Avancier Methods
Value Stream Analysis

In an EA context

EA and value stream analysis

- EA is about the design, improvement and optimisation of information-intensive business systems.
- It involves the analysis and design of business processes and data

- Value stream analysis is commonly associated with reducing waste in the processes of material stock-and-flow systems (as in “Lean” and the “Manufacturing revolution”).

- This paper introduces value stream analysis and relates it to enterprise architecture.

Business architecture - general premises

- The likes of TOGAF and ArchiMate presume that a business is required to perform discrete behaviours that
  - produce results of value (if only to keep records up to date)
  - are often called services
  - are triggered by discrete events, and run over time
  - are performed by actors or components (structures that occupy space and must be addressable)
  - create and use business data objects (cf. Michael Porter 1985)
    - each data object (entity or event) contains a data structure or item that is meaningful or valuable to its creators and users.

Business architecture - general practices

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The general idea is to treat a business organization as a system

1. Identify business customers and suppliers
2. Identify business inputs and outputs (material and/or information flows)
3. Decompose a business into subsystems, each with its own inputs and outputs
4. Draw the network of subsystems (goods and services flow diagrams)
5. Define the end-to-end processes needed to transform inputs into outputs
6. Define the resources (roles, equipment, buildings, money etc.) needed to perform processes
7. Draw a process flow chart for each core business scenario (with swim-lanes for subsystems, roles, functions or organisation units)
8. Measure the time, cost and value of process steps, and inter-step gaps
9. Look for inefficiencies in business processes and optimise them.

Cf. The Value Chain

Value Streams

Value Stream Analysis

Note

- Nothing above implies the existence of computers
- They are general premises and practices for modelling business systems, regardless of IT

Business structure decomposition

- Decomposition divides a business into subsystems, each with its own inputs and outputs.
- Subsystems might be
  - organisation units in the management structure, or
  - purely logical subdivisions of the business

- Logical “functional decomposition” or “capability decomposition”.
  - Groups the business activities (found in business processes/scenarios/value streams) under nodes in a hierarchical structure
  - Uses that structure to present an overview of a business, for heat mapping, and to organise other structures (notably the application portfolio).

Value chain v Value stream

- The terms are commonly used interchangeably.
- Often, however
  - A value chain is a top-level business decomposition diagram, and
  - A value stream describes one specific end-to-end process.

- Note that a so-called “end-to-end business process” may cut across business divisions, be they physical or logical.

