AICTE sponsored National Conference on

Making of a Digital India-Renewed Challenges, Opportunities and Effective Deliverables

Frontiers of Digital Supply Chain Management and the Smart Factory : Smart Strategy for Indian Enterprises

(modified version of) talk delivered on Nov 16, 2017 by

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Frontiers of Digital Supply Chain Management and the Smart Factory

- Historic Prelude: Industry 4.0
- What are Digital Supply chains
- What are smart factories
- What are the underlying technologies
- What is the business imperative for rushing towards DSC and SF
- How relevant are DSC and SF for India
- Which components do we pick
- How do we prioritize
- Is there a India road Map for Digitization
- The Smartness of Factory, Product, Service and Logistics
- Summary Assessment

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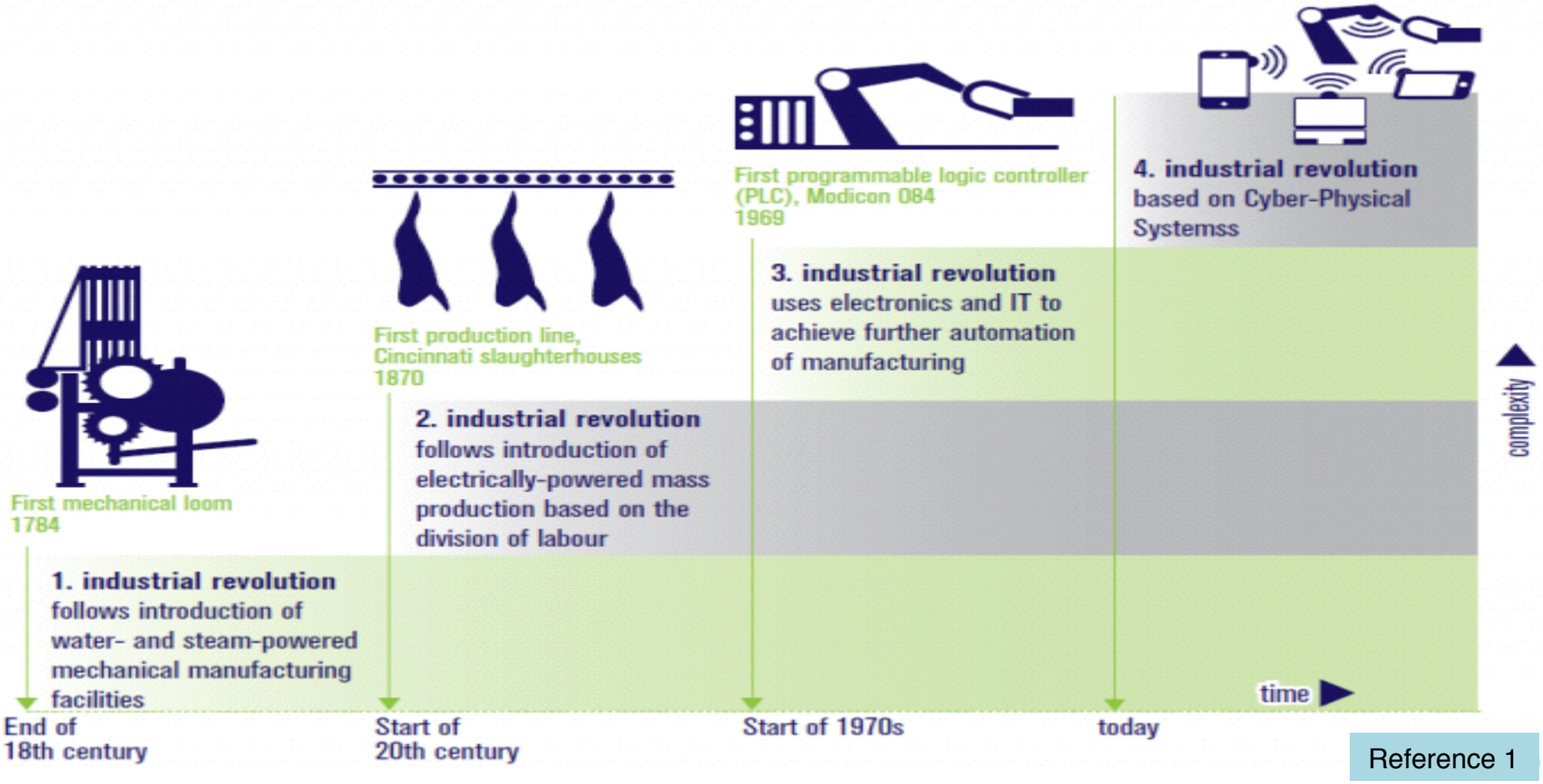
Industry 4.0



Reference 1

The era of Cyber Physical Systems has already begun.

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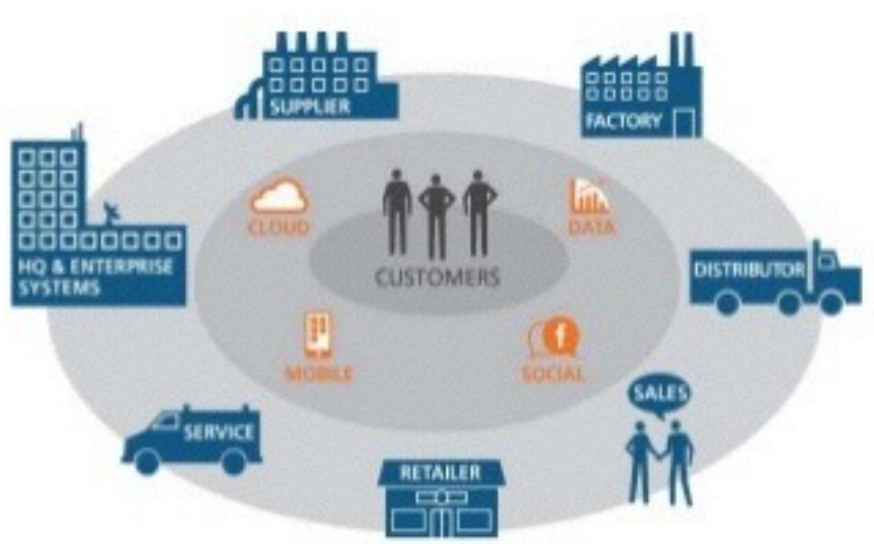
WHAT IS DIGITAL SUPPLY CHAIN ?

DIGITAL SUPPLY CHAIN IS AN INTELLIGENT VALUE DRIVEN NETWORK THAT LEVERAGES NEW TECHNIQUES & METHODS WITH DATA ANALYTICS TO CREATE VALUE AND REVENUE.

- DIGITAL PLANING
- DIGITAL SUPPLY
- DIGITAL MANUFATURING
- DIGITAL LOGISTICS



Reference 2

Originally referred to goods such as books, music ,films etc. that could be delivered electronically.

But no longer

Connectivity is the key

Digital Supply Chain covers all goods and services

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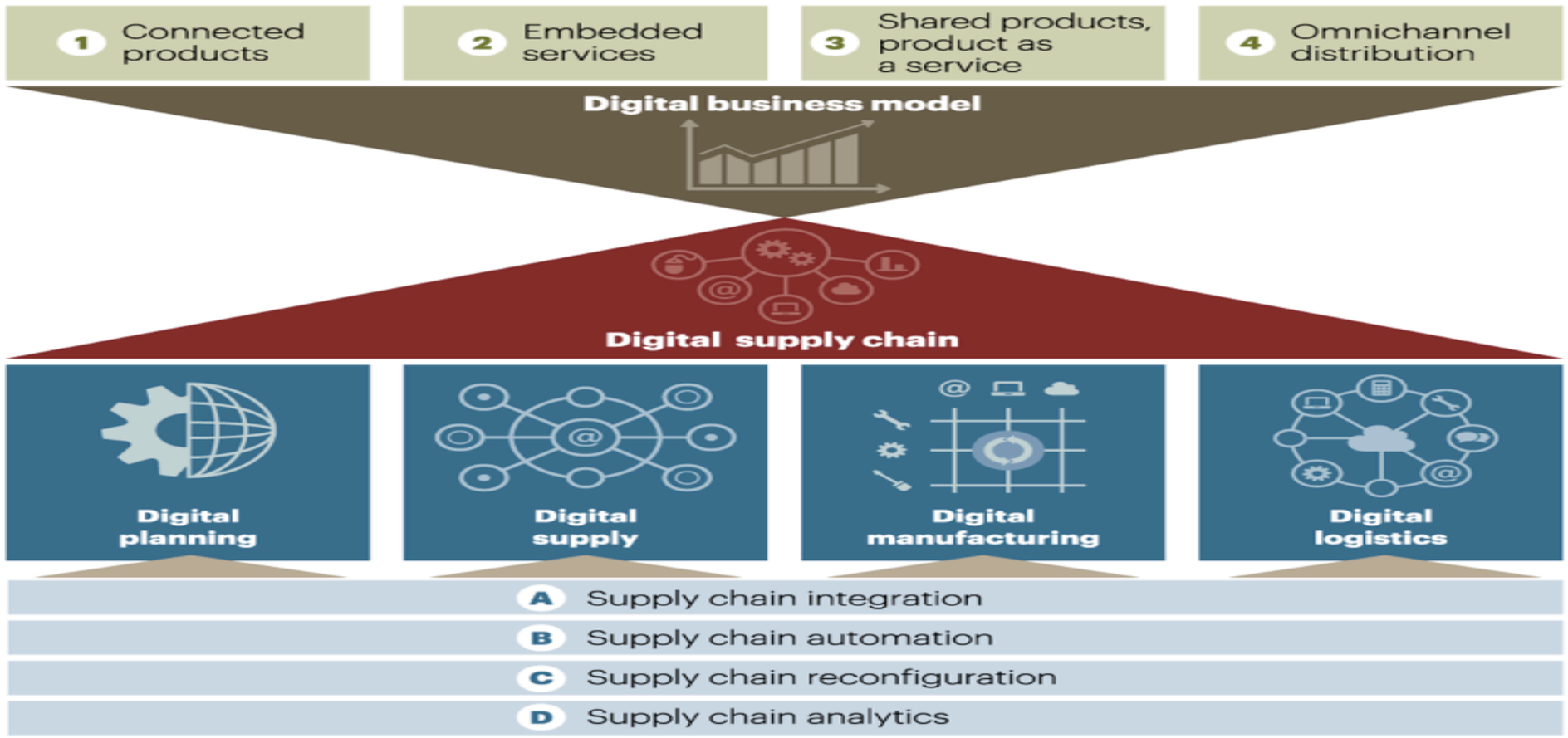
Figure 3
Digital supply chain framework



