

UNIVERSITY OF ILLINOIS

AT URBANA-CHAMPAIGN

Retrocommissioning (RCx)

Facilities & Services - Engineering Services

“Saving the planet, two buildings at a time.”

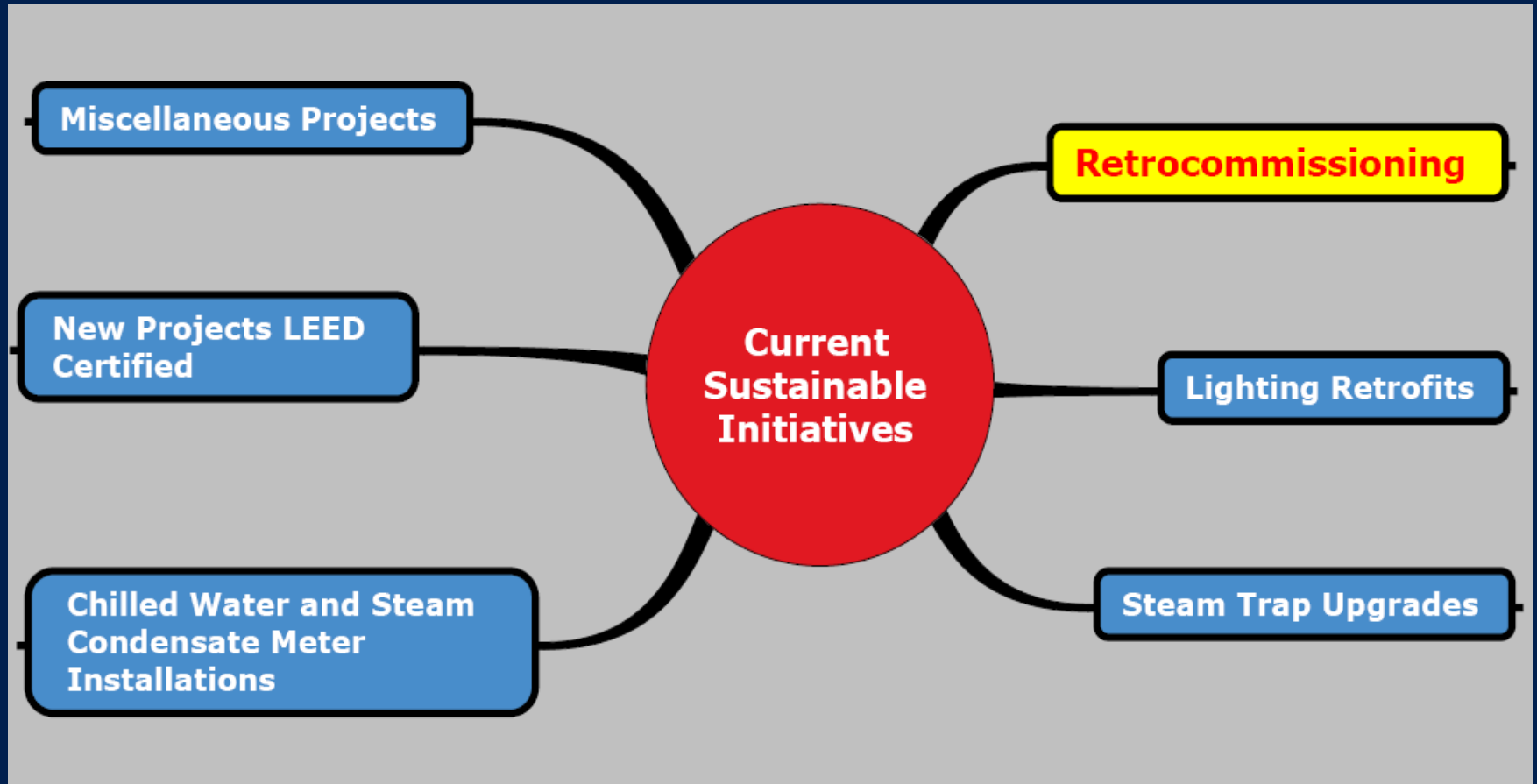
Mr. Karl Helmink

Mr. Damon McFall



www.illinois.edu

Creating a Sustainable Campus



What is Retrocommissioning @ Illinois?

