
A Content Connect Initiative White Paper

# Lean Six Sigma for Media Organizations

By Gijsbert Voorneveld in partnership with MEDIAGENIX

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## Executive Summary

In this Content Connect Initiative (CCI) white paper, management consultant Gijsbert Voorneveld explains how organizations can become more data-driven, connected, and agile using Lean Six Sigma as a very effective method to drive and implement process improvements.

In 2022, a CCI survey revealed considerable potential for media organizations to make more data-driven decisions and connect their supply chains better. A CCI white paper described why media companies must improve on those two axes to thrive in any of the most probable scenarios for tomorrow's media industry.

This follow-up white paper now aims to help the reader start improvement projects using the DMAIC (Define, Measure, Analyse, Improve, Control) approach with a good understanding of Lean Six Sigma.

Lean Six Sigma is all about streamlining processes and using data to drive processes and decision-making with built-in mechanisms to ensure the project immediately adds value for customers and employees and involves all relevant stakeholders from start to finish.

Reading this document, you will learn about the seven key principles of Lean Six Sigma:

1. Focus on client needs.
2. Understand how the work is done.
3. Have work or information flow uninterrupted.
4. Identify and remove non-value added activities.
5. Introduce data-driven process management.
6. Empower and train people to optimize their processes.
7. Use a structured approach to improving.

Behind each of those seven principles lies an enormous collective experience from Lean Six Sigma practitioners gathered over the past 20 years in many different industries. One can tap into this vast experience by reading many useful publications and books, receiving training from accredited practitioners and/or calling in specialist consultancy firms.

Our own lessons learned from applying Lean Six Sigma in various media organizations are:

1. Spend enough time understanding the business value of your project.
2. Use the DMAIC approach to make sure you are ticking all boxes.
3. Look beyond your own organization or department when solving problems.
4. Encourage a 'speak up' mentality and foster collaboration.
5. Celebrate success to attract attention to good project results.

This white paper starts from a real-life case. Reading it will inspire you to start your own improvement projects to become more data-driven, more connected, and more agile.

## About the author

Gijsbert Voorneveld specializes in organizational performance improvement. He holds a Black Belt in Lean Agile Six Sigma. For the past 25 years, he has been designing and leading numerous improvement programmes for national and international media, streaming and broadcasting organizations.

Although Lean Six Sigma is agnostic to its environment, Gijsbert acquired detailed knowledge about managing rights, sales, billing, ad-sales, localization, and titles & metadata in media during his projects.

His approach to achieving breakthrough improvements is connecting organizational strategy and goals with departmental and personal ambitions, as he believes change will happen best through collaboration between motivated people.

Gijsbert lives in the Netherlands, is married, and has two sons. When he is not working, you will find him preparing for his next marathon or on the mountain bike.

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# 01 Better connected, more data-driven and more agile with Lean Six Sigma

During IBC 2022 (September), MEDIAGENIX revealed the white paper they published as part of the Content Connect Initiative: **'The Transformation of TV: Industry Perspectives on the Road to 2030'**.

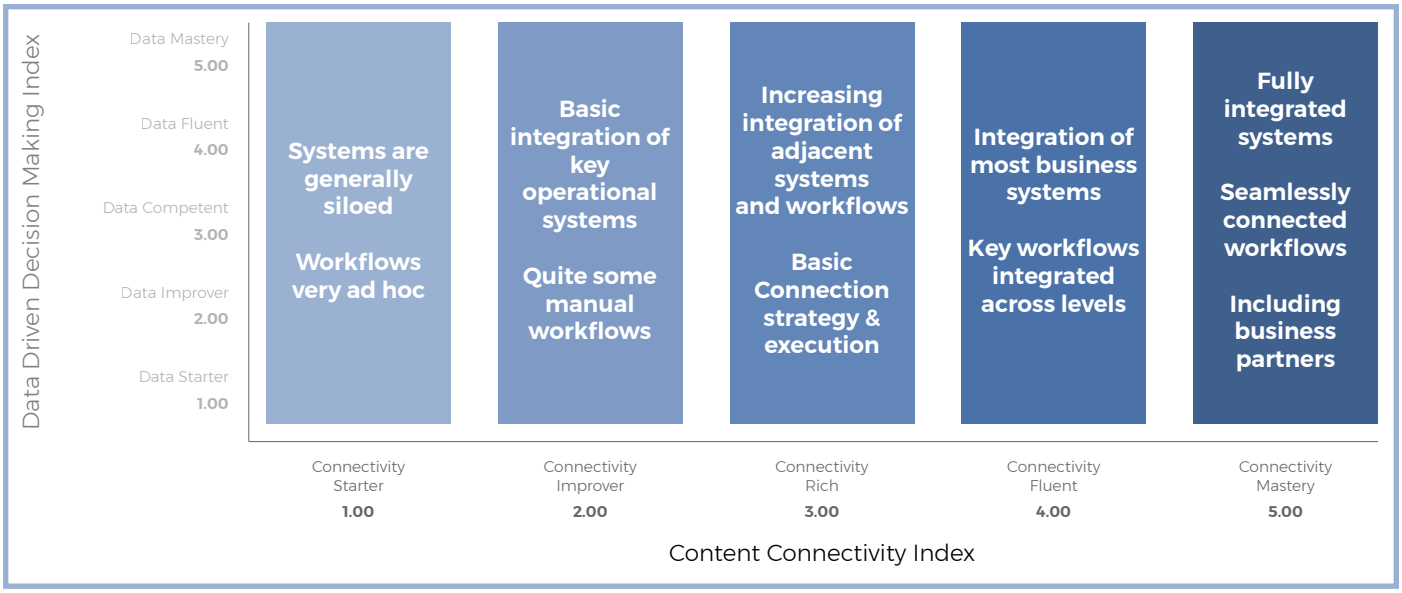
The white paper describes four scenarios indicating how market dynamics, technological innovation and changing consumer behaviour could shape the industry between now and 2030:

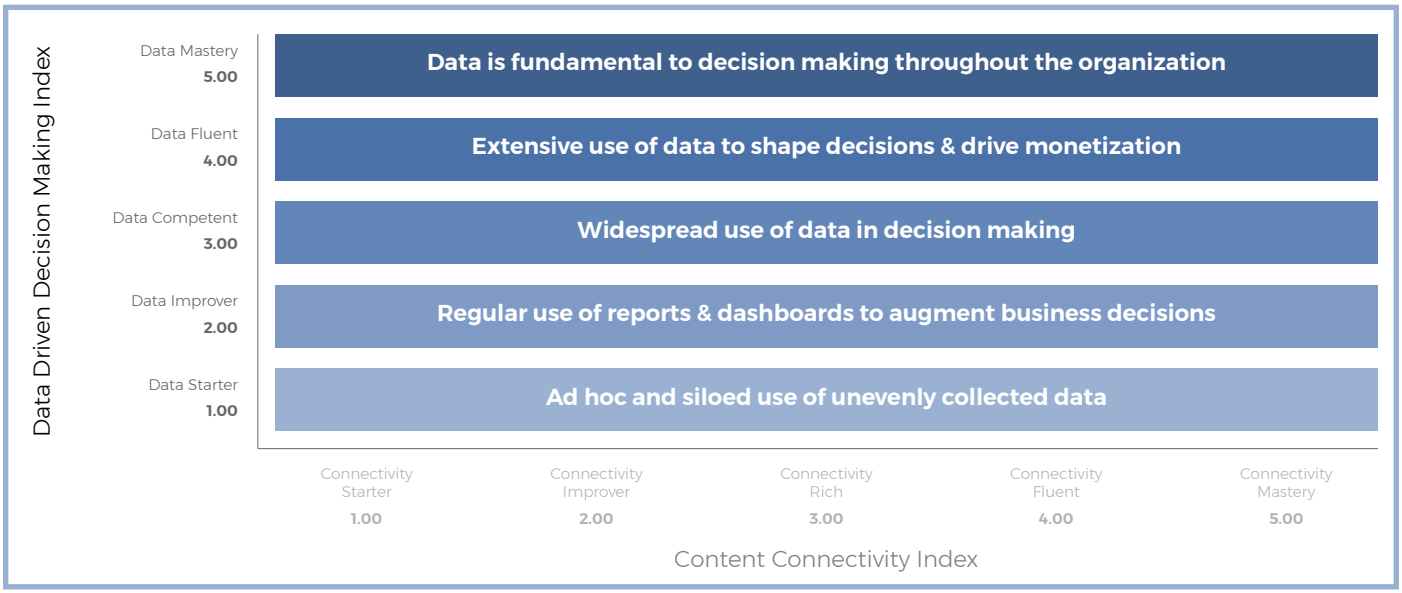
1. Steady as we go
2. Growth of the Digital Giants
3. The Perfect Storm
4. TV's Golden Age

For each scenario, the authors describe the opportunities and challenges for individual organizations and how they can mitigate risks and/or take advantage of the changed market conditions.

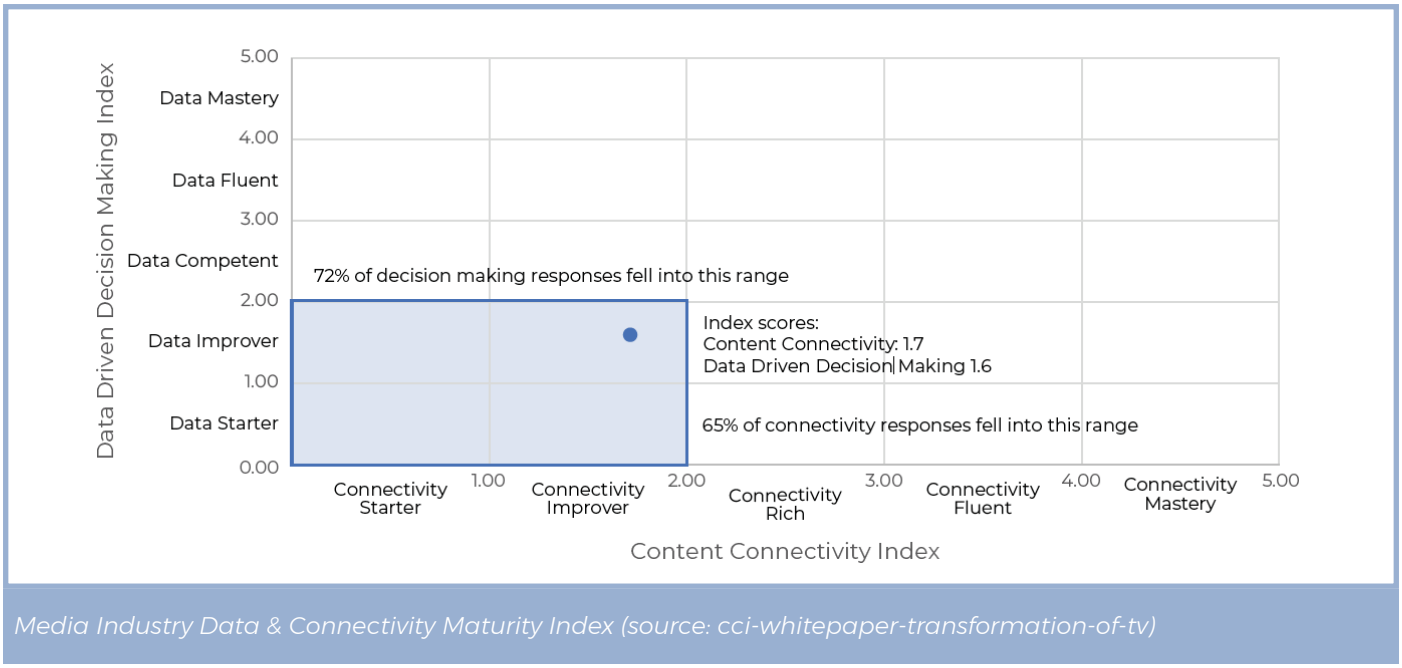
One constant across the scenarios is that they all require organizations to **become more data-driven, more connected, and more agile**. This means that initiatives and investments that help improve the organizations' core content supply chains on these aspects will be beneficial, regardless of which scenario materializes over time.

By way of simplified metric on the 'connectivity' and 'data-driven' dimensions, the Content Connect Initiative introduced a capability maturity model with the following stages on two axes as summarized below[1].




A Content Connect Initiative survey carried out in 2022 (outcome in picture below) revealed a huge potential for media organizations to make **more data-driven** decisions and to connect their supply chains better. On average, the industry scores **1.6** on a 1-to-5 scale for Data-Driven Decision Making and **1.7** on a 1-to-5 scale for Content Connectivity[1], positioning the industry on average as Data & Connectivity Improver.




*Media Industry Data & Connectivity Maturity Index (source: cci-whitepaper-transformation-of-tv)*

For media organizations, this suggests they should keep working on a better use of data in their decision-making processes and improve the connectivity of their supply chains.

At a high level, the implied benefits of improving on these two axes can be summarized as follows:

### The Data-Driven ' Dividend'

- more actionable content & audience intelligence...
- which drives more granular commissioning & acquisition processes...
- and which results in a smarter closed-loop content life cycle where decisions on both acquisition and planning are driven by measurement.

### The Connectivity 'Dividend'

- Collaborative content-centric workflows all across the content supply chain...
- that avoid non-productive work and duplication commonly referred to as 'supply chain waste'...
- and set up the organization to take a nimble and agile approach at planning, sourcing, preparing, distributing and monetizing content.

Rather than magically achieving improvement by mere declaration of intent, any realistic path to improvement on either of these axes will obviously be the result of targeted improvement and refinement programmes that take into account the specific reality of processes in any given organization.

The natural running order of which improvement project will deliver the largest benefit and should therefore be tackled first will inevitably be organization dependent.

Moreover, the claimed benefits captured in the 'dividends' above should not simply be taken at face value but rather be measured all along the improvement journey with an objective to refine iteratively.

**Lean Six Sigma (LSS)** is a very effective method to drive and implement such process improvements and become **more data-driven, more connected, and more agile**.

This white paper explains how media organizations can use LSS. We will also share a real-life use case as well as lessons learned from using LSS within media organizations. In the appendix, we have provided a more elaborative description of LSS, as well as information about its historical and theoretical background.

We hope that when you finish reading this document you will be inspired and enthusiastic to take on your own LSS projects!

## Lean Six Sigma: A bird's eye view

Lean Six Sigma, or LSS for short, is a methodology aimed at improving customer satisfaction, product quality and process performance through process optimization and statistical tools and encouraging a mindset of continuous improvement.

LSS is the synthesis of two very powerful concepts—'Lean' and 'Six Sigma'—on which you will find more information in the appendix. Over the past 20 years, LSS has proven to be an effective method to make organizations in many different industries more profitable, more productive, more data-driven, more connected, and more Agile.

Where Lean aims to transform processes to flow continuously and without waste (only perform activities that add value for the customer), Six Sigma deploys statistical data analysis to ensure consistent quality and identify areas for improvement by looking for patterns in data.

In short, Lean establishes the standard on how to best organize processes; Six Sigma removes the deviations from that standard and provides clues as to where more improvement is possible.

In 2001, Barbara Wheat c.s. published their book 'Leaning into Six Sigma' where they combined the benefits of **Lean** and **Six Sigma** into a definition of **Lean Six Sigma** around seven principles:

1. Focus on the client and what they need from you. The factors that describe what the clients want from you are described as CTQs or Critical to Quality (e.g. delivery within five days, exactly five litres in a can).
2. Describe how the work is done using 'value-stream maps'. These value-stream maps provide critical insights into the company's core processes, how they deliver on the CTQs and where value-added and non-value-added activities occur.
3. Analyse the workflows. Where can you remove bottlenecks, optimize capacity, balance activities, work differently and faster with less error and strive for 'pull'? Only produce when there is actual demand from the customer.
4. Remove and/or reduce non-value-added activities, such as excessive administration or movement.
5. Introduce process management through facts & data using statistical tools, such as control charts and Six Sigma principles. This allows teams to control the process better and spot improvement opportunities early on.
6. Empower people to improve the processes they work on, provide them with training and tools for analysis, visualisation and teamwork and any other resource they ask for once they become enthusiastic on their journey towards continuous improvement.
7. Implement improvements using the DMAIC approach (see appendix). When everyone uses the same DMAIC approach, there will be a significant learning effect throughout the organization, and people can easily collaborate on improvement initiatives using a shared approach.

