

Manufacturing Complexity Network Conference

**Complexity, Order and
Change: The Principles of
Value Stream Management**

Professor Daniel T Jones

Cambridge 10 April 2002

Complexity and Order

- Everyone loves complexity – it is fascinating, challenging and appropriable!
- But to change social reality you need to seek the underlying order – the **principles** that shape the **processes** within which **people** work together – in that order!
- Changing to a new set of principles involves changing the **consciousness** of those involved in reconfiguring their **processes** – not just designing better **systems**!

The Existing Business Model

- Is based on a simple set of principles -
- Organise activities by **firm**, centralise **information processing** & optimise the utilisation of each **asset**
- Cost down comes from economies of scale and specialisation - bigger & faster **equipment** and longer **production runs** – and through piece price auctions with **suppliers** and location based on factor costs for touch labour
- Profits come from growing **demand**, offering superior **products** and better **marketing** - segmenting and dominating markets

Research to Date

- Has primarily involved refining the operation of this business model
- Developing more sophisticated asset utilisation and production control systems – MRP, MRPII, ERP and supply chain ERP
- But this business model is inherently limited, is no longer competitive – and these systems fail to deliver the promised results
- I hope to enlist your interest in elaborating an alternative business model

The Alternative Path

- Venetian armouries > Colt rifles > Henry Ford at Highland Park in 1913 – **Flow Production**
- Single product – dedicated tools – simple pull systems for parts to assembly – vertically integrated firm - more sales by lower prices
- But to offer product variety Ford switched parts production at the River Rouge in 1927 to processing batches through process villages – the beginning of **Mass Production**
- Led to vertical disintegration and dispersion – starting with assembly

Rediscovery of Flow

- Toyota followed a different path from the 1950s – learning from Highland Park
- 20 year experiment to develop lean production internally, then spread it to its suppliers – and to develop it into a complete **Lean Business System**
- Managed by product family value streams and by minimising the amount of information that needs processing centrally
- Toyota has grown steadily since – and now aims to be No 1 in the next decade!
- A complete mistake to think this only applies to autos – the logic is universal

