Internet of Things in Supply Chain Management
IE 694: Credit Seminar

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Introduction

What is Supply Chain Management

"**Supply Chain Management(SCM) is collection of all the activities, which involves in planning, controlling and executing a product's flow, in the processes of acquiring raw material, production, transportation and distribution to final customers, in the most streamlined and cost effective way possible**".[scm]

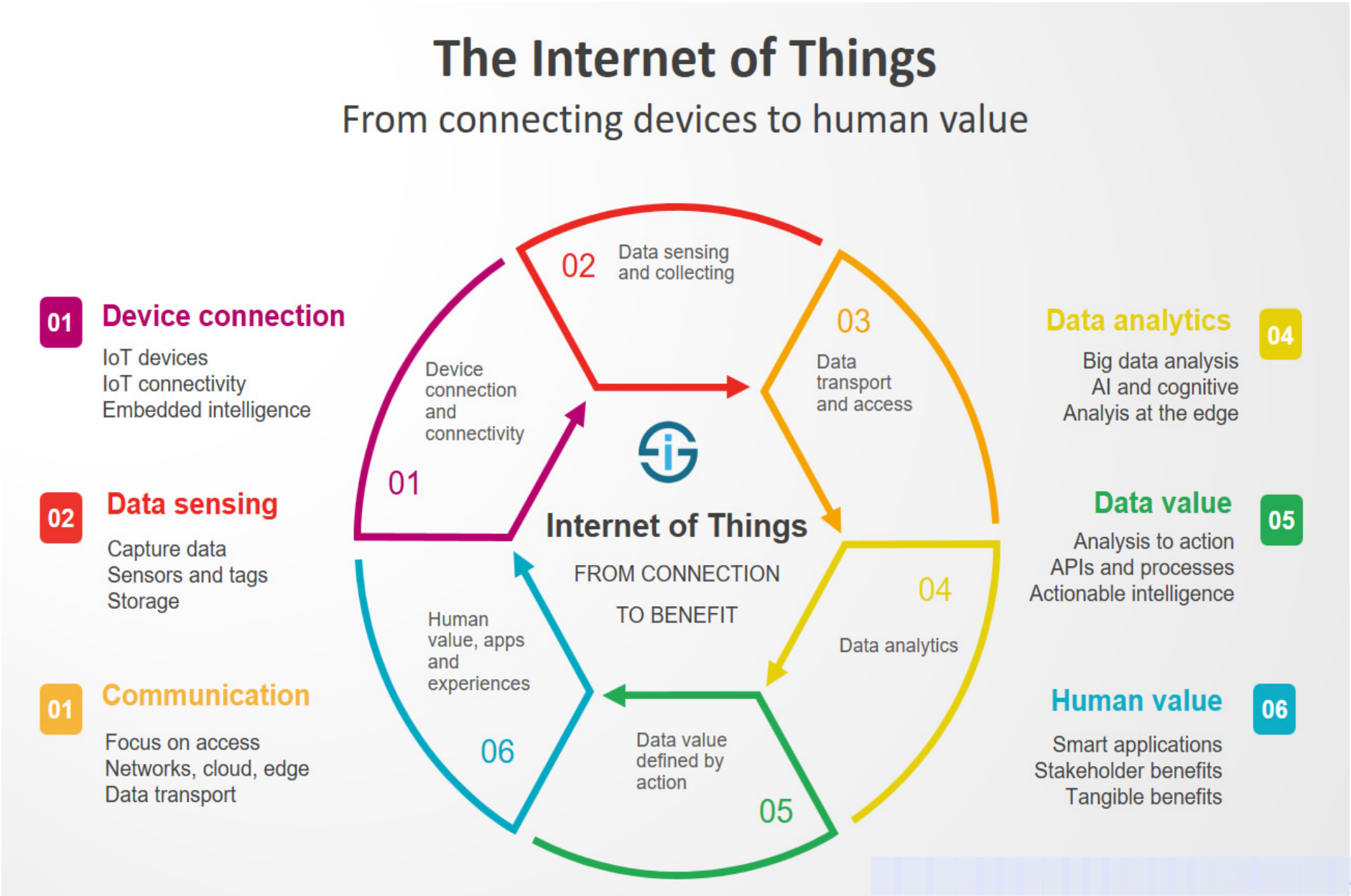
So basically SCM insures the smooth flow of services and products keeping losses and costs (in terms of time, capital, labour etc.) to minimum, providing maximum possible profit to an organization by achieving maximum customer satisfaction.

