

TLM, Verification and the AVM

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VERIFICATION TECHNOLOGIST

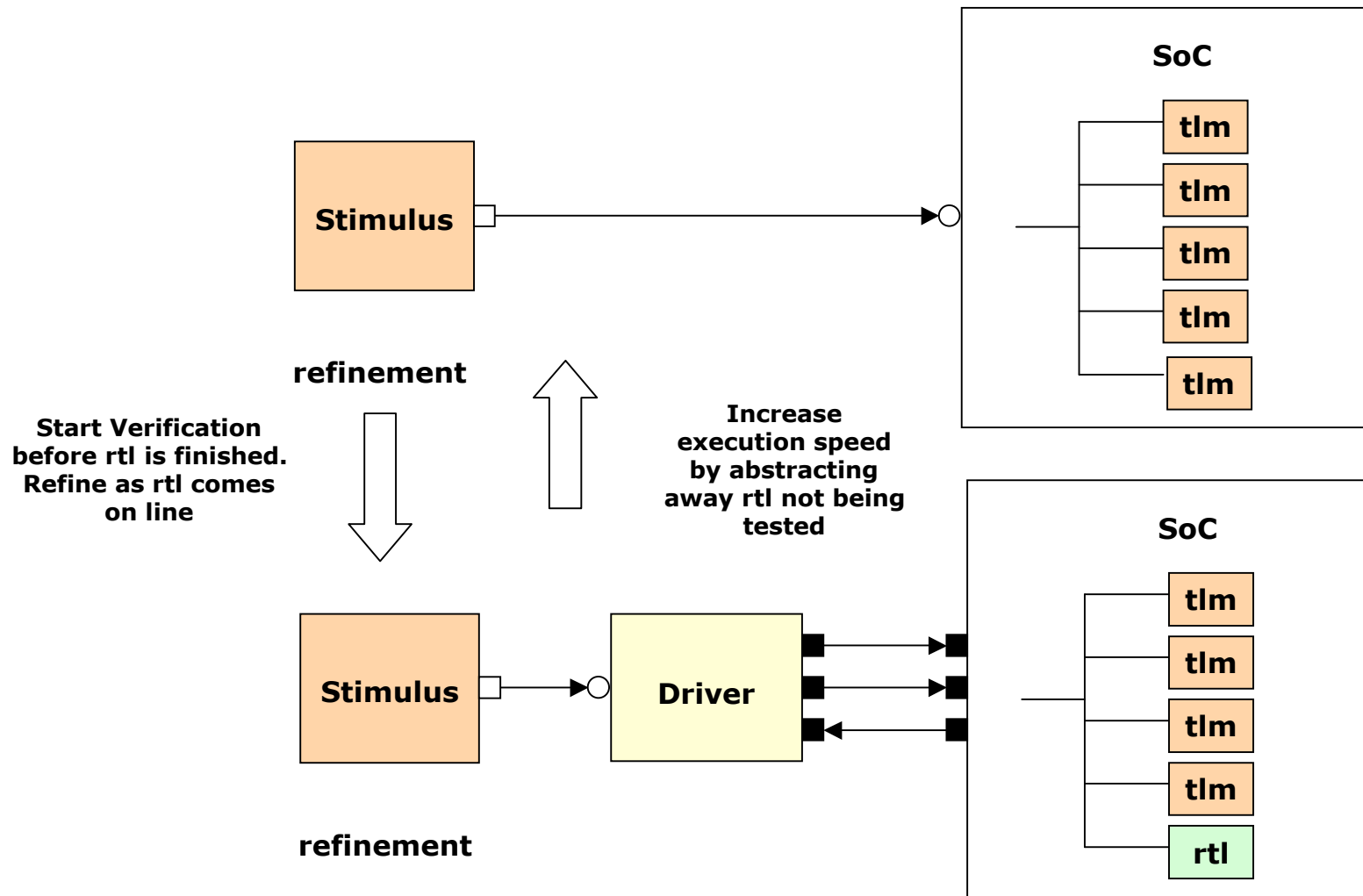
DVT

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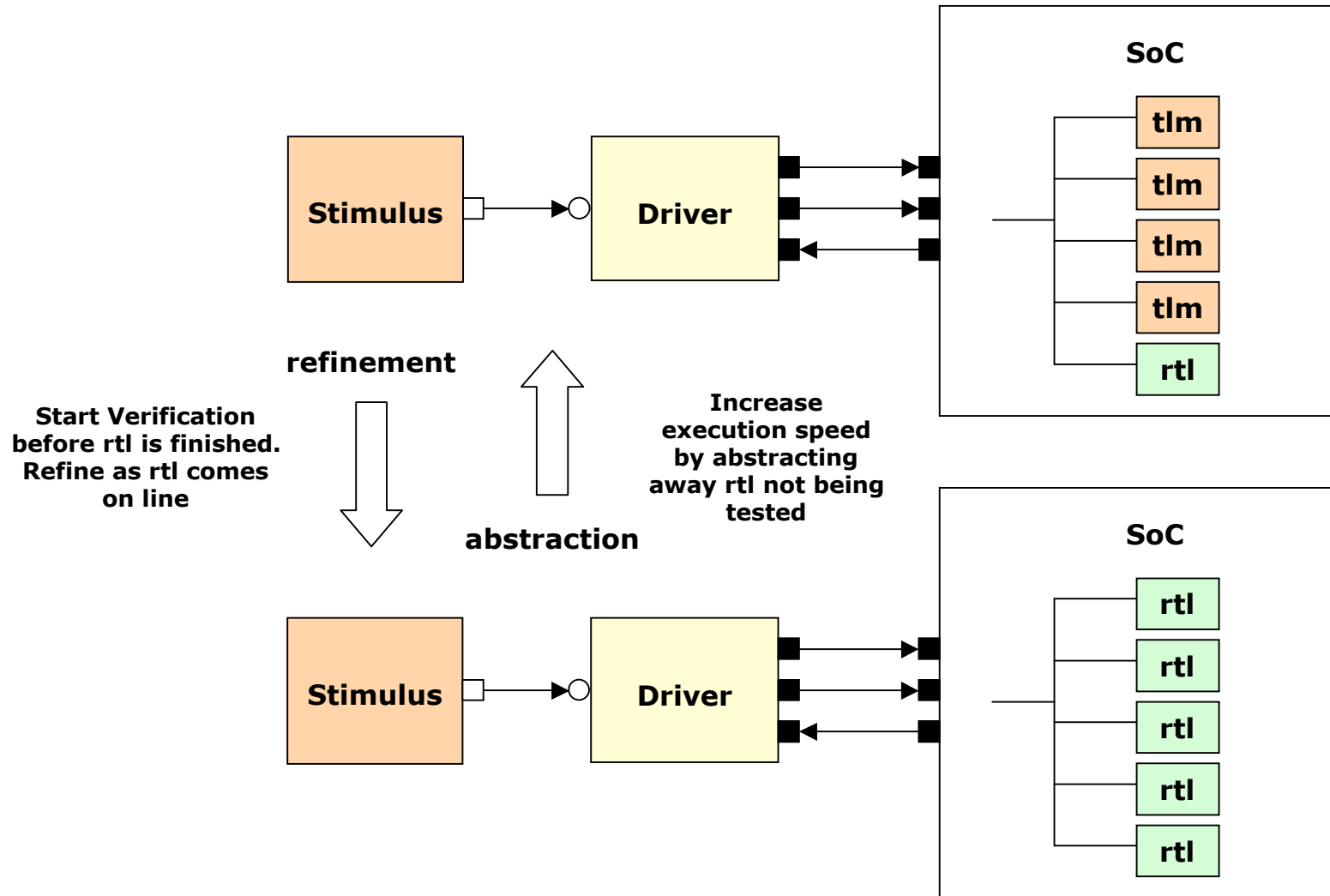
TLM and Verification

