

LEAN TERMINAL PRODUCTION: THE APPLICATION OF LEAN MANUFACTURING TECHNIQUES TO IMPROVE MATERIAL FLOW IN INTERMODAL TERMINALS

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12th December 2011

Outline:

- What is lean?
 - TPS
 - 5 Lean Principles
- ERIP Showcase Lean Methodology
 - Norwegian Bitesize Methodology for SMEs
- Lean Workshop @ Alnabru
- Oppsummering

Hva er Lean?

...Lean betyr eliminering av sløsing (Liker, 2006)

"det eneste vi gjør er å se på tidslinjen fra det øyeblikket kunden gir oss en ordre til det punktet vi får pengene. Og så reduserer vi tidslinjen ved å eliminere sløsing"

*"All we are doing is looking at the timeline from the moment the customer gives us an order til the point we collect the cash.
And we are reducing that time line by removing the waste"*

Taiichi Ohno, 1988

Frederick Taylor
(Scientific
management)

Henry Ford
(assembly line,
mass production)

Toyota Production System



Dr. Taichii Ohno
1950: Assembly
Manager



Eiji Toyoda
1950: Managing
Director



Dr. Shigeo Shingo
1959: Industrial Engineer

**Deming, Feigenbaum, Juran,
Ishikawa (TQM, SPC)**

1900

1920

1940

1949

1960

1975