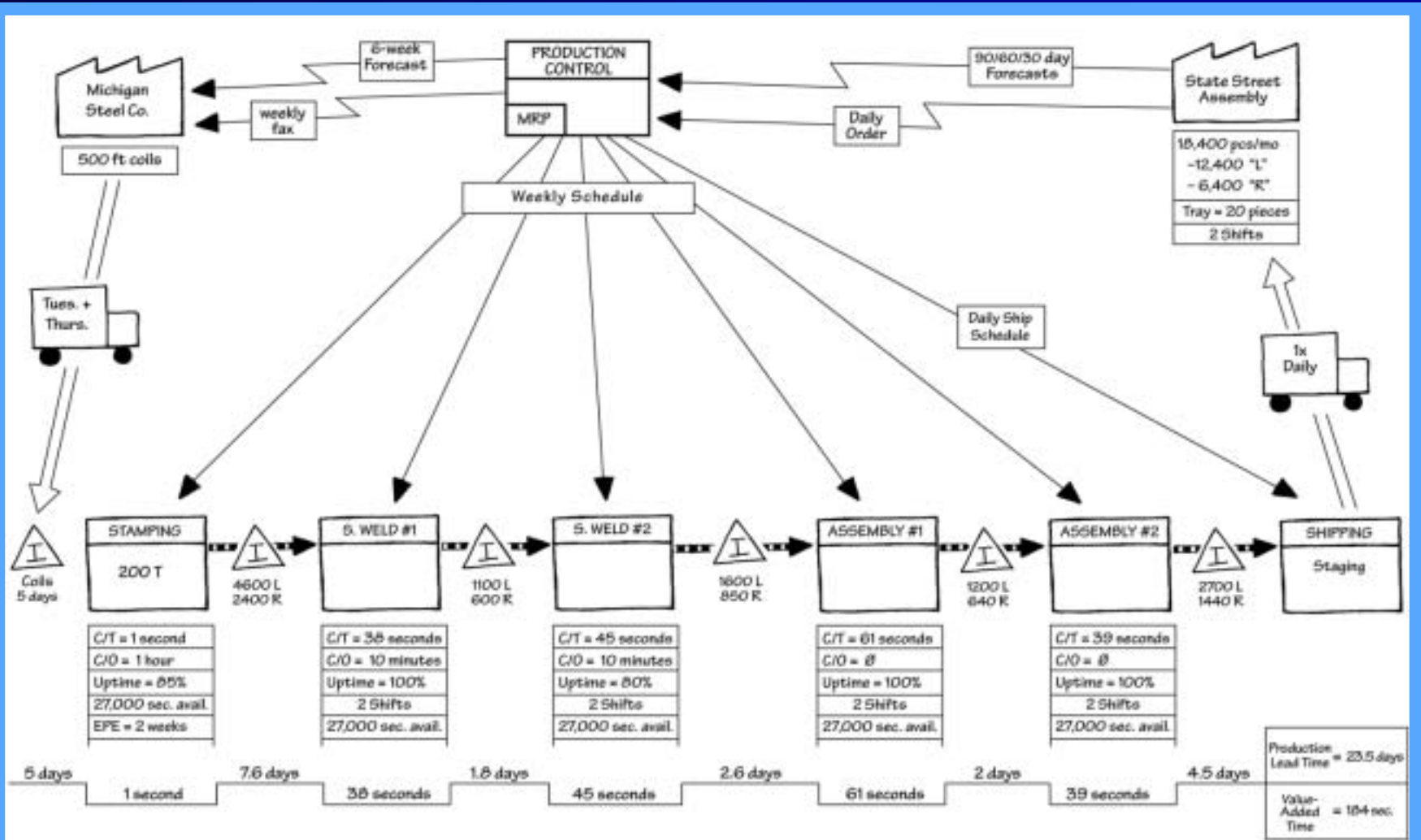
Lean Insights

- A tiny % of steps and time create value – eliminating **muda** is the biggest opportunity
- Optimising assets creates **muda** elsewhere – instead optimise end-to-end product flows
- Once steps are capable and available - link value creating steps so the product flows
- Triggered at one point by levelled customer orders, to which you can respond in time
- Reconfigure step by step from current to future states - towards an ideal state

Progress so Far

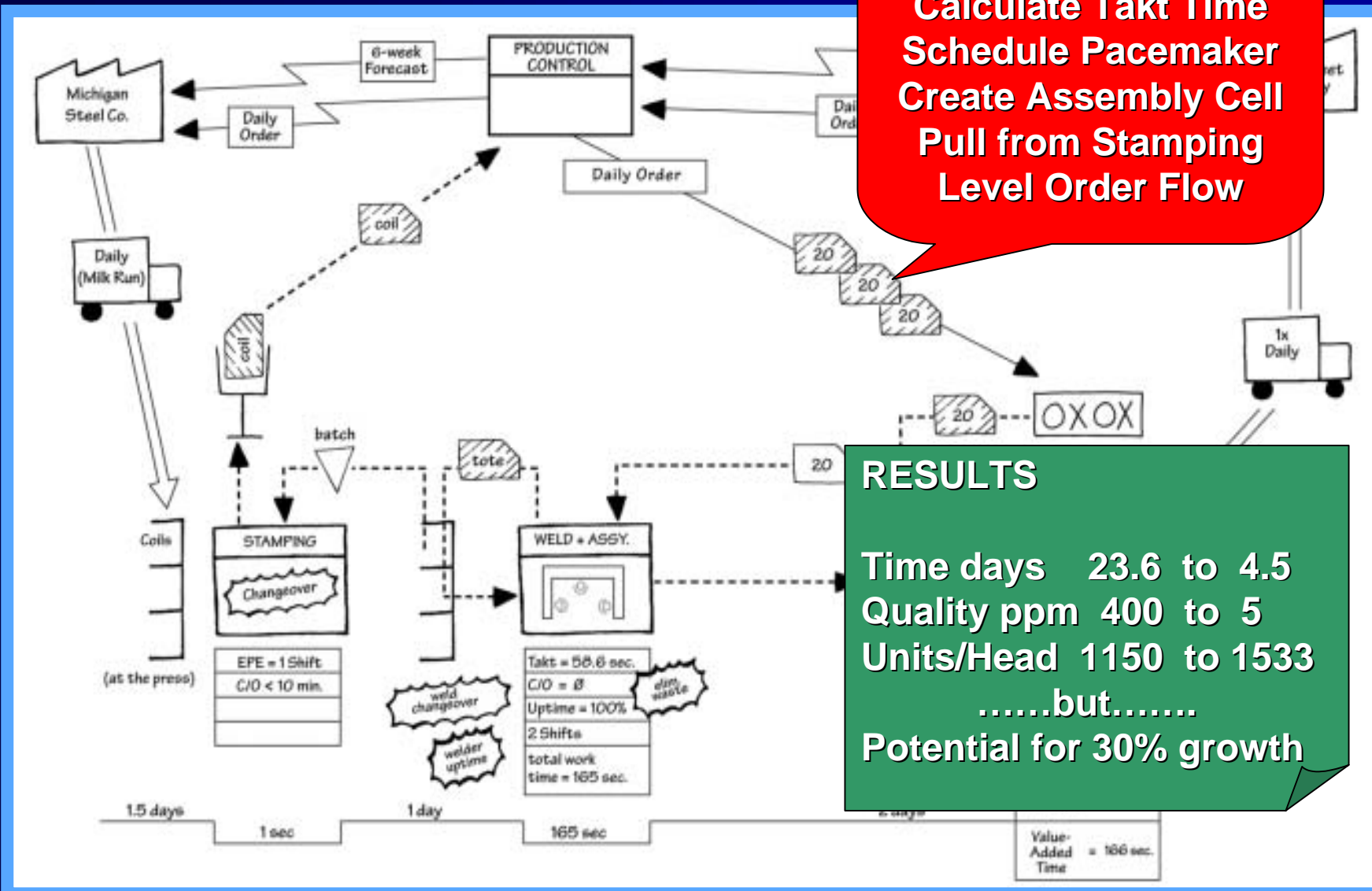
- Largely about reconfiguring internal operations from batch villages to flow – big gains in quality, delivery and cost
- Next steps are – **1** to reconfigure the whole value stream and – **2** to include the end user/customer within the system!
- While working out the social basis to make this win-win cooperation sustainable
- And to translate it to other sectors

