Innovation Appraisal Group * Gideon Samid, PhD

Chemical Engineering Series

Chemical Engineering and Innovative Chemistry

Innovative Chemical Engineering

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Main message:

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- ***Early, Early, Early!!!***

- Early in your chemistry R&D – think chemical engineering: mind the industrialization aspects!
- Identify chemical engineering cost mines!
- Invite a chemical engineer into the intimacy of your bench work

Design Harmony

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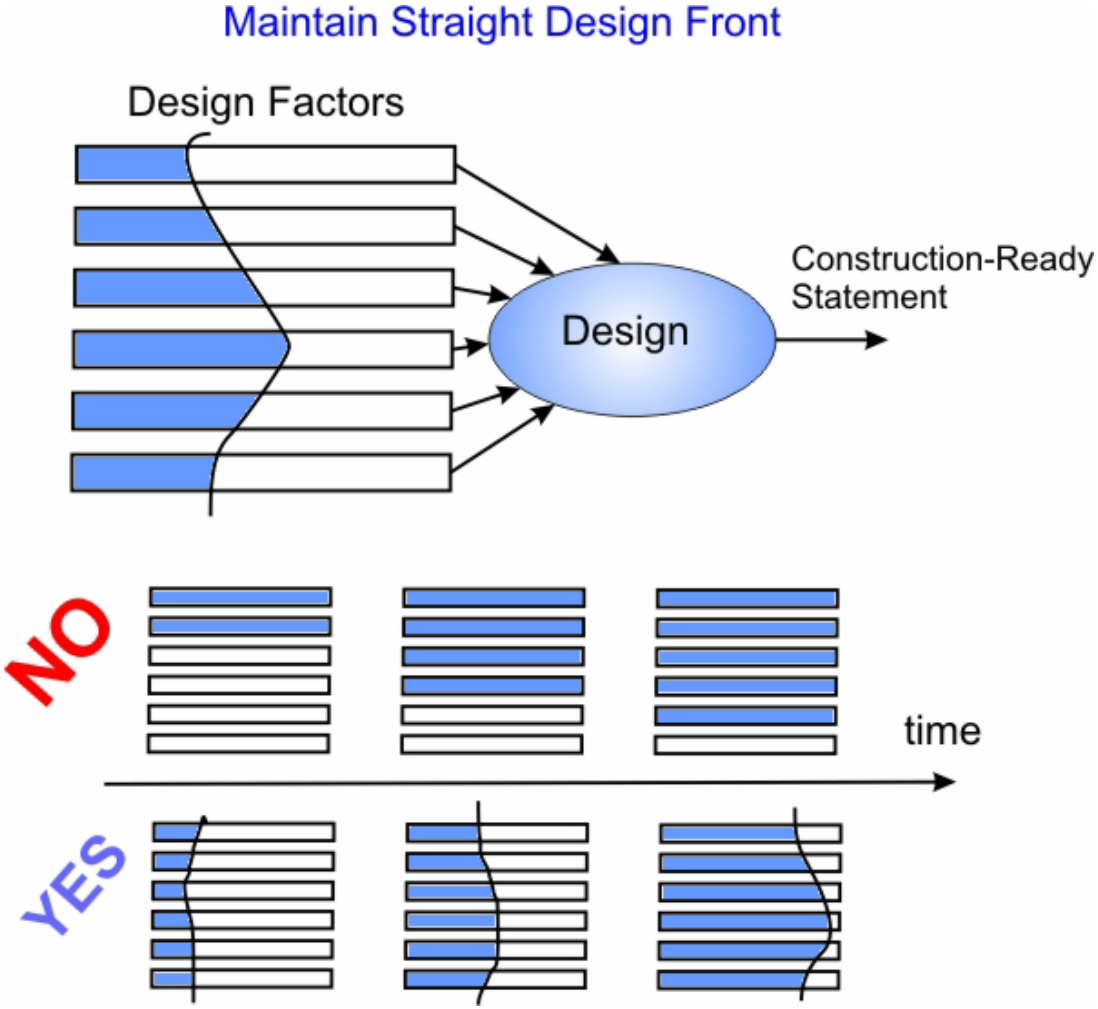
- ***Factors:*** *corporate goal, economics, chemistry (R&D), chemical engineering (R&D), construction, operation, maintenance, code & regulation, damage control, disposition*



