

Acceptance Testing for Continuous Delivery

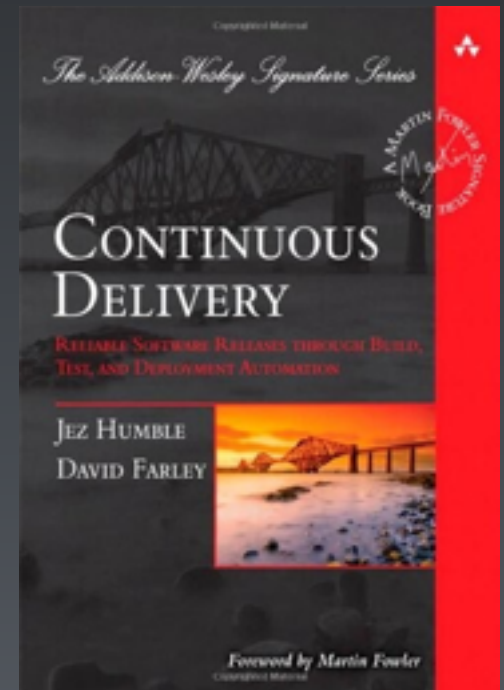
Dave Farley

<http://www.davefarley.net>

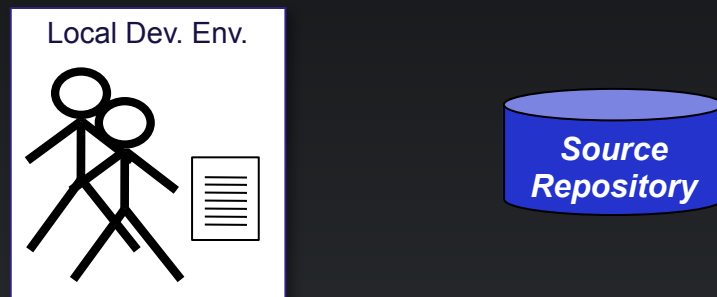
@davefarley77



