

Future ready pharma: Exploring the technology and innovation needs in medicines manufacturing

Online workshop
2nd October 2025



Agenda:

- Introduction
Martin Wallace (MMIP Technology and Innovation Workstream Lead)
- Innovate UK funding for medicines manufacturing
Mark Talford (Deputy Director - Medicines Manufacturing)
- Breakout rooms
- Conclusions and next steps



Medicine Manufacturing Technology Roadmap – What's next?

Martin Wallace

MMIP Technology & Innovation Workstream lead
& Senior Director & Head of Innovation and
Manufacturing Technology
Portfolio & Technology Delivery, R&D, GSK



Agenda for today



Refresh for the MMIP Technology & Innovation Roadmap



Original Drivers



Proposed Responses



What Next?



The Medicines Manufacturing Industry Partnership



Vision → For the UK to be recognised as a world-class, advanced centre for medicines manufacturing

Strategic partnership of the **medicines manufacturing industry** working together with the **government** and its agencies, to drive a growth agenda for medicines manufacturing in the UK



Medicines & Healthcare products
Regulatory Agency

Office for Life Sciences



Innovate
UK

A ten-year vision for renewed global leadership



Follow the green, high-tech road

A path to UK growth, net zero and health resilience from innovation in medicines manufacturing



MMIP believes the UK has the potential to be the best global location for **innovative** and **environmentally sustainable** medicines manufacturing, delivering health security and nationwide economic prosperity



The future

driving sector growth through policy development and implementation



Fiscal

Net zero

Regulatory

Skills

T&I

ATMPs



Key Milestones: from T&I publication to Now?

June 2021- T&I Roadmap Publication

T&I Roadmap defined strategic priorities for future developments and set the foundation for progress.

Aug 2022 – Innovate UK Transforming Medicine Manufacturing program.

Strategic initiative aimed at revolutionizing the UK's medicines manufacturing sector

June 2023 - MMIP Follow the green, high-tech road:

The release of the MMIP "Follow the green, high-tech road: A path to UK growth, net zero and health resilience from innovation in medicines manufacturing paper showcased tangible progress in sustainable innovation and highlighted new directions.

March 2024 - The Sustainable Medicines Manufacturing Innovation Programme (SMMIP) launched

Ongoing Initiatives and Monitoring

Current efforts emphasize implementing projects, monitoring outcomes, and continually updating advancements in the field.

2025/2026 – What's Next? 2026 to 2030 T&I Roadmap

MMIP Mission and Vision

Mission of MMIP:

Become a leading force in manufacturing innovation, to maximise ROI from the exceptional UK LS R&D base, to be the leading force in manufacturing innovation, ensuring national and regional economic benefits and a secure supply of medicines for patients in the UK.

Vision for MMIP:

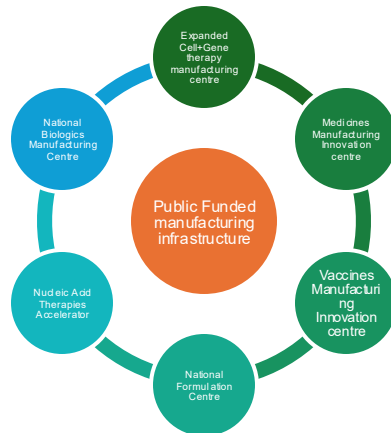
Focusing on technology and Innovation leadership to make the UK the best place in the world for medicines manufacturing through:

1. Our ability to develop the manufacturing process for new medicines and rapidly move from research through development to launch is world class.
2. Our ability to bring innovative advanced manufacturing methods to medicines manufacture to ensure high quality and high productivity is world class.

Drivers

- Providing access to innovative medicines
- Moving towards personalised medicines.
- Delivering a Net Zero economy
- Changing Portfolio - Advanced Therapies – ADCs, Vaccines, Nucleic Acids, Oligos, Cell based therapies
- Shortening Development and Launch times
- Harnessing the potential from the UK medicine manufacturing ecosystem
- Increase the impact of Digital Transformation from molecule to patient
- New Business Models

Infrastructure



Strategic Grand Challenges

Current

- Digitalisation
- Continuous Manufacturing
- ATMPs manufacturing & delivery

Potential Future

1. Robust Agile Supply Chains
2. Future Sterile Manufacturing
3. A Net zero approach to medicines manufacture
4. Next Generation Biopharma
5. Nanotherapeutics for Intercellular Drug Delivery

Technology opportunities

- Digital Design/Supply chain – from Molecule to patient
- On Demand Manufacturing
- On Demand Sterile manufacturing capacity
- Cell free systems for development and manufacture.
- Real time release for Advanced Therapies
- Advanced Bioprocess control
- Infrastructure to support the industrialization of future therapies (LNP)

Fiscal, Regulatory, Skills, Advanced Therapies, Community Build, **Technology & Innovation**, **Sustainability**

Grand Challenges



Grand Challenge	Exemplar projects
Robust Agile Supply chains (Improving the Agility and robustness in developing, launching and supplying new products)	- Continuous DP - JIT Clinical - Digital Design Accelerator/Digital Design Studio - Advanced & Integrated measurement tech (CAMS)
Sterile Manufacturing for the Future (Delivering sterile manufacturing capacity faster and at lower overall economic cost)	- Digital twin of fill finish - Alternative on demand filling lines - Rapid Sterility testing
Next Generation Biopharm (Harnessing the full potential of future therapies)	- RTR for Autologous Gene therapies - Advanced Bioprocess control - Cell free development
Nanotherapeutics for Intracellular Drug Delivery (Creating a portfolio of "Pharma Ready" modalities)	Clinical infrastructure for industrialising of Nucleic based therapies.
Net Zero (Minimising the carbon impact of medicine supply)	- Alternative Oligo manufacturing process. - Eco Design and Development - Sustainable Packaging.

Drivers remain consistent –albeit need more pronounced

2017

- Providing access to innovative medicines
- Moving towards personalised medicines.
- Delivering a Net Zero economy
- Changing Portfolio - Advanced Therapies – ADCs, Vaccines, Nucleic Acids, Oligos, Cell based therapies
- Shortening Development and Launch times
- Harnessing the potential from the UK medicine manufacturing ecosystem
- Increase the impact of Digital Transformation from molecule to patient

2020

- Providing access to innovative medicines
- Moving towards personalised medicines.
- Delivering a Net Zero economy
- Changing Portfolio - Advanced Therapies – ADCs, Vaccines, Nucleic Acids, Oligos, Cell based therapies
- Shortening Development and Launch times
- Harnessing the potential from the UK medicine manufacturing ecosystem to deliver a more resilient end to end medicine supply chain
- Improve the preparedness for future pandemics
- New ways of working.
- New Business models
- Increase the impact of Digital Transformation from molecule to patient

>2025?

- Providing access to innovative medicines
- Moving towards personalised medicines.
- Delivering a Net Zero economy
- Changing Portfolio - Advanced Therapies – ADCs, Vaccines, Nucleic Acids, Oligos, Cell based therapies
- Shortening Development and Launch times
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Medicines Manufacturing Industry Partnership (MMIP)

Proposals to deliver T&I Roadmap Ambition

1. Identification and funding of projects under proposed “Grand Challenges” – (£150m over 4 years)
 - I. Robust Agile Supply chains
 - II. Future Sterile Manufacturing
 - III. Next Generation Biopharm
 - IV. Nanotherapeutics for Intercellular Drug Delivery
 - V. Net Zero
2. Signpost the “Industry needs” and engage with Innovation ecosystem to understand the “Opportunities” presented by advances in science and technology in other enabling technologies and capabilities (Technology Strands).
 - Increase awareness of Medicine Manufacturing challenges and how they link with other ISCF e.g. Made Smarter.
 - Regular engagement with Research Councils to understand progression of the technology strands (Industrial readiness), and support required.
 - Regular updates on MMIP website to engage with broader community on plans and future opportunities.
3. Continue to identify incentives and methods to improve broader accessibility to advanced technologies.

