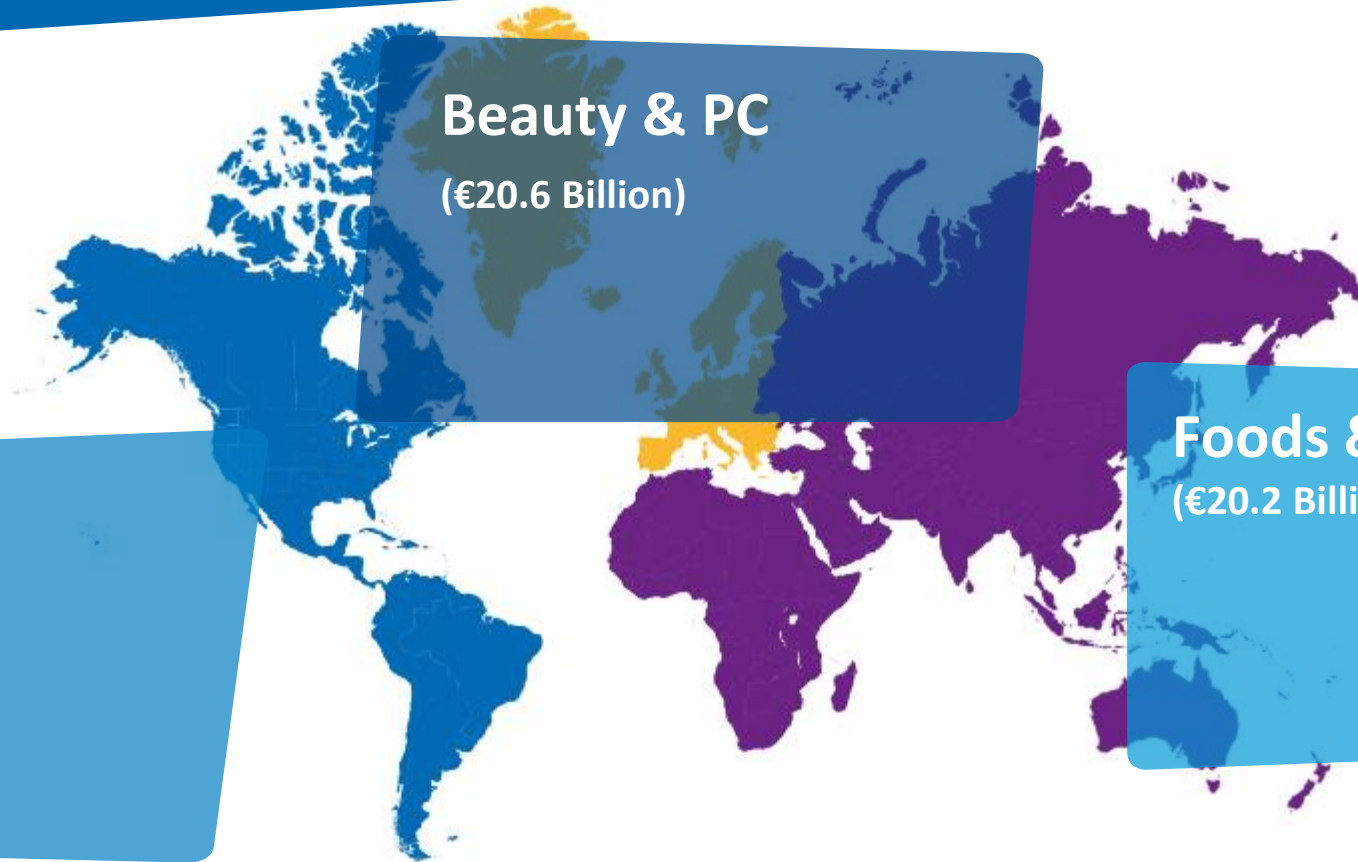


# Digital Transformation in Manufacturing Industry

**Dr. Satyajit Wattamwar,**  
**Data Science Leader, Unilever R&D**



# UNILEVER IS A GLOBAL COMPANY



**Homecare**

(€10.1 Billion)

