Delivering the Digital Future we Want, Together

Jan Godsell

8th June 2023

MAKE uk
The Manufacturers' Organisation

MADE SMARTER
INNOVATION

INTERACT
Pioneering human insight for industry

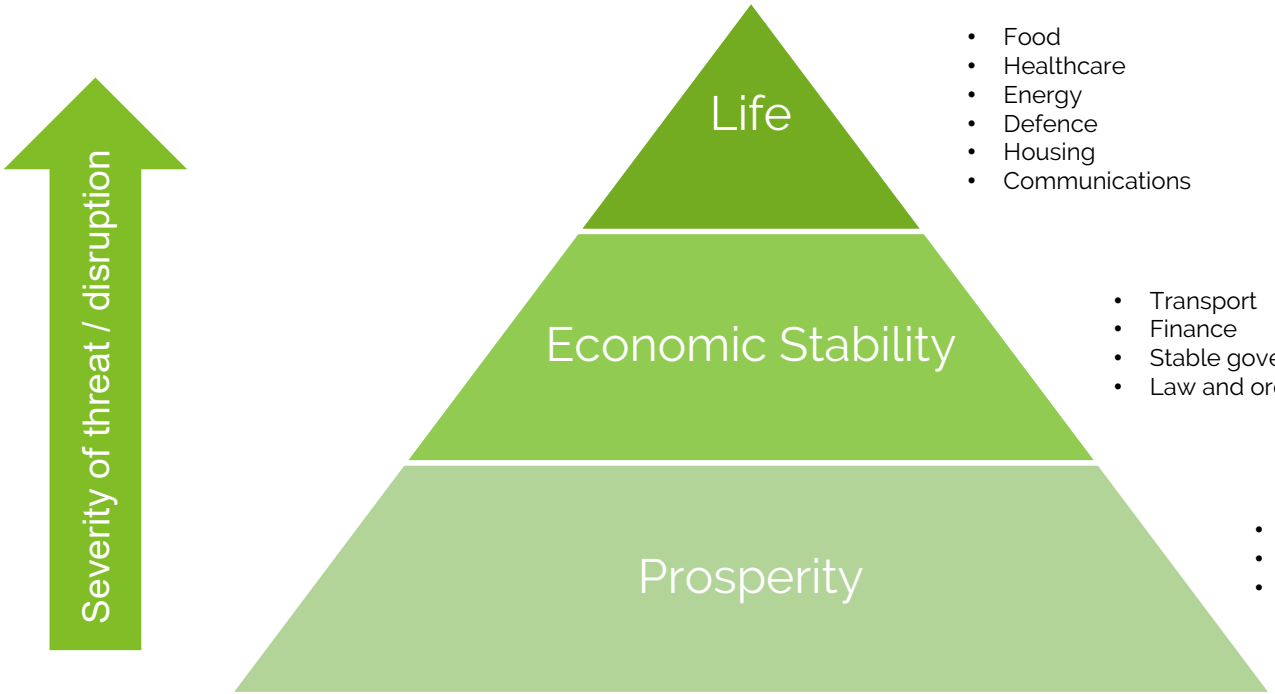
UKRI Economic and Social Research Council

MIDLANDS ENGINE

2023 Manufacturing@MIT Annual Symposium

Charting the Future of Production in a Time of Shifting Globalization

Countries should be self-sufficient in the manufacture of products critical to life…



- Food
- Healthcare
- Energy
- Defence
- Housing
- Communications

- Transport
- Finance
- Stable government and trade arrangements
- Law and order

- Access to education
- Equal opportunities
- Ownership of major organisations

3 things…

1. What we can learn from the past
2. The digital future we want
3. From past to future

01. What we can learn from the past

Lessons to be learnt from 80s manufacturing…

- Vertically integrated
- Generated own power (bi-product of steam production)
- Highly automated process control (hard wired)
- Telematics (inventory visibility of some suppliers)
- MRPII backbone
- Links to the community
- Investment in talent development

And a scale up in the 90s…

- Balancing demand and supply
- Taking and end-to-end perspective
- Need to understand true consumer demand (honesty from customers)
- Work with suppliers to increase supply (flexibility through stability)
- Develop inhouse capability to increase supply
- Use automation to increase supply
- Understand your supply base and potential vulnerabilities
- Close the loop – design for repair
- Empower talent

02. The digital future we want

Made Smarter Innovation (MSI) Challenge…

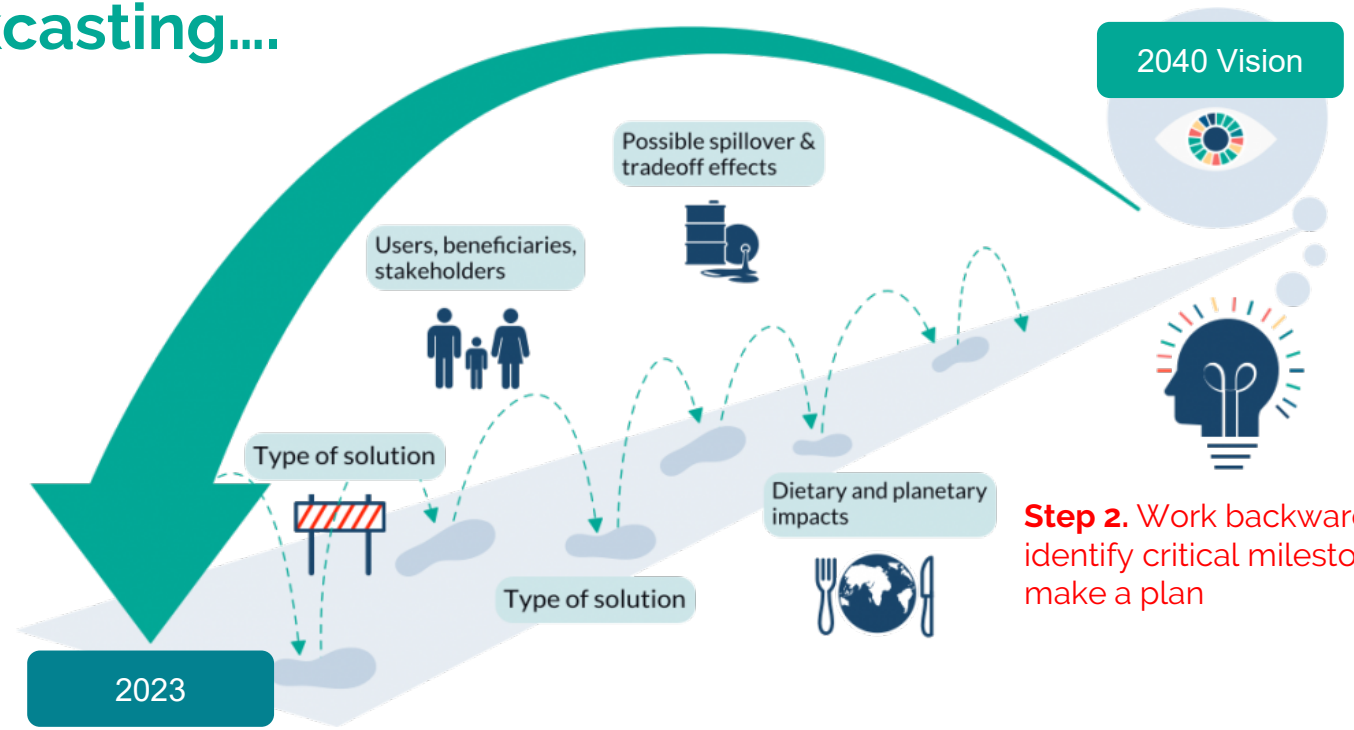
…aims to help **UK manufacturing** become more **productive** and **competitive** through the **innovation and diffusion of digital technology**, and to support manufacturing to achieve **Net Zero** by 2050.

