

Chemical Engineering Process Engineering

INTRODUCTION

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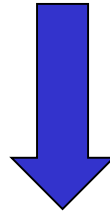
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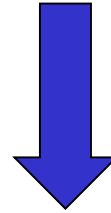
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Chemical Engineering
Génie Chimique



Génie des Procédés

Génie des Procédés

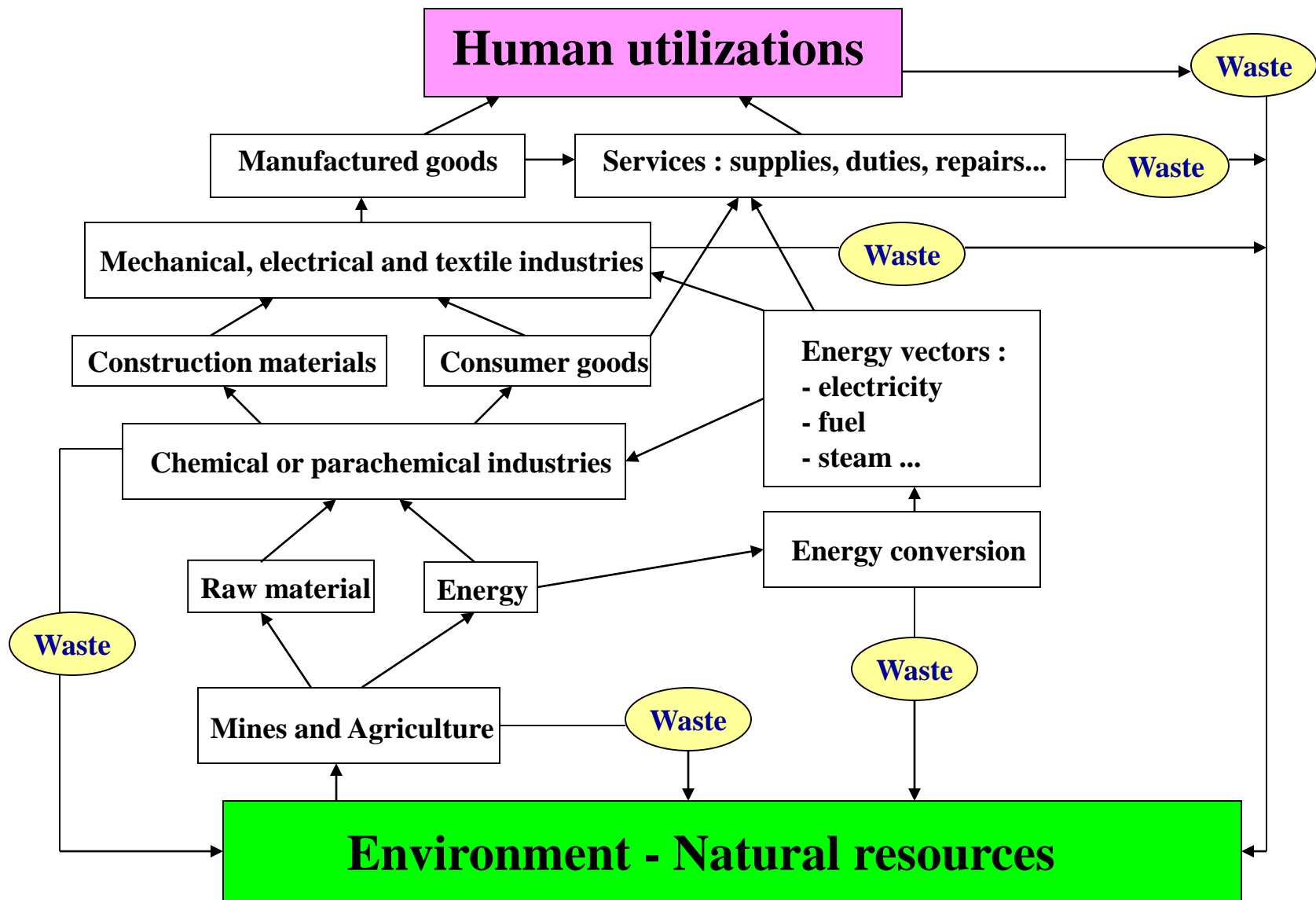


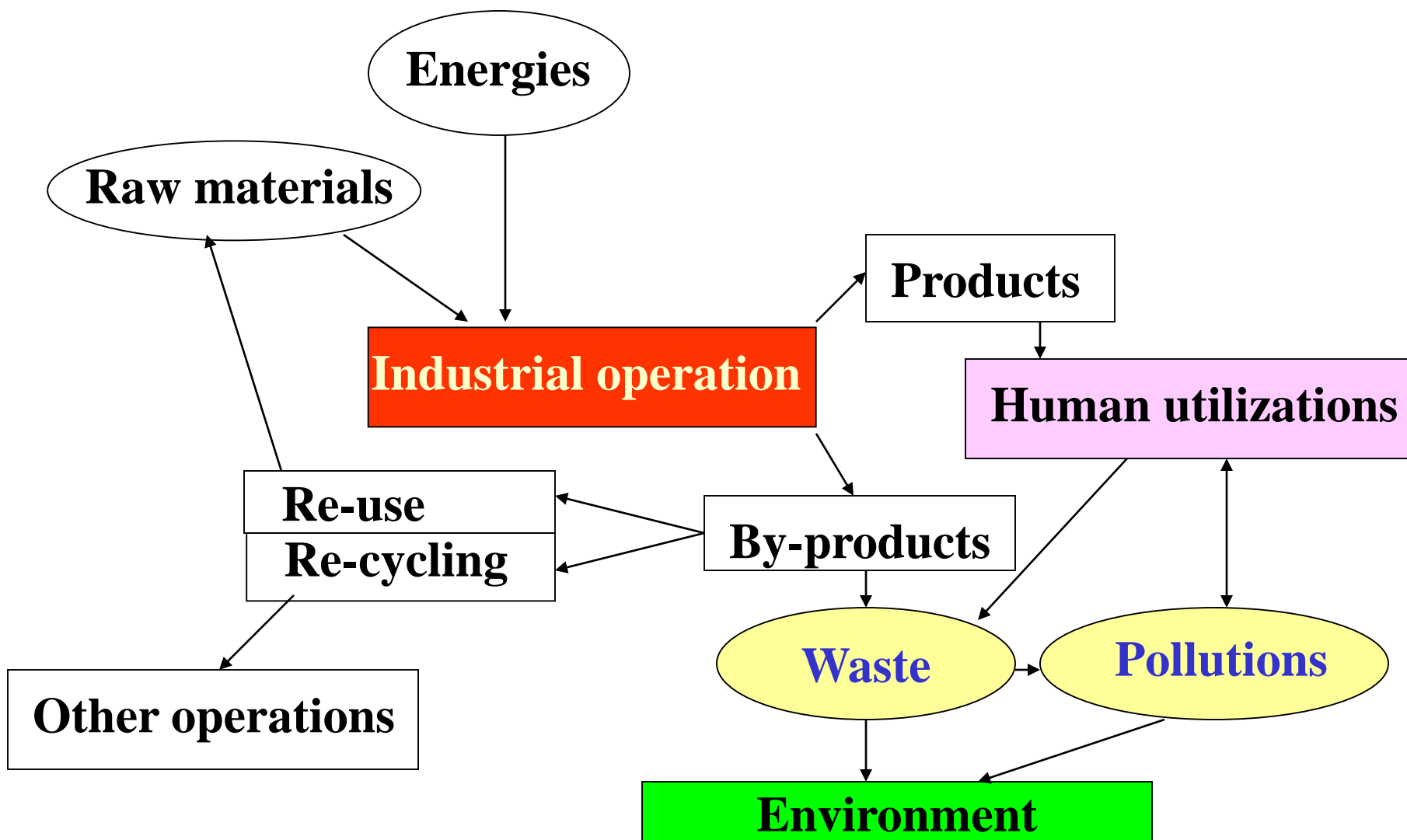