What has changed?
What more needs to be
done?

2 - Enabling Technologies & Capabilities (Technology Strands)

These are the enabling technologies which when combined present opportunities to address medicine manufacturing needs. The continued focus on these technologies and capabilities will deliver a strong pipeline of new solutions to address medicine manufacturing needs.

Enabling Technologies & Capabilities (Tech Strands)



- These are the common technology and capabilities that with continued development will present new opportunities in solving the broader industry challenges.
- We expect that the development of some of these Tech strands will be progressed through the Grand Challenges but we want to highlight the importance of continued support outside of the Grand Challenge support to maintain a strong technology pipeline for the future.
- Some of these are common across multiple industries and so highlights the opportunity to leverage across industry sectors and adapt as needed to meet specific Medicine Manufacturing needs e.g. Made Smarter and Advanced Materials.
- The development and the associated impact of these technologies will be dependent on accessing a skilled workforce. Development of future workforce should be in considered in parallel to technology development.
- Emerging tech reflects the technologies that will present new opportunities to how we deliver new treatments and so will present new opportunities or challenges for medicine manufacturing.

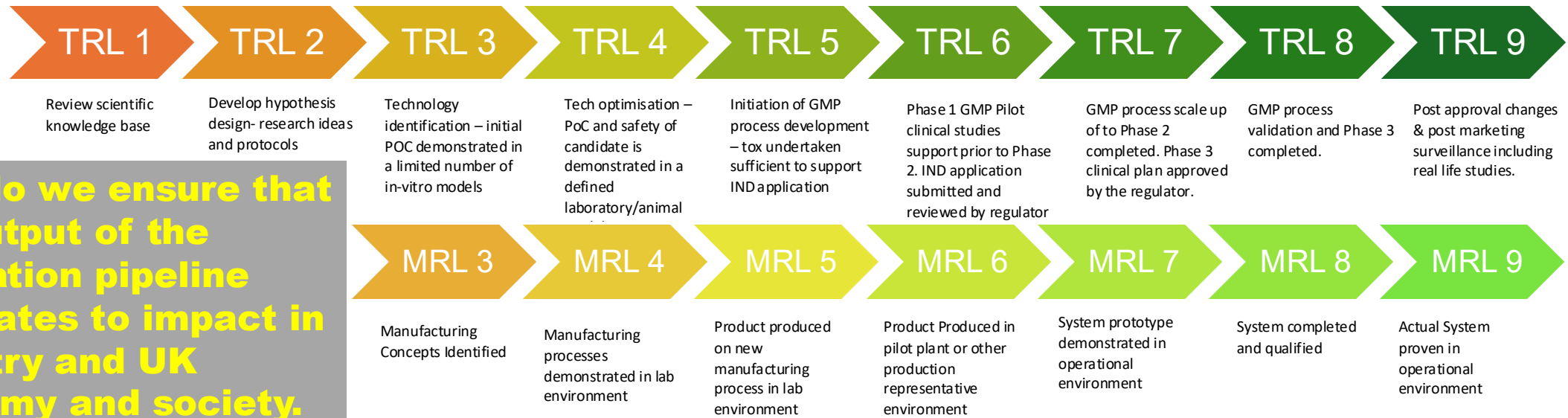
What has changed?
Which areas require more focus?

3 - Continue to identify incentives and methods to improve adoption of advanced technologies.

How might we incentivise the adoption of the new tech?

Translation of Innovation to Industry Impact

How do we ensure that the output of the innovation pipeline translates to impact in Industry and UK economy and society.



