Engineering Management

EE470

Session 2

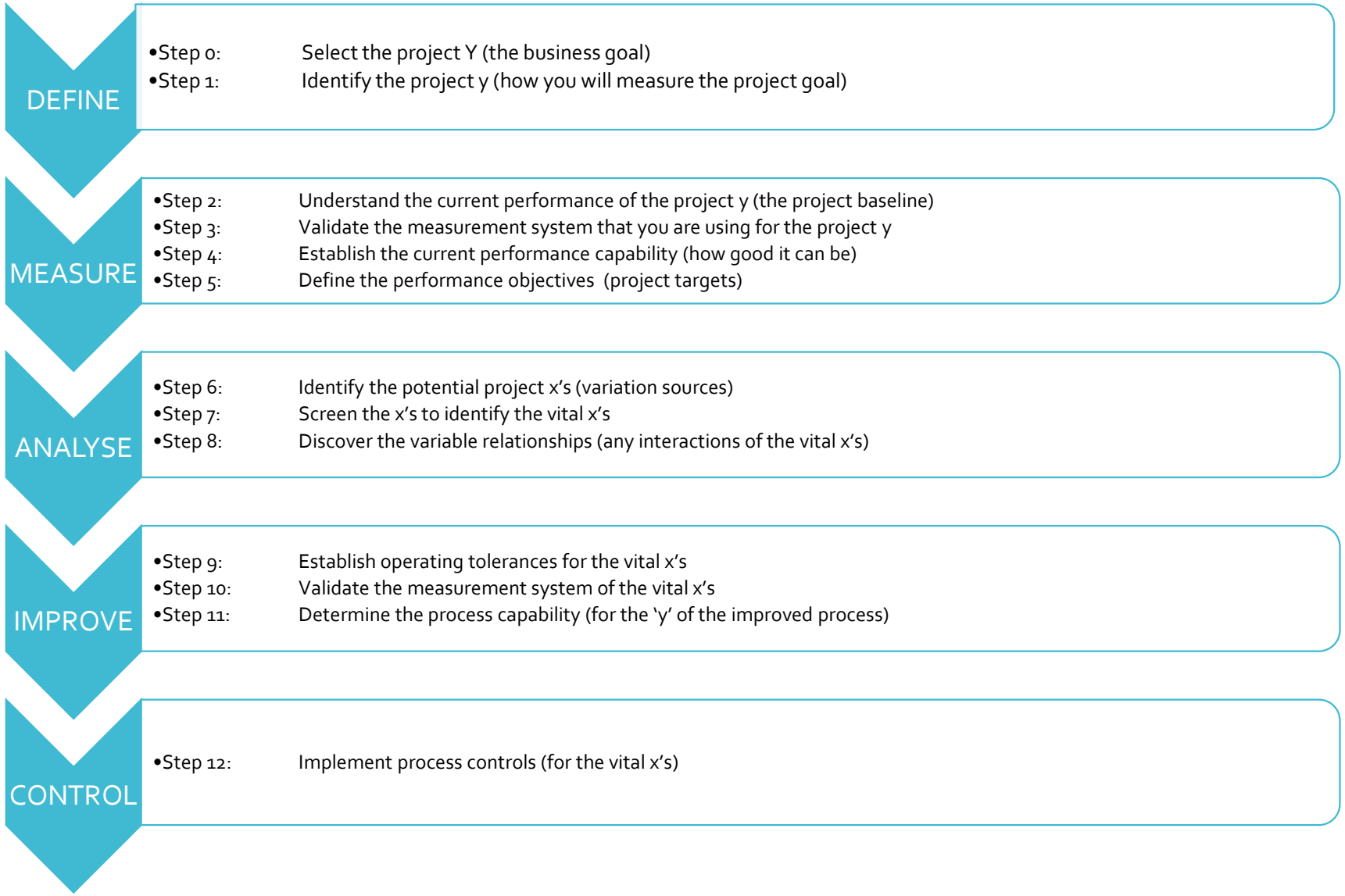
Course Layout (1-5)

