

Abstract

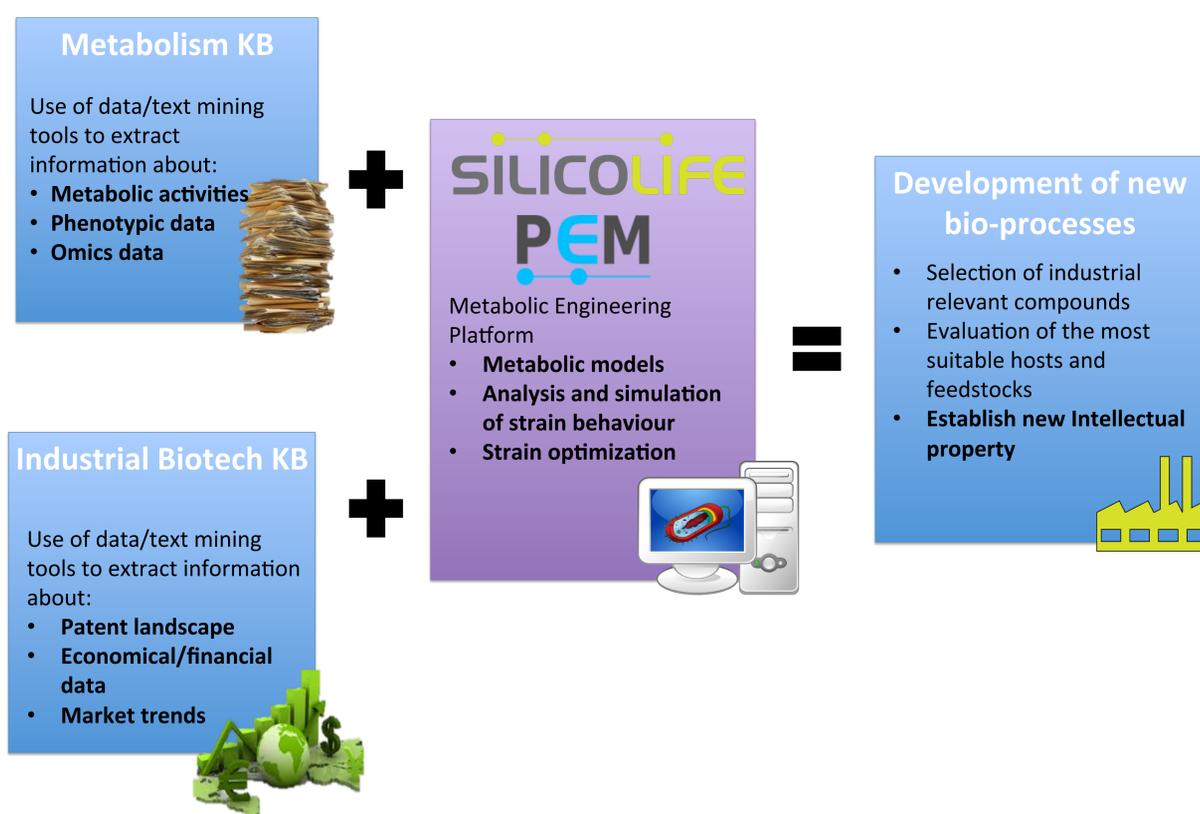
The recent advances in the field of Metabolic Engineering, regarding the optimization of microbes as cell factories, capable of producing compounds of high economic interest, have made this field one of the main providers of solutions for some of the main challenges faced by Industrial Biotechnology. Among other important contributions, some can be highlighted including strain optimization through the determination of suitable genetic changes, the optimization of culture medium conditions, the selection of suitable host microbes or the search for the most adequate pathways for the production of specific compounds through the insertion of heterologous pathways.

SISBI is a new 3-year project lead by SilicoLife, in collaboration the Centre of Biological Engineering from University of Minho, seeking the development of an intelligent decision support system for Industrial Biotechnology. This system promotes the development of innovative tools for the extraction and integration of knowledge, to provide an adequate support to reach important decisions in the context of Industrial Biotechnology, as it is the case of the selection of added value compounds, of adequate host microorganisms or of advantageous raw materials to be used in target bioprocesses.

SISBI will result in a knowledge hub including a set of knowledge extraction and integration modules, which will take into account diverse sources of available technical and economical data, boosted by powerful data and text mining tools capable of extracting knowledge from this raw information, useful knowledge for decision making.

Business Intelligence for Industrial Biotechnology

Overview and main results



Software ecosystem

Existing open-source tools



@Note is a Biomedical Text Mining platform that copes with major Information Retrieval and Information Extraction tasks and promotes multi-disciplinary research.
www.anote-project.org



OptFlux is an open-source software to support *in silico* metabolic engineering tasks aimed at being the reference computational application in the field.
www.optflux.org



Merlin is a user-friendly application that performs the reconstruction of genome-scale metabolic models for any organism that has its genome sequenced.
www.merlin-sysbio.org

New tools in development

- Integrated metabolic data staging area
- Phenotypic data knowledge base
- Omics data repository
- Patent analysis pipeline
- Extraction and analysis of market data
- Market trend analysis
- Tool for selection of industrial relevant compounds
- Tool for selection of the most suitable organisms and feedstocks

Pipeline for the design of new industrial biotechnology applications

Future work and impact

- ▶ This project (2016-2018) will develop a new intelligent system to support the decision process in the industrial biotechnology context, the system will exploit the *in silico* metabolic engineering capabilities from both partners combining it with innovative extraction and knowledge integration methods to rationally define added value target compounds, most suitable hosts and evaluate different feedstock alternatives.
- ▶ The system will allow the monitoring of markets with opportunities for industrial biotechnology applications and the integrated analysis of yield and profitability using scientific information with market data to better exploit opportunities and design economical valuable strategies for the development of new bio-processes.
- ▶ The rational design of cell factories using a systems biology is an approach that has been contributing to accelerate the development of new bioprocesses, SISBI will contribute to expand the same rational approach into the overall industrial biotechnology development pipeline from product idea to process.

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