

TEAM CADAIR BERWYN

ASSESSMENT ₁ INTERNATIONAL INNOVATION PRESENTATION

Module Code : ACPA 7003

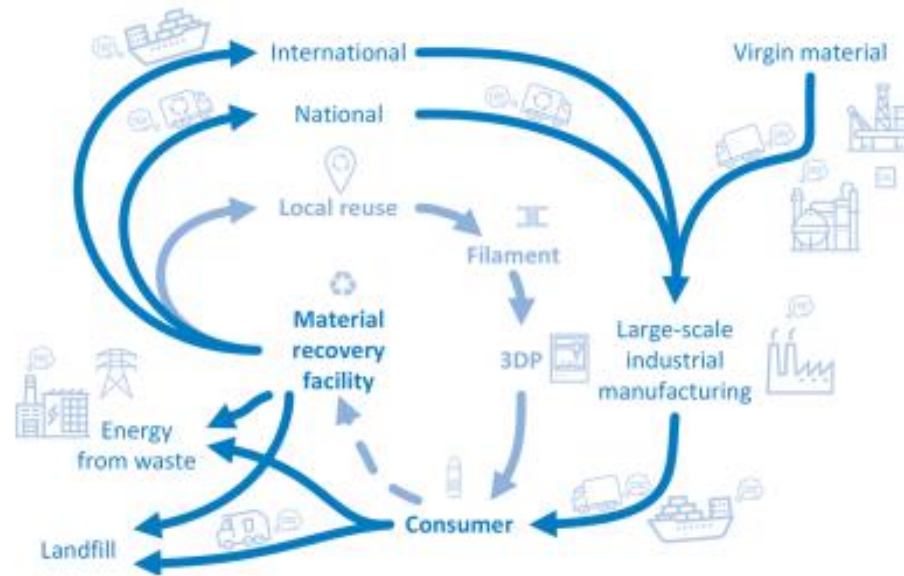
Team members : Elin Davies / Laura Davies / Maria Shipman / Sara Ladd

Lecturer : Alan Mumby



CIRCULAR ECONOMY / SUSTAINABILITY

FIGURE 1. A schematic diagram showing the local, national, and international material flows.



Note: 3DP = three-dimensional printing.

**CIRCULAR
ECONOMY AND
HOW ADDITIVE
MANUFACTURING
CAN BE A
SUSTAINABLE
PRODUCTION
PROCESS**

Figure 1

- Reclamation
- Recycle
- Precision
- Energy tracking and timing
- Scalability

What is the research saying so far?

- Research is still ongoing, no definitive trials to refer to.
- Businesses are reluctant to share honest results due to competitive nature of market
- Is AM as energy efficient as perceived?

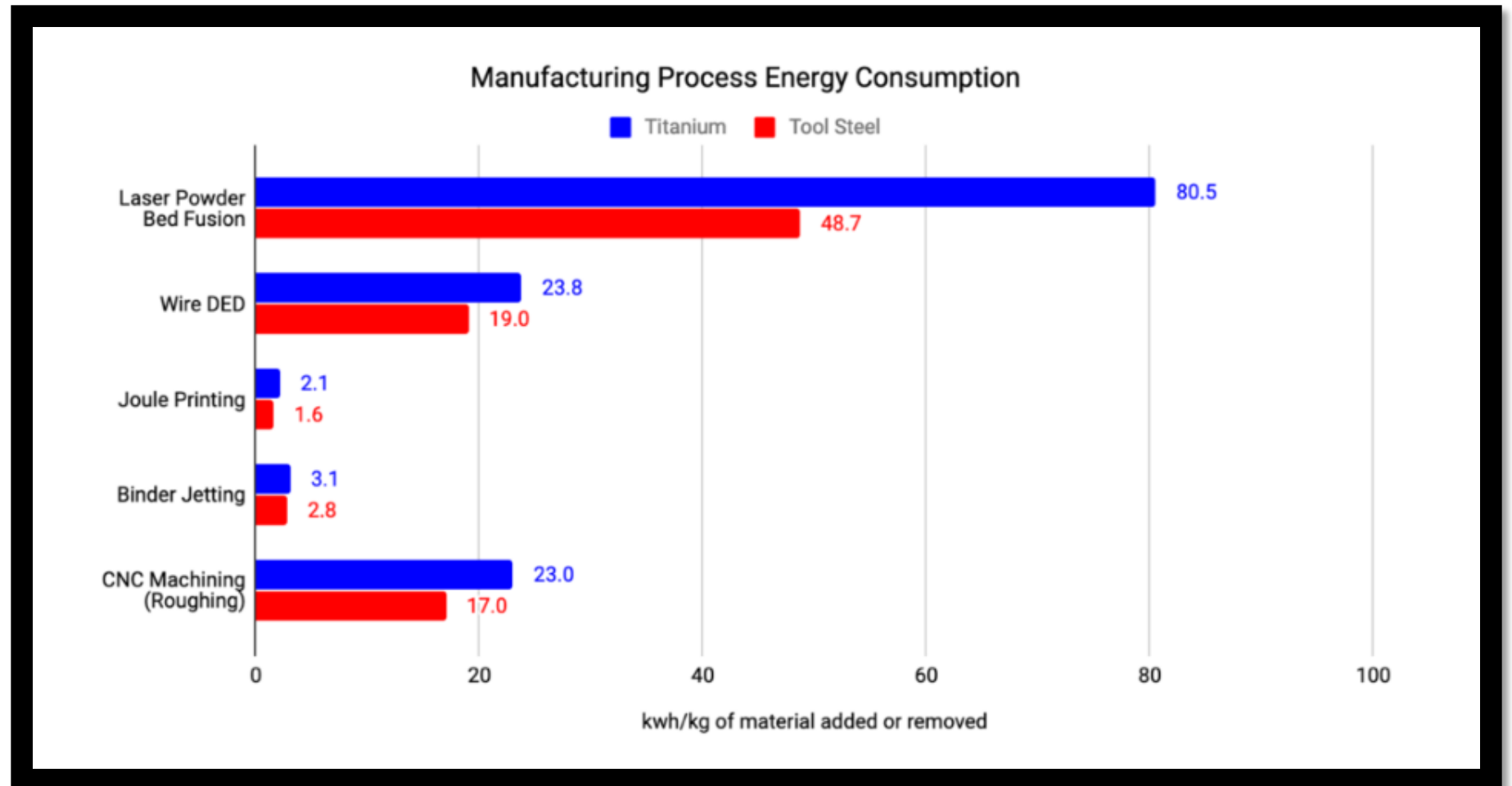


Figure 2: (Huckstepp, 2019)



**HOW CAN WE
DEVELOP THE
MARKETS THAT
WE SIT IN?**

What are the regional insights for Additive Manufacturing

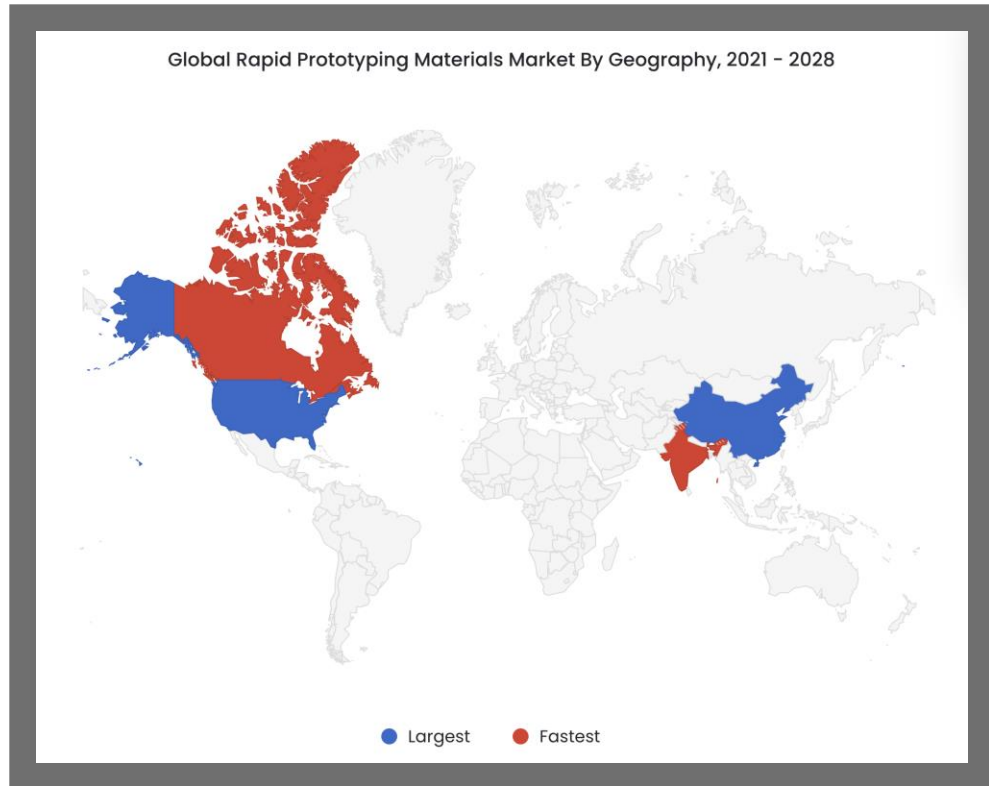


Figure 3: (quest, 2022)

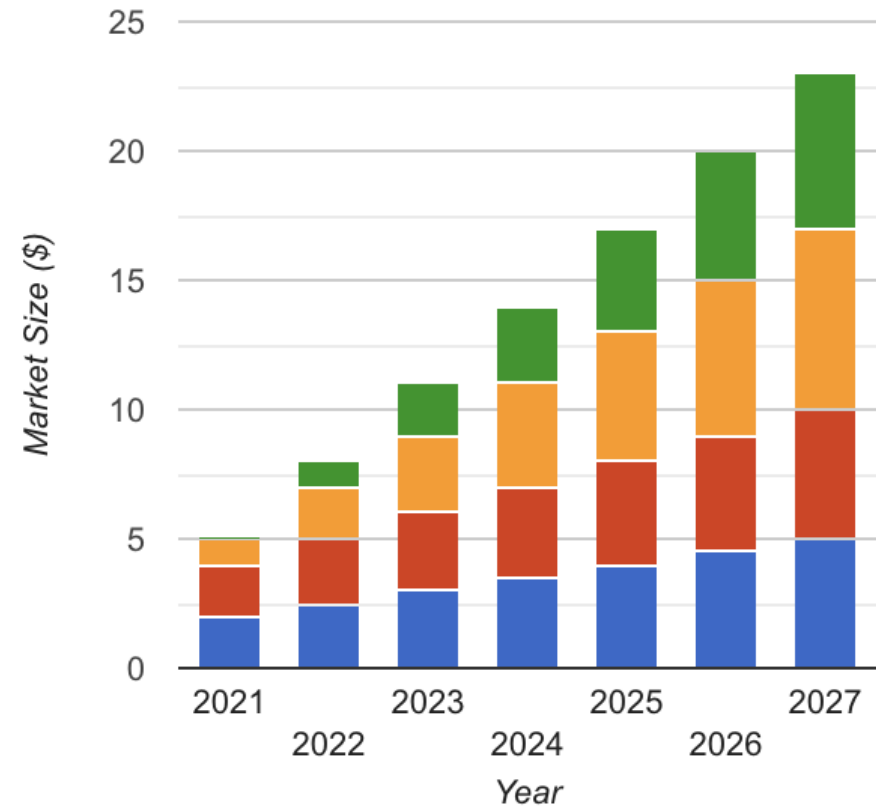


Figure 4: (quest, 2022)



Medical and Dental markets

- Rapid prototype of idiosyncratic shapes of body parts
- Provides flexibility for growth and rapid manufacturing that responds to biological changes in growth and development
- capabilities for dental and facial reconstructions.