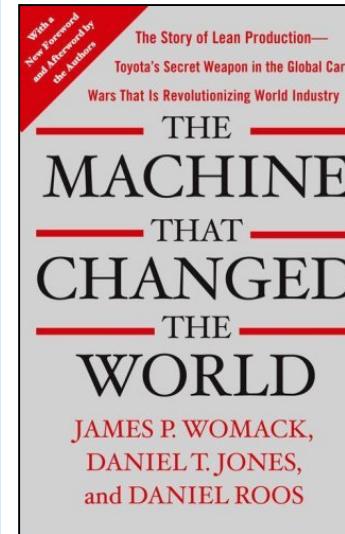
1980

Toyota Production
System

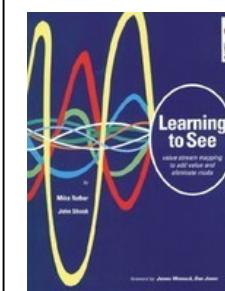
World Class
Manufacturing

2000

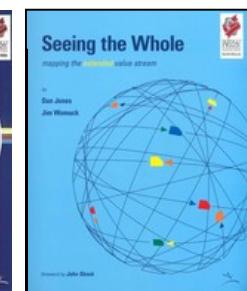
Lean
Manufacturing



1990



1999

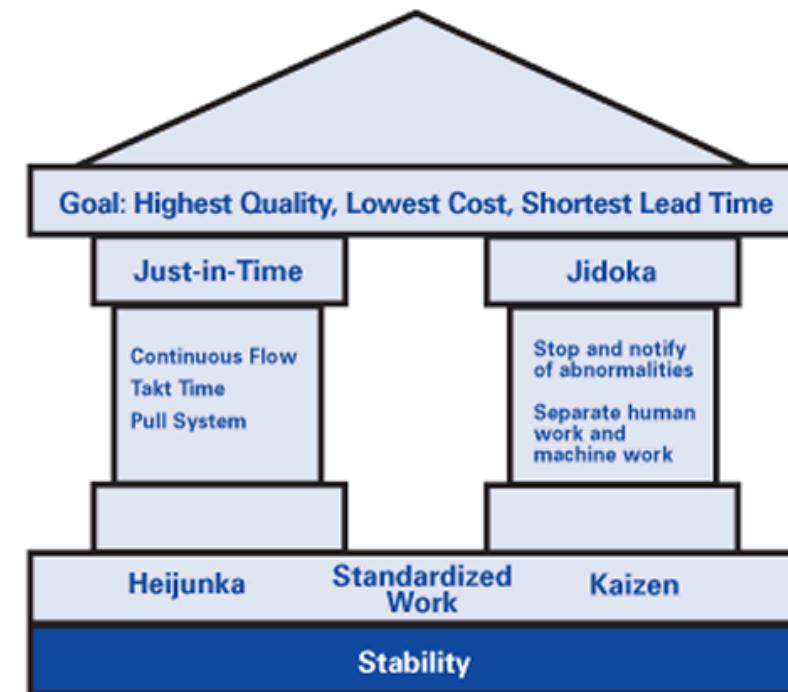
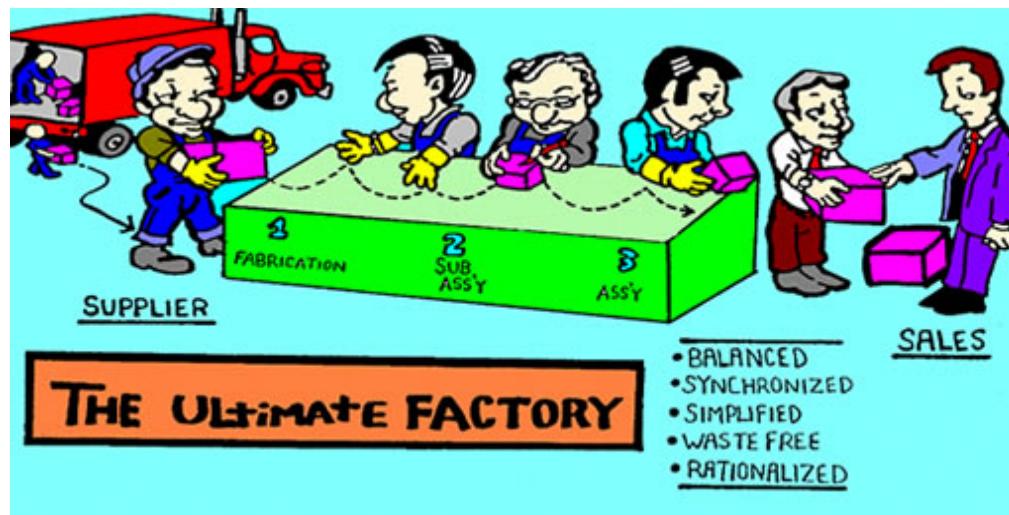


2003

Toyota Production System



"The primary goal of the Toyota production system is to identify and eliminate waste and reduce costs"



(Marchwinski and Shook 2006)

Toyota Production System

“Det første jeg gjorde var å standardisere jobbene. Og så instruerte jeg arbeiderne på produksjonsgulvet om å revidere metodene kontinuerlig, ved å forklare at “du stjeler penger fra selskapet om du ikke forbedrer metodene hver måned””

Taiichi Ohno (1946)

Core Elements:

Focus on value

- Value is defined in a way that allows objective measurement
- Elimination and/ or reduction of waste
- Value is defined exclusively from the customer's perspective and must be long-term

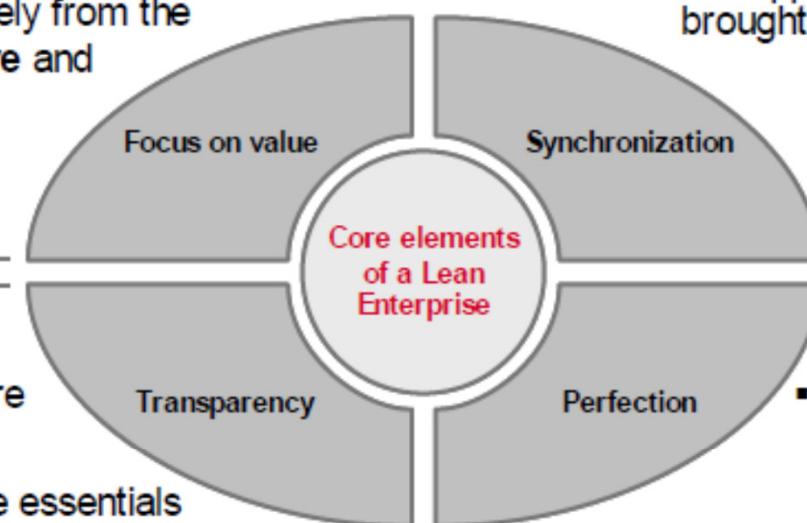
Synchronization

- Processes are linked; work flow is synchronized
- The speed at which processes flow is coordinated; supply and demand are brought into alignment