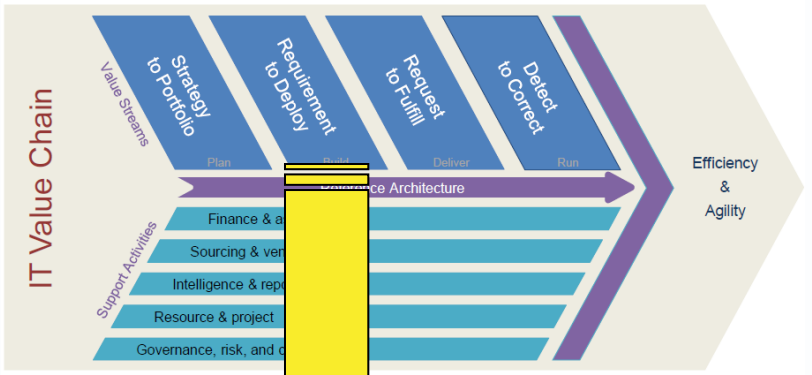


Figure 1: IT Value Chain

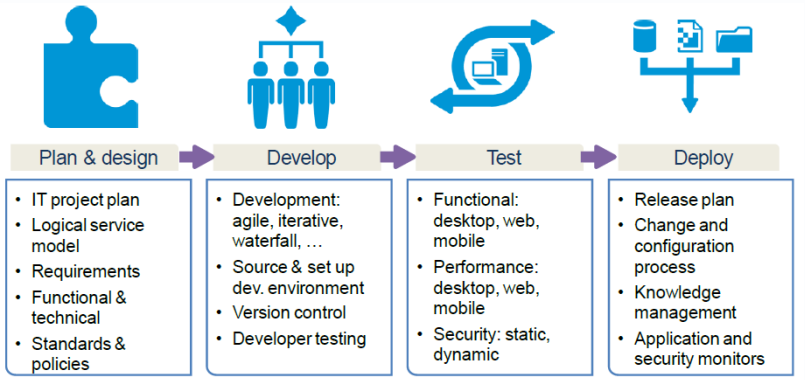
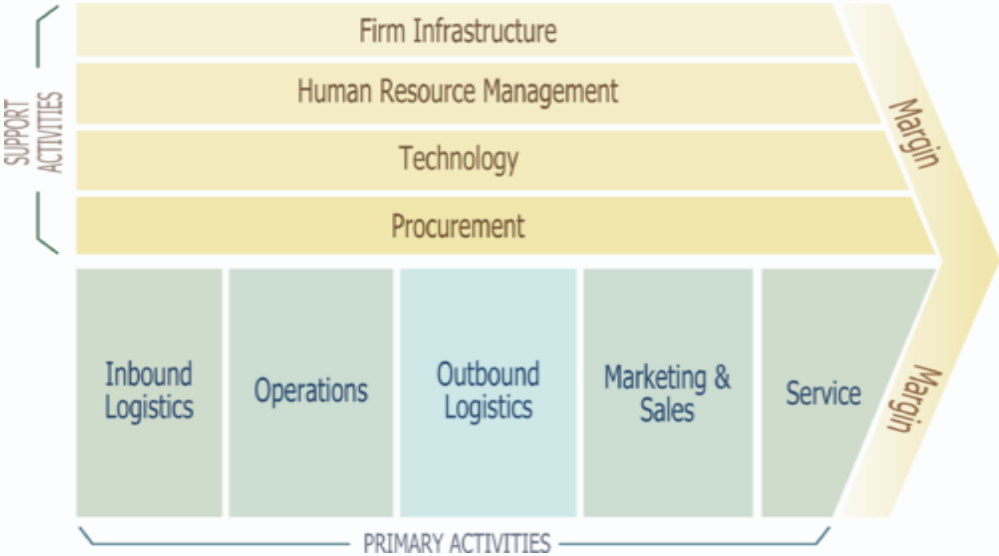


Figure 5: Requirement to Deploy Activities

Value chain

- A collection of inter-related business activities that a business performs to deliver one or more products and services of value to its customers.
- Popularized in “Competitive Advantage: Creating and Sustaining Superior Performance” by Michael Porter (1985)
- The Open Group’s IT4IT is a reference model for EA that features this value chain diagram.



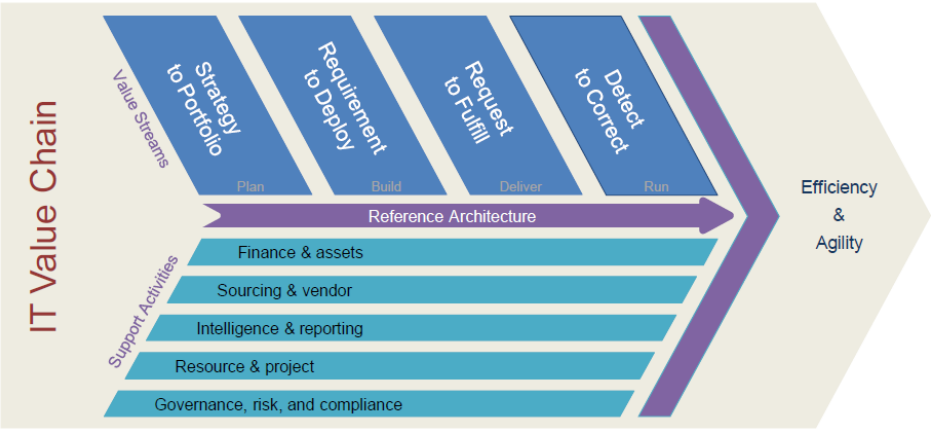


Figure 1: IT Value Chain

Value streams

- The term **value stream** is often used to label a particular sequence of activities that terminate with the delivery of a product or service of value to a customer of a business or system or interest.
- Cf. business scenario, end-to-end process, workflow
- Remember, it may cut across divisions in the value chain diagram

