



# Why do we need DFSS ?

We need design methodologies like DFSS because we live in a complex world; new products and processes have many opportunities to ‘go wrong’.

If they go wrong, then DMAICT is needed to fix them – or a complete re-design becomes necessary.

This is too late and too costly.

DFSS provides a systematic **proactive** approach to design which is backed up with **quantitative** predictive design tools which lead to **quantitative confidence** in the performance of the new process or product prior to implementation.

## **For examples of new system (product/process) failures look around you . . .**

**Are you happy with the service you receive from your bank or goods suppliers?**

**Do you think that they have good customer-oriented systems in place?**

**Are you happy with your washing machine or cooker?**

**Do you find them easy to use, with good performance and reliability?**

**Do you find yourself frustrated by things which 'ought to work' but are clearly 'not fit for purpose' or things that you need 3 hands to use?**

A number of high profile new IT system failures in the public sector have been well-documented by the media – millions of pounds spent on new computer systems which subsequently do not fulfil customer requirements.

There is no reason to believe that new process/system implementations are any better in the private sector either.

New cars have been re-called by manufacturers for safety concerns.

There are lots of other examples of things which don't work to the satisfaction of their users when implemented from new.

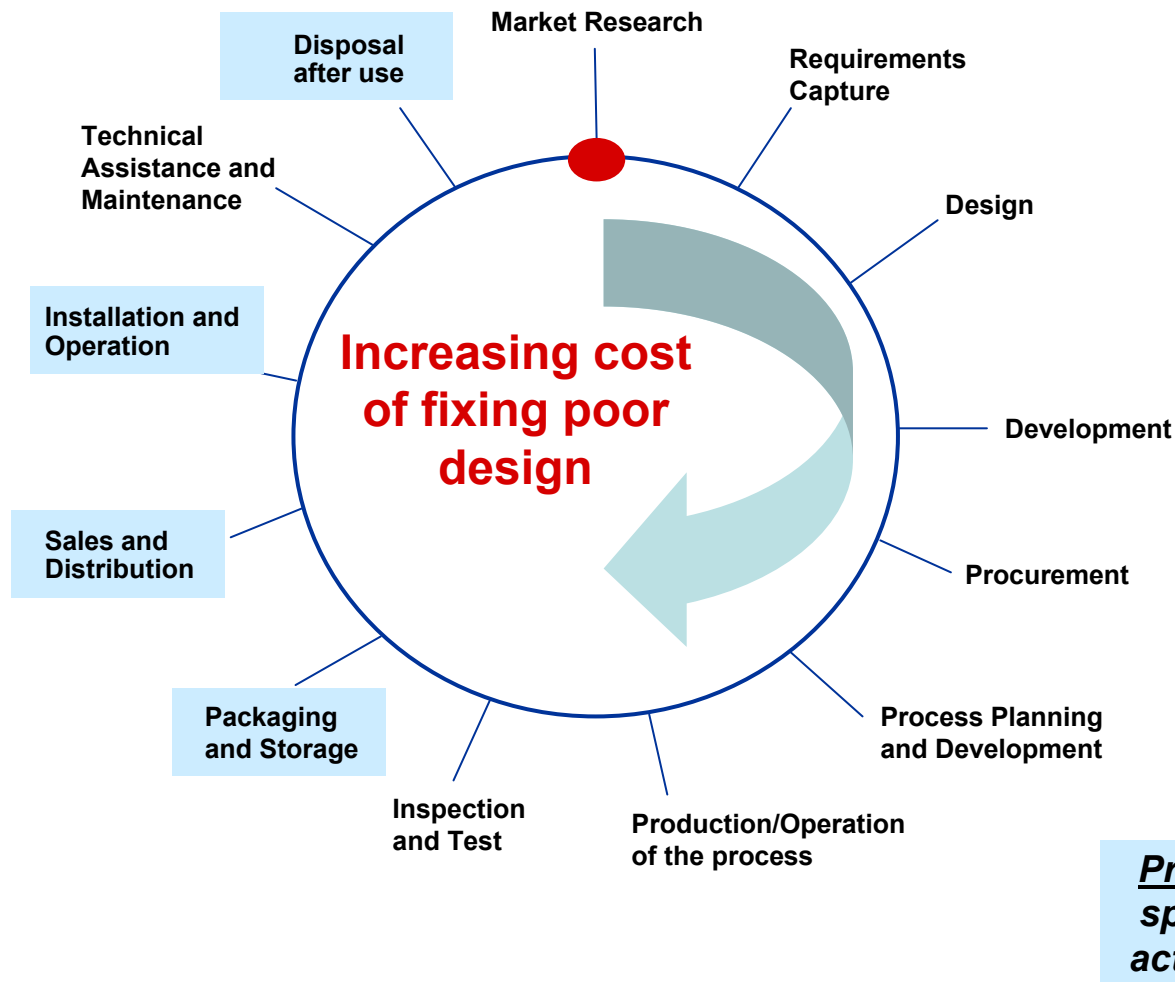
## Why the difficulty?