Source: A.T. Kearney analysis

Reference 3

Digital Supply Chain encompasses all functions

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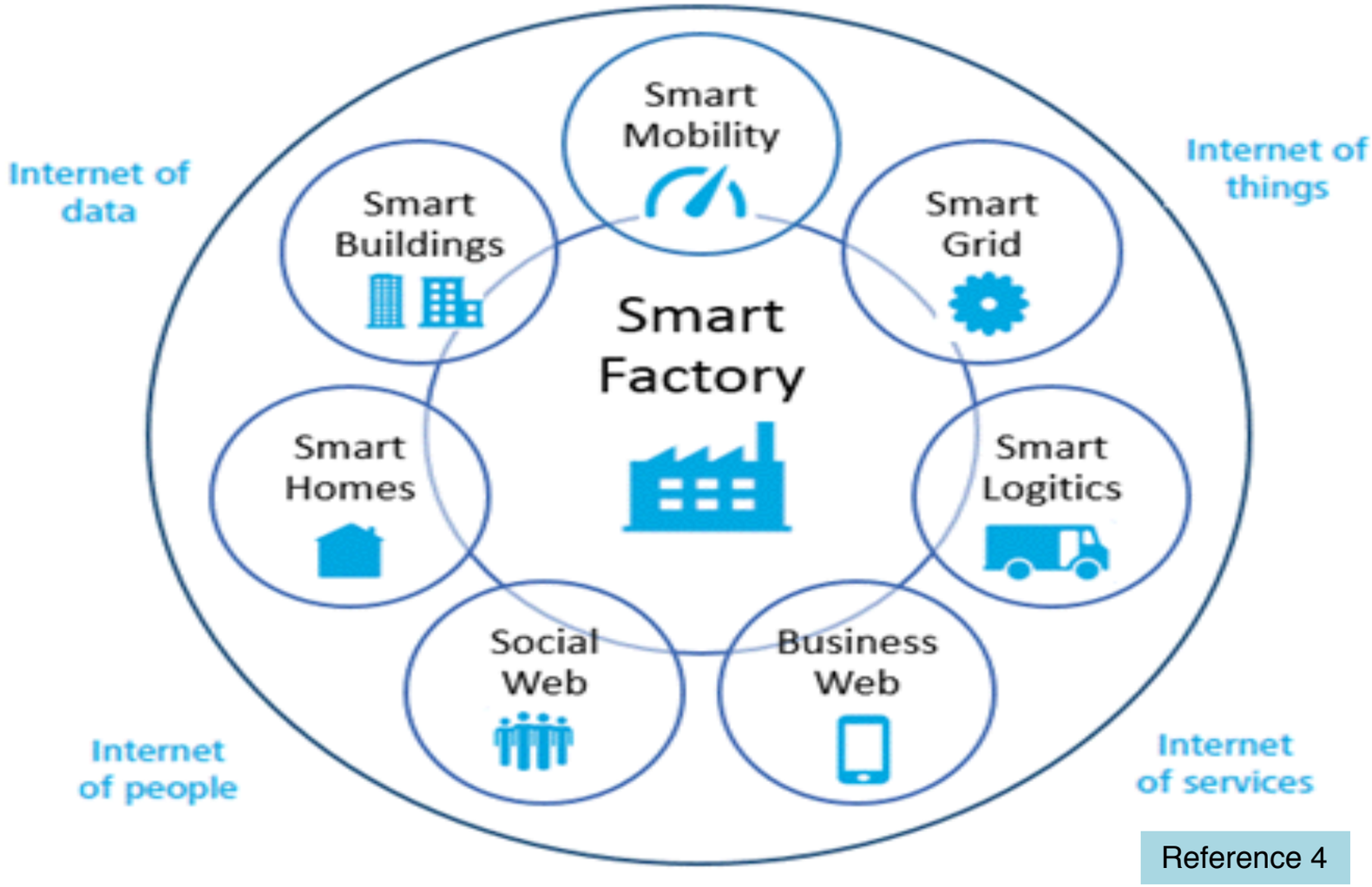

Reference 4

Connectivity and real time information sharing is the key

Automation permeates all functions

The Smart Factory is a comprehensive and connected entity of machines, materials, stake holders and products.

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Technologies under the hood

- IoT, IIoT
- **Automation, Robotics, Machine Vision, Speech Recognition**
- Identity Mgt, Network Security, Distributed Networks etal
- AI, Machine Learning, Deep Learning, Analytics
- Additive Printing
- GPS, Autonomous Vehicles
- Wearable Technologies
- Blockchain (Nextgen SC)

Interlocking technologies are accelerating the pace

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Internet of Things (IoT)

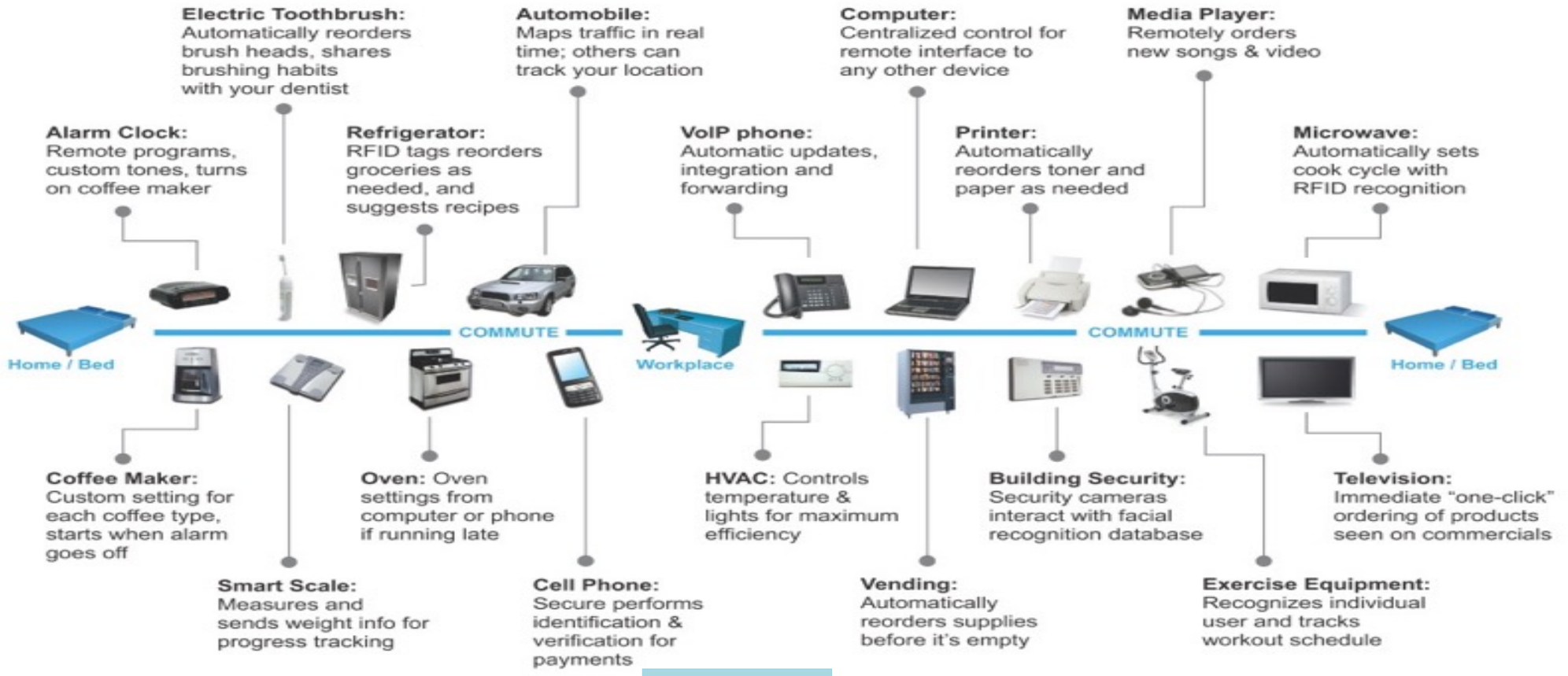

Figure 3. The Internet of Things

Reference 5

Most devices are turning to be smart; capable of sensing ,sharing and processing information

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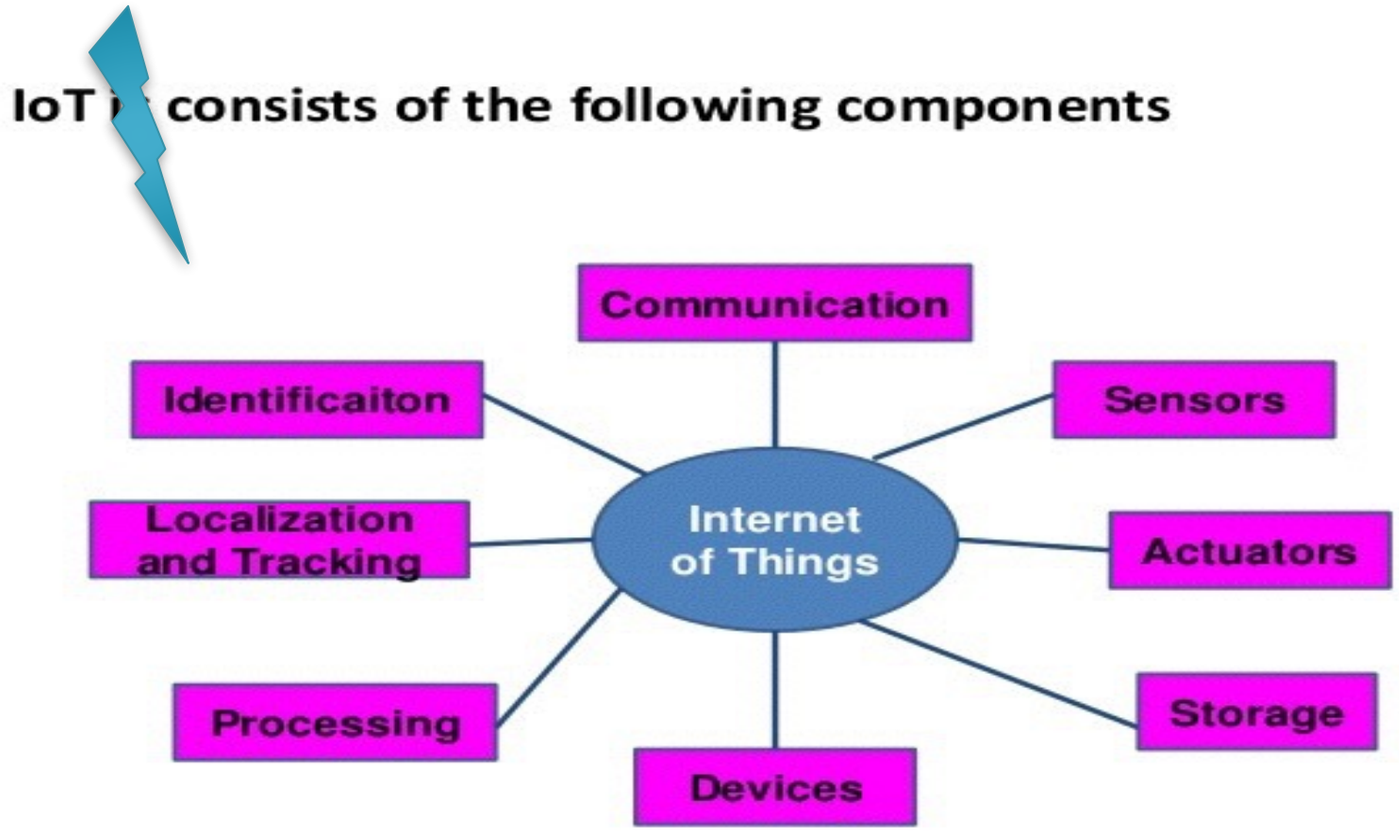