- Génie Chimique
- Génie Biologique - Biotechnologies
- Génie de l'environnement
- Génie des matériaux
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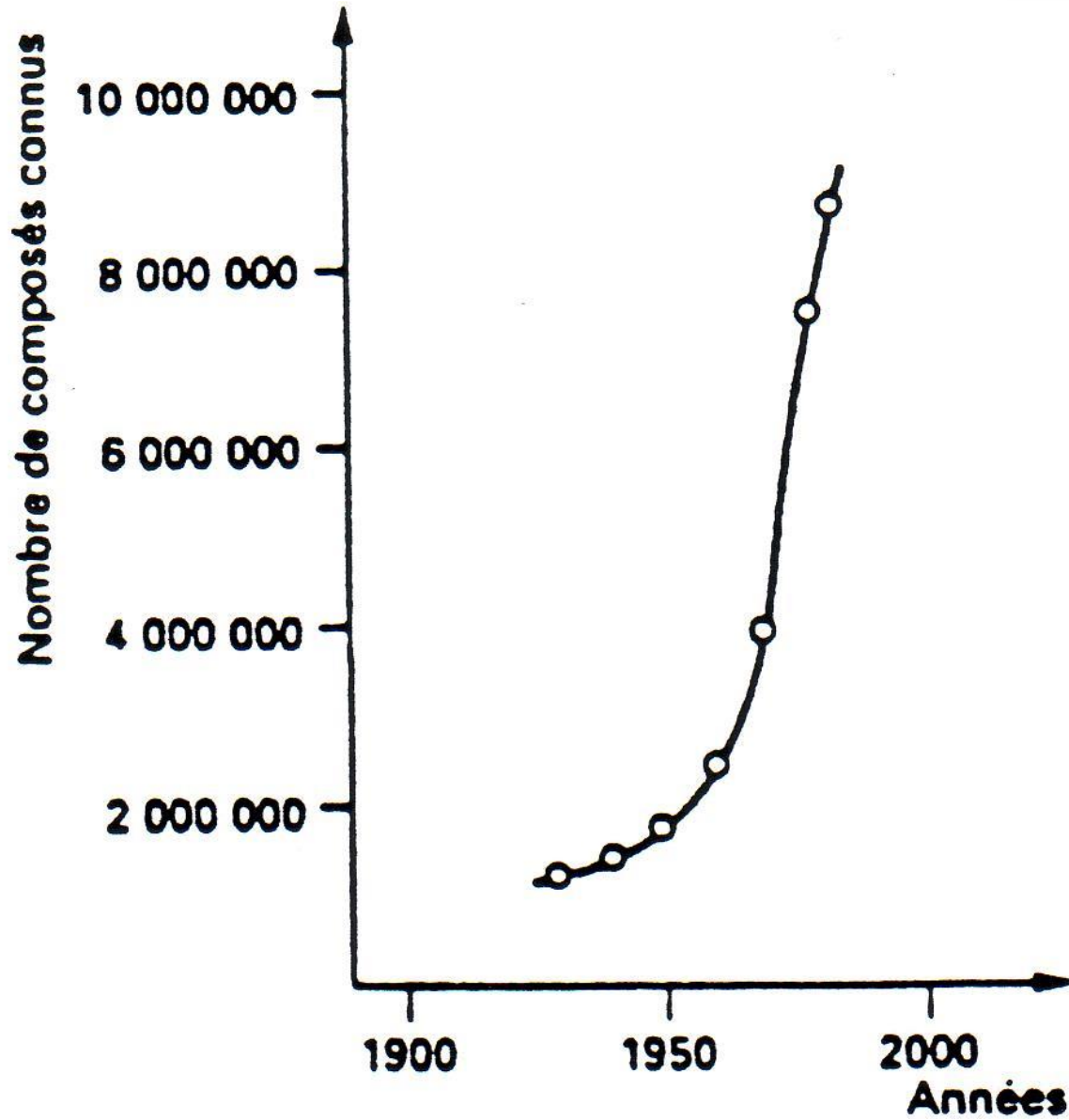
Chemical Engineering - Génie Chimique

