

Beyond Setpoints

Balancing conservation, public access and environmental performance in cultural buildings

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The problem is bigger than plant

Environmental control is about buildings, people and operations, not just setpoints.



NGA, Aboriginal Memorial Gallery

A successful cultural building has to do several things at once:

- Care for collections and changing exhibition needs
- Welcome people without creating a fragile environment
- Respect architectural intent and the public experience
- Remain understandable, tunable and maintainable over time

Design success is often measured by what visitors do not have to notice.

Increasing demands on museums and galleries

The brief should define the outcome, risk tolerance and operating reality.

Changing collection types

What is being protected and why?

Energy consumption and costs

24/7 operation

Operational patterns

After-hours events, touring exhibitions and normal visitation

Complexity

Iconic architecture, facades, security, operations and environmental control

Resilience

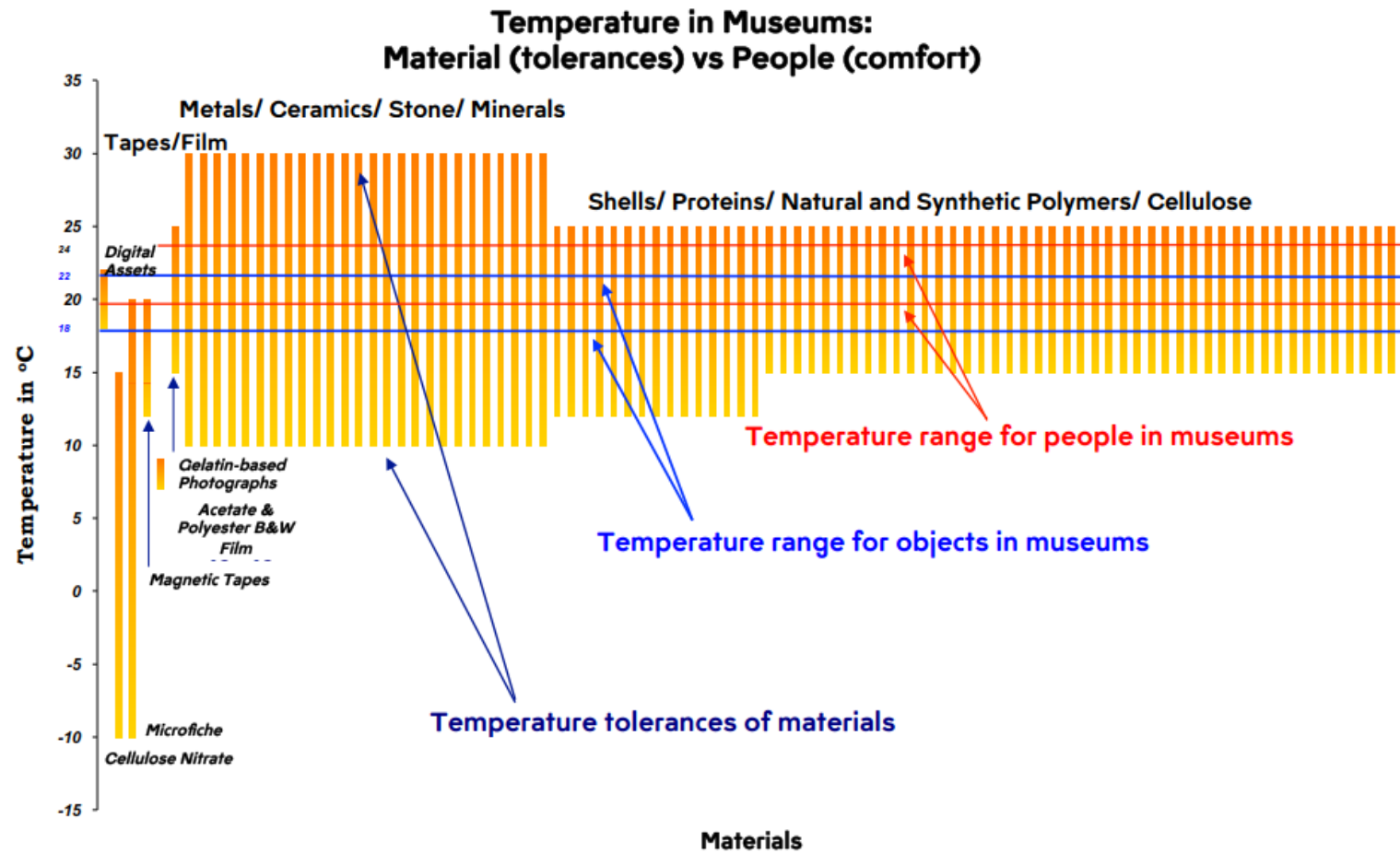
What happens during temperature extremes, smoke, power or plant failures?