New process/system design requires:

- a lot of thought and careful planning **up front**.
- careful and comprehensive attention to customer needs.
- that customer needs are 'flowed down' (integrated) into the design and that this has been **verified** to be the case **prior** to implementation.

**This is what DFSS helps you to do !**

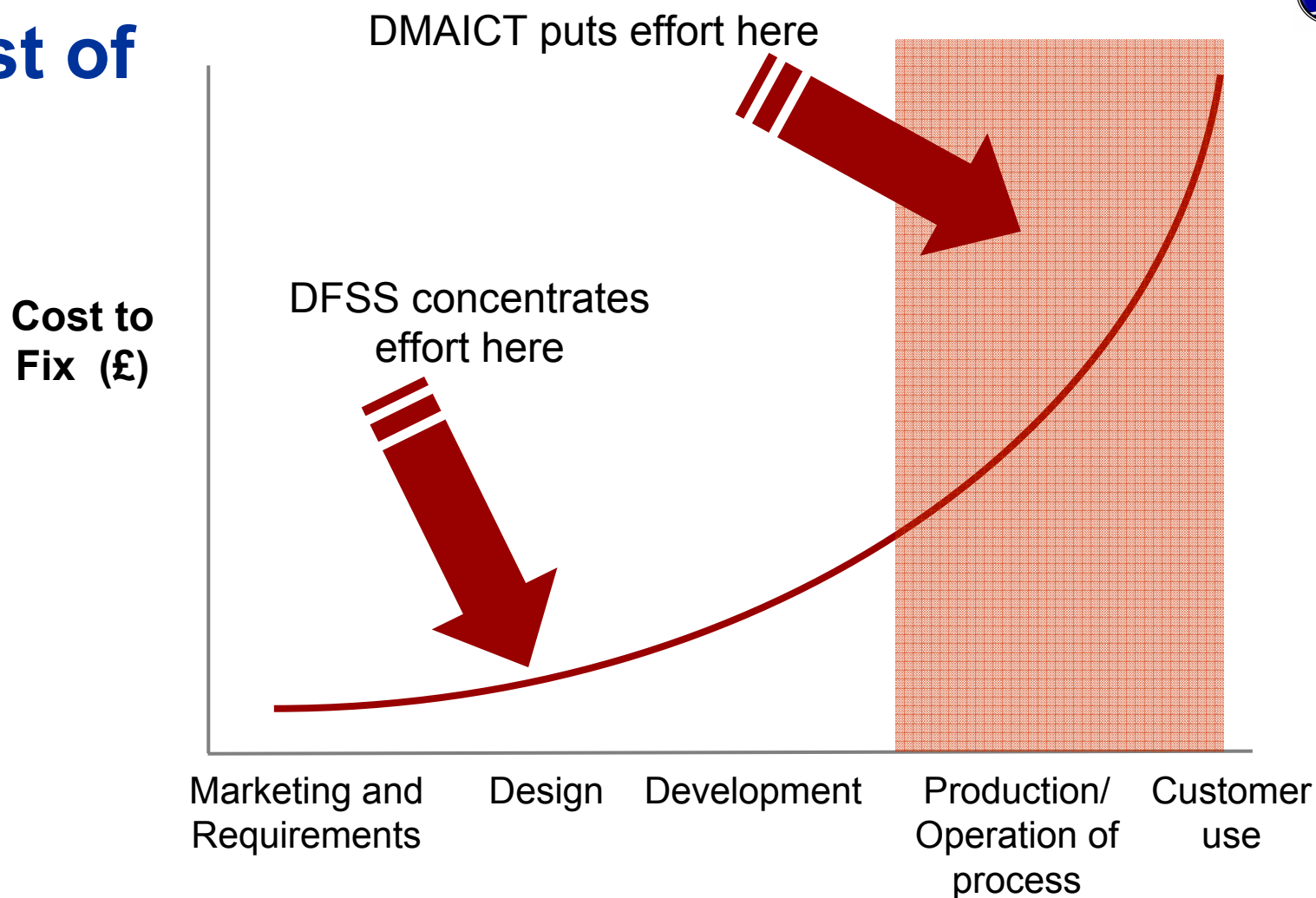
# Getting it right – designing for the product/process life cycle



- Errors if left undetected will be built upon in subsequent activities – potentially making them harder to find and more costly to fix.
- DFSS focuses on doing more work up front but involving every function with a stake in the life cycle to ensure that the design captures and delivers all requirements.