- **All advanced verification methodologies today are based on transactions**
 - Aids reuse
 - Representing transactions as classes makes randomization easier
- **Golden Models and Scoreboards are TLMs**
 - Verification engineers have been producing TLMs for years without realising it
- **Refinement and Abstraction**
 - Refinement speeds up verification timescales
 - Abstraction speeds up testbench execution times

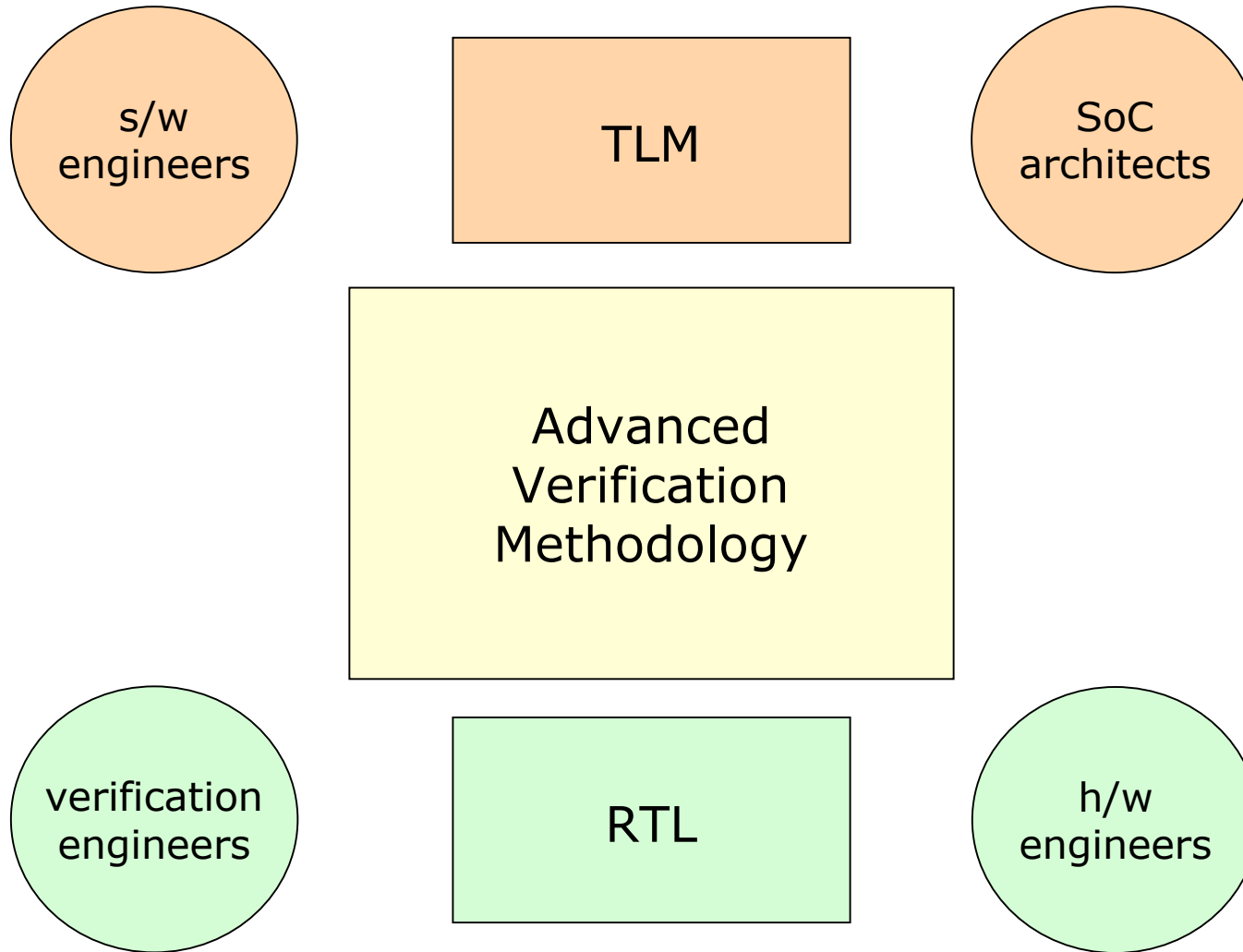
Abstraction and Refinement



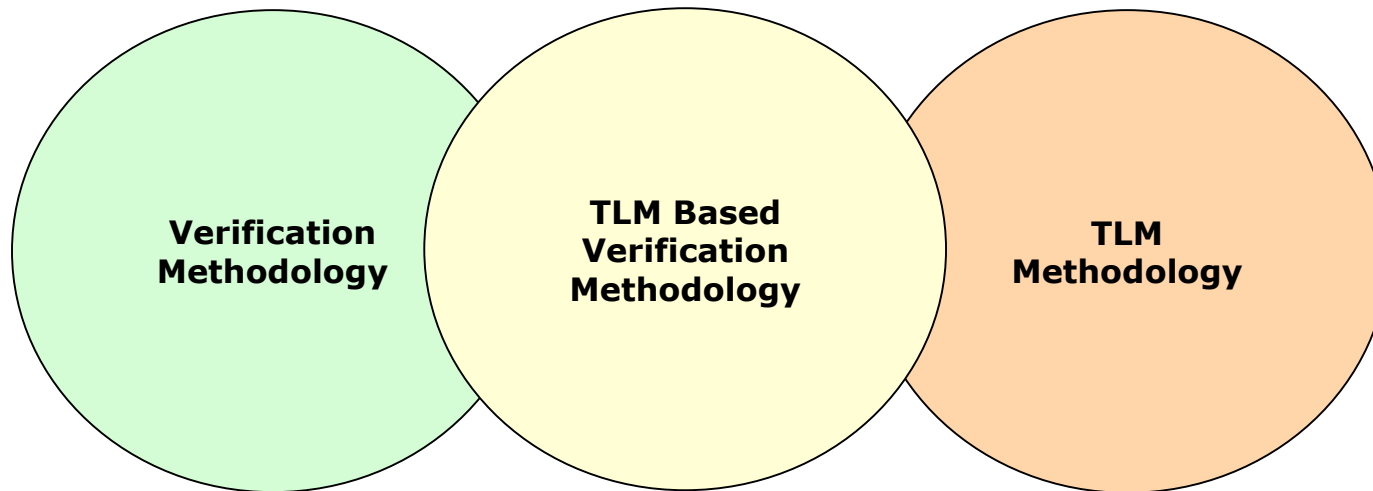
Abstraction and Refinement



Advanced Verification Methodology

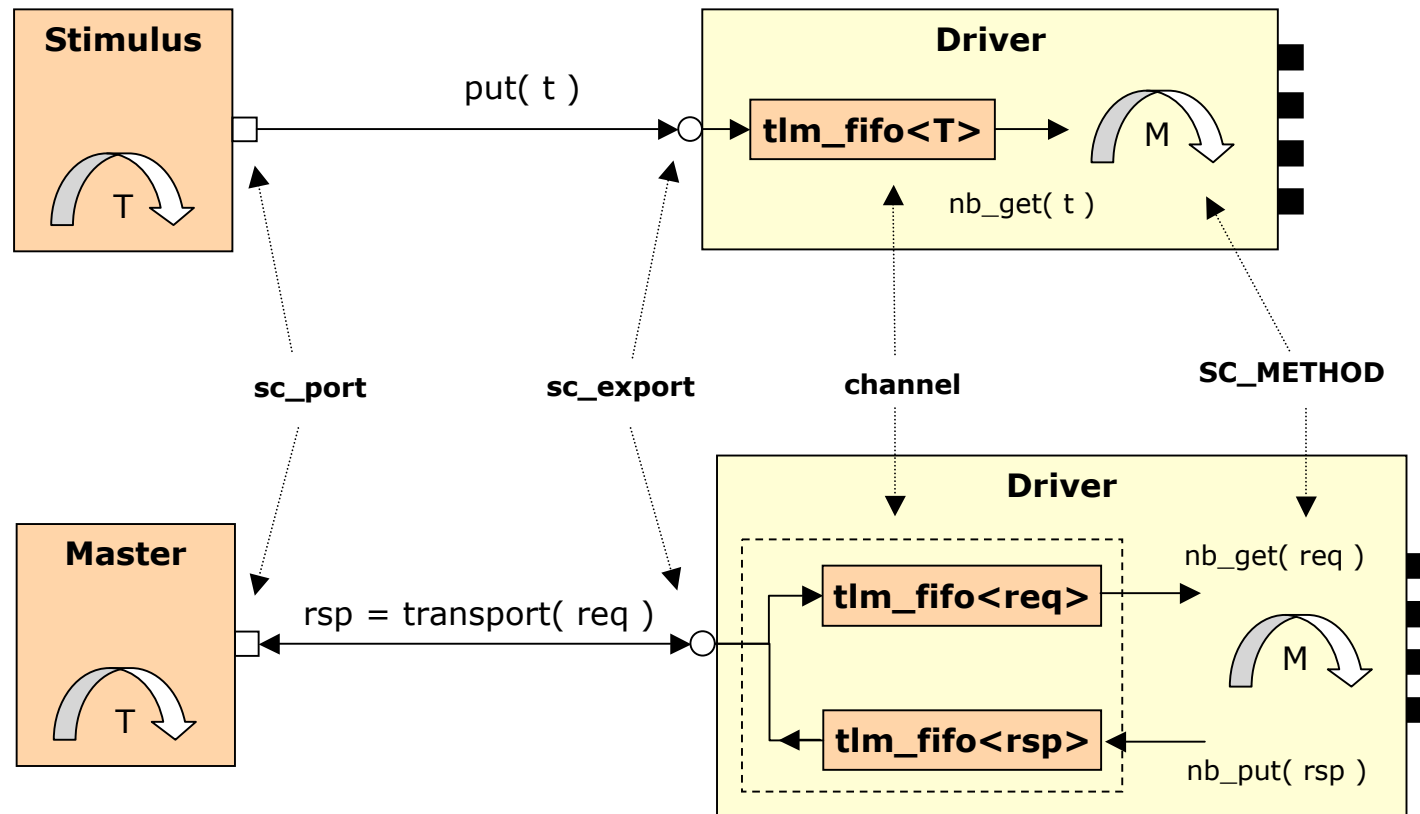


AVM



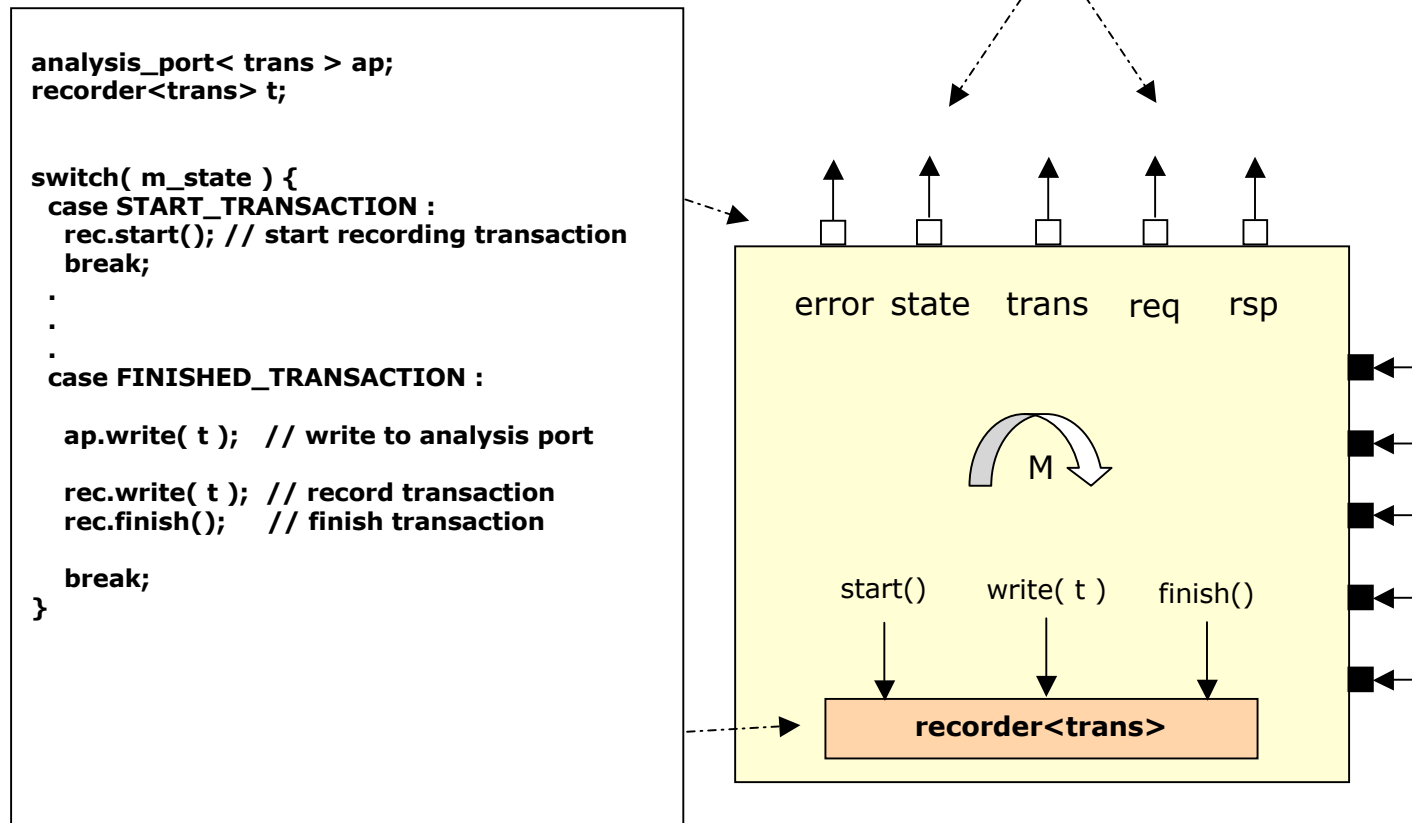
- **Standards Based**
- **Non Proprietary and Open**

