



Scaling Up 2019

Delivering a Bio-Circular Economy

November 4 – 6, 2019, Fairmont Château Laurier, Ottawa, Canada

Open Innovation in biomass based biorefineries & lessons learned

**Theodora Retsina, Ph.D
CEO
American Process**

Open innovation means an organization

doesn't rely exclusively

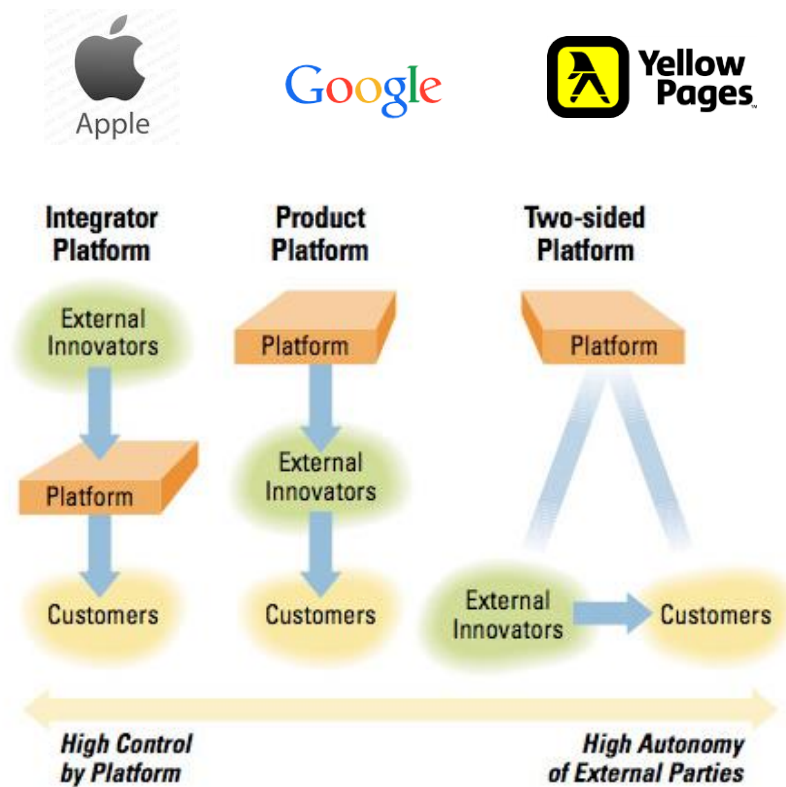
on their own internal knowledge sources and
resources for innovation

but also uses

multiple external sources to drive innovation.

Open = Sharing

- An mindset that runs counter to the secrecy and silo mentality of traditional corporate research labs