Session	Theory	Tools	Case Studies	Project
1	Introduction: Module DMAIC CAP		Six Sigma at GE	Discussion on potential projects
2	DEFINE: Step 0 & 1 CAP: Leading Change	Project Charter Continuous Data GRPI	Stable Operations: "Free Chemical Plant"	Project Selection
3	MEASURE: Step 2 & 3 CAP: Creating Shared Need	GR&R Stakeholder Analysis	"Wing to Wing"	Review Step 0 & 1
4	MEASURE: Step 4 & 5 CAP: Shaping a Vision	Minitab	Revolving Credit	Review Step 2 & 3
5	ANALYSE: Step 6 & 7 & 8 CAP: Mobilising Commitment	Probability Plots ARMI	Absenteeism in Manufacturing Plant	Review Step 4 & 5

Course Layout (6-10)

Session	Theory	Tools	Case Studies	Project
6	IMPROVE: Step 9 & 10 & 11 CAP: Making Change Last Project Finance Project Ethics	ROI FMEA	Hakker Rollen	Review Step 6 & 7 & 8
7	CONTROL: Step 12 CAP: Monitoring Progress Presentation Skills	PowerPoint	TBC	Review Step 9 & 10 & 11
8	CAP: Changing Systems & Structures Organising for Success	GRPI	TBC	Review Step 12
9	Module Review			Final Project Review
10	Exam Preparation			

Six Sigma DMAIC 12 Steps

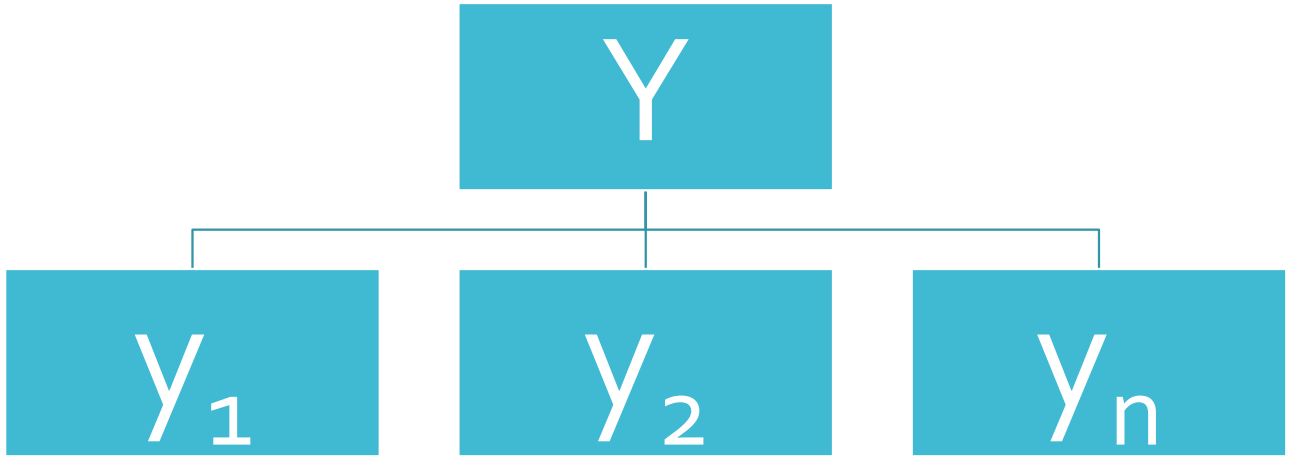


DEFINE

Step 0

Select the project Y (the business goal)

- Project flowdown



- *Exercise*

A robust data set

Characteristics of a good data set

- Continuous versus discrete
- Level of granularity
- Statistically significant size
- Availability of labels

Q: Examples of good data sets

Data collection methods

- Existing data sets
- Build new data set

DEFINE

Step 1

Identify the project y (how you will measure the project goal)

Unit of measure	e.g. KW/Hours
Time/sampling period	e.g. 1 per hour
Time period	e.g. over 1 year
Scope	Stokes Building

Tool:

GRPI

Goals:

Clearly articulate the project goal (the elevator speech)

Roles:

Define the project roles required for the fulfilment of the project goal (to the best of the current understanding)

Processes:

