


# Energy Revolution through Digitalization

Nilesh Y. Jadhav  
Program Director, EcoCampus  
Energy Research Institute @ NTU, Singapore

# Digitalization Trends

- 
- High Data Volume
  - Advanced Analytics Progressing Rapidly
  - Enhanced Connectivity: People & Devices
  - Higher Investments

- 
- Low Cost Sensors
  - Cheaper Data Transmission
  - Quicker Data (real-time)

# Digitalization Trends: Data Explosion

KB	kilobyte	$10^3$ bytes
MB	megabyte	$10^6$ bytes
GB	gigabyte	$10^9$ bytes
TB	terabyte	$10^{12}$ bytes
PB	petabyte	$10^{15}$ bytes
EB	exabyte	$10^{18}$ bytes
ZB	zettabyte	$10^{21}$ bytes
YB	yottabyte	$10^{24}$ bytes

1987  
2 TB

1997  
60 PB

2007  
54 EB

2017  
1.1 ZB

## Global Internet Traffic

Source: IEA & Cisco, 2017

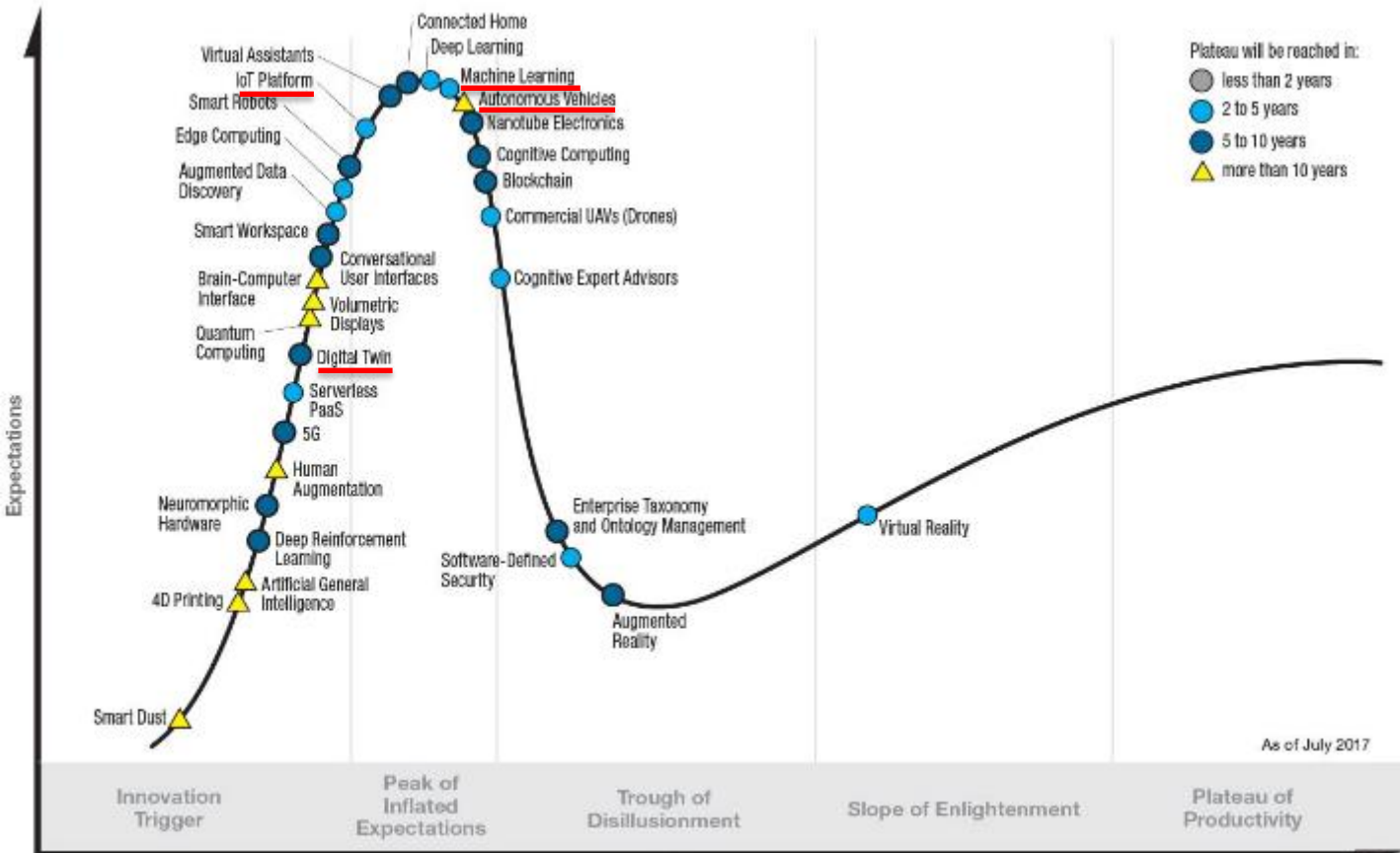
# Digitalization Trends: ICT Crush

## Largest Companies by Market Capitalisation



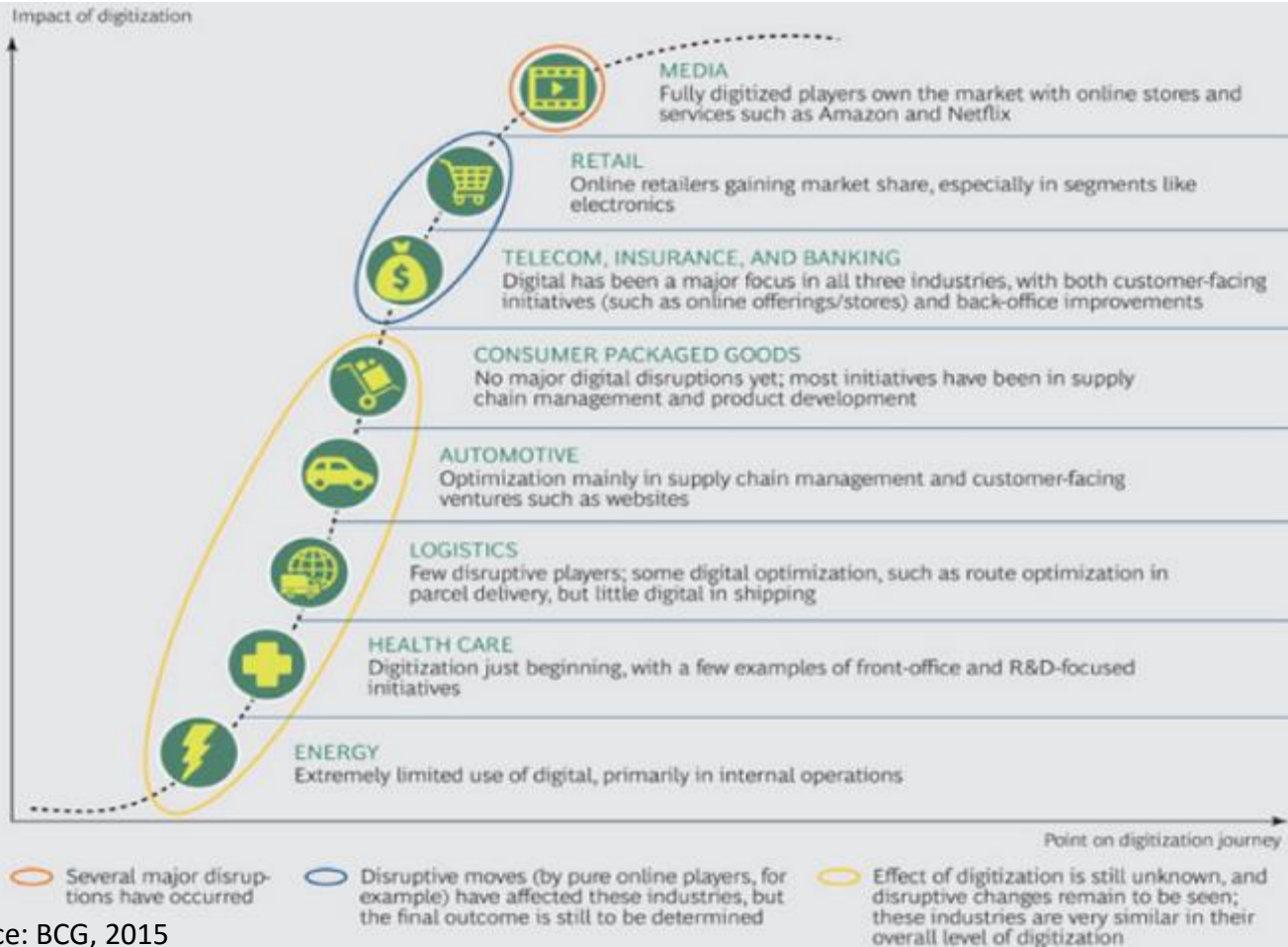
Source: IEA, 2017