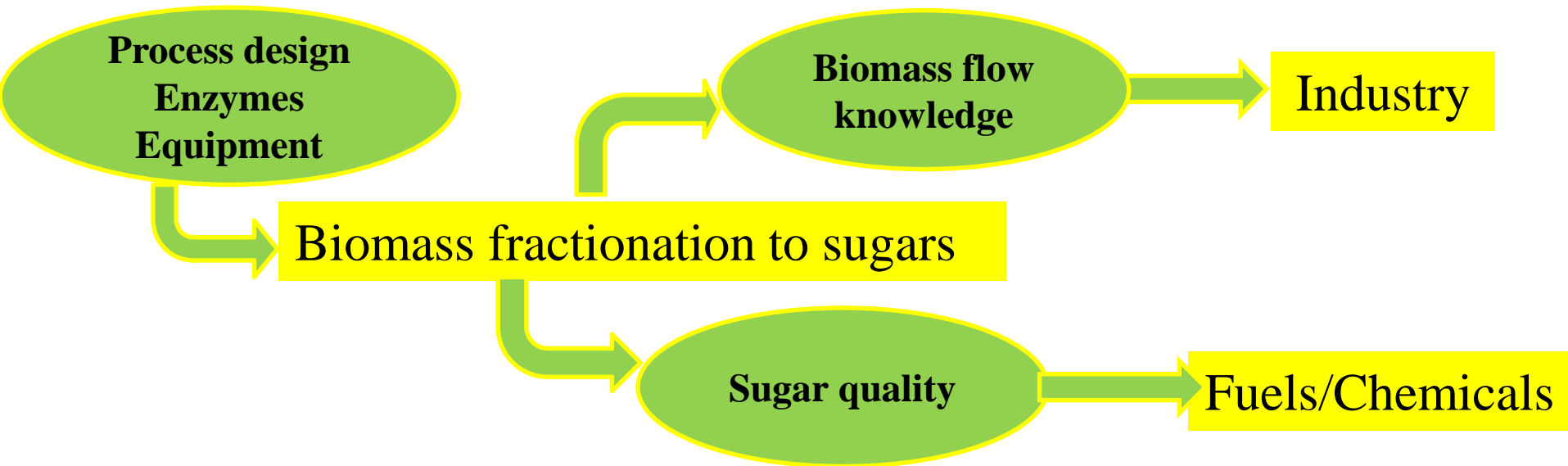
Open Innovation in Biorefineries

Outside → In Strategy

An organization is inviting external contributions such as ideas, technology and expertise.

