

BIOPROCESS
PILOT FACILITY

*Have your lab process scaled up
@BPF, a reliable and experienced
industrial scale partner*

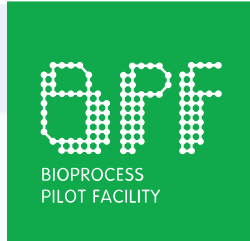


Past, Present, Future

SmartPilots

The Hague / Delft, 26SEP2017

Eric Goossens



Introduction

Universiteit Utrecht



UNIVERSITY
OF TWENTE.

Johnson & Johnson

uniQure

INSEAD
The Business School
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SKISUI



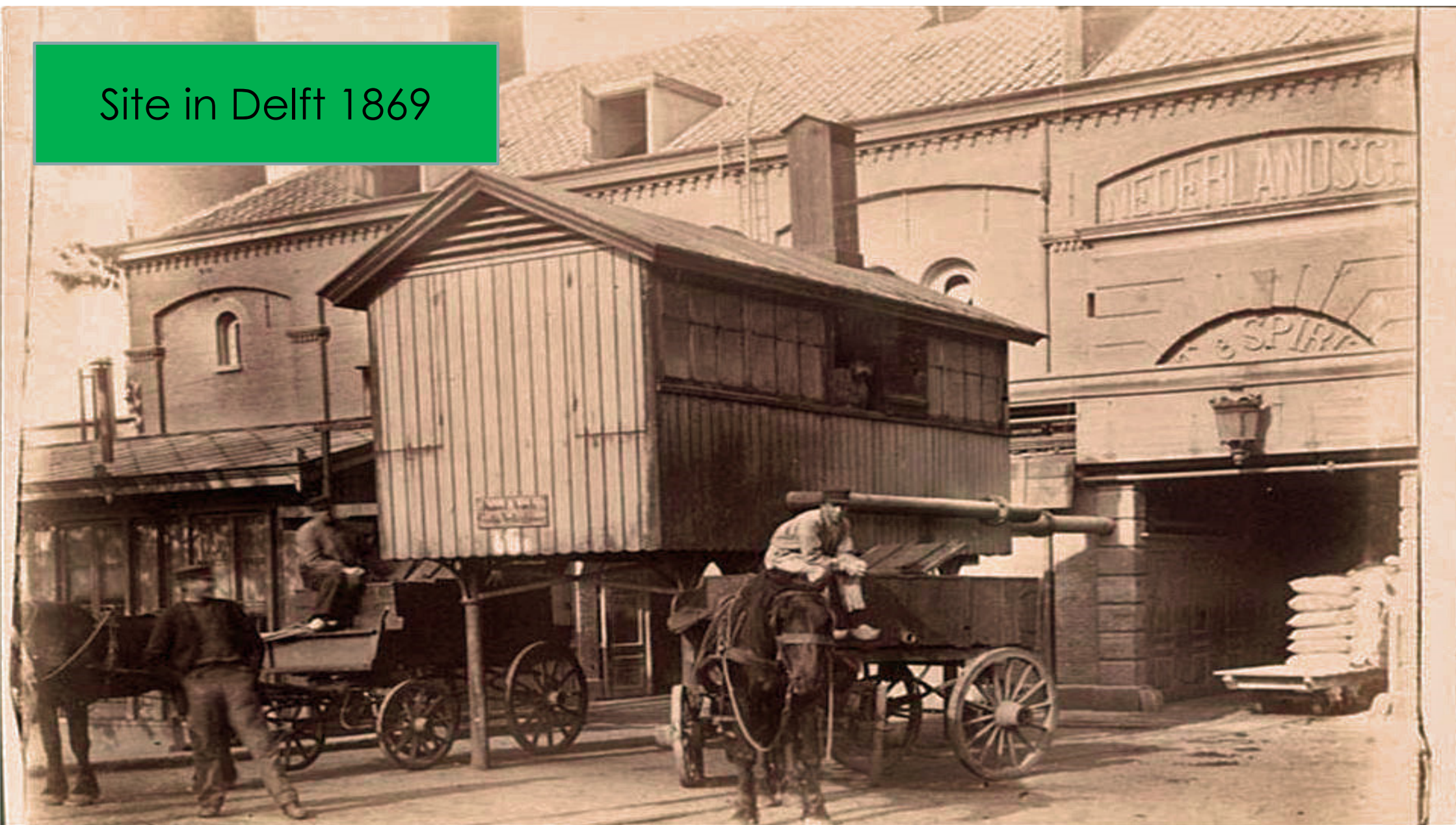


Past

Site in Delft 1869



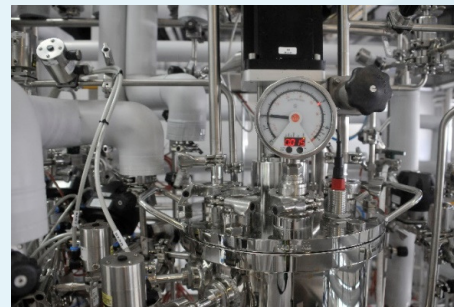
Site in Delft 1869



Background

History

- Originating from Gist Brocades
