NPTEL ONLINE CERTIFICATION COURSES

Management Information Systems

Prof. Surojit Mookherjee
VGSoM, IIT KHARAGPUR

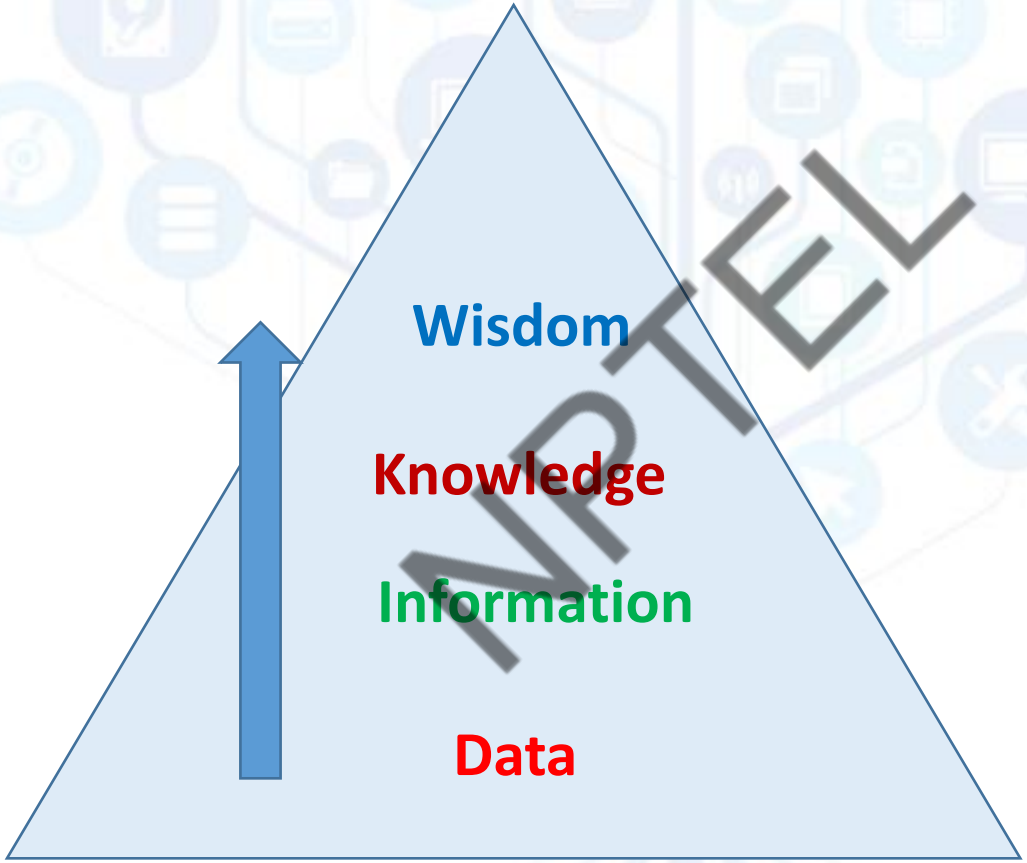
Week 01: Introduction to MIS

Lecture 01 : Introduction – Part 1 of 2

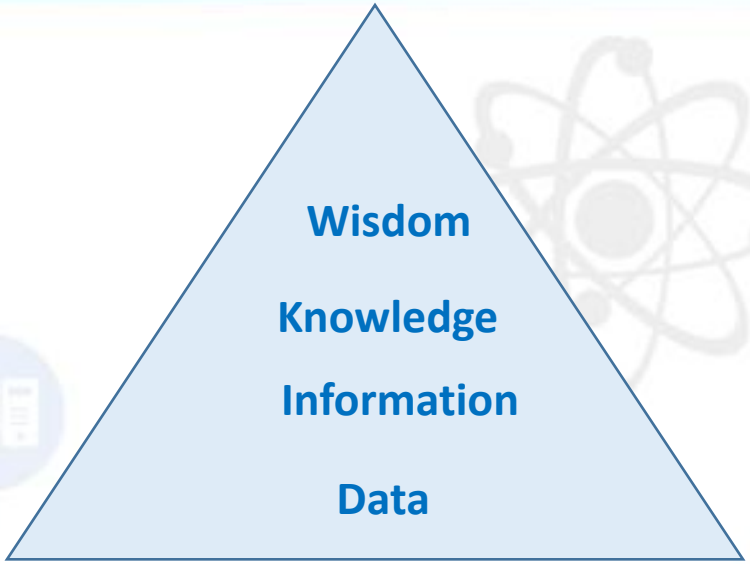
Learning Objectives

- How are information systems transforming business, and why are they so essential for running and managing a business today?
- What is an information system? How does it work? What are its management, organization, and technology components? Why are complementary assets essential for ensuring that information systems provide genuine value for organizations?
- What academic disciplines are used to study information systems, and how does each contribute to an understanding of information systems?

Goals of MIS



What Is an Information System? (1 of 3)



- Information system
  - Set of interrelated components
  - Collect, process, store, and distribute information
  - Support decision making, coordination, and control
- Information vs. data
  - Data are streams of raw facts
  - Information is data shaped into meaningful form
  - Information is an ordered set of data that you can understand and act on.

Data – Information - Decision

Data

Region	Sales in Rs.
North	50 lacs
West	40 lacs
South	22 lacs
East	10 lacs

Information

Sales is best in North region and worst in the South and East region, where the target of 40 lacs has been missed.

Decision

1. Appoint more sales engineers in South and East region
2. Increase advertisement budget
3. Offer more discounts to dealers

What Is an Information System? (2 of 3)

- Three activities of information systems produce information organizations need
  - Input: Captures raw data from organization or external environment
  - Processing: Converts raw data into meaningful form
  - Output: Transfers processed information to people or activities that use it

What Is an Information System? (3 of 3)

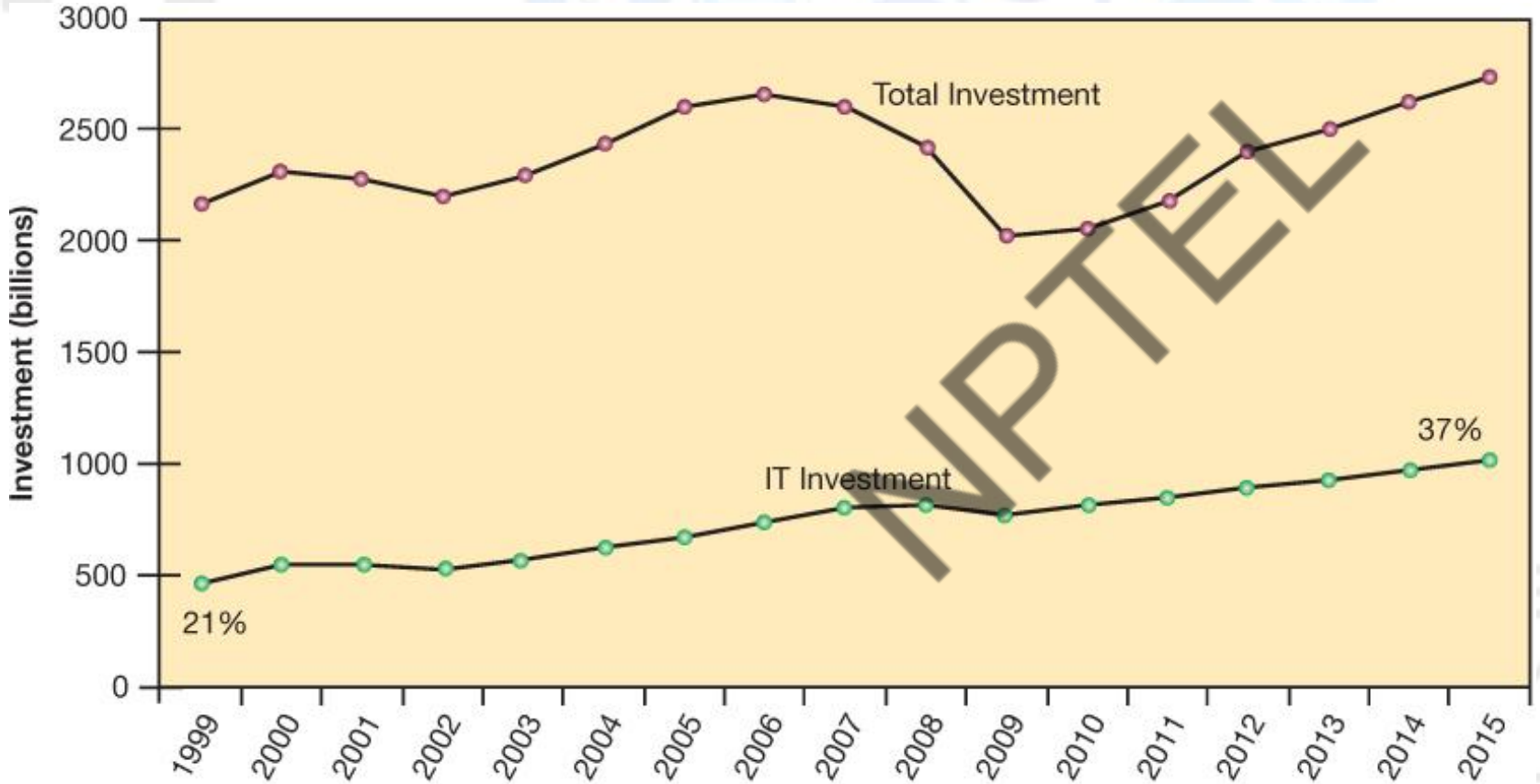
- Feedback
  - Output is returned to appropriate members of organization to help evaluate or correct input stage
- Computer/computer program vs. information system
  - Computers and software are technical foundation and tools, similar to the material and tools used to build a house , but are not complete by themselves.
  - These are the foundation or the base for building any Information system.