# Technology: Hype Cycle



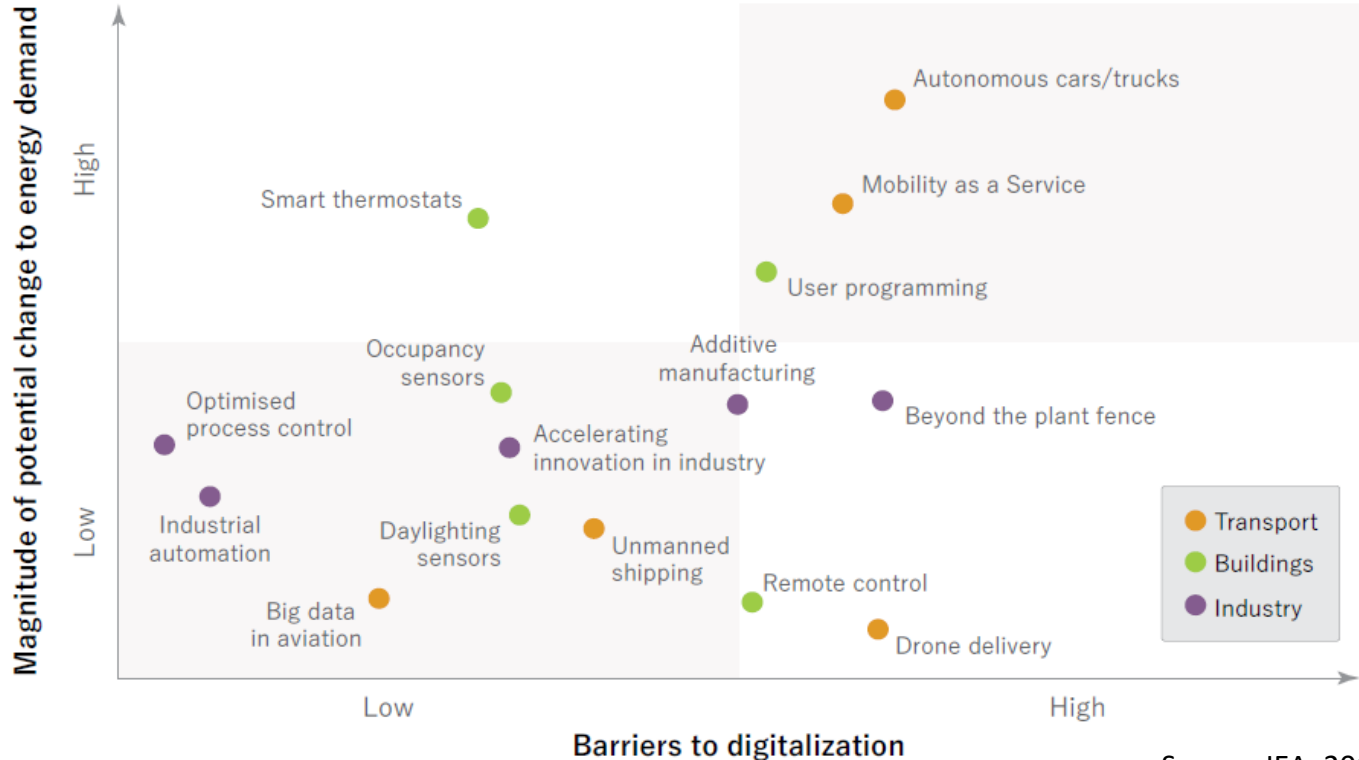
As of July 2017

# Digitalization: Industry Adoption



# Technology: Impact on Energy Demand

## Digitalization's potential impact on transport, buildings, and industry

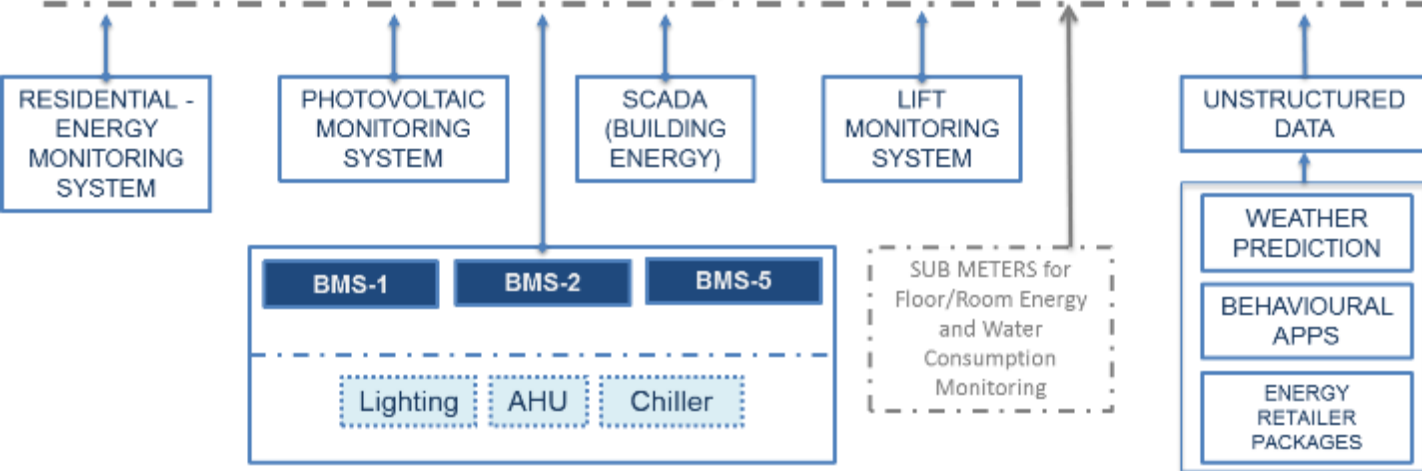


# RD&D: Green Building Data Analytics



- Machine Learning
- Graph Analysis
- Network Analysis
- Pattern Matching
- Neural Networks

## Unified Data Layer @NTU



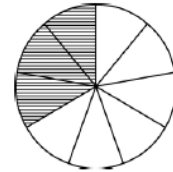
