

Evaluating Collection Spaces

IMAGE PERMANENCE INSTITUTE | AUGUST 15, 2019

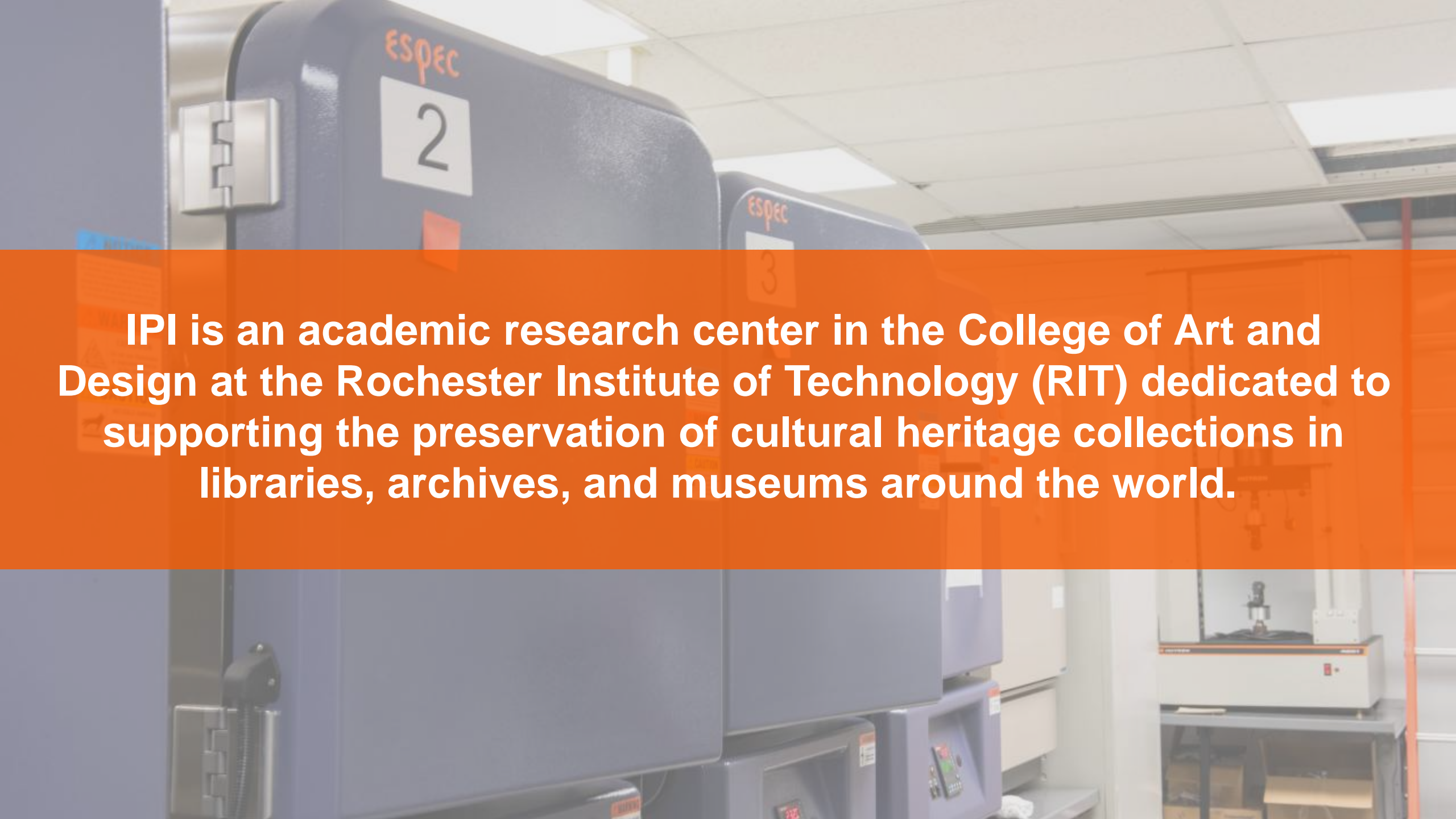
TRAINING SUSTAINABLE ENVIRONMENTAL MANAGEMENT TEAMS FOR CULTURAL INSTITUTIONS

Today's Webinar

- ▶ **Funding provided by the National Endowment for the Humanities Education and Training grant**

- ▶ **Series I: Environmental Management**
- ▶ **Series II: Environmental Data Analysis**
 - ▶ **January 23, 2020**





IPI is an academic research center in the College of Art and Design at the Rochester Institute of Technology (RIT) dedicated to supporting the preservation of cultural heritage collections in libraries, archives, and museums around the world.

Your Presenters

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Questions



Feedback



Environmental Management: Phases

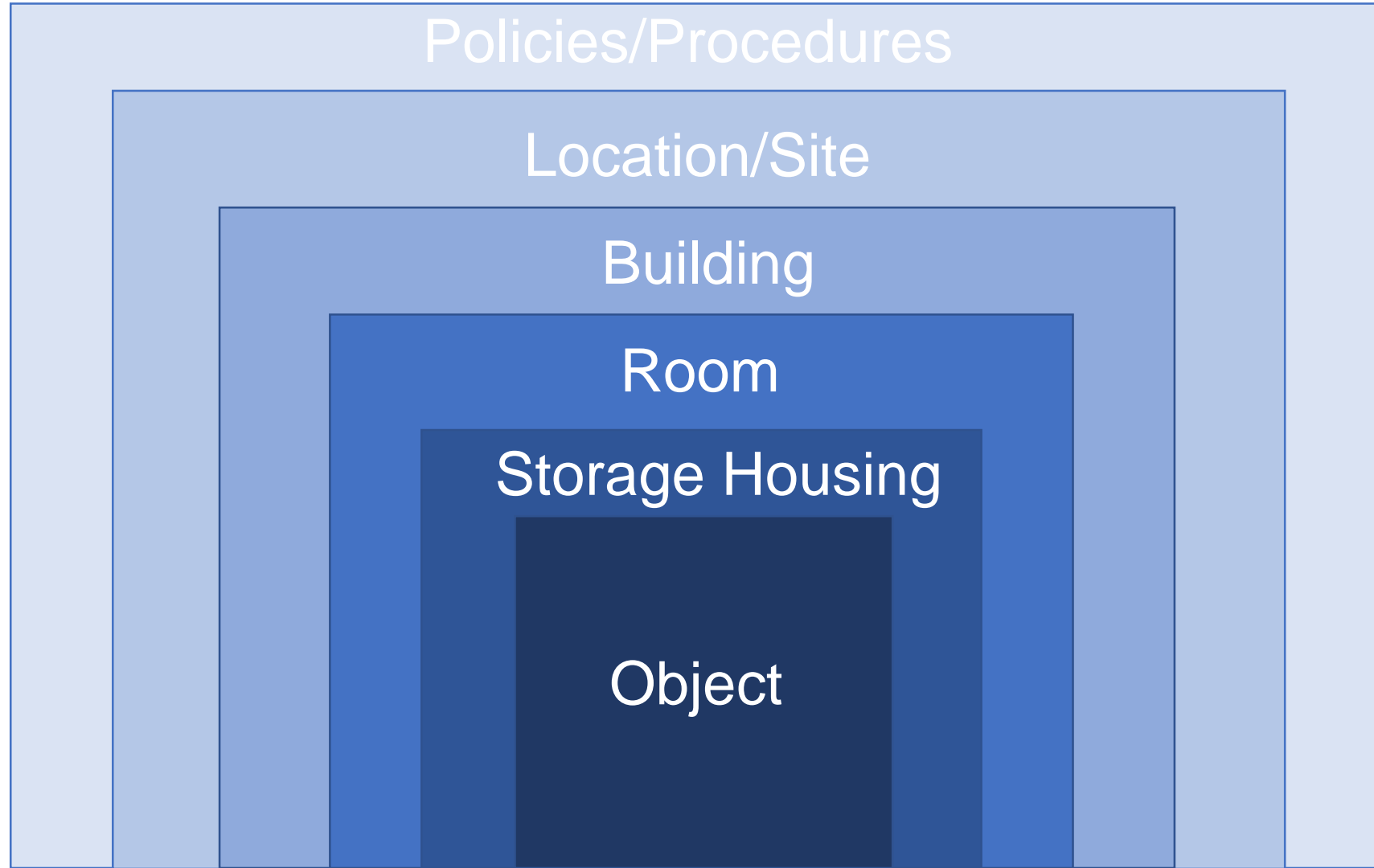
- ▶ **Set-up**
- ▶ **Data collection**
- ▶ **Data analysis**
- ▶ **Evaluate options**
- ▶ **Institute actions**