How Information Systems Are Transforming Business

- Global networking on real-time
- Mobile digital platform
- Systems used to improve customer experience, respond to customer demand, reduce inventories, and more
- Growing online learning and readership
- Expanding e-Commerce and Internet advertising
- Banking , Finance and Stock Markets
- New federal security and accounting laws

  (companies to store e-mails for 5 yrs)

Figure 1.1. Information Technology Capital Investment



What's New In Management Information Systems (1 of 2)

- Technology
  - Cloud computing
  - Big Data and the Internet of Things (IoT)
  - Mobile digital platform
- Management
  - Online collaboration and social networking software
  - Business intelligence
  - Virtual meetings (Post Covid-19 has become essential)

What's New In Management Information Systems (2 of 2)

- Organizations
  - Globally connected enterprises
  - Changing business models driven by new technology (e.g Uber / Airbnb)
  - Rapid change in technologies
  - Time / Speed to market (e.g Vaccines and drugs for Covid 19)
  - Social business (education sector)

The Emerging Digital Firm

- In a fully digital firm:
  - Significant business relationships are digitally enabled and mediated
  - Core business processes are accomplished through digital networks
  - Key corporate assets are managed digitally
- Digital firms offer greater flexibility in organization and management
  - Time shifting (multiple time zones),
  - Space shifting (multiple geo locations)

  – Work from Home

Strategic Business Objectives of Information Systems (1 of 2)

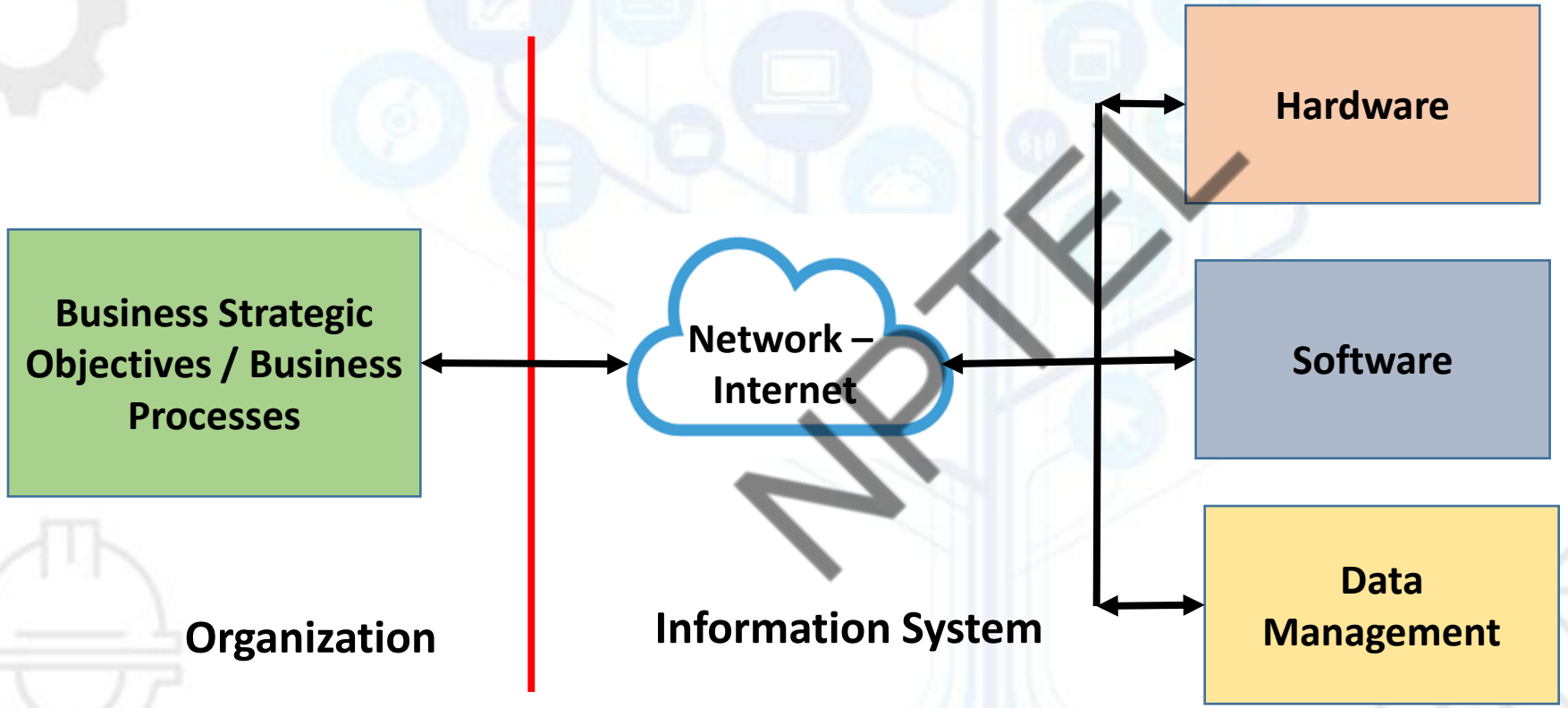
- Growing interdependence between:
  - Ability to use information technology and
  - Ability to implement corporate strategies and achieve corporate goals

Class Q - (For instance, Speed to Market is very important to firms introducing new products. How can IT help achieve that objective?)

Strategic Business Objectives of Information Systems (2 of 2)

- Firms invest heavily in information systems to achieve six strategic business objectives:
  1. Operational excellence
  2. New products, services, and business models
  3. Customer and Supplier intimacy
  4. Improved decision making
  5. Competitive advantage
  6. Survival

The Interdependence Between Organizations and Information Systems



REFERENCES

- **The World is Flat : Thomas L Friedman**
- **Management Information Systems: Managing the Digital Firm - Kenneth C. Laudon & Jane P. Laudon**

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Week 01: Introduction to MIS

Lecture 02 : Introduction – Part 2 of 2

Learning Objectives

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- What is an information system? How does it work? What are its management, organization, and technology components? Why are complementary assets essential for ensuring that information systems provide genuine value for organizations?
- What academic disciplines are used to study information systems, and how does each contribute to an understanding of information systems?

Strategic Business Objectives - 1.Operational Intelligence (Excellence)

- Improvement of efficiency to attain higher profitability
- Information Systems Technology is an important tool in achieving greater efficiency and productivity
  - Take a look at Amazon / Flipkart / Alibaba etc. from an Operational excellence perspective.

Strategic Business Objectives – 2.New Products, Services, and Business Models

- Business model: describes how company produces, delivers, and sells product or service to create wealth (Uber / Airbnb / Amazon)
- Information systems and technology is a major enabling tool for new products, services, business models
  - Examples: Apple's iPad, Google's Android OS, and Netflix

Class Q - (What is IT's role in development of Electric / Hybrid cars / Green technologies like Wind and Solar power generation ?)

Strategic Business Objectives – 3.Customer and Supplier Intimacy

- Serving customers well leads them to return, increasing revenue and profits
  - Example: High-end hotels that use computers to track customer preferences and then monitor and customize the environment
- Intimacy with suppliers allows them to provide vital inputs, which lowers costs

Class Q – (Online sites achieving a high degree of Customer intimacy – Amazon / Swiggy etc. How are they doing this ?)

Strategic Business Objectives 4.Improved Decision Making

- Without accurate information:
  - Managers must use forecasts, best guesses, luck
  - Results in:
    - Overproduction, underproduction
    - Misallocation of resources
    - Poor response times
  - Poor outcomes raise costs, lose customers

Strategic Business Objectives 5.Competitive Advantage

- Delivering better performance
- Charging less for superior products
- Responding to customers and suppliers in real time
- Examples: Apple, Walmart, UPS , Airbnb , Uber, OYO

Strategic Business Objectives - 6.Survival

- Information technologies as necessity of business
- Governmental regulations requiring record-keeping

  Examples: Toxic Substances Control Act, Sarbanes-Oxley Act

  Compliances – Financial , Statutory , Environmental , Income-Tax , GST records etc.
- Current Pandemic situations forcing Organizations to work differently (e.g Working from Home)

Information System and Organization Strategy

Information technology and Organizations influence one another

Following are the major influencers in an Organization.

