Creating flow and reducing cycle time by reorganising teams around components

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Abstract
There is constant need to bring release time closer to the accounting period. To do that, one must reduce the cycle time of the statistical production process. In Statistics Estonia we have chosen to introduce Lean tools and Agile methods to define the value stream and let value flow better, based on the demand of the user.

Keywords: Statistical production, work flow

1. Lean production and one-piece work flow

A lean organization contains little to no "fat" in its work processes. It operates in an economical and efficient manner, constantly striving to improve its workflow. However, the primary focus is on identifying and eliminating waste in all its work and operational areas (Watson 2015).

Working harder or doing more is not a permanent solution to a problem in the process. People want to do their job right and are frustrated when their process does not flow smoothly and they are unable to deliver a result that meets user expectations (Watson 2015).

The throughput rate measures capability of a physical transformation. The higher the rate, the faster the transformation. To increase the throughput rate, it is important to work with small units or small unit of orders. This kind of production is referred to as "one-piece flow" or "continuous flow", and it helps organisations achieve just-in-time production. This means that

parts or components are moved through operations from step to step with no work-in-progress (WIP) in between either one piece or a small batch at a time (Dolcemascolo, n.d).

In a typical batch-and-queue production, as illustrated in Figure 1, parts or components move from a functional area to functional area in bigger batches and each processing step or set of processing steps is controlled independently by a schedule.

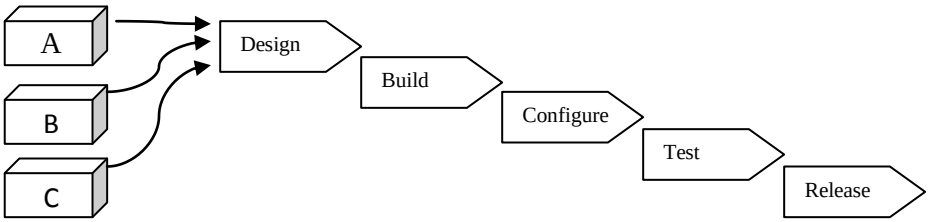

Fig. 1

This results in:

- Large amounts of defected components when a defect is found because of large batches of work-in-progress unfinished products,
- Long manufacturing lead time,
- Poor on-time delivery and/or lots of finished goods inventory to compensate, and
- Large amounts of WIP (Dolcemascolo, n.d).

In a continuous flow production there is a connection between steps as a one-piece flow. As illustrated below in Figure 2, one-piece flow is the method for creating connected flow because a small number of products or components are moved from step to step with essentially no waiting (zero WIP) and it is all done within one cell (Dolcemascolo, n.d.).

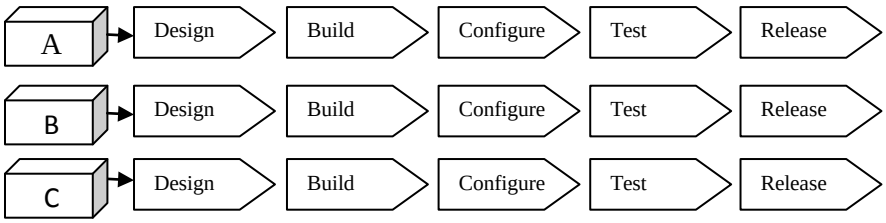

Fig. 2

2. The "before" situation

The working arrangement of Statistics Estonia is extraordinarily centralised. As of autumn 1993, when the central Marketing and Dissemination Department was created, different functions have been consolidated year after year and the number of specialised departments has decreased. The current structure is presented in Figure 3.

