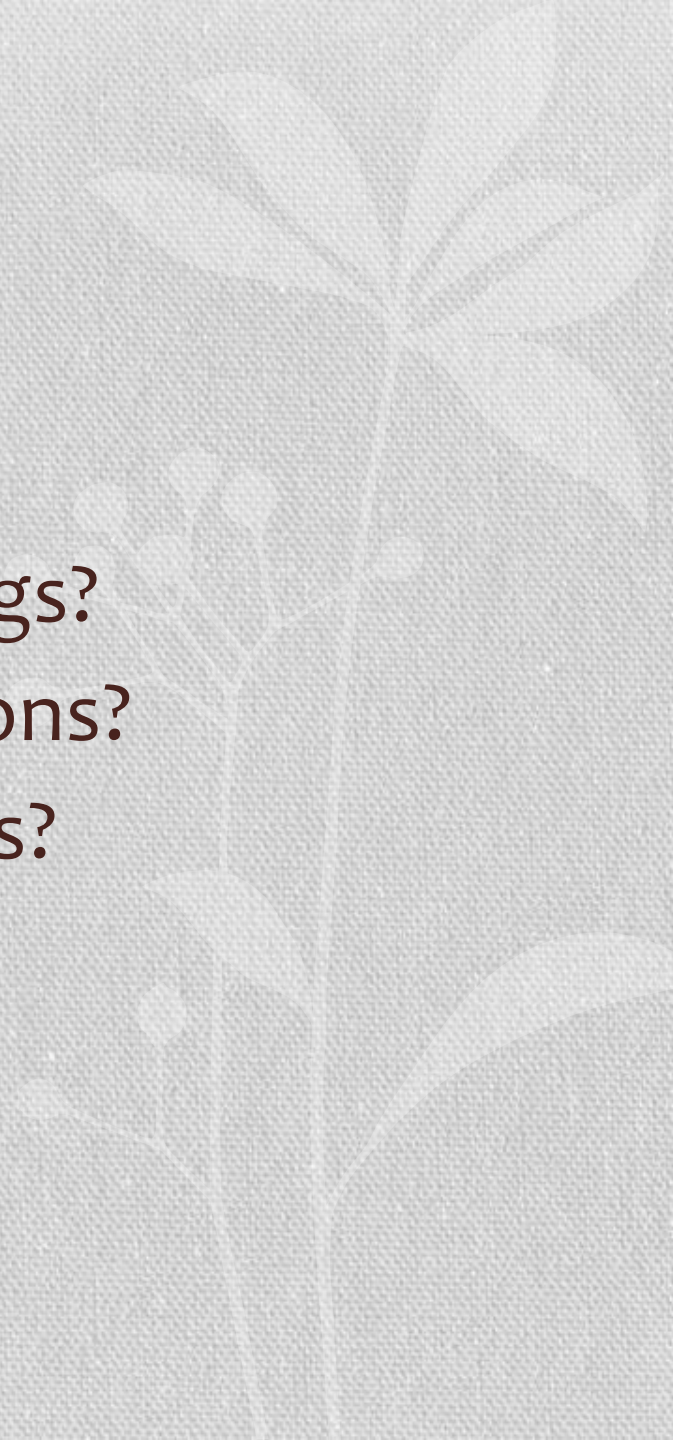




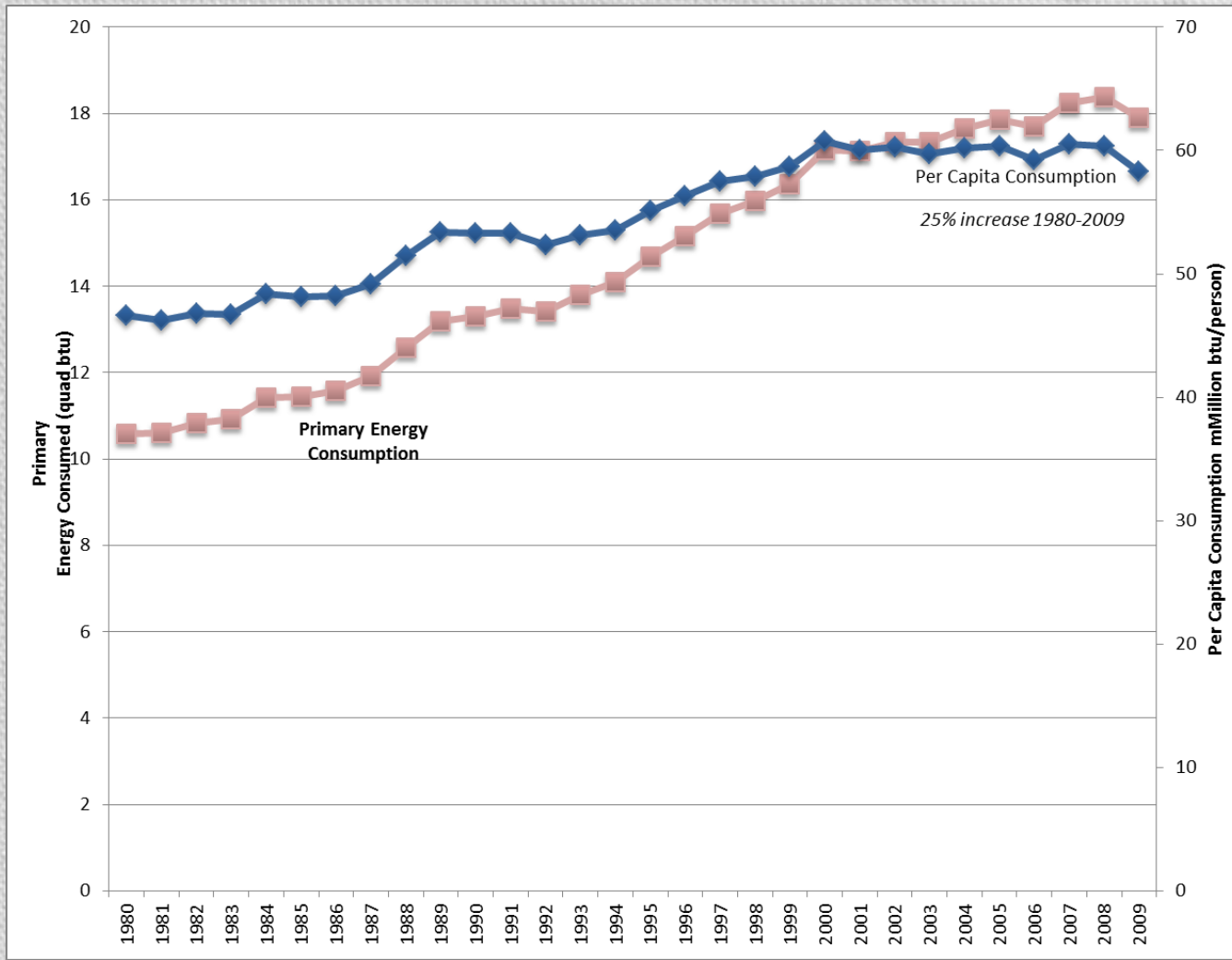
BUILDING OPERATIONS STORIES & CONSEQUENCES FOR CHANGE

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BEHAVIOR ENERGY AND CLIMATE CHANGE CONFERENCE ■ SACRAMENTO CA