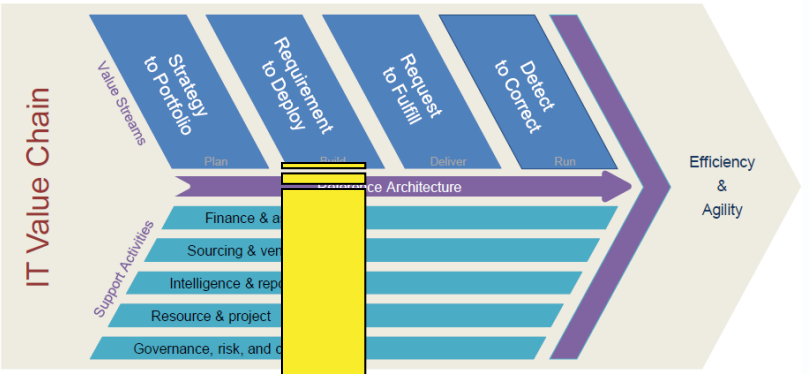


Figure 1: IT Value Chain

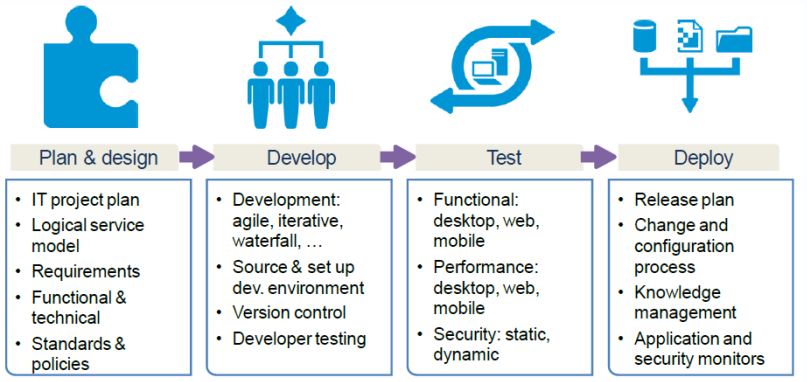
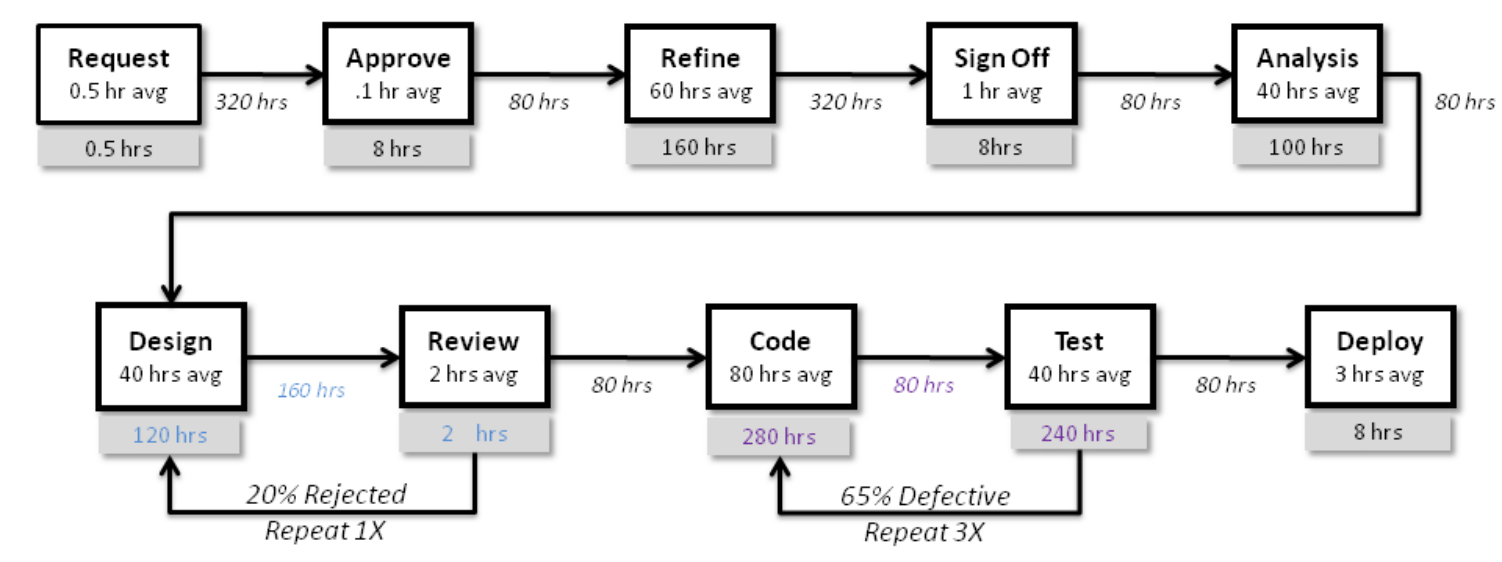