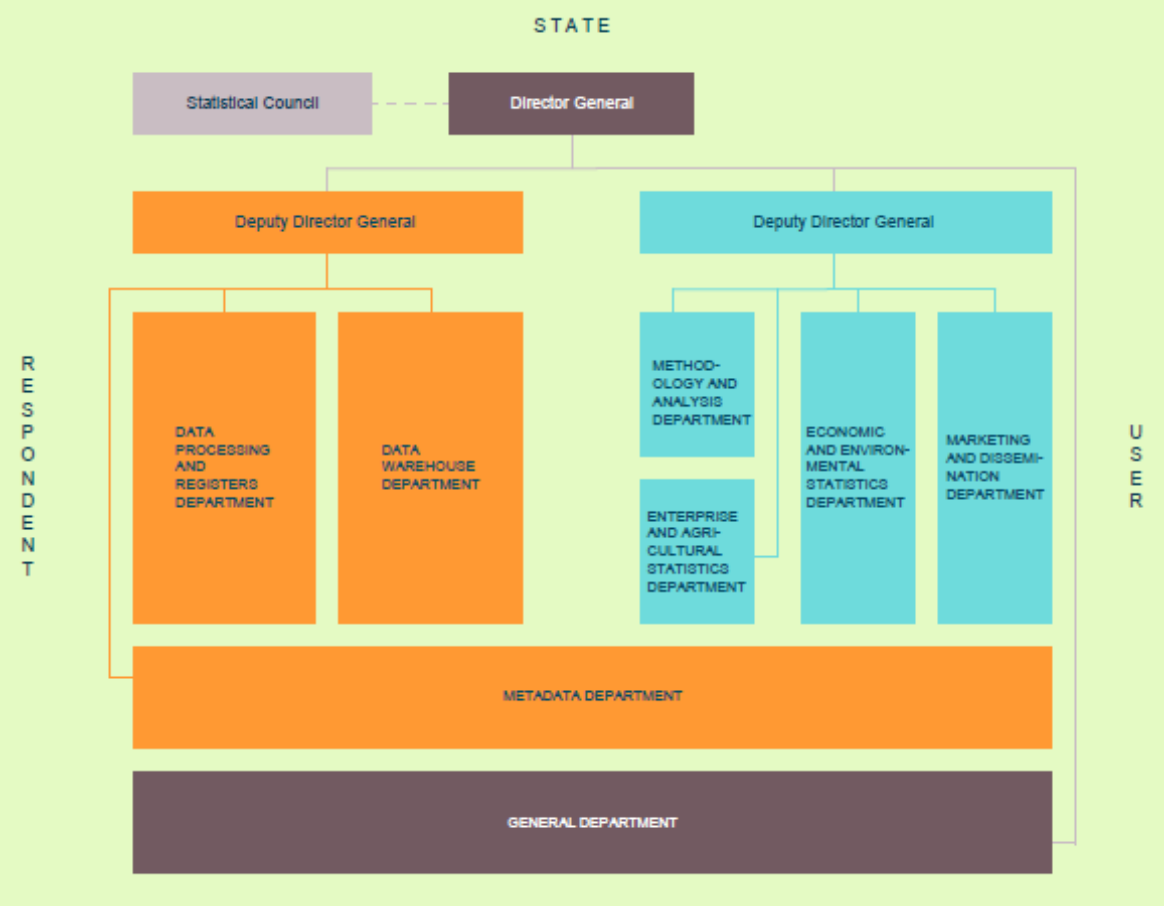

Fig. 3

There are in total eight departments, three of which are subject matter departments. The remaining five departments are function-based. In addition to a rather extensive centralisation of functions, the structure is also relatively flat. There are not any structural units that are smaller than those presented in the figure. There are on average 30 persons in a department, the largest department has 160 employees and the smallest has 10.

The main reason for such a centralised working arrangement is extreme paucity of resources. Consolidating similar functions has contributed to standardisation which in turn has increased resource efficiency. Figure 4 gives an overview of task distribution between departments.

