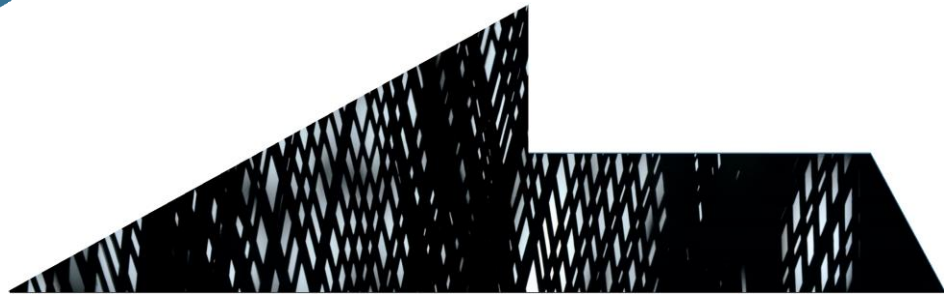


# LIGHTWEIGHT MANUFACTURING CENTRE

a first step towards  
creating a National  
Manufacturing Institute  
for Scotland

**Prof. Iain Bomphray FIMechE**  
2019



# ScotCHEM at the Lightweight Manufacturing Centre



- Who we are
- What is Lightweighting?
- Role of the Lightweight Manufacturing Centre
- The National Manufacturing Institute for Scotland?
- ScotCHEM within NMIS

# Lightweight Manufacturing Centre



The Lightweight Manufacturing Centre is an accelerator for the National Manufacturing Institute for Scotland

