The School of Business Studies and Humanities (BuSH)

BuSH 6008: Technological Innovation and Entrepreneurship Management:

Module 1/ BUSH 6004: Innovation Management and Competitiveness

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RECARP OF SUB MODULE 1:

- Appreciate the need of competitive advantage
- Competitiveness Framework
  - Porters Competition Model (Vertical: Suppliers & Buyers), Horizontal (new entrant, substitute products and existing rivarlys)
  - Diamond economic models (determinants of national's development
  - Competitive Strategy : Offensive Vs Defensive; Market Penetration (cost leadership, product differenciation e.t.c & Market Dorminance), Growth (Horizontal * vertical
  - Competitive Intelligence System
- The Firm
  - Firm VS Industry;
  - Internationalization : motives(internal & External), Mode (Inside Vs Outside> export, offshore services, contractual (Licensing, franchising e.t.c)
  - Business Analysis (SWOT, PESTEL)
- *** Clusters
  - Meaning, determinants, advantages, types,

WISHES TOWARDS PERSONAL SATISFACTION

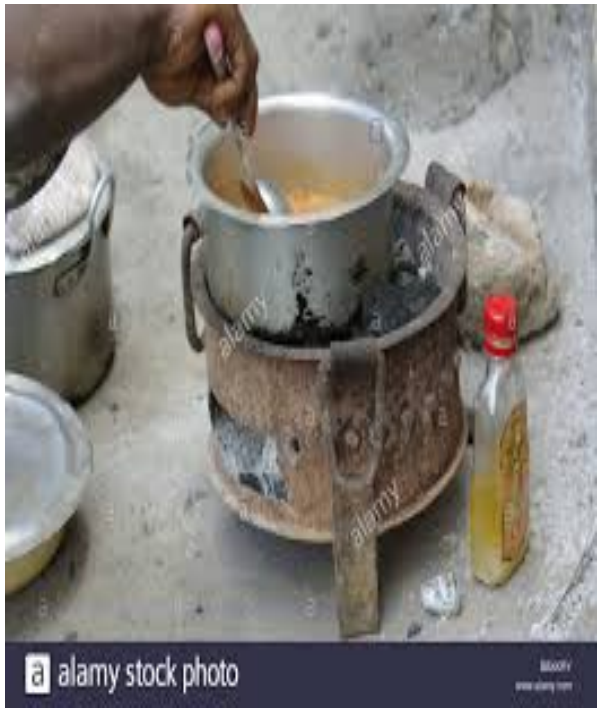
"People who had severe illness with COVID-19 might experience organ damage affecting the brain, heart, pancreas, kidneys, lungs , stomach, intestines.

SUB MODULE 2:

TECHNOLOGICAL INNOVATION

CLASS ACTIVITY 1:
WISHES TOWARDS SATISFACTION

1. Food
2. Car
3. Wallet
4. Cellphone
5. Laptop
6. Dental services
7. Garbage collection
8. HIV-AIDs adverts
9. Long safari buses
10. Classroom
11. Shoes
12. Bongo Movies programs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Evolution of the Mobile Phone
Motorola 8900X-2
Nokia 2146
Nokia 3210
Nokia 6210
Ericsson T39
Alcatel OT511
Samsung E250
Apple iPhone
BlackBerry Curve 8900
Samsung Galaxy S2
Samsung Galaxy S4
Sony Xperia Z Ultra