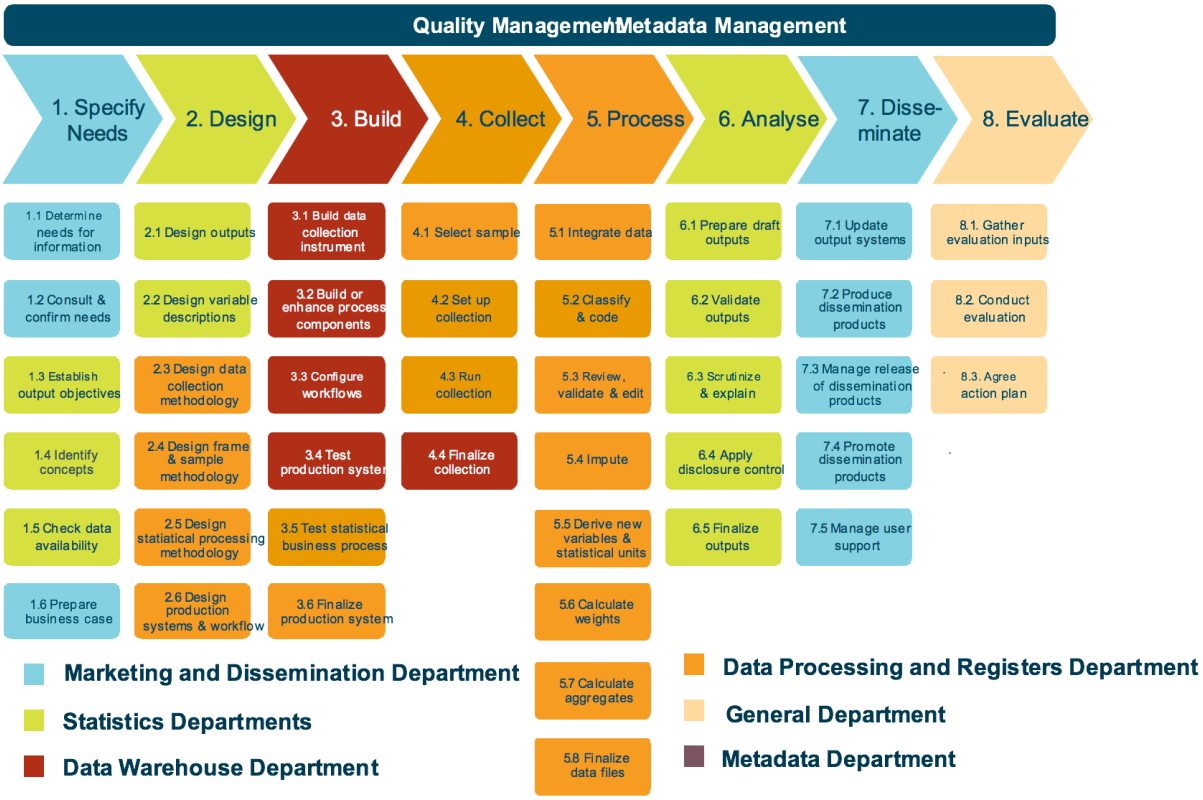

Fig. 4

While on the one hand, consolidation of functions has increased resource efficiency, on the other hand it has caused many hand-offs, batches are large and cycle times long, which in turn has had a negative effect on adherence to release times, i.e., lead time has increased.

3. Objective

Our strategic objectives are:

1. Producing relevant and understandable statistics and
2. Measuring changes faster.

The first objective is mainly connected to product development and knowing the users wishes (GSBPM stages 1–3). The second objective is connected to increasing the efficiency and speed of the production process. To achieve this objective, we want to improve flow, decrease cycle times and, eventually, decrease lead time.

4. Creating flow

The production of statistics is somewhat similar to manufacturing; however, the production of statistics takes place in an office environment, which is cardinally different from a factory environment. Therefore, we move forward step by step, experimenting and looking for solutions that work. We are developing and implementing a new working arrangement and developing the organisation culture by following these steps:

a. Forming teams around components

The performance of a statistical action generally consists of several stages: defining the need, design, implementation, data collection, etc. As a result of those stages, a statistical product or service is created, hopefully creating value for the user. However, in the process many important interim results are achieved, for example the questionnaire used to collect data, the processing program, the dataset, etc. Let us call these interim results **components.**

A component is something that is whole and that can be tested and used independently of other components.

There are three types of components. The first type is components that are connected to stages 1–3 of the GSBPM, i.e., components connected to preparing statistical actions or product development. For example, the description of a statistical action which is input for a program and the delivery schedule of the following 12 months, the prepared questionnaire and data processing package to collect and process data, etc.

The second group of components are connected to stages 4–8 of GSBPM, i.e., components connected to performing statistical actions, such as the dataset that is prepared for analysis or a cube published in the statistical database.

The third group of components include components connected to support activities, for example the metadata system, data warehouse, data collection system etc.

As for production, one-piece flow gives the best results in the case of cellular manufacturing. Therefore, teams must be organised around the aforementioned components so that the production of a component would take place as optimally and effectively as possible in the cell. When talking about a team here, we mean a group of persons working together on a day-to-day basis for a common goal. We certainly also need teams who meet periodically to achieve common objectives, but in this case we are talking about teams that work together every day in one cell.

Taking this into account, a team should have all the basic resources and competences for producing components. The optimal size of a team is 5–9 persons. In general, every team has a component owner who manages the team's working plan and priorities, and communicates information between the team and other interest groups (e.g. other component owners). In addition to a component owner, the team can also have a leader.

