



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Direct Digital Control

...the future is a *Building Control*

John J. "Jack" Mc Gowan, CEM



ENERGY USER NEWS
ENERGY MANAGEMENT FOR THE COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL MARKETS

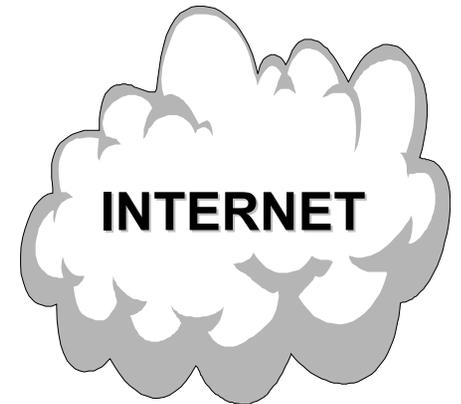
AutomatedBuildings.com



PRESENTATION VISION

Raise awareness of seamless connection between:

- **Energy / Utility Cost Management**
- **Building Design**
- **Building Control Technology**
- **The Internet**



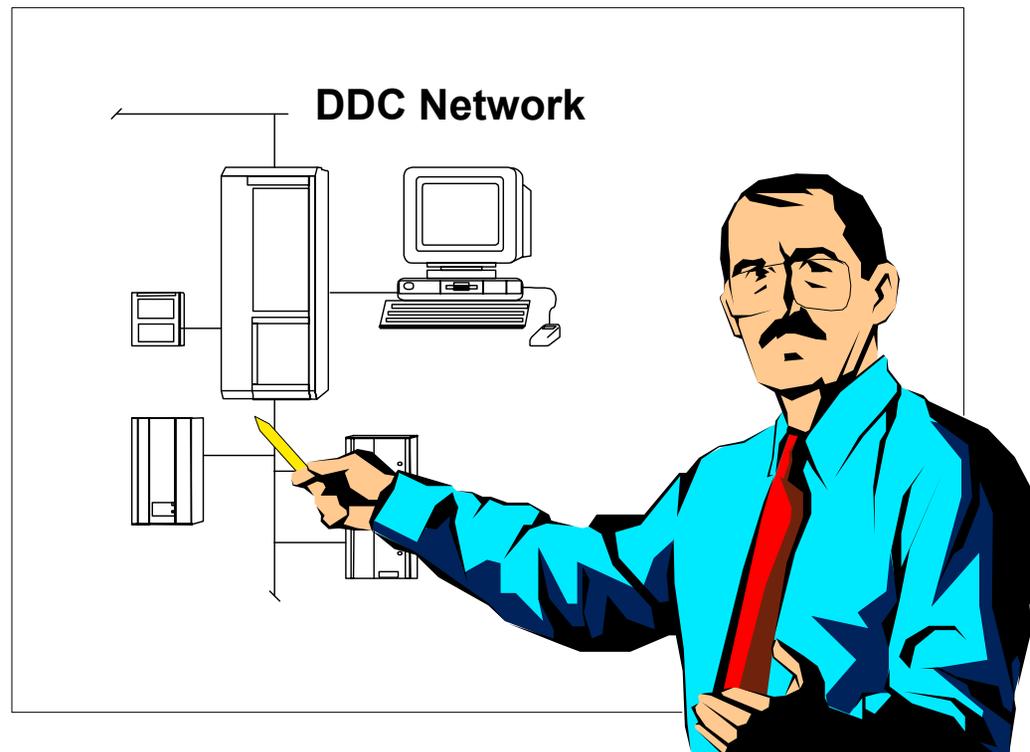
... and this connection must become *Real-time*

Albuquerque Academy won national recognition for both understanding and acting on these facts