- ✓ Structure
- ✓ Business processes
- ✓ Politics
- ✓ Culture
- ✓ Environment, and
- ✓ Management decisions

Features of an Organization

- Use of hierarchical structure
- Accountability, authority in system of impartial decision making
- Adherence to principle of efficiency
- Decision making and business processes
- Organizational politics, culture and environment
- Ethical practices

Major economic impacts of Information Systems / Technology

- IT changes relative costs of capital and the costs of information
- Information systems technology is a factor of production, like capital and labor
- IT affects the cost and quality of information and changes economics of information
- Information technology helps firms contract in size because it can reduce transaction costs (the cost of participating in markets)
- Outsourcing

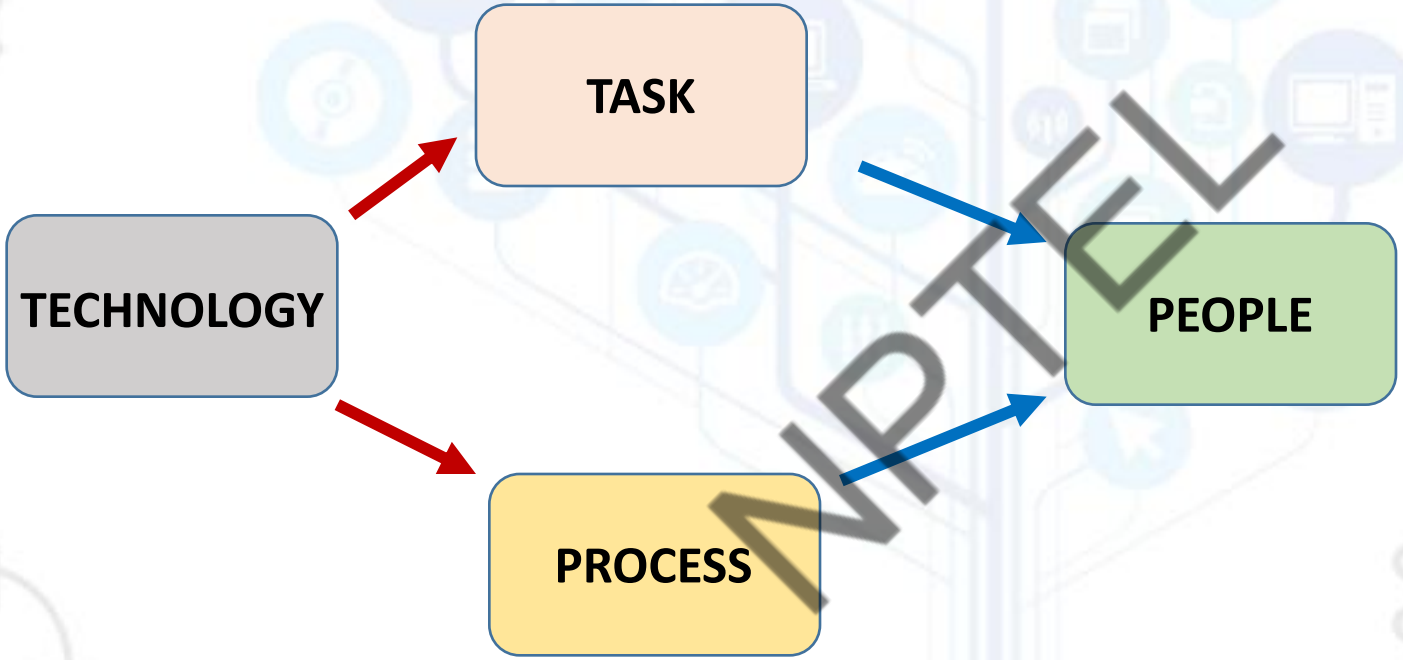
Organizational and Behavioral impacts

- IT flattens organizations
  - Decision making pushed to lower levels
  - Fewer management levels / managers needed (IT enables faster decision making and increases span of control)
- To days organizations
  - Organizations flatten because in post industrial societies, authority increasingly relies on knowledge and competence rather than formal positions

Organizational resistance to change…

- Information systems become bound up in organizational politics because they influence access to a key resource – **information**
- Information systems potentially change an organization's structure, culture, politics, and work
- Most common reason for failure of large projects is due to organizational and political **resistance to change**

Organizational resistance to change…



Michael Porter's Competitive Forces Model

Five competitive forces shape fate of firm

1. Traditional competitors
2. New market entrants
3. Substitute products and services
4. Customers
5. Suppliers

IT enabled Strategies for managing competitive forces

- Low-cost leadership – e.g Walmart
- Product differentiation – e.g. Apple , Google
- Focus on market niche – e.g. Uber , Airbnb
- Strengthen customer and supplier intimacy – e.g. Netflix , Amazon

Michael Porter's Competitive Forces Model

1. Traditional competitors
2. New market entrants
3. Substitute products and services
4. Customers
5. Suppliers

Internet's impact on Competitive Advantage

- Transformation, destruction, threat to some industries - e.g. travel agency, printed encyclopedia, newspaper
- Competitive forces still at work, but rivalry more intense – e.g. Booking.com
- Universal standards allow new rivals, entrants to market - e.g. Amazon competing with Microsoft & IBM with Cloud technology
- New opportunities for building brands and loyal customer bases – e.g. Uber , Airbnb

REFERENCES

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Lecture 03 : Dimensions of Information System

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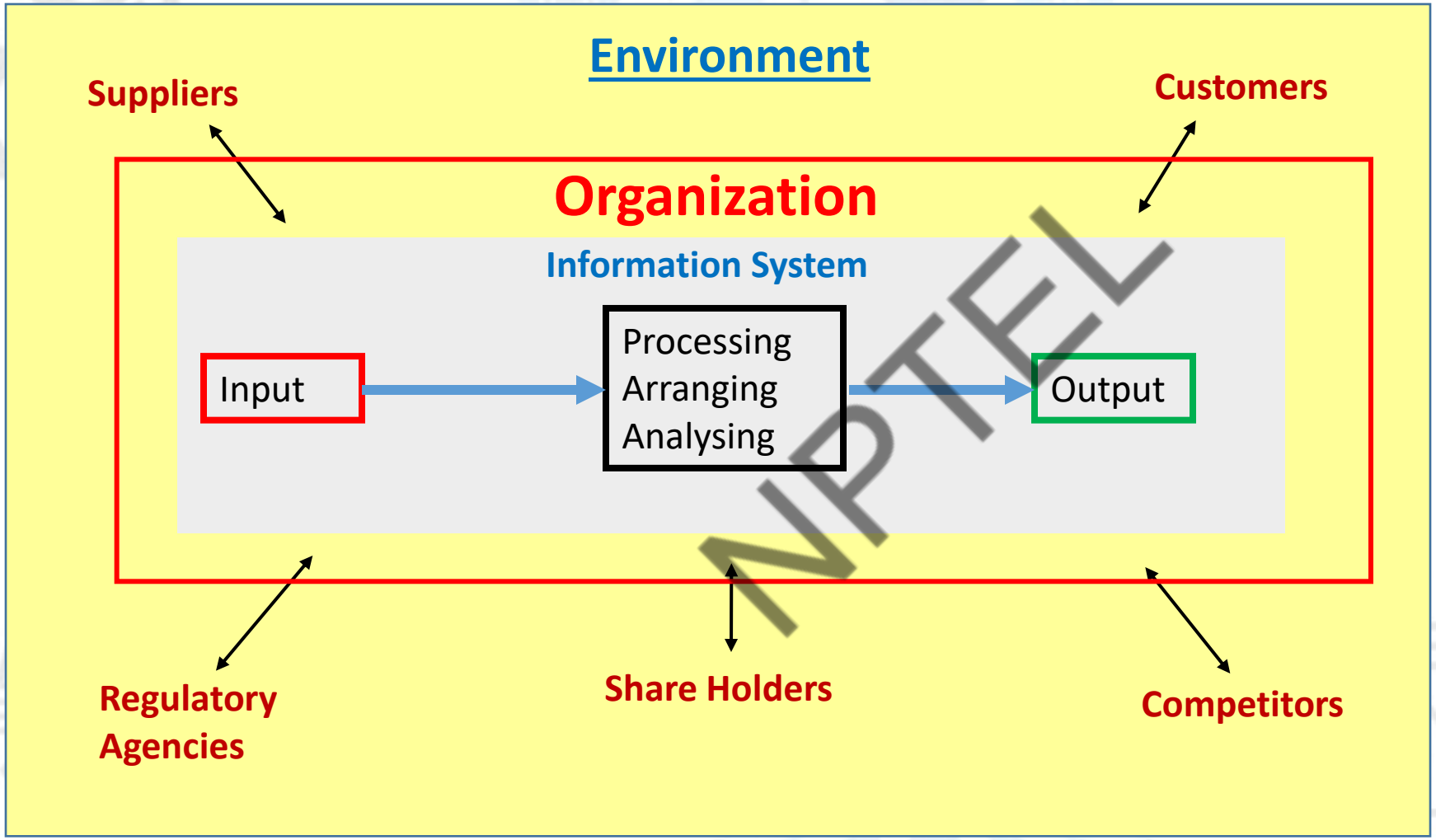
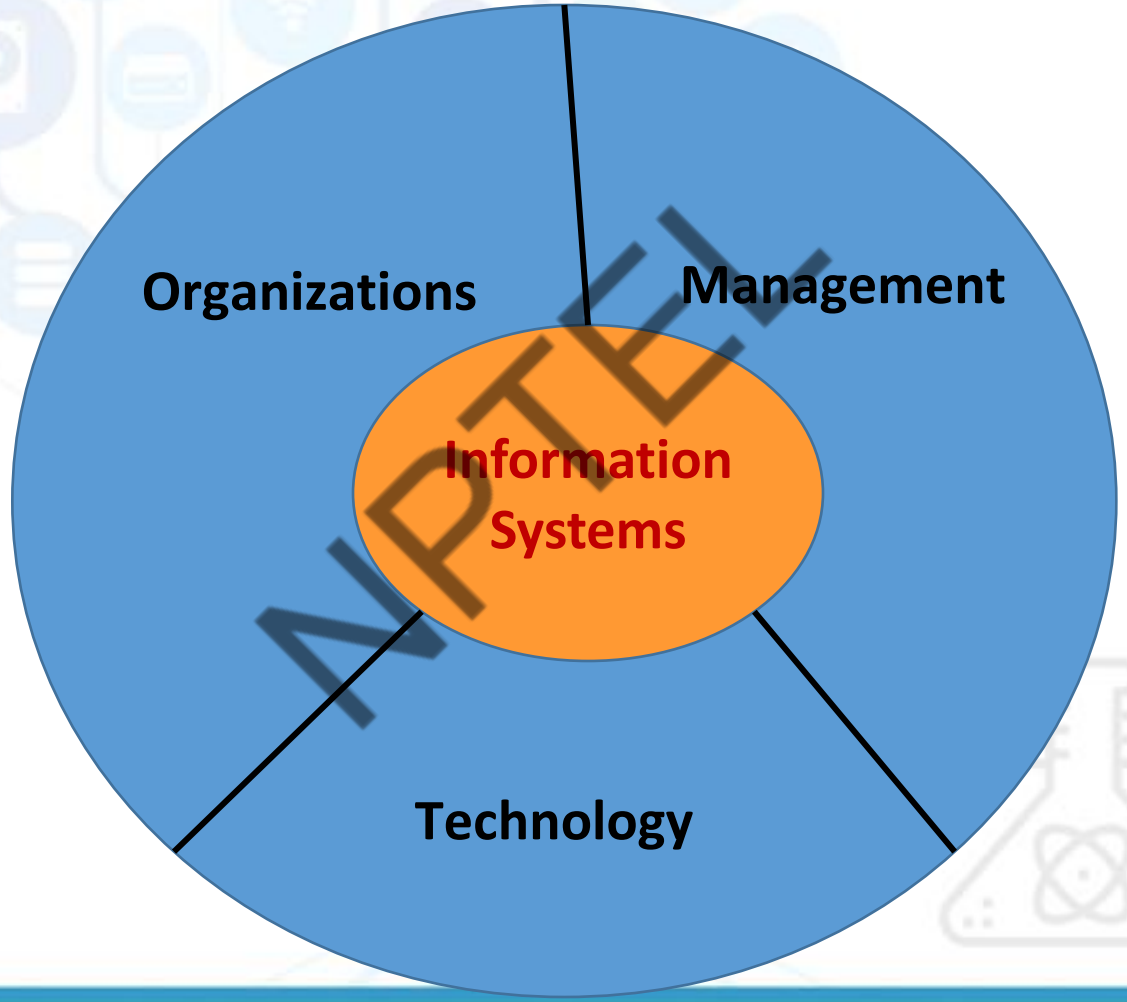
Information System – Eco System