**Beauty & PC**

(€20.6 Billion)

**Foods & Refreshment**

(€20.2 Billion)

2018 TURNOVER = €50.7 BN

WE MAKE MANY OF THE WORLD'S  
FAVOURITE BRANDS

AXE

Dove  


  
WALL'S

'BRING OUT THE BEST'  
HELLMANN'S

  
Knorr

  
Lipton

  
M  
MAGNUM

  
OMO

  
Rexona  
IT WON'T LET YOU DOWN

  
sunsilk  
CO-CREATIONS

  
Surf

LUX



# THE WORLD FACES NEW AND BIGGER CHALLENGES







**MAKE  
SUSTAINABLE  
LIVING  
COMMONPLACE**



# A NEW WAY OF DOING BUSINESS



**SUSTAINABLY SOURCED  
RAW MATERIALS**



**EQUAL OPPORTUNITY  
& SUSTAINABLE LIVELIHOODS**



**THE PLANET PROTECTED  
FOR FUTURE GENERATIONS**



**ACCESS TO WATER  
SANITATION &  
HYGIENE FOR ALL**

# Digital Transformation as Key to Sustainable and Profitable Business



WHAT IS DT?



DT VALUE



CHALLENGES



TOOLS



SUCCESS  
STORIES??

# What is Digital Transformation?



A word cloud on a dark blue background featuring various terms related to digital transformation. The words are arranged in a cluster, with 'DIGITAL TRANSFORMATION' being the largest and most central. Other prominent words include 'Innovation', 'Cloud', 'Paperless', 'Global', 'Application', 'Embracing', 'Change', 'Society', 'Technology', 'Competence', 'Business', 'Connected', 'Analytics', 'Opportunities', 'Leverage', 'Integrate', 'Future', 'Usage', 'Mobile', and 'Aligned'. The words are in different colors (white, yellow, green, blue) and orientations (horizontal, vertical).

Global Paperless Cloud  
Application Innovation Embracing  
DIGITAL Change Society  
TRANSFORMATION  
Future Technology Usage Competence Mobile  
Business Connected  
Analytics Opportunities Aligned  
Leverage Integrate



# Definition: Digital Transformation

## Per Wikipedia:

In a narrower sense, "digital transformation" may refer to the concept of "going paperless", and reaching a "digital business maturity"<sup>[3]</sup> which affects both individual businesses<sup>[4]</sup> and whole segments of society, such as government,<sup>[5]</sup> mass communications,<sup>[6]</sup> art,<sup>[7]</sup> medicine,<sup>[8]</sup> and science.<sup>[9]</sup>

## My definition:

“ Use of new digital technologies (as against traditional IT backend only) to collect & generate new data based value for organizations that leverage interconnected aspects of devices, processes & people, employs AI & cloud tech tools if necessary, towards driving faster data to decision journey of organizations with wide reaching impact on individuals, private/public organizations resulting into transforming the ‘manual’ way of decision making”.