Control Theory

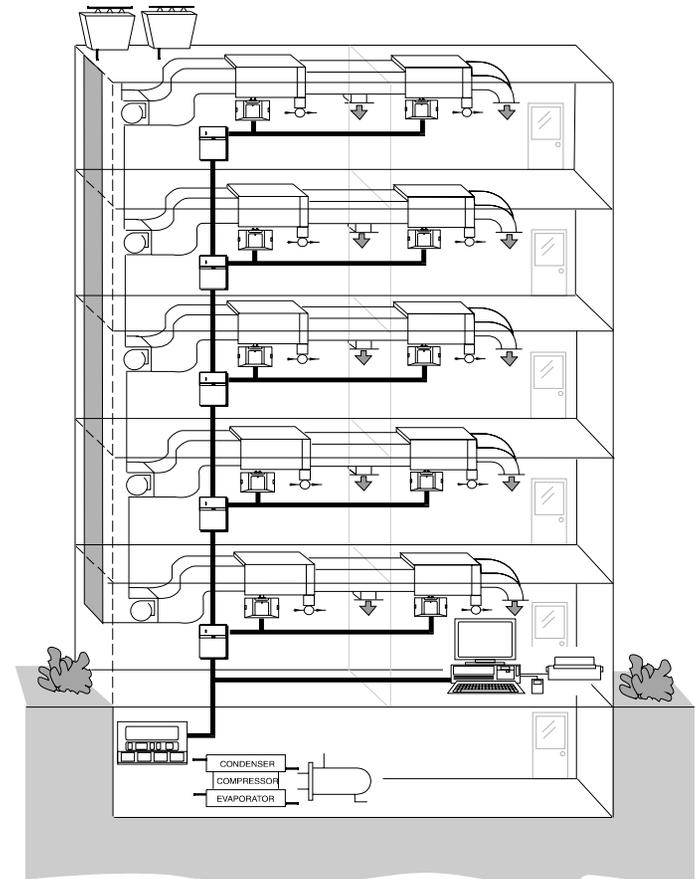
- ◆ Basic Temperature Control
- ◆ Direct Digital Control (DDC)





DDC Application & Benefit

- **Complete Building Control System**
 - Microprocessor reliability/precision
 - Local/remote setpoint adjust & tune
 - Local and/or remote start-stop
- **Saves Energy**
 - Start-stop based upon occupancy
 - Eliminate cool & heat unoccupied areas
- **Reduces Maintenance Cost**
 - Immediate notification of failures/alarms
 - Provides warning prior to actual alarm
 - Remotely “view” equipment from a P.C.
 - Diagnose mechanical problems from PC
- **System Integration**
 - Fire, Security, Energy Systems work together
 - Internet-based Interface via Web Browser
 - Enterprise Energy Management



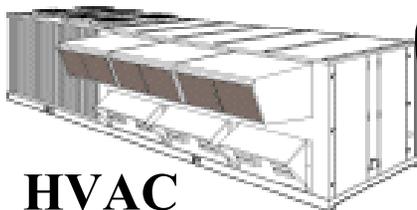
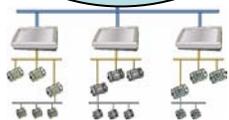


The Control Business ?

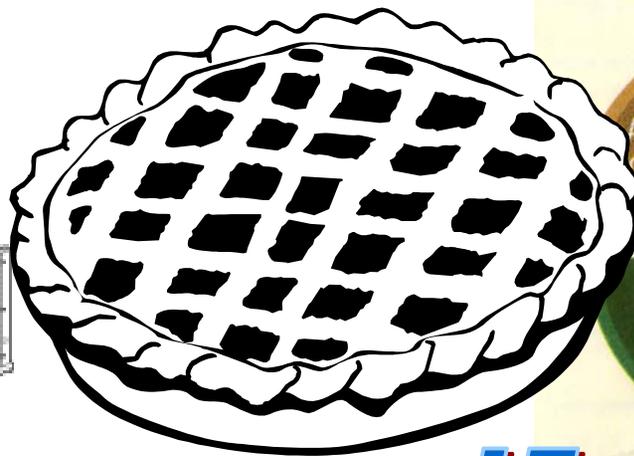
**Not Just DDC
Contractor &
Manufacturer**