- ▶ **Set-up**
 - ▶ Understand the problem
 - ▶ Why is the environment important?
 - ▶ **Assemble documentation**
 - ▶ **Build team**
 - ▶ **Define objective**
 - ▶ Deploy instrumentation

Assemble Documentation

Levels of Control

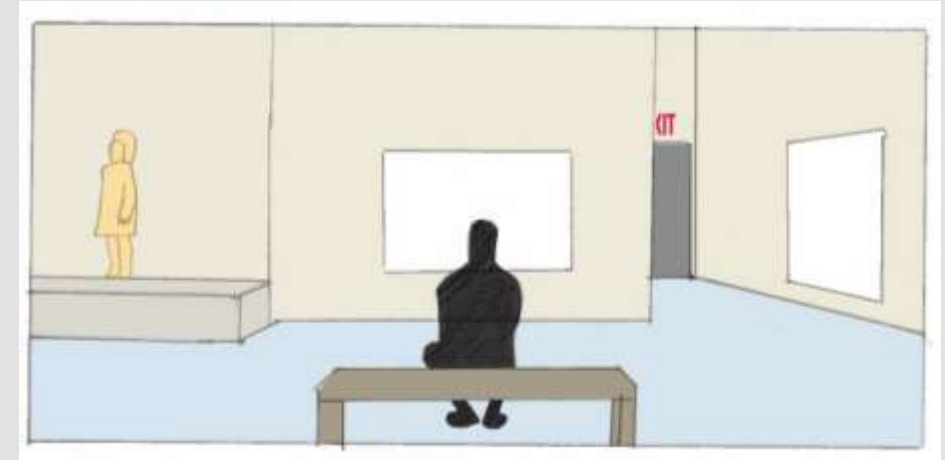
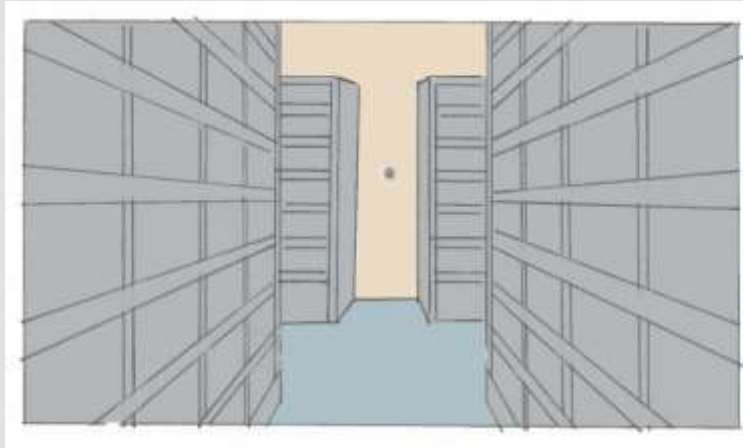


Building and Room Envelopes

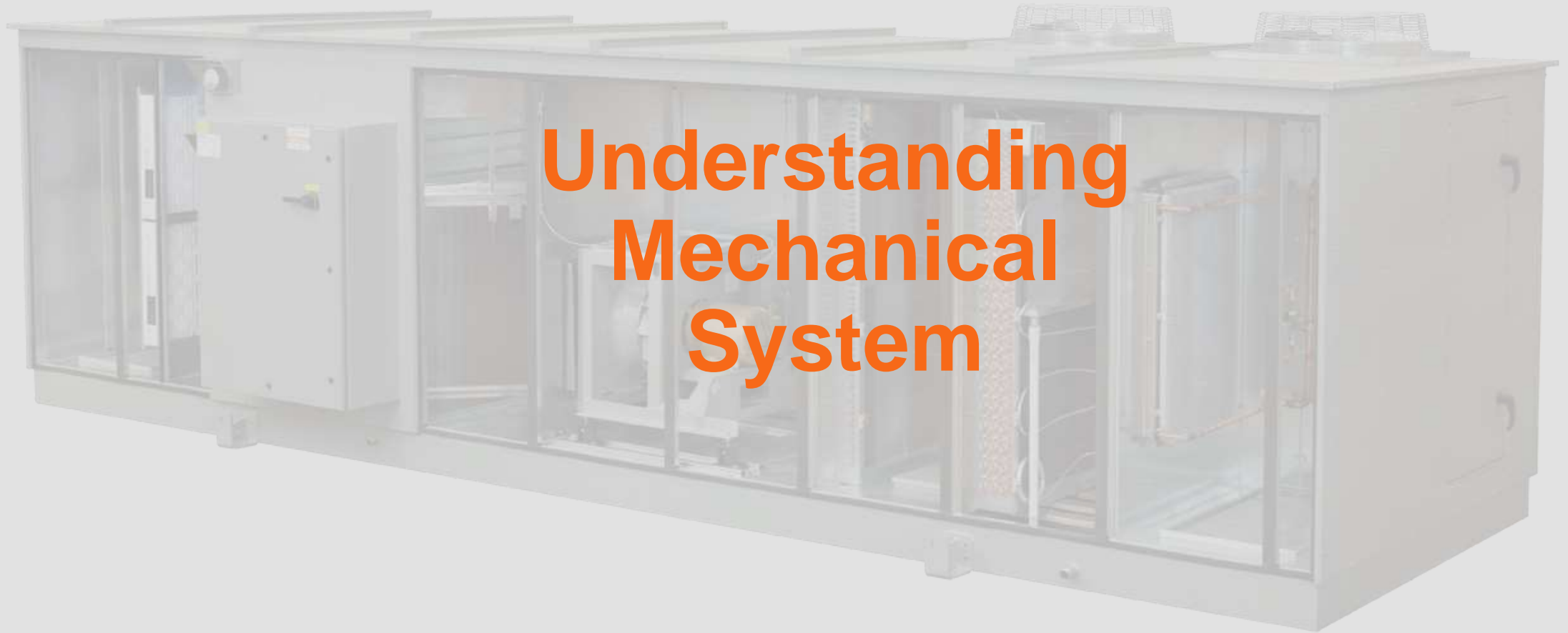
- ▶ **Heat loads and sources of moisture:**
 - ▶ Solar load
 - ▶ Transmission through exterior
 - ▶ Infiltration from surrounding spaces
- ▶ **Openings (windows, doors, holes, structural design)**
- ▶ **Construction materials**
- ▶ **Presence of insulation, vapor barriers**
- ▶ **Within space (lights and electronics, people)**

Types of Collection Spaces

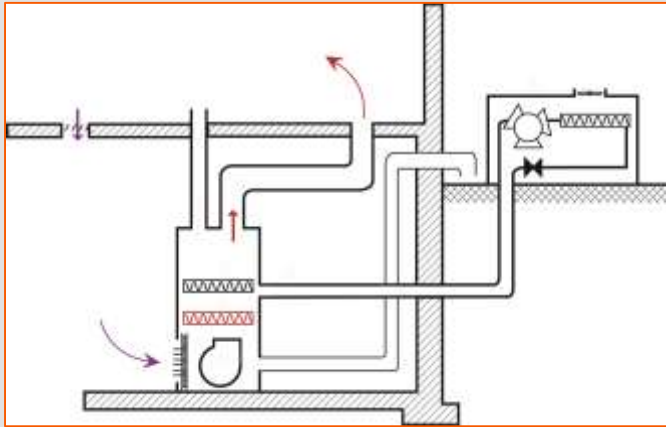
- ▶ **Exhibition**
- ▶ **Storage areas**
- ▶ **Cold storage**