What processes will be used to deliver this project

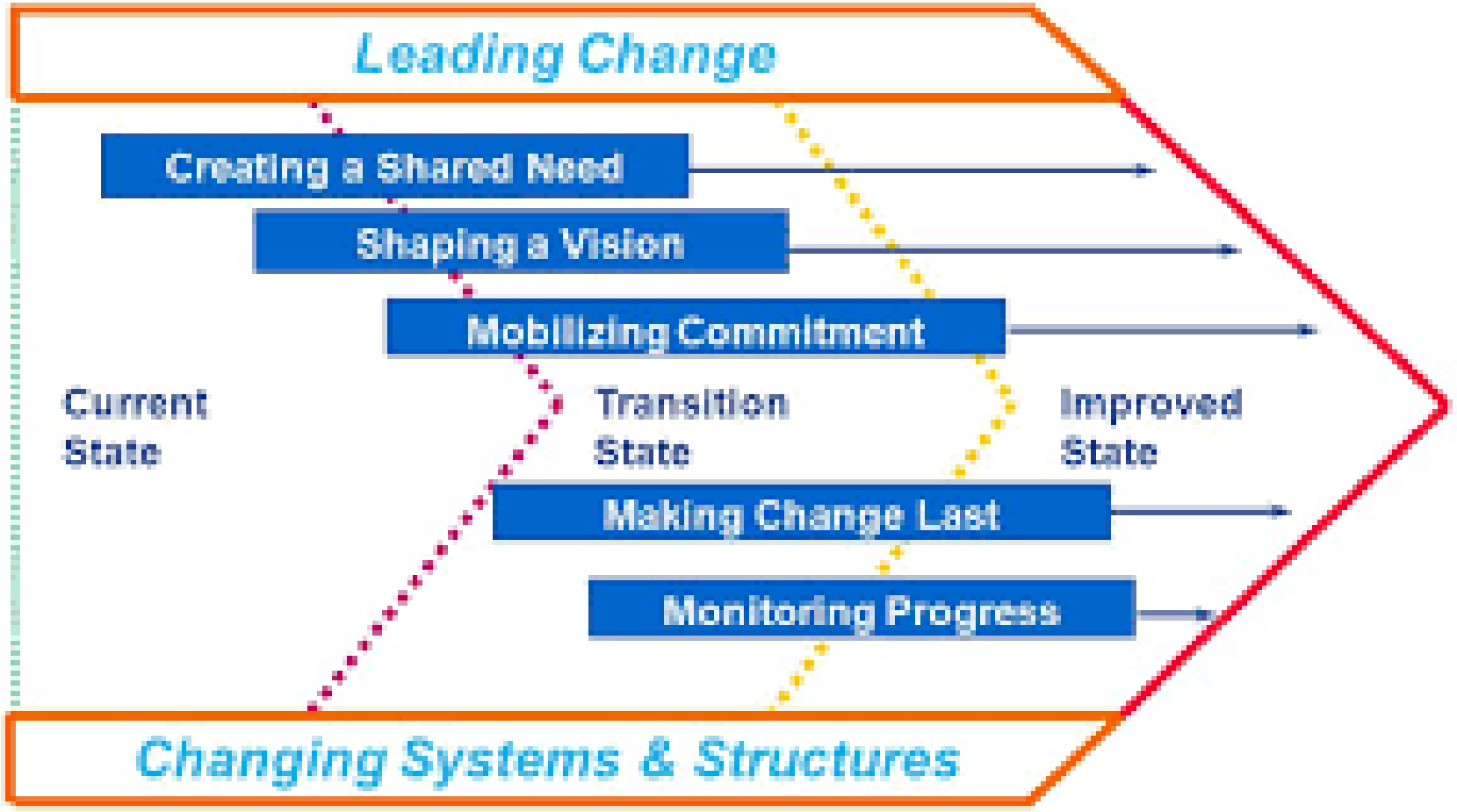
Interactions:

Who/what are the key interactions required to deliver this project (to the best of the current understanding)

Exercise

CAP

Change Acceleration Process (CAP)



CAP

Leading Change

AS IS	DESIRED STATE

Problem Statement:

Opportunity Statement:

CAP

Creating a Shared Need

Who are the stakeholders?	What are their roles? ARMI

A: Approver
R: Resource
M: Team Member
I: Keep Informed

Tool: Stakeholder Analysis

Creating a Shared Need

Name	- -	-	0	+	++

- Mark where they are today ❌
- Mark where they need to be ✔
- Where ❌ <> ✔, define action plan

