



A People-Led Approach to Automation for a Sustainable Future

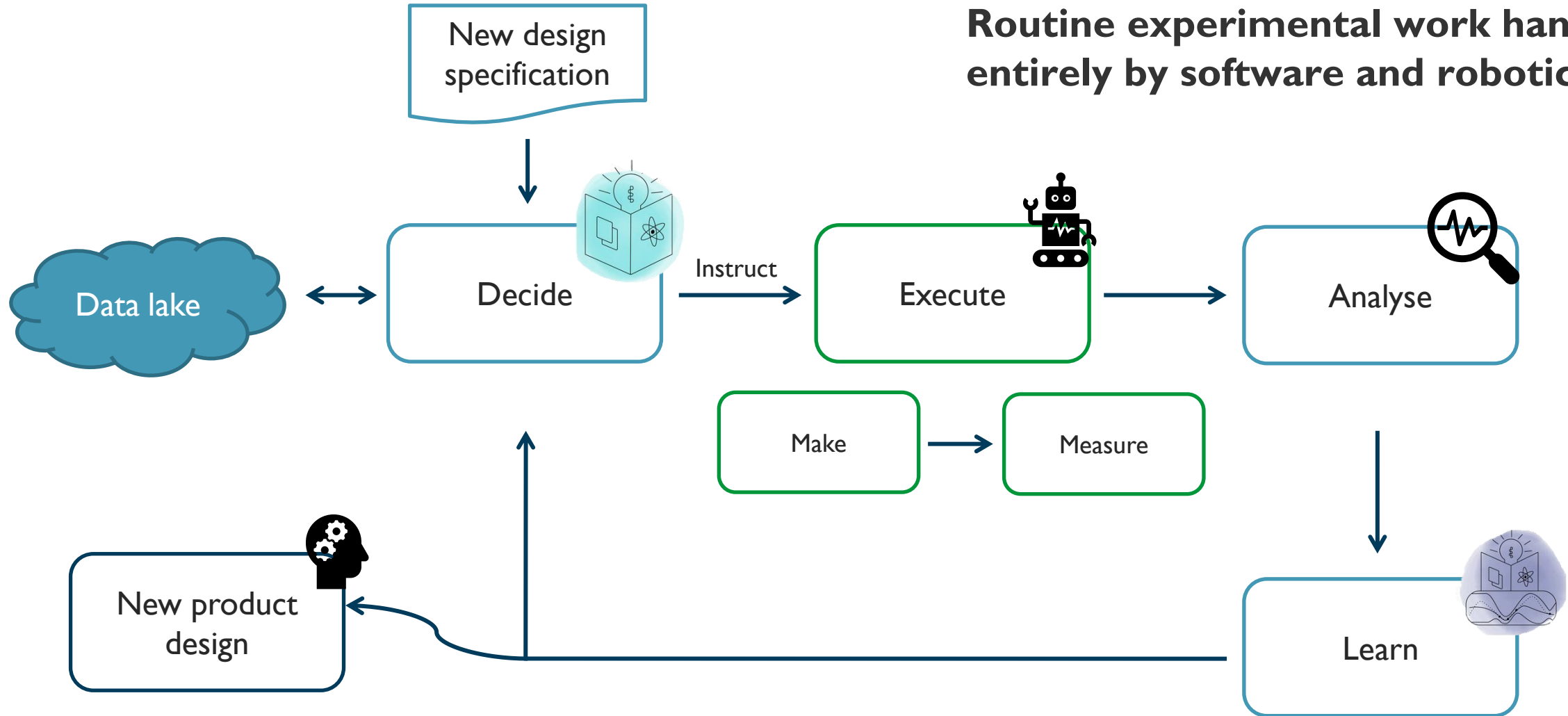
Jessi Godleman
Senior Automation Chemist



Closed Loop Design the 2030 Goal

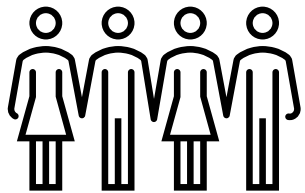


Routine experimental work handled entirely by software and robotics

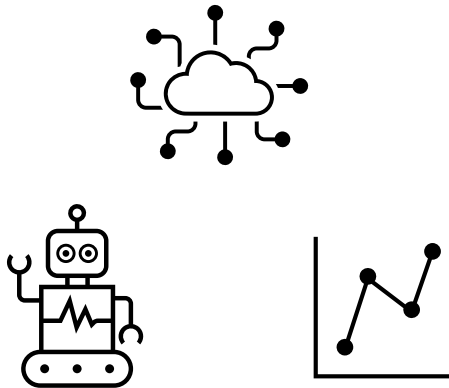


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We will invest to ensure we are oriented towards sustainable growth and contributing to a responsible society



