



Swiss Think Tank and Research Laboratory for Intelligent Living

ICT as a way towards the Building Intelligence

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Agenda

- **Motivation**
- **Building Automation & Control**
- **Standards**
- **Integration Trends**
- **IP-based Integration**
- **Application Fields**
- **The iHomeLab – Research Laboratory**

Motivation

Energy Efficiency & Environmental Effect

- Advanced control strategies
- Limiting peak energy consumption
- Central access to all building systems
- Increased energy cost transparency
- Efficient planning of preventive and corrective measures

Comfort

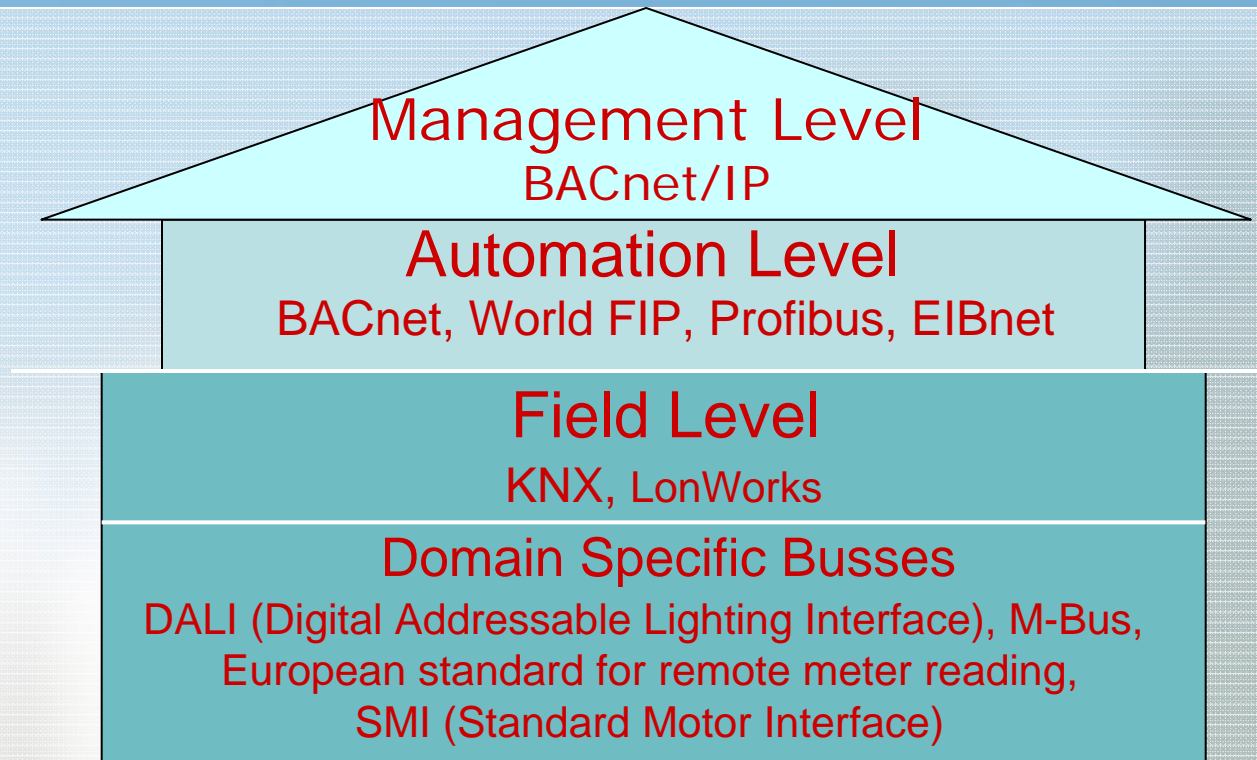
- Tailor-made user controls
- Remote access
- People exhibit higher motivation
- Tenants concerned with their image

