

# Unit 8: Internet and Internet Services

Prashant Gautam

M.Sc. CSIT

# Topics Covered

- E-Governance
- Cloud Computing
- GIS
- Smart City
- IOT

# E-Governance

- A new paradigm shift has been developed in the field of governance by the application of ICT in the processes of governing called Electronic-Governance or E-Governance.

**ICT** + **GOVERNANCE** = **E-GOVERNANCE**

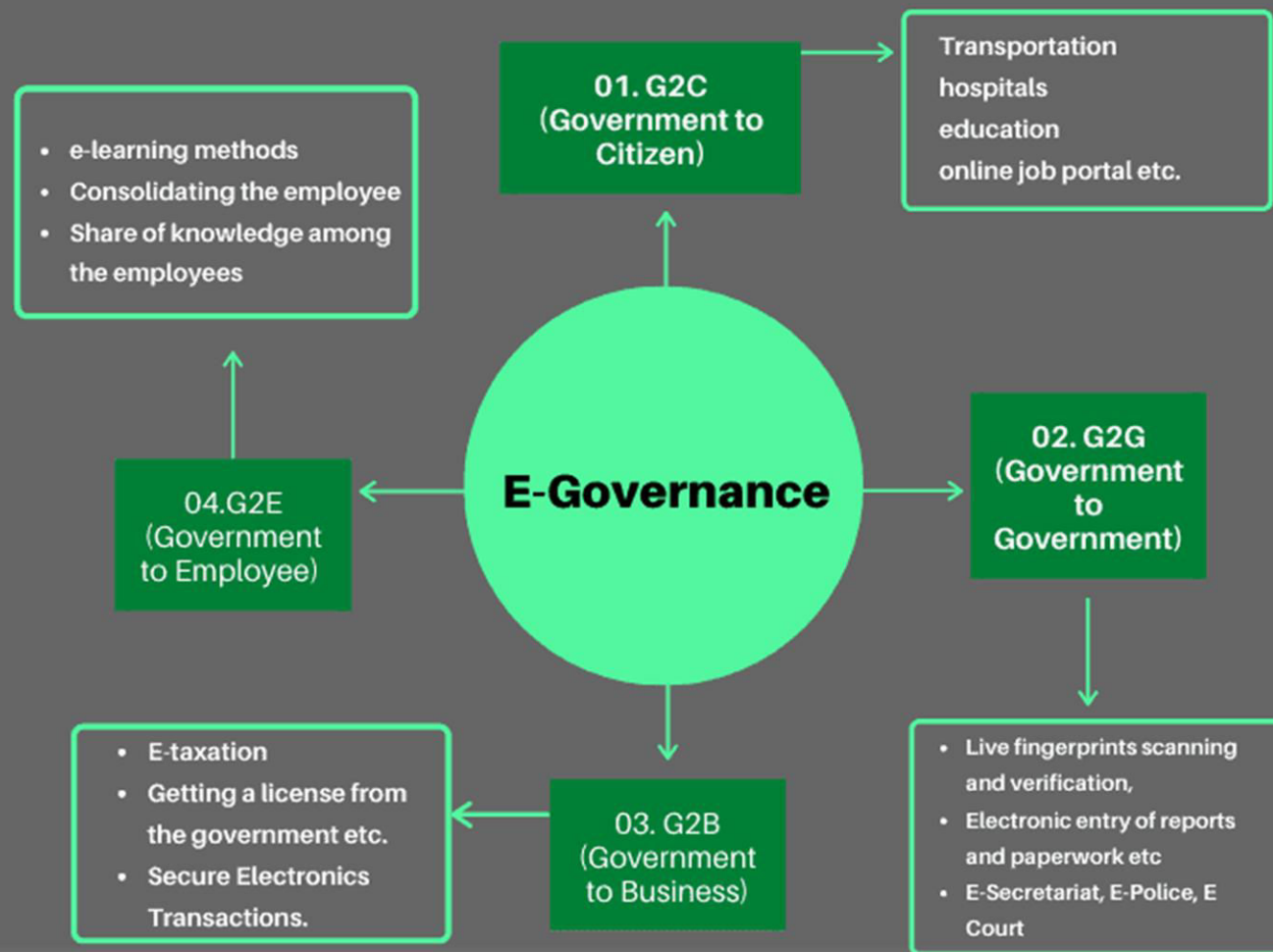
# Objectives

- to make every information of the government available to all in the public interest.
- to create a cooperative structure between the government and the people and to seek help and advice from the people, to make the government aware of the problems of the people.
- To increase and encourage people's participation in the governance process.
- e-Governance improves the country's information and communication technology and electronic media, with the aim of strengthening the country's economy by keeping governments, people and businesses in tune with the modern world.
- To establish transparency and accountability in the governance process.
- To reduce government spending on information and services.

# Features

- **De bureaucratization**
- **E-Services**
- **International Services**
- It enhances the **right to express** to the citizens.
- **Economic Development**
- **Reduce inequality**

# Types of E-Governance



# Challenge ??

- Digital Divide



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जेन ट्राभल्स

होमपेज / विज्ञान / रोजगार

# बेरोजगारको डाटा निकाल्ने ओली सरकारको तयारी

वर्षमा १०० दिन काम दिने, नसके सरकारी भत्ता!

होमपेज / विज्ञान / सूचना प्रविधि

# कम्प्युटर र स्मार्टफोनबाट एक घण्टा टाढा हुदा के फाइदा हुन्छ ?

अनलाइनखबर २०७५ माघ २ गते ८:३५ मा प्रकाशित

0 प्रतिक्रिया [Facebook] [Twitter] [Email]



## सिफारिस



माघ १ क-कसको पर्व ?



PHOTO-FEATURE

# Nepal holds first digital Cabinet meet (With photos)

- Post Report, Kathmandu



# आइप्याडमा 'रातो' हेर्दै प्रधानमन्त्री !



# जागिर खोज्न सरकारी वेबसाइट



कान्तिपुर



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विज्ञान र प्रविधि

## जागिर खोज्न सरकारी वेबसाइट

आश्विन ३, २०७४ | कान्तिपुर संवाददाता

संग्रह सेयर

काठमाडौं – जागिरको खोजीमा रहेका व्यक्ति र रोजगारदातालाई समन्वय गराउन श्रम विभागले 'जब पोर्टल' सञ्चालनमा ल्याएको छ । नेपालमा निजी क्षेत्रमा विभिन्न 'जब पोर्टल' सञ्चालन भए पनि सरकारी स्तरबाट सञ्चालित यो पहिलो हो ।





नेपाल सरकार  
श्रम, रोजगार तथा सामाजिक सुरक्षा मन्त्रालय  
श्रम तथा व्यवसायजन्य सुरक्षा विभाग  
रोजगार सूचना केन्द्र  
रोजगार पोर्टल

व्यवसाय


Eg. Manager

स्थान

Eg. Kathmandu

निजामती कर्मचारीको प्रतिवद्धता: पारदर्शिता र चुस्तता ।

नयाँ कामहरू (🔥)

 Unilever Nepal Limited  
Sales and Marketing...

नयाँ आवश्यकता - विशेष सूची

कामको दर्जा	रोजगारदाता	किसिम	अन्तिम दिन
Marketing 🔥	Chaulani Group Of Companies	News Paper	9 Days
Environmental Engineer, Social Development officer 🔥	Godawari Municipality	News Paper	14 Days
Sales and Marketing Managers, ASM/RSM- Customer Development 🔥	Unilever Nepal Limited	Full Time	2 Days
School Teacher 🔥	New English Secondary Boarding School, Murli Chowk	News Paper	48 Days

## लोकसेवा आयोगको अनलाइन शुल्क भुक्तानी

**लोक सेवा आयोग**  
**PUBLIC SERVICE COMMISSION**

Name (in English) **Online Form**

First  Middle

नाम (नेपालीमा)  बीचको

जन्म मिति  
आफ्नो नागरिकता प्रमाणपत्रमा जन्ममिति उल्लेख गर्नुहोस् ।  
वि.सं.मा:  ईस्वी सम्वत्   
Day / Month / Year

वाचुको नाम



**काठमाण्डौ उपत्यका**  
**दरखास्त संकलन केन्द्र**

रकम भुक्तानी गर्ने विकल्पहरू

औचर विवरण  
आर्थिक वर्ष: २०७५/०७६

**कारोबार २०७५-१२३८५६**  
संकेत:

मिति: २०७५/०६/२८  
कार्यालय: काठमाण्डौ

**connect IPS**

**रकम भुक्तानी गर्नुहोस्**

**रकम भुक्तानी गर्नुहोस्**

सि.नं.	औचर नं.	रकम शीतमा
१	१५६१	३०० रकम

### भुक्तानी गर्ने विधि:

- उम्मेदवारले फारम भरी सकेपछि *connectIPS* छनोट गरी लोक सेवाको शुल्क भुक्तानी गर्ने ।  
अथवा
- connectIPS* ([www.connectips.com](http://www.connectips.com) वा Mobile App) मा Login गरी Government Payment मेनुमा गई कारोबार संकेत नं. र शुल्क दाखिला गरी भुक्तानी गर्ने ।

Available on:

[www.connectips.com](http://www.connectips.com)  Google play

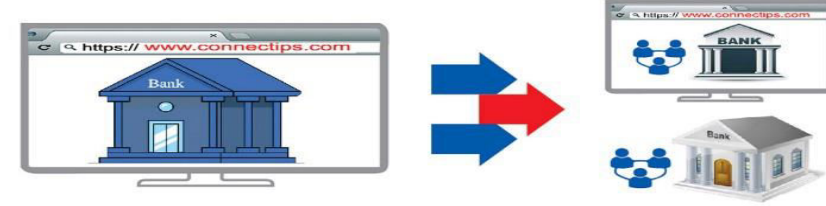


अनलाईन माध्यम मार्फत  
आफ्नो बैंक खाताबाट सिधै e-Payment गर्न  
**connect IPS** प्रयोग गर्नुहोस् ।

