

*Considering time, space and energy constraints*

# Smart Factory! Dream ? Or Illusion?

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2017. 11. 14

**POSCOICT Marketing Strategy Division**

# POSCO ICT provides the Total Solution for Smart Factory.

## Engineering Based

- Steel automation
- Chemical automation
- Logistics automation
- P/C process automation

## Product Based

- Machinery automation
- Robotics automation

## Maintenance Based

- L0~4 automation specialty service
- Trial operation of newly built/rationalization
- Remote service for overseas steel mills

## Industry4.0 Based

- e-Operation
- e-Maintenance
- e-Safety
- e-Energy
- e-Environment
- e-Quality

Diagnosis/  
Consulting

Design

Production

Installation/  
Trial operation

Operation/  
Maintenance

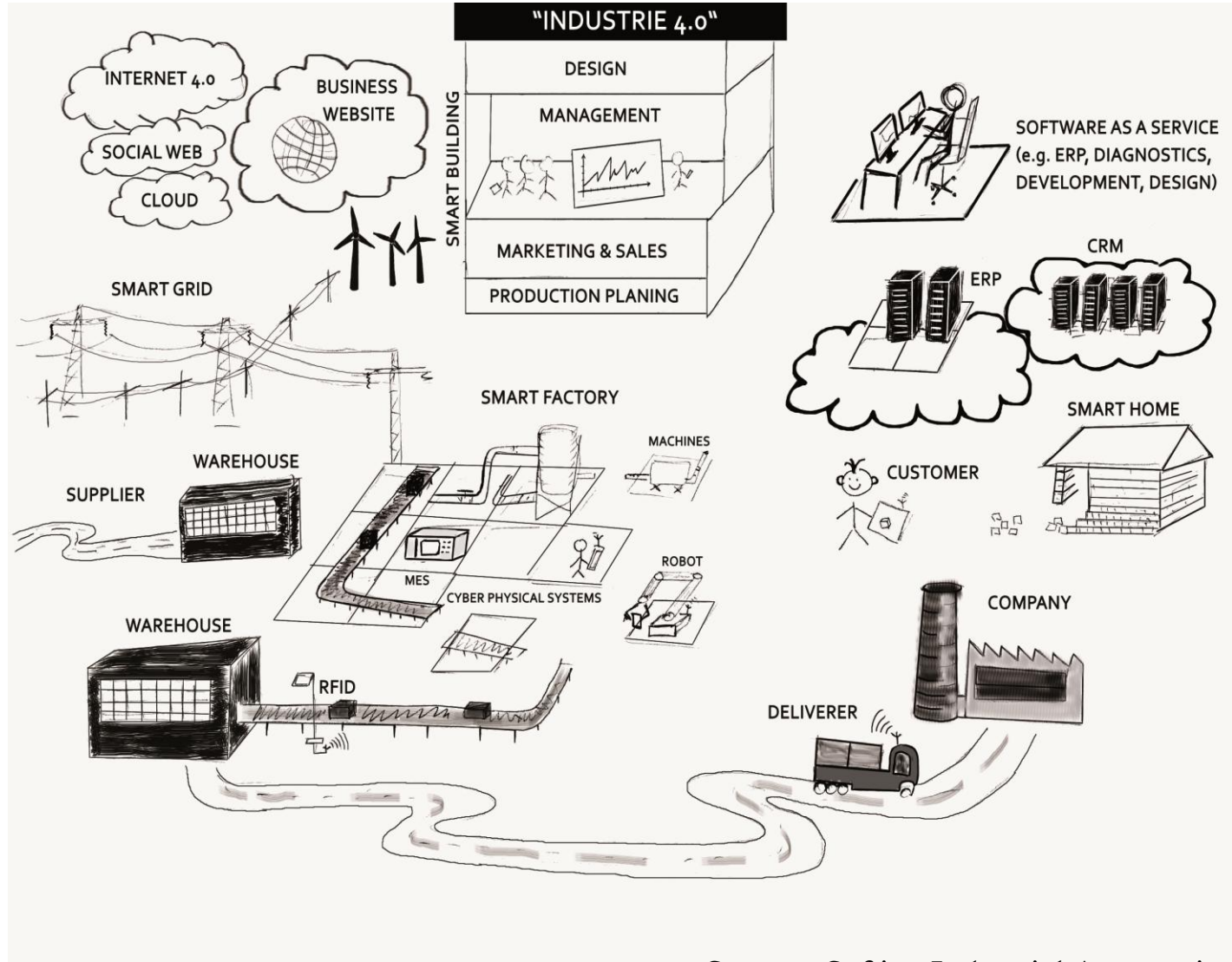
**I. Introduction**

**II. Points of View**

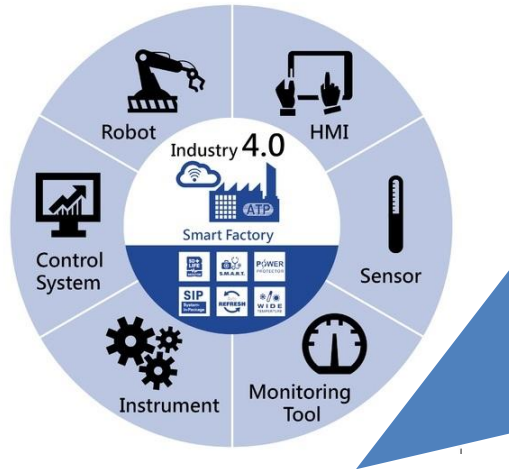
**III. How to Prepare**

**IV. Conclusions**

## Why do you want to SMART ?



## ① What is Smart Factory?



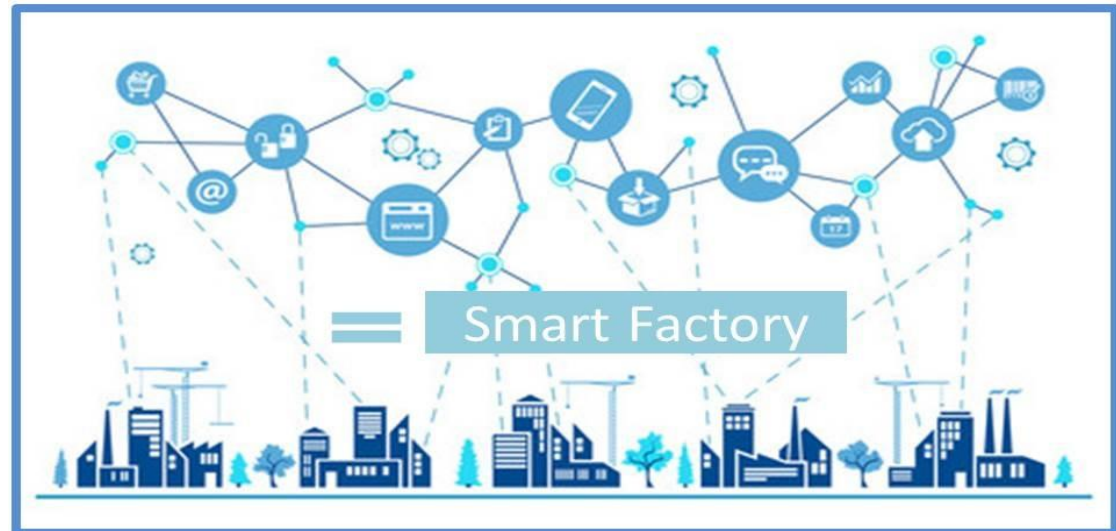
## ② When do you Prepare Smart Factory?



