibrated
 - HD,4k or 3D
 - Equipment – Endoscopic, Microscope, Sonar , External Cameras, Vital Signs
 - Inform DOR Vendor Of all Possible Signal formats to ensure compatibility
 - 4K, HDMI, DVI, SDI, Composite etc.
- **Digital Control Panel**
 - Contain you main control Touch panel
 - Touch panel will have a graphic user interface
 - Control of the whole theatre
 - Alarms
 - Timers
 - Information.
 - PACS images



Full Digital Design

Practical Implementation

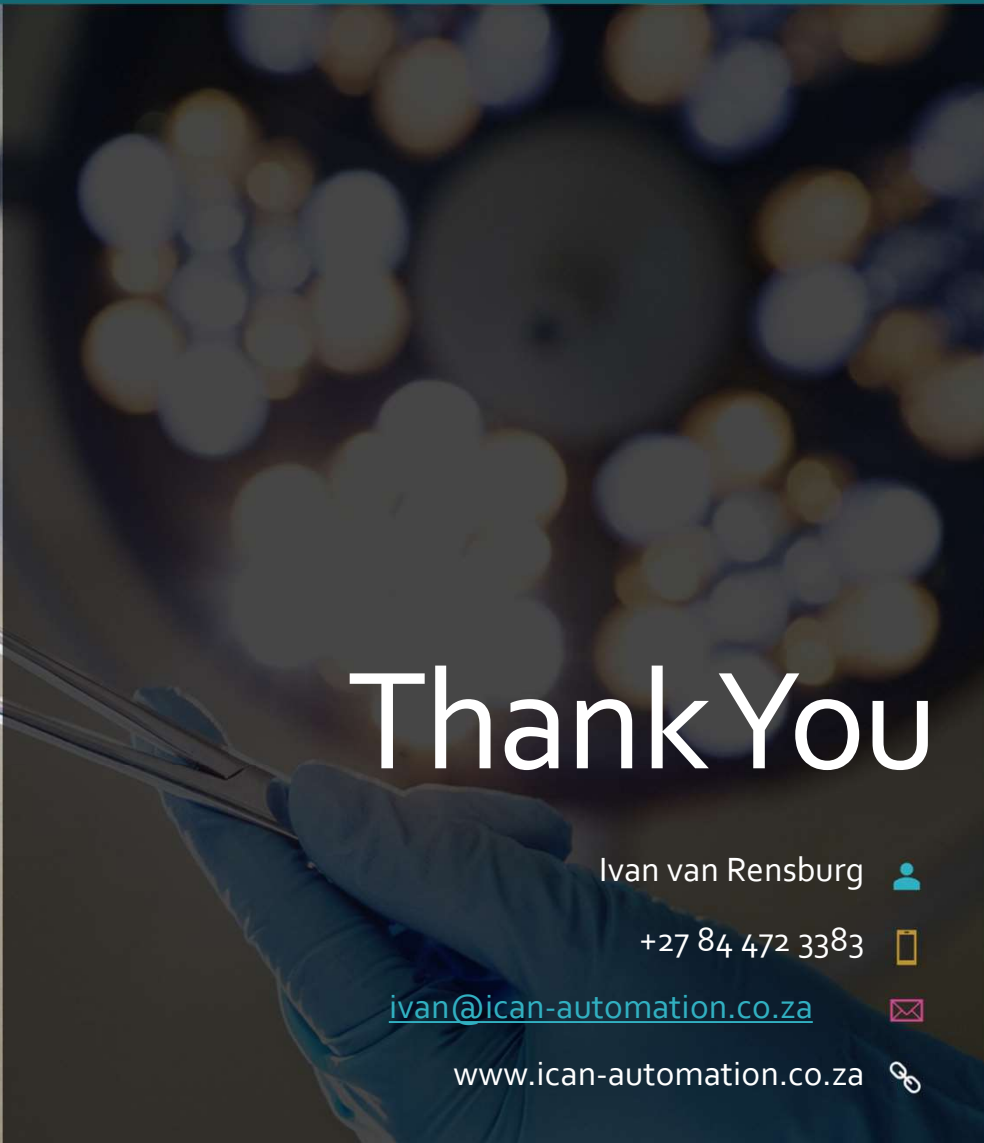
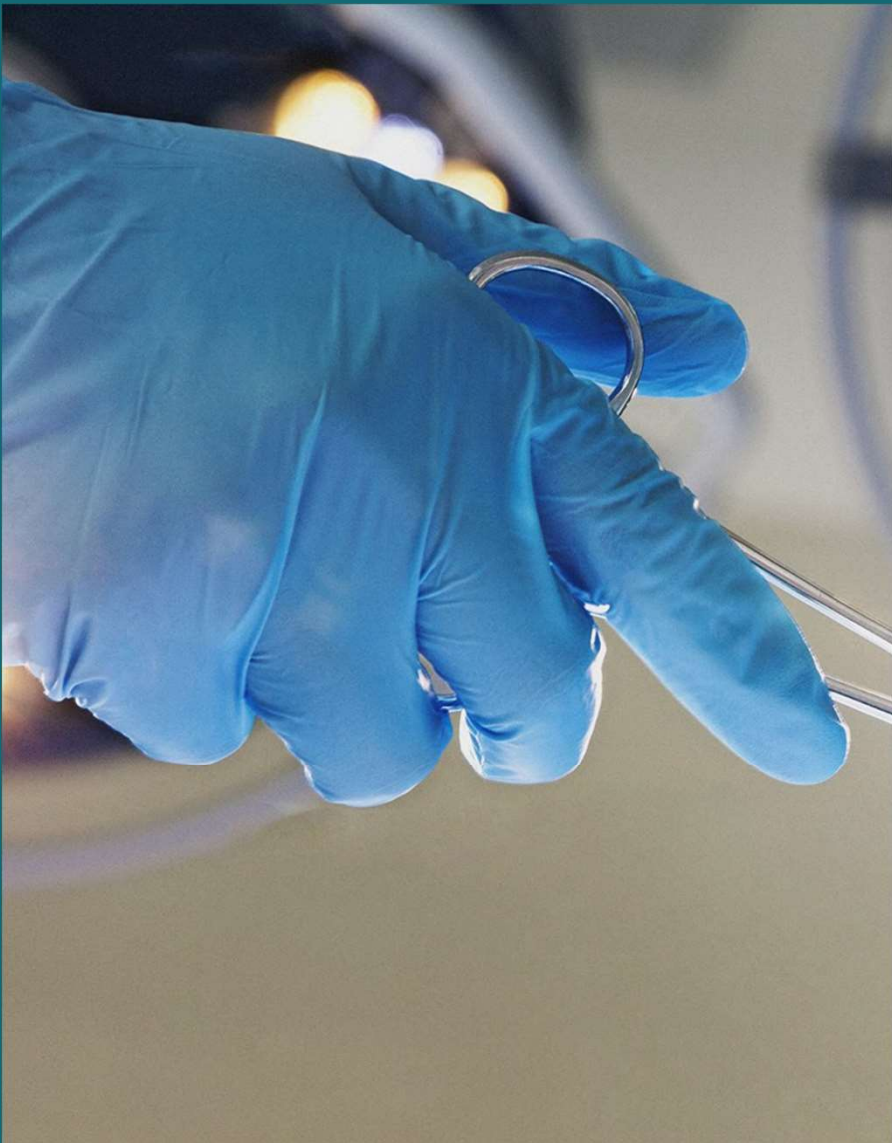
- Budget submissions
- Assign DOR vendor
- Include in Architectural Design consideration towards Server Room and Pendant placements, TCP placements.
- Integration requirements with other Service suppliers – GAS, Medical Equipment etc.
- Electrical Submission of conduit layouts, power and HVAC requirements
- Boardroom integration planning if required.
- Installation date towards the end of project completion.
- Rough work to be completed at building phase.
- Area should be clean and dust free with climate control before any medical equipment is installed.
- Commissioning and training in line with Project completion

Full Digital Design

Potential problems

- Not Including Digital theatre Cost (AV, Cabling, Equipment Control, Monitors) in initial equipment budget.
 - Be sure to know what the costs are for all equipment.
- Assuming electrical Contractor will handle the Digital Operating room design. (Medical Device Knowledge required.)
 - Involve the Clinical Engineer
- Assuming Architect has included all required Rooms and integration.
- Electrical Contractor has added all Digital theatre Reticulation.
- Not involving , Theatre Matron / Surgeons in the design.
- Decide on the Digital theatre Vendor as early as possible to involve vendor in initial design.


- **USE a Digital operating Room Consultant!!!**



Thank You

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