**connect IPS** मा आवद्ध हुने विधि



- [www.connectips.com](https://www.connectips.com) मा गई आवश्यक विवरण भर्ने ।
- आफ्नो Username बनाउने ।
- आफ्नो Mobile No. र E-mail Verify गर्ने ।
- **connectIPS** मा Login गरी आफ्नो बैंक खाताको विवरण भर्ने ।
- उक्त विवरण सहितको फारम Download गर्ने ।
- Download गरिएको फारम र आफ्नो परिचयपत्र (परिचय खुल्ने र बैंकलाई मान्य हुने) सहित आफ्नो बैंकमा जाने ।
- फारममा उल्लेखित आफ्नो खाता बैंकबाट एक पटक Verify गराउने ।



आफ्नो बैंक खाताबाट कुनै पनि सदस्य बैंक/वित्तीय संस्थामा रहेको खातामा सोभै फण्ड ट्रान्सफर गर्न **connectIPS** e-Payment प्रयोग गर्नुहोस् ।

फण्ड ट्रान्सफर गर्न सकिने तरिकारहरू

### 1. Own Account

बैंक खाताबाट आफ्नो अन्य बैंक खातामा फण्ड ट्रान्सफर गर्न सकिने ।

### 2. connectIPS User/ Mobile No.

लाभग्राहीको **connectIPS** ID अथवा मोबाईल नं. को आधारमा फण्ड ट्रान्सफर गर्न सकिने ।

### 3. Bank Account

लाभग्राहीको बैंक खाता विवरणको आधारमा फण्ड ट्रान्सफर गर्न सकिने ।

### 4. Favorite Account

नियमित रूपमा कारोबार हुने लाभग्राहीको बैंक खाता अथवा **connectIPS** ID लाई एकपल्ट Favorite मा राखी उक्त List को आधारमा फण्ड ट्रान्सफर गर्न सकिने ।

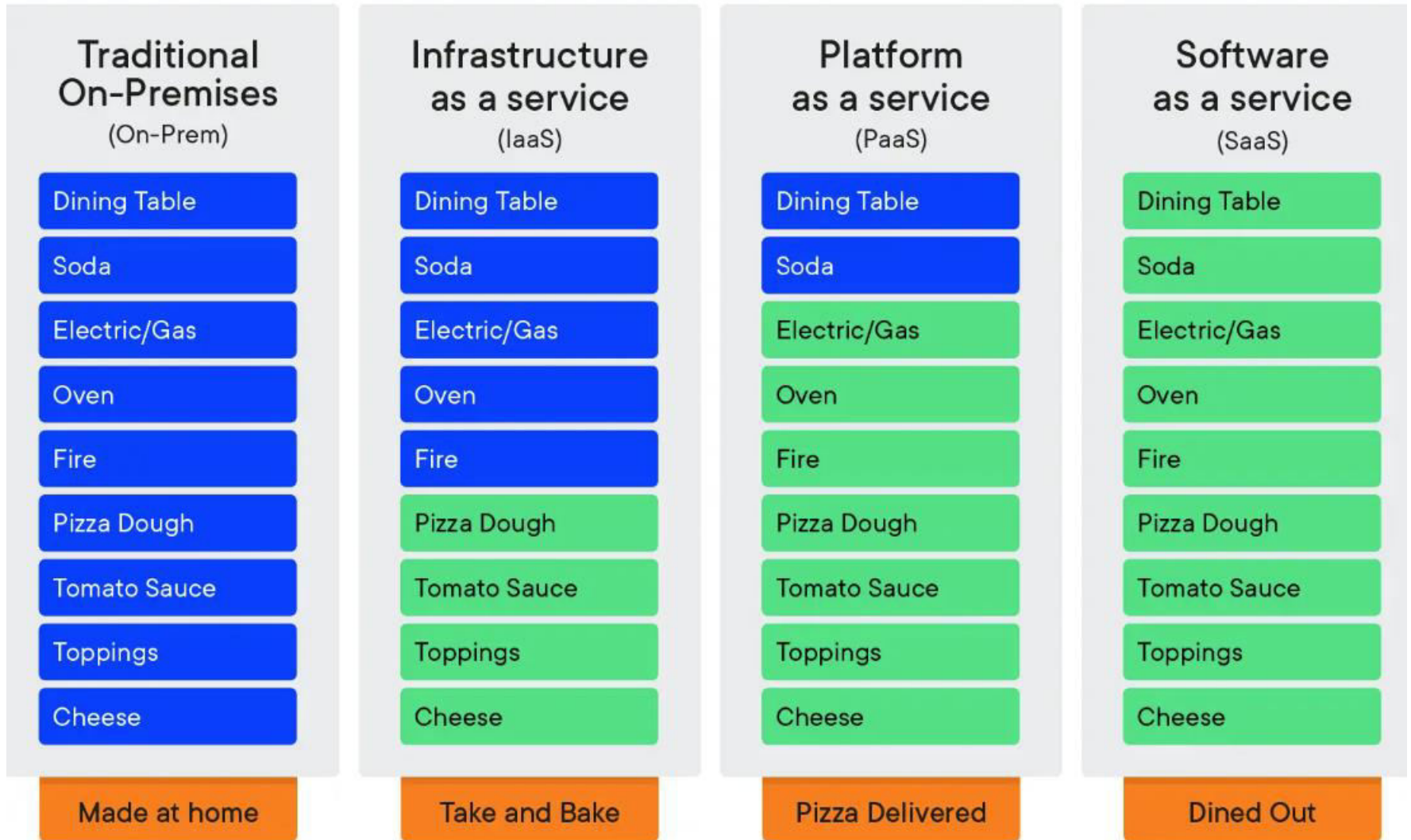


**Nepal Clearing House Ltd. (NCHL)**

3<sup>rd</sup> Floor, Kamaladi Complex, Kamaladi, Kathmandu,  
PO Box: 21400, Tel: +977-1-4255306, Fax: +977-1-4255309  
E-mail: [info@nchl.com.np](mailto:info@nchl.com.np), URL: [www.nchl.com.np](http://www.nchl.com.np)



# Pizza as a service

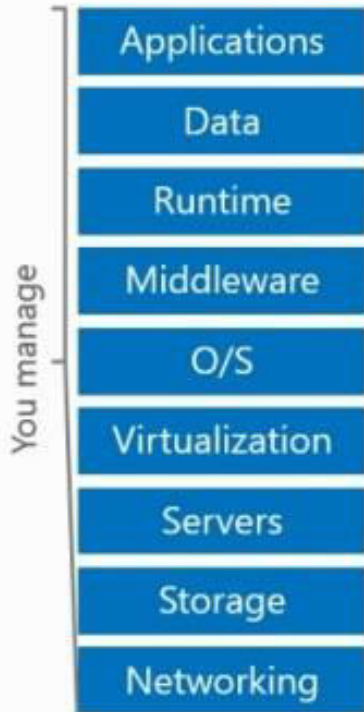


 You Manage

 Vendor Manages

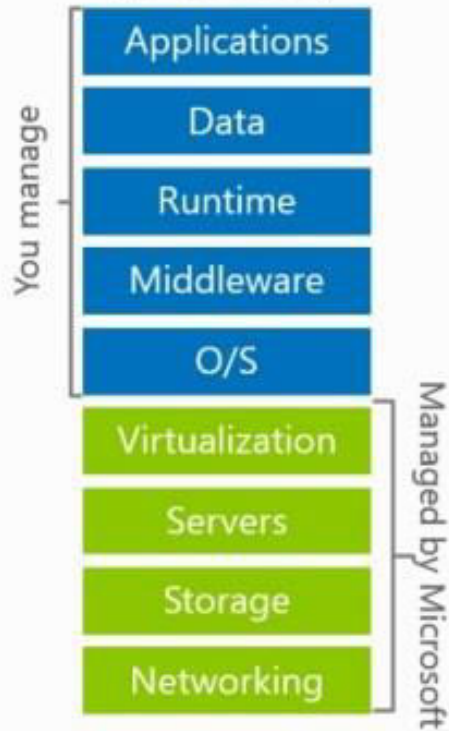
# Cloud Models

## On Premises

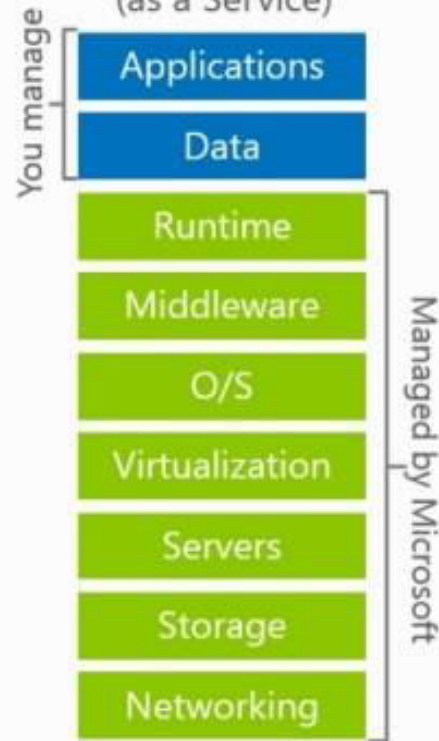


Windows Azure

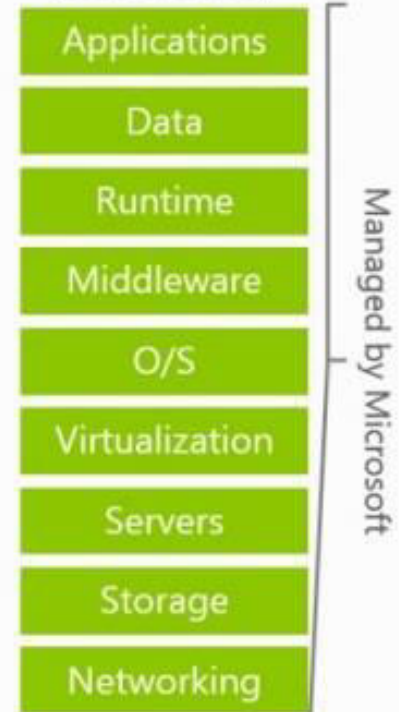
## Infrastructure (as a Service)