Driver Design

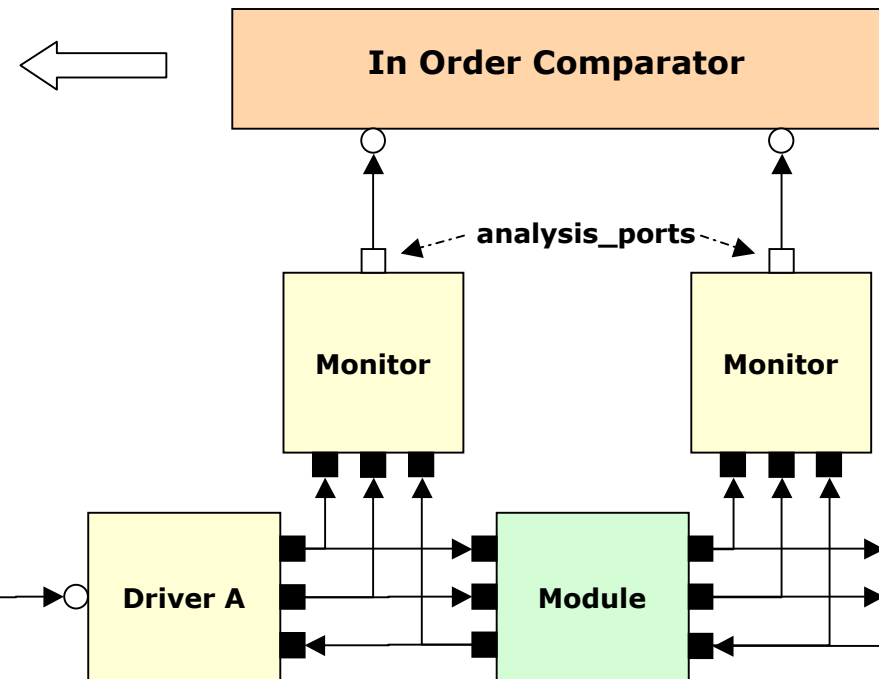
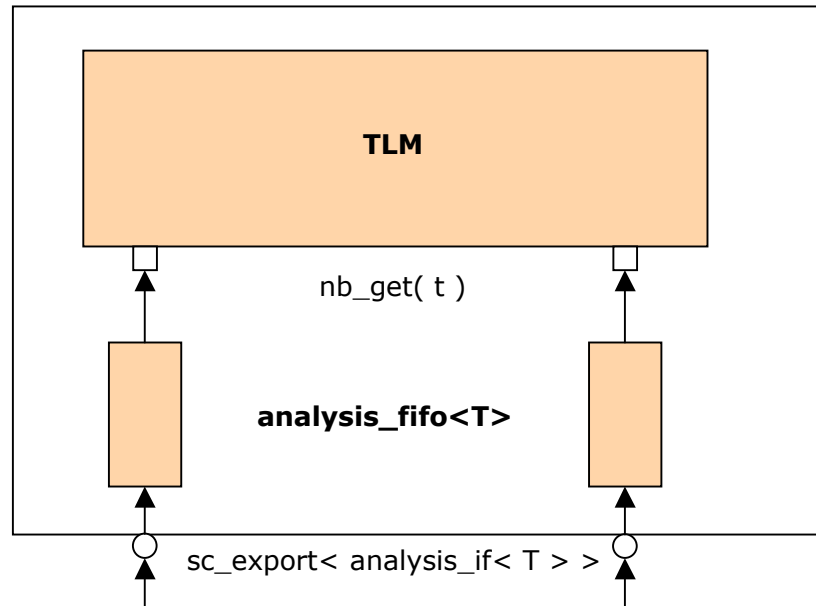


Monitor Design

Analysis Ports and Recorders



Scoreboard Design : Analysis Fifos

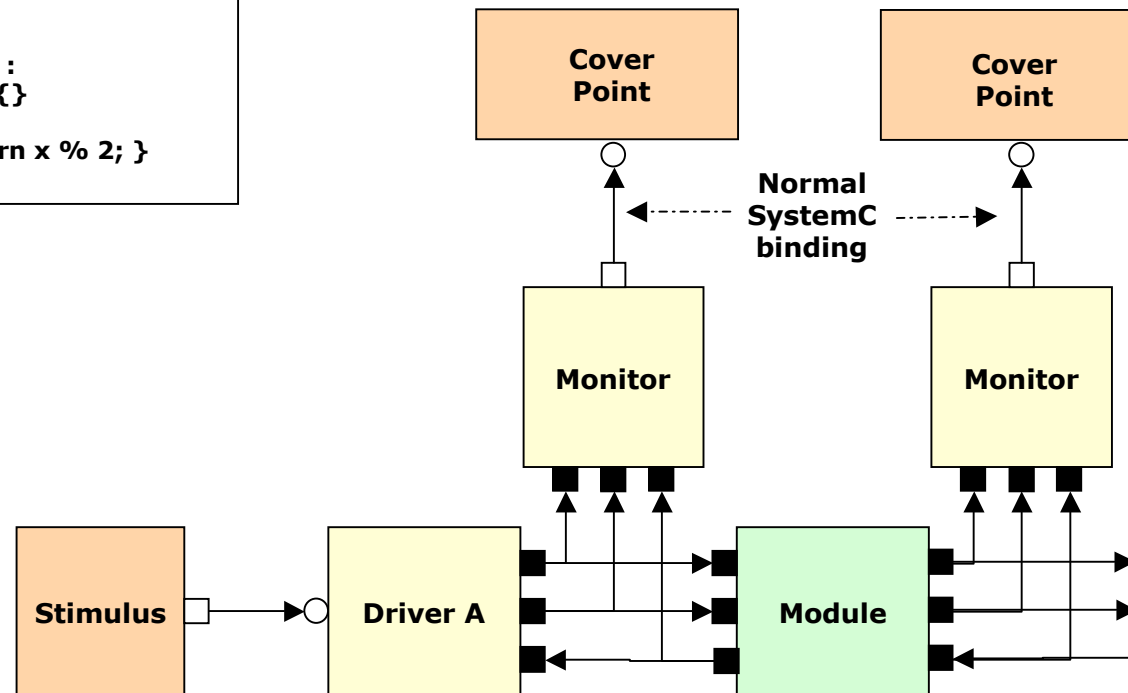


- Analysis fifos are unbounded `tlm_fifos` that implement the analysis interface
 - No losses even if multiple transactions in one delta cycle