Safety & Security

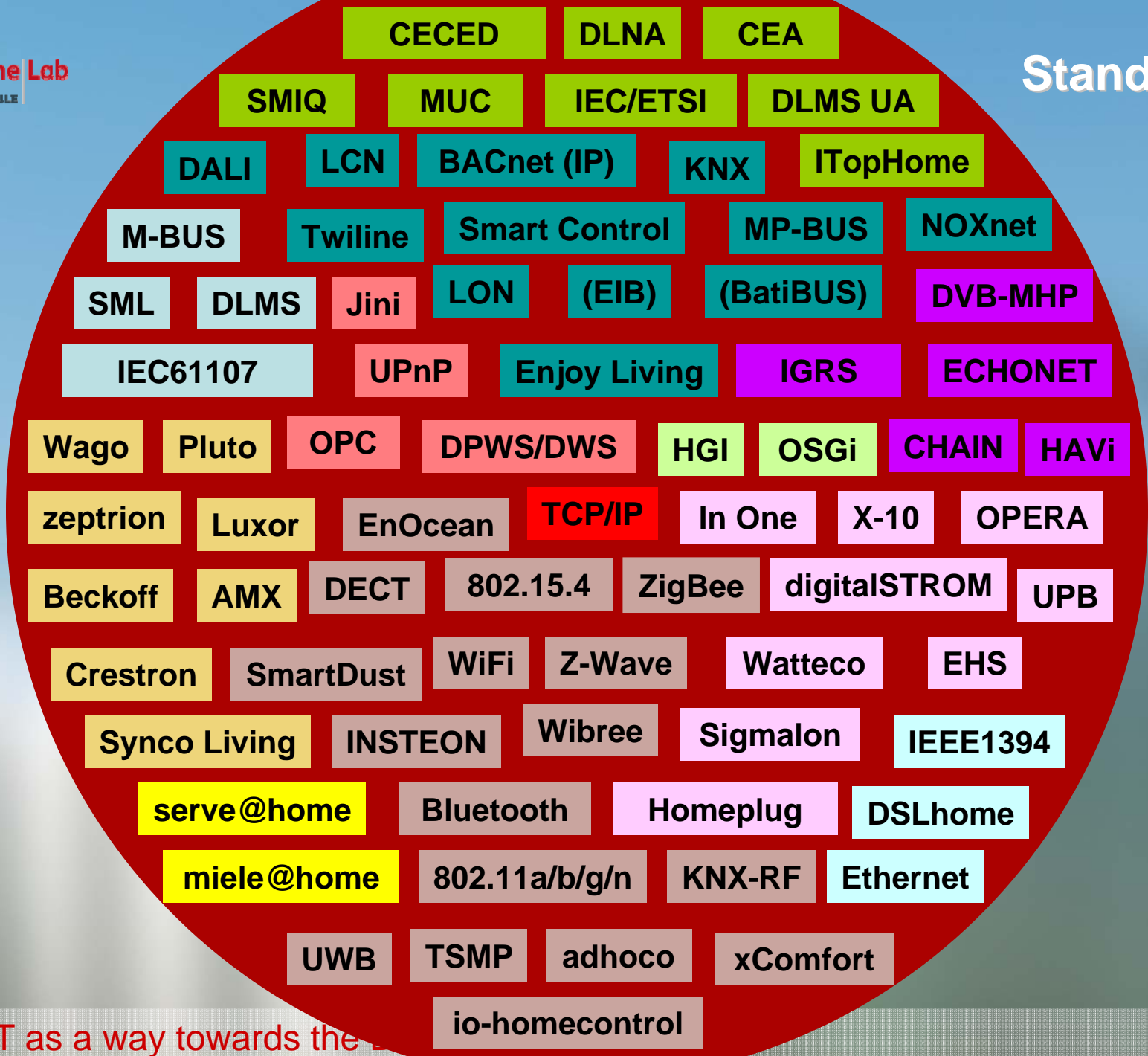
- building security
- access control
- people safety



BA & Control



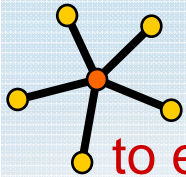
Open System Approach vs. Single-Source Solution



BAS Integration Trends

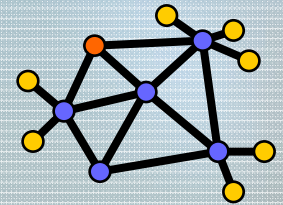
Cross-communication between building service domains is a key for **Integration in BAS**

- Different communication technologies cause appearance of gateways
- Separated address domains cause appearance of proxies



Solution:

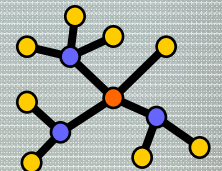
to equip devices with network technologies from respective domains



The integration of smart metering devices in the system brings

Additional Services

- Remote meter read-out
- Detection and handling of events and alarms
- Extensive diagnostics
- Monitoring and logging



CECED DLNA CEA
SMIQ MUC IEC/ETSI DLMS UA
DALI LCN BACnet (IP) KNX ITopHome
M-BUS Twiline Smart Control MP-BUS NOXnet
SML DLMS Jini LON (EIB) (BATI-BUS) DVB-MHP
IEC61107 UPnP Enjoy Living IGRS ECHONET
Wago Pluto OPC DPWS/DWS HGI OSGi CHAIN HAVi
zепtrion Luxor En ce n X-10 OPERA
Beckoff AMX DECT 802.15.4 ZigBee digitalSTROM UPB
Crestron SmartDust WiFi Z-Wave Watteco EHS
serve@home INSTEON Wibree Signalon IEEE1394
miele@home Bluetooth Homeplug DSLhome
UWB 802.11a/b/g/n KNX-RF Ethernet
TSMP KNX-RF adhoco xComfort
io-homecontrol

TCP/IP

IP-based Integration

Universal Plug and Play (UPnP):

- IP addressing (DHCP or APIPA)
- Device and service discovery (SSDP)
- Description (XML)
- Control (HTTP/SOAP)
- Eventing (GENA)
- Presentation (URL/HTML)

“Device Control Protocols” (**DCPs**) on the top for standardized device classes

Devices Profile for Web Services (DPWS)

- Specify services for device
- Service discovery
- Messaging and eventing

DPWS brings WS protocol suite to resource constrained devices and **extends UPnP**:

- Homogenous security model
- Standards based description language
- Ability for integration into SOA

Application Fields

Climate control are long timing constants applications including HVAC equipped with air quality and humidity sensors.

Visual comfort has stringent requirements on response time and comprises:

- Lighting applications (e.g., daylight)
- Constant light controllers
- Scene selections for special rooms

Security refers to protecting the building premises from unauthorized access (access control) and intrusion detection.

Safety applications refer to life safety and include monitoring and alarm management of numerous building parameters.

Ambient Intelligence and Context Awareness offer more efficient energy usage by allowing tasks to be executed when the energy is cheaper.

The iHomeLab - Research Lab

iHomeLab @ Lucerne University of Applied Sciences

Energy Efficiency
Ambient Assisted Living (AAL)
Human Machine Interfacing (HMI)
ZigBee
Indoor Localisation
Building- & Home Automation

Industry research partner
Partner for research consortia



iHomeLab

- Deployment Location and Live Test Environment
- Since November 2008, 32 x 10 x 2 meters
- Latest building automation technologies..

*Human-Building Interaction, Context Awareness & Indoor Localization,
Home Network (KNX, ZigBee, digitalSTROM), Smart Metering,
Edu & Infotainment, Content & Multimedia Management*

- Think Tank for “Innovative Living Scenarios”
- Can be visited by public



Thank you for attention!

Information Communication Technologies

To schedule a visit to experiments, see

► www.ihomelab.ch ◀