Figure 5: Requirement to Deploy Activities

Value stream measurement

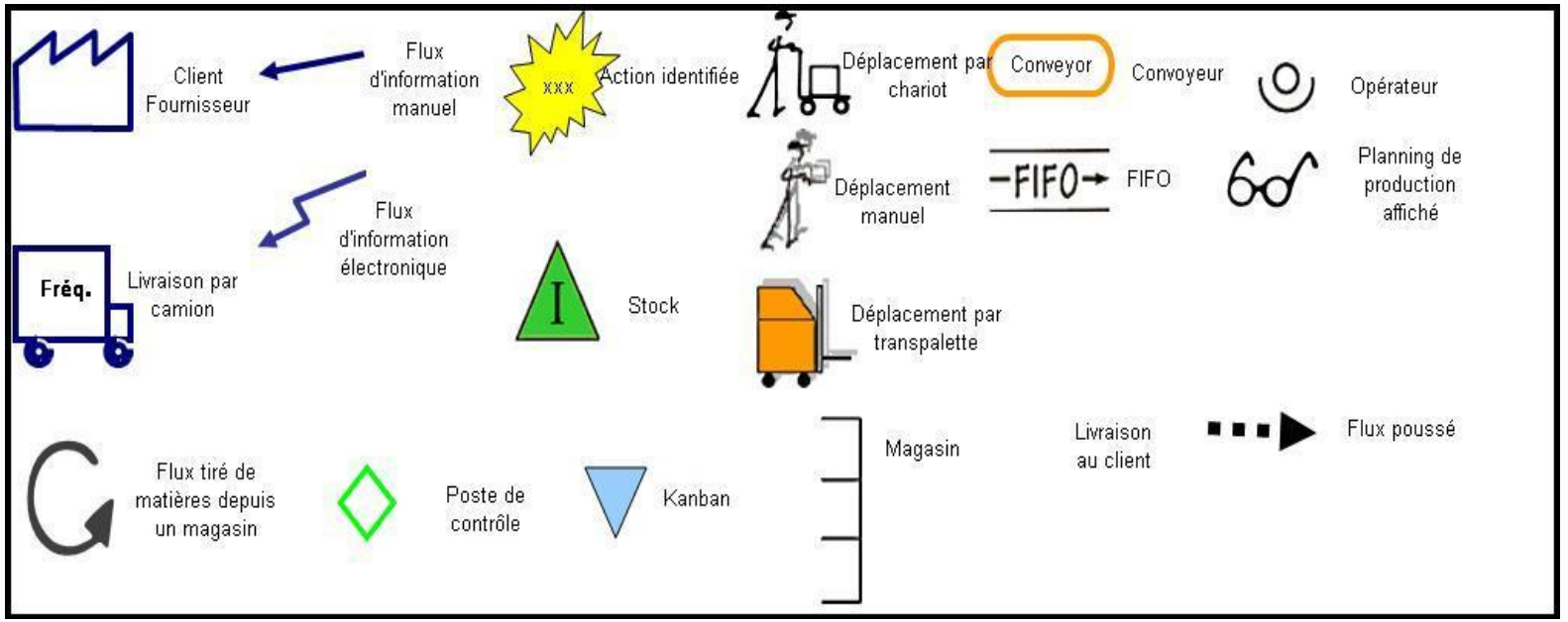
- Business processes are composed of measurable activities - arranged in a defined sequence with SMART objectives.
- Value stream analysis is about the measurement and optimisation of process activities and outcomes.



- This simple diagram records the time for each process step, and the time between steps.
- http://www.netobjectives.com/blogs/why-kanban-board-value-stream-map-scrum-board-isnt-and-what-tells-us