- 
- Why buildings?
 - Why operations?
 - Why stories?

Why buildings? #1

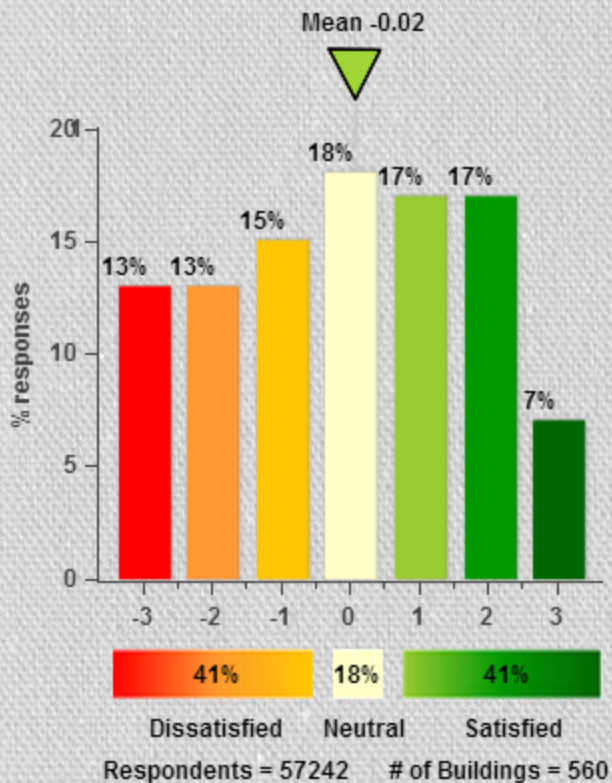


Primary Energy Consumption in Commercial Buildings is Increasing
(Source: US DOE Energy Data Book)

