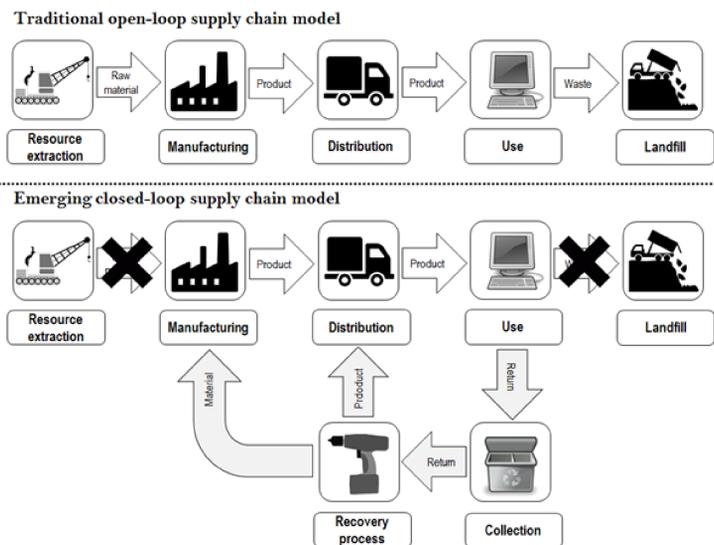


# RERUN

## Resilient Remanufacturing Networks: Forecasting, Informatics and Holons

### 1 Background, Motivation and Research Challenge

- ▶ The world economy is currently evolving from a linear to a *circular model*.
- ▶ *Remanufacturing* is one of the cornerstones of this emerging model.
- ▶ Its value within the UK economy represents £2.4B, and will increase to £5.6B in the near future.



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- ▶ Remanufacturing requires forecasting not only the demand, but also the *rate* and *quality* of the returns.
- ▶ No studies to-date look at how return forecasts can be *integrated* with inventory and production optimisation (IPO) procedures.
- ▶ Such procedures would be stepping-stones towards *financial and environmental sustainability*.



Source: Wright Flow Technologies

### 2 Vision and Objectives

Our vision is to create a sustainable and resilient world where remanufacturers and their networks have 'visibility' of returns and reflect such information into circular economy compatible IPO.

- II. *Develop new theory on returns forecasting.* We identify the streams of information through which uncertainty manifests itself.
- III. *Explore the role of informatics.* We investigate how cyber-physics, IoT and Big Data may contribute to a better understanding of closed-loop supply chains.
- IV. *Build on systemic structures.* We establish a suite of archetype holons of forecasting and IPO, given the integrated nature of supply chains.

#### Research objectives.

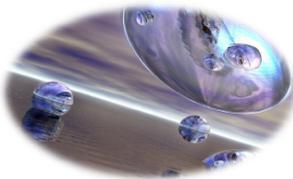
I. *Empirically ground the problem.* We work closely with remanufacturers in order to create a dashboard for practical applications.



Forecasting



Informatics



Holons

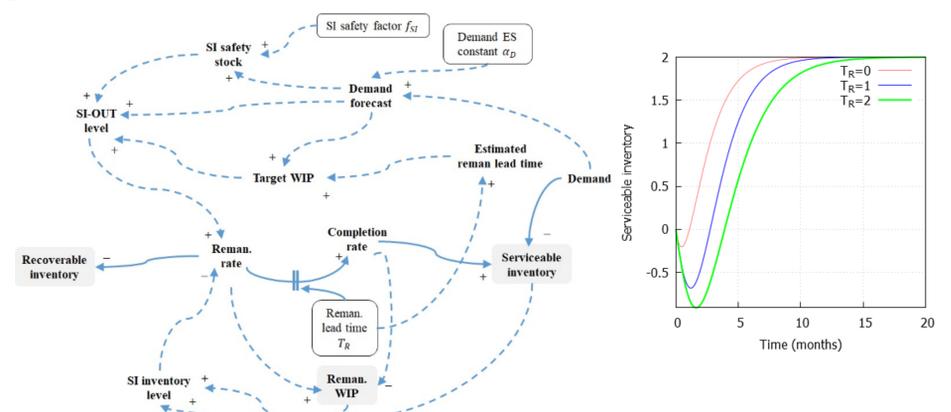
#### Industrial partners



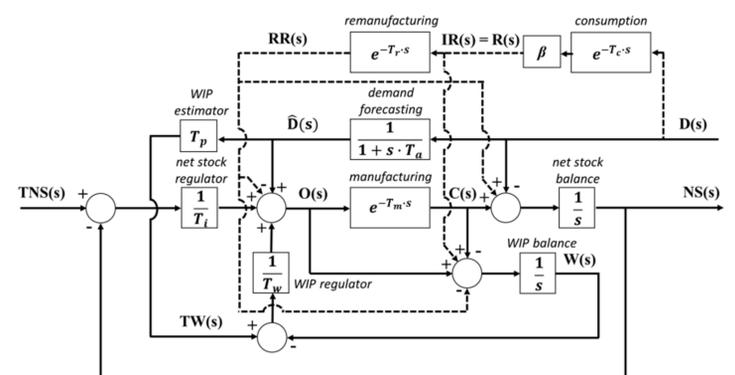
#### Policy advisors



### 3 System Dynamics Analysis



- Exploring the behaviour of real-world remanufacturing systems from a supply chain dynamics perspective.



- A control-theoretic approach to modeling uncertainty in closed-loop supply chains. We show the benefits of appropriately regulating the remanufacturing line.