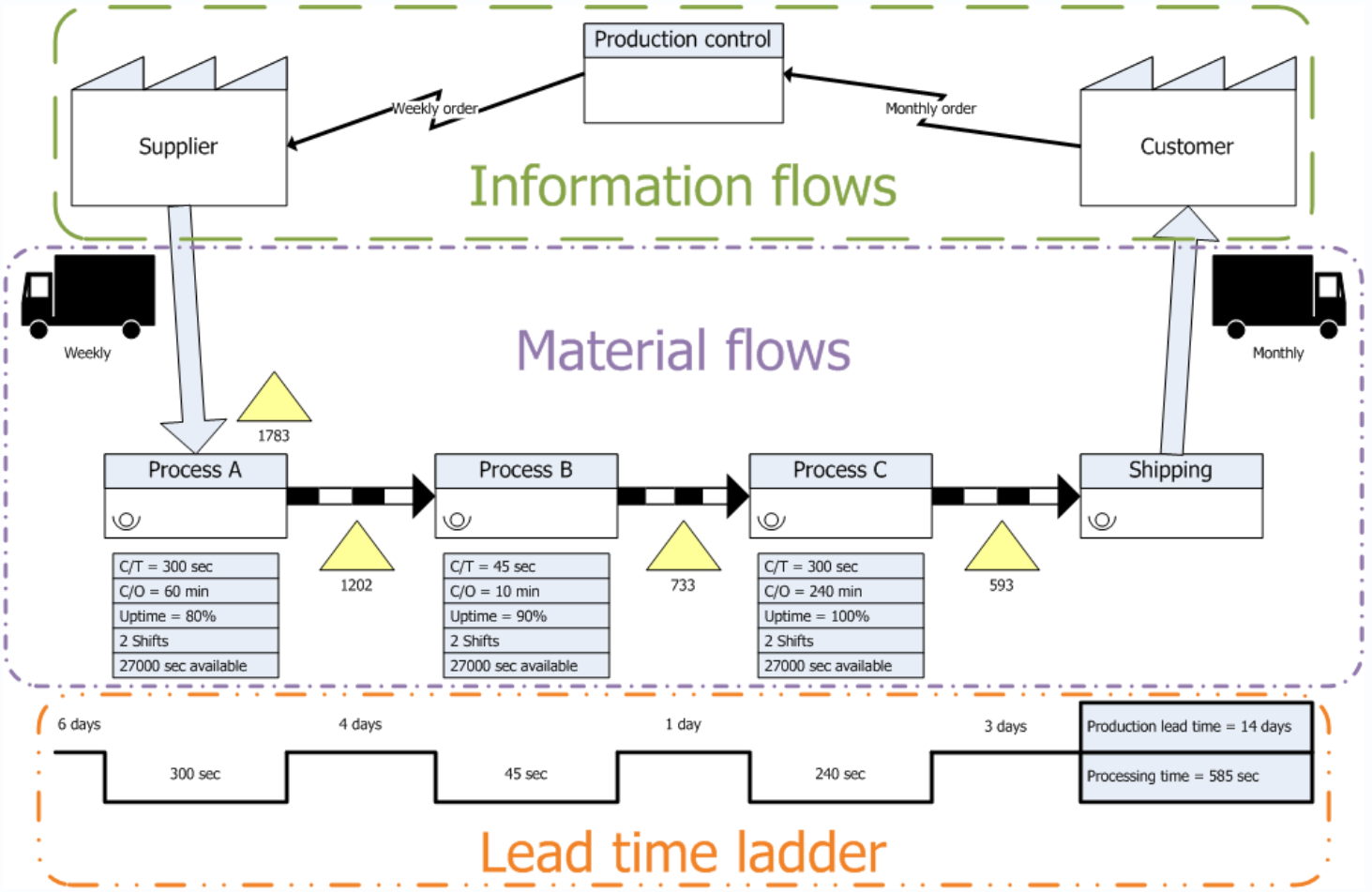
Value stream diagrams

- There are countless graphical notations for modelling business scenarios, end-to-end processes, workflows…
- People draw everything from crude cartoons to BPMN and UML diagrams.



- These value stream symbols published by Foster24 - Own work, CC BY-SA 3.0 https://commons.wikimedia.org/w/index.php?curid=19856825