EVOLUTION CARS

1880

1900

1920

1940

1960

1970

1980

1990

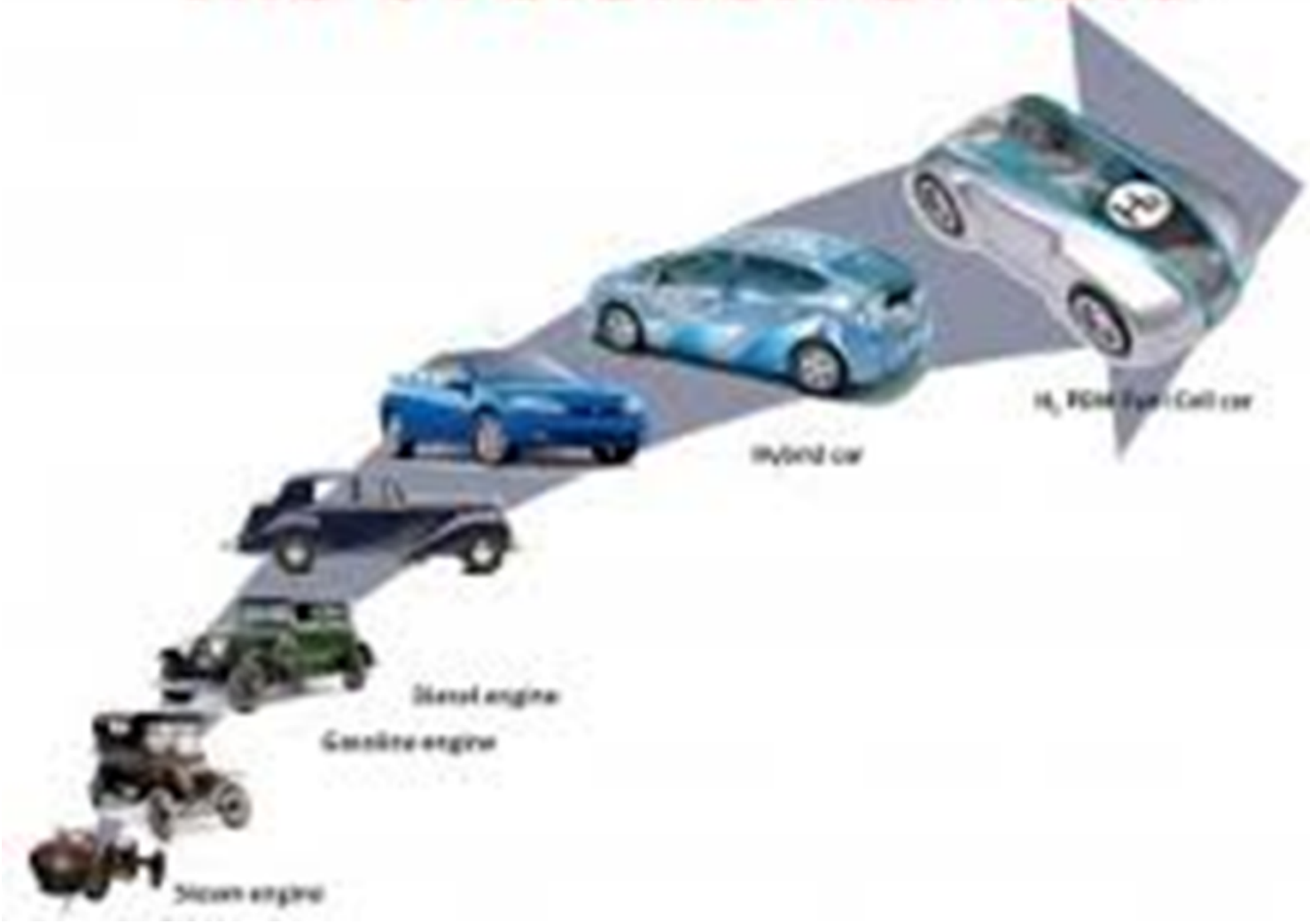
2000

2005

2010

2020

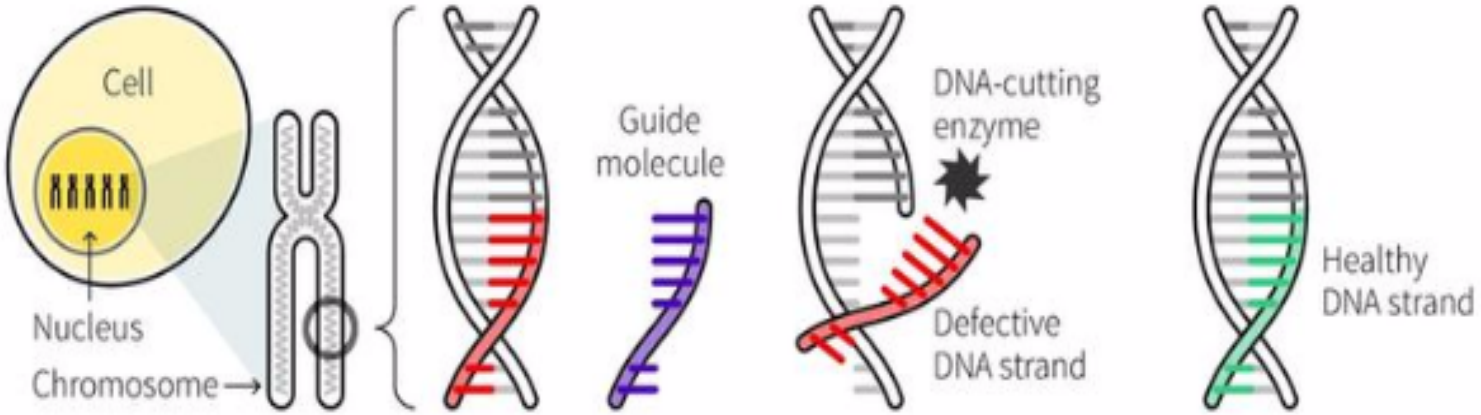
The evolution of cars



DNA editing

A DNA editing technique, called CRISPR/Cas9, works like a biological version of a word-processing programme's "find and replace" function.

HOW THE TECHNIQUE WORKS



A cell is transfected with an enzyme complex containing:

- Guide molecule
- Healthy DNA copy
- DNA-cutting enzyme

A specially designed synthetic guide molecule finds the target DNA strand.