Research Councils (EPSRC, MRC, ESC BBSRC, etc)

Medicine, Made Smarter, Net Zero

RTOs/CPI/Catapult/SMEs

 **Industry Adoption**

Proposed Action

- Communicate broader industry needs and engage to understand alignment of opportunities
- Monitor the progress of Technology strands to understand the opportunity presented by advances in science and technology
- Signpost potential areas of science which will need support in order to develop to industrialisation

- Seek to leverage technologies/solutions from other industries and adapt to better reflect specific Medicine Manufacturing needs.
- Monitor the progression of activities in the RTOs against industry needs.
- Refresh Industry needs to inform priority allocation of funding to new technologies, SMEs etc.
- Develop the current/future workforce while developing new technologies.

In summary

1. Business needs and drivers remain largely consistent with priorities shifting over time
2. Technology cycles shortening so imperative that we reduce the gap from technology identified to technology benefits being realised.

**Our sector has
high potential
for growth**



**Industry and
government are
working in close
partnership to
deliver that growth**



**We are here to capture
your voice in shaping the
future Technology and
Innovation Direction**



Innovate UK funding for medicines manufacturing

Mark Talford, Deputy Director –
Medicines Manufacturing

2nd October 2025



Future Medicines

Preventing and treating disease through innovation in transformative therapeutics and vaccines

The need

- UK USP and economic growth potential
- unmet clinical and patient need
- trend to right medicine, right time, right dose
- manufacturing - cheaper, faster, sustainable
- market failure - start up to scale up

Our focus

- innovation across discovery, development, manufacture, supply
- exploring new platforms and modalities
- sustainability of process and production

Achieving impact

- working in partnership
- leveraging the innovation ecosystem
- right intervention for the right challenge

Medicines
Manufacturing
Challenge Fund
2017-2022
£206M*

Transforming
Medicines
Manufacturing
2022-2026
£45M

Sustainable Medicines
Manufacturing
Innovation Programme
2025-2029
up to £80M

* UKRI Challenge Fund allocation

The Medicines Manufacturing Challenge Fund

Leverage and invest in world-leading UK research & innovation capability to:

- develop and manufacture new medicines
- support UK life sciences SME growth
- drive inward R&D investment



Sector opportunity identified

HMG policy context

Key Industry Asks

Challenge Fund delivers

Innovation infrastructure to de-risk innovative technology adoption

Medicines Manufacturing Innovation Centre (MMIC)

CGT Catapult MIC expansion

Support SME R+D Collaboration

Medicines Manufacturing CR&D
(Digital Health Tech Catalyst)

NHS readiness and adoption

Advanced Therapy Treatment Centre Network

Transforming Medicines Manufacturing

£45 million programme
2022-2026

Project portfolio

Strategic
Investments

Smart
bioprocessing

Oligonucleotide
Grand
Challenge

Intracellular
Drug Delivery
Centre

Collaborative
R&D

Digitalisation
and Automation

Nucleic Acids

Intracellular
Drug Delivery

Flexible, Agile,
Scalable and
Sustainable
Manufacturing

Community of Practice



Automation &
Digitalisation



Skills



Manufacturing

Equality, Diversity and
Inclusion



Formulation



- bring together stakeholders within a cohesive environment of shared learning and collaboration, to drive forwards innovation and enterprise
- representation from all experience levels and backgrounds
- launched October 2023
- 400+ members and counting...

TMM project leads

OUTFOX BIO

Theragenics

Vitarka
Therapeutics

MNS

REACH
INDUSTRIES

Sixfold.

Sferola

MESOX

TECREA

Spliceor

TOUHLIGHT

CX

EXACTMER

The London Dermatology Centre®

ID HEALTH

Micropore
Technologies

RNAassist

THERAKIND

BiologigC
Technologies

BioToolomics

cpi

CATAPULT
Cell and Gene Therapy

Causeway
Sensors

elixi

Rentschler
Biopharma

autolomous

MEDCO HOLDINGS, INC.