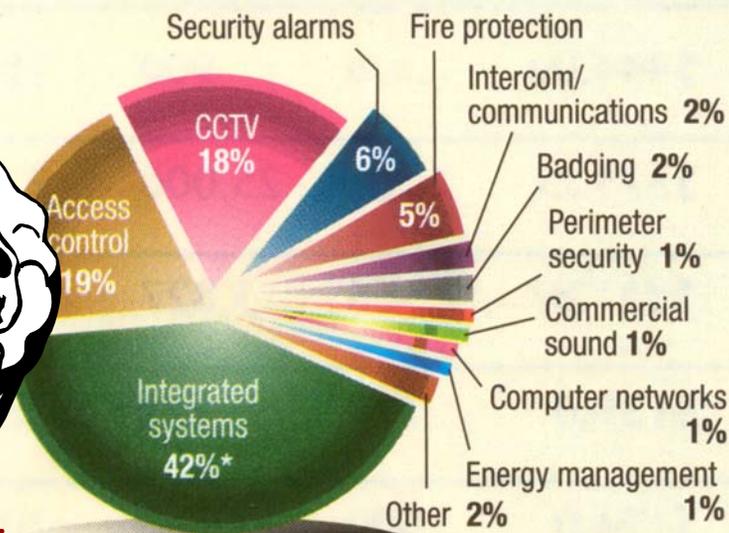
**INTERNET
Web Services**



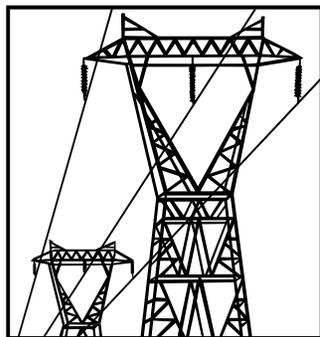
**HVAC
Manufacturers**



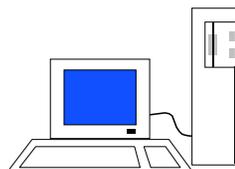
BuilConn Expo Integrators' Revenue by System Type



**ESCO's
Utilities**



IT



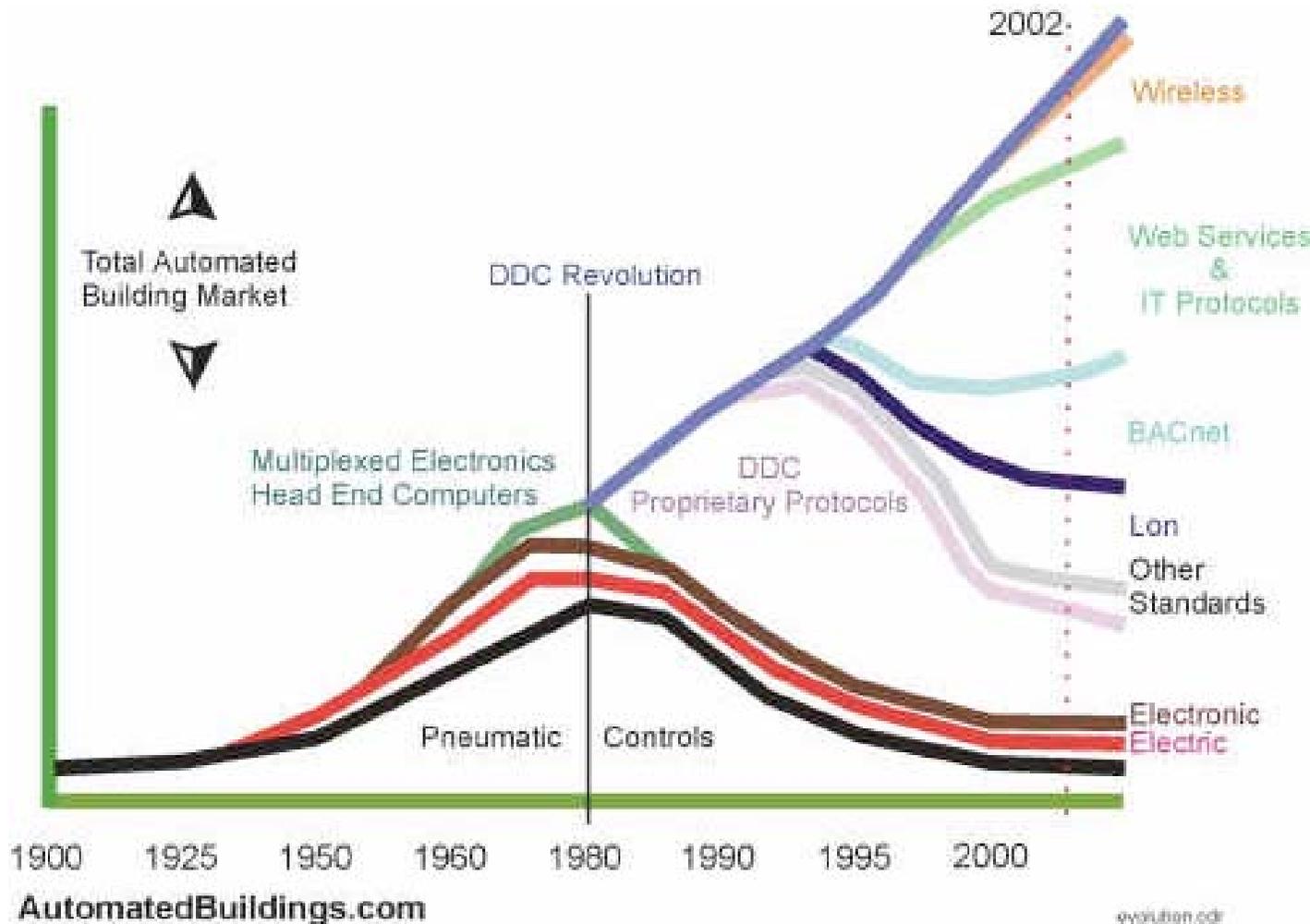


Automated System Evolution

- Another perspective based on chronology
- The path to a \$5 billion market Marcon DDM Marketing

2003 → Internet Control

- ✓ Standards
- ✓ Web-services
- ✓ Wireless
- ✓ Integration
- ✓ Real-time





What business is DDC?

- Energy?, Controls?, Buildings? ...maybe
- **Web services?** ...closer
 - "applications delivered over the Internet, ...users can select, combine through almost any device" *Ayman Ismail*
 - "web services open doors to computer programs that were... locked from each other." *CFO.com 8/2002*
- **"...the only function of a business is to create value and to innovate"** *Peter Drucker*