- Tasks, expertise and responsibilities do not overlap

Transparency

- Objectives and results are expressed as data
- Scope is reduced to the essentials and communicated visually
- Discrepancies from target values are immediately made obvious



Perfection

- Standards lead to stable processes and provide continuous improvement
- Company strives to achieve perfection
- This means that achievements to date must constantly be challenged

Fem Lean Prinsipper:

1. Verdi (*Value*)
2. Verdistrøm (*Value stream*)
3. Flyt (*Flow*)
4. Sug (*Pull*)
5. Fullkommenhet (*Perfection*)

Womack og Jones (1996)

Lean production

- Value: ‘...can only be defined by the ultimate customer’

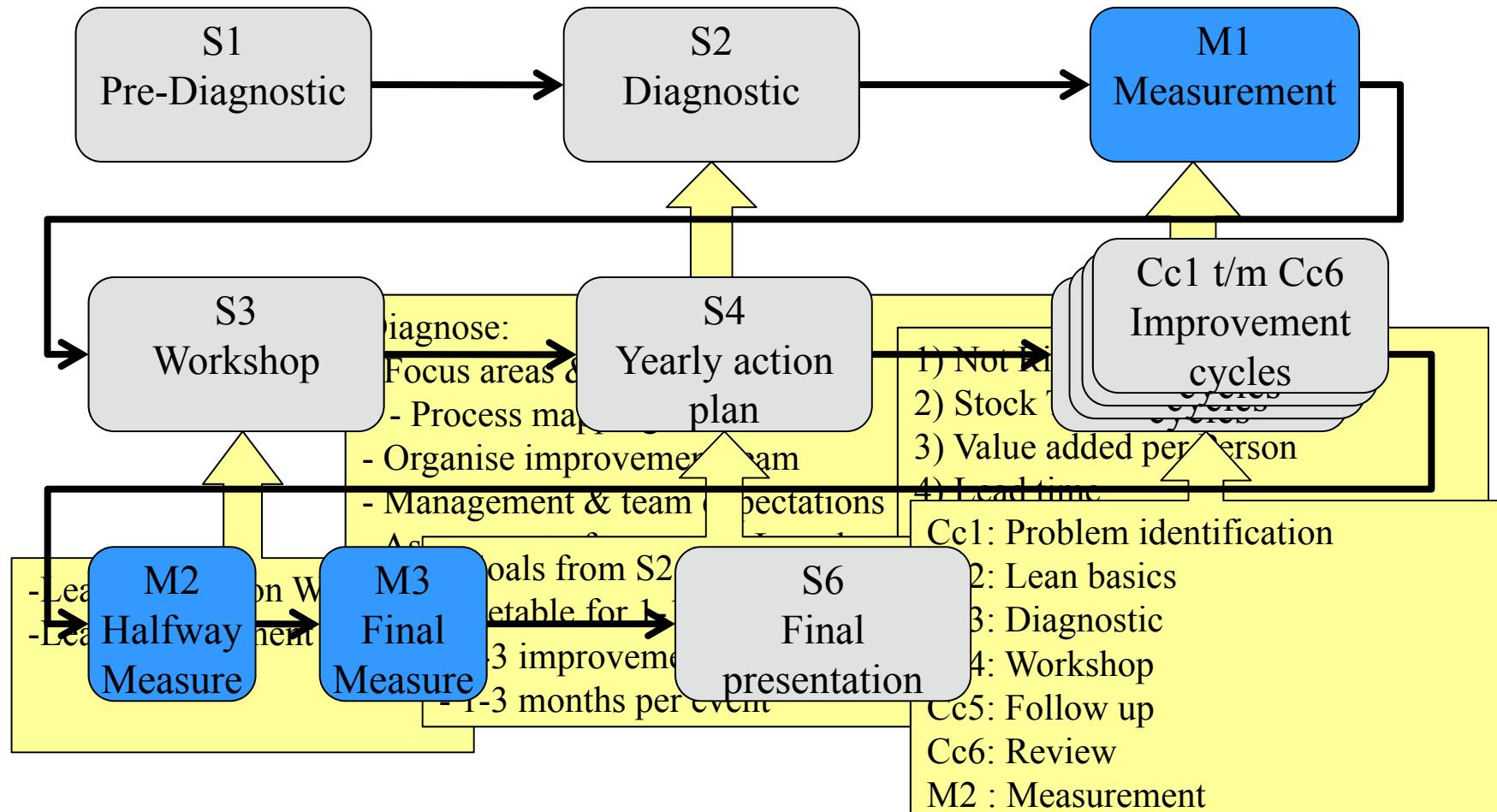
Womack and Jones, 1996, p16

- Value stream:
 - An action either adds value, creates no value but is unavoidable (Type 1 Muda) or creates no value and can be dispensed of (Type 2 Muda)

Lean production

- Flow:
 - Value adding steps should be placed one after the other in order to avoid delays
- Pull:
 - Build only what is wanted, when it is wanted