- Focused systematic review of air conditioning & heating systems and their sequences of operation
- Attempt to save as much energy as reasonably possible without *overly* affecting operations



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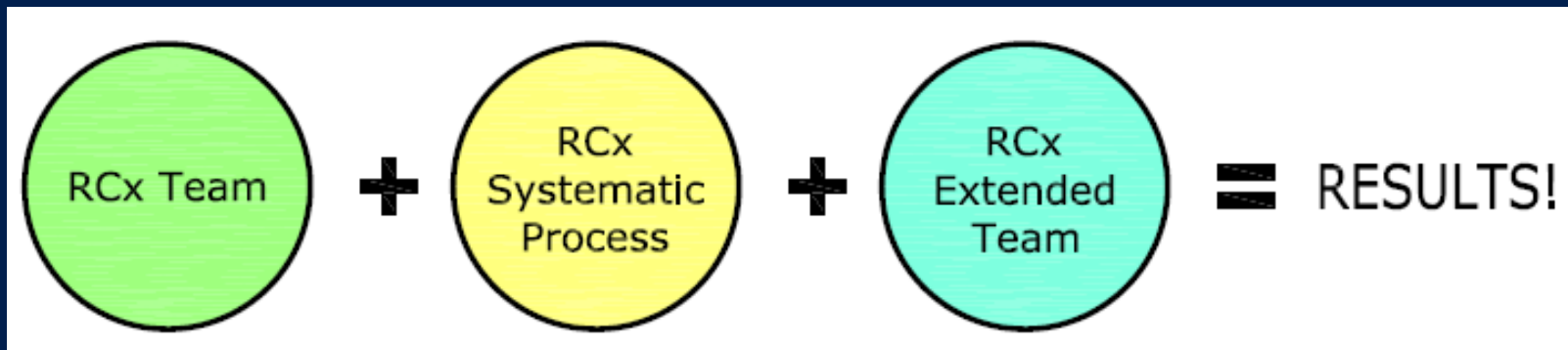
RCx Economic Summary To Date – December 2008

Building	Time Period of RCx Visit	RCx follow up complete	Billing Period	Building Area (GSF)	% Energy Saved	Actual Energy Saved (MMBTU)	Projected Savings per Year	Actual Saved per Billing Period
National Soybean Research Laboratory	Aug-Sep 07	Nov. 2007	Jan 08 - Dec 08	98,854	11%	5,391	\$ 65,000.00	\$ 85,531.11
Krannert Center for the Performing Arts	Oct-Dec 07	March 2008	Jan 08 - Dec 08	298,293	31%	22,395	\$ 376,000.00	\$ 418,359.91
Newmark Civil Engineering Laboratory	Jan-Feb 08	June 2008	Feb 08 - Dec 08	183,931	29%	13,566	\$ 150,000.00	\$ 205,266.36
Turner Hall	Mar-Apr 08	Jan. 2009	Apr 08 - Dec 08	180,002	16%	6,975	\$ 200,000.00	\$ 105,929.42
Aces Library	May-Jun 08	July 2008	Jun 08 - Dec 08	82,742	39%	7,584	\$ 75,000.00	\$ 120,457.45
Music Building	Jul-Aug 08	Sept. 2008	Aug 08 - Dec 08	105,343	31%	3,791	\$ 135,000.00	\$ 55,746.89
Mechanical Engineering Laboratory	Sep-Oct 08	April 2009		151,859	0%	0	\$ 150,000.00	\$ -
Animal Sciences Lab	Nov-Jan 09	?		149,211	29%	781	\$ 150,000.00	\$ 14,161.27
Madigan Lab	Feb. 09	?		171,007			\$ -	\$ -
Chem-Life Science	Feb. 09	?		231,315			\$ 250,000.00	\$ -
Totals				1,652,557		60,484	\$1,551,000.00	\$ 1,005,452.42
Average Based on Average of Percentages					27%			
Reduction in CO2, metric tons						4,828		

Note: Savings are calculated by comparing billing period with previous year billing period month for month.



