Sustainable Planning for IIT Buildings

Summer 2006
IPRO 320

Project Goals

- Review building systems

- Quick snapshot of the condition of the buildings

- Reduced maintenance costs
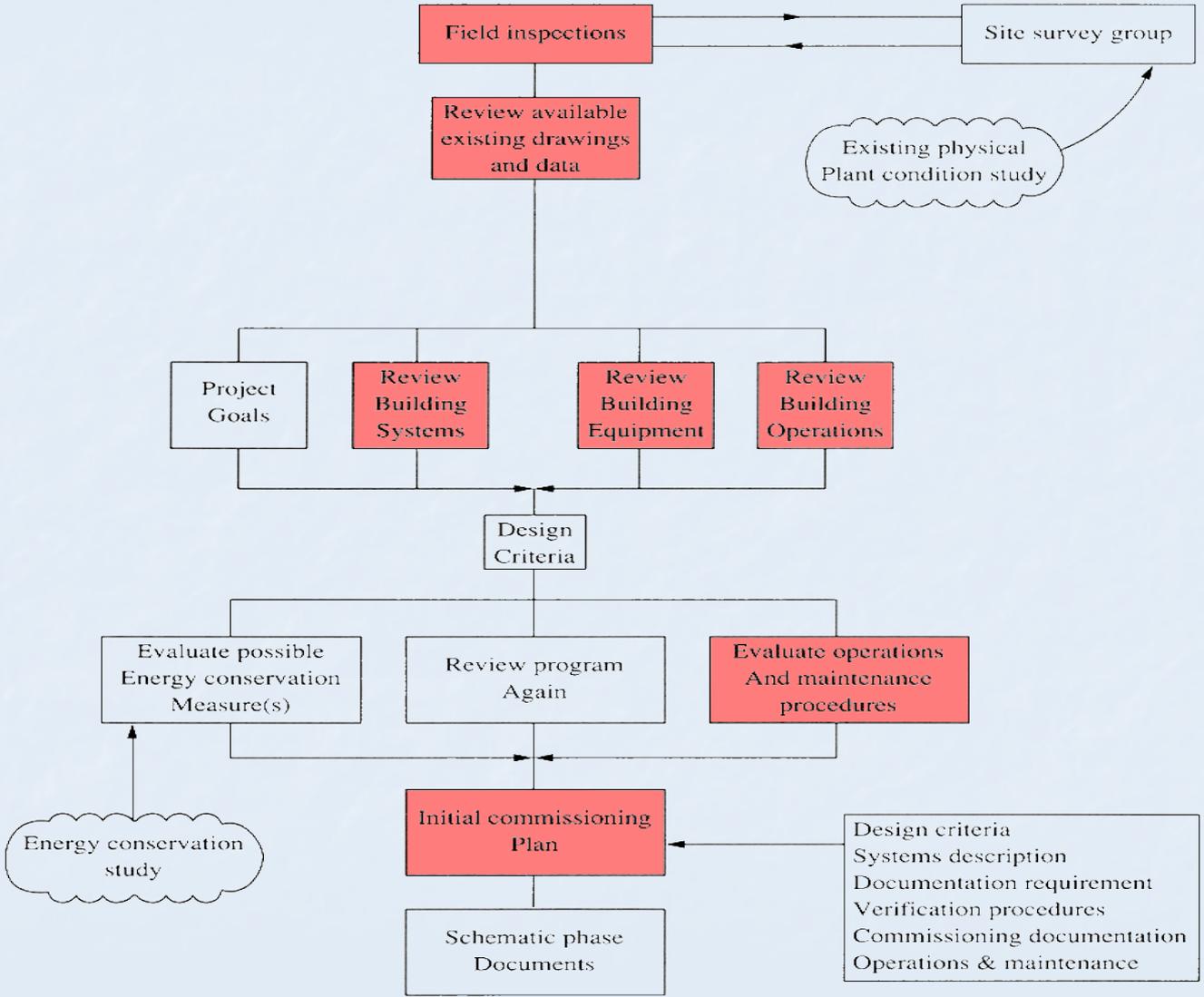
- Review of building thermal comfort

Work Distribution

- Field Data Collection Team

- Device Model Building Team

- Research and Data Analysis Team

Our Commissioning Process

Field Data Collection Team

Data Collection Overview

• Researched finding a Data Collection Device

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• Recorded data collected as well as observations for
further analysis

Device Model Building Team

Air Capture Hood

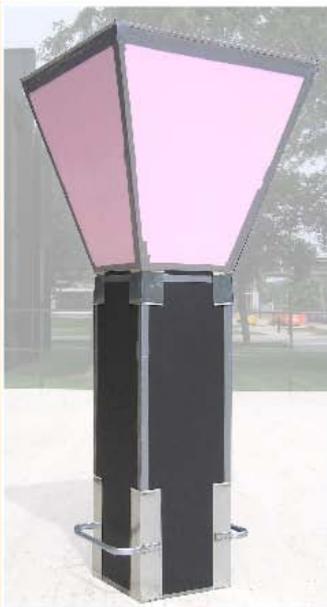
Commercial Hood ~ $2000

1st Prototype ~ $20

4 IN 1 METER
W/ AIR VELOCITY
used with prototype hoods
~ $150

2nd Prototype ~ $40

3rd Prototype ~ $30

GOALS

- Create an AFFORDABLE air capture hood

  In order to

- Measure air flow through DIFFUSERS

  While

- Maintaining ACCURACY

  In order to

IDENTIFY ducts that require maintenance.

WHY

- A part of commissioning involves AIR BALANCING. This involves checking the flow through diffusers to make sure spaces are receiving adequate conditioned air

- This affects the COMFORT of the occupants

Prototype 2

Preliminary Testing for Prototype 2

Prototype 2 was tested on an a supply and return diffuser, and compared with professionally taken measurements.

Supply

| Proto2	Professional	Error
340 CFM	380 CFM	10.5%

Return

Proto2	Professional	Error
65 CFM	100 CFM	35%

This prototype is fairly accurate at higher air flows, but less accurate at low flows. It would probably be possible to formulate a correction factor in proportion to air flow to achieve accurate measurements using a low cost, self-made hood.

- Can be fairly accurate
- Extremely <u>AFFORDABLE</u> at $40
- Although <u>TIME CONSUMING</u>
- More appropriate for an <u>IN DEPTH PROJECT</u>