Since the structure is relatively function-based whereas every team should have all the main resources, there are also several cross-functional teams. For example, questionnaire team consists of people from three different departments, data processing and registers, data warehouse and metadata department. This in turn resulted in quite a lot of people moving offices in order to bring teams together to work in the same room. The moving took place quite recently and in several waves. The biggest one was on 4–6 April 2016.

There are in total about 30 teams of different types and working arrangements. There are product-focused teams that produce a single component that is connected to a single statistical action, e.g. the collection and processing foreign trade data. However, most teams are mixed-model teams, i.e. they produce components for various statistical actions.

There are also teams that are more specialised on development (e.g. GSBPM stages 1–3 or some support processes) and that use a Scrum-based working arrangement, and there are also teams that have a changing working arrangement (GSBPM stages 4–8 or some support processes) and that use Kanban.

In the implementation process we have reached the point where components have been defined, teams have been formed, roles have been determined and the members of a team have been moved into the same room. The fact that many people have to re-adapt is perhaps the greatest challenge of this stage. For example while previously a person was specialised in a certain statistical action, e.g. a statistician-methodologist designed their own questionnaire, the processing program and later processed the dataset, then the new component-based working arrangement requires specialisation in the component, i.e., the statistician-methodologist of the questionnaire team has to re-specialise in questionnaire design, the statistician-methodologist of the processing package team has to re-specialise in processing package design and the statistician-methodologist of the dataset team must re-specialise in data processing.

Eight teams have proceeded to the next phase which is work flow visualisation.

b. Visualisation of work flow and movement of information

The next stage after the establishment of components and the cells created to produce them is visualisation of work flow and enhancing the mobility of information. For this we use Kanban boards, both in Scrum and Kanban teams. As for software, we use Jira, but in teams just starting out we encourage using physical boards, at least initially.

Every morning, team members gather in front of the board for a daily stand-up meeting where team members can efficiently exchange information, plan work, solve problems and update the working plan on the board. This meeting takes place between 9:00 and 9:30 every morning in every team and should not last longer than 15 minutes. Right after the team meeting, at 9:30, the component leader gathers their component owners to also discuss current issues. Every team has a component owner and every component owner has only one team. A component leader coordinates several interconnected components' owners. For example there are six teams that produce datasets for the data warehouse, every team has their own component owner and they are coordinated by a common component leader. Or there is a team

for producing questionnaires and two teams for producing processing packages, each team has a component owner, coordinated by one component leader.

c. Measuring and monitoring processes

When a team has been working together for some time, knows how to visualise, monitor and update their work on a Kanban board and morning meetings are effective and well organised, we can move on to the process measuring and monitoring phase.

According to the schedule, the first teams should reach this phase by mid-May at the latest. Here we aim to conduct more in-depth analysis of the team's working arrangement, dividing activities into smaller steps and measuring various indicators connected to steps of the process and also the process as a whole. For example lead time, cycle time, processing time, takt time, queue length and other indicators that are process-specific.

The objective in this phase is to visualise the progress and variability of the process through indicators, enhancing understanding of the process and its characteristics in the team.

d. Improving processes – Kaizen

When the team members know how to and are used to measuring and monitoring their processes, we meet the prerequisites for optimising the process. The objective of this phase is to improve the layout of work places, decrease the changeover time, reduce waste, balance cell to takt time, standardise work, etc.

In this phase we can introduce to the teams various Lean tools, depending on what is being optimised at the moment. In this phase we can create and optimise flow on team level.

e. Optimising the value chain

When the work of the teams producing components of statistical actions stabilises, it is possible to start optimising the entire value chain. At the same time with designing and operating a delivery schedule, we started implementing the new working arrangement in

teams, but it is only possible to start balancing the value chain when the capacity and cycle times of the teams stabilise.

If found necessary in the course of work, people have to be moved from one team to another, a bigger team divided into several smaller ones, etc. Objective is to create and optimise flow on value stream level and where applicable, introduce pull-system.

5. Conclusion

We are in the beginning of our Lean journey and there is still much to learn. As changing the organisation culture and passing knowledge between people takes time, we take things slow. The first objective is to get our teams working in the new working arrangement so that people who have changed roles will have adapted. Then we continue to visualise the team working plan and start measuring the steps of the working process. Only when team members have attained primary knowledge and experience of the new working arrangement, it will be possible to start improving and optimising the process in cooperation with the leaders.

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