.

Towards the Future of Digital Manufacturing Ecosystems

Backcasting….

Step 1. Identify the future vision

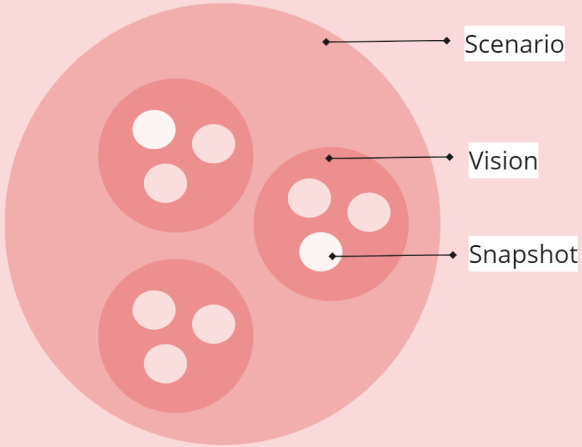


Step 2. Work backwards to identify critical milestones and make a plan

Step 3. Turn the plan into creative & measurable actions

SCENARIO 2040

Approach



1

Productivity Powerhouse

2

Flexibility as the standard

3

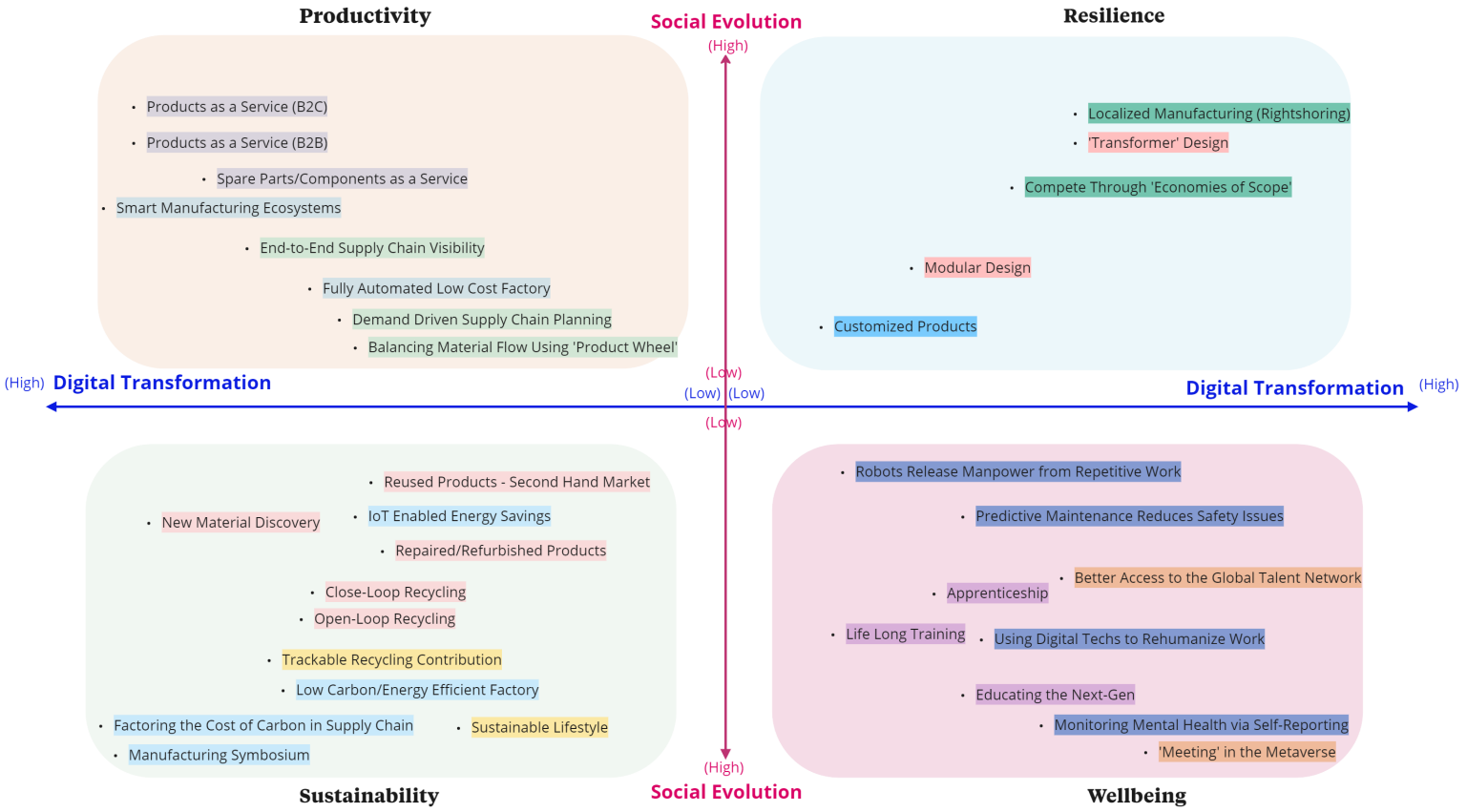
Sustainability Champion

4

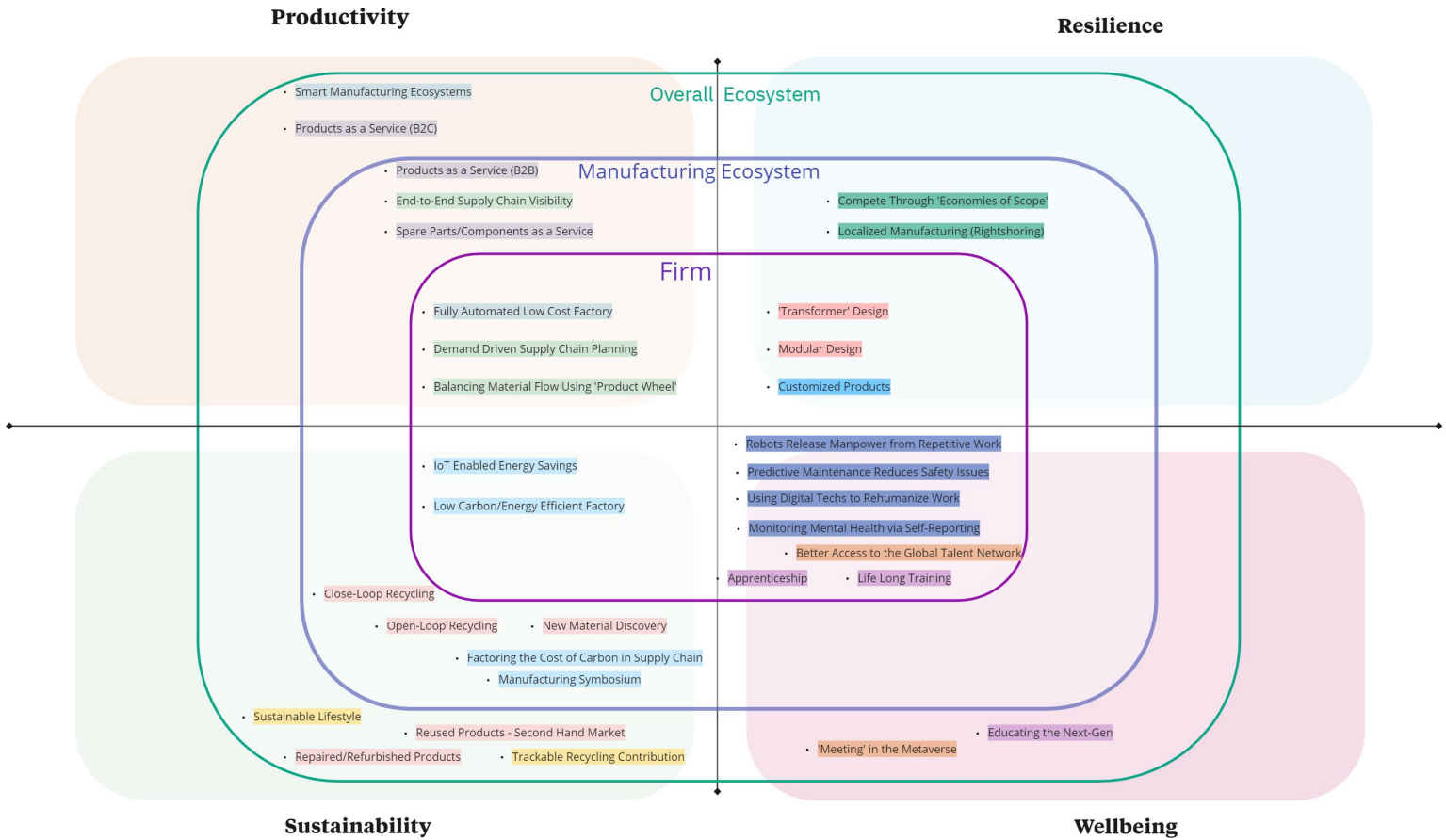
Happy & Sustainable Workforce

4 Scenarios, each with 3 visions…

Scenario	Visions		
Productivity Powerhouse	Digital Manufacturing	Digitally Enabled Integrated Offering	Smart End-to-End Supply Chain Management
Flexibility as standard	Mass Customization	'Flexible' Products	Distributed Manufacturing
Sustainability Champion	Responsible Consumption	Mining Materials from the Current Ecosystems	Carbon-Zero Manufacturing Ecosystems
Happy & Sustainable Workforce	Better Health & Wellbeing	Sustainable Talent Development	Workforce is a Part of the Digital Ecosystem



- Digital Manufacturing
- Digitally Enabled Integrated Offerings
- Smart End-to-End Supply Chain Management
- Mass Customization
- 'Flexible' Products
- Distributed Manufacturing
- Responsible Consumption
- Mining Resources from the Current Ecosystems
- Carbon-Zero Manufacturing Ecosystems
- Better Health & Wellbeing
- Sustainable Talent Development
- Workforce is a Part of the Digital Ecosystem



- Digital Manufacturing
- Digitally Enabled Integrated Offerings
- Smart End-to-End Supply Chain Management
- Mass Customization
- 'Flexible' Products
- Distributed Manufacturing
- Responsible Consumption
- Mining Resources from the Current Ecosystems
- Carbon-Zero Manufacturing Ecosystems
- Better Health & Wellbeing
- Sustainable Talent Development
- Workforce is a Part of the Digital Ecosystem

SCENARIO 2040

Sustainability Champion

In the scenario of Sustainability Champion, UK manufacturing has achieved some of the sustainability goals through the significant improvement of resource and energy efficiency across end-to-end supply chains. This is facilitated by the adoption of circular economy principles and digital technologies, which enable firms to maximize the value of materials through the entire lifecycle.

VISIONS & SNAPSHOTS FROM THE FUTURE

Vision 7 - Responsible Consumption

- Sustainable Lifestyle
- Trackable Recycling Contribution

Vision 8 - Mining Materials from the Current Ecosystems

- Reused Products - Second Hand Market
- Repaired/Refurbished Products
- Open-Loop Recycling
- Closed-Loop Recycling
- New Material Discovery

Vision 9 - Carbon-Zero Manufacturing Ecosystems

- IoT Enabled Energy Savings
- Factoring the Cost of Carbon in Supply Chain
- Low Carbon/Energy Efficient Factory
- Manufacturing Symbiosis

SCENARIO 2040

Sustainability Champion

Vision 7 - Responsible Consumption

- Sustainable lifestyle
- Trackable Recycling Contribution

Vision 8 - Mining Materials from the Current Ecosystems

- Reused Products - Second Hand Market
- Repaired/Refurbished Products
- Open-Loop Recycling
- Closed-Loop Recycling
- New Material Discovery

Vision 9 - Carbon-Zero Manufacturing Ecosystems

- IoT Enabled Energy Savings
- Factoring the Cost of Carbon in Supply Chain
- Low Carbon/Energy Efficient Factory
- Manufacturing Symbiosis