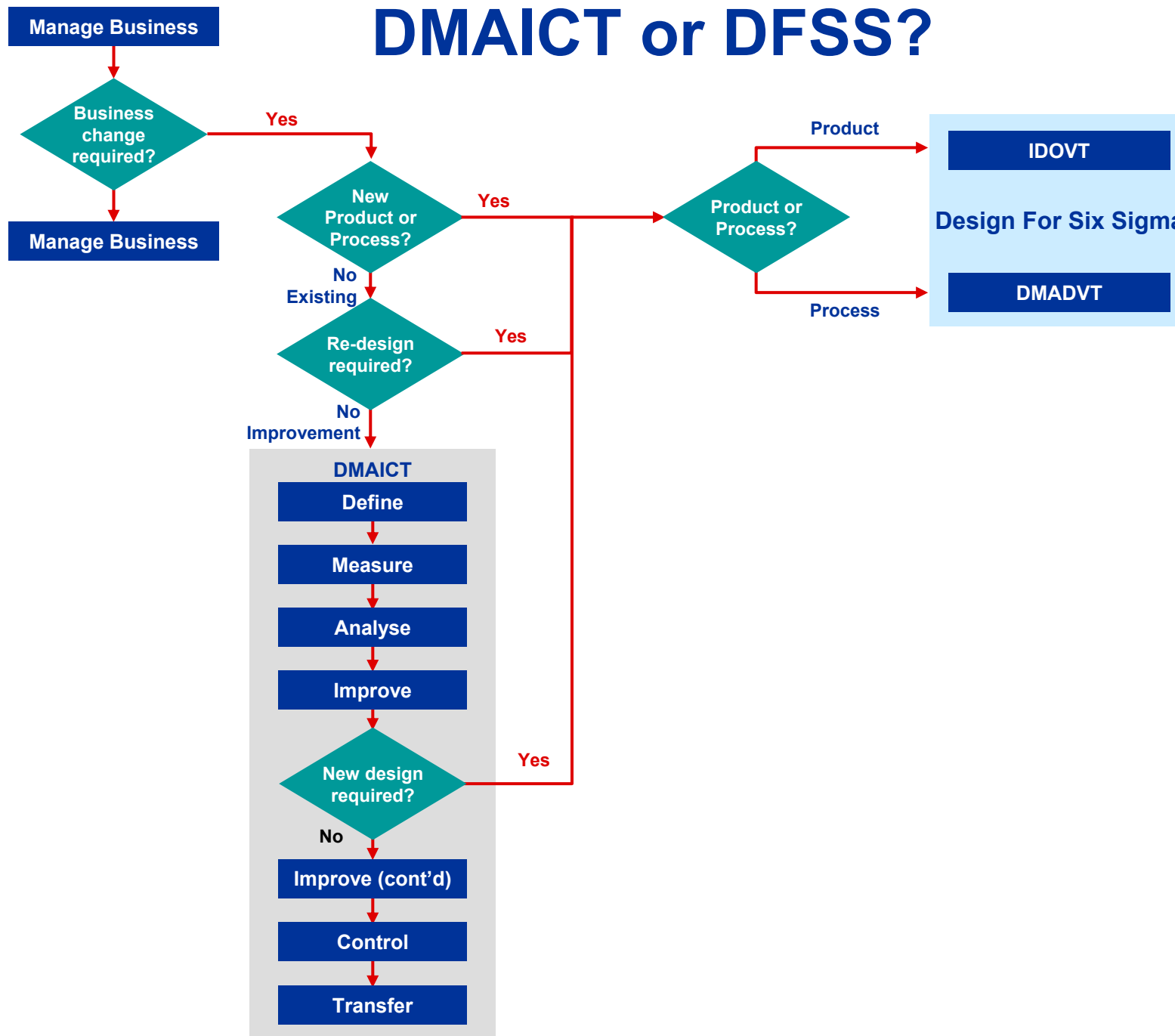
# How does DFSS fit with DMAICT Six Sigma ?