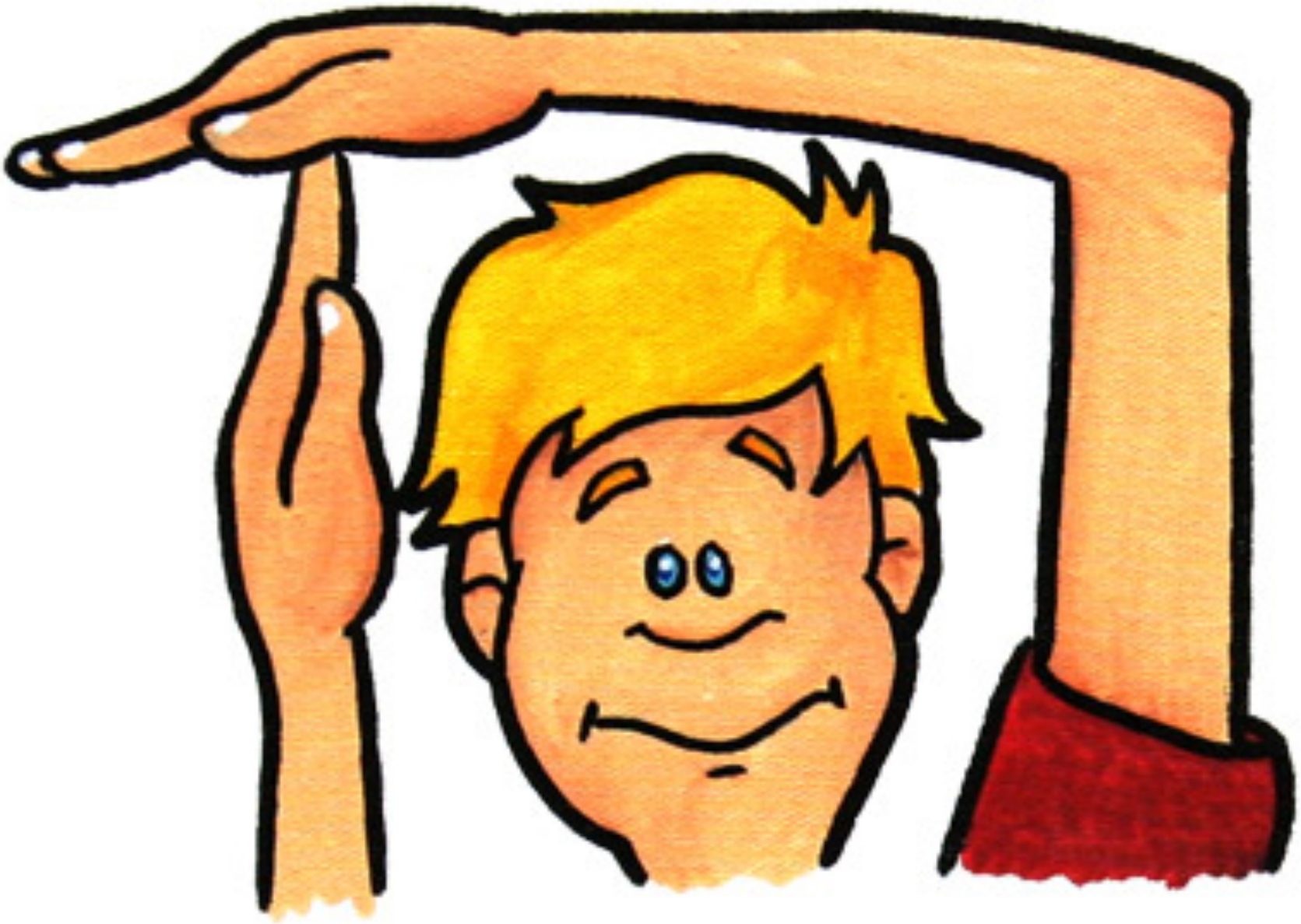
An enzyme cuts off the target DNA strand.

The defective DNA strand is replaced with a healthy copy.

Sources: Reuters; Nature; Massachusetts Institute of Technology

CONTENTS FOR SUB MODULE 2:

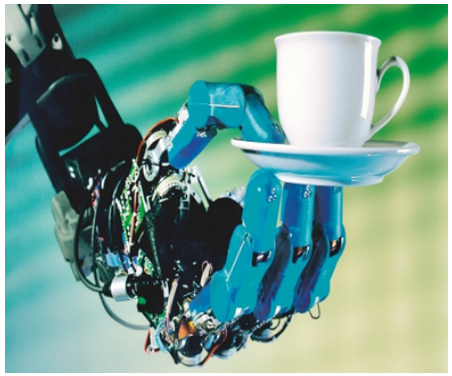
i. Background of Innovation
ii. Organizing for Innovation
iii. Types and Extent of Innovation
iv. Managing Innovations
v. The Innovation Process
vi. Measuring Innovations
vii. Innovation Outcomes
viii. Barriers to Innovation



2.1 BACKGROUND OF INNOVATION

- What is Innovation?:
  - Is the implementation of new or improved product (goods or services), a processes, a new marketing or organization methods in a business practices, a work place organization or external relations (Olso Manual, OECD 2005).

  - A new way of doing things in a place or by people where they have not been done before.



AREAS TO INNOVATE

- **Product innovation :**
  - Introduced to the market in the form of
    - development of a new product,
    - An improvement of the performance of the existing product,
    - Introduction of a new feature to an existing product, such as power windows to a car.
  - In most f the time it is visible to customers
  - e.g cellphone, mobile app, an increase in the digital camera resolution of the phones, television in the car or power window in the car

Product Innovation: Biosensors

- an analytical device, used for the detection of a chemical substance, that combines a biological component with a physicochemical detector
- Calibrated and designed to track various biosignatures such as blood pressure, pulse, breathing, and body temperature thus monitor human health.
- E.g vest monitor to help track the amount of fluid in the lungs of heart failure patients developed by Sensible Medical Co.