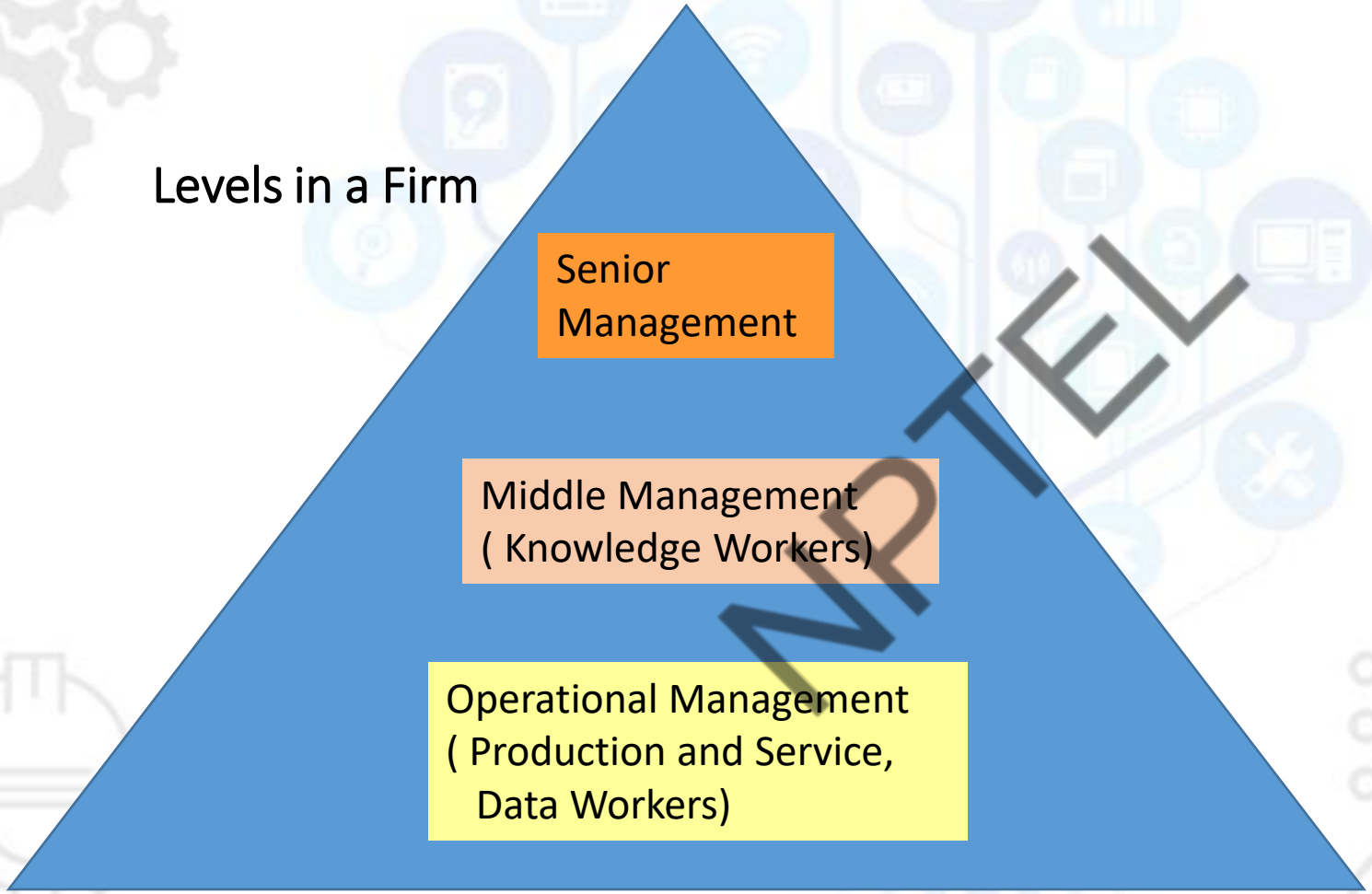
Dimensions of Information Systems

- Organizations
- Management
- Technology

Not just Computers



Dimensions of Information Systems: Organizations (1 of 2)



Dimensions of Information Systems: Organizations (2 of 2)

- Separation of business functions
  - Sales and Marketing
  - Human resources
  - Finance and Accounting
  - Manufacturing and Production

"Every business is different."

Class Exercise – Study the "Dabbawala " business of food delivery systems in Mumbai. What type of Information System is practiced for achieving 'Zero' defect service round the year.

Dimensions of Information Systems: Management

- Managers set Organizational Strategy for responding to business challenges
- In addition, managers must act creatively
  - Creation of new products and services
  - Occasionally re-creating the organization (e.g. Mergers , acquisitions , hiving-off , Joint Venture , Collaboration etc.)

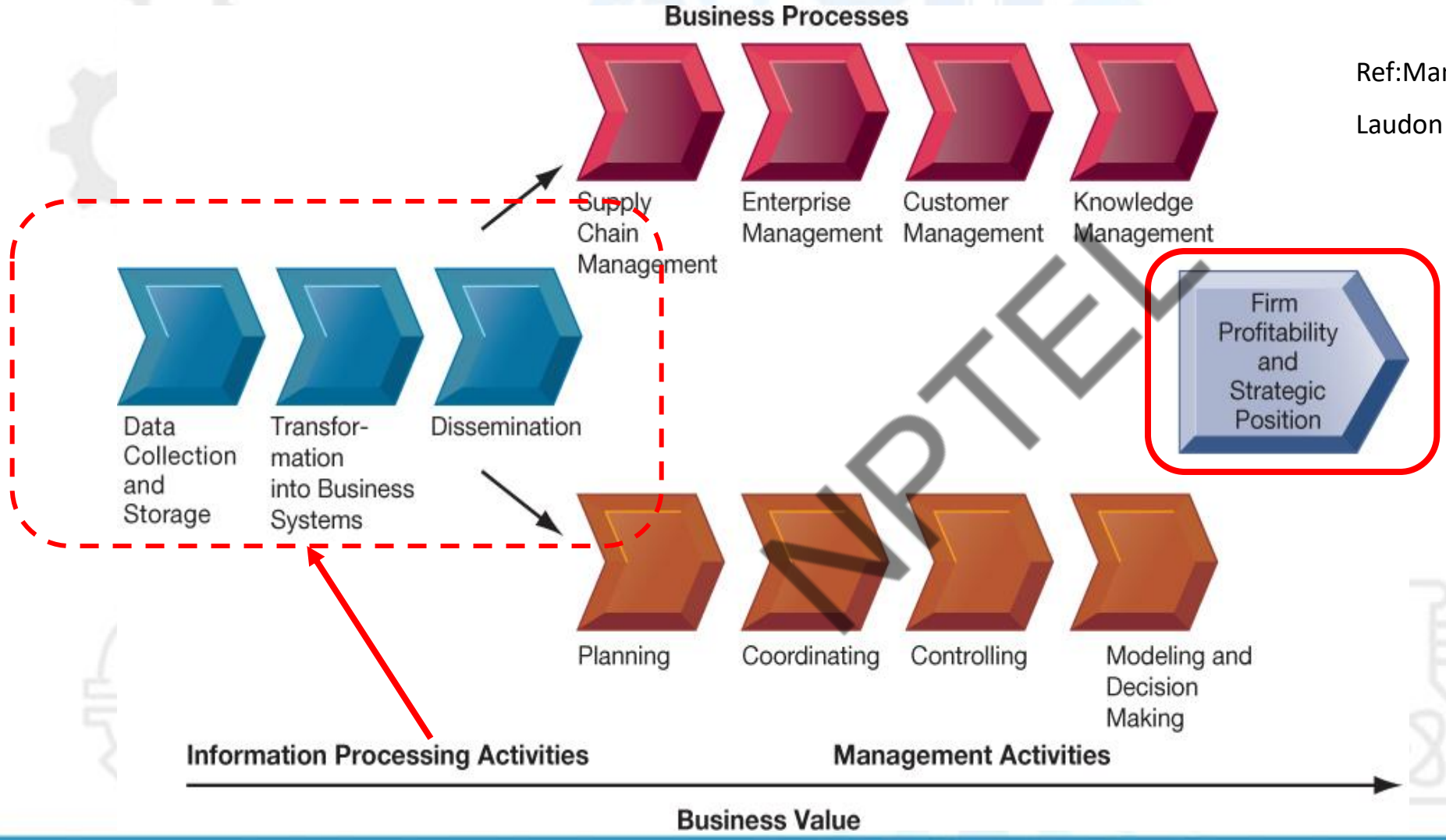
Class Discussion – MIS issues related to the recent merger of Public Sector Banks