Machine ideologies:

- Small and compact
- Clean and sanitary
- Surface roughness Compliant

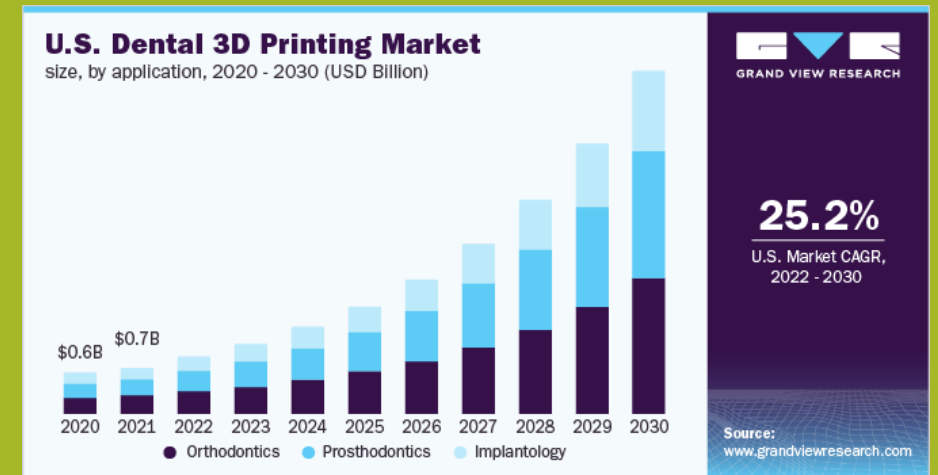


Figure 5: (Grand view research, 2020)

Aerospace

- Jigs & Fixtures
- Surrogates
- Mounting brackets
- High detail visual prototypes

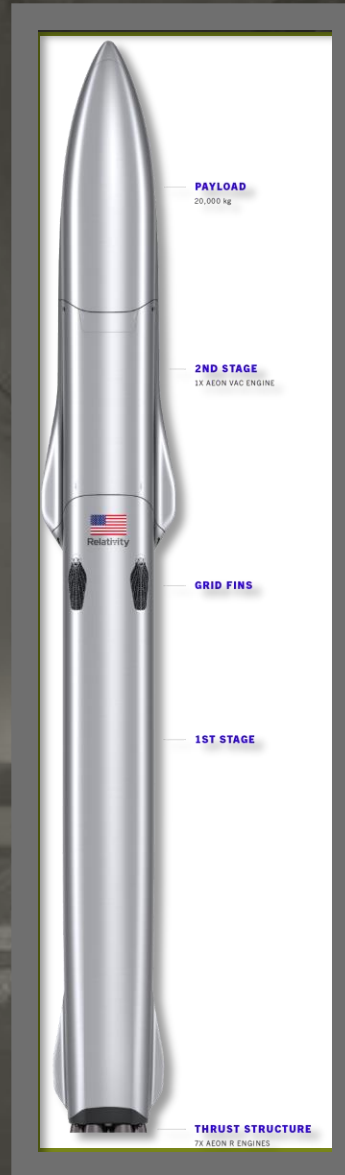


Figure 7: (Relativity, 2022)

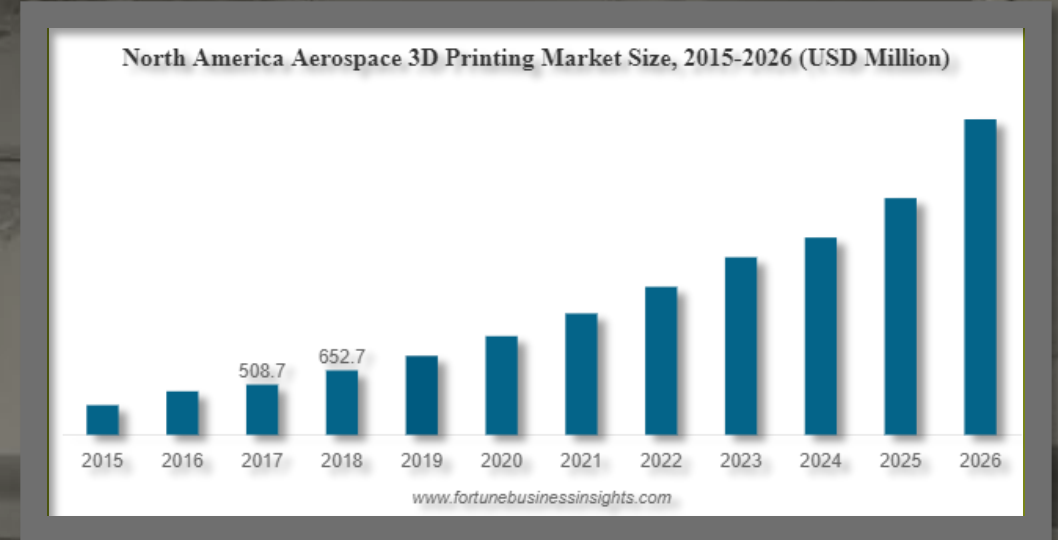


Figure 6: (Aviation, 2018)

Automotive

- Bespoke car designs
- Lighter cars and higher fuel efficiencies
- Fully 3D printed vehicles

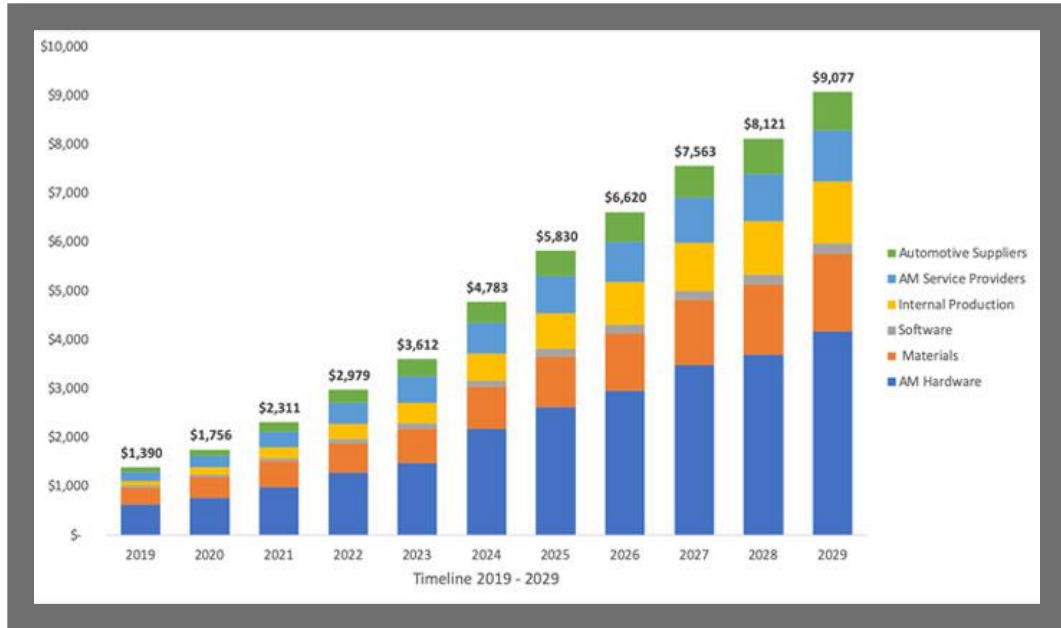


Figure 8: (V, 2019)



Figure 9: (3DPrint, 2015)

"Over the next five years (especially in light of many people shifting to work remotely and the UK's 2040 petrol car ban) we can expect big changes in the automotive industry."

(R.Nichols, 2019)



**CULTURAL / SOCIAL /
ECONOMY**

Global Rankings

Innovation ⁽¹⁾	Environment ⁽²⁾	Wealth ⁽³⁾
South Korea	Denmark	Luxembourg
Singapore	Luxembourg	Singapore
Switzerland	Switzerland	Ireland
Germany	United Kingdom	Qatar
Sweden	France	Switzerland
Denmark	Austria	Norway
Israel	Finland	United States
Finland	Sweden	Brunei
Netherlands	Norway	Hong Kong
Austria	Germany	Denmark

¹ (Bloomberg UK, 2021)

² (Yale Center for Environmental Law & Policy; Center for International Earth Science Information Network, Columbia University, 2020)

³ (Rodriguez, 2022)

Cultural & Social Attitudes

- Lack of awareness/buy in around environmental issues
- Consumerism vs. sustainability
- Global visibility and pressures
 - Qatar – World Cup
 - Indonesia – G20 Summit
 - Egypt - COP27
 - Beijing – Olympics
- Highest level of education/training within population
- Media influences

Political Attitudes

- Government strategy and focus
- Government instability
- War
- Global partnerships/alliances

Economic Attitudes

- Responsibility of 'rich' countries vs. 'poor' countries
- Economic communities and partnered resources
- Core domestic industry
 - Tech (inc Fin Tech)
 - Manufacturing
 - Agricultural

**WHAT HAVE
BUSINESSES
PREVIOUSLY FACED?**

Indonesia CEF 2018

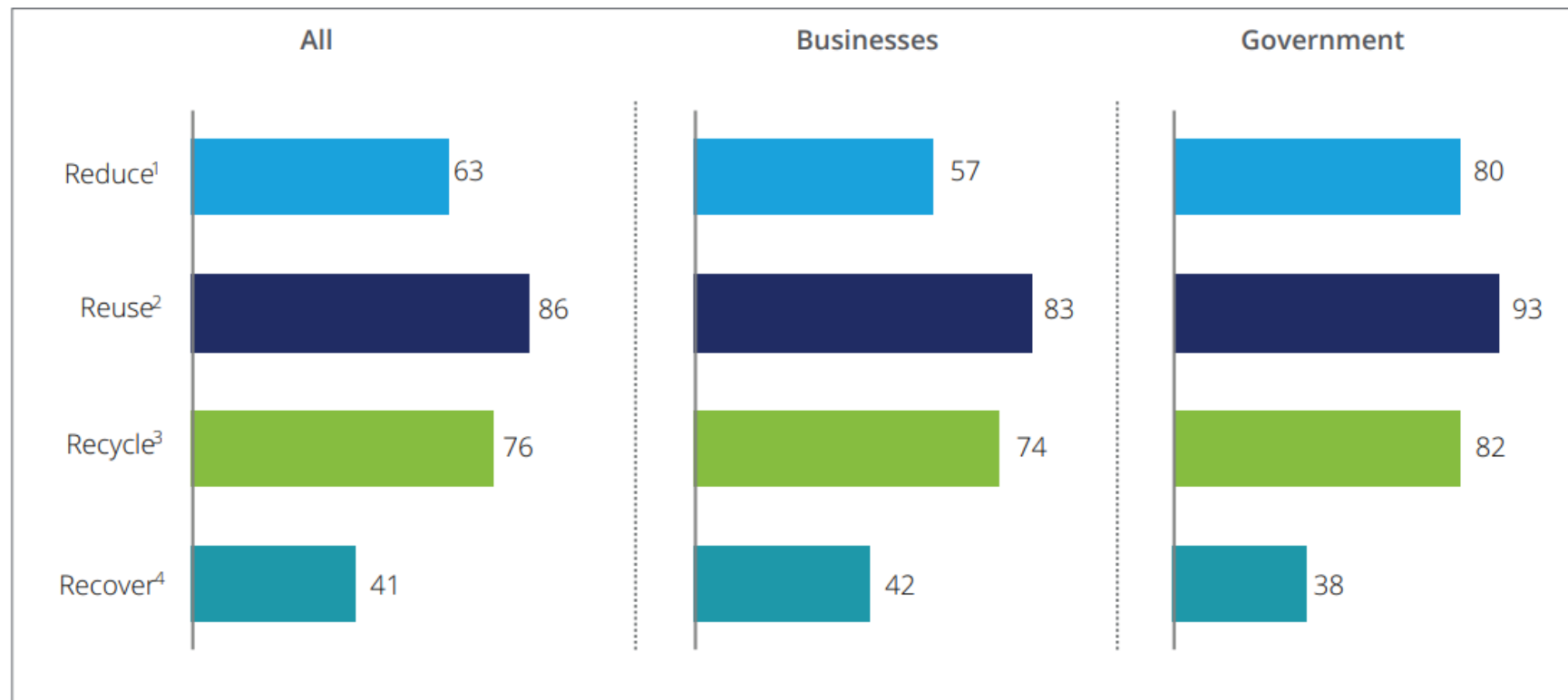


- Indonesia's future plan on waste management which leads to the implementation of Jakstranas 2018-2025 programme
 - Indonesia's plastic waste and marine debris countermeasures
- Indonesia's latest efforts on the occasion of the circular economy era

Bahraini. A (2021)

Figure 1. Conceptualizations of the Circular Economy

- 1 = Rethinking, redesigning (including prolonging the lifespan of products), minimization, reduction, prevention of resource use and/or preserving of natural capital
2 = Reusing (excluding waste), closing the loop, cycling, repairing and/or refurbishing of resources
3 = Remanufacturing, recycling, and/or reuse of waste
4 = Incineration of materials with energy recovery



