

System-Integration Platform, Simulation, LCA

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Objective

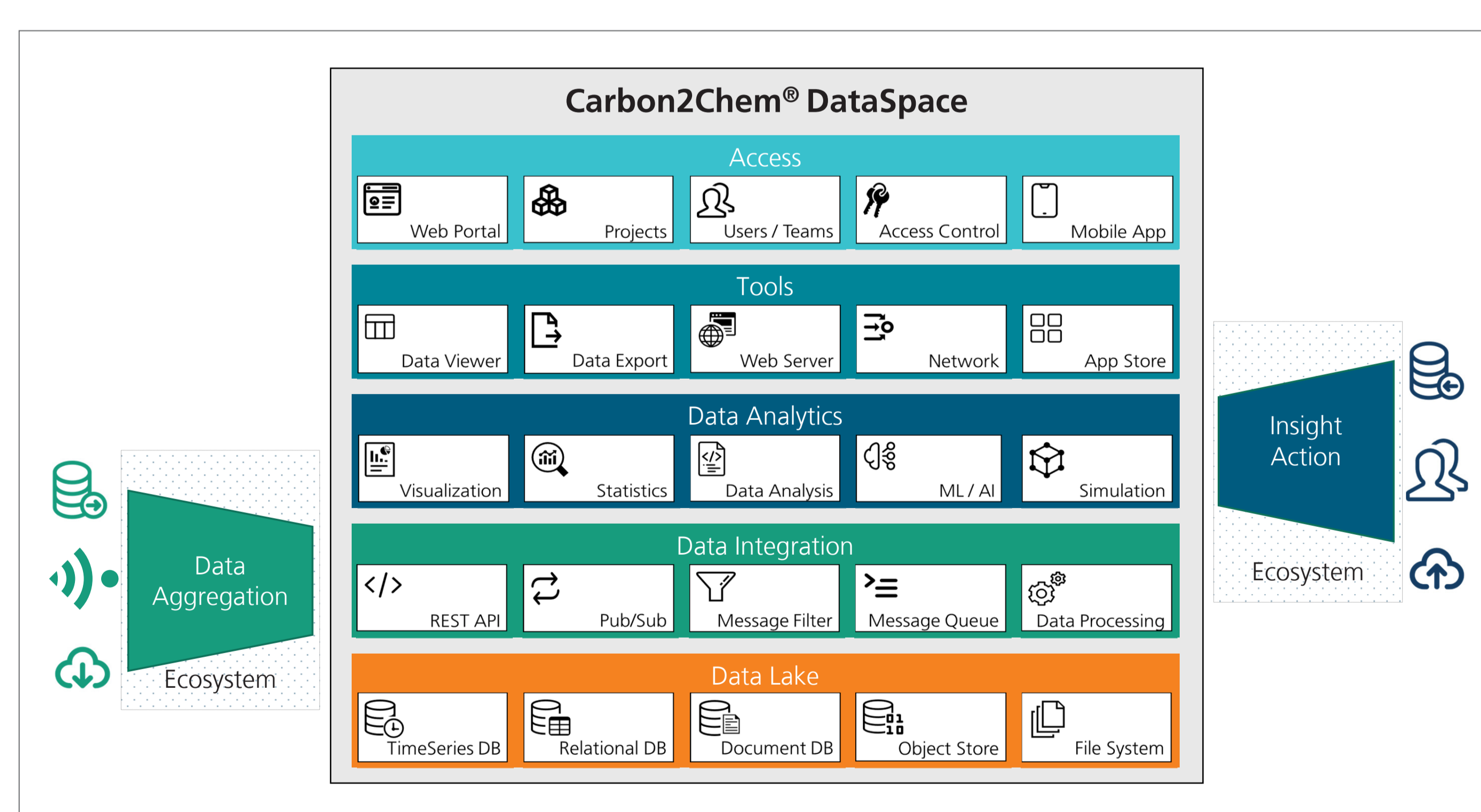
System-Integration covers various important aspects in the development of technical plant networks, such as the scaling of individual components and processes, the determination of optimum operating points or control strategies and operating modes. In particular, mathematical modelling and simulation, model-based optimization as well as life cycle assessment are used as important tools.

Key challenge

Process logistics and engineering

Process logistics simulation and optimization is a crucial basis for evaluating technical concepts against the background of defined scenarios. It is used to determine operating specifications and modes of operation for integrated concepts that fulfil the specified restrictions and framework conditions even in highly volatile educt and product markets. The time scales for these analyses range from several months to years. The resulting dynamics in plant operation, start-up and shut-down processes, behavior of storage systems and buffers in the overall system, etc. are examined iteratively, particularly in the critical areas, with the help of transient, process engineering simulations and evaluated with regard to their effects and feedback on the overall system.

The observation periods are in the range of minutes and hours. A consistent concept scenario combination determined on the basis of process engineering and process logistics is then evaluated ecologically and economically.