# The Cost of Errors

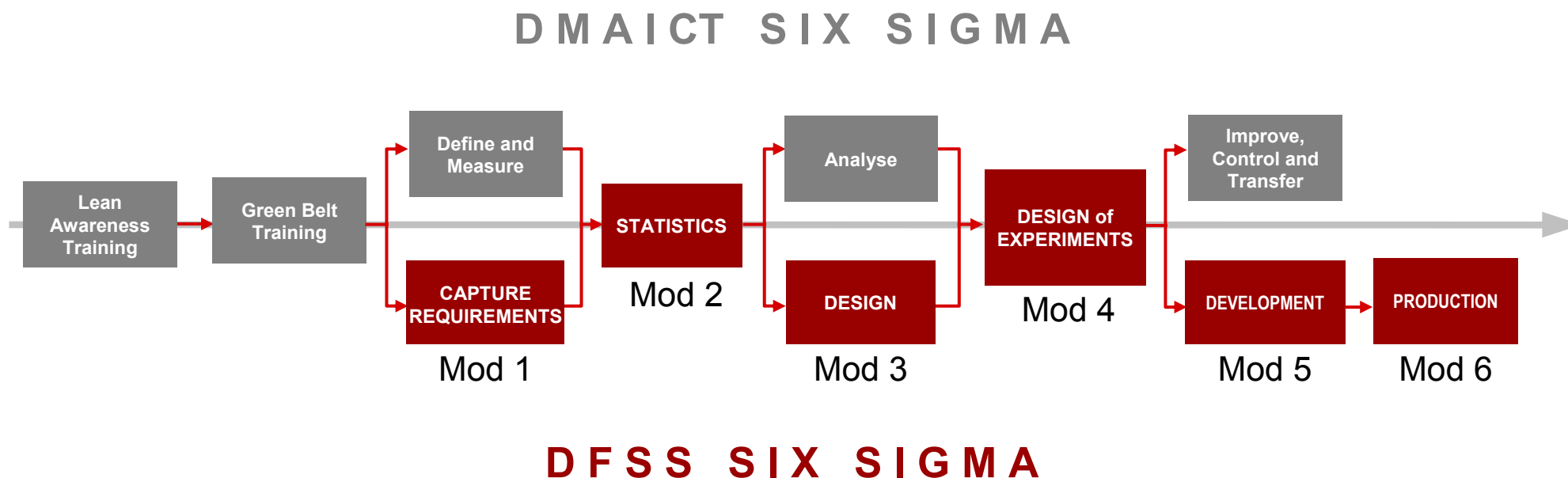


<b>Problems are:</b>	Difficult to see and predict	→	Easy to see
	Easy to fix	→	Difficult and costly to fix