# Lightweight Manufacturing Centre



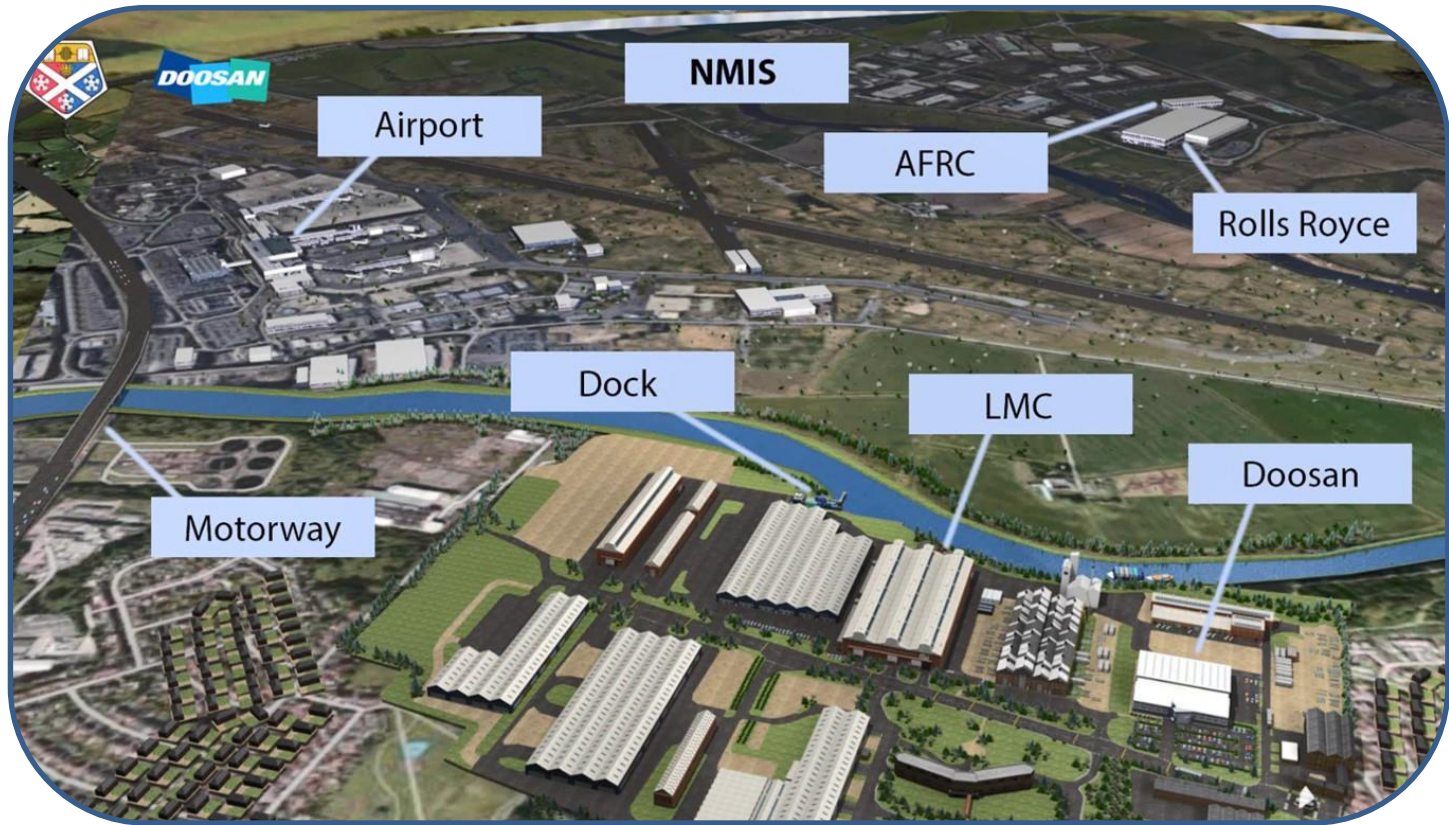
## The Lightweight Manufacturing Centre

|                            |   |
|----------------------------|---|
| <b>Iain Bomphray</b>       | Director, Group Technical Specialist – Lightweight Structures |
| <b>Dr. Kenneth Burnham</b> | Senior Manufacturing Engineer, Team Lead                      |
| <b>Tony Rodden</b>         | Senior Manufacturing Engineer                                 |
| <b>Gerry Ward</b>          | Business Development  |
| <b>Dr. Ruoyu Huang</b>     | Process Modeller  |
| <b>Tobias Weis</b>         | Technician  |

# Lightweight Manufacturing Centre

- Where are we operationally?
- Staff      5x FTEs
- Capital   1x Press, PEI (May 2019)  
              1x RTM Press, Coexpair  
              1x 5-Axis Machining, Breton  
              1x Autoclave  
              Cleanroom  
              Metrology Lab  
              Design & Engineering Office

# Lightweight Manufacturing Centre





# Lightweight Manufacturing Centre



# Lightweight Manufacturing Centre





# Lightweight Manufacturing Centre



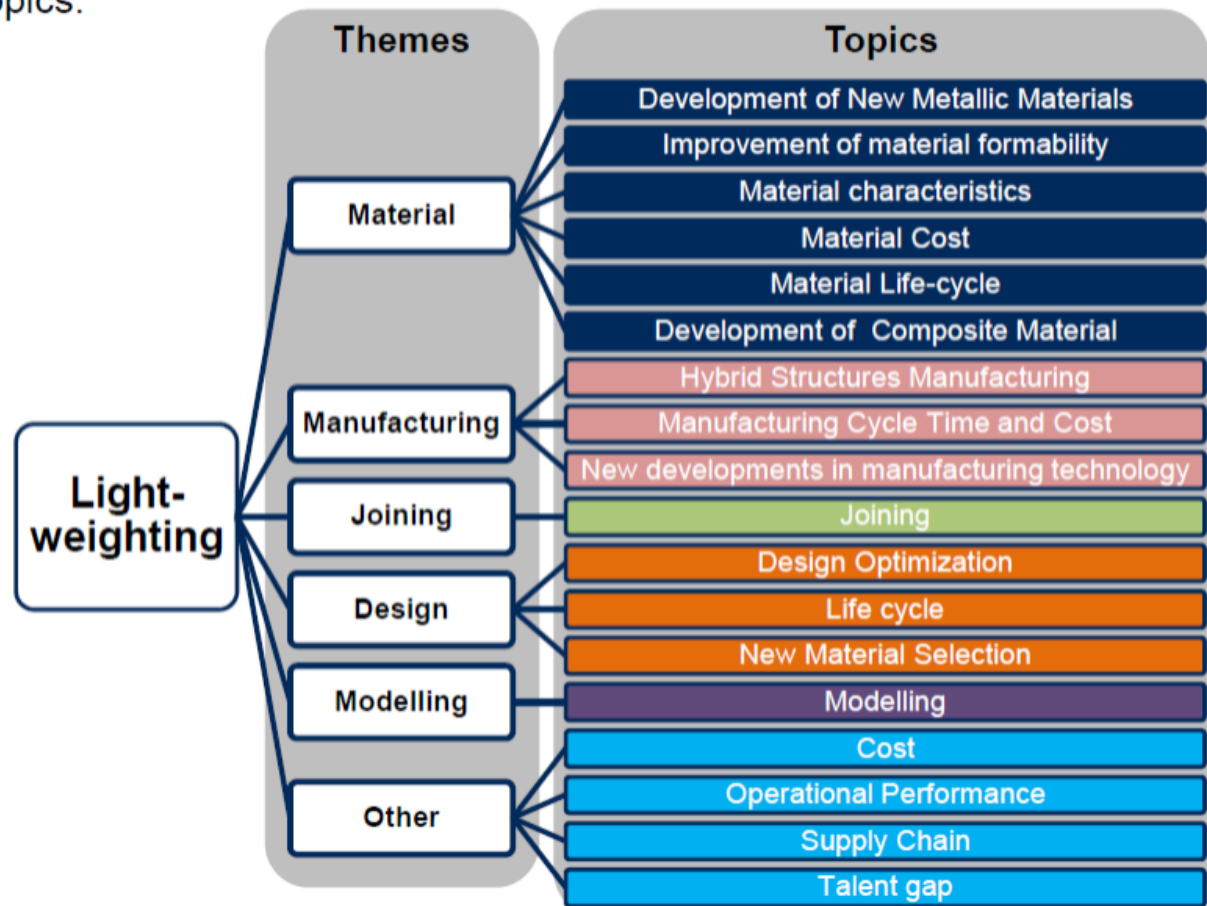
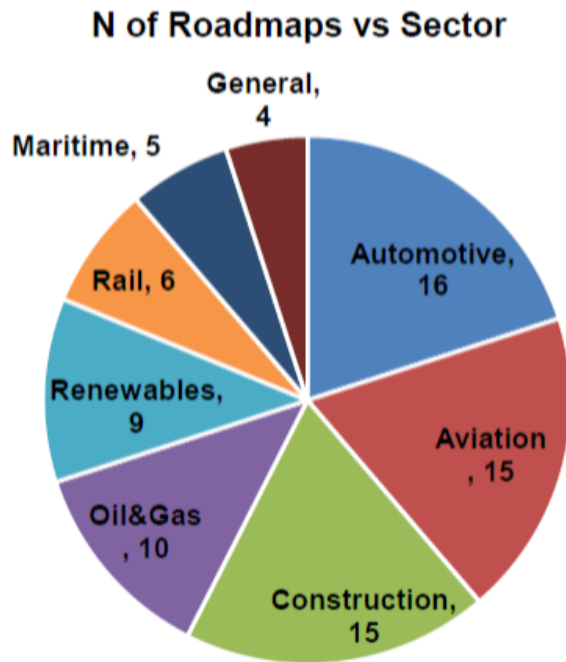
What is lightweighting?

The material and process agnostic application of materials in the pursuit of mass reduction

Taking into account structural efficiency, cost of manufacture, rate of manufacture and sustainability

