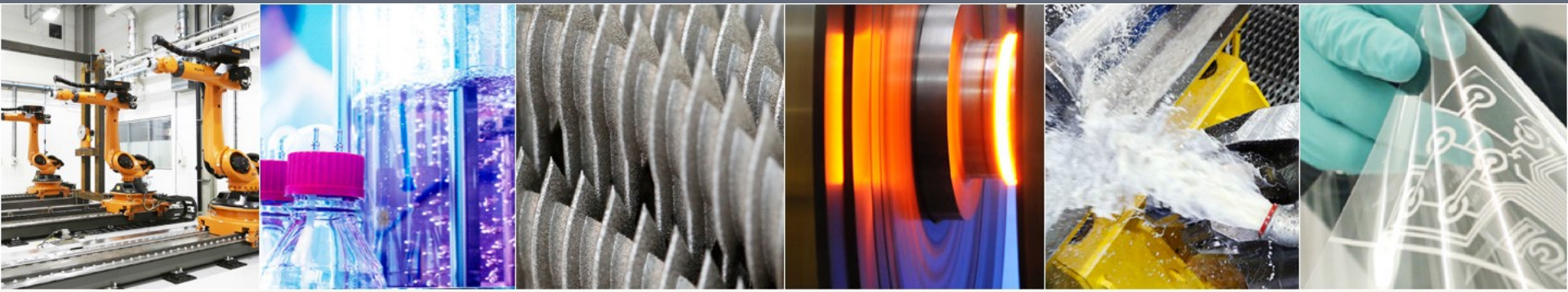
Innovation District Workshop – Capabilities

High Value Manufacturing Catapult, 26-Apr-2023



Capabilities Review – Key Questions

1) What are the distinctive advanced manufacturing capabilities of South Yorkshire that differentiate it nationally and internationally?

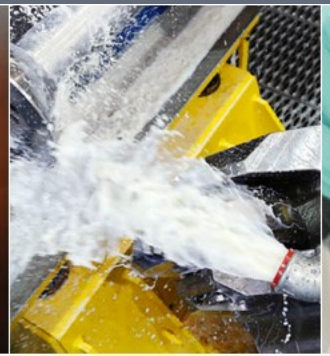
2) What are the future market opportunities in advanced manufacturing and potential market share for the region?

3) What types of interventions are required for the region to seize these opportunities and realise their impact on economic growth?

Introduction








Introduction – The HVMC Team

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In partnership with:

Introduction – Contributors

1-2-1 Interviewees

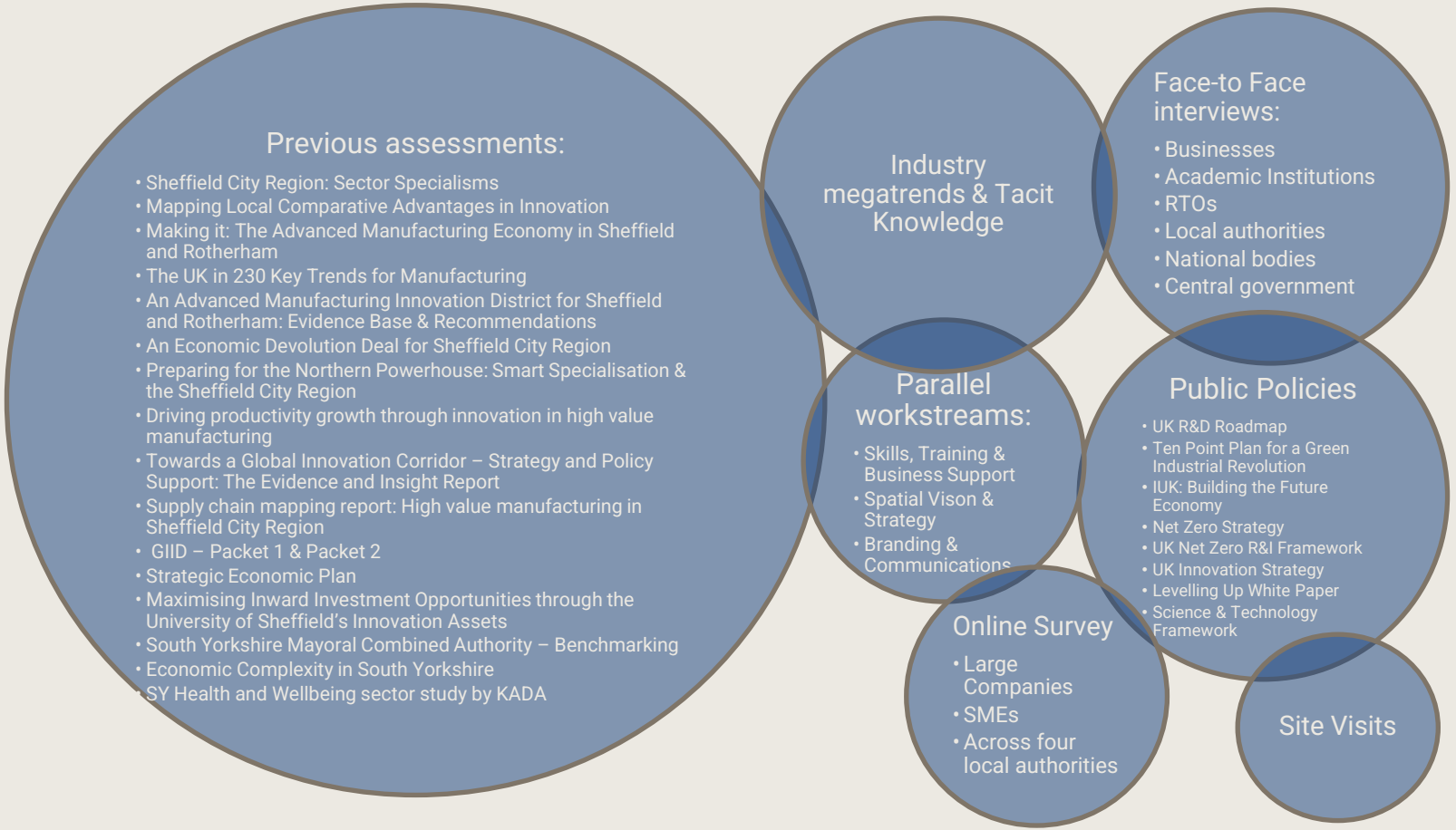
Survey Respondents

A R Wentworth Ltd
A. Wright & Son Ltd
Aalberts IPS
Abbey Forged Products Ltd
Accurate Laser Cutting (SJS) Limited

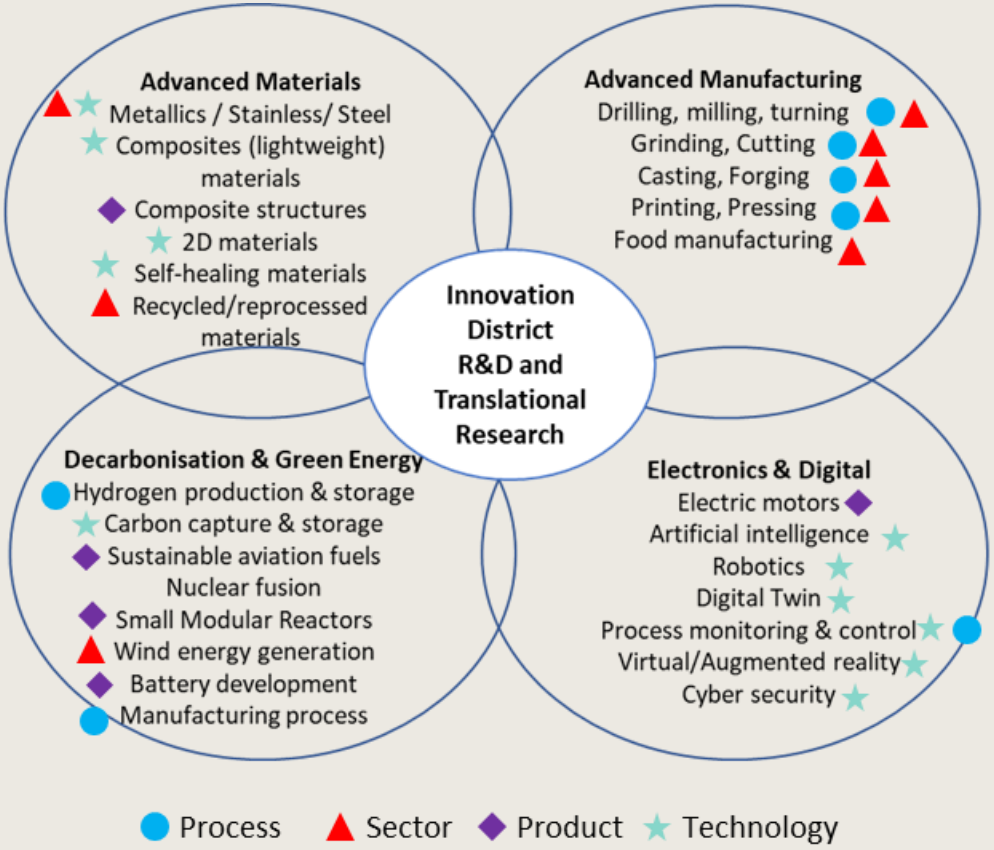
Agemaspark Ltd
Air Accessories (Sheffield) Ltd
Bridon Bekaert Ropes Group (Bridon International Ltd in UK)
Chesterfield Poultry
Clyde Pneumatic Conveying Ltd
DN4 Innovation Management Ltd
Dual Inventive Ltd
Edward Turner and Son Ltd
Erodatools Ltd
Euroweld Technologies UK Ltd
Fernite of Sheffield Ltd
Forged Solutions Group
Globetrace Limited
Kiveton Park Steel
laser web ltd
MAN Hydraulics & Engineering Limited
McCallum Manufacturing Ltd
Mechtronic Industries Ltd
Medezine Ltd
Nordic Energy Ltd
Performance Engineered Solutions (PES) Ltd
PGM Technologies Ltd
Project Display Ltd
QSSLTD.COM

R Anson & Son
Sheffield Precision Medical Ltd
Simpson Pattern Ltd
Techni Measure
Technicut Limited
Tecoglas ltd
The Boeing Company
The Rack Group Ltd
W. Hallam Castings Limited
We Do 3D Printing
Wellhouse Leisure
WINTWIRE LTD

Introduction – Inputs



Initial Advanced manufacturing definition



- Original definition
- Overly complex
- Too generic
- Not comprehensive

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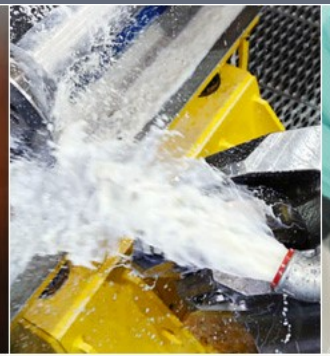
South Yorkshire Differentiators in Advanced Manufacturing








