People are more connected than ever before

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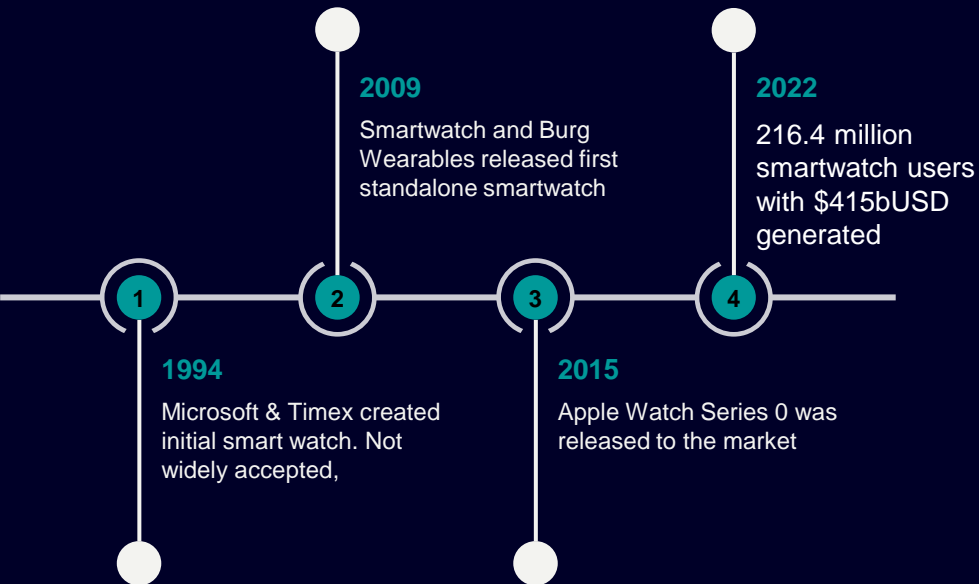|			
Change the temperature at home	Check the fuel/charge level of vehicle	Be notified when someone arrives	Instant access to medical records & appointments
Better comfort & reduced energy	Help to plan & major issue prevention	Personal security & safety	Improved health & awareness

How Smart Devices have transformed people?

How Smart Devices have transformed people?

2009

Smartwatch and Burg
Wearables released first
standalone smartwatch

2022

216.4 million
smartwatch users
with $415bUSD
generated

1

2

3

4

1994

Microsoft & Timex created
initial smart watch. Not
widely accepted,

2015

Apple Watch Series 0 was
released to the market

Impacts Smart Watches has on Daily Life

Manage emails
Set meetings
Create reminders
Be more informed

Track cal/carb/protein
Running total
Notified of high levels
Projected outcome

Track activity
Promote exercise
Get results
See immediate impact

Heart health
Sleep quality
Achievements
Recommendations

Why People Gravitate toward Smart Devices?