Week 2 Assignment

Assignment 1 : Prepare and Submit by Week 3

For your selected project*:

1. Draft a GRPI based on your current understanding (Page 8, Week 2)
2. Draft an "AS IS" & "DESIRED STATE" (Page 10, Week 2)
3. Identify your stakeholders & their role on your team (Page 11, Week 2)
4. Complete a stakeholder analysis (Page 12, Week 2)

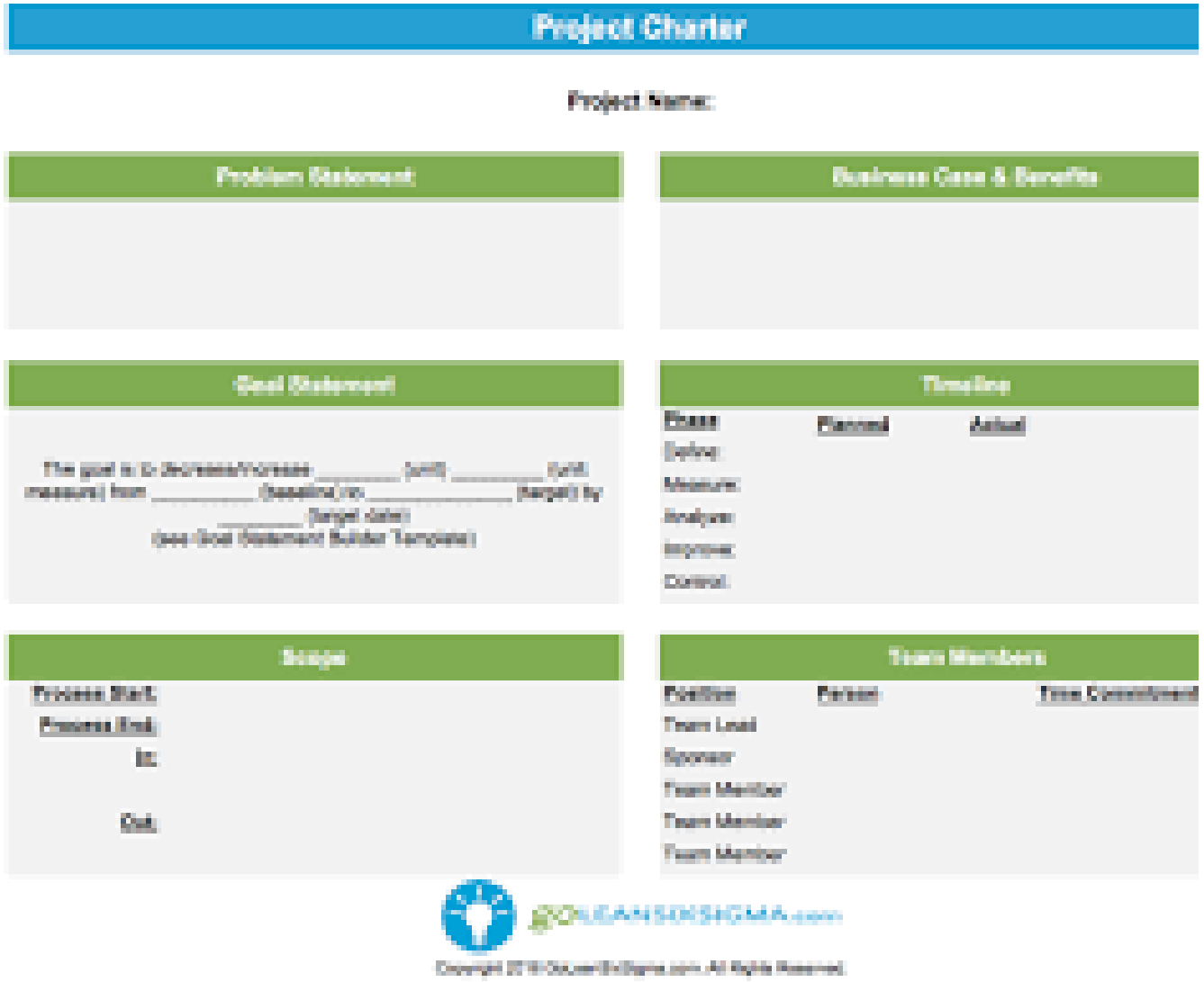
** Project may be changed up until week 4*