# DMAICT or DFSS?



# Integrated Six Sigma and DFSS Training Programme

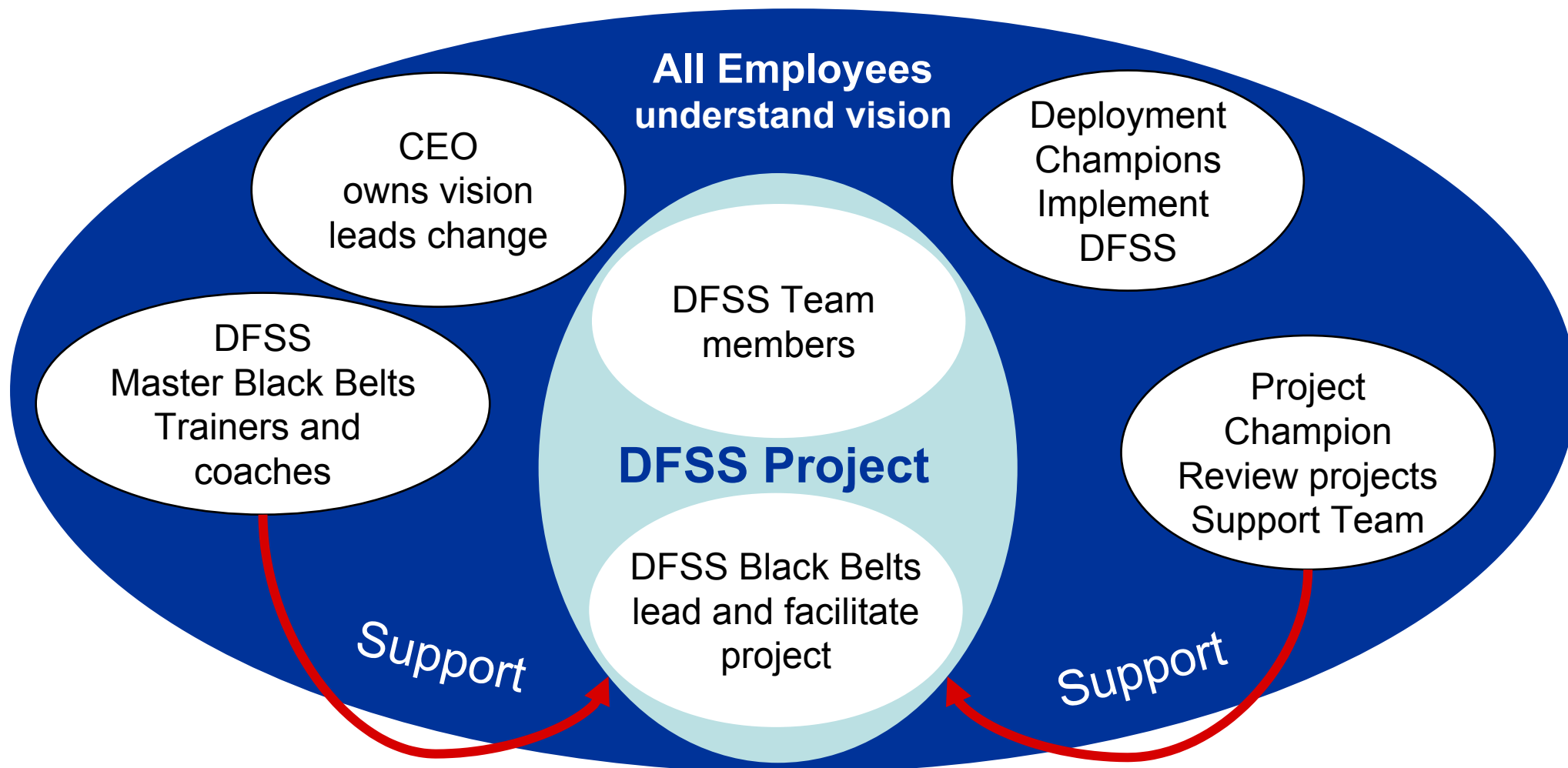


**This is an example of integrated Six Sigma/DFSS training programme that was tailored to suit a specific customer need – we can also customise a programme to suit your requirements.**

# Who does it? – The DFSS Roles

DFSS deployment is supported by a number of roles, which are entirely analogous with DMAICT Six Sigma.

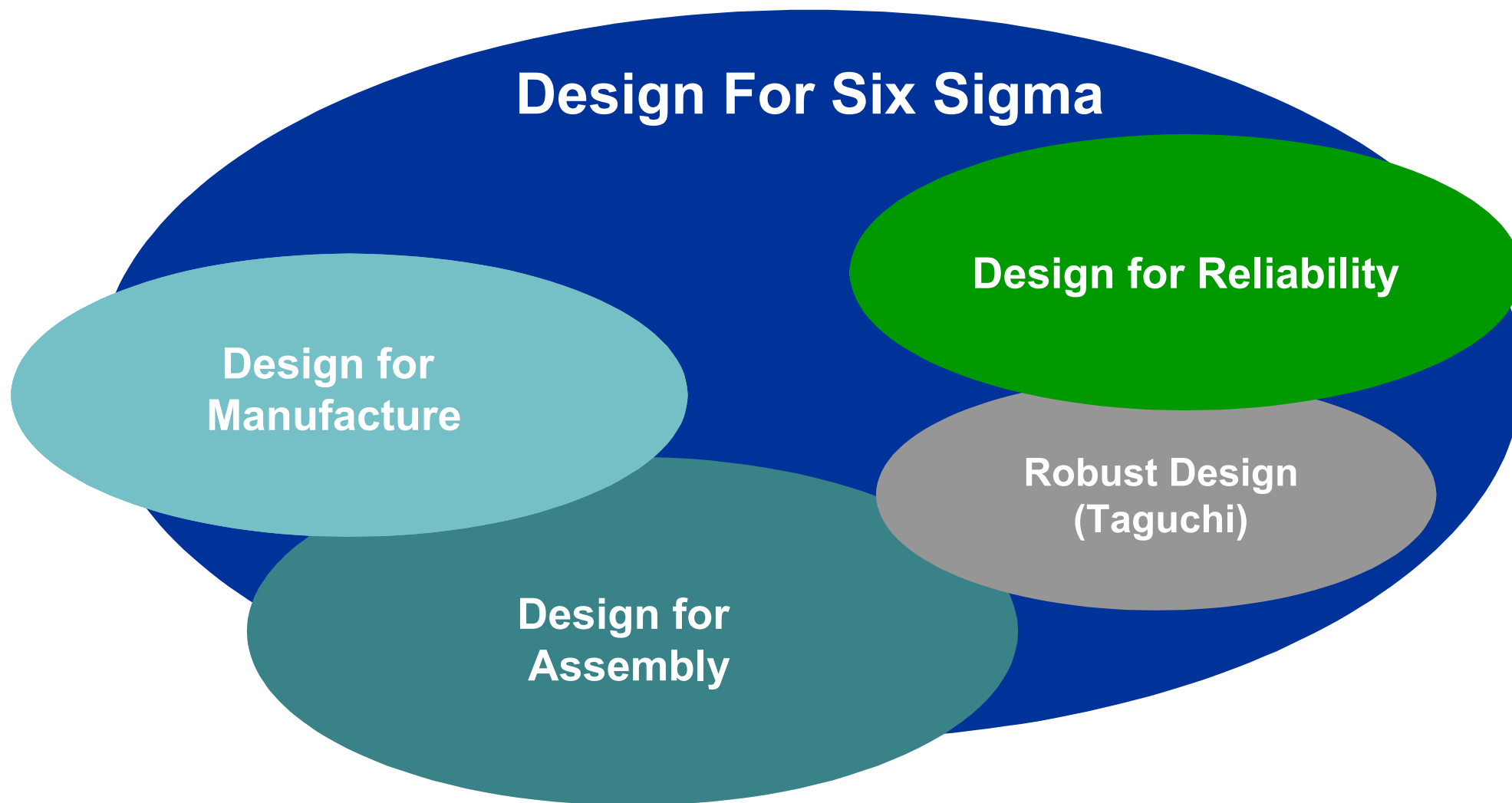
The skill sets and people involved are different, however.





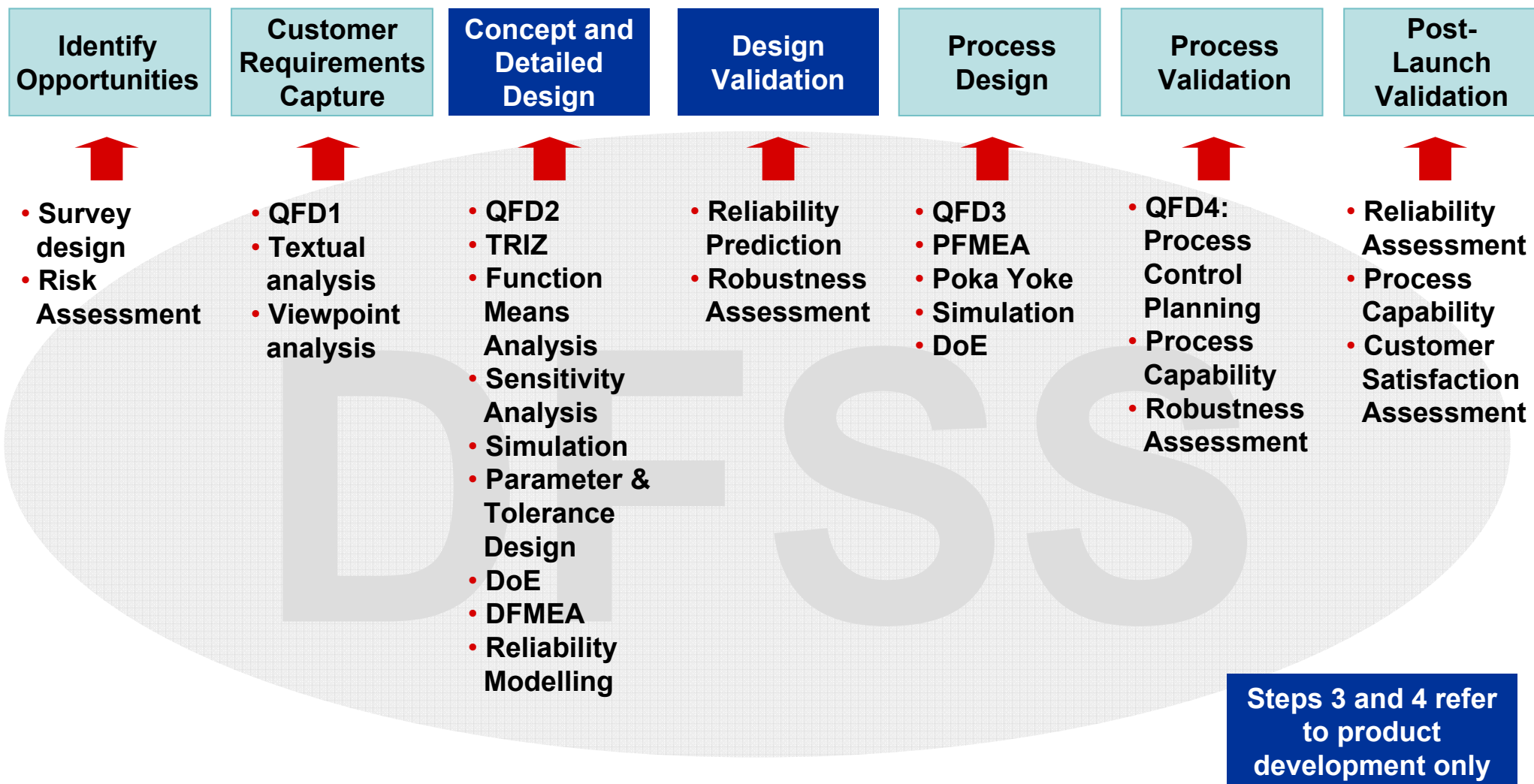
# How does DFSS fit with other design methodologies ?