Current-State Value Stream



Future-State Value Stream

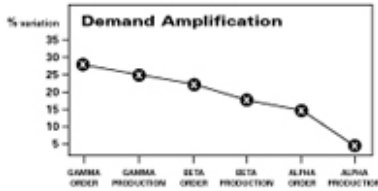
ACTIONS
 Calculate Takt Time
 Schedule Pacemaker
 Create Assembly Cell
 Pull from Stamping
 Level Order Flow



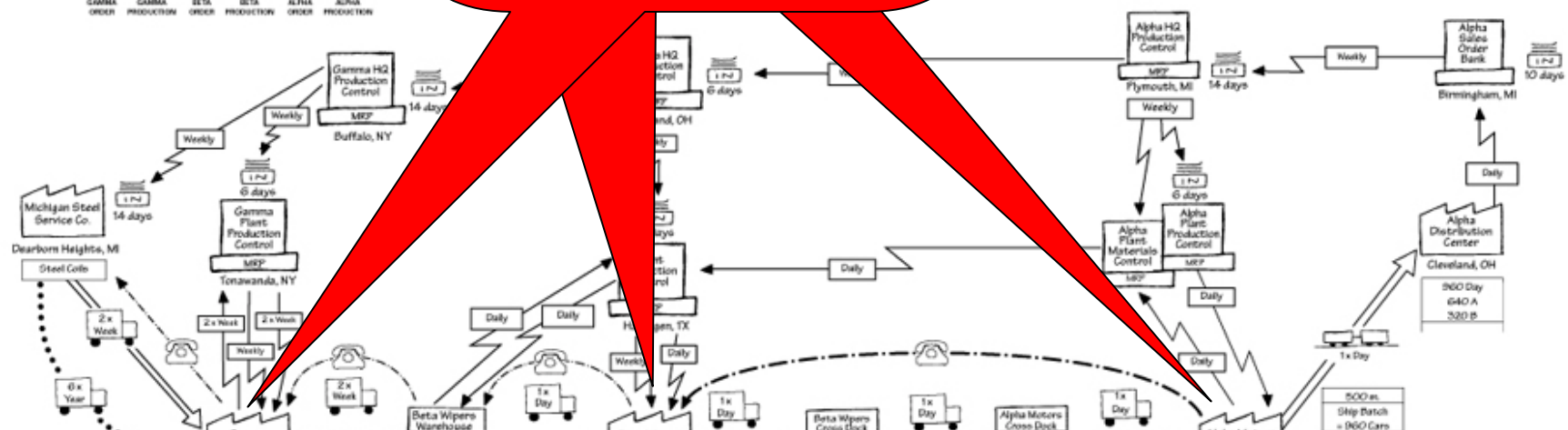
RESULTS
 Time days 23.6 to 4.5
 Quality ppm 400 to 5
 Units/Head 1150 to 1533
but.....
 Potential for 30% growth

