WP11

Specification

Design of Software Architectures

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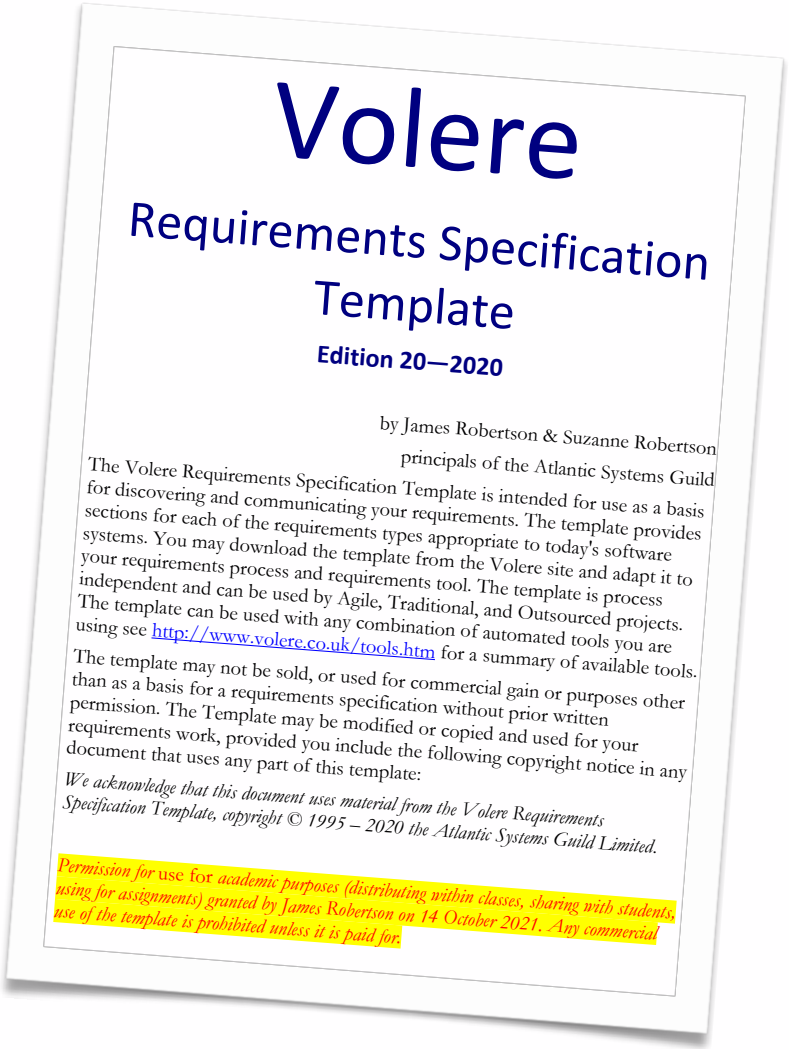
WP10 Recap:

- Requirements fulfil the needs
  - of 1+ stakeholders
- Requirements are
  - testable / verifiable
  - realisable / approved
  - unique / atomic
  - grouped / prioritised
  - free of conflicts



Volere

Requirements Specification Template

Edition 20—2020

by James Robertson & Suzanne Robertson

principals of the Atlantic Systems Guild

The Volere Requirements Specification Template is intended for use as a basis for discovering and communicating your requirements. The template provides sections for each of the requirements types appropriate to today's software systems. You may download the template from the Volere site and adapt it to your requirements process and requirements tool. The template is process independent and can be used by Agile, Traditional, and Outsourced projects. The template can be used with any combination of automated tools you are using see http://www.volere.co.uk/tools.htm for a summary of available tools.

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WP08/09 Recap:

- Domain
- concepts
- Aspects
- Specification

What is a specification?