Industry partner

**SIEMENS**



# RD&D: Virtual Green Building Audit

Our Innovative approach



Virtua Data  
Collection

- Multi Physics based Digital Twin Analysis
- Data from sensors

- 1000's of scenarios tested
- Algorithmic optimization

- Suggested Solutions
- Wide scope
  - High accuracy
  - Low/no risk

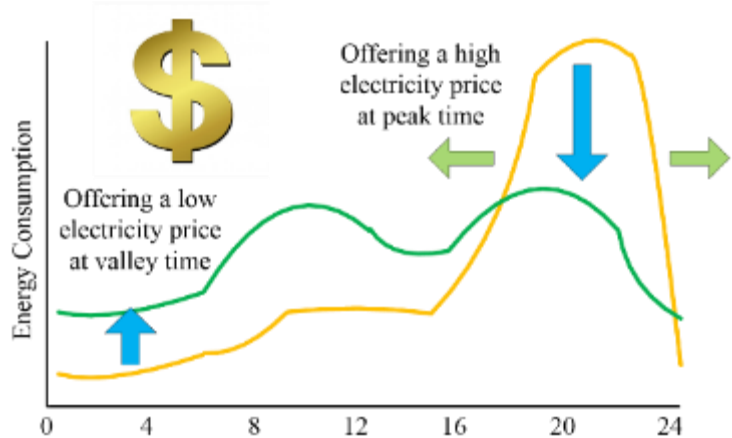
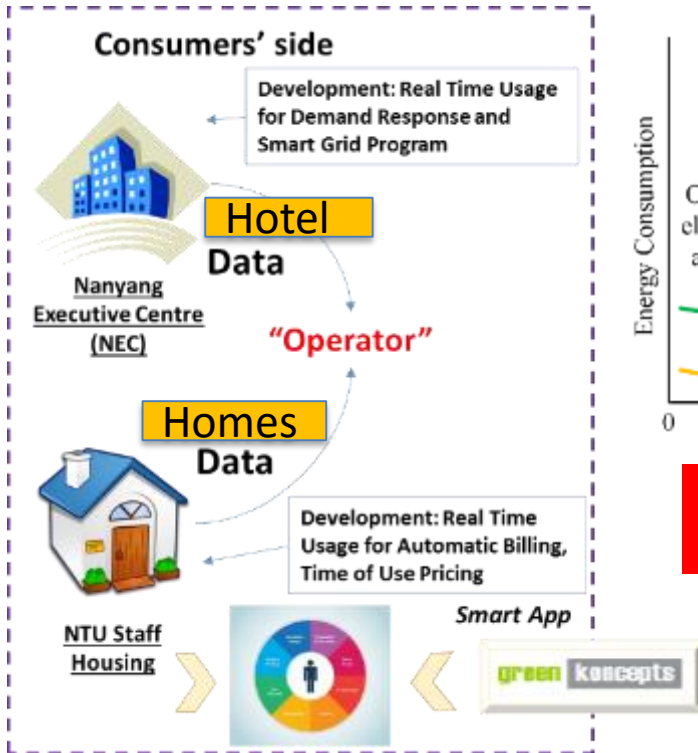
Quickly & Cheaply,  
**Audit Buildings Remotely, Anywhere in the world !**

