



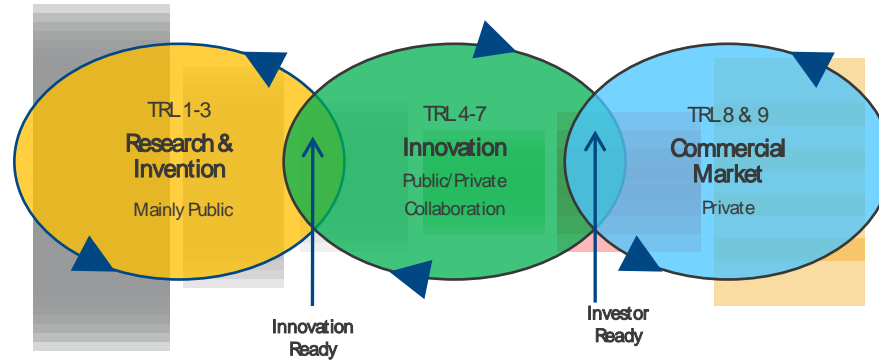
CATAPULT
High Value Manufacturing

CPI's National Formulation Centre - 1 Year On

Dr. Caroline Kelly & Dr. Dave Berry



UK FORMULATION INDUSTRIES CONNECTING THE ECOSYSTEM



EPSRC

Engineering and Physical Sciences
Research Council

**Future Formulation of
Complex Products 2015**



**National Formulation Centre
2015**

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**UK Formulation Industry &
Associated Supply Chain**



THE VISION FOR THE NATIONAL FORMULATION CENTRE IS TO CREATE...



New facility at
Netpark now open

An open access, not for profit, Innovation Centre
for
Advanced formulated product design and manufacture

Technical staff
with cross-sector
expertise

comprising

A central hub connected to spokes
of

Joining up the UK
Innovation System

World class cross-sector expertise, technology, equipment and skills
that

Enables companies of all sizes to accelerate high value products and processes to market

underpinned by

A step-change in design capability
built on

A deep mechanistic understanding of complex formulated systems

Creating new
research
infrastructure
for the UK

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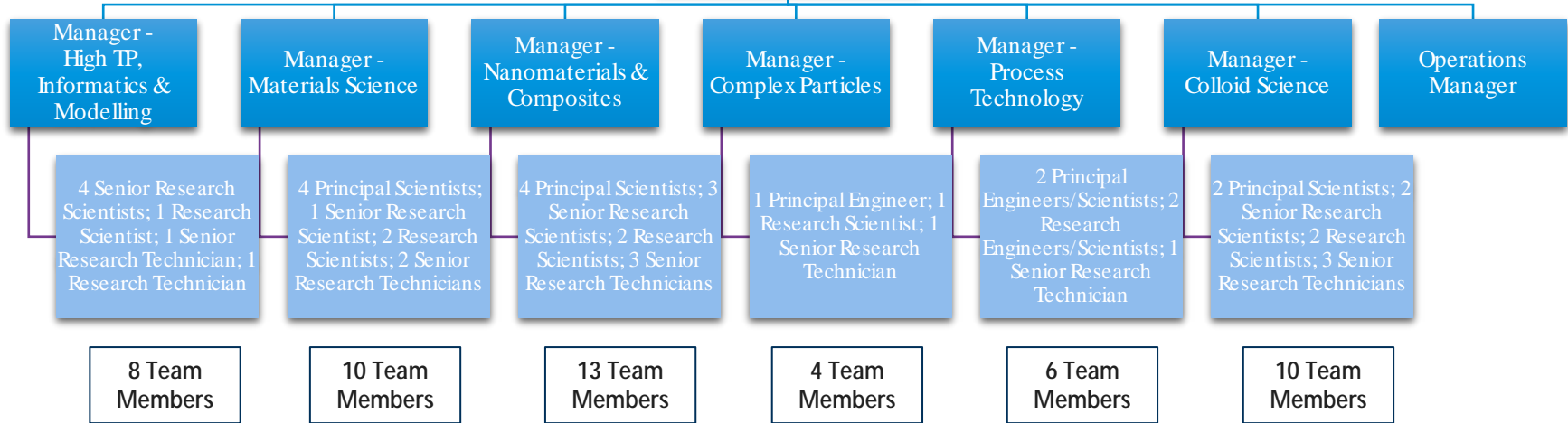


