

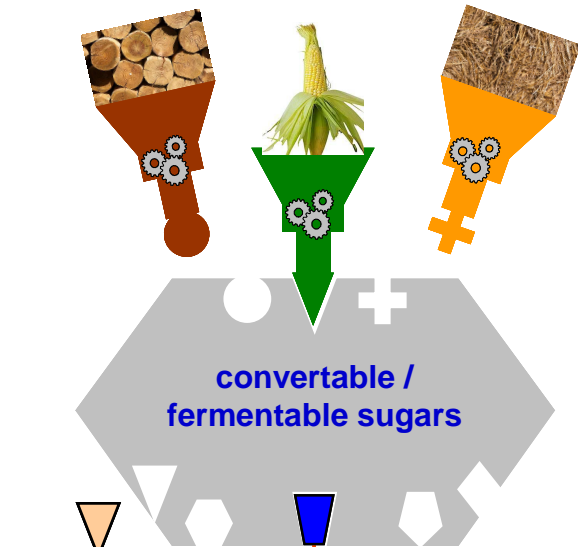
# The Modular Biorefinery System

## Microbial platforms for bioconversion of renewables and production of organic building blocks

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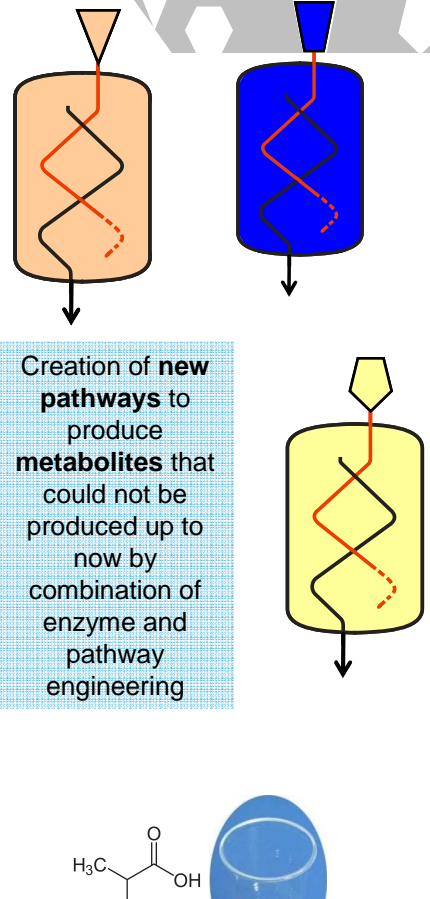


supply of various feedstocks  
milling, grinding  
cracking  
hydrolysis  
fractionation into different convertible sugars

### Pretreatment Modules

glucose, fructose,  
xylose, arabinose,  
lactose

### Substrate Platform



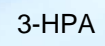
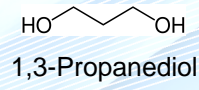
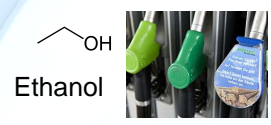
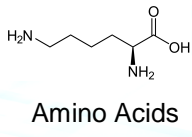
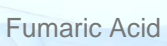
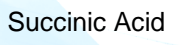
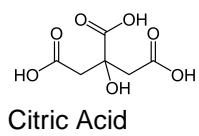
Enzyme and pathway engineering to broaden the substrate range of current production organisms

### Fermentation Process Modules

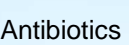
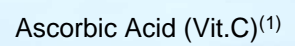
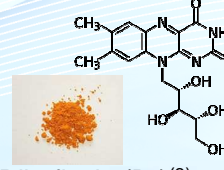
Creation of new pathways to produce metabolites that could not be produced up to now by combination of enzyme and pathway engineering

**Analysis Tools**  
Metabolomics and fluxomics will allow the construction of **Models**.  
These allow the optimization of metabolic pathways in desired host organisms

A **systems biology** description of stress will allow **cell engineering** to increase productivity<sup>(1)</sup>  
e.g. processes at very low pH, production of toxic compounds  
Global transcription regulation could be a means for the alleviation of stress



### Building Blocks Platform



(1) Branduardi P, Fossati T, Sauer M, Pagani R, Mattanovich D and Porro D; PLoS One. 2007, 2(10):e1  
(2) Valli M, Sauer M, Branduardi P, Borth N, Porro D and Mattanovich D; Appl Environ Microbiol. 2006, 72(8): 5492-5498