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**CHEMRAWN XVI**

# **Innovation**

**The Way from Pure to Applied Chemistry,**

# Linear model : cartesian rationalism

## The innovation axis

(Science) - **Technology** - **Society**



*(before 17th Century)*  
**Craftmanship**

**Science** - **Technology** - **Society**



*(after 17th Century)*

**Progress**



**Happiness**

*(Philosophy of Enlightenment)*

*Turgot (1750), Condorcet, Voltaire, Encyclopedists, ...*

# Science - Technology - Society

(1780-1980)  
*Industrial Revolutions*



?

- **PROGRESS** = *measured progress (Scientists, Economists, Industrialists, Governments...)*
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- **PROGRESS** → *Happiness (Positivism, Scientism, ...)*

- **PROGRESS** → *Apocalypse ! (Ancient authors, Montaigne, Montesquieu, J.J. Rousseau), Romanticism, Modern philosophers, Hard Ecologists, ...*

« The two Cultures » (C.P. SNOW)

*Binary approach*

**Science - Technology – Society**

**Examples :**      **University Sc. & Tech. Departments**  
                         **Scientific Journals**  
                         **IUPAC**  
                         **Etc.**

*Binary approach*

**Science - Technology - Society**



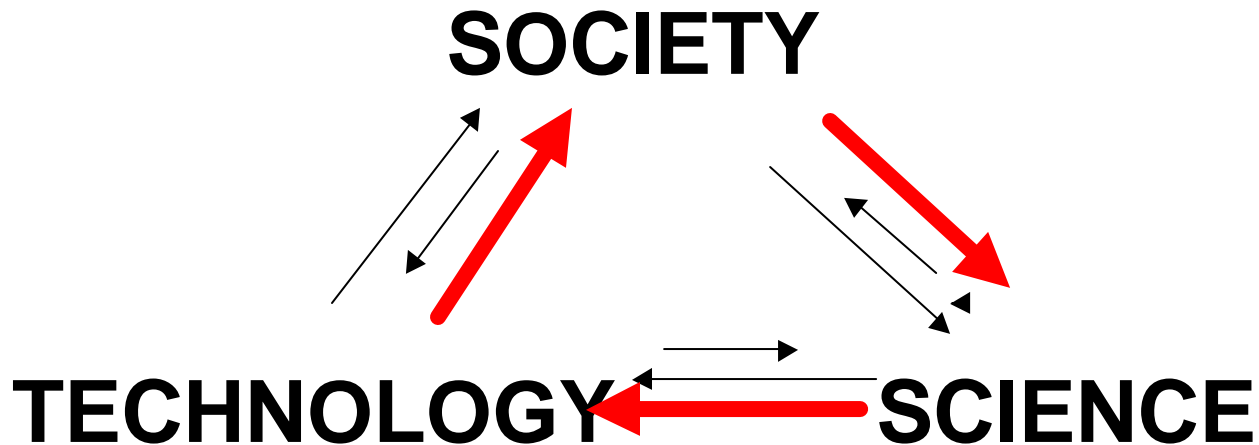
**Examples :**      **Business Schools, Economists,  
Technical Magazines,  
Globalization of the Economy,  
CHEMRAWN Committee,**

.....