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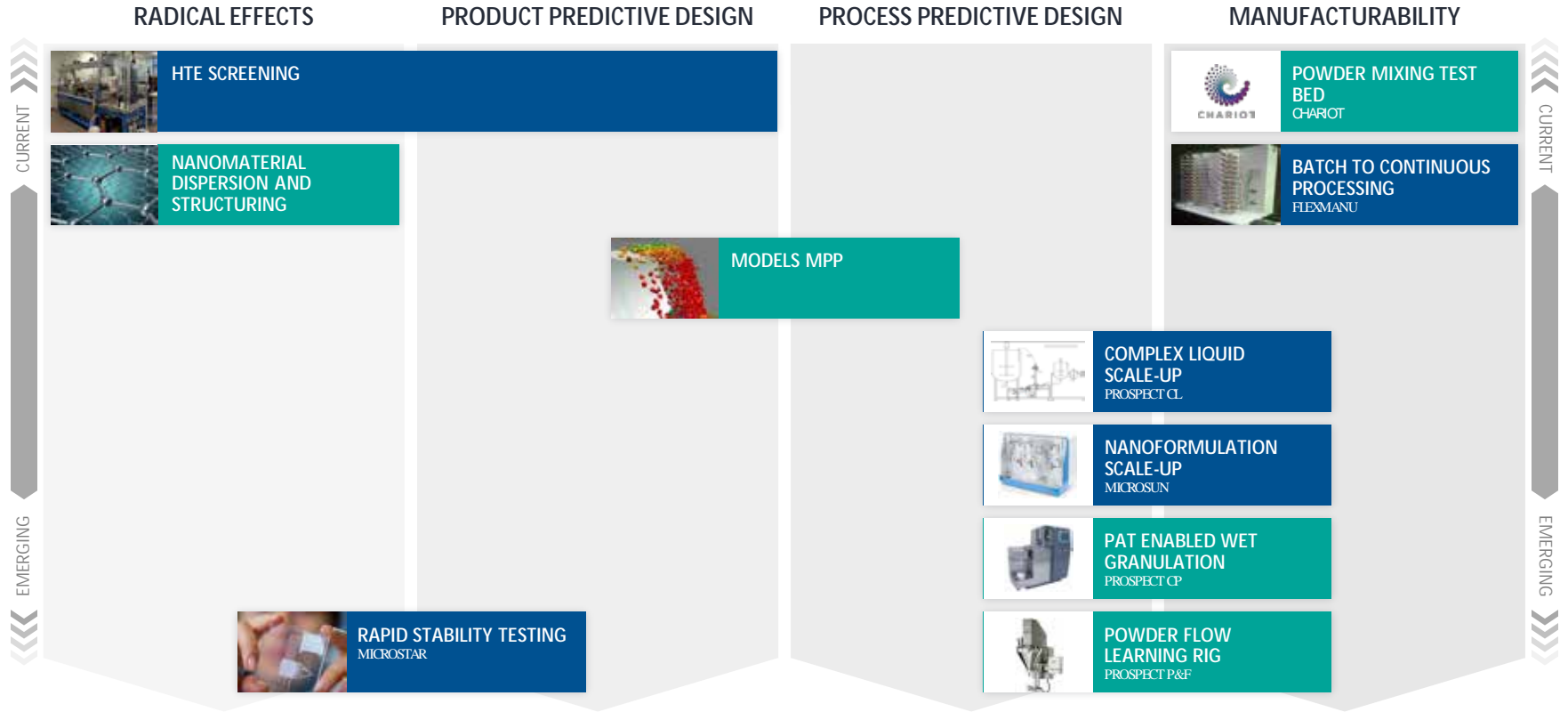


Head of Research



Joining up the UK Innovation System...

...Creating new research infrastructure for the UK



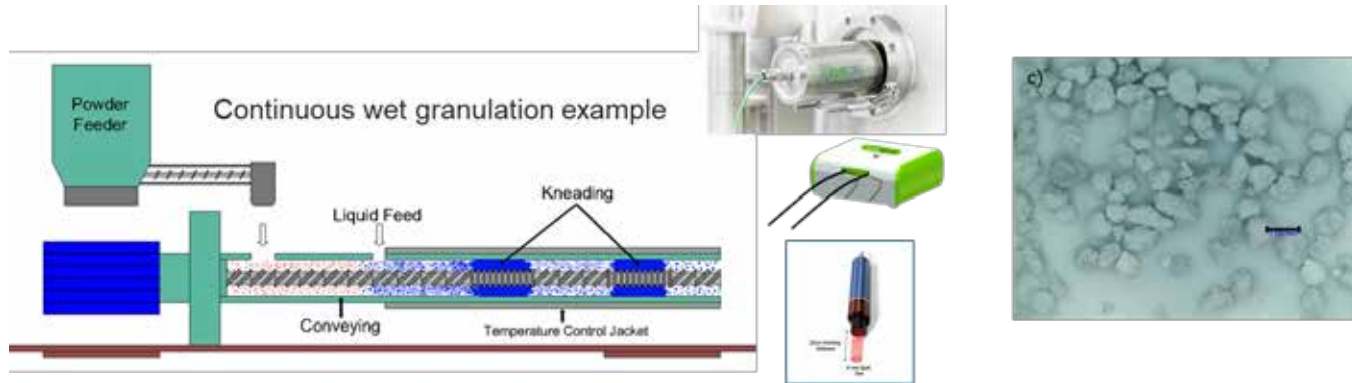
Complex powders facility overview

Dr. David Berry
Manager (Complex Particles team)

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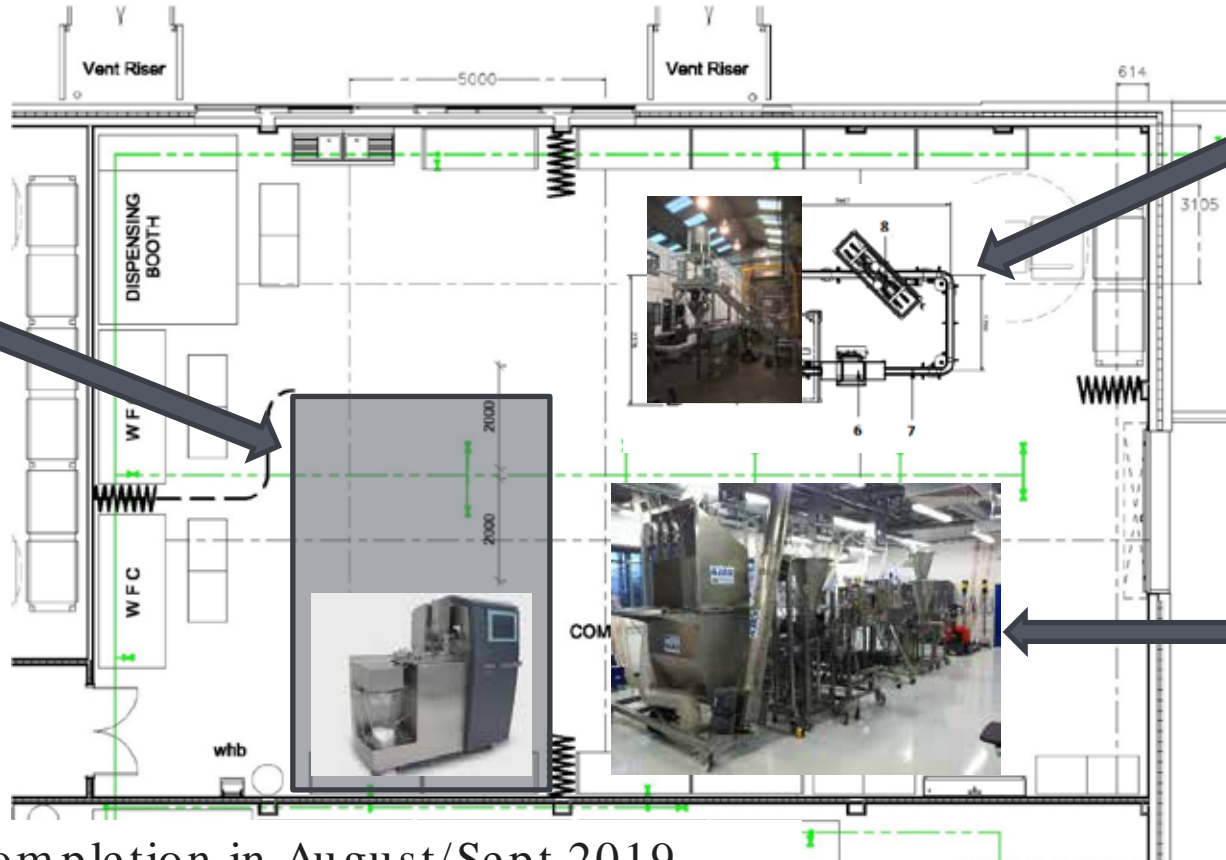
Complex Solids: Strategic vision for the facility



Creating and validating a national open-access development facility to support the development and registration of new products and processes

- PAT enabled process understanding to support ‘development for launch’
- Marrying data from multiple sensors to finished product attributes
- Facilitating the industrial implementation of innovative process analytics
- Data to inform commercial control strategies – real products, real-life situations

Complex Particles Facility



Prospect CP housed within a containment facility

We cannot work with bulk actives outside of this space

Prospect Pack and fill (PF) also involved in PAT sensor integration infrastructure within the lab with the ability to measure bulk powder flow/density etc.

Continuous twin screw mixer rig Ex. Chariot project

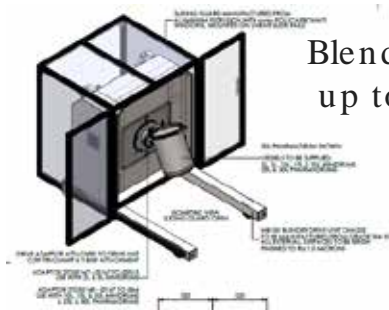
I haven't included more on this

Expecting completion in August/Sept 2019

Continuous granulation facility: What it does



- Enables fast definition of formulation processing parameters and control strategies for wet granulated products
- Granulation and processing of all powders (except highly explosive), including active pharmaceutical ingredients
- High degree of Process Analytical Tool integration to enable the application of Quality by Design (QbD) protocols and scale up learning through model based control systems



Blending of powders
up to the 5 kg scale



Continuous wet
granulation
10 g- 5 kg scale



Particle size
reduction
10 g- 5 kg scale

Physical PAT sensor integration for the ConsiGma



Prospect CP

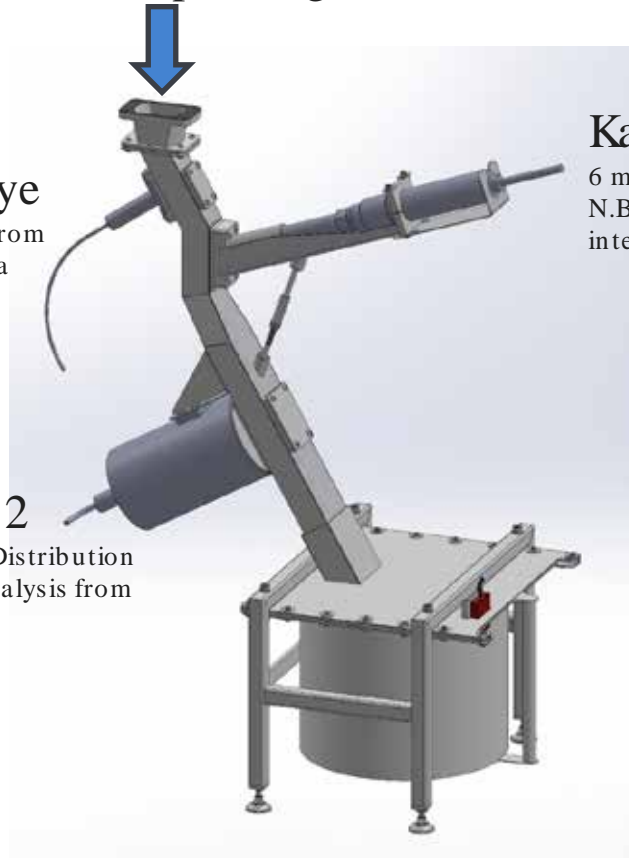
Connection to ConsiGma (replacing fluid bed drier)



