



PANALPINA'S SECOND "OUTSTANDING" KTP

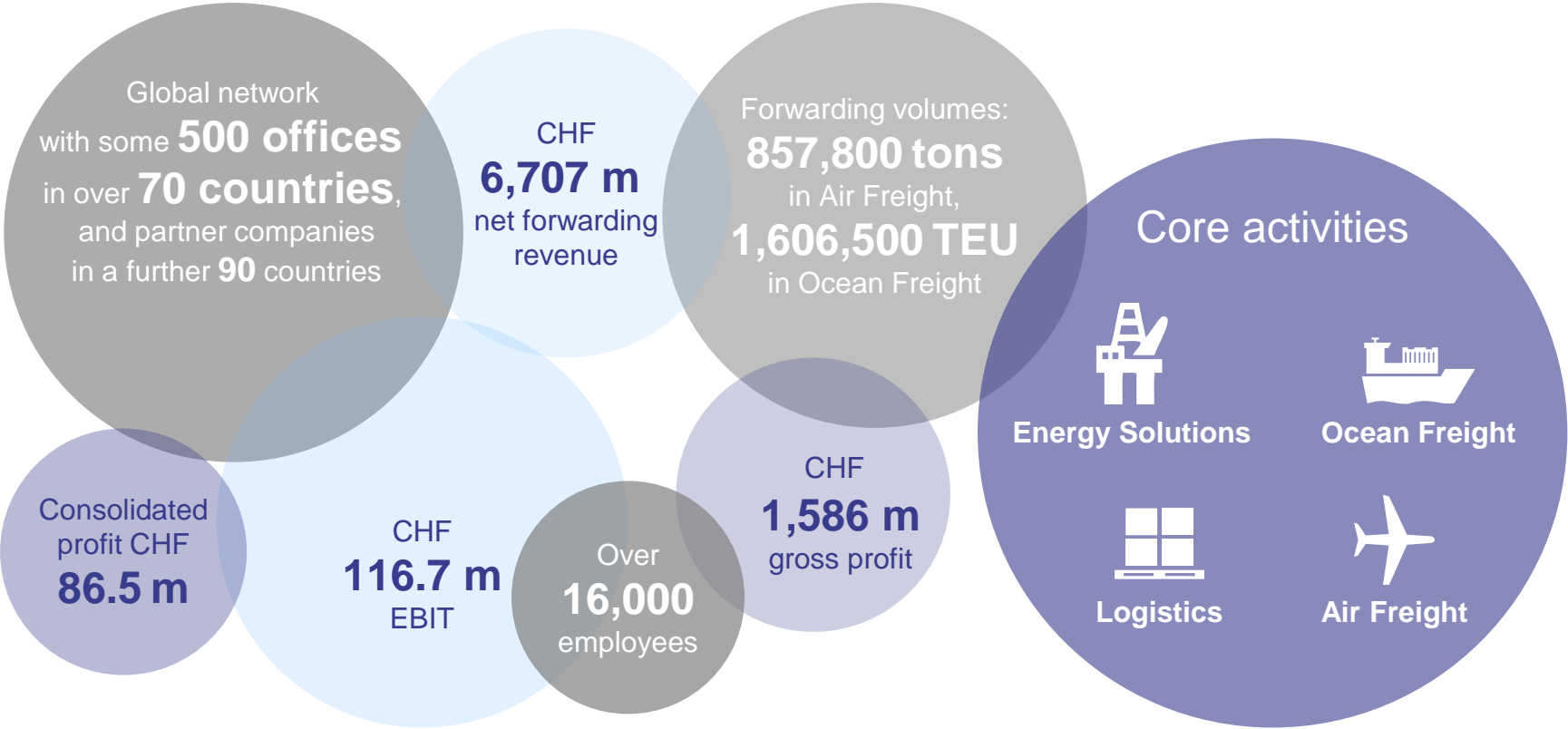
INTEGRATED 3DP AND SUPPLY CHAIN SOLUTION

AGENDA

- Panalpina at a glance
- Panalpina – Cardiff University KTP projects
- 3D Printing solution overview
- Logistics Manufacturing Services



PANALPINA AT A GLANCE



CHANGING SUPPLY CHAINS

Consumer behaviour

- Product variety
- Drive for personalised products
- Faster & free delivery (& returns)

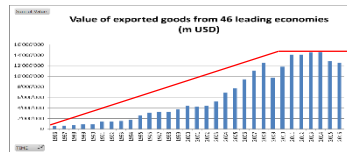


Companies' challenges

- Escalating inventories
- Product obsolescence
- Speed to market

Supply Chains redesign

- Near/re-shoring
- Circular economy
- On Demand manufacturing
- Proximity to the end customer



OECD 2017



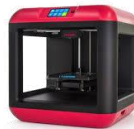
Macroeconomic changes

- Growing middle class
- Energy dynamics
- Labour costs
- Exchange rates

**Logistics
Manufacturing
Services (LMS)**

PANALPINA
on 6 continents

Busse and Wallenburg, 2011



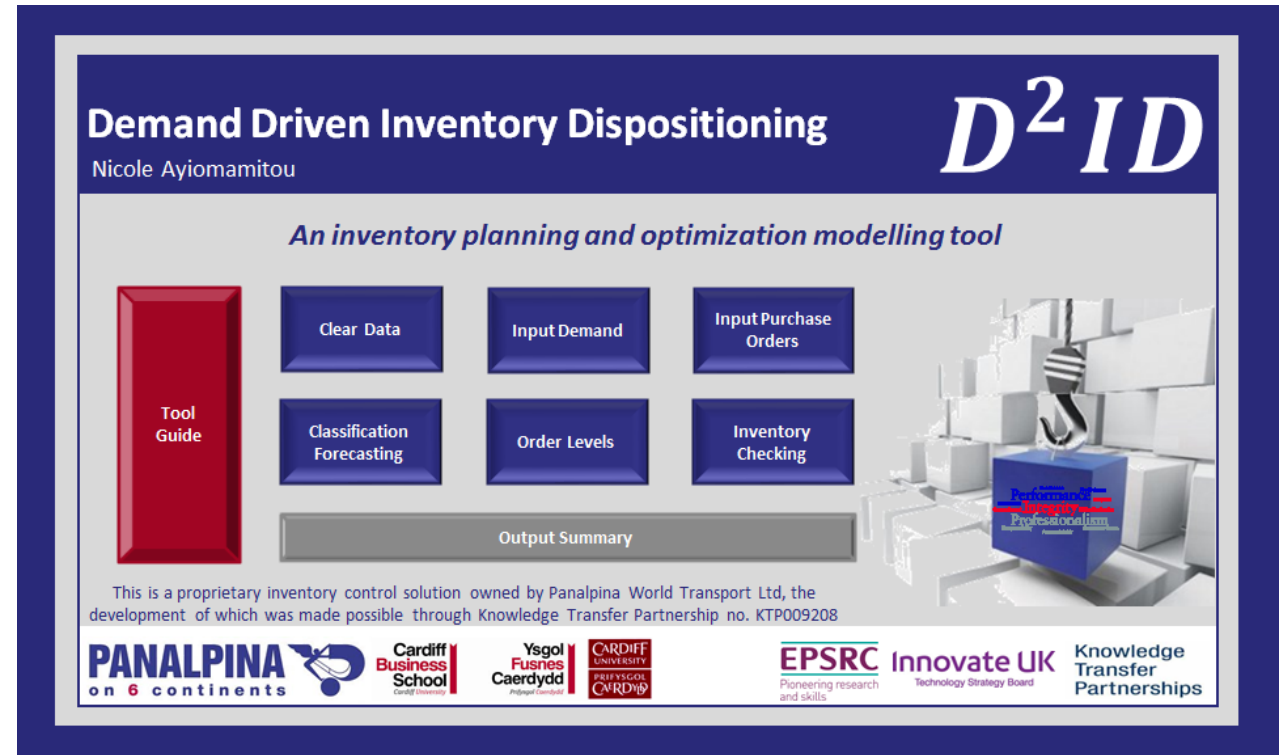
Emerging technologies

D²ID: DEMAND DRIVEN INVENTORY DISPOSITIONING

Panalpina's first "outstanding" KTP

Award winning, smart tool designed for:

- **Product Classification**
- **Demand forecasting**
- **Inventory planning**
- **Inventory Optimization**
- Automated output.
- SKU level analysis & optimisation
- Developed over 2 years together with Professor Aris Syntetos (Cardiff University) and Nicole Ayiomamitou (Panalpina employee) during a knowledge transfer partnership project (KTP)
- Rated as "outstanding" by UK Innovation board,
- Awarded best business & impact and people's choice award by Cardiff University.



INTEGRATED 3DP AND SUPPLY CHAIN SOLUTION

Panalpina's second “outstanding” KTP



Cardiff Business School
Ysgol Busnes Caerdydd



Cardiff School of
Engineering



- Prof. Aris Syntetos
- Dr Xun (Paul) Wang
- Fevos Charalampidis

- Dr Franck Lacan
- Hrishikesh Pawar

- Andrew Lahy
- Peter Szabados
- Mihaela Rit

- 2 year joint KTP project between Cardiff Business School, Cardiff School of Engineering & Panalpina
- Rated as “outstanding” by UK Innovation board

Customer challenges – Project objectives

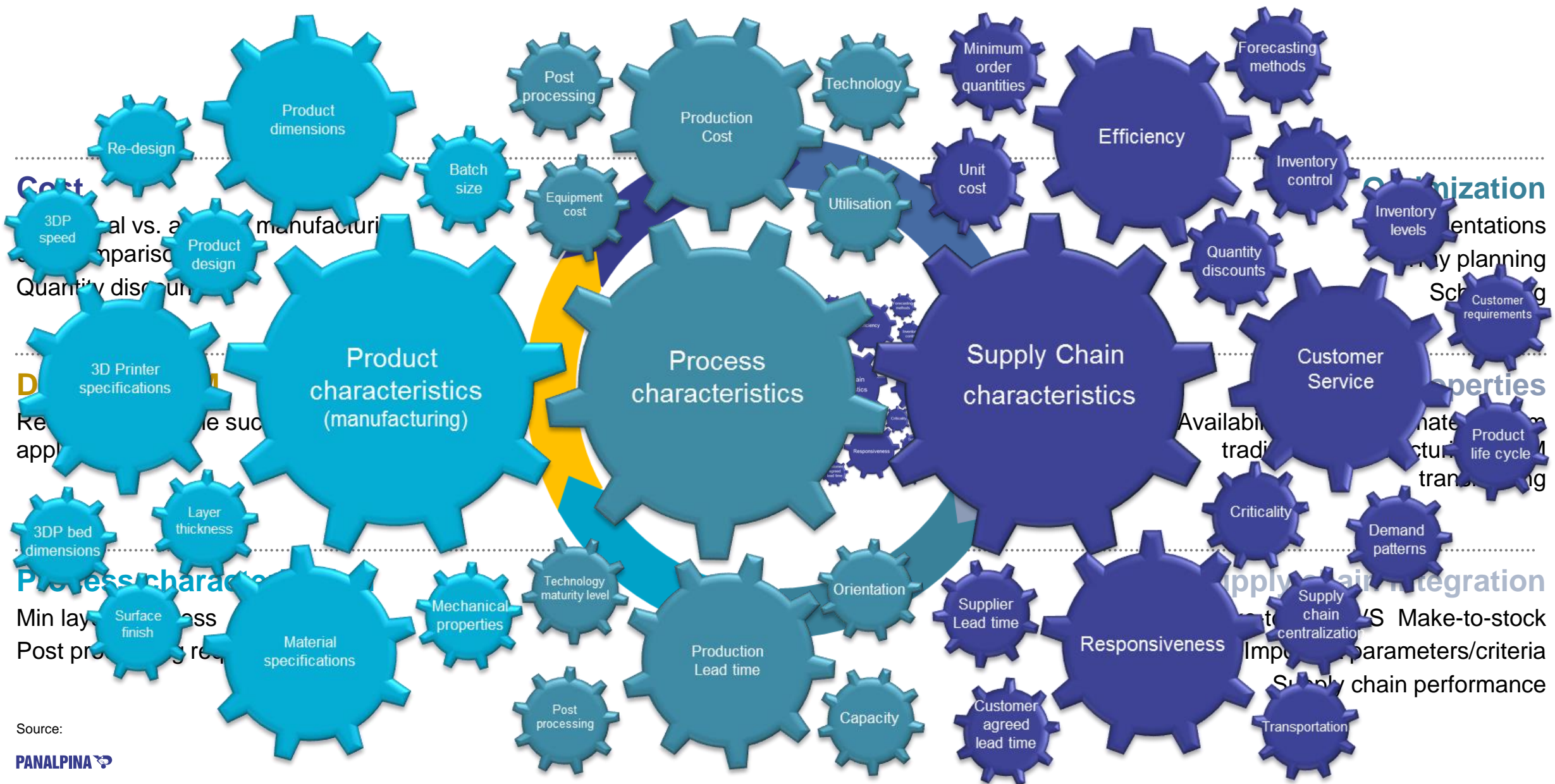
- Shift to 3D Printing is not a “plug and play” process
- The selection of products is a critical factor
- Companies are discouraged by lack of knowledge and current high cost.
- Companies are struggling to identify promising business cases



Deliverables

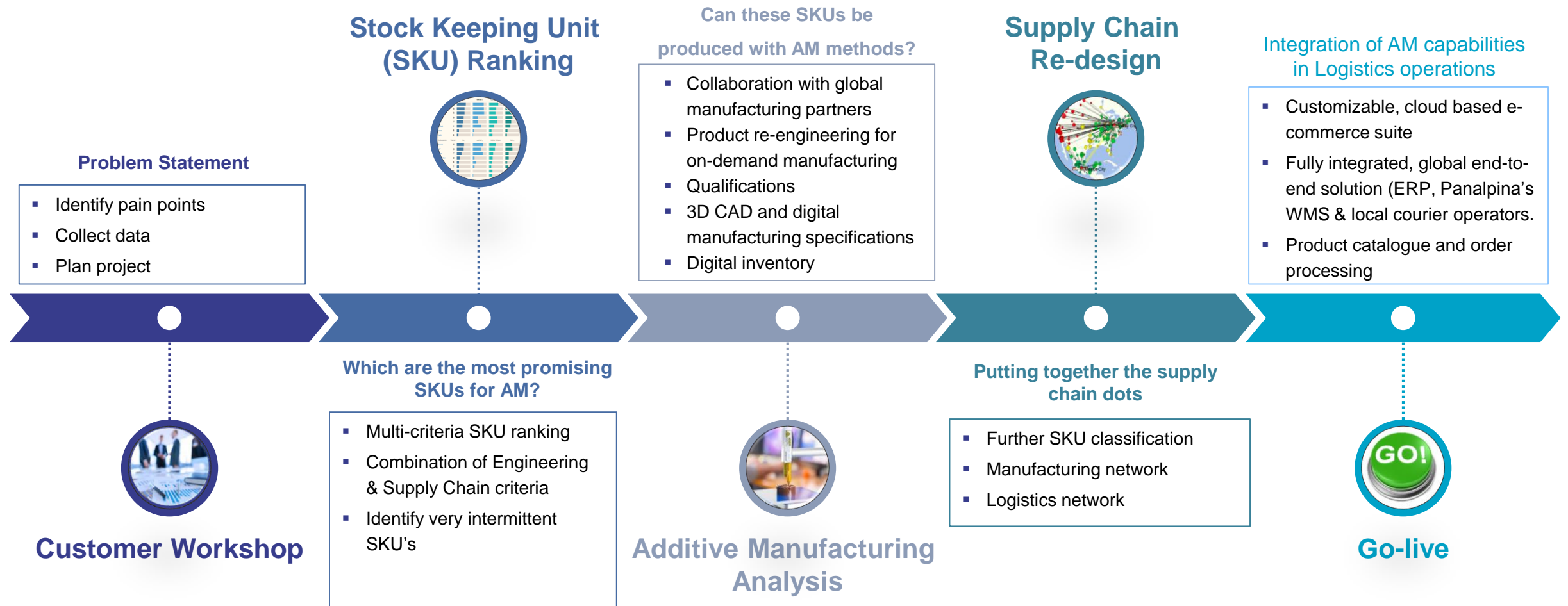
- A project based approach / framework which aims to inform decisions regarding:
- Whether to stock items / 3D print them on demand / Introduce a Kanban type (pull) system
 - Redesign supply chains introducing AM technology

PROJECT CHALLENGES



INTEGRATED 3DP AND SUPPLY CHAIN SOLUTION

Solution overview



INTEGRATED 3DP AND SUPPLY CHAIN SOLUTION

Academic background of solution

4 Main Streams of Research

AM Engineering DSSs

- Lindemann et al. (2015)
- Zhang and Bernard (2014)
- Rao and Padmanabhan (2007)
- Mahes et al. (2005)
- The Swedish IVF (2005)
- Byun and Lee (2005)
- Muller et al. (1996)

AM Supply Chain DSSs

- Tziantopoulos et al. (2016)
- Knofius et al. (2015)
- Simkin and Wang (2014)

Customer order decoupling point

- Rajagopalan (2002)
- Holweg & Pil (2001)
- Olhager (2003)

Supply chain implications of AM

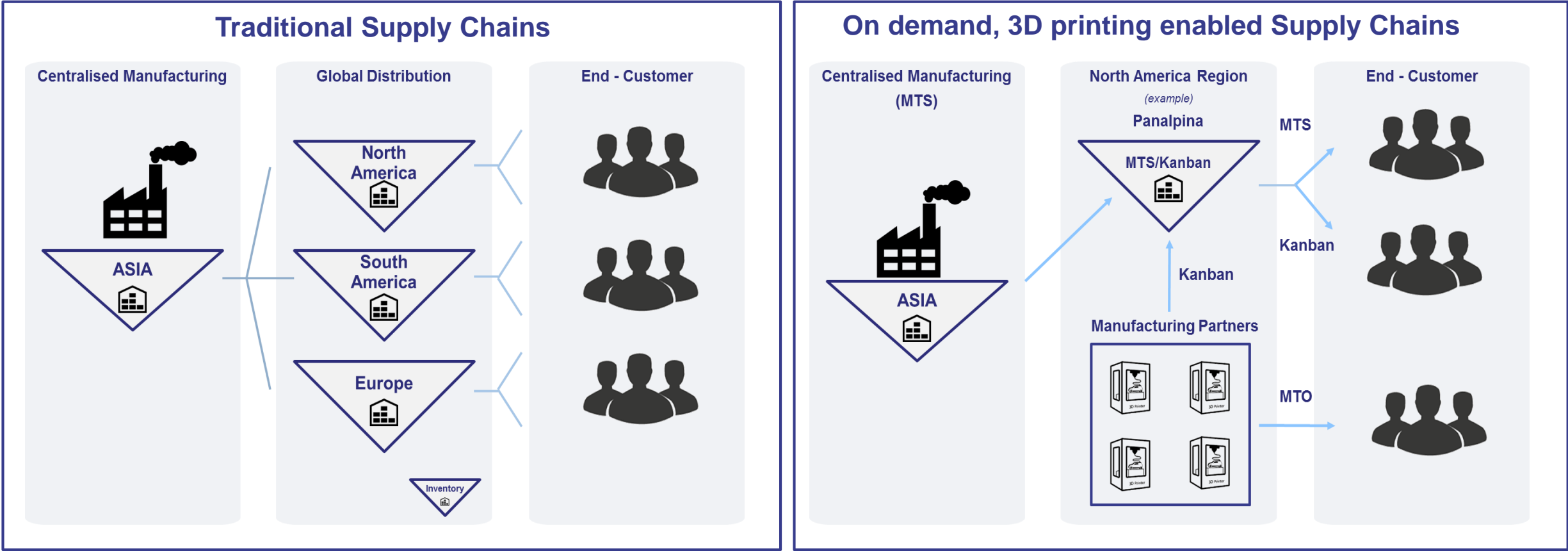
- Zhen (2016)
- Westerweel et al. (2016)
- Barz et al. (2015)
- Atzeni & Salm (2012)
- Holmström et al. (2010)
- Atzeni et al. (2010)

Data collection requirements

Trade off: Robustness Vs Accuracy

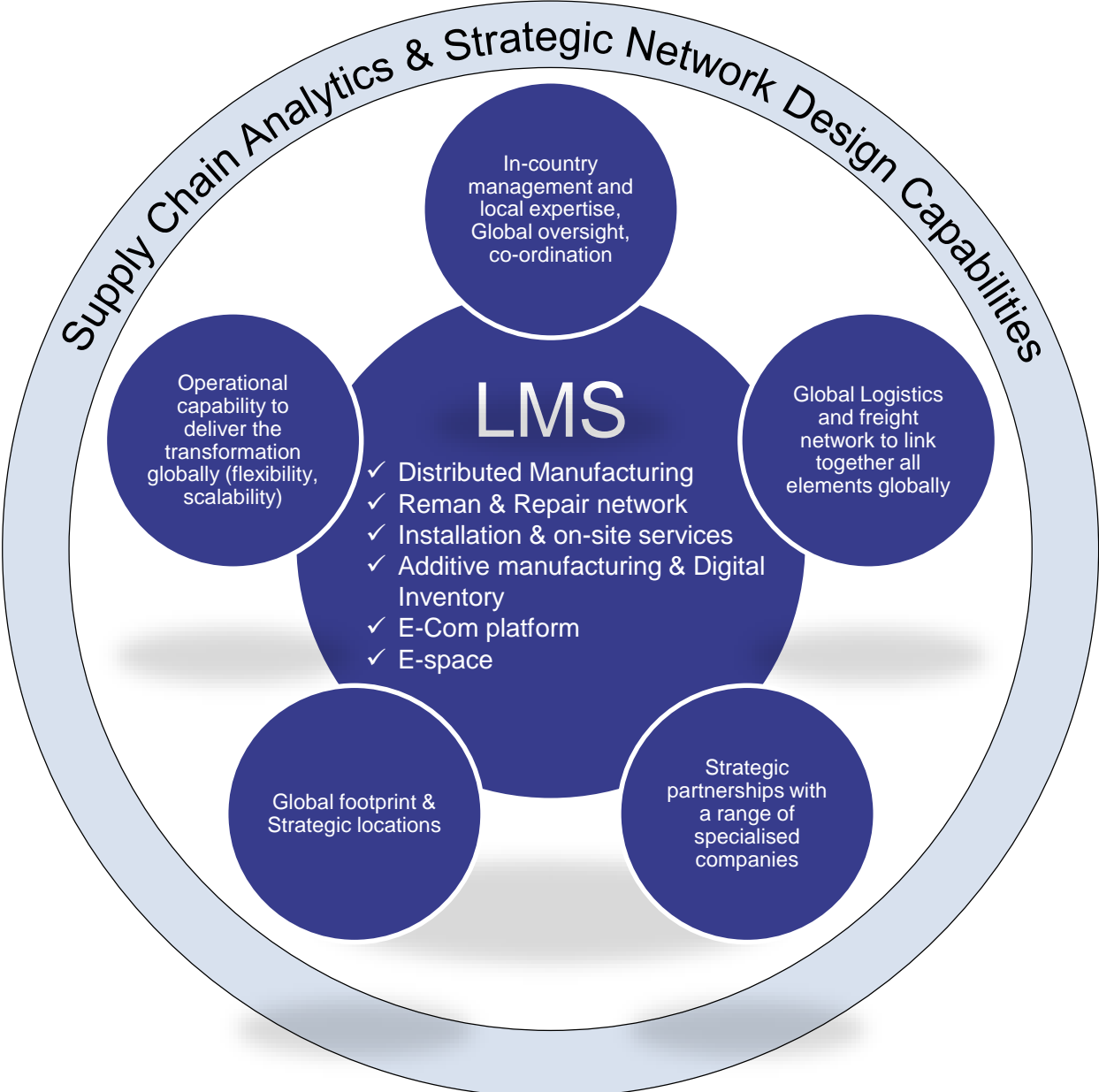
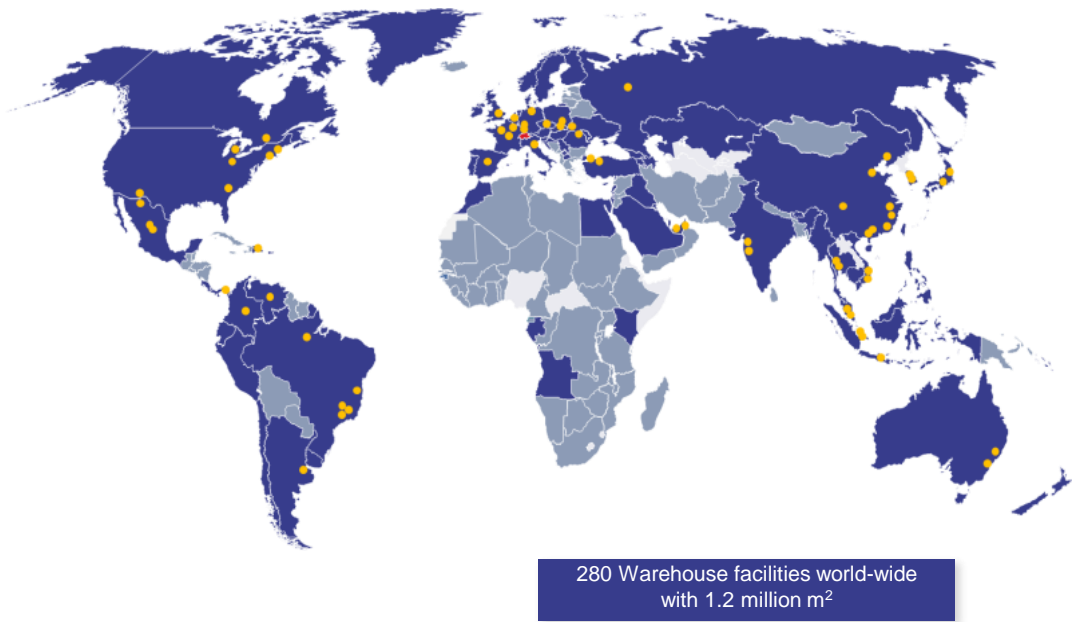
INTEGRATED 3DP AND SUPPLY CHAIN SOLUTION

Supply Chain re-design



OUR LMS SERVICE PORTFOLIO

How it all fits together

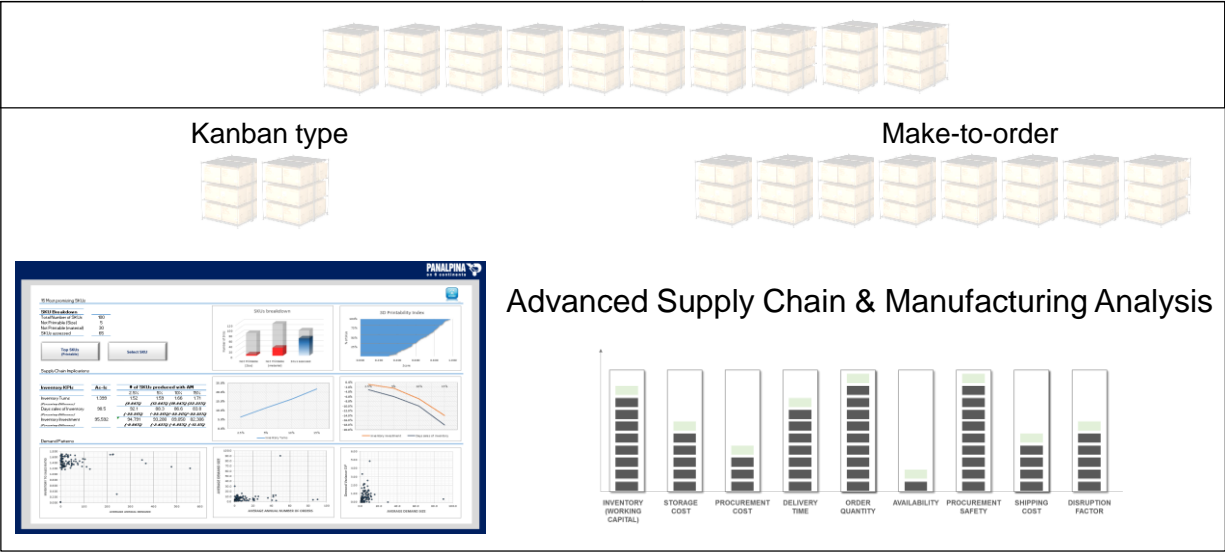


SUPPLY CHAIN ANALYTICS - INVENTORY TRANSFORMATION PROCESS

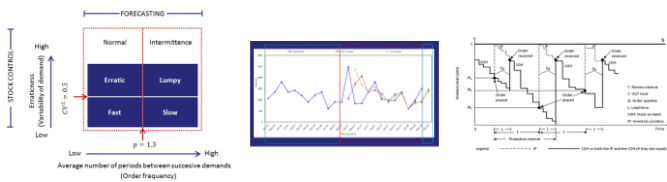
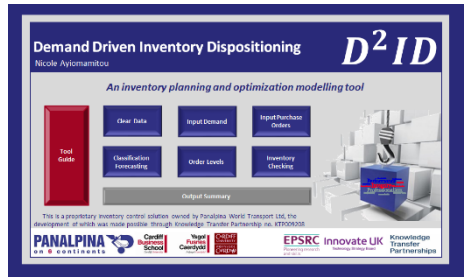


Push Supply Chain

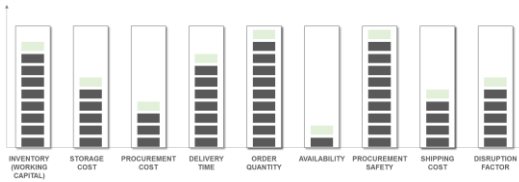
Pull Supply Chain
(Enabled by AM)



Advanced Demand Forecasting & Inventory Optimisation Solution



Advanced Supply Chain & Manufacturing Analysis

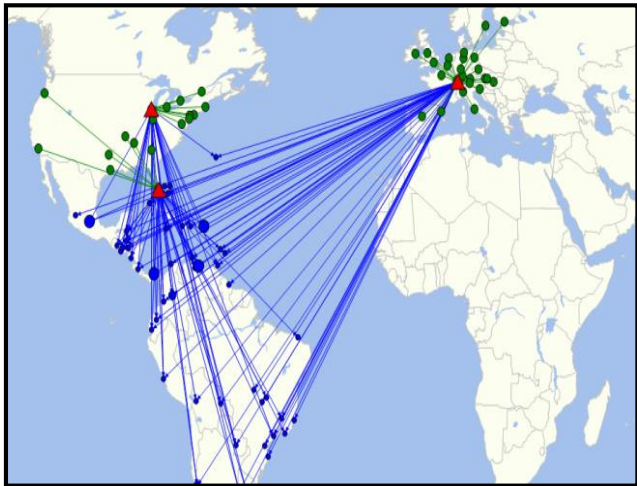
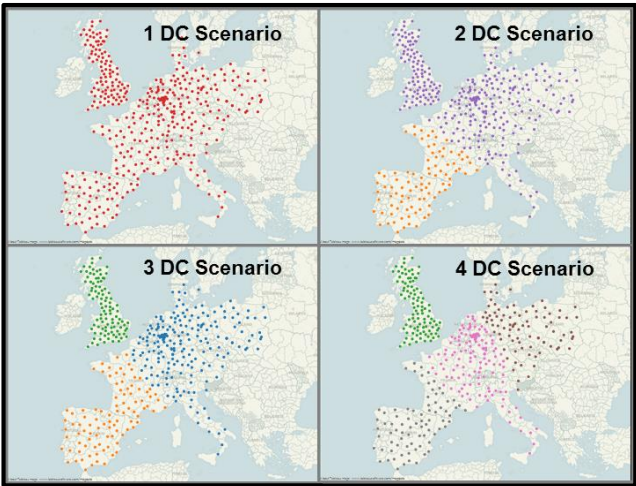
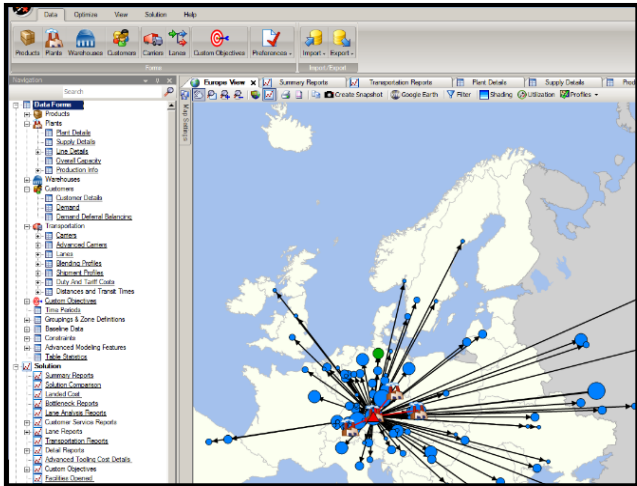


Optimised Inventory Levels:



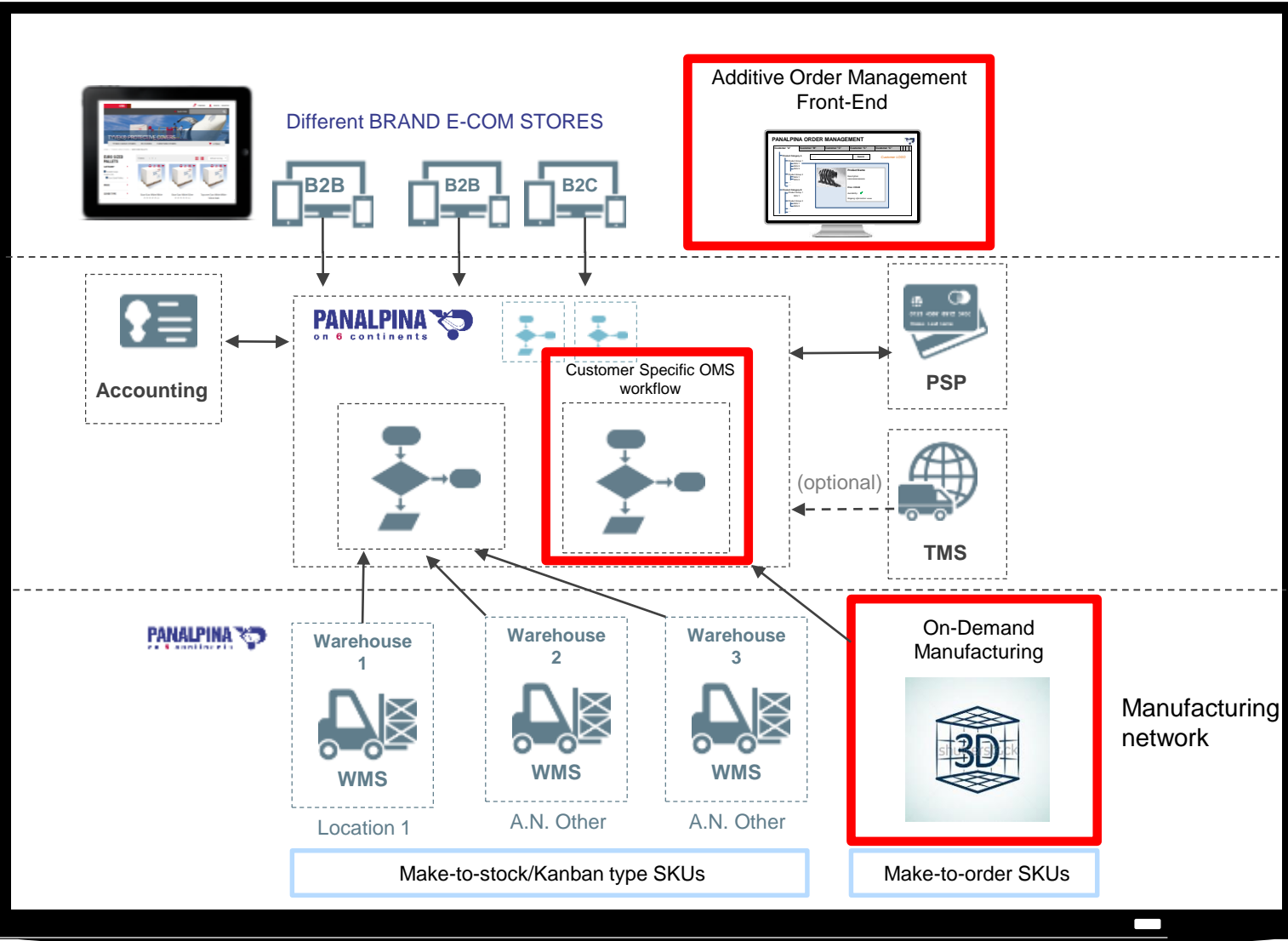
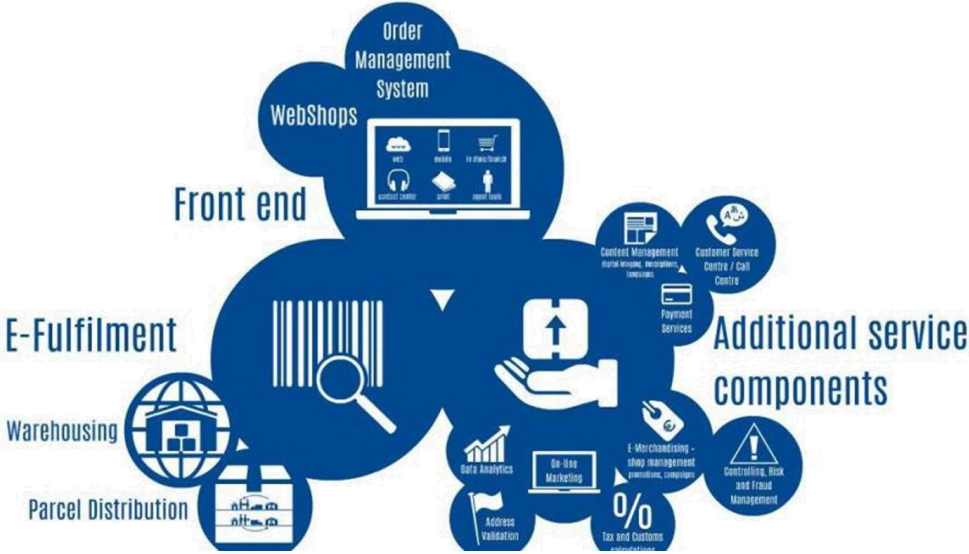
SUPPLY CHAIN SOLUTIONS ANALYTICS

Strategic Network Design

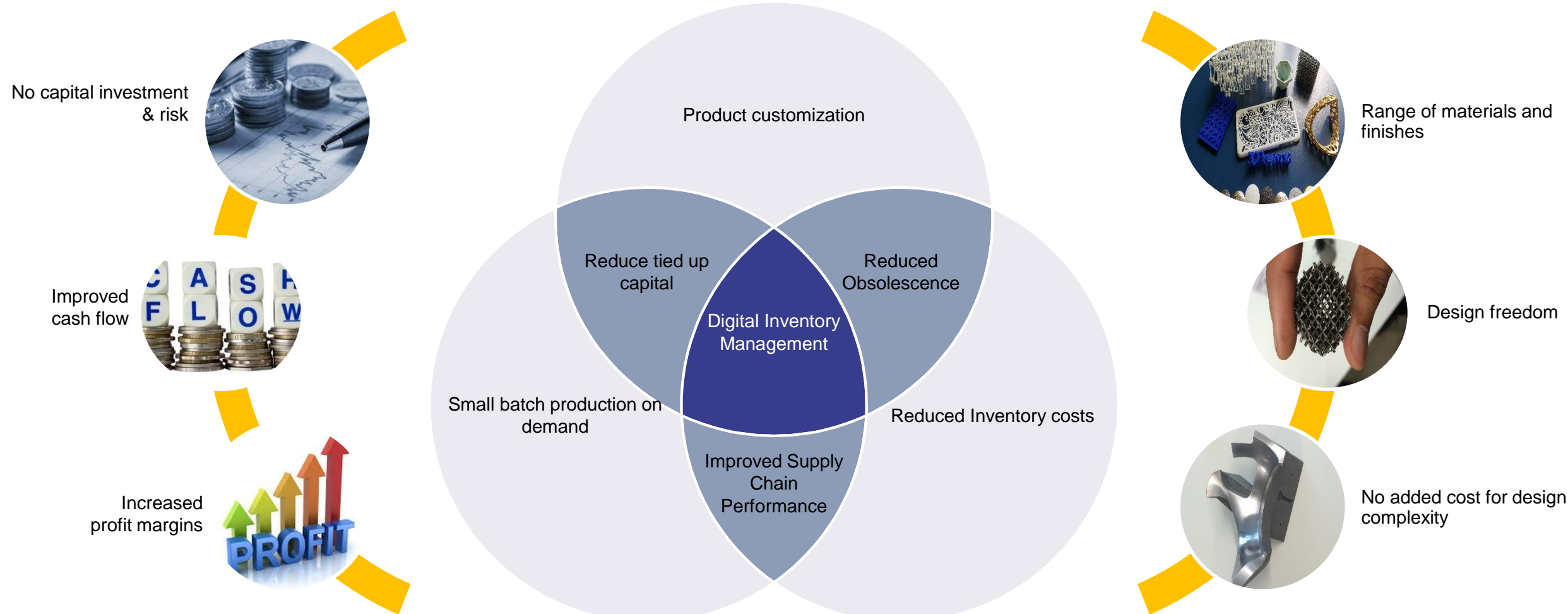


E-COMMERCE PLATFORM

Order Management



INTEGRATED 3DP AND SUPPLY CHAIN SOLUTION



THANK YOU

DAKUJEM

谢谢

DANKE

TERIMA KASIH!

ขอบคุณครับ, ขอบคุณค่ะ

DANK

ありがとう

OBRIGADO

SALAMAT

BEDANKT

СПАСИБО

БЛАГОДАРЯ

감사합니다 / 고맙습니다!

شكرا

MERCI

GRACIAS

GRAZIE

TEŞEKKÜR

TAKK

DZIĘKUJĘ

DHANYAVAAD!

CÁM ƠN!

ASANTE