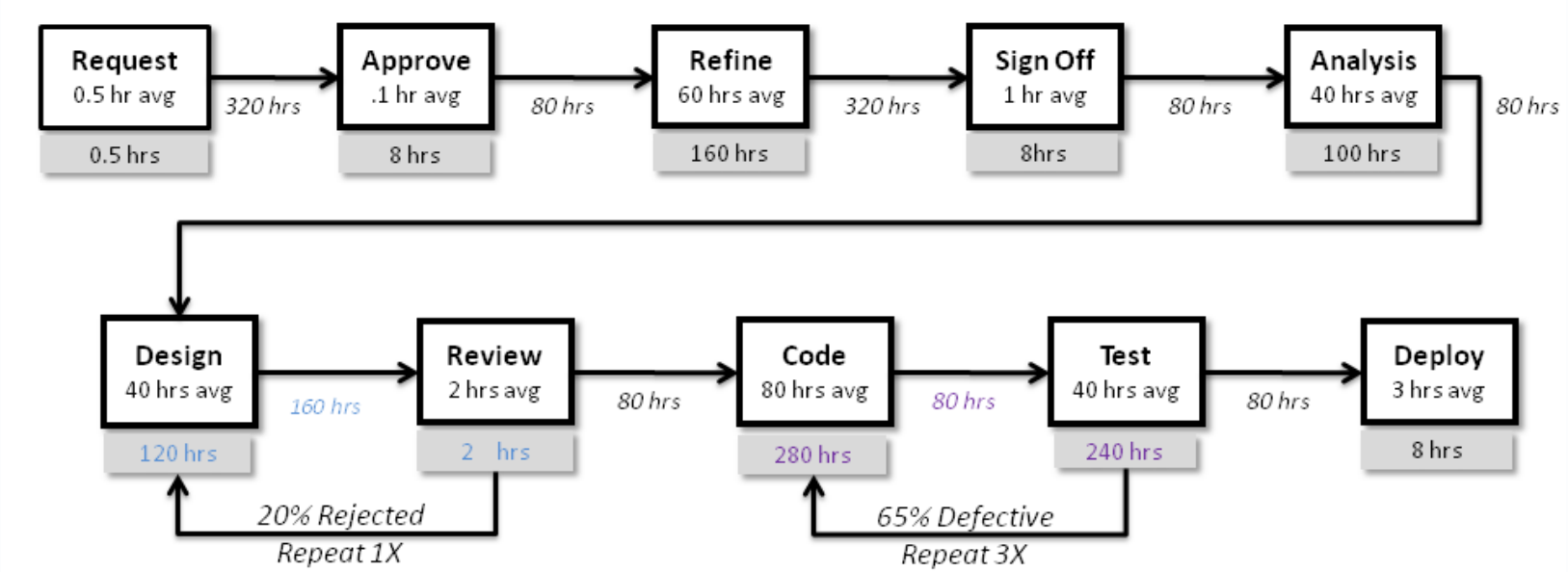
An example value stream map



Value streams as simple sequences

- A value stream is *all* the activities necessary to produce and deliver a product or service, from end to end.

- But diagrams/maps usually show a plain sequence of activities, with little or no logical control flow and alternative paths.



Value stream mapping

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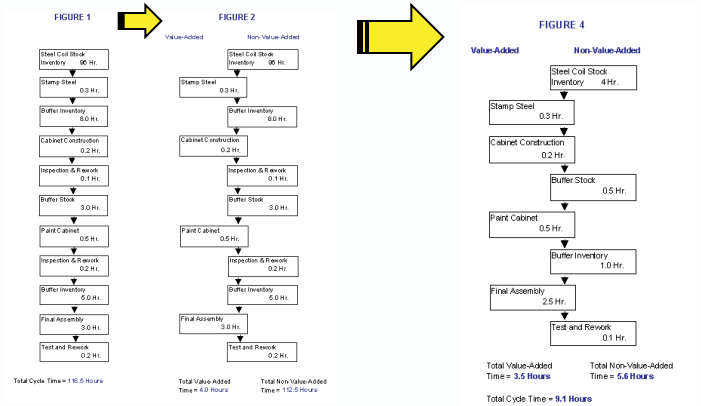
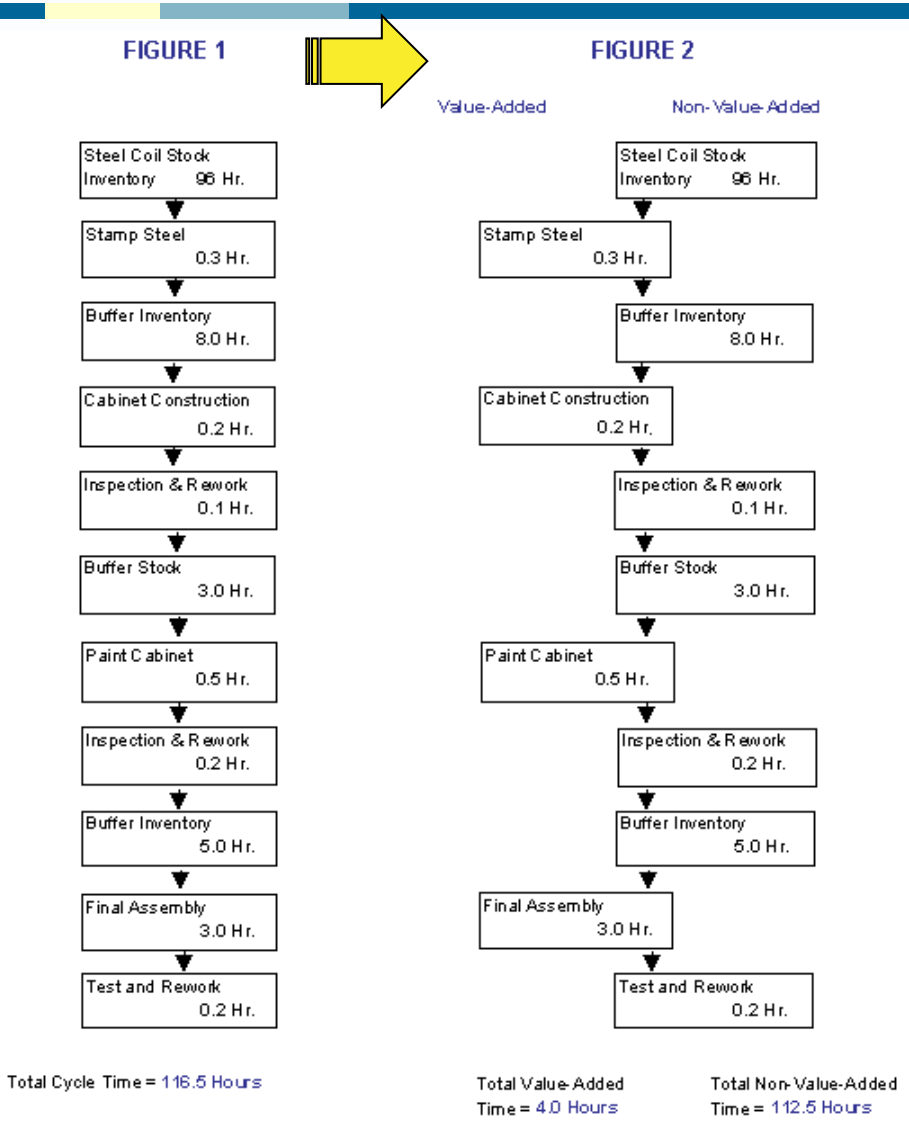
- A lean-management method for analyzing the current sequence of activities that take a product or service from its beginning through to the customer, and designing a future state for the same.