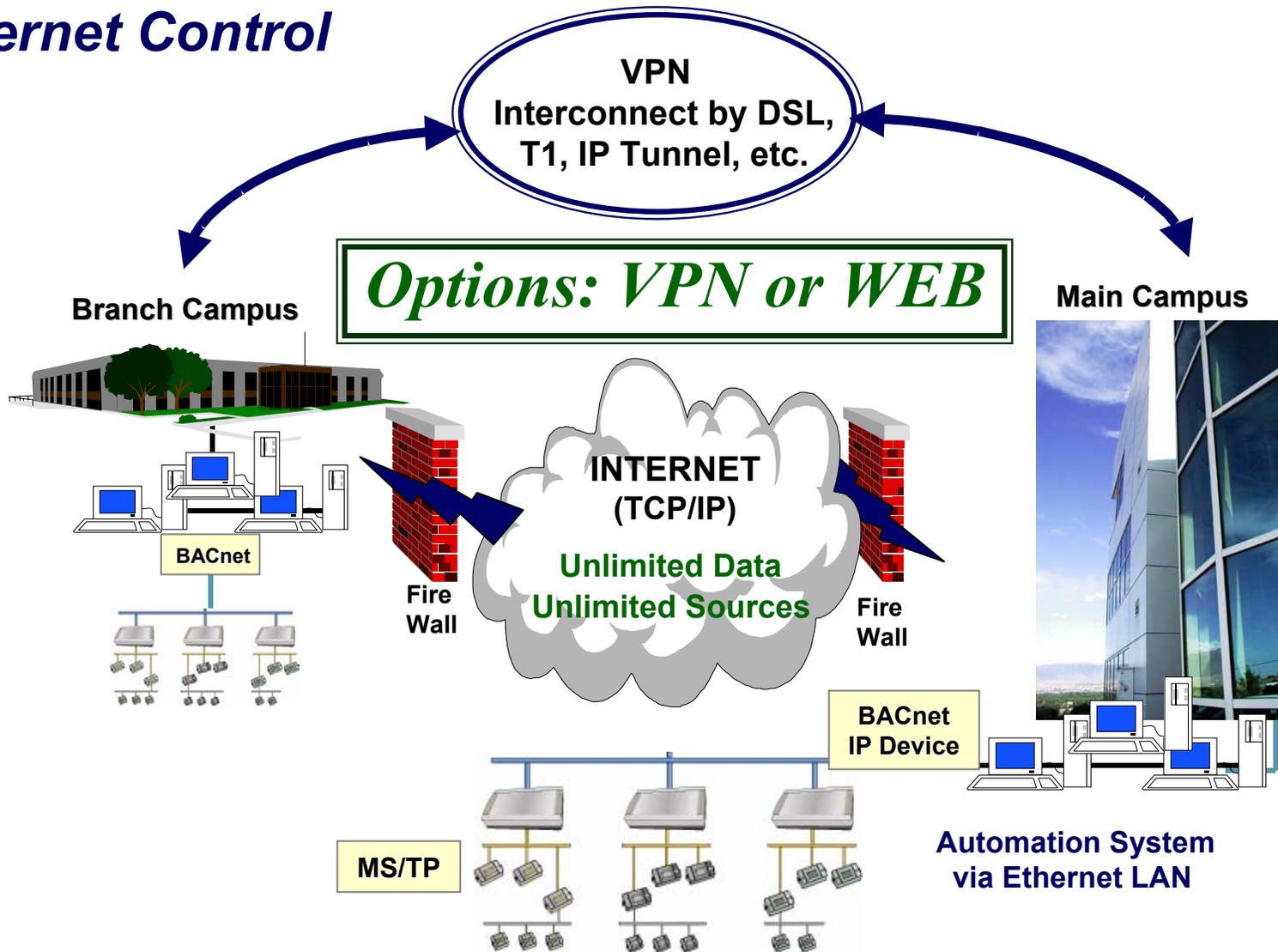
Conclusions

- ✓ **Automation is Web-based technology business**
- ✓ **Success requires: manage new players & innovate**
- ✓ **Quality demands understanding Web-impact**



The Real Time Vision

Internet Control





Directions in Digital Control



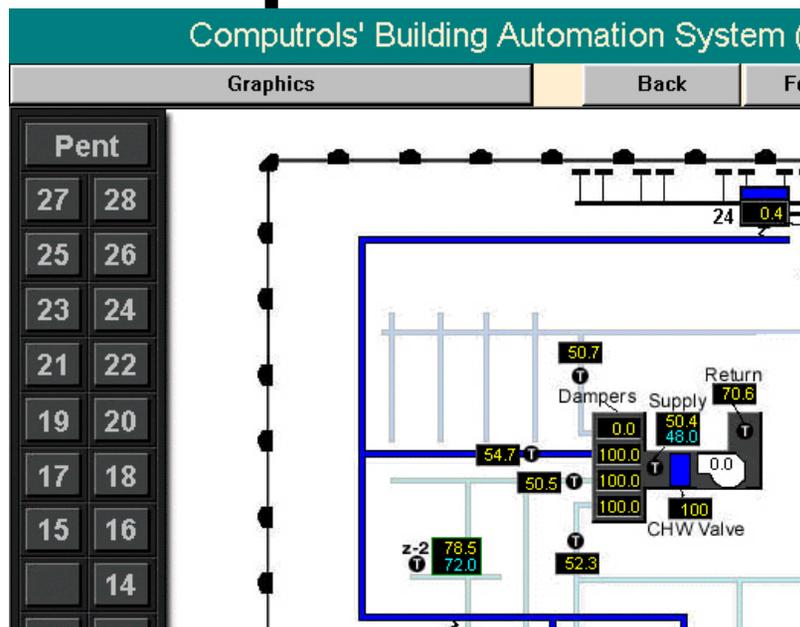
What's missing? ✓ Access Control
✓ Fire / Life Safety

✓ Video Surveillance
✓ Web Services



What is the next Killer App.?