- Formal specification:

```
VARIABLE clock
Init == clock \in {0, 1}
Tick == IF clock = 0 THEN clock' = 1 ELSE clock' = 0
Spec == Init /\ [][Tick]_<<clock>>
```

https://en.wikipedia.org/wiki/TLA+

```
System simple_cs = {
  Component client = {
     Port sendRequest;
     Properties { requestRate : float = 17.0;
                  sourceCode : externalFile = "CODE-LIB/client.c" }}
  Component server = {
     Port receiveRequest;
     Properties { idempotent : boolean = true;
                  maxConcurrentClients : integer = 1;
                  multithreaded : boolean = false;
                  sourceCode : externalFile = "CODE-LIB/server.c" }}
  Connector rpc = {
     Role caller;
     Role callee;
     Properties { synchronous : boolean = true;
                  maxRoles : integer = 2;
                  protocol : WrightSpec = "..." }}
  Attachments { client.send-request to rpc.caller ;
                server.receive-request to rpc.callee }
}
```

Garlan, *Formal Modeling and Analysis of Software Architecture: Components, Connectors, and Events*, SFM 2003

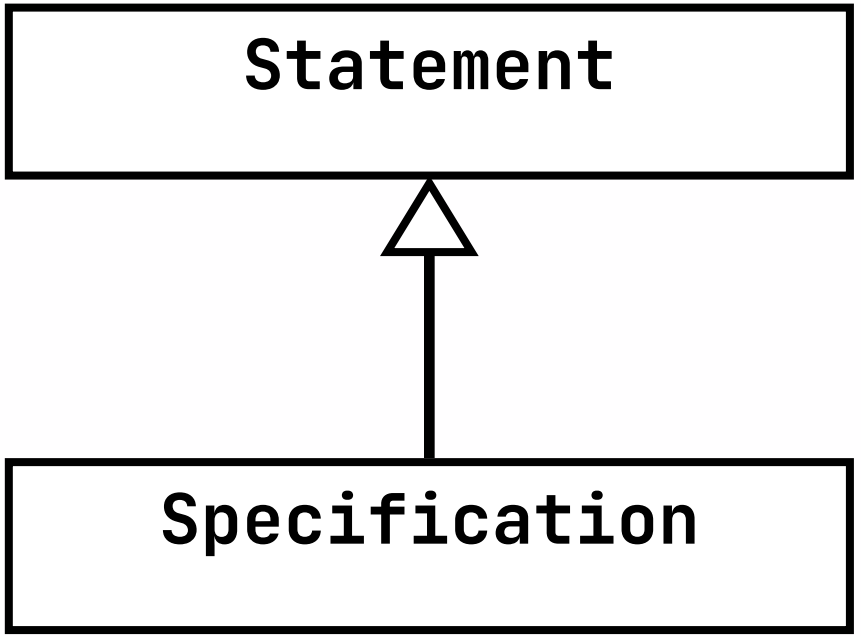
What is a specification?

- Formal specification
- “Specification” aka documentation/standard
  - requirement specification
  - functional specification
  - language/format/protocol specification
  - architecture specification

https://en.wikipedia.org/wiki/TLA+

What is a specification?

- Formal specification
- “Specification” aka documentation/standard
- Specification is a statement
  - about some aspects
  - has defined context
  - is assignable



Specification properties

- Specifications have a validity
  - wish - intention - requirement - assumption - proven
- Specifications have a scope
  - system
  - system element
  - environment element
  - range of the above
- Direct relations
  - composed of other specifications
  - derived from / based on other specifications
  - made according to other specifications
- Indirect relations via shared aspects or shared context

Specification ~ Standardisation

- Consistently specific everywhere
  - ⇝ standardised
- Wellerness: containerisation
- TurboWorkbench: plugins
- COBOL-FIT: athletic performance
- All standards you use are (external) specifications

Keep track of specifications

Keep track of all the specifications that you use and introduce

- Identification (name, version, source)
- Relation to the architecture:
  - For what architecture element is it used?
  - How does it use the architecture?
- Dependencies on other specifications
  - (graph) specifications are nodes, relations are arrows
  - (table) a row for each specification