**WHAT ARE THE
COMMON FACTORS
THAT NEW
BUSINESSES FACE IN
TODAY'S WORLD?**



- FINANCE

- SECURITY

- COMPETITION

- EXPECTATION

- TEAM

- CULTURE

- CUSTOMERS

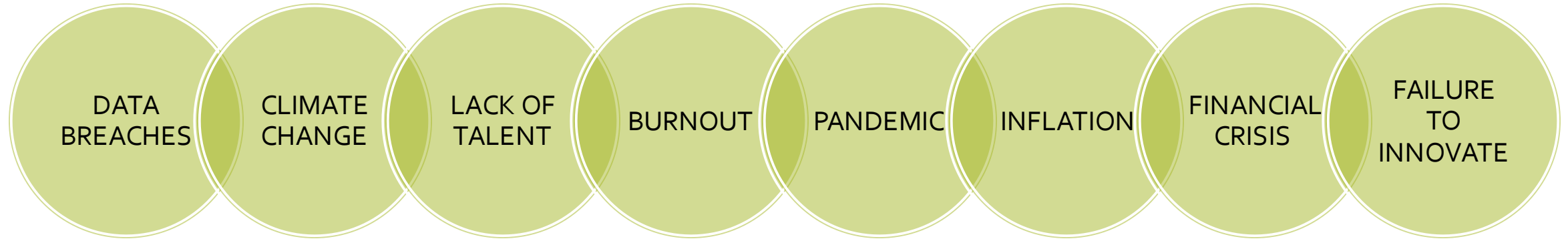
- LOCATION

- SUSTAINABILITY

- DEVELOPMENT

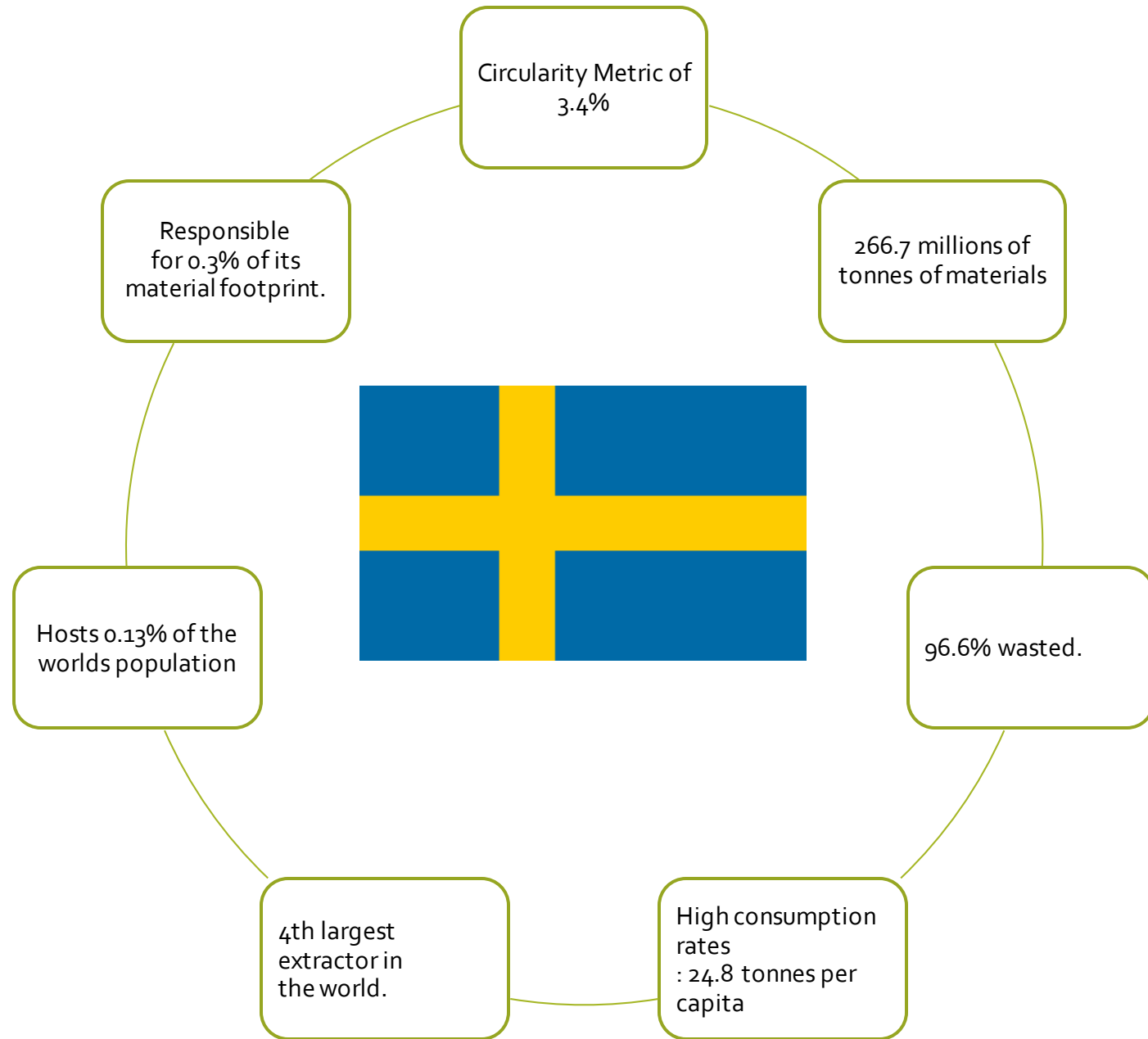
TECHNOLOGY

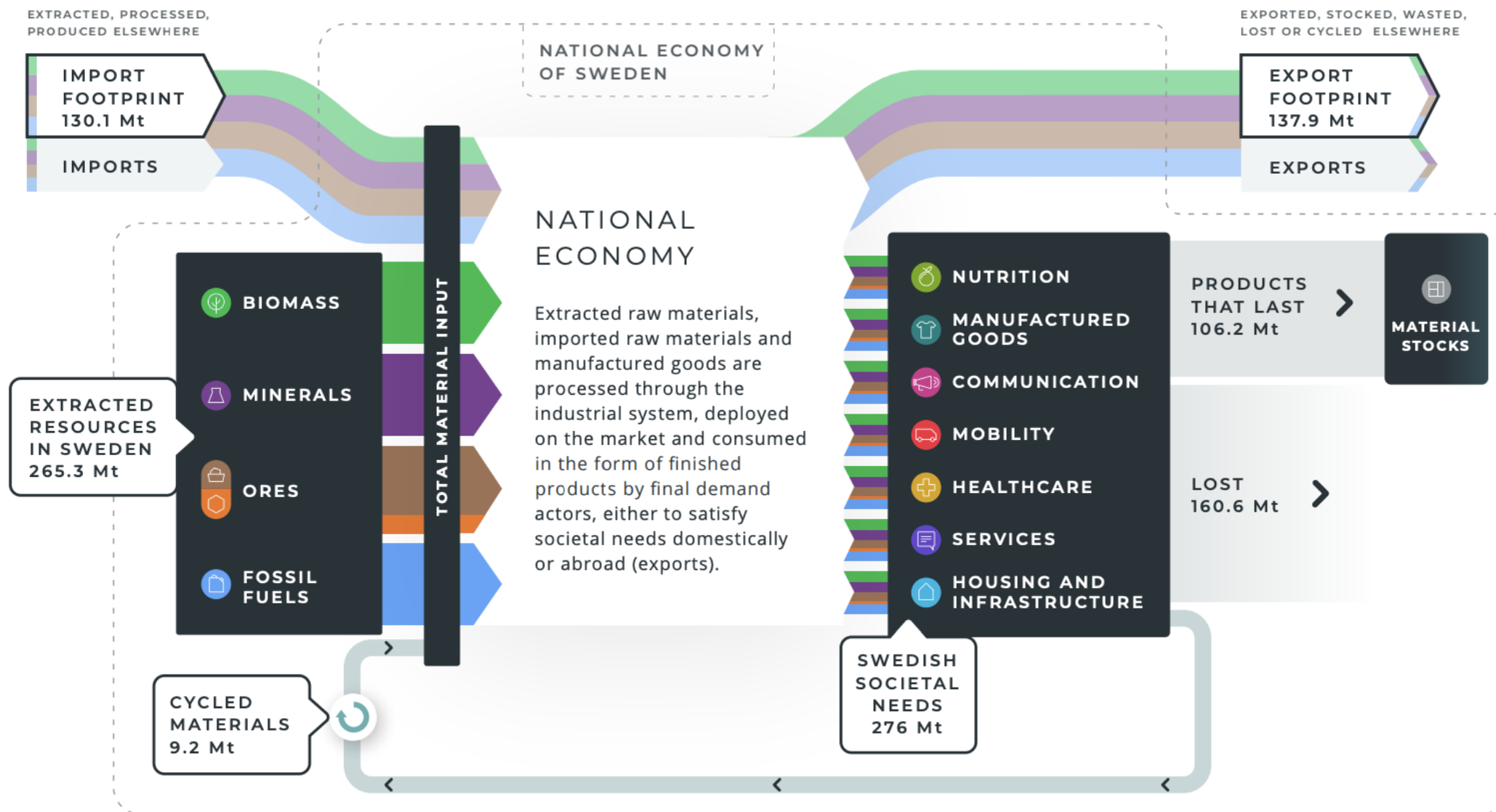
MANUFACTURING



Global Circularity Metric







GOTHENBURG.

Voted World's most sustainable destination according to the Global Destination Sustainability Index.
6 times in a row.