# DFSS encompasses many other “Design” Approaches



# DFSS works within the new product/process design infrastructure to produce a quality outcome

## Generic New Product/Process Development Framework





# DFSS for Product Design (IDOVT) & Transactional Processes (DMADV)

# DFSS Methodologies

Unlike the DMAICT methodology, the phases of DFSS have not been standardised since different organisations will define the phases and their outcomes to suit their needs.

The Six Sigma Group can work with you to build a DFSS strategy to meet your needs, whether you are using software simulation models or physical hardware to develop your designs.

The following pages illustrate the phases of two of the more common approaches to DFSS; IDOVT and DMADV.

(It is less common to see a 'T' (Transfer) phase in the literature, but we strongly believe that benefits of DFSS are greatly enhanced by re-use of information generated during a DFSS project in a formalised fashion.)

# DFSS for Products : IDOVT

- Identify** Identification and interpretation of the customers' requirements (Critical To Quality)
- Design** Generation and selection of appropriate concept designs to meet customer requirements.
- Optimise** Optimisation of design to achieve required performance and make it insensitive (Robust) to variation
- Validate** Validation of design solution to ensure the “ilities” – reliability, producibility, maintainability etc.
- Transfer** Transfer learning to future product designs



# DFSS for Processes : DMADV

- Define** Define the project and process to be designed.
- Measure** Measure customer requirements.
- Analyse** Analyse potential designs for robustness and ability to satisfy customer requirements.
- Design** Generate detailed design for chosen concept.
- Verify** Validate that process meets requirements.
- Transfer** Transfer learning to future process designs.



I	D	O	V	T
<b>Identify Customer Requirements</b>	<b>Design Concept</b>	<b>Optimise The Design</b>	<b>Validate Design Performance</b>	<b>Transfer Knowledge Gained</b>
Identify Customer CTQs	Generate Alternative Concepts	Develop Detailed Design Requirements	Confirm build matches predictions	Assess data for organisational learning
Obtain Competitive Benchmarks	Evaluate and Select Concepts	Generate Detailed Design Solutions	Undertake reliability growth	Update mfg capability databases
Agree Reliability Targets	Assure Solution meets Functionality	Assure Detailed Design meets CTQs	Validate manufacturing control plan	<b>Transfer Review</b>
Identify and Scope DFSS Projects	Define Sub-contractor requirements	Identify Trade-offs and conduct studies	Update Scorecards	Close the Project
Identify Functions	Build Scorecards	Develop Transfer Functions	<b>Validate Review</b>	
Assure functionality meets CTQs	Develop Transfer Functions	Predict detailed Design Performance		
Sensitivity and Risk Analysis	Identify Simulations and validation	Build and Test Prototypes		
<b>Identify Review</b>	Revise Concept	Update Scorecards		
	Risk Analysis	Risk Analysis		
	<b>Design Review</b>	<b>Optimise Review</b>		

D	M	A	D	V	T
<b>Define The Project</b>	<b>Measure Customer Requirements</b>	<b>Analyse Design Concepts</b>	<b>Design</b>	<b>Verify Design Performance</b>	<b>Transfer Knowledge Gained</b>
Define scope of Project	Identify Customer	Identify Functions	Develop Detailed Design Requirements	Conduct Pilot	Collect Project Data
Establish Project Goals	Assess Existing Data	Assure Functionality meets CTQs	Generate Detailed Design Solutions	Evaluate and Analyse Pilot Results	Assess data for Organisational Learning
Develop Project Plan	Determine VoC Strategy	Generate Alternative Concepts	Assure Detailed Design meets CTQs	Update Design	<b>Transfer Review</b>
Develop Organisational Change Plan	Collect Customer Data	Evaluate and select Concepts	Develop Transfer Functions	Implement the Design	Close the Project
Risk Analysis	Identify CTQs	Develop Transfer Functions	Predict Detailed Design Performance	Verify Performance	
<b>Define Review</b>	Prioritise CTQs	Predict Concept Performance	Determine Verification Activities	<b>Verify Review</b>	
	Risk Analysis	Revise Concept	Develop Process Management Plans		
	<b>Measure Review</b>	Risk Analysis	Plan for Pilot		
		<b>Analyse Review</b>	Risk Analysis		
			<b>Design Review</b>		