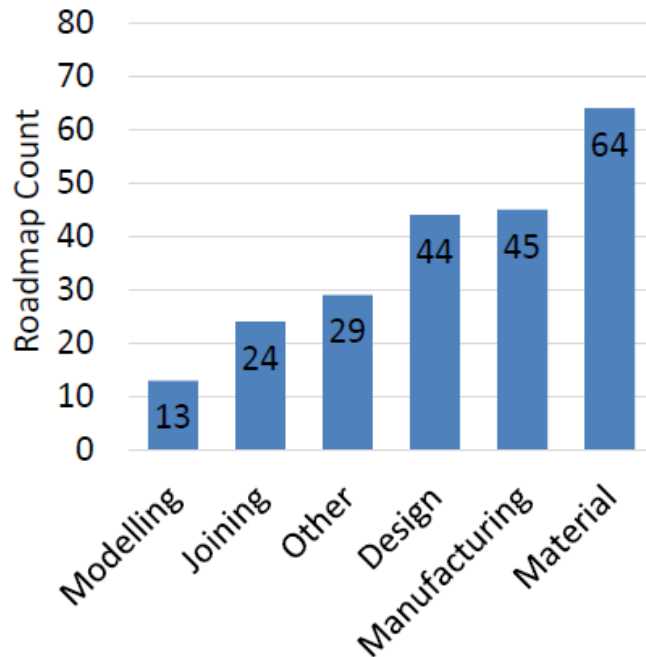
# Lightweight Manufacturing Centre

A total of 82 strategic roadmaps were reviewed and 110 different challenges were identified. The challenges were grouped into 6 different themes and within each theme, they were grouped further into different topics.