- Spin-off from DSM (Est. 2012), 40 FTE (2017)
- Longstanding experience in industrial scale up/ scale down fermentation and downstream processing
- 37 million EUR investment; plant upgrade, pretreatment & food grade pilot plant extension





Present

BPF playing field

Biotechnology & bio-based economy

Towards a sustainable world now!



Bulk-chemicals



Fine-chemicals



API's



Plastics



Food



Ingredients



Biofuel



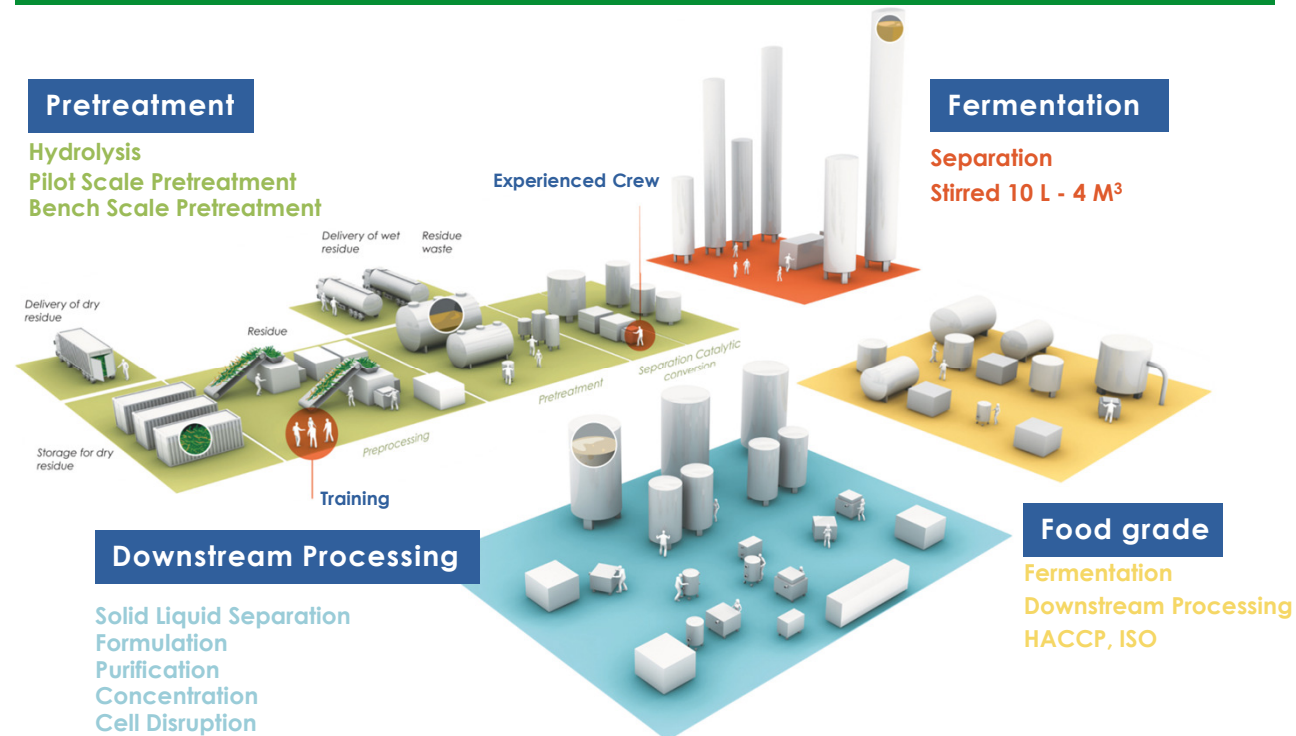
Enzymes

**... (im)proving the process
of the client ...**

*BPF is a downsized plant of a highly complex process
→ we can take almost all biotech processes*