People

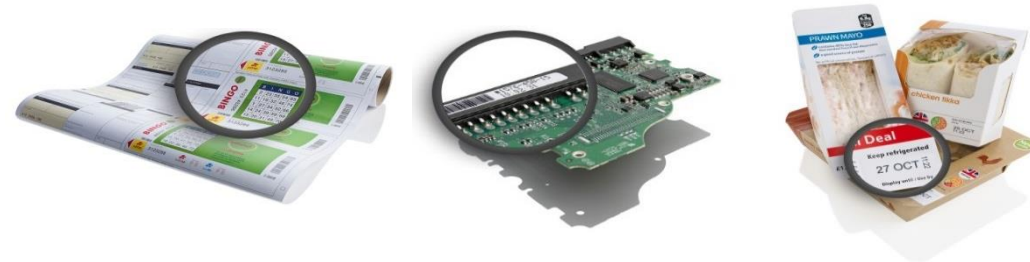
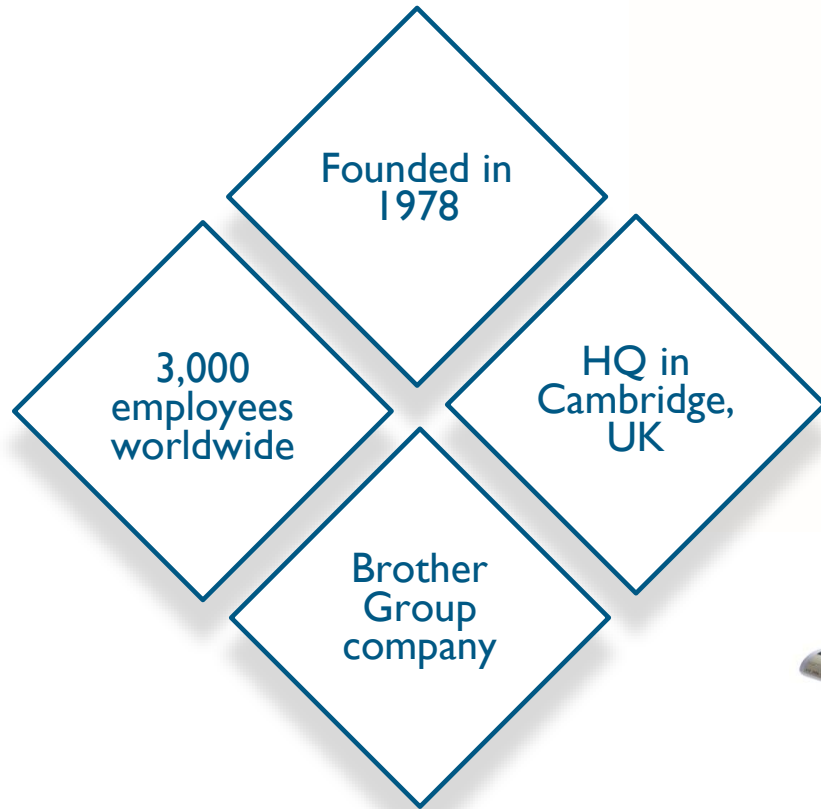


Tools



Sustainability

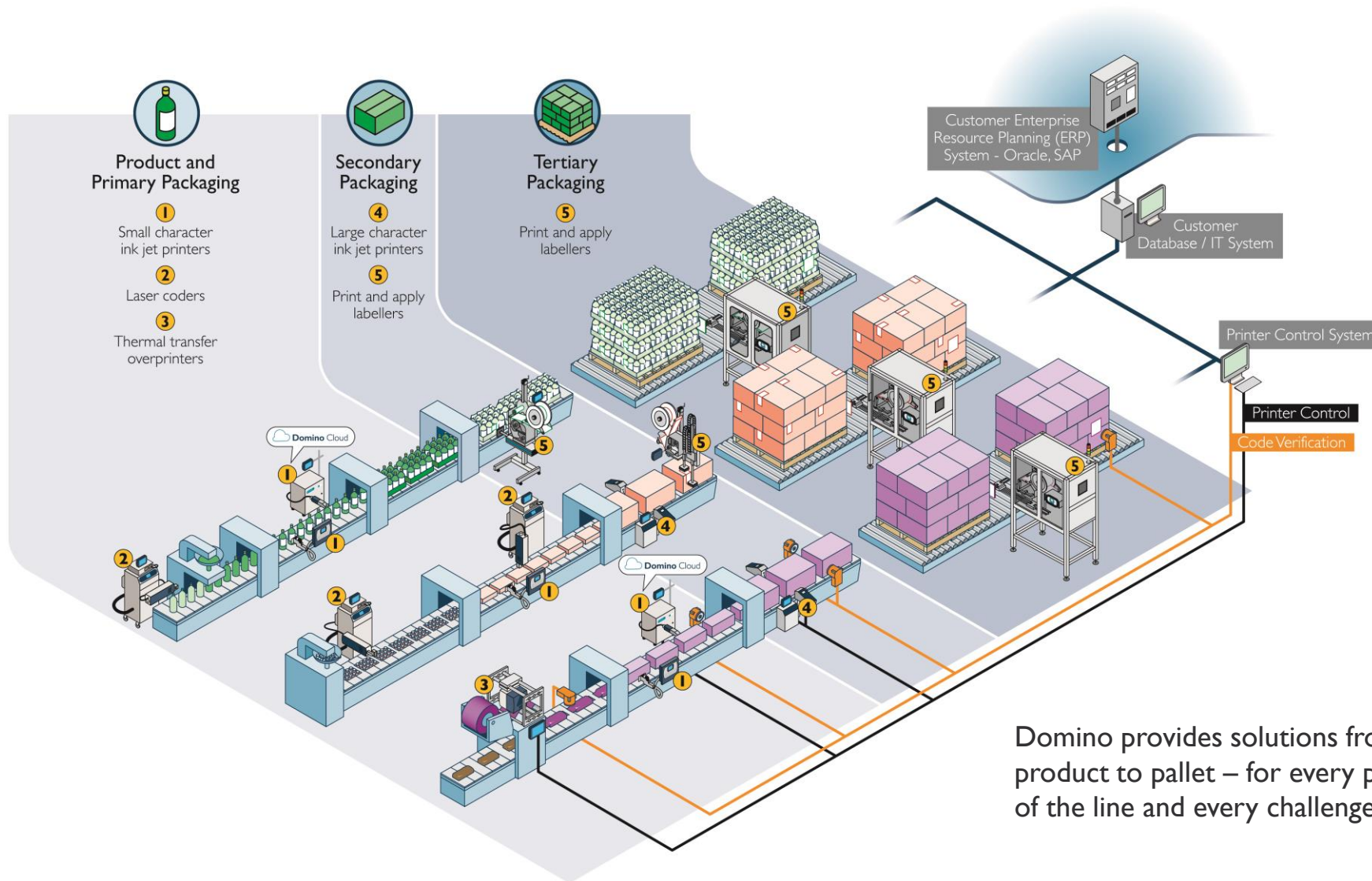
About Domino



- We provide very high-reliability industrial printing systems: printers, inks, consumables, aftermarket services
- Our solutions provide supply chains with robust and reliable information, decoration, and personalisation

Domino. Do more.

Product to Pallet Approach

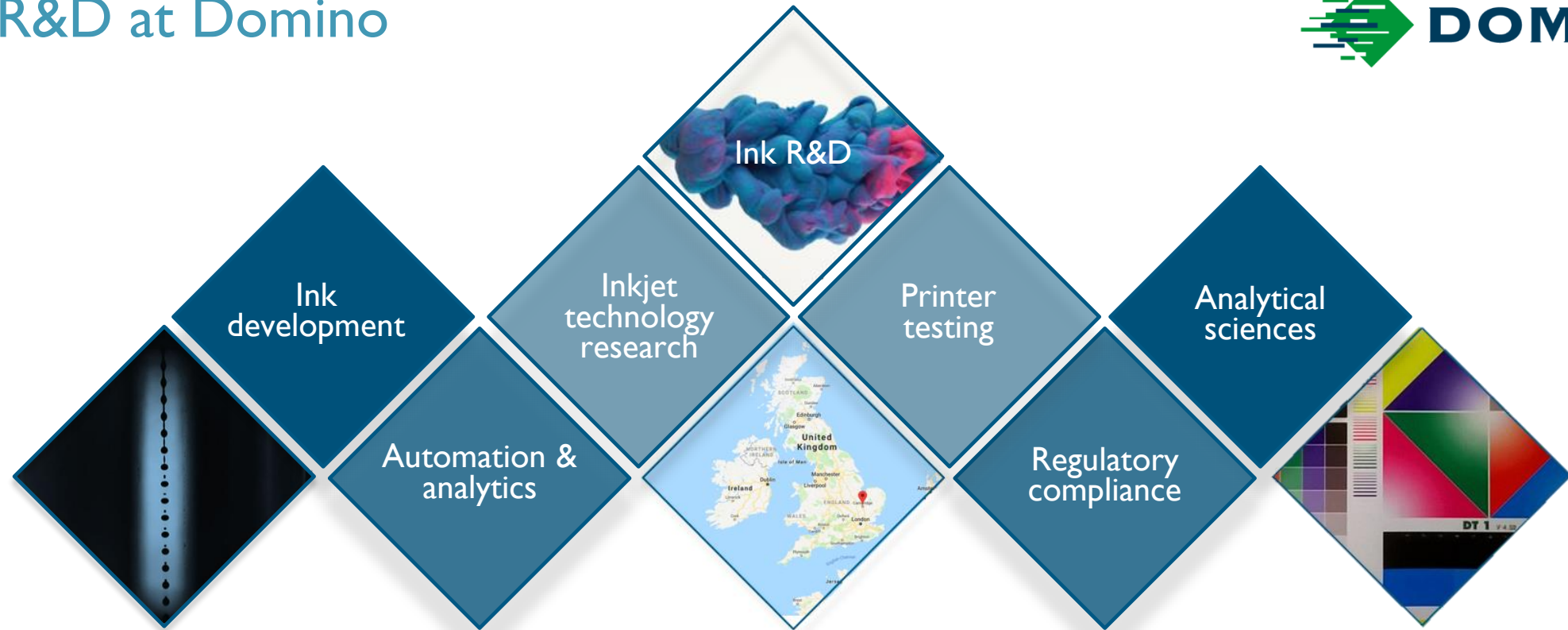


Domino provides solutions from product to pallet – for every part of the line and every challenge.