## How to use LSS to become more data-driven, more connected, and more agile

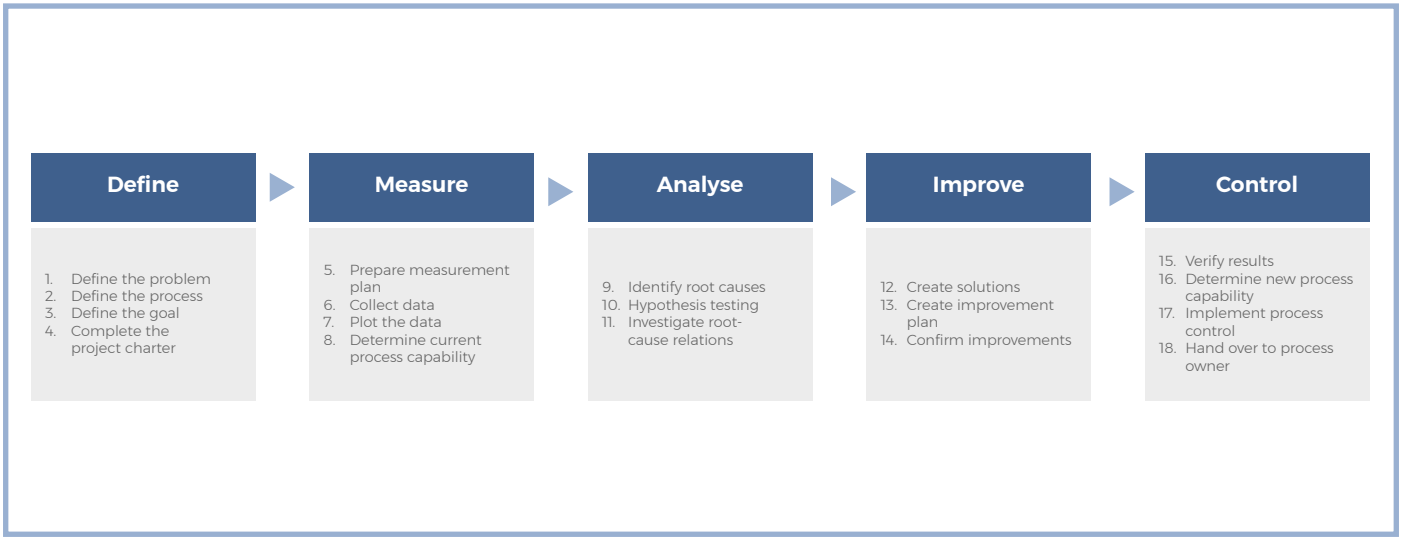
To implement LSS, organizations can start programmatically implementing the core LSS and roll out the concepts listed above throughout the whole organization. This is a good way to implement LSS, but it lies beyond the scope of our white paper.

Our primary aim is to provide you with a good understanding of LSS and how you can start your own improvement projects to become more data-driven, more connected, and more agile using the DMAIC (Define, Measure, Analyse, Improve, Control) approach.

The next chapter provides a sample use case demonstrating how improvements are identified, analysed, and implemented using the DMAIC project approach. You can find a more detailed introduction on DMAIC in the appendix.

# 02 Improving the localization supply chain: a sample Lean Six Sigma use case

After the general introduction to LSS in the previous chapter, we will now demonstrate how an improvement project is carried out using the DMAIC approach.




*DMAIC approach*

## Define

Our media company has a huge localization hub at a central location in the EMEA region. Most original materials arrive from studios in the U.S. and need to be localized[2] by studios in EMEA before they can be delivered to customers in the EMEA countries (more than 50 countries and more than 30 different languages).

As the business and platforms have expanded, it is noticed that releases need to be rescheduled quite often due to materials not being ready. Also, there is an exponential growth in the number of staff involved in fixing materials and rescheduling release and delivery dates. This is summarized in the project charter (see below) and signed off by the project sponsor.

## Series and Movies timely delivered to our customers

**Problem Definition**

Films and series that have to be translated from the original language to the language of the country where the series is made available are not always available on time, which means that the announced date cannot be met. This date will then be adjusted to a new date in the future, resulting in reputational damage. It may also be the case that extra effort is required to correct a received translation before it can be made available to the public.

**Project Scope**

Focus is on the internal process of initiating the assignment to the translation supplier, after which the translated films and series are received back and then delivered to the customer.

The translation process at the supplier is not part of the assignment, but how the supplier can be better managed and how joint planning can be better approached.

**Project Team**

Project sponsor: management team

Commissioner: head of operations

Core team members: localization manager, operations manager, data analyst

**Goal**

Within 4 months a timely delivery of the translated films and series in 98% of the cases. In 95% of the cases, no extra effort should be required to broadcast the film or series (FTR).

**Clients and Stakeholders**

Consumers who want to see the latest series and films in their own language and cultural context as quickly as possible.

Programming teams that want to make new films and series available to subscribers at a specific time.

Platforms (telecom companies and television companies) would like to receive the content at the agreed time and in accordance with the agreed technical specifications.

**Process Description**

Monthly schedule from the local programming team at 100 days before release. When the title has been announced internally, it can be requested from the producing studio. A lower resolution copy of the production is then made and sent to studios for translation. The studio then sends the translated assets back to the central HUB where they are stored in a central database. When the translation for a film or series has been completed for a specific region, it will be delivered to the telecom providers and television companies in that region. So there is no waiting until all translations for a title have been received, as soon as the required language for the specific region has been received, it will be delivered.

**Estimated costs and benefits**

Less internal rework - 1 FTE

Less admin on moving expected delivery dates and associated adjustments - 2 FTE

| Project phase | Tollgate Date | Status |
|---|---|---|
| Define | March 15 | Started |
| Measure | April 19 | - |
| Analyse | May 13 | - |
| Improve | June 10 | - |
| Control | July 8 | - |

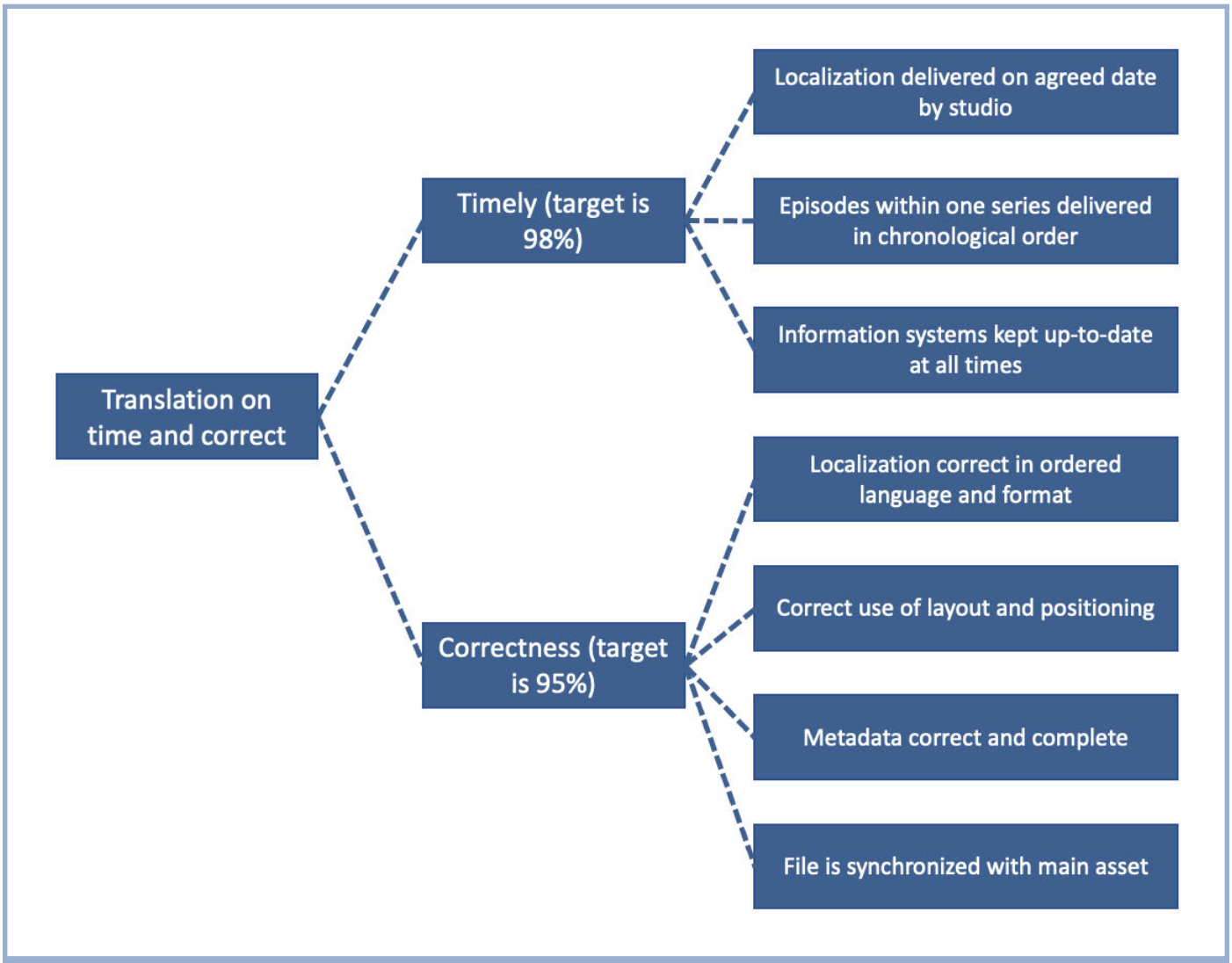
*Project charter*

In the Define phase, we also used a SIPOC diagram (Supplier, Input, Process, Output, Customer) to study all the different elements of the process in detail. We will also need to do this in the subsequent phases.

| Suppliers | Input | Process | Output | Customers |
|---|---|---|---|---|
| Global planning team | Global title release calender | 1. Title planning | Premiere list | Content operations |
| Local planning team | Regional EMEA planning | | | Content localization managent |
| Internal (US) production studios | - High res asset<br>- Script<br>- Creative letter | 2. Materials collection | - Low res video with time codes<br>- Translation instructions and materails | Translation studio |
| Distributors (licensed titles) | | | | |
| Strategic sourcing department | Budget available<br>Preferred studio (vendor) list | 3. Issue translation order | Purchase order | Quality assurance studio aggregator |
| | - Purchase order<br>- Low res video with time codes<br>- Localisation onstructions and materials | 4. Produce translation | Translation | |
| | - Low res video with time codes<br>- Translation | 5. Quality control translation | Verified translation | Content operations |
| | Verified translation | 6. Receive Translation | Verified translation matched to high res asset | Content library |
| Content library | High res asset with relevant translations | 7. Deliver materials | High res assest with relevant translations | Telecom platforms |
| | | | | Streaming and linear platforms |

*SIPOC Diagram Translation Process*

We then mapped out the Critical to Quality aspects (CTQs) for our process to make sure we always know exactly what the customer expects (this can also be an internal customer).




*CTQ for translations being 'On Time' and 'Correct'*

## Measure

The next step is to move to the 'Measure' phase, and one of the first activities there is to prepare a measurement plan. What is it that we are going to measure, and how do we do that?

We identified that we would need to track at least the number of orders processed, which studio works on the order, what the required localization entails and whether the order was delivered on time. As we aim to use Six Sigma techniques to look for patterns in a large collection of data, we must consider the type of data we need to collect. The table below summarizes our measurement plan for the project. It describes what, how, where and when to measure, as well as who will measure.

| What to Measure | | How to Measure | | | Who, Where and When to Measure |
|---|---|---|---|---|---|
| **Attributes** | **Data type** | **Instruction** | **Data elements** | **Sample** | |
| **Timely(1): Delivered on the agreed date by Studio** | | The value is obtained by calculating the number of days between the values in the columns 'due date' (the agreed delivery date) and 'completion date' (the date on which the translation was actually delivered. | Agreed delivery date (due date) then compare to actual delivery date (completion date) | We use the entire population (approximately 700-1000 items) for one month, which amply meets the requirement for representativeness. | From the aggregator system, the value 'Due Date' is automatically copied from the order sent by us. The value 'Completed' is automatically logged when the translation is delivered. The aggregator sends a monthly overview in Excel. |
| - Object: Translation | | | | | |
| - Aspect:Translation on time or earlier than agreed | | | | | |
| **Data elements** | | | | | |
| - Number of orders | Variable - Discrete | | | | |
| - Studio | Attribute- Nominal | | | | |
| - Requested language for translation | Attribute- Nominal | | | | |
| - Number of days before (negative) or after (pos tive value) the agreed delivery date | Variable- Continual | | | | |
| | | | | | |
| **Timely (2) : Predictable delivery of consecutive episodes in one series** | | The value is obtained by comparing the delivery dates of different episodes of a series. When all episodes have been delivered in a period of 7 calendar days, there is a 100% score. If the delivery dates of the various deliveries always differ by 7 days or more, there is a 0% score. A percentage can be calculated between these by always looking at how many episodes have been delivered together within 7 days and then dividing this number by the total number of episodes and then displaying this as a percentage. | How many episodes (for series) have been processed at the same time. How many episodes have been processed. | We use the entire population (approximately 700-1000 items) for one month, which amply meets the requirement for representativeness. | Excel files for several months (the Excel extracts from aggregator system) will need to be combined to arrive at the requested percentages. Our data analyst will take care of this. |
| - Object: Translation | | | | | |
| - Aspect: Episodes from the same series are delivered as a sequential processed batch | | | | | |
| **Data elements** | | | | | |
| - Number of orders | Variable - Discrete | | | | |
| - Studio | Attribute - Nominal | | | | |
| - Requested language for translation | Attribute - Nominal | | | | |
| - Delivery date translation | Attribute - Nominal | | | | |
| | | | | | |
| Timely (3): Information systems are kept up-to-date by studio | | The value is obtained by comparing the data fields of the said systems for all data elements and seeing f they are the same. | How many orders have been compared, for how many orders the systems contain exactly the same information | Manually compare 50 orders every month on the first Tuesday of the month | Aggegrator will provide export/ screenshots for their systems. Data analyst will consult our internal systems (Traffic and Planning) and then perform the prescribed calculations. |
| - Object: Translation | | | | | |
| - Aspect: Traffic, system, planning system, vendor system all contain same data on status of the order within 15-minute time frame after updating one of the systems | | | | | |
| Data elements | | | | | |
| - Number of orders | Variable - Discrete | | | | |
| - Studio | Attribute - Nominal | | | | |
| - Requested language for translation | Attribute - Nominal | | | | |
| - Delivery date translation | Attribute - Nominal | | | | |
| - Order date | Attribute Ordinal | | | | |
| - QC date | Attribute - Ordinal | | | | |
| - Ready date | Attribute - Ordinal | | | | |

*Measurement plan*

After we defined our measurement plan, we held a review with the project sponsor. He advised us to focus on the first measurement (marked in yellow): Timely Delivery by Studio. He anticipated the fact that our team could become overwhelmed working on multiple measurements simultaneously and the timely delivery had become more of a priority for him over the past weeks. From that moment, we adjusted the project charter and continued with this narrowed scope.

As we collected the data, we found that the data we could get our hands on was not normally distributed[3], so we were somehow limited in making predictions on how the process would perform in the long term. However, as our sample was quite large (n = 724), we could do enough analysis based on actual (observed) data.