- HVAC and Automation **Web Appliances ?**
- (1) 1M bps **Ethernet** connection uses standard screw terminals and multi-drop **twisted pair wire**.
- Native **TCP/IP Internet protocol** for open communication

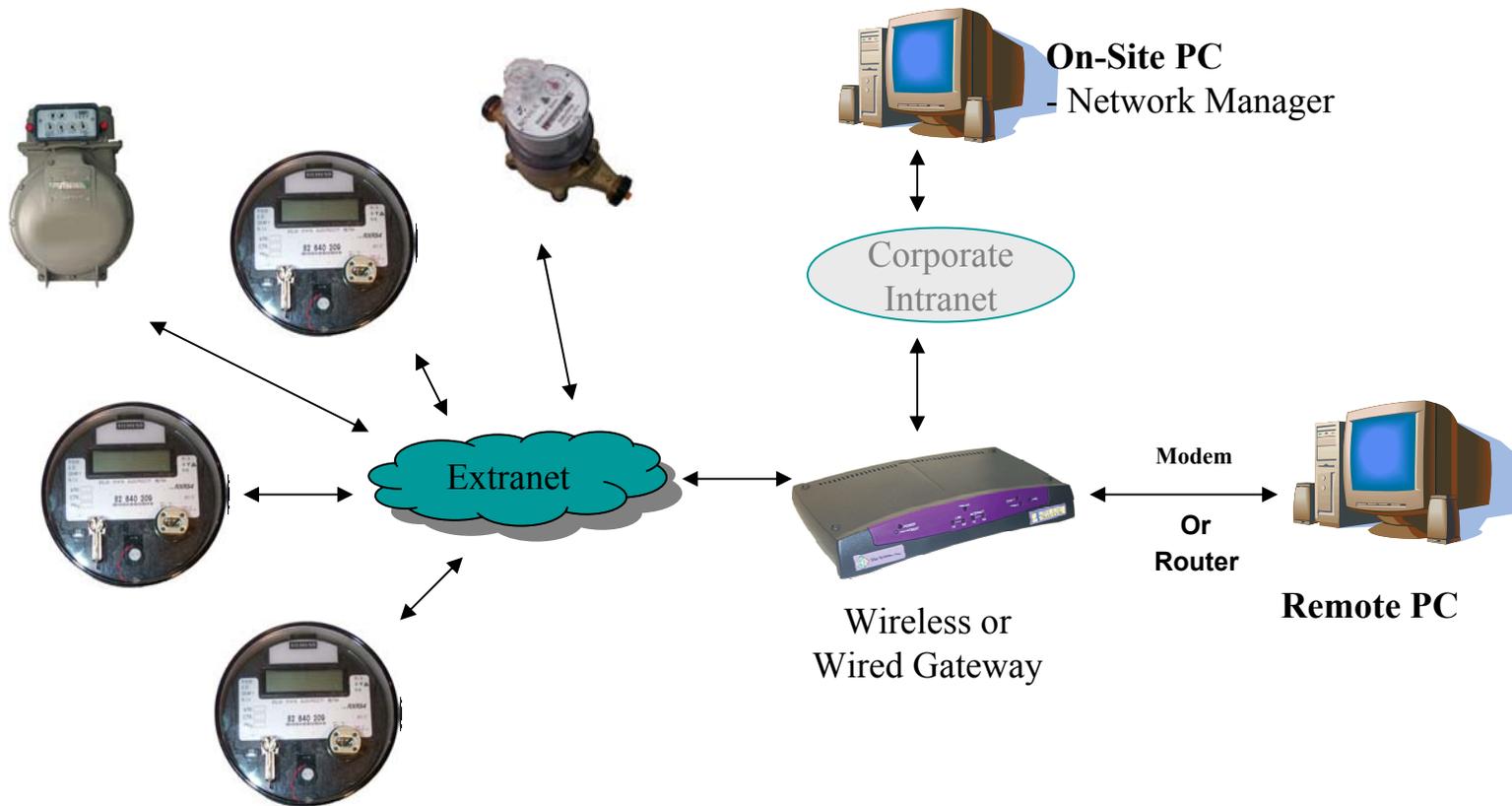




What is the next Killer App.?

