Technology and Development Vs Society

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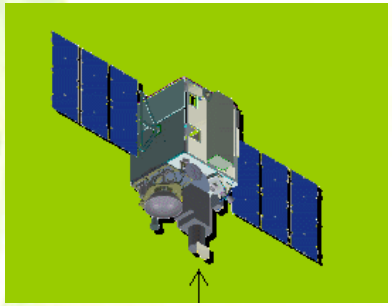


What is Technology?

The branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science.

The use of scientific knowledge to solve practical problems, especially in industry and commerce.

The specific methods, materials, and devices used to solve practical problems.

Technology is comprised of the products and processes created by engineers/inventors to meet our needs and wants.

Technology vs. Science

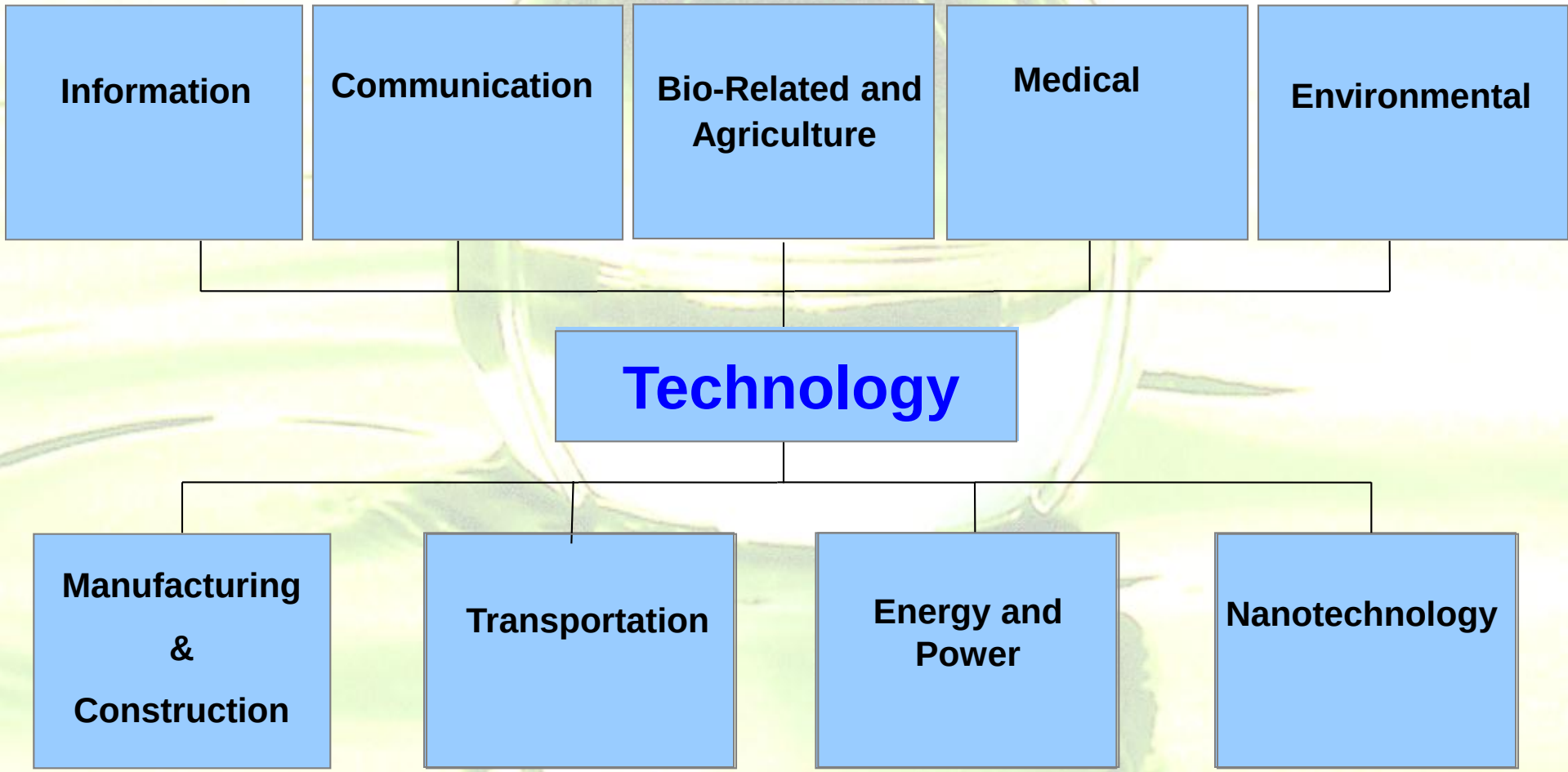
Technology

- Study of our **human-made world**
- Deals with "**what**

Science

- Study of our **natural world**
- Deals with **"what is"**

How Does Technology Address Human Needs and Wants?



Example:

Information Technology allows us to send signals around the world.

Examples:

Television, Internet, satellite, GPS, cell phones

Development

Development as a process or course of positive change.