VISION 7

Responsible Consumption

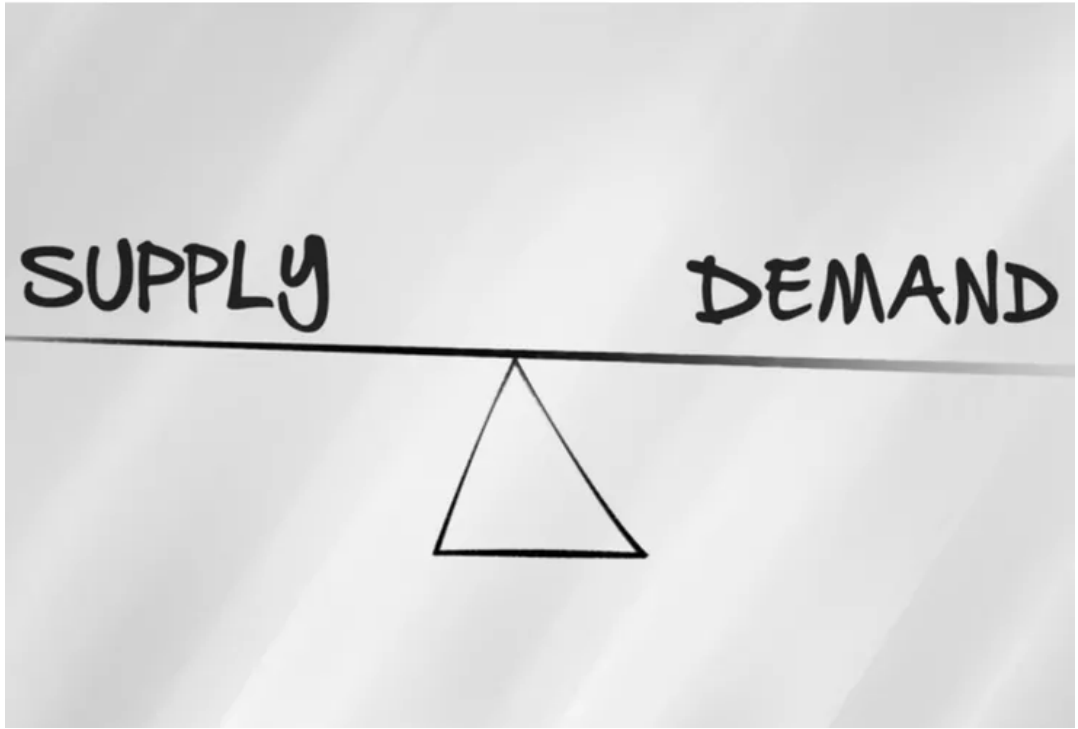
Consumer purchasing decisions are driven by both sustainability and financial factors. This requires a greater level of supply chain visibility, so the relevant data such as carbon footprint, material ingredients, country of origin can be revealed to consumers for them to make a well-informed decision. Moreover, consumers have a better understanding of how they could contribute to the sustainability goal of the entire ecosystem. For example, an initiative has been taken to track individuals' contributions to the material recycling, which is achieved through the tracking technologies. The shift of mindset on the demand side is a critical driver for adopting sustainable practices on the supply side.

Sustainable Lifestyle

Consumer buying behaviours are driven by both the cost and sustainability. The supply chain data associated with a product is gathered through tracking and tracing digital technologies, which help to store data and make it readily visible to consumers to facilitate their purchasing decisions. This shift in the demand side has driven the suppliers/vendors to take a proactive approach to achieving sustainable growth.