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Source: Internet of Things – Strategic Research Roadmap, CERP-IoT, 2010

Reference 6

Location and Status Aware technologies with sensors, transmitters, actuators facilitate M2M interaction

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Maruthi Factory in India

Productivity
Quality
Safety
Cost Effectiveness

Reference 7

Riding on sensors and computers, robotics and automation are sweeping across the shop floors

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Aakash Sinha , CEO of Omnipresent Robot Tech, a Delhi-based robotics startup for industrial inspection and defense demonstrating a drone

Reference 8

Drones and other Robots are making headway into industry and society with numerous applications

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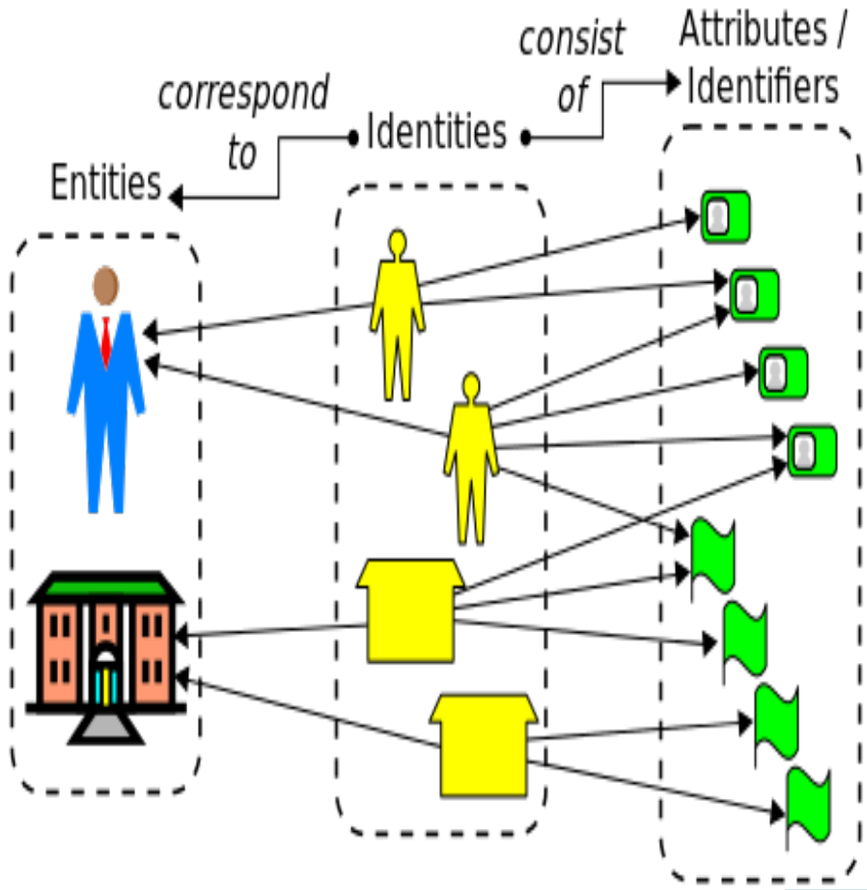

Reference 9

Issues of Network Security and Privacy concerns have arisen with the rapid spread of Aadhar applications

111 crore people in India have an Aadhar number. It is getting embedded into numerous government services.

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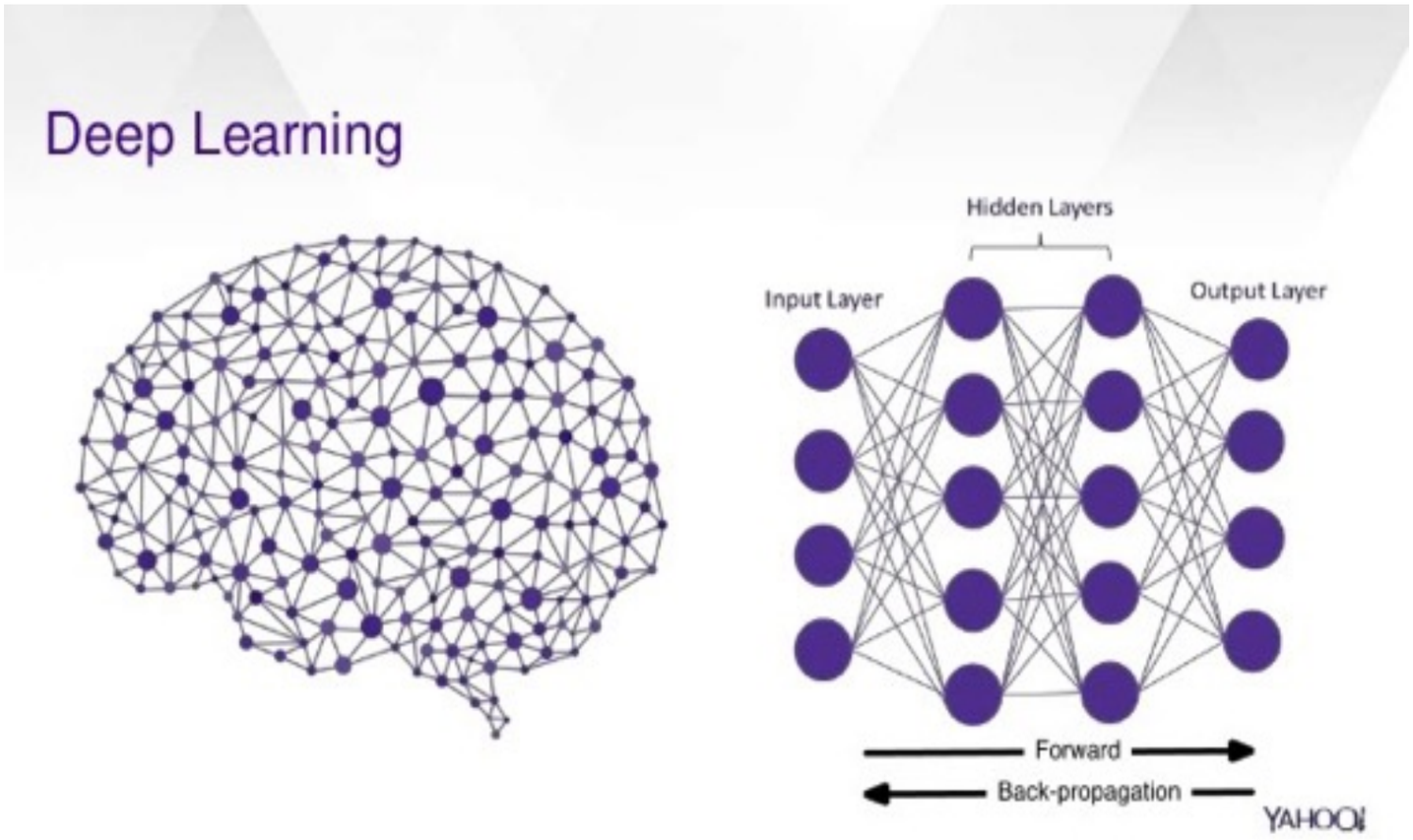
World of Big Data



Can machines be taught to see, observe, infer and learn like human beings?

Reference 10

Every object has features and attributes. The challenge is to identify and classify each object quickly with minimal human intervention

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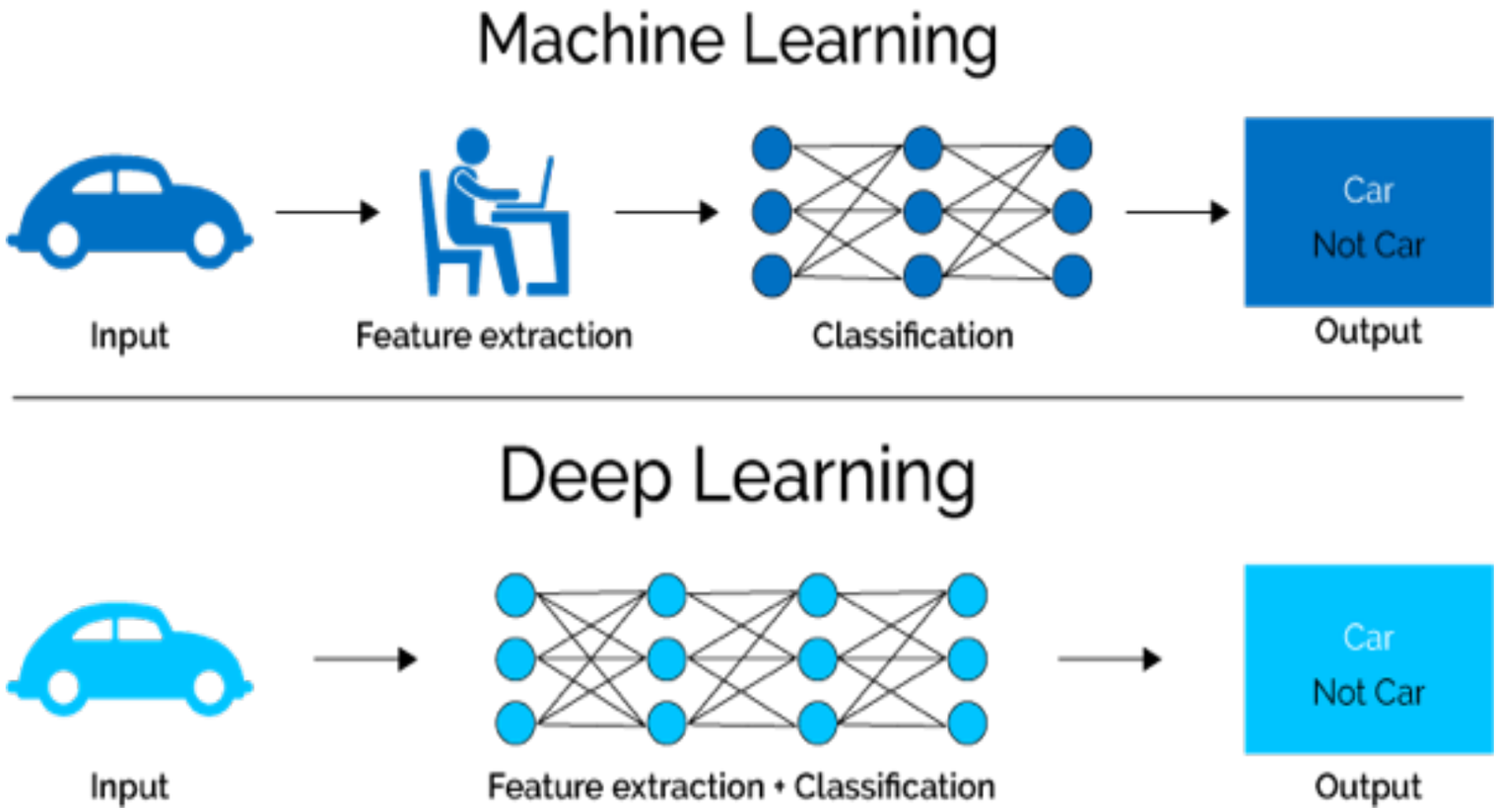