# DT Examples in various domains

## Marketing

- Understand Consumer behavior
- Targeted Campaign

## Sales

- Distribution Mix
- New product launch

## Manufacturing

- Production Optimization
- Equipment health

## Banking

- Credit risks
- Portfolio Optimization

## R&D

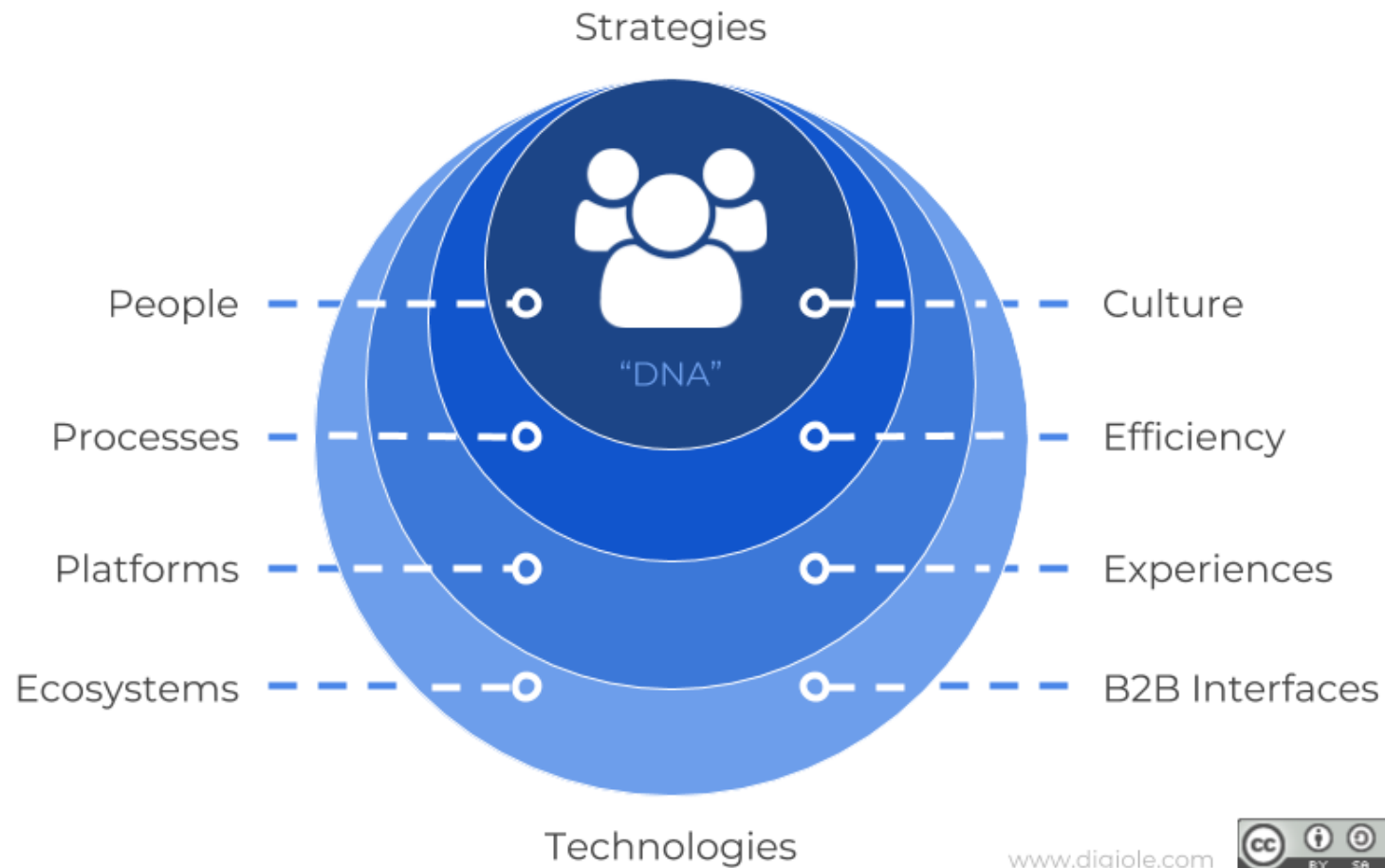
- Rapid Product Development
- Sustainable products