- Perfection:
 - Continuous, incremental improvement (Kaizen)

The ERIP "Showcase" Methodology



The ERIP “Bitesize” Methodology



Pre-Diagnostic

Diagnostic

Workshop

Pre-diagnostic

- Meet and great with company key contact persons
- Management expectations are considered (if there are any immediately important areas for focus)
- General introduction to lean production principles and the need for continuous improvement

0,5 days

Diagnostic

- Aims to achieve buy-in and involvement from the core team who will be working on the improvement cycles
- Teaching points focus on identifying 7 wastes and Value added and non-value added activities
- Considers 6 core ERIP measures (KPIs)
- Process mapping
- Poorest indicators become the focus for the workshop

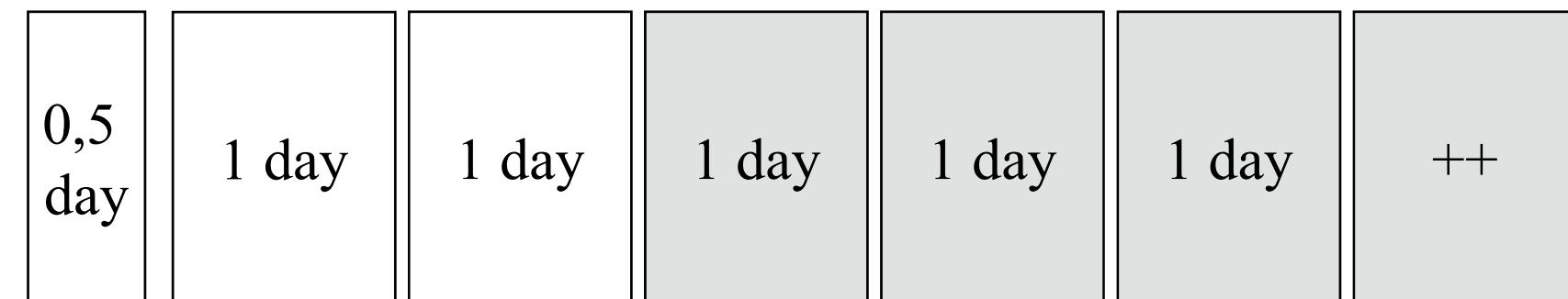
0,5 days

1 day

1 day

Workshop

- Uses Plan-Do-Check-Act (PDCA) cycle to focus on improving the poorest of the measures / problem area from process mapping
- Teach points focus on lean tools to identify the areas for improvement and to countermeasure the problems