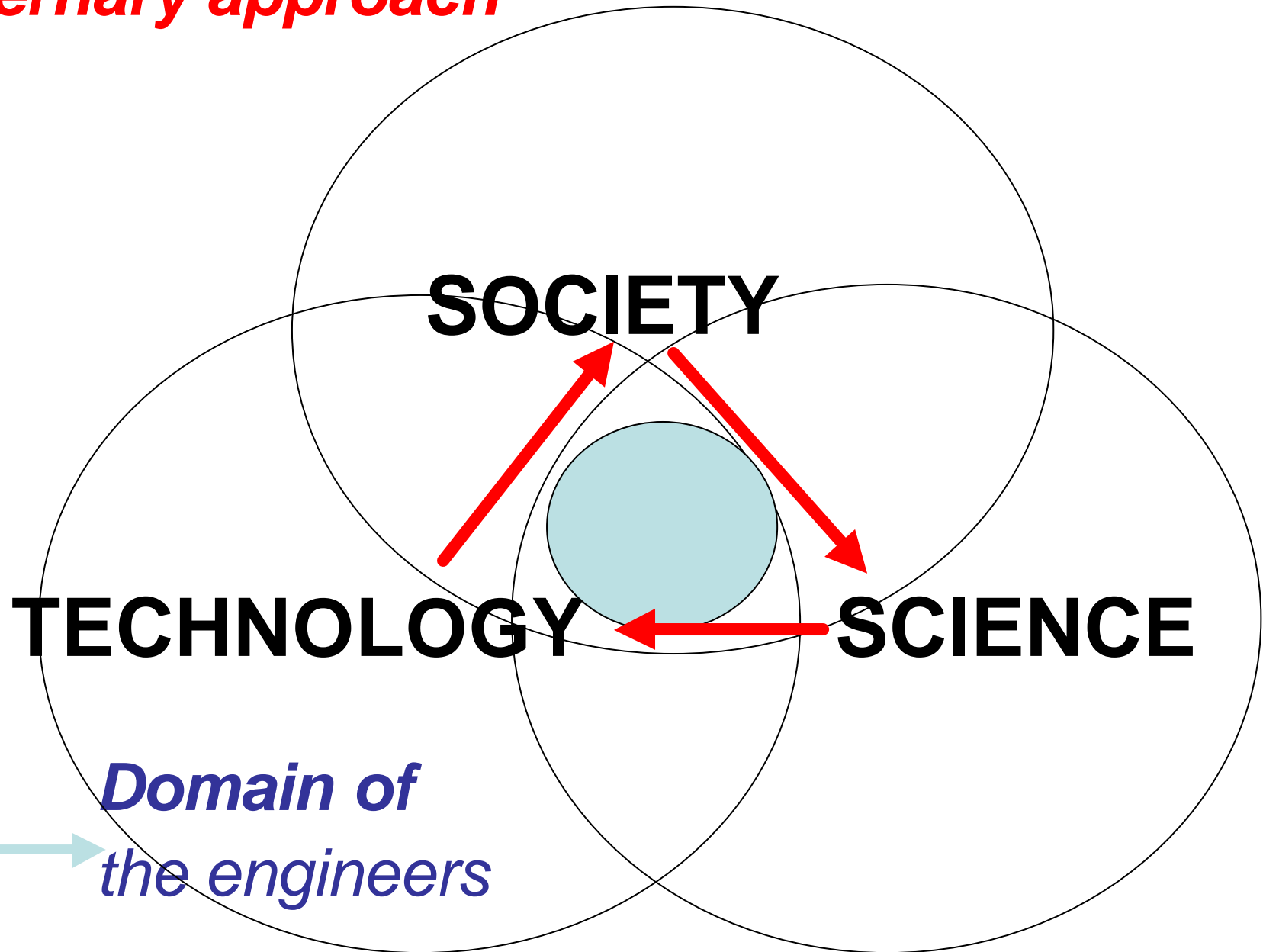
# Cyclic model : neocartesian rationalism