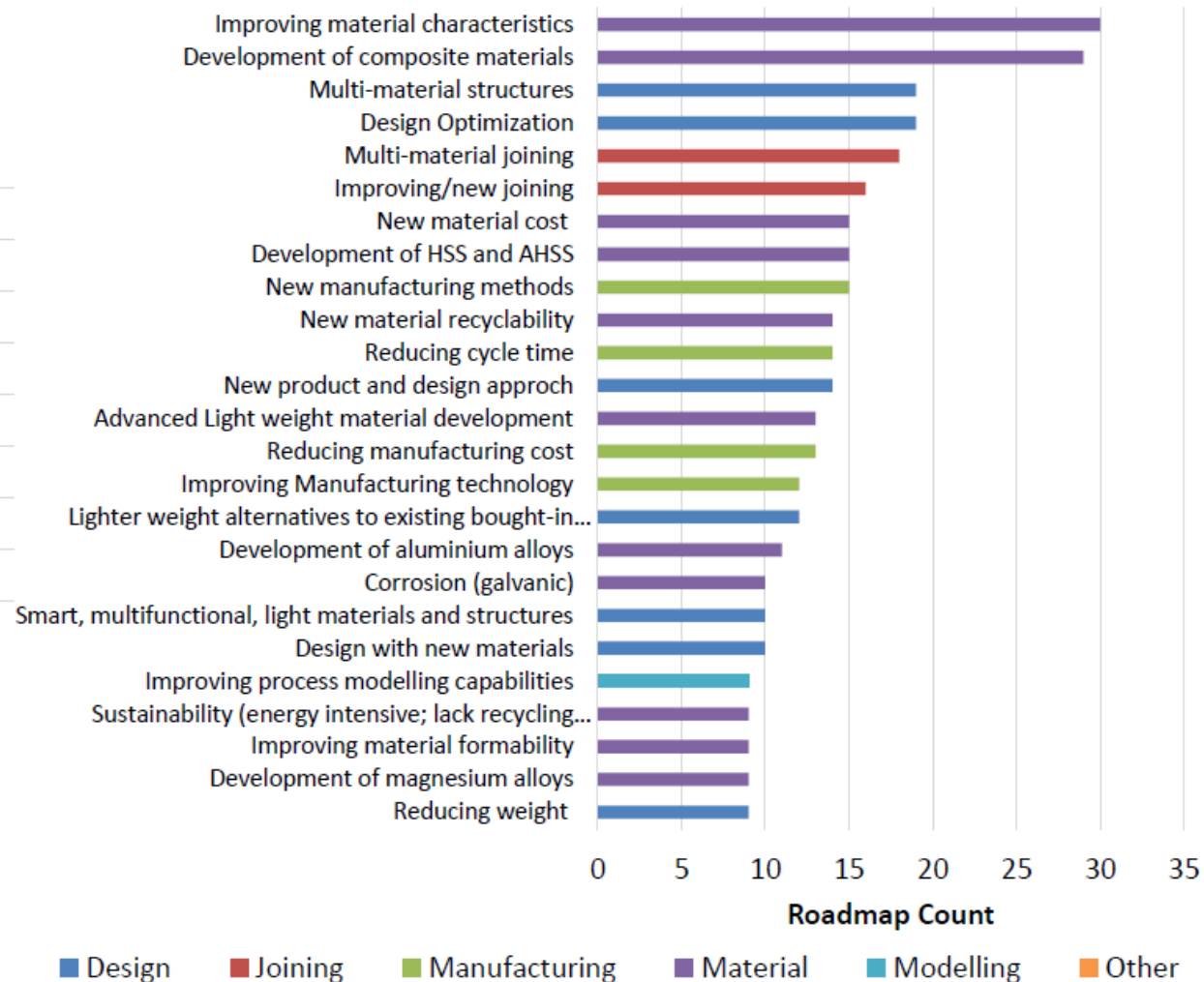


# Lightweight Manufacturing Centre

## Themes vs. N of Roadmaps



## Main Challenges vs. N of Roadmap



The **National Manufacturing Institute Scotland** is an industry-led international centre of manufacturing expertise where industry, academia and the public-sector support bodies work together to transform skills, productivity and innovation making Scotland and the UK a global leader in advanced manufacturing.

- Make it easier for Scottish businesses to use technology to grow and compete
- Will create jobs right across the country
- NMIS will help to grow our economy by galvanising investment from within Scotland and internationally
- It will equip our people with the skills to lead and prosper in an evolving manufacturing environment and to inspire and attract a new generation of talent.