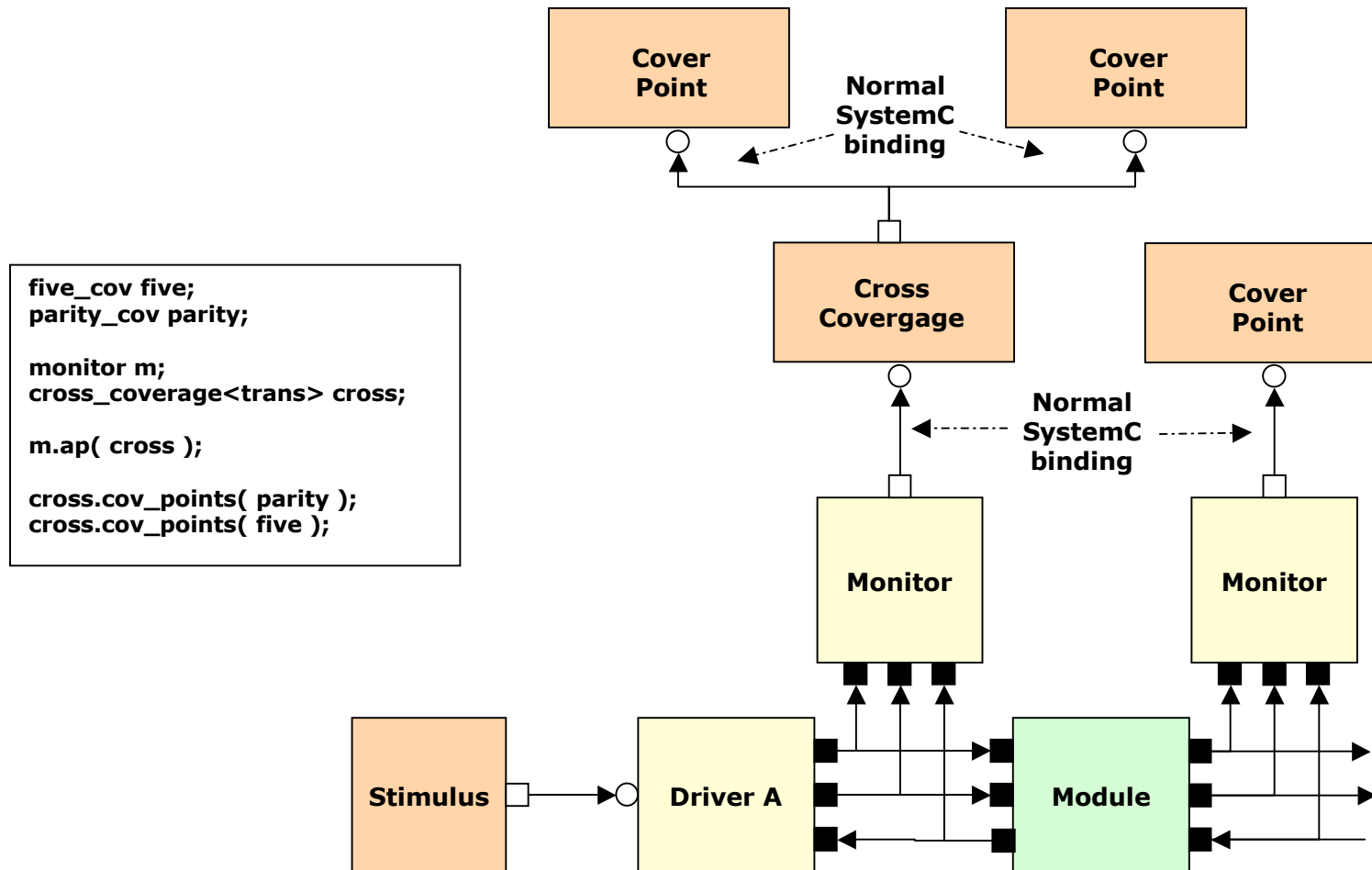
Transaction Level Functional Coverage

```
class parity_cov : public coverage_object< int , 2 >
{
public:
  parity_cov( sc_module_name nm ) :
    coverage_object< int , 2 >( nm ) {}

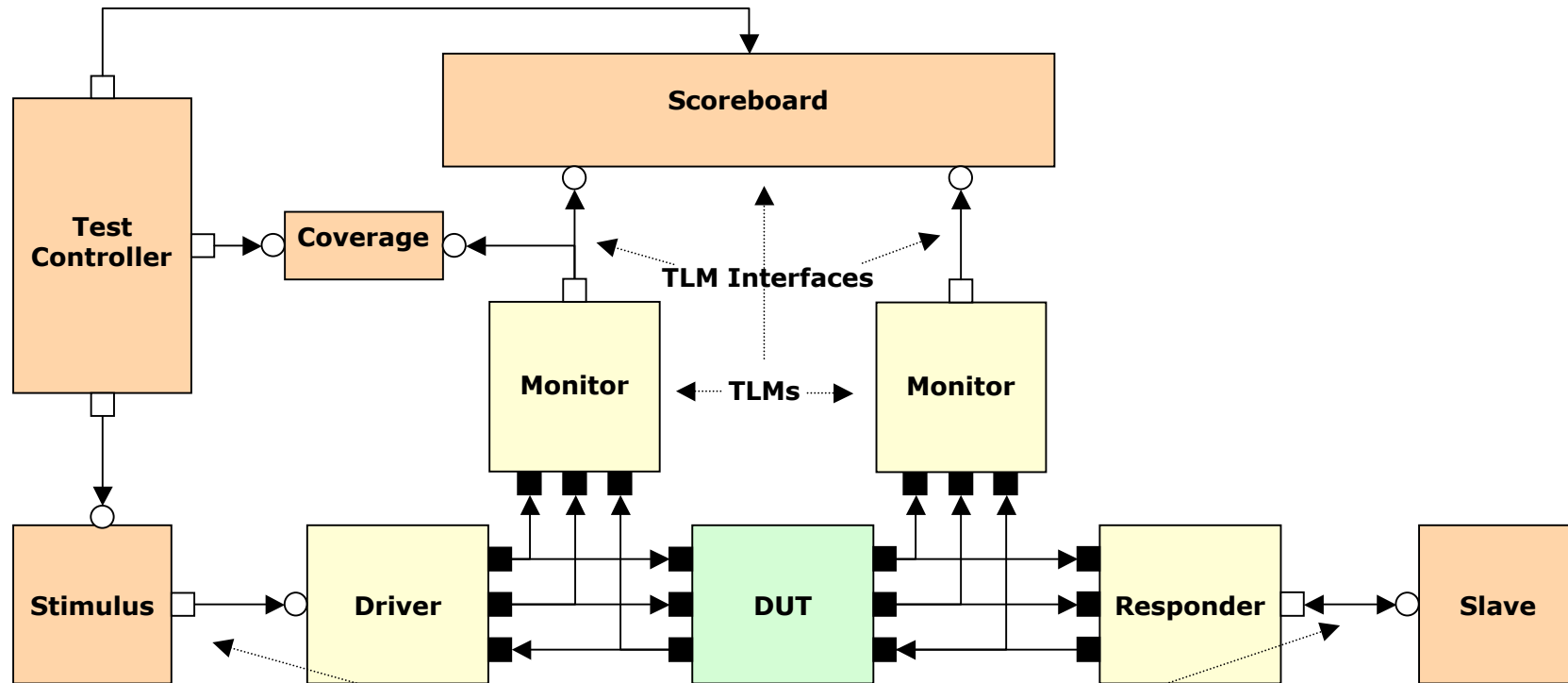
  int sort( const int &x ) const { return x % 2; }
};
```



Transaction Level Cross Coverage

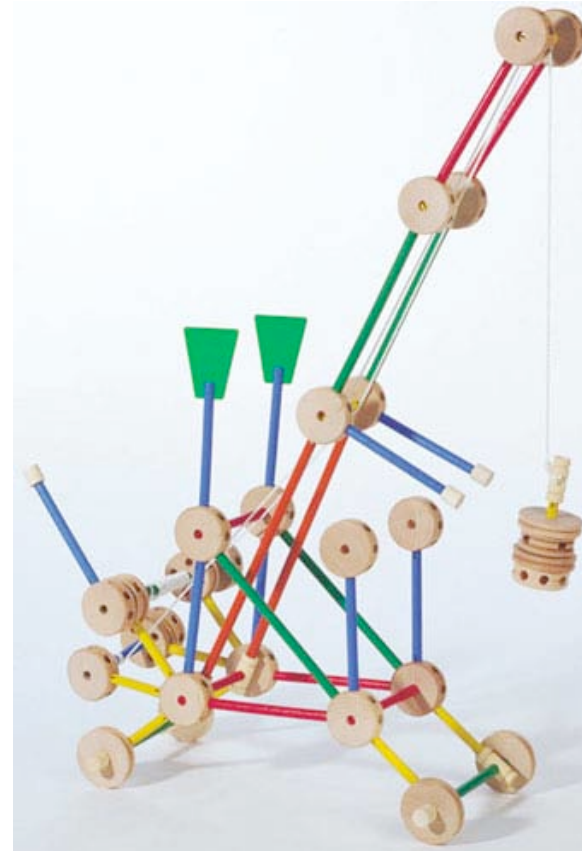
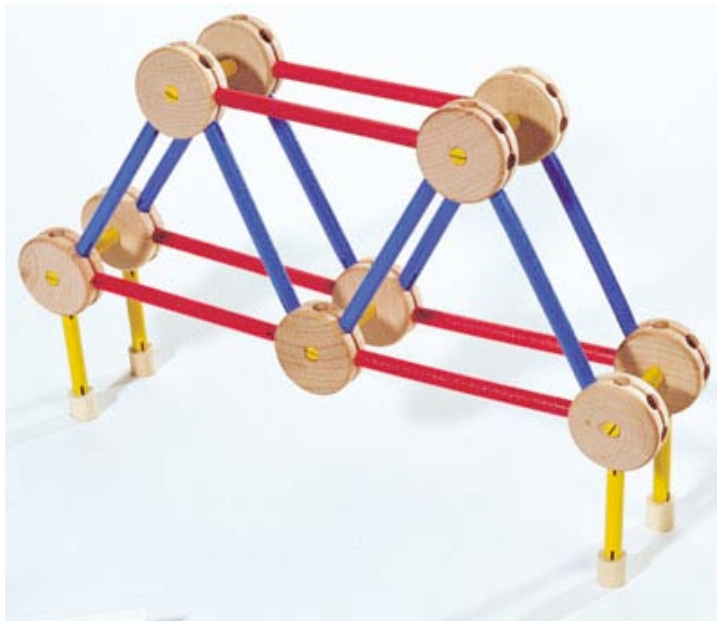


Verification Methodology



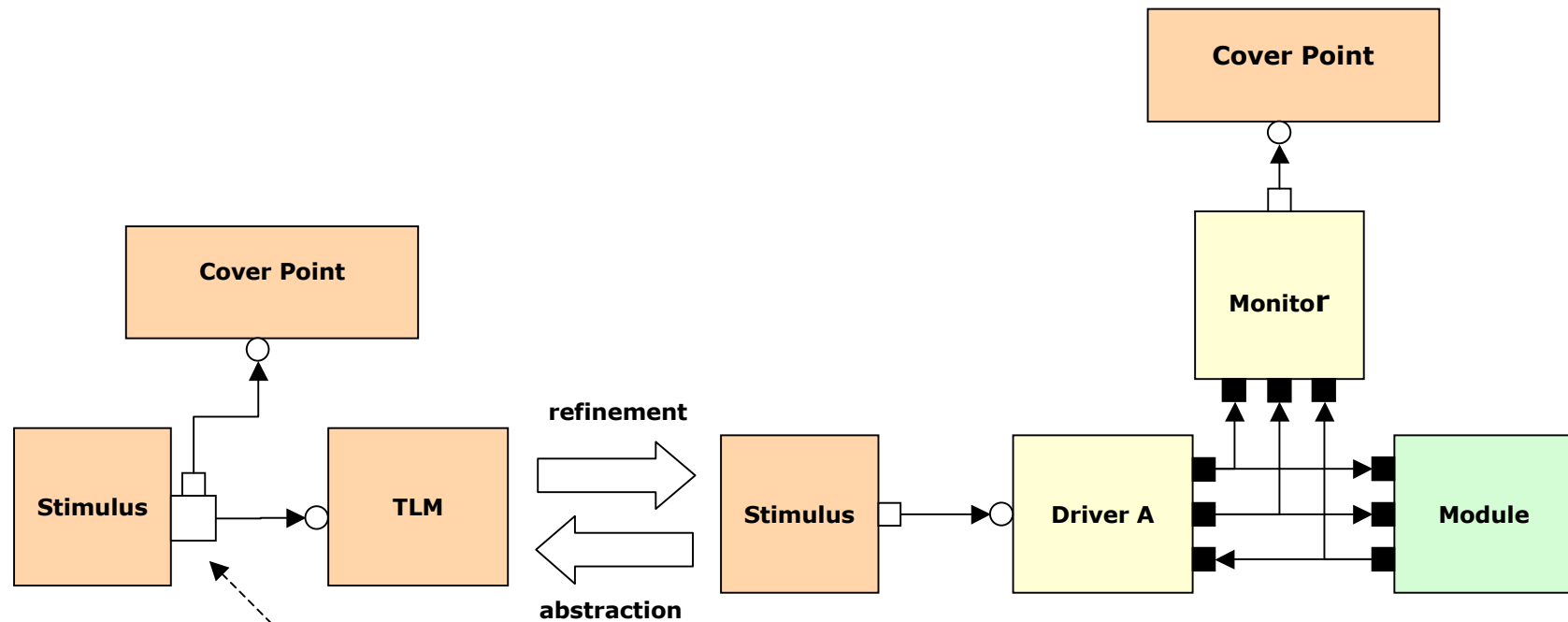
TLM Interfaces
Components are basically very simple
TLMs
Complex verification infrastructures can be built using them
Components are language independent