Key Sectors and Customers



Ink R&D at Domino

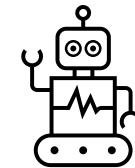


- Approximately 80 scientists and engineers
- Responsible for the development and testing of new ink designs
- A diverse and experienced team
- Located in Cambridge, UK
- Reducing the environmental impact of products
- Making existing inks safer for people
- Novel substrates or environments
- New customer applications

Key Challenges Ahead



- Changing environment:
 - Business model shift to outcome-based services
 - CSR at the forefront
 - IoT, automation and AI a global trend
 - Increasing STEM skills gap

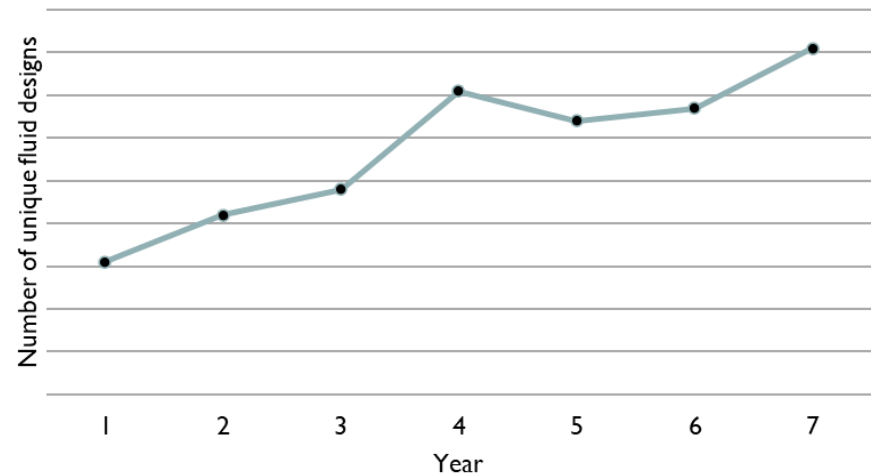


Key Challenges Ahead



- Increasing demand on Development
 - Increasing sustainability
 - Wider range of applications
 - Wider range of technologies
 - Greater pressure to maintain existing product lines
 - Supply chain
 - Regulation

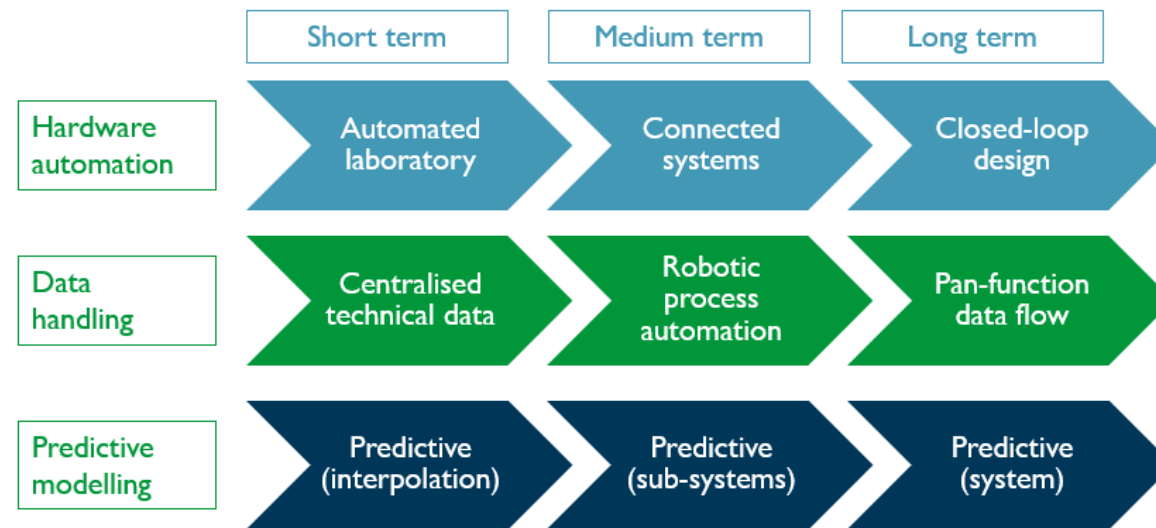
Increasing demand on Ink Development



Our Automation Goals



- Make best use of our people and **digital tools** to meet customer needs



- Increase **productivity** without compromising **quality** or scope
- Increase motivation, increase staff retention, and attract talent
- Challenge the research culture within R&D