Inside → Out Strategy

An organization is willing to share its own ideas and innovations with outsiders

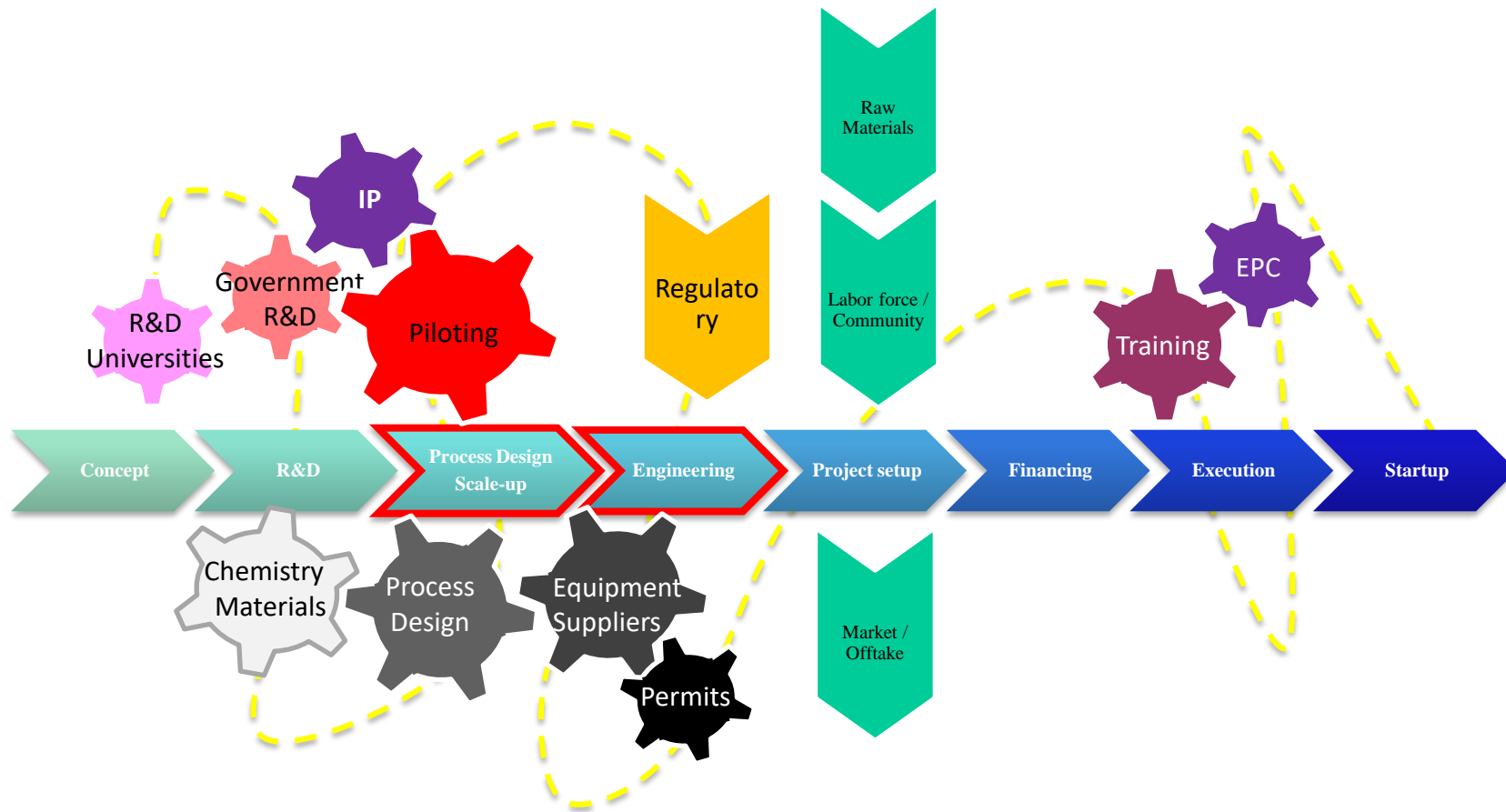


Project execution realizing the project

in order

deliver the project expected results.

NO STEP CAN BE MISSED



ALL STEPS BENEFIT FROM OPEN INNOVATION

Cool !

- Open innovation is not just a cool way of doing things.
- It is critical in new innovative industrial process industries