Tinkertoy® Interfaces



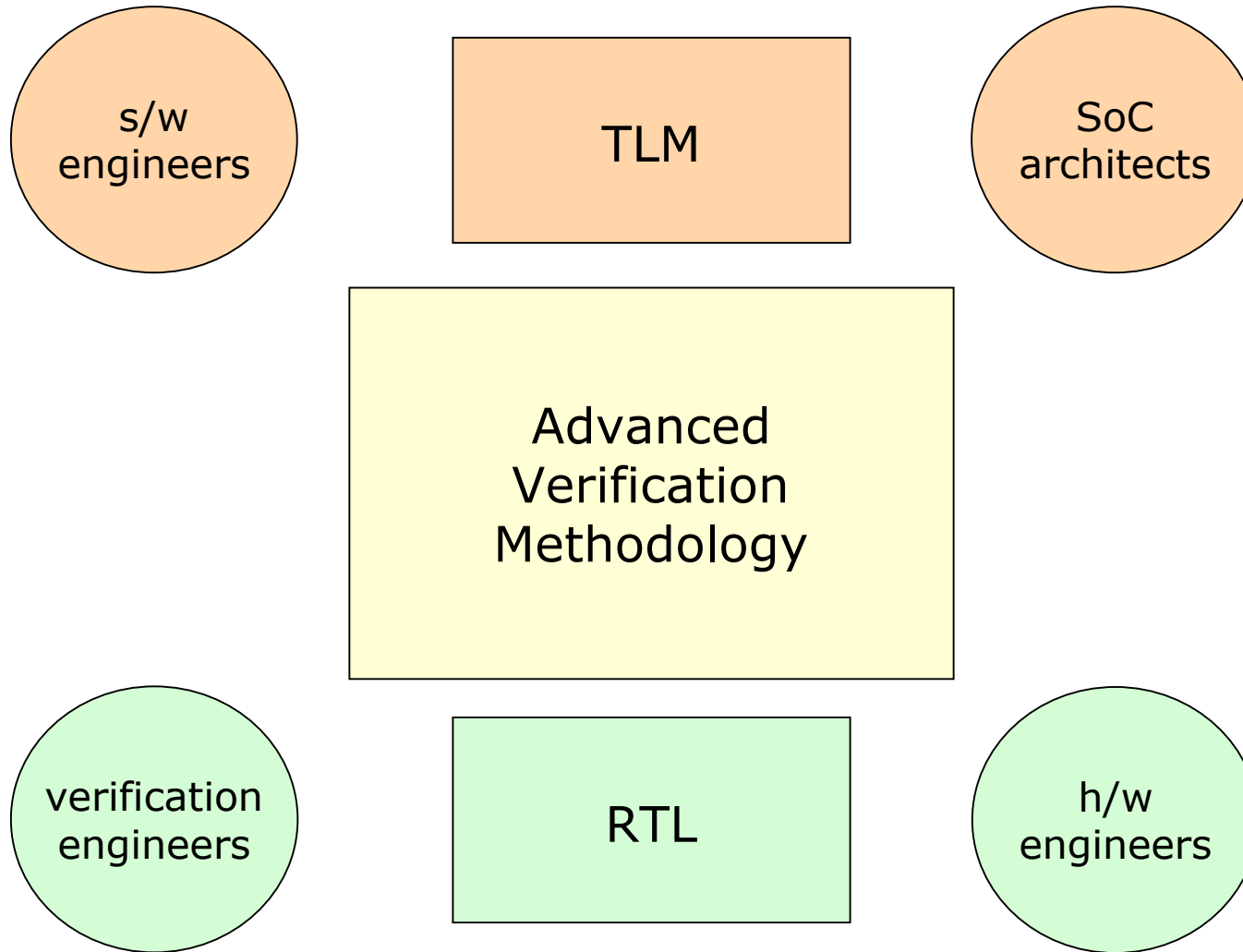
Simple and complex structures created from same kind of building blocks

TLM and Verification

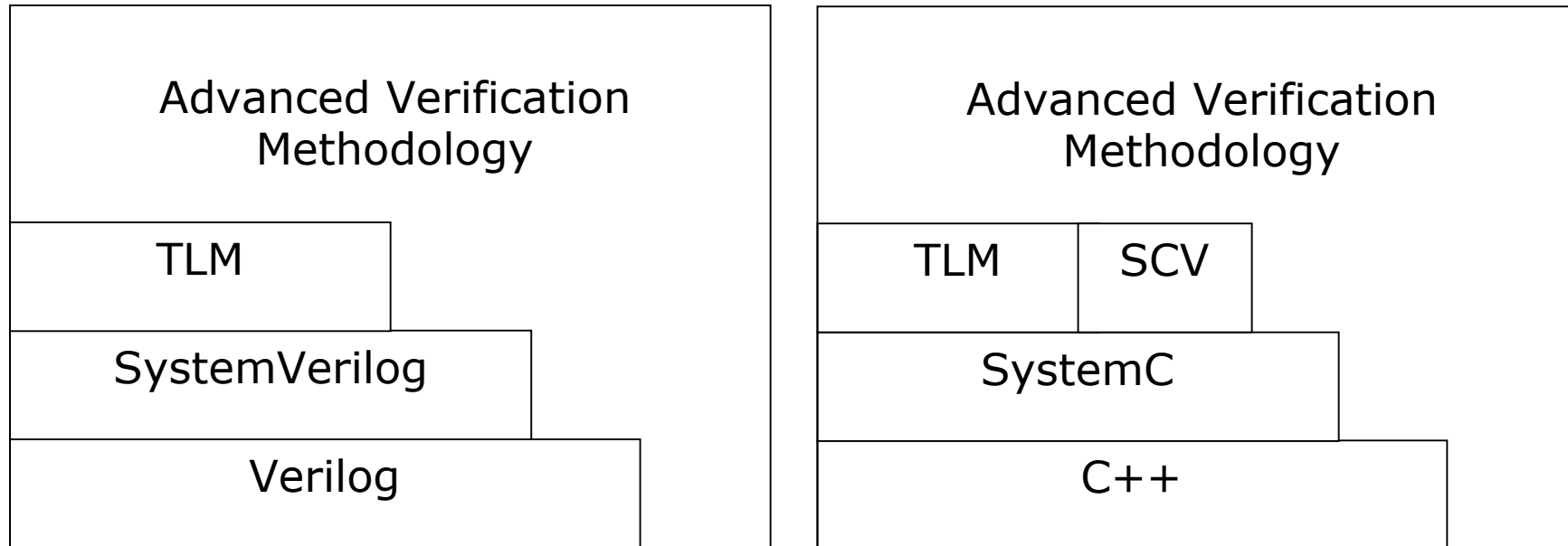


- **Hidden analysis ports**
 - use coverage and some scoreboards with both TLMs and rtl
- **Hidden recorders**
 - Transaction recording for free, no need to modify code

