RiFTMaP: Towards digitalization of the formulated products industries

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Formulated products are among the largest and most dynamic businesses in the U.K. manufacturing sector. They include products such as food, pharmaceuticals, agricultural and specialty chemicals, energy storage and energetic materials and consumer goods. They are structured, multiphase products (granules, tablets, emulsions, suspensions) whose performance characteristics (critical quality attributes) are just as dependent on the product structure as they are on the chemical composition. The products have complex performance designed in, e.g. the controlled released profile for a pharmaceutical tablet. The structure of the products allows for apparently incompatible critical quality attributes (CQAs) to be achieved, eg. a water dispersible herbicide granule that is strong to resist attrition and dust formation during handling, but disperses “instantaneously” to a stable dispersion when mixed with water on the farm.

Smart Manufacturing refers to the goal of using data, models, algorithms and computer control to optimize the whole supply chain producing manufactured products. All parts of manufacturing industry aims to use this information and technology to digitalize and improve responsiveness, efficiency and sustainability. Smart manufacturing capability is particularly needed in a number of process sectors producing formulated products. Consumer goods need to be very responsive to customer demand (in the same way as the food industry) so their manufacture must be quickly adjusted to product and volume changes which are very dependent on changing consumer demand. The pharmaceutical industry has historically had to be less responsive as healthcare requirements are more regular but there are many pressures on healthcare providers with drug purchasing budgets, often by national agencies, needing greater efficiency and less inventory.

The RiFTMaP project is a multi-University project which aims to develop a general risk-based framework for determining the optimal design and operation of pharmaceutical manufacturing processes using digital capabilities implementing advanced systems engineering algorithmic approaches and new measurement technologies. The framework incorporates a risk-based evaluation of different manufacturing routes to give inherently robust design for real time control and flexibility of operation. The outcomes from the application of the framework will be evaluated on the Diamond formulated products pilot plant at the University of Sheffield. The presentation will outline the objectives of the project which is in its early stages, the nature of the pilot plant, and the expected outcomes of the project.