Génie des Procédés

- Transferts de quantité de mouvement -
Mécanique des fluides
- Transferts de chaleur
- Transferts de matière
- Réacteurs







FROM A TEASPOON TO A TON

ACS MEETING NEWS: Process chemists master the task of scaled-up pharmaceutical synthesis
BETHANY HALFORD, C&EN NORTHEAST NEWS BUREAU

IF BRINGING A NEW pharmaceutical to market were a relay race, process chemists would be the ones running the oft-overlooked middle legs. There's no roar from the crowd for them as they set off from the starting line, and they don't get the glory of crossing the finish. But it's those middle legs where races are won and lost, and if the process chemists can't keep pace, there's no way a drug will make it to the finish line.

"People don't really know what it takes to do a synthesis scale-up and produce material on large scale," said Ahmed Abdel-Magid, a longtime process chemist who is currently the chief scientific officer of the contract research organization Therachem Research Medilab. "We tackle everything."

As process chemists tell it, if bringing a new pharmaceutical to market were really a relay race, not only would they run the race's middle legs, they would also ensure the track was safe for the anchor runner; they would make certain that the race could be safely enjoyed by all; they would minimize the race's environmental impact; and they'd be responsible for keeping the overall cost of race as low as possible.

"This is the ultimate in chemistry," said Abdel-Magid, summing up his fondness for process research. "You've reached the stage where it's becoming a project that people can spend millions of dollars on. The end result, if it succeeds and makes it all the way to the market, is that it will benefit people."

To shed light on what precisely a process chemist does, Abdel-Magid started a series of process chemistry symposia at American Chemical

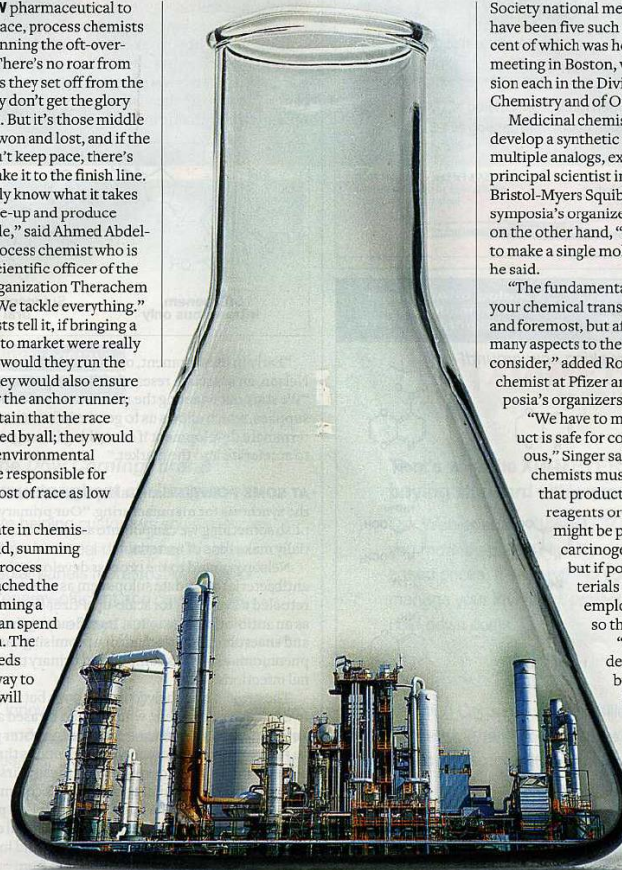
Society national meetings in 2001. There have been five such symposia, the most recent of which was held during last month's meeting in Boston, with one half-day session each in the Divisions of Medicinal Chemistry and of Organic Chemistry.