Our Automation Goals



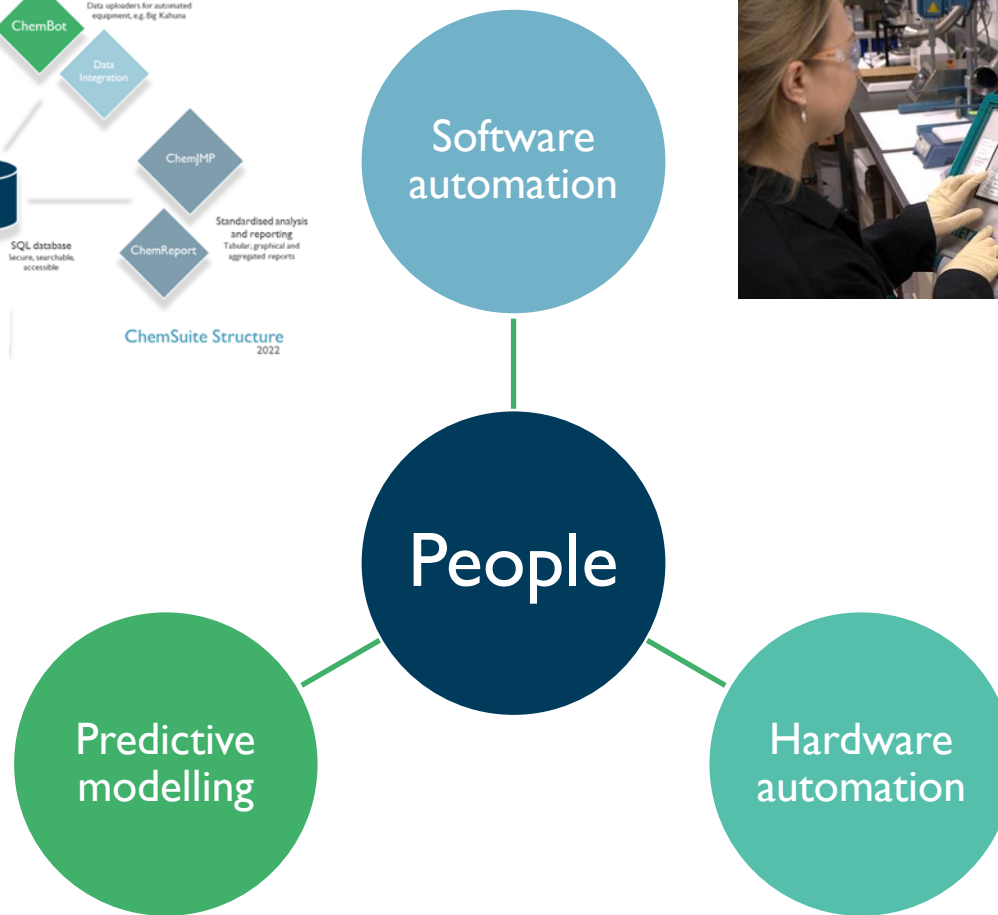
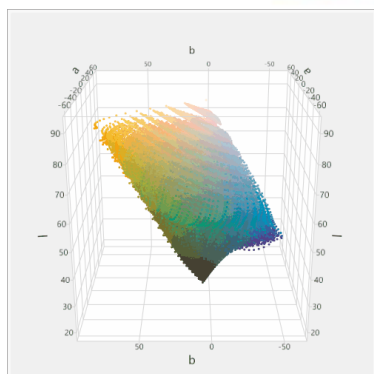
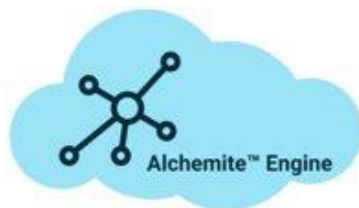
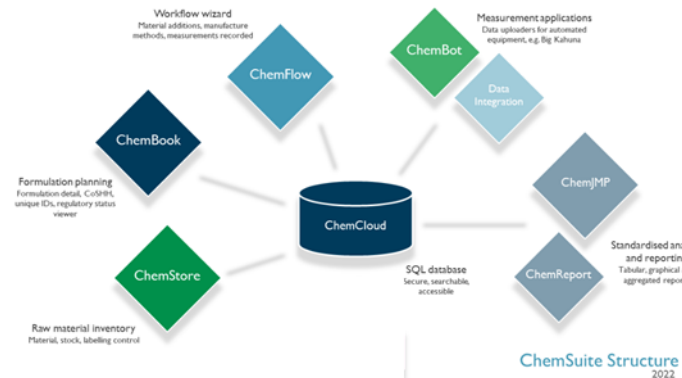
- Make best use **of our people** and digital tools to meet customer needs



- Increase productivity without compromising quality or scope
- Increase **motivation**, increase staff **retention**, and **attract** talent
- Challenge the research **culture** within R&D