NMIS National Manufacturing Institute Scotland
The University Of Sheffield. AMRC Advanced Manufacturing Research Centre
cpi
mtc Manufacturing Technology Centre
NATIONAL COMPOSITES CENTRE
NUCLEAR AMRC
WMG THE UNIVERSITY OF WARWICK

AMID differentiators

Capabilities

Strength

- Adv. Materials (metallics & composites)
- Metal fabrication processes (machining, casting, forging etc.)
- Robotics, automation and control systems
- Design, Modelling and Simulation
- Joining technologies
- Additive mfg. / 3D printing
- Digital, AI & Data for Health-Tech
- Genomics/Gene therapies

Sectors

Size

- Steel
- Aerospace
- Automotive
- Defence
- Power and Energy
- Nuclear
- Life sciences & health tech
- Food & drink

Major R&I assets

- University of Sheffield
- Sheffield Hallam University
- Adv. Manufacturing Park (AMP)
- Advanced Manufacturing Research Centre (AMRC)
- Advanced Wellbeing Research Centre (AWRC)
- National Centre of Excellence for Food Engineering (NCEFE)
- Nuclear Adv. Manufacturing Research Centre (NAMRC)
- The University of Sheffield Energy Institute
- Gene Therapy Innovation and Manufacturing Centre (GTIMC)
- UKAEA Fusion Technology Facility
- The Translational Energy Research Centre (TERC)
- National Centre for Sports and Exercise Medicine's (NCSEM)

Enablers

Supportive workforce and skills Pipeline

- ~60,000 employees in mfg. Sectors.
- Circa 10,000 graduates and apprentices each year completing courses in complementary subject areas.
- 1,234 researchers in the field and 96% research internally recognised or better in target sectors.

Global reach & supply chain:

- 14 OEMs/Tier 1 companies who are global players in target sectors and competences.
- All are research active in the region and are in sectors which are technology driven.
- Higher than avg. location quotient.
- >2000 companies with the potential for supply chain diversification into target sectors.

Advanced Manufacturing Thematic Areas

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Carbon Neutral & Circular Industries

Sustainable & Smart Mobility

Resilient Supply Networks

Clean energy transition

Digital Engineering & Manufacturing

Health & Wellbeing

Aligning Themes with SY Capabilities – Examples

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Net Zero/Circular Industries

Advanced material & component processing (composites, milling, forming, forging, casting)
Process, production & material efficiency incl repurposing & waste management
Fabrication, joining & additive tech

Sustainable & Smart Mobility

Propulsion tech
Lightweighting/composites
Additive manufacturing
Low carbon transport eg EV, batteries propulsion tech/power drives

Clean Energy Transition

Nuclear Fusion & Reactors
Hydrogen application incl. aviation
Retrofit incl. renewable energy solutions
CCUS, heating & cooling & energy recovery and efficiency

Digital Engineering & Manufacturing

Design, modelling, prototyping & simulation
Sensors, validation and testing
Smart assembly, factories, machinery
Programming, AI, AR/VR & digital twins
Systems integration & Analytics

Health & Well-Being

Bio-medical, devices & imaging
Sports and chid health
Nano material/devices
Food mfg, proteins & packaging
Data science

Resilient Supply Networks

Material supply chain
Machinery & equipment
Business/supply chain models
Transport & software

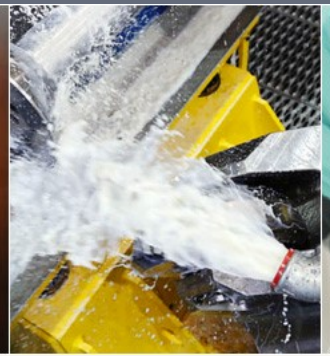
Value of Manufacturing in South Yorkshire

Overview	South Yorkshire	UK
Total GVA of the region	£28.1bn	£1,946.9bn
Manufacturing GVA (% of total)	£3.4bn (12.1%)	£186.9bn (9.6%)
Manufacturing employment (% of total)	60,000 (10.4%)	2,295,000 (7.6%)
GVA/employee manufacturing 2019 (overall)	£59,500 (£49,500)	£83,500 (£67,000)
Manufacturing growth (overall growth)		
GVA 2015-2019	7.1% (11.7%)	12.3% (16.8%)
Employment 2015-2019	Constant (2.8%)	1.9% (4.5%)
GVA/employee 2015-2019	11.7% (8.6%)	10.2% (11.8%)