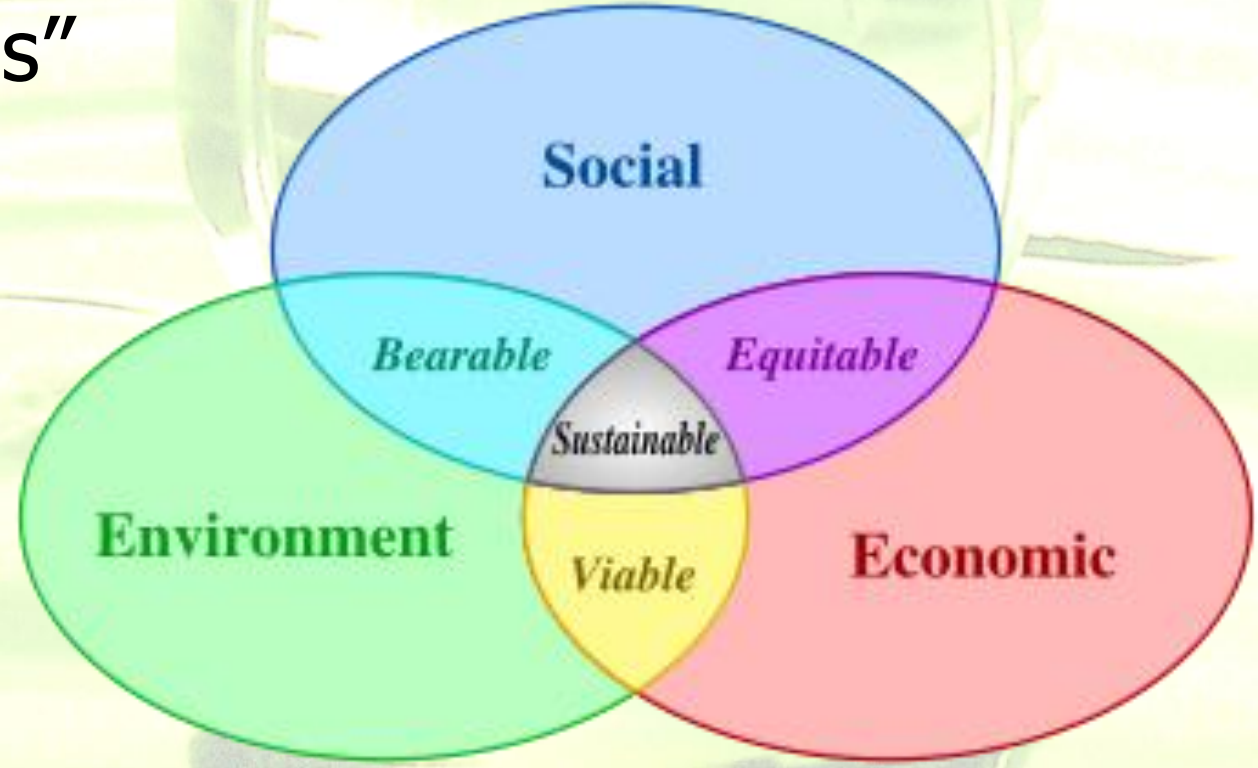
Development is not purely an economic phenomenon but rather a multi-dimensional process involving reorganization and reorientation of entire economic **AND** social system.

Development is process of improving the quality of all human lives with three equally important aspects. These are:

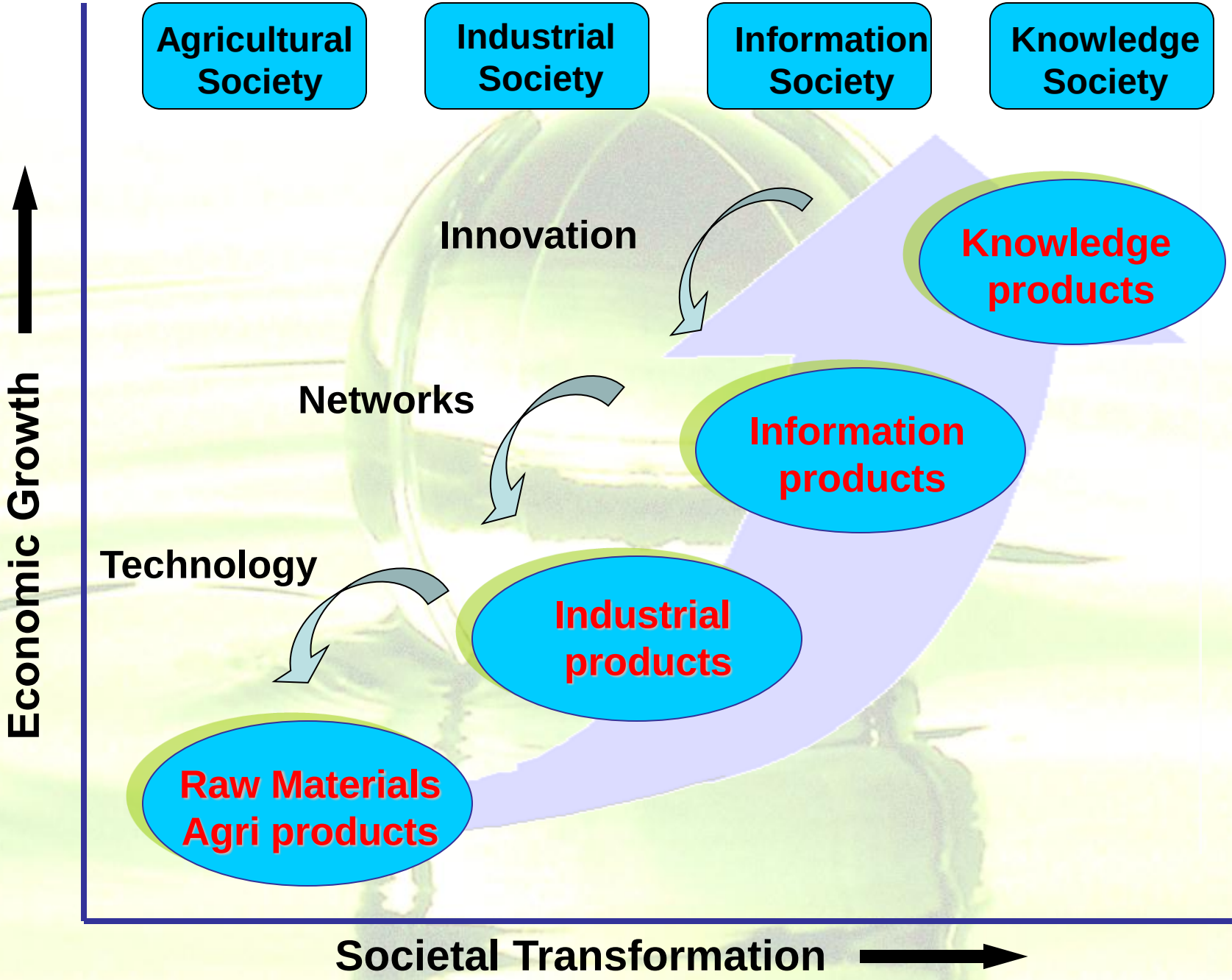
1. Raising peoples' living levels, i.e. incomes and consumption, levels of food, medical services, education through relevant growth processes
2. Creating conditions conducive to the growth of peoples' self-esteem through the establishment of social, political and economic systems and institutions which promote human dignity and respect
3. Increasing peoples' freedom to choose by enlarging the range of their choice variables, e.g. varieties of goods and services