Tool:

Project Charter

Tool:

Project Charter



Case Study

A "Free Chemical" Plant

- Demand for Polycarbonate (PC) material >> supply
- Investment of $1B was approved for development of a second PC Plant
- In parallel, a Six Sigma project was started to identify possible process improvements to increase output of existing plant
- Daily output data was analysed
- Peaks & troughs
- Culture was to drive hard and celebrate record days
- A record output day was followed by zero output days
- What if the culture was changed?

Case Study

Stable Operations:

$Q1/Q3 = 1$

Exercise:
Discuss behaviours that this measurement should/could drive

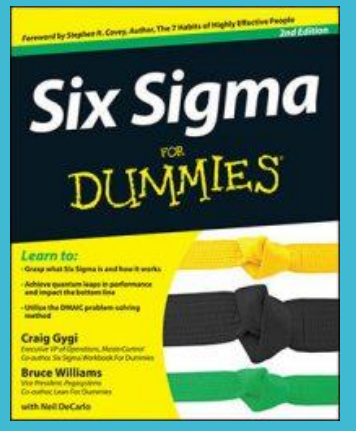
Appendices

Learning Objectives

At the end of this module you will have learned:

- To recognise different types of engineering projects and the associated project frameworks and methodologies to use
- Common pitfalls on why projects (and managers) fail and how to avoid them
- Theory of key project management skills including
  - Six Sigma DMAIC 12 Step Process
  - Change Acceleration Process (CAP) for leading effective change and stakeholder management
  - Business case development
  - Goal setting and project tracking
  - Project finance basics
  - Project presentation and communication skills
  - Organising for success: GRPI Project planning and resourcing tools
  - Project ethics
- Theory & tools for Engineering Management
  - A day in the life of an Engineering Manager
  - Environmental, Health & Safety (EHS) management
  - KPI management & operating rhythm
  - Supply chain management
  - Performance management & industrial relations
  - ESG (Environmental, Social, Governance) principles
  - Managing cyber security risk)
- Application of key project management skills
  - Complete a Six Sigma DMAIC project incorporating project management theory learned in class

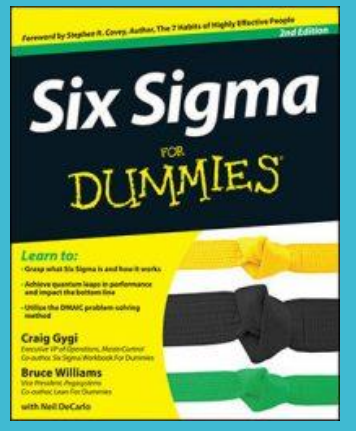
Companion Text Book



What is Six Sigma?
Generally, Six Sigma is a set of techniques and tools that help businesses improve their processes. It's a problem-solving methodology that helps enhance business and organizational operations. It can also be defined in a number of other ways:
•A quality level of 3.4 defects per million opportunities
•A rate of improvement of 70 percent or better
•A data-driven, problem-solving methodology of Define-Measure-Analyze-Improve-Control
•An initiative taken on by organizations to create bottom-line breakthrough change

Six Sigma principles
Six Sigma is based on a handful of basic principles, and these principles create the entire Six Sigma arrangement. Here are Six Sigma's fundamental principles:
•*Y=f(X)* + *ε:* All outcomes and results (the*Y*) are determined by inputs (the*X*s) with some degree of uncertainty (å).
•To change or improve results (the Y), you have to focus on the inputs (the*X*s), modify them, and control them.
•Variation is everywhere, and it degrades consistent, good performance. Your job is to find it and minimize it!
•Valid measurements and data are required foundations for consistent, breakthrough improvement.
•Only a critical few inputs have significant effect on the output. Concentrate on the critical few.
•Every decision and conclusion has risk (*ε*), which must be weighed against the context of the decision.

Companion Text Book



The tools and methods of Six Sigma

Having the right tools and knowing how to apply them to your Six Sigma projects will help you produce accurate, acceptable, and reusable outcomes. Here's an overview of the Six Sigma landscape: