



# Using big "bio-data" to design better cell factories

The EU has granted 6.3 million Euros to the project DD-DeCaF, coordinated by the Novo Nordisk Foundation Center for Biosustainability. The objective is to develop a computer tool that will allow biotech companies to design and engineer cell factories faster than is currently possible today. The tool will accelerate the production of sustainable bio-chemicals and lay the groundwork for design of healthier foodstuff.

Today, many valuable molecules used in consumer goods, for example plastic diapers, cosmetics and food can be produced by cell factories – genetically engineered microbes such as baker's yeast and *Escherichia coli*. But engineering microbes to produce large amounts of a given bio-chemical is very complicated, time consuming and expensive.

So called "omics" data – genomics, transcriptomics, proteomics, metabolomics, fluxomics – allow life scientists to inventory a cell's molecular components and therefore enables a data-driven approach to biology and bioengineering. Unfortunately, biotech industry has not yet been equipped with tools that would allow them to make effective use of this data. The scope of the DD-DeCaF project is therefore to develop an easy to use web application that collects all this data and enables engineers to integrate it with computational models of biological pathways.

"The biotech industry is in great need of a computational design tool that allows them to simulate how a cell will behave if you engineer it in a certain way – just as engineers design and test buildings before they build them" says project coordinator of DD-DeCaF, Professor Markus Herrgard from the Novo Nordisk Foundation Center for Biosustainability (DTU Biosustain) at the Technical University of Denmark.

The web platform will have an intuitive and user friendly interface that will enable exploratory data analysis through interactive and interconnected visualizations reducing the costs of developing cell factories and making them able to compete with currently used unsustainable petrochemical processes.

The DD-DeCaF project is a collaboration between the Technical University of Denmark, Chalmers University (Sweden), European Molecular Biology Laboratory, University of Minho (Portugal), Ecole Polytechnique Federale de Lausanne (Switzerland), SilicoLife Lda (Portugal), Genialis d.o.o. (Slovenia), Biobyte solutions GmbH (Germany), Biosyntia A/S (Denmark) and DSM N.V. (the Netherlands).

## The tool will be tested by the industry

Three small and medium sized bioinformatics companies – Biobyte (Germany), SilicoLife (Portugal) and Genialis (Slovenia) – will be involved in the development of the software tools and intuitive visualizations of biological networks that can be used by non-experts. Simultaneously, two industrial biotech partners – the DTU spin-off company Biosyntia and the Dutch multinational company DSM (>20,000 employees) – will utilize the tool in two real-world cell factory projects and thus continuously evaluate the tool's usability from two very different user perspectives.



#### DD-DeCaF can lead to healthier food

DD-DeCaF also aims at exploring interactions between cell communities and obtaining novel data about the interplay between microbes. For example, the human gut consists of many different cell types that interact and compete with each other.

If some cell types begin to dominate the gut, or if communities fight each other, this may lead to diseases. Being able to describe these cell interactions computationally, the industry will eventually be able to develop food and pharmaceutical compounds with beneficial implications on the gut.

### Facts about DD-DeCaf

- DD-DeCaF (Bioinformatics Services for Data-Driven Design of Cell Factories and Communities) brings together leading academic partners from five European universities with five innovative European companies to address the challenge of building a comprehensive design tool.
- The academic partners will develop cutting edge methods for using large scale data to design cell factories and communities for biotechnological applications.
- The project was launched 1<sup>st</sup> of March 2016 and runs over a 4-year period.
- The grant was given as part of a call from EU within the Horizon2020 program 'New Bioinformatics approaches in service of Biotechnology'.

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