AREAS TO INOVATE…

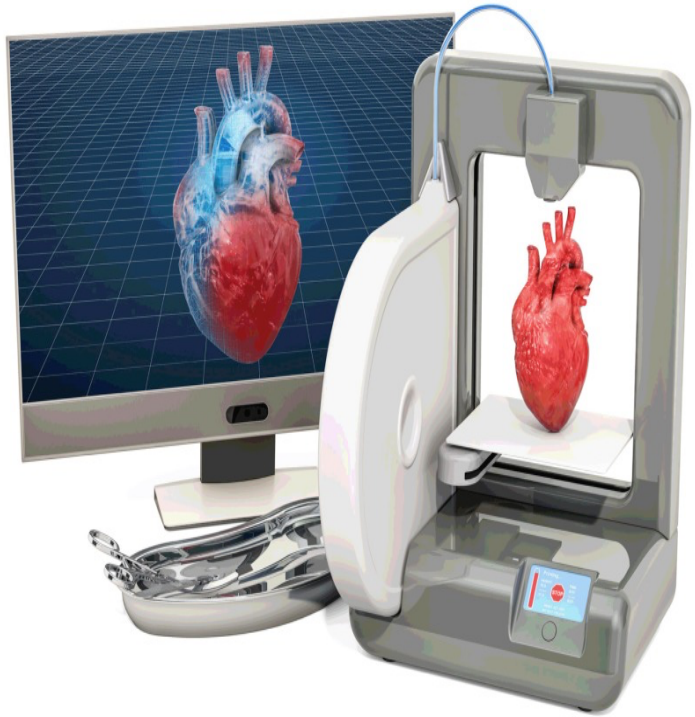
- **Process innovation**
  - Different ways of doing things

- Implementation of a new or significantly improved process of production or delivery method (such as significant changes in techniques, equipment, tools, and/or software used) along the value chain.

- E.g layout in manufacturing industry or motor vehicle assembly line, food/ cooking process, accounting methods, customer service techniques e.t.c

Process Innovation: 3-D Bioprinting

❑is a 3-DP technique that combines living cells (e.g., stem cells) and supportive biomaterials (e.g., scaffolds on which cells can grow) into so-called bioinks. These bioinks are printed into pre-specified computer-generated designs with the goal of eventually maturing into specific tissues.



❑ Was one among the major achievements in the 2010s. And the next stage is no less revolutionary. By using living cells, this technology can create various human body parts such as heart valves, skin, and cartilage for use in medicine.

❑Bioprinting has the potential to create drugs and pills, as well as entire organs such as hearts or livers grown from a patient's own body cells.

❑The ability to print human organs also have applications in medical research and training, as a way to provide accurate samples for study and analysis.

AREAS TO INNOVATE…

- **Marketing innovation**:
  - Innovative ways to reach more customers
  - Usually applied in the commercial activities
  - E.g . Mobile money transfer i.e M-Pesa by Safaricom, Use of voice as marketing tool, using celebrities , story telling, video marketing, mobile friendly sites and social media

AREAS TO INNOVATE….

- Organization innovation
  - e.g Organization methods/practice, new research collaboration ways, design thinking
  - Innovative work place which enhance the workers capacity for learning and problem-solving

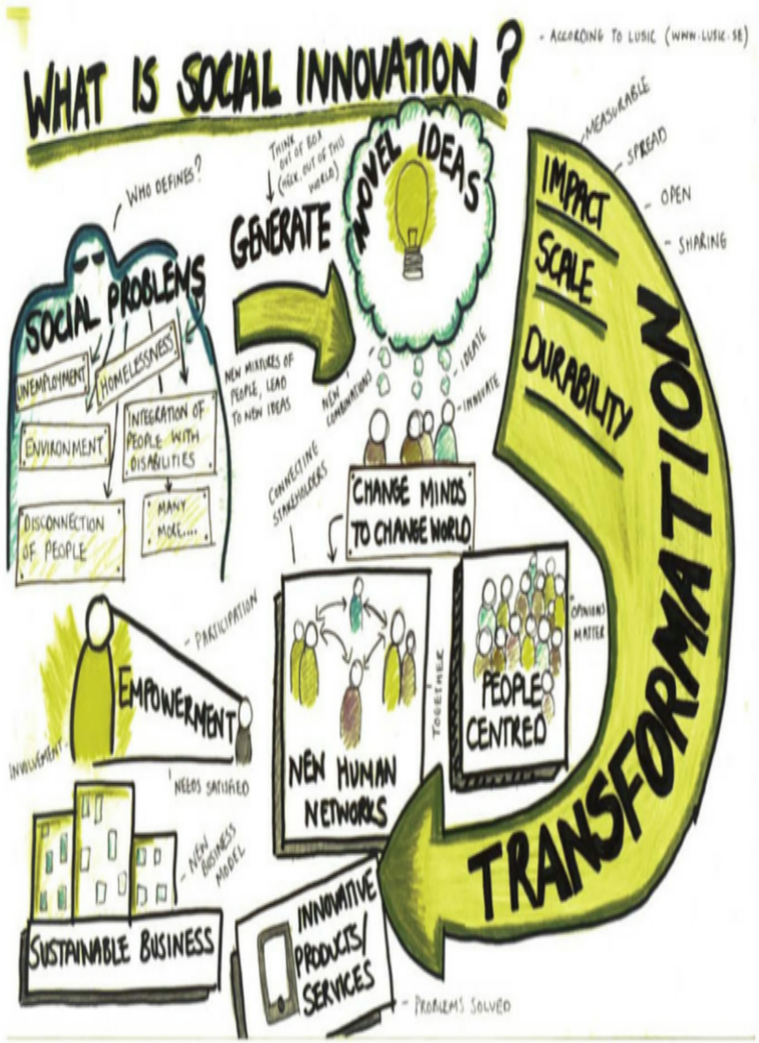
AREAS TO INNOVATE….

