

Paper PM07

Six Sigma DMEDI Methodology: Drive and Develop Your Team

Caroline Gray, CROS NT, Cork, Ireland

ABSTRACT

Six Sigma ® is a methodology that can be used across any industry, not just manufacturing and has various applications and approaches that can help solve many problems. It's completely process-oriented and if we look at everything that we do, we can ultimately break everything into a process. Through a defined methodology, we can apply logic and method to help us streamline and develop our own skills and that of our teams. This paper will look at the DMEDI (Define, Measure, Explore, Develop and Implement) approach and showcase practical examples of how to implement simple techniques to help your team gain soft skills and ultimately make you a better manager. With over 25 years of experience, CROS NT explains its approach to using DMEDI for statistical programmer's growth and development.

INTRODUCTION

Developing a team is hard and it can be difficult as a manager to find challenging ways of enhancing the skill-set of your team while everyone is busy working on projects. It's not always possible to work on initiatives or R&D projects so for the majority of development, it's on-the-job training and this is fine for the most part, however, it's imperative to not only enhance technical skills but also develop soft skills and business awareness all while doing the day to day project work.

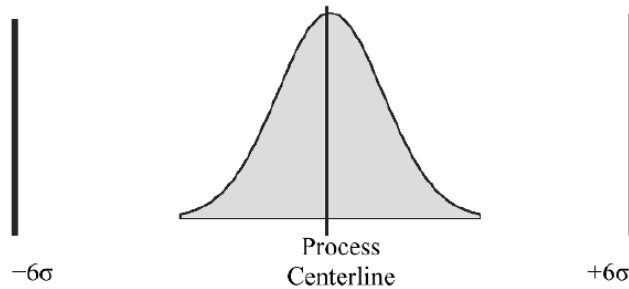
As a manager, you should really want to get the best from your team and allow your team to gain transferrable skills that will help them to not only be better at what they do, but also help them to grow into leadership roles if they choose that pathway. One approach that I have used for leading successful high-performing teams is to encourage Six Sigma tools within daily activities. Six Sigma is often overlooked in the clinical research industry and is thought to be mainly associated with manufacturing and industrial processing. Ultimately, it's a series of tools and techniques used to improve or create a process but it's also a shift in mindset that helps you to evaluate and look at things differently. It does not have to be something only a senior or principal level programmer can get involved in as there are many elements that can help even a junior programmer. You will not become a Six Sigma expert overnight, but the beauty is that you can add skills that you can actually see working as soon as you get started.

For this paper we will focus on the Six Sigma DMEDI (Define, Measure, Explore, Develop and Implement) approach to develop highly transferable skills and help to create a continuous improvement mindset within your team. Training your team using this approach, along with any other development and training program will only work if the mentor and the learner is dedicated, you can bring a horse to water, but you cannot make it learn Six Sigma!

A (SUPER QUICK) CRASH COURSE IN SIX SIGMA

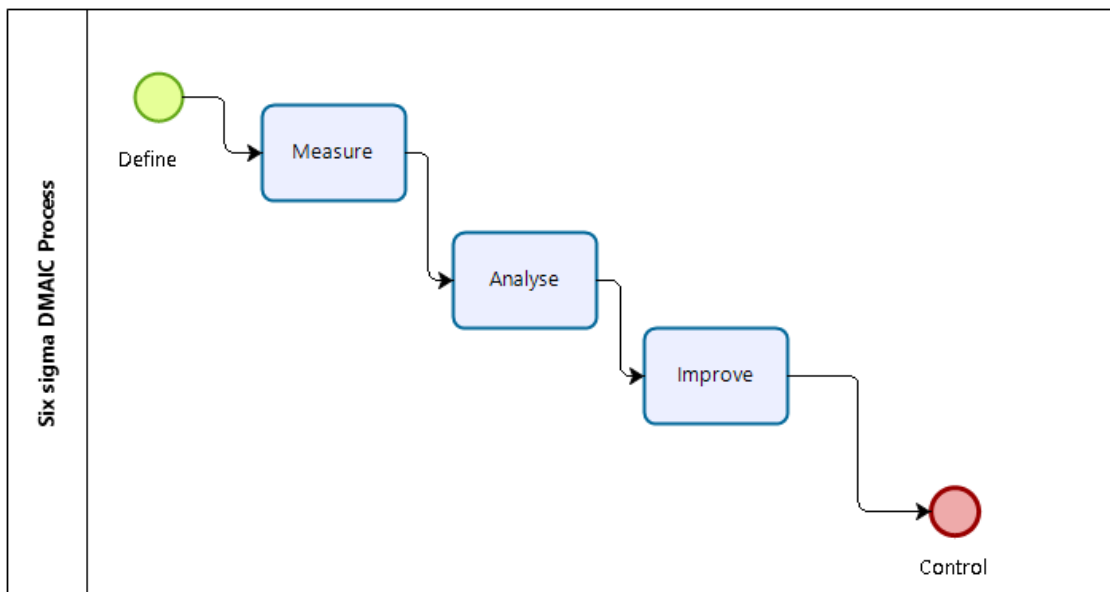
Six Sigma is a defined management framework that is a blend of statistics, project management, business, management and engineering. Its main purpose is to enhance process improvements, leveraging tools and standard techniques as a way to measure variance in a process and identify a solution to reduce this variance. Six Sigma began in 1986 at Motorola who trademarked and developed this concept to reduce variance in their electronics manufacturing process.