Future Market Opportunities








SY Innovation opportunities short-list – 3 Horizons approach

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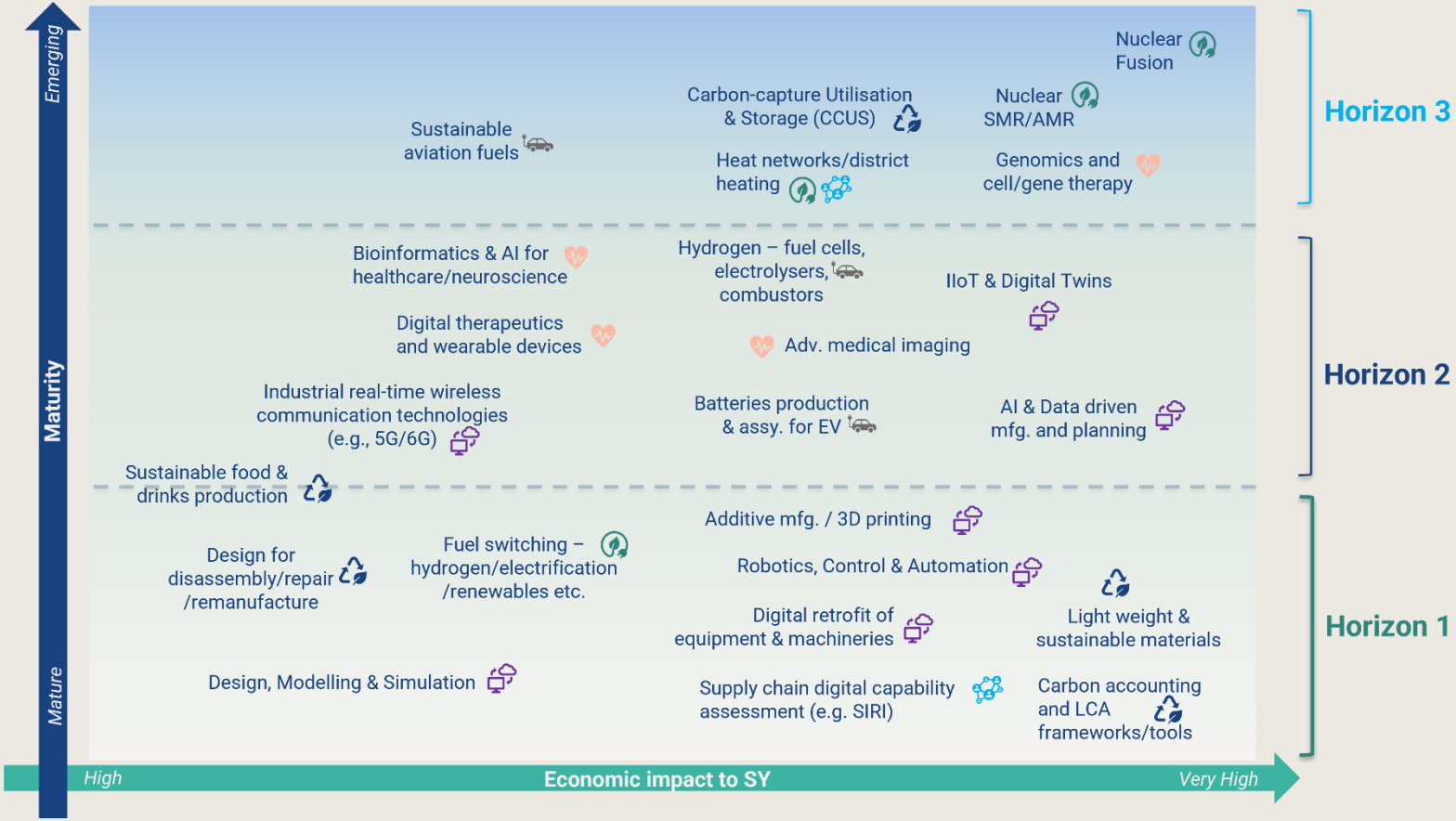
Six focus areas for ID

- Net-Zero & Circular industries
- Clean energy transition
- Sustainable & Smart Mobility
- Digital Eng. & adv. Mfg.
- Health & Wellbeing
- Resilient supply networks