Medicinal chemists work to quickly develop a synthetic route that leads to multiple analogs, explained Jaan Pesti, a principal scientist in process chemistry at Bristol-Myers Squibb and one of the recent symposia's organizers. Process chemists, on the other hand, "need to figure out how to make a single molecule very, very well," he said.

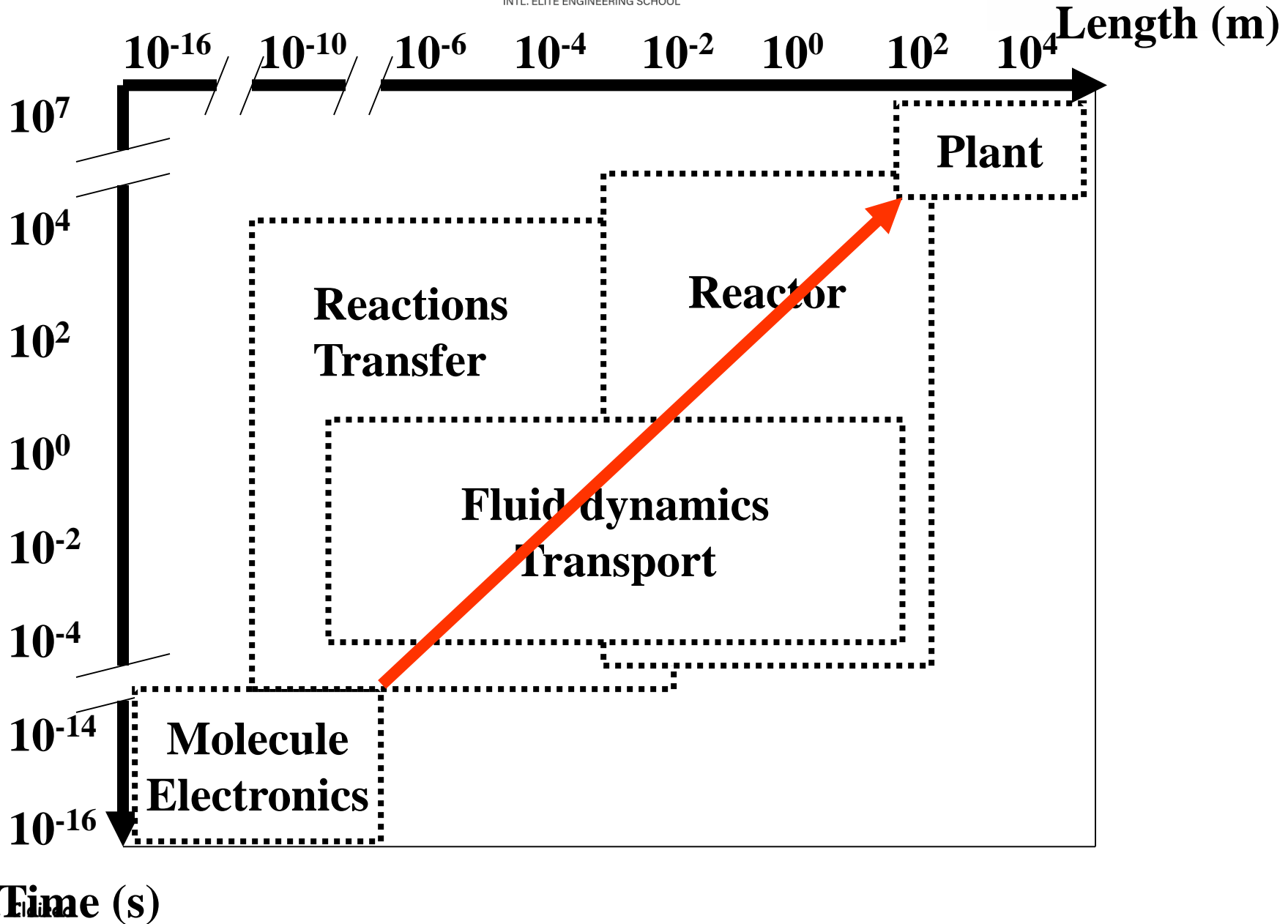
"The fundamental thing is just getting your chemical transformations right, first and foremost, but after that, there are many aspects to the job that you have to consider," added Robert Singer, a process chemist at Pfizer and another of the symposia's organizers.