Future State 1 Value Stream

ACTIONS
Levelled Pull and
Flow within each
Facility



Value Stream Future State 1

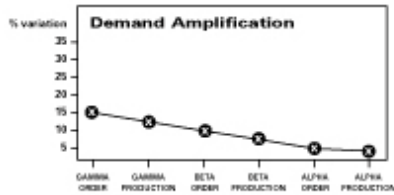


RESULTS	CS	FS1
Steps	73	54
Time days	44	24
Inv Turns	5	9

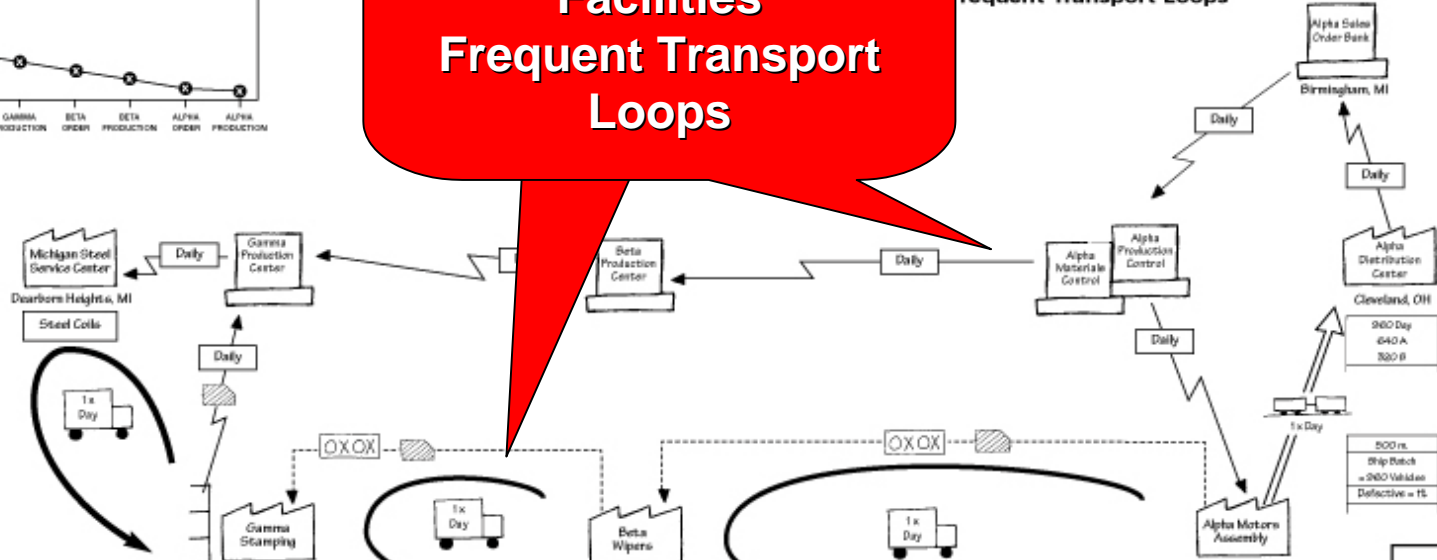
STEPS	1	5.1 (3131)	1	2.0	1	12 (50)	1	0.5	1	0.5
Total Steps =	1	20 (3)	1	4	1	8 (3)	1	4	1	4
Value Creating Steps	0.3		4.0		0.25		0.25		4.0	