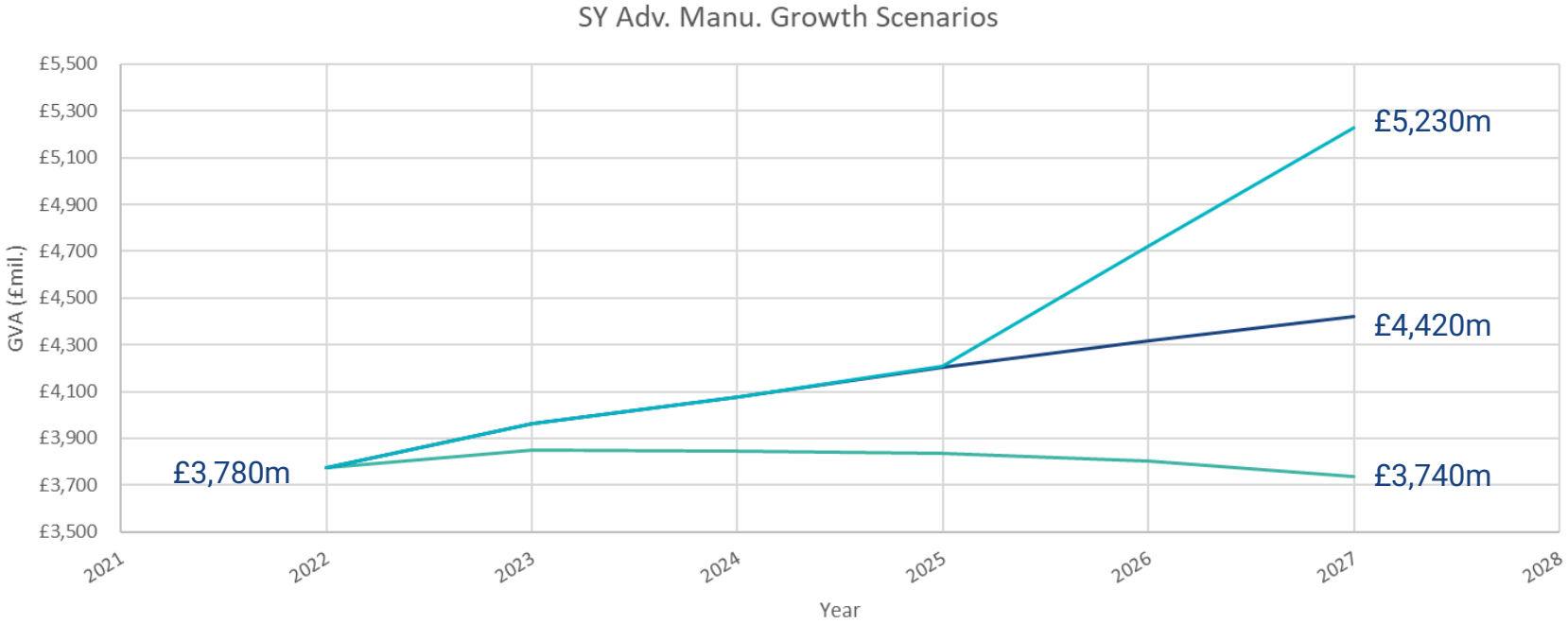


Horizons Approach

- Horizon 1 leverages previous capital investment:
  - Encourage SMEs to grow through innovation;
  - Create integrated networks of manufacturing businesses to diversify into emerging supply chains;
  - Create clusters that can influence strategic investment
  - Increase regional visibility nationally through coherent & tailored regional missions

- Horizons 2 & 3 realise the benefits of emerging national priority sectors:
  - Secure Government contracts and coordinating a regional supply chain responses;
  - Develop the technical competence of the regional in target sectors: Aerospace, Automotive, Defence, Energy (incl. Hydrogen and Nuclear), Life-sciences and wellbeing, Food and Drinks

Growth Scenarios



Advanced Manufacturing Thematic Areas

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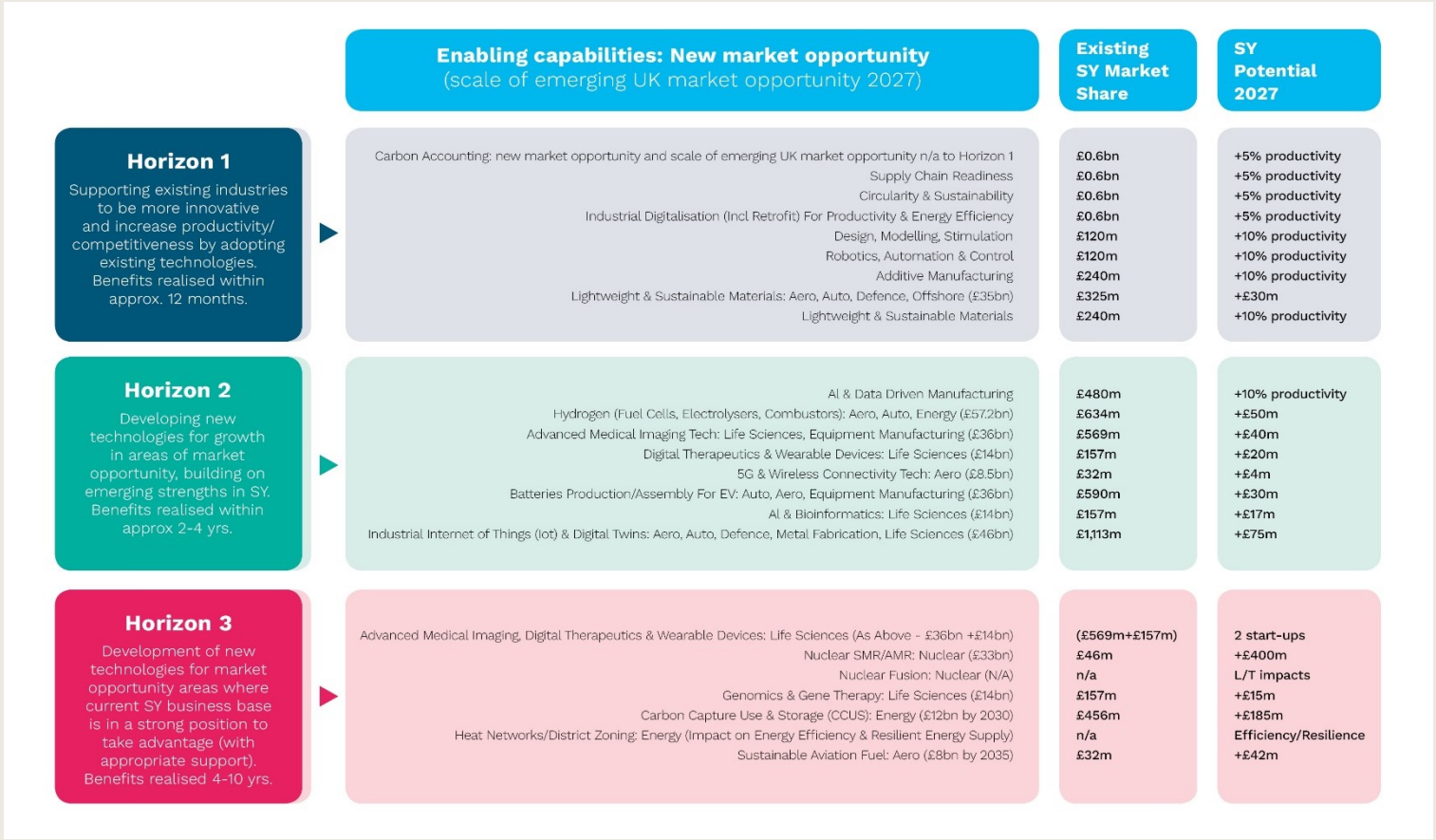
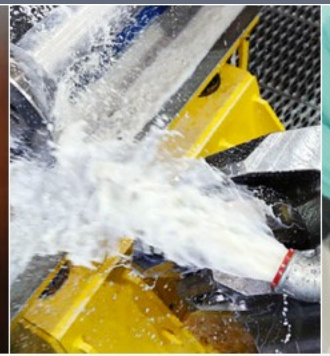