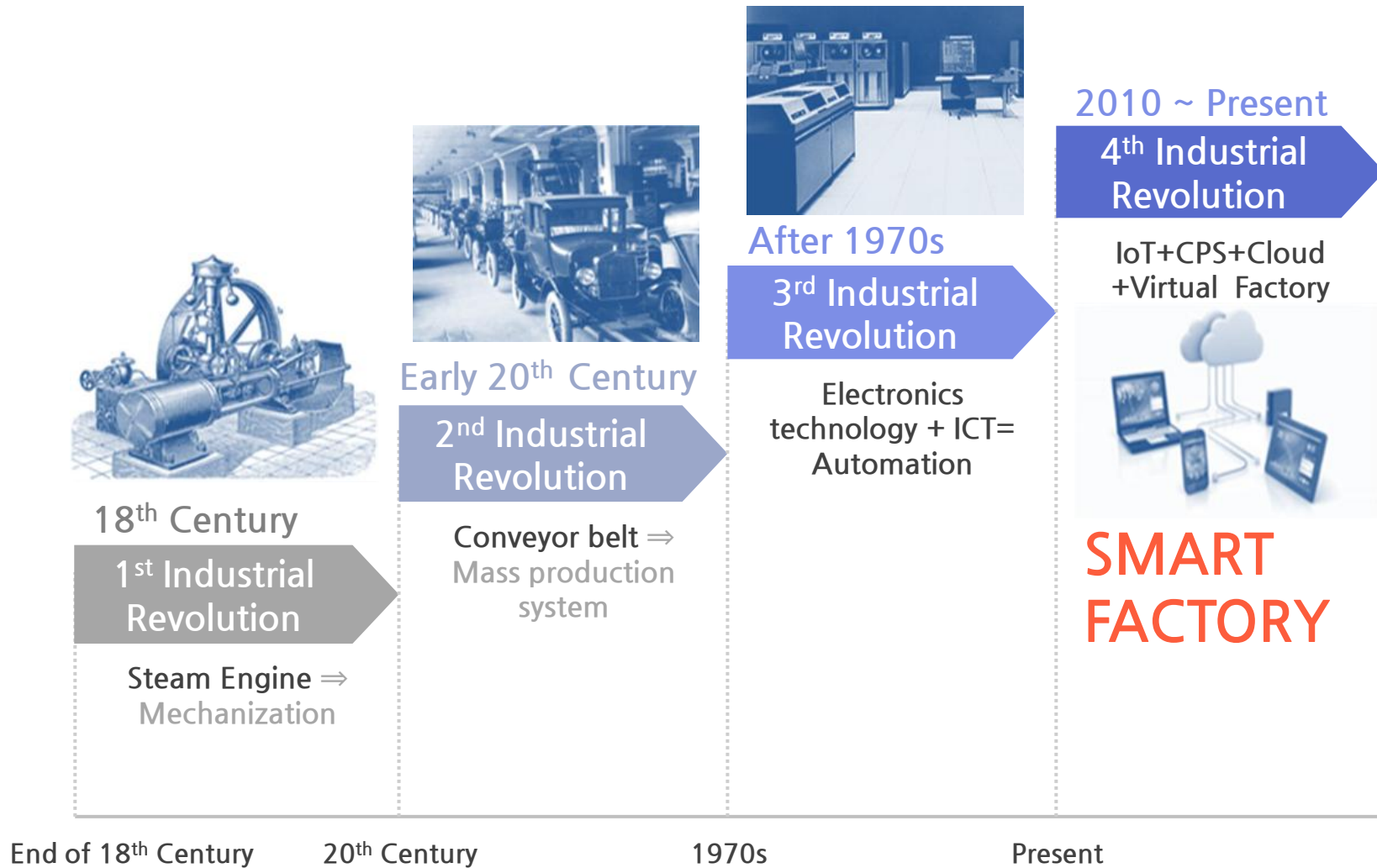
## ③ Where? How?



Globalization, Timely, Fast, Monetization



## Entry into the age of the 4th industrial revolution



\* CPS : Cyber-Physical Systems

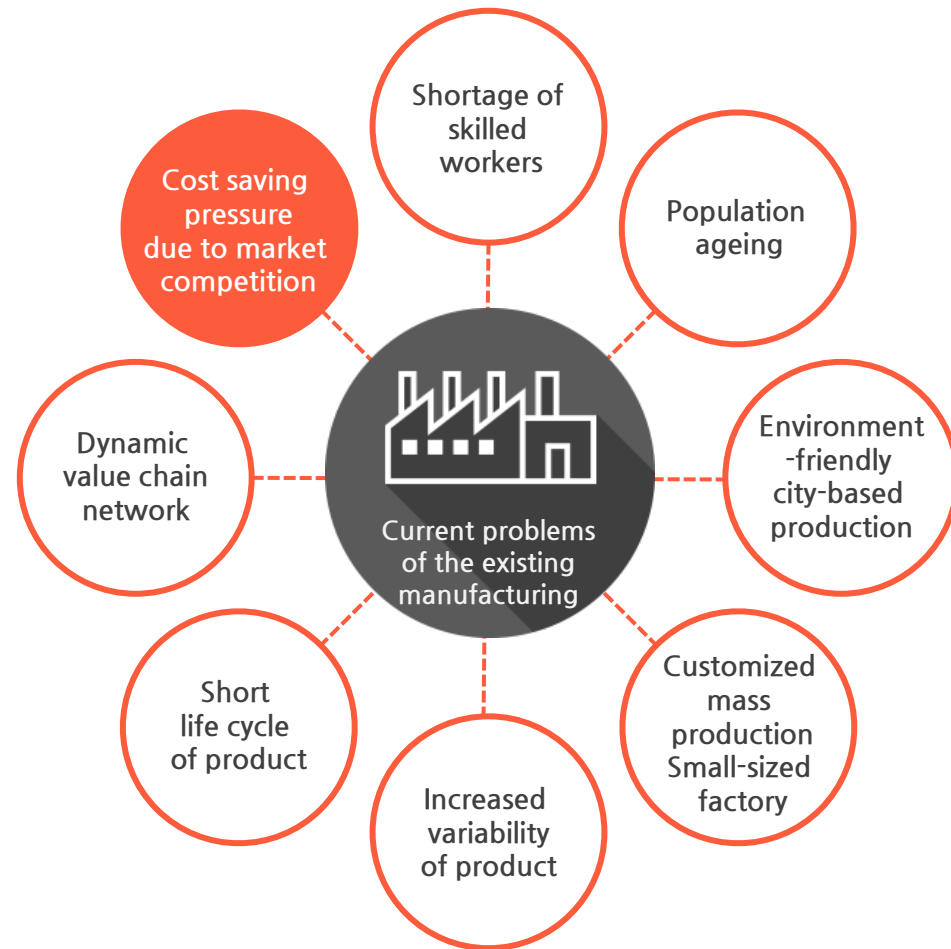
## Smart Factory

### 1. What do you want to?

- Smart Service?
- Capacity Up?
- Factory Automation?

### 2. Why ?

- ① Threads of Future
- ② Risks of Present
- ③ Will of CEO
- ④ etc.



## Future of Smart Factory

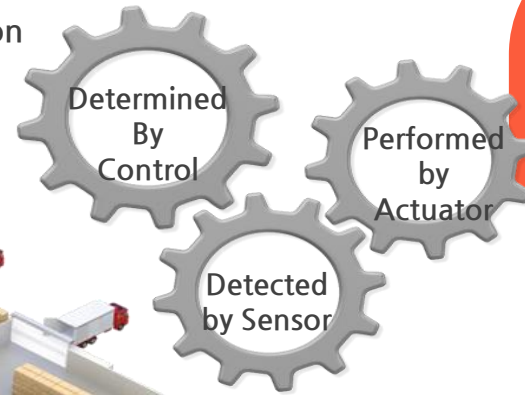
### Complex

### Expansion

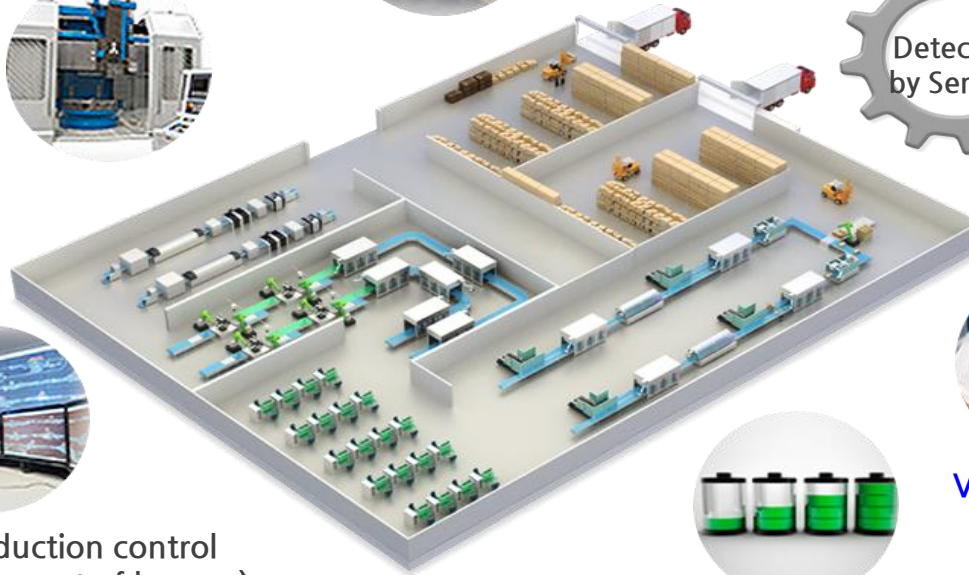
### Capacity

Collection and processing of real time data related to production

Real time production monitoring



Productivity ↑  
Quality ↑



Automated production control  
(Minimized involvement of human)



