Challenges in training the Next Generation of Synthetic Chemists fit for the 21st Century

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The way synthetic chemistry is practised has changed substantially in the last decade: moving away from slow, labour-intensive manual methods, to highly automated, data-driven approaches. In R&D laboratories, high-throughput automated equipment is beginning to execute a large number of reactions in parallel, for screening multiple reaction parameters, such as to optimise reactions quickly. Similarly, there is a wider use of analytical tools, enabling larger-scale reactions to be carried out and monitored in a highly controlled and reproducible manner, in order to achieve best productivity and quality, while also being economically and environmentally sustainable.

In the past few years, the rise of Big Data has also started to influence the practice of synthetic chemistry: there is an increasing demand for chemists to collect high-quality large datasets, in order to extract reaction understanding and to validate Machine Learning algorithms, with the aim to make more accurate reaction predictions based on data, rather than trial-and-error.

In this presentation, a number of case studies will be provided to demonstrate and highlight the type of interdisciplinarity and data-centric skills that the synthetic chemists will be expected to have for the future.