## Platform (as a Service)



## Software (as a Service)



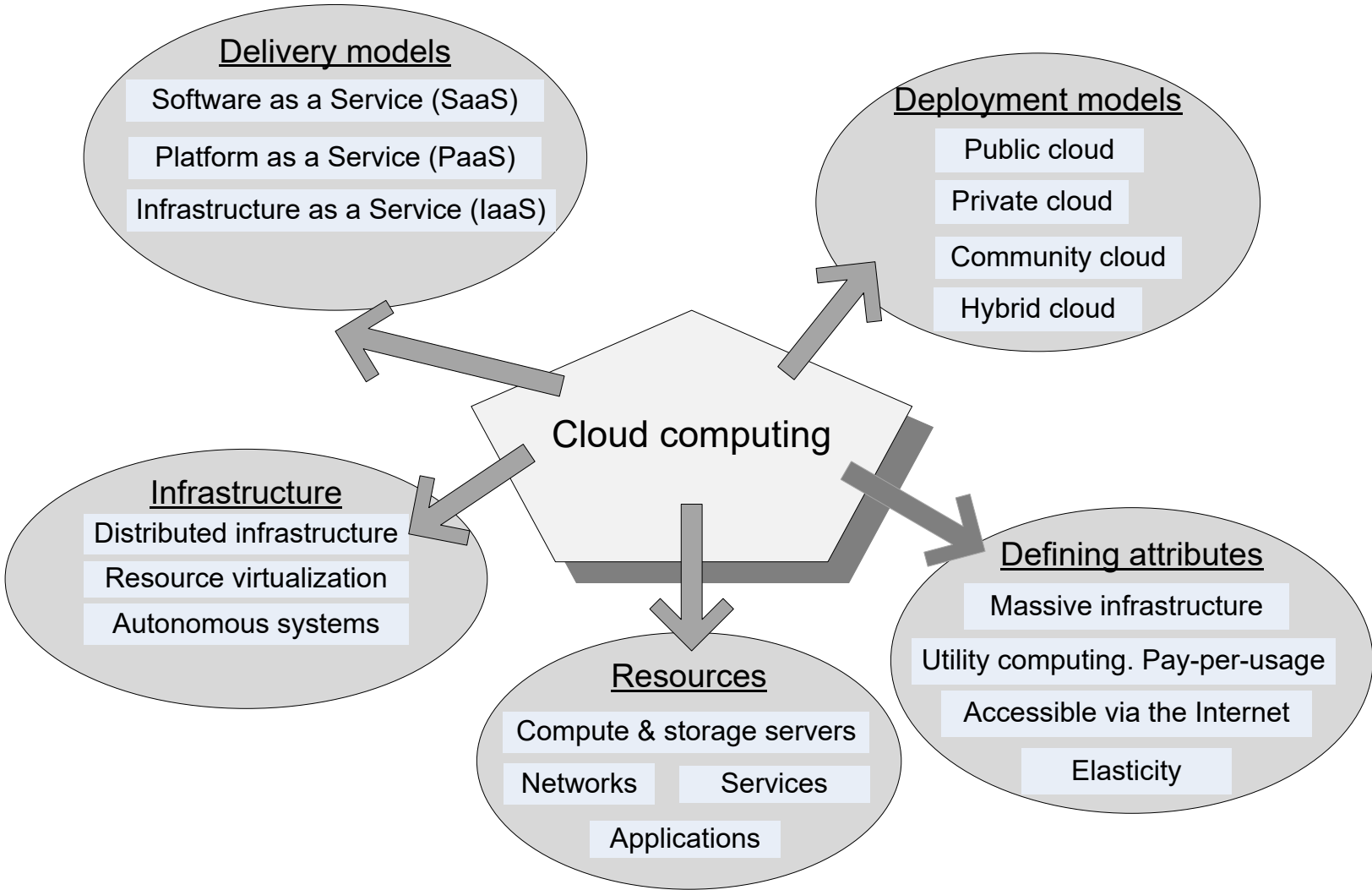


# What is Cloud Computing?

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- What do you think?
- **"Cloud computing** is an [information technology](#) (IT) paradigm that enables ubiquitous access to shared pools of configurable [system resources](#) and higher-level services that can be rapidly [provisioned](#) with minimal management effort, often over the [Internet](#). Cloud computing relies on sharing of resources to achieve coherence and [economies of scale](#), similar to a [public utility](#)." [https://en.wikipedia.org/wiki/Cloud\\_computing](https://en.wikipedia.org/wiki/Cloud_computing)
- "Simply put, cloud computing is the delivery of computing services – servers, storage, databases, networking, software, analytics and more – over the Internet ("the cloud"). Companies offering these computing services are called cloud providers and typically charge for cloud computing services based on usage, similar to how you're billed for gas or electricity at home." <https://azure.microsoft.com/en-gb/overview/what-is-cloud-computing/>

# Cloud Computing Models, Resources, Attributes



# Cloud computing - Characteristics

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*“Cloud Computing offers on-demand, scalable and elastic computing (and storage services). The resources used for these services can be metered and users are charged only for the resources used.”* from the Book

## **Shared Resources and Resource Management:**

1. Cloud uses a shared pool of resources
2. Uses Internet techn. to offer **scalable** and **elastic** services.
3. The term “**elastic computing**” refers to the ability of **dynamically** and **on-demand** acquiring computing resources and supporting a variable workload.
4. Resources are metered and users are charged accordingly.
5. It is more cost-effective due to **resource-multiplexing**. Lower costs for the cloud service provider are passed to the cloud users.

# Cloud computing (cont' d)

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## Data Storage:

### 6. Data is stored:

- in the “cloud”, in certain cases closer to the site where it is used.
- appears to the users as if stored in a location-independent manner.

7. The data storage strategy can increase reliability, as well as security, and can lower communication costs.

## Management:

8. The maintenance and security are operated by service providers.

9. The service providers can operate more efficiently due to specialisation and centralisation.

# Cloud Computing Advantages

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1. Resources, such as CPU cycles, storage, network bandwidth, are **shared**.
2. When multiple applications share a system, their peak demands for resources are not synchronised thus, **multiplexing** leads to a higher resource utilization.
3. Resources can be **aggregated** to support data-intensive applications.
4. Data sharing facilitates **collaborative** activities. Many applications require multiple types of analysis of shared data sets and multiple decisions carried out by groups scattered around the globe.

# Cloud Computing Advantages

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5. Eliminates the **initial investment costs** for a private computing infrastructure and the maintenance and operation costs.
6. **Cost reduction:** concentration of resources creates the opportunity to pay as you go for computing.
7. **Elasticity:** the ability to accommodate workloads with very large peak-to-average ratios.
8. **User convenience:** virtualization allows users to operate in familiar environments rather than in idiosyncratic ones.

# Types of clouds

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- 1. Public Cloud** - the infrastructure is made available to the general public or a large industry group and is owned by the organization selling cloud services.
- 2. Private Cloud** – the infrastructure is operated solely for an organization.
- 1. Hybrid Cloud** - composition of two or more Clouds (public, private, or community) as unique entities but bound by a standardised technology that enables data and application portability.
- 2. Other types: e.g., Community/Federated Cloud** - the infrastructure is shared by several organizations and supports a community that has shared concerns.

# **Why cloud computing is (could) be successful when other paradigms have failed?**

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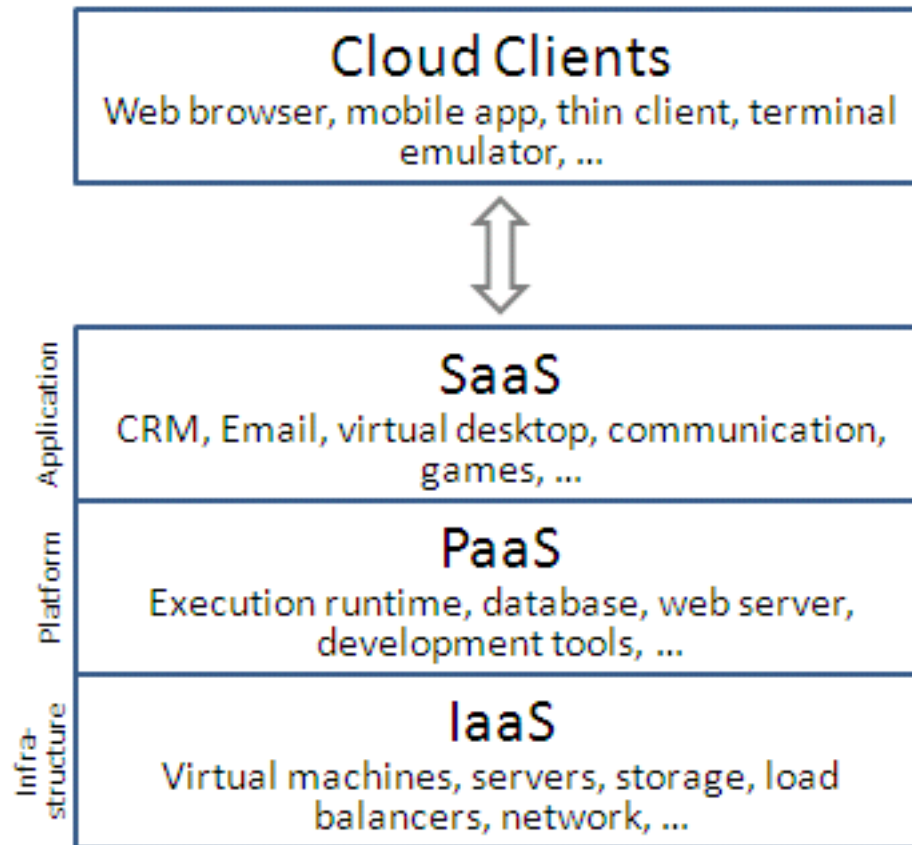
- It is in a better position to exploit recent advances in software, networking, storage, and processor technologies promoted by the same companies who provide Cloud services.
- Economical reasons: It is used for enterprise computing; its adoption by industrial organizations, financial institutions, government, and so on has a huge impact on the economy.
- Infrastructures Management reasons:
  - A single Cloud consists of a mostly homogeneous (now more heterogeneous) set of hardware and software resources.
  - The resources are in a single administrative domain (AD). Security, resource management, fault-tolerance, and quality of service are less challenging than in a heterogeneous environment with resources in multiple ADs.



