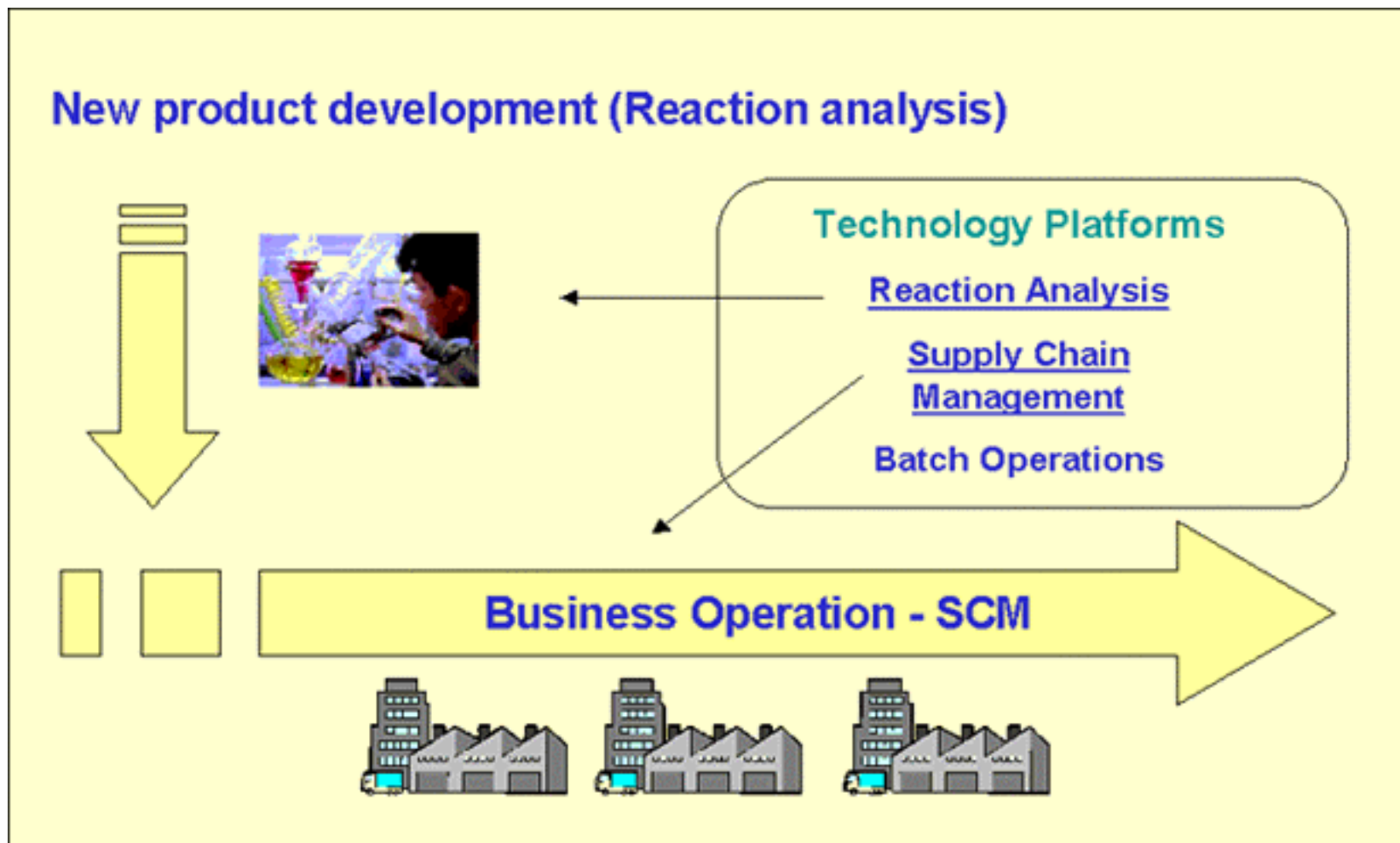

Opportunities & Challenges for Research
Collaboration Between Academia & Industry
'Industrial Perspective'

Bhieng Tjoa
MC Research & Innovation Center
(Mitsubishi Chemical)

MC-RIC - Optimization Group Activities



Our policy on a research topic selection

- Only develop application when it is not 'readily' available in the market place
 - Why
 - » It is often cheaper to buy (cost & maintenance)
 - » We have limited internal resources

- When it can create significant value
 - » Financially
 - **Fast ROI**
 - » Technology
 - **Strategic know – how**
 - » Project execution
 - **Flexibility**
 - **Speed (time)**

Opportunities to Collaborate with Academia

- When we can be defined clearly
 - » Scope
 - » Information exchange
 - **Project ownership**
 - » Deliverability
 - **Concept**
 - **Prototype**
 - **Usable application**
- Example of our experience
 - Reaction Analysis Studio (RAS)

Our Experience on RAS...(1/3)

➤ RAS

- Application for...
 - **Kinetics mechanism analysis**
 - **Kinetics parameter estimation**
 - **Reactor optimization (optimal control)**
 - **Sensitivity analysis**
 - » **Critical link in product development chain**

- Issues in application development
 - **Software environment (UI)**
 - » **User friendly and flexibility**
 - **Modeling platform**
 - » **Flexibility and expandability (GAMS)**
 - **Modeling**
 - » **DAE & nonlinear system**
 - **Nonlinear optimization solver**
 - » **Robustness**
 - **Sensitivity analysis**
 - » **Nonlinear**

Our Experience on RAS...(2/3)

➤ RAS

- Issues in outsourcing decisions
 - **What part can be outsourced effectively**
 - » Require our judgment
 - **Assigning the right person**
 - » With the right background
 - » With the right level of responsibility
 - **Finding the appropriate collaborator(s)**
 - » Mutual interests
 - » Defining working relationships
- Our decisions on collaborations
 - **Software environment**
 - » CAPEC - DTU (Prof. Rafiqul Gani)
 - **Sensitivity analysis & DAE solver**
 - » CAPD – CMU (Prof. Larry Biegler)

Our Experience on RAS...(3/3)

➤ RAS

- Our results on collaborations
 - **Very successful**
 - » **Deliverability**
 - » **Schedule**
 - » **Cost**
- The application effectiveness
 - **Very successful**
 - » **Solve various problems**
 - » **Accepted by many users**
 - » **Create real value**

Summary

- **Keys to our successful collaboration**
 - Identifying the right topic
 - Assigning the right person
 - Finding the right partner