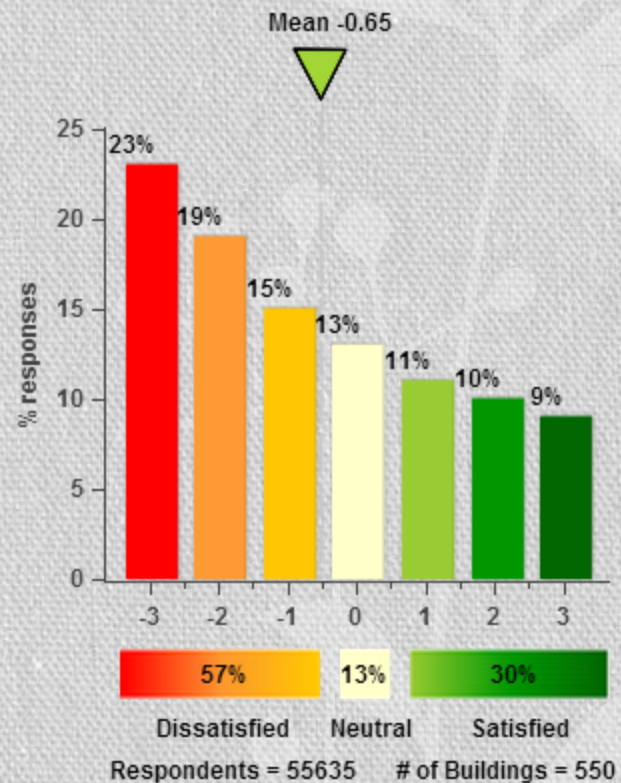
Why buildings ? #2



Adrian Leaman



Temperature



Sound Privacy

Why operations?



U.S. Department of Energy
Office of Inspector General
Office of Audit Services

Audit Report

The Department of Energy's
Opportunity for Energy Savings
Through the Use of Setbacks in its
Facilities

DOE/IG-0817

July 2009



Why stories?



John Everett Millais, 1870, *The boyhood of Raleigh*

The plural of anecdote
is a kind of data

THE WORLD OF DATA

NUMBER OF EMAILS SENT EVERY SECOND

2.9

MILLION

DATA CONSUMED BY HOUSEHOLDS EACH DAY

375

MEGABYTES

VIDEO UPLOADED TO YOUTUBE EVERY MINUTE

20

HOURS

DATA PER DAY PROCESSED BY GOOGLE

24

PETABYTES

TWEETS PER DAY

50

MILLION

TOTAL MINUTES SPENT ON FACEBOOK EACH MONTH

700

BILLION

DATA SENT AND RECEIVED BY MOBILE INTERNET USERS

1.3

EXABYTES

PRODUCTS ORDERED ON AMAZON PER SECOND

72.9

ITEMS



SOURCES: Cisco, comScore, MapRenduc, Radicati Group, Twitter, YouTube

IN THE 21ST CENTURY, we live a large part of our lives online. Almost everything we do is reduced to bits and sent through cables around the world at light speed. But just how much data are we generating? This is a look at just some of the massive amounts of information that human beings create every single day.

Aim: improve buildings

- Buildings are not working so well
- Limited lines of attack: technology, technology investment, occupant behavior
 - Hard problem, superficial response?
- Operators as “missing link”

Aim: look deeper and more systemically

- “Informal” knowledge
 - Counter/augment formal theory and assumptions
 - Unwritten: politics, proof, platform... say it indirectly
- Multidimensional (systems framing)
- Use what people already know

Stories

- Lighting Controls

OPAQUE
CONTROLS
Interactive
Labeling



- Kresge Foundation

OPERATOR
INITIATIVE

Fully Engaged 24/7 Paying Attention



- WORN BINS
REACTION w/o
COMMUNICATION

- "Trusted old Technology"
... says the contractor.
HOW DO CONTRACTORS
MANAGE TRUST?

Being conservative
while being an adopter...



- Mini-fridge
Initiative

How to SAY NO

Appealing to
Common sense



- Auto-ON-OFF



OPERATOR
OVERRIDES

MANUAL vs. AUTOMATIC
CONTROL CONTROL

- Summer in D.C.
NAHB offices...

WINTER SUMMER



- RAND Corp.
Air Conditioning
Install....



- CBE Survey
"General Satisfaction"

WILLING
to COMPLAIN
ABOUT SMALL
THINGS

EXPECT
A CERTAIN
AMOUNT of
FAILURE

- Schools: Teachers
don't have high
expectations

POWER of
VALUING
COMMUNITY



What is a good building?

THE RATS

The building also harbored rats, and we were told that repairing things could "stir up the rat population." What the?!?! I mean, they don't hibernate! It was like they were implying that if the building suddenly became warm the rats might say, hey, let's leave our cold underground pipe and go up and enjoy the warmth!



Managing Complaints

Complaints

People kept complaining ...

The guy before me ...

Inertia

Stories told to occupants

- “We can change rules and regulations when we want to.”
- “ Sometimes we bend the truth.”



Making Changes



They installed some high pressure sodium lamps in a parking garage. A scientist employed by the organization scolded the facilities manager for that change, saying that he was using the wrong ballast and it was screwing up his AM radio reception in the garage. So they reminded him he didn't get AM reception before the lamp change, either.

