

A Flow Stream Approach for Process Cell Modularization

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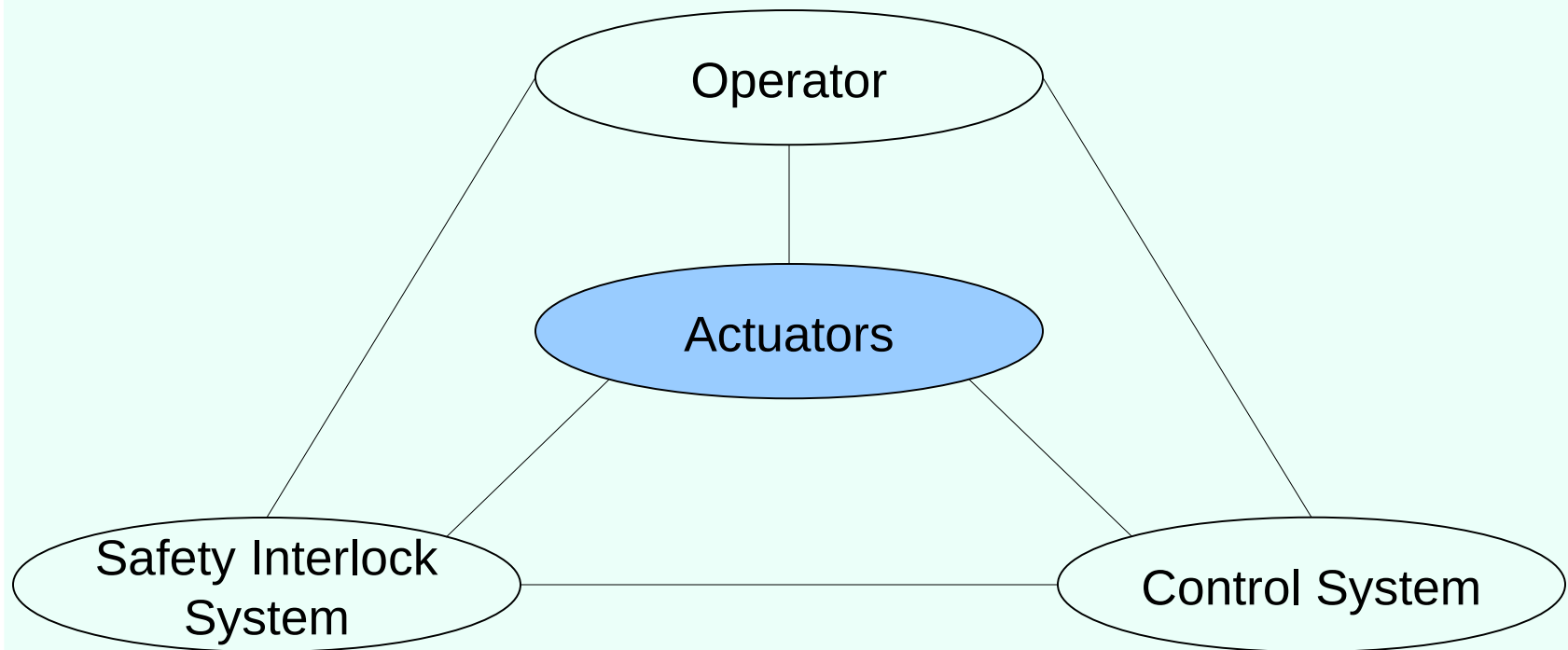
World Batch Forum 2000

Brussels, October 2000

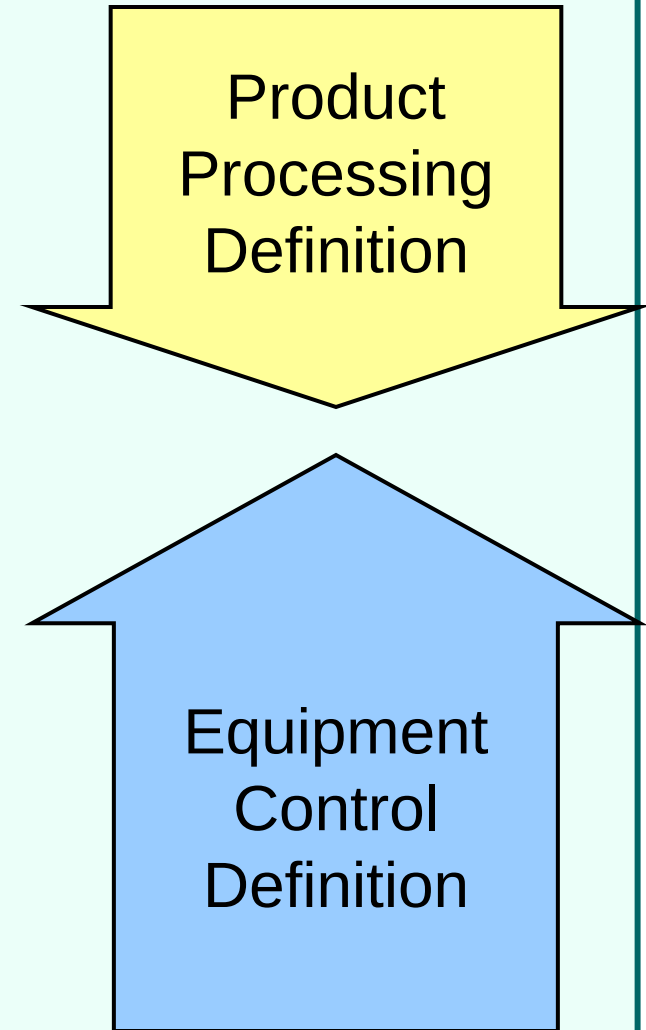
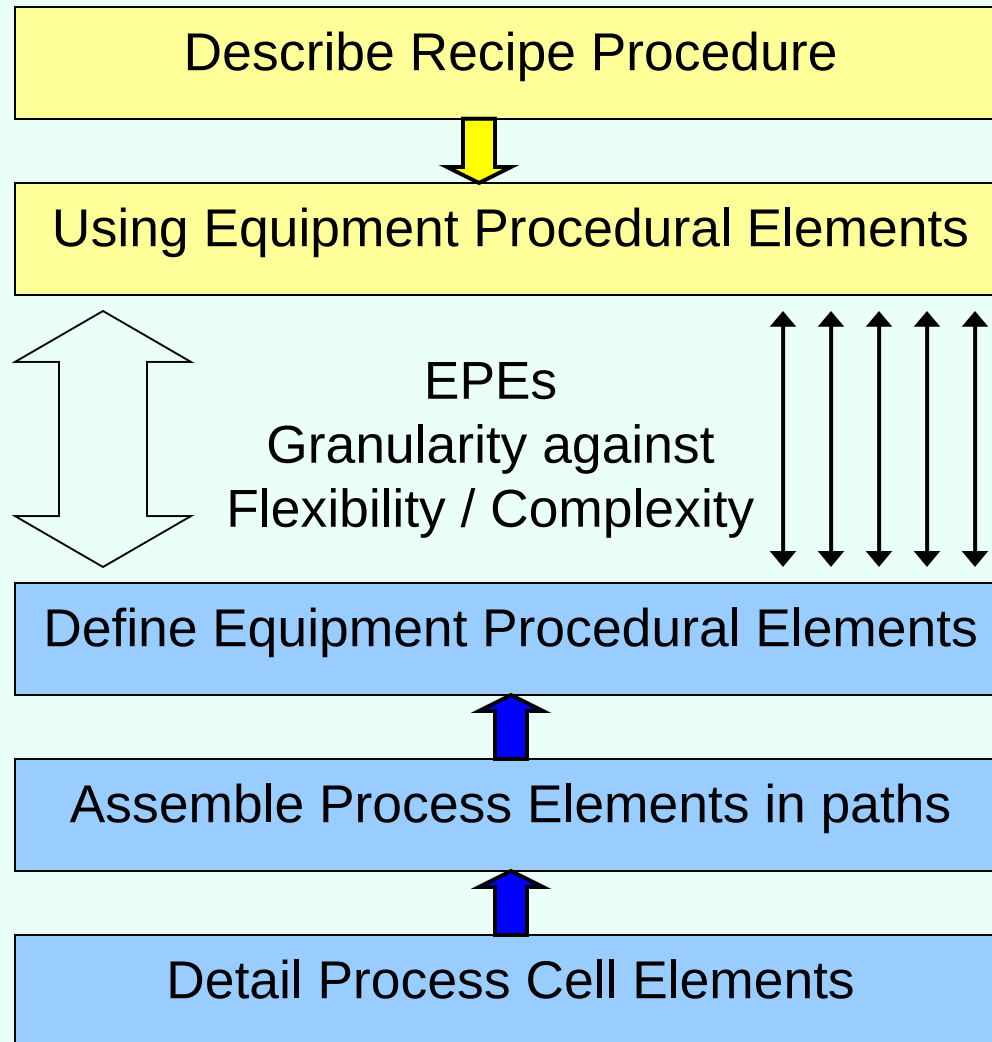
- Origin of ASTRID
- Product Processing vs Equipment Control : no longer mixed-up
- Safe Operation vs Flexibility: reducing the risk
- Material & Energy Flow Analysis
- Bottom-up Engineering
- The 4 ASTRID objects
- ASTRID vs S88: how do they fit together?
- Successes and Issues
- Future