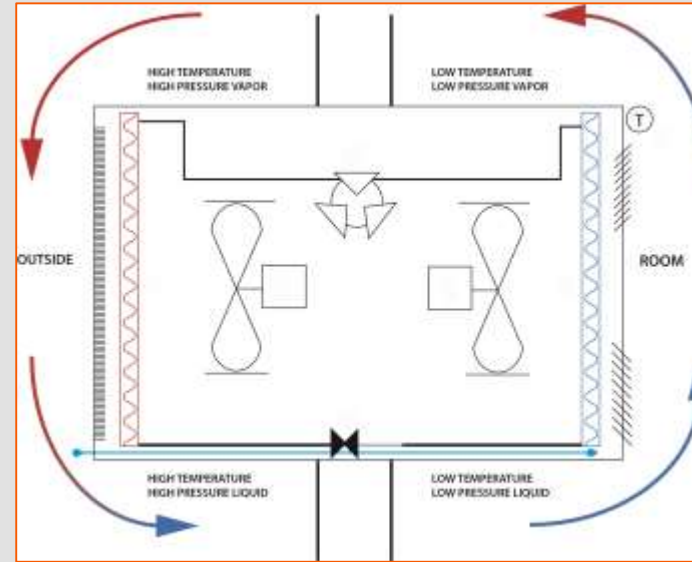
Understanding Mechanical System



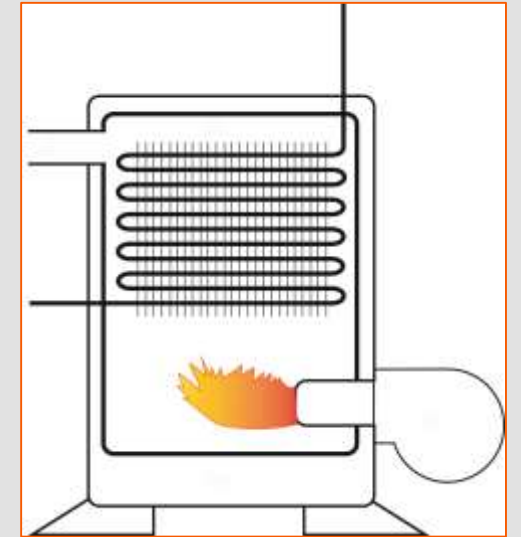
HVAC Systems



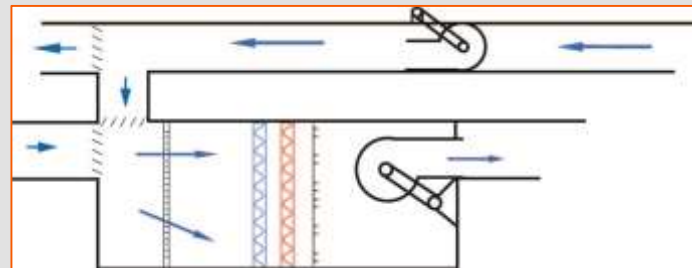
Forced Air System



Air Conditioner



Boiler



Air Handling Unit

Inside a unit

Cooling Coil



Heating Coil



Downstream Equipment

Humidifiers



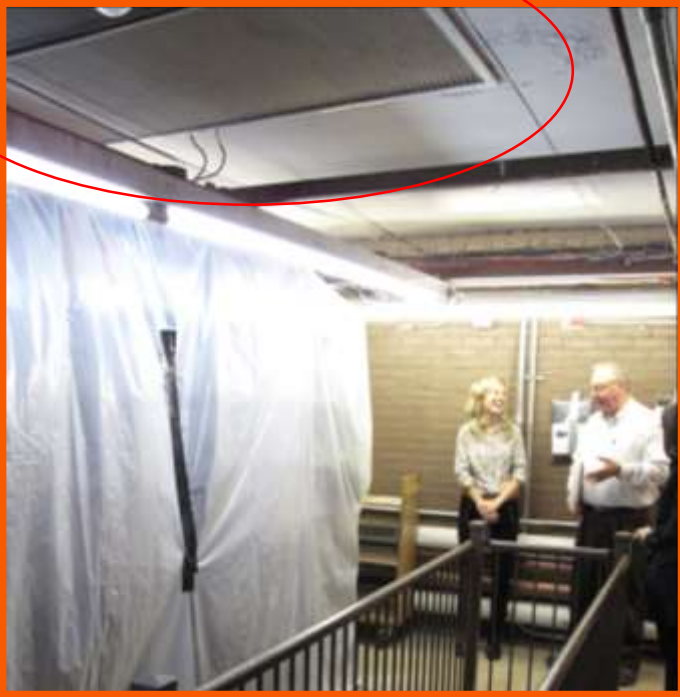
Reheats



Supply Vents or Diffusers



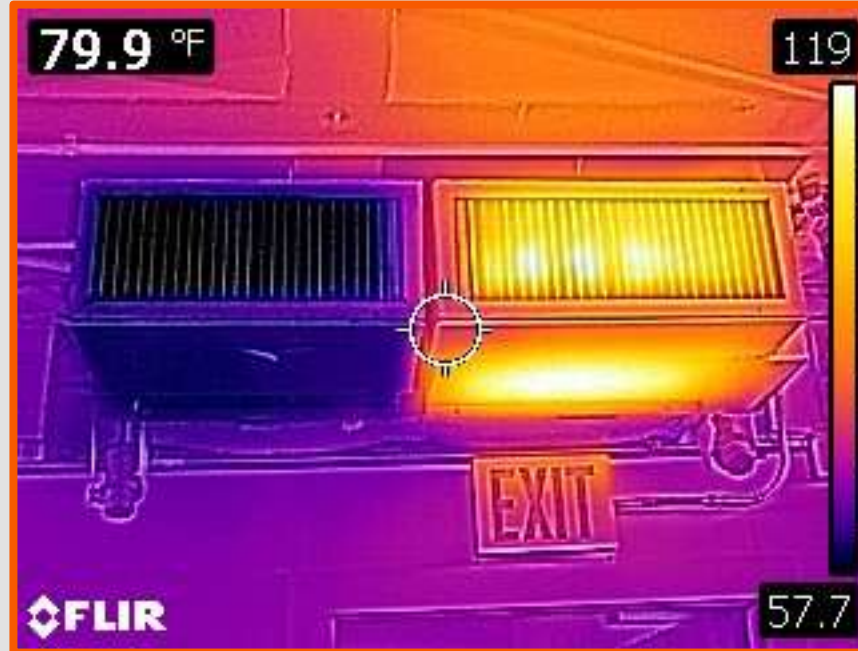
Return Vents or Grilles



Best tool for determining air flow



Supply and Return Issues



Thermostats

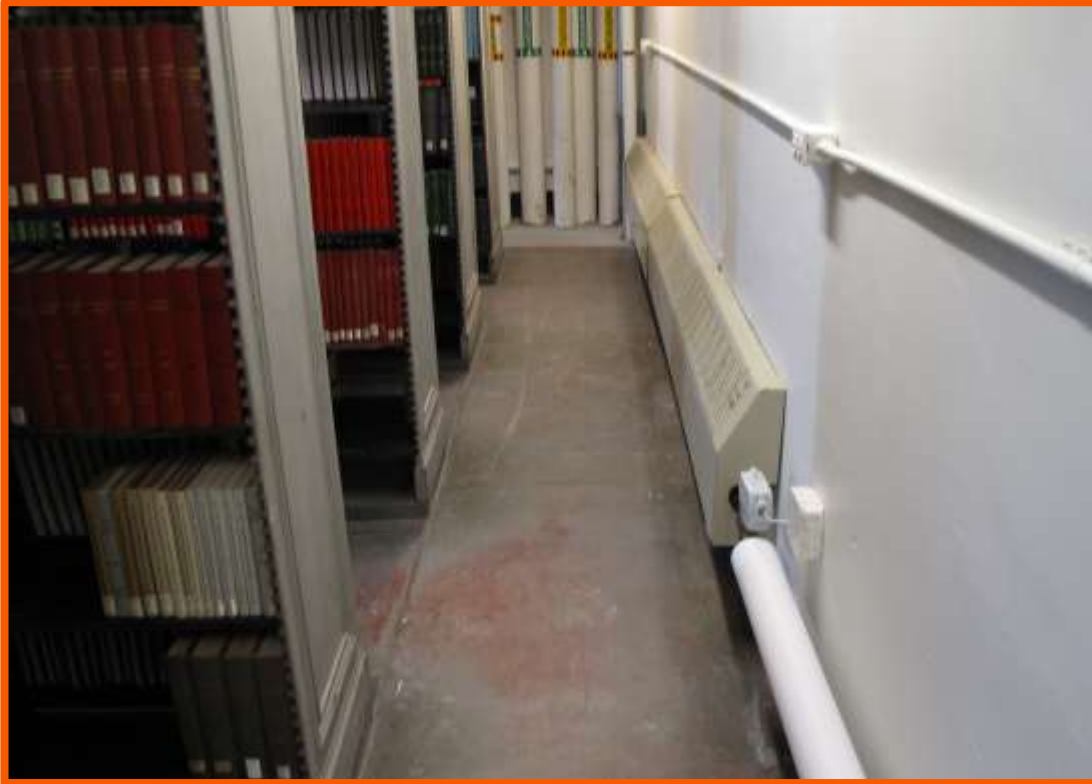


There should be free airflow to all thermostats



Heating

Radiators



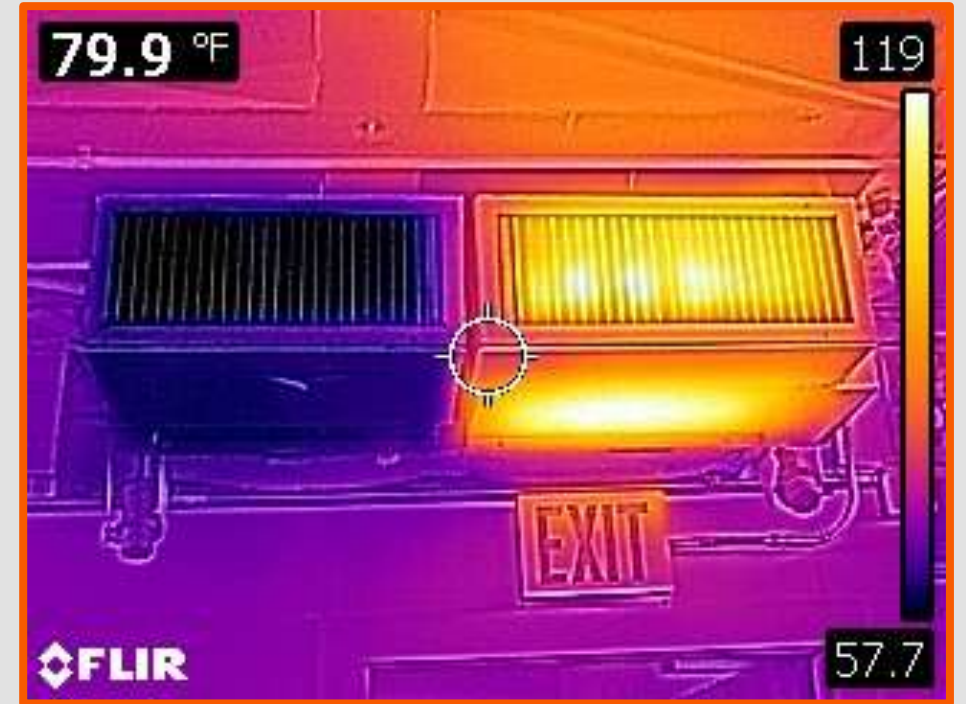
Helpful Tools

**Non-contact Digital
Laser Infrared
Thermometer
Temperature Gun**

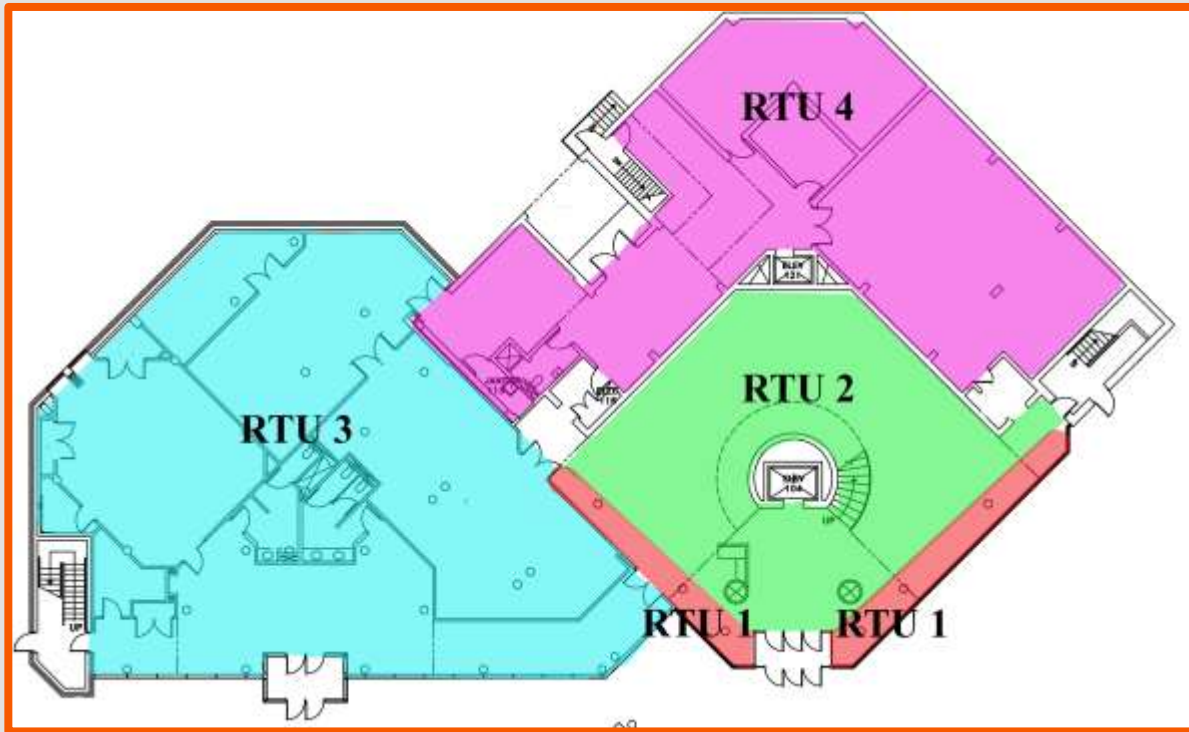


Helpful Tools

IR Camera



Helpful Tools: Zone Maps



Zoning issues

- ▶ **Multiple units that serve one space**
- ▶ **One air handling unit serving both occupied spaces and collection spaces is not recommended**
 - ▶ **Directors office, restrooms, galleries, server rooms, etc.. tied with collection spaces**
 - ▶ **Staff offices in collection spaces**

Human Comfort Control Issues

Human comfort requires different conditions than collections

Human comfort, according to ASHRAE:

- ▶ 68-75°F in the winter
- ▶ 75-80°F in the summer

Collections need cooler conditions

Define Objective

Data Analysis

An **optimal storage environment** is one that achieves the best possible preservation of collections with the least possible consumption of energy, and is sustainable over time.