03. From past to future

1. Get the fundamentals right



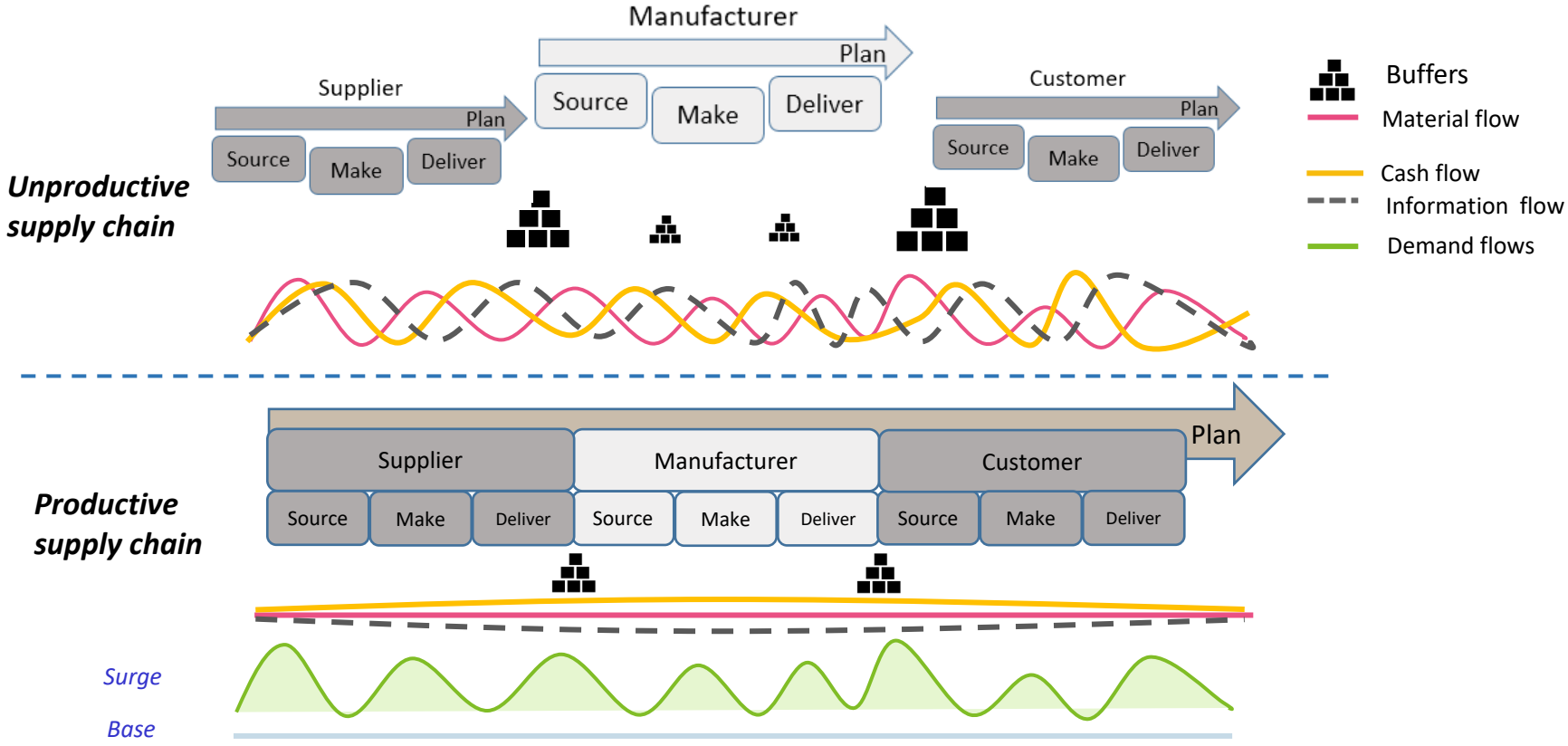
flow

Buffer

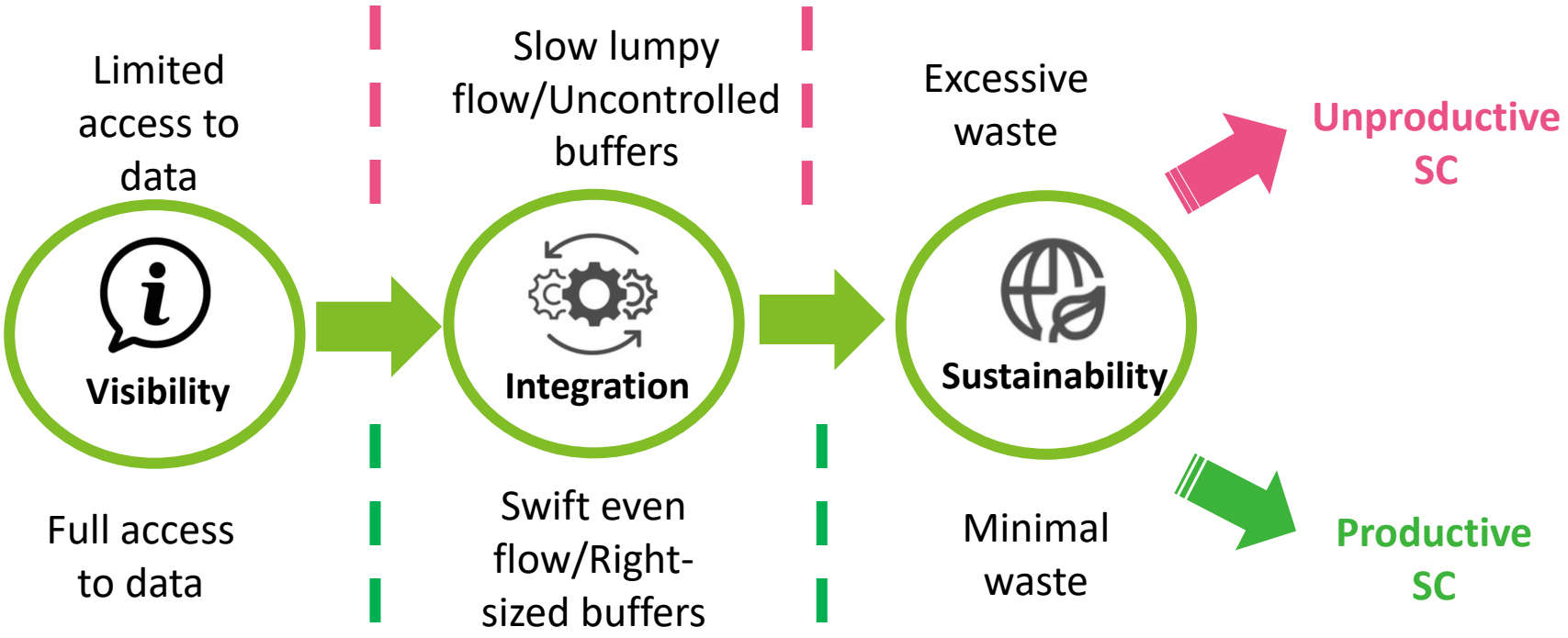
The lean philosophy

1. Understand customer value
2. Develop value streams
3. To make it flow
4. At the pull of the customer
5. In pursuit of perfection

2. Take an end-to-end perspective