## The innovation loop

*Ternary approach*



# *Ternary approach*



# Cyclic model : neocartesian rationalism

## The innovation loop

### ***Ternary approach***

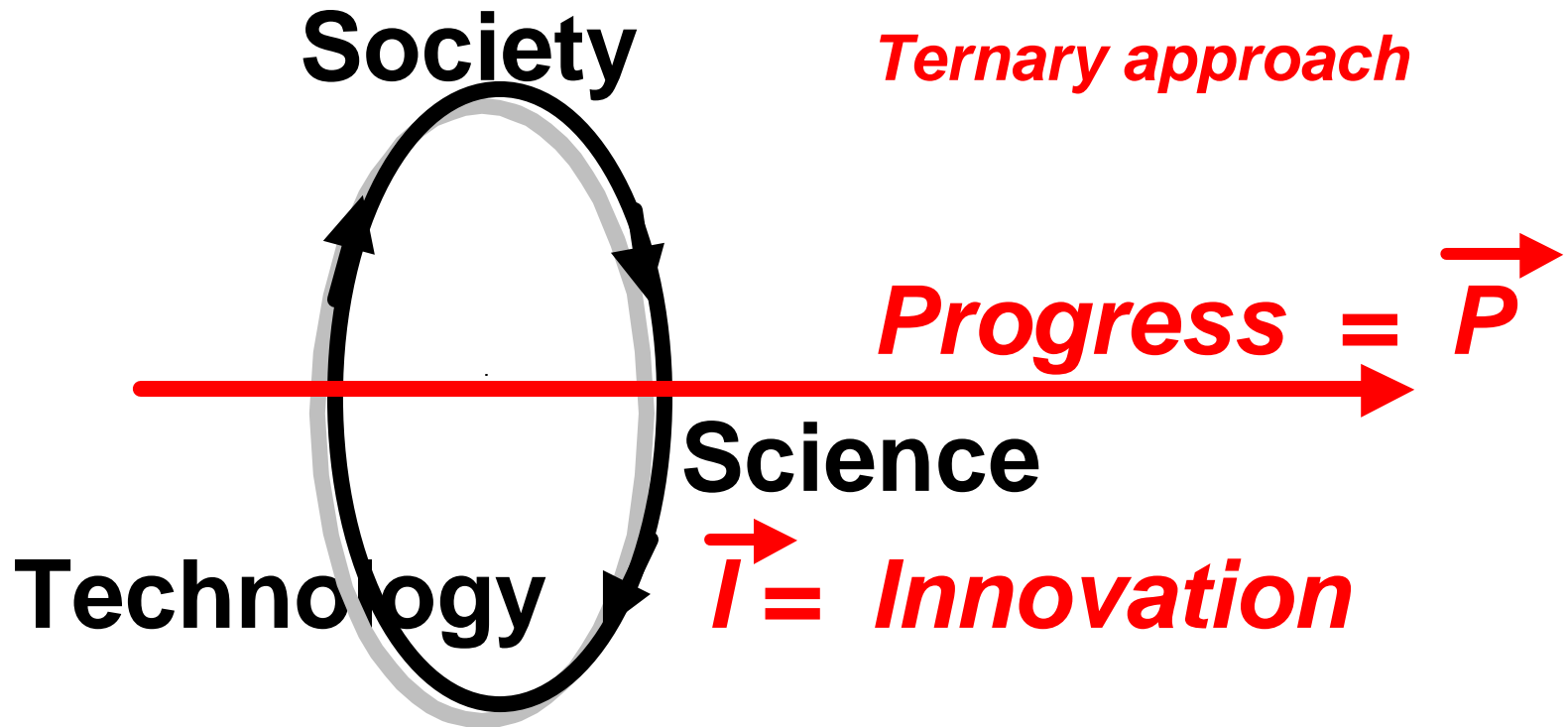
### **Domain of the Engineers**

***Engineers must have a balanced training :***

- \* a solid scientific background***
- \* a technological competence***
- \* some good societal and cultural aptitudes (languages, law, ecology, management, economy, arts, ...)***



**Cyclic model : neo-cartesian rationalism**  
**The innovation loop**



# Cyclic model : neo-cartesian rationalism

## The innovation loop

### ***Ternary approach***

***Innovation*** appears as an intensity depending of the three interfaces :

- \* ***Science – Technology***
- \* ***Technology - Society***
- \* ***Society – Science***

**Example : A reduction of a research budget decreases the innovation intensity.**

# Cyclic model : neo-cartesian rationalism

## The innovation loop

### *Ternary approach*

**The *Progress* appears as a flux induced, not copied created by a current (of means) between Science, Technology and Society. (No problem of finality)**

**This flux may induce innovation (induced, not copied) in another system (as long as interfaces exist)**

***(International cooperation)***

# Cyclic model : neo-cartesian rationalism

## The innovation loop

### *Ternary approach*

Examples :            (Good) Engineering Schools  
                         Sustainable Development  
                         Green Chemistry (*CHEMRAWN XIV*)

.....

*CHEMRAWN XV Project* (Paris June 2004)

- if the participants are only chemists (*binary approach*) : *failure*

- if there is a balanced number of chemists and representatives of  
the Society (media, politics, administration, ...) : *success*

# Innovation : The Way from Pure to Applied Chemistry

## Conclusion

To restaure the public image of Chemistry in the Society  
Chemical Innovation must progressively adopt the ternary approach from the beginning.

i.e. : Instead of the classical binary approach :

Research → Development then Development → Market

We must take in account the societal constraints at the laboratory stage.

How ? Case by case answers