Extremes

- ▶ **What:** highs and lows of temperature and relative humidity beyond what is usually experienced in the space
- ▶ **Where:** unconditioned spaces, lack of environmental controls, areas with additional loads, change in operation

Extremes

- ▶ **How to Identify:**
 - ▶ Reports from staff
 - ▶ Temp gun
 - ▶ IR camera
 - ▶ Environmental data



Extremes

- ▶ **Consequences:** Accelerated chemical deterioration, increased risk of other forms of damage; operational costs

- ▶ **Mitigation:** Depends on cause
 - ▶ Secure building and room envelope
 - ▶ Reduce moisture loads (landscaping, outside air)
 - ▶ Reduce heating and cooling loads
 - ▶ Use shades, etc.
 - ▶ Remove occupancy
 - ▶ Reduce lighting
 - ▶ Relocate/ buffer sensitive materials

Harmful Microclimates

- ▶ **What:** The climate of a very small or restricted area that differs from the climate of the surrounding area
- ▶ **Where:** By supply diffusers, within compact shelving, against exterior walls/windows, inside containers, etc.
 - ▶ Any place where differences exist



Harmful Microclimates

- ▶ **How to Identify:**
 - ▶ Reports from staff
 - ▶ Temp gun
 - ▶ IR camera
 - ▶ Environmental data
 - ▶ Anemometer
 - ▶ Moisture meter



Harmful Microclimates

- ▶ **Consequences:** Mold outbreaks can occur, increased risk of other forms of damage; operational costs
- ▶ **Mitigation:** Depends on cause
 - ▶ Arrange boxes and storage furniture to promote air mixing
 - ▶ Identify and eliminate sources of dampness
 - ▶ Relocate/ buffer sensitive materials



