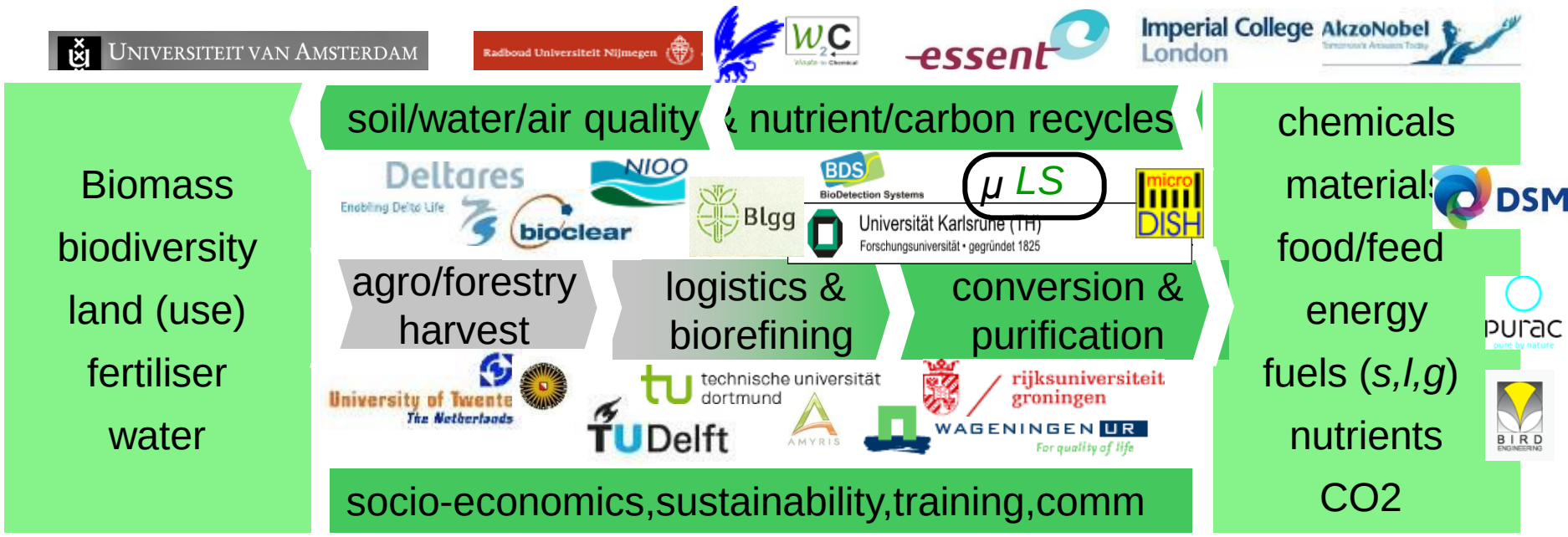
BE-BASIC Foundation – Introduction & International activities

Prof. dr. Bram Brouwer,

Managing Director BE Basic Foundation

BE-Basic is focused on R&D & Innovation in Biobased processes (volume of 45 M€/year)

structured around integral biomass value chain & sustainability



BE-Basic

2013 overview of Flagships in BE Basic Foundation

- 1) Carbon-based building blocks
- 2) Nitrogen-based specialties
- 3) Sustainable soil management and upstream Processing
- 4) Bioconstruction materials
- 5) Microbial production of biofuels and biorenewables
- 6) Synthetic biology
- 7) High-throughput experimentation & (meta)genomic mining
- 8) Environm. impact of chemicals, bio-based molecules and processes
- 9) Societal embedding of a biobased economy
- 10) Genomics for Industrial (Food) Fermentation
- 11) Energy, Policy & Sustainability
- 12) IsoButanol Platform Rotterdam

Some examples: Flagship 1:Carbon-based compounds

- Second generation **carbon-based** compounds:
  - Chemicals
  - Materials
  - Fuels
- Clean and efficient industrial processes
- Lignocellulosic materials and other bio-based feed stocks

Hein Stam (DSM)

Gerrit Eggink (WUR)