Reference 11

Difference between Machine Learning and Deep Learning

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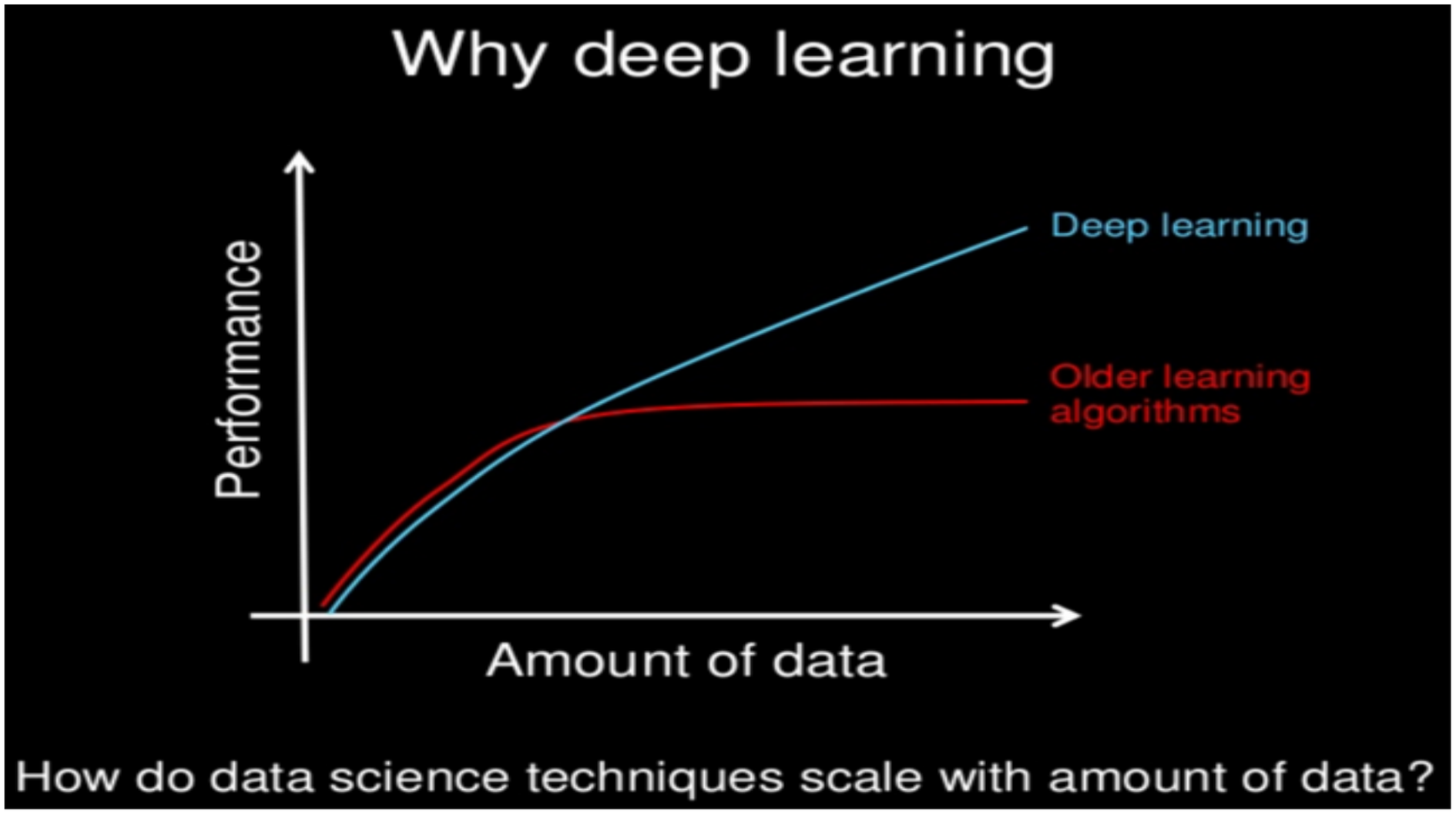

Reference 12

Vast data implies higher learning in Deep Learning techniques

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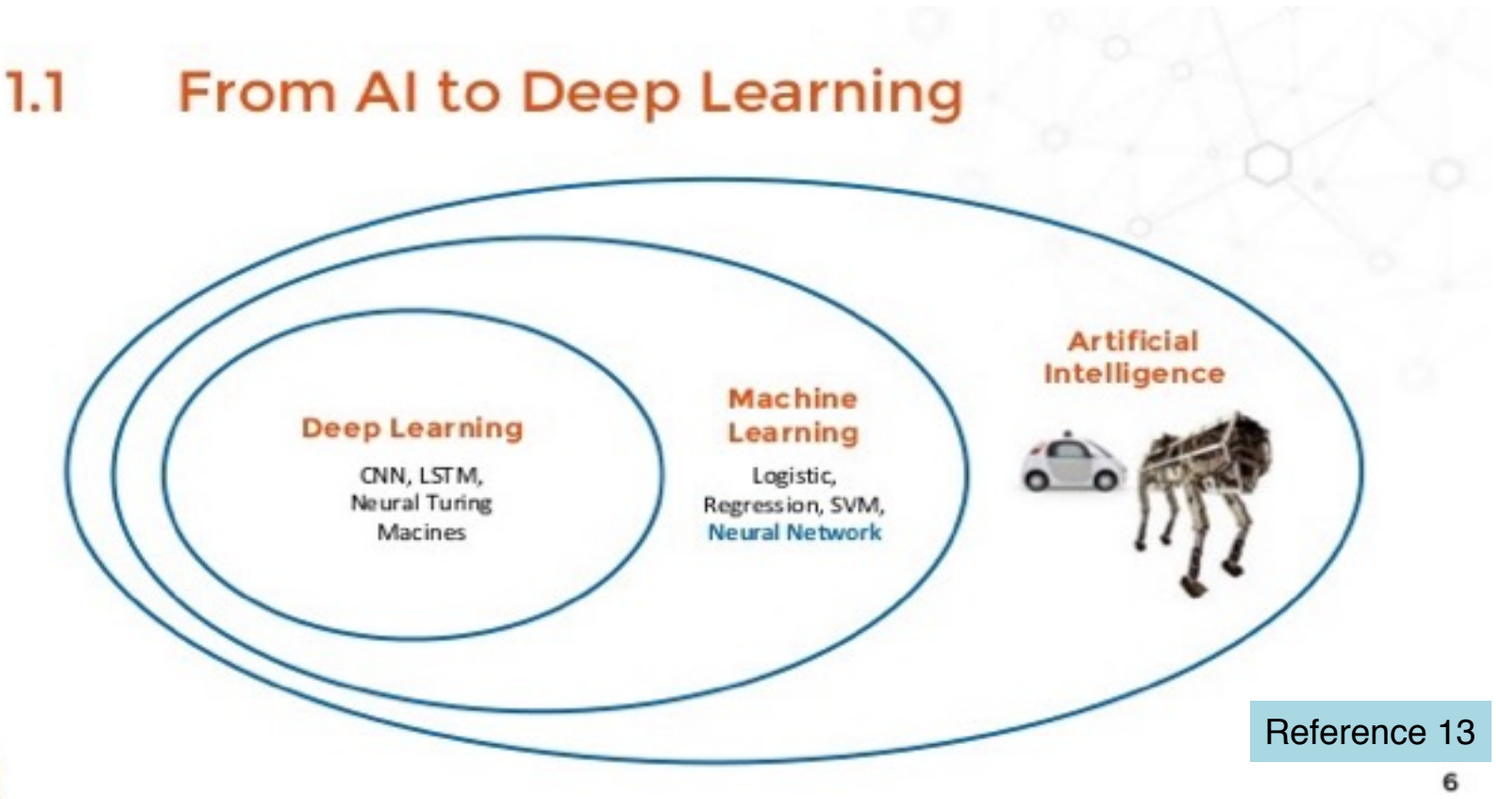

Exponential growth in learning techniques have happened over four decades; from Expert Systems to Artificial Intelligence to Machine Learning and now to Deep Learning

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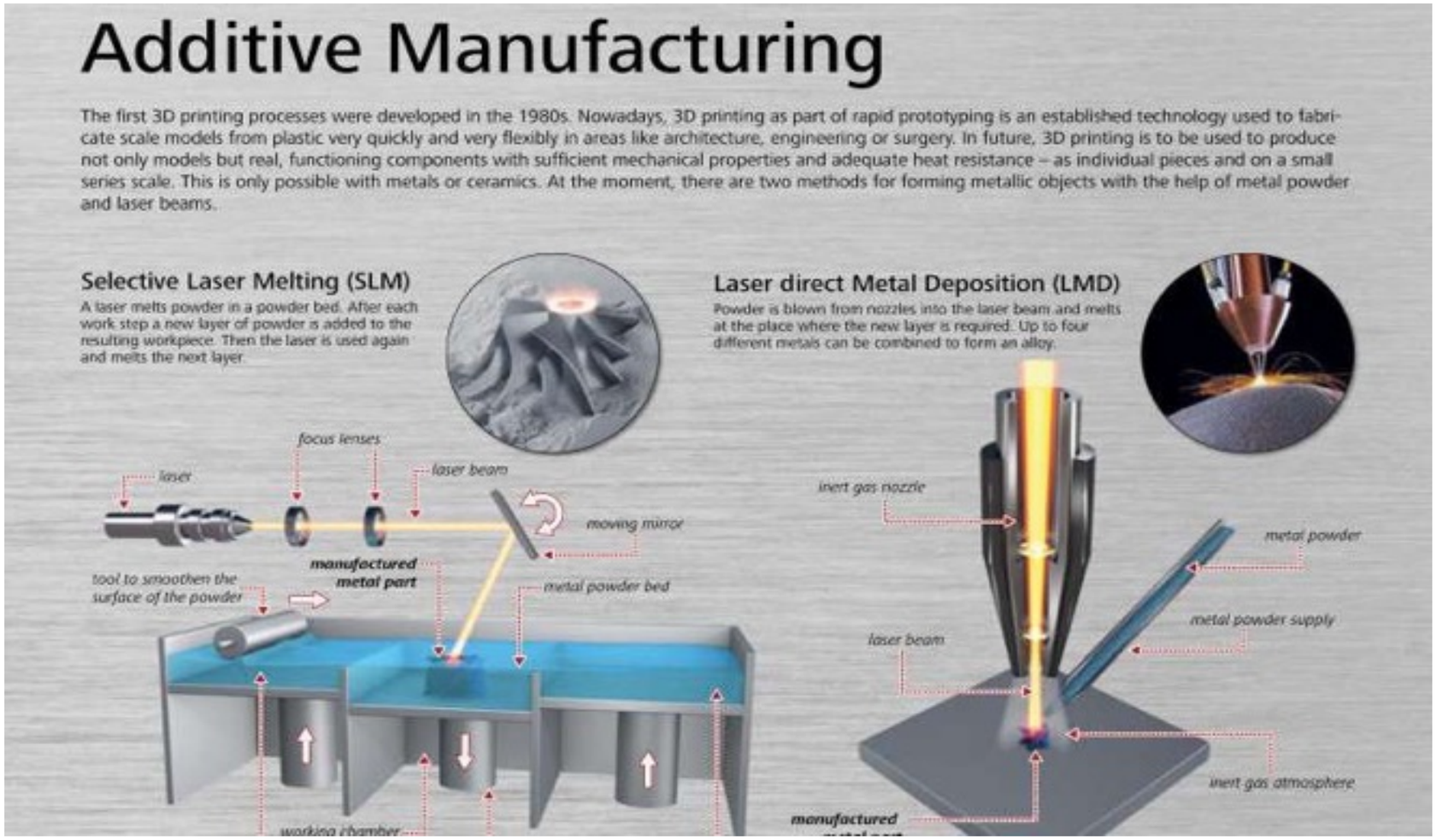