**Descriptive Statistics: Completion - Due Date**

**Statistics**

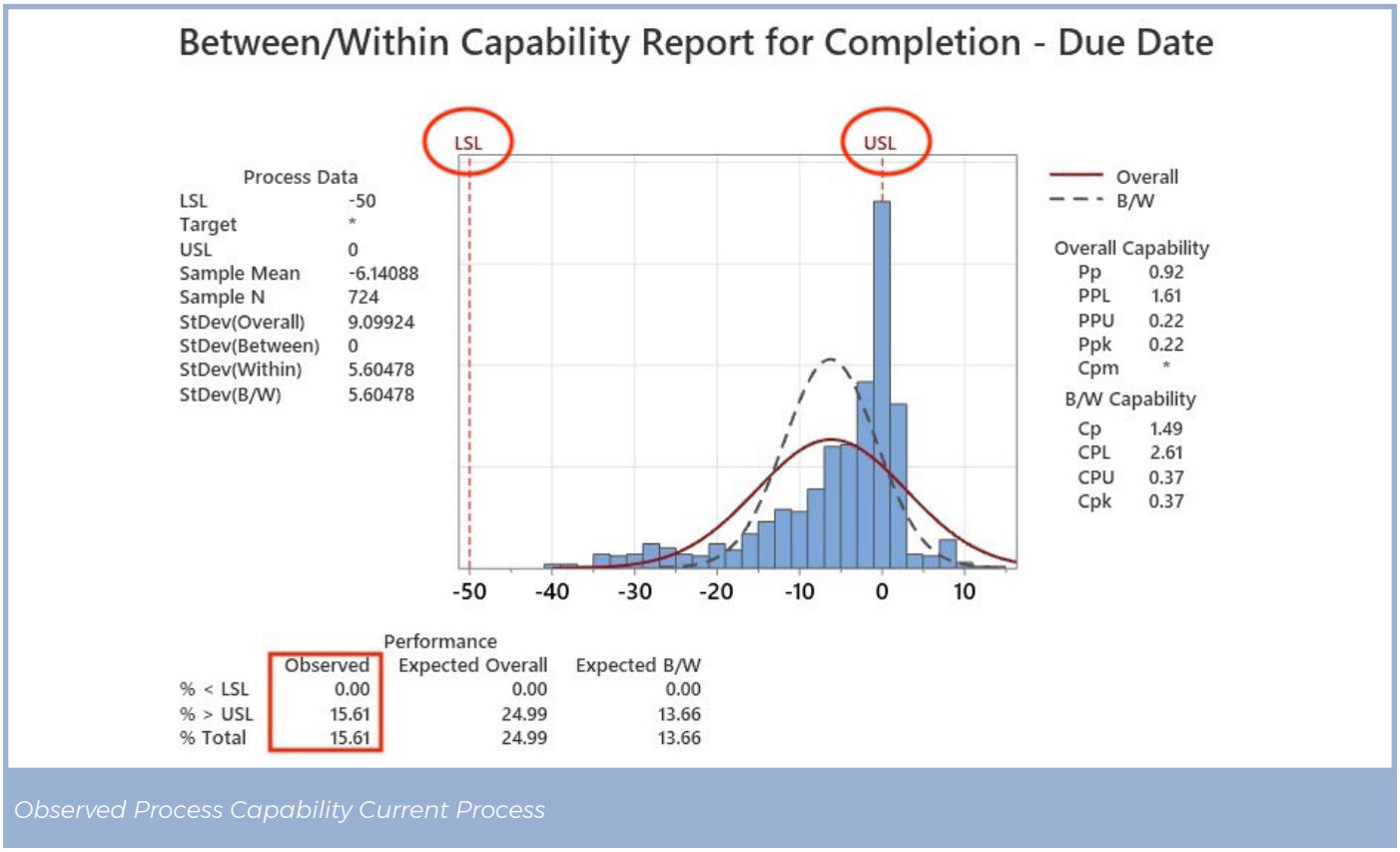
| Variable | N | N* | Mean | SE Mean | StDev | Minimum | Q1 | Median | Q3 |
|---|---|---|---|---|---|---|---|---|---|
| Completion - Due Date | 724 | 0 | -6.141 | 0.338 | 9.099 | -40.000 | -9.000 | -3.000 | 0.000 |

| Variable | Maximum |
|---|---|
| Completion - Due Date | 13.000 |

*Basic statistics existing process*

We can see that we have 724 data points. The Mean is at -6.1 days, which seems good as everything under 0 is On Time. The earliest delivery was 40 days before order date, and the worst delivery was 13 days after order date.

The next step is to calculate the current process capability. This will be our baseline for comparison once we have implemented our improvements in the Improve phase.




*Observed Process Capability Current Process*

The above graph shows the capability calculation for our process using an advanced statistical software package. As we will not use all the package's options for our situation (because our data is non-normal), we will focus on just a few of the items displayed.

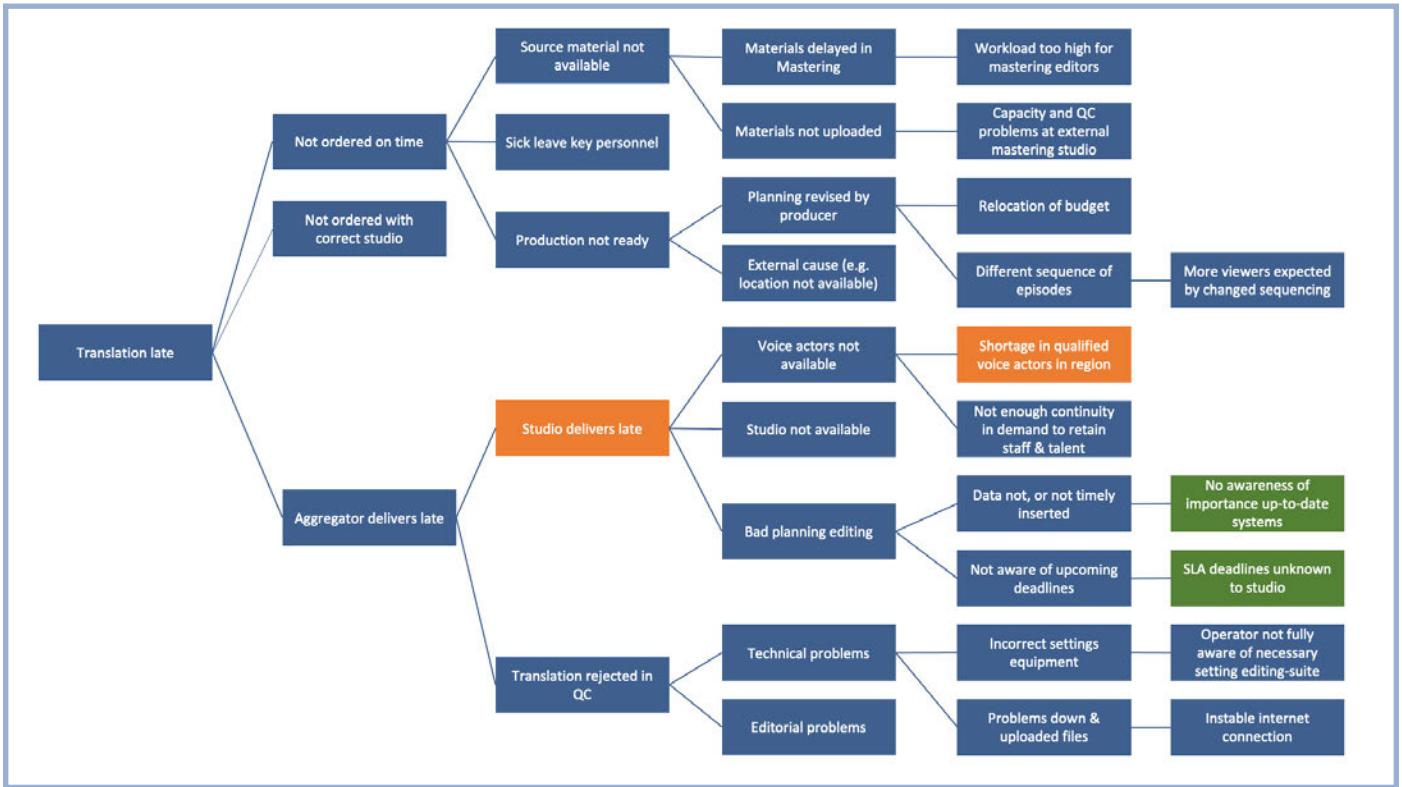
The most important data for our project are

- **LSL:** Lower Specification Limit (we do not want materials delivered more than 50 days before order date);
- **USL:** Upper Specification Limit (nothing past '0' days);
- **Observed Performance:** This informs us that our current process never delivers too early (< LSL) but it does deliver too late for 15.61% of the time (>USL).

Looking at the Mean (which tells us that, on average, all items are delivered 6 days before due date), one might think the process is doing quite well. We know better when we see that 15.61% are too late. That is why the Mean is by itself never a good indicator of process performance.

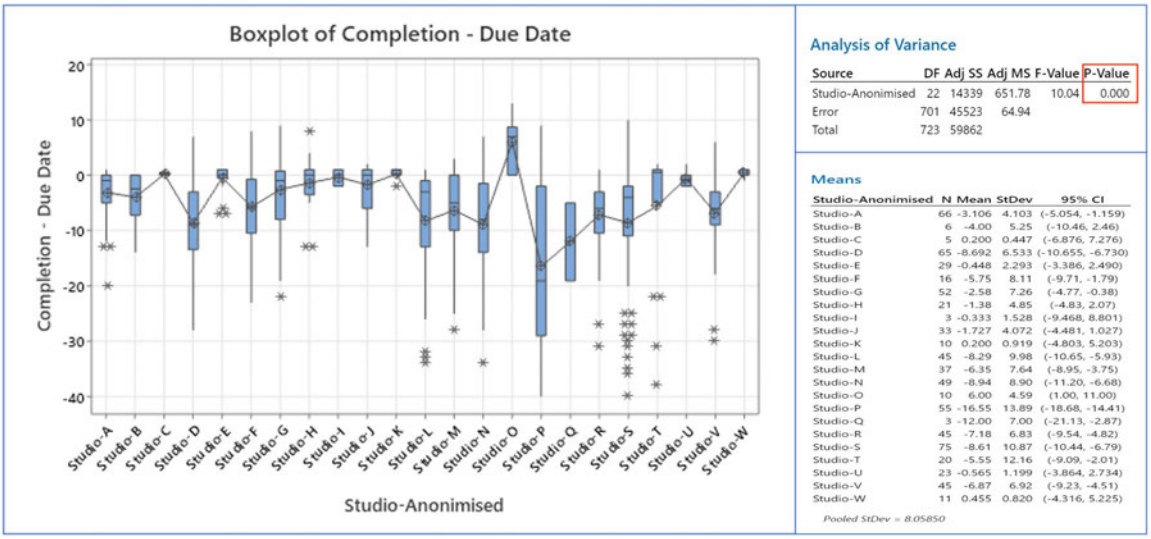
## Analyse

During the Analysis phase, we used the '5 times WHY' technique and asked ourselves 'why translations could be late'.




*Five times WHY analysis: 'Why Translations are Late'*

The **'Five times WHY'** diagram was built through subsequent brainstorm sessions with the project team. We then tested and eliminated options to arrive at two options we wanted to investigate with 'Hypothesis Testing'. For this, we took our original dataset and performed statistical tests (in this case, ANOVA, a method for testing across different groups) to see if we could prove a relationship between different variables for the scenarios we had in mind.



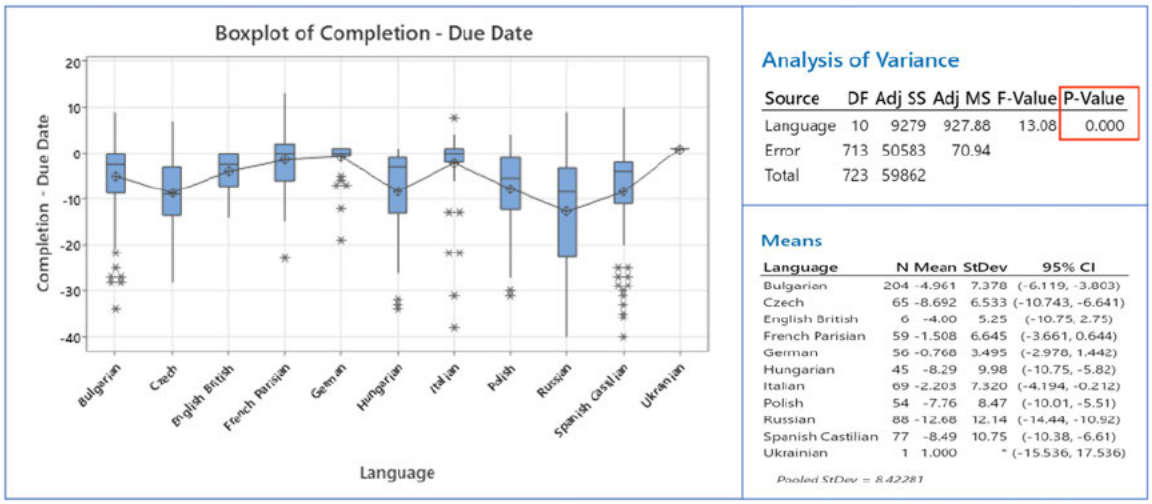

*Hypothesis Test 1: Investigate whether there is a relation between Due Date and Studio*

The ANOVA test determines whether there is a relationship between Studio and Due Date. For our tests, we want P (probability value) to be less than 0.05 to prove that there is a significant (> 95% certainty) relationship between the two factors. As the P value from our test is 0.0 (see red box in 'Analysis of Variance' section), we can conclude that the studios' delivery-timing characteristics differ significantly.

Other components of the test are the 'Boxplot', which shows the Mean for each studio as a black horizontal zig-zag line, and the blue boxes, each representing 50% of the observed samples. The asterisks indicate the extreme values (for example, -40 days for Studio S).

Finally, the 'Means' table in the bottom right corner provides all statistical details for each studio.

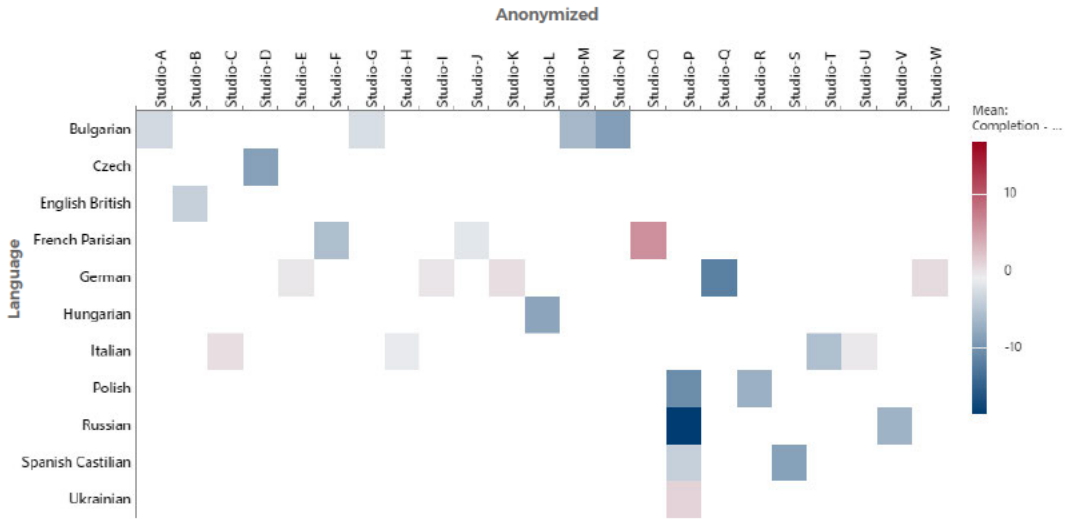
The second Hypothesis test investigates the relationship between Requested Language and Due Date.




*Hypothesis Test 2: Investigate whether there is a relation between Due Date and Language*

The second hypothesis test also has a P value of 0.0. Therefore, we can conclude that there is a relationship between Language and a studio's ability to deliver at or before Due Date.

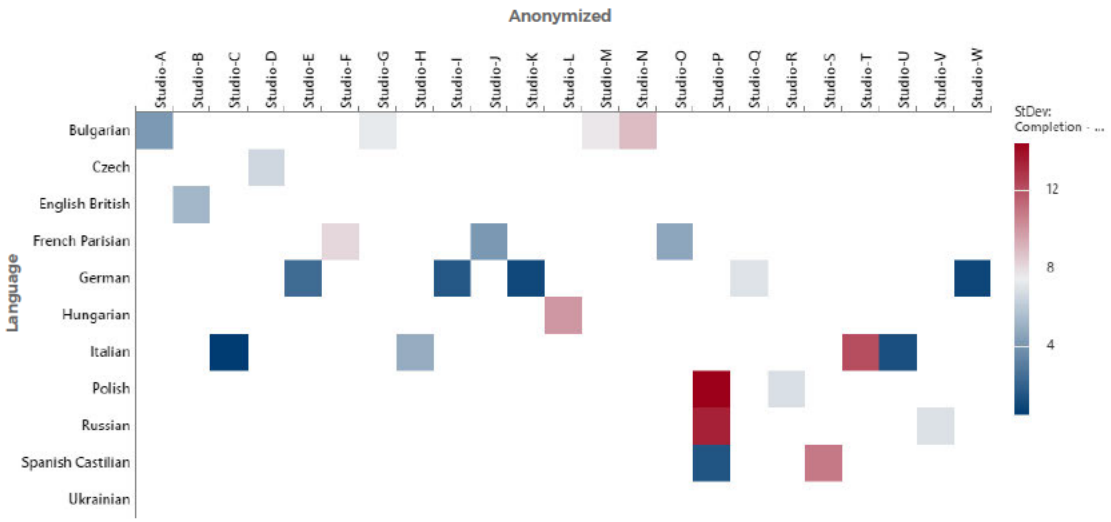
Now that we know that Studio and Language correlate with a studio's ability to deliver at or before Due Date, we will use a heatmap to analyse the most problematic combinations further. As the heatmap can be used to display relationships between different variables, we went through various iterations. We concluded that heatmaps based on Mean and Standard Deviation provided the most valuable insights.




*Heatmap for Language vs Studio based on Mean.*

The heatmap based on Mean shows that:

- French is problematic for Studio O, while Studio F and J deliver on time.
- German is problematic for almost all studios except for Studio Q.
- Italian is problematic for Studio C, while other studios deliver on time.
- Only one studio does Ukrainian, and that studio is not delivering on time.




*Heatmap for Language vs Studio based on Standard Deviation.*

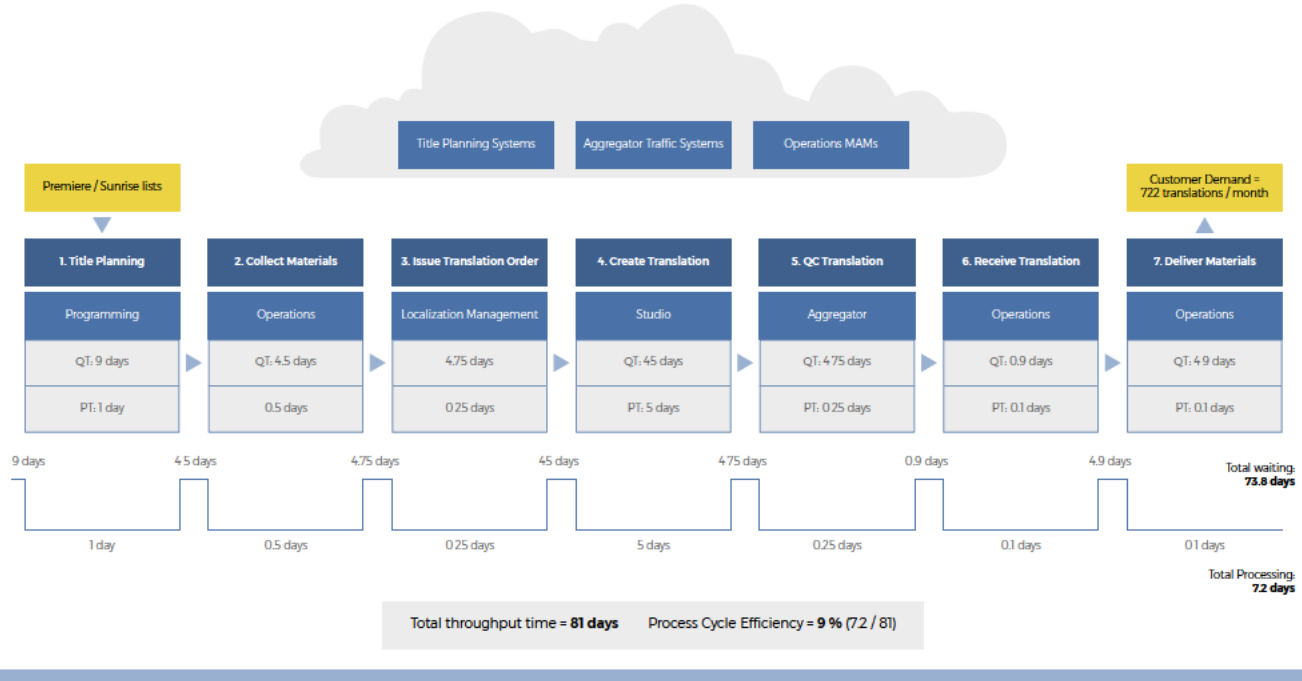
The heatmap based on the Standard Deviation[4] allows us to distinguish between studios with a stable process (less variation) and studios with a more unstable process (more variation).

The graph shows that Studios F, L, N, P, S, and T (6 out of 23) have a relatively high standard deviation. This indicates that we can expect more fluctuation in the delivery times for assets coming from these studios. This does not necessarily mean they will deliver late (for that, we use the heatmap based on Mean), but we will see, for example, more assets coming one day after the deadline and another time maybe ten days before the deadline. Studios with a lower Standard Deviation are more likely to deliver, say, one day before the deadline and another time two days before the deadline. From a Lean perspective, you always prefer a lower Standard Deviation because it makes planning your work easier and it is a better use of resources (less waiting to begin with).

With the insights from the two heatmaps, we then approached the problematic studios.

We learned that at that moment, there was a high demand for German translations due to the arrival of a new U.S. streamer. As a result, studio capacity for German was sold out. That explained why almost all studios providing German translations delivered late. The interviews for French and Italian translations did not reveal that market conditions or capacity were a possible problem. For Ukrainian, it was clear that the geopolitical situation hampered the studios' ability to deliver.

In parallel with Hypothesis Testing, we also performed a Value Stream Mapping (VSM) exercise to find irregularities and/or opportunities for improvement in the value stream.




*Value Stream Map for Translation process*

Based on the above VSM, we can conclude that the average translation item takes 81 days from start to finish. From those 81 days, 73.8 days are spent waiting! This means that an item is being worked on only 9% of the time. Further investigation revealed that contractually agreed deadlines currently dictate timelines, so we parked this as a future improvement for another (DMAIC) project.

We then used the VSM in meetings with all involved groups (Programming, Operations, Localization Management, Studios, and Aggregator) to determine whether they fully understood their impact on timing for other groups. It turned out that Studios and Aggregators had internal deadlines per activity which were not linked to the overall end-to-end (SLA) deadlines.

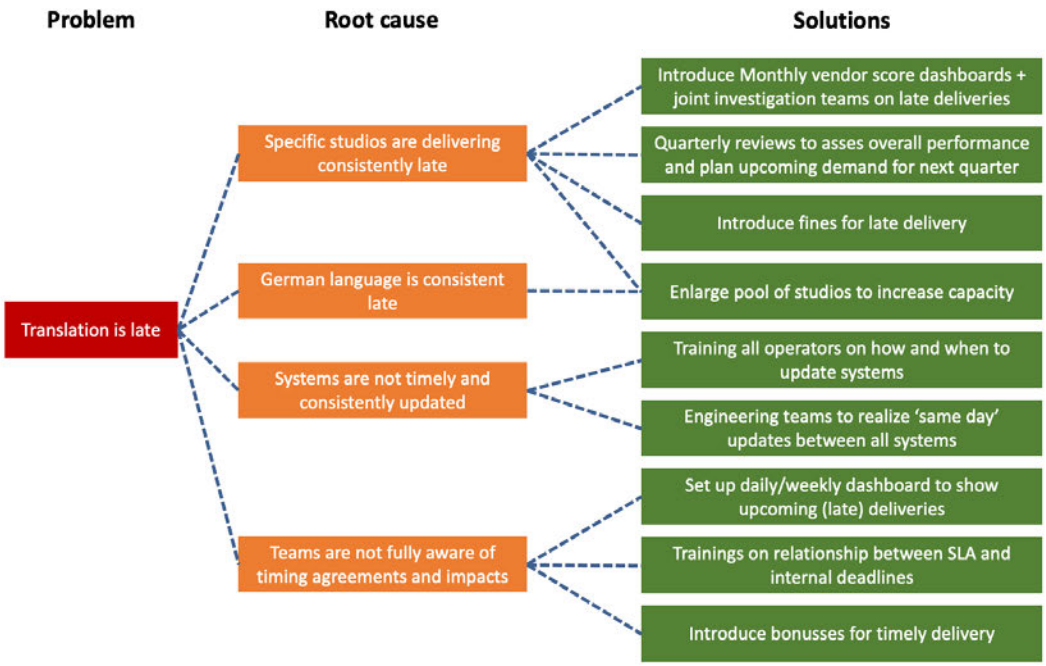
Also using the VSM, we zoomed in on how the various groups used the three different information systems and how they kept those up to date. Again, we found that some data was updated near-real-time (Ordering) and some once a week (Planning by Studio and Aggregator), while other data was updated overnight (MAM systems). This insight had consequences for the conclusions we were drawing based on our dataset. For example, a large portion of orders was consistently late by just one day. We found that this was caused by a combination of late administration by operators (end of day instead of real-time) and the overnight updates with the MAM system, which indicated items as one day late, while they were actually delivered on time.

In summary, our analysis phase provided four root causes:

1. Specific studios are delivering consistently late (Hypothesis Testing)
2. German language is consistently late (Hypothesis Testing)
3. Systems are not timely and consistently updated (VSM)
4. Teams are not fully aware of timing agreements and impacts (VSM)

## Improve

Using the four root causes identified during the Analysis phase, we brainstormed with the team on possible solutions. We invited a wider internal team, including representatives from the strategic buying department and the legal team. Below is the result of a total of three brainstorming sessions and follow-ups:




*Solutions matrix*

It was time to see which solutions we could implement using the decision matrix. The table below shows the result.

| Solution | Improvement impact | Time to implement | Cost <-> benefit | Acceptable for stakeholders? | Action plan available? |
|---|---|---|---|---|---|
| Introduce monthly vendor score dashboards + joint investigation teams on late deliveries | v | v | v | v | v |
| Quarterly reviews to asses overall performance and plan upcoming demand for next quarter | v | v | v | v | v |
| Introduce fines for late delivery | v | x | ? | x | x |
| Enlarge pool of studios to increase capacity | ? | ? | x | v | x |
| Training all operators on how and when to update systems | v | v | v | v | v |
| Engineering teams to realize 'same day' updates between all systems | v | v | v | v | v |
| Set up daily/weekly dashboard to show upcoming (late) deliveries | v | ? | v | v | v |
| Trainings on relationship between SLA and internal deadlines | v | v | v | v | v |
| Introduce bonusses for timely delivery | v | v | ? | x | x |

*Decision matrix*

Based on the decision matrix, we implemented all five solutions with five 'green ticks'. The one solution with just four green ticks (set up daily/weekly dashboards at vendors) was not implemented as part of our programme. However, we did notice that various studios independently decided to set these up internally without any effort required from the project team.

## Control

The first step in our control phase is to confirm that our improvements are working. As we implemented all our solutions in May and June, we took July data to see how our improvements worked out.

**Descriptive Statistics: Completion - Due Date (Diff)**

### Statistics

| Variable | N | N* | Mean | SE Mean | StDev | Minimum | Q1 | Median | Q3 |
|---|---|---|---|---|---|---|---|---|---|
| Completion - Due Date | 775 | 0 | -8.974 | 0.355 | 9.875 | -49.000 | -14.000 | -6.000 | -2.000 |

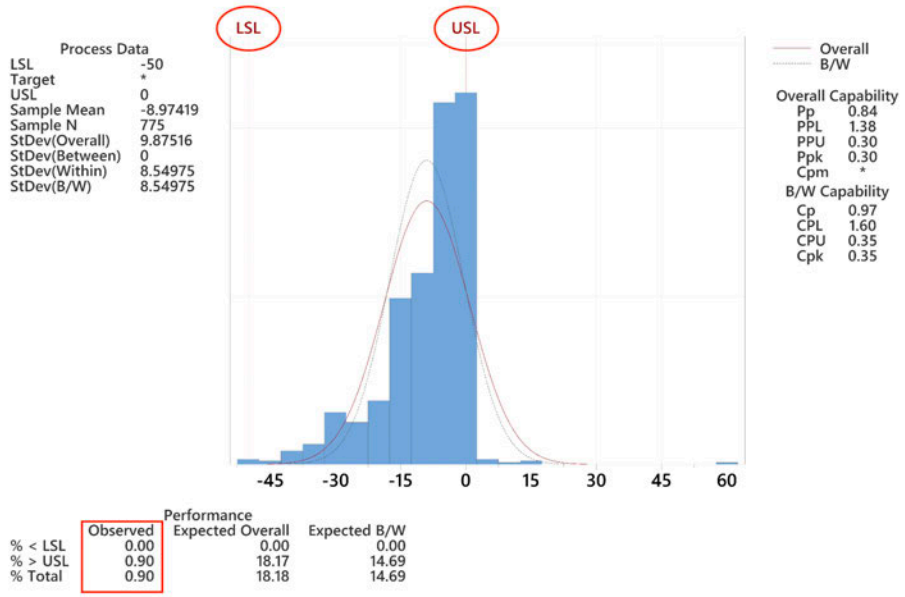
| Variable | Maximum |
|---|---|
| Completion - Due Date | 59.000 |

*Basic Statistics Improved Process*

Our sample is almost the same size as our initial measurement (724 in March vs 775 now) and we can see that the Mean improved slightly from -6.1 to -8.9. The earliest delivery is even earlier than in March (from -40 to -49), and the slowest delivery is now later than before (from 13 to 59 days).

Let us look at the process performance data in the picture below.

Let us look at the process performance data in the picture below.




*Observed Process Capability Improved Process*

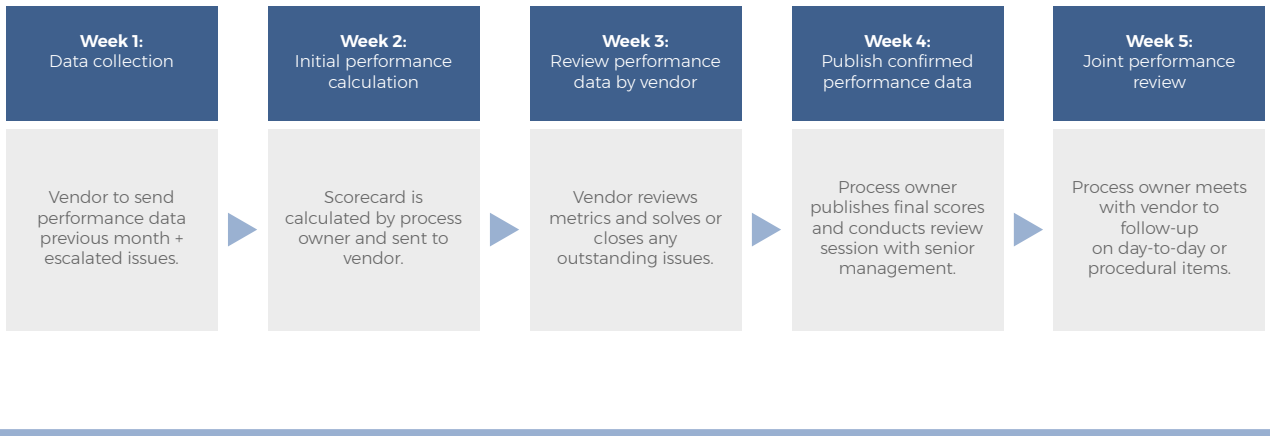
The new process has 0.9% of items not delivered according to the client specification (previously 15.61%), so our improvements have had their effect!

But is it enough? For this, we must go back to our project charter, where we see that our goal was to arrive at 98% timely delivery. As we achieved 99.1 %, we can conclude that the project's objective has been met.

Now it is time to hand over the new, improved process to the process owner. For this, we did the following:

1. Organize monthly review session with internal teams to discuss process performance, improvement suggestion and learnings from major incidents.
2. Organize quarterly business review sessions with vendors discussing their performance, work on collaborative capacity planning and anticipate anything that can impact business continuity (labour strikes etc.).
3. Hand over renewed process documentation and training materials.
4. Hand over data portal where the dashboards are populated and maintained.

Below is a schematic overview of the newly implemented collaborative business processes that proved instrumental in improving the performance.




*Monthly data collection & process performance review process*

# 03 Using Lean Six Sigma: lessons learned for media organizations

One of the most significant benefits of DMAIC projects is that they deliver tangible, measurable results quickly and constantly adapt to new insights working with a multidisciplinary team. As organizations continuously initiate and complete DMAIC projects, more and more people within the organization get involved and learn about the Lean Six Sigma tools and principles. Over time, the accumulated effect of continuously delivering DMAIC projects is that the organization will adopt a more agile culture focussed on continuous improvement.

Having gone through multiple DMAIC projects in media, we have summarized what we believe are valuable lessons for anyone attempting their own DMAIC projects in media. As DMAIC is industry-agnostic, our lessons are very likely to apply outside media as well.

## Lessons learned

1. **Understand your customer's 'Critical to Quality' aspects.**
   Processes in media organizations are often internally focused with no clear understanding of how they impact customer experience. As a DMAIC sponsor or project lead, you should always ensure CTQs are identified and documented in the project charter.

2. **Use DMAIC to improve your 'Return on Data'.**
   Media organizations have invested substantially in data-driven tools, such as dashboards and workflow management software. However, DMAIC projects carried out in media organizations revealed that data from these platforms is often unsuitable for true Lean and Six Sigma process measurements and performance management. The main reason is data is not aligned from an end-to-end process perspective. Data quality is the other main issue. There are very few 'closed loops' where data is checked on completeness and correctness. The good news is that every completed DMAIC project is a boost to data organization and quality as this is an integral part of DMAIC.