Industry partners



# RD&D: Smart Demand Management

## Smart Community Solution for Energy & Demand Management

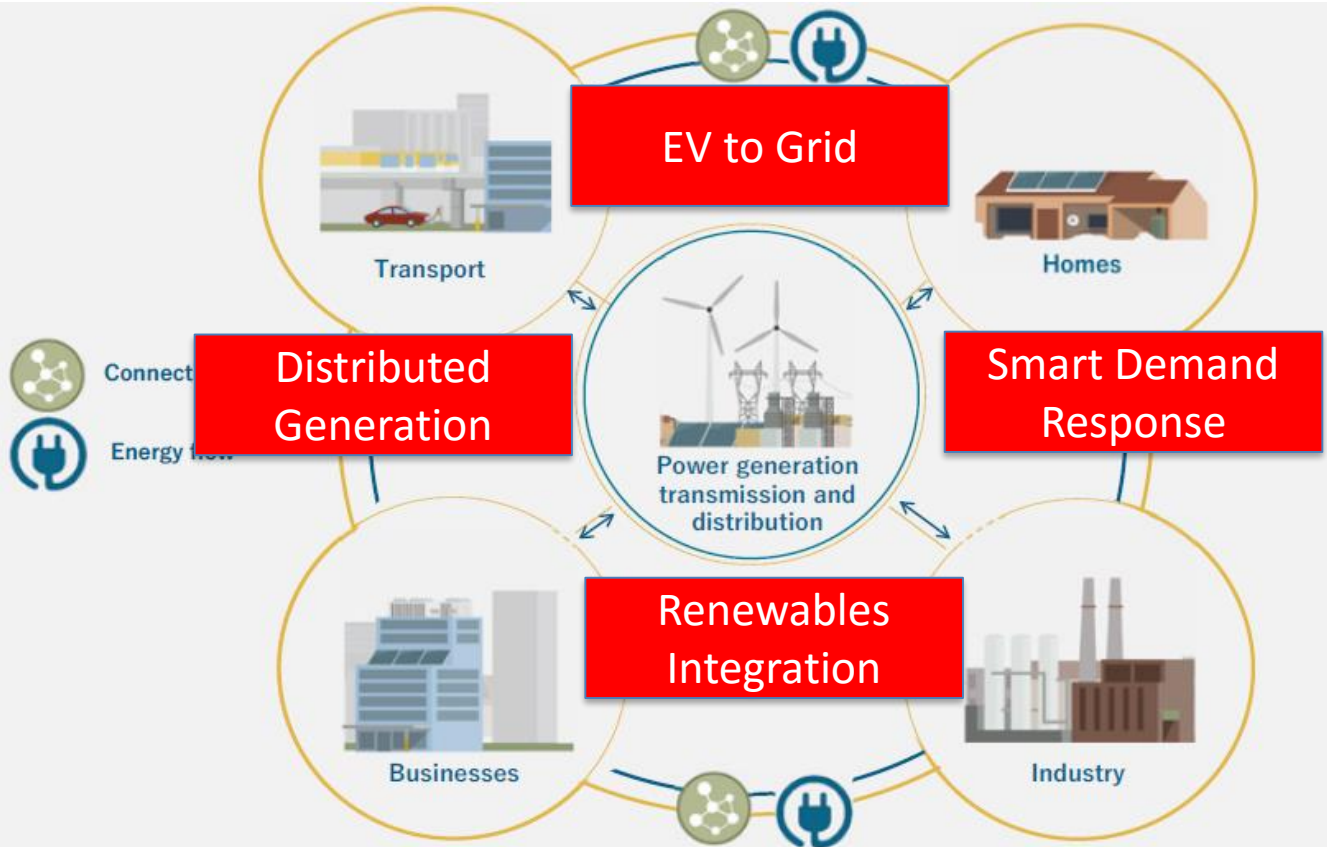


**Peak Demand shifting through appropriate consumer incentives**

Industry partners



# Digital Energy Revolution





THANK YOU

Nilesh Y. Jadhav  
nilesh@ntu.edu.sg