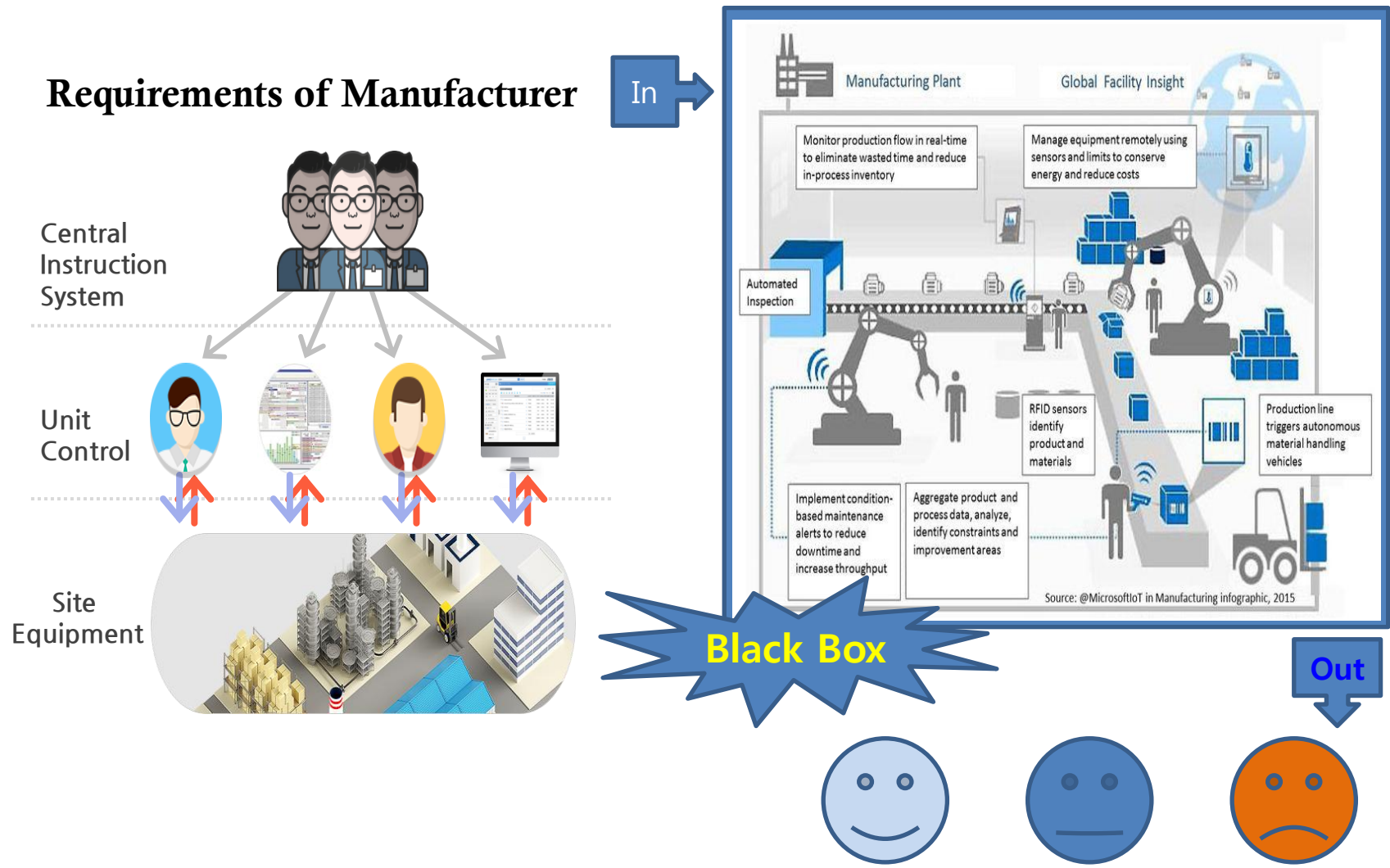
Optimum/efficient use of energy necessary for production



Virtual Factory Simulation





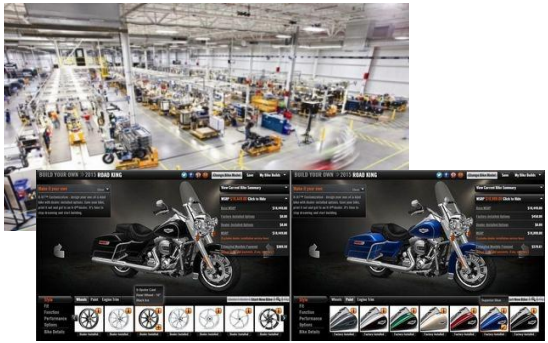
## Factory Automation



# Points of View – Manufacturer

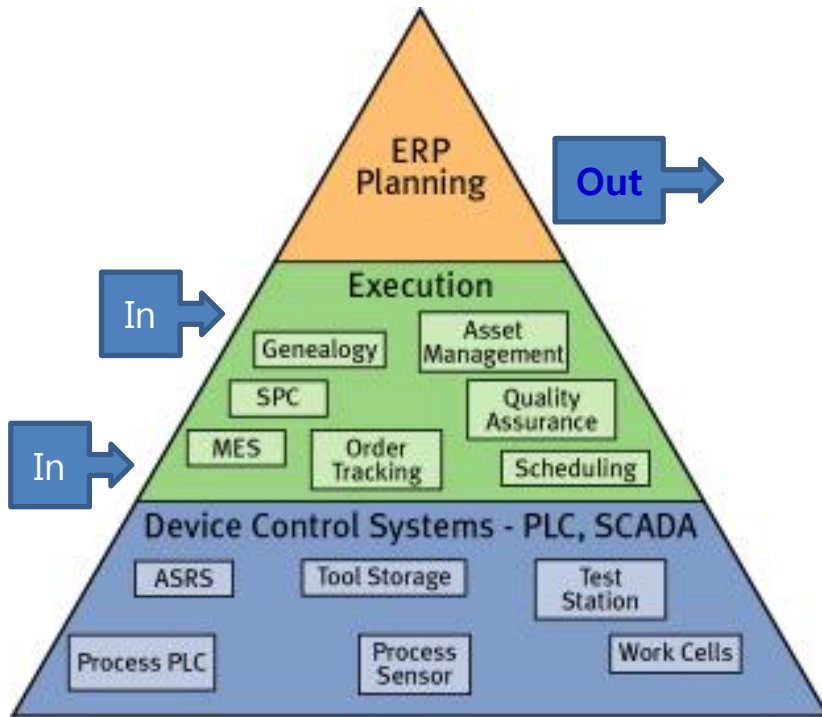
## Case I Factory Automation & High Price Solution (like CPS, IIoT, AI, Robot, Big data etc.)

### Benchmark model of Smart Factory

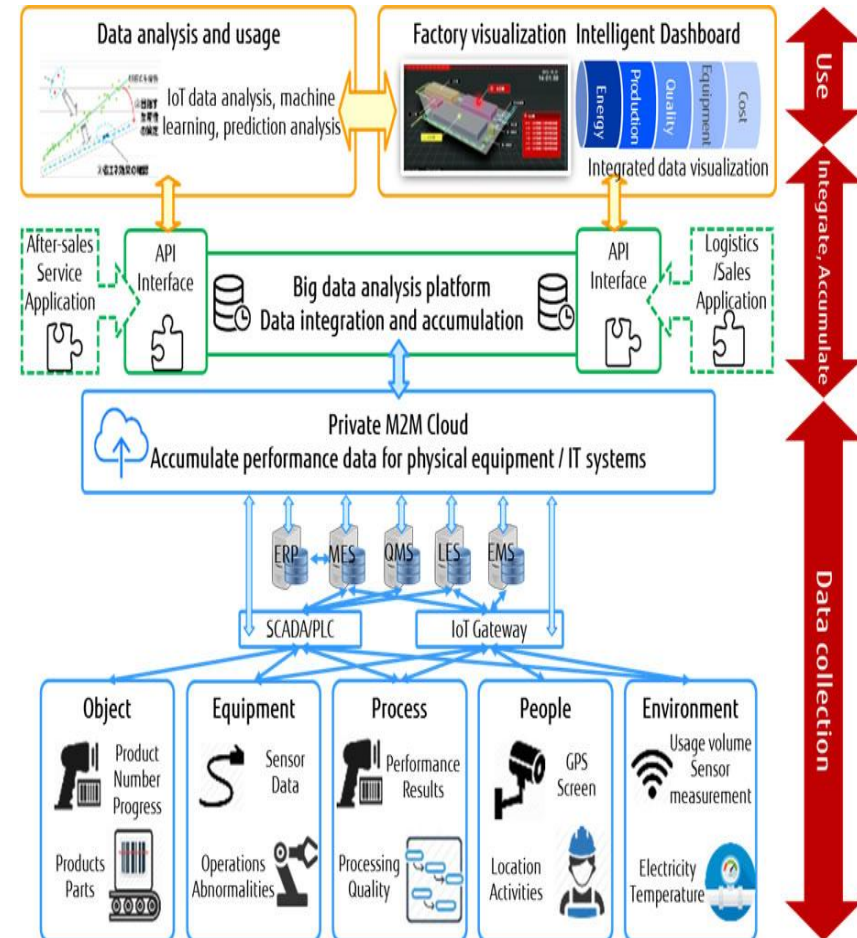
Case	Germany, BMW Smart Factory	Japan, Okuma Corp.	USA, Harley Davison
<p><b>What to do</b></p>	 <ul style="list-style-type: none"> <li>▪ All day Operating is possible by comm. with Robots.</li> <li>▪ Space is reduced 1/3 times. Only half Employees are needed.</li> </ul>	 <ul style="list-style-type: none"> <li>▪ Factory Automation of Milling part. (¥ 3Billion)</li> <li>▪ Operation for 7 days</li> <li>▪ All process are possible to check by Tablet PC.</li> </ul>	 <ul style="list-style-type: none"> <li>▪ Real time Monitoring with IoT ('11~) -Milling Machine, Manufacturing Equip., Moving Equip. with Sensor</li> </ul>
<p><b>Main Tech.</b></p>	<p><b>Cyber-Physical Systems(CPS)</b></p>	<p><b>AI, Robot</b></p>	<p><b>IIoT, Big data</b></p>