Also known as 3D Printing

Significant reduction in material wastage

Reference 14

Can deliver low cost prototypes, complex objects and even body parts in near future.

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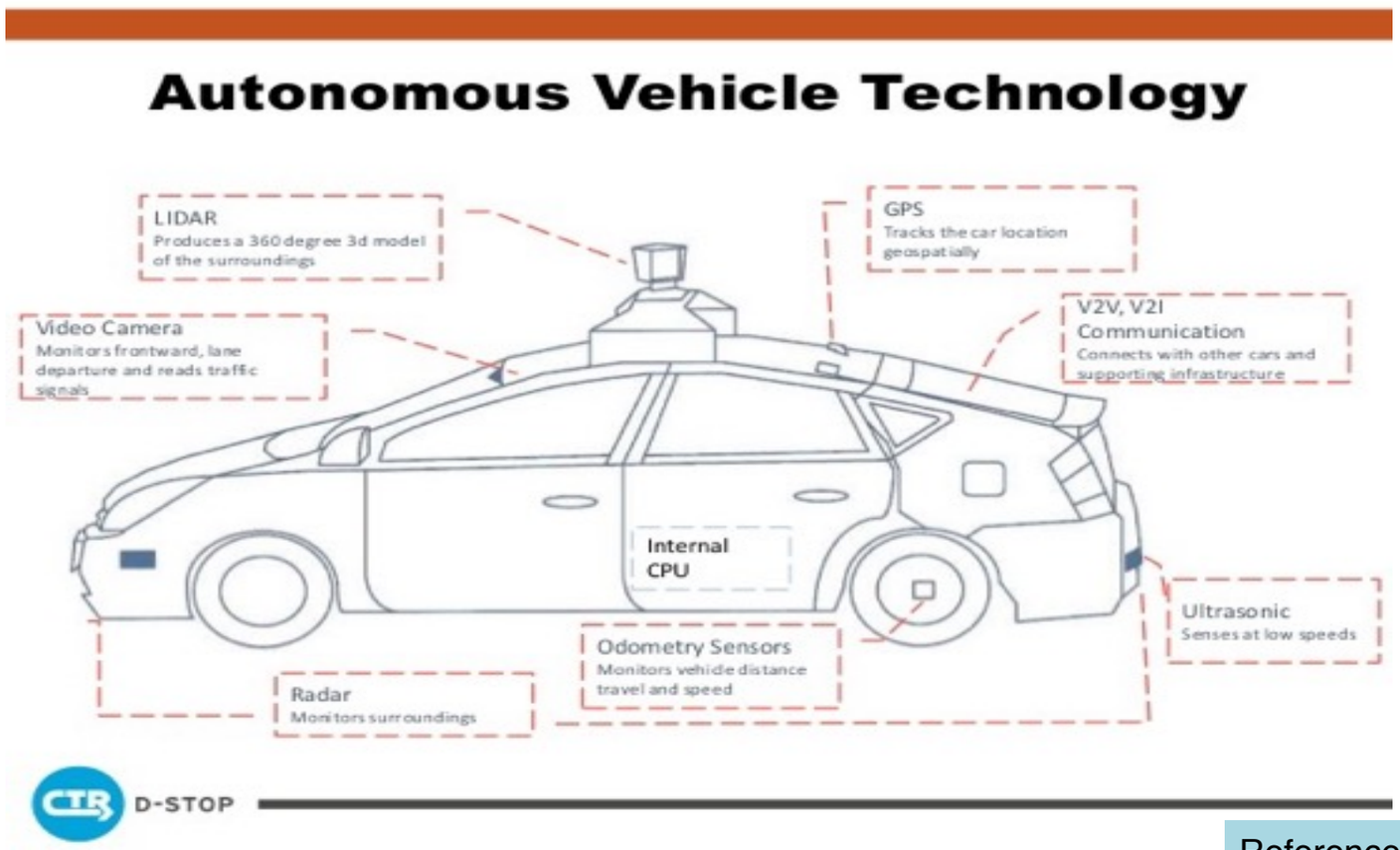
Autonomous Vehicles



Reference 15

Disruptive Technology worldwide. Promise of high safety and threat of elimination of millions of jobs

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Wearable Technology

Embedded sensors pick up and transmit information from persons or objects

Reference 16

Patients, Children, Defense Personnel and others have become accustomed to wearing these devices in the last decade.

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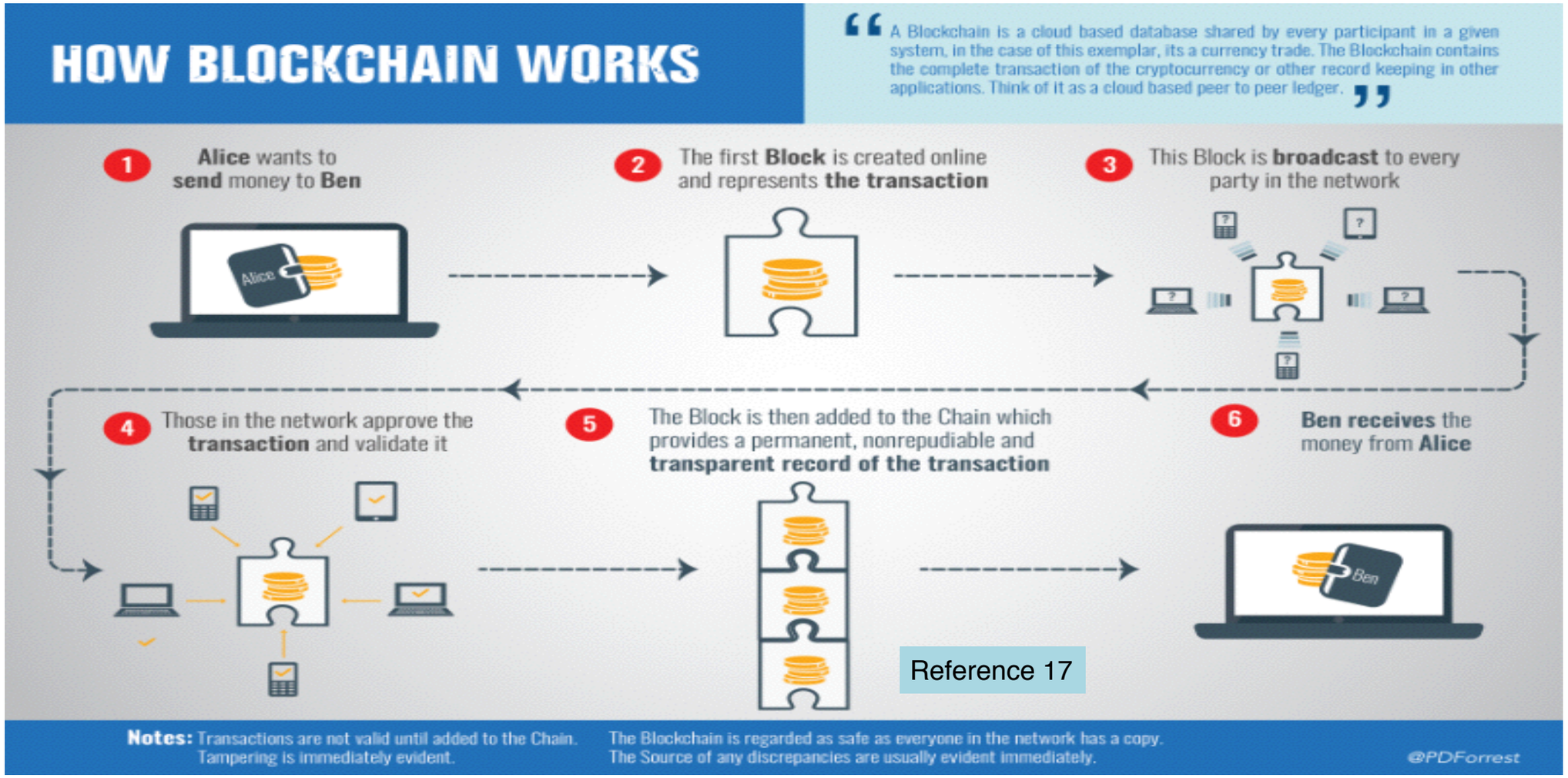

Every major Technology firm is investing in this Technology since it could impact on every industry in a few years

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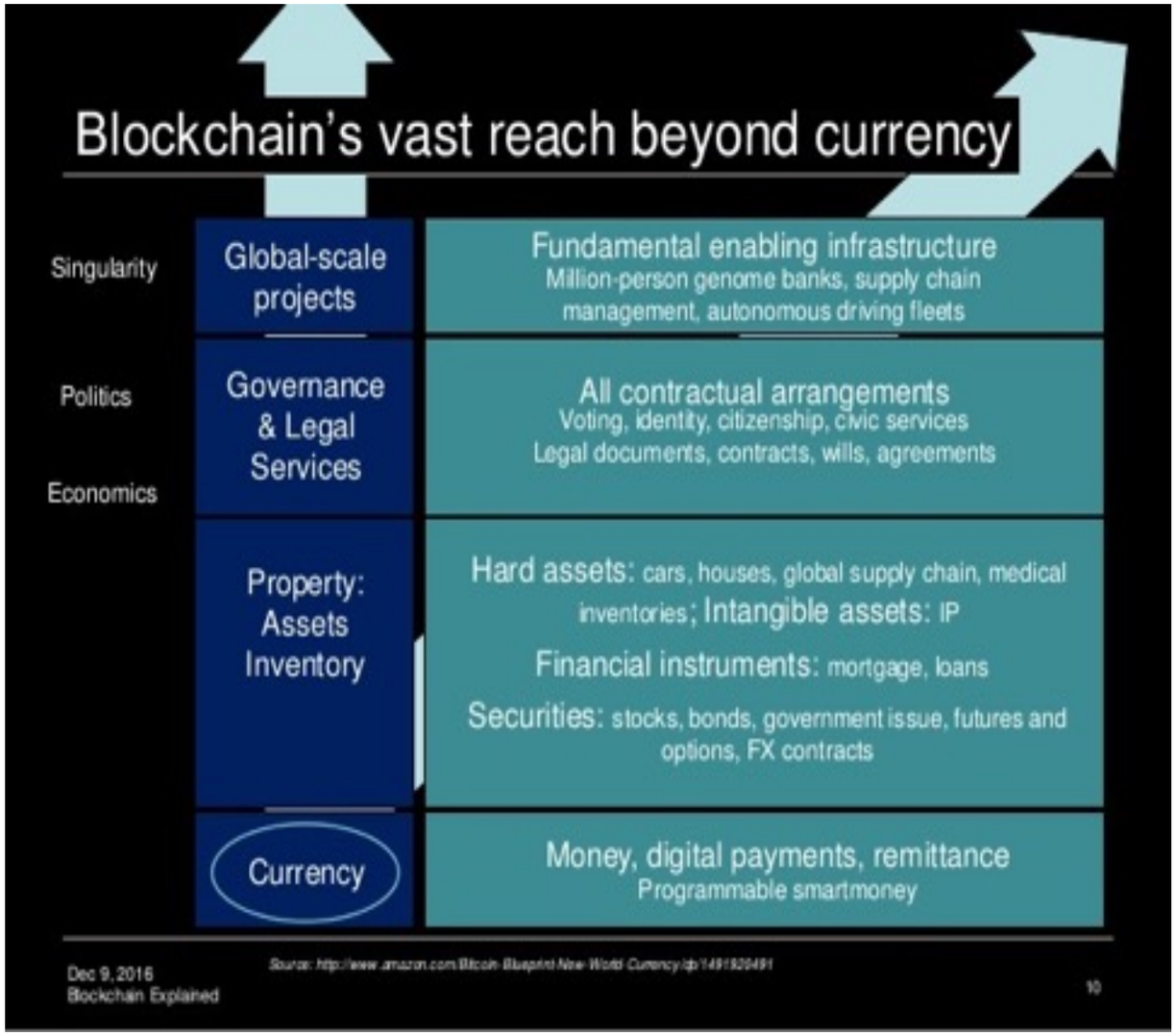

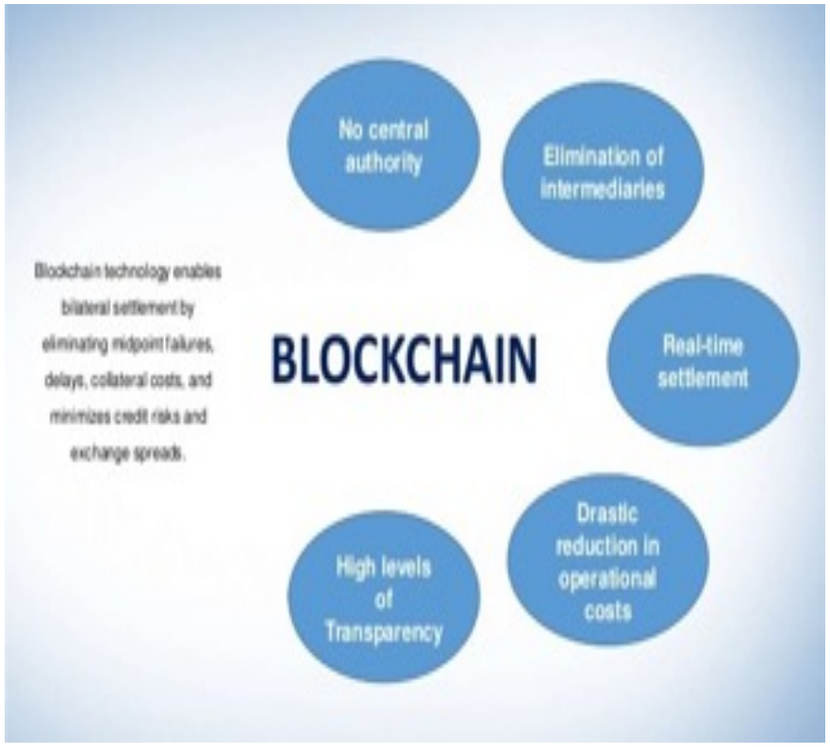

Reference 18

Financial services and Supply Chain Management would undergo paradigm shift

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Reference 19

Many start ups have invested in development of templates for appropriate use cases

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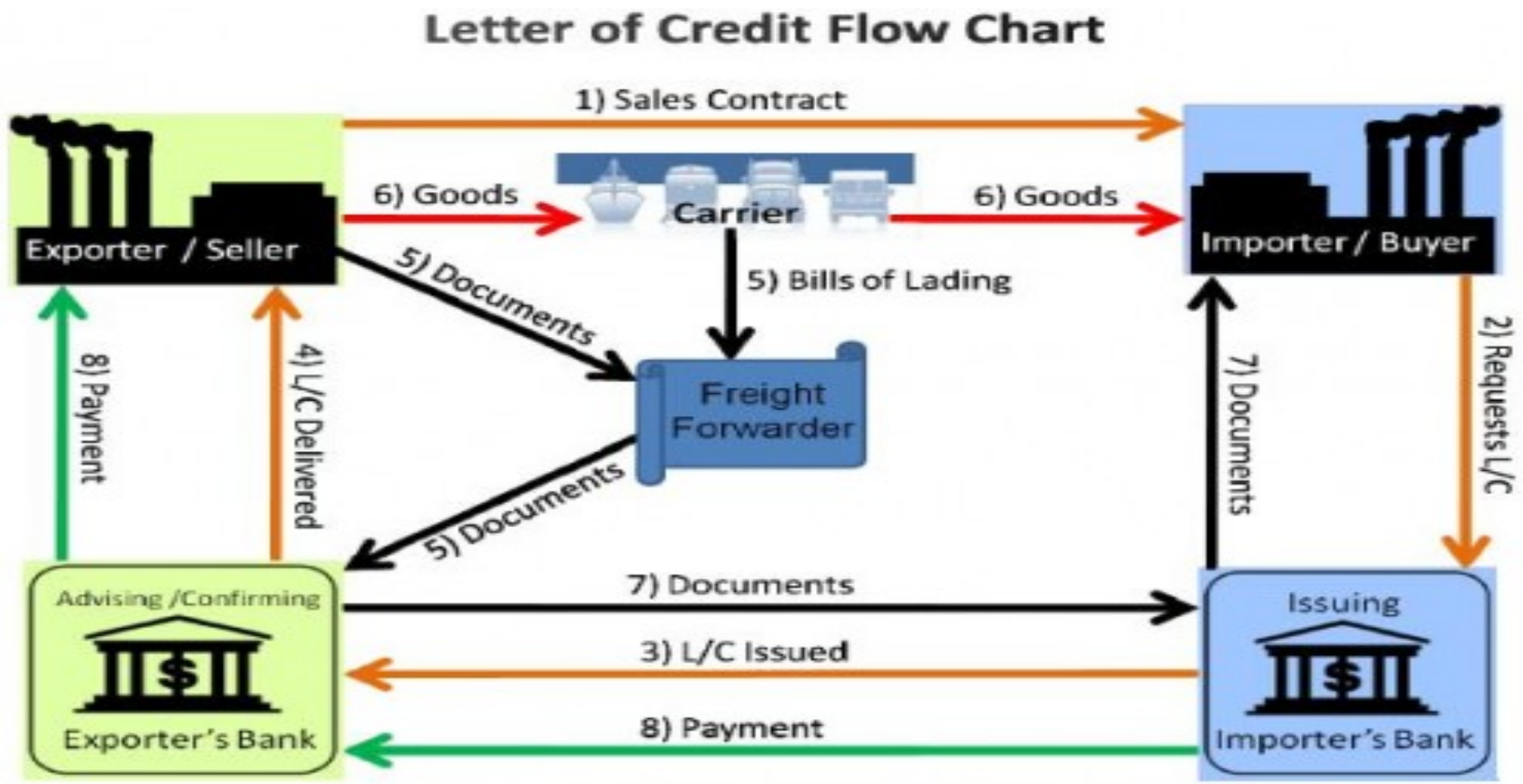

Reference 20

Information asymmetry will disappear thus leading to the demise of intermediary services.

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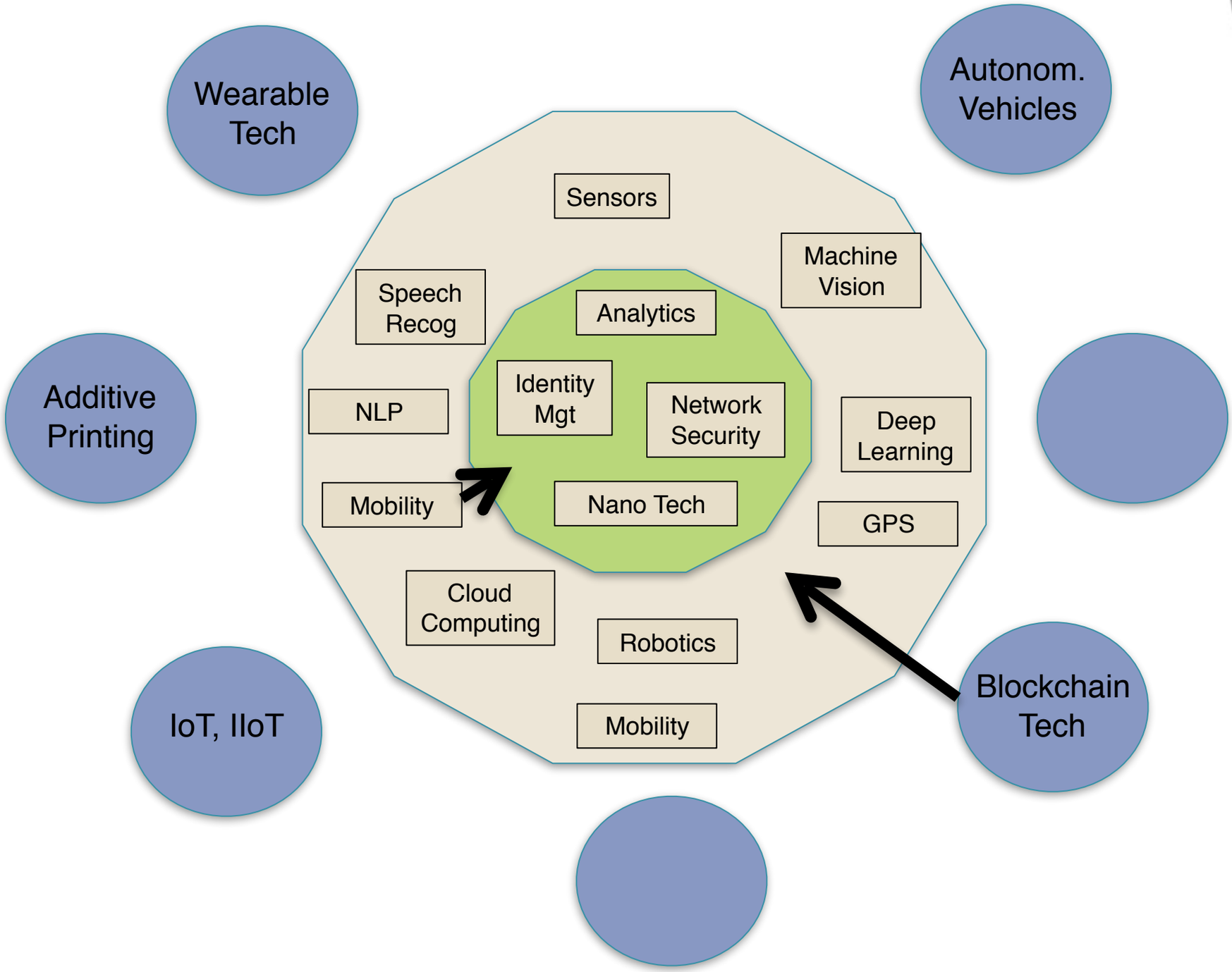
Significant Technologies



Core and Common Technology developments are fueling many applications

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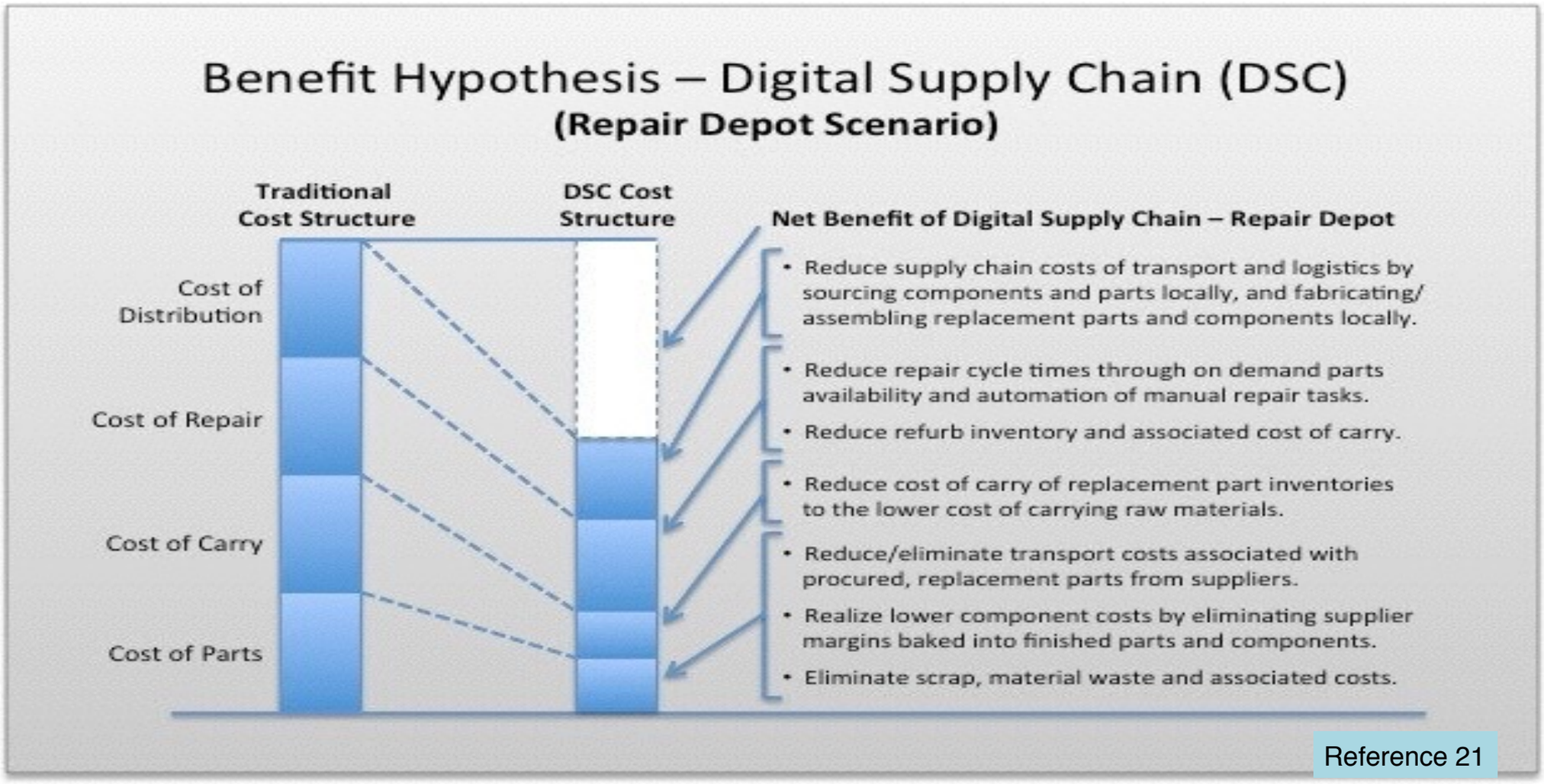
Business Imperative



Reference 21

These technologies when combined, will result in dramatic cost reduction and service quality enhancement

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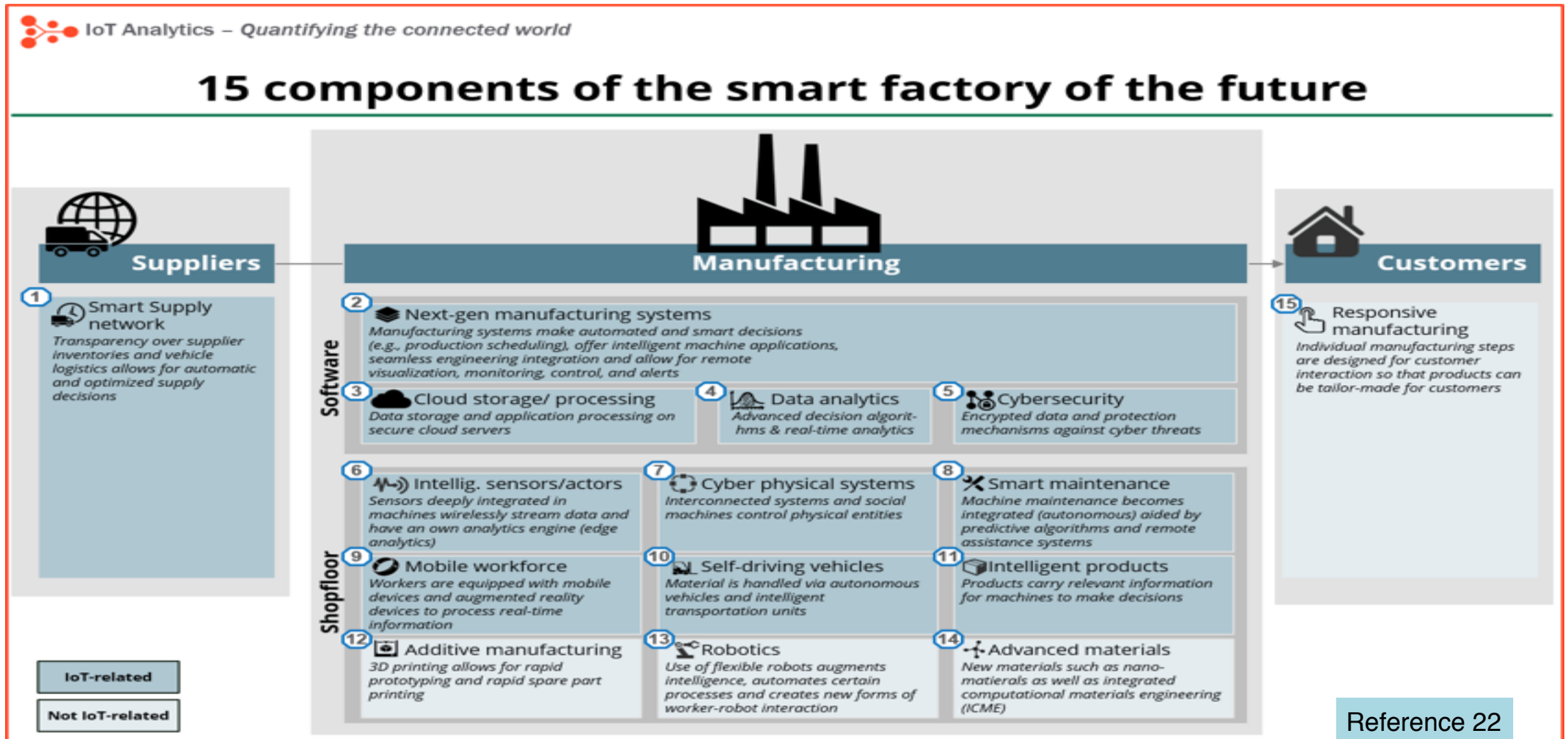

Reference 22

Digital Supply Chains within the smart factory will pan out on all functional areas

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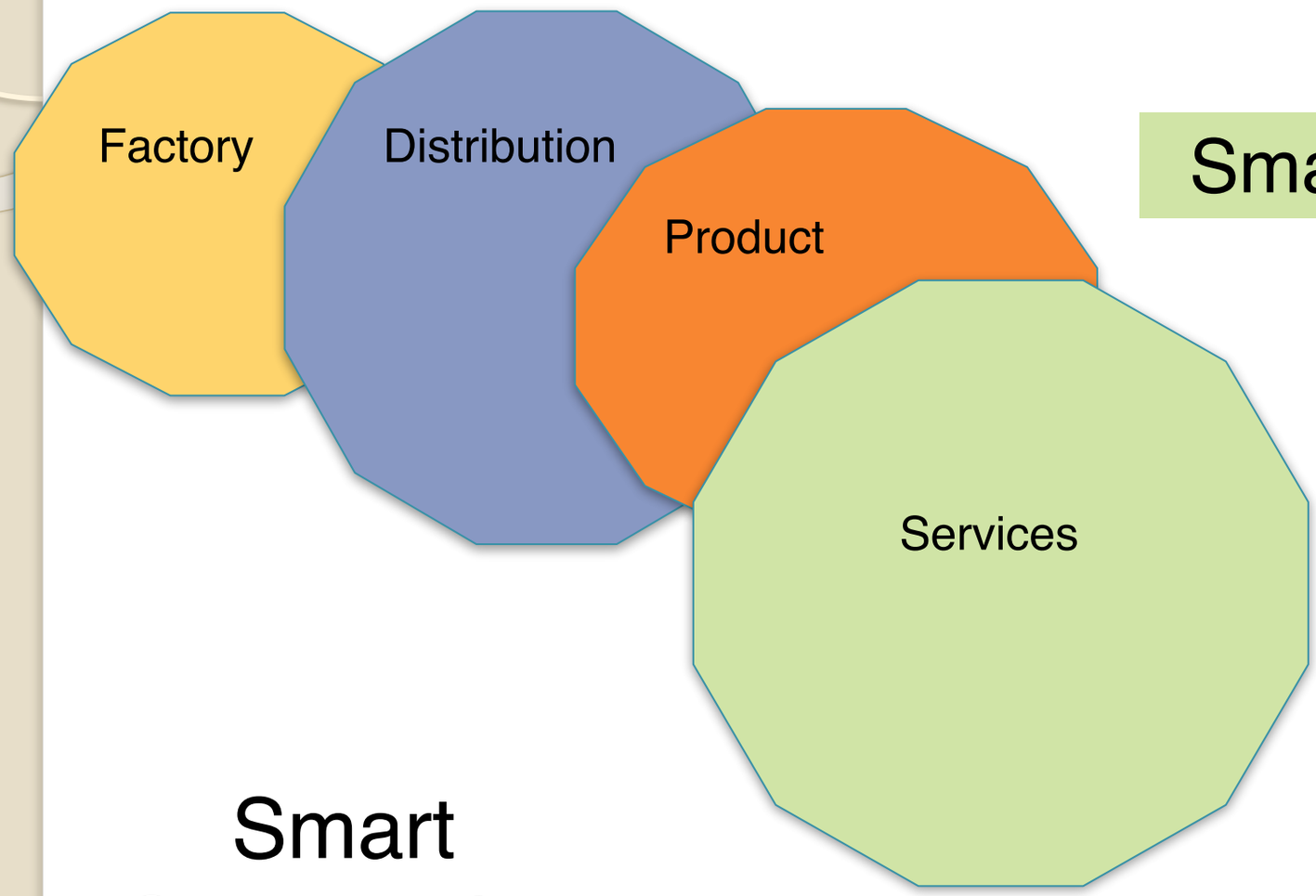

Smart Services

Smart Logistics

Smart Products

Smart Factory

Smart Strategy for India

Higher level of focus in Services and Logistics recommended

Indian firms have to formulate a firm specific strategy to invest in new technologies

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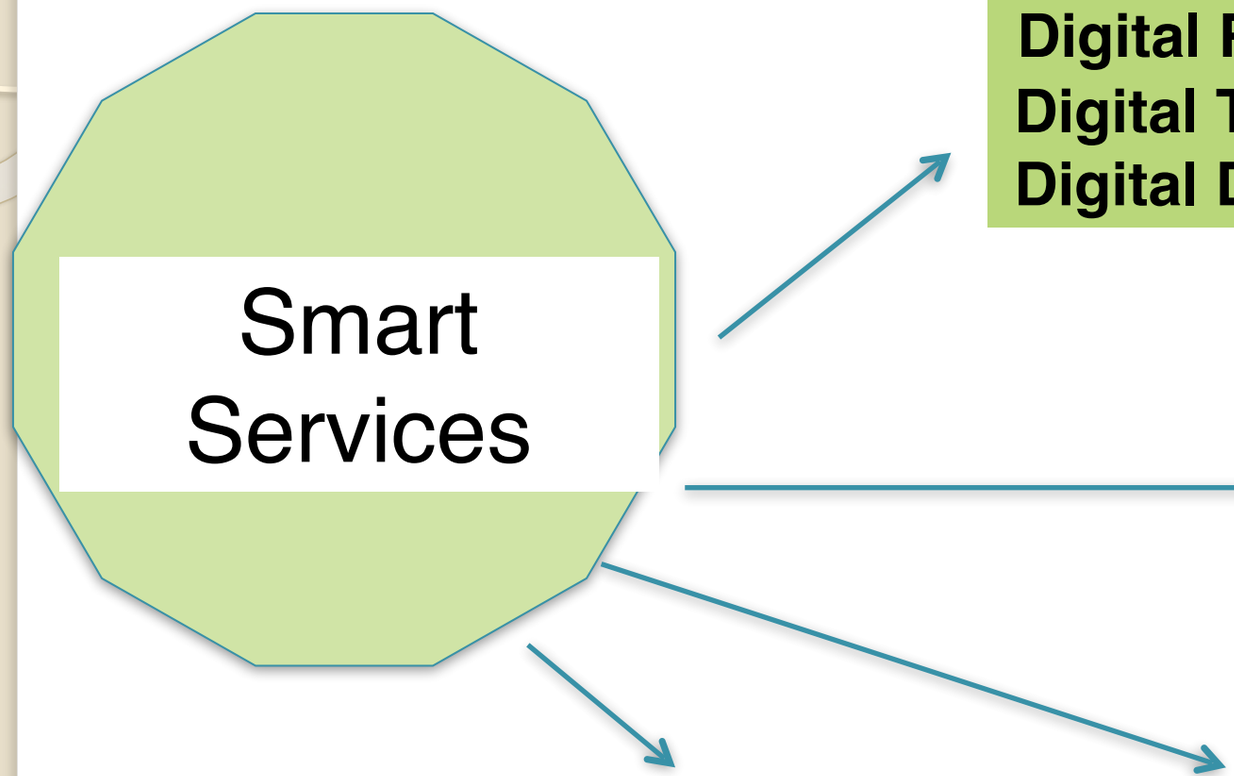

Digital Records
Digital Transactions
Digital Delivery

eGovernance
Health, Education
Infrastructure

Smart Strategy for India

Service Opportunity Identification for Certification

CRM
Condition Monitoring
eWallets

Digital India initiatives of GOI can be coordinated to provide Smart Services across the entire spectrum

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Smart Logistics

Location Aware Tech
Status Aware Tech
Selective Autonom.Vehicles

Consignment consolidation
Spot Assembly, Manufacturing
Mixed Mode Delivery
Eliminate non value adding roles

Safety of Vehicles, Goods and People
Route Planning

Smart Strategy for India

Ample opportunity exists to cut distribution costs and waste substantially

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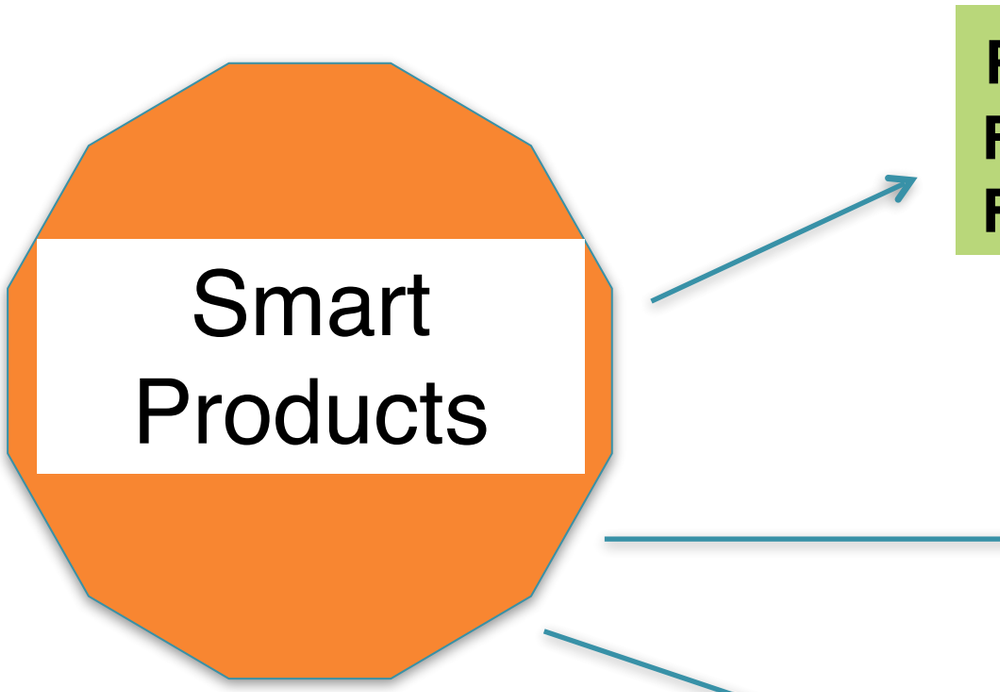

RM2FGDataLog
FieldPerfMonitoring
FieldStatusRecord

Proactive Push of Maintenance, Usage Information

Product Standardization
Product Componentization

Smart Strategy for India

Investments in Smart Product strategies have the highest potential to yield higher returns in export markets. This is to be aligned with the Make In India campaign

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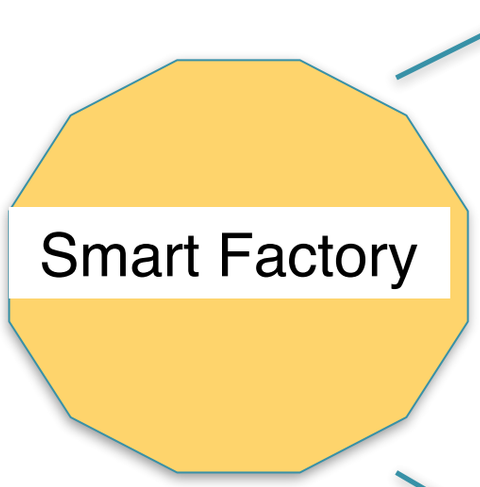

Cobotization
IIoT + Human safety
Additive Printing for Prototypes,moulds

Smart Work Stations
Worker Skill Development
Work Scheduling

Equipment Condition Monitoring
Integrates ProdnPlng and Machine Maint

Smart Strategy for India

Material Accounting
Warehousing, Stores
Inventory Management
M2S to M2O

Indian firms have to evolve a country specific implementation model of available Smart Factory applications

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Summary Assessment

- Digital SCM and SF applications are projected to grow exponentially in the coming decade
- Indian economy can be transformed to be a high skilled job growth market by appropriate adoption of emerging technologies
- Many of them present a significant opportunity to energize the export markets of India as well
- India needs to integrate the Make In India, Digital India and Smart Cities initiatives into a cohesive set to maximize their beneficial impact

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Thanks and Best Wishes

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