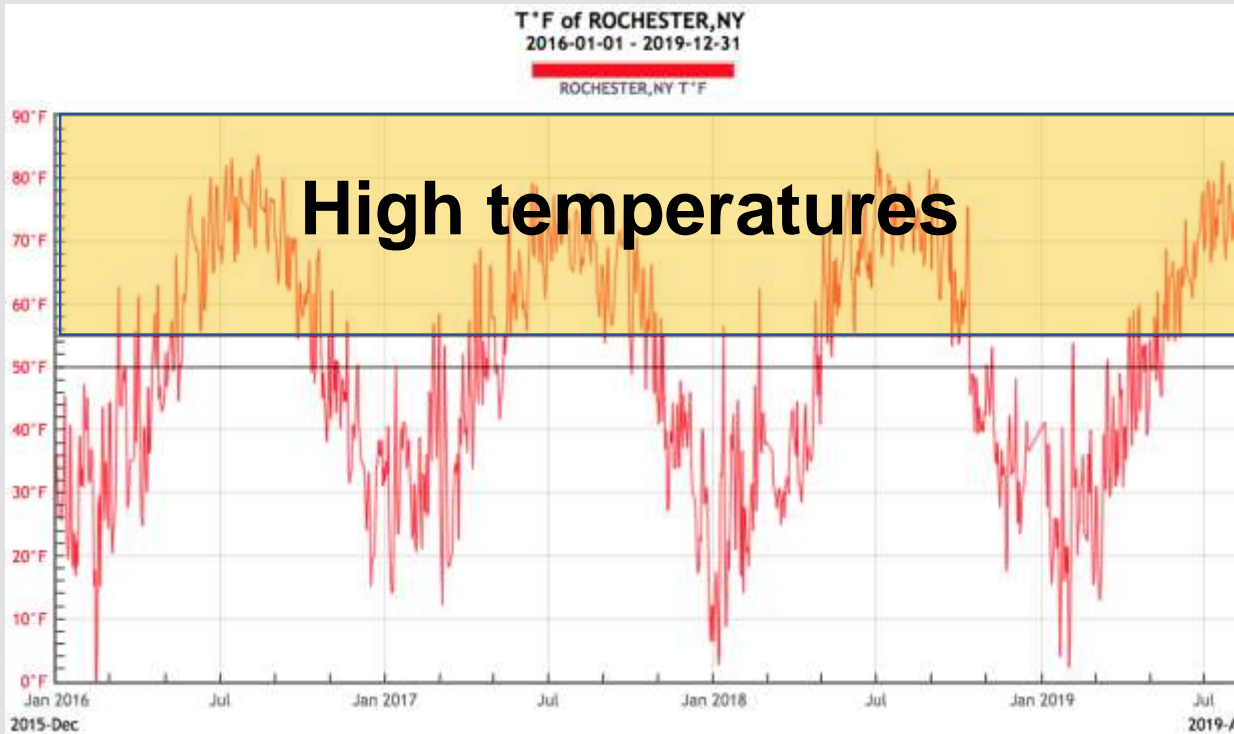
Sustainability

- ▶ **Depends on:**
 - ▶ Local Climate
 - ▶ Building Envelope
 - ▶ Mechanical System
 - ▶ Collection Needs
 - ▶ Institution's Goals

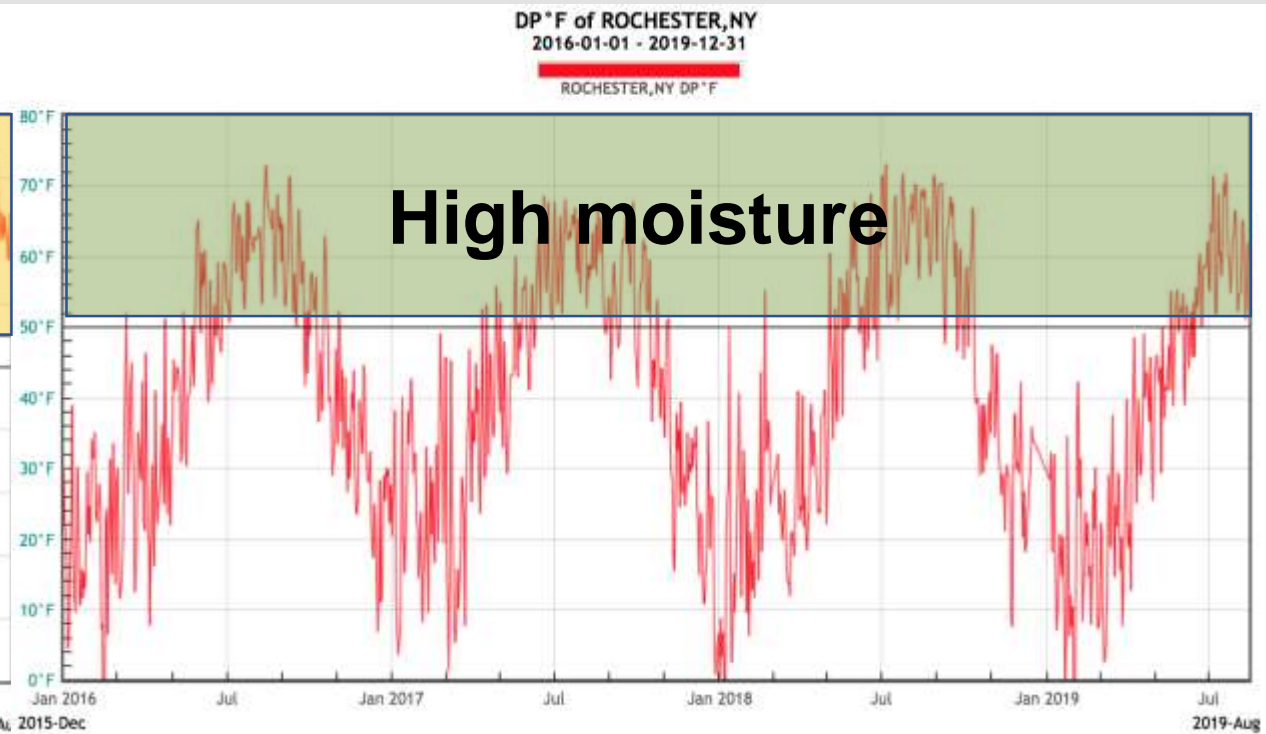
- ▶ **Achievable with:**
 - ▶ Knowledge of Collections
 - ▶ Team Approach
 - ▶ Reliable Data
 - ▶ Experimentation