*NMIS will transform manufacturing for Scotland*

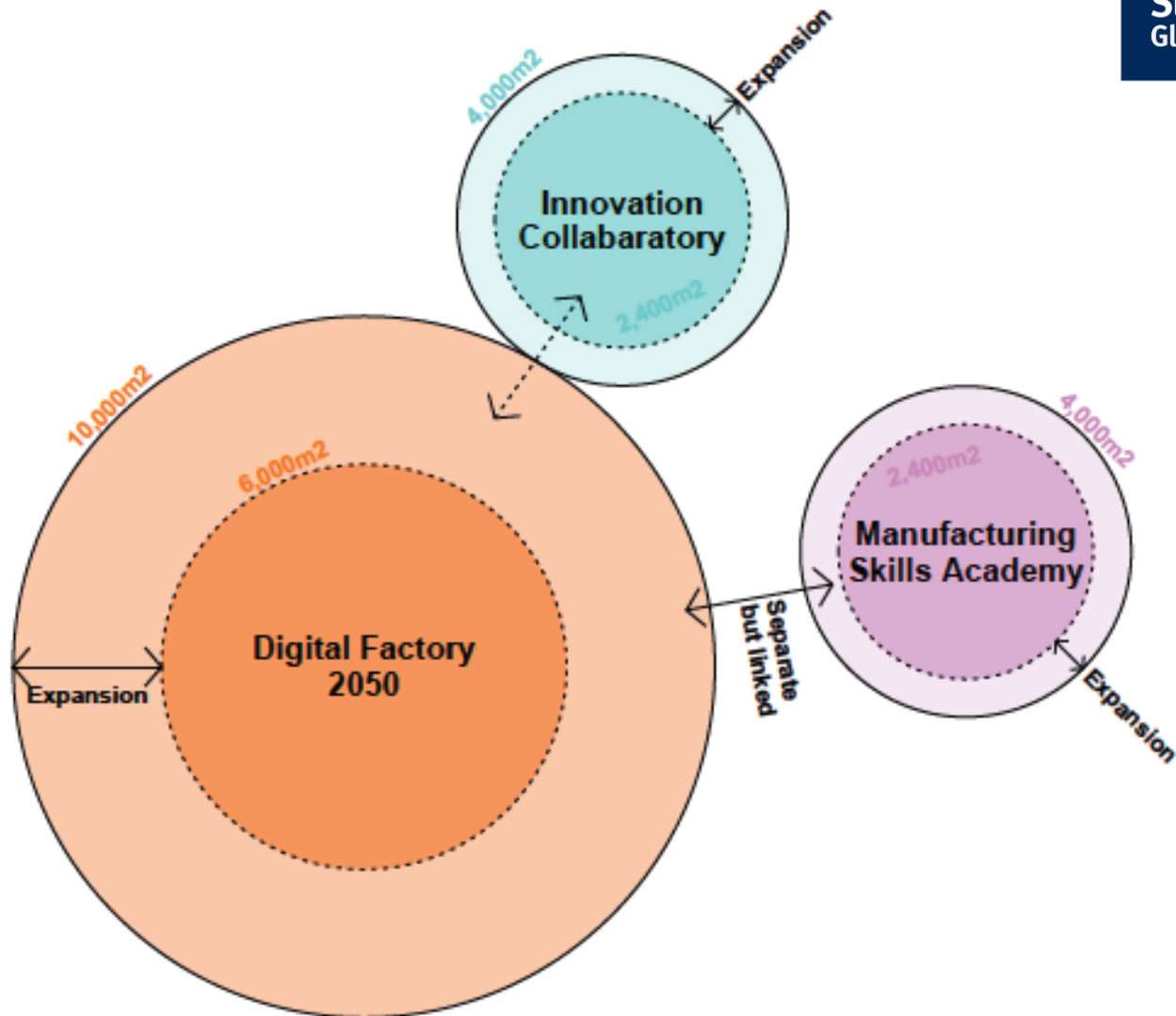


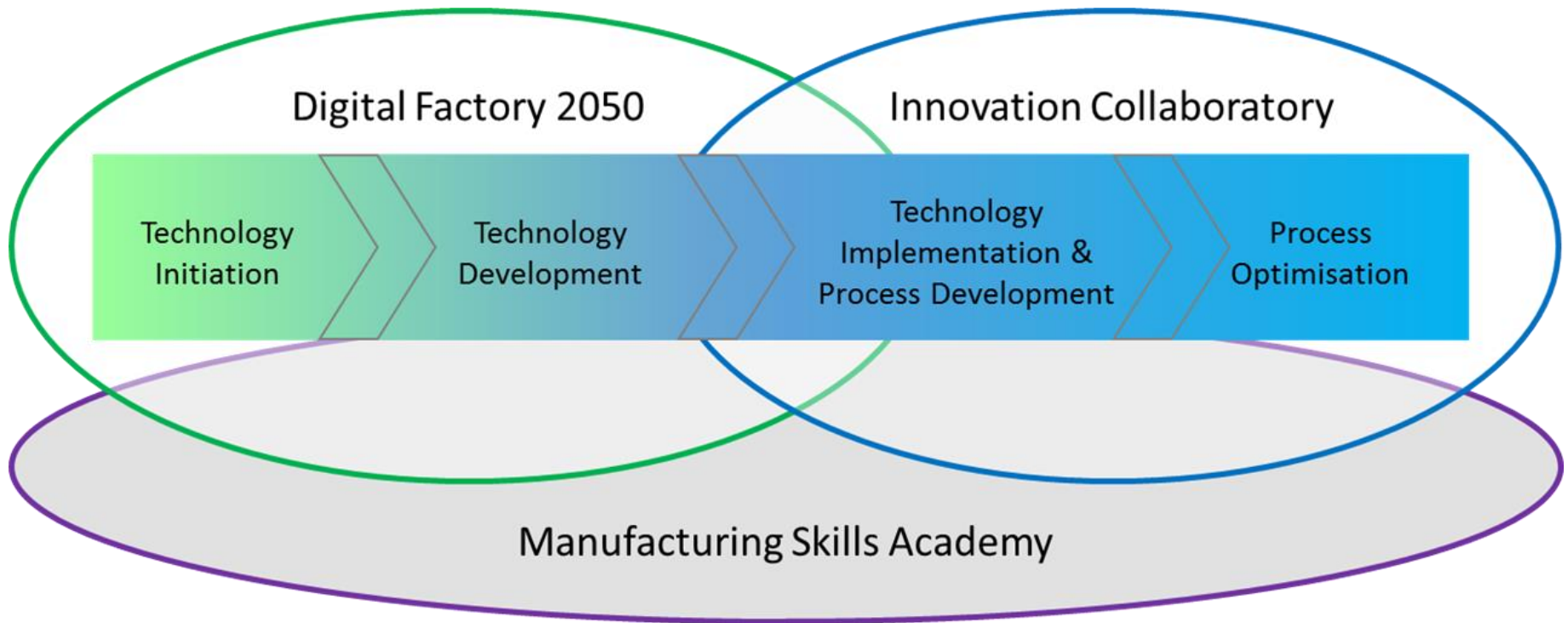
# NMIS

## Manufacturing innovation district growth

Advanced Forming Research Centre | Lightweight Manufacturing Centre











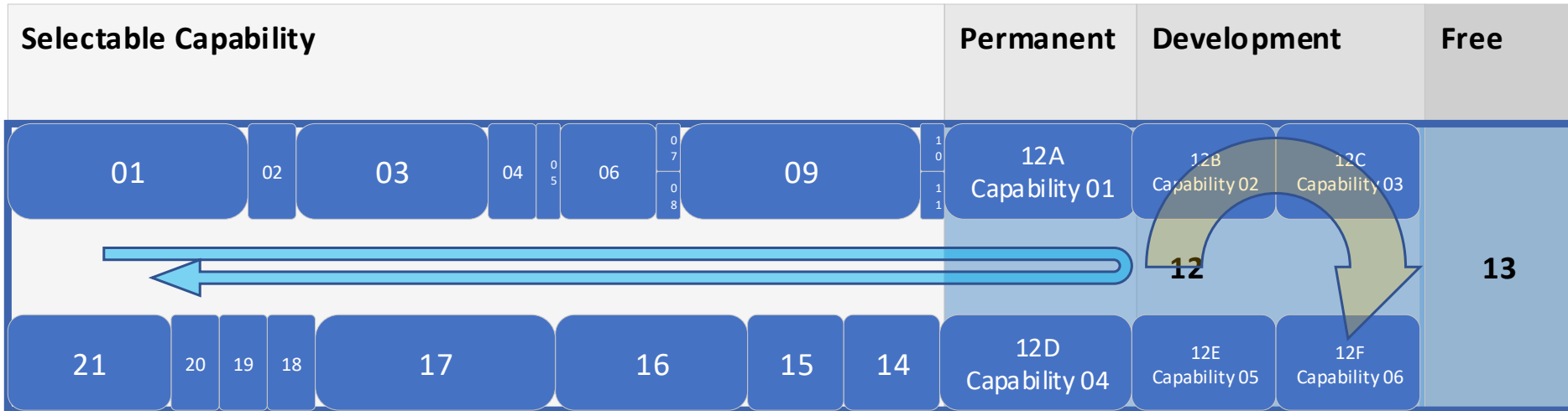
- **LMC capability aspiration:**

- **Material handling**
- **Large scale (physical) component manufacture**
- **Hybrid material manufacture**
- **Fibre pilot line manufacture**



# Lightweight Manufacturing Centre

- Reconfigurable Pilot Line Manufacturing
- Capability Development
- TRL 2 – 8, MRL 1 - 5