# Our experience in DFSS

# Why The Six Sigma Group for DFSS?

- **We have helped a number of companies deploy DFSS in sectors such as aerospace, automotive, telecoms and electronics**

Rolls-Royce  
Cooper Standard  
Bookham Technologies

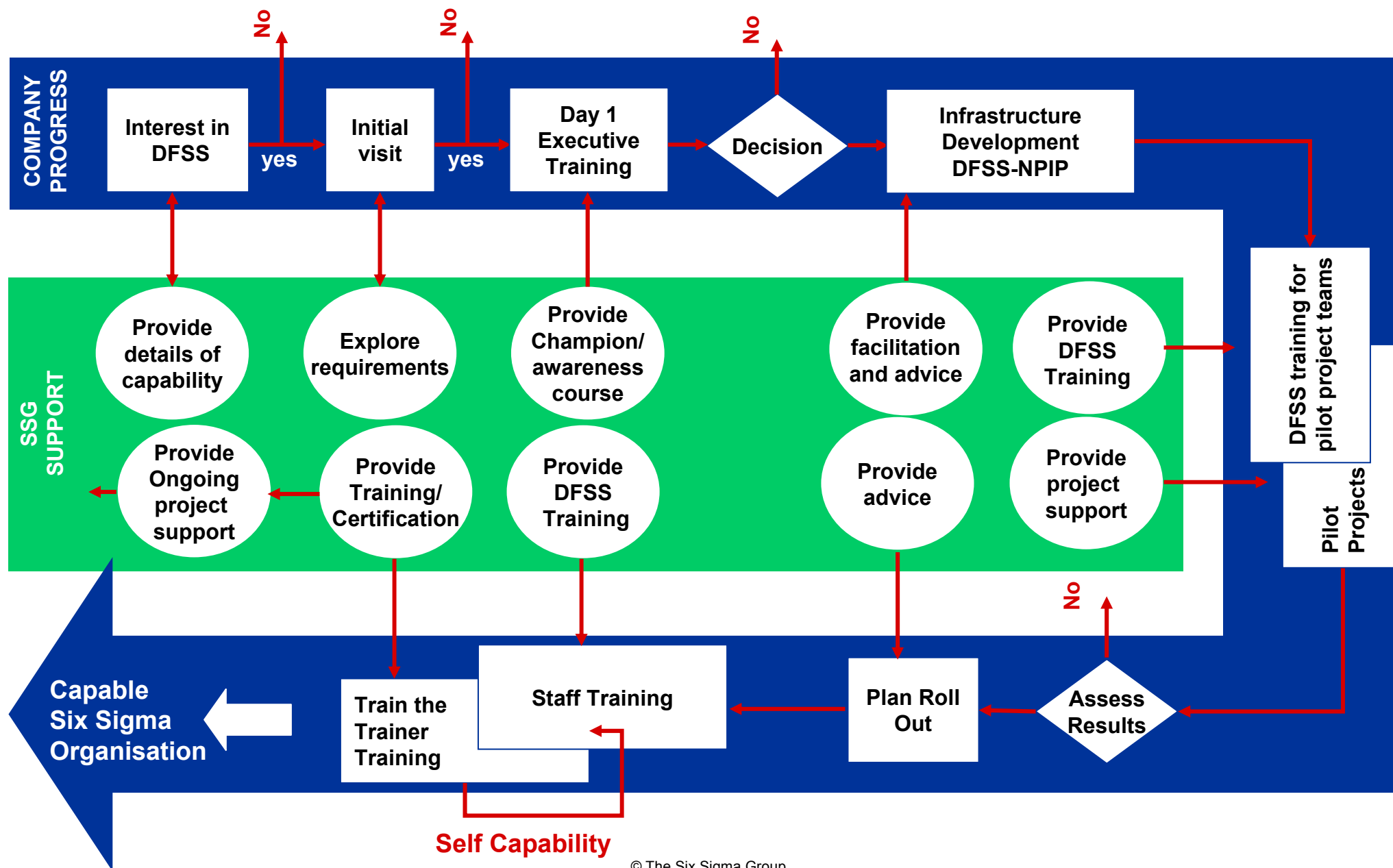
BAE Systems  
Marconi  
e2v

- **We have people who have “done it”.**
- **Our DFSS Support and Training has unique features and tools that come from our experience base.**



# What we can offer

# The Six Sigma Group Route to Implementing DFSS



# Six Sigma and DFSS Training Programmes

We offer a range of Six Sigma training programmes that can be tailored to suit your requirements, including:

- Six Sigma DMAICT training (Champion, Green Belt, Black Belt and Master Black Belt)
- Design for Six Sigma training (Champion, Black Belt, Master Black Belt)
- DMAICT and DFSS integrated training programmes as depicted below

