Being in a band is always a compromise. Provided that the balance is good, what you lose in compromise, you gain by collaboration. *Mike Rutherford*

Good design begins with honesty, asks tough questions, comes from collaboration and from trusting your intuition. *Freeman Thomas*

It is the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed. *Charles Darwin*

Alone we can do so little; together we can do so much. *Helen Keller*

If everyone is moving forward together, then success takes care of itself. *Henry Ford*

Many ideas grow better when transplanted into another mind than the one where they sprang up. *Oliver Wendell Holmes*

Politeness is the poison of collaboration. *Edwin Land*

The secret is to gang up on the problem, rather than each other. *Thomas Stallkamp*
Established 2011, Industry demand led

Portfolio of Funded Programmes – shaping the innovation landscape
- EPSRC Future Manufacturing Research Hub (2017-2023)
- Training & studentships,
- Capital & infrastructure
- Basic, Applied and Translational Research Programmes

130 staff and rising: international talent

Pre-competitive=leverage Portfolio of confidential projects

Hub @ £100m Technology Innovation Centre @ Strathclyde

7 Tier 1s: GSK, AZ, Novartis, Bayer, Takeda, Lilly, Roche

16 Tier 2 technology companies
**Vision:** To deliver predictive design tools and novel integrated continuous processing platforms for the supply of next generation high performance personalised products.

**Academic Partners**
- University of Strathclyde, Glasgow
- University of Bath
- University of Cambridge
- The University of Sheffield
- Imperial College London
- University of Leeds
- Loughborough University

**Supporters / End Users**
- EPSRC
- GSK
- AstraZeneca
- Novartis
- Bayer
- Lilly
- Takeda
- Roche
CMAC: Predictive Process Design and Microfactory Ecosystem

- Develop using minimal material exploiting predictive modelling
- Control crystal attributes for enhanced manufacturability and performance
- Demonstrate simplified, integrated, flexible continuous process streams

WP1: Predictive Design / Development Pathways

WP2: Microfactories

WP3: Demand, Opportunity, Impact

Flexible, Modular, Integrated Platforms
Award Winning Facility for Continuous Manufacturing and Crystallisation Research

World Class Manufacturing Research Facility accelerating the adoption of continuous manufacturing

Unique expertise in continuous crystallisation, process development, formulation and product analysis

With continuous process skids for process development, state-of-the-art analysis and characterisation capabilities, comprehensive suite of PAT tools

For more information contact national-facility@cmac.ac.uk
CMAC and NPL
Pharmaceutical Innovation and Manufacturing
Metrologies Theme

- Advanced measurement supporting advanced process R&D and manufacturing
- Improved measurement of pharmaceutical particles
- Real-time analysis of large datasets (data compression, GPU, novel matrix inversion)
- Data & image fusion from multiple techniques
- Advanced multivariate methods—identification of small features (low s/n) in large data
- Data management infrastructure, data-traffic, storage, searching and automated workflows

Thematic areas
- Data science challenges
- Novel in situ process analytical tools
- Measurement of composition, dynamics and structure in formulated systems

MIT-CMAC

2nd International Symposium on Continuous Manufacturing of Pharmaceuticals
Implementation, Technology & Regulatory

September 26–27, 2016

- Community events in 2014, 2016
- Series of whitepapers output from 2014
- Regulatory whitepaper output from 2016
- Planning for an EU regulatory event 2017
I2APM
International Institute for Advanced Pharmaceutical Manufacturing

Advancing the science and technology of integrated primary and secondary continuous manufacturing of pharmaceutical products