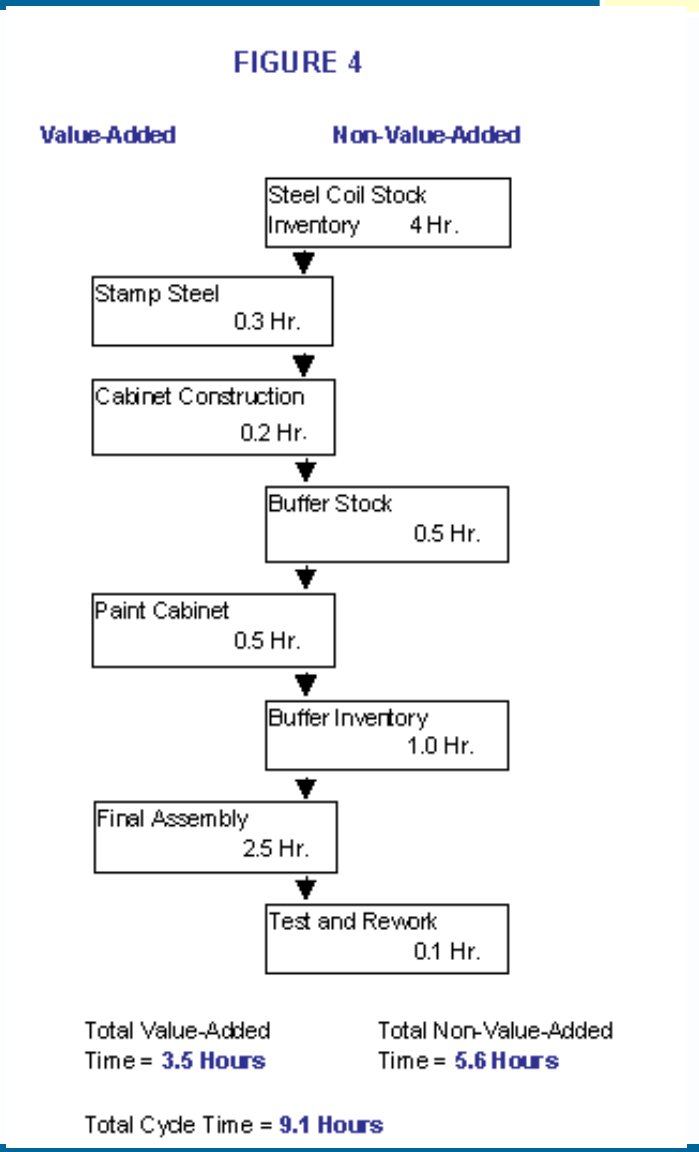
- Toyota calls this "material and information flow mapping"; they use it to focus attention and effort on waste reduction.
- The process involves creating a current-state map of the value stream, followed by a future-state map from which specific action plans are developed.