Operation

Can the team maintain, monitor and tune the system?

Plant selection should follow the conservation, operational and risk brief.

Responding to conservation needs



Integrated Skills and Knowledge

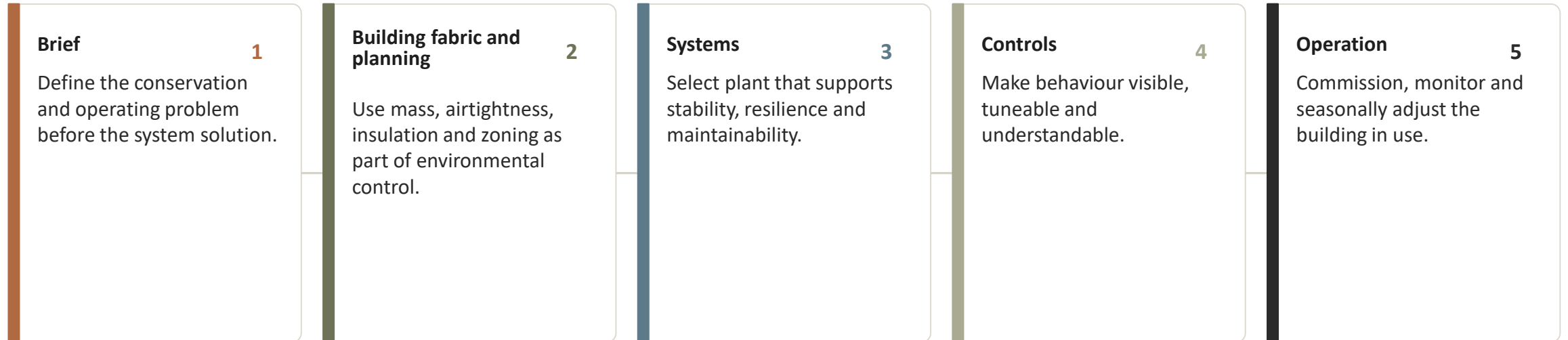


Blending engineering expertise with knowledge from other fields

- Cultural needs
- Life science
- Physiology
- Conservation and preservation
- Material science
- Organisational behaviour
- Environmental science
- Building physics
- Security and asset protection

The thread for today

A practical way to frame the competing demands of cultural buildings.



“If a building becomes architecture, then it is art. If a building is not functionally and technically in order, then it is not architecture either, it is just a building.”

Arne Jacobsen

Start with the brief, not the plant

The brief should define the outcome, risk tolerance and operating reality.

Protect

What is being protected and why?

Limits

What temperature and humidity limits are genuinely required?

Tolerance

What rate of change can the collection tolerate?

Use

How will spaces change with exhibitions, events and occupation?

Resilience

Protection during climate extremes, smoke, loss of power or plant failure?

Operation

Can the team maintain, monitor and tune the system?

Plant selection should follow the conservation, operational and risk brief.

Case study 1: Sydney Modern, AGNSW

A public gallery with large volumes, extensive glazing and changing patterns of use.