Outdoor vs. Desired Conditions

Temperature

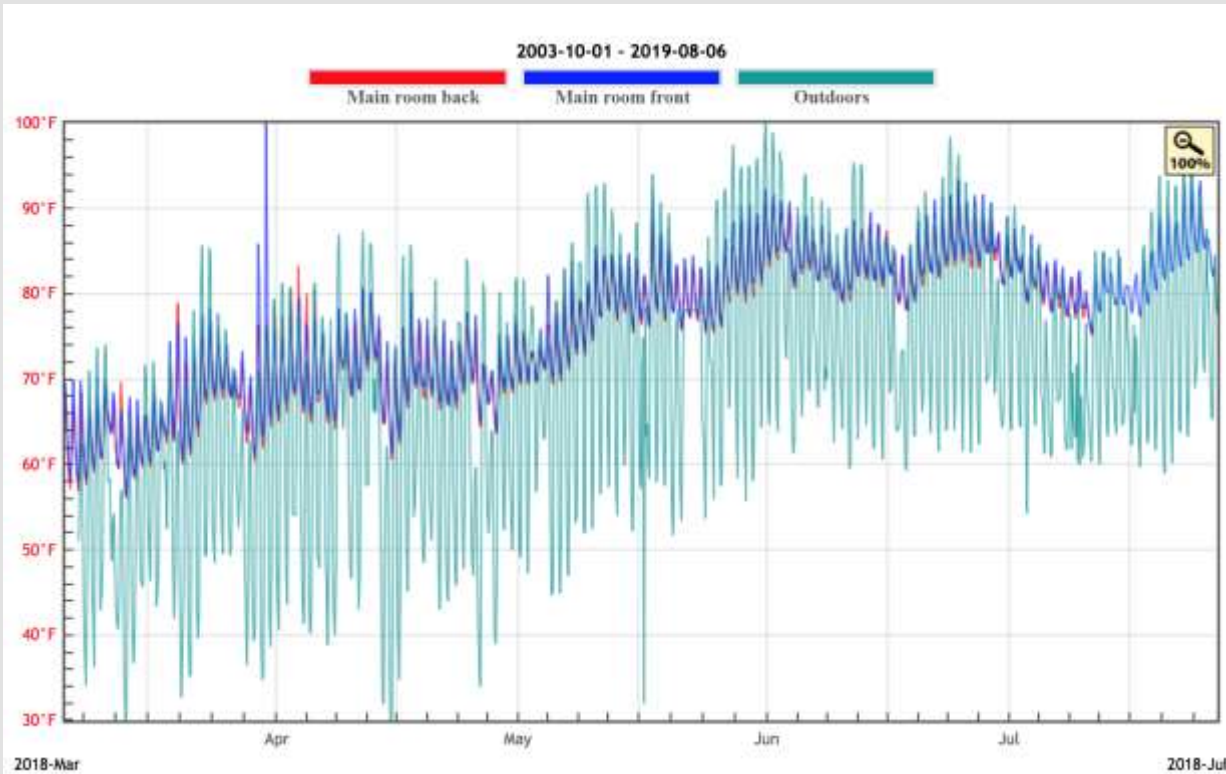


Dew Point

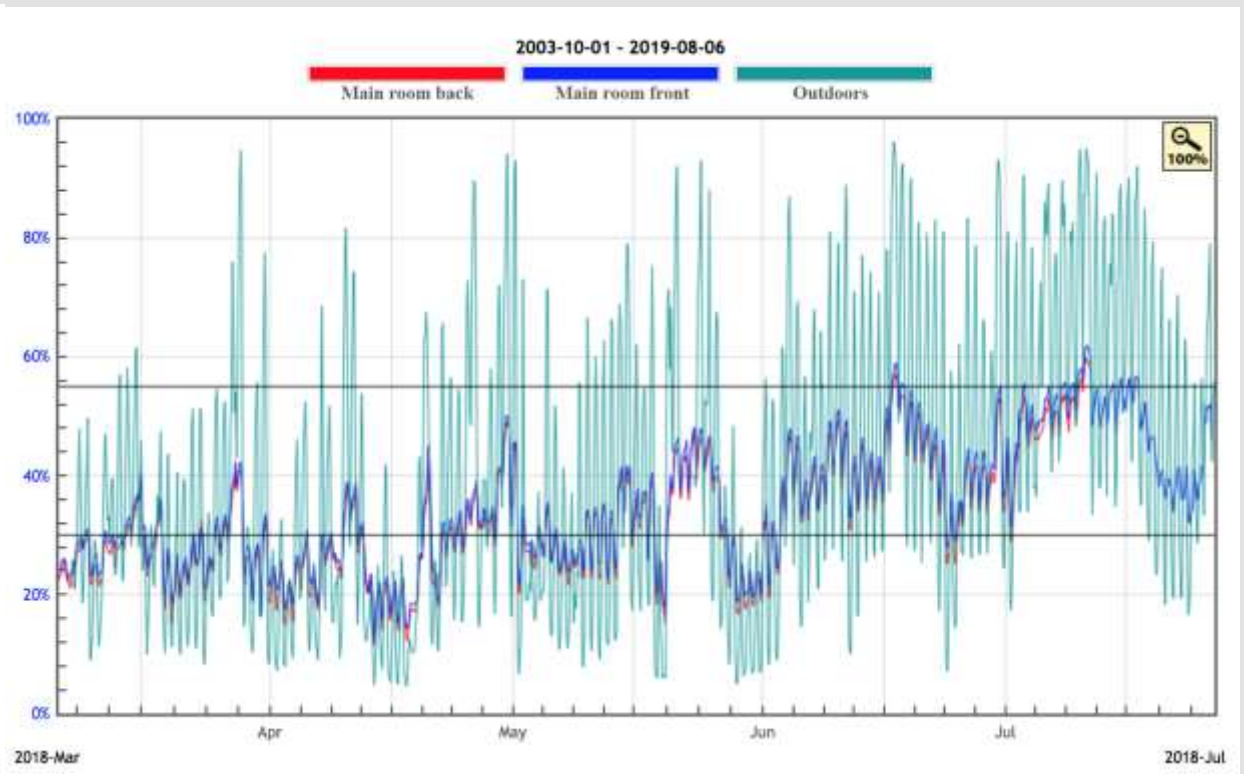


Influence of Building Envelope

Temperature

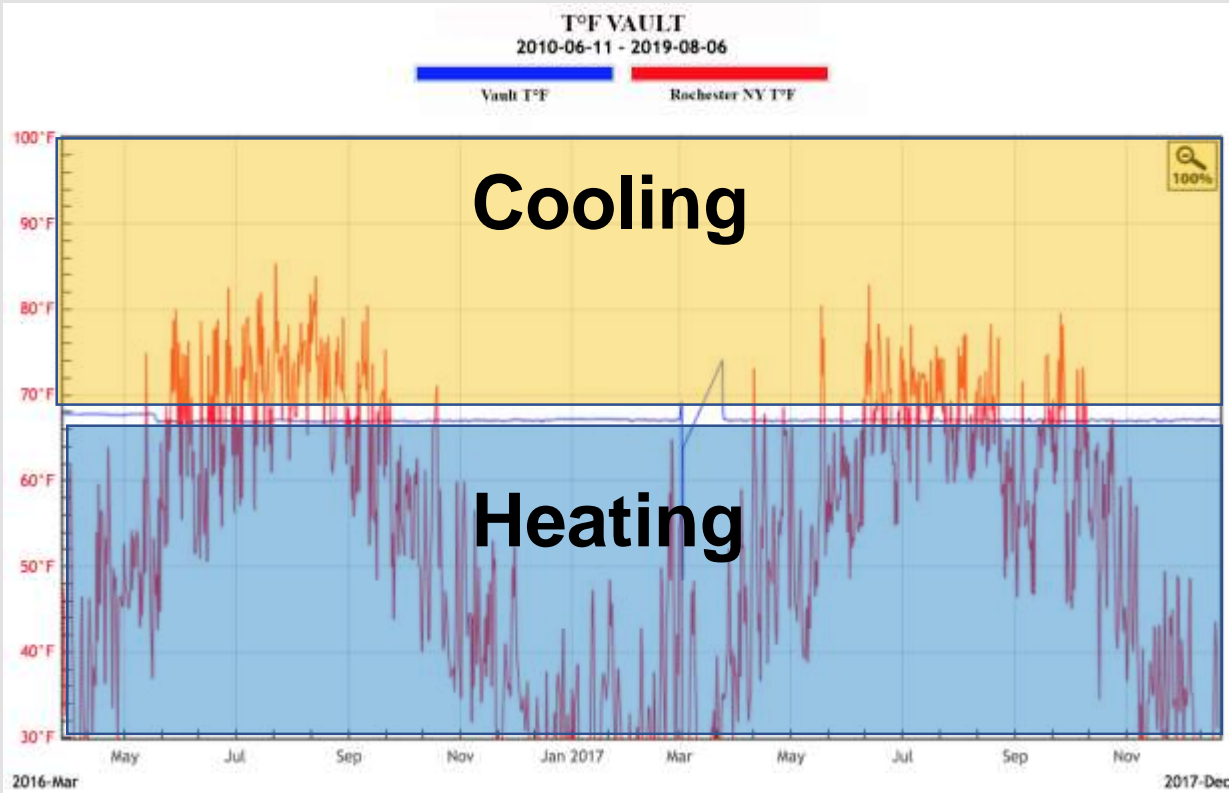


Dew Point

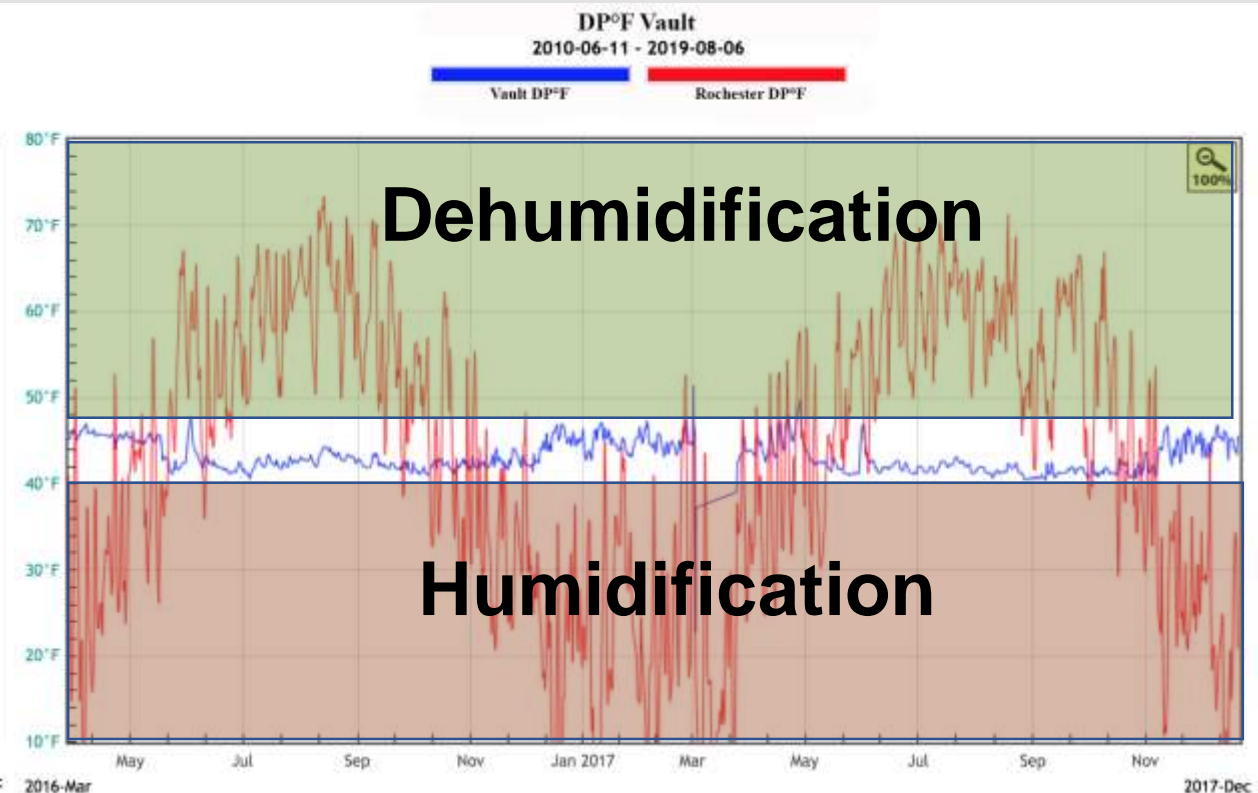


Influence of Mechanical System

Temperature

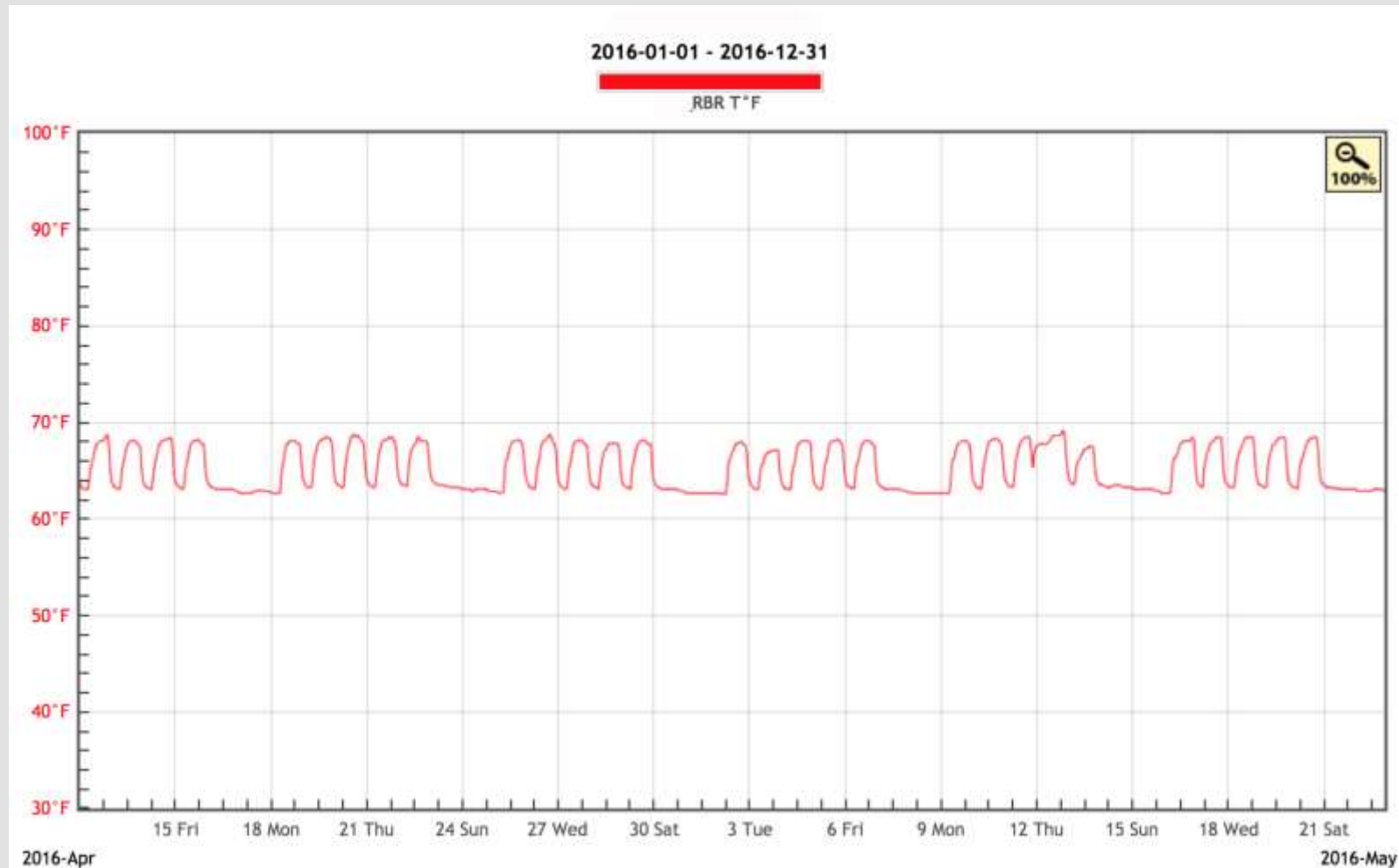


Dew Point



Effects of Heating Loads

Temperature



Build Team

Evaluate Options

Risk Management: Teamwork

Team members:

- ▶ Those who create the environment (Facilities staff)
- ▶ Those responsible for preservation of collections (Collections staff)
- ▶ Those who work in and around collections (Curatorial, Interpretation)
- ▶ Those responsible for administration and finances (Administration, Finance)
- ▶ Those who direct the sustainability mission and goals (Sustainability officers)



Risk Management: Control

Levels of Control

- ▶ Policies/Procedures
- ▶ Location/Site
- ▶ Building
- ▶ Room
- ▶ Storage Unit
- ▶ Object