Sustainable Development

- "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs"



21st century will be the century of knowledge


Agricultural Society
Industrial Society
Information Society
Knowledge Society
Economic Growth
Innovation
Networks
Technology
Knowledge products
Information products
Industrial products
Raw Materials Agri products
Societal Transformation

What is a Knowledge Society ?

That uses knowledge holistically to empower and enrich people– and is an integral driver of sustainable development (societal transformation)

- A life-long learning society committed to innovation
- Has the capacity to generate, diffuse, utilize and protect knowledge - creates economic wealth and social equity
- Enlightens people towards an integrated view of life as a fusion of mind, body and spirit

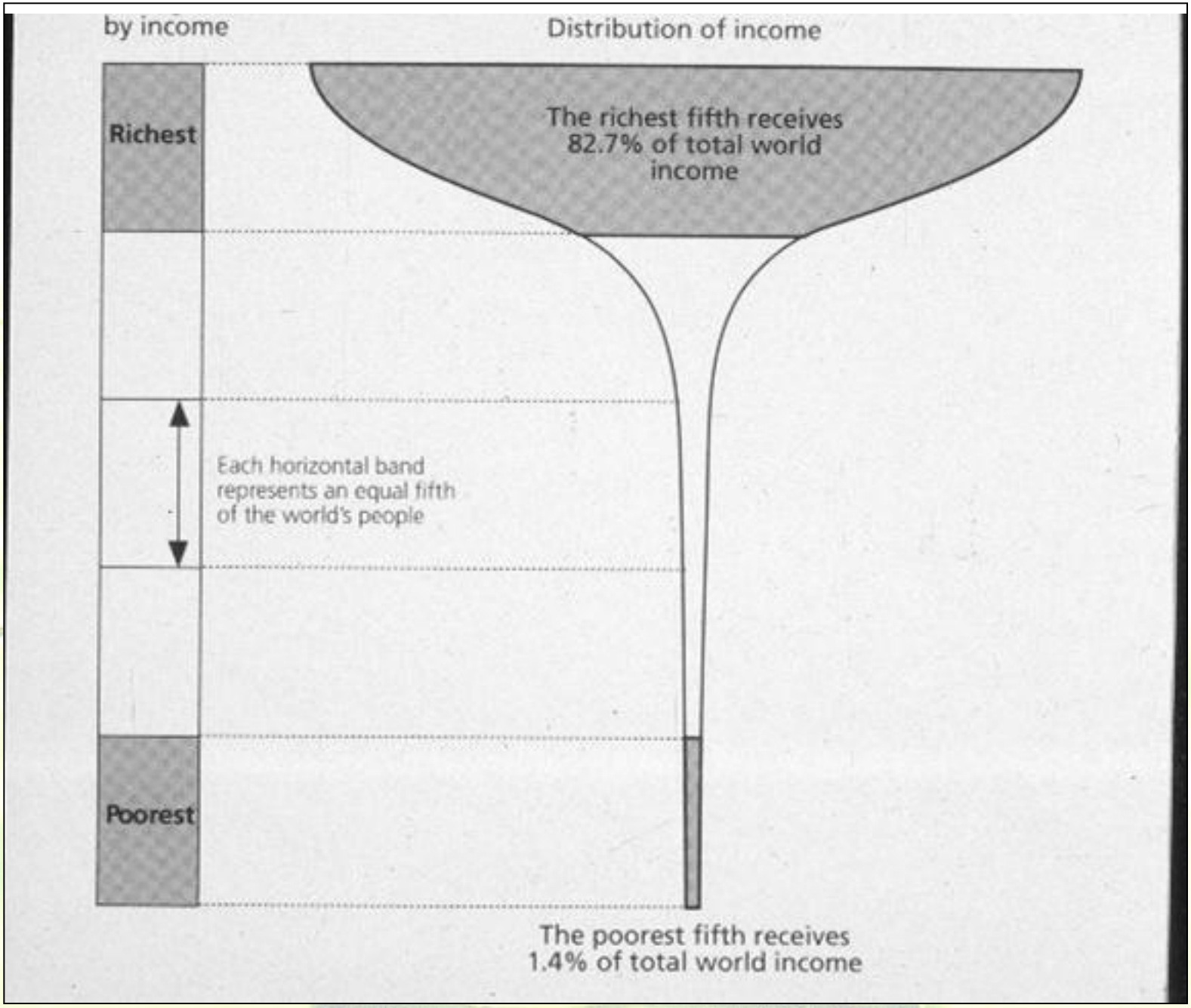
“There is hardly any social problem on which science cannot make some contribution”

-D. K. Price, Scientific Estate

Science for policy
and
Policy for Science

Both for Society with Technology

Science is never sufficient to solve a problem completely; it is, however, always necessary.


by income
Distribution of income
Richest
The richest fifth receives
82.7% of total world
income
Each horizontal band
represents an equal fifth
of the world's people
Poorest
The poorest fifth receives
1.4% of total world income

What is Appropriate Technology

- Appropriate technology is the appropriate selection of a device or solution to a problem based on the individual needs of an area, or a population; which generally utilizes simple and user friendly products and or systems.