public access

large volumes

glazing

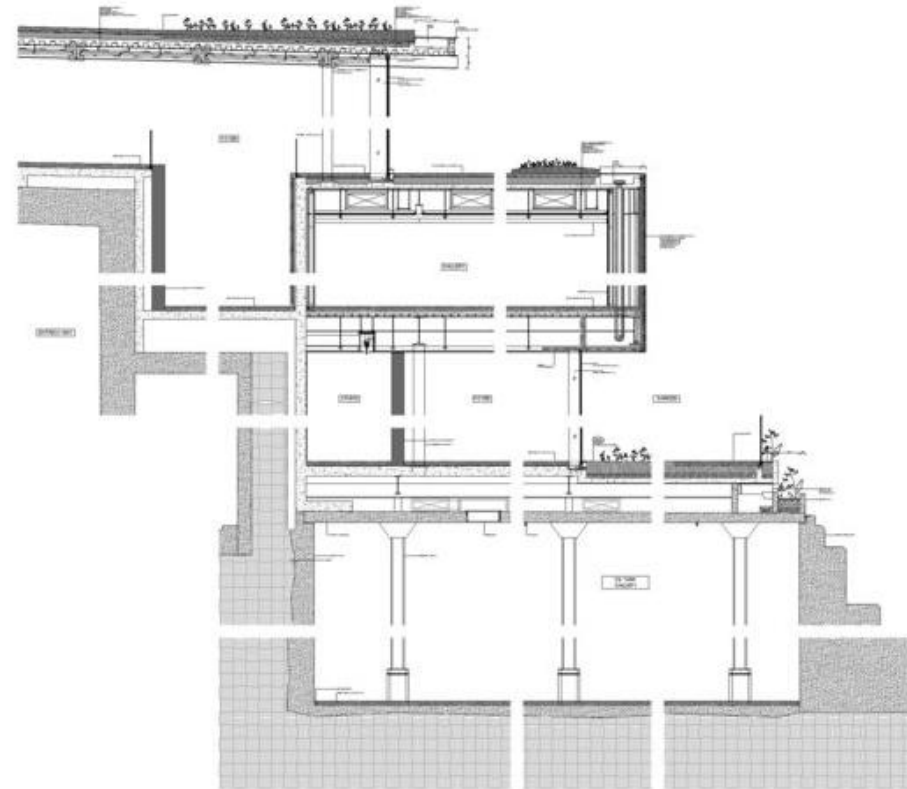
seasonal operation

The environmental strategy has to protect storage conditions while supporting access and operations.

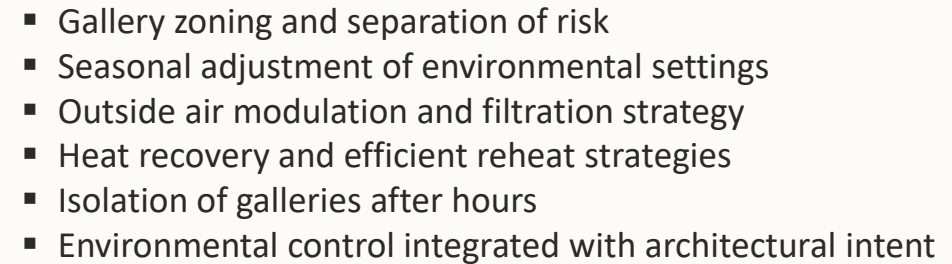
Case study 1: Sydney Modern, AGNSW

Key challenges

- Extensive and orientated glazing
- Large interconnected volumes
- Diverse public, exhibition and operational profiles
- External pollution sources
- Heritage and integration constraints
- Limited ceiling and reticulation space