 - e.g. cellulosic biomass renewables
 - Capital intensive
 - Multidisciplinary (IT, Materials, Chemistry, Permits, Equipment)
 - Very large turnaround times between first failure and success
- It can have major cost benefits – often it is the differentiator between success and failure

Challenges

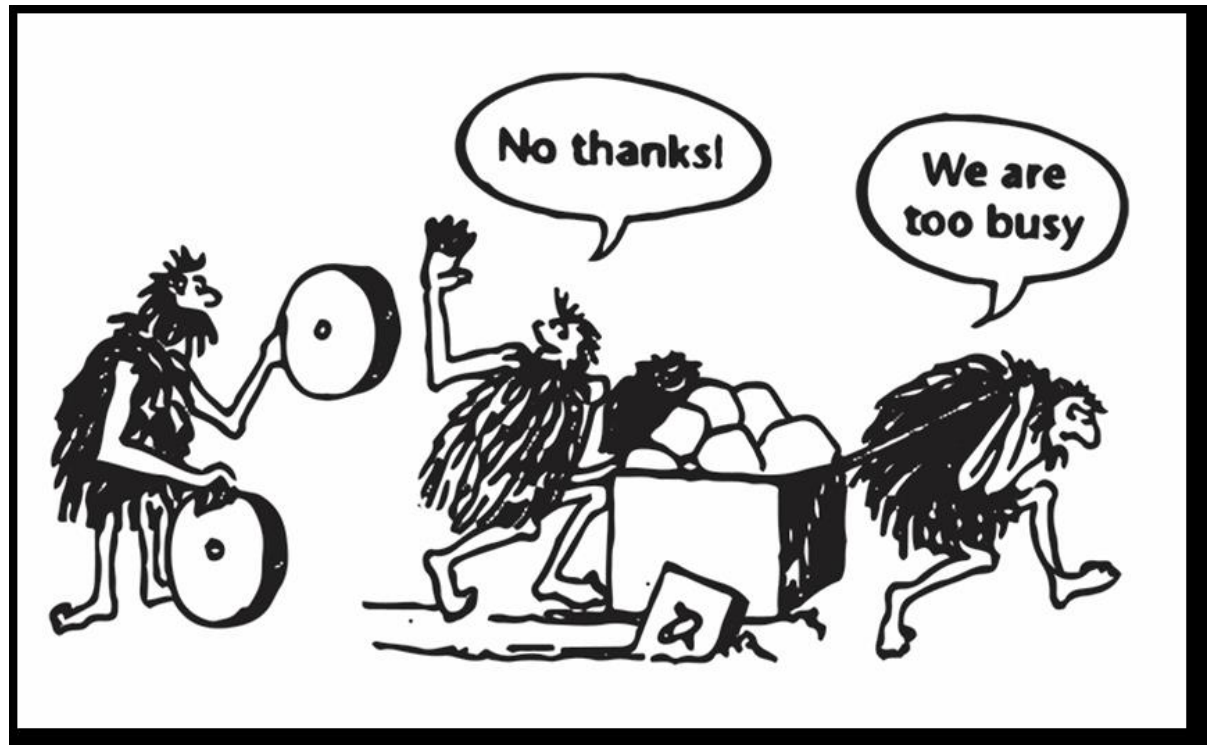
- Perceived loss of competitive advantage