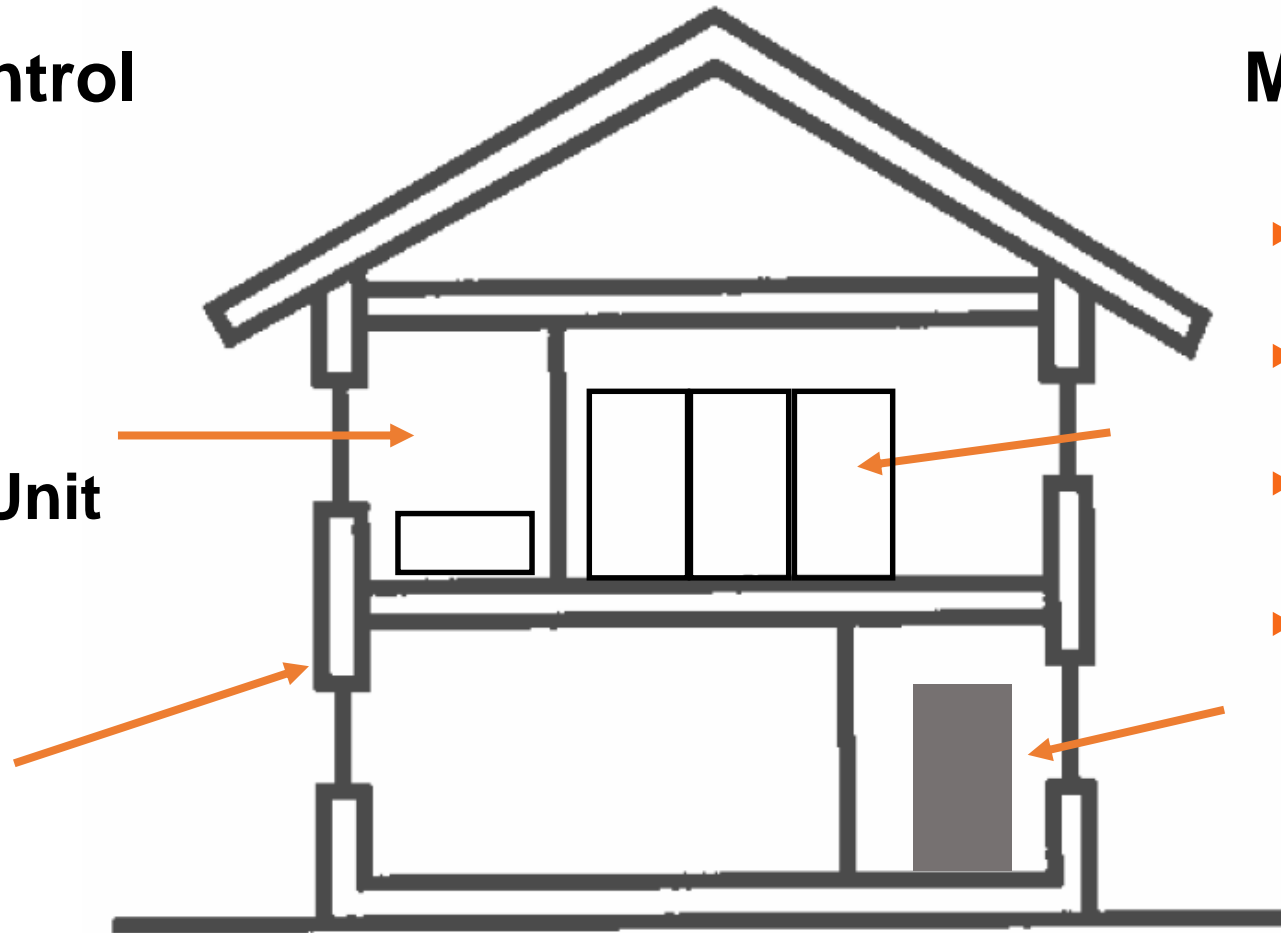
Methods of Control

- ▶ Avoid
- ▶ Block
- ▶ Reduce
- ▶ Detect
- ▶ Respond

Risk Management: Control

Levels of Control

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- ▶ Room
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Methods of Control

- ▶ Block
- ▶ Reduce
- ▶ Detect
- ▶ Respond

Risk Management: Options

Factors to consider:

- ▶ Timeframe
- ▶ Cost
- ▶ Impact
- ▶ Sequence/relationship with other options
- ▶ Goals/priorities → preservation plan

Institute Actions

DO:

- ▶ **Assemble Documentation**
 - ▶ Collections
 - ▶ Building Envelope
 - ▶ Mechanical System and Downstream Equipment
- ▶ **Build team**
- ▶ **Define objective**
- ▶ **Deploy instrumentation**
- ▶ **Begin data collection, analysis**

DO NOT:

- ▶ **Institute certain actions without awareness of the consequences**
 - ▶ Open windows
 - ▶ Install window A/C unit
 - ▶ Arbitrarily lower temperatures
- ▶ **More outside air/economizer**
 - ▶ 2012 Energy Conservation Code recommends an economizer to be capable of supplying 100% outside air
- ▶ **5°F temperature dead band**
 - ▶ Can lead to significant change in RH

Advocacy

With effective team management, you can:

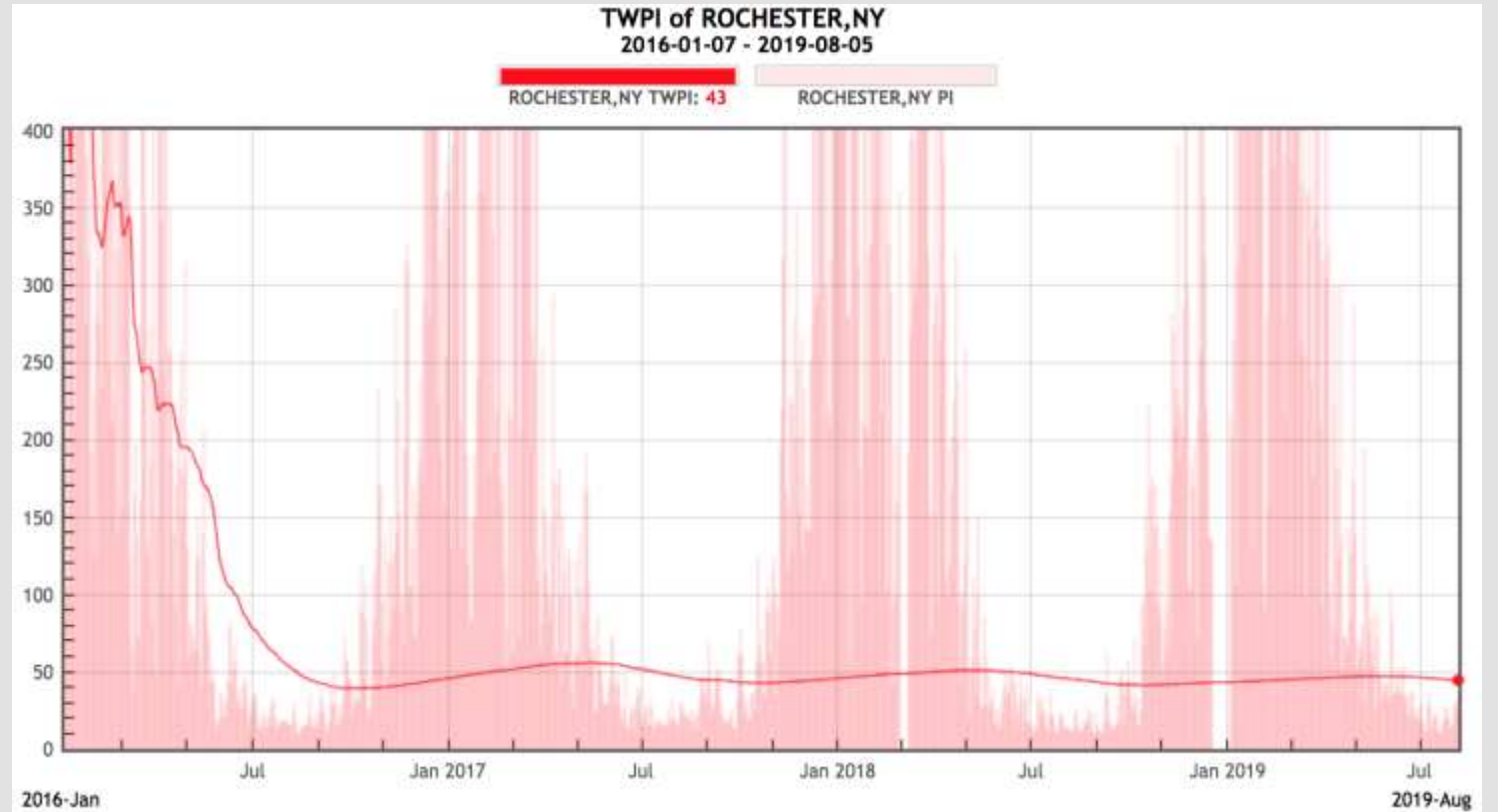
- ▶ **Define realistic, sustainable preservation and operational goals**
- ▶ **Reduce operational inefficiencies**
- ▶ **Reduce the number of human comfort calls**
- ▶ **Improve communication and understanding between collection and facility staff**

Advocacy: Collections

Experiences



Metrics



Advocacy: Institution

- ▶ **Mission**
 - ▶ Research
 - ▶ Outreach
 - ▶ Professionalism



Advocacy: Financial

- ▶ Preventive vs. Interventive
- ▶ Sustainability
- ▶ Prioritization



Other Challenges

- ▶ **Dedicated funding**
 - ▶ **Phased approach**
 - ▶ **Grants**
 - ▶ **Equipment loans**
- ▶ **Staff time**
 - ▶ **Shared responsibilities**
 - ▶ **Less time spent on repeated issues**
- ▶ **Other**

Conclusions

- ▶ **Documentation**
 - ▶ Building
 - ▶ Mechanical system and equipment
 - ▶ Layout
- ▶ **Defining Objective, Data Analysis**
 - ▶ Extremes and microclimates
 - ▶ Capabilities of climate, envelope, system
- ▶ **Evaluate Options**
 - ▶ Levels and methods of control
- ▶ **Institute Actions**

Thank you!

<https://ipisustainability.org>

<https://www.imagepermanenceinstitute.org/>

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