Origin of ASTRID

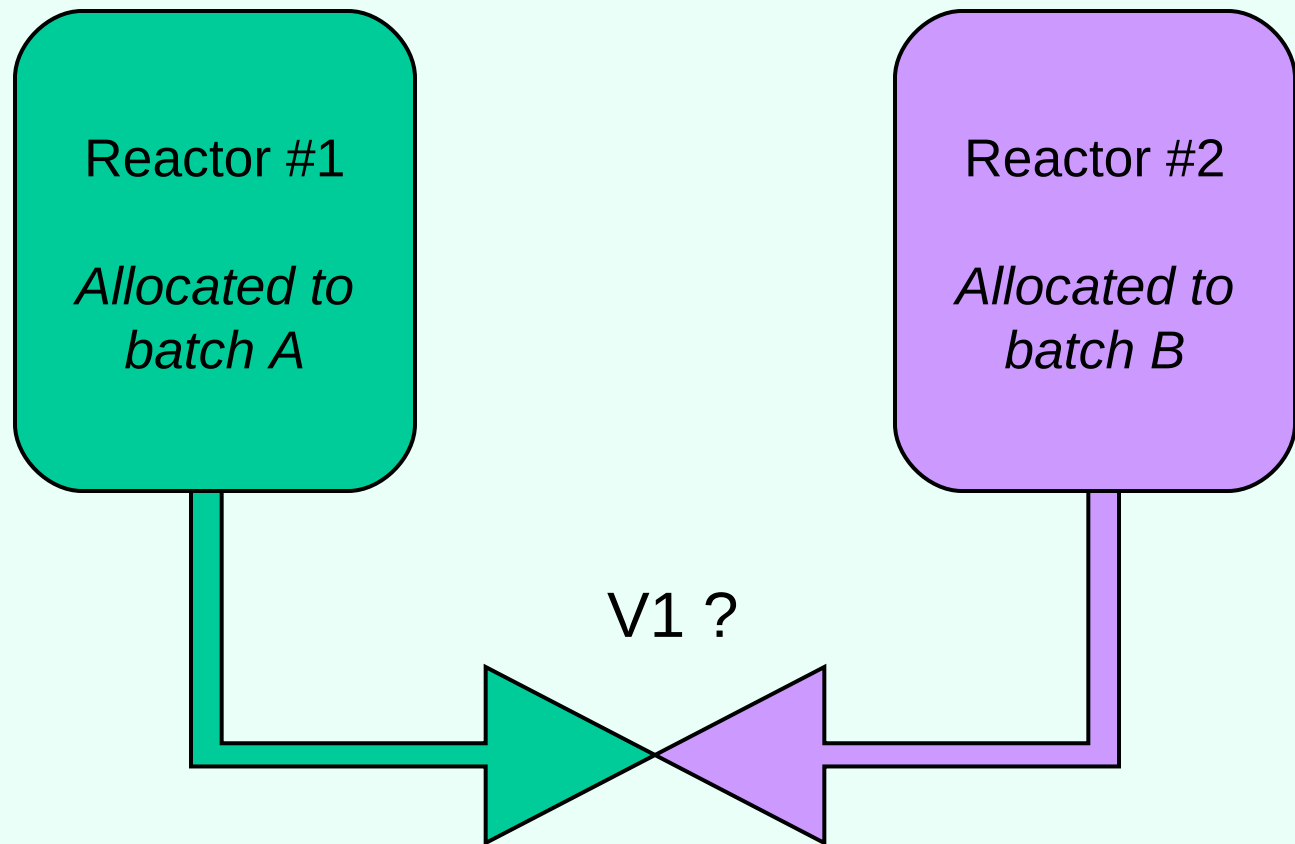
- The Story begins in 1988
- WG led by Health, Safety and Environment Management of Rhône-Poulenc
- Part of « Process Control Safety » program
- Focused on Safe Operation of Multipurpose process cell