What is appropriate technology?

- Appropriate technology has been used to cover a wide range of both technologies and lifestyles including sustainable living, alternative fuels, and ethical technology transfers.
- A technology is considered appropriate if it solves a social problem without many adverse negative effects.
- Every new technology has consequences for society. A technology is appropriate when its intended positive consequences outweigh its unintended negative consequences

Appropriate technology = technology that is suited to the needs, skills, knowledge and wealth of local people in the environment which they live.

What do you think is meant by this statement?

Can you think of inappropriate and appropriate technology?

E.F. Schumacher

- Coined the term Appropriate Technology.
- Based the philosophy of appropriate technology on his experiences in developing nations.
  - He worked around the world as a Economist.
- His 1973 publication "*Small Is Beautiful: Economics As If People Mattered*" outlined Appropriate technology.

Appropriate Technologies

- That is designed with special consideration to the environmental, cultural, social and economic aspects of the community it is intended for
- Typically requires fewer resources
- Is easier to maintain
- Has a lower overall cost
- Less of an impact on the environment

To take a simple approach to design as a problem-solving activity is, in fact, a caricature. Design – whether concerned with socially responsible products or even consumerist luxuries – is a cultural activity in which meaning and identity relative to a group, society or country are essential considerations.

Technological processes of production, too, have to be 'appropriate' to the culture of a country or region. Much has been written about 'AT' (appropriate technology), and its relationship to responsible design in Third World countries cannot be neglected. Briefly, the main characteristics of appropriate technologies are that they are low in capital costs; use local materials whenever possible; create jobs, employ local skills and labour; are small enough in scale to be locally or regionally affordable; and can be understood, controlled and maintained by local groups wherever possible, without the need for a high level of Western-style education. Furthermore, they involve decentralized renewable energy sources such as wind power, solar energy, water power, or muscle power and are understandable to the people using them. They are unlikely to involve patents, royalties, consultancy fees or import duties, as these tend to maintain the reliance of developing countries on affluent countries. Finally – and this is facilitated by the 'people rather than technology' emphasis of AT – they need to be flexible so they can adapt to changing circumstances.[41] Much of the thinking behind the values of AT derives from another key book of the early 1970s: E. F. Schumacher's *Small is Beautiful.*

Feature of appropriate Technology

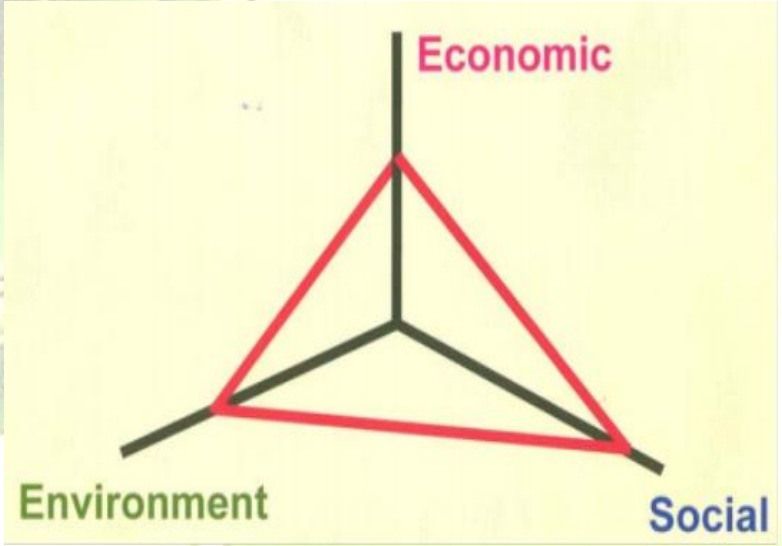
1. Low cost of technology

2. Self Reliance - Technology is its dependency on local environment not only for resources for production but also for know-how's and solutions