# Cloud Delivery Models

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1. **Software as a Service (SaaS)** (high level)
2. **Platform as a Service (PaaS)**
3. **Infrastructure as a Service (IaaS)** (low level)



# Infrastructure-as-a-Service (IaaS)

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- Infrastructure is compute resources, CPU, VMs, storage, etc
- The user is able to deploy and run arbitrary software, which can include operating systems and applications.
- The user does not manage or control the underlying Cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of some networking components, e.g., host firewalls.
- Services offered by this delivery model include: server hosting, storage, computing hardware, operating systems, virtual instances, load balancing, Internet access, and bandwidth provisioning.
- Example: Amazon EC2

# Platform-as-a-Service (PaaS)

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- Allows a cloud user to deploy consumer-created or acquired applications using programming languages and tools supported by the service provider.
- The user:
  - Has control over the deployed applications and, possibly, application hosting environment configurations.
  - Does not manage or control the underlying Cloud infrastructure including network, servers, operating systems, or storage.
- Not particularly useful when:
  - The application must be portable.
  - Proprietary programming languages are used.
  - The hardware and software must be customised to improve the performance of the application.
- Examples: Google App Engine, Windows Azure

# Software-as-a-Service (SaaS)

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- Applications are supplied by the service provider.
- The user does not manage or control the underlying Cloud infrastructure or individual application capabilities.
- Services offered include:
  - Enterprise services such as: workflow management, communications, digital signature, customer relationship management (CRM), desktop software, financial management, geo-spatial, and search.
- Not suitable for real-time applications or for those where data is not allowed to be hosted externally.
- Examples: Gmail, Salesforce

# The Three delivery models of Cloud Computing

## Cloud Service Models

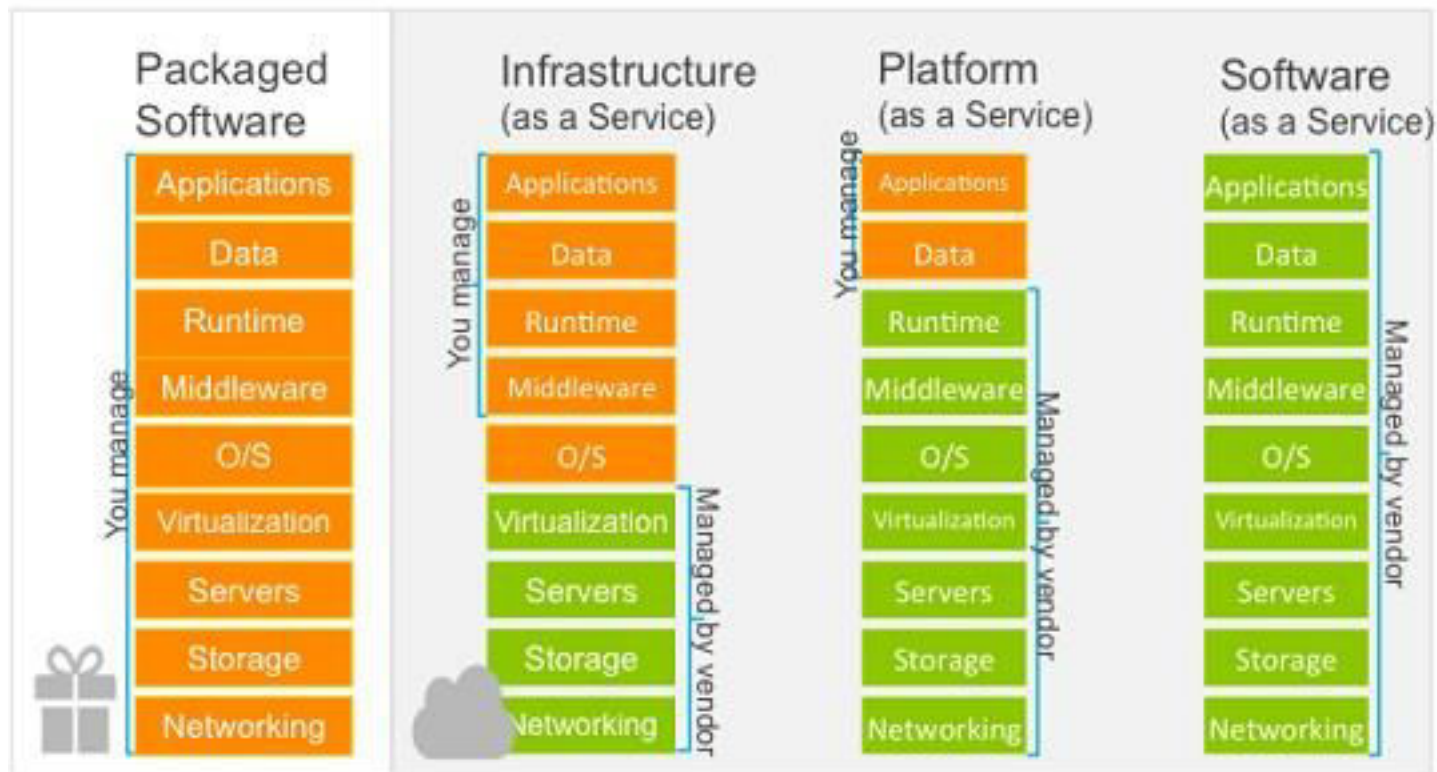


Figure 1.

Source: Microsoft Azure



The geographical information system consists of two distinct disciplines namely, **Geography** and **Information System**.

## **Geography + Information System**

**Geography** is the science which involves a combination of physical and cultural disciplines, which are used to describe, explain and help us to understand our environment and our relationship with it.

**Information System** can be defined as an interactive combination of people, computer hardware and software, communications device and procedures designed to provide a continuous flow of information to the people who need information to make decision or perform analysis.

A Geographical Information System (GIS) is a system of hardware, software and procedures to facilitate the management, manipulation, analysis, modeling, representation and display of geo referenced data to solve complex problems regarding planning and management of resources.

*Arnoff:*

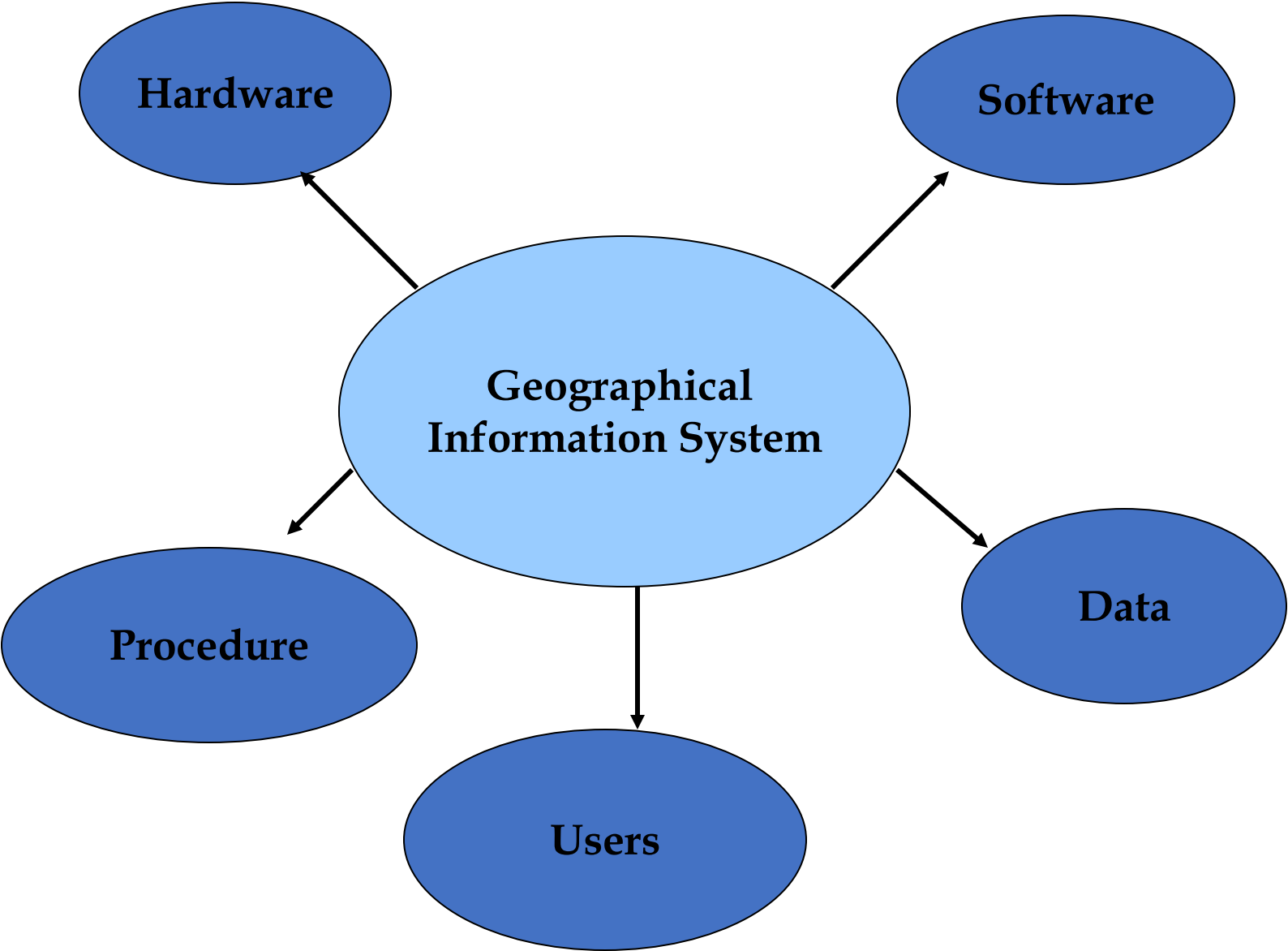
*A computer based system that provides four sets of capabilities to handle geo referenced data: data input, data management, manipulation and analysis and data output.*