3. **Look beyond your own organization.**
The media industry is extremely fragmented; almost every integral process includes working with internal and external partners. Too often, people stop at their own organizational barriers thinking 'I am not responsible', 'the vendor is looking after this', or 'that is agreed in the SLA and someone else looks after that'. These excuses should not be accepted as they block improvement opportunities worth exploring. Involving vendors and/or internal partners (for example, strategic sourcing) in your DMAIC projects should be encouraged!

4. **Encourage speaking up and collaboration.**
Many media organizations have several smaller teams specialized in processing assets for niche audiences and/or platforms. These teams are often overlooked when looking for process improvements, while advancements in technology or other processes might unlock improvement opportunities for them. Although these teams often have endemic process problems, these are often not escalated as they only represent a small part of the business. Including people from these teams in your DMAIC project offers a great learning experience for them and will expose improvement opportunities that otherwise would have gone unnoticed.

5. **Celebrate successes.**
This might be the least media-specific lesson learned. Still, we also experienced in media organizations that celebrating tangible successes and learnings from DMAIC projects makes it clear to employees that the organization is making improvements and how they and their colleagues have contributed. This stimulates them to bring their own improvement initiatives forward, eventually fostering a mindset of continual improvements that will benefit the organization and its employees.

# 04 Improvement opportunities for media organizations

Now that we know what LSS is and how we can use DMAIC projects to improve processes, we can look at specific opportunities to start working.

The Content Connect Initiative publication 'The Transformation of TV: Industry Perspectives on the Road to 2030' provides useful clues on where to start. Below is an interpretation of the areas we think are worthwhile targeting:

- **Operations and supply chains need to modernize.**
  This is to unlock the full potential of streaming and advanced advertising (p 6).
- **The number and range of services will grow.**
  These services will then need to get distributed across a wider range of aggregation platforms (p 9).
- **More use of customer data to drive customer experience.**
  Customer data will be more and more used to provide a perfectly tailored user experience. Areas most impacted by this are: commissioning, windowing, monetization, advertisement offerings, and programmatic buying (p 10).
- **Integration of key supply chains.**
  Production, content management and content distribution have been separate areas with their own systems and workflows. Still, they will need to come together to meet tomorrow's demands regarding speed and efficiency (p 54).
- **Move to data-driven decision-making.**
  ensure that data is not only actionable but also sufficiently understandable for the humans managing each stage of the process (p 56).
- **The need for a connected content supply chain.**
  the transition towards connected content does not happen uniformly. While it is not trivial, for example, for a company to refresh its internal processes and have content and metadata travel together in-house, it is an order of magnitude more complex to arrange seamless integration of content and metadata with third-party production organizations (p 59).

Another way to look at areas for improvement is to consider the whole ecosystem of processes available in a media organization. Below is an attempt to show all the interconnected and interwoven processes at a typical media organization.


*Framework of Media Organization Processes*

This framework shows the organization's three main processes—**Strategy, Planning, and Execution**—and how they are implemented and embedded through a web of interconnected processes and activities. You can also see that our 'Localization' DMAIC use case is plotted as part of the main process 'Execution' (bottom left corner).

Now suppose your organization feels that improvement is needed at 'Packaging and Publishing', for example, because of growing volumes and the increased number of platforms you need to deliver to. Platforms might also have been complaining about late deliveries. This use case aligns with one of the trends noticed in the Industry Perspectives 2030 white paper (see item two on the previous page).

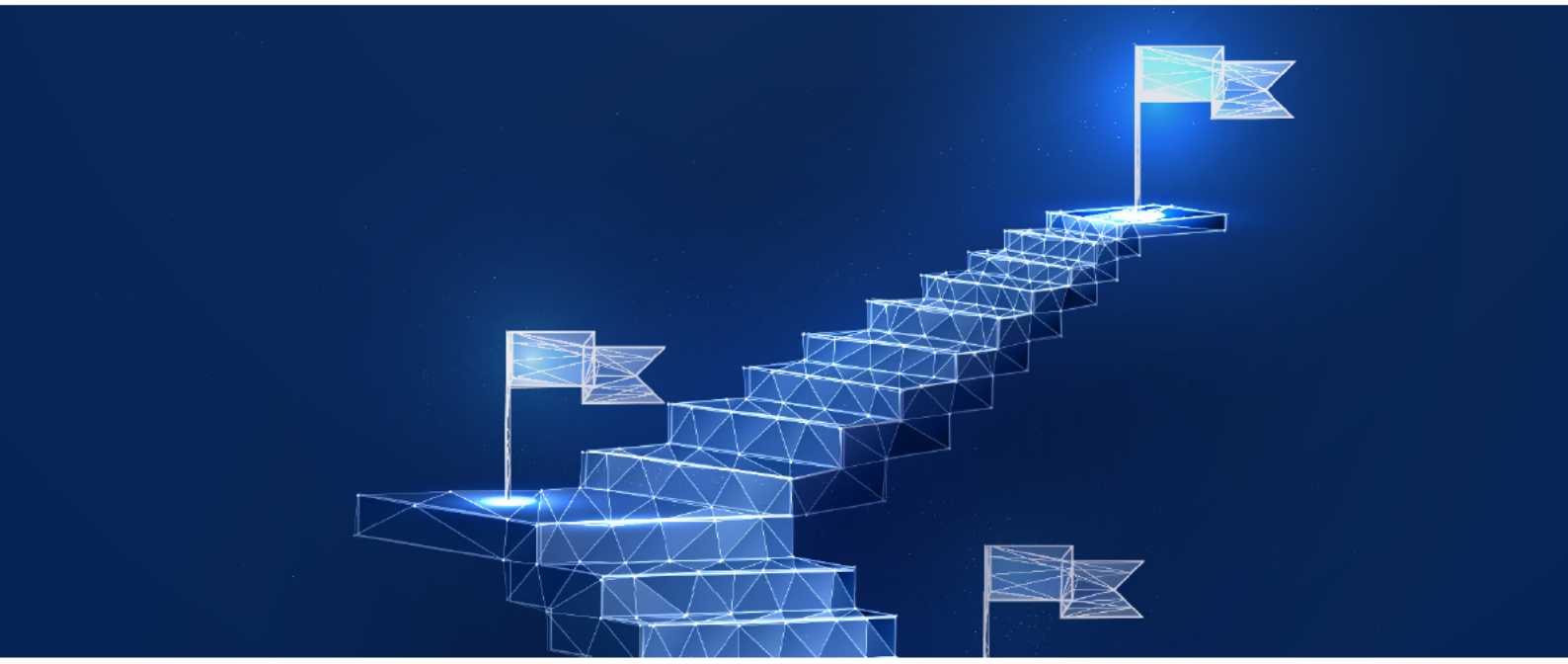
Based on this, you start a DMAIC project to improve 'Packaging and Publishing'. As you work through the different phases of the DMAIC project, you will see improvements in this area but also in adjacent areas such as 'Content Preparation' and 'Presentation Scheduling'. As LSS projects always look to create flow and collaboration, they will also impact surrounding processes.

Once you have finished your DMAIC project on 'Packaging and Publishing', you could use the framework to select another area to improve, finish that and pick a new one, thus establishing a continuously learning & improving organization.

You have seen how LSS is all about streamlining processes and using data to drive processes and decision-making. The approach differs from traditional improvement or system implementations as it has built-in mechanisms to ensure the project immediately adds value for customers and employees and involves all relevant stakeholders from start to finish.

We are not advocating that LSS is the only tool to use. LSS will help you drive and optimize process performance by continuously focusing on customer requirements and only doing value-adding work with the best available tools and processes. During the Improve phase, new solutions might need to be implemented that leverage other methodologies such as PRINCE-II (for large scale infrastructure projects) and SCRUM (for Software development). From an LSS perspective, this is fine. Being collaborative, LSS will look at how to best interact with these other approaches/teams to ensure that the solutions they deliver are timely and suitable to address the problems identified in the LSS projects.

With this white paper, we trust to have shown you what LSS is and how media organizations can use DMAIC projects to address the challenges and opportunities they are up against in the years to come.



# APPENDIX

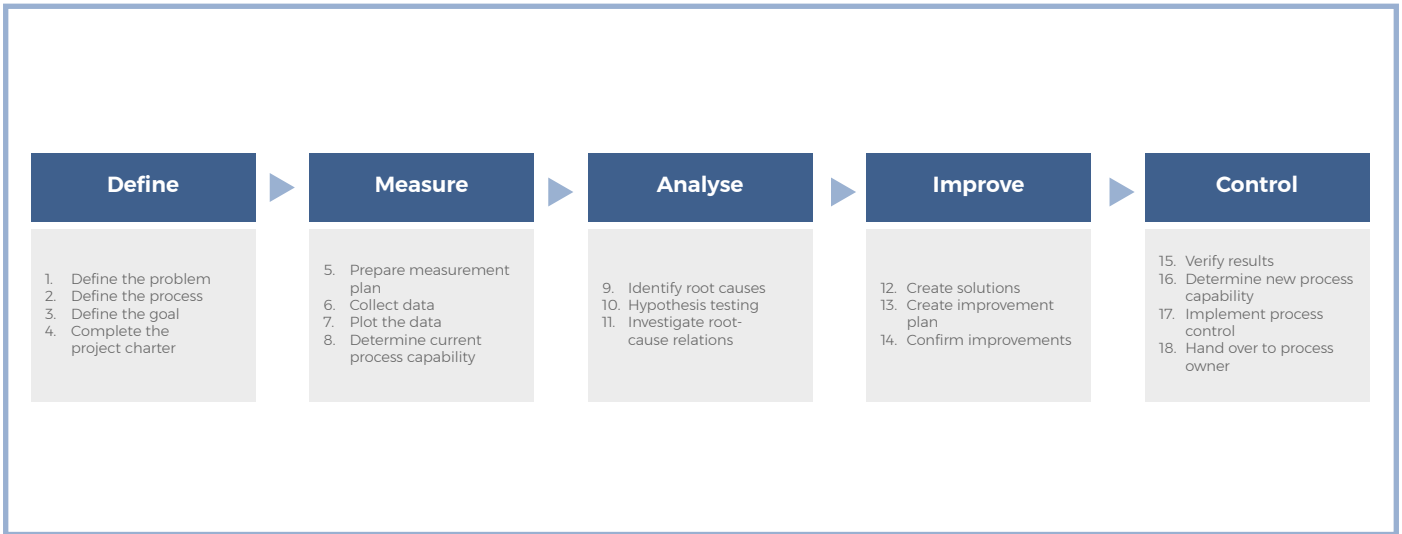
# 05 Appendix: DMAIC - The LSS project management approach explained

The acronym DMAIC stands for Define, Analyse, Measure, Improve, Control. Each of these represents a phase in the DMAIC project approach. Once all phases are completed the project is finished. A typical DMAIC project takes between three and six months from start to finish. DMAIC projects are especially effective for complicated problems where the relationship between cause and effect is unclear.

For situations where the problem is believed to be less complicated or fuzzy and does not require a thorough DMAIC approach, one can choose to use the 'Kai Sigma' approach.

Kai Sigma typically takes around 30 days. The approach uses the concepts of DMAIC but emphasizes mobilization for teams of which it is believed they already have the answers, but a breakthrough is needed. A Kai Sigma approach has less emphasis on analytics and is typically organized as a series of workshops in a 30-day period to mobilize the organization and implement solutions quickly.

Below is an overview of the DMAIC phases and the main activities in each phase.




*DMAIC Project Approach*

## DMAIC – Define phase

The first phase is Define. Here you describe what the problem is you are trying to solve (e.g. 'We have too much rework'), how the process operates today (process diagram) and what you would want to achieve (e.g. 'First Time Right' above 95%). All these elements together constitute the project charter.

Other than with a traditional project approach, a project charter fits on one piece of A4 paper to ensure it can be communicated easily to anyone at any moment. During the project, the project charter will be updated as new insights emerge. It is not 'set in stone'.

Once the Define phase completes (step 4 in phase 'Define'), the project sponsor should sign off on the project charter. This sign-off by the project sponsor is repeated at the end of each subsequent DMAIC phase. The repeated sign-off of the project charter ensures that the project sponsor's expectations are kept in line through each phase with the insights that emerge during the project. It avoids disappointments.

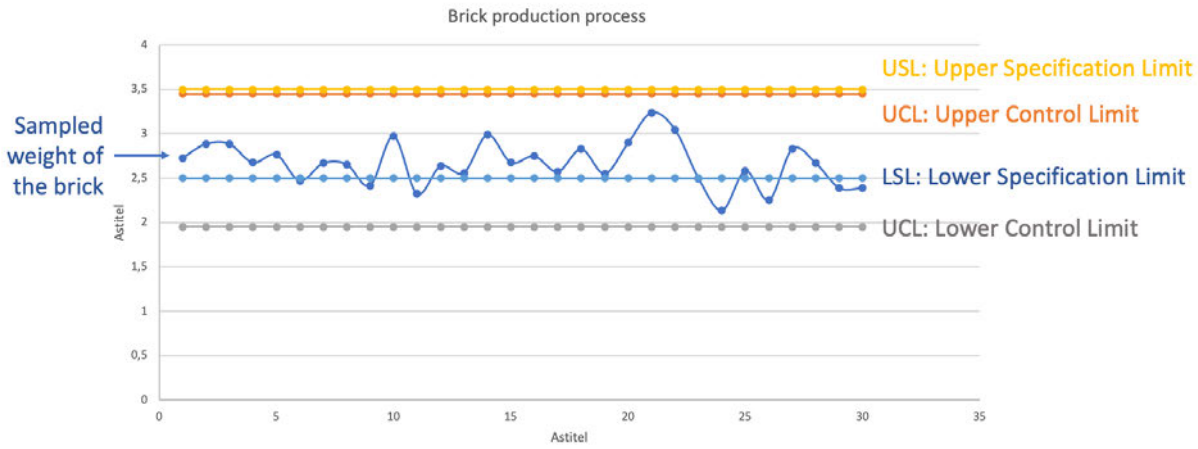
<table>
<tr><th>Problem Definition</th><th>Project Scope</th></tr>
<tr><td rowspan="2">Describe the problem, where does the problem manifest itself, in what circumstances, for who is this a problem, since when is this happening, what is the impact if not solved, what has been done before, etc.</td><td>What is considered to be included in the analysis and what is explicitly not included in the project's goal and analysis.</td></tr>
<tr><td>Project Team<br>Who is involved in the project:<br>Project Sponsor, Commissioner (who owns the problem)<br>Project Manager (Green / Black Belt / Other)<br>Team Members</td></tr>
<tr><th>SMART Goal</th><th>Clients and Stakeholders</th></tr>
<tr><td>When is the improvement realised, how much improvement is targeted, what will be the business impact, what type of impact?</td><td>Describe which clients are impacted and what internal and axternal stakeholders are important for the succes of the project.</td></tr>
<tr><th>Process Description</th><th>Estimated costs and benefits</th></tr>
<tr><td rowspan="7">What is the name of the process we are focussing on, where does the process start, what are its inputs, what are the outputs, make it graphical.</td><td>Describe what the upside of the project is in terms of money and/or productivity increases and what costs are expected to complete the project.</td></tr>
<tr><td>
<table>
<tr><th>Project phase</th><th>Tollgate Date</th><th>Status</th></tr>
<tr><td>Define</td><td>01-01-20xx</td><td>Completed</td></tr>
<tr><td>Measure</td><td>01-02-20xx</td><td>Started</td></tr>
<tr><td>Analyse</td><td>01-03-20xx</td><td>-</td></tr>
<tr><td>Improve</td><td>01-04-20xx</td><td>-</td></tr>
<tr><td>Control</td><td>01-05-20xx</td><td>-</td></tr>
</table>
</td></tr>
</table>

*Project charter*

## DMAIC – Measure phase

In the Measure phase, you prepare a measurement plan to determine the data you will collect. You then test whether your data collection systems are accurate to ensure that the data you are about to collect is stable and useful.

Once you have collected your data, you will plot it to determine what type of distribution the data has and whether there are any unusual patterns (see the explanation of the control chart in the Appendix on Six Sigma). Once we have determined the characteristics of the process and confirmed that the data coming from the process is ready for our analysis, we determine the current capability of the process, expressed as 'Cpk'. The process capability index (Cpk) is determined by counting how many samples of the total fall between the boundaries specified by the client. These boundaries are represented by the Upper Specification Limit (USL) and the Lower Specification Limit (LSL).