Dimensions of Information Systems: Technology

- Computer hardware and software
- Data management technology
- Networking and Telecommunications technology
  - Networks, the Internet, intranets and extranets, World Wide Web
- IT infrastructure: provides the platform on which the system is built on

Information technology is at the heart of information systems.

The Business Information Value Chain



Ref:Management Information Systems - Kenneth C. Laudon & Jane P. Laudon

Complementary Assets: Organizational Capital and the Right Business Model (1 of 2)

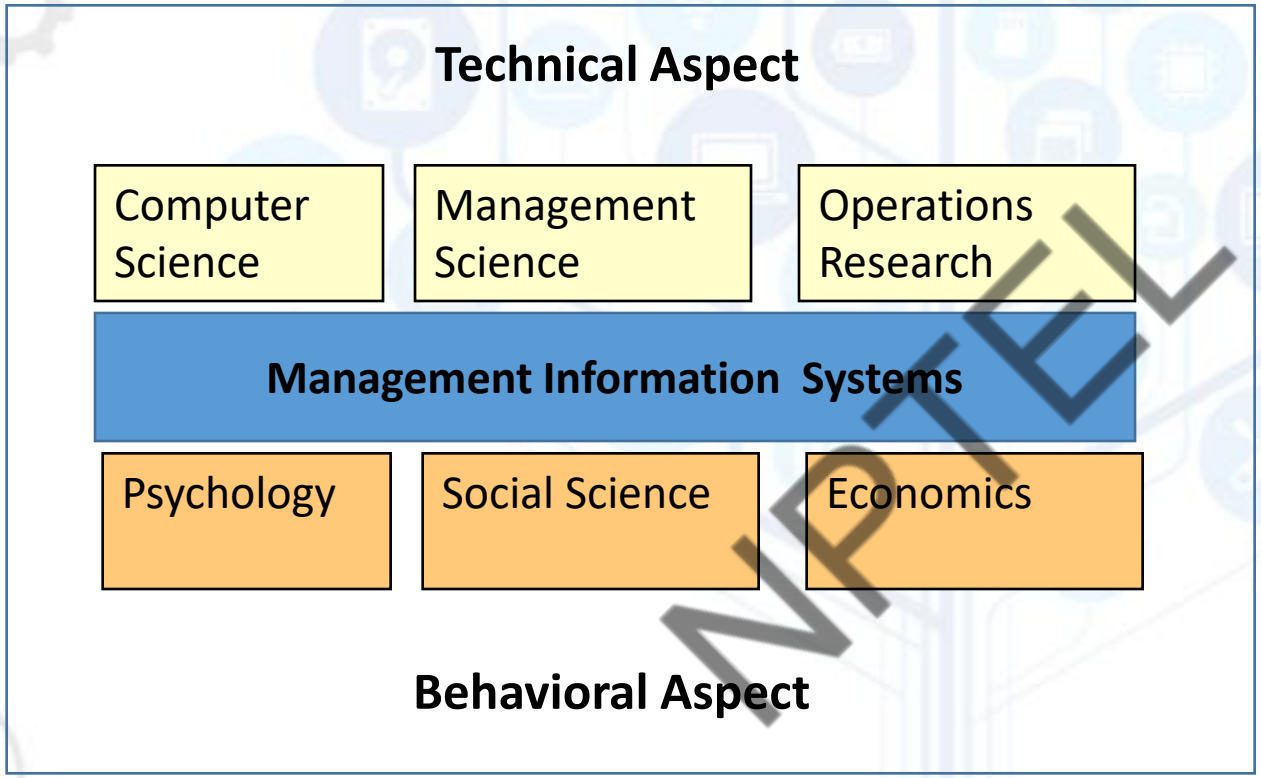
- Assets required to derive value from a primary investment
- Firms supporting technology investments with investment in complementary assets receive superior returns
- Example: Invest in technology and the people to make it work properly

e.g – Petroleum Companies having Retail business in Petrol Pumps

Complementary Assets: Organizational Capital and the Right Business Model (2 of 2)

- Complementary assets
  - Examples of organizational assets
    - Appropriate business model
    - Efficient business processes
  - Examples of managerial assets
    - Incentives for management innovation
    - Teamwork and collaborative work environments
  - Examples of social assets
    - The Internet and telecommunications infrastructure
    - Technology standards

Contemporary Approaches to Information Systems



The Three Categories of IT

IT Category	Examples
Functional IT	Spreadsheets, computer-aided design, and statistical software
Network IT	E-mail, instant messaging, wikis, blogs
Enterprise IT	Software for Enterprise resource planning, Customer resource management, and Supply chain management

The IT Dialogue….

Functional IT

Will any of the new software on the market enable our engineers, scientists, analysts, and other workers to do their jobs more efficiently? Do we need to invest in software.

Are our function technologies outdated? If so, why? What has changed?

The IT Dialogue….

Network IT

- How do our people collaborate? Do we know what technologies they're using?
- If we wanted to get broad feedback on an important topic, how would we do it?
- How do we know what our people are working on and what they think the hot topics are?

The IT Dialogue

Enterprise IT

- In what ways are our current processes not supporting the needs of the business? Which ones need to be redesigned? Which ones should be extended to our customers and suppliers?
- Are there important business activities, events, or trends that we should monitor?
- Are the data unavailable or stored across so many systems that the information is difficult to assemble?

REFERENCES

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Lecture 04 : Information Management in the Digital World