Together We Can Achieve Results!



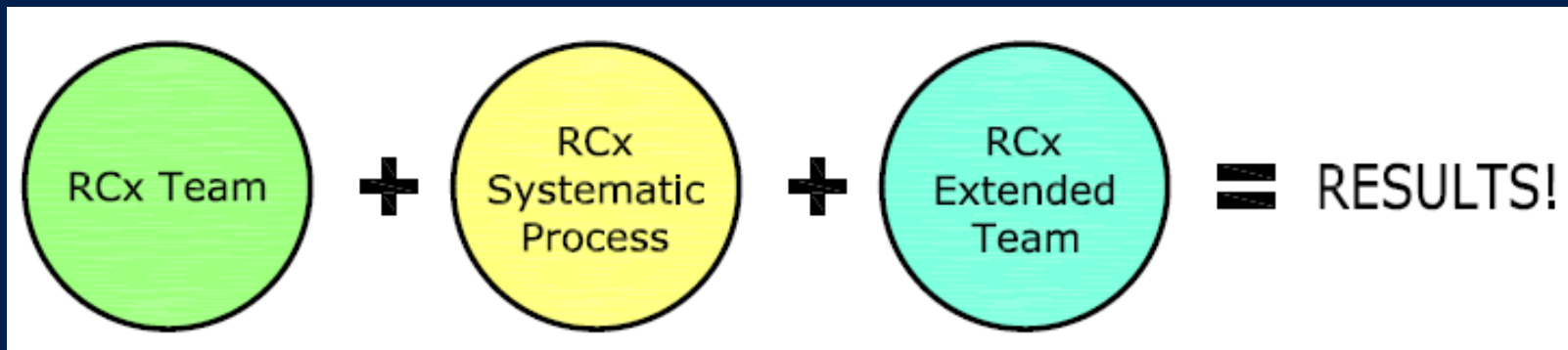
Highly Skilled RCx Teams

Currently Two Composite Teams, each with:

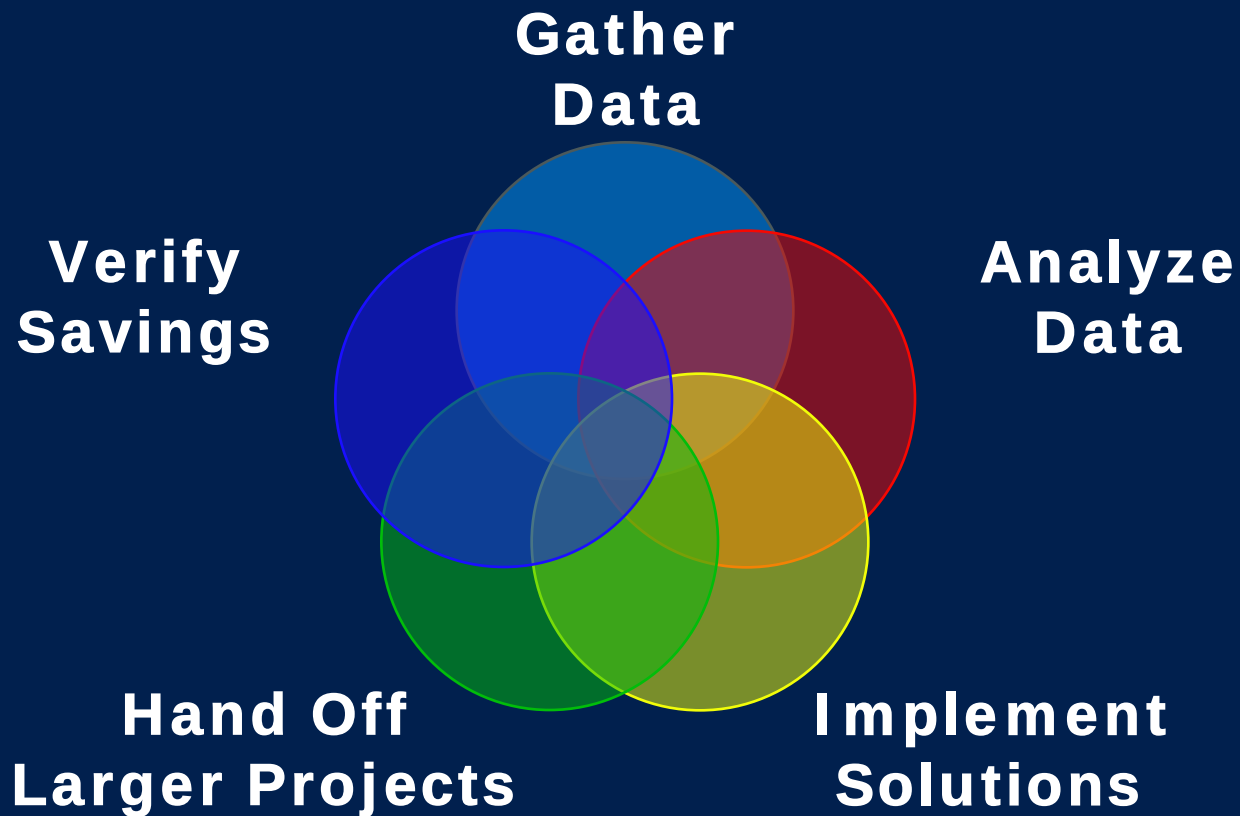
- Team Leader
 - DDC Programmer
 - Pneumatic Temp Controls Mechanic
 - DDC Electrician
 - Sheet Metal
-
- TC Mechanic (Flex)
 - Sheet Metal (Flex)
 - 3 to 4 engineering students