To tackle 3 enduring supply chain issues….



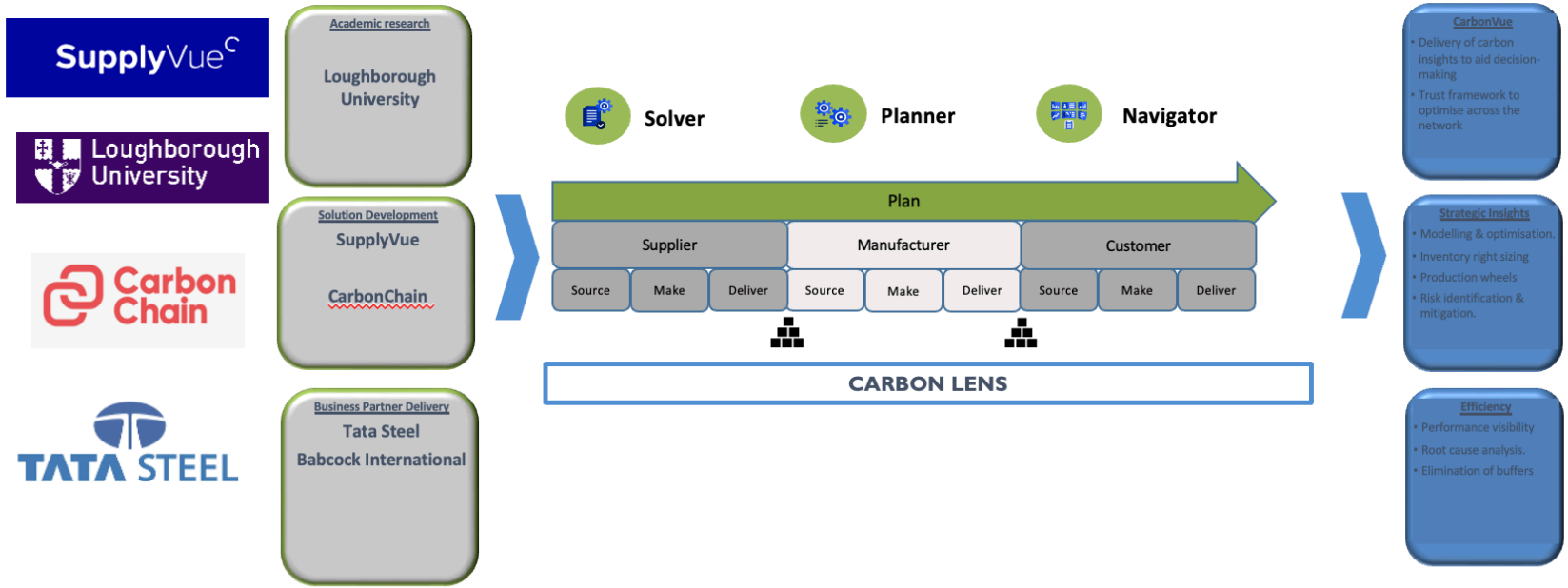
3. Start with consumer demand

What we need	vs.	What we want
Access/use	vs.	Ownership
Utility	vs.	Newness

4. The 4th SC Dimension : Carbon

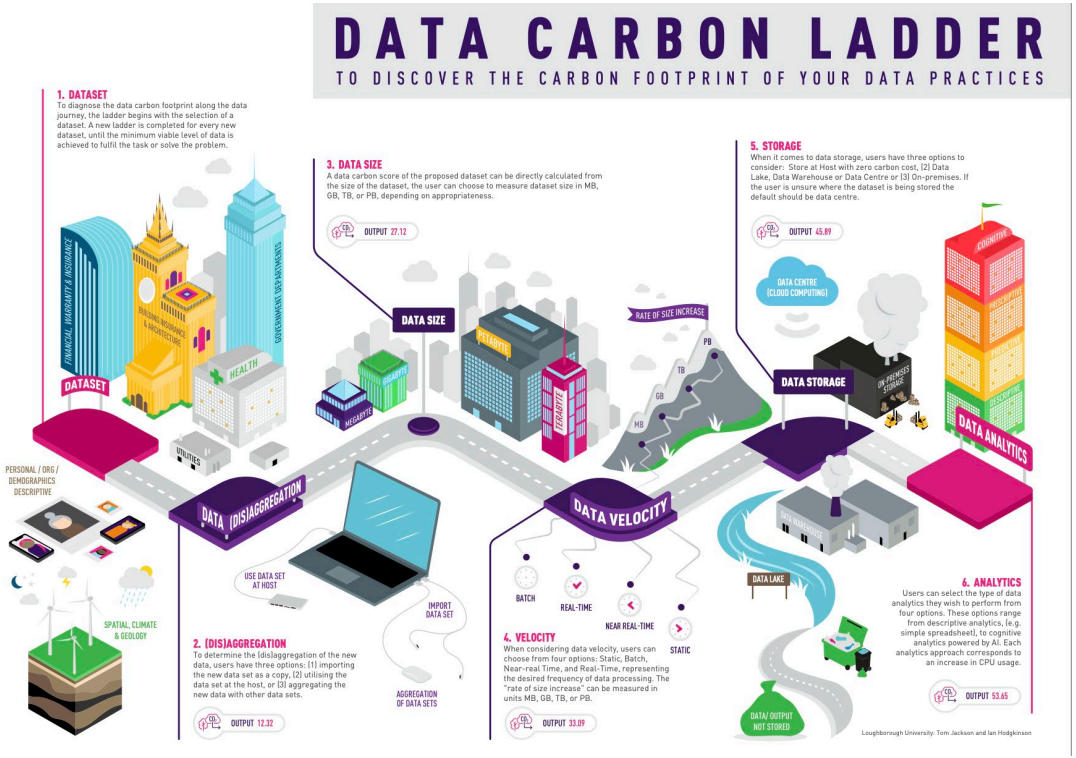
CarbonVue: SC Synchronisation Technology Toolkit