Internet of Things

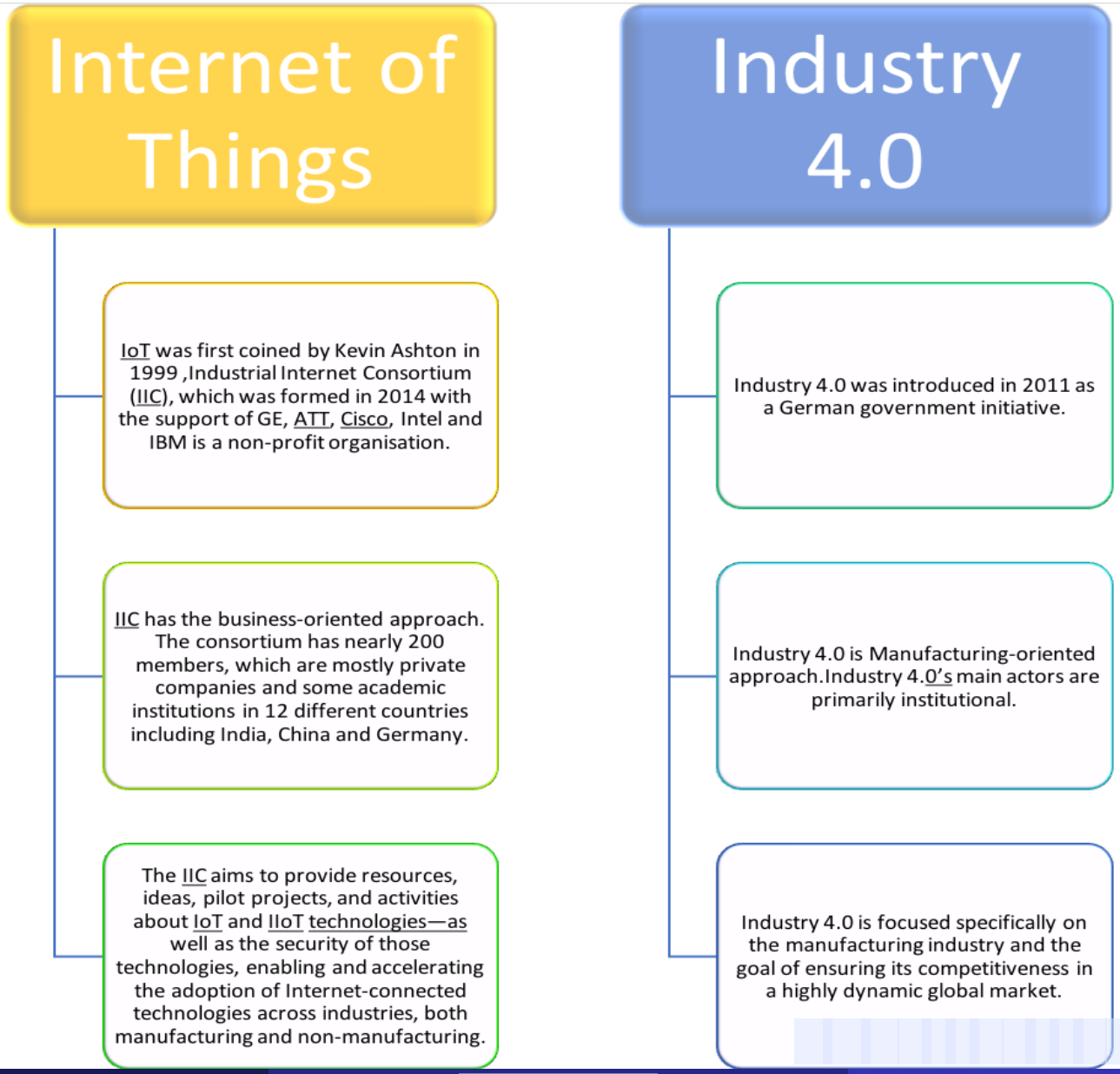
What is Internet of Things

"A network of devices such as computing devices, mechanical machines, digital devices, objects and even animals and humans provided with a unique identification, all these devices are then connected through the internet which allows the transfer and processing of the data generated by 'things'."

What is Internet of Things



IOT vs Industry 4.0



Architecture of IoT

There are mainly two type of architecture exists-

- Three Layer Architecture.
- Five Layer Architecture.