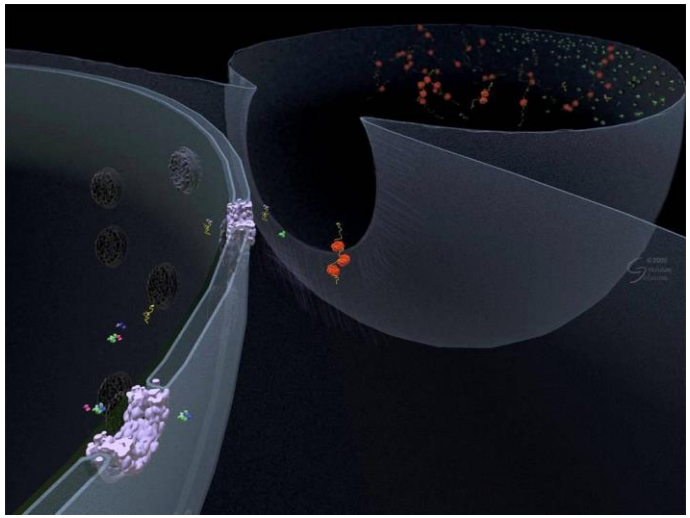
Some examples: flagship 2: Nitrogen-based specialties

- Novel technologies for nitrogen-containing compounds
  - Pharmaceuticals
  - Materials
- Renewable feed stocks
- Engineering of micro-organisms and design of pathways

Arnold Driessen (RuG)

Isabel Arends (TU Delft)

Some examples: flagship 6: Synthetic biology



- Tools and techniques for the improvement of micro-organisms.
- Design and optimization of novel pathways to desired products
- Cell membrane engineering for efficient product export and improved robustness of the production organisms

Bert Poolman (RuG)

Ton van Maris (TU Delft)

Some examples: flagship 7: HTE and (meta)genomic mining

- Develops and applies high-throughput approaches
- Explore the metagenome (DNA directly from environmental samples)
- Engineer and screen enzymes and other products for improved properties.

Hans van Veen (NIOO-KNAW)

Dick Janssen (RuG)

Some examples: flagship 8: Environmental impact

- Environmental and human safety issues in a biobased economy
- Novel and efficient methods for the evaluation and improvement of chemical safety in the bio-based economy

Hauke Smidt (WUR)

Bart van der Burg (BDS)

Some examples: flagship 9: Societal embedding

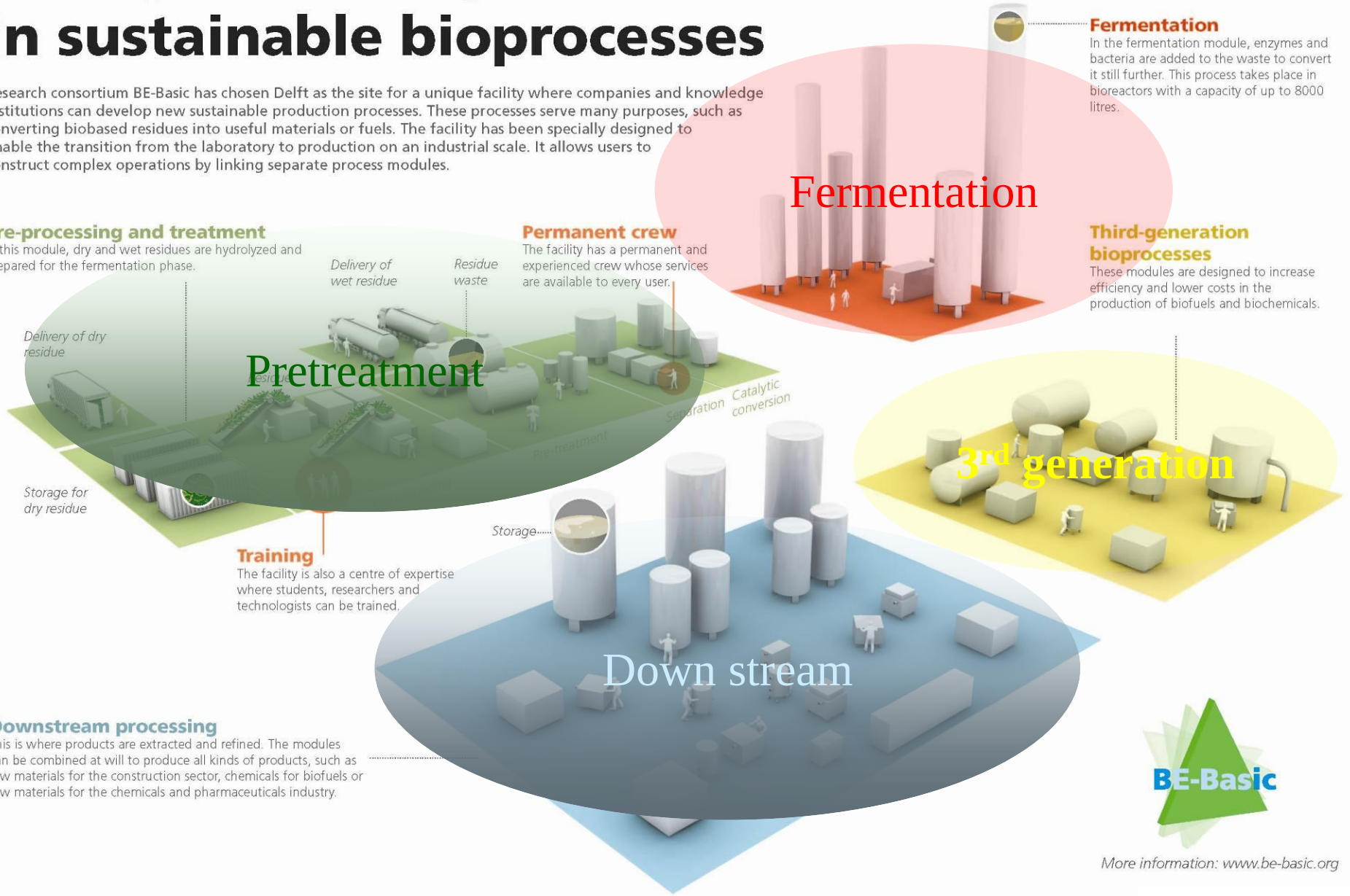
- Identification of socio-economic aspects and sustainability issues
- Development of adequate systems to monitor and model these
- Development of effective and efficient education, communication and societal valorisation programmes

Patricia Osseweijer (TU Delft)

Roeland Bosch (Min EL&I)

Delft pilot facility for innovations in sustainable bioprocesses

Research consortium BE-Basic has chosen Delft as the site for a unique facility where companies and knowledge institutions can develop new sustainable production processes. These processes serve many purposes, such as converting biobased residues into useful materials or fuels. The facility has been specially designed to enable the transition from the laboratory to production on an industrial scale. It allows users to construct complex operations by linking separate process modules.



BioPort on Maasvlakte 2

From: Bas Hennissen PoR
Deltalinqs Netwerk bijeenkomst
Groene Chemie 1 nov 2011

1. **CO_2 Cluster**
   Storage, liquifaction and shipping of CO_2.
2. **Next generation biodiesel**
   Oils and fats - based biochemicals en fuels production facilities.
3. **Multi-user jetty and storage**
   Sharing of infrastructure maximises efficiency in using it.
4. **Ethanol based chemicals**
   Dry biomass based production of next generation ethanol and chemicals.
5. **Handling and storage of dry biomass**
   Multi user storage and handling of all sorts of dry biomass.

Port of Rotterdam

BE-Basic's network with top players in EU, Brazil, Vietnam, Malaysia and USA

Universität Karlsruhe (TH)
Forschungsuniversität • gegründet 1825

CLIB 2021 CLUSTER INDUSTRIELLE BIOTECHNOLOGIE

technische universität dortmund

Imperial College London

Porter Alliance

BE-Basic NL/EU

CLIMATE KIC

CLIB2012

EBI / ONRL
via GSB 5 M€

Energy Biosciences Institute

OAK RIDGE National Laboratory

VAST 4 M€

OPBC 5 M€

FIESP

BIOEN

CTBE

UNICAMP

FAPESP

UTM

UPM

BE-Basic ASEAN

BE-Basic/BIOEN 8 M$

BE-Basic Brazil

BE-Basic

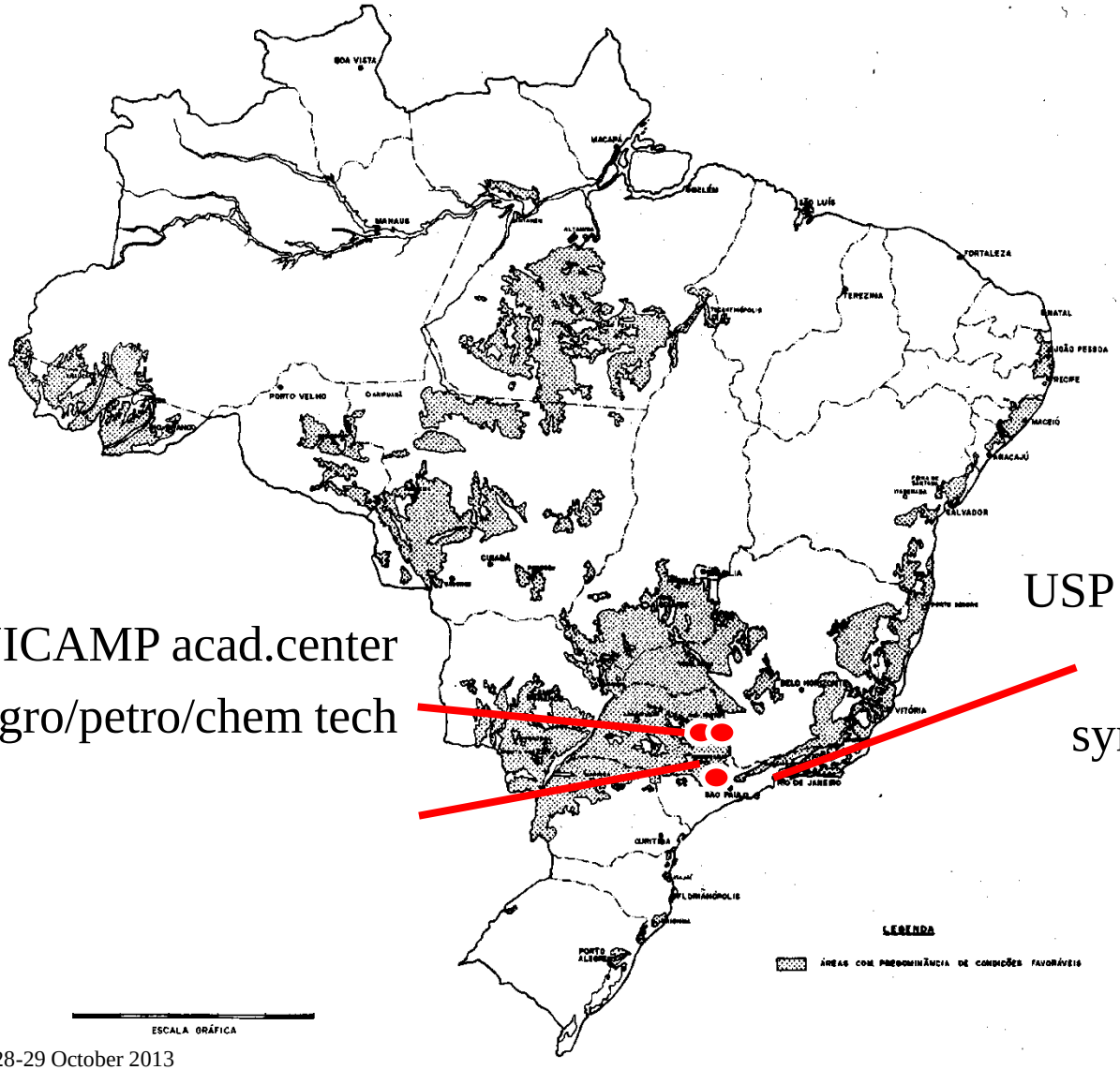
Scale & scope of activities in Brazil

- **Central hub for collaborations in Brazil for**
  - BE-Basic (partners)
