2012 Developments in **M**odular (**S**oftware) **S**afety **C**ases and Modular GSN

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Agenda

- **What** is IAWG MSSC?
  - System Wide Arguments
  - Applicability
- Status of IAWG MSSC work
- MSSC and Standard Modular GSN
  - Away References to Consumer Goals
  - Contract and Integration SC Modules
  - Patterns and Templates
  - Context
  - Containment
- Future Developments?
  - Strength of Assurance

IAWG MSSC

The modular construction of a Safety Case seems like common sense, but in practice, over a real supply chain, it is challenging.

MSSC describes *practically* how to;

- Make the best choice of SC modules
  - Hazard Mitigation
  - Requirements
  - Component Related
  - Integration
- Fit them all together
- Populate them with argument (from GSN patterns)
- Alter an approved SC upon System change

IAWG MSSC: Applicability

MSSC principles are applicable at System Level

Software

- It was developed originally for Software
- It has been applied
  - to SC with both HW and SW elements.
    - Integrating to a traditional HW safety case in a SC Module “wrapper”
  - Where Hazards are the starting point, rather than (Software) Safety Related Requirements.
- Potentially larger benefits than for SW alone

IAWG MSSC: System Wide Arguments

MSSC modularises the argument and evidence only where it is beneficial to do so

- Some evidence may not be efficiently modularised.
  - Resource consumption
  - Latency
- Generate this evidence later in the integration process… and…
- Introduce it higher up the safety argument

IAWG MSSC

- The research strand started in 2005.
- Programme completed on 20th Nov 2012
- Trialled on real programmes, Hawk & Wildcat
- Process documents now public domain
  - Overview (0101)
  - Core Process (0201)
  - Glossary (0202)
  - GSN (0203)
  - Artefacts (0204)

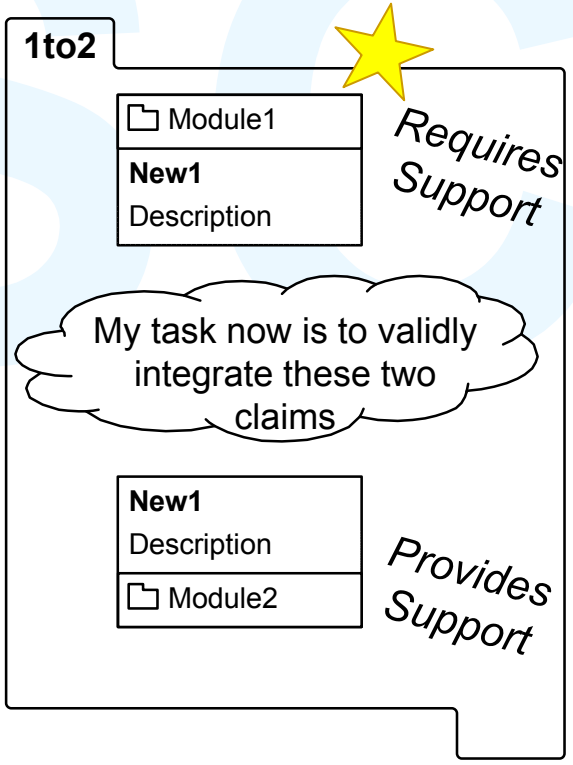
Available at www.capability-agility.co.uk

Leaflet & White Paper available today

Away References to Consumer Goals

- The final argument must be navigable top-down
  - but modular argument construction order varies
- SC Modules that change independently cannot refer to each other
  - instead the integrator will refer to them both in a SC Contract.

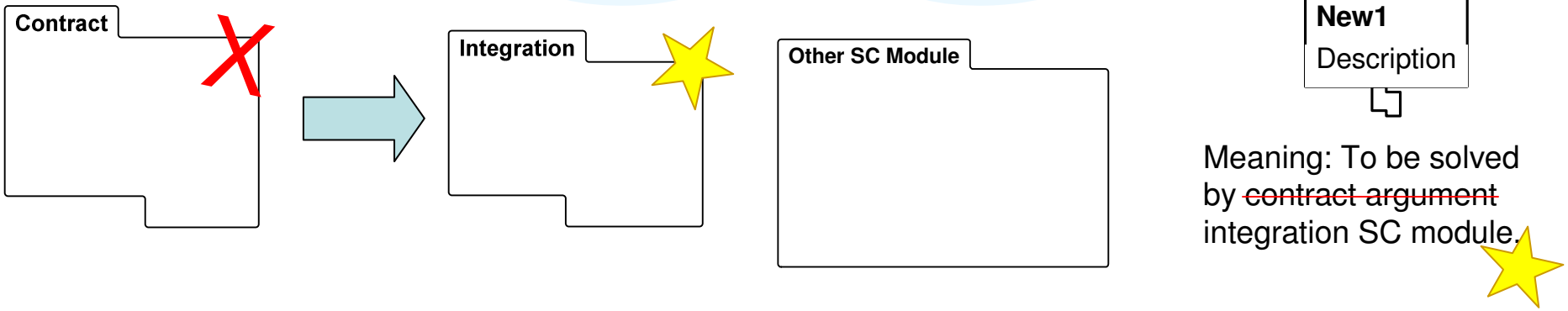
*The integrator's view needs clarification by distinguishing away references to goals that **require** support from those to goals that **provide** support.*



Contract and Integration SC Modules

MSSC users need to be allowed to develop away goals in integration arguments that are not constrained to a SC contract pattern.

- Necessary in
  - No Unwanted Interactions (NUI) pattern
  - Initialisation
  - Possibly elsewhere in future.