Layers and tools of the Carbon2Chem® DataSpace.

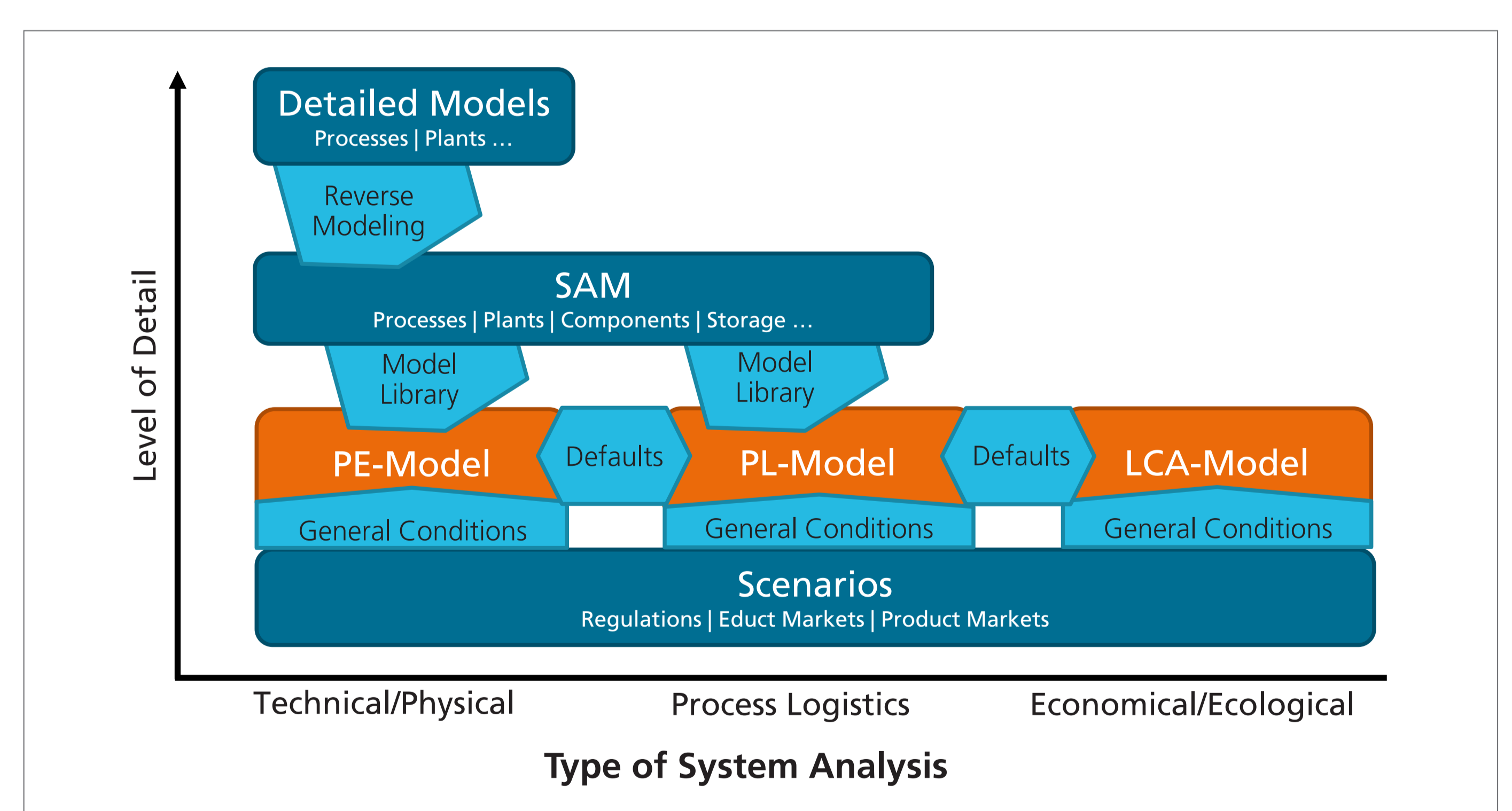
Conclusion

Ecological and economic analysis and evaluation

In order to assess the ecological and economic properties, the schedules of the calculated integrated concept are linked to the underlying framework conditions and scenarios.

A large number of relevant influencing variables such as the market situation of the educts and products, the development of CO₂ certificate prices, the price development and composition of electricity generation in the period under consideration, the investment and operating costs (CAPEX and OPEX) as well as the amount of bound CO₂ in the planned target product, etc. are taken into account.

This analysis is typically carried out analogously to the process logistics analysis on a time scale of several months to years, with direct feedback to the process logistics model by analyzing the sensitivities of different parameters. In this way, an optimal result is determined by iteratively analyzing the process logistics level, the process engineering level and the life cycle assessment level.



Overview of the levels of detail of the models used in the respective system considerations.

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