# Points of View- Provider

## Classify the Role of Smart Factory



## Necessity of Provider



Source : [www.fujitsu.com/global/about/resources](http://www.fujitsu.com/global/about/resources)

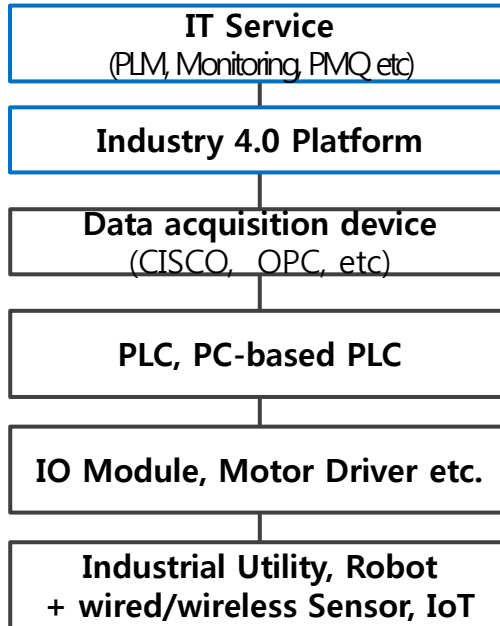
# Points of View- Provider

## Case II Control S/W companies of Legacy system expand Information Biz. (Supply Total Solution Link with PLM, ERP, MES etc)

### Schneider

✓ ERP/PLM - SCM/CRM – MES –  
PC/PLC – Sensor/Actuator connect

Add Industry  
4.0 Total  
Service area



Traditional Machinery  
and  
Device control area  
+  
(IoT)  
Sensor

### Siemens

✓ Through Design ~ Product  
Integration Platform (PLM, MES, Automation)

Smart  
Platform  
& Service

- PLM
  - Product Planning, Design, Test and Simulation
  - Product Scheduling, Engineering & Simulation



Smart  
Control

- MES & SCADA/HMI
- TIA (Totally Integrated Automation)
  - PLC, Remote I/O, HMI, Drive, Motion Control & Integrated NW manages Motor and integrates Data



Smart  
Sensing

# Points of View- Provider

## Case III Information Biz. Companies expand control areas of the Factory (Consortium with FA Vendor, New Service Model, etc.)

### SAP



**FA/Sensing Vendor joined to support Total Services**

- High speed data acquisition from Sensor of FA equipment  
- use CISCO Pilot equip.

- Implementation with Industry/Comm. Technology Vendor into the SAP Platform  
- SAP HANA(In-Memory)

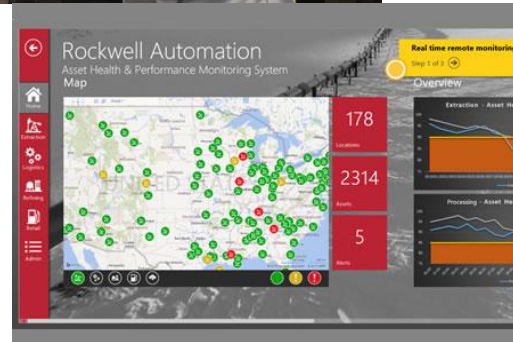
- Status Monitoring of equip. using the real-time Visualization  
- (2D, 1sec Delay)

- Checking operation process & quality, Alert Service  
- Quality & Process Analytics

### MS



**Global Engine Vendor integrate data from the customer in the world.**



### IBM



**Watson's Intelligent Service (voice recognition, etc.)**



# Points of View – Engineering

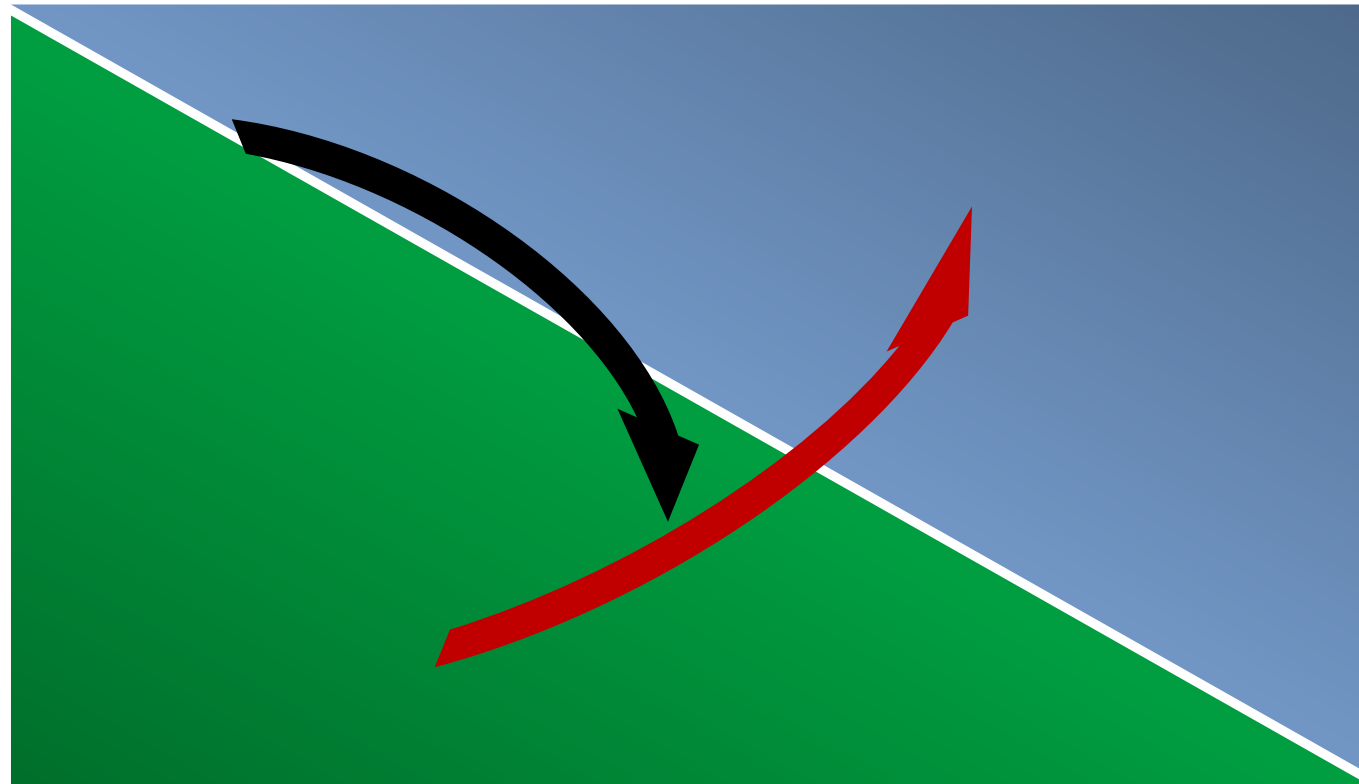
## With Constraints

- ✓ Manufacturers want to reduce the Risk, Time and Cost.

Provider

Risk

Cost



Manufacturer

Time

- ✓ Providers consider Issues

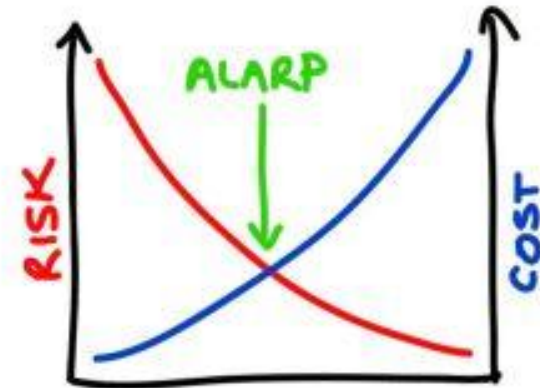
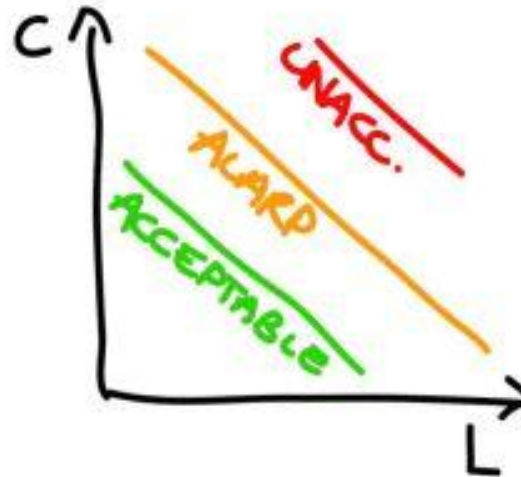
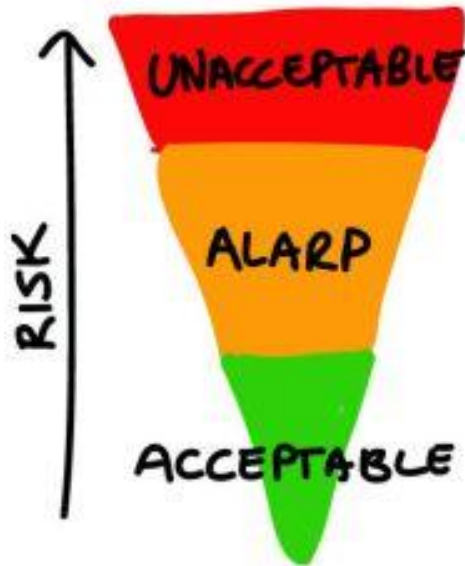
- like Operation/Energy Efficiency, Fault, Global Inform, etc.