## Education

- Edu. For all
- Drop-out rate reduction



# Considerations for DT



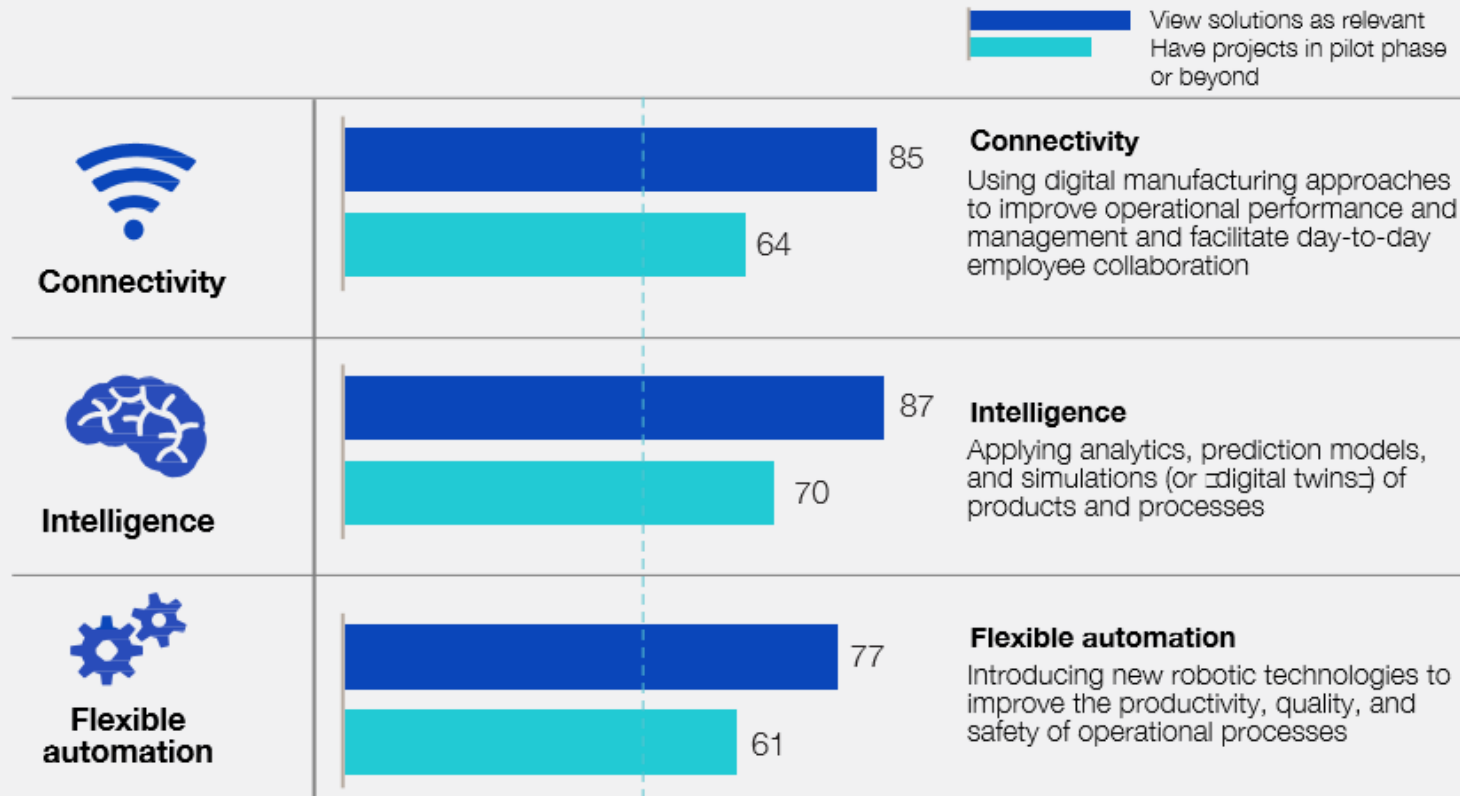
[www.digirole.com](http://www.digirole.com)



# Current State of Digital Transformation in Manufacturing

Most survey respondents regarded digital manufacturing as relevant, and many had pilots under way

Percent of respondents piloting digital manufacturing solutions or viewing them as relevant,  
N = 700



Source: McKinsey Digital Manufacturing Global Expert Survey 2018

# Digital Transformation Pillars in Manufacturing World



CONNECTED (IIOT) &  
SMART  
MANUFACTURING



CLOUD  
PLATFORMS



(BIG) DATA  
MANAGEMENT



ANALYTICS &  
DATA SCIENCE



# (I)IoT's role in Digital Transformation

IIoT is evolution of OT (MES, SCADA, HMI, PLC, Historians), not fully though.