	Enabling capabilities: New market opportunity (scale of emerging UK market opportunity 2027)	Existing SY Market Share	SY Potential 2027
Horizon 1 Supporting existing industries to be more innovative and increase productivity/ competitiveness by adopting existing technologies. Benefits realised within approx. 12 months.	Carbon Accounting: new market opportunity and scale of emerging UK market opportunity n/a to Horizon 1	£0.6bn	+5% productivity
	Supply Chain Readiness	£0.6bn	+5% productivity
	Circularity & Sustainability	£0.6bn	+5% productivity
	Industrial Digitalisation (Incl Retrofit) For Productivity & Energy Efficiency	£0.6bn	+5% productivity
	Design, Modelling, Stimulation	£120m	+10% productivity
	Robotics, Automation & Control	£120m	+10% productivity
	Additive Manufacturing	£240m	+10% productivity
	Lightweight & Sustainable Materials: Aero, Auto, Defence, Offshore (£35bn)	£325m	+£30m
	Lightweight & Sustainable Materials	£240m	+10% productivity
Horizon 2 Developing new technologies for growth in areas of market opportunity, building on emerging strengths in SY. Benefits realised within approx 2-4 yrs.	AI & Data Driven Manufacturing	£480m	+10% productivity
	Hydrogen (Fuel Cells, Electrolysers, Combustors): Aero, Auto, Energy (£57.2bn)	£634m	+£50m
	Advanced Medical Imaging Tech: Life Sciences, Equipment Manufacturing (£36bn)	£569m	+£40m
	Digital Therapeutics & Wearable Devices: Life Sciences (£14bn)	£157m	+£20m
	5G & Wireless Connectivity Tech: Aero (£8.5bn)	£32m	+£4m
	Batteries Production/Assembly For EV: Auto, Aero, Equipment Manufacturing (£36bn)	£590m	+£30m
	AI & Bioinformatics: Life Sciences (£14bn)	£157m	+£17m
	Industrial Internet of Things (Iot) & Digital Twins: Aero, Auto, Defence, Metal Fabrication, Life Sciences (£46bn)	£1,113m	+£75m
Horizon 3 Development of new technologies for market opportunity areas where current SY business base is in a strong position to take advantage (with appropriate support). Benefits realised 4-10 yrs.	Advanced Medical Imaging, Digital Therapeutics & Wearable Devices: Life Sciences (As Above - £36bn +£14bn)	(£569m+£157m)	2 start-ups
	Nuclear SMR/AMR: Nuclear (£33bn)	£46m	+£400m
	Nuclear Fusion: Nuclear (N/A)	n/a	L/T impacts
	Genomics & Gene Therapy: Life Sciences (£14bn)	£157m	+£15m
	Carbon Capture Use & Storage (CCUS): Energy (£12bn by 2030)	£456m	+£185m
	Heat Networks/District Zoning: Energy (Impact on Energy Efficiency & Resilient Energy Supply)	n/a	Efficiency/Resilience
	Sustainable Aviation Fuel: Aero (£8bn by 2035)	£32m	+£42m