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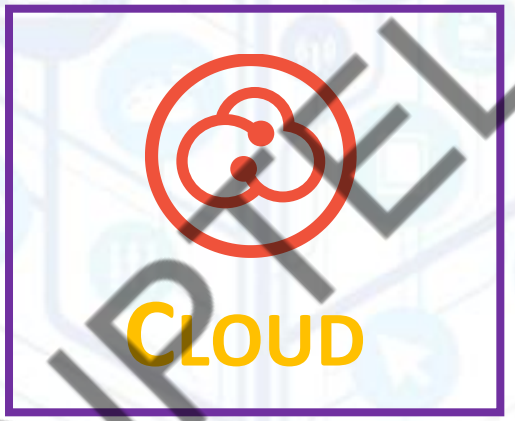
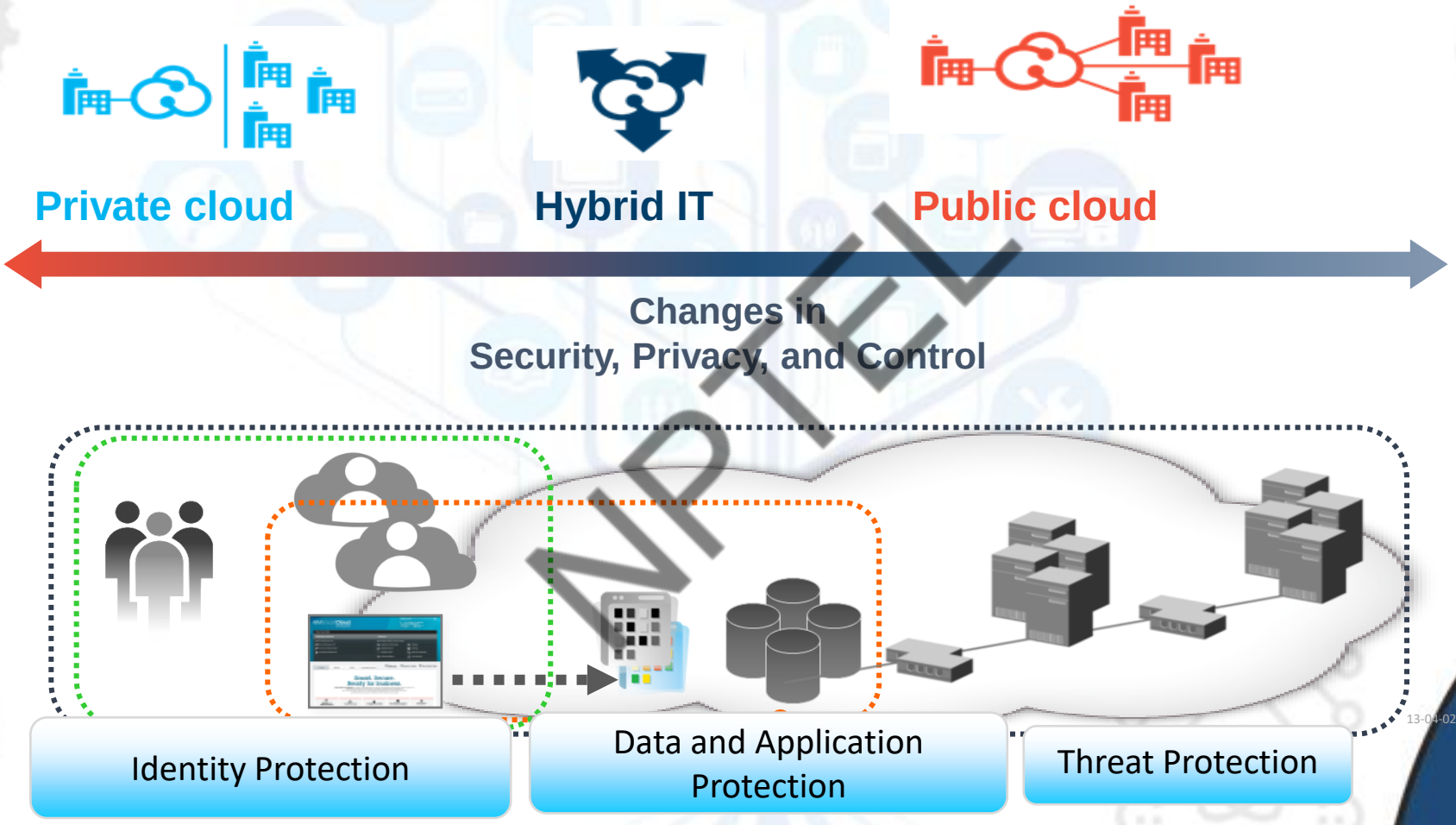


Cloud computing: Four key service categories of Cloud offerings

Business Process As A Service	Sales Force.com , Workday.com
Software As A Service	MS Office , Google Docs
Platform As A Service	Amazon Web Service , Azure
Infrastructure As A Service	Data Centers

Cloud computing changes the way we think about security



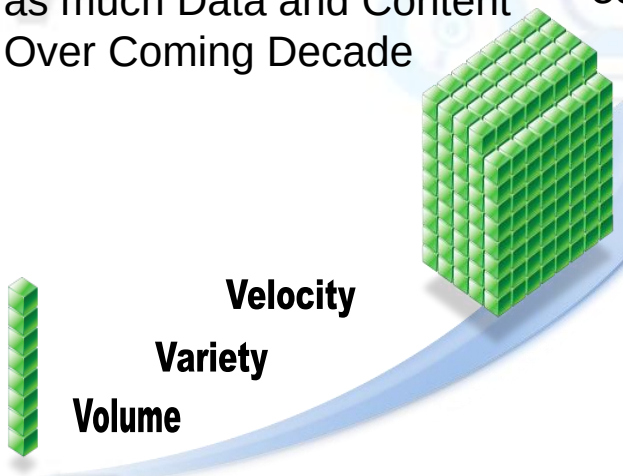
Organizations are thirsty, despite oceans and streams of data

Need for business analytics was never so much …

44x

as much Data and Content Over Coming Decade

2020
35 zettabytes



2009
800,000 petabytes

80%

Of world's data is unstructured

90%

Of world's data has been generated in the last TWO years

… They need deeper insights!

1 in 3 Business leaders frequently make decisions based on information they don't trust, or don't have

1 in 2 Business leaders say they don't have access to the information they need to do their jobs

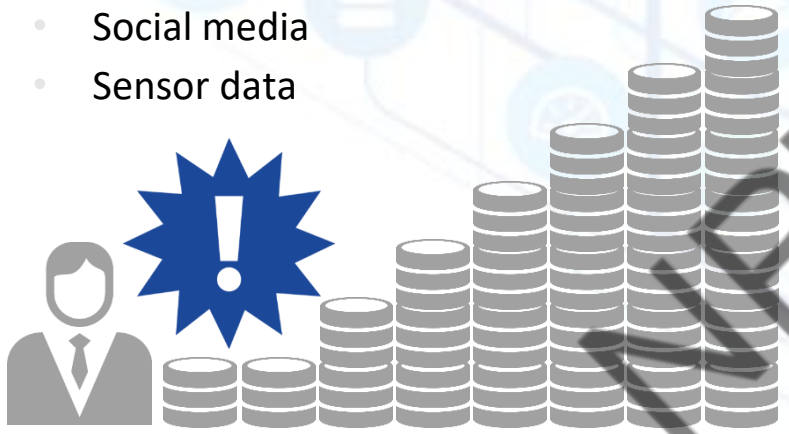
83% of CIOs cited "Business intelligence and analytics" as part of their visionary plans to enhance competitiveness

60% of CEOs need to do a better job capturing and understanding information rapidly in order to make swift business decisions

Analytics presents security risks and opportunities

Big data explosion

- Personally identifiable
- Credit card data
- Health data
- Intellectual property
- Social media
- Sensor data



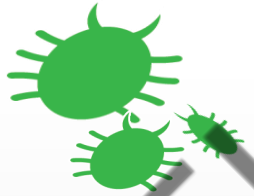
Analytic insights for security

- Larger more diverse data sets
- Faster analysis
- Deeper insights
- Predictive models

As mobile grows, so do security threats

In 2014 the number of cell phones (7.3 billion) will exceed the number of people on the planet (7 billion).

Mobile downloads increase to 108 billion in 2017.

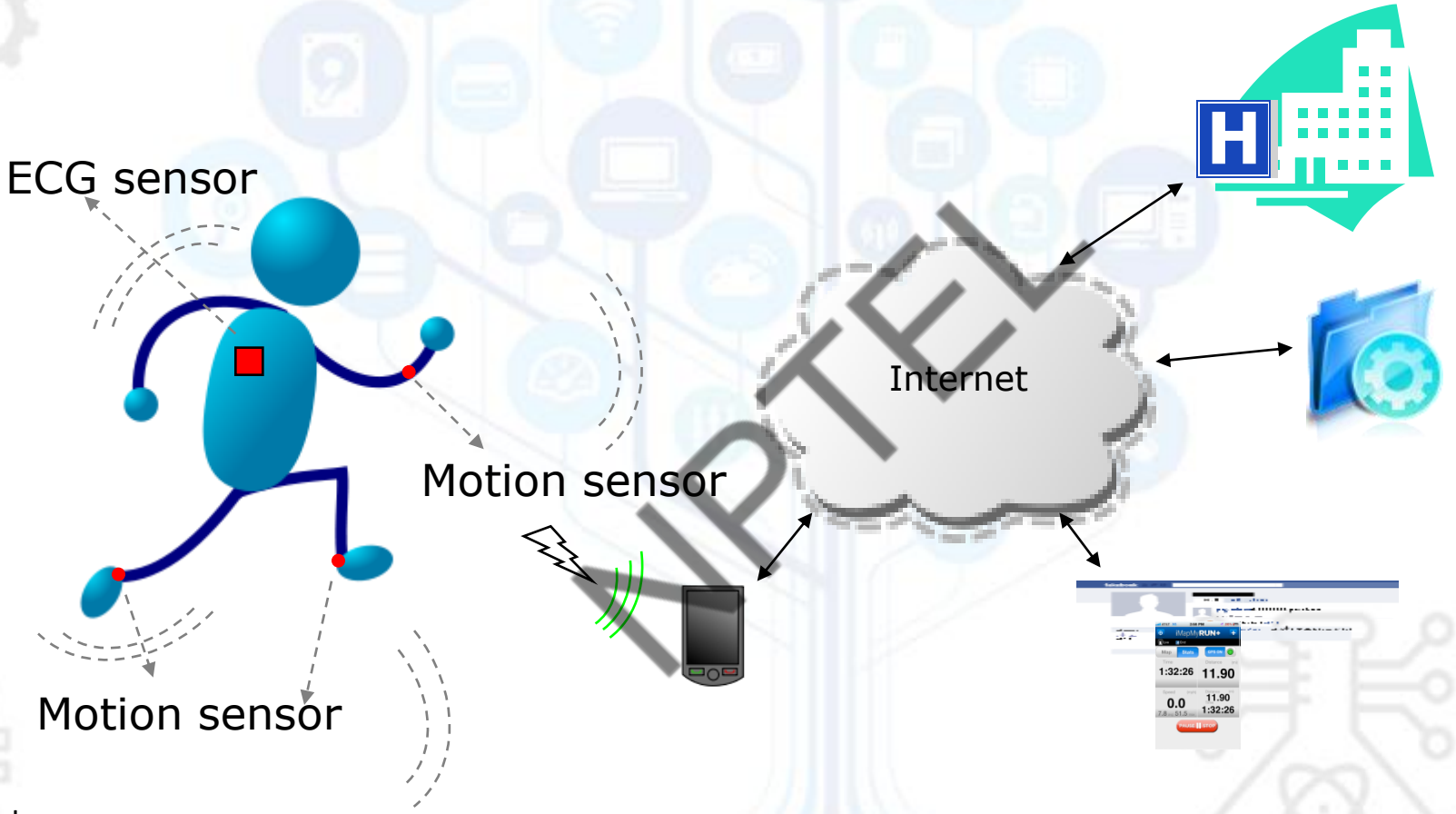


Mobile malware is growing. Malicious code is infecting more than 11.6 million mobile devices at any given time.