Pilot plant

Modular concept based on Pretreatment, Hydrolysis, Fermentation and/or Downstream Processing



Way of working

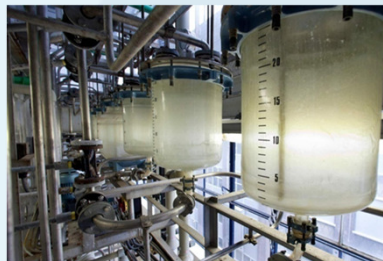
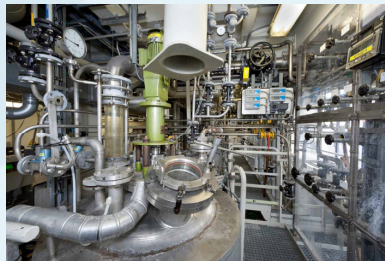
Scale-down and teamwork for optimal success

Approach

- Onsite joint project execution; optimal usage mutual expertise
- Scale down targeted commercial plant
- Run pilot scale to confirm / modify proof of concept
- Data generation for commercial scale engineering & safety

Customer Benefits

- Reduce risks and costs
- Test/validate new technical designs
- Enhance customer's bio-processing competence
- Pre-marketing / application / tox trials product quantities



Trends & challenges in biochemical eng

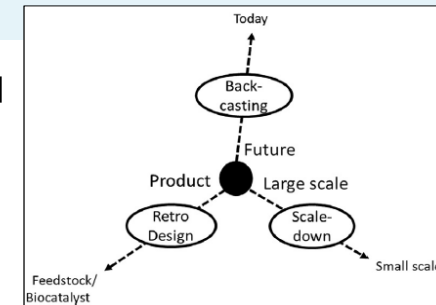
Increased importance of scale-down approach [1]

Challenge

- Increasing complexity of biotech processes
- Aggressive time-to-market timelines

Advantages scale-down approach

- Design of ideal process taking into account constraints from manufacturing
- Meet project targets within budget and time-to-market



Critical stage is conceptual design → reversed design in 3 dimensions

1. *Product: specs and DSP purification set before upstream processing*
2. *Future market: time perspective with feedstock in place*
3. *Large scale: set by industrial operation*

[1] Noorman, H.J., Heijnen, J.J. Biochemical engineering's grand adventure, Chem. Eng. Sci. (2017)

Scaling up challenges

Track record

Close critical gap scientific feasibility - industrial application

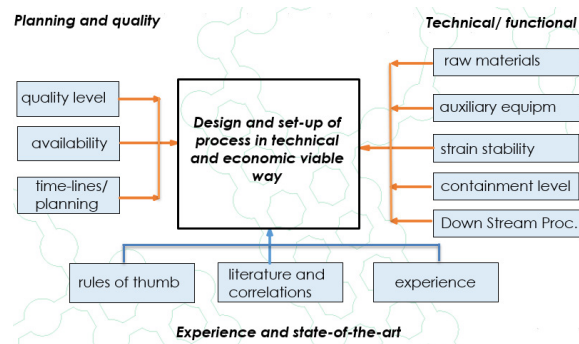
Challenge

- non-linear scale up, difficult to model total biotech process
- translate industrial scale knowledge into right set of pilot scale dimensions to validate/improve lab scale process

Scale-down approach

- planning and quality
- functional/technical specs
- state-of-the-art

→ **experience is key**



Track record (examples)

- DDDA: DSP optimization/ validation of yeast based product for nylon 6,12
- FDCA: fermentation and DSP optimization, from ent-train to purification, renewable sources based, premarketing volumes
- Multiple other projects (*details can't be shared because of confidentiality*)