Design response themes



Case study 1: Sydney Modern, AGNSW

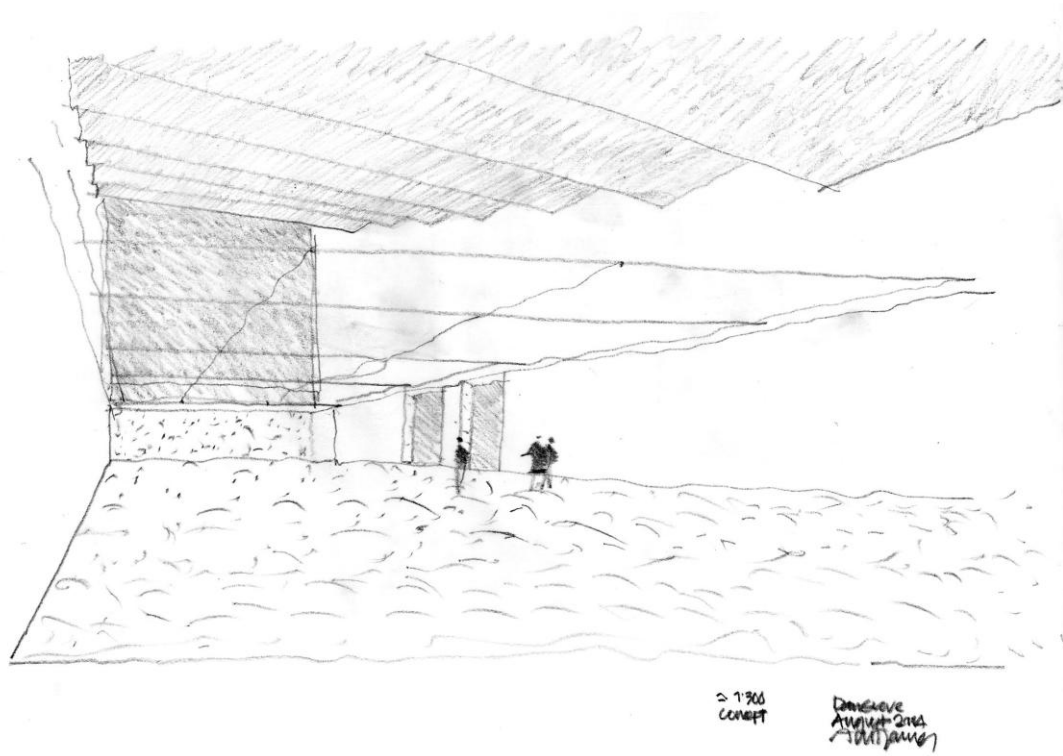
Key challenges

- Extensive and orientated glazing
- Large interconnected volumes
- Diverse public, exhibition and operational profiles
- External pollution sources
- No roof space for external plant
- Heritage and integration constraints
- Limited ceiling and reticulation space
- People movement



Case study 2: Dangrove Art Storage Facility

Private 10,000 m² art storage facility



controlled access

large volumes

passive buffering

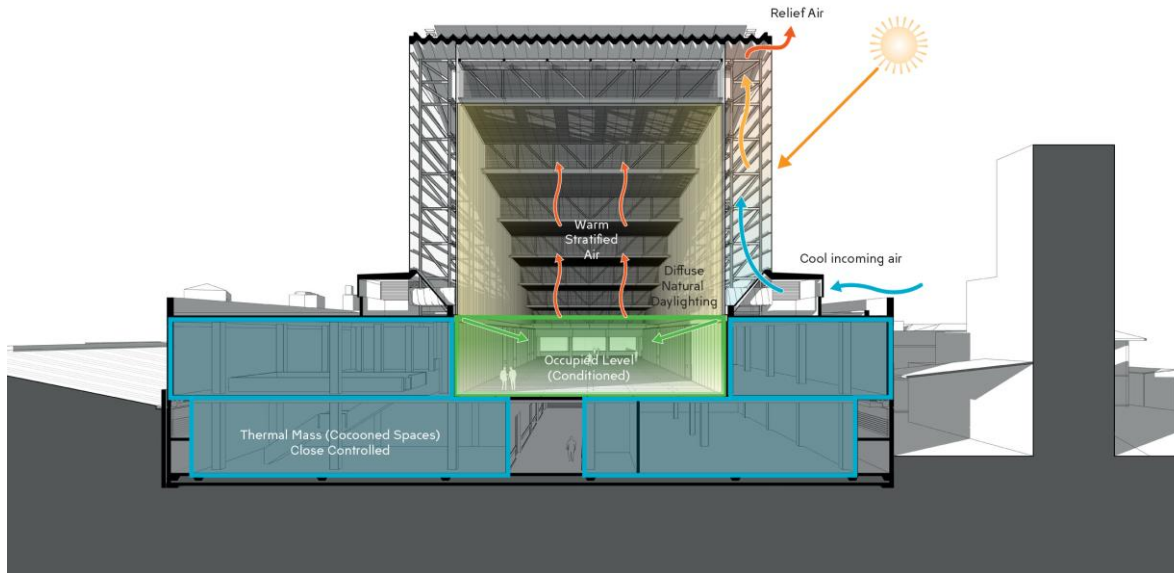
close control



The environmental strategy has to protect storage conditions while supporting access and operations.

Case study 2: Dangrove Art Storage Facility

Passive design can reduce how hard mechanical systems need to work.