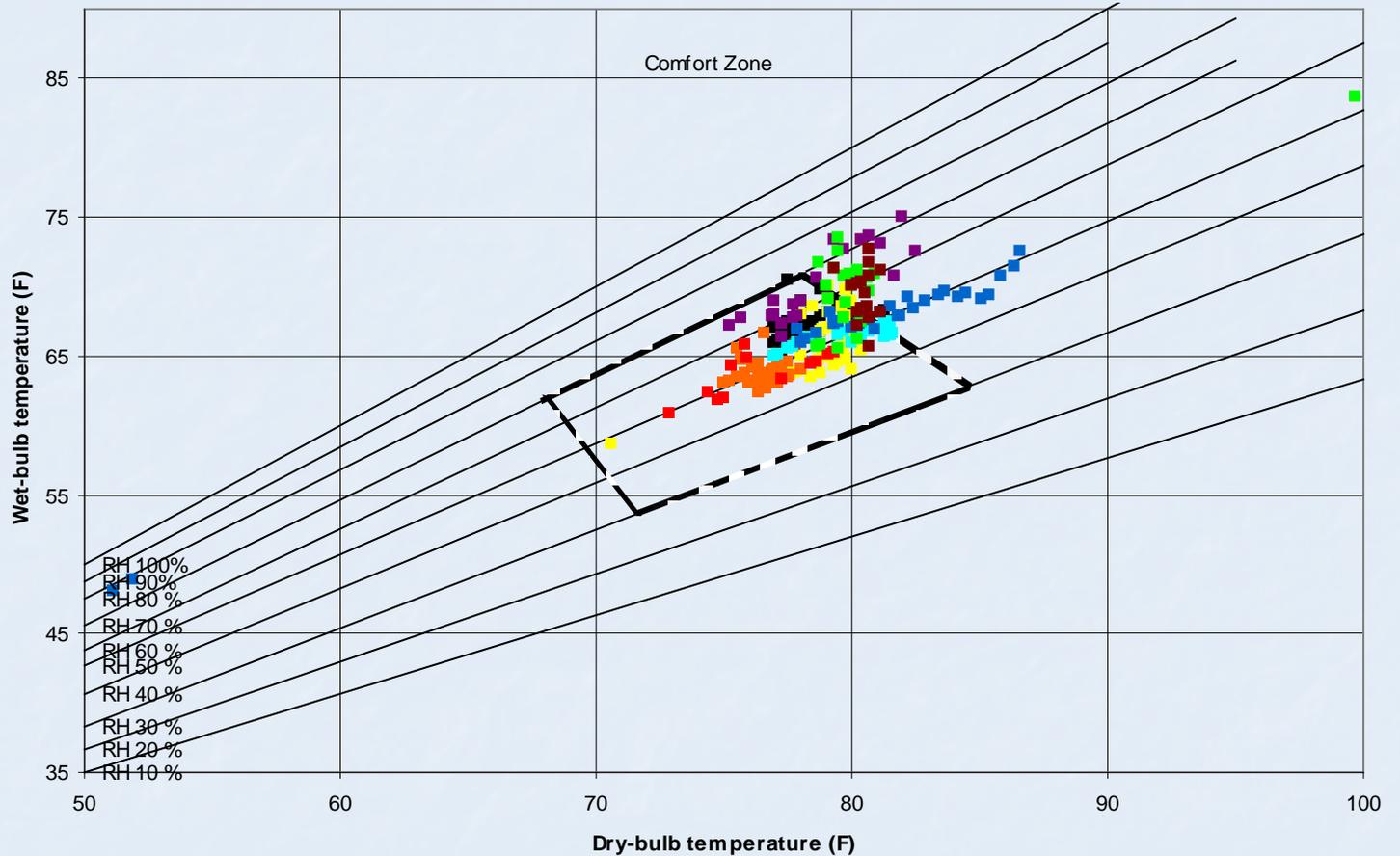# Research and Data Analysis Team
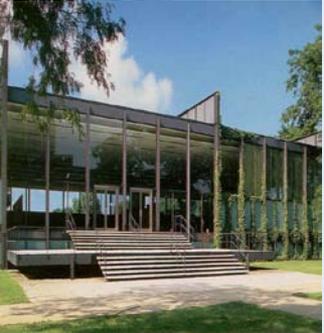
Data Analysis

- Temperature and Relative Humidity plotted on a Wet-Bulb Temperature vs. Dry-Bulb Temperature Graph