Advanced Verification Methodology



AVM



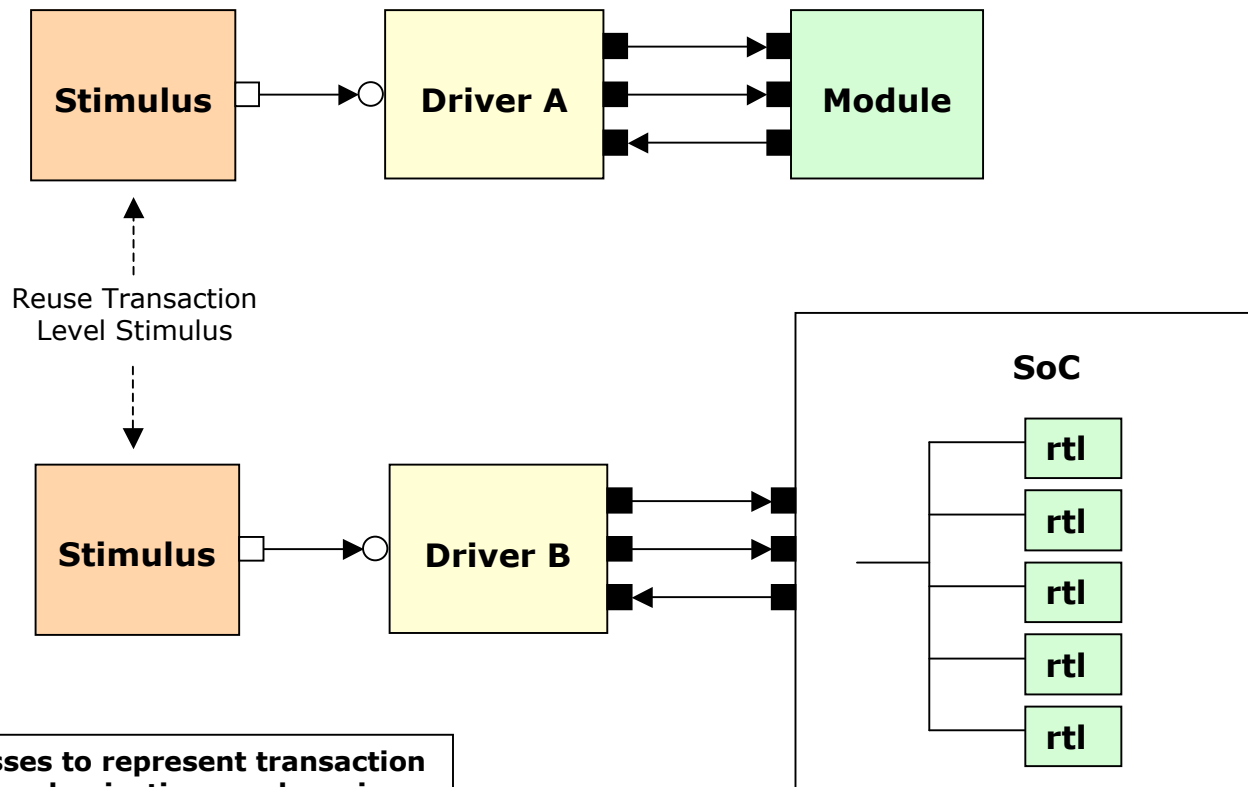
- **Mentor has developed the AVM**
 - Analysis ports, Recorders, Coverage
 - Configuration interfaces, general purpose verification utilities
- **Non Proprietary and Open**
 - Standards based
- **Contact vtech_team@mentor.com for further information**



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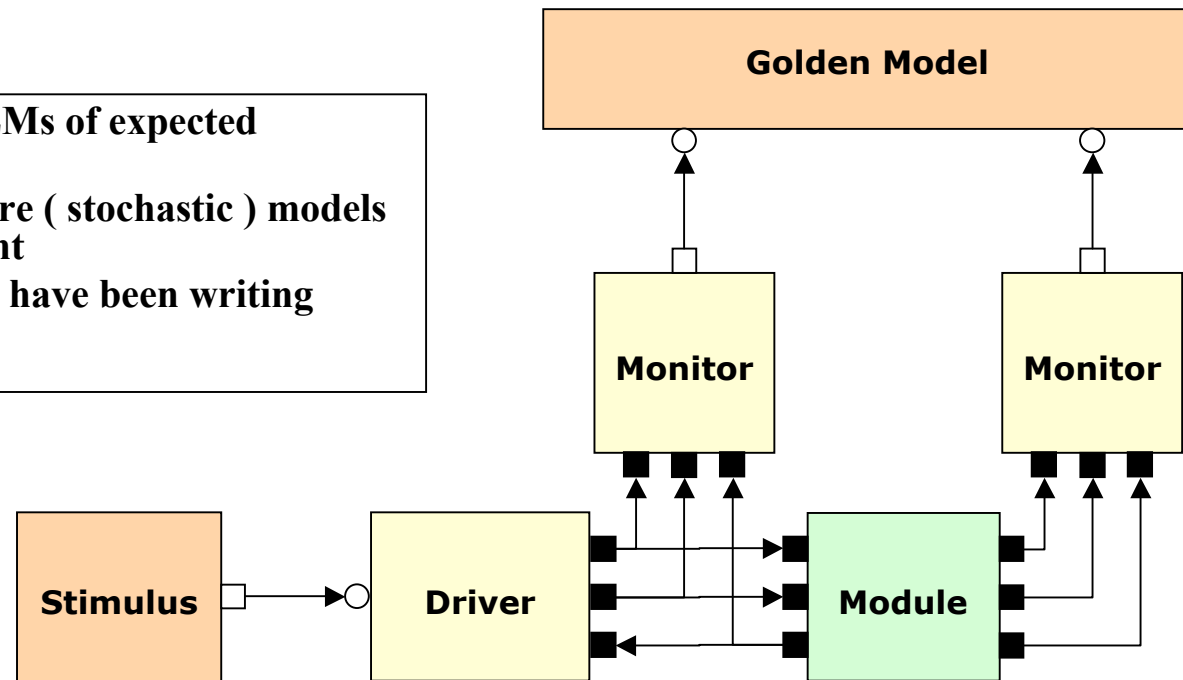
Transaction Level Verification and Reuse



Using classes to represent transaction makes randomisation much easier

Golden Models are TLMs

- Golden Models are TLMs of expected behaviour
- Stimulus Generators are (stochastic) models of external environment
- Verification Engineers have been writing TLMs for years



Responder