Barriers to Success



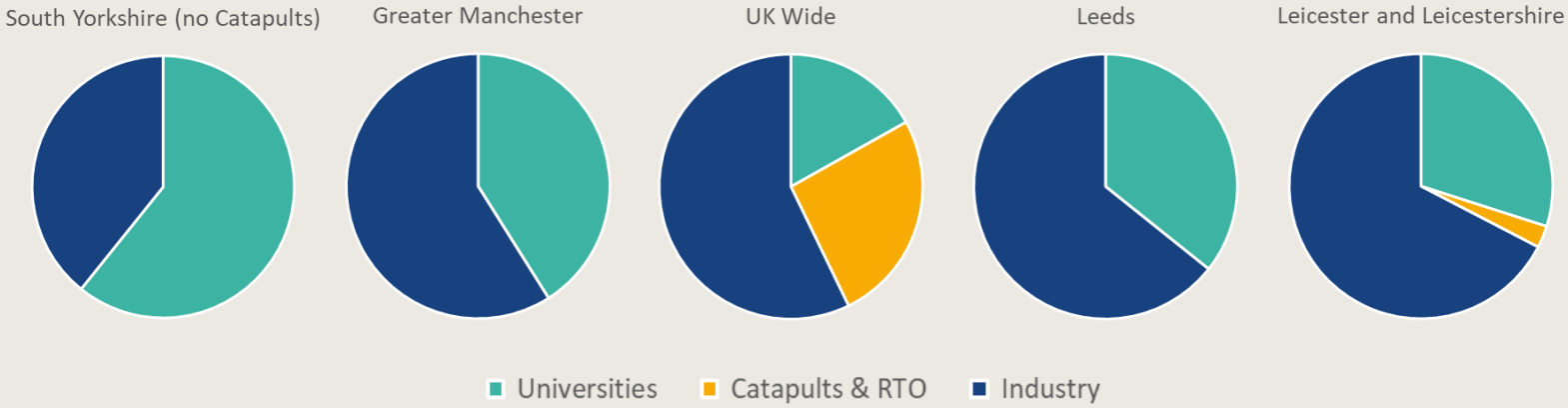




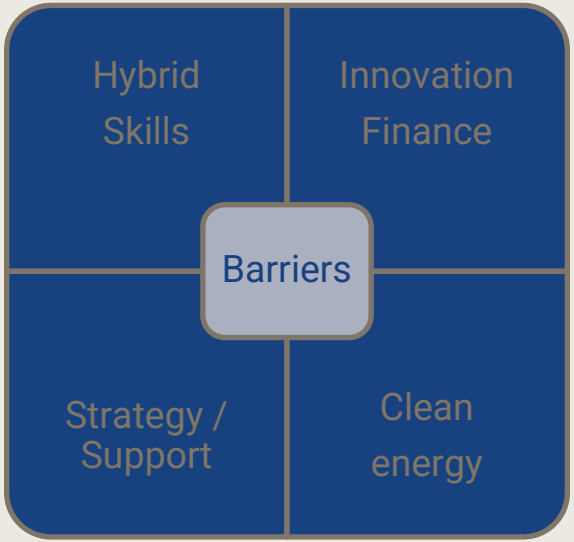

Significant funding, but skewed...

Innovate UK funding awarded (since 1999)

Region	Total	Universities	Catapults & RTO	Industry
South Yorkshire	£ 508,551,525	£ 156,209,271	£ 251,508,722	£ 100,833,532
Greater Manchester	£ 200,772,595	£ 82,365,717	£ -	£ 118,406,878
Leeds	£ 167,639,169	£ 59,850,135	£ -	£ 107,789,034
Leicestershire	£ 225,403,306	£ 67,395,467	£ 6,055,280	£ 151,952,559
UK wide	£ 13,355,997,599	£ 2,257,337,470	£ 3,458,166,551	£ 7,640,493,578



The Business Perspective

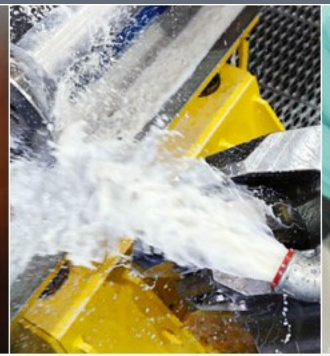


Risk / Barrier	Description
Skills availability	• Local labour mostly has experience in "traditional" manufacturing and engineering capabilities. • Attracting **talent with a hybrid manufacturing skillset** and retaining university alumni with relevant expertise is critical.
Support to scale	• Small business, especially those with high manufacturing demands, **lack capital and facilities to scale up operations**. • It is often **difficult to get SME financing for low TRL projects**, support is needed to **de-risk investment** • Many SMEs are focused on the day-to-day, and don't have the **capacity to collaborate** and expand into new areas
Unclear regional strategy	• There is limited cross-sector support within the region. • This is largely driven by a **lack of shared understanding** across different stakeholders **on the strategy and direction of AMID**.
Access to capital	• Micro and small sized businesses highlighted a **lack of channels to access funding or support for grants** in efforts to reduce risk of investment. • This limits the growth trajectory of these entities.
Access to clean energy	• Growth of manufacturing, digital and sustainability businesses within the district **requires sufficient energy, with growing demand for renewable energy sources**.

Recommendations

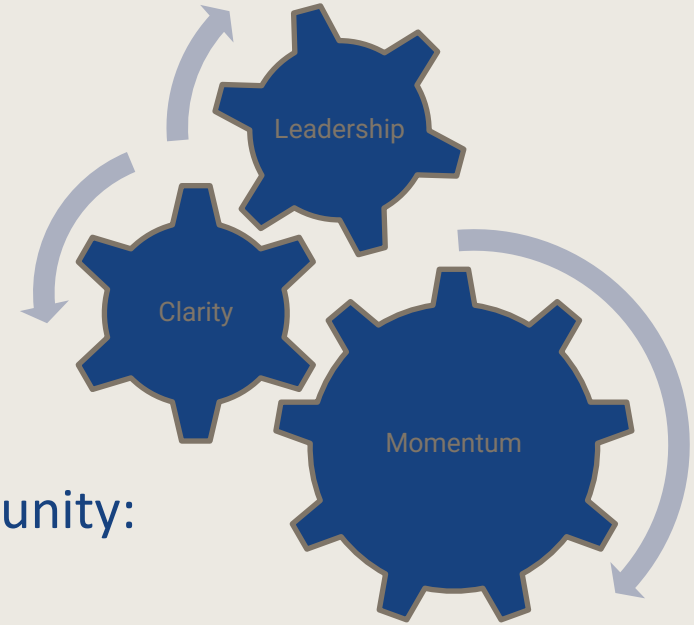







Call to Action

- Provide coherent innovation Leadership:
  - To central Government
  - For local businesses
  - To attract inward investors
- Provide clarity of innovation offering:
  - Which regional strengths will you back?
  - What are you offering?
  - How can the community engage?
- Maintain momentum with Innovation Community:
  - Continue engaging community
  - Providing tangible “quick wins”
  - Co-create credible strategy