3. Labour intensiveness

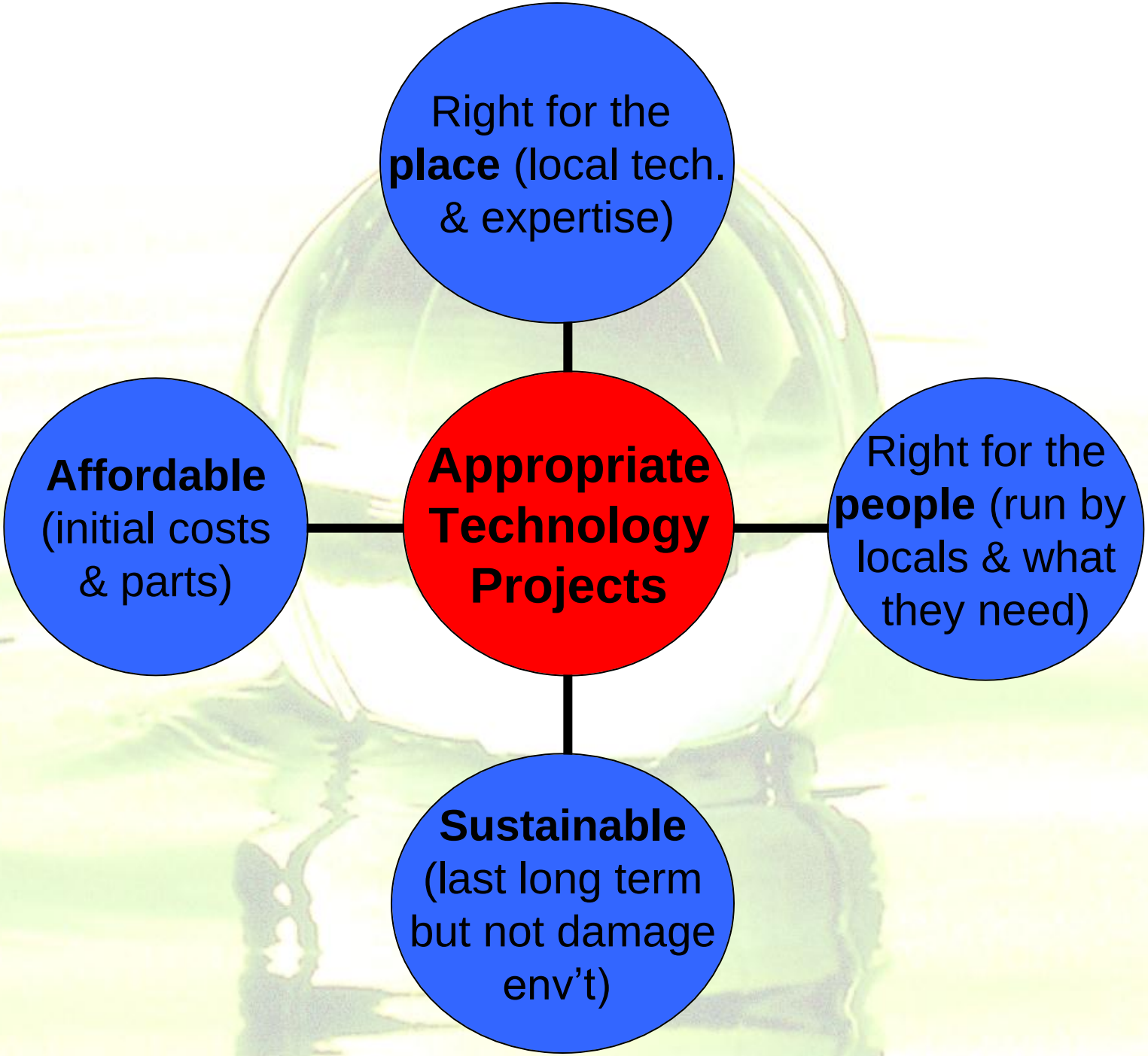
4. Smallness, simplicity and non-bureaucratic features

5. Non-Violence



Goals for appropriate Technology

- Non-Violent / sustainable (no damage to the environment)
- Renewable Sources of Energy
- Create Job opportunities
- Created locally
- Use Local skills
- Use local materials
- Simple, small scale Appropriate to the community
- Low Cost


Right for the **place** (local tech. & expertise)
Affordable (initial costs & parts)
Appropriate Technology Projects
Right for the **people** (run by locals & what they need)
Sustainable (last long term but not damage env't)

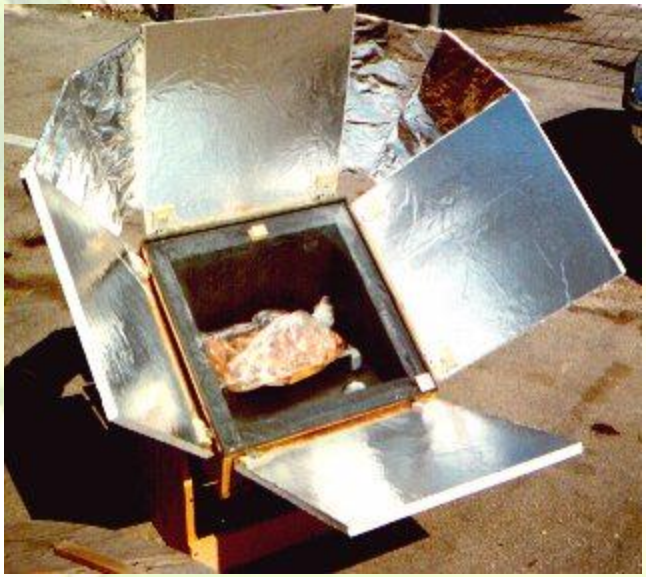
Examples of Appropriate Technology

- Hybrid Vehicles
  - The hybrid vehicle typically achieves greater fuel economy than conventional internal combustion engine vehicles (ICEVs), such that fewer air pollution emissions are generated per kilometre travelled.
  - In addition noise emissions are reduced, particularly at idling and low operating speeds

Plug-In Partners
National Campaign

Examples of Appropriate Technology

- Solar cooking
  - Ovens that heat food using only sunlight
  - Since they use no fuel and they cost nothing to run
  - humanitarian organizations are promoting their use worldwide to help slow deforestation caused by the need for firewood used to cook



How do we evaluate appropriateness?

- There are three ways of evaluating appropriateness: technical, cultural, and economic.
  - Technical--considering the technical knowledge and background of the people who will be using this technology.
  - Cultural—the relationship of the technology to the critical social systems in the society including family systems, religious beliefs, division of labor in a society, and levels of education and training.
  - Economic--a technology's effect on income levels and income distribution in a society and income disparity between different socio-economic groups.

Factors for the assessment of an appropriate technology

- Various factors for assessment of appropriateness would include the following[1]:
  - What is the need?
  - Is there an adequate business environment in place for this technology?
  - What is the best technical option for the transfer? (Some issues include the requirements for operating the technology, repair facilities for the technology, scope of the technology)
  - What are the possible unintended negative effects of the technology?
  - What are the broader cultural, political and/or social effects of the technology?