Op Goal: Estimate Credibility

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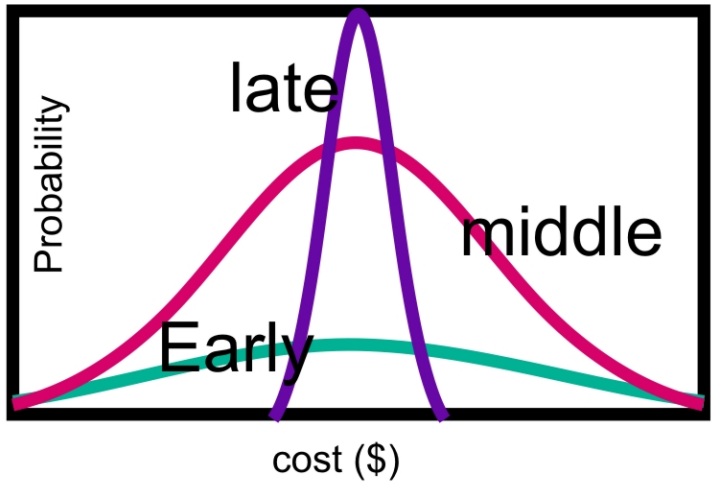
- Driven by the goal to boost estimate credibility as fast as possible, one would spot, and tackle the most serious ‘cost mines’ in the design landscape, and avoid ‘last minute nasty surprises’.



The cost-probability of Innovation Projects betrays the true progress of the research and development The early-stage flat curve transforms into a spike.

Economics

- The Chemist is concerned with the laws of nature – what they permit him or her to do.
- The Chemical Engineer is concerned with the laws of nature and with the laws of economics – what all these laws permit him or her to do.
- ***No Project, however brilliant, however fascinating, should be pursued if it costs too much, or lasts too long! (hard to swallow!)***

The common touch

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- Choose common ingredients as much as possible: ordinary solvents, popular catalysts, small organic backbones.
- Be easy on temperature/pressure/vacuum requirements – may be prohibitive on material cost, safety expenses, control design.
- Keep viscosities low!
- Minimize number of chemicals – each needs to be purchased, stored, delivered, guarded – expensive!!!
- Acquire the basics of chemical engineering to extend your research into ‘baby pilot’.

Use of the ITM

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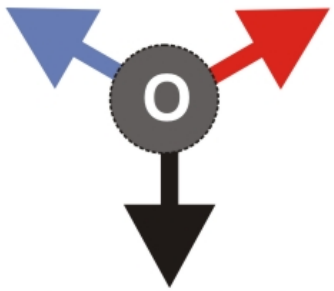
The Innovation Turing Machine used by the innovative chemist

Use the chemical engineer to hit on fresh ideas.

Ask the chemical engineer about similar processes already industrialized.



break off non critical process elements for ad-hoc solution, with known chem. eng. design

Cost engineering driven chemistry

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- Conduct R&D so as to increase the validity of your estimate of time-to-finish.
- Spot R&D cost mines.
- Subcontract non-essentials.
- “BiPSize” your project.

BiPSA

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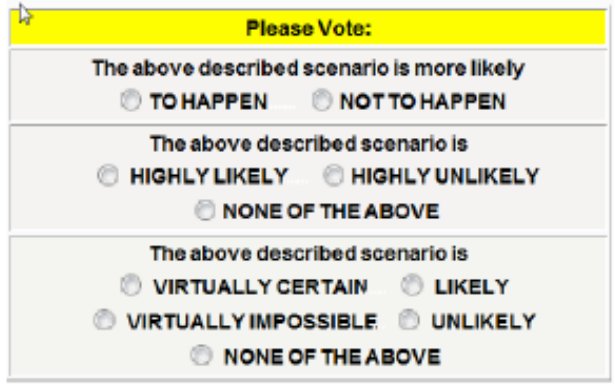
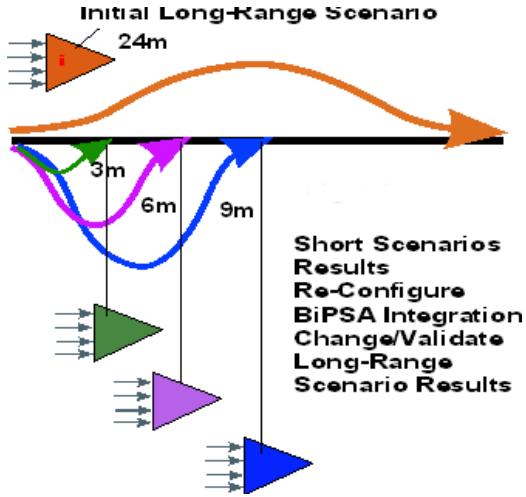
- Devise a time-to-finish statement, let all knowledgeable people vote on it.
- Integrate votes according to BiPSA rules of ‘controversy to consensus’
- Act on results, solicit auxiliary input, repeat.