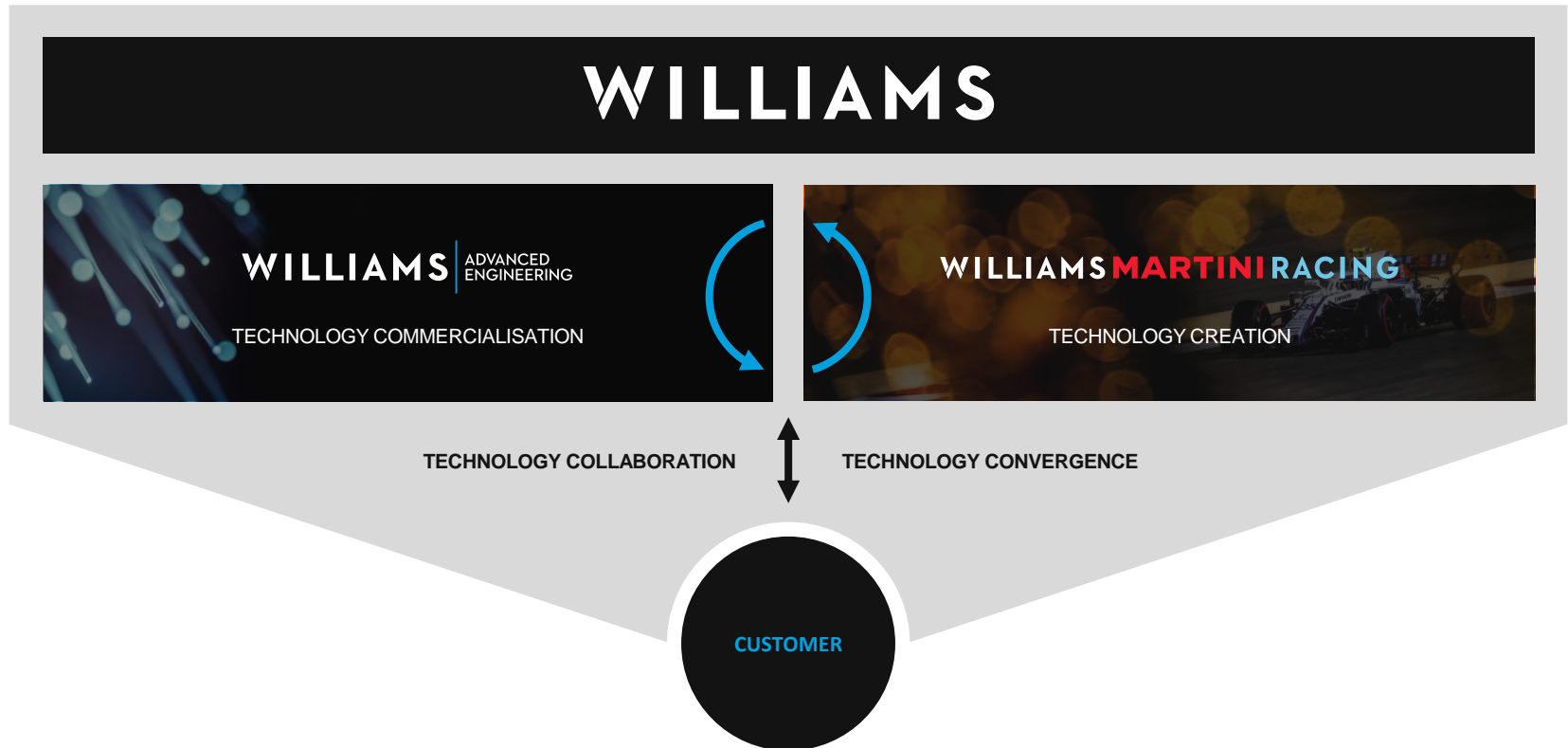


# WILLIAMS | ADVANCED ENGINEERING





## TECHNOLOGY TRANSFER & COMMERCIALISATION





# LIGHTWEIGHT EV PLATFORM

## KEY FEATURES

- Composite / hybrid chassis
- Composite wishbones
- Innovative cell / module enclosure
- Structural integration of module case
- Battery cooling system via sills
- Energy absorbing sill
- Integration of battery cooling
- Wireless module control to BMS link

Strictly private and confidential.  
©Williams Advanced Engineering Limited 2018.







Strictly private and confidential.  
©Williams Advanced Engineering Limited 2018.



## WILLIAMS ADVANCED ENGINEERING SUSTAINABILITY DRIVEN ENERGY EFFICIENT PERFORMANCE

AERODYNAMICS,  
THERMODYNAMICS  
& SIMULATION

Improving  
performance and  
efficiency

ENERGY SYSTEMS &  
TECHNOLOGIES

Capturing,  
controlling, storing  
and deploying  
energy

LIGHTWEIGHT  
STRUCTURES

High performance,  
composite and  
metallic  
technologies

### F1 CAPABILITIES DEPLOYED IN DIVERSE MARKETS



# ScotCHEM @ NMIS