Mobile devices and the apps we rely on are under attack. 90% of the top mobile apps have been hacked.

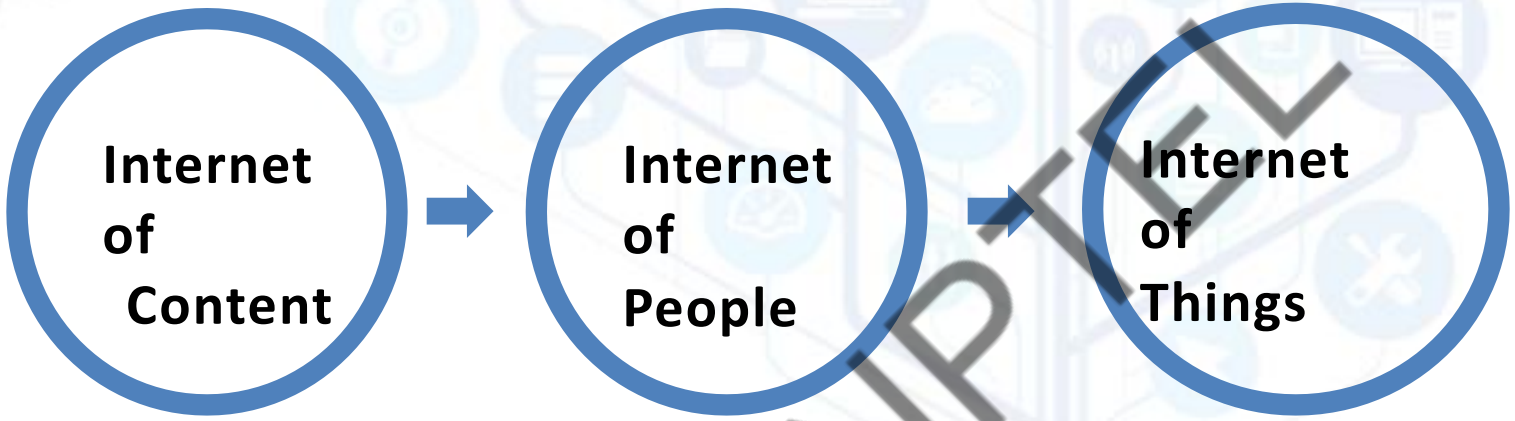
Internet of Things
Industry 4.0

People Connecting to Things



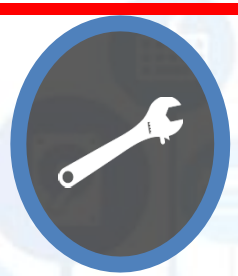
Ref:www.kayarvizhy.com

Connecting information, people, and things is greatest resource ever to drive insightful action



Manufacturing domain

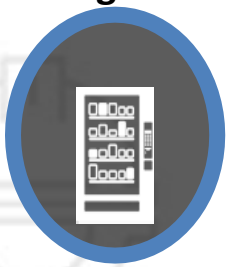
Responsive supply chains



Predictive maintenance

Connected asset management

Connected logistics



Connected retail

Connected Factory

Human Society's Ecosystem

Connected home

Connected cities

Connected car

Connected healthcare

IoT Everywhere

Industry 4.0

Industry 4.0 has been defined as “a name for the current trend of **automation** and **data exchange** in manufacturing technologies, including **cyber-physical systems**, the **Internet of things**, **cloud computing** and **cognitive computing** and creating the **smart factory**”.

IoT and “Datafication”

In today’s world , we are seeing a rapid acceleration of Sensors , Actuators and Devices.

This will lead to a deluge of data being generated from all of these connected devices. This is what is known a s “Datafication” of IoT.

This Datafication will have a similar effect of pervasiveness as that of ‘Electricity’ in the 20th Century and ‘availability of Data’ will be as taken for granted as we do for Electricity.

Key impacts of IoT on Industry

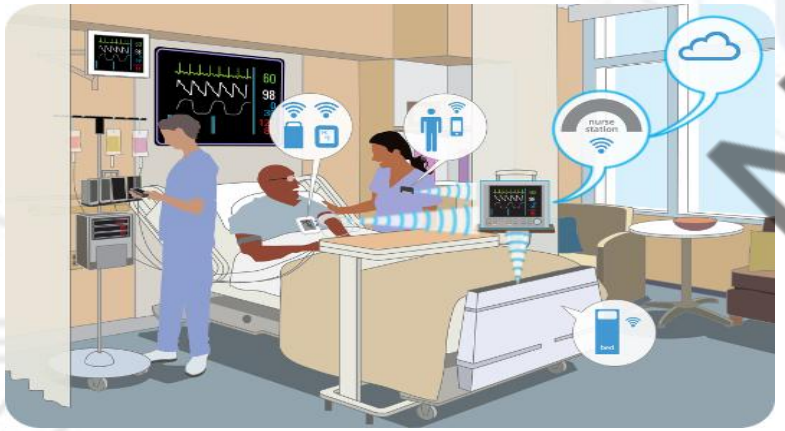
Automation: Connecting machines, sensors, and actuators to computing systems enables a large degree of process automation. E.g.- jet engines.

Integration: Integrating the data from a machine with data from other sources,(e.g ERP, CRM systems) greatly enhances the value derived

“Servitization”: Combination of automation and integration help organizations move from product-centered business models to service-oriented business models .