☑ Quick setup
☑ Low complexity
☑ Multi-vendor alignment

☑ API Integration
☑ Seamless Connectivity
☑ Pre-defined Metrics

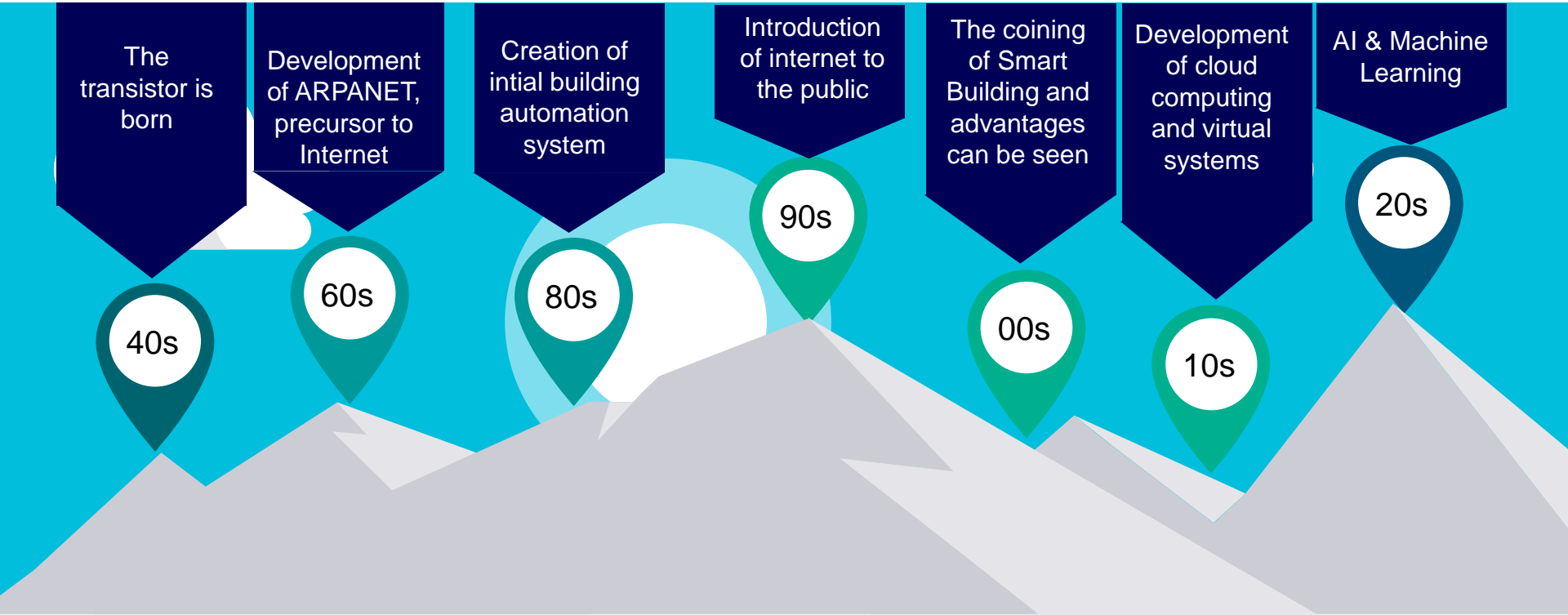☑ Quick data access
☑ Metadata applied by app
☑ Easy to understand UI

☑ Result & reports
☑ Predicitive trends
☑ Definitive outcomes

The Path to Smart Buildings

The transistor is born

40s

Development of ARPANET, precursor to Internet

60s

Creation of intial building automation system

80s

Introduction of internet to the public

90s

The coining of Smart Building and advantages can be seen

00s

Development of cloud computing and virtual systems

10s

AI & Machine Learning

20s

Challenges Facing Today's Smart Buildings

Proprietary Approach

Extensive Setup Time

Lack of Defined Rules

Reactive Data

Data Overload

Lack of Guidance/Direction

Data Defined by Integrator

Pushed from the Management Level

Many Buildings are not equipped for building management

Small- to medium-sized buildings — usually considered to be under 50,000 square feet — make up about **94%** of all commercial buildings in the U.S., according to the U.S. Energy Information Administration, yet only **13%** of those buildings have a building automation system (BAS).*

Medical Office Building

Municipal Offices

Commerical Office/Retail
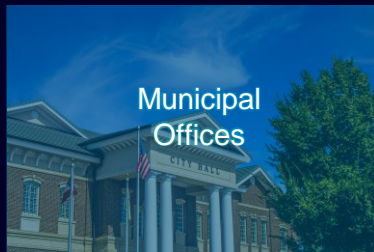
Top Reasons

o Minimal Support Staff
o Lack of infrastructure
o Business Impact

Cloud Managment

* Turpin, J. R. (2022, February 16). Smaller buildings can benefit from building automation systems. ACHR News RSS. https://www.achrnews.com/articles/146159-smaller-buildings-can-benefit-from-building-automation-systems#:~:text=Small%2D%20to%20medium%2Dsized%20buildings,building%20automation%20system%20(BAS).