- Points are analyzed according to their position in relative to comfort zone

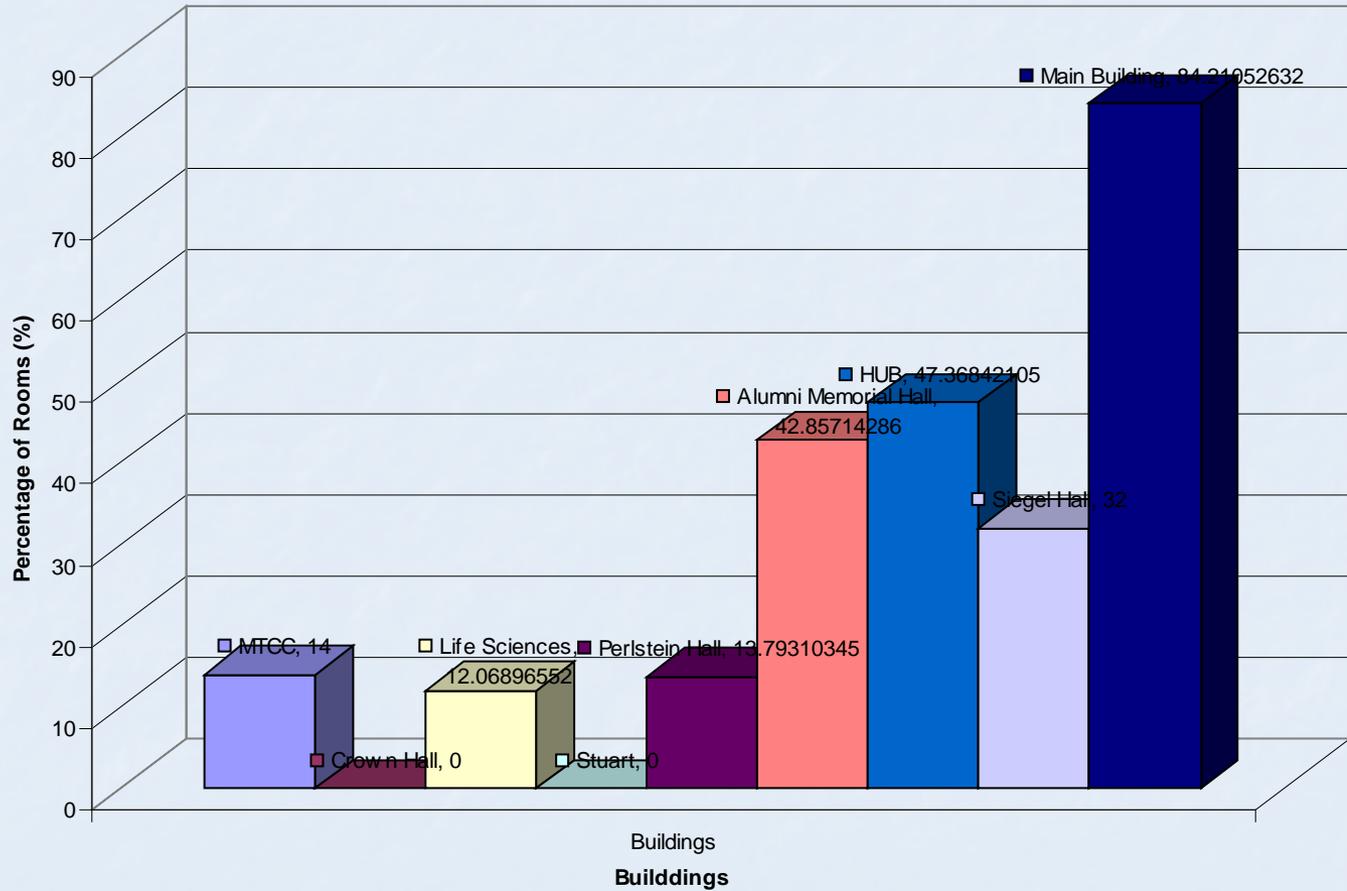- Provide Performance snapshot of the buildings
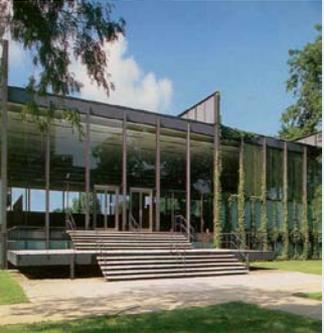
Comfort Chart

Comfort Chart Summary

HVAC Data Analysis Summary

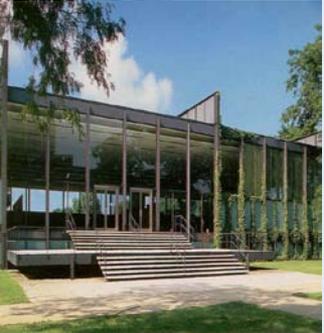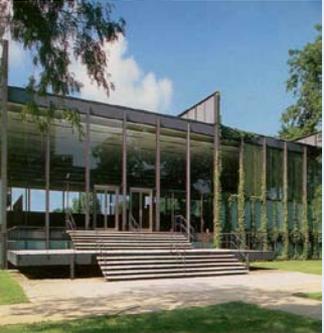Percentage of Rooms with Comfort Problems per Building

Reference

- Wang Shank K. *Handbook of Air Conditioning and Refrigeration* McGraw Hill, Inc, 1993

- ASHRAE Handbook

- Norman C. Modern Air Conditioning Practice. McGraw Hill Book Company Gregg Division 1983

- http://www.ashrae.org/template/EducationLinkLanding/category/1553;jsessionid=aaaeUIIcz91dJx retrieved July 23 2006

Credit

- **Prof. Nancy Hamill,** Illinois Institute of Technology

- **Russel Smith,** Siemens Inc.

- Bill Fridono , AEROTECH Balance Inc.

Question Time