Lean Workshop @ Alnabru

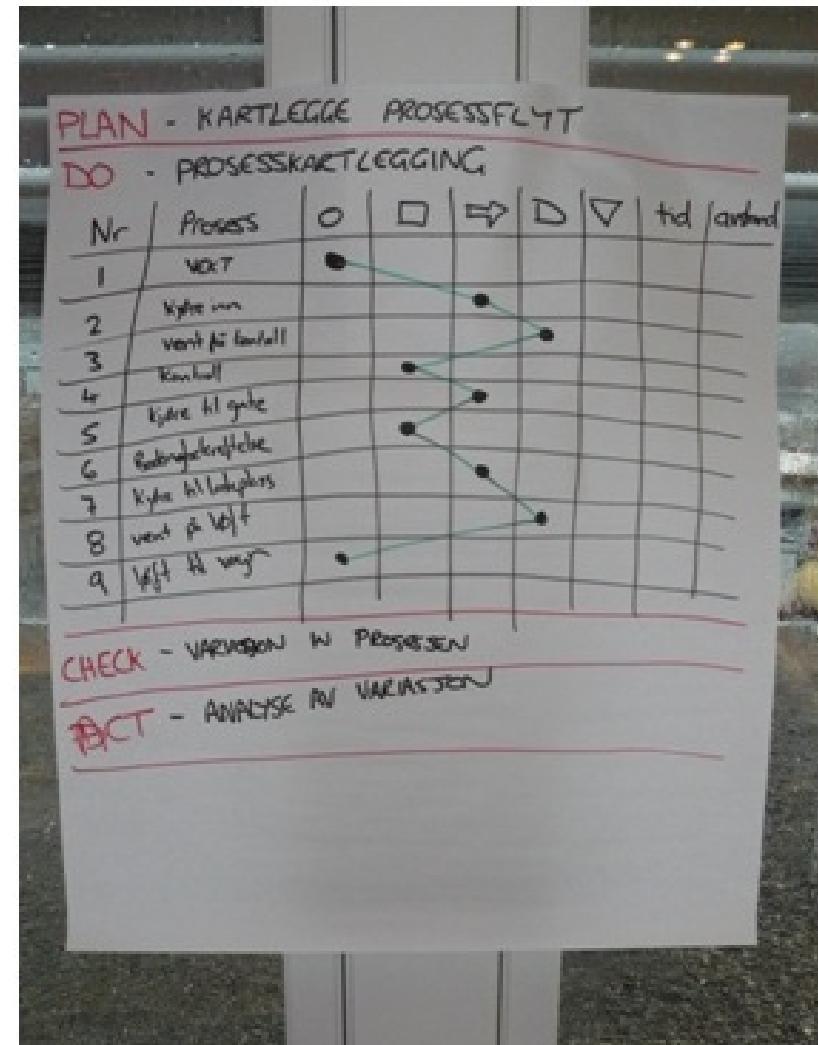
Diagnostic Workshop

- Basics of lean production
- Process Mapping
- Continuous Improvement
- Plan-Do-Check-Act (PDCA) Cycle



Prosesskartlegging: Biler

- Operasjon
- Inspeksjon
- Transport
- Ventetid
- Lager



Variasjonsanalyse:

- ProsesSEN "kontroll / kjøre til gate" viste største variasjon
- Årsaksanalyse trengs!