Why is the deployment of Smart Buildings so complex?

Protocol Limitations

- Focus - **common operation** of **BMS**
- **Too rigid** yet vague in interpretation
- Many times, a **proprietary layer**
- **Lacks functionality** to apply to IoT
- Requires **complex knowledge**

Lack of Point Naming Standard

- Many **vendors**, many **names**
- Protocols **do not** control names
- **Open interpretation**
- Multiple **applications**, **same name**
- Requires **complex knowledge**

Standardization at BMS

- Normalization, **management level**
- **Lengthy process**
- Open for **interpretation**
- **Redundant** processes into **cloud**
- **Lack** of standard, **onboarding**

Tagging is the backbone to bringing Smart Buildings to next level

Tagging, metadata, allows for standardizing of data in the Smart Building platform regardless of application or vendor

Haystack, Brick Schema, & others

Benefits & gaps

Industry needs more active role

New **technologies**

Scalable & adaptable

Relations & dependencies outside of HVAC, lighting, & energy
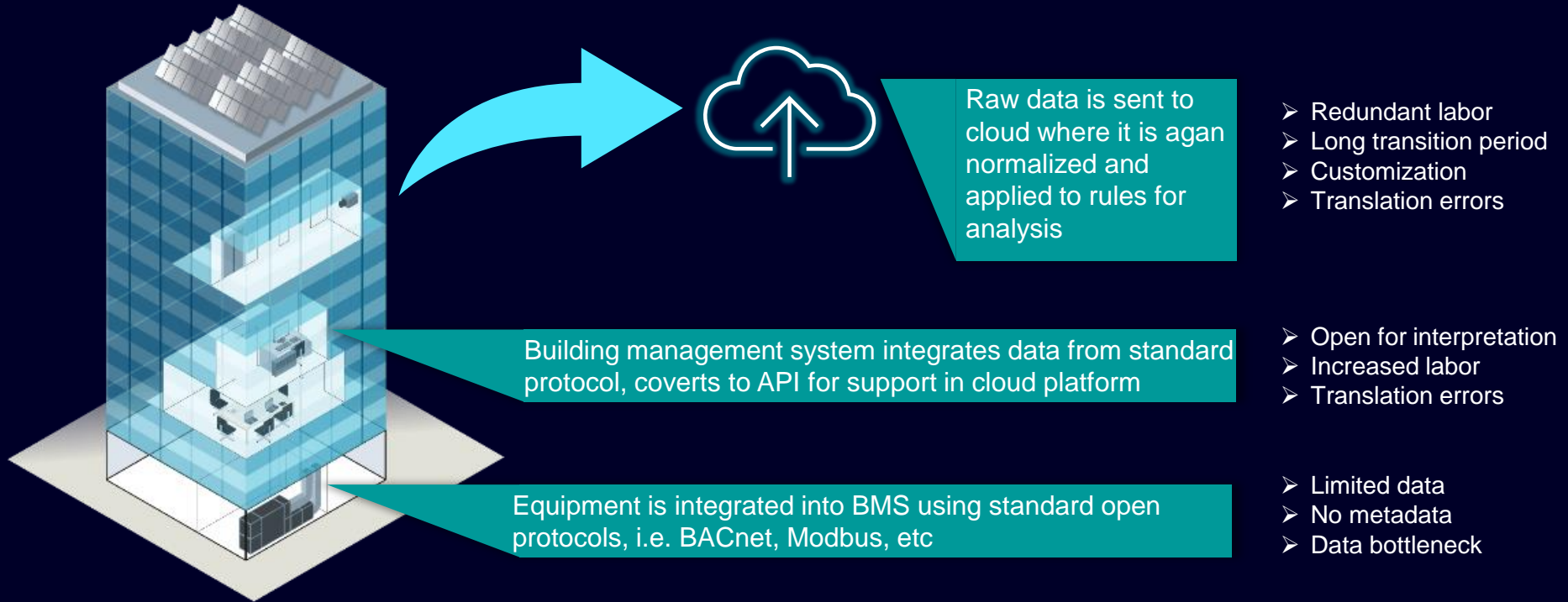
Definition of **standards**