Business Needs of IoT -

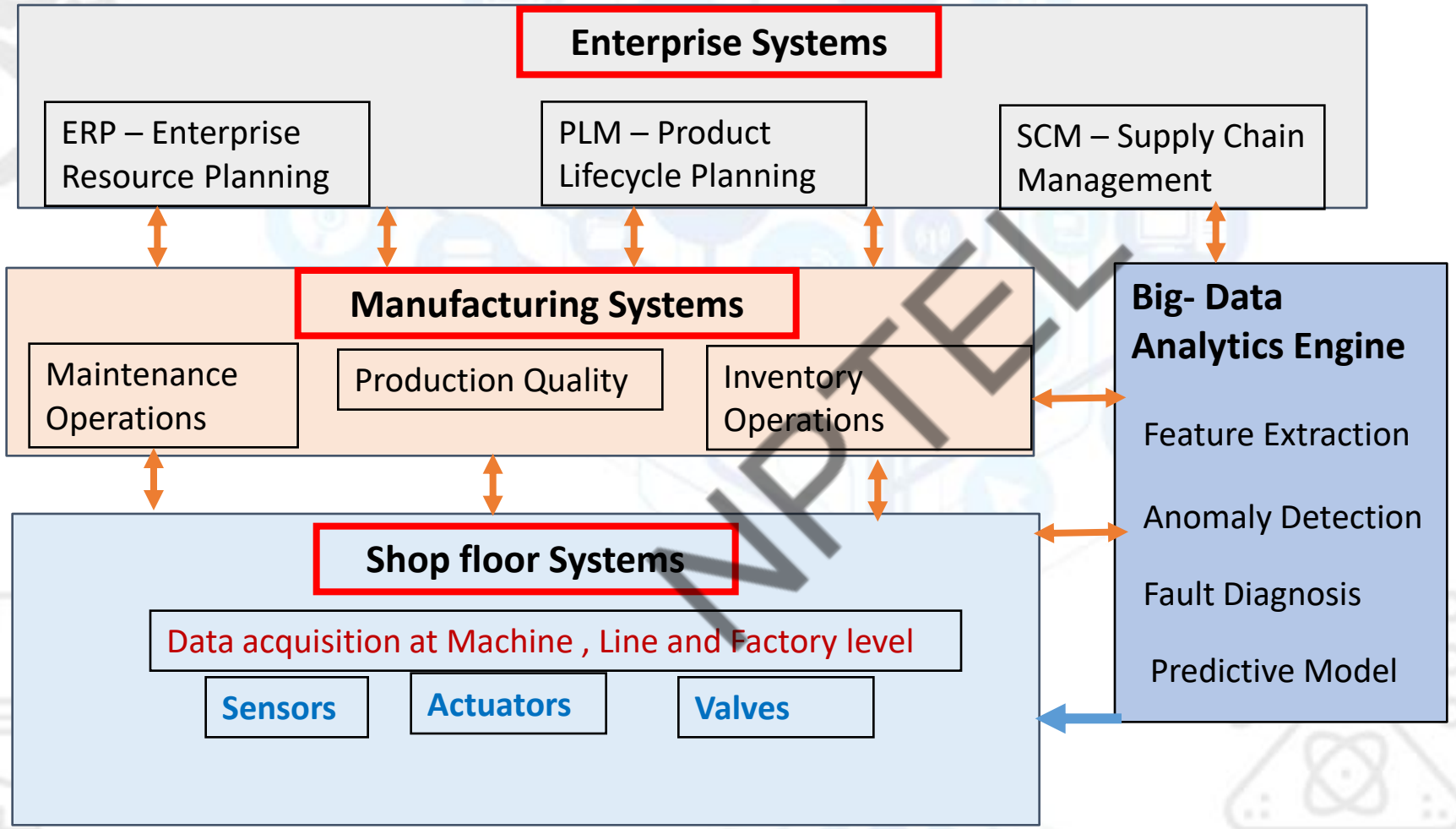
Wearable Tech



Healthcare

Smart Appliances

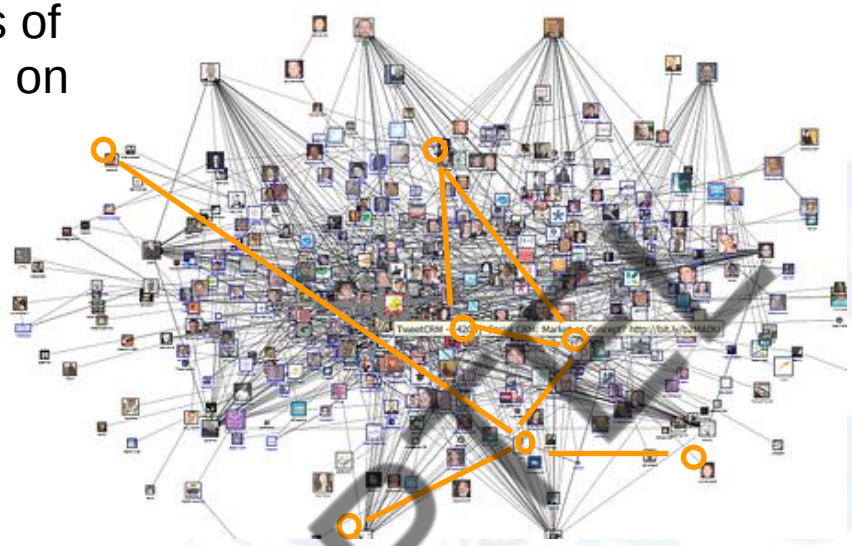
Manufacturing Analytics- How it is integrated



2018 This Is What Happens In An Internet Minute

You are what you share, the social transformation

30 billion pieces of content are shared on **Facebook** each month



More companies now use social internally than externally

66% of top financially performing companies leverage social in their business processes

Social technologies raise the productivity of interaction workers by 20-25%

Security Implications

Information is exposed in new ways that can pose security concerns

Mixing of personal and corporate data on social platforms creates risk. **Your privacy is now limited**.

REFERENCES

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Lecture 05 : Class Discussions and Conclusion

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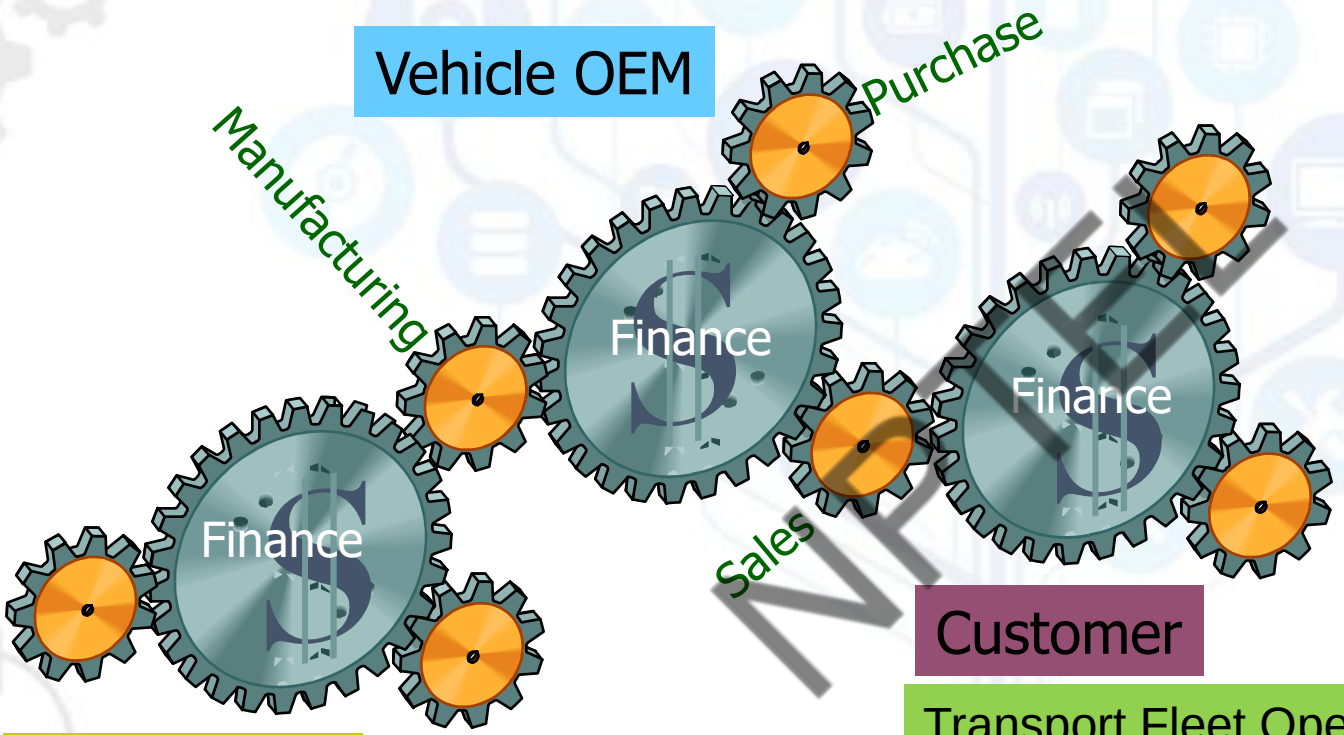
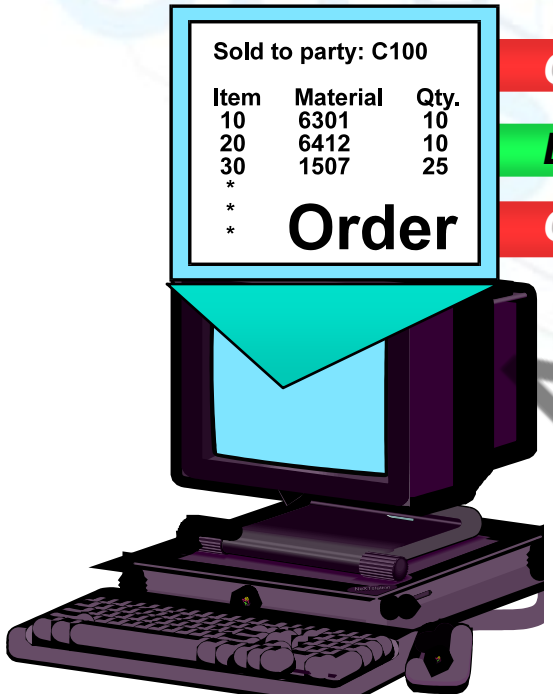
Enterprise Resource Planning

… extends to the complete value chain…



The beauty & power of MIS (Enterprise Resource Planning)…

Request from a Customer



Globalization Challenges and Opportunities: A Flattened World

Class Discussion :

- **Internet** has drastically reduced costs of operating on global scale
- Increases in foreign trade, outsourcing
- Presents both challenges and opportunities

Class Q – Airbnb / Uber / Booking.com etc.
How are they managing their entire business only using Internet and Information Systems ? They donot have any other material assets.

Customer and Supplier Intimacy

- Serving customers well leads them to return, increasing revenue and profits
  - Example: High-end hotels that use computers to track customer preferences and then monitor and customize the environment
- Intimacy with suppliers allows them to provide vital inputs, which lowers costs

Class Q – (Online sites achieving a high degree of Customer intimacy – Amazon / Swiggy etc. How are they doing this ?)

Pointers :

1. Return policy gives confidence to customers
2. Royalty bonus
3. Offers and Discounts
4. Are you aware that your data / browsing history / preferences are sold to marketing agencies .
5. Your every click may mean revenue for someone else.

Interactive Session: Management- The Mobile Pocket Office

- Class Discussion
  - What kinds of businesses are most likely to benefit from equipping their employees with mobile digital devices such as iPhones and iPads?

e.g. – Point of Sales Order and Supply information at the Retailers

Customer satisfaction survey

Marketing data collection / questionnaire

Payment banks in rural areas.

Conclusion… (1 of 2)

- Management information systems
  - Combines computer science, management science, operations research, and practical orientation with behavioral issues
- Four main actors
  - Suppliers of hardware and software
  - Business firms
  - Managers and employees
  - Firm's environment (Customer Satisfaction , legal, social and cultural context)

Conclusion (2 of 2)

In a socio-technical perspective, the performance of a system is optimized when both the technology and the organization mutually adjust (mesh) to one another until a satisfactory fit is obtained

It is extremely important for the business leaders (specially the CIO) to understand which technology would be best suited for their organization. Follow the Jones's often can lead to wrong investments.

REFERENCES

- **The World is Flat (book) : Thomas L Friedman**
- **Management Information Systems: Managing the Digital Firm - Kenneth C. Laudon & Jane P. Laudon**

THANK YOU !