  - Delft University of Technology (TUD)

- **Focus on:**
  - Research, Advanced Education and Innovation on “Sustainable Biorenewables” in wide definition.
    Including a range of associated ‘clean and sustainable technology’ and supporting areas.

- Operated under **joint TUD/BE-Basic responsibility**. In close collaboration with leading Brazilian institutions

Brazil office – location Campinas



UNICAMP acad.center
agro/petro/chem tech

USP largest university,
plant research,
synth biology center

Our Brazil Office in Campinas

Unique cooperation with interdisciplinary centre of Energy Planning (NIPE) at Unicamp, targeting a **joint 3 MEUR/yr** academic program

Agreement providing great facilities & staff:

- Academic support staff for event organization, communication, financial and contract management
- Academic research staff in (bio)energy & sustainability field
- equipped office space for local & TU Delft & BE-Basic staff, e.g. location manager and visitors

Key agreements in place

- **FAPESP**: BIOEN, LACAF program (since 2010)
  - MoU signed in 2010, budget **US$ 8 mio**
  - MoU will be extended (2017) and budget increased
- **CTBE** - Brazilian Bioethanol Laboratory
  - MoU signed in 2011, 2 PDEng projects completed
- **Unicamp** - University of Campinas
  - MoU signed in 2012, extended activity plan, office 2013
- **FIESP** – Federation of Industries of SP State
  - MoU signed in 2012
- More MoU's planned (e.g. USP / ESALQ)

Stimulating collaborative research projects

- New proposals submitted to NWO & CNPq call (Sept) and NWO & FAPESP call (May)
- Third BE-Basic & FAPESP BIOEN call expected soon, with proposals on e.g. remote sensing and downstream processing
- Roadmap for Biochemicals in Brazil, a research – industry collaboration
- BE-Basic call 4: with proposals on sustainability of total production chains and international education program
- current BE-Basic projects – links to Brazil?