Cloud data repositories - devices, equipment, defined applications

More **collaboration** between industry professionals, committees

Create initiatives & **drive** standards

Getting to a Smart Building Today

Raw data is sent to cloud where it is agan normalized and applied to rules for analysis

- ➢ Redundant labor
- ➢ Long transition period
- ➢ Customization
- ➢ Translation errors

Building management system integrates data from standard protocol, coverts to API for support in cloud platform

- ➢ Open for interpretation
- ➢ Increased labor
- ➢ Translation errors

Equipment is integrated into BMS using standard open protocols, i.e. BACnet, Modbus, etc

- ➢ Limited data
- ➢ No metadata
- ➢ Data bottleneck

The Open Road to Smart Buildings

Open source
Lightweight
Support transference of metada, in addition to data objects
Stronger connection, direct link between devices (bi-directional)
Flexible design
Multi-platform, multi-program language support
Supports Haystack tags, in addition to custom tags

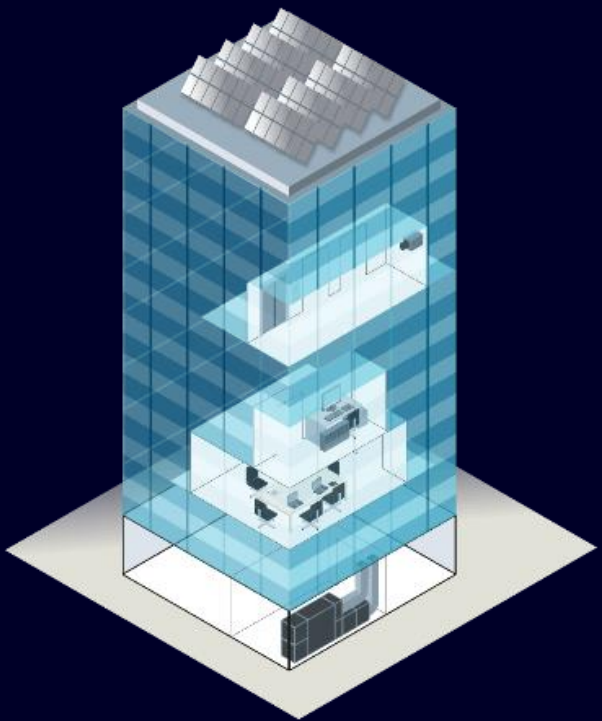| Lightweight |
| --- |
| Bi-directional communication |
| Scalable |
| Reliability of data |
| Security enabled |
| Limited support of metadata, tags |

The Open Road to Smart Buildings

- Cloud received normalized (tagged) data
- Tag based rules pre-defined
- Data quickly applied to rules at integration
- Transition to AI learning

- Localized HMI
- Daily Operation
- Day to Day Operations
- High Availlability

FIN Framework

- Local device supports **Haystack API** with MQTT shell
- Data is defined at the equipment
- Data transmitted directly to cloud or to local BMS

Smart Building of Tomorrow

Configured with Haystack tags

Local device support Haystack API

Metadata transmitted

Can support local BMS and cloud

Rules applied at discovery

Instant analysis

Tangible outcomes

Problem/Diagnosis

End user instantly informed problem with diagnosis

3rd party data integrated, i.e., service provider, parts, etc.

Equipment life expectancy

Support less complex buildings where no BMS

How do we proceed to the next level of Smart Buildings?

1

Community

Integrators, analytic, & manufacturers

Engineers & facility managers

Industry commitees & leadership

2

Collaboration

Multi-level approach

Meet early, often

Define the future, not settle for the past

Agile approach

3

Coaching

Educate & train

Transparency

Focus on the future