# Points of View – Engineering

## With Constraints

### Basic Economics for Smart Factory

- ALARP (As Low As Reasonably Practicable)

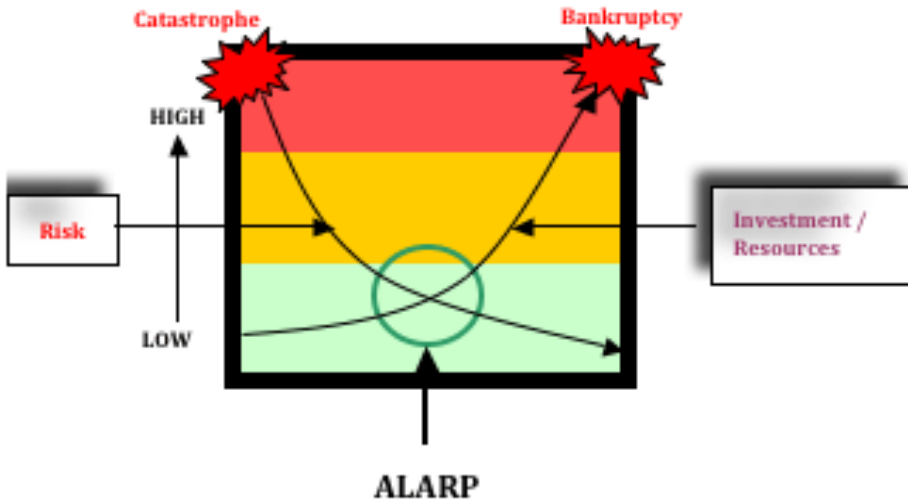


# Points of View – Engineering

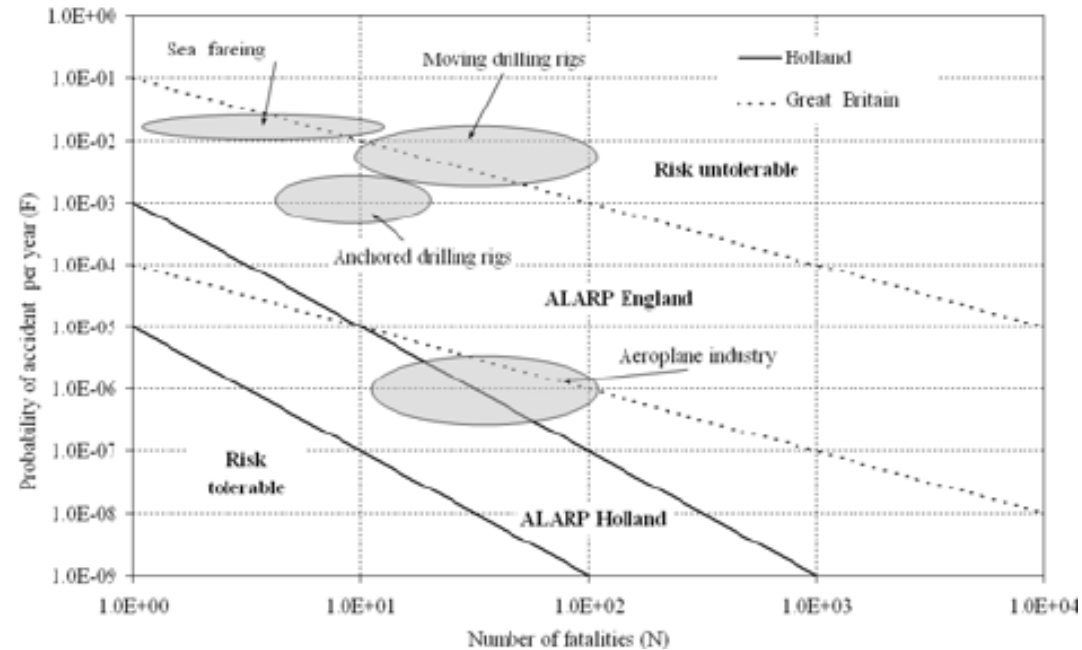
## With Constraints

### Basic Economics for Smart Factory

- How to Adapt



- Set the Own Rule



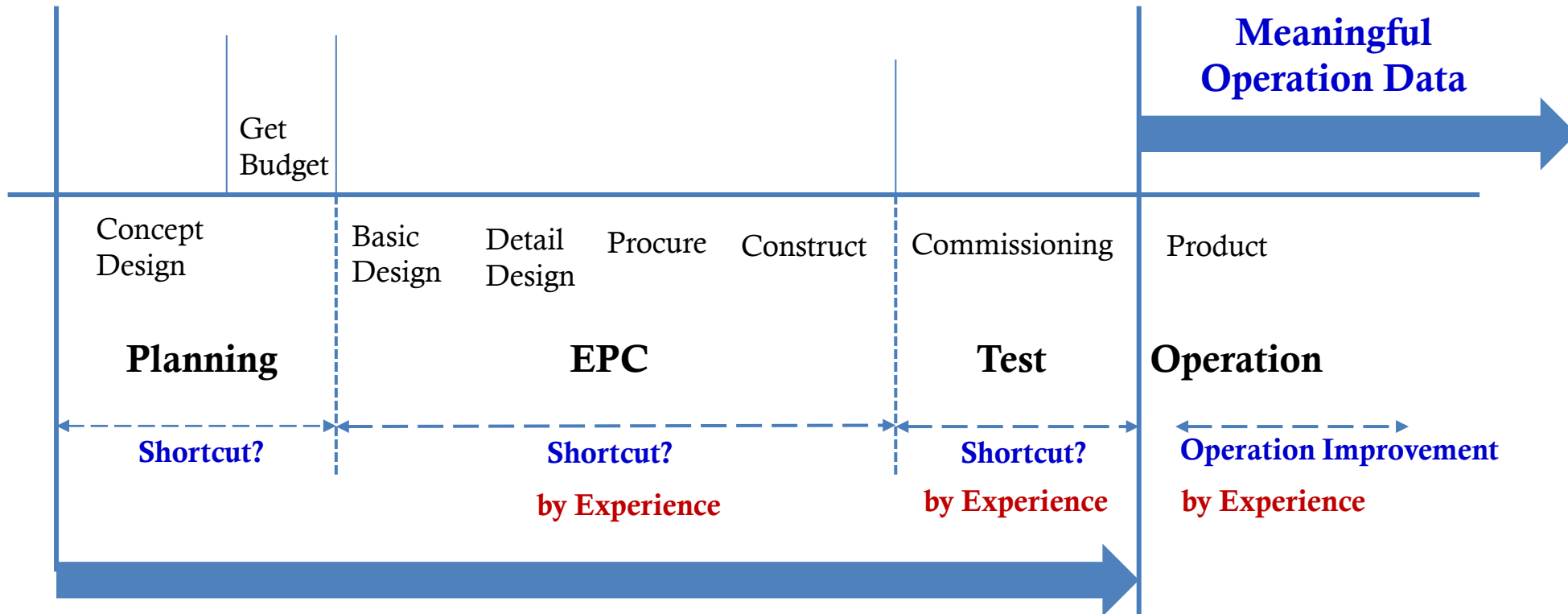


# Points of View – Engineering

## With Constraints

Time, Space

### Gap of Timing



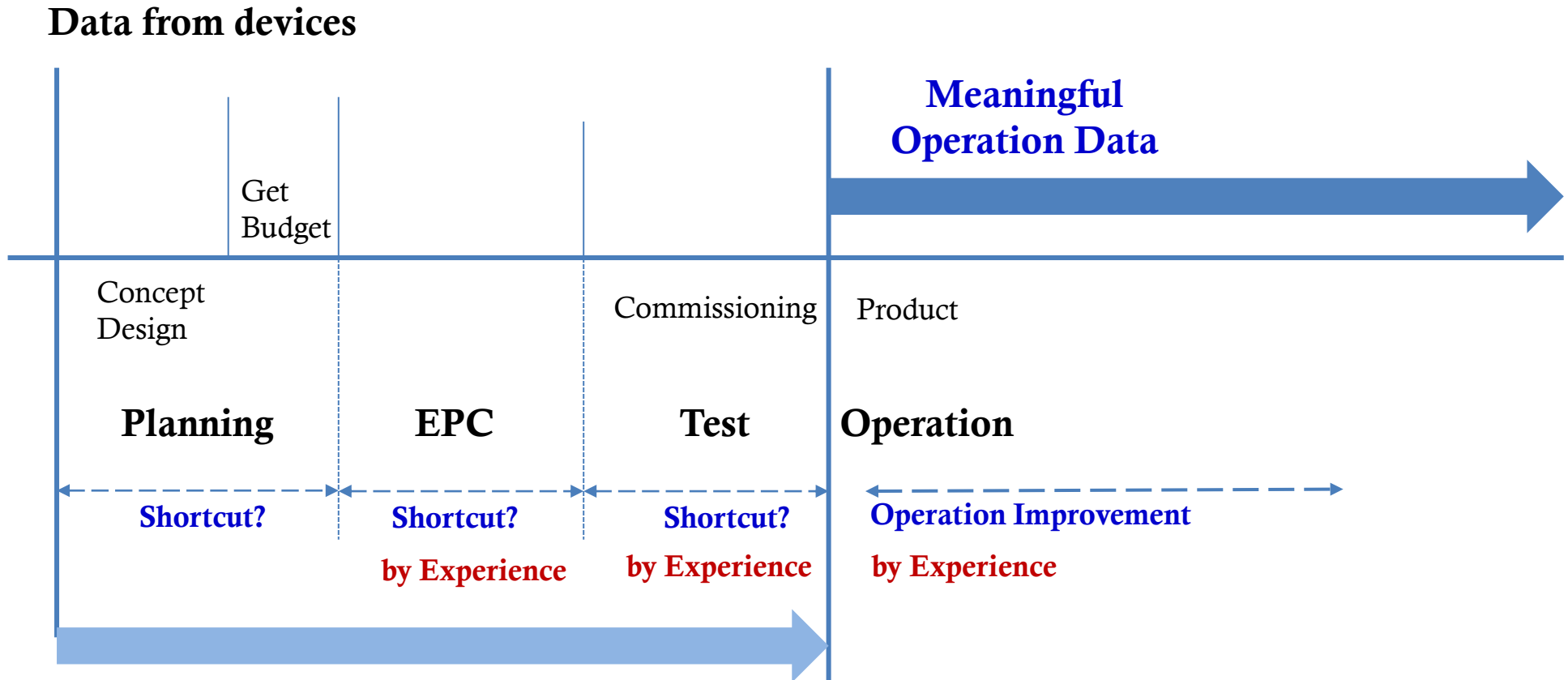
- How long do you endure?
- How much do you reduce?

Can you dream a concept after 2~4 yrs.?

# Points of View – Engineering

## With Constraints

Energy



- How to supply energy for construction?

Who supply energy to smart devices and Network?