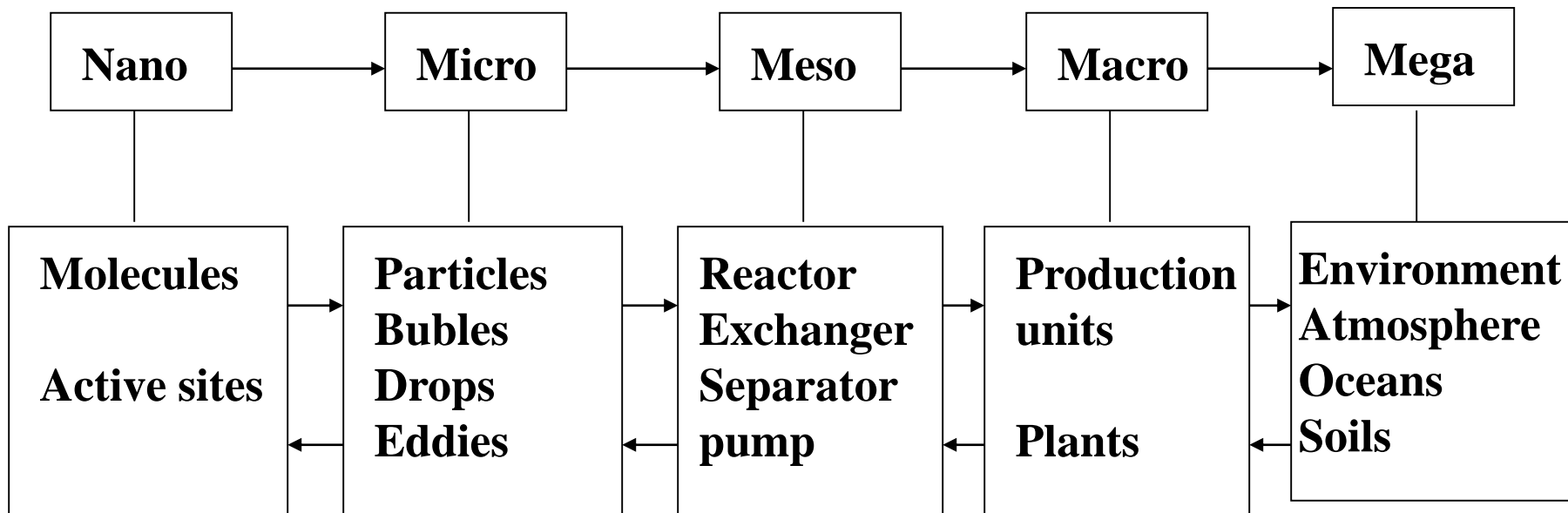
"We have to make sure that the product is safe for consumers. That's obvious," Singer said, noting that process chemists must also assure regulators that products are safe. Avoiding reagents or intermediates that might be potential mutagens or carcinogens is a priority, he said, but if potentially genotoxic materials must be used, they're employed early in the route so they can be purged easily.

"A big part of process development from a business perspective is lowering costs," Singer added. That includes optimizing yields, reducing excess amounts of reagents used, avoiding costly manufacturing processes whenever possible, and



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Multi Scale Analysis of Process Engineering

- **Mechanisms**
- **Process unit development**
- **Operating conditions**
- **Balances (momentum, mass, heat)**
- **Modeling - Simulation**
- **Scale up**

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