Exploits 'Sensor -> gateway -> (on-premise) cloud'

Allows scale-up of analytics-based monitoring & advisory services, at unprecedented level

Supports Asset model at enterprise level

Exposes data to outside world, concern of cyber security, data localization, identity, etc.

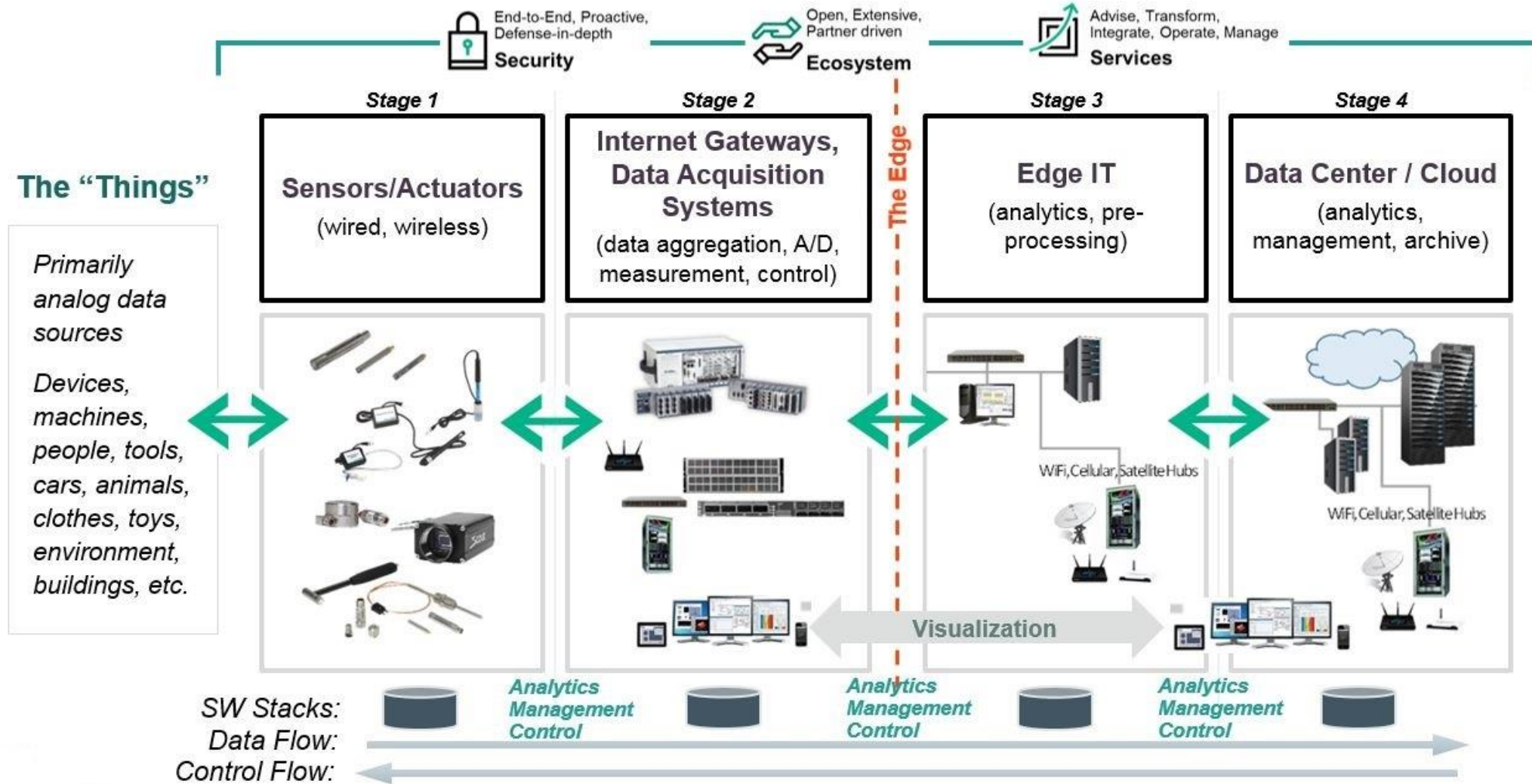
PTC, GE Predix, Siemens & many other major and niche player

Many success stories over last few years

Great success with expensive mechanical assets, e.g. turbines, wind-mills, locomotives, etc.