- **Technological innovation** :Specific technology e.g , robotic exploration, body heat operated aircraft,

AREAS TO INNOVATE….

Social Innovation

- Include all new strategies, ideas, concepts and or strategies intended to meet the social needs
- Applicable in different social settings such as: community development, public health, working conditions
- Main target being societal changes or transformation E,g information networks, village financing and savings e.t.c



Social Innovation: 3-D Bioplastic

- plastic usage vs environmental destruction of ocean and land
- Environmental and ecological destructions and concerns are fast becoming a major area of focus. People are increasingly conscious of the materials they use in their day-to-day lives.
- It takes hundreds of years to break down and poses a huge threat to marine life. New strategies are beginning to help reduce our reliance on it. One method to emerge from the biotech industry has been the development of bioplastics.
- More and more we're seeing organic materials that will biodegrade over time, or can even be safely eaten, in place of plastic. It's thought that use of bioplastics may increase 20% a year until 2021. These materials are far less toxic to the environment, while still maintaining many of the benefits of regular plastics.

CLASS ACTIVITY 1:

- Group1: Reasons for Innovation
- Group 2: Sources of Innovation

REASONS FOR INNOVATION

- Solve existing problems
- Customer need/ demand and requirement/
- Customer satisfaction> retention
- Simplifies work
- Improve quality of life
- Modernize medical test, treatments, and intervention
- Improve quality of life e.g DNA editing, embryo chroning
- Sourcing of funds/ income/ money
- Competitive advantage/ stand out from the competition
- Growth
- Productivity
- Technological advancements,
- Wealth creation
- Increase of shareholders' value
- Return in Investment & Return in Technology
- Survival of the firms e.t.c