ONE CAN STEAL IDEAS... BUT NO ONE CAN STEAL EXECUTION OR PASSION

Challenges

- Perceived loss of competitive advantage
- Not invented here - slave to execution timeline



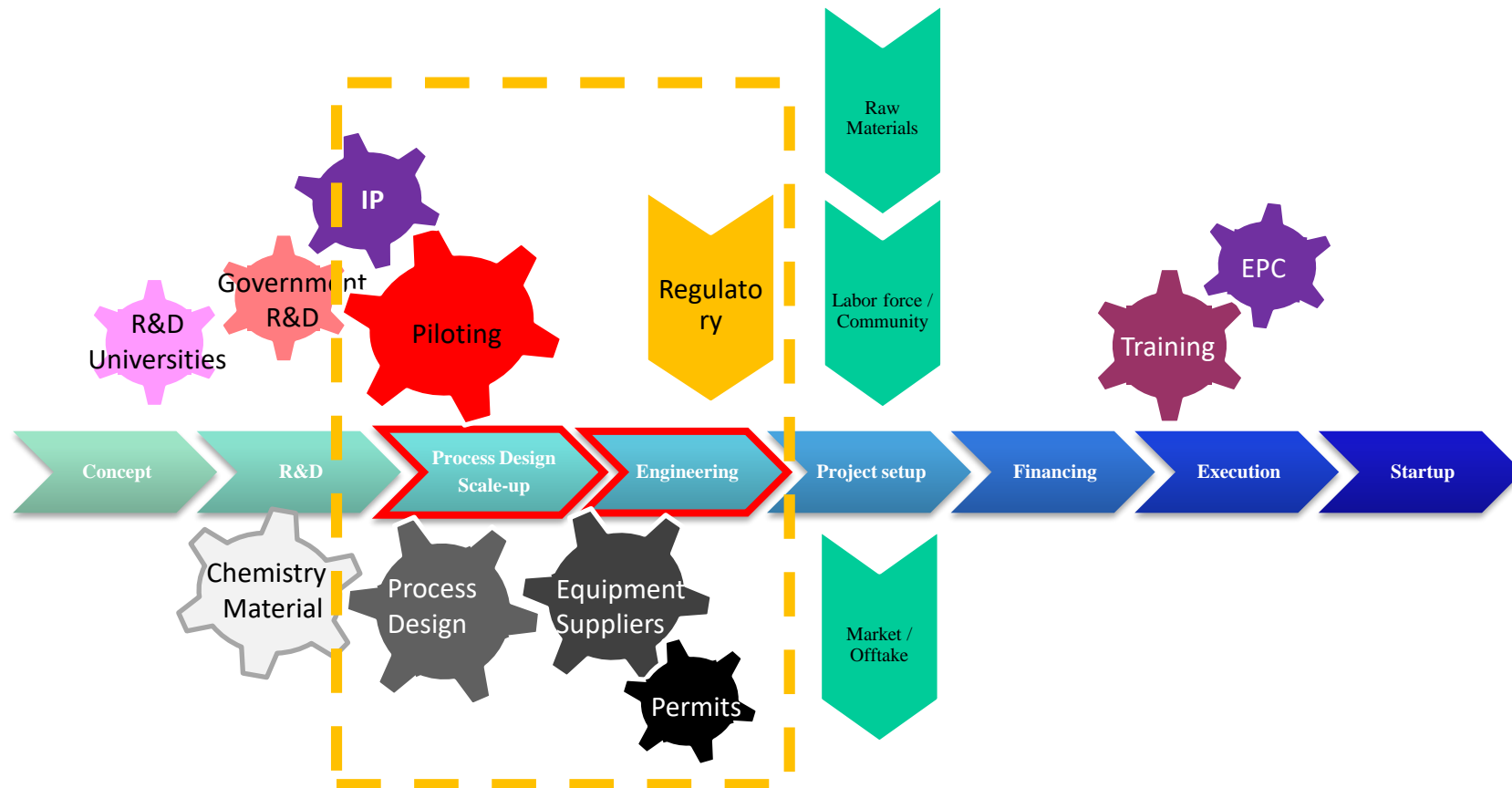
Challenges

- Perceived loss of competitive advantage
- Not invented here - slave to execution timeline
- Knowledge management
- Relationship management & communication



Let's discuss a partnership !

NO STEP CAN BE MISSED



ALL STEPS BENEFIT FROM OPEN INNOVATION

Biorefineries project execution

- A reaction does not a process make!
- Process design, equipment selection and engineering relevant expertise are key to success
- Scale-up must be done by Full Scale Integrated Demo, “FSID”
 - CONTINUOUS DEMONSTRATION
- Energy intensity, lack of integration and complexity can sap profit margins
- Biomass requires respect – flow problems, erosion and plugging cause ~75% of downtime

PEOPLE
THINK
IT'S
MAGIC
WE CALL IT
ENGINEERING



Examples of insular innovation failures

- Batch reactor for demonstration – Commercial plant uses continuous pretreatment – no involvement of outside experts
 - Scaling, plugging, lignin deposition realized only at commercial plant – project failure
- Batch short time demo – Commercial plant using first of a kind equipment by a company with no equipment design experience
 - Plant inoperable, downtime, extreme erosion, equipment failures, process failure – project failure
- Scaleup using wood chip equipment and process design for agricultural waste – no FSID
 - Inoperable – project failure

Effects of insular innovation

- 5 commercial biorefineries – not delivering
- Yield <60% of potential – weak pre-treatment fractionation
- Availability 25% - 75% (years after start-up) – plugging
- Loss of public and private moneys >>\$1.5 billion
- Loss of investor confidence
- Delay climate change mitigation contributions
- Bolster the oil sector claims

IP licensing

a tool for corporate growth for biorefinery companies

- Friend or foe?
- A tool for unrealistic valuations?
- Help or inhibit innovation?
- Stronger than project implementation?

*When the facts change – I change my mind.
What would you do?*

Winston Churchill

Conclusions

- Project succeeds only when aligning everything
- Indeed open innovation is more necessary in new process industries
- Balance zealous IP protection vs. successful first to market advantage

Availability and mobility of skilled workers → Knowledge is not anymore proprietary to the company. It resides in employees, suppliers, customers, competitors and universities.

- Recognize strengths and weaknesses of your company
- Search and share innovation with partners AND competitors
- Mindset - believe (test it) that with OI everybody wins



Scaling Up 2019

Delivering a Bio-Circular Economy

November 4 – 6, 2019, Fairmont Château Laurier, Ottawa, Canada

Thank you

Theodora Retsina

theodora@americanprocess.com