Often exploit subscription /service as the business model, e.g. sell equipment uptime

# The 4 Stage IoT Solutions Architecture



# Cloud Tech. role in DT

IIoT is enabled by cloud technologies

Web services, Cloud or standalone apps on VMs

Cloud technologies are here to stay

Almost every sector is benefitting by cloud technologies

Lower IT costs, rapid product development & launch, on-demand hardware, operational scale makes cloud a compelling story

Hybrid = OT + IT technologies are optimal for supply chain

PoC is advised due to immaturity of many players



# Big Data & Manufacturing Industry

Non-standard manufacturing plant, relatively small (big) data

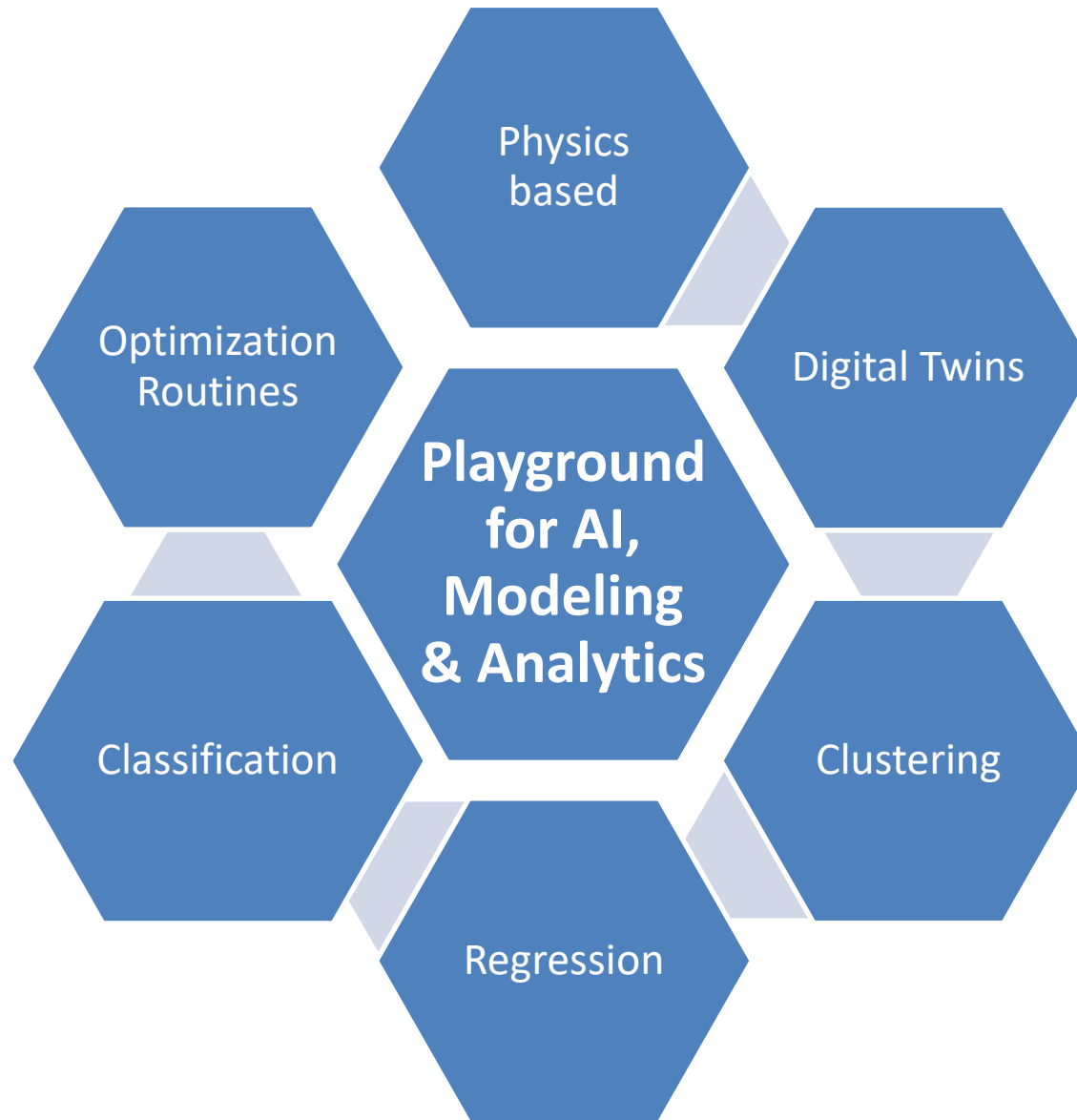
Disparate/non-connected plants & units – can't justify to be looked as relational big data