*Peter Burrough:*

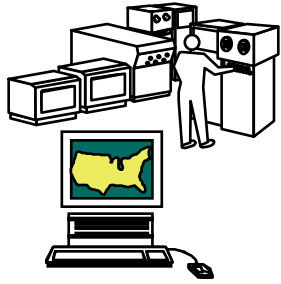
*GIS is a powerful set of tool for collecting, storing, receiving at will, transforming and displaying spatial data from the real world for a particular set of purpose.*



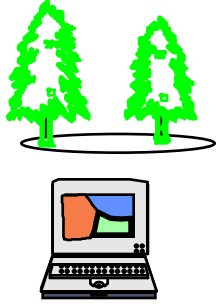
**COMPONENT OF GIS**



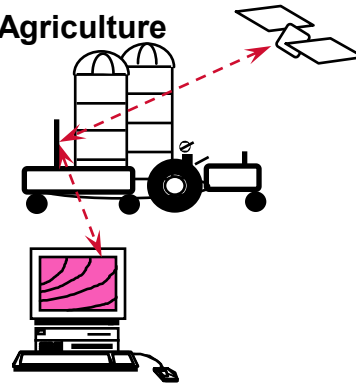
Government



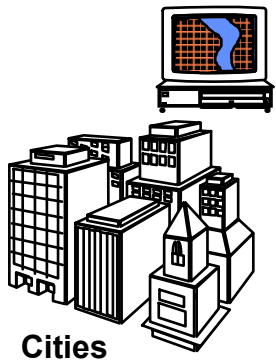
Natural Resources



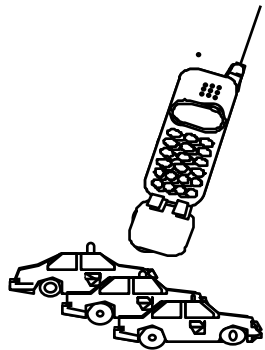
Agriculture



# GIS Application Sectors



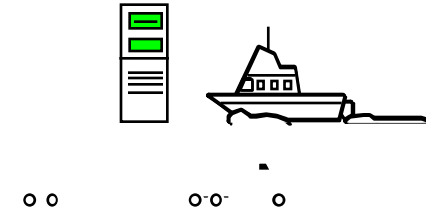
Cities



Security/Emergency



Engineering



Transportation

## Application of GIS - Examples

# Application of GIS - Agriculture

## Satellite Based Crop Monitoring System in Pakistan



# Application of GIS – Hydro Power

Pre-feasibility Study of Bunji Hydro Power Project using RS and GIS Technologies



# Application of GIS and RS– Disaster Mapping, Management and Mitigation

## Sendai, Japan



*April 2010*



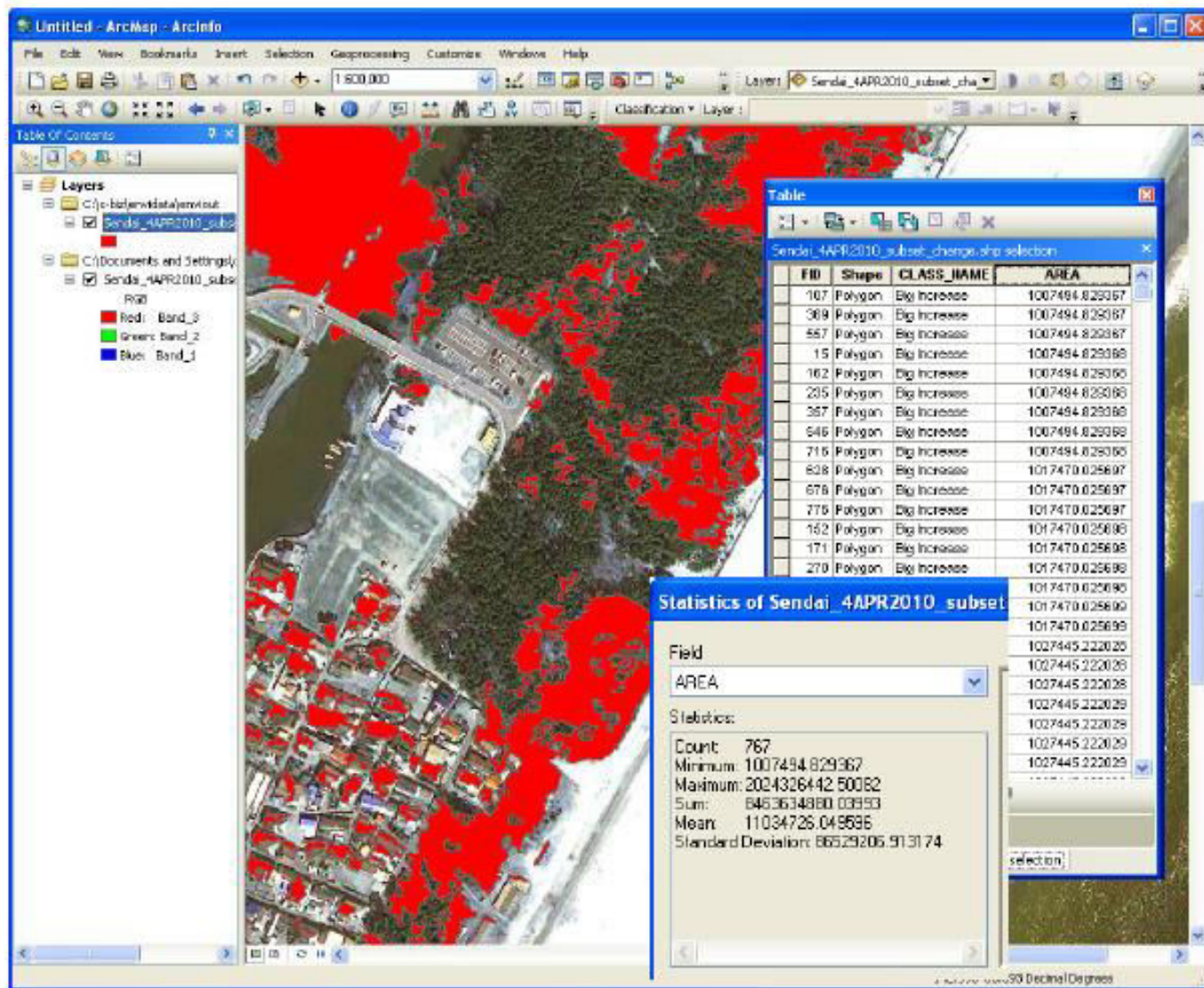
*March 2011*

Inland flooding, building destruction, and vegetation damage

Source: ESRI Webinar



# Sendai, Japan, Coastline Analysis



Additional statistics conducted in ArcMap

Total area of damage can be assessed

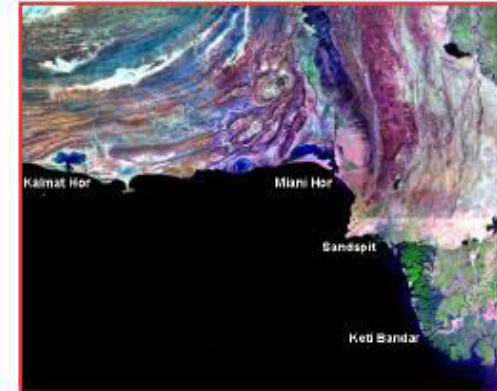
*Imagery courtesy of GeoEye*

# Application of GIS – Coastal Resources

GIS/Remote Sensing based  
Assessment of Mangroves  
Resources of selected project  
sites of Indus Delta and  
Makran Coast



GIS/Remote Sensing based Assessment of  
Mangroves Resources of selected project  
sites of Indus Delta and Makran Coast



A technical report submitted to 'Tackling Poverty through Sustainable  
Livelihood Resources Project'