Renewable Energy

- Renewable energy industries produce energy using resources such as sunlight, wind, water current, and organic waste
- Renewable sources of energy are diffuse (spread thin) and intermittent. One example of the diffuseness feature is that a 1000-megawatt solar farm might occupy about 5000 acres of land, while a nuclear power station with the same generating capacity only requires around 150 acres.

Examples of Renewable Energy--Biomass

- Many developing countries depend on wood and agricultural waste for energy.
- Almost half of India's and nearly 90 percent of total energy consumption in several small countries in Africa is provided by wood.
- Sweden has increased its use of biomass dramatically in the last ten years and presently uses fast-growing willow trees and other organics to supply 20 percent of its total energy supply.

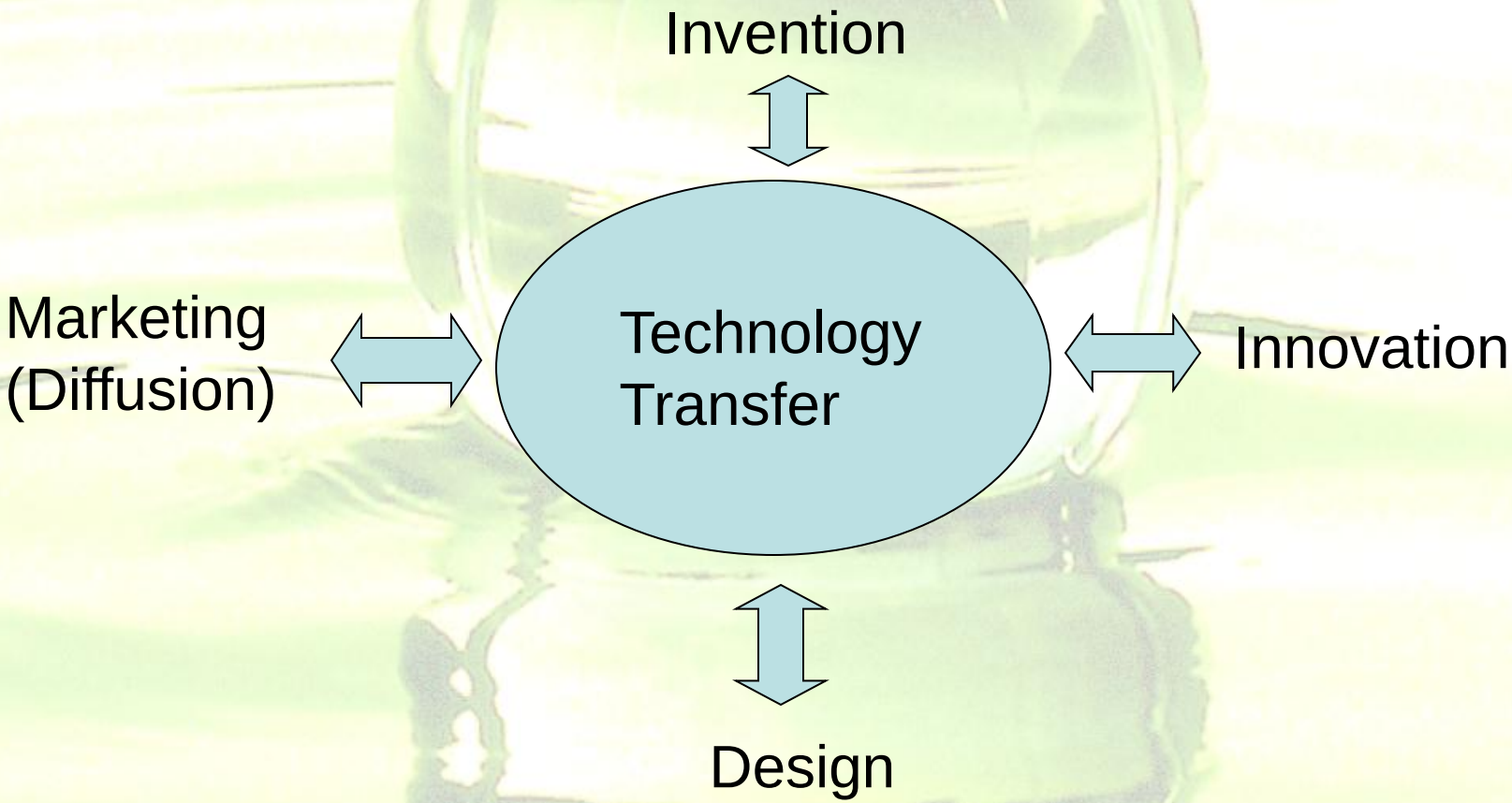
Appropriate
Vs
Hi-tech technology

Appropriate technology	Advanced Technology
•Smaller scale •Cheaper equipment •Small demand for energy •Large demand for labour •Uses local resources •Involves traditional skills	•Large scale •Expensive equipment •Big demand for energy •Employs few people •Often needs imported materials •Needs training in new skills

What is Technology Transfer?