Big data historians are powerful non-cloud data tools

Data quality is always a big concern

Appropriate data curing differentiate success from failure

Batch and streaming analytic needs separate attention



# DT in Manufacturing Industry

Manufacturing is slow in exploiting IIoT enabled DT

Relational Database, good enough for most of the opportunities

Analytics Tools from Data Science community are useful

Complex operations make data curing a critical step

Existing MES & automation players are pushing for DT in supply chain

Extremely rewarding but Analytics is quite skill and manpower intensive

Identifying low hanging fruits is a good start



# Success Stories (Manufacturing)

Many IoT enterprise level success stories

Many success for Process industries – Akzo, BP, P&G, Suez E., Miller Coors, GE, Covestro, Intel, Unilever, etc.

Data polishing/transformation is the Crux

Success comes only combining tools form Data Science + Statistics + Manufacturing + Common Sense

Analytics + APC solutions had some success in process industry

Production Optimization (equipment level)

Soft sensing, fingerprinting, equipment uptime

Other run-time analytics solutions

# Challenges with DT in Manufacturing Industry

Identification of Opportunity / Use-case formulation

Demanding Analytics: Asset specific dynamic operation, Interconnected units

Difficult Data Curing: non-standard plant configuration & operations

Skill & knowledge gap of manufacturing & IT engineers

'IoT + Data Science' benefits comes mostly with scale of operation

Already mature OT, hesitation for IoT

Culture: fear of job loss, no intensive, etc.

Lack of standardization of operations, even within a same organization



Implementation



Discovery

Pilot

Scale Up





# Discovery

```
graph LR; A[Decision on Vendor, Use Case, Software, Footprints, SME, expected benefits & project timeline] --> B[Project Kick off – Knowledge transfer to the vendor]; B --> C[Historic Data Collection]; C --> D[Collection of – Project, Process, Equipment, Logs, KPI, etc.]; D --> E[Data migration to the selected tool]; E --> F[Data Analysis]; F --> G[Documentati on of findings];
```

Decision on Vendor, Use Case, Software, Footprints, SME, expected benefits & project timeline