Journey to a sustainable, automated R&D

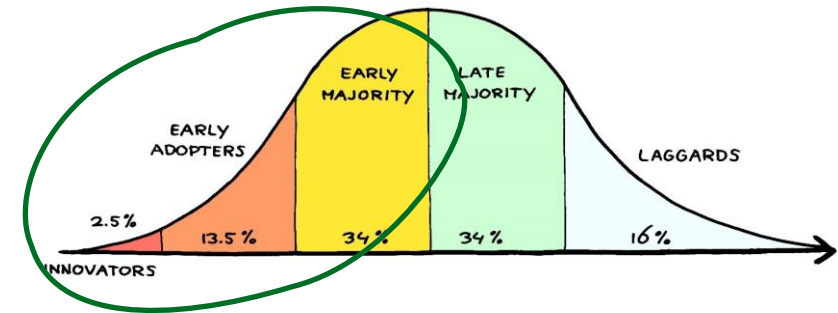


Adoption and Change Management



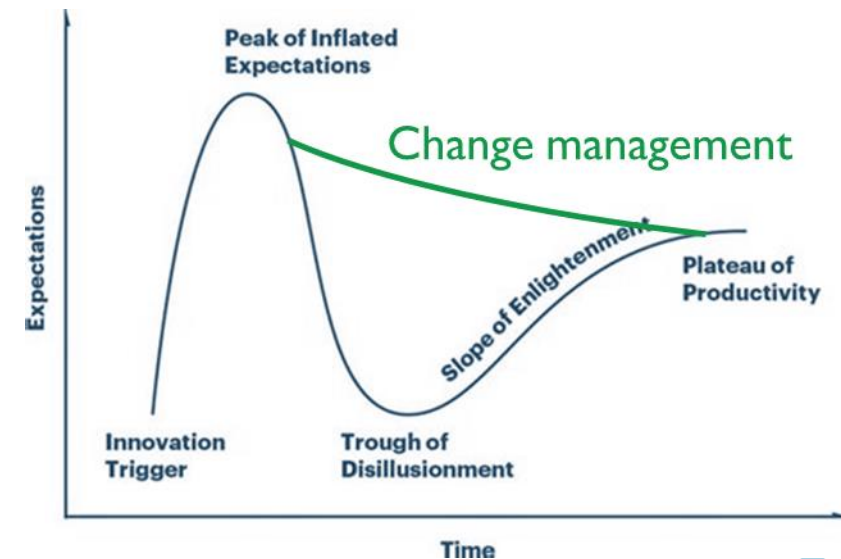
Getting people onboard

- Early adopters- enthusiastic drivers
- Laggards- equally important to consult



Keeping people on board

- Change management is vital to avoid the trough of disillusionment
- Streamlined process to success



Implementation successes



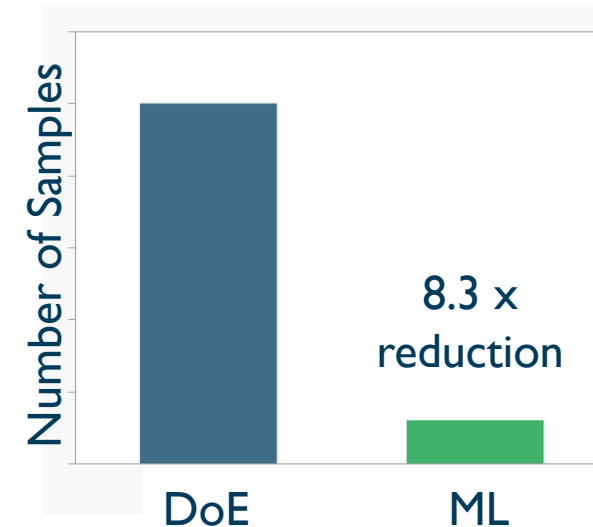
Automated formulation (Big Kahuna)

- Tripled annual formulation throughput
- Fully integrated with data systems
- Integral part of ink development
- Strong uptake



Machine Learning (Intellegens)

- Requires fewer samples
- Reduces amount of testing
- Faster way to optima
- Being used in increasing number of projects