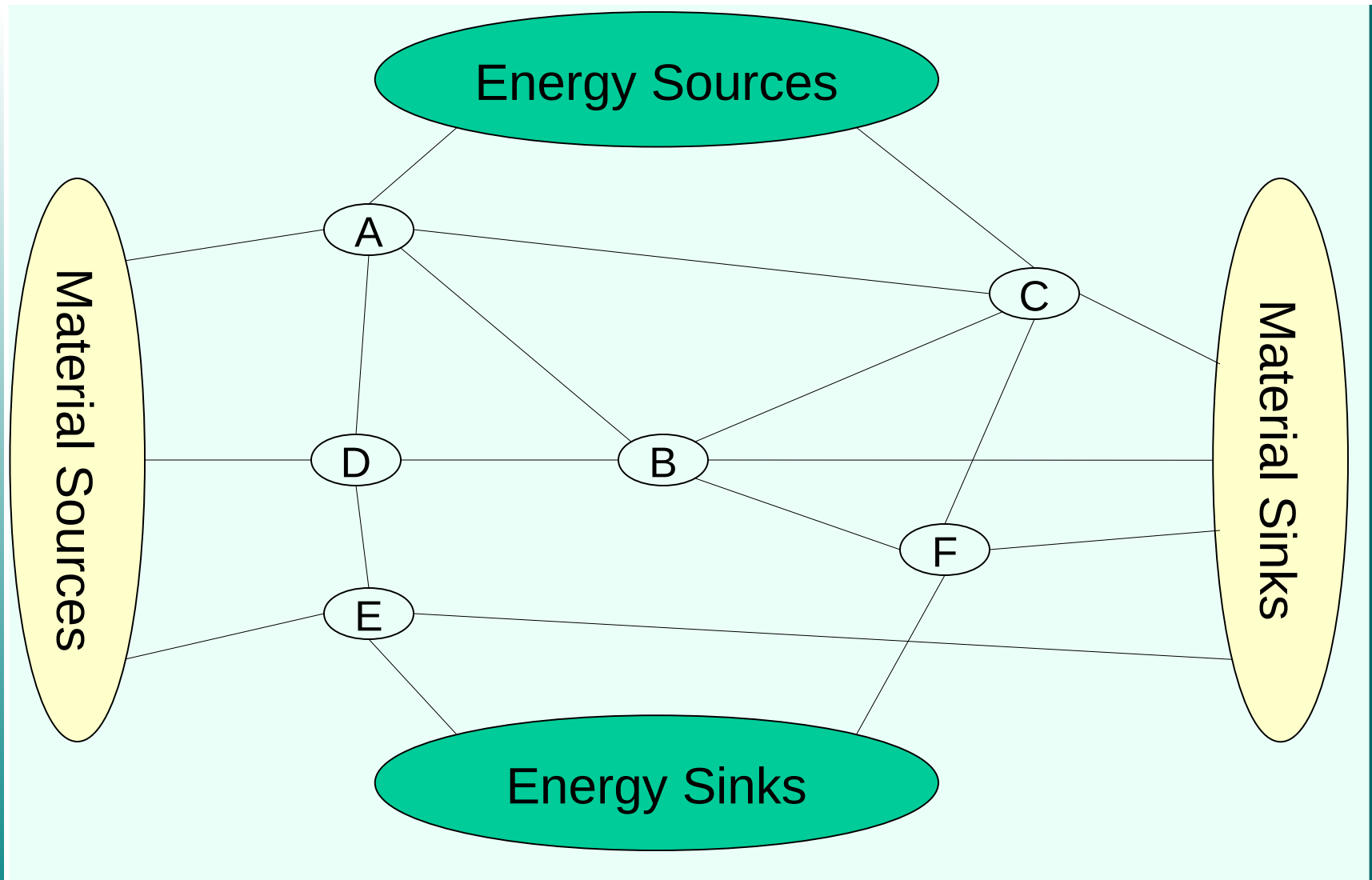
Product Processing vs Equipment Control: no longer mixed-up



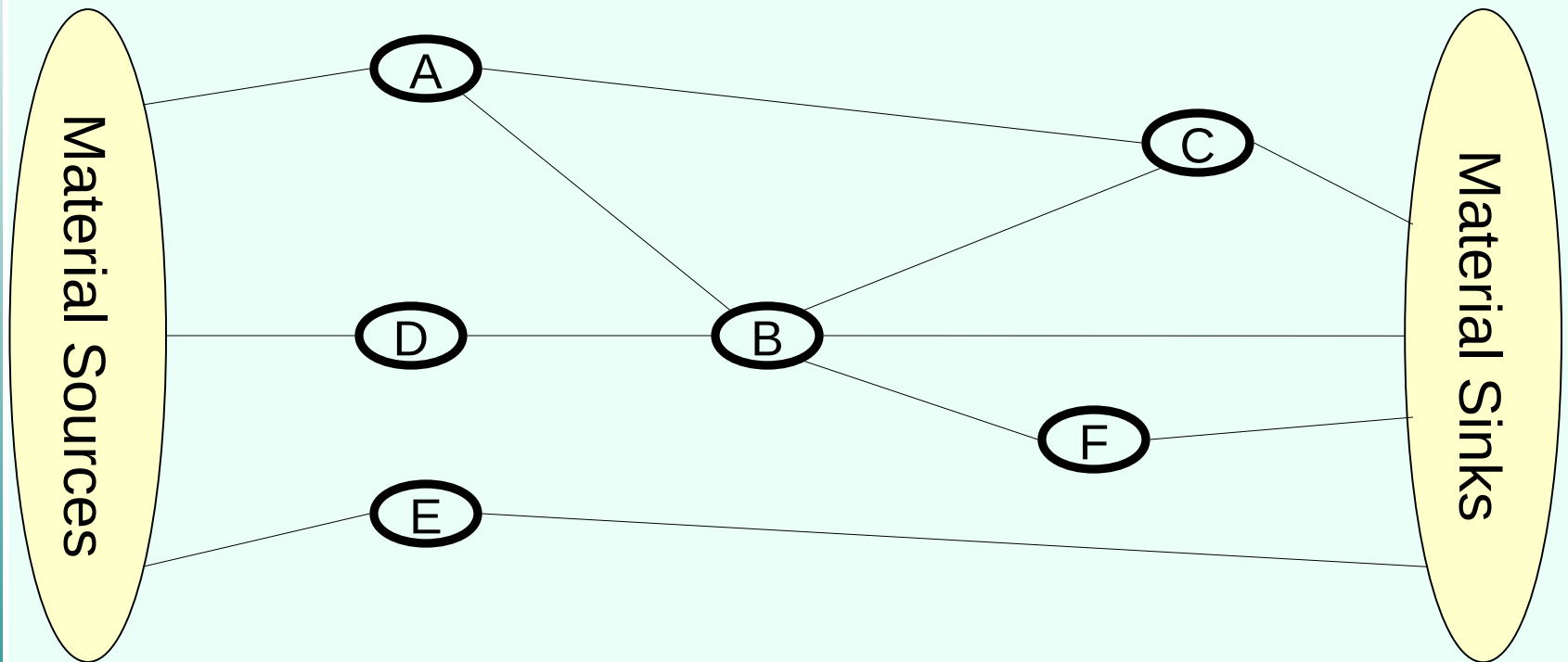
Safe Operation and Flexibility : Reducing the risk