Stimulating new proposals - workshops

- **Workshop "upstream challenges"**
  - 16-18 September 2013,
  - hosted by IAC, Campinas
  - Feedstocks, soil, nutrients, monitoring, logistics, sustainability, round table with mills

- **Workshop "downstream challenges"**
  - 6-7 November 2013
  - Hosted by CTBE, Campinas
  - Pretreatment, hydrolysis, fermentation, bio- and chemical conversions, coproduction, production chains

Joint education program on BBE topics

- Kick off “Beyond Bioethanol” @ FEQ-UNICAMP

VN-Basic Planning Workshop Hanoi 3-4 october 2013

INVITATION TO JOIN AN INTERNATIONAL WORKSHOP

TO BE HELD IN HANOI, VIETNAM ON OCTOBER 3-4, 2013

"FORMAL KICK-OFF MEETING FOR VN-BASIC, A SCIENCE AND INNOVATION COLLABORATION FOCUSSED ON DEVELOPMENTS AND IMPLEMENTATION OF BIOBASED ECONOMY"

Venue: Vietnam Academy of Science & technology, 18 Hoang Quoc Viet, Hanoi, Vietnam

CWD Hotel, 20 Thuy Khue – Tay Ho, Hanoi, Tel: + 84-4-7280280; E-mail: cwd@fmail.vnn.vn

CO-ORGANIZED BY THE VIETNAMESE ACADEMY OF SCIENCE & TECHNOLOGY AND THE DUTCH BE-BASIC CONSORTIUM

For information on the program contact: in Vietnam: Prof. Dr. Dang Thi Cam Ha: Tel: + 84 4 3836 0892 E-mail: dangcha80@yahoo.com; or contact: in The Netherlands: Prof. Dr. Bram Brouwer:Tel: +31-20-4350750; E-mail: Bram.Brouwer@BDS.nl

For registration, or further information on the kick off meeting and practical matters please contact: Jenny Vreeken, General Secretary of VN-Basic T:+31-20-4350750; Jenny.Vreeken@BDS.nl

VN-BASIC – Anticipated outcome

Detailed collaborative workplan for each project, including who is doing what, which site visits, which personnel exchanges, training activities

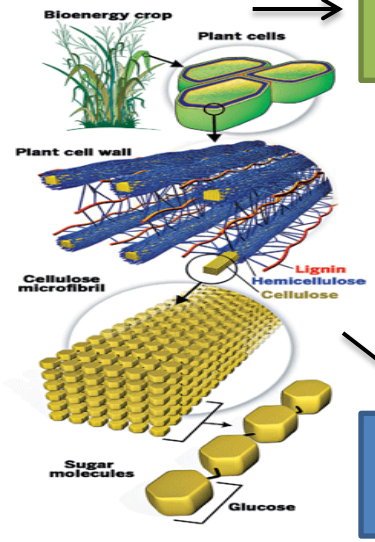
Ambition of VN-Basic program

Ambition is to setup and execute a joint 4 million Euro collaborative Science and Innovation program between VAST-Vietnam and BE Basic Foundation of The Netherlands

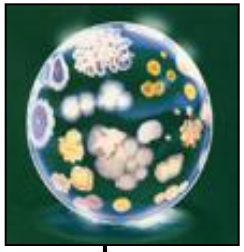
- Aims Vietnam:
  - Setup a BBE Science & Innovation program
  - Building up a BBE technological infrastructure
  - Training & building up human resource capacity in BBE
  - Full industrial implementation of BBE

- Aims Netherlands:
  - Enlarging the discovery pipeline of novel bioactive compounds
  - Discovery of novel enzymes for bioconversion & bioremediation
  - Foster the availability of biomass and intermediairy products for biofuesl and chemical building blocks

VN-BASIC focus on biomass conversion and on Nature Mining



Isolate Microorganisms



New antibiotics,

enzymes

Bioremediation, soil quality & safety

Pretreatment/ fermentation

Sugars

chemical building blocks & biofuels

Project I

Project II

Project III

BE-Basic

If you are interested in collaboration please contact us

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