Three Layer Architecture

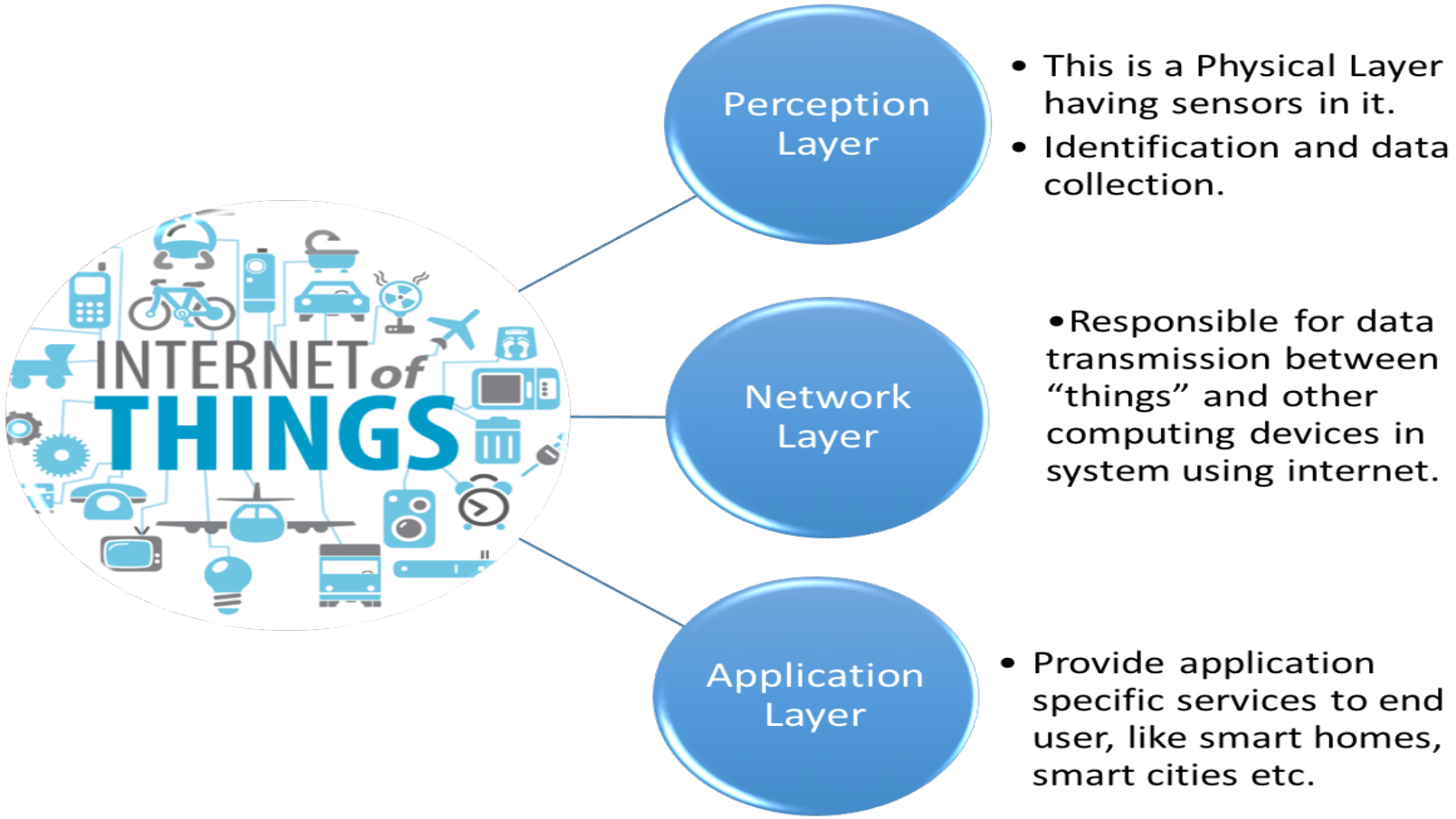


Figure: Three Layer Architecture

Five Layer Architecture

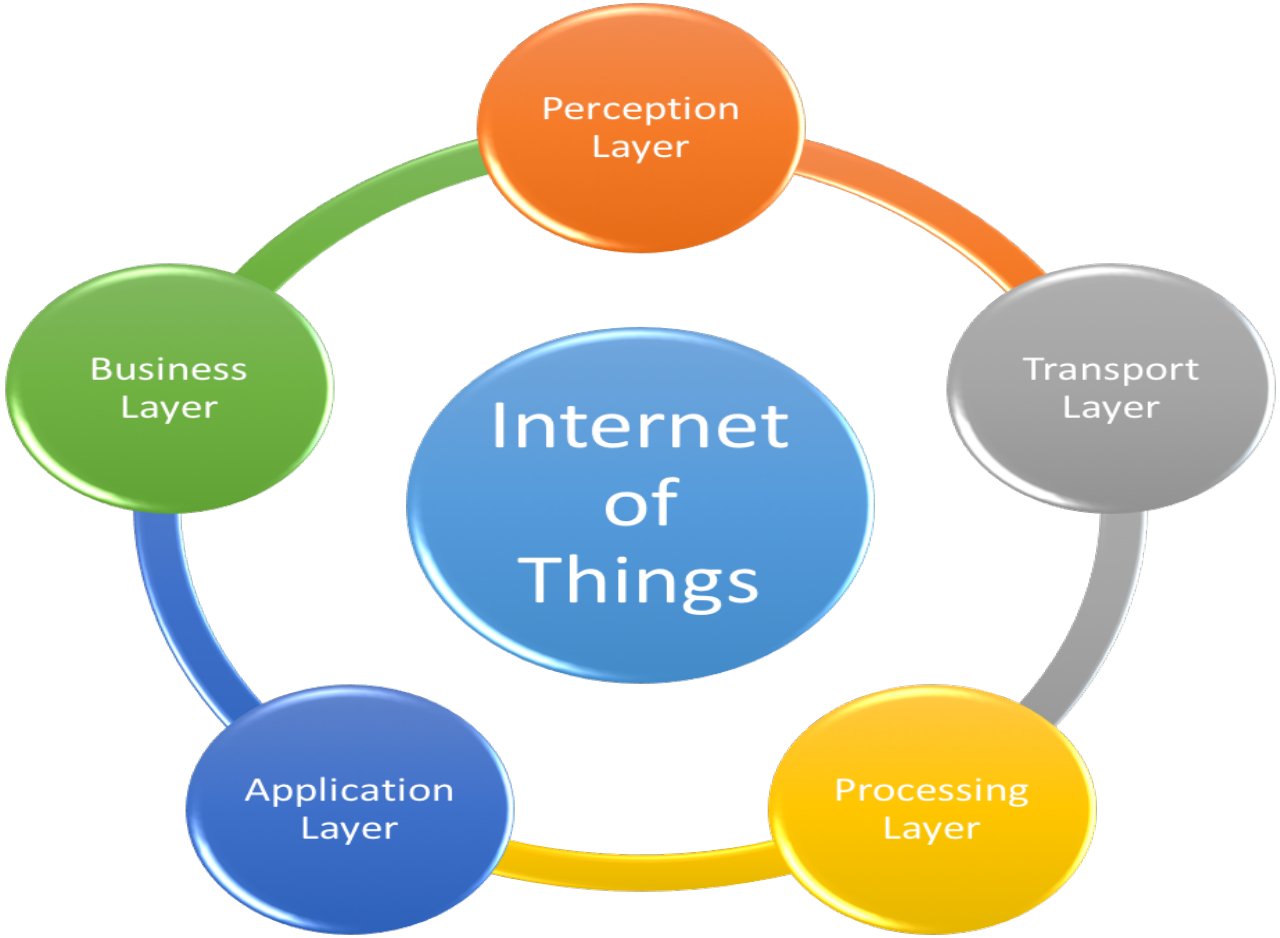


Figure: Five Layer Architecture

Major Components of IoT

Major Components of IoT are-

- ID.
- Security Control.
- Relationship Management.
- Service Discovery.
- Meta-information.
- Service Composition.

Supply Chain Information Transmission based on IoT and RFID

Information transmission plays very important role in-

- Demand forecast.
- Price Fluctuations.
- Limited supply and short term gaming.