# How to Prepare

## Go to Basics

- Coincide the Unit, Global Time, Metering, Global space, Starting point

Physical

Time

Space

Energy

Decision

Operation

Data

1 m ≠ 1 m  
Clockwise = Counter-clockwise  
Summer = Winter

1 ≠ 1  
12:00 ≠ 12:00  
Summer = Winter

1 ≠ 1  
12:00 ≠ 12:00  
1 m ≠ 1 m  
Clockwise = Counter-clockwise  
Summer = Winter

**65.3 KG to Lbs**

**[kg]** 1 ≠ 1      **65.3** kg      **143.96** lbs  
**[lbs]**                      Kilograms      Pounds

**[eastern]** 12:00 ≠ 12:00  
**[western]**

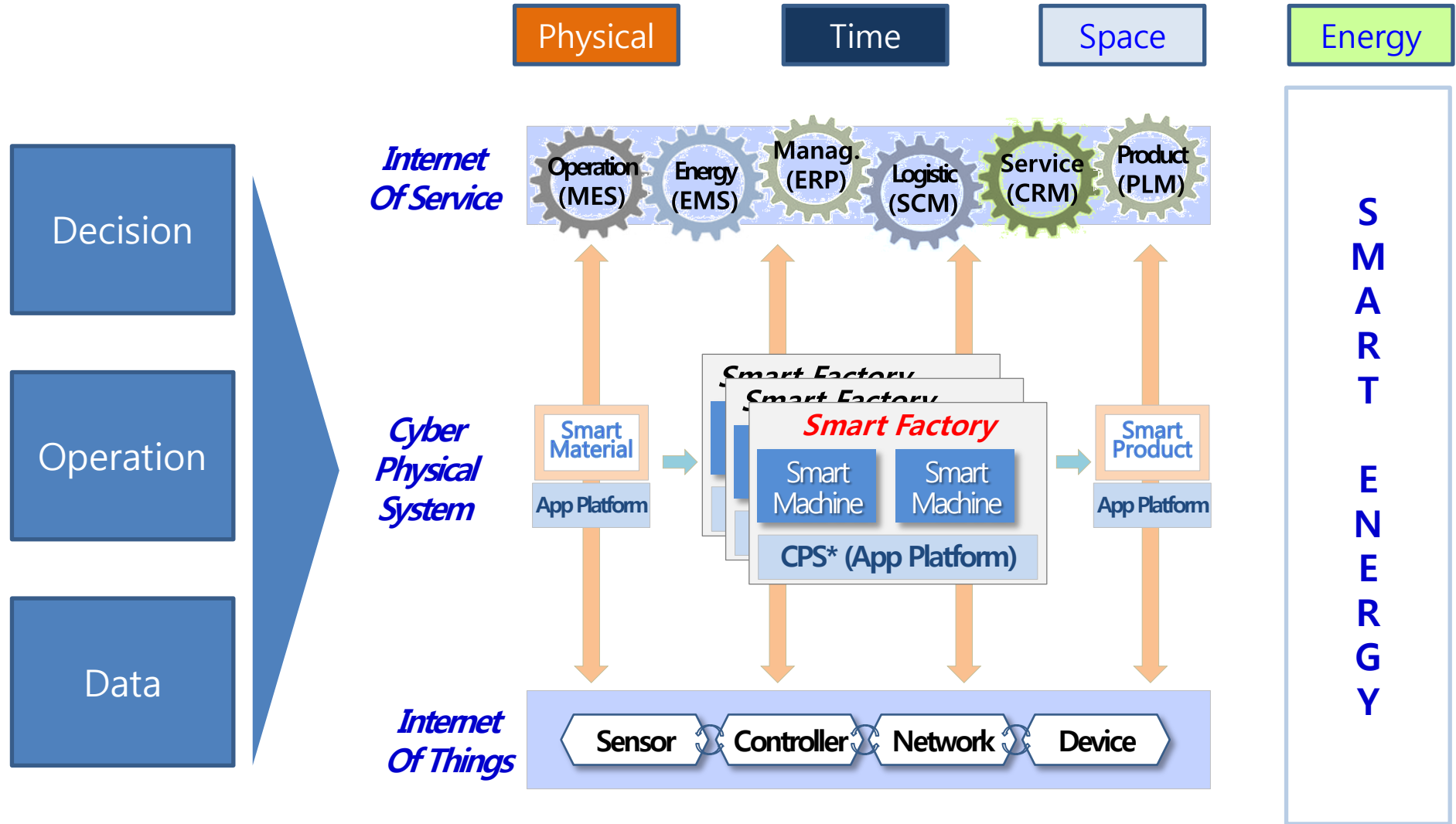
**[Hemisphere]**  
 Summer = Winter  
 Clockwise = Counter-clockwise

**[Starting point]**  
 1 m ≠ 1 m

※ GPS is used for global time sync, but EU(Galileo), Japan and China try to set up their own GPS.