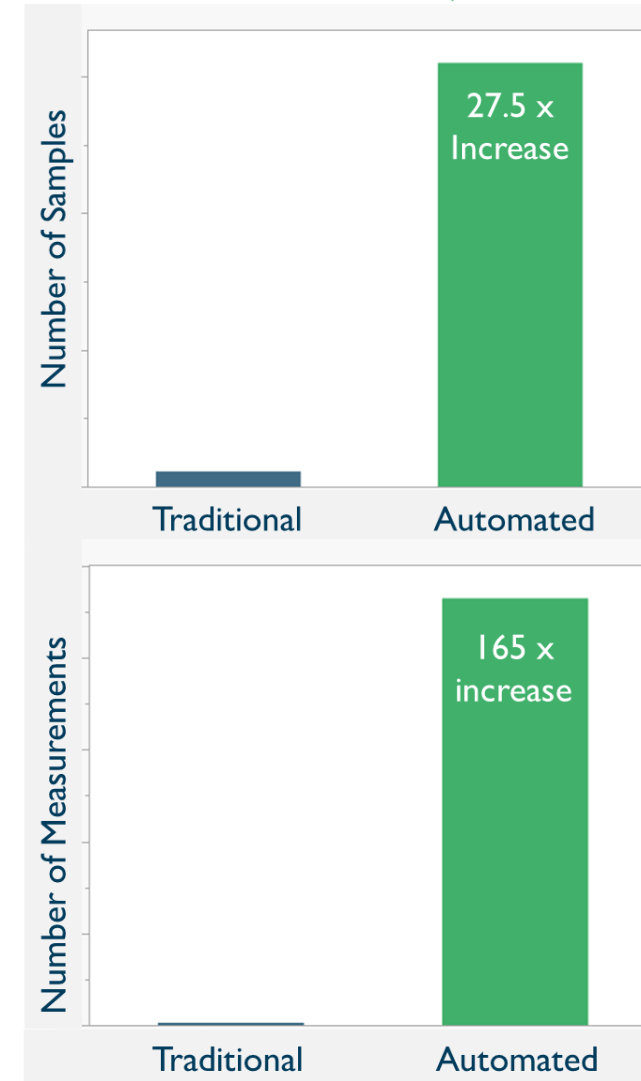


Implementation Successes



Automated Viscosity Measurements

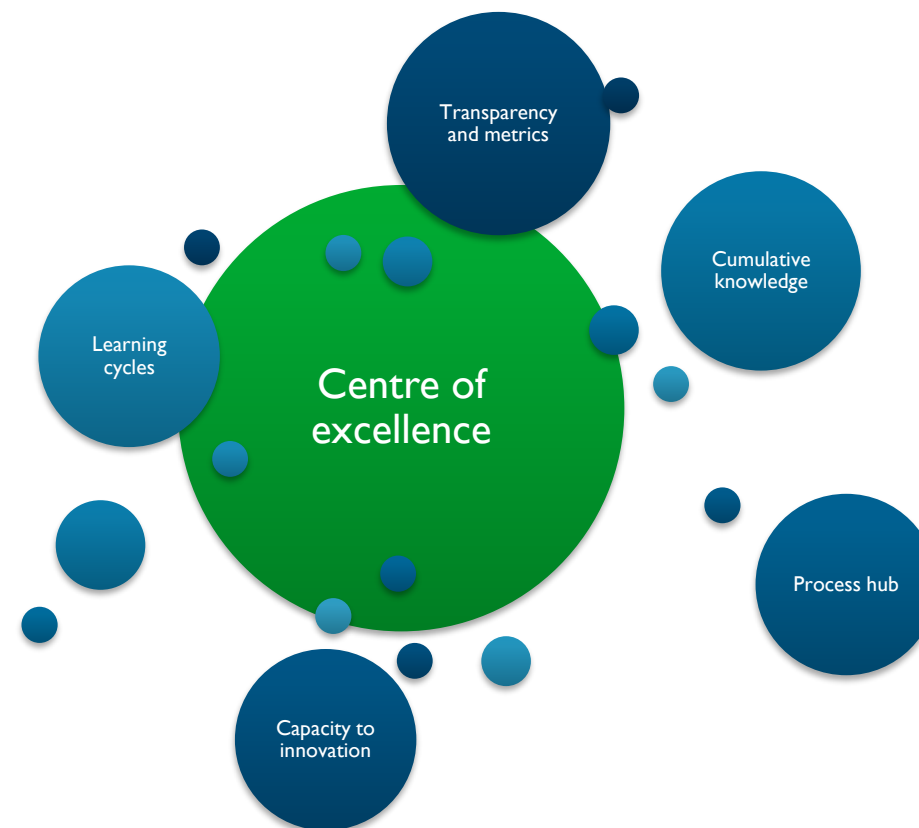
- Used as predominant viscosity method
- 27.5 x increase in samples measured
- 165 x increase in number of measurements made



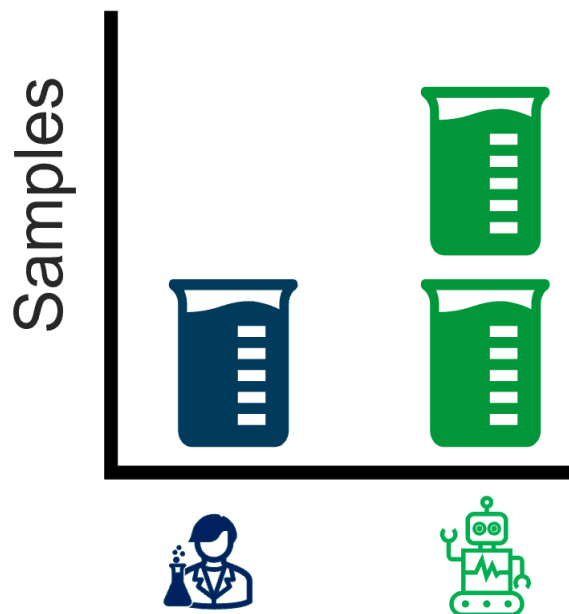
Compounding Outcomes



- Built a centre of excellence for development work
 - Knowledgeable team of cross-functional experts
- Enables rapid and common learning cycles
 - Advances in formulation expertise
 - Cementing the use of DoE and ML
 - Nexus for introducing new ways of working
- Excess capacity allows chemists time to innovate
 - More resource to tackle sustainability goals



Sustainability in Formulating



Increased number of formulations

- Formulation output tripled
- Wider formulation space explored
- Enables exploration of novel areas

Reduced Sample size

- 30 x reduction in size of formulation
- Raw material usage decreased
- Larger % sample used- less waste

Average Sample Size

30 : 1



Sustainable Inks and Printing



- CSR- large focus on improving sustainability of products
- Domino UK - associate members of RSPO
- Low-impact, vegetable oil-based inks for porous substrates
- Used with Cx350i-maximum quality, minimal ink
- Still lots more to achieve!



What next?