The world's most sustainable destination

2021 Lonely Planet – World's Most Sustainable City stay.

Low emission zone in the centre.

First city in the world to issue Green Bonds.

95% of hotels are eco certified

97% of public transport run on renewable energy

NORWAY.

\$26.9 million equity funding
22 blockchain solution
providers

DENMARK.

\$32.4 million fund raised
24 blockchain startups

SWEDEN.

\$39.9 million raised in initial coin offerings
15 blockchain startups launched



FINLAND.

18 blockchain startups

ESTONIA.

\$284 million raised
200+ blockchain solution
providers

LITHUANIA.

\$1.09 billion raised by local startups
31 blockchain startups

TRUMPF



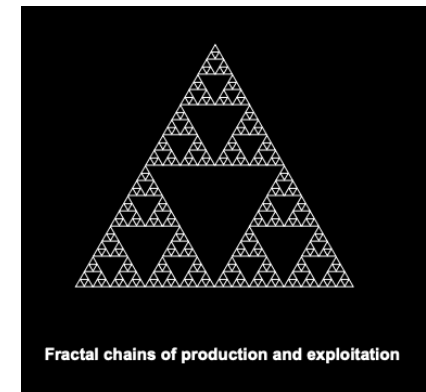
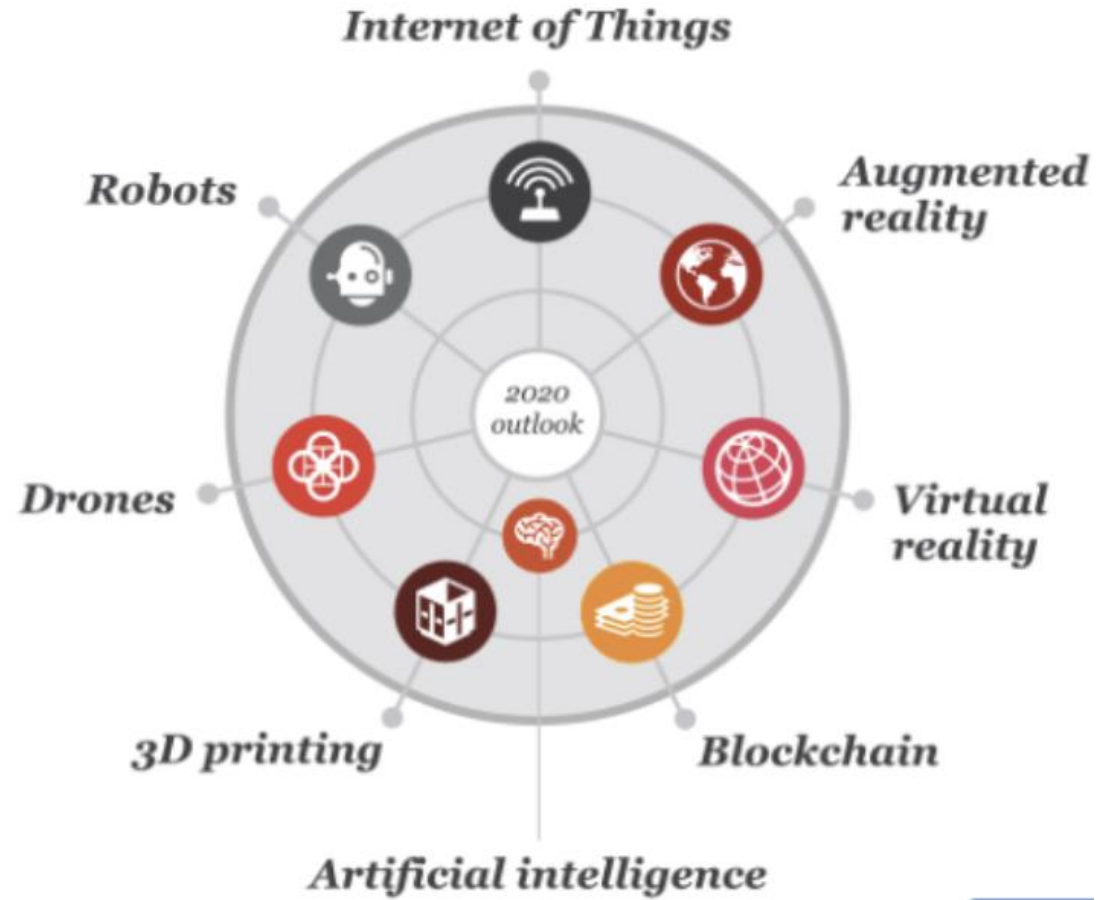
CBM Wales Centre For Advanced
Batch Manufacture

Canolfan Gweithgynhyrchu
Arloesol Ac Arbrofol Cymru

**ORANGE
CULTURE**

N I G E R I A

The essential eight technologies



**HOW THE
INNOVATION IS
MANAGED.
FROM CONCEPT TO
DELIVERY.**

Additive Manufacturing - Areospace

October 1st:

1

Plan Duration

 Actual Start

 % Complete

Actual (beyond plan)

% Complete (beyond plan)

[illegible]

REFERENCES

Attlee, D. (2022). *The state of crypto in Northern Europe: Hostile Scandinavia and vibrant Baltics*. [Online]. cointelegraph.com. Last Updated: 30 October 2022. Available at: <https://cointelegraph.com/news/the-state-of-crypto-in-northern-europe-hostile-scandinavia-and-vibrant-baltics> [Accessed 22 November 2022].

Bahraini, A (2021) *The 5 common obstacles in implementing circular economy* [online] available at: <https://waste4change.com/blog/the-5-common-obstacles-in-implementing-circular-economy/> [Accessed 14 November 2022] .