Patterns and Templates

- It is necessary to distinguish:
  - **(MSSC) Patterns**

    Incomplete GSN arguments that guide SC authors
  - **(MSSC) Templates**

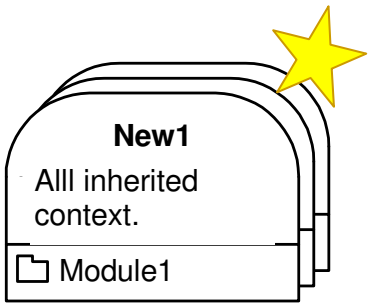
    A concise presentation of multiple similarly formed arguments in the final SC.
- Templates have particularly been used for:
  - contract arguments for many communication channels between applications.
  - Similar arguments for many guaranteed behaviours of a part of the system.

Treatment of Context

MSSC takes positive steps to de-mystify and address treatment of the vague term "context".

- Must be **Captured** completely and then **Compared** for incompatibilities during integration.
- Limited to information that constrains a claim's validity
- Relies upon Problem Domain and Argument experts
  - But provides aid-memoires by argument subject
- High Level - e.g. Sub-system Integrity Level, authoring organisation
- Low Level - e.g. units, precision and accuracy of exchanged data.

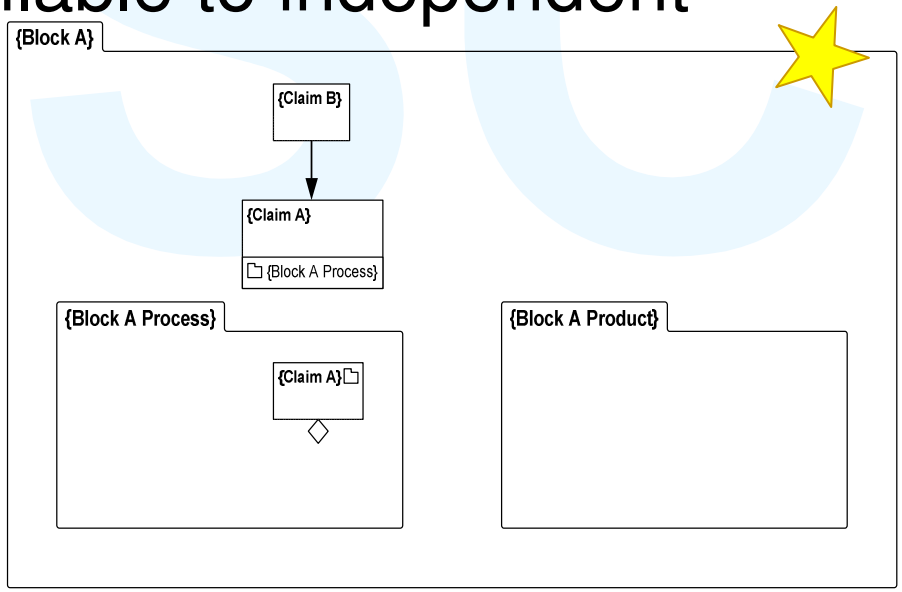
MSSC needs a concise diagrammatic symbol behind which all captured context inherited by an away reference to a goal may be documented.



Containment

MSSC found value in the use of Containment

- To allow suppliers to both
  - hide their SC Module structure
  - make their argument available to independent scrutiny
- Simplifies Integration
- Protects IPR
- (Along with Public I/F Private Argument)



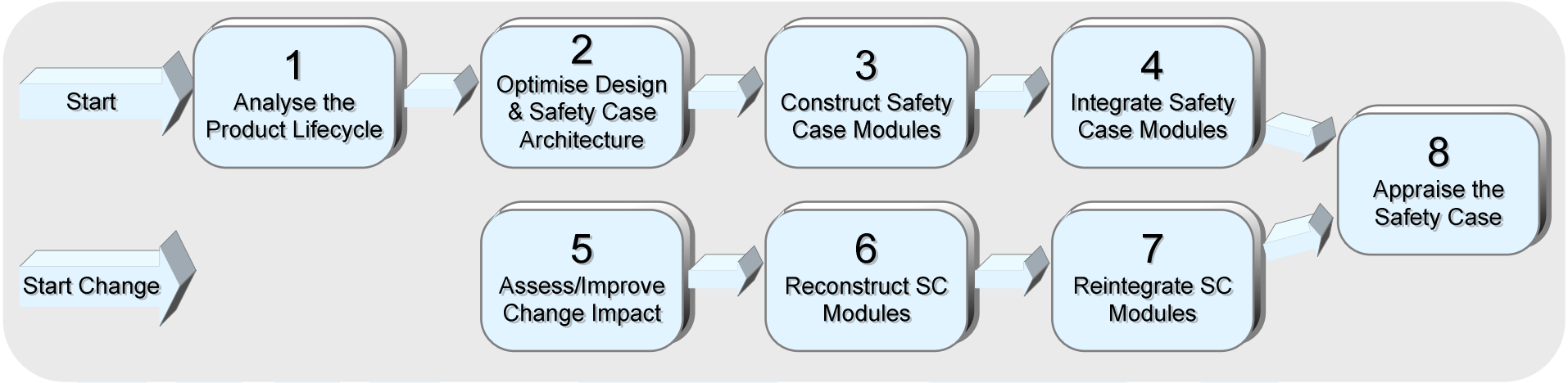
Strength of Assurance

The problem of capturing the strength of a claim or argument is unchanged by the use of MSSC

Compatibility with any particular scheme;

- Stakeholder satisfaction
- Providing assurance measures as context
- Assurance meta-argument
- Also with a parallel meta-argument (although this work has not been done)
  - Presumably this would also need to be modular

MSSC Process Steps



End of Presentation