Together We Can Achieve Results!

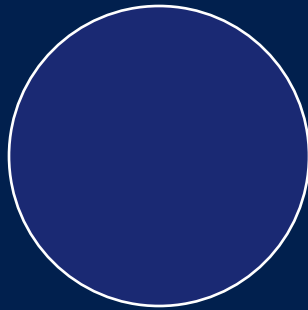


Systematic RCx Process



Systematic RCx Process

Gather Data

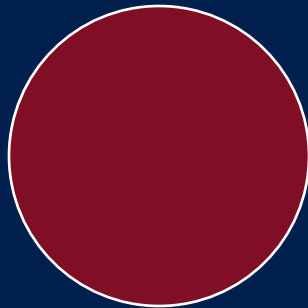


- HVAC Floor Plans
- Shop Drawings
- Air Balance Reports
- Occupant Interview
- Web Surveys
- Key Personnel Interview



Systematic RCx Process

**Analyze
Data**

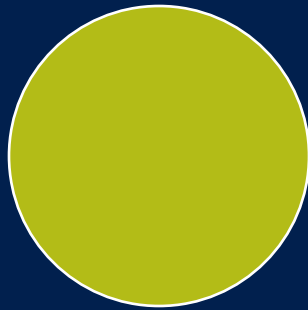


- Engineer Review
- Control Shop
Drawing Review
- Sequence Review
and Simulation
- Verify Field Realities
- Construct Occupant
Behavior Model



Systematic RCx Process

Implement Solutions

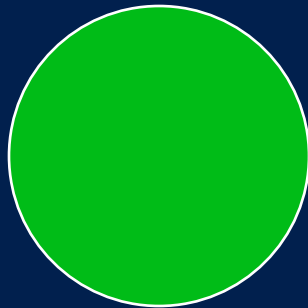


- Field Revisions
- Occupancy Schedules
- RCx Specific Solutions
- Occupant Energy Awareness Program



Systematic RCx Process

**Hand Off
Larger Projects**



- To Maintenance
- To Engineering Support
- To Solicit Capital
 - (SSC)
 - (DCEO)
 - (AFMFA)



UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Music Building (Bldg 39) - Chilled Water Entrance - Chilled Water Tonnage

tons_rfg

260
240
220
200
180
160
140
120
100
80
60
40
20
0

27-Sep

28-Sep

29-Sep

30-Sep

1-Oct

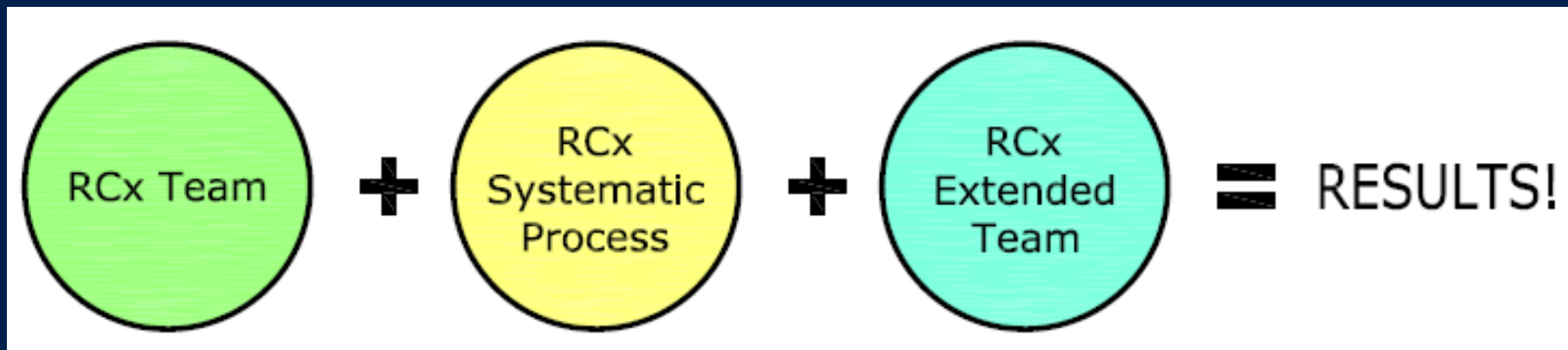
2-Oct

3-Oct

26-Sep-2008 to 3-Oct-2008



Together We Can Achieve Results!



RCx Extended Team

- Facility Managers / Building Occupants
- Lab Monitor / Animal Care Taker / PIs
- Maintenance Support - Route Mechanics
- Engineering Support
- Energy Conservation / Provost Office
- Utilities / Accounting
- Communications Department



Buildings Addressed so far...

- RCx has completed the following buildings so far...
- We are currently working at Chemical Life Sciences Laboratory (#9) and Edward R. Madigan Laboratory (#10)
- Loomis Laboratory and Wohlers Hall are next...



Buildings Addressed so far...



Buildings Addressed so far...



Buildings Addressed so far...



Buildings Addressed so far...



Buildings Addressed so far...



Buildings Addressed so far...



Buildings Addressed so far...



Buildings Addressed so far...



RCx Success at K.C.P.A.



Flickr.com

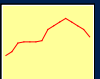
- Occupancy Schedules
- CO2 Sensors in the Great Hall
- Cleaned Plugged Ductwork
- Hybrid Economizer
- DDC Web Graphics



RCx Success at Music Building



- Occupancy Schedules
- Restroom Exhaust Fans (4,000 CFM)
- Hybrid Economizer
- DDC Web Graphics
- Corrected 3-Way Cooling Valve (35 T)



Some things encountered...



Some things encountered...



Some things encountered...



Some things encountered...



Some things encountered...



Some things encountered...



Some things encountered...



Some things encountered...



Some things encountered...



Largest Energy Saving Items @ Illinois

- Implement more aggressive Occupancy Schedules
- Reducing Outdoor Air and Exhaust Air Qtys
- Fixing / Calibrating sensors, dampers, etc.
- Eliminating simultaneous heating and cooling when possible
- Create temperature control web pages
- Campus Utility Billing Program (starting FY 10)



Summary of Positive Results

- Area Covered to Dec. 08: 1,250,165 SqFt.
- Actual Utility Savings to December 2008: \$1,005,452.42
- Actual Energy Saved: 18% to 36%
- Actual CO2 Reduction: 4,828 Metric Tons
- Equivalent to 25 railcars of coal or 884 passenger vehicles annual emissions



Thank you!

More information can be found at our website:

<http://www.energymanagement.uiuc.edu/retro-commissioning.cfm>

Retrocommissioning
Facilities and Services
Engineering Services