# How to Prepare

Decision ~ Operation ~ Data : with Energy

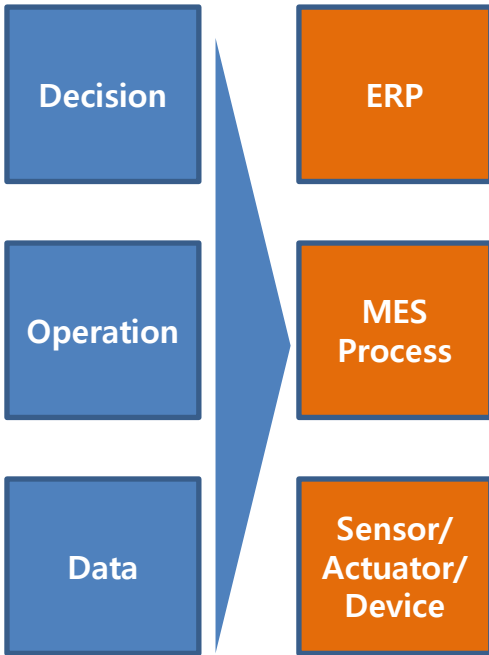
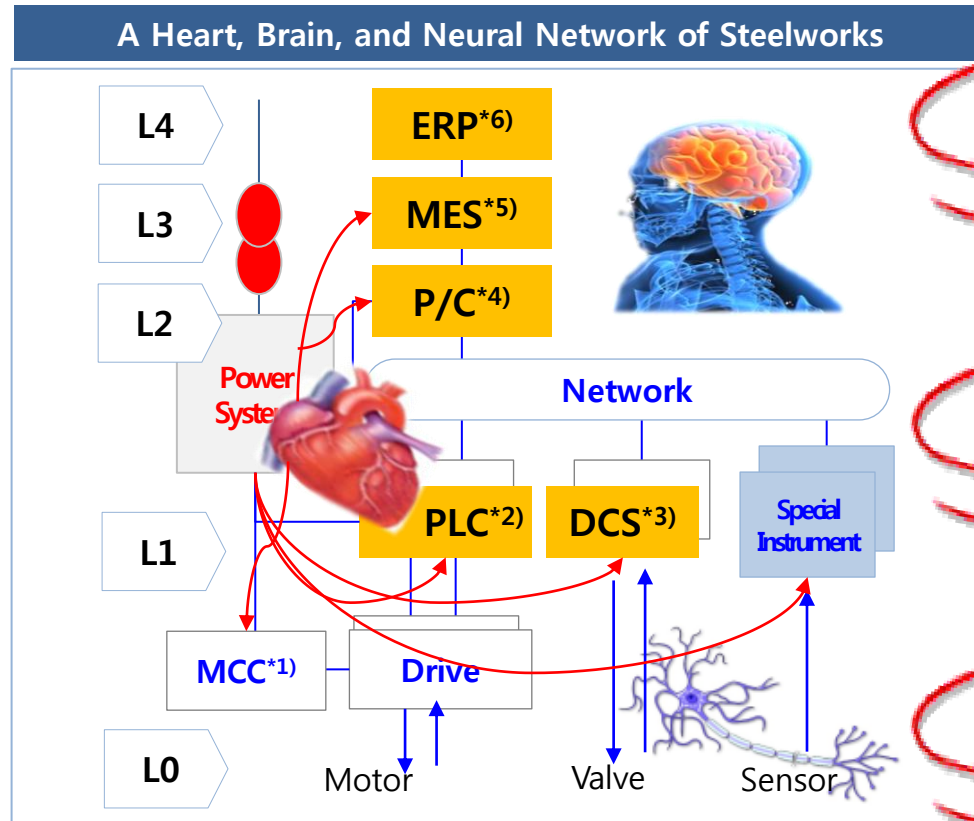


# How to Prepare

ERP ~ MES/Process ~ Device : through Data

Energy Physical

Time Space



AI

Big Data

IoT



\*<sup>1</sup>MCC : Motor Control Center \*<sup>2</sup>PLC : Programmable logic controller  
 \*<sup>3</sup>DCS : Distributed control system \*<sup>4</sup>P/C : Process Computer  
 \*<sup>5</sup>MES: Manufacturing Execution Solution \*<sup>6</sup>ERP : Enterprise Resource Planning  
 \*<sup>7</sup>SDD : Surface Defect Detector

# How to Prepare

## Case I

### Considering the industrial characteristics & Costs in the Brown Field / Green Field

Physical

Time

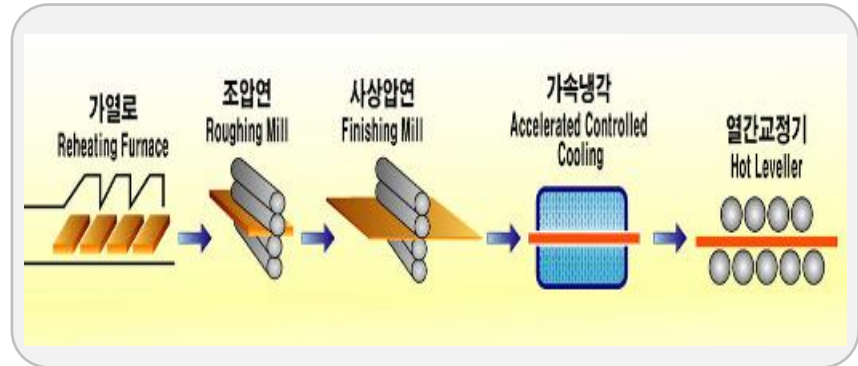
Space

#### General Manufacture

#### Steel & Iron Area

Decision

Material /devices



Operation

Unfixed path/material flow path ≠

Fixed path/material moving path

Discrete(Module) → automatic /distribute control ≠

Continuous → central/integration control

General Equipment ≠

Special Equipment for steel & Iron process

Data

Fault only affects own Equip. → able to use other Equip. ≠

Fault affects the process → disable to work, costs UP

# How to Prepare

## Case I

### Software based Innovation constructs the cost-optimal smart factory in the legacy



#### Objective Factory

#### How to Adapt

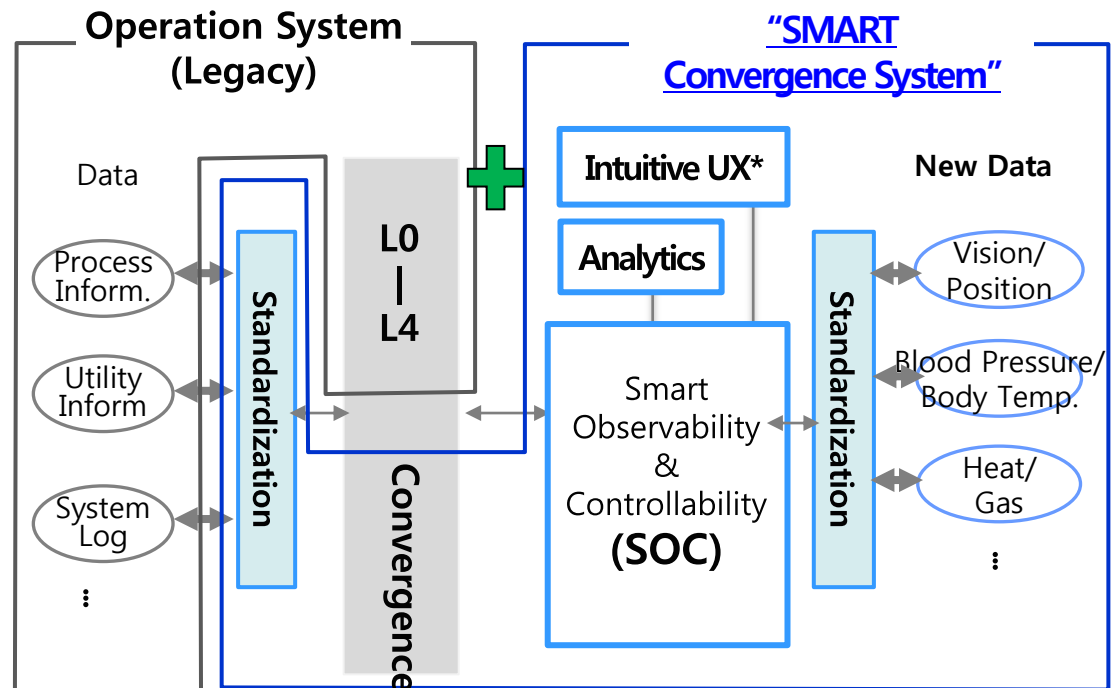
##### Remodeling Legacy

- **Known object**  
(Process, Utility, Customer)
- **Minimizing CAPEX**  
(possible system downsizing, etc)
- **Mixed effects to prove**

vs.

##### Adapt New Factory

#### Add "SMART Convergence System" to Legacy



# How to Prepare

## Case II

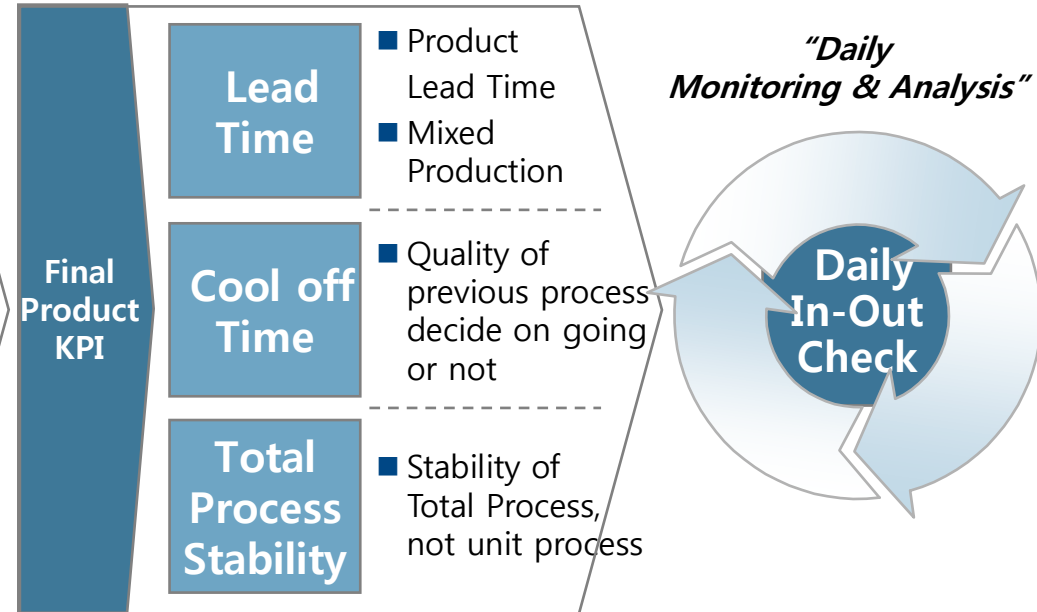
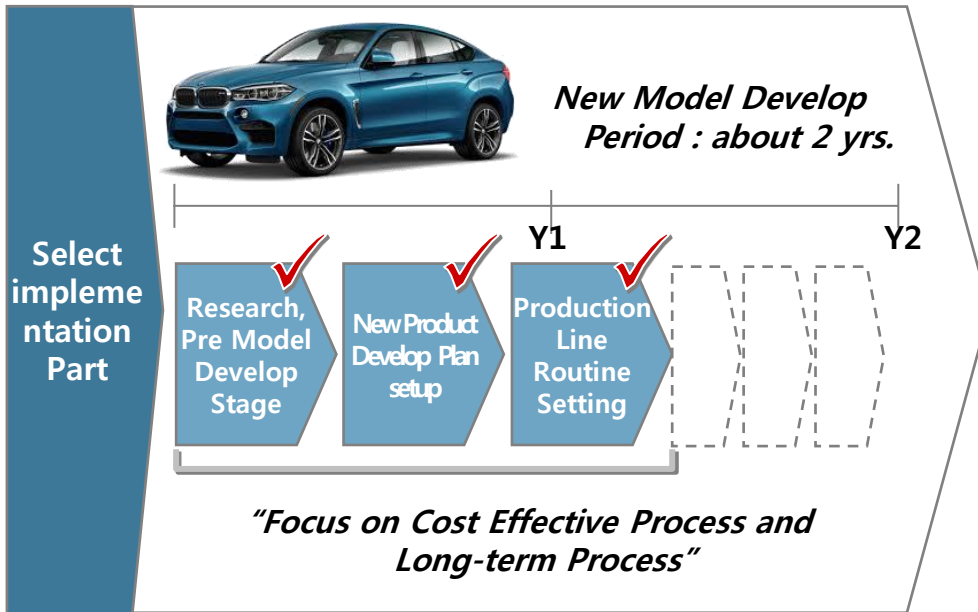
Establish the Main Process firstly,  
then check the Results of Final Products