GIS LAB

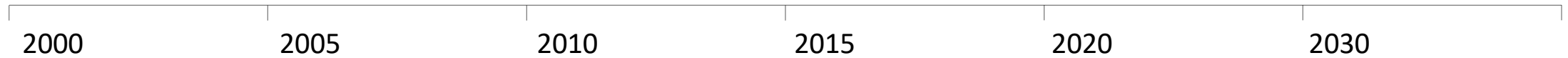
WWF-Pakistan  
Lahore

2005



**A city is smart  
because it uses  
technology  
to make its citizens'  
lives better.**

# Development of IoT for Smart Cities



**In 2000 - No term such as IoT**



**In 2015 - 6 billion of IoT devices worldwide**



**In 2030 - over 100 billion of IoT devices over the world**



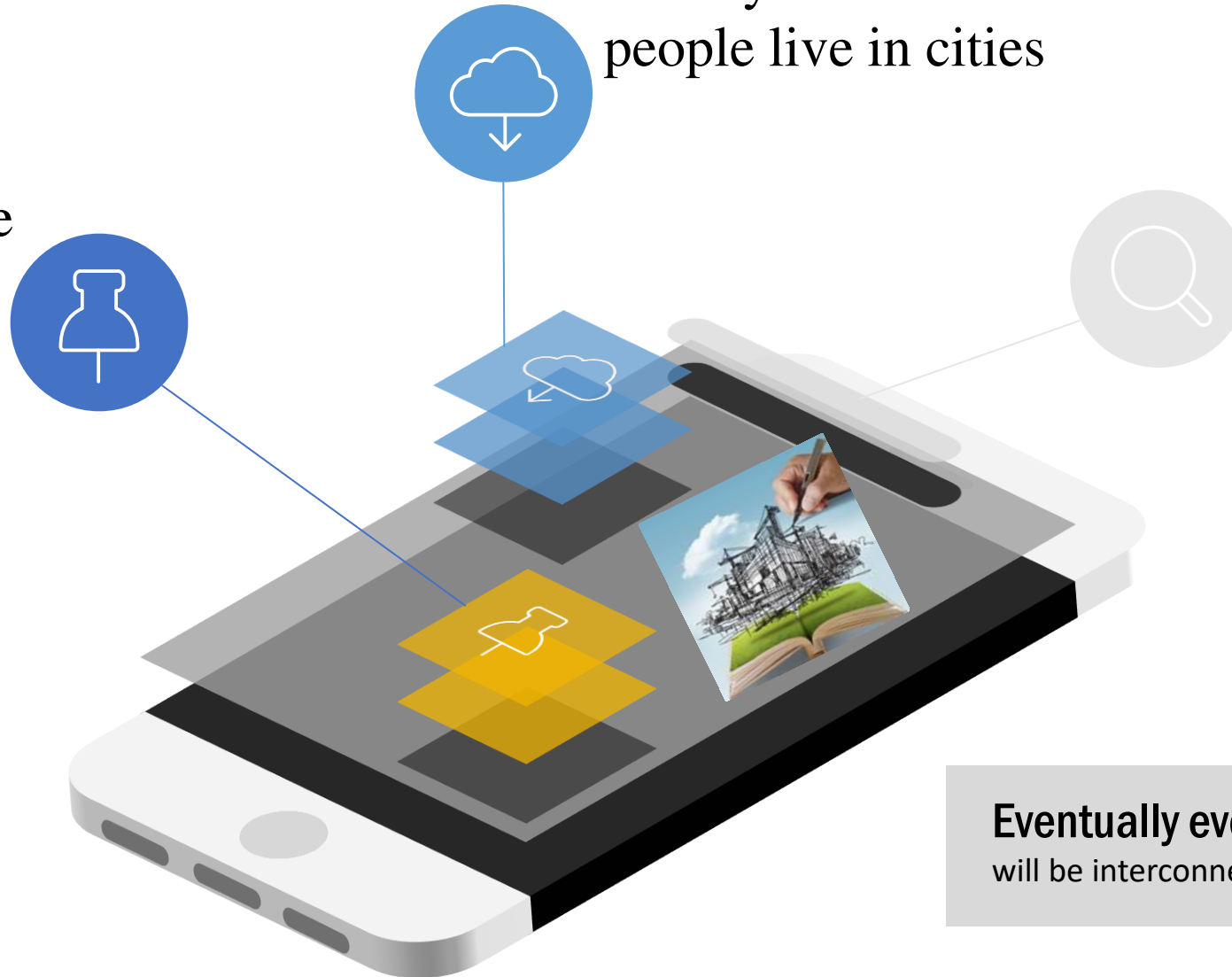
Convergence of smart houses, sensor systems parking, house management, housing and public utilities all together will form a Smart Cities.

# Why we focus today on smart cities?

Today 3.6 billion  
people live in cities

Up to 80 billion  
connected objects by  
2020

By 2050, 75% of the  
world's population  
will live in cities



**Eventually everything and everyone**  
will be interconnected with each other.



*Smart cities have the potential to improve the quality of life, while ensuring the needs of present and future generations with respect to economic, social and environmental challenges.*

# “Smart city” development roadmap

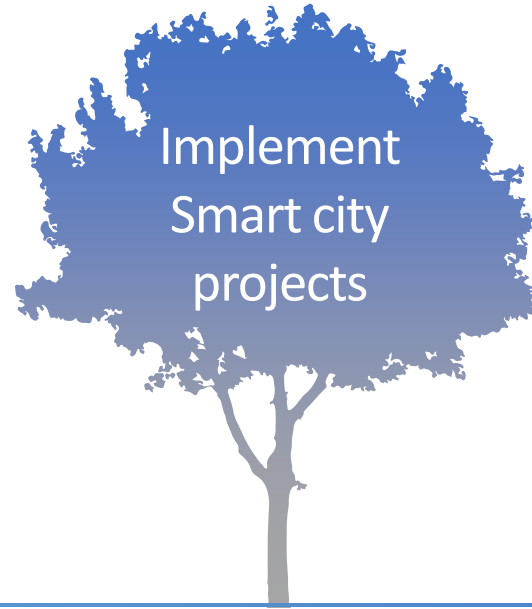
Live smarter life

Build a strategy

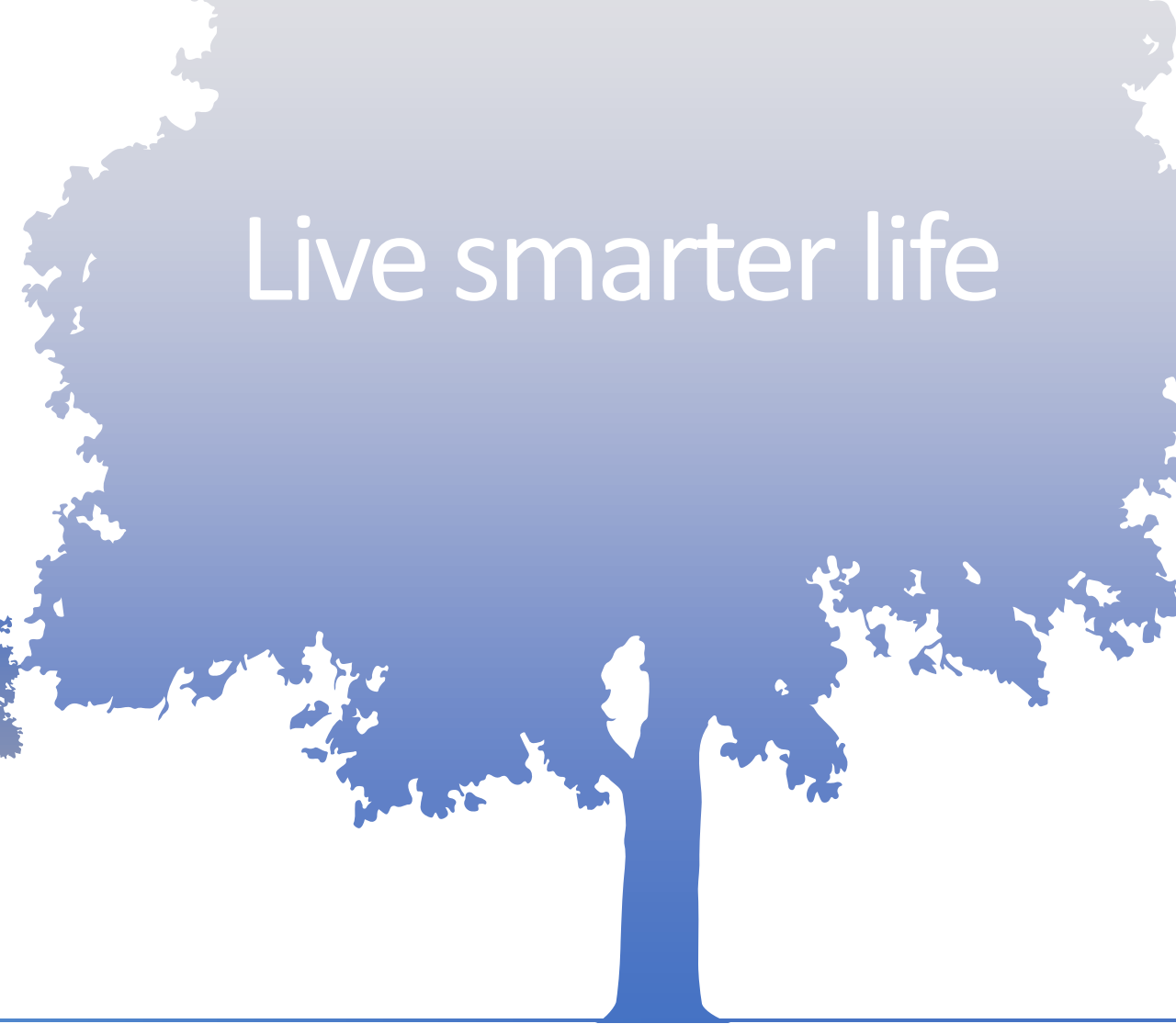


Infrastructure

Implement  
Smart city  
projects



From small to big



Connect people

**Wise management of resources results in  
High Quality of Life**



## Assignment (Sunday)

1. Explain in details about eGovernance.
  - Definition
  - Advantages/Disadvantages
  - Types
2. Explain the Status of e-governance in context to Nepal.
3. Explain in details about GIS
  - Definition, Components
4. Explain about Smart City.