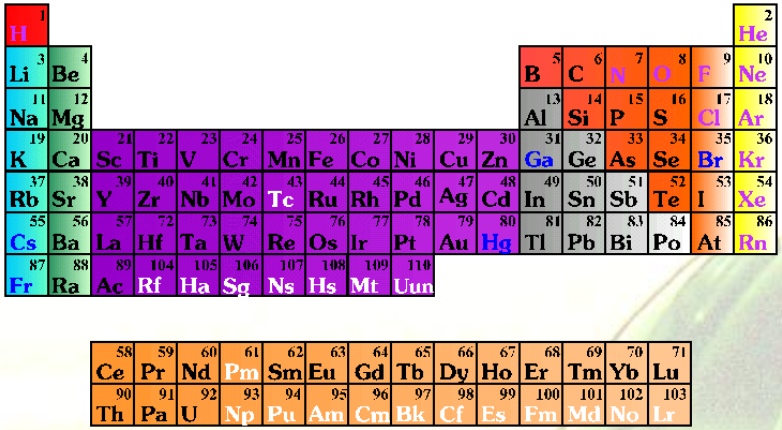
The technology transfer process helps a manufacturing company more effectively use its human, physical, and capital resources by providing knowledge, information, or assistance, which leads to improvements in its facility, equipment, manufacturing methods, management methods, or marketing methods.

Technology Transfer



Simple Example

- Incredible that people a million years ago invented the wheel that would be useful for so long. They saw the need for such a device that would make certain tasks easier – invention.
- Someone needed to device a way to utilize the wheel – innovation
- Turn idea into reality and implement other ideas to use the wheel – design
- Further developments need promotion and device/idea needs to be disseminated - diffusion



Inventions

Some are nothing more than scientific curiosity for years before being transformed into a working device, prototype, or product

100 Years

Aluminum
(H. Saite-Claire Deville, 1854)

Utensils, mast for sailboats window frames – late 1950's

90

Total Internal Reflection
(William Wheeler, 1881)

Fiber Optics 1971

43 Years

Theory of Lasing
(A. Einstein, 1917)

First I Prototype Gas discharge laser 1950

Inventions

Some inventions have immediate appeal

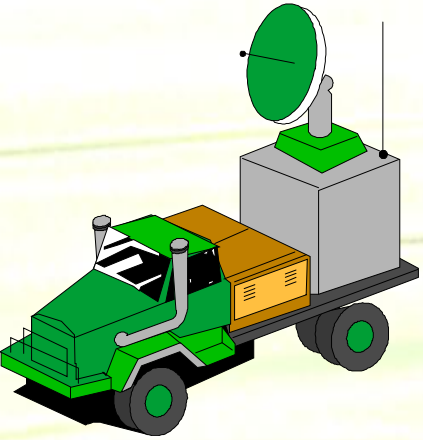
X-Rays
(1895 – William Rontgen)

Few Years

1900's
Used in Medical Profession

Inventions

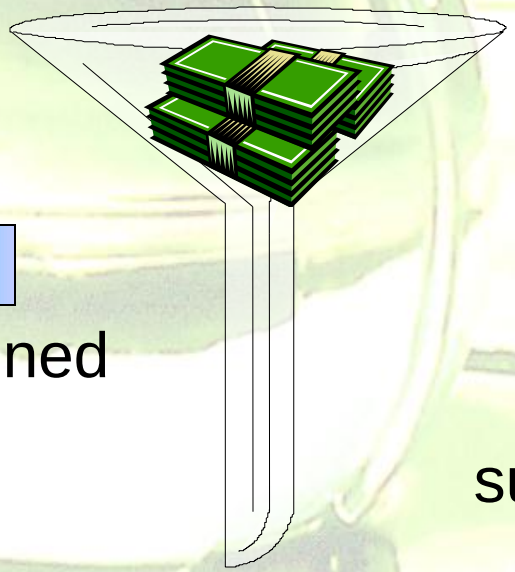
Some Inventions are forced

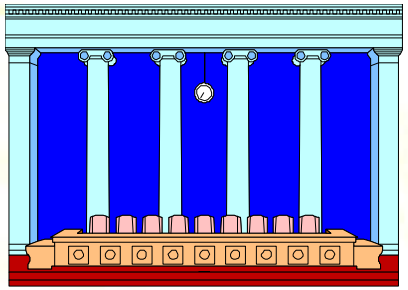


Radar
(Patent, 1914)
unworkable

35 years

Nothing happened





1940's
successful need
WWII

The 'need' preceded the product

Inventions

The need proceeded the product – another example

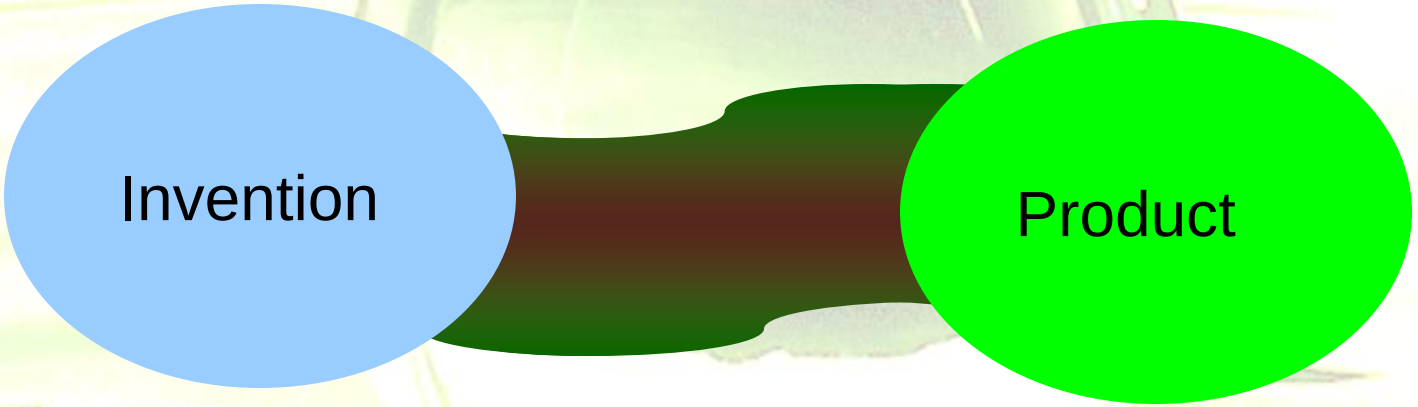
The vacuum tube was bulky, fragile, power hungry, and had lifetime issues – it was inherently unreliable

The need for a transistor existed long before its invention

Bell laboratories poured money into it resulting in the first patent of the resistor (1940)

In 1951, the first point – contact transistor was manufactured

Innovation



This period of development is characterized by INNOVATION!