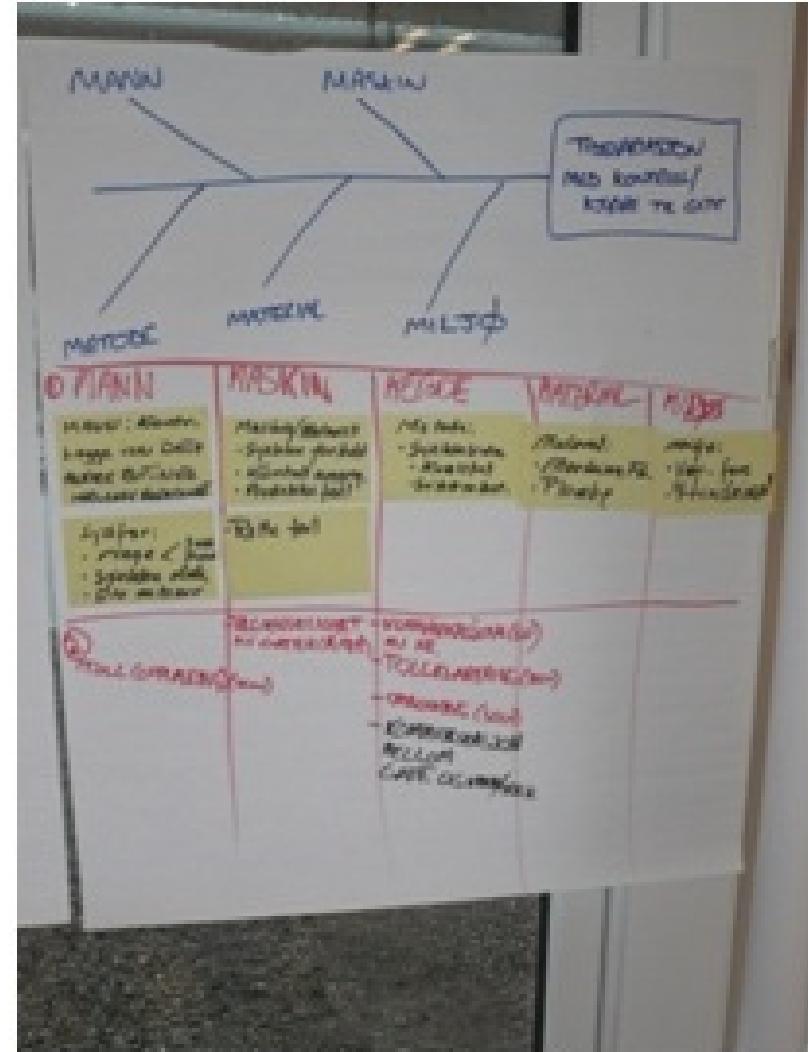
PLAN - ANALYSE AV VARIASJON I PROSESSEN				
DO - PROSESSEN	MIN	MÅLS	DIFFERANSE	PLASSERT
1. VEKT	-	-	-	-
2. Kjøpe inn	9	25	16	7
3. levering	15	185	170	4
4. Kontroll/Mykligte	12	730	758	1
5. Redusert lastebil	10	113	97	5
6. Kjøpe til lastebil	15	290	275	2
7. veit p. last	17	258	241	3
8. last fr. bildegg	40	85	45	6

CHECK - ÅRSAK TIL kommealderen til gate

ACT - FIKSERES INN DIAKRAM

Årsaksanalyse:

- Årsaksanalyse viste at Gate-in prosessen egentlig er kilden til variasjon i prosessen...



Gate In som Flaskehals...

- Ingen standardiserte kommunikasjonsmetoder forbundet med Gate In
- Forbedringsforslag:
 - å implementere kanban som den standardiserte kommunikasjonsmetoden
 - Å implementere standardiserte arbeidsprosesser for å skape flyt
 - Tollklaring
 - rebooking

Kanban

- Introdusert i 1953 hos Toyota Motor Co.
- Kanban er et Japansk ord som betyr ‘signal’ eller ‘kort’
- Kanban er brukt i en lean bedrift for å godkjenne produksjon og flytting av produkter og materialer (ingen kanban, ingen produksjon / flytting).
- Det finnes to typer kanban
 - Produksjonskanban
 - Transportkanban

Kanban på terminalen?!?!

- Ingen kanban, ingen inngang!
 - Bilene trenger ordernummer før de får adgang til terminalen
- Kanban følger containeren (sjåføren)
- Kanban har all nødvendig informasjon, og blir tilgjengelig for operatøren i Gate In
 - Ordrenummer
 - Containernummer
 - Bilnummer
 - Tognummer

Kanban på terminalen...

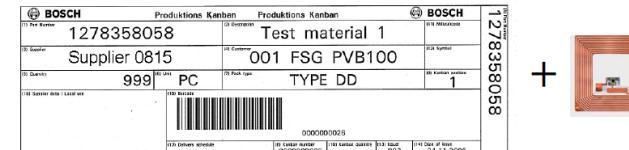
- Kanban kan være så enkel som et kort med trykt informasjon på...
- Eller en strekkode...
- Eller en RFID-brikke...
- Alt er mulig!!!