**Technologies Driving**

**CHANGE**

# **Internet of Things (IoT)**



# What is Internet of Things?

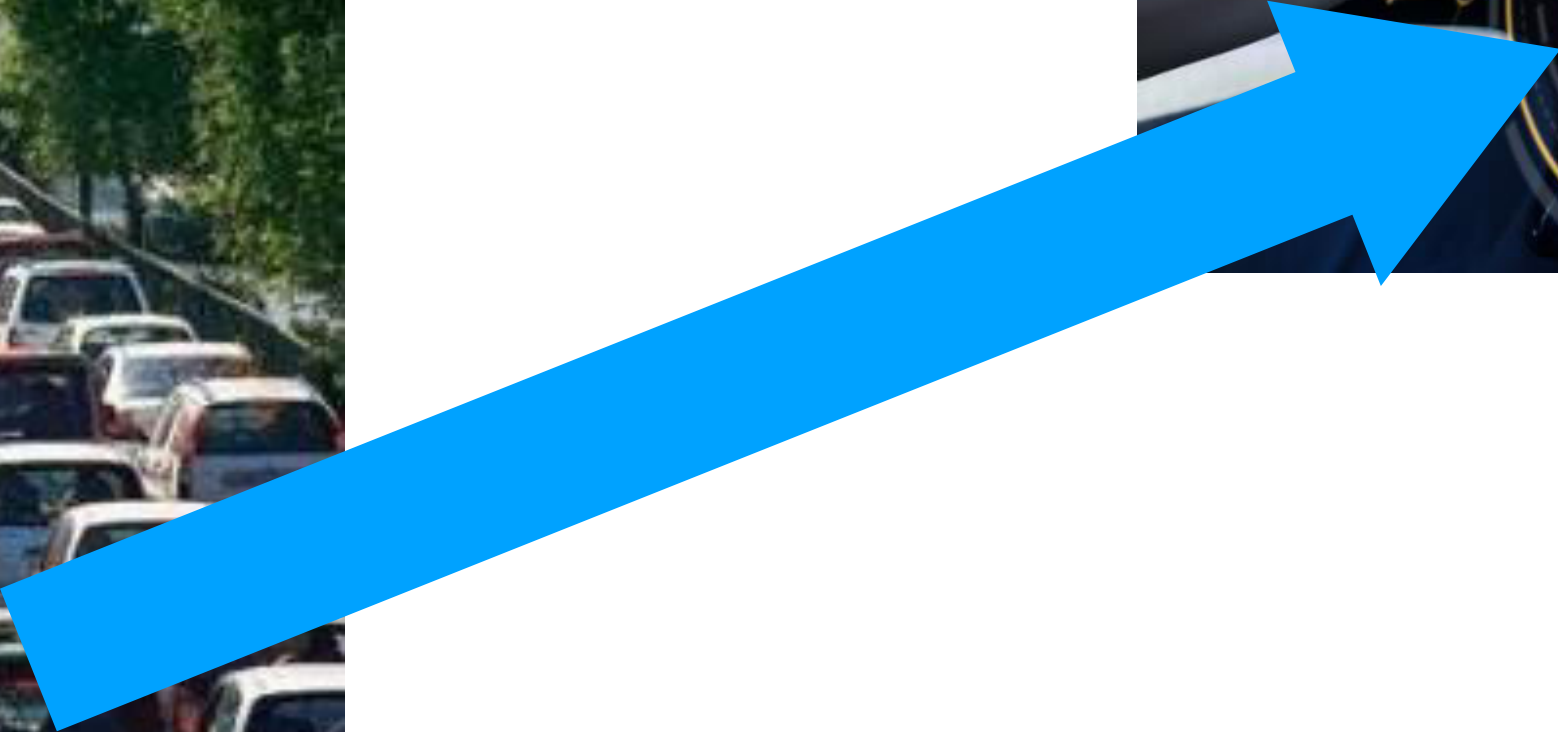


# IoT

- **Internet of Things (IoT) refers to the network of physical devices, vehicles, appliances, and other items embedded with sensors, software, and connectivity, which enables these objects to connect and exchange data.**
- **IoT devices collect and transmit data to the cloud or a central hub, where it is processed and analyzed. This data can then be used to inform decision-making, automate processes, and improve efficiency.**
- **IoT has the potential to transform industries and improve our daily lives in many ways, such as enabling smarter cities, improving healthcare, optimizing industrial processes, and increasing energy efficiency.**



# How Does This Impact You?





# How Does This Impact You?



# IoT-based Smart Farming

**Utilize wireless IoT applications to collect data regarding the location, well-being, and health of their livestock**

**Monitor pregnant cows:**

- **Sensor powered by battery is expelled when its water breaks.**
- **This sends an information via the Internet to the rancher.**





# IoT for the Elderly



- **With a built-in accelerometer that automatically detects falls**
- **Medication reminder**
- **With a GPS, which allows an emergency operator to locate and provide directions to the individual.**

# HAPIfork

The HAPIfork is an electronic fork that helps you monitor and track your eating habits. It also alerts you with the help of indicator lights and gentle vibrations when you are eating too fast.



<http://www.hapi.com/products-hapifork.asp>



# MyVessyl Cup

**It can hold 13 ounces of liquid. The battery takes 60 minutes to fully charge and will last for 5-7 days. Also has wire-free charging.**

<https://www.myvessyl.com/>



# Smart Tooth Brush

**The Beam Brush is a connected toothbrush that engages users with their daily hygiene routine.**

<http://www.beamtoothbrush.com/toothbrush/>





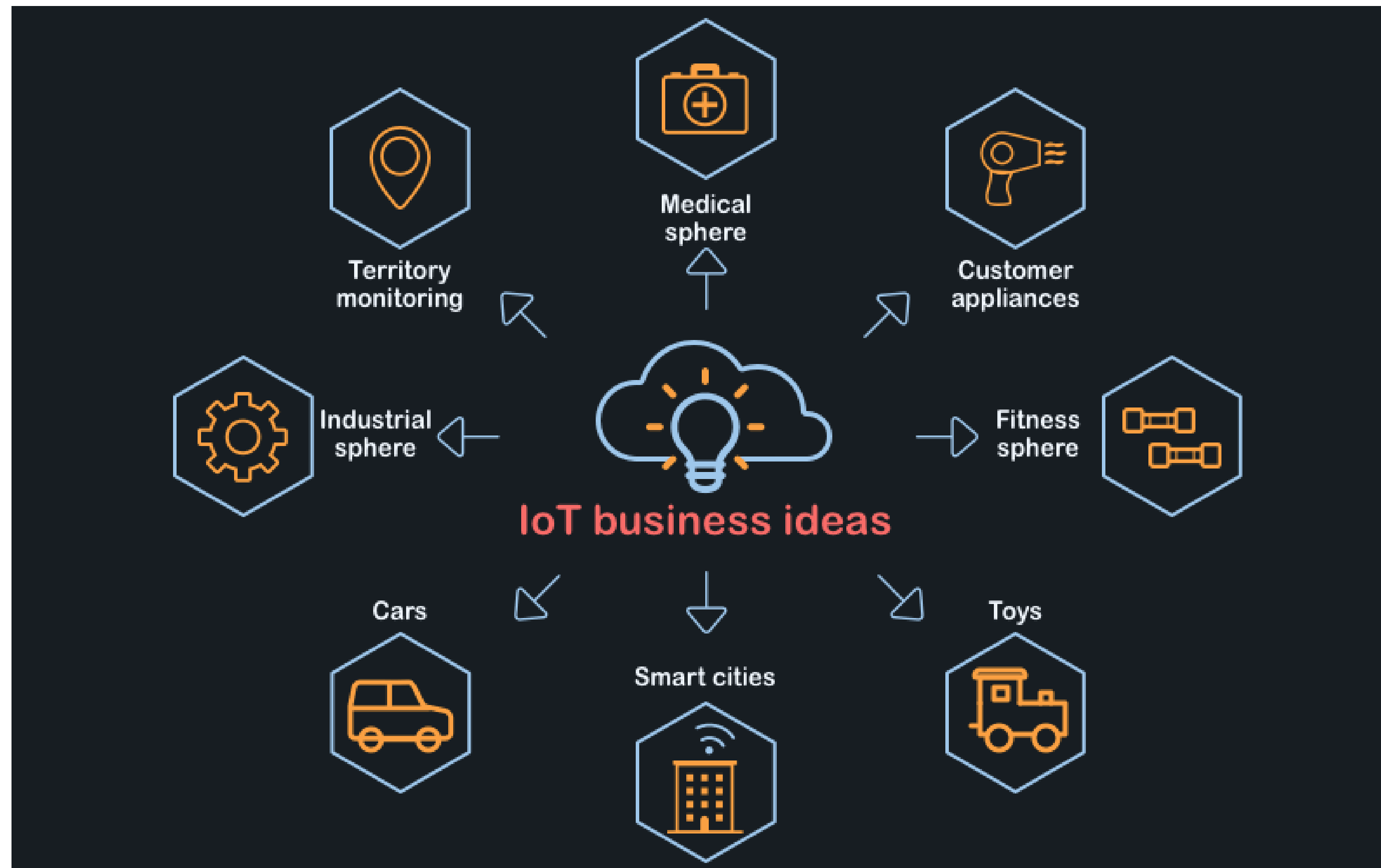
# Smart Egg Tray

**Egg Minder syncs with your smartphone to tell you how many eggs you've got at home (up to 14 eggs) and when they're going bad.**

<http://www.quirky.com/shop/619>



# IoT business opportunities





# IoT – Advantages

- **Improved Customer Engagement –** Current analytics suffer from blind-spots and significant flaws in accuracy; and as noted, engagement remains passive. IoT completely transforms this to achieve richer and more effective engagement with audiences.