Example from https://www.moresteam.com/toolbox/value-added-flow-chart.cfm

Value stream analysis and optimisation





Value stream analysis process

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- Draw and revise a value-added flow chart to improve cycle times and productivity by
  - visually separating value-adding from non-value-adding activities
  - identifying opportunities reduce waste, speed up and lower costs

- The process can be distilled along these lines:
  1. Represent all process steps and inter-step gaps as a linear sequence of boxes
  2. Annotate each box and gap with the time it takes
  3. Identify what does not add value (store, move, wait, inspect, test, rework)
  4. Move non-value-added (NVA) boxes to the right of the value-adding boxes
  5. Calculate percentage of time wasted (total NVA cycle time, divided by total cycle time * 100) and set a target for improvement
  6. Look to reduce or eliminate NVA boxes.
  7. Look to reduce or improve value-added boxes.
  8. Refine and redraw the process (using benchmarking and best-in-class analysis) until a target level of improvement is achieved

The potential value of “Non-Value Added” activities

- One source suggests the percent of total cycle time consumed by NVA activities is often shockingly large - in excess of 80%.

- But NVA activities may cost only a small amount and/or not lie on the critical path
- And they may provide a value outside of producing or delivering a specific product or service such as
  - reducing error rates and recalls
  - capturing business data for future analysis
  - selling the customer additional products!

Value stream analysis in manufacturing

- Value stream analysis is commonly associated with reducing waste in manufacturing processes.

- Probably, nobody who designs steel mills, car production lines and other such stock-and-flow systems calls themselves an enterprise architect.
- And conversely, nobody who calls themselves an enterprise architect is expected to design material stock-and-flow systems.

Value stream analysis in EA

- However, value stream analysis can be used in the design, improvement and optimisation of information-intensive business processes.

- As long ago as 1985, Michael Porter pointed to the increasing value of IS and IT in improving business processes.

The importance of information to business processes

- “Porter states that "Information Technology" and "Information Systems" are particularly important as every [business] activity creates and uses information.
- He points out that modern information system technology plays a particularly crucial role in scheduling, controlling, optimizing, measuring and otherwise co-ordinating all manner of activities.
- Similarly, he notes that office or administrative technologies, although often neglected or subsumed beneath the umbrella term of information systems, also have an important role to play as: "Change in the way office functions can be performed is one of the most important types of technological trends occurring today for many firms, though few are devoting substantial resources to it." (Porter, 1985, p 168)”
- http://www.chris-kimble.com/Courses/World_Med_MBA/Competitive_Advantage.html

The importance of data to processes

- Analyse the business data that must be created and used at each step in a value stream to

- Identify show stoppers, which prevent activity because
  - data is not available
  - a data value contravenes a precondition for success.
- Increase efficiency, by
  - improving the quality or timeliness/readiness of data
  - (perhaps improving one at the expense of the other)
- Identify opportunities for IT to
  - speed up or improve data capture or retrieval
  - capture data for future business analysis/intelligence

The main or straight-thru path

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- A value stream typically has a
  - Main path
  - Straight-thru path
  - Happy path
  - Sunny day scenario
- that leads from the start of the process to the desired product or service.

- In a manufacturing industry (like making cars) you might expect more than 99% of cases to follow this path.

Exception handling

- Much of the complexity in governmental and service-industry processes arises in recognition, design and implementation of *alternative or exception paths*.
- It is often said that 20% of exceptional cases consume 80% of the time and cost - at design time if not at run time also.

Compensating transactions

- A traditional approach in information systems
  - Design a business transaction so that it wholly succeeds or wholly fails.
  - All necessary data is collected for inspection
  - All steps within the transactions appear synchronous
  - The process cannot half-complete, leaving the system in an inconsistent state.

- In a modern business system
  - The steps of one logical transaction are distributed, performed asynchronously, and must be orchestrated by a workflow.
  - When data is not available, or a data value contravenes a precondition for success, then the workflow may have to invoke *compensating transactions* to undo the process so far or otherwise restore a consistent business state.

A few remarks

- EA is about the design, improvement and optimisation of information-intensive business systems.
- It involves the analysis and design of business processes and data

- Value stream analysis is commonly associated with reducing waste in the processes of material stock-and-flow systems.
- However, it is a generally useful process improvement technique.
- EA should supplement it with analysis of the data created and used

- Nothing here is new, though people keep reinventing and renaming the ideas