Design readings

- Thermal mass, insulation, airtightness and vapour control affect stability
- Buffer zones can reduce direct exposure to external conditions
- Solar gain, daylight and public comfort need to be tuned together
- The section often explains the environmental strategy better than a plant schematic

The building fabric does part of the environmental work

Case study 2: Dangrove Art Storage Facility

A passive-first approach for close-control collection storage.



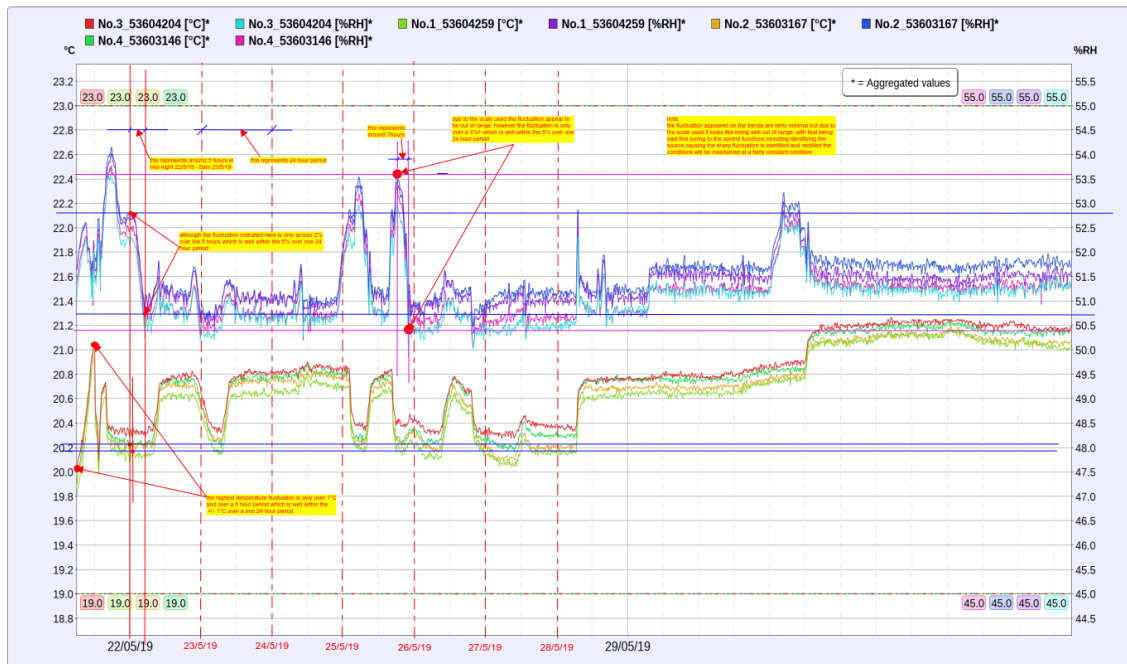
Design principles

- Use passive mechanisms first, supplemented by mechanical systems
- Locate storage deep within a buffered building
- Avoid conditioning unnecessary volume
- Zone environmental control to match risk and use
- Use mass and surrounding spaces to slow environmental change
- Support energy efficiency without compromising conservation

The building fabric is part of the environmental control system.

Stability is more than a number

For collection care, rate of change can be as important as the setpoint itself.



Controls and commissioning

- Define the control philosophy clearly
- Use suitable control variables and sufficient sensors
- Calibrate, trend and record changes
- Avoid plant conflict and control loop hunting
- Commission dynamically, not only at handover
- Tune seasonally after the building is in use

Commissioning is not a final activity. It is part of the whole project lifecycle.

Practical lessons for design, delivery and operation

A short checklist for resilient cultural facilities.

Define the conservation outcome first

Understand collection risks and acceptable environmental limits.

Design fabric as part of the system

Mass, airtightness, insulation and vapour control matter.

Zone by risk and use

Not every space needs the same level of control.

Make controls understandable

If the team cannot understand it, they cannot tune it effectively.

Allow time for tuning

Stabilisation, seasonal testing and staged adjustment are part of the work.

Design for maintainability

Access, documentation, records and operating capability are performance issues.

The best cultural buildings remain understandable, tuneable and cared for after opening day.

Closing message

Good cultural-building engineering is not only about holding numbers steady.

It is about helping a building care for collections, welcome people and remain operable over time.

Thank you

Chris Arkins
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