Synchronising supply chains and enabling carbon to be a fourth core consideration in supply chain management, along with the traditional cost, quality and service

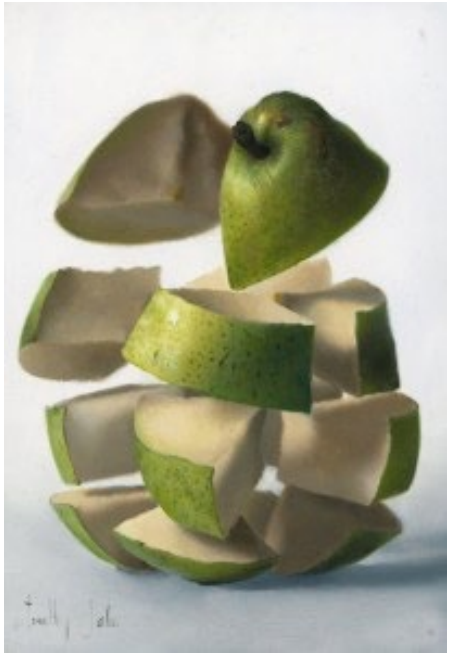


5. Digital decarbonization

New carbon trade off: carbon in inventory vs. carbon in data



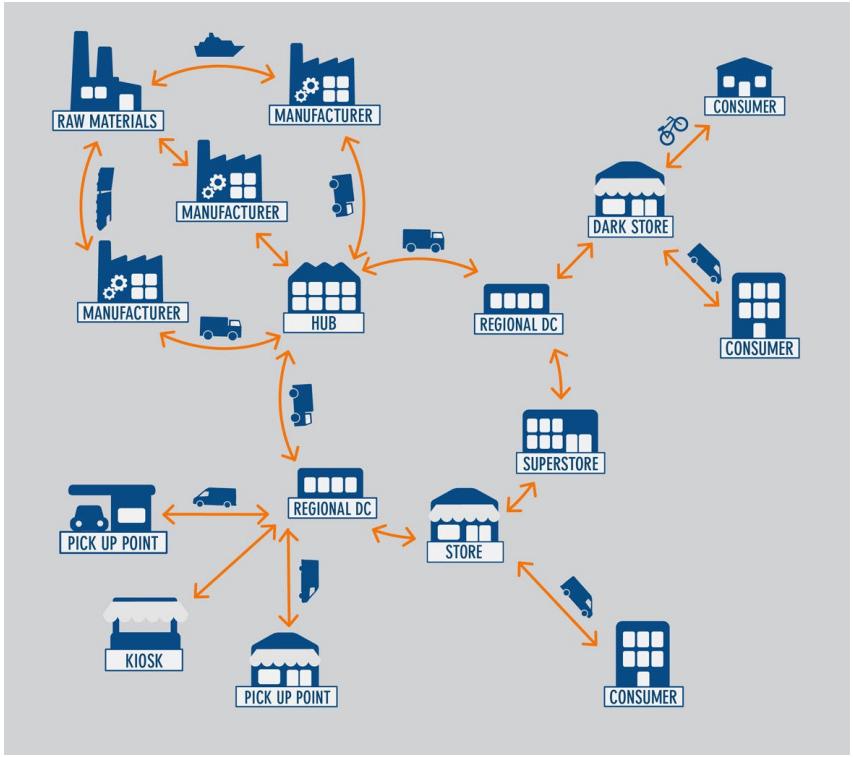
6. Design for structural flexibility



Reconfigure (Timothy Jahn)

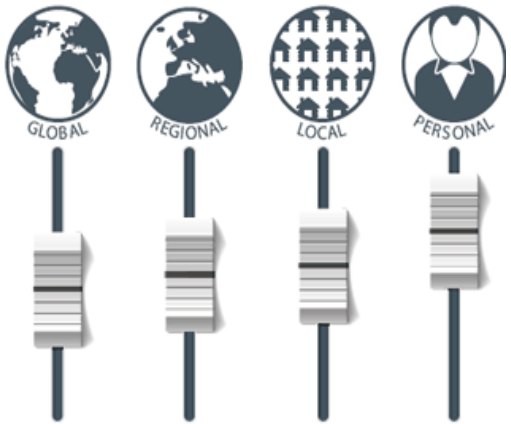
a. What SC assets to have in the network?
b. Where to position the SC assets?
c. What's the ownership / operational model for the asset?
d. Who will manage the network?
e. How will the network remain dynamic and refreshed?

a. What SC assets to have in the network?



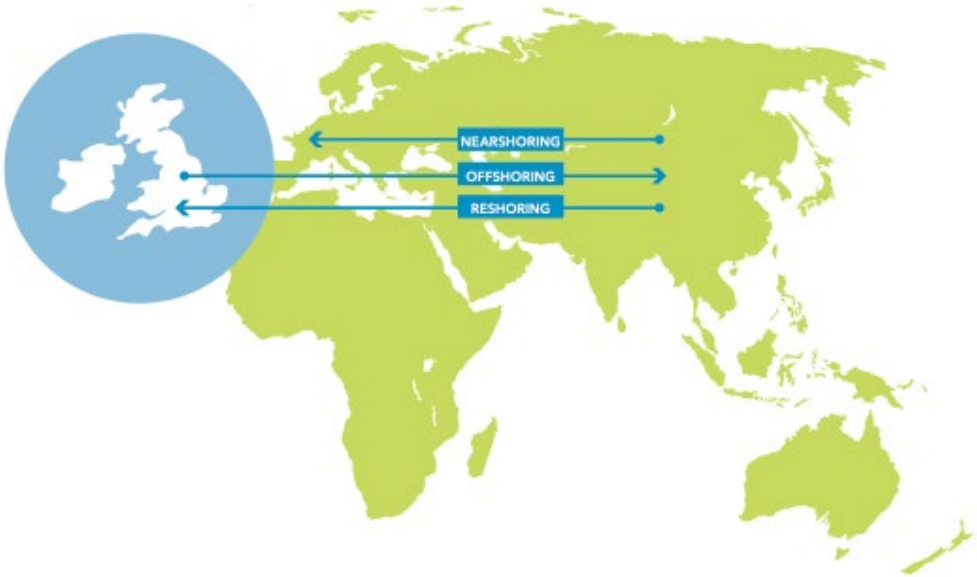
b. Where to position the SC assets?