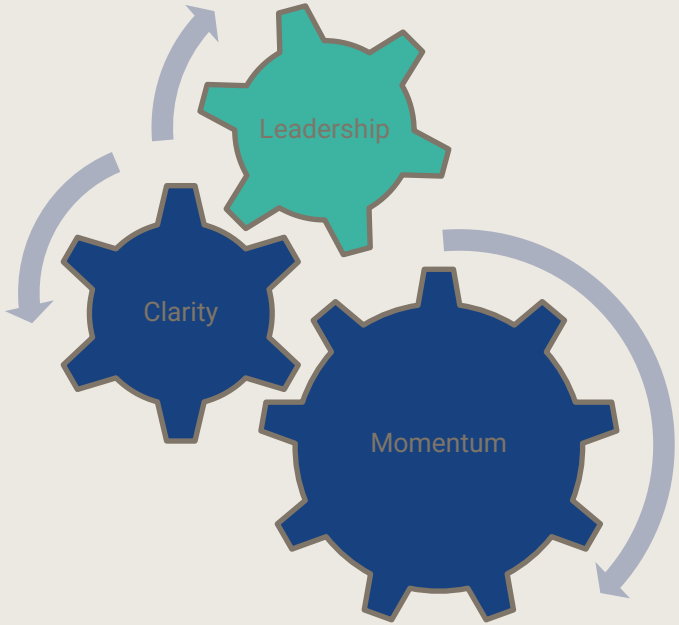
Recommended Implementation Plan

Provide coherent innovation Leadership:

1) Develop an integrated proposition and regional partnership agreement with UKRI to attract place-based innovation support

2) OEMS and TIER 1s to provide sectoral leadership and steer to local supply chains for capability development/export

3) Targeted grant funding support for long tail of innovation inactive firms in SY



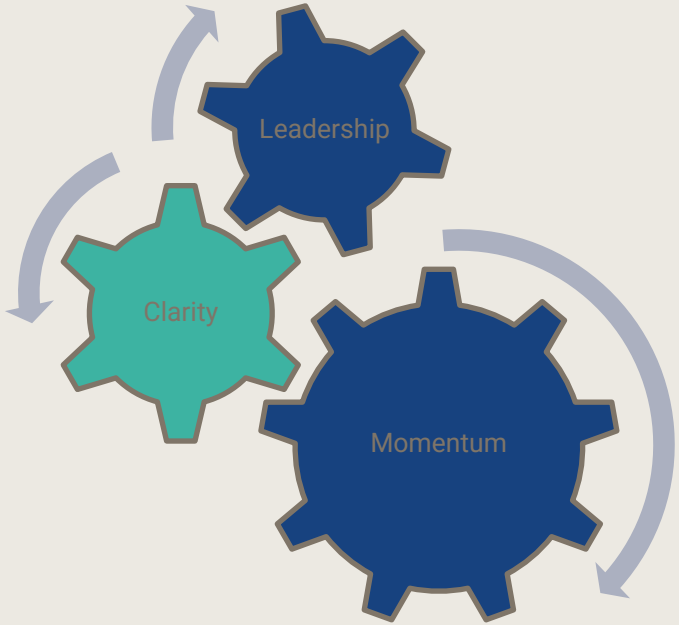
Recommended Implementation Plan

Provide clarity of innovation offering:

1) Supply chain mapping and gap analysis of high-growth potential sectors to provide the position, both geographically and in the value chain

2) Identify target supply chains for integration and/or diversification

3) Clarify AMID innovation support offerings and facilitate shared access (across all sectors) to existing research facilities and services



Recommended Implementation Plan

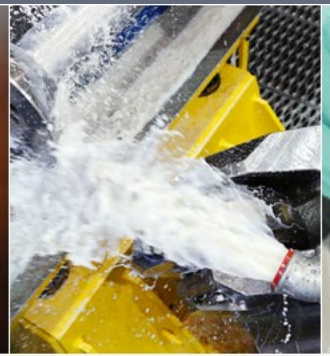
Maintain momentum with Innovation Community:

1) Knowledge providers to proactively engage with the wider business base to ensure knowledge diffusion
2) Invest in skills initiatives esp. on digital, industrial decarbonisation, energy, automation and health tech
3) Roll out company level diagnostic tools and develop an integrated range of innovation advisory services
4) Prioritise innovation support for 6 themes, taking a portfolio approach across all three horizons (ensuring infrastructure support to de- risk Horizon 2/3 opportunities)

To sum up








Final Thoughts

- South Yorkshire Core strengths:
  - Advanced materials
  - Metallics processing
  - World class research and innovation capabilities (including robotics, digital)

- Emergent opportunities:
  - Life sciences; health & wellbeing
  - Clean energy; hydrogen; nuclear
  - Defence

Example of regional Advanced Manufacturing

- Required Ecosystem:
  - Establish supply chain clusters connecting SMEs with OEMs and RTOs
  - Ensure skills, innovation, finance are accessible to all to unlock growth
  - Build consensus and coherent leadership to develop an integrated proposition and improve visibility at regional and National level

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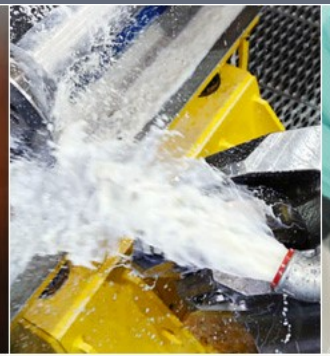
Open Discussion





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