The importance of description

April 2011
V1.0
Ambiguity

QuickTime™ and a mpeg4 decompressor are needed to see this picture.
Dead Horse Tales

Dakota tribal wisdom says that when you discover you are riding a dead horse, the best strategy is to dismount. However, in business, we often try other strategies with dead horses, including the following:

1. Buying a stronger whip.
2. Changing riders.
3. Saying 'This is the way we always have ridden this horse.'
4. Appointing a committee to study the horse.
5. Arranging to visit other sites to see how they ride dead horses.
6. Increasing the standards to ride dead horses.
7. Appointing a tiger team to revive the dead horse.
8. Creating a training session to increase our riding ability.
9. Comparing the state of dead horses in today's environment.
10. Change the requirements declaring that 'This horse is not dead!'
11. Hire contractors to ride the dead horse.
12. Harnessing several dead horses together for increased speed.
13. Declaring that 'No horse is to dead too beat.'
14. Providing additional funding to more...

Behind Schedule

The program manager couldn't grasp the idea of gathering requirements at the start of a project. "At a project kickoff meeting, which he had neglected to actually invite the customer to, we had a lot of discussion around what the software we were creating was supposed to do," says a programmer on the team. "I suggested putting together a requirements teleconference with the customer to clarify their ideas and goals." PM's response? "I was told we were already behind schedule and didn't have time to meet with the customer."
Descriptions

- Why do we want to describe?
  - If we cannot describe a thing we cannot understand it
  - Consider “He was of average height and weight, fair hair?”
    “Who is he?”
- What do we want to describe?
  - Software systems which comprise behavior across peers
    - Interactions and their ordering rules
    - Constraints
    - Information needs
- What can we do with a description?
  - Ask questions
    - Is A a representation of B?
    - How much of A fulfills B?
The micrometer removed ambiguity between specification and implementation leading to both Stevenson’s rocket and off shoring in the productionisation of the Enfield rifle during the US Civil War.
Zero Deviation Lifecycle (ZDLC)

- Testable integration Architecture Methodology
  - Refinement and Abstraction to support successive refinement of TiA models from requirements and alignment through abstraction
  - Formal verification of design against requirements
  - 80% reduction in costs from requirements to technical contracts

- The Systemic Defect Profiler
  - Based on TiA
  - Enables early identification of complex integration defects in SIT
  - Reduces cost by compressing time to identify
  - 50% reduction in cost of defects

- CPN Modeling and Simulation
  - Modeling and simulation for statistically based performance
"Fact 1: Here it is EXPENSIVE to fix defects (200 times than in REQUIREMENT)"

"Fact 2: Here it is CHEAPER to fix defects"

"If most of the defects are found here, according to CMMI this is a low maturity Organisation"

"If most of the defects are found here, according to CMMI this is a high maturity Organisation"

Testable Architecture enables prevention and early defect detection

Testable Architecture is FORMAL hence it reduces defects injection

This is a typical Defect Density Graph that shows the trend of defects across the phases of software development.

Yet Testable Architecture makes the steepest part of the curve flatter, reducing defects and increasing profit margins for clients.

Press Enter to continue...
What changes when you deploy TiA?

Faster, More Accurate

Deliverables

High Level Requirements

Refine Requirements And Construct Architectural Model

Refined Requirements And Architectural Model

Enterprise Architect

Construct Architecture Model

Architecture Model

Review Model

Review Contracts

Derive Technical Contracts

Generate Technical Contracts

Production Deliverables

UAT to Production

Code/Test

SIT

Remediate

Remediate (N)

Remediate (N*20%)

Remediate (N)

Derive Technical Contracts

Technical Contracts

Remediate (N)

Generate Technical Contracts

Enterprise Architect/Designer

Developer

Developer

Developer

Review Contracts
It’s a bit like having a design complier that matches requirements to design. You can trust it for the same reasons that we don’t check the byte code generated by a compiler.
The TiA Methodology

Requirements, Models and Levels

The TA Methodology

Monitor - Runtime Enforcement
Test - J2EE, .NET
Implement - J2EE, .NET
Guide Implementation - UML, WSDL, BPEL, HTML

Gather requirements - Sequence diagrams and messages
Model - system architecture of services
Verify model sign-off on description - BPMN, HTML
Removing ambiguity - Driving up quality, Driving down costs, Increasing agility in a controlled way
## Refinement and Abstraction