Multieye
NIR probe from
Innopharma



Eyecon 2
Particle Size Distribution
and shape analysis from
Innopharma



Kaiser Phat Raman probe

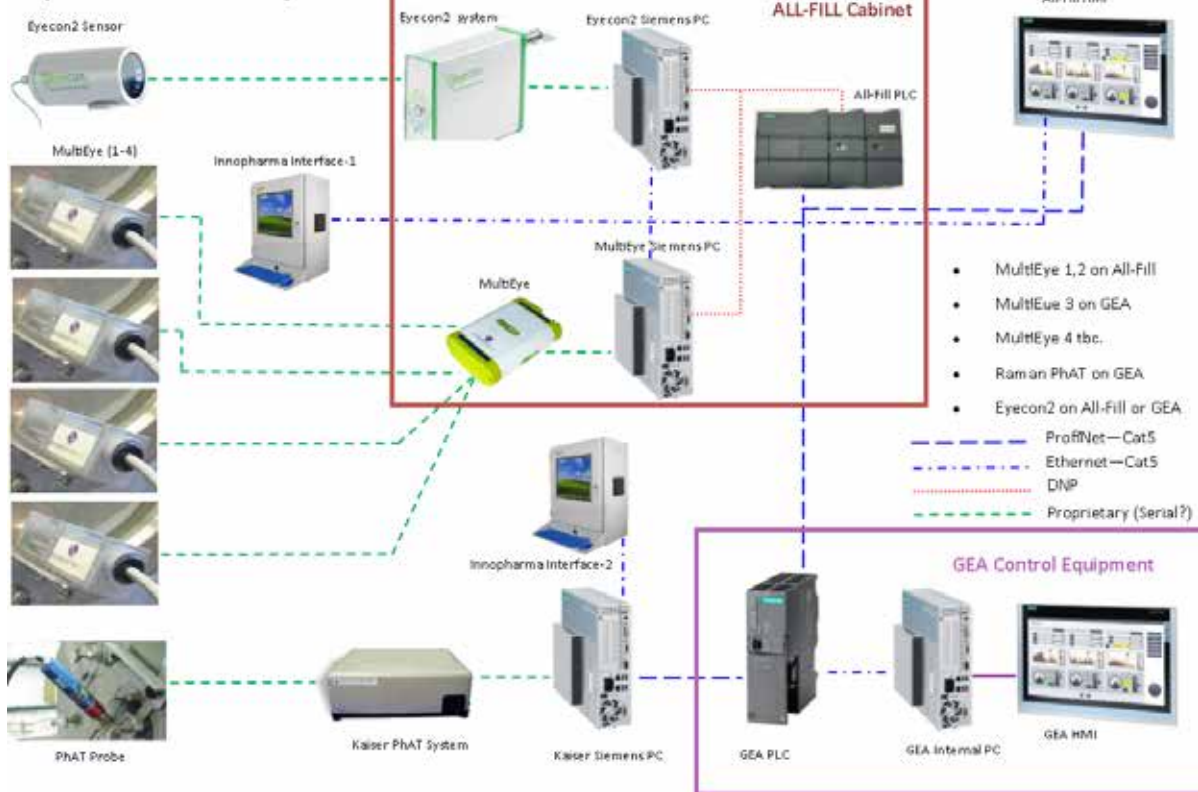
6 mm spot size and 785 nm laser
N.B. The attachment has been fully specified with
interlocks/locking screws for laser safety



Hardware: PAT sensor communication infrastructure



Proposed All-Fill & GEA Integration



NB. Software PAT integration and control is under tender at present

Detail of this can be added soon

PAT sensors are:
Tracerco -Density
Eyecon- PSD/shape
Multieye- IR
PhAT- Raman

Supported by multiple 'soft sensors'

Prospect PF: Convey, flow monitoring, pack and fill



Powder storage bin (1000kg scale)



150 cross feed auger

Powder sifter

AFI gravimetric filler

Check weigher-

Filling weight 1g to \approx 10 kg



Recirculating conveyor with rinser

Prospect PF: Convey, flow monitoring, pack and fill



- Enables definition of processing parameters and control strategies for packaging powders to ensure high quality from filling line to consumer
- Enables understanding of efficiency savings in packing such as minimising product giveaway
- Allows understanding of bulk product: packaging interactions in new packaging
 - High degree of Process Analytical Tool integration to enable the application of Quality by Design (QbD) protocols and scale up learning
 - (such as flow, segregation and attrition on conveying)

Key points



- We will soon (by September) have a facility for which we will know the OEL
- We can work in liquid and solid formulation of APIs
- We will be able to process bulk powders (kgs not tonnes) in the contained facility
- We can look at flow, conveying and packing problems on the tonne scale for 'safer' materials (high OEL)

Thank you...

For more information visit www.uk-cpi.com

Email: info@uk-cpi.com

Twitter: [@ukCPI](https://twitter.com/ukCPI)

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