Bloomberg UK, 2021. *South Korea Leads World in Innovation as U.S. Exits Top Ten*. [Online] Available at: <https://www.bloomberg.com/news/articles/2021-02-03/south-korea-leads-world-in-innovation-u-s-drops-out-of-top-10?leadSource=verify%20wall> [Accessed November 2022].

Cartmill, C. (2022). *Axial3D partners Stratasys to bring 3D printed anatomic models to life*. [Online]. www.newsletter.co.uk. Last Updated: 4 November 2022. Available at: <https://www.newsletter.co.uk/business/axial3d-partners-stratasys-to-bring-3d-printed-anatomic-models> [Accessed 11 November 2022].

Cheema, S. (2022). *What Makes Gothenburg The World's Most Sustainable Destination*. [Online]. www.outlookindia.com. Last Updated: 16 November 2022. Available at: [https://www.outlookindia.com/outlooktraveller/explore/story/72389/what-makes-gothenburg-the-worlds-m](https://www.outlookindia.com/outlooktraveller/explore/story/72389/what-makes-gothenburg-the-worlds-most-sustainable-destination) [Accessed 23 November 2022].

Circle Economy. (2022). *The Circularity Gap Report Sweden*. [Online]. PACE. Available at: https://assets.website-files.com/5e185aa4d27bcf348400ed82/63469714078daaa46750fafe_The%20Circularity%20Gap%20Report%20-%20Sweden.pdf [Accessed 22 November 2022].

Crawford, K & Joler, V.. (2018). *Anatomy of an AI System*. [Online]. Available at: <https://anatomyof.ai/> [Accessed 23 November 2022].

Ellen McArthur Foundation. (2022). *Circular Design For Fashion*. Cowes: Ellen McArthur Foundation Publishing. P77.

Huckstepp, A., (2019). *Environmental Impact of Metal AM*, s.l.: 3D Printing.com.

REFERENCES

- Jones, R. (2019). New Disruptive Technologies Initiative Set to Support Welsh Manufacturers. *Business News Wales*. 1(1), p.1. [Online]. Available at: <https://businessnewswales.com/new-disruptive-technologies-initiative-set-to-support-welsh-manufacture> [Accessed 11 November 2022].
- Klöckner, M et al. (2020). DOES BLOCKCHAIN FOR 3D PRINTING OFFER OPPORTUNITIES FOR BUSINESS MODEL INNOVATION?. *Cambridge BMI Group Working Papers*. 1(1), pp.2-16. [Online]. Available at: https://www.ifm.eng.cam.ac.uk/uploads/Research/BMI/Cambridge_BMI_Working_Papers_02_2020.pdf [Accessed 9 November 2022].
- Kirchherr, M et al. (2017), *Breaking the barrier to the circular economy* [online] available at: https://circulareconomy.europa.eu/platform/sites/default/files/171106_white_paper_breaking_the_barriers_to_the_circular_economy_white_paper_vweb-14021.pdf [Accessed 14 November 2022]
- Malik, S. (2022). *Disruptive Technology and creation of new world*. [Online]. asianatimes.com. Last Updated: 31 October 2022. Available at: <https://asianatimes.com/disruptive-technology-and-creation-of-new-world/> [Accessed 7 November 2022].
- Petch, M. (2022). *2022 TRENDS IN 3D PRINTING, FORECASTS FROM ADDITIVE MANUFACTURING EXPERTS AND LEADERS*. [Online]. 3dprintingindustry.com. Last Updated: 17 January 2022. Available at: <https://3dprintingindustry.com/news/2022-trends-in-3d-printing-forecasts-from-additive-manufacturing> [Accessed 11 November 2022].
- Quest, S., (2022). Global Rapid Prototyping Materials Market. Issue 1, p. 165.
- R.Nichols, M., (2019). *How does the automotive industry benefit from 3D metal printing?*, s.l.: Science direct.
- Relativity, (2022). *100X FEWER PARTS*. [Online] Available at: <https://www.relativityspace.com/rockets> [Accessed 22 11 2022].
- Rodriguez, C., (2022). *The Richest Countries In The World: Tiny Luxembourg At The Top*. [Online] Available at: <https://www.forbes.com/sites/ceciliarodriguez/2022/08/07/the-richest-countries-in-the-world-tiny-luxembourg-at-the-top/?sh=23de9208e072> [Accessed November 2022].

REFERENCES

Segal, E. (2022). *The 10 Biggest Risks And Threats For Businesses In 2022*. [Online]. www.forbes.com. Last Updated: 20 January 2022. Available at: <https://www.forbes.com/sites/edwardsegal/2022/01/05/the-10-biggest-risks-and-threats-for-businesses-> [Accessed 9 November 2022].

Swiss Federal Laboratories for Materials Science and Technology (EMPA). (2022). A swarm of 3D printing drones for construction and repair. *ScienceDaily*. [Online]. Available at: <https://www.sciencedaily.com/releases/2022/09/220922103202.htm> [Accessed 7 November 2022].

TRUMPF Inc. (2019). *A visit to the TRUMPF Smart Factory in Chicago*. [Online]. <https://www.youtube.com/watch?v=kbNwSJyZz1w>. Last Updated: 11 June 2019. Available at: <https://www.youtube.com/watch?v=kbNwSJyZz1w> [Accessed 23 November 2022].

UWTSD. (2022). *Wales Centre for Advanced Batch Manufacture (CBM)*. [Online]. www.uwtsd.ac.uk. Available at: <https://www.uwtsd.ac.uk/wales-centre-for-advanced-batch-manufacture/> [Accessed 11 November 2022].

V, C., (2019). *The use of additive manufacturing by automobile manufacturers*. [Online] Available at: <https://www.3dnatives.com/en/additive-manufacturing-automobile-manufacturers-190820195/#!> [Accessed 22 11 2022].

Yale Center for Environmental Law & Policy; Center for International Earth Science Information Network, Columbia University, (2020). *Environmental Performance Index*, s.l.: s.n.