SOURCES OF INNOVATION

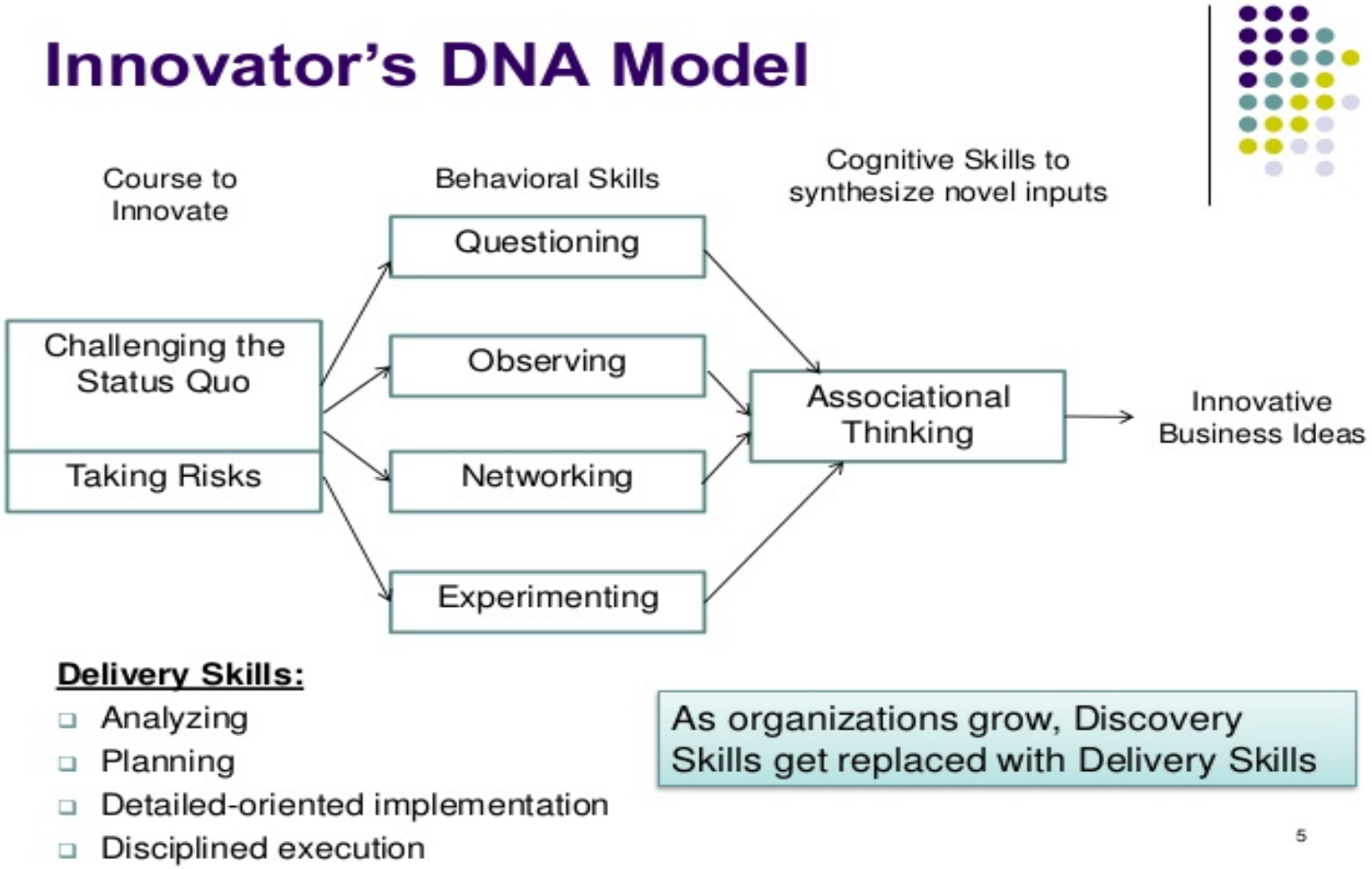
Within the organization

- Experience/ Knowledge of
  - Shareholders: perception or knowledge
  - Managers: knowledge
  - Staff (multi skilled teams)
- Process need (task focused)
- Resources :availability and scarcity
- Demographic(age, gender, income, education, population e.t.c)
- Approach (suggestion and creativity schemes) including the use of ICT & Internet of Things
- Strategies (time and freedom to generate ideas)

Outside the organization

- Users: &Customers
- Producers/ Competitors
- Suppliers
- Intermediaries
- Universities and Research Centers
- Conferences, Meetings and Publication (professional or business)
- Trade Fairs and Exhibition (Scientific or business fairs)
- Government machineries and policies
- Market situation: Disasters, Poverty, Communication barriers

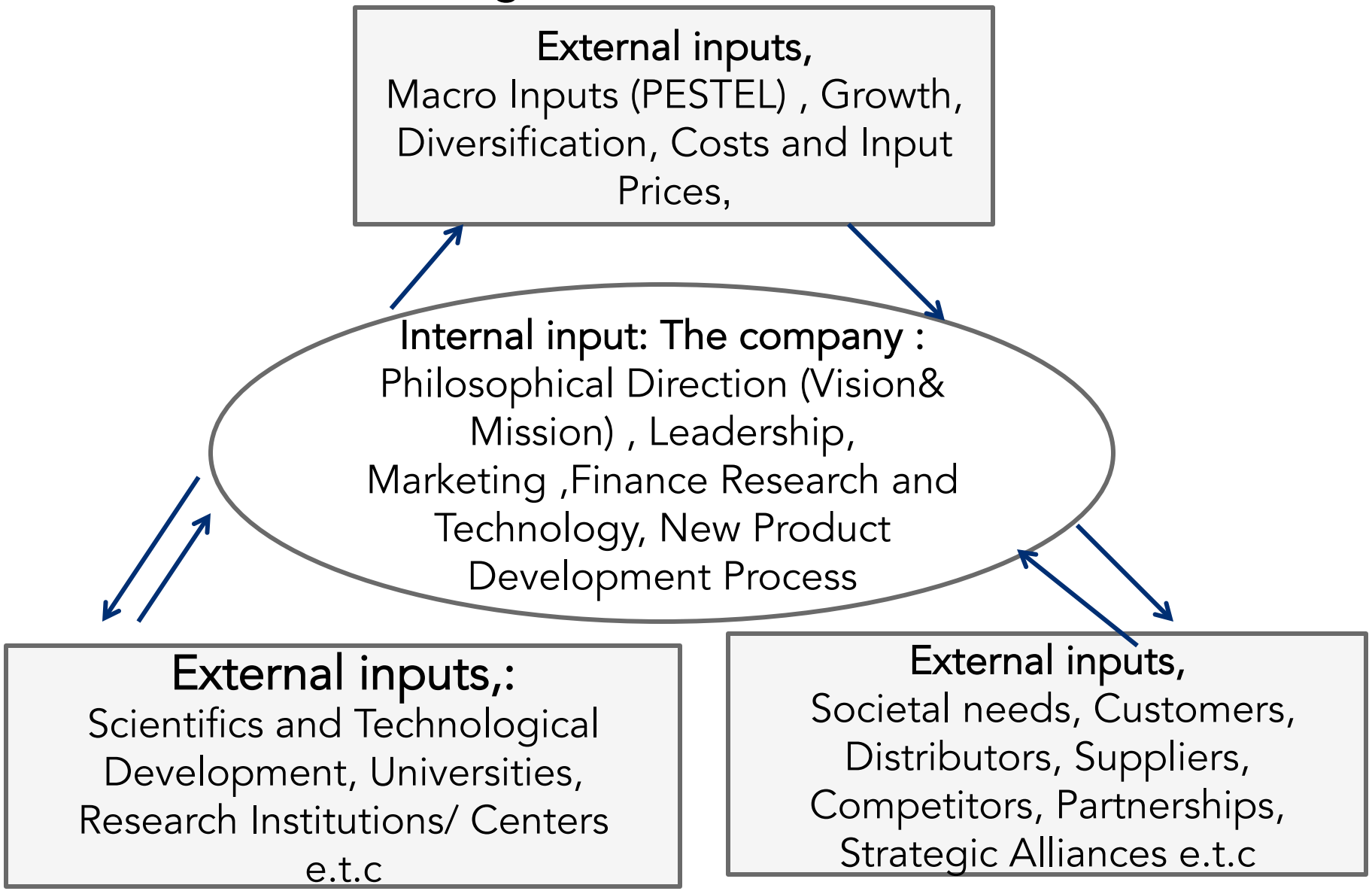
INNOVATION DISCOVERY SKILLS



- @Dyre, Gregersen & Christensen (2011)