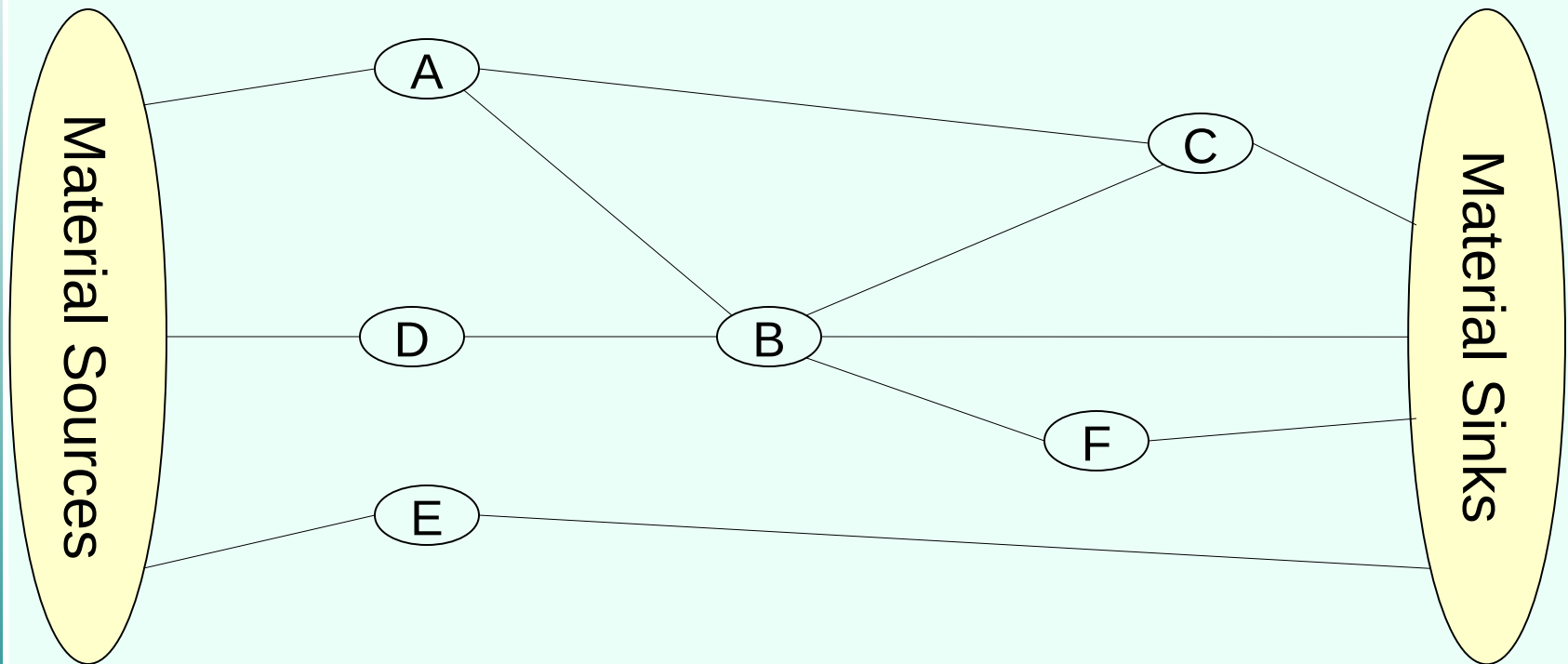
Material and Energy Flow analysis



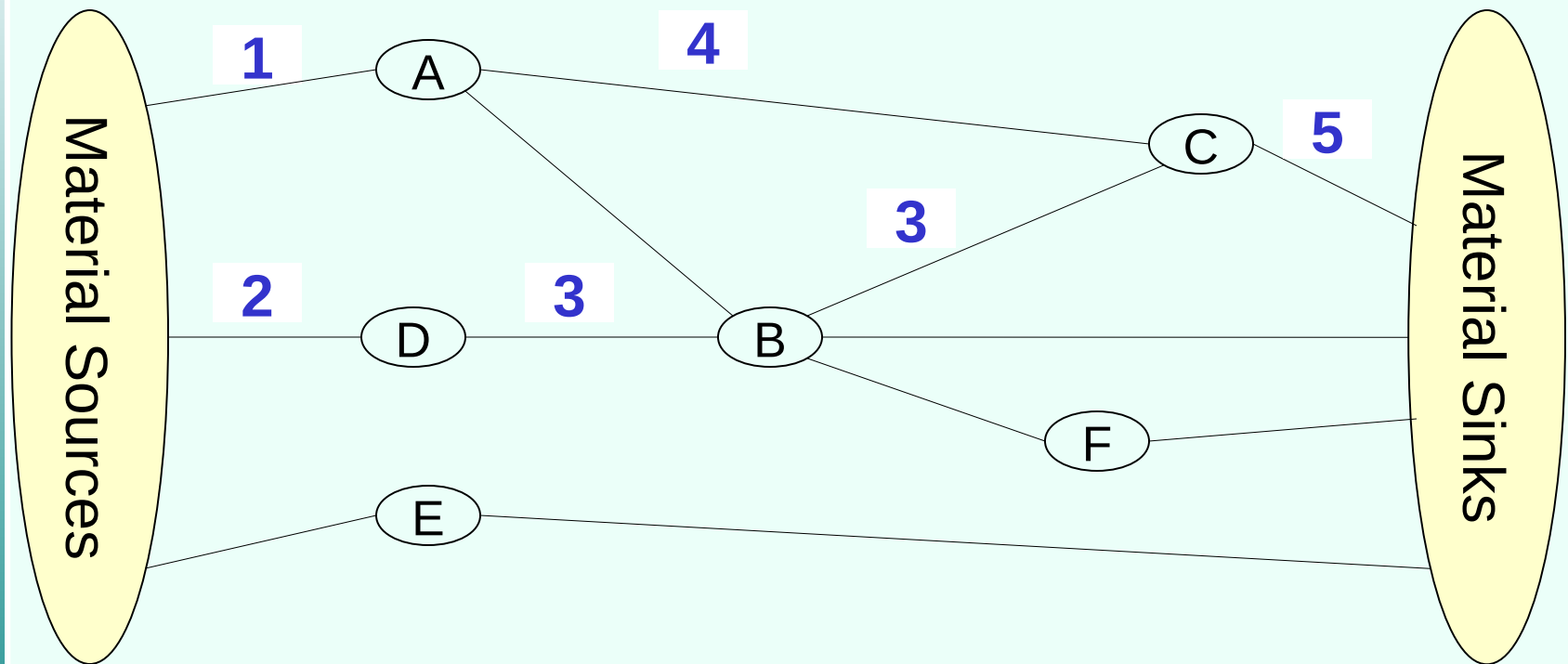
1. Identify Containers



2. Identify realistic Paths



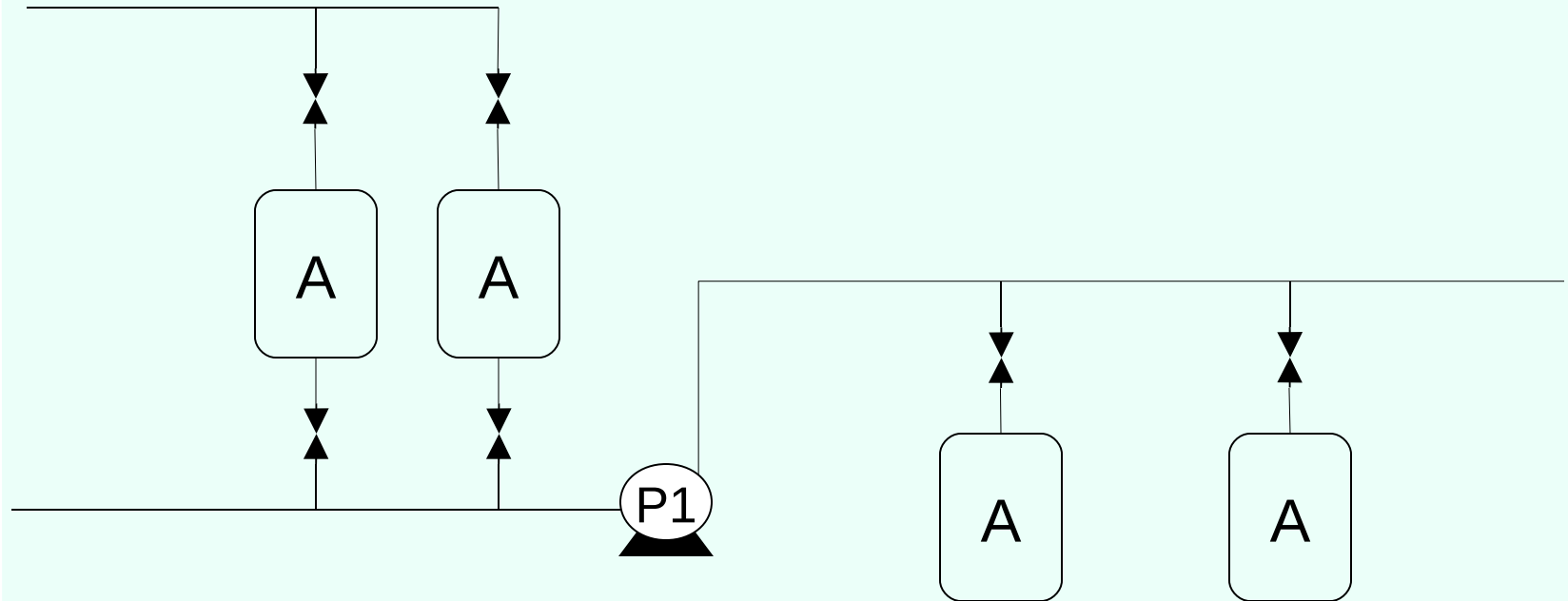
3. Create / check Recipes: Sequence Paths