<table>
<thead>
<tr>
<th>Levels</th>
<th>Description</th>
<th>Requirements</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Business</td>
<td>We want to have a cross functional claims process available online for both agents and insured parties</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Lifecycle</td>
<td>No processing of a claim can occur until after a claim has been notified. Status enquiries and claims processing happen in parallel. Only when claims processing has finished will a claim be settled</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Abstract Communication</td>
<td>All policies will have a policy reference that is a string Portals will be provided for key participants. Existing systems will be reused as services. A set of concrete use cases and supporting sequence diagrams.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bound Communication</td>
<td>Legacy system will use a schema called Legacy.xsd Identities are provided by ClaimRef or PolicyRef depending on context Use BPEL and WebMethods</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>State Machines</td>
<td>Generated from an L3 model</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Executables</td>
<td>Generated from an L3 model and augmented by business logic from low level designs</td>
<td></td>
</tr>
</tbody>
</table>
The Systemic Defect Profiler

- **Conventional Testing today:**
  - In Systems Integration Testing (SIT), when a tester finds an error he/she hands it back to the developer in the form of test results report and any log files.
  - The developer, armed with a series of logs and test result reports, tries to determine the cause of the errors.
  - However developers having a partial (application-based) view can only identify coding errors but in most cases complex design / architectural errors are usually overlooked and are hard to detect. The only other individual with the holistic and complete view of the expected outcome is the Solutions Architect.

- **The premise:**
  - The understanding of the overall picture is a combination of design documents, models and some innate knowledge of how the system should behave. The designs and models are often expressed at the incorrect level to lend themselves to any automated reasoning.
  - Information needed to correctly identify the root cause of complex problems is at worst lost and at best poorly encoded / defined.
The Systemic Defect Profiler

- **TiA Model**
  - Correlates observation to model to determine variance from hypothesis that is the model

- **SDP Analyzer**
  - Generates an SDP report showing where variance arises and indicates the likely cause

- **Correlator**
  - Conducts an auction with potential Buyers

- **Seller**
  - Offers good for sale with a reserve price

- **Buyer**
  - Buys goods at an acceptable price to Buyer

- **Broker**
  - Conducts a negotiation

...
The Systemic Defect Profiler

Test run for /Users/steve/workspace/BrokerExample/choreography/models/Broker.cdm on Tue Aug 04 13:17:17 BST 2009

<table>
<thead>
<tr>
<th>SEQUENCE</th>
<th>STATUS</th>
<th>ELAPSED (MS)</th>
<th>FROM</th>
<th>TO</th>
<th>OPERATION</th>
<th>MESSAGE</th>
<th>INTERACTION</th>
<th>EXCHANGE</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Completed</td>
<td>1251</td>
<td>BrokerRole</td>
<td>SellerRole</td>
<td>sendMessage</td>
<td>Payload</td>
<td>Seller2BrokerGoodsRequest</td>
<td>Request</td>
</tr>
<tr>
<td>2</td>
<td>Completed</td>
<td>373</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Payload</td>
<td>Broker2BuyerGoodRequest</td>
<td>Request</td>
</tr>
<tr>
<td>3</td>
<td>Completed</td>
<td>34</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateNotification</td>
<td>Request</td>
</tr>
<tr>
<td>4</td>
<td>Completed</td>
<td>38</td>
<td>BuyerRole</td>
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<td>sendMessage</td>
<td>Update</td>
<td>Broker2BuyerUpdateRequest</td>
<td>Request</td>
</tr>
<tr>
<td>5</td>
<td>Completed</td>
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<td>BuyerRole</td>
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<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateNotification</td>
<td>Request</td>
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<tr>
<td>6</td>
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<td>BuyerRole</td>
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<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateRequest</td>
<td>Request</td>
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<td>Update</td>
<td>Buyer2BrokerUpdateNotification</td>
<td>Request</td>
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<tr>
<td>8</td>
<td>Completed</td>
<td>21</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateRequest</td>
<td>Request</td>
</tr>
<tr>
<td>9</td>
<td>Completed</td>
<td>15</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateNotification</td>
<td>Request</td>
</tr>
<tr>
<td>10</td>
<td>Completed</td>
<td>14</td>
<td>BuyerRole</td>
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<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateRequest</td>
<td>Request</td>
</tr>
<tr>
<td>11</td>
<td>Completed</td>
<td>12</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateNotification</td>
<td>Request</td>
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<tr>
<td>12</td>
<td>Completed</td>
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<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateRequest</td>
<td>Request</td>
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<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateNotification</td>
<td>Request</td>
</tr>
<tr>
<td>14</td>
<td>Completed</td>
<td>12</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateRequest</td>
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</tr>
<tr>
<td>15</td>
<td>Completed</td>
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<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateNotification</td>
<td>Request</td>
</tr>
<tr>
<td>16</td>
<td>Completed</td>
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<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateRequest</td>
<td>Request</td>
</tr>
<tr>
<td>17</td>
<td>Completed</td>
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<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateNotification</td>
<td>Request</td>
</tr>
<tr>
<td>18</td>
<td>Completed</td>
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<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Update</td>
<td>Buyer2BrokerUpdateRequest</td>
<td>Request</td>
</tr>
<tr>
<td>19</td>
<td>Initiated</td>
<td></td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>sendMessage</td>
<td>Acknowledgement</td>
<td>Buyer2BrokerAcknowledgementNotification</td>
<td>Notify</td>
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</tbody>
</table>
| 20       | Unexpected |              | BuyerParticipant | BrokerParticipant | Payload |}

