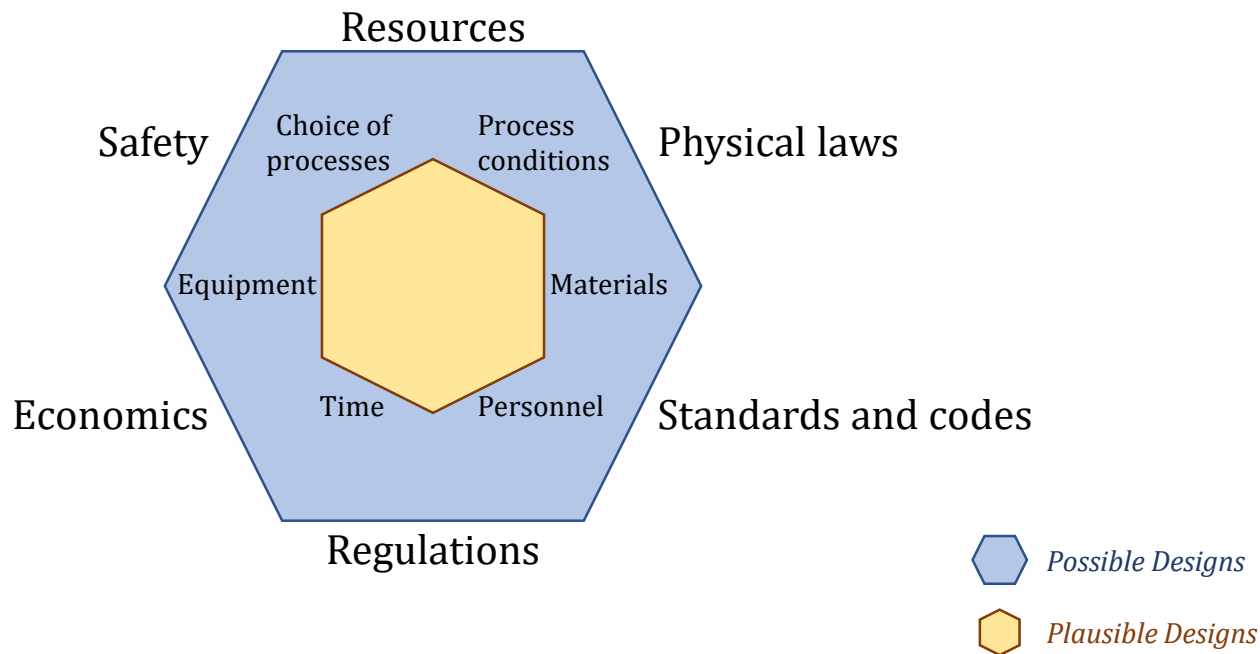




Design Preliminaries

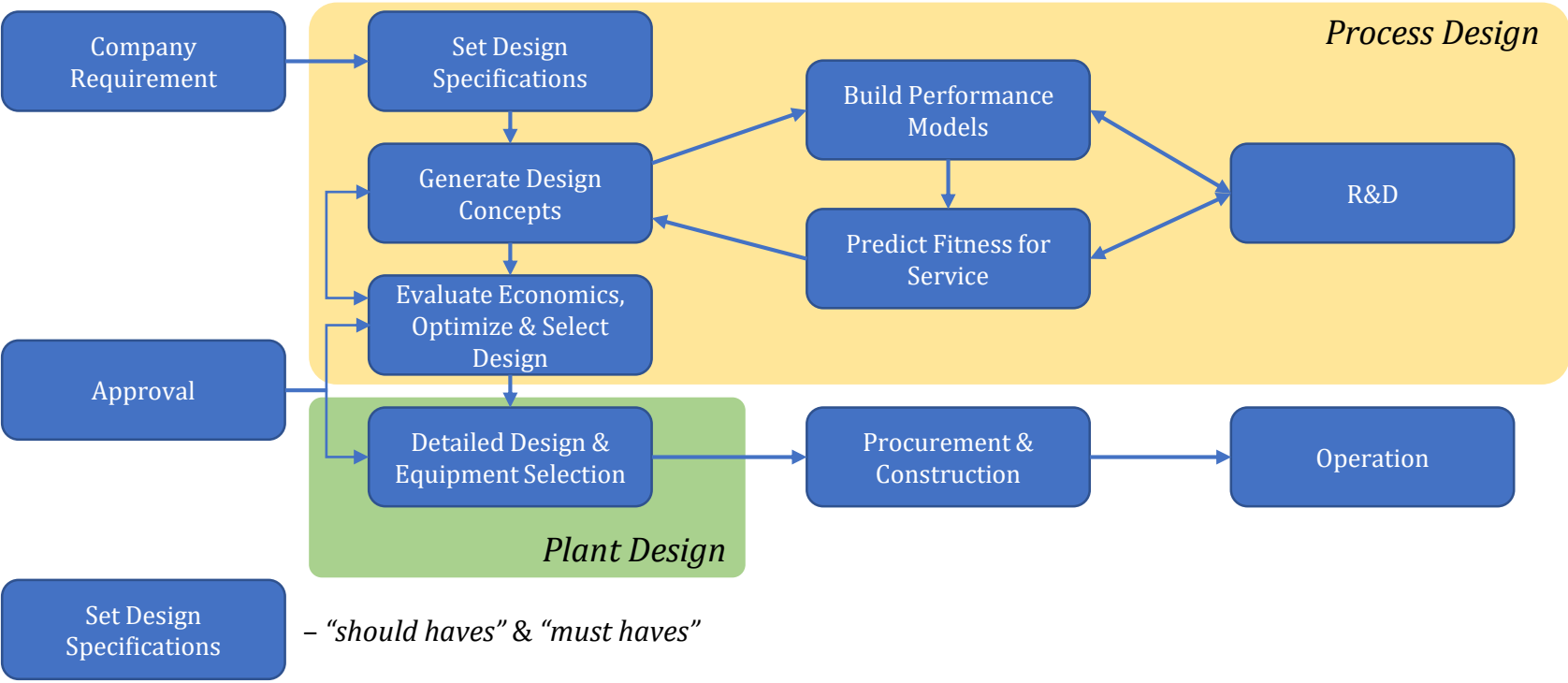
Jose V Parambil

Design Constraints



(Towler, G., Sinnott, R. (2008). Chemical Engineering Design: Principles, Practice and Economics of Plant and Process Design. Netherlands: Elsevier Science.)

The Design Process



Chemical Engineering Projects

- Retrofitting
 - Modification/addition to existing plant.
- Increasing production capacity
 - Repetition of existing designs
- Green-field processes
 - New process
 - Laboratory research, scale-up (*pilot plant, commercial scale*)
 - Unit processes and operations using established or innovative designs

Codes and Standards

- Standardization to ensure uniformity and interchangeability
 - First standard screw thread was defined in 1841 by Sir Joseph Whitworth.
- *Code* – code of practice
 - Recommended design or operating procedure.
 - Fabrication, inspection, testing.
- *Standard* – preferred size, composition, etc.
- Developed, revised, and accepted by specific bodies (ISO, BIS, ASME, ASTM, API)



(https://www.lemonde.fr/en/pixels/article/2022/10/04/eu-lawmakers-impose-single-charger-for-all-smartphones_5999086_13.html)

Design Factors

- Design factor/Design margin/Safety factor
- Mechanical and structural design factors
 - Specified by codes
- Tolerance for operation
 - 10% increase in average mass flow rate
- Greater uncertainty in method/operation/data require larger design factor.