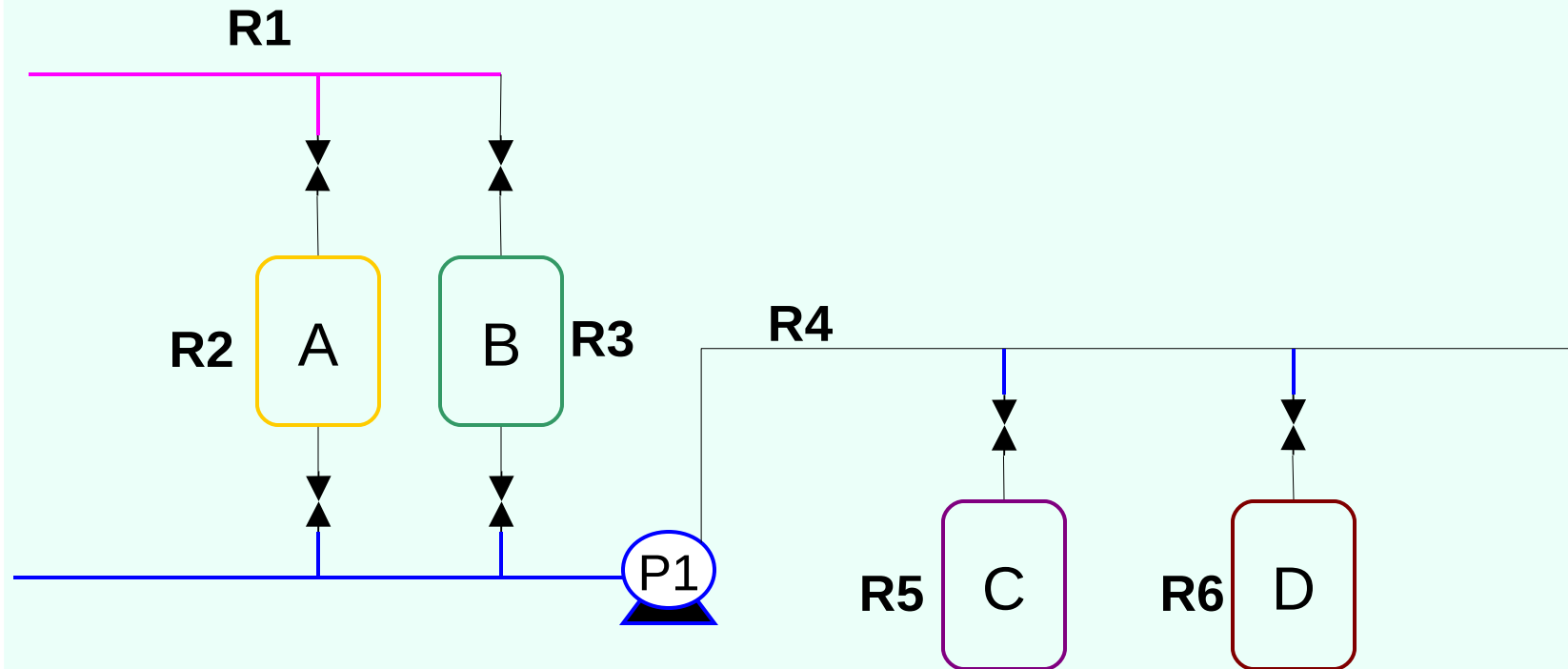
Bottom-Up Engineering

1. Identify, highlight & name Containers or **RESOURCES** on P&ID
 - Analytic Process Equipment check
 - Straightforward, rule-based Process
1. Identify, highlight & name Paths or **FUNCTIONS**:
Build all elementary flows/paths
 - Combine and attach resources to the path
 - Check ability to execute Recipes
1. Attach **DEVICES** to Resources
2. Describe **FUNCTIONS** and **RESOURCES** behavior

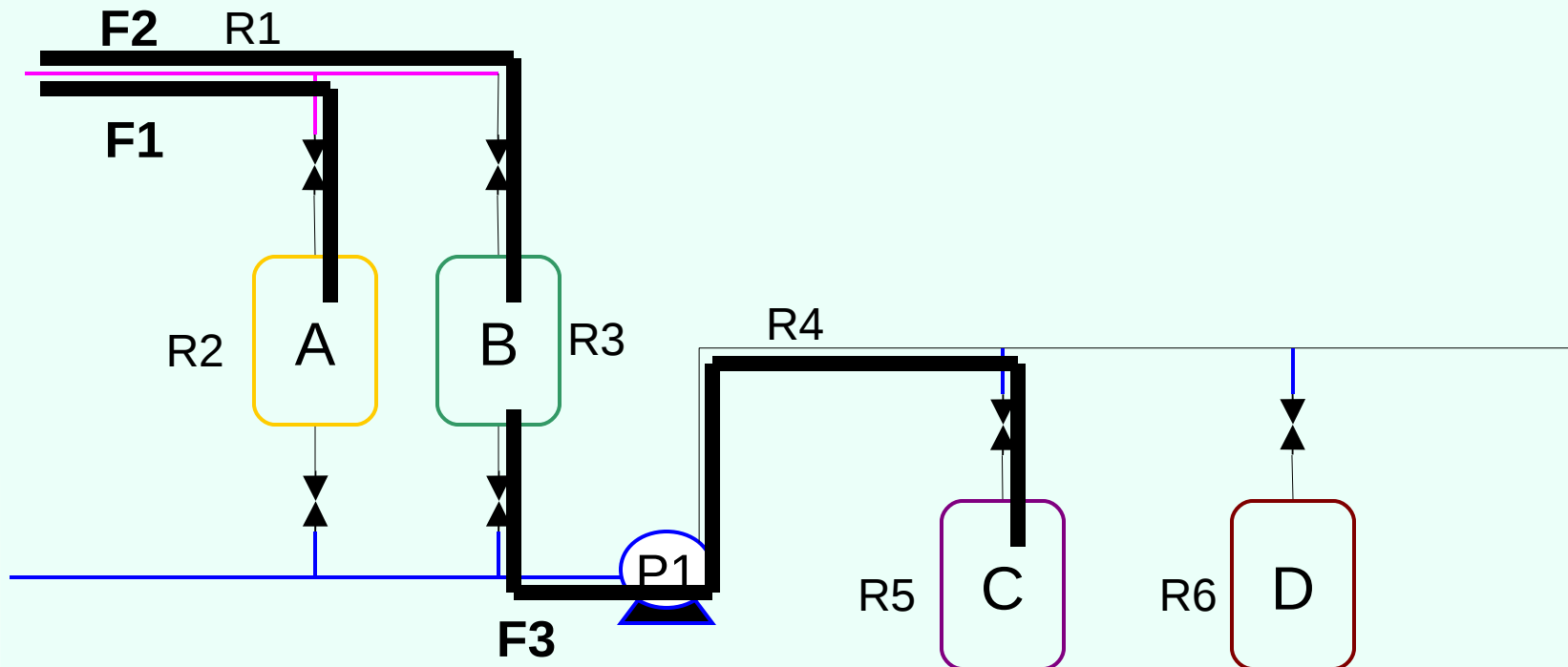
Work on P&ID



Highlight Resources



Define paths : get functions

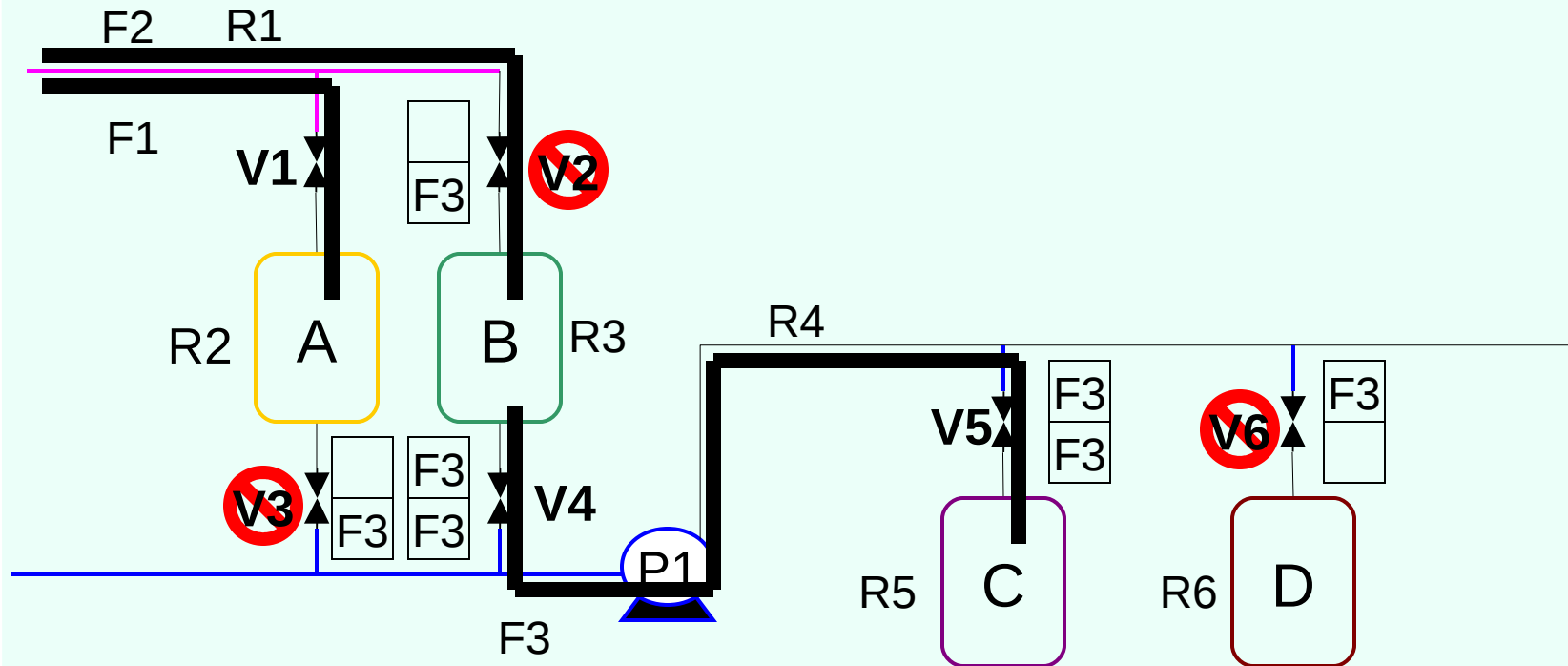


F1 : Fill A (R1, R2)

F2 : Fill B (R1, R3)

F3 : Transfer B -> C (R3, R4, R5)

Attach Devices to Resources : manage interlocks

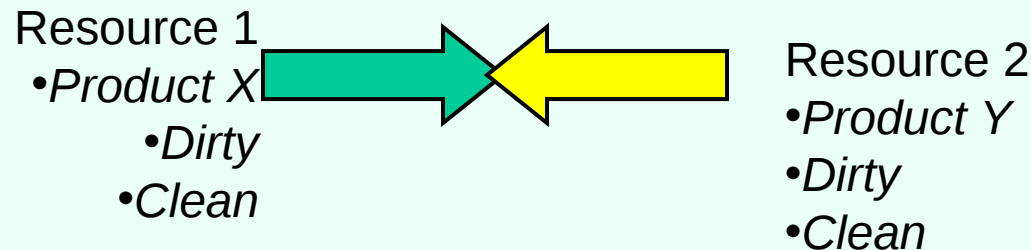


Transfer from B to C: F3 is active, F1 and F2 are inactive:

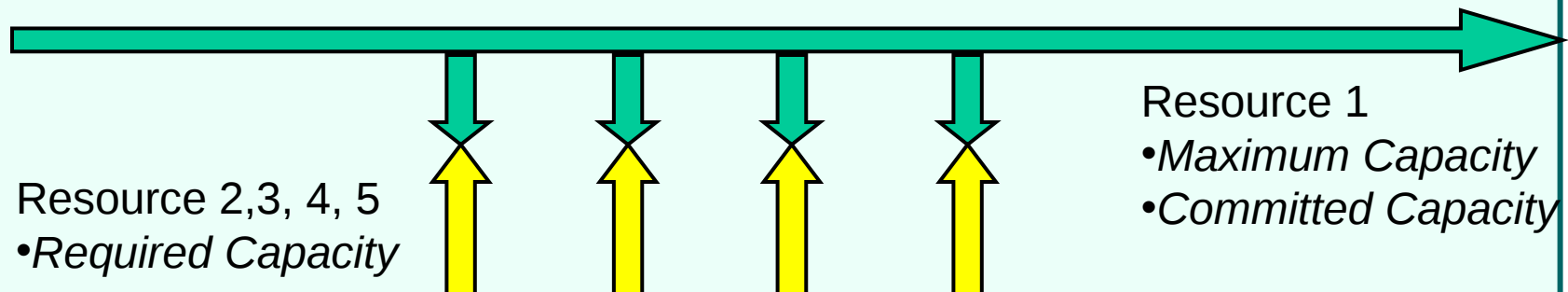
- V4 and V5 are controlled by F3
- V2,3,6 are locked; F2 is inhibited, F1 is available for use

Other applications

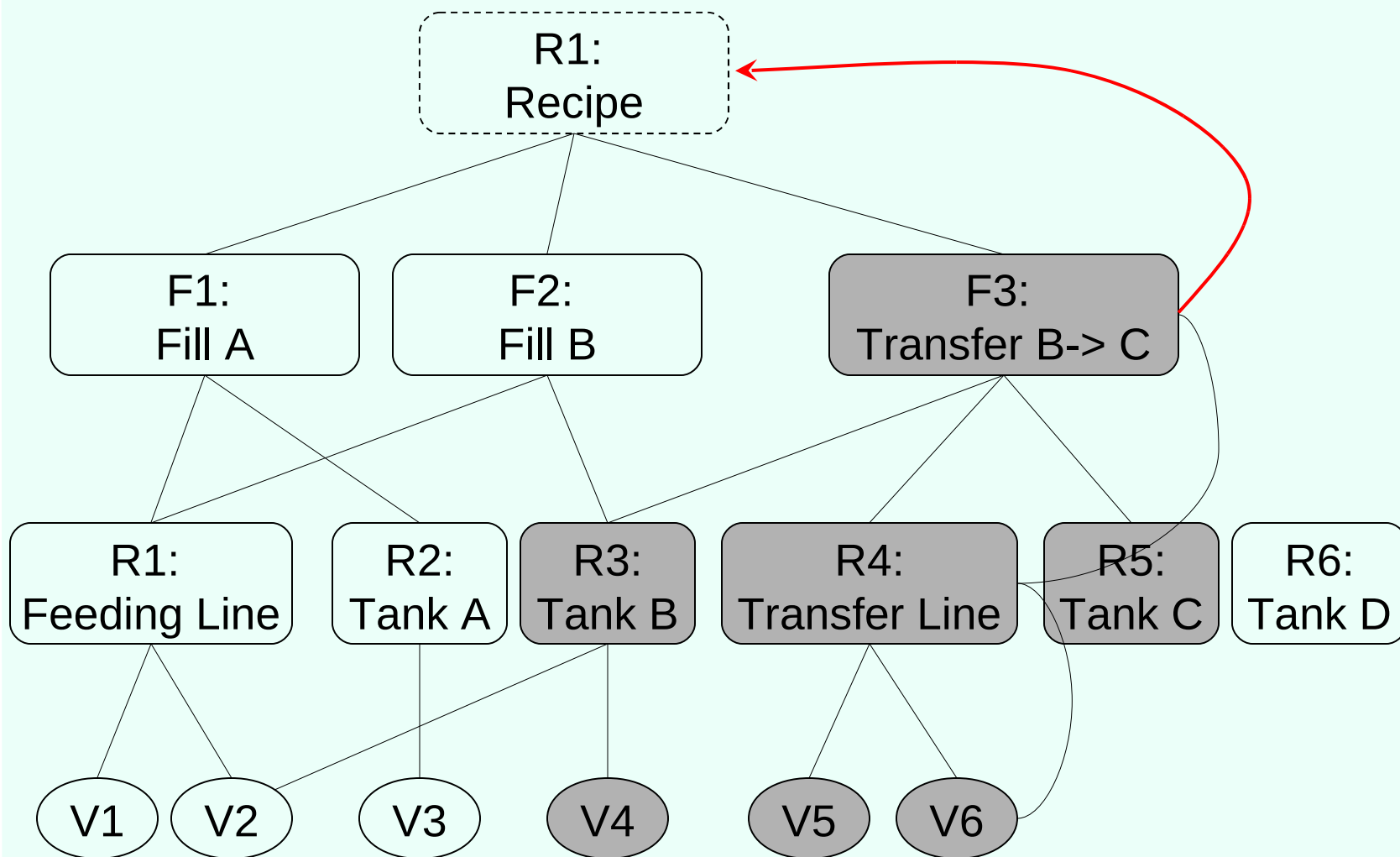
- The Flow Stream analysis opens interesting domains of application:
 - Sanitary / cross contamination control



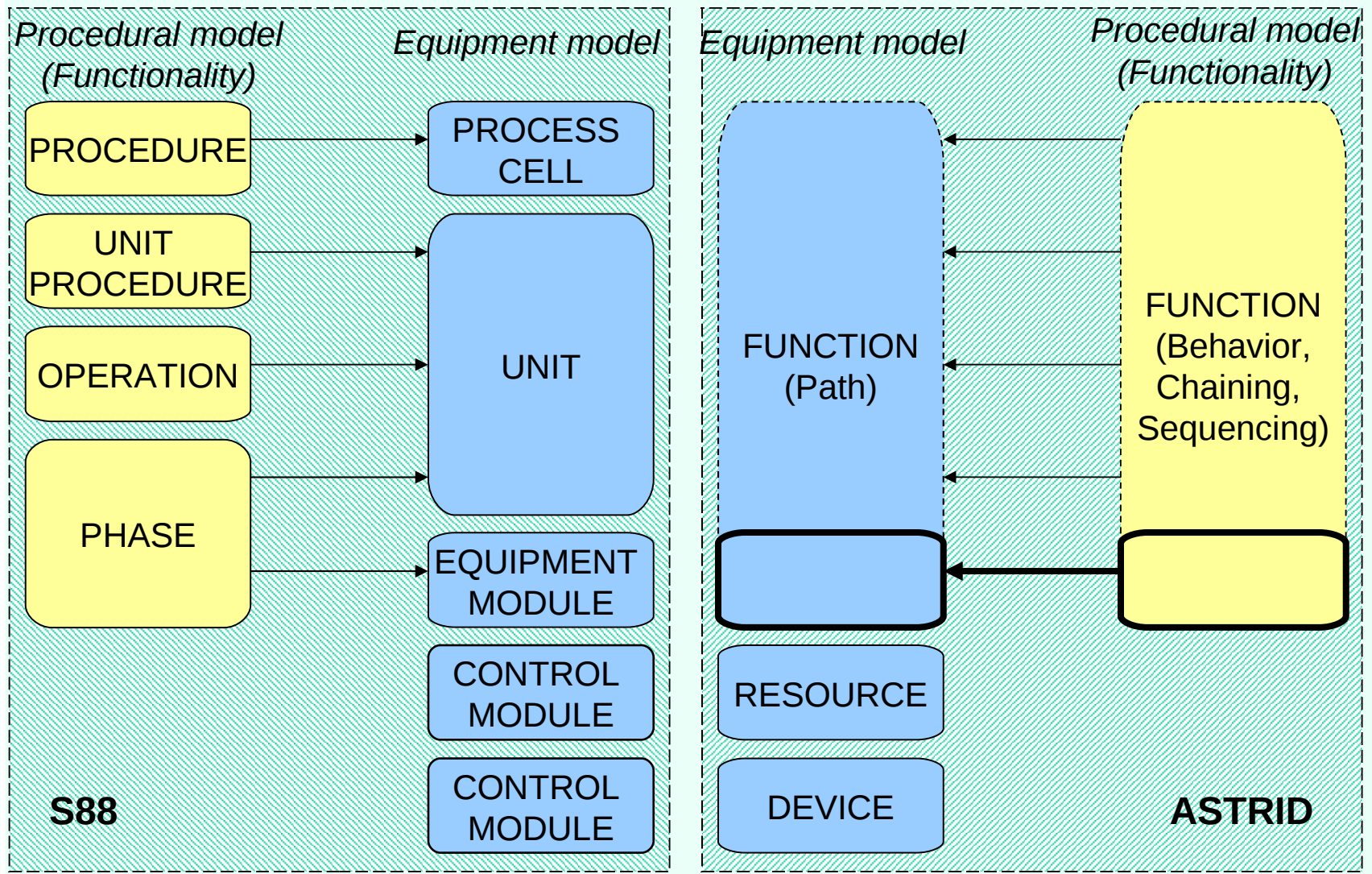
- Capacity limitation



The 4 ASTRID Objects



ASTRID vs S88: How do they fit together



- Successes
 - Used for over 10 years
 - 20 plants, 40 Process Cells, 100 Controllers, 40000 I/O 's
 - New Users since Rhône-Poulenc affiliation (AVENTIS, RODHIA, PASTEUR-MERIEUX):
 - PFITZER, DANONE (LU, KRONENBOURG), SANOFI, (Chemical, F&B, Pharma)
 - Users are fans!
- Issues
 - Slow spread: education and promotion needed (as S88)
 - Control System implementation : ASTRID resources availability, programming features

Conclusion

- ASTRID as an S88 companion
 - for Equipment control: solidification of concepts
- ASTRID fans love:
 - Easy to understand, Equipment based Specifications
 - Dynamic and optimized Resource Allocation / Safe Actuator Interlocks
 - Easy Material transfers
 - Information propagation and summarization
 - Operational Qualification support for validation
 - SO SIMPLE!
- Future
 - Improvement of ASTRID vs S88 compliance
 - ASTRID vendor libraries in Control Systems

Extensive documentation available at <http://fbforg.homepage.com>