Design

- Design is part of the innovation process, sophisticated modeling and software shaves years off the development process

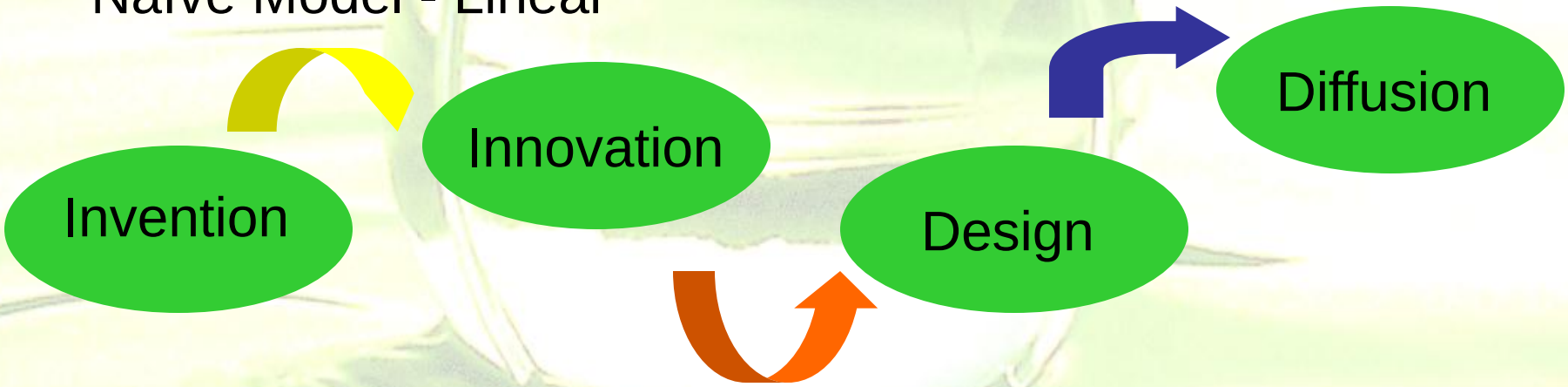
- Many issues can be identified during the modeling stage, before prototyping – saves time and money

Diffusion

- Sometimes referred to as marketing,
  - everything that is involved in the promotion and sale of the product
- Also important is promotion by use of publication
- Users and customers have important input on how to improve or refine the product
- Can conflict with IP

Relationship – Invention, Innovation, Design, and Diffusion

Naïve Model - Linear



What's Wrong with this Model?

- Feedback from each stage
- No real beginning and end, invention is often continuous

Some Working Definitions

- Technology Transfer The transactions between changing technology and invention, innovation, production, and diffusion

- Innovation – The exploitation of new ideas

Reasons to Innovate

- Competition – Keep ahead of Competitors
- Science & Technology – Technological change can be the result of science push and changes in the science and technology base lead to product innovation
- Market – Customer feedback influences innovation leading to product improvements
- Legislation – Government can force innovation (e.g. safety, environment, economic Policy)
- Human Nature – Curiosity "what happens if I do this…?"; Laziness "There must be an easier way to do this"

Technology Portfolio

Technology Importance

Business Attractiveness

Low Position High Importance A	High Position High Importance B
C Low Position Low Importance	D High Position Low Importance

A: Attractive Business, not much competitive position, use R& D Resources to gain competitive advantage

B: Attractive Business, good competitive advantage. Company should sustain funding and resources, be prepared for counter attack

C: Poor Position, company should not use resources here

D: Mixed, not important technology for company, move to cell B or eliminate

Collaborations between Companies

Agreements for organizations to work together

- Alliances
- Networks
- Cooperatives
- Collaboration

These arrangements could be with suppliers, customers, and even competitors

Many times manufacturers form alliances to work together but retain their individual brand names.

Technology Transfers: Positive and Negative Effects

Technology Transfer	Positive	Negative
Product Sales (Consumer)	Upgrades Consumption know how/consumer education	Affordable only to wealthy segments
Product Sales (Industrial)	Upgrades production process technologies; technician/engineering skills; lowers per unit production costs/prices	Displaces workers with more intensive use of capital Wall-Mart effects on the local businesses.
Licensing, technology agreements; corporate R & D efforts	Broadens, elevates technology bases and workforce vocational and scientific skills	
Banking and Financial institutions	Mobilizes savings to create investment markets for public/private sector-stock market capital; consumer/installment credit for individuals and business	Only the wealthy benefit in the short term and leads to power concentrations; possible unwanted foreign influences encouraging buyers to purchase goods beyond their means.

Technology transfer	positive	negative
Local procurement of materials and components	**Stimulus for private enterprise/local initiatives**	Easier for other foreign firms to meet procurement quality requirements
Establishment of wholesale/retail distribution systems	Creates distribution infrastructure/expertise; increases customer exposures to modern goods & services	Foreign control over distribution; consumer exposed to products that are beyond their means to purchase
Worker training in technologies and production know how	Upgrades labor skills and vocational bases	For a minority only; majority have insufficient education
Management training in organizational know how/methods	Increased managerial education and efficiency	Only educated elites benefit
Financial and accounting skills	Planning and budgetary control	


Thanking You
Discussion