Technology can Web-enable all types of devices

✓ Real-time control means data from anywhere, anytime





Real-time Internet-based Video Surveillance

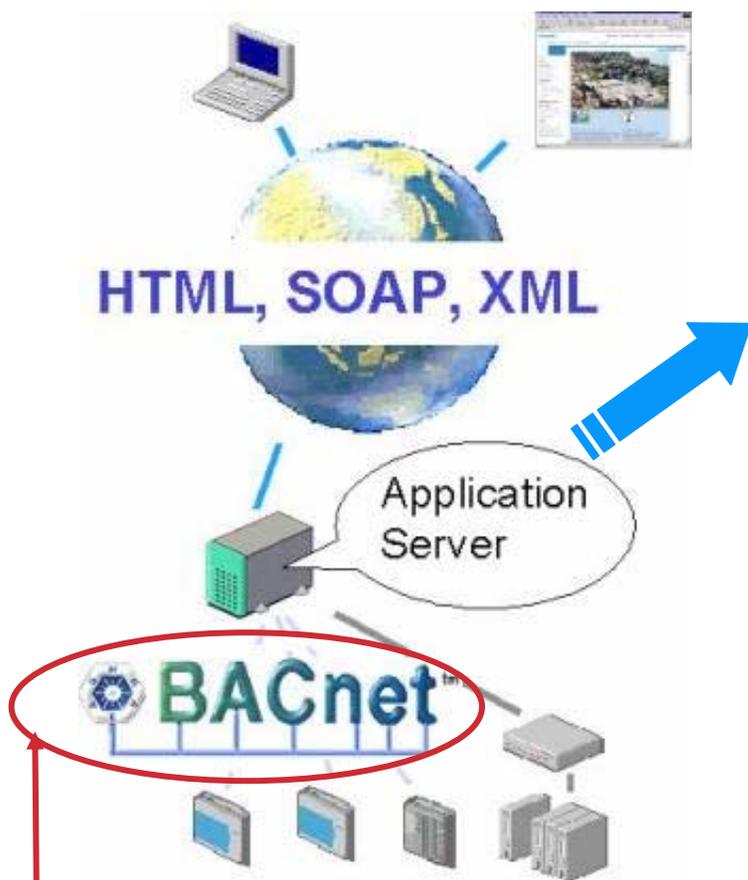
- **Digital Cameras**
- **Video Database**
- **Machine Vision**
 - Trip wires
 - Alarm filtering
- **Alarming**
- **Audio features**
- **Central Monitoring**
- **"Safe Walk" feature**
- **Access Control**
- **System Integration**
 - **Facility Management or Building Automation**
 - **Security**
 - **Fire**
 - **Wireless Internet for campus security**
 - **Full Dashboard Package**





System Integration Overview

Integration plays a key role in bringing down operating costs and permits a look at the building as one single process



Source: Automatedbuildings.com, *Standardization & IT Technology will shape the BACS Industry*, January 2002



Control with building automation via BACnet and Web-enabled devices through:

- **Integration platform** (integration on operating level, subsystem integration via standards communication protocols and interfaces - BACnet, EIB/KNX, LONMARK, OPC, ... - data exchange with customers business processes, office environment, ... via Application Server)

Application server supports the following technical and technological solutions:

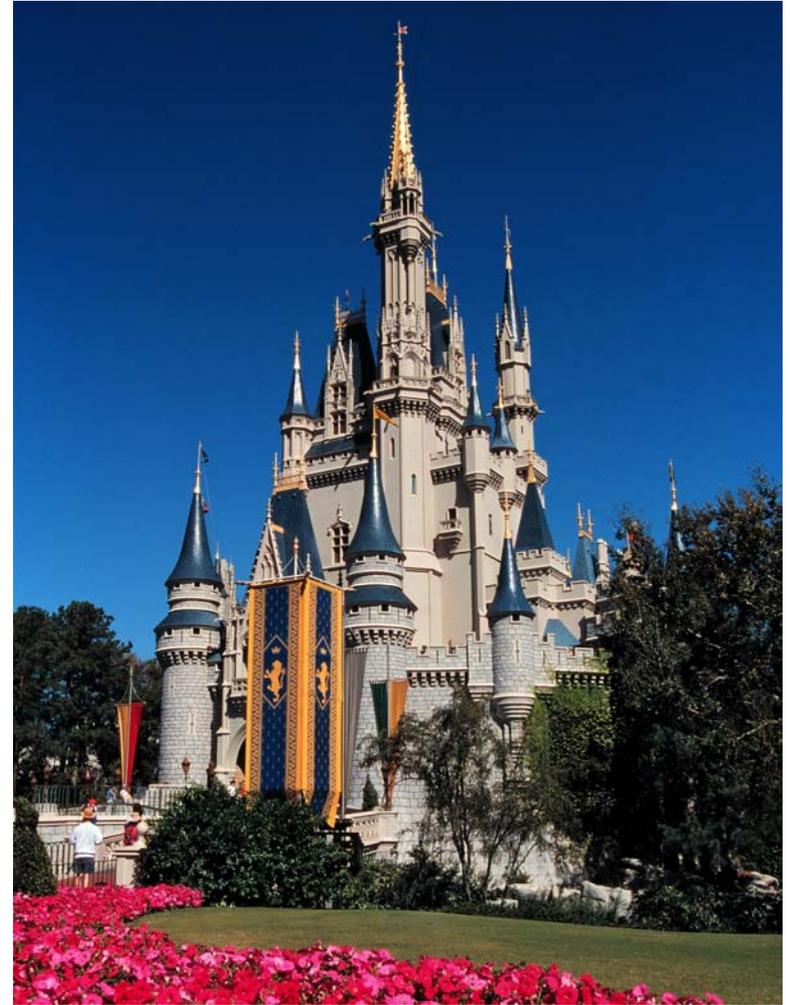
- **Operating** (reporting, alarm handling, plant optimization, security, lighting, HVAC, media access, room automation, ...)
- **Data management** (reporting, energy data evaluation, consumption control, process data evaluation, trends, billing, ...)
- **Service and maintenance** (application libraries, customer specific solutions and programs, online documentation, knowledge database, preventive maintenance information, support / hotline, ...)

BACnet (ASHRAE developed and backed), LON, OPC are the most widely used FIELD BUS STANDARDS



WEB HOSTING AT DISNEY

- **Disney is at the forefront of Web publishing for energy data**
- **Data Collection**
- **Web Publishing**
- **Value**





Best Education Project *Albuquerque Academy*

Presented to:
Energy Control Inc. (ECI)

National Recognition

- Energy Efficiency
- Excellence in operations
- Improved learning environments
- Optimized systems



Award Winner!

Business Story

- Revenue-neutral capital project
\$2,000,000 project with no up-front cash
- Improved “Mission” learning environments
- Management Awareness
- National Recognition

Technical Story

- Access Technical / Engineering Resources
- Improve Efficiency & campus loop issues
- Eliminate lighting maintenance issue
- Optimize management – FMS / IT network
- Leverage the power of the Internet



ECI RED

Albuquerque Academy

Main

BAS

Fire Systems

Access

CCTV

Budget

Support

Utility Costs

Public Service

Electricity - [\\$0.0854/kWh](#)
Natural gas - [\\$0.32/therm](#)

Spot Market

Electricity - [\\$0.0794/kWh](#)
Natural gas - [\\$0.27/therm](#)

Breakeven for Onsite CHP

Cost/kWh - [\\$0.0794/kWh](#)
Demand - [270 KW](#)

Campus Events

Events on Campus Today

[School starts Sept. 7](#)
[Soccer Game tonight](#)
[Faculty meeting @ 4 PM](#)

Messages

Headmasters and Teachers Welcome Back! ([Click here](#))



System Status

Mon, November 4, 2002 11:28 AM

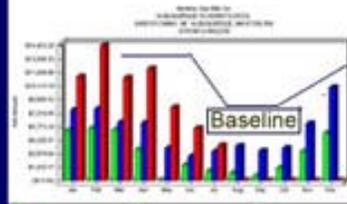
All Systems are **Operational**

[Service History](#)

[Contact ECI](#)



Energy Savings



\$18,000 saved this month

\$6,000 to be shared with the teachers

Weather Forecast

Enter a City or US Zip:



Albuquerque, NM
Reported by Albuquerque, NM
Partly Cloudy

[Click for Forecast](#)



weather.com

Thu Dec 05 08:56 AM MT
Temperature: 35°F/2°C
Humidity: 76%
Barometer: 30.351in/1029mb
Winds: N at 7mph/11kph

Energy Control Inc.
Real-Time Energy Dashboard



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Wrap Up and Questions

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