ALGREEN
Treat Nature With Nature

nuclera

Plurify

4+ FOUR PLUS

CELL
guidance systems

D

aqdot®

SAGETECH
MEDICAL

Sustainable Medicines Manufacturing Innovation Programme

part of the VPAG Investment Programme

- up to £80M investment to 2029
- funded through the 2024 VPAG agreement between DHSC and branded medicines manufacturers
- making the UK a global leader in sustainable medicines manufacturing

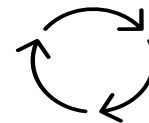


Green Chemistry

New Technologies

Solvent free systems

Biomanufacturing



Circularity

Recycle & reuse of solvents, water, plastics

Materials with potential for Circularity

Standardised packs



Productivity & Resource Efficiency

Continuous processing

Digitalisation, automation, robotics.

Shared data to enable use of AI & ML

Regulation

what regulatory issues are raised by the innovation and how will projects address these?

Measurements, Standards & Data

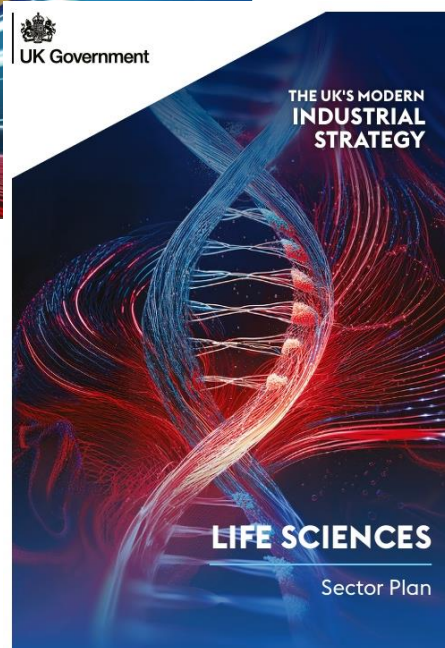
development of common techniques to enable comparable measurement and reporting of resource efficiency metrics across the sector and supply chain

The 2025 Modern Industrial Strategy



Transform the IS-8 sectors, including life sciences, advanced manufacturing, digital and technologies

Drive innovation

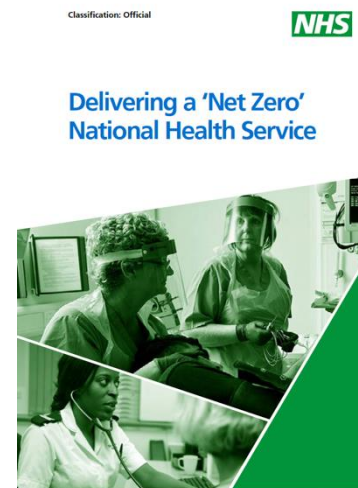


Enabling world class R&D

An outstanding place to start, scale, grow and invest

Drive health innovation and NHS reform

Continue to invest at scale in life sciences manufacturing innovation



Net zero medicines supply by 2045 through measures including improvements in production

Vision:

The UK will be

- **by 2030, the leading life sciences economy in Europe; and**
- **by 2035, the third most important life sciences economy globally**

Other relevant Innovate UK activities



AI and quantum computing
Data economy
Digital security



Made smarter innovation
Clean energy
Industrial biotechnology

In summary

Our focus

- discovery, development, manufacture, supply innovation
- new platforms and modalities
- sustainability of process and production
- embedding digitalisation and automation

The prize

- manufacturing - cheaper, faster, sustainable
- unmet clinical and patient need
- broadening access to the right medicine, right time, right dose
- UK USP and economic growth potential

Achieving the impact

- “triple helix” partnership – academia, industry, government
- leveraging the innovation ecosystem
- right intervention for the right challenge

Thank you



Breakout rooms:

- Sustainable manufacturing and Net Zero
- Data collection and process analytics
- Data interpretation, modelling and AI
- Next-generation biopharma (high potential modalities and personalised medicines)