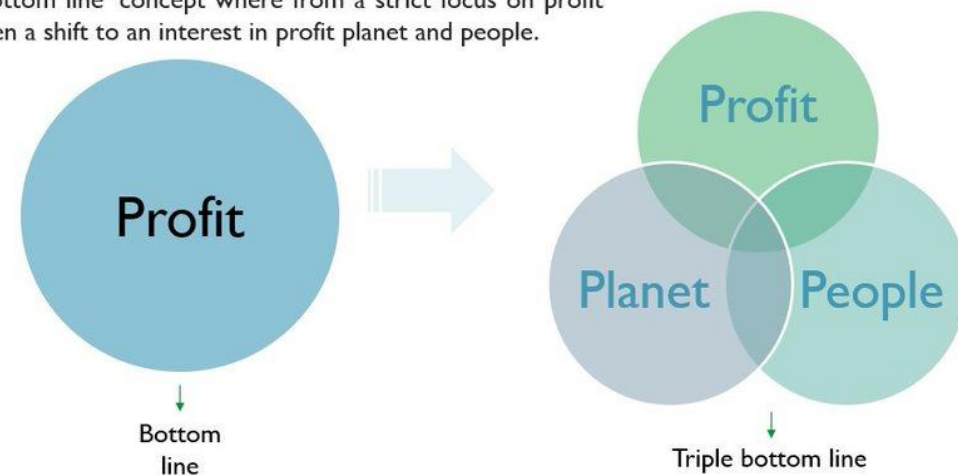


- Enhancing CSR and delivering services to customers
- Shifting focus from profit to sustainability
- Automation of time-consuming processes is key in providing chemist resource to complex new areas of design
- Collaboration- Accelerating adoption of AI to deliver net zero goals faster (Intellegens)

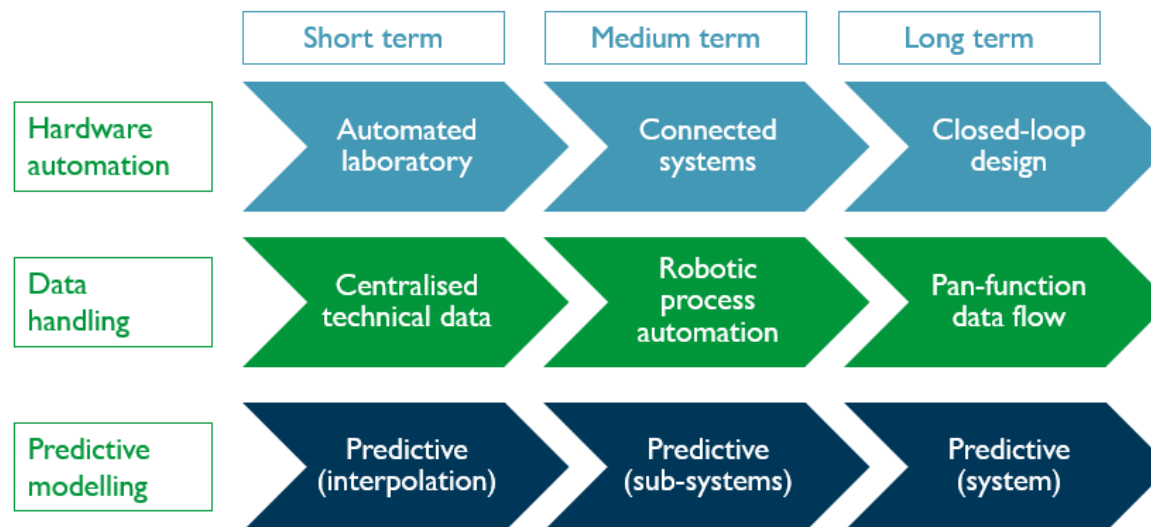
Triple Bottom Line

The triple bottom line focuses not just on profit but also on planet and people

Concept of sustainable development translated for corporations in the 'triple bottom line' concept where from a strict focus on profit there has been a shift to an interest in profit planet and people.



What next?



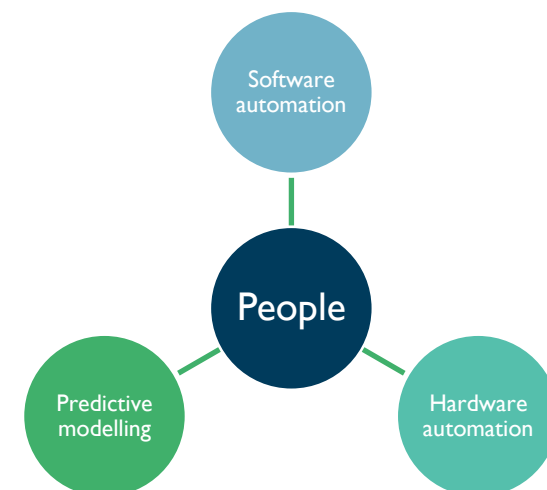
- Continue to target bottle necks and pain points
- Continue to upskill-taking people along with the automated journey
- Continue to engage- continuous feedback and consultation of stakeholders
- Free up chemist time to enable more creative, sustainable chemistry



Summary



- Automation of Ink development process has increased speed of development work and removed a large amount of manual, time-consuming tasks
- Hardware, software, data and ML advances are complimentary to one another and driven by stakeholders
- Uptake by the department has been very strong
 - People are engaged, empowered and included
- R&D function equipped with the right skills and tools to enable sustainable formulation and products





Questions?

Domino. Do more.