Physical

Time

Space

### Object and KPI

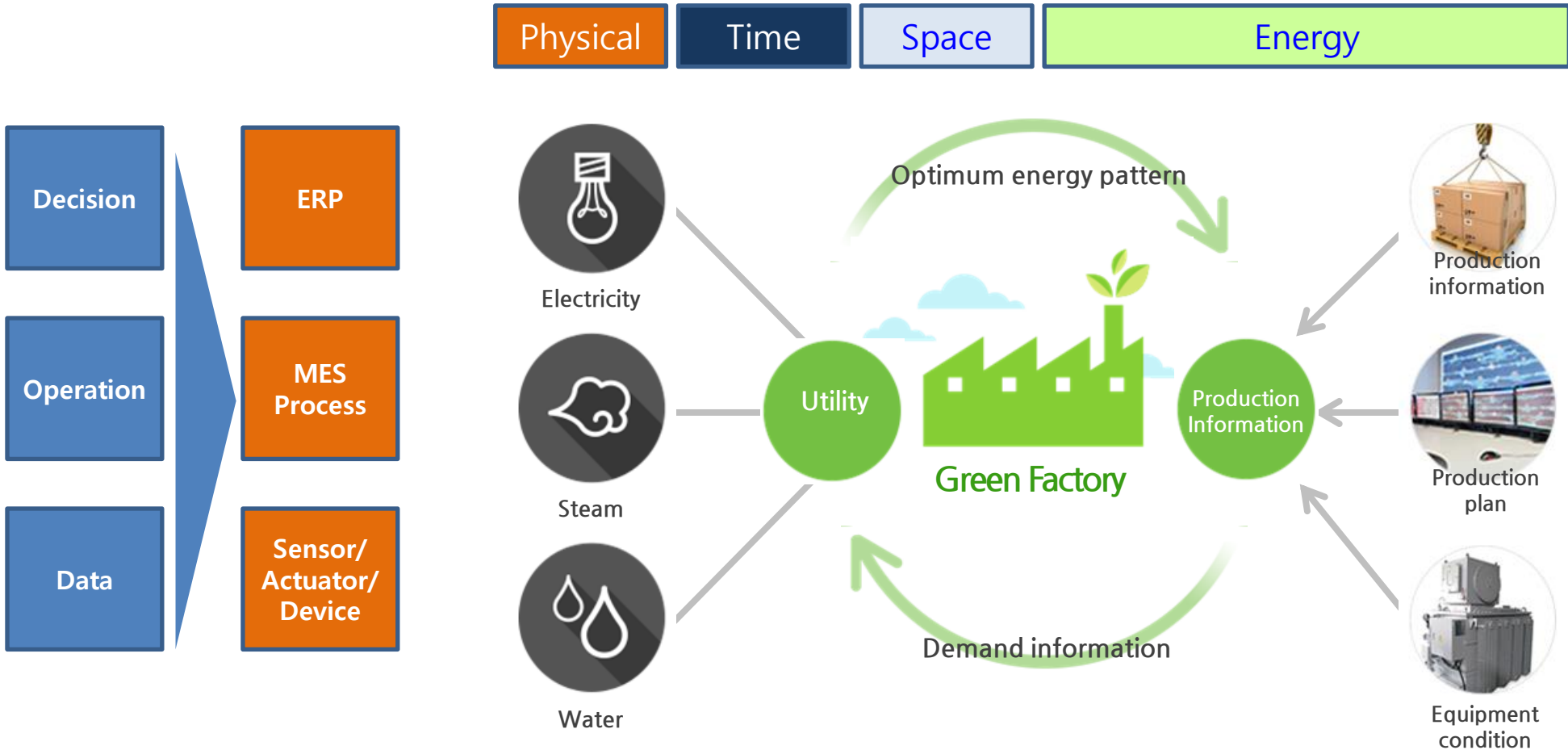


<p><b>Goal</b></p>	<p><input checked="" type="checkbox"/> Day to Day 5% Production gains</p>	<p><b>Innovation (5% UP)</b></p>	<p>Depend on the capacity of production line</p>
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# How to Prepare

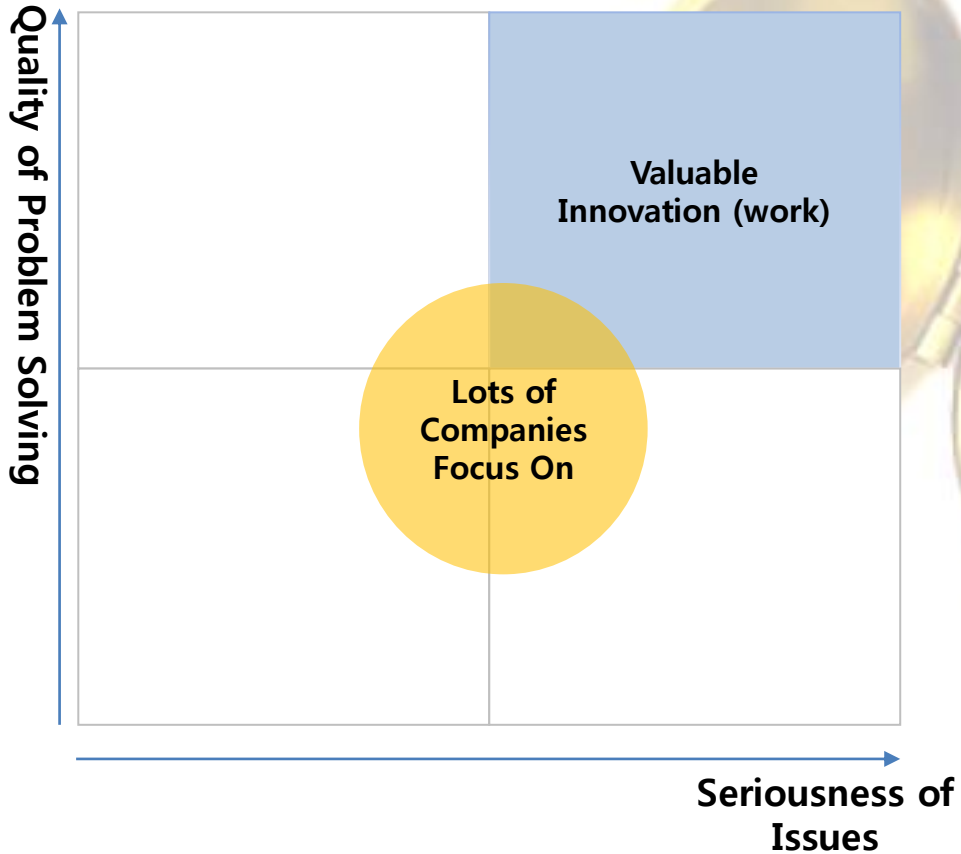
## Optimized Energy contributes to environments



※ POSCO ICT proposes the method of Economics for Energy Infrastructure.

# Conclusions

## To get the Smart Factory



1

Check the Seriousness of Work

2

Draw your dream & find the Expert

3

Open problems of Shop-floor  
(Remove Bottlenecks)

4

Reuse/Activate Data

5

Share Data using ERP, MES etc.

# Thank You!

Contact point : [ryoums@poscoict.com](mailto:ryoums@poscoict.com)