Supply Chain Information Transmission based on IoT and RFID

RFID system structure and its working

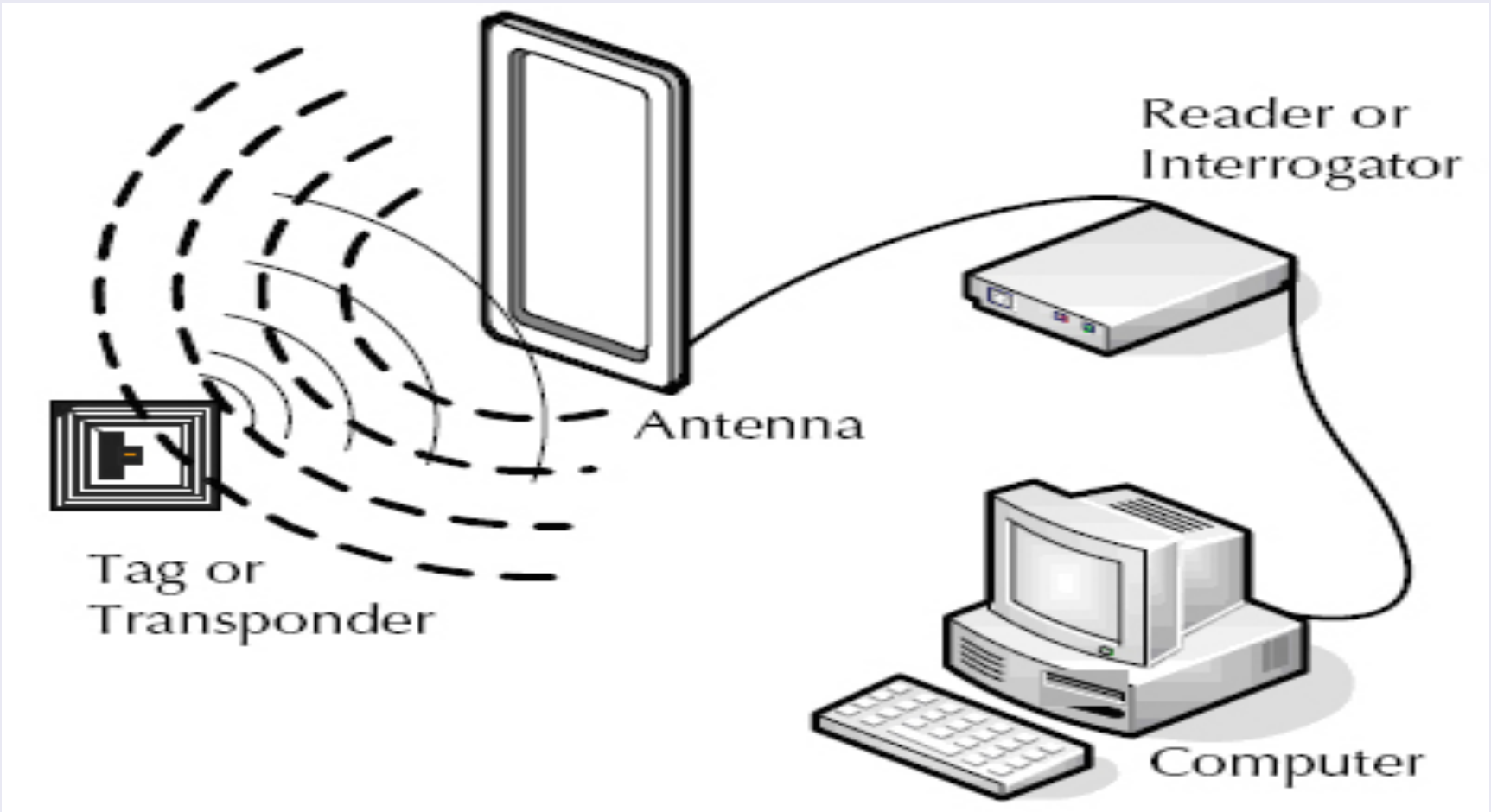


Figure: RFID System[YH09]

