

A new era in life sciences software

Life sciences industries still use outdated tools and methodologies to develop, optimise and operate their (bio)molecule production processes. Ypso-Facto proposes to take a fresh look at the needs and expectations of this sector.



Ypso-Proxima addresses (bio)molecule production processes in their entirety.

Digitalisation or digital transformation is ubiquitous in discussions, articles, conferences and white papers. There are so many promises from digital technologies that many companies are considering them a key focus for their business.

Although at different stages and paces, this evolution is underway and the main question for an organisation has shifted from "Should we go digital?" to "How do we go digital?"

Life science industries are no exception. They face major challenges such as molecule discovery or development of optimised and reliable manufacturing processes, both with increasingly stringent competition and regulatory frameworks. They could benefit

considerably from digitalisation, but therein lies the rub.

Although in constant evolution – in particular, to integrate more and more artificial intelligence and machine learning – molecule discoverers have been using dedicated software programs for years for retrosynthetic analyses or molecular modelling, for instance.

However, as far as manufacturing process development and optimisation is concerned, there is a huge gap between users' expectations and software offering.

Blockbusters versus specialist software

On one side of the software offer are the blockbusters coming from oil refining and commodities fields. These have been designed by engineers and programmers

(simulation experts) for their fellows, with process features such as well-known molecules and physicochemical properties, as well as stable production volumes with visibility.

But the life science industries are led by chemists or biochemists (molecule experts) and characterised by ever-changing novel structures (thus properties) and uncertainties on production volumes. The companies in these domains need agile software able to work with a minimal amount of data. The adoption of the 'blockbusters software' described above is therefore minimal in these industries.

On the other side, a myriad of specialised software applications (generally mutually exclusive) have been developed to address



➊ There is a real need for software solutions at the crossroad of all expertise involved in (bio) molecule production projects.

➋ dedicated and scattered issues like laboratory notes management, kinetic modelling, design of experiments (DoE), costing, scale-up or production scheduling. Nevertheless, it appears that these applications have a hard time in replacing personal home-made files and the systematic use of trial and error approaches. Why?

An indication may lie in the diversity of profiles actually hiding behind the molecule experts previously cited: it ranges across quality, sourcing, sales, management, plant operation, R&D, engineering and safety. And there comes another paradox: there is no software solution at the crossroad of all these skills while there could be huge benefits from a common smart and flexible platform to gather the whole process development, evaluation and operation project team.

In light of the current situation, it seems that life science and software companies not only have given up developing non-Excel based solutions (although this could overstep many limitations

like traceability and multiple entry requirements for example) but also have abandoned integrating scientific and rationale methodologies (including the possibilities offered by mechanistic modelling in connection with expertise and experiments).

Disruptive software required

Ypso-Facto believes that disruptive software applications are needed in this domain to bring together all the project stakeholders and streamline process development, while allowing the design and operation of smarter and more efficient processes in an unbiased manner.

These tools are increasingly needed. In the fine chemicals industry, process development is still time- and resource-consuming because it is mainly experiment-based with trial and error approaches, direct scale-up and use of tedious statistical methodologies. The automotive and aeronautical industries were at this stage decades ago but, today, cars and planes

are designed digitally. The fine chemicals industry cannot escape this evolution.

Ypso-Facto is convinced that the fine chemicals and biochemical industries will evolve towards more digitally designed processes associating experiments, user know-how and mechanistic modelling. It believes that smart and flexible process modelling and simulation are key to designing and optimising robust chemical and biochemical processes.

Ypso-Proxima

To this end, the company is developing Ypso-Proxima, a software suite to address processes in their entirety. This tool is designed to allow:

- proximity between all stakeholders, to share adequate information on technical aspects, economics, quality, HSE and more; and
- approximation with an approach starting with high level information and refining when and where needed to focus action plans on hard spots. The user can easily move from first guess estimates to highly sophisticated mechanistic modelling.

This is a revolutionary approach, providing the possibility for those with a mixture of expertise and skill to work together via a common tool and platform. With this software, Ypso-Facto's ambition is to usher the chemical and bio-chemical industries into a new era for the development and manufacturing of their products. ●

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