# Chapter 1

# Introduction

Software Engineering is concerned with the controlled and correct development of Systems (Machines) that impact upon the environment in which they are deployed (World). Where the objective of the deployment of a Machine is to improve the World.

The purpose of Requirements Engineering is to take a set of Stakeholder Requirements and arrive at a complete, correct and usable set of System Specification Statements for the system under development. Within REVEAL$^{TM}$ the application of the process is also intended to have a wider objective of adding benefits to the project Stakeholders through learning, negotiation and the development of trust between all parties involved in the production of the system.

REVEAL$^{TM}$ is Altrans' systematic method for the elicitation, specification and management of System Requirements. Through its application we clearly identify three key artefacts:

- Requirements (R) which are statements about things in the World that we want the System to make true.
- Specification Statements (S) describe the Systems external behaviour.
  - Specifications include only shared phenomena in the interface between the World and the System being developed.
  - Specifications can only constrain shared phenomena that the System can control.
- Domain Statements (D) which are knowledge about the World, that is generally assumed and not normally documented, but must hold if the Specification Statements are to fully satisfy the System Requirements.

Once this information has been gathered, a Satisfaction Argument is constructed to show that all the Stakeholder Requirements have been addressed through the System Specification and Domain Statements. (As Verification and Validation progresses, V&V Plans and summary results can also inform the satisfaction argument, although this may not be done for the competition.)

The REVEAL$^{TM}$ process is far more extensive than that described above including detailed processes for:

- Stakeholder Identification,
- Knowledge Elicitation,
- Requirement Verification and Validation,
- Conflict Management and Resolution,
- Requirements Maintenance and Management.

More information on the REVEAL$^{TM}$ method can be found on http://intelligent-systems.altran.com/technologies/systems-engineering/revealtm.html.

Since by its nature the VSTTE 2013 competition has a very short timescale, and the Requirements are provided by the competition organisers it is not expected that there would be time to apply a full REVEAL$^{TM}$ process, however the benefits of Requirements capture, expression, satisfaction arguments and traceability can be shown by their application in this context.

# Chapter 2

# DSR

## 2.1 Requirement Statements

### 2.1.1 R.display

The display of time should be easily read.

**Satisfaction argument** An operation exists to clearly display the transition of time.

**Satisfied by**

- S.display (D.time, D.accuracy)

### 2.1.2 R.lapse

It should be possible to display the time lapsed since time recording began.

**Satisfaction argument** The time operation displays the currently held value of time, even if the counter is progressing.

**Satisfied by**

- S.display (D.time, D.accuracy)

### 2.1.3 R.measurement

There is a need to measure lapsed time between two Events.

**Satisfaction argument** Starting, stoping and counting the time between these Events allows us to measure the passage of time.

**Satisfied by**

- S.start ()
- S.count (D.time, D.time.period, D.accuracy)
- S.stop ()

### 2.1.4 R.reset

It should be possible to reset the watch to measure other Events.

**Satisfaction argument** A separate operation exists to reset the watches value.

**Satisfied by**

- S.reset ()

### 2.1.5 R.usability

It should be easy to operate the Stopwatch.

**Satisfaction argument** Separate operations make it ease to operate the watch.

**Satisfied by**

- S.start ()
- S.stop ()
- S.reset ()

## 2.2 Domain Statements

### 2.2.1 D.accuracy

The accuracy of the Stopwatch shall be sufficient to satisfy international racing authorities.

### 2.2.2 D.time

A duration measured in Hours, Minutes and Seconds.

### 2.2.3 D.time.period

The measurement accuracy of the Stopwatch, assumed to be 1 second.

## 2.3 Specification Statements

### 2.3.1 S.count

If the Start operation has been activated, and the Stop operation has not been activated, then the count of time shall be incremented every time period.

**In the context of** D.time, D.time.period, D.accuracy

### 2.3.2 S.display

There shall be an operation to display the current time stored within the Stopwatch application.

**In the context of** D.time, D.accuracy

### 2.3.3 S.reset

There shall be an operation to reset the time currently stored within the Stopwatch.

**In the context of**

### 2.3.4 S.start

There shall be an operation to start the watch counting time.

**In the context of**

### 2.3.5 S.stop

There shall be an operation to stop the watch counting time.

**In the context of**

# Chapter 3

# Data Dictionary

## 3.1 Terms

### 3.1.1 Events

Occurances between which we wish to measur the passage of time.

### 3.1.2 Stopwatch

A device for measuring and displaying the passage of time.