Supply Chain Information Transmission based on IoT and RFID

EPC network structure and its working

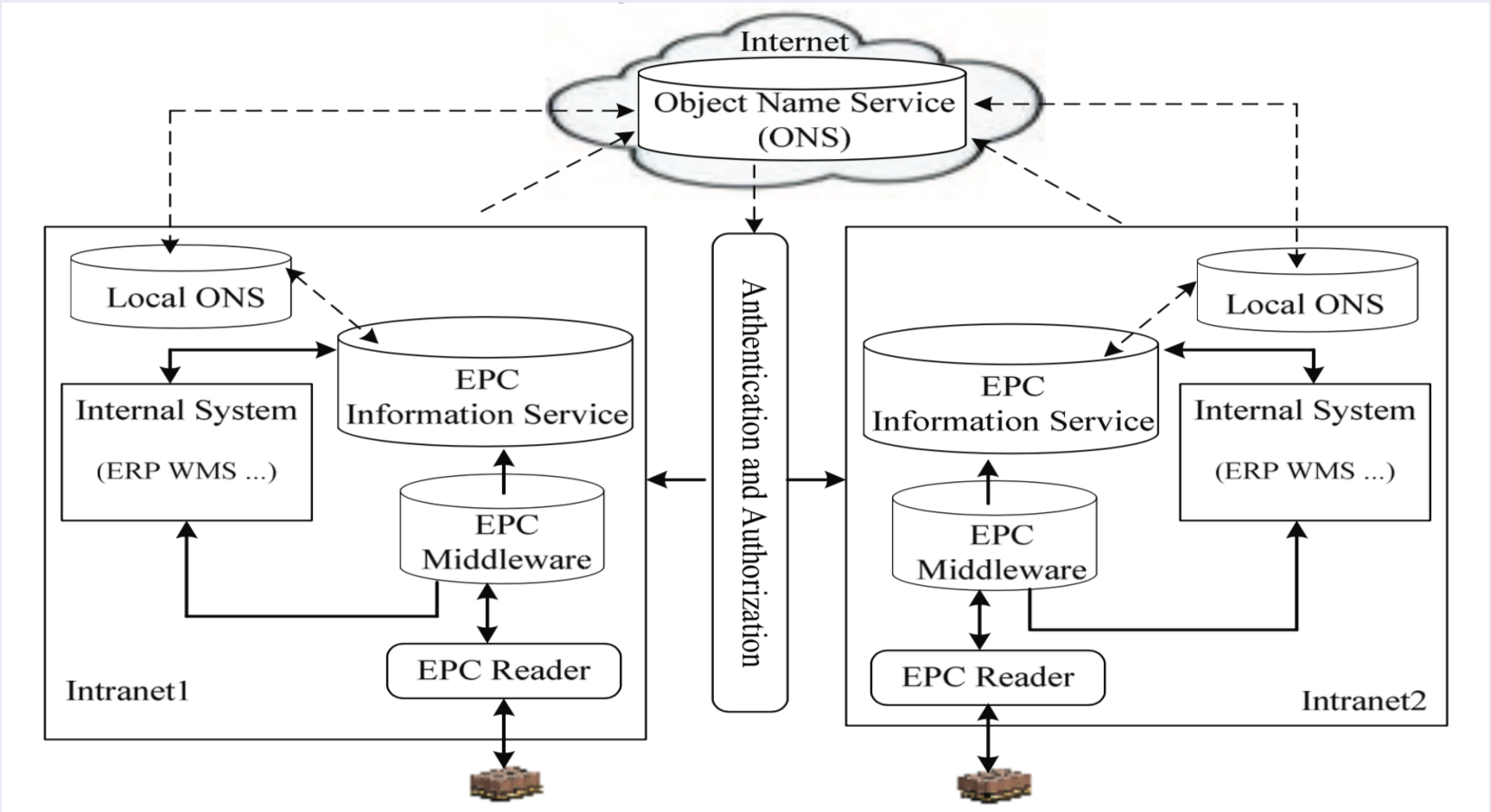


Figure: EPC Network System[YH09]

Supply Chain Information Transmission based on IoT and RFID

EPCglobal Network

- Current management organisation of IoT.
- Develops and manage EPC standards.
- Every enterprise must be a registered user of EPCglobal in order to apply IoT in their enterprise.[wik]

Working of IoT using RFID in Supply Chain Information Transmission.

Procedure for start using IoT in a supply chain is as follows-

- Do registration at EPCglobal network.
- Now Supply chain members configure their internal internet of things equipments.
- For RFID systems, information coding rules in tags must adopt the standard developed by EPCglobal.
- RFID systems, EPC middlewares and EPC-IS are core technologies in this system.
- EPC middleware can be independently developed and compatibility between EPC middleware and background information system must be considered.
- With the services of local ONS (or Root ONS), supply chain members can get and update the product information in time.

Application of IoT in Drug Supply Chain Information Transmission

Working of IoT in Drug Supply Chain

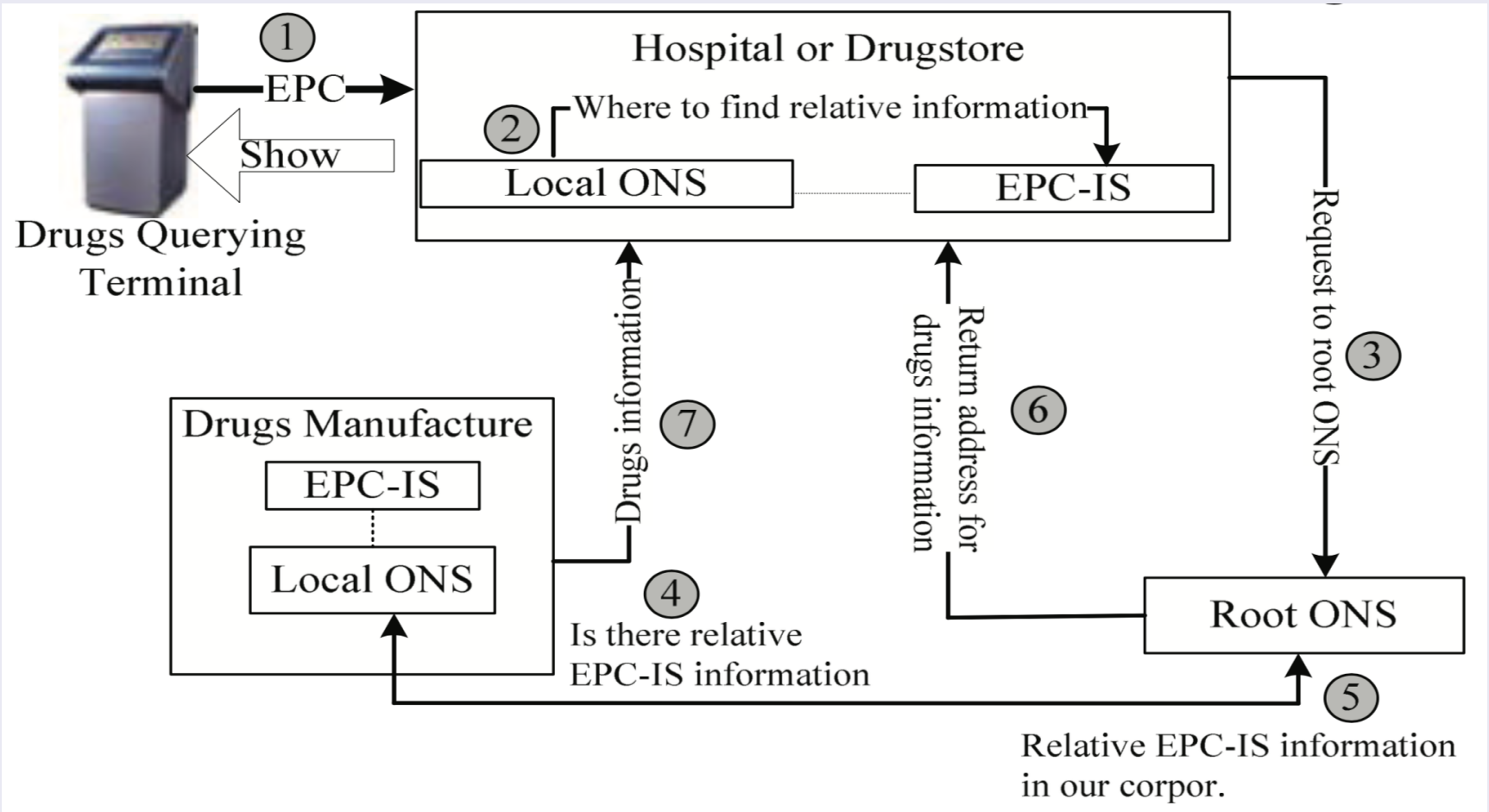


Figure: IoT in drug supply chain[YH09]

Benefits of IoT in Supply Chain Management

Benefits of IoT in Supply Chain Management are as follows-

- Internet of Things realize information visualization in a supply chain.
- Improves the level of information sharing among supply chain members.
- Improves overall performance .
- Helps in decision making.
- IoT enhances "Vendor relations" and "Customer retention".
- Reduces machine downtime cost by planned and predictive maintenance.
- Protects supply chain from bullwhip effect.
- Allows companies to live track their products.

Benefits of IoT in Supply Chain Management

cont'd-

- Produces high quality, clean and reliable data.
- Visual inventory management allows the dynamic information about the inventory to be collected automatically over the IoT.
- Customers can understand the process of fabricating and transporting over the IoT.[LLZW11]
- Using IoT it is possible that a defect in a product can be serviced even before it come to notice of customer.

Conclusions

1. Internet of Things in Supply Chain allows fast, reliable and smoother information transmission.
2. IoT enhances transparency in supply chain.
3. IoT increases operational efficiencies and revenue opportunities for an organisation.
4. Data generated from IoT is clean and precise, which can be further used for predictive analysis for inventory forecasting, demand forecasting etc.[LSO00]
5. IoT offers "Perpetual connectivity".
6. IoT generates and process data real timely.
7. Data collected can also be used for building new models.[YH09]

References I

[LLZW11] Ping Lou, Quan Liu, Zude Zhou, and Huaiqing Wang, *Agile supply chain management over the internet of things*, Management and Service Science (MASS), 2011 International Conference on, IEEE, 2011, pp. 1–4.

[LSO00] Richard A Lancioni, Michael F Smith, and Terence A Oliva, *The role of the internet in supply chain management*, Industrial Marketing Management **29** (2000), no. 1, 45–56.

[scm] *supply chain management (SCM)*, https://searcherp.techtarget.com/definition/supply-chain-management-SCM.

[wik] *EPCglobal Network*, https://en.wikipedia.org/wiki/EPCglobal_Network.

References II

[YH09] Bo Yan and Guangwen Huang, *Supply chain information transmission based on rfid and internet of things*, Computing, Communication, Control, and Management, 2009. CCCM 2009. ISECS International Colloquium on, vol. 4, IEEE, 2009, pp. 166–169.

Extra

Bullwhip Effect

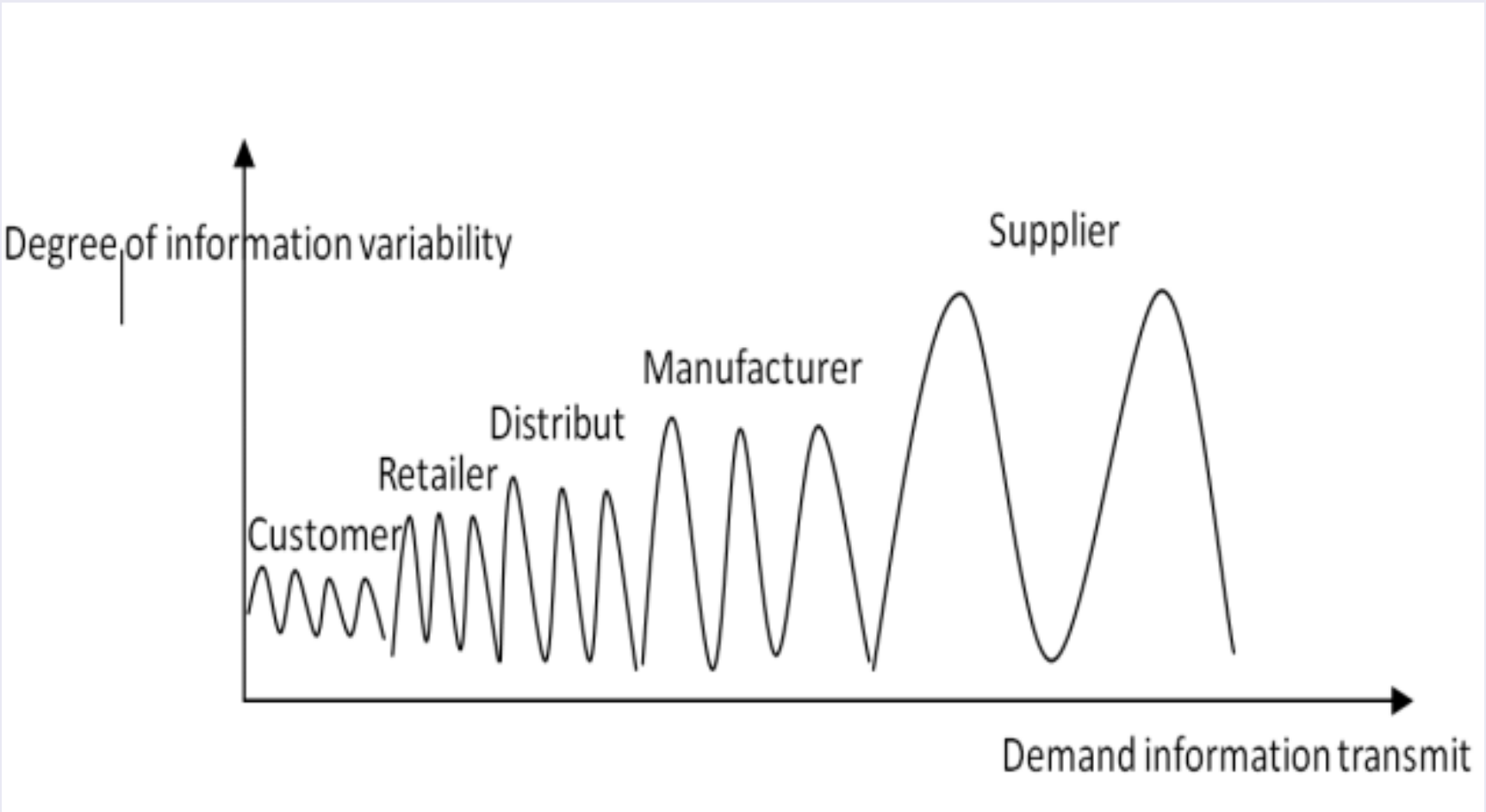


Figure: Bullwhip Effect

Source: Internet