TryAgain or ELS

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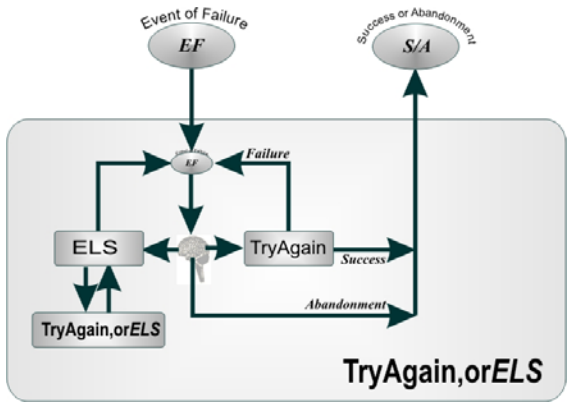
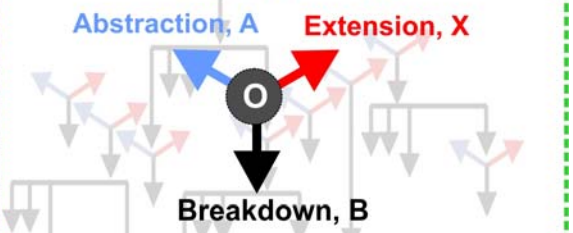
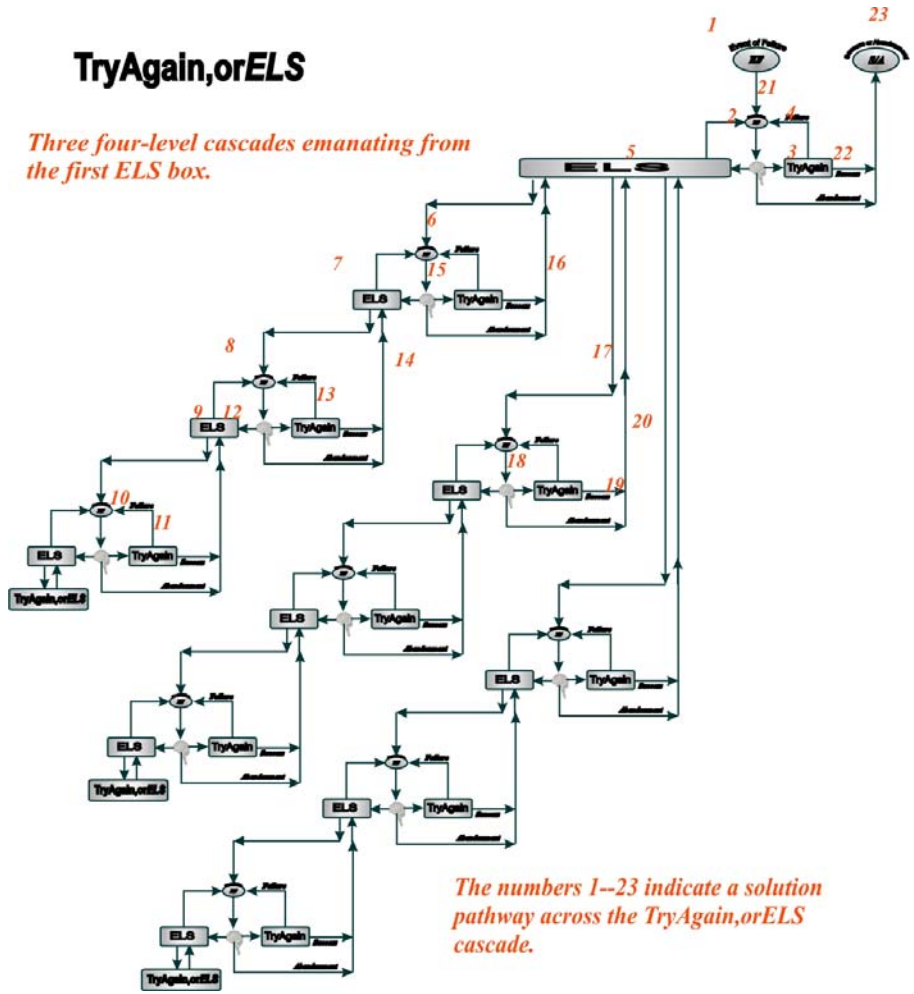


The Intractability Turing Machine



Challenge, O, is handled either by breaking it down to components, or by re-defining it with greater abstraction, or by coupling it with similar challenges, some of them partially solved. This 3-way replacement may be re-applied, giving rise to the Intractability Map.



Argue & Cooperate!

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- Demand foundation for the engineer's statement of cost, duration, difficulties, change orders. (Red Team – prepare for and use: options, Pro&Con, choice, justification)
- Build a team!
- Try Again!
- Enjoy!

Seminar Offerings

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- Engineering is Cost Engineering
- Chemical Engineering for Innovative Chemistry
- Innovation Acceleration Methodologies
- The Universal Theory of Innovation
- Innovation Management
- BiPSA: Management by Inclusion
- Nurturing the Culture of Innovation

Seminars range from a single evening overview, a dedicated Saturday; six, ten, and thirty hours on a weekly or bi-weekly basis, and per-case arrangements.

Seminars are offered (1) online, (2) at Case Western Reserve University, (3) on the road, (4) on customer's location.

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