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The Systemic Defect Profiler

Test run for /Users/steve/workspace/BrokerExample/choreography/models/Broker.cdm on Tue Aug 04 13:17:17 BS

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<tr>
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<th>FROM</th>
<th>TO</th>
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<tbody>
<tr>
<td>1</td>
<td>Completed</td>
<td>1251</td>
<td>BrokerRole</td>
<td>SellerRole</td>
<td>Seller offers goods for sale to the Broker</td>
</tr>
<tr>
<td>2</td>
<td>Completed</td>
<td>373</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>Broker offers the goods at the original price to the Buyer for consideration</td>
</tr>
<tr>
<td>3</td>
<td>Completed</td>
<td>34</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>Buyer sends a new price to the Buyer for consideration</td>
</tr>
<tr>
<td>4</td>
<td>Completed</td>
<td>38</td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>Buyer sends a notification to the Broker that the price is not acceptable</td>
</tr>
<tr>
<td>5</td>
<td>Completed</td>
<td>34</td>
<td>BuyerRole</td>
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<td>BuyerRole</td>
<td>BrokerRole</td>
<td>Buyer sends a notification to the Broker that the price is not acceptable</td>
</tr>
<tr>
<td>19</td>
<td>Initiated</td>
<td></td>
<td>BuyerRole</td>
<td>BrokerRole</td>
<td>Buyer sends an acknowledgement message accepting the goods at that price to the Broker</td>
</tr>
<tr>
<td>20</td>
<td>Unexpected</td>
<td></td>
<td>BuyerParticipant</td>
<td>BrokerParticipant</td>
<td>BuyerParticipant has sent a message that is unrecognised by BrokerParticipant it is likely that either the sender (BuyerParticipant) or recipient (BrokerParticipant) have been implemented incorrectly as their contracts do not match. The receiver (BrokerParticipant) expects to receive AcknowledgementMessageType but the sender (BuyerParticipant) has sent Payload. Look at the exchange labelled Buyer2BrokerOkEx which is in the interaction labelled Buyer2BrokerAcknowledgementNotification in the Choreography Flow of the TA model file /Users/steve/workspace/BrokerExample/choreography/models/Broker.cdm</td>
</tr>
</tbody>
</table>

The diagnosis of the error is what SDP does. This has been totally automated. This is specific to ASP/CTS.
About Savara

- Open Source Community Project
- Co-founded by:
  - Cognizant Technology Solutions
  - Red Hat
  - Amantra
- Launched Sept 2009
- Based on Testable Architecture
- A tool suite that will support the end to end enterprise/solution architecture and delivery such that all artefacts are testable against some hypothesis (the principle of testable architecture).
- Savara’s initial target is in support of SOA’s
- **Descriptions, conformance of descriptions, bi-simulation of description and simulation of descriptions are at the heart of Savara**