Right-shoring is the placement of a business' components and processes in localities and countries that provide the best combination of cost and efficiency. Right-shoring does not require a company to move business processes overseas. Rather, it is a strategy in which a business analyzes the complexity and importance of required tasks and entrusts their completion with the most suitable workforce, regardless of location



Source: http://www.investopedia.com/terms/r/right-shoring.asp

Different types of shoring decisions…



Offshoring: A firm's decision to relocate production capacity from its home country to an overseas destination

Nearshoring: A relocation of offshore production capacity to a country geographically closer to the firm's home country

Direct reshoring: A relocation of offshore production capacity back to the home country

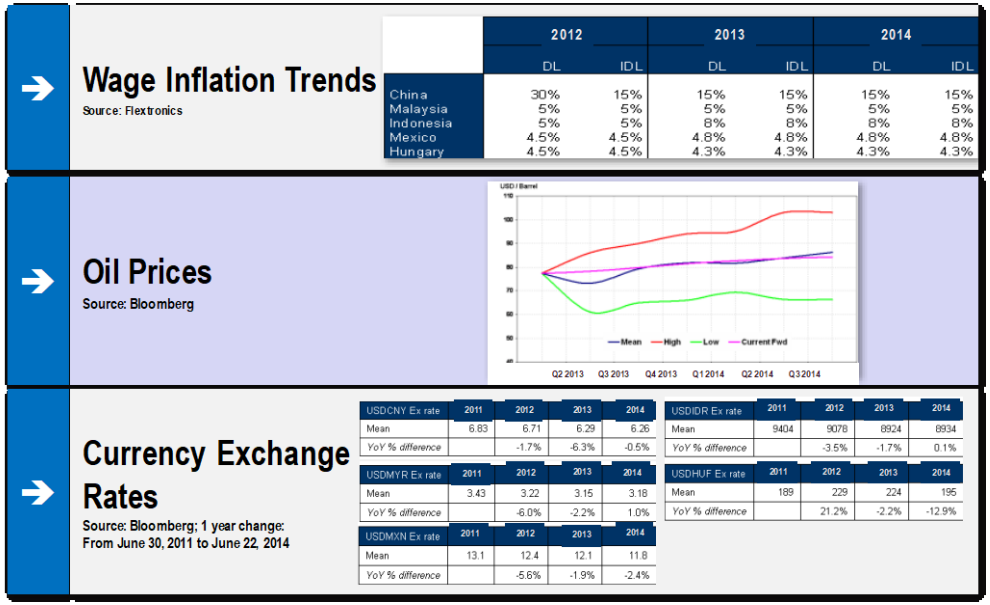
Indirect reshoring: A firm's explicit strategic decision to increase capacity at home instead of abroad

Location decisions are complex…

Strategic considerations	**Business strategy** • Generic strategy • Growth strategy		**Decision type** • Internal decision • Customer requirement	
Operational considerations	**Why?**	**Internal competitive priorities** • Cost • Quality • Time • Flexibility	**External incentives** • Tax • Subsidies	**Risk mitigation** • Cultural distance • Political risk • Social risk • IP risk
	What?	**Product type** • Finished good • Sub-assembly • Componet	**Product heritage** • Original/Existing • Update or new variant • New product	**Other** • Remanufacturing • Product volume
	Where?	**Proximity** • R&D Centre • Head office • Registration country • Main market		
	How?	**Governance** • Our company • An existing supplier • A joint-venture • An new supplier		
Impacts on suppliers	**Local supply base** • Local supply base increased • Local supply base decreased • No change			
Outcome/ performance	**Business performance** • Market share • ROI • Market share growth • ROI growth • ROS • Pre-tax return on assets (ROA) • ROS growth • Customer satisfaction		**Manufacturing performance** • Cost • Quality • Time • Flexibility + carbon	

Requires a total landed cost perspective…

A **total landed cost** is the **total** price of a product once it has arrived at a buyer's door. The total **landed cost** includes the original price of the product, all transportation fees (both inland and ocean), customs, duties, taxes, insurance, currency conversion, crating, handling and payment fees.



Wage Inflation Trends

Source: Flextronics

	2012		2013		2014	
	DL	IDL	DL	IDL	DL	IDL
China	30%	15%	15%	15%	15%	15%
Malaysia	5%	5%	5%	5%	5%	5%
Indonesia	5%	5%	8%	8%	8%	8%
Mexico	4.5%	4.5%	4.8%	4.8%	4.8%	4.8%
Hungary	4.5%	4.5%	4.3%	4.3%	4.3%	4.3%

Oil Prices

Source: Bloomberg

Currency Exchange Rates

Source: Bloomberg; 1 year change: From June 30, 2011 to June 22, 2014

USDCNY Ex rate	2011	2012	2013	2014
Mean	6.83	6.71	6.29	6.26
YoY % difference		-1.7%	-6.3%	-0.5%

USDIDR Ex rate	2011	2012	2013	2014
Mean	9404	9078	8924	8934
YoY % difference		-3.5%	-1.7%	0.1%

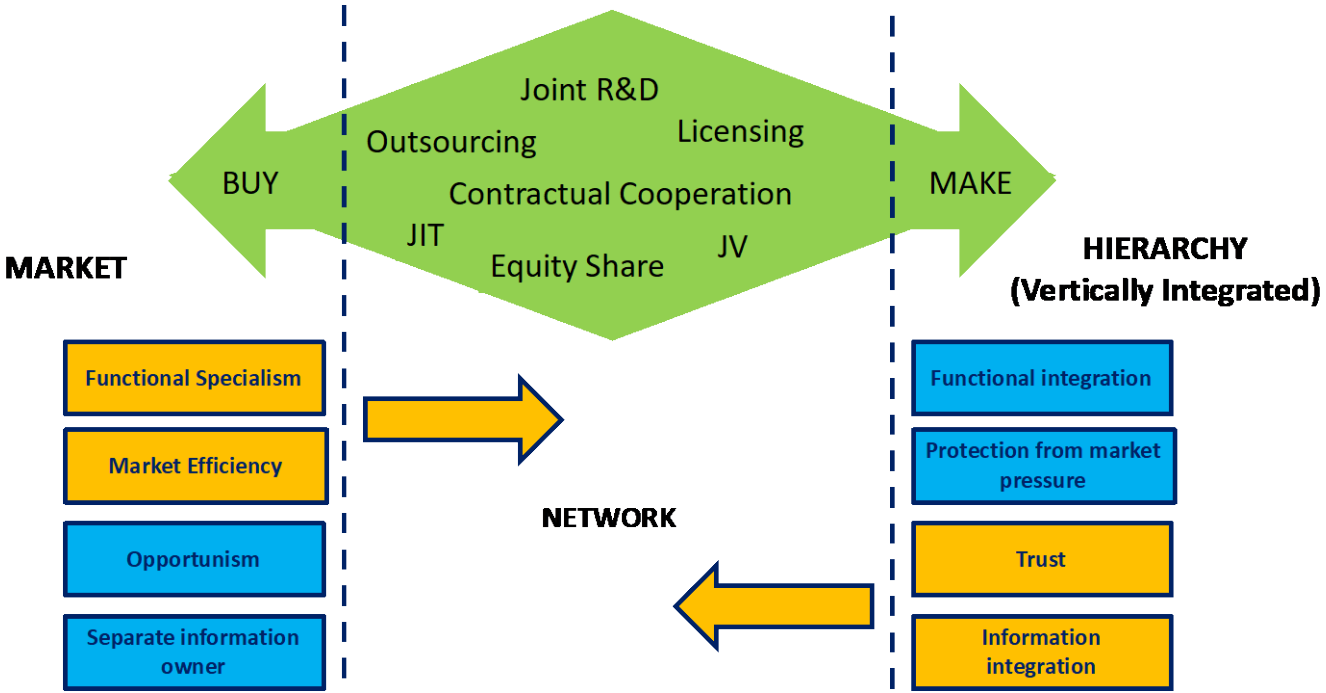
USDMYR Ex rate	2011	2012	2013	2014
Mean	3.43	3.22	3.15	3.18
YoY % difference		-6.0%	-2.2%	1.0%

USDHUF Ex rate	2011	2012	2013	2014
Mean	189	229	224	195
YoY % difference		21.2%	-2.2%	-12.9%

USDMXN Ex rate	2011	2012	2013	2014
Mean	13.1	12.4	12.1	11.8
YoY % difference		-5.6%	-1.9%	-2.4%

http://blogs.pb.com/ecommerce/2013/05/15/what-is-a-landed-cost-and-why-its-essential-in-global-trade/

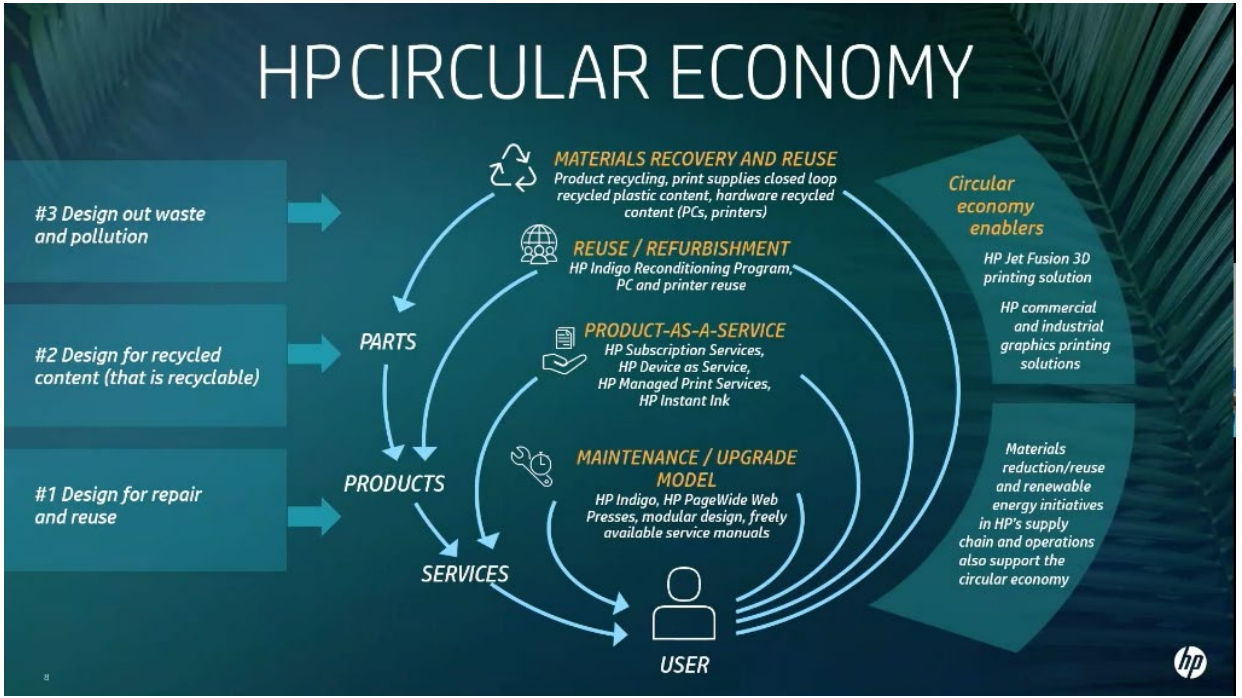
c. What's the ownership / operational model for the asset?



d. Who will manage the network?

e. How will the network remain dynamic and refreshed?

7. Business models adapt to support the Circular Economy



8. Stock market evaluation drive sustainable and responsible practices

In conclusion

Shared purpose…

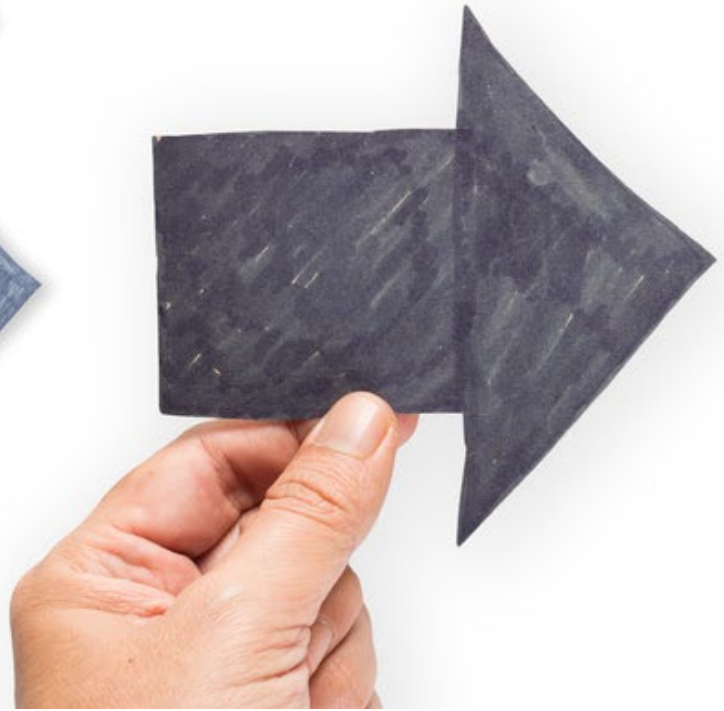
UK manufacturing a place where everyone wants to work

Future of digital manufacturing ecosystems…

Delivering the digital future we want, together.

Phase 1 2022	Phase 2 2023	Phase 3 2024
Scenarios, business model and ecosystem design	Blueprint for the Midlands Engine and methodology for other regions	Putting the blueprint into practice for 2-3 manufacturing ecosystems in the Midlands

Contact: Jan Godsell
j.godsell@lboro.ac.uk




Connect and start interacting
Visit our website: www. interact-hub.org
Follow us on Twitter: @InterActNetwork
Like us on LinkedIn: InterAct