It is a statistical data-driven approach and methodology to eliminate defects from a process with the aim of getting within six standard deviations between the mean and the nearest limit. Looking at a bell curve it would be the area under the curve where the probability of producing a defect is almost nil.



SIX SIGMA DMAIC

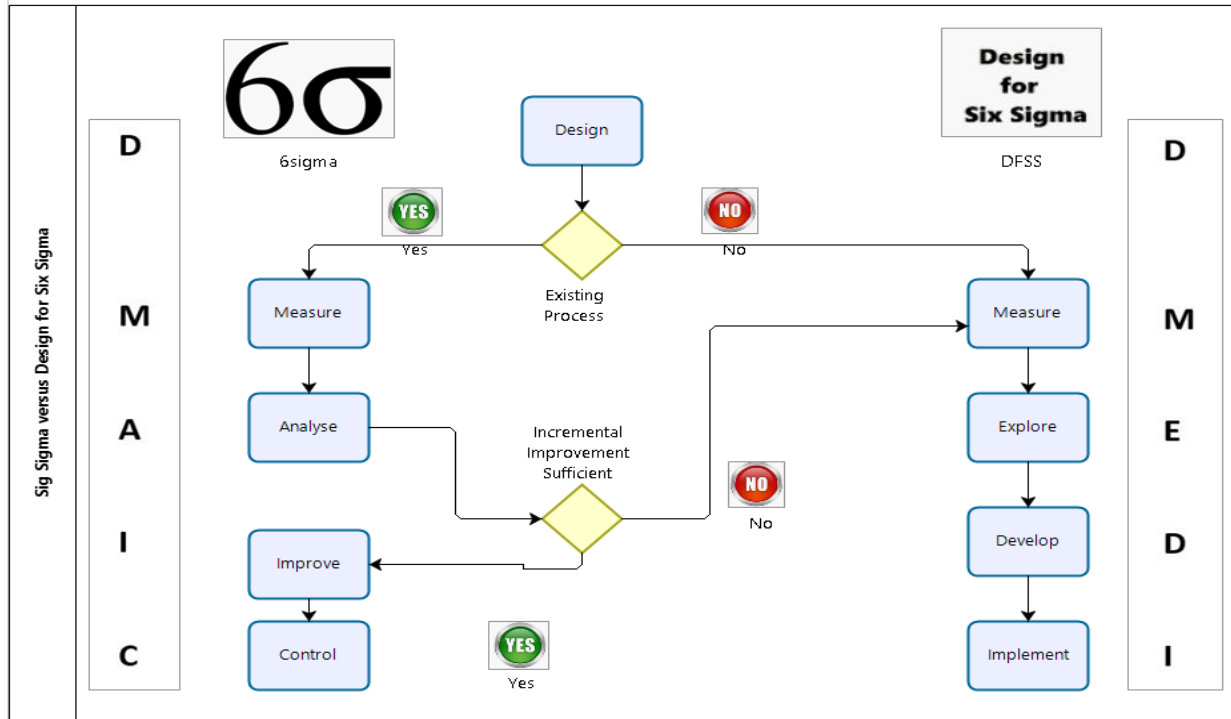
The typical Six sigma approach utilizes a DMAIC (Define, Measure, Analyse, Improve and Control) methodology which is heavily data-driven and statistical in nature. It is used when a product or process already exists but is currently under-performing or needs to be improved. This is primarily used in manufacturing and where there are highly automated processes that can be easily measured. This approach is highly effective and can be used anywhere a current process needs to be improved, for example, at CROS NT, we utilized this approach to decrease the processing time of our standard table macros.



Created using Bizagi © Modeler 3.3.2.033

DESIGN FOR SIX SIGMA

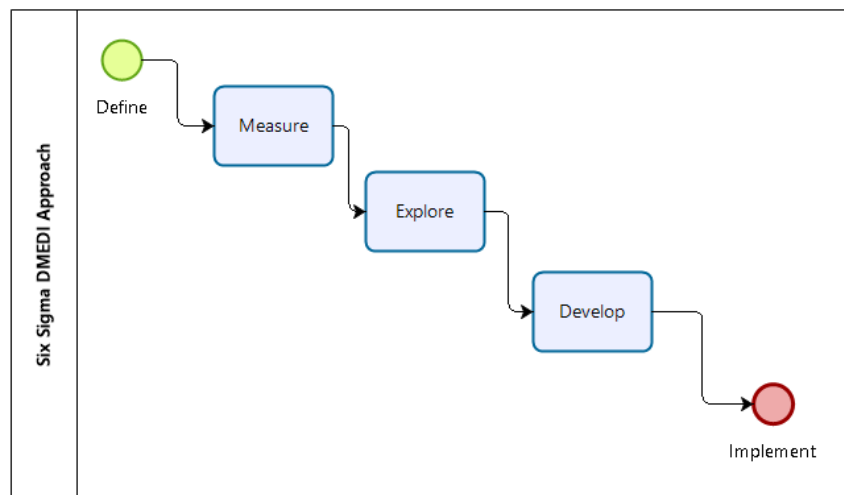
A less rigid and more innovative way of using Six Sigma would be to use a DFSS (Design for Six Sigma) approach. Unlike DMAIC, DFSS is used when designing a new product or process and can be adapted more to what you need as it's an approach more than a methodology. There are multiple variations of this model and it shares some of the same steps as the DMAIC model, however, it can be adapted easily to fit your purpose. DFSS is an approach that has quantifiable data and proven design tools that allow a proactive approach to designing a new process/service. We will focus on DMEDI methodology for the purpose of this paper and there is a link to additional material in the recommended reading section. The below flowchart can be used to decide if a traditional DMAIC or a DFSS approach is best for your process /service.



Created using Bizagi © Modeler 3.3.2.033

DESIGN FOR SIX SIGMA DMEDI APPROACH

DMEDI is a five-step process that uses a DFSS approach to break down and build new processes based on the analysis of needs and preferences. As this is less rigid than DMAIC, it is more suitable to Clinical Statistical Programming as we rarely have anything that is truly automated and there is a lot of customization in everything that we do. We will focus on these five steps: Define, Measure, Explore, Develop and Implement. It's all about the end customer and designing exactly what they are looking for and providing the best customer experience.



Created using Bizagi © Modeler 3.3.2.033

HOW CAN SIX SIGMA HELP A TEAM?

Each phase of the DMEDI process has standardized tools and techniques that can be used across any industry. Having a knowledge of how to use these and some practical experience will help you to understand the concepts and start changing the way we look at problems. You probably already approach problems using elements of Six Sigma without even realizing it but when you put it all together, it becomes a powerful tool in creating leaner processes. There are many training courses in Six Sigma and a number of these are short courses that introduce the concepts but there is nothing like getting your hands dirty and delving right in, start using the tools, understand the techniques and watch as your knowledge grows in business, analytical and quality direction.

If you can get your team involved with learning and applying the methodologies of Six Sigma, this can have an incredible impact on business understanding and analytical abilities for the individual. Factor in the intrinsic motivational benefits, job enrichment and empowerment that this role expansion provides, and you have a recipe for success. As a manager you also reap the benefits of the team thinking differently and looking for ways to continually improve current processes and thinking with a leaner mindset. Six Sigma can also prepare your team for leadership roles as there are elements of driving initiatives, quantifying financial benefits and being accountable for quality. The skills learned are somewhat standardized so are highly transferrable to other roles. It's a win-win situation for your company, for you as a manager and your team members.

WHY THIS WOULD WORK FOR STATISTICAL PROGRAMMERS

Working within Statistical Programming is a unique environment, traditional pathways of learning may not be of keen interest or relevance to true growth. How many Statistical Programmers do you know that will jump at a chance to do another training on communication styles? Not to generalize but, Statistical Programmers are technically focused, we like working with data, we like statistics and we like a certain methodical and structured element to everything that we do, even learning. In the end, we like to see results and fast.

As your team progresses through their careers, there will also be more requirement to understand the business aspects of their roles and seeing the bigger picture. When you put this all together, it's a lot of different directions to gain skills in and it can be difficult to focus on the right ones. With this in mind, it can be challenging to find something that fits the bill, we need a methodology that will challenge and drive personal growth that encompasses statistically technical competencies, soft skill elements and business acumen and all while doing a great job. Six Sigma may have some answers.

A PRACTICAL EXAMPLE OF DFSS DMEDI IN ACTION

Do a search for Six Sigma and you will soon be overwhelmed with millions of hits, there is a lot of information out there and no wonder, this methodology has been around since the '80s. It can be difficult to know where to begin but using a simple practical example we will look at the process to get you started on your Design for Six Sigma journey (DFSS) and explain how these techniques can enhance your teams' skills.

First things first, let's find a product/service or a process you want to create or completely re-design.

Now that your head has a million ideas about what needs to be created, we need to condense this into something more manageable. We cannot create everything at once so think about which one would add most value right now. Forget the rest, there are plenty of other days to do this all over again.

Let's begin by defining the product/service or process that we want to achieve. For the purpose of this paper we will use a recent example at CROS NT to help solidify understanding. We will reference a number of different Six Sigma tools and techniques, however, for the scope of this paper will not detail them all individually. There is a table showcasing some of the more popular tools with additional details and in the reference section there is a link in the recommended reading section to the American Society of Quality where more information on specific tools can be obtained.

Project Aim: To develop a new service to create data visualization drill-down reporting
--

DEFINE PHASE

Phase	Description
Define	Define the purpose, structure, goals and the value to the team/company. What are the benefits/challenges/risks?

Our first step was to define the scope of the data visualization project, write down all the information that we had and where we wanted to get to. We needed to think about what documentation would help us to reach our goals as correct planning and documentation at the start of a project dramatically reduces the chances of things going wrong and at least when they do go wrong, you have mechanisms in place to deal with it. We defined what the project should involve, a very high-level process of potential inputs and outputs and how we would communicate internally and with the customers

Using some of the following tools helped us to define the scope of the project and how we expected to handle challenges, it also ensured that everyone was on the same page:

Phase	Example Tools/Techniques Used
Define	• Project Charter • Suppliers, Inputs, Process, Outputs, Customer (SIPOC) • Communication Plan

Encouraging the team to try out and develop these techniques and tools allowed for growth in some of the following skills:

Tools/Techniques Used	Skills Gained
Project Charter	• How to draft a project plan and think about the connected elements from different sources, therefore creating a broader understanding of the bigger picture. • Overview of the project not just from a technical perspective but also the business element • Exposure to how project success is measured (objectives/metrics)
Suppliers, Inputs, Process, Outputs, Customer (SIPOC)	• Help the team define a complex project that is not well scoped from a customer perspective • Grasp the concept of all elements involved in a process
Communication Plan	• Thinking about the project from all possible team members perspectives and how these would all work together and communicate effectively • Define solid approaches to document communication and action items • Learn about escalation pathways and resolving roadblocks

MEASURE PHASE

Phase	Description
Measure	Gather the needs of the customer/project and how these can be measured

Our next step was to focus on the needs of the customer and translating them into something measurable. We wanted to make sure that our service and end data visualization product excited the customer. We needed to consider if what we were proposing had everything that they needed and also what they might want?

Needs and wants are essential to define as clients will usually want everything but only need the bare essentials. As we did not already have an end process/service in place this step was critical to ensure that the project was doing the right thing for the end result. Using some of the following tools helped us to gather customer requirements, the moral of the story here is, if you do not know what the end result or service should be, find out, ask the right questions and listen to the customer.

Phase	Example Tools/Techniques Used
Measure	• Voice of the Customer (VOC) • Voice of the Business (VOB) • Critical Customer Requirements (CCR) • Kano Model

We spoke with the customers and asked them what they wanted to do with the data and how they wanted to visualize it, we delved into this to understand what we needed to implement in order to meet their requirements. It was also important to assess if this project would be business viable and had stakeholder backing. With the team involved in gathering customer requirements, this helped enhance the following:

Tools/Techniques Used	Skills Gained
Voice of the Customer (VOC)	• Objective thinking about customer requirements • Client interactions skills • Foundation in relationship building
Voice of the Business (VOB)	• Exposure to financial implications • Strategic elements as to what is important to CROS NT from a project perspective
Critical Customer Requirements (CCR)	• Identify the four areas relating to customer satisfaction • Develop skills in asking the right questions • Negotiation of wants versus needs for a customer
Kano Model	• Create a customer-centric approach to projects/services • Develop psychology related technique to meet customer requirements

EXPLORE PHASE

Phase	Description
Explore	Explore a conceptual design of your new process/service

Next, we conceptualized and investigated our different options available and we explored an approach alongside a potential process. Nothing was created at this time apart from laying out our options. Using some of the following tools helped us to map out a new process or to come up with some new ideas on how to visualize data:

Phase	Example Tools/Techniques Used
Explore	• Brainstorming • Affinity Diagram • Pareto Chart • Pugh Matrix

Once we had some options in place, we were able to make an informed decision about how to proceed. Using the tools/techniques allowed the team to grow in the following areas:

Tools/Techniques Used	Skills Gained
Brainstorming	• Conducting meetings and establishing ground rules • Leadership skills in driving ideas and collaboration
Affinity Diagram	• Techniques for clustering ideas into tangible results • Decision making
Pareto Chart	• Critical thinking for evaluating factors • Excel skills

Tools/Techniques Used	Skills Gained
Pugh Matrix	- Leadership and decision making - Increased customer understanding

DEVELOP PHASE

Phase	Description
Develop	Develop a detailed plan on how you are going to organize and implement this process/service at its optimal state.

We needed to decide how we would action this project and how we were going to develop this data visualization tool into something that the client actually wants. Using some of the following tools helped us to develop some ideas, ensuring that the customer requirements were considered and met.

Phase	Example Tools/Techniques Used
Develop	- Design of Experiments - Failure Mode and Effects Analysis (FMEA) - Risk Assessment/Management Plan

As the team were heavily involved in this area, they gained knowledge of the following:

Tools/Techniques Used	Skills Gained
Design of Experiments	- Cause and effect concepts - Optimization techniques
Failure Mode and Effects Analysis (FMEA)	- Considering possible failures and mitigating risk - Excel skills
Risk Assessment/Management Plan	- Critical thinking regarding project risks - Effects on the business/customer

IMPLEMENT PHASE

Phase	Description
Implement	Implement the process/service, validate the design and establish controls

The last step was to implement the project design and the data visualization tool we have come up with

Phase	Example Tools/Techniques Used
Implement	- Pilot - Control Plan - Design Scorecard

Once your process/service has been designed and set up, then you can use a DMAIC approach to continually improve it. At the end phase of the project, the team learned the following:

Tools/Techniques Used	Skills Gained
Pilot	- Confidence of leading the project - Customer relationship building

Tools/Techniques Used	Skills Gained
Control Plan	- Awareness of quality standards - Metrics and KPI's
Design Scorecard	- Evaluate design performance - Optimize future performance of a service

HOW CAN I GET MY TEAM INVOLVED?

There are hundreds of tools and techniques for implementing DMAIC or DMEDI that can be transferrable to other aspects of the business and there is usually something for every occasion. I started learning Six Sigma in 2014 and I still learn something new every time I read an article, book or journal on the subject. Your team can start learning at any level and the below tables show some of the techniques and advantages for learners at every level. They can build on these skills and use them to be more effective at what they do best.

JUNIOR LEVEL PROGRAMMERS

Tool/Technique	What is it used for?	Description	Benefit
Kanban	Time Management	- Visual representation of daily tasks - Allows to gain skills in prioritization	Ability to manage time effectively and take ownership of tasks
5 Whys Strategy	Root Cause analysis of a problem	- Helps identify root cause of a problem - Changes mindset in analyzing problems	Empower objective thinking in resolving issues in an effective manner
Flow Chart	Define a process visually	- Allows for a complete understanding of a process - Creates a what is the next step mindset	Simplify and encourage a deeper understanding of processes
Brainstorming	Idea Gathering	Generates a large volume of creative ideas in a short period of time	Build leadership skills and experience of coordinating others

MID/SENIOR LEVEL PROGRAMMERS

Tool/Technique	What is it used for?	Description	Benefit
Ishikawa Fishbone diagram	Root Cause analysis of a problem	- Helps identify root cause of a problem - Useful when a team's thinking is in a rut	Understanding of cause and effect
Pareto Chart	Identify issues on an 80/20 rule - 20% of issues cause 80% of the problems	- Helps focus on the most significant issues that will add value - Helps communicate results to others	Learn what adds the most value using the 80:20 rule
Poke Yoke	Mistake Proofing	- Changing a process to avoid human error - Process driven approach and thinking	Ensuring issues are mitigated sufficiently so the likelihood of them happening is dramatically reduced
Gantt Charts	Defines timelines and next steps with dependencies	- Allows for bigger thinking on a project - Better scheduling	Overview of projects and identifying dependencies

Tool/Technique	What is it used for?	Description	Benefit
Voice of the Customer (VOC)	Gather Customer Requirements	- Find out what a customer actually wants - Learn to ask the right questions	Enhancing a customer focused mindset and relationship building
Kano model	Gather Customer Requirements	- Useful to translate customer needs into manageable tasks - Creates a thorough understanding of requirements	Creates an understanding of true customer requirements
Design Scorecard	Used to document the current status of the project/service critical to quality elements	- Helps to ensure the project/service is meeting customer expectations - Changes mindset to focus on the customer	Determines if the process is working and the client is happy
Control Plan	For monitoring repetitive tasks	- Statistically based evidence ensuring a process is working properly - Create awareness of metrics, controls and out of bounds results	Statistically based results about a process that can be shared with senior management, your team or the customer
Communication Plan	Defines how communication will occur on a project	- Sets expectations on communication within a project - Defines roles and responsibilities and creates awareness of other departments	Enhanced communication internally and with customers

PRINCIPAL LEVEL PROGRAMMERS

Tool/Technique	What is it used for?	Description	Benefit
FMEA Analysis	Identify all possible failures in a design, process or service	- Allows the associate to think about possible risks - Gathers a complete understanding of current process/service	A risk approach mindset being developed within the team
Project charter	Define a project scope and requirements	- Multiple elements involved in collecting and designing a project flow - Business acumen and understanding	Clear expectations of roles and responsibilities for a more streamlined project
Voice of the Business (VOB)	Defines stated and unstated needs of the business	- Ensures project/service meets business needs - Business acumen and understanding - Creates business financial awareness	Stakeholder engagement
Risk Assessment /Management Plan	Defines how risks are identified and mitigated	- Create a risk-based approach mindset to projects - Allows the user to think about the process in a different way	Mitigate risks as much as possible

Tool/Technique	What is it used for?	Description	Benefit
Design of Experiments	Determines cause and effects relationships	- Statistical method of determining effects on input/outputs of a process - Changes mindset of processes	Creates a goal of wanting a more optimized process and continually improving
Pugh Matrix	Facilitates concept generation and selection	- Team leadership skills required - Develops leadership skills and decision making	Decision making and critical thinking development
SIPOC	Tool that summarizes inputs and outputs of a process	- Gives a full overview of a process before work begins - Creates a high-level process mapping	Thorough understanding of external elements in a process
Affinity diagram	Organizes a large number of ideas into their natural relationships	- Turns brainstorming chaos into actionable items - Develops leadership skills and decision making	Organizational skills and decision making

CONCLUSION

By challenging your team to learn new ways of doing things, you can build their expertise and also make it relevant for a high-performing team. You can create a mindset of continual improvement and allow people to grow their own skills and all while doing the best job that they can. Six Sigma is not only relevant to so many aspects of the business that we are in but it's also interesting to those of us looking for a statistically based approach to doing things better.

RECOMMENDED READING

Quality tools for Six Sigma with explanations from ASQ

<https://asq.org/quality-resources/quality-tools>

Design for Six sigma Overview

<https://www.isixsigma.com/new-to-six-sigma/design-six-sigma-dfss-versus-dmaic/>

Keller, Paul (2011) Six Sigma Demystified, McGraw Hill

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Caroline Gray
CROS NT
Fairbourne Drive, Atterbury Lakes
Milton Keynes, MK10 9RG, United Kingdom
Work Phone: +44 1908 488 787
Fax: +39 045 820 58 75
Email: caroline.gray@crosnt.com
Web: <https://www.crosnt.com>

Brand and product names are trademarks of their respective companies.

® indicates USA registration.