Kanban

RFID in Production Logistics

RFID and Kanban

RFID transponder on kanban cards

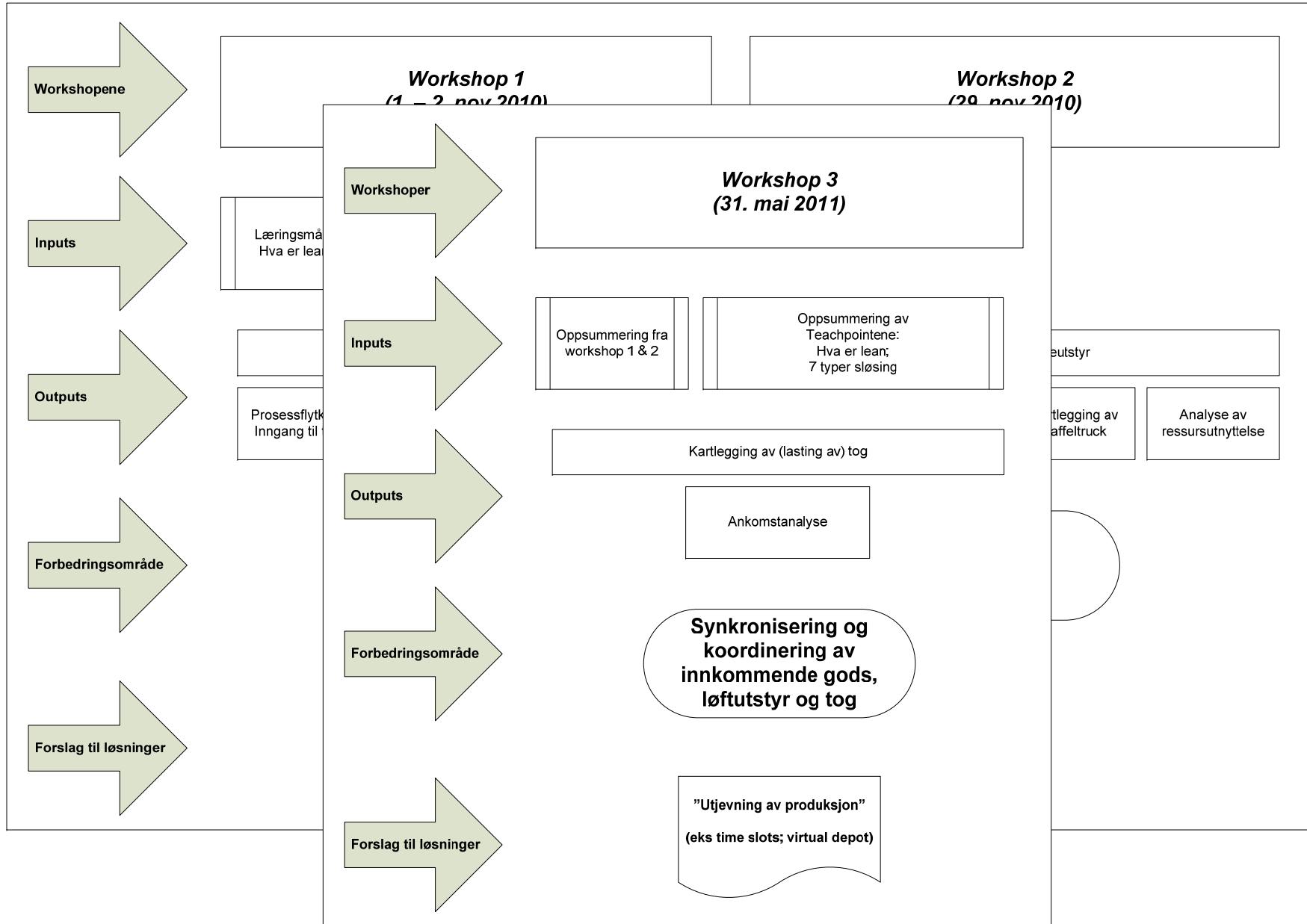


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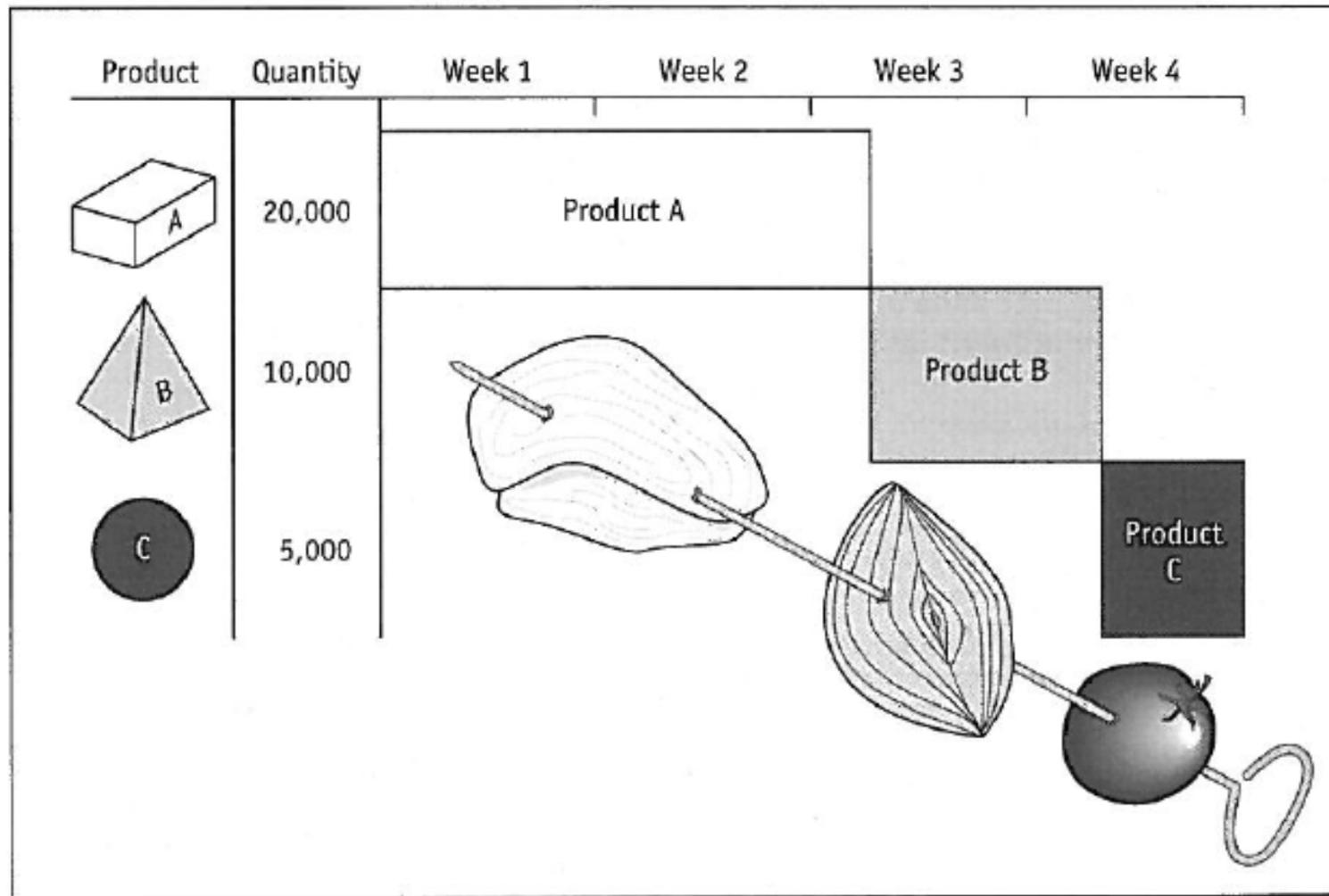
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 **BOSCH**





Level production: Shish-kebab or Heijunka?





Questions or comments?

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