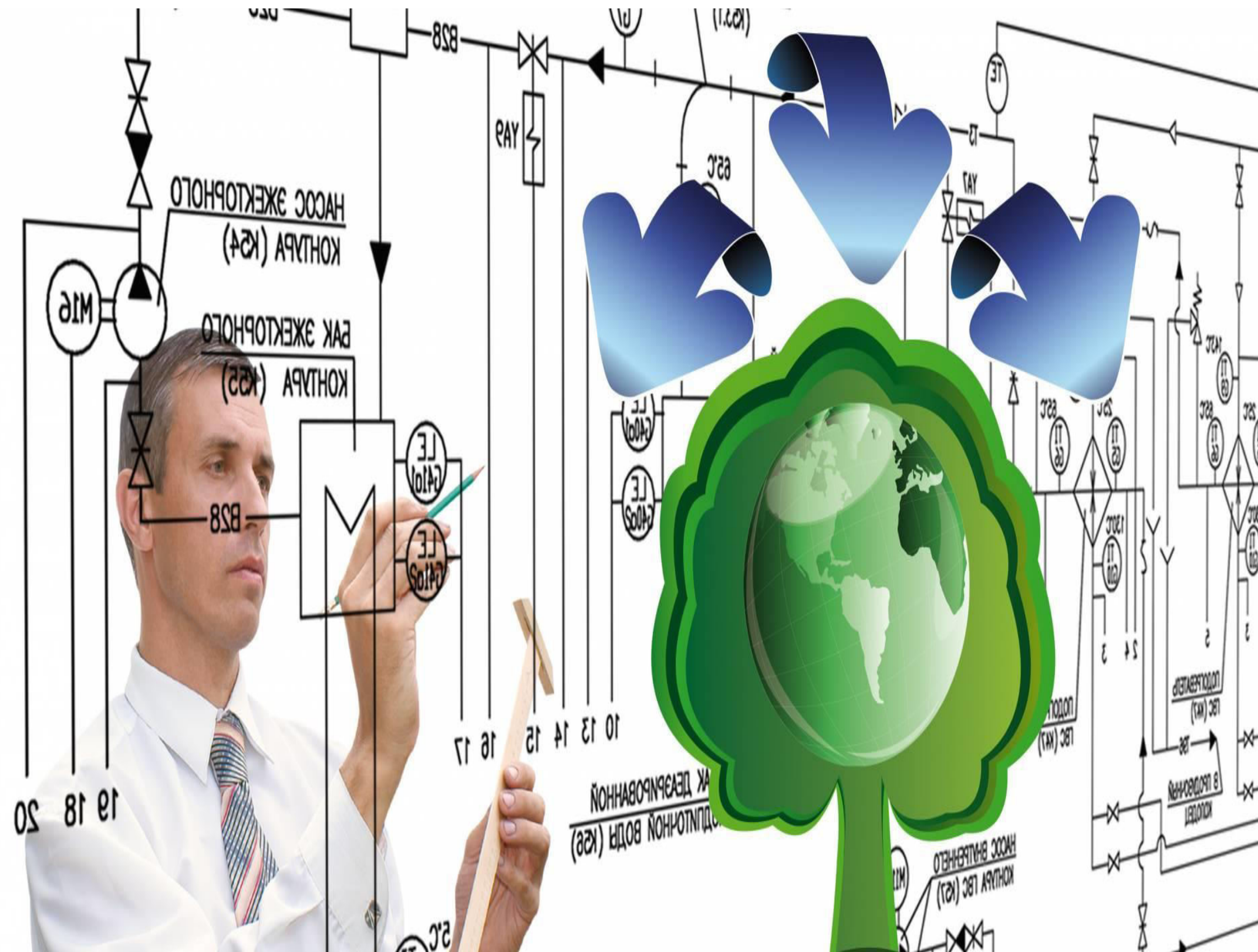
# IoT – Advantages



**Technology Optimization –**  
The same technologies and data which improve the customer experience also improve device use, and aid in more potent improvements to technology. IoT unlocks a world of critical functional and field data.

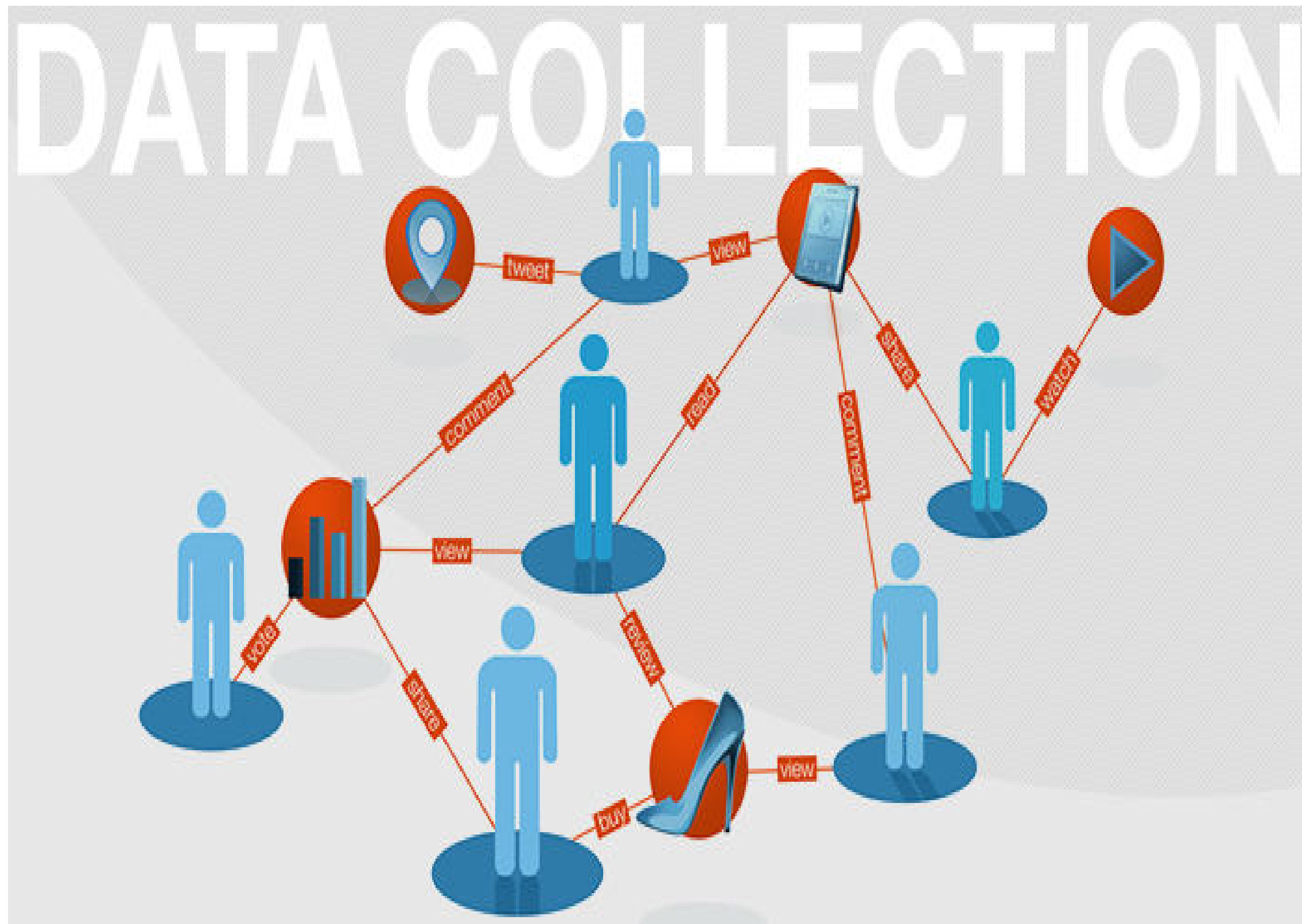


# IoT – Advantages



- **Reduced Waste** – IoT makes areas of improvement clear. Current analytics give us superficial insight, but IoT provides real-world information leading to more effective management of resources.

# IoT – Advantages



- **Enhanced Data Collection –** Modern data collection suffers from its limitations and its design for passive use. IoT breaks it out of those spaces, and places it exactly where humans really want to go to analyze our world. It allows an accurate picture of everything.



# IoT – Disadvantages

- **Security** – IoT creates an ecosystem of constantly connected devices communicating over networks. The system offers little control despite any security measures. This leaves users exposed to various kinds of attackers.





# IoT – Disadvantages



- **Privacy** – The sophistication of IoT provides substantial personal data in extreme detail without the user's active participation.



# IoT – Disadvantages

- **Complexity** – Some find IoT systems complicated in terms of design, deployment, and maintenance given their use of multiple technologies and a large set of new enabling technologies.





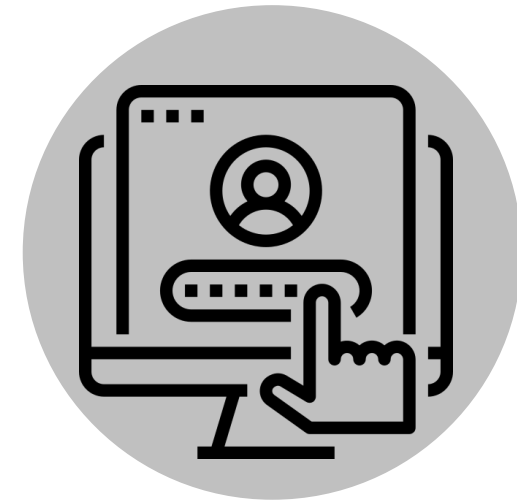
# IoT – Disadvantages

- **Compliance** – IoT, like any other technology in the realm of business, must comply with regulations. Its complexity makes the issue of compliance seem incredibly challenging when many consider standard software compliance a battle.





# Securing IoT Devices



**Authentication** – IoT devices connecting to the network create a trust relationship, based on validated identity through mechanisms such as: passwords, tokens, biometrics, RFID, X.509 digital certificate, shared secret, or endpoint MAC address.



**Authorization** – a trust relationship is established based on authentication and authorisation of a device that determines what information can be accessed and shared.



**Network Enforced Policy** – controls all elements that route and transport endpoint traffic securely over the network through established security protocols.



**Secure Analytics: Visibility and Control** – provides reconnaissance, threat detection, and threat mitigation for all elements that aggregate and correlate information.