Project Kick off – Knowledge transfer to the vendor

Historic Data Collection

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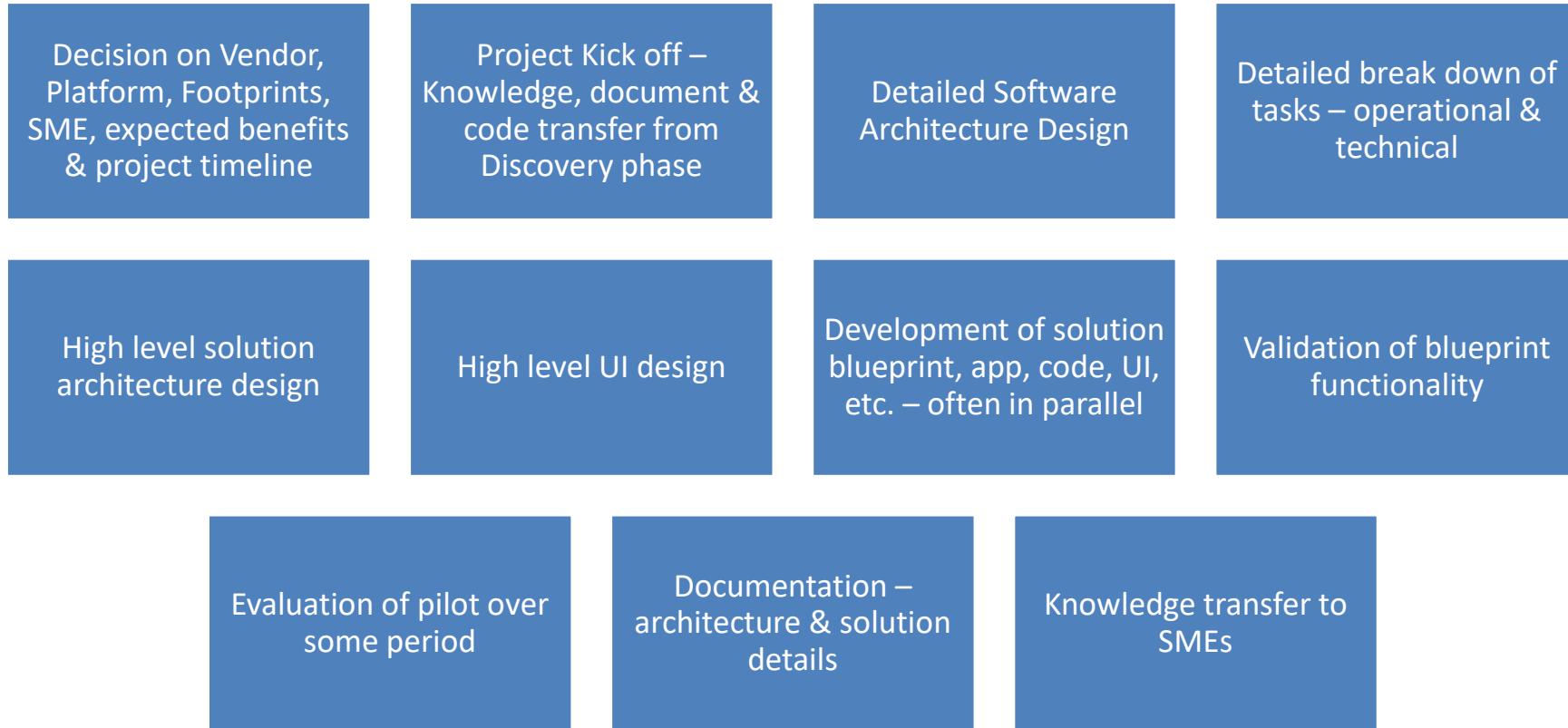
Data migration to the selected tool

## Data Analysis

- Data cleaning & polishing
- estimating stat. properties
- visual analysis
- modeling by machine learning/AI tools
- knowledge extraction
- estimation of real-time benefits

Documentati on of findings

# Pilot



## Scale-up

Decision on Vendor, Platform, Footprints, SME, expected benefits & project timeline

Project Kick off – Knowledge, document & software code transfer from pilot

Detailed Software Architecture Design (inclusion of cloud components)

Detailed break down of tasks – operational & technical

High level UI design

Integration of pilot solution to the enterprise – inclusion of SOA modeling

Validation of enterprise level integration

Evaluation of work over some period

Documentation – architecture, performance & maintenance details

Knowledge transfer to SMEs



Thank you!!