*Capability of the current process: Cpk*

In the above chart, the client is **asking for bricks of 3 kilograms** (kg) with a tolerance of plus or minus 0.5 kg. This means the USL is 3.5 kg, and the LSL is 2.5 kg. The customer is satisfied if a brick is produced with a value between 3.5 and 2.5 kg. The data collected from our process reveals that the process produces bricks weighing between 1.95 and 3.45 kg with **an average of 2.7 kg**. As the chart shows, the process is producing bricks close to the client's Lower Specification Limit; therefore the client will see many bricks not meeting specifications (below LSL).

In this example, **only 24 out of 30 bricks meet customer specifications**! Using LSS statistics, we calculate process capability (Cpk), and we arrive at a **Cpk of 0.27**. LSS states that any process with a CPK of less than 1 is not capable, so there is room for improvement!

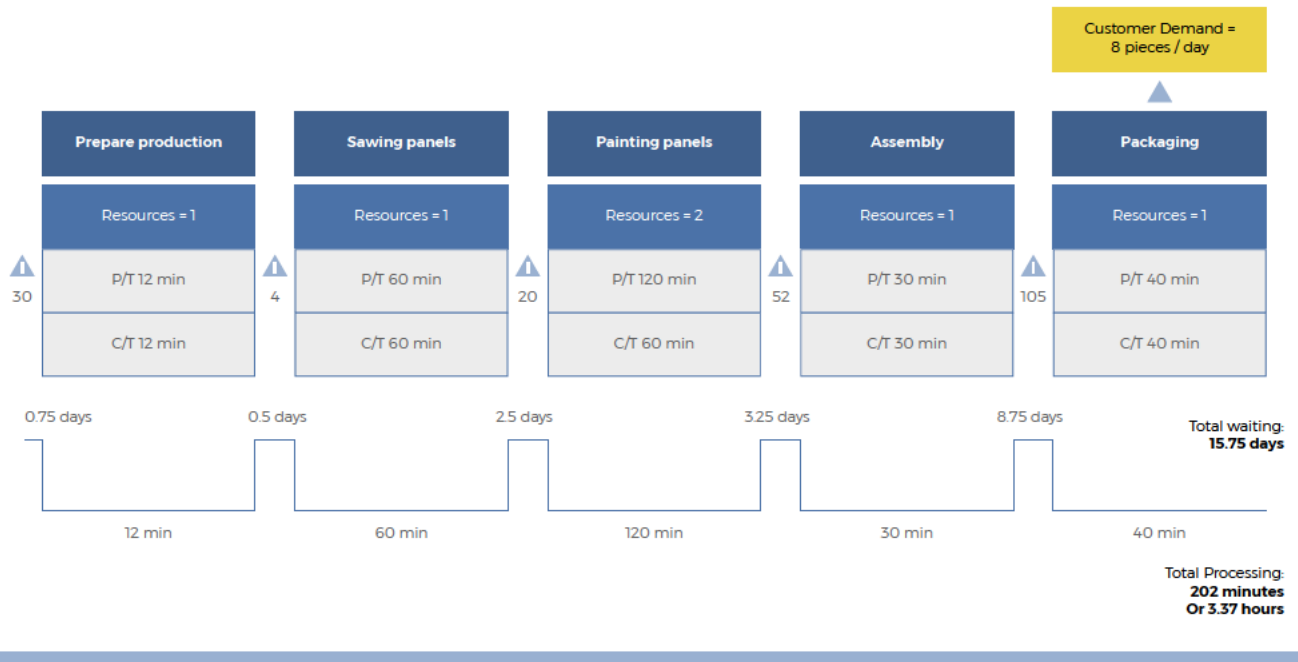
### DMAIC – Analyse phase

In this phase, we analyse the process in detail to find the problem's root cause. In LSS, we can follow two different direct trajectories for analysis. One is to use explorative models from the LEAN toolkit, such as Value Stream Mapping, Failure and Effect Mode Analysis (FEMA), Theory of Constraints (TOC), Fishbone Diagrams and Five Times WHY. The other trajectory uses datasets and models from Six Sigma, such as Histograms, Pareto-analysis, Boxplots and regression analysis.

Both trajectories yield useful results and can be used in conjunction as well.

## Analysis using Lean tools

Below is an example of a Value Stream Map (VSM as used in the LEAN toolkit.



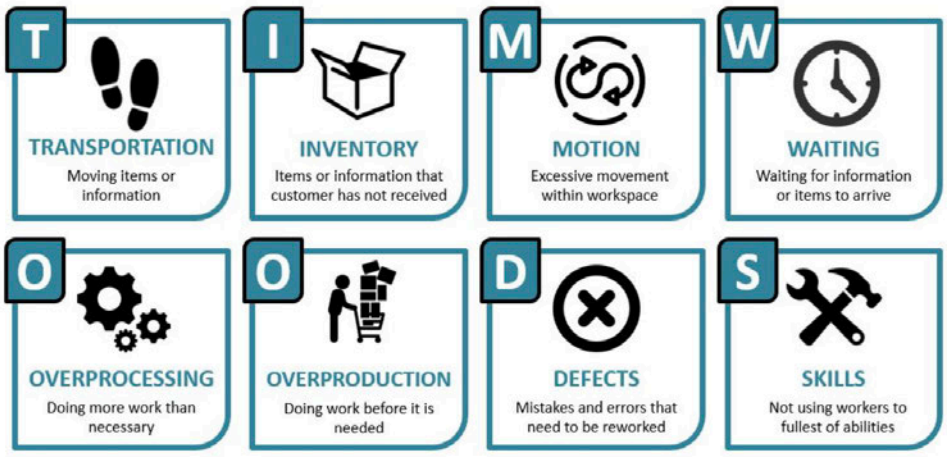

*Sample Value Stream Map*

This Value Stream Map describes a closet factory. When creating a VSM, we work from right to left, so we start by looking at customer demand, which is 8 closets per day. We then document how many people are active in the process (resources), what the processing time is for one item (P/T) and how quickly each process step produces one piece (C/T). Between the process steps, we capture how much inventory (I) there is at the time of measurement. This is represented by a triangle. Producing one closet takes 202 minutes (sum of C/T).

Taking a closer look at the timetable of the process at the bottom of the diagram, we see waiting time caused by inventory (for example, between assembly and packaging, there are 105 items waiting. This will take 105 * 40 min = 8.75 days to process!). If we also add the waiting time between the other process steps, we have a total of 15.75 days of waiting time, where the actual time spent working on the product is only 202 minutes.

Combining these numbers, we arrive at a process efficiency of only 2.6 % (202 (202 + 7560) * 100%). This means that of the total time it takes to produce one new closet, 97.4% is wasted waiting!

Waste is an important concept in Lean and more things are considered waste. The TIM WOODS concept sums up the various flavours of waste considered in Lean.



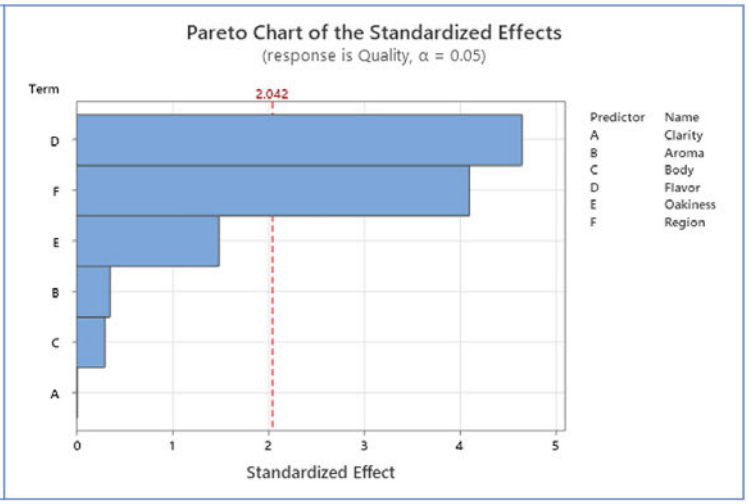

*TIM WOODS acronym describing different types of waste we should strive to eliminate.*

## Analysis using Six Sigma tools

The other trajectory to find areas for improvement is to use the statistical toolset from Six Sigma. At the heart of Six Sigma analytical tools is the regression analysis. Below is an example that illustrates the power of Six Sigma analytics.

**Analysis of Variance**

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 7 | 129.648 | 18.5212 | 22.10 | 0.000 |
| Clarity | 1 | 0.000 | 0.0001 | 0.00 | 0.991 |
| Aroma | 1 | 0.104 | 0.1041 | 0.12 | 0.727 |
| Body | 1 | 0.074 | 0.0742 | 0.09 | 0.768 |
| Flavor | 1 | 18.121 | 18.1210 | 21.62 | 0.000 |
| Oakiness | 1 | 1.852 | 1.8525 | 2.21 | 0.148 |
| Region | 2 | 18.108 | 9.0539 | 10.80 | 0.000 |
| Error | 30 | 25.140 | 0.8380 | | |
| Total | 37 | 154.788 | | | |




*Sample regression analysis*

We have a team of wine experts during a wine-tasting event. Each expert writes down their score (a number between 0 and 10) for Clarity, Aroma, Body, Flavour, Oakiness and Region[5] and concludes with an overall judgement labelled 'Quality'.

Using regression analysis (in this case, a technique named 'ANOVA'), we can determine which factor (input or 'X value') has the strongest impact on the quality of the wine (output or 'Y value').

The output of the test is shown in a table where we should look for column 'P-Value' (Probability). Where P-Value is lowest, the relation between the X (input) and Y (Output, here 'Quality') is the strongest. We then see that Flavour and Region (both having a rounded value of 0.000) have the strongest relationship. Oakiness has a weak relationship (0.148), while Clarity, Aroma and Body have little to no relationship to Quality. This data is graphically represented as a Pareto chart where it is immediately clear that Flavour and Region are the factors driving Quality.

If a wine-importer organized this wine-tasting to see which wines he should be importing more to grow his reputation (and revenues), it is clear that he should be importing more wines with a specific flavour from region 2[6].

### DMAIC – Improve phase

This phase is all about mobilising knowledge and experience from the team members Their input is crucial as they know their processes best and know what has been tried and tested in the past.

The analysis phase has shown us which factors affect process performance most. From the examples, you might remember the factory with the underweight bricks, the closet factory that only spends 2.9 % of its time producing closets, and the wine importer whose best scoring wine has a specific flavour and comes from a specific region.

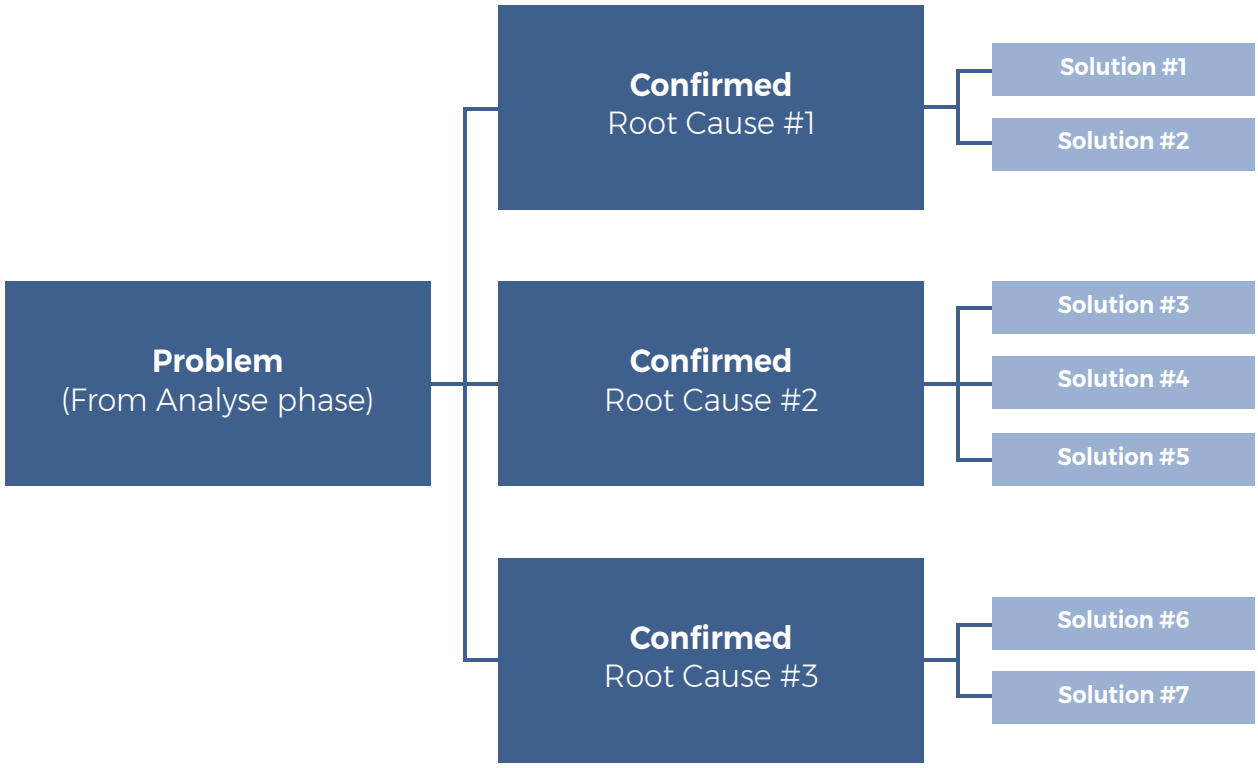
Lean provides us with a whole array of areas we can explore to improve. The table below shows an overview of the most useful Lean concepts in the Improve phase without the intention of being exhaustive.

| LEAN Concept | Description |
|---|---|
| Focus on customer | Explore and confirm what is critical to quality (CTQ) to your customers. What is it your customer needs in terms of quality, price, volume, frequency, service. |
| Remove waste | Use TIM WOODS to identify non-value adding activities: Transportation (unnecessary), Inventory (excess), Motion (unnecessary), Waiting, Overproduction, Overprocessing, Defects, and Skills (underutilizing). |
| Create flow | Create flow by balancing the capacity of stations throughout the end-to-end process thus minimizing inventory and waiting time. |
| Implement Takt | Takt means aligning your production capacity and delivery cadence with (expected) customer demand allowing you to meet their expectations in the most efficient (lean) manner. |
| Introduce pull | Introduce tools such as Kanban and other visual tools to allow teams to only pull in work once they are ready to start on a new item. This prevents unnecessary 'work in progress' inventory and prevents faulty products from propagating to the next station. |
| Use visual management | Use statistical tools and dashboards to allow the teams to inform themselves continuously about the performance of the processes. This intimate and up-to-date information on the process will foster a mindset of continuous improvement. |

*Major Lean Concepts*

Six Sigma statistical tools provide us with the powerful tools of linear regression and hypothesis testing. These tools allow us to define a hypothesis, such as 'I believe using a lower temperature oven (X) will deliver bricks closer to 3 kg (Y)'. Through a series of tests (or experiments), we can then see whether lowering the temperature indeed delivers bricks closer to 3 kg in a statistically significant way. If this can be proven (this is called 'hypothesis testing'), lowering the temperature is a possible solution.

Using Lean and Six Sigma ideas and concepts in brainstorming sessions and experiments, you will eventually arrive at a set of possible solutions you could implement. Listing all possible solutions that solve your root causes in a decision matrix will then help you select the most appropriate solutions.




| | Improvement impact | Time to implement | Cost / Benefit | Show Stopper? |
|---|---|---|---|---|
| Solution#1 | X | V | V | X |
| Solution#2 | V | V | ? | V |
| Solution#3 | V | X | V | X |
| Solution#4 | V | V | X | ? |
| Solution#5 | V | V | ? | ? |
| Solution#6 | V | V | V | V |
| Solution#7 | V | ? | X | ? |

*Decision matrix for selecting solution(s) to implement.*

The decision matrix clarifies that for Root Cause 1, we have solution 2 as a good candidate, although there are some doubts about cost effectiveness. For Root Cause 2, there are multiple potential solutions, but not a clear winner. For Root Cause 3, we have solution 6 that meets all the criteria for successful deployment.

## DMAIC – Control phase

In the previous phase, we have implemented solutions based on the decision matrix. This means we will now have to update the process descriptions, calculate the new process capability, and hand these over to the process owner.

It is good practice in LSS to document processes using a Standard Operating Procedure (SOP) that can then be used by any operator to operate the process and/or use it to train new staff. This is also consistent with any Quality Management System you might have in place where you go from one controlled version of a document to the next. Below is an example of a Standard Operating Procedure using the example of the bricks.