2.2 ORGANISING FOR INNOVATION

- Innovation as Management Process



DIMENSIONS OF ORGANIZING INNOVATIONS

- **Focus of innovation**
  - internal or external e.g own marketing strategies or competitors push
- **Flow direction of innovative ideas**
  - top –down, bottom up, lateral
- **Development of innovation**
  - Develop ? Buy? Outsource? copy?
- **Location of innovation: centralized**
  - corporate level or decentralized (SBU level)
- **Management of innovation process**
  - formal or informal

2.3 TYPES OF INNOVATION….

❑ Change Over: …

- Relates to early emergence of innovation which shapes basic life principles and technological application
  - e.g *discovery of fire*,

  - e.g *biotechnology revolutionized the traditional medicine* and help save and improve the quality of life for people suffering from various illnesses such as cancer, blood-related illness, and neurological cases such as multiple sclerosis.

TYPES OF INNOVATION…

❑ Radical

- Require new knowledge/ technology or resources (*new to the word) in a new market
- Usually leads to step change in the performance or utility and transform the market and the society
- Relatively rare but in most of the cases it create a new big market demand/ niche market
- Levels :
  - Breakthrough: to a pressing problem
  - Disruptive: create a new niche market
  - Game Changer: transform the market and society
- E.g
  - Computer : knowledge of micro processor > Integrated electronics
  - Invention of flying machines/ airplanes
  - Telephone: new knowledge of telecommunication

TYPES OF INNOVATION…

❑Incremental

- build upon existing knowledge or research(*doing what usually done but in a better or different way) in existing market

- Usually leads to relatively small changes in the performance or utility

- Result into steady improvement of product or service

  e.g artificial legs, cellphones ,television, lighting systems e.t.c

TYPES OF INNOVATION…

❑ Architecture Innovation

- Refers to destroying the usefulness of a company's architectural knowledge but preserving the usefulness of the knowledge about the firm's products components (a physically distinct portion of a product that represents the core design concept and performs a well-designed function).
- Existing technology in a new market
- Involves changing the overall design of the system and the way components are interact
- changes the nature of interactions between core components, while reinforcing the core design concepts
- e.g high wheel bicycle to safety bicycle, multifunctional desktop photocopier, amazon in a medical field

TYPES OF INNOVATION…

❑ Modular

- Uses architecture and configuration associated with *existing system of an established products* but employ new component with different design concept
- Leads to changes in one or more component of a product system without significantly affect the overall design
- may result in the complete redesign of core components, while leaving linkages between the components unchanged.
- Often it leads to less dramatic impact e.g adding a gel-filled materials to a bicycle seat, burners plates

TYPES OF INNOVATION…

❑ Continuous

- Innovations which gives new ways of destructing old or existing innovations
- Changing or improving the already existing product
- It is more tha incremental as it relates to the ongoing, gradual evolution that occurs in activities, operations, and creations without changing customer's habits
  - e.g automobiles, MacDonald's products

2.4 MANAGING INNOVATION

- The interactions between the actors needed in order to turn an idea into a process, product, or service on the market.

- **Innovation System**
  - Set of interconnected key stakeholders such as institutions, agents, organizations and the linkages between them that together and individually attribute to the development and diffusion of new knowledge in the form of process of products
  - Provides a valuable framework that clarifies relationships and interdependencies when applied to complex systems.

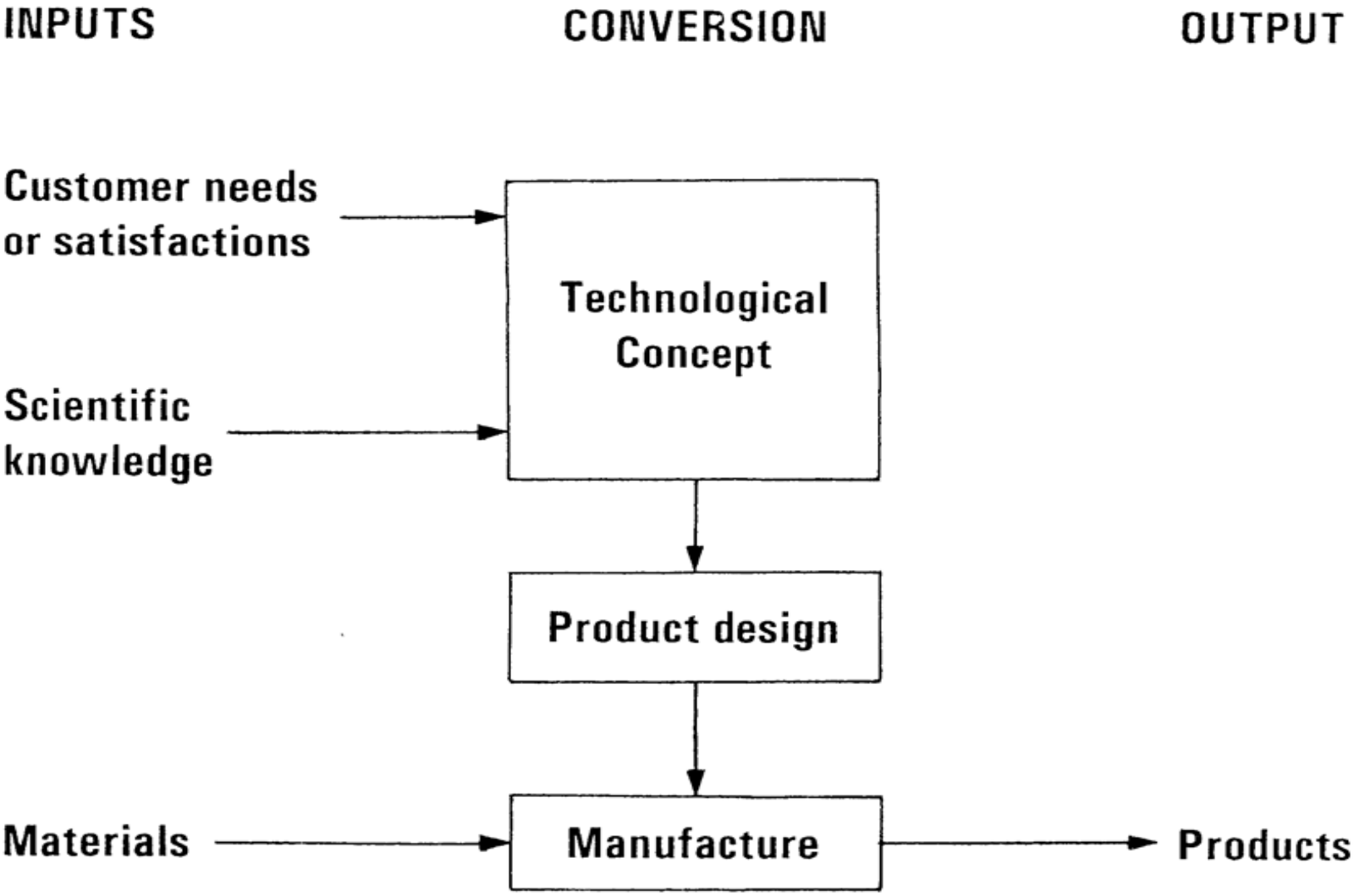
MANAGING INNOVATION…

Innovation Systems: Components and Roles

- Industrial system (firms)
  - Employment, R&D, market creation
- Education and public research system (academia)
  - basic research, capacity building, collaboration potential
- Political system (government)
  - funding, incentives e,g tax, IPR, education system, policy framework
- Individual
  - Demand for better, a market, advocacy, user based experience
- Infrastructures
  - Power, roads, ICT e.t.c
- Conditions
  - culture, geography)

2.5 INNOVATION PROCESS

- what are the actions required to turn idea it into an innovation?



@ Califonia State University

THE INNOVATION CHAIN (PROCESS)

IDEA/CONCEPT

TECHNOLOGY DEVELOPMENT

Invention -- patents, trade secrets, Intellectual Property (IP)

TECHNOLOGY TRANSFER

Investment Grade -- license, joint venture, start company

TECHNOLOGY COMMERCIALIZATION

Business Plan, Strategic Plan, financing/internal funding

Narayan

INNOVATION PROCESS

1st generation: (push)

- Assumed a linear innovation process *i,e (scientific discovery R&D > inventions> manufacture> marketing> sales)*

2nd generation (pull)

- Research vs market demand *i.e (market demand> R&D> manufacture> sales)*
- *Development vs R&D*

3rd generation (Communication)

- Involves communication and feedback along the process i.e (*R&D,> design> prototyping> testing.> operation,> marketing,> sales > services)*

4th generation (Customer Orientation)

- i.e interaction of custom and suppliers during(*R&D,> design> prototyping> testing.> manufacture> marketing,> sales > services)*

5th generation (integration of ST&I)

- Depend on innovation strategies and integration of stakeholders i.e customers, suppliers, communities, business and scientific networks)

2.6 MEASURING AND ASSESSMENT OF INNOVATION

Thick Method

T = Technology

- Technology in use (products, processes, designs)
- Technology transfer opportunities… etc.

H = Human Resources

- Trained workers available
- Training opportunities available… etc.

I = Institutions, Infrastructure

- Standards and testing organizations
- Research institutes and research funds
- Incubators
- Technology / Research financing

C = Communication, Coordination, Cooperation

- Extension Services
- Professional societies
- Conferences and workshops
- Access to ICTs…etc.

K = Knowledge Resources

- Technical reports and scientific papers
- Regulations and laws
- Indigenous know-how…etc.

2.8 BARRIERS TO INNOVATION

- **People/ Stakeholders / Players:** The friends and players in the industry that can destroy or boost an innovation's chance of success.
- **Funding:** The processes for generating revenue and acquiring capital, both of which differ from those in most other industries.
- **Technology:** The foundation for advances in communication and for innovations for efficient and effective delivery
- **Customers:** The increasingly engaged customers seeking your support / services, in knowing their needs.
- **Policy:** The regulations that pervade the industry, because incompetent or fraudulent suppliers can do irreversible damage.
- **Accountability:** The demand from vigilant consumers and competitive market that an industry should be able to meet their customers expectations.

NEXT SESSION ...

Innovation Strategy

i. General Innovation Strategy
ii. Model of Innovation Strategy
iii. Types of Innovation Strategies
iv. Return from Innovation
v. Building Innovation Strategy
vi. Innovation Strategy in SME