“Oh yeah.”



+



So how much do energy
savings matter?

I had a mentor who told me a trick. He said that you make or break the energy bills, but nobody knows that and they don't pay attention.

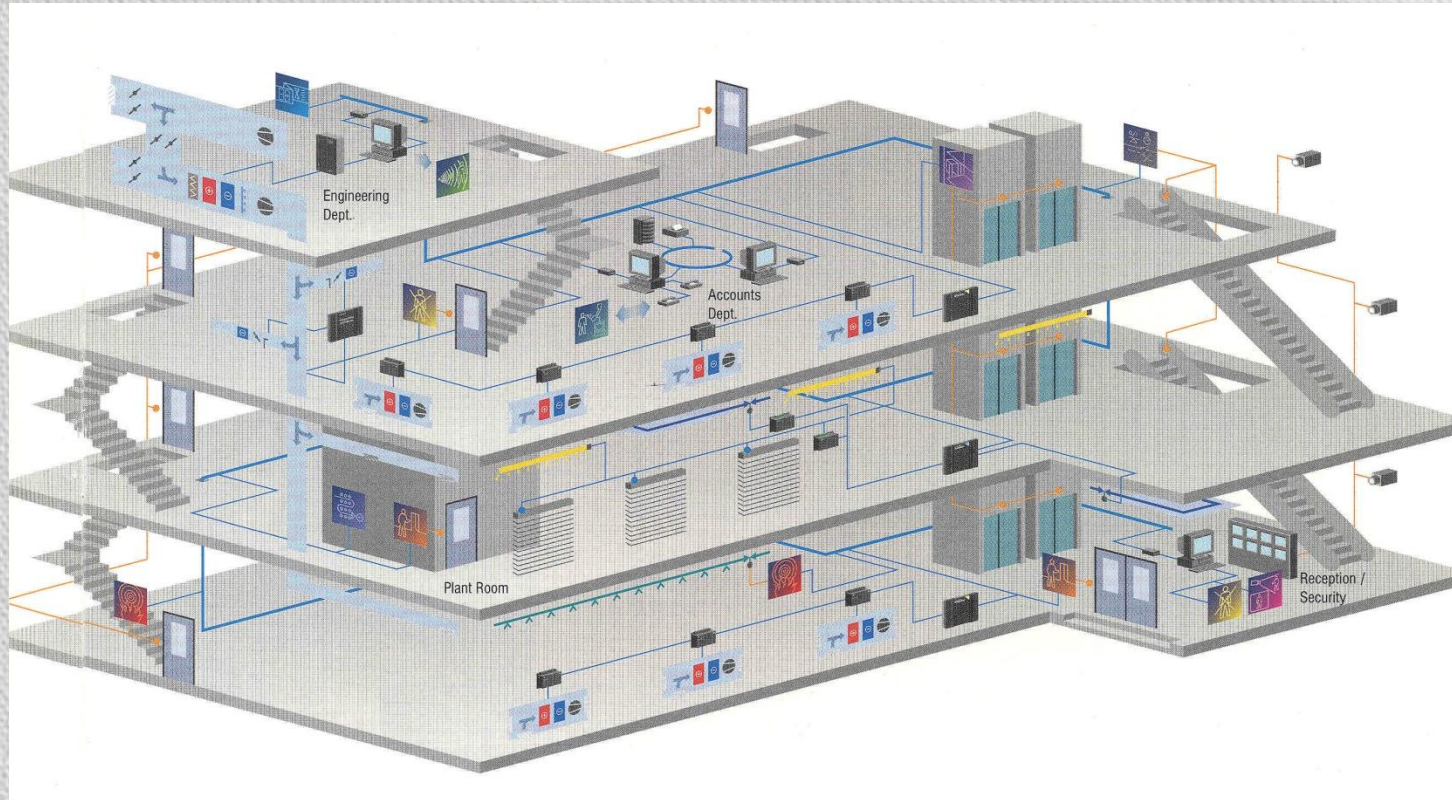
But if you can make changes, create savings, and document it all, you'll be a hero and you'll always be employed.



For illustration only

I was knocking them dead with energy and cost savings, but money was not an issue with them, and the green trend didn't matter. I did it because I care.

What happens with building automation?



Conclusions

Research

- Ordinary stories have something to tell
- Review assumptions
- *If only ...*
 - Not a matter of getting individual technologies or even behaviors “right”

In and outside of buildings

- Involve operators, give them leeway, visibility, and respect
- Work with real buildings & ask users
- IEQ shortcomings affect energy use and well-being : start fixing IEQ



Questions , comments, info:

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Occupants, Buildings, Operators, Energy Project
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