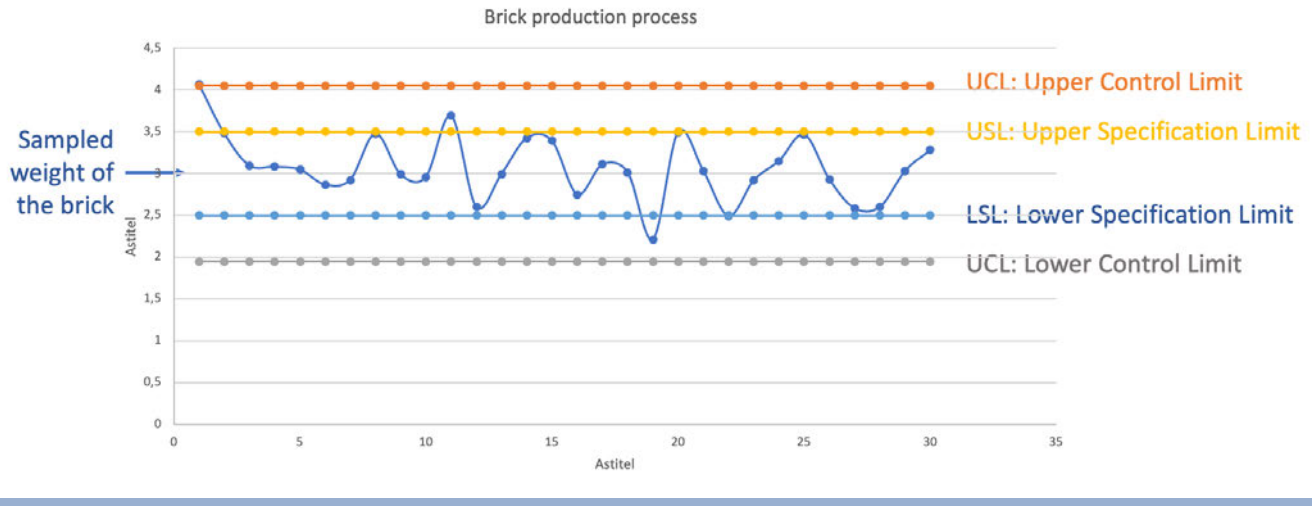
| | Bricks Factory | | |
|---|---|---|---|
| | Creating Bricks | Doc. # | Page 1 of 2 |
| | | Rev. 0 | Date: |
| Process Owner: John Doe | | Approved by: Adam Tay or | |

| Responsibility | Procedure | Notes / Instructions |
|---|---|---|
| Driver | Load Clay into factory. | Make sure to load oldest clay first! |
| Worker | Fill brick-malls with Clay. | |
| Worker | Combine brick-malls into a batch of 1024 bricks and move to oven. | Make sure to use new temperature at 300 Celsius! |
| Operator | Set temperature to 300 Celsius, humidity to 45% and timer at 240 minutes. | |
| Worker | Move backed bricks from oven to storage. | |

| Rev.# | Date | Revisions |
|---|---|---|
| 1 | Feb 23, 2022 | In t a document descr b ng AS IS process. |
| 2 | May 12, 2022 | Update to ref ect process mprovements from DMAIC project, oven now at 300 Ce s us to mprove average br ck we ght. |

*Sample (updated) process description or 'SOP'.*

Suppose you have managed to improve the bricks process by lowering the temperature of the oven. The new control chart might then look like this:




*New control chart after lowering oven temperature.*

The new control chart is showing an improvement, as the average brick is now at 3 kg, which is exactly what the client is expecting as the mean value. The process capability (Cpk) has improved from 0.27 to the new value of 0.48, but is still not at or above 1, which would make it a 'capable process'.

However, the change has improved the process to produce 28 out of 30 (previously 24 out of 30) bricks meeting client specifications (USL + LSL). The operators are now tasked to use the new control chart to keep the process stable between the new Upper and Lower Control Limits (UCL + LCL).

## Conclusion

The DMAIC approach has revealed how the current process works and performs (Define and Measure). We have then zoomed in on the root causes for underperformance (Analyse) and invented, selected and implemented solutions to remove the root causes (Improve). Finally, we have equipped the process owner with a new and improved process (Control). This is where the DMAIC project ends.

Although the process might not be perfect yet, it has improved significantly through the (time-boxed) DMAIC project. Before deciding on further improvements, the organization will have to weigh other opportunities for improvement through a DMAIC project to ensure only projects that contribute most are selected.

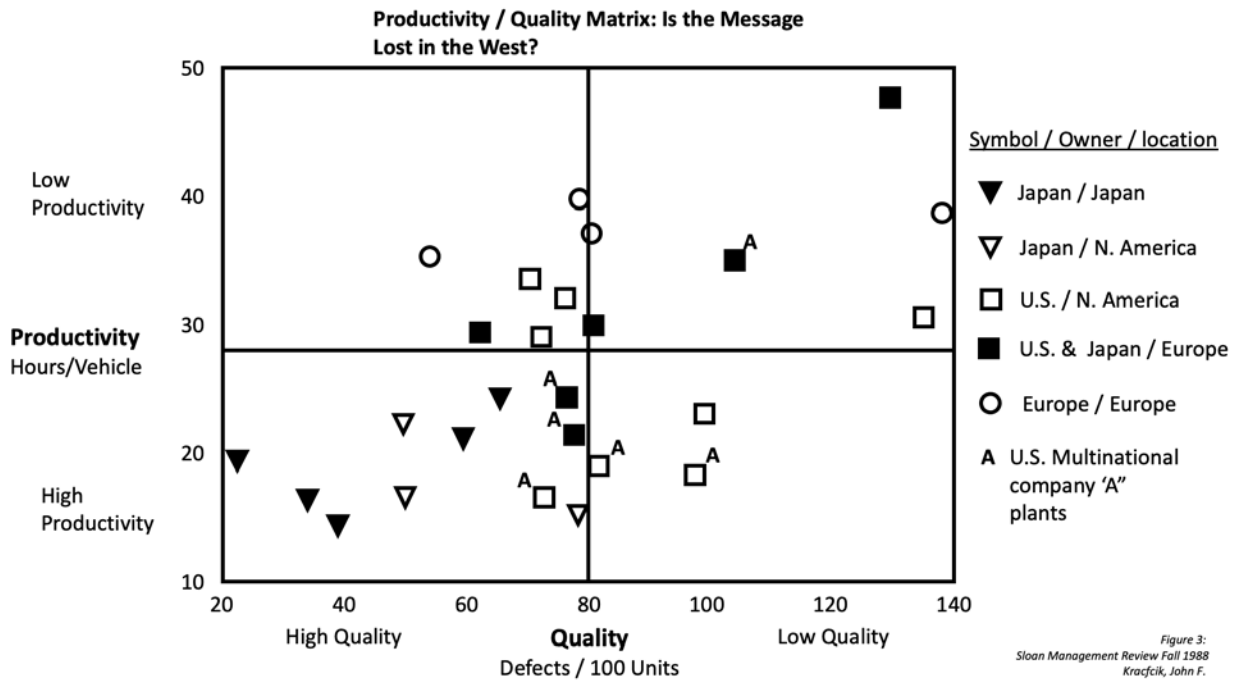
# 06 Appendix: History and theoretical fundaments of Lean and Six Sigma

The LSS methodology is a synthesis of two very powerful concepts: 'Lean' and 'Six Sigma'. In the next paragraphs, we will introduce both concepts and their merger into 'Lean Six Sigma', the powerful approach making organizations more data-driven, more connected, and more flexible.

## On the origin of Lean

The term 'Lean production' was minted by John Kracfcik in his 1988 article 'Triumph of the Lean Production System' in Sloan Management Review. He was working at MIT's 'International Motor Vehicle Program', which studied car manufacturing plants to find out which sites and brands were among the best performers and what lessons could be learned.

Kracfcik's survey involved a very large research programme combining data and insights on productivity and quality performance from more than fifty facilities in the U.S., Japan and Europe owned by U.S., Japanese and European brands.




*Productivity Matrix Sloan Magazine*

The research revealed that Japanese-owned firms were among the best performers. Surprisingly, however, also the sites outside Japan from these Japanese owners were performing very well, so it was not purely the location, local workforce or culture that was responsible for excellent quality and performance. It was clearly something within the company policies that was making the biggest difference!

Further analysis showed that U.S. and European-owned firms operated 'buffered' operations, which meant they kept inventory at various places in the production chain to compensate for failing machines, absent workers, and incorrect products, all this with the aim of 'keeping the production line working at all costs'. The span of control was enormous as tasks were broken down to the most detailed level. Staff was instructed to perform very simple tasks very quickly. It was the ultimate scientific management, all with the underlying assumption that low-cost production is only achieved by focusing on maximum utilization of scarce resources.

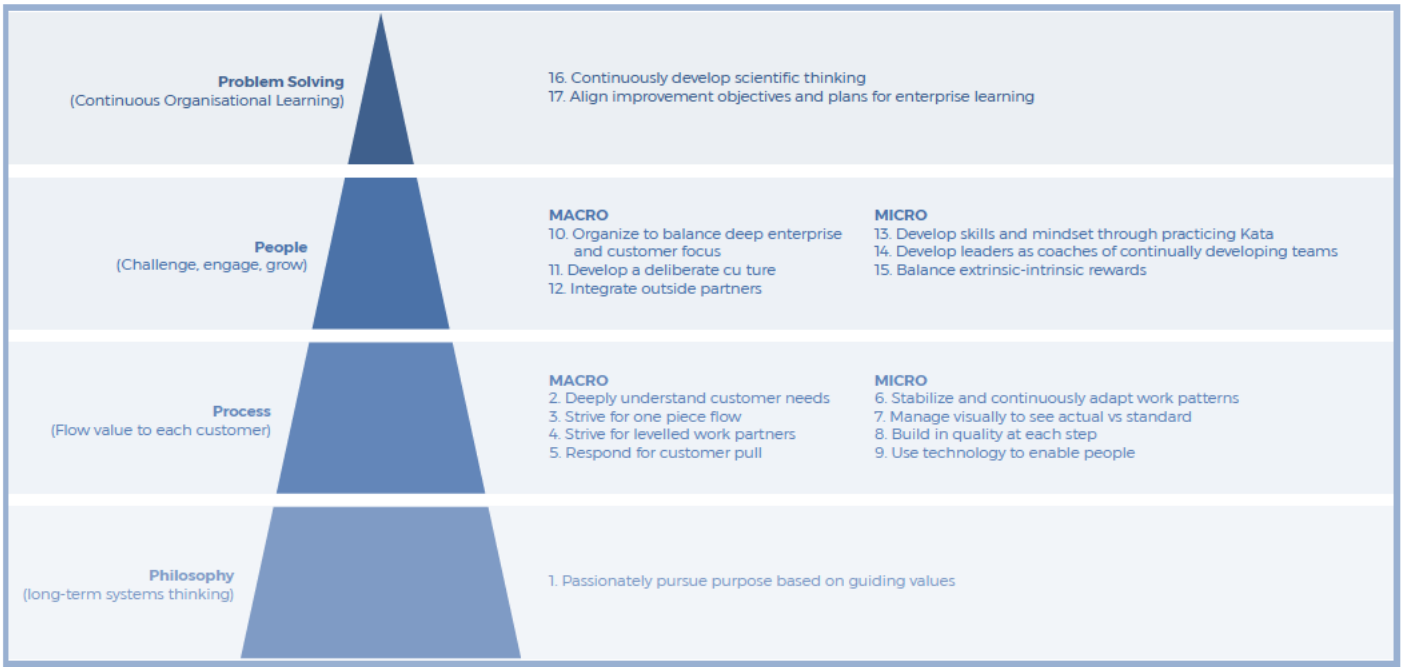
Japanese-owned firms did use similar technology to their U.S. and European counterparts, such as the assembly line and robots, but had a totally different management style. They created teams that had an integral responsibility for the production, maintenance, and improvement of the production line. They were also given autonomy on how they organized and prioritized their work. Paired with a corporate policy that no team should give faulty products to the next team and internal buffers should be kept to a minimum, the resulting production process worked faster and with less error.

Looking for a term that describes this successful 'Japanese' approach, Krafcek minted it 'Lean', this as opposed to the 'buffered' approach used by the lesser performing organizations.

## Modern Lean

Since the initial publication on Lean by Krafcek, many publications followed that describe Lean methodology and tools in great detail. Often they refer to the successful use of Lean by Toyota and their 'Toyota Production System', the corporate production philosophy that gave Toyota a strategic edge over their competitors for many decades. It was first described in detail by Womac, Jones and Roos in their book 'The Machine that Changed the World'.

Fast forward to today. Lean has proven itself over time as a very successful approach best represented by a pyramid with 16 principles to implement to become LEAN.




*Lean principles*

Lean starts with defining the corporate philosophy (fundament, principle 1) that is based on shared values and a purpose that everyone underwrites.

The next level is that of the processes. These should be geared towards fulfilling customer needs (principle 2), with a minimum of waiting time (principle 3), with no interruptions (principle 4), and always based on customer request (principle 5). Processes are constantly scrutinized for improvement (principle 6), and exceptions are caught immediately (principle 7). Faulty items are never propagated to the next step in the process (principle 8), and only supportive technology is used (principle 9).

As Kracfcek described in his article, teamwork is the cornerstone under Lean. Therefore, the third level—'People'—is crucial to connect everything and drive to perfection. It starts with ensuring the voice of the customer is always present in everything you do (principle 10). For improvements to be encouraged, people need to be willing to discuss errors and opportunities (principle 11). External partners need to be included in the optimization of working processes (principle 12). To stimulate continuous improvement, learning routines (Kata) are embedded in day-to-day management (principle 13), and leadership is trained in disseminating a culture of continuous learning (principle 14). Finally, KPIs from teams, individuals and the company should be continuously and carefully aligned (principle 15).

The fourth level describes the need for a culture of problem-solving and continuous learning as these drive continuous improvement based on scientific thinking (principle 16) and provide opportunities to improve the company as a whole (principle 17).

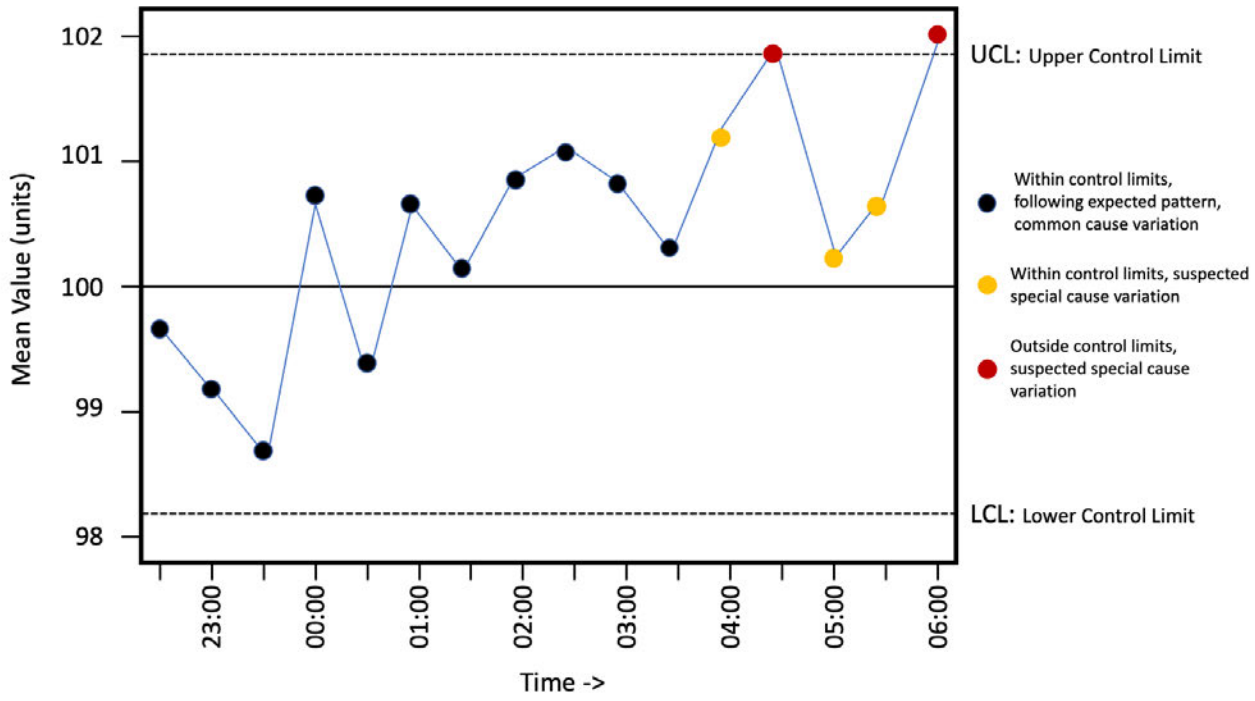
## How to implement Lean

No company can or should attempt to implement Lean overnight. Lean is a concept, a philosophy or a strategic intent, and the more elements a company adopts, the Leaner it becomes and the more Lean benefits it will realize. Therefore, any organization striving to implement Lean should consider the approach that fits their ambition and starting point best. Generally, there are three approaches to implementing Lean:

1. Top-down: Top-management is aware of all benefits and risks related to implementing Lean. The Lean programme will train and implement all elements of Lean throughout the whole organization in a uniform way.
2. Middle-out: A cluster of key business lines and/or product/process combinations are selected, and the majority of the 17 Lean principles are applied until noticeable improvements are realized. After that, more business lines will be targeted for implementing Lean and, over time, Lean will be implemented in the whole organization.
3. Opportunity-driven: Problem areas where there is an urgent need for rapid improvement are selected, and Lean tools and experts are put to work to solve problems using a Lean approach and tools. Building on the success (which we believe inevitably follows when attacking problems with Lean), other organizational units will ask to use Lean to solve their problems. This creates a pull for implementing Lean, possibly until Lean is implemented in the whole organization.

## The origin of Six Sigma

The popular term Six Sigma builds on the concept of statistical process control and the use of its most important artefact, **the control chart** as originally introduced by Shewart in 1924 when working at telephone company Western Electric Company. Shewart was tasked with quality inspection of telephone equipment and concluded that by measuring and plotting process performance one could distinguish between common-cause variation (expected deviations from the norm) and special-cause variation (new, unanticipated deviations signalling change or 'problems').




The most important data on the control chart are the Mean, Upper and Lower Control Limits. The Mean is on the Y-axis and represents the number of units produced sampled at a given time interval (plotted on the X-axis). The Upper and Lower Control Limits indicate the boundaries within which a stable process should function.

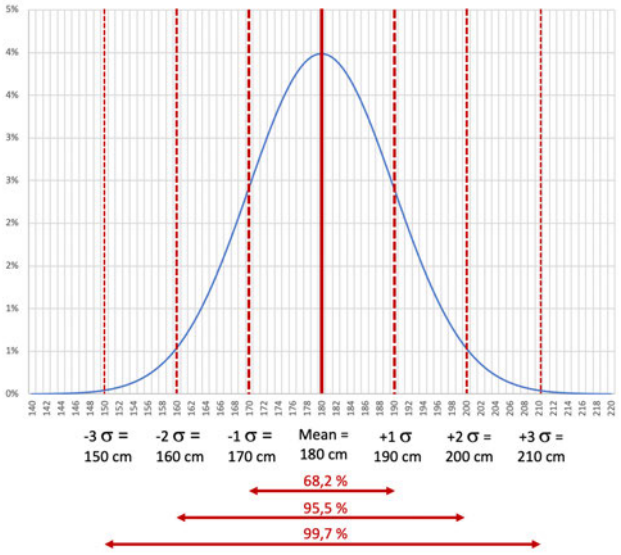
The graph above shows that the process is functioning stable until 03:30. In a stable (normally distributed) process, the samples vary around the Mean, sometimes above, sometimes below.

At 04:00, something important happens. A normal distribution definition (see upcoming paragraph on normal distribution) prescribes that there should be no more than seven consecutive samples above or below the Mean. That is why the control chart indicates something special has happened that we should investigate and solve for the process to become stable again. The samples at 04:30 and 06:00 are also suspect as they deviate too much from the Mean to a value outside the boundaries where we expect the process to function. These cases should also be investigated to bring the process back to a normal, stable situation.

Shewart concluded that common-cause variations (as seen between 22:30 and 03:30) are normal, as small process variations can be expected. Special-cause variations, however, signal that something is wrong with the process and investigation and improvements are needed.

Control charts were an absolute breakthrough as they provided insights into process characteristics that were previously hidden. Historically, focus had been on the Mean as a primary indicator for performance. With the control chart, organizations could make reliable predictions on the performance of their processes and the quality of the products they deliver. This concept would revolutionize many industries worldwide.

With the control chart as a strong visual indicator, we now zoom in on the two dotted lines, the Upper (UCL) and Lower (LCL) Control Limits. Where these lines are drawn is determined by how much common cause variation is allowed for the process. Many natural and man-made processes follow a normal distribution.




*Sample normal distribution*

Above graph plots a normal distribution for the average length of men. The Mean is 180 cm, and given the characteristics of the normal distribution, we can predict that if we sample the population, we will find men of 170 and 190 cm in 68.2% of the cases. Looking further, we will find 95.5% of men in the bracket between 160 and 200 cm, and 99.7% between 150 and 210 cm. These predictions are made possible by using the concept of 'standard deviation' describing the distance between a given sample and the Mean of the population. One standard deviation is called one 'Sigma' (symbol 'σ').

Using the normal distribution in our control chart, we can now say that if we have a process to measure men's length, we expect to see men with a length between 160 (LCL) and 190 (UCL) cm in 95.5% of all measurements. This represents a confidence interval of 2 Sigma. If we start seeing values outside this interval in our control chart, we know that something must be wrong in our measurement process.

Many organizations and industries around the world have used Shewart's original work to achieve giant leaps in quality and performance improvements of processes and finished products. Motorola and General Motors are among the most famous users of his insights. These highly industrialized mass production environments have given birth to the term 'Six Sigma', which represents an error margin of 0,00044 % or 3.4 defects per million. Striving for Six Sigma, they transformed their processes and quality perceptions in an unprecedented way allowing them to grow and outpace their competitors on a scale not seen before.

## Modern Six Sigma

Over the years, Six Sigma has transformed into a modern approach that is built on five central themes:

1. Explore your customer's needs (Voice of the customer) and translate these into measurable terms.
2. Understand your processes and how your inputs influence the performance of your process using the universal formula Y = F (X), where Y represents the output of your process and X he input. F describes how much and how X influences Y.
    a. Example: My neighbour and I both have sowed fresh grass in our garden:
        i. After 30 days, we measured how tall the grass had grown: 20 centimetres for me and 40 centimetres for my neighbour. This is Y (output).
        ii. From the start, we kept track of the inputs: the type of grass (X1), the volume of water added every day (X2), the amount of fertilizer we added (X3) and the hours of sunlight recorded every day (X4).
        iii. With Six Sigma, you can now use statistical tools to determine which of the X values (X1 – X4) has the most significant impact (F) on the outcome (Y)
    b. Understanding your processes in statistical terms of X and Y is the key that Six Sigma offers to create stable and excellent performing processes.
3. Manage your processes using statistical tools, such as the control chart, strive for stable processes, and act on special-cause variation.
4. Involve the responsible teams in measuring performance and equip them with tools to improve their processes.
5. Have a systematic approach to continuously stimulate improvement and ensure improvement never stops. Six Sigma takes the DMAIC approach: Define, Measure, Analyse, Improve, Control.

# 07 Appendix: Data-driven decision-making & connected content explained

Data Driven Decision Making

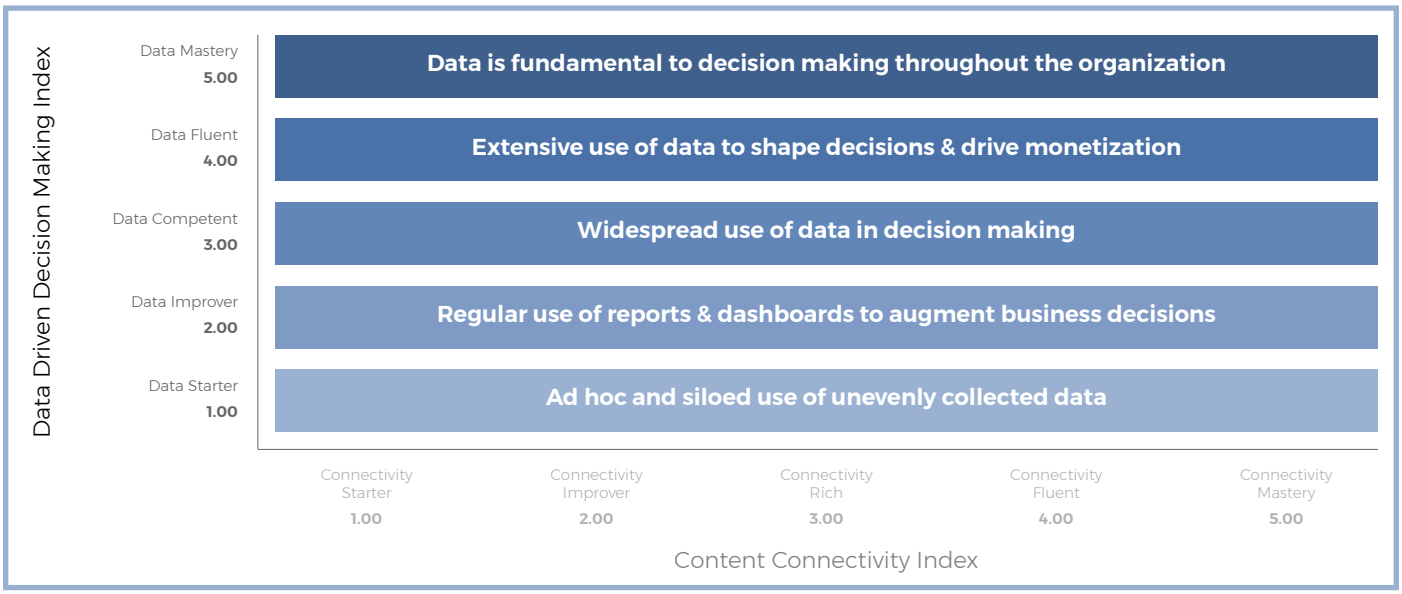
| | Data Starter | Data Improver |
|---|---|---|
| Data strategy and goals | Senior management relies on standard financial reporting and traditional industry reporting. (e.g., Nielsen) | Senior management keen to develop data usage across the organization but happy to focus on a few strategic priorities for now rather than redevelop the enterprise |
| Data literacy and skillsets | Skills concentrated in traditional reporting functions, with little cross-functional collaboration between those organizations. | Data teams are resourced to deliver specific applications (e.g., content recommendation) but much decision making remains grounded in traditional approaches. |
| Data sourcing and processing | Use of first- and third-party data is often rigorous, but not systematized and often limited to Excel and static visualization. Different groups frequently use different data and sources. | Some systematization of data processes e.g., for financial reporting or addressable ad sales that blend first and third-party data. But no company-wide initiatives. |
| Data management | Usage concentrated on teams with specific functions no wider "source of truth" for the company as a whole | Islands of digital dividend data becoming common place, but little systematic connection between islands |

| Data Competent | Data Fluent | Data Mastery |
|---|---|---|
| Senior management sees value in systematic data connections. Work to develop roadmap for using digital data across functions in a systematic way has begun | Company-wide initiative to ensure the widespread use of data to enhance monetization is well under way | As a TV company, data fuels much of the decision-making process but management understands it cannot become completely algorithmic. |
| Stadardized processes and tools for ingestion, quality, and governance are widely used. Sporadic deployment of internal applications and data workflows beyond traditional use cases | Data teams driving key applications (e.g., optimizing marketing campaign effectiveness) and automated reporting is used to enhance other functions e.g., program sales | Data is no longer prerogative of data/ analyst teams but supports operations of the entire organization in different capacities. |
| First party digital data and new audience segmentation techniques are used to augment some traditional processes. The number of data-first applications has increased. | Most major decisions are now informed by a combination of third-party data and first party digital data, e.g., content acquisition for underserved interest clusters that are in danger of churning | Seamless bending of first- and third-party data is used to drive key decision making across the organization |
| Growing use of data automation to aid in the decision making and planning processes e.g., use of rights data to automate planning broadcast and VOD schedules | Data is widely available to those who need it in an either self-service or well-managed fashion. | Data is used widely across the entire organization from enhancing marketing, user acquisition and churn reduction, to content sales and acquisitions and addressable ad sales. |

| | Connectivity Starter | Connectivity Improver |
|---|---|---|
| Connected content strategy | Senior management sees value in improving content and data connectivity, and some high-priority use cases have been deployed but it is not a strategic priority. | Content and data connectivity is of growing importance to management. Roadmap to expand existing deployments is being developed. |
| Content roles and responsibilities | Content and metadata workflows are only partially joined up. Operational data is mostly siloed within specific teams and functions. | Key workflows are joined up. Operational data integration supports many key processes. |
| Content sourcing and processing | Content is files-based but does not move easily between systems. Associated data is mostly siloed without systematic integration of third-party information. | Key content workflows are joined up. Roadmap developed for third party content and data integration, with some partners already fully on board. |
| Connected content management | Integration of key business systems (e.g., finance and sales data), and major components of the content supply chain (e.g., automated asset preparation from mezzanine files). | Core systems are connected, but there are still process efficiency gains to be had with the use of more automation. |

| Connectivity Rich | Connectivity Fluent | Connectivity Mastery |
|---|---|---|
| An efficient and flexible content supply chain is a strategic priority; a roadmap has been developed but it has not been fully executed. | Resourcing for a continuous content supply chain, an execution plan, and a measurement strategy has been developed. | As a TV company, content and distribution are the core strategic assets but management prioritizes content supply chain automation and data connectivity to manage, deliver and monetize as effectively as possible. |
| Assets and metadata need some manual assistance to move across the organization from third party production to playout. Operational data integration supports most internal processes. | Most content assets, metadata and operational data is moved easily across the organization. | Data and content assets flow easily across the organization, including connecting everything from subtitling to search, scheduling to press, finance to rights management etc. |
| Majority of third-party production companies have integrated content and metadata with core systems; however, some gaps still need to be entered manually. | Data is consistently used to inform content and resourcing decisions at key stages in the supply chain. Key individuals within departments have access to this data and are consulted by execution teams to inform the next move. | Systems smoothly integrate a wide variety of external content and data sources including external production companies and social media data. |
| Connectivity and automation are being used more widely e.g., automated international version generation based on partner platform's specification for format, metadata, synopsis etc. | Processes are automated and instrumented for detailed tracking of business implications. Reporting and visualization of this data is beginning to be standardized and data-literate employees can self-serve data to achieve business results. | Seamless and instrumented movement of content and data are the operational backbone of the organization, making processes smoother and more automated. |

Although data from streaming services clearly has the potential to help the industry unlock the full potential of its investments in streaming services, many respondents participating in our research suggested that their companies remain relatively early stage in this transformation.




## The connected content supply chain

The move to digital distribution has coincided with a wealth of other technological innovations that have transformed the way that programming is made and processed. This move towards a more digital supply chain has allowed TV companies to increasingly become content-first, ready to meet audiences wherever they may be rather than the more traditional approach that was intertwined with broadcast platforms.

Common benefits reported from moving to a connected supply chain include:

- Increased flexibility to launch content on new platforms/ services quickly.
- Rapid deployment of international versions (e.g., launching a show to over 100 territories the day after home market transmission).
- Improving efficiency by uniting digital and broadcast supply chains.
- Facilitating program sales with easy deployment of international versions.
- Avoid supply chain waste induced by duplication of work throughout the media operation due to manual processes or manually interconnected processes within the media operation.
- Establish collaborative content-centric workflows not just throughout the internal media operation but also with upstream and downstream partners (e.g., upstream fulfilment of both material and metadata flows by the production companies).

As with the transition to digital decision making the transition towards connected content does not happen uniformly. While it is not trivial, for example, for a company to refresh its internal processes and have content and metadata travel together in-house, it is an order of magnitude more complex to arrange seamless integration of content and metadata with third party production companies.

The exhibit below captures that complexity and the multiple dimensions that need to be addressed for companies to take full advantage of connected content throughout the content supply chain.

# 08 References & credits

1. See appendix for a more detailed definition of the terms ‘Data Driven Decision Making’ and ‘Content Connectivity’.
2. By localization we expect a studio to provide 1) an additional audio-track, 2) a subtitle-file or 3) a partial audio-track and/or subtitle-file.
3. Please see ‘Six Sigma’ section in appendix for a more elaborate explanation on this topic.
4. Shortened in the graphic to ‘StDev’: This indicates amount of variation in the sampled values to the Mean.
5. Region is not an actual score as it is a value they take from the bottle and write in their journal.
6. In the sample, there were three different regions and region two had the highest quality scores.

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