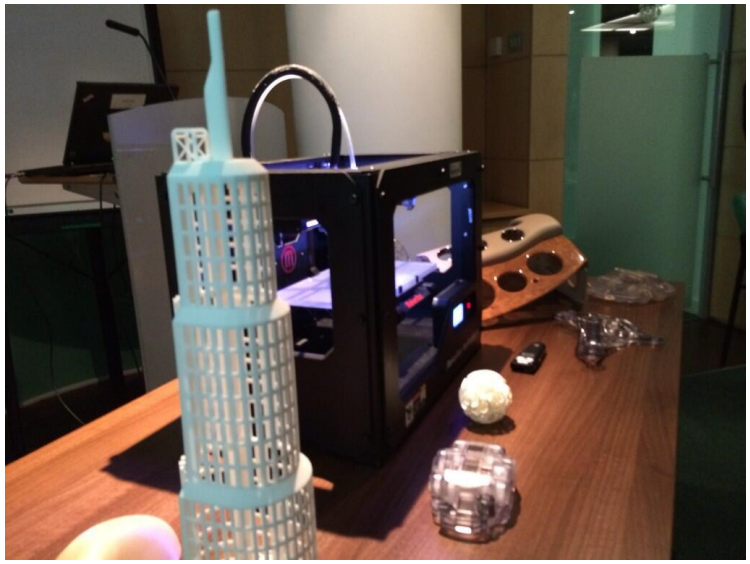
Made in ~~China 2013~~ ..... Mexico 2014
Made in ~~Mexico 2014~~.....Maidenhead 2024?!

2014

2024



THE PANEL





Simon O'Reilly
Cushman & Wakefield

Mark Webster
Cushman & Wakefield

Graham Bennett
CRDM

Alan Carswell
Stanley Black & Decker

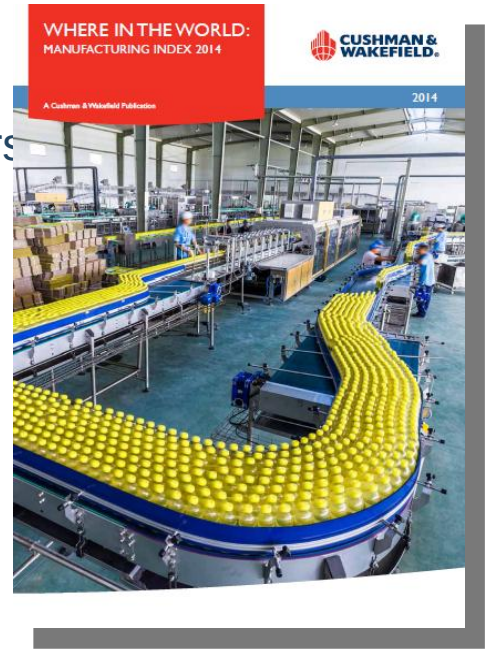
Jonathan Turner
Honeywell

WHERE IN THE WORLD: MANUFACTURING INDEX 2014

MADE IN ……

WHY DID WE CREATE A MANUFACTURING INDEX?

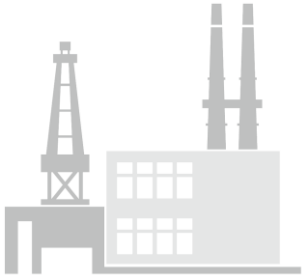
- Location is critical
- Numerous factors to be aware of
- Increasing globalisation
- The rise of e-commerce and speed/distance to customers
- Cost : short and long-term



HOW DID WE GENERATE THE RESULTS?

Framework for the assessment – category weightings

MADE IN .....



CONDITIONS	40%	Talent / Labour Force	25%
		Logistics / Access to Markets	25%
		Business Environment	10%
		Time to First Supply	25%
		Sustainability / Corporate Responsibility	15%
RISK	20%	Natural Disaster Risk	20%
		Economic Risk	30%
		Corporate Risk	20%
		Energy Risk	30%
COSTS	40%	Manufacturing Labour Costs per Hour	40%
		Electricity for industrial / heavy use (price per hour)	40%
		Construction Building Costs	10%
		Registering Property Cost (% of income per capita)	10%

POLLING QUESTION

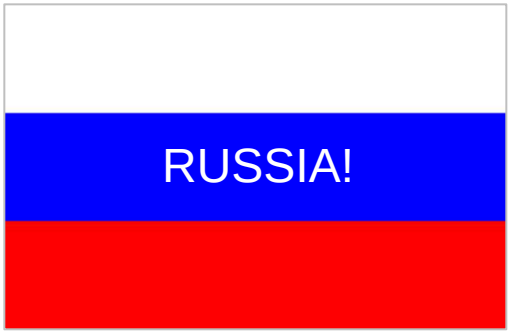
WHICH COUNTRY DO YOU THINK HAS MOVED UP THE MOST PLACES IN THE OVERALL RANKING THIS YEAR COMPARED TO 2013?

OPTIONS

- United Kingdom
- The USA
- Russia
- Turkey
- China
- Germany

MADE IN .....

THE RESULTS OF THE 2014 INDEX



REGION	COUNTRY	OVERALL	CONDITIONS	RISK	COST	CHANGE 2013-2014
APAC	Malaysia	1	19	5	3	- →
APAC	Taiwan, Republic of China	2	3	14	7	- →
APAC	Korea, Republic of	3	7	17	8	-3 ↓
APAC	Thailand	4	16	24	4	- →
APAC	**China**	5	15	26	6	-2 ↓
AMERICAS	Canada	6	22	1	14	2 ↑
EMEA	**Russian Federation**	7	28	19	2	8 ↑
APAC	Indonesia	8	25	22	5	1 ↑
AMERICAS	**United States**	9	13	13	13	-4 ↓
AMERICAS	Mexico	10	26	20	11	2 ↑
EMEA	**Turkey**	11	21	29	10	-4 ↓
EMEA	Switzerland	12	1	3	23	-1 ↓
EMEA	Poland	13	17	15	15	3 ↑
AMERICAS	Venezuela	14	30	27	1	-1 ↓
EMEA	South Africa	15	23	12	16	4 ↑
EMEA	Sweden	16	2	2	28	4 ↑
EMEA	Austria	17	12	7	20	-3 ↓
EMEA	**United Kingdom**	18	9	11	21	4 ↑
APAC	Japan	19	8	18	18	-1 ↓
EMEA	France	20	14	10	22	3 ↑
AMERICAS	Argentina	21	29	28	9	-4 ↓
EMEA	Netherlands	22	6	6	26	2 ↑
AMERICAS	Brazil	23	27	23	17	-2 ↓
APAC	India	24	24	30	12	-14 ↓
EMEA	Spain	25	4	21	25	2 ↑
EMEA	**Germany**	26	5	8	29	- →

Source: Cushman & Wakefield

POLLING QUESTION

WHICH OF THE FOLLOWING ITEMS **CAN** BE PRINTED USING A 3D PRINTER?

OPTIONS

- Chocolates
- Gun
- Replica Classic Car
- Prosthetic animal body parts
- Aeroplane seat
- Shoes
- Bicycle
- None of the above – we're mad!

3D PRINTING – SETTING THE SCENE

MADE IN .....

- Almost **every large-scale manufacturing** organisation now has their own 3D Printing facility or is closely aligned to a bureau who provides parts for them

- HP estimate that by 2025 there will be **3 million** 3D Printing machines in use around the world

- Today there are around **50,000**

- The 3D Printing market is still growing at around **25%** per year

WHAT IS 3D PRINTING?

- 3D PRINTING CAN BE DEFINED AS “JOINING MATERIALS TO MAKE OBJECTS FROM 3D MODEL DATA, USUALLY LAYER UPON LAYER […]”
  - ALSO CALLED ADDITIVE MANUFACTURING
  - CAN PROCESS METALS, PLASTICS AND OTHER MATERIALS
- THERE ARE MANY DIFFERENT TYPES OF 3D PRINTING TECHNOLOGY
  - DIFFER STRONGLY IN SIZE AND CAPABILITIES
  - MACHINE PRICES RANGE FROM <£1000 TO AROUND £1M
- CURRENTLY MANY DIFFERENT APPLICATIONS
  - A FEW HIGH VOLUME (>100,000S OF PARTS)
  - MOST NICHE & LOW VOLUME
- HUGE POTENTIAL MARKET IN THE FUTURE
  - QUESTION IS: CAN 3D PRINTING PENETRATE THIS MARKET?

WHAT 3D PRINTING **ISN'T**

- Conventional manufacturing

Some technologies operate by removing material:

e.g. CNC machining, drilling, sawing, etc.

→ 'Subtractive' manufacturing

Some technologies operate by giving shape:

e.g. casting, moulding, forging

→ 'Formative' manufacturing

A VERY BRIEF HISTORY

- But is Additive Manufacturing really new?

‘Yes’ and ‘No’

- Automated computer controlled additive processes were first invented in the 1980s
- Adopted first for prototyping building (Rapid Prototyping)
- However, the additive, layer-by-layer operating principle has existed for thousands of years in ‘coiling’-type pottery

THE REALITY

- In mechanical component prototyping 3D Printing is a key technology
- 3D Printing is now slowly gaining traction for production applications
- Commercial 3D printing systems are often prohibitively expensive to operate for production applications (this will change)
- Consumer type 3D Printers struggle to make truly useful objects due to process and material limitations
- Haven’t destroyed any jobs
- Haven’t destroyed the concept of copyright
- Not even particularly good at making guns!

This will change

ADVANTAGES OF 3D PRINTING

- Three main advantages normally associated with 3D printing:

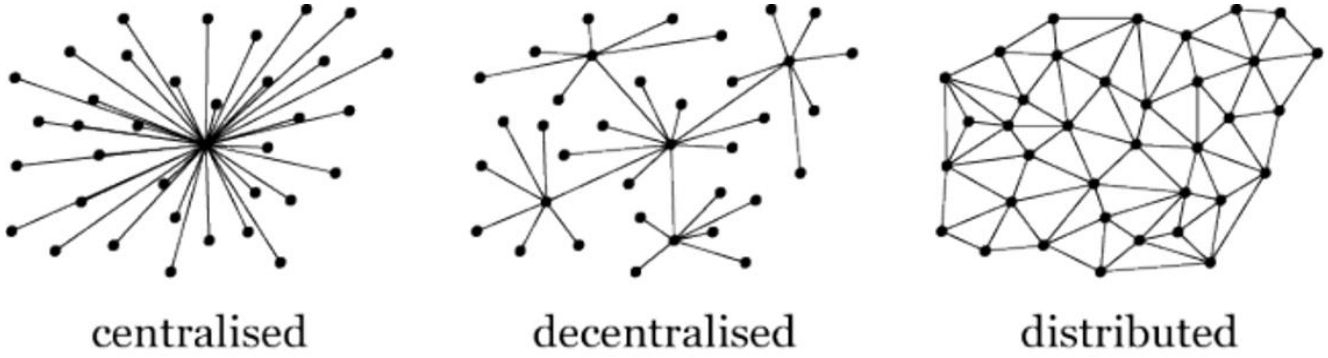
1. 3D Printing is very fast – ‘Rapid Prototyping’
2. 3D printing processes are very good at efficiently building complex structures and parts – complexity of part does not add cost
3. 3D printers need very little set-up time

GENERIC LIMITATIONS OF 3D PRINTING

- No universal standards yet available for industry
- Limited material availability
- Low process speed when considered for production applications
- Problems with dimensional accuracy, part distortion, warpage
- Poor, rough surface finish
- Repeatability issues, depending on build configuration

EFFECT ON SUPPLY CHAIN NETWORKS

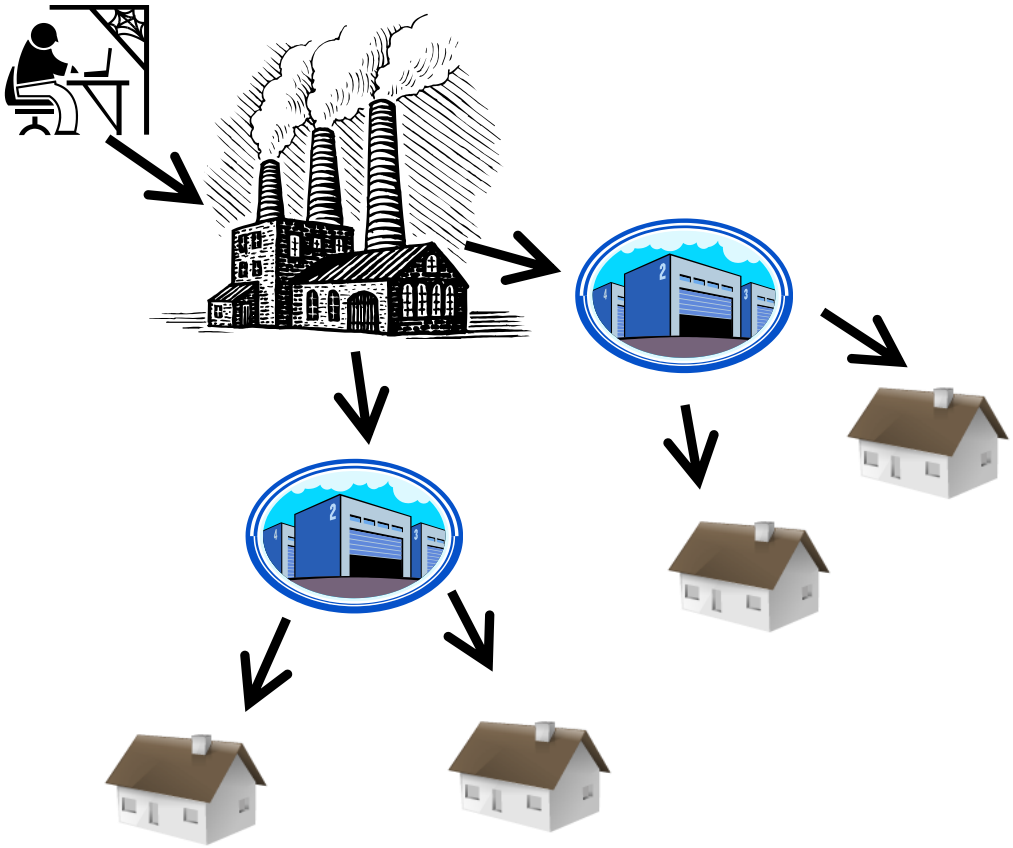
- **Location**
  - Facilities closer to the customer
  - Possibility of “dematerialisation” → digital supply chain



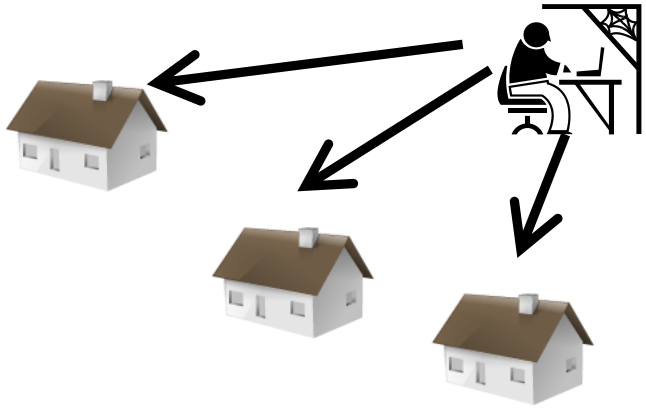
- **Logistics**
  - Smaller requirement in terms of volume
  - Higher requirement in terms of variety

EFFECT ON SUPPLY CHAIN NETWORKS

Traditional Supply Chain



3D Printer Supply Chain



Fewer centralised factories;

Fewer warehouses needed

3D PRINTING IN USE

Align Technologies

- Production of teeth aligners via 3D Printing
- Millions produced per year
- Physical manufacturing centralised
- Software manipulation in large offices in low cost economies

3D PRINTING IN USE

Siemens

- One of many companies producing hearing aid shells via 3D printing

Reasons for using 3D Printers:

1. Customer-centred
2. Better product
3. Economical
4. More profit

OUR PREDICTIONS

WHAT COULD THIS MEAN FOR REAL ESTATE IN THE FUTURE?

- Reduction in warehousing take-up in traditional locations (20 years time)
- Long live the high-tech office building!
- 3D printers located in every retail warehouse /distribution unit
- Reinvigoration of trade counters
- Void retail units taken up by pop-up print shops
- Service centres – locating 3D printers to replicate the Unipart model