Future State 2: Pull + Milk Runs

ACTIONS
 Levelled Pull between Facilities
 Frequent Transport Loops



Stream — Future State 2
 Frequent Transport Loops



500 m.
 Ship Batch = 24 Coils
 Defective = 3%

30V 24
 WP 62
 FG 12
 3 Shifts
 5 Days
 EPE = 1 Day
 Defects = 250 ppm

1500 m.
 Ship Batch = 12 Pallets
 Defective = 2%

30V 18
 WP 0
 FG 12
 2 Shifts
 5 Days
 EPE = 1 Day
 Defects = 50 ppm

1800 m.
 Ship Batch = 6 Pallets
 Defective = 1%

STEPS	1	4.0 (3131)	1	1.2 (30)
Total Steps = 39		20 (3)		8 (3)
Value Counting = 8 Steps				

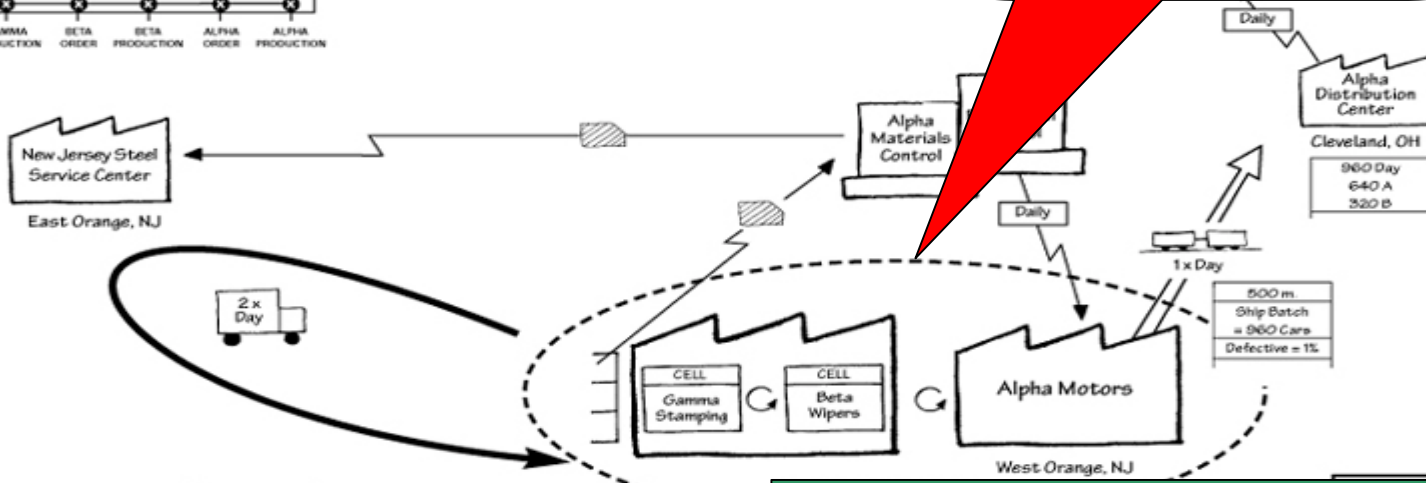
RESULTS	CS	FS1	FS2
Steps	73	54	39
Time days	44	24	16
Inv Turns	5	9	14
Amplification	8	8	3

Ideal State

ACTIONS
Value Stream Compression



Wiper Value Stream Id



25 m.
Ship Batch = 12 Coils
Defective = 1%

STEPS	1
Total Steps =	30
Value Creating Steps	8

RESULTS	CS	FS1	FS2	IS
Steps	73	54	39	30
Time days	44	24	16	3
Inv Turns	5	9	14	79
Amplification	8	8	3	1



Strategic Lessons

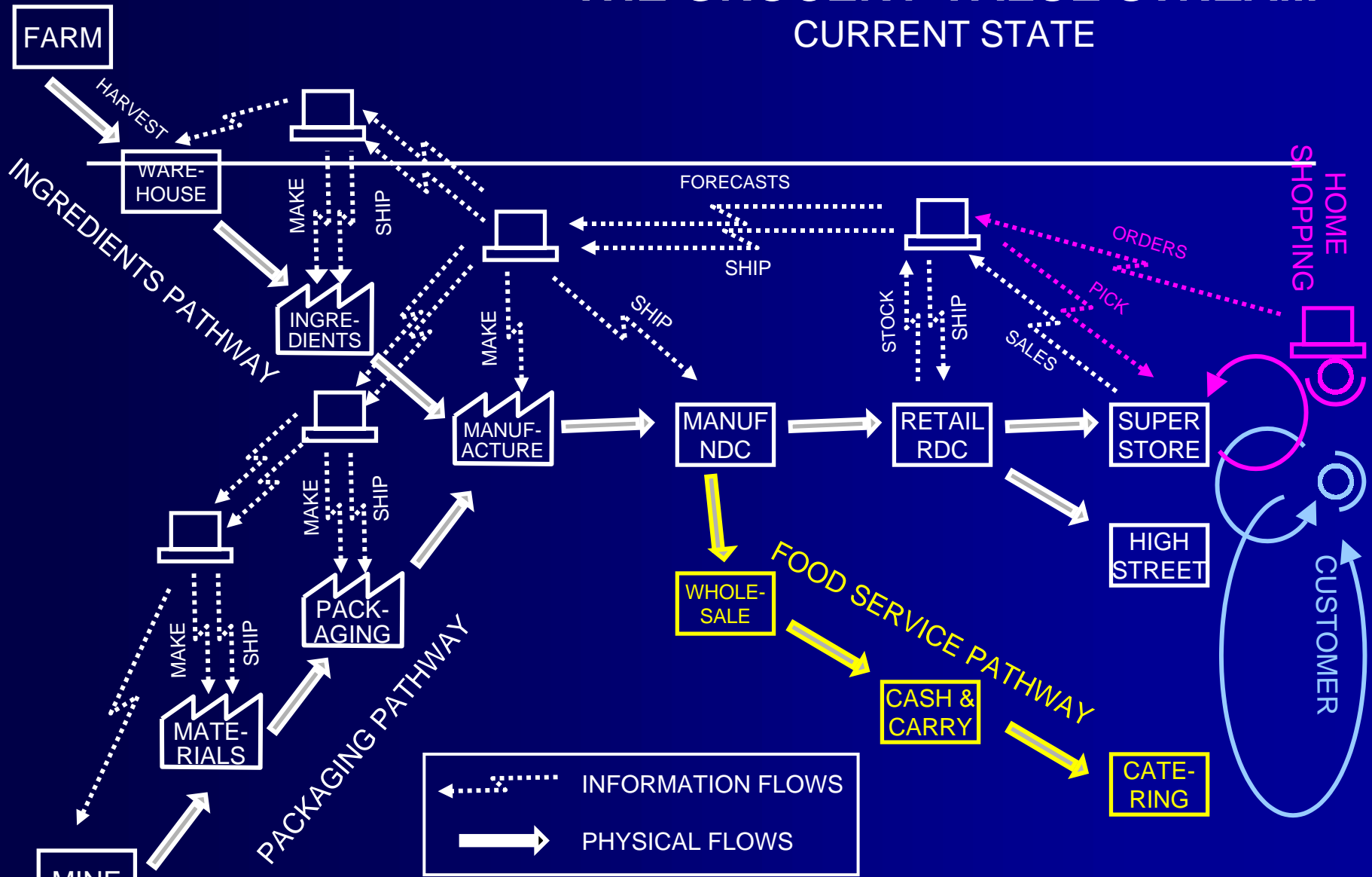
- This is the logic behind Toyota City – a stable group of 300 1st tier suppliers, 2-3 per part – whose operations have been tightly synchronised for 30 years!
- Partnerships are not enough – the success of the group has to be built on joint process analysis at the product level
- Adversarial piece-price games can't compete
- But this is only half of the story!

Including the Customer

- Is essential to level demands on production – and go beyond marketing - which is really the skilful disposal of stock to strangers
- Use of most products is very stable – while purchases are not – because of marketing and the limited asset base of customers
- Most customers can foresee the timing of their replacement purchases – but as strangers have no incentive to share this
- Can this form the basis for a new “Deal” to **level** demand in line with use in exchange for better responsiveness through **compression**?

THE GROCERY VALUE STREAM

CURRENT STATE



Implications

- Have to understand the characteristics of use by different groups of customers
- Have to rethink the unit of analysis – which should also be the unit of action
- Have to understand the rules that optimise the value stream – aligning the production constraints, pricing and parallel routes to market with patterns of use/replacement
- Have to rethink the social basis for cooperation with customer/users

Manufacturing Complexity Network Conference

**Complexity, Order and
Change: The Principles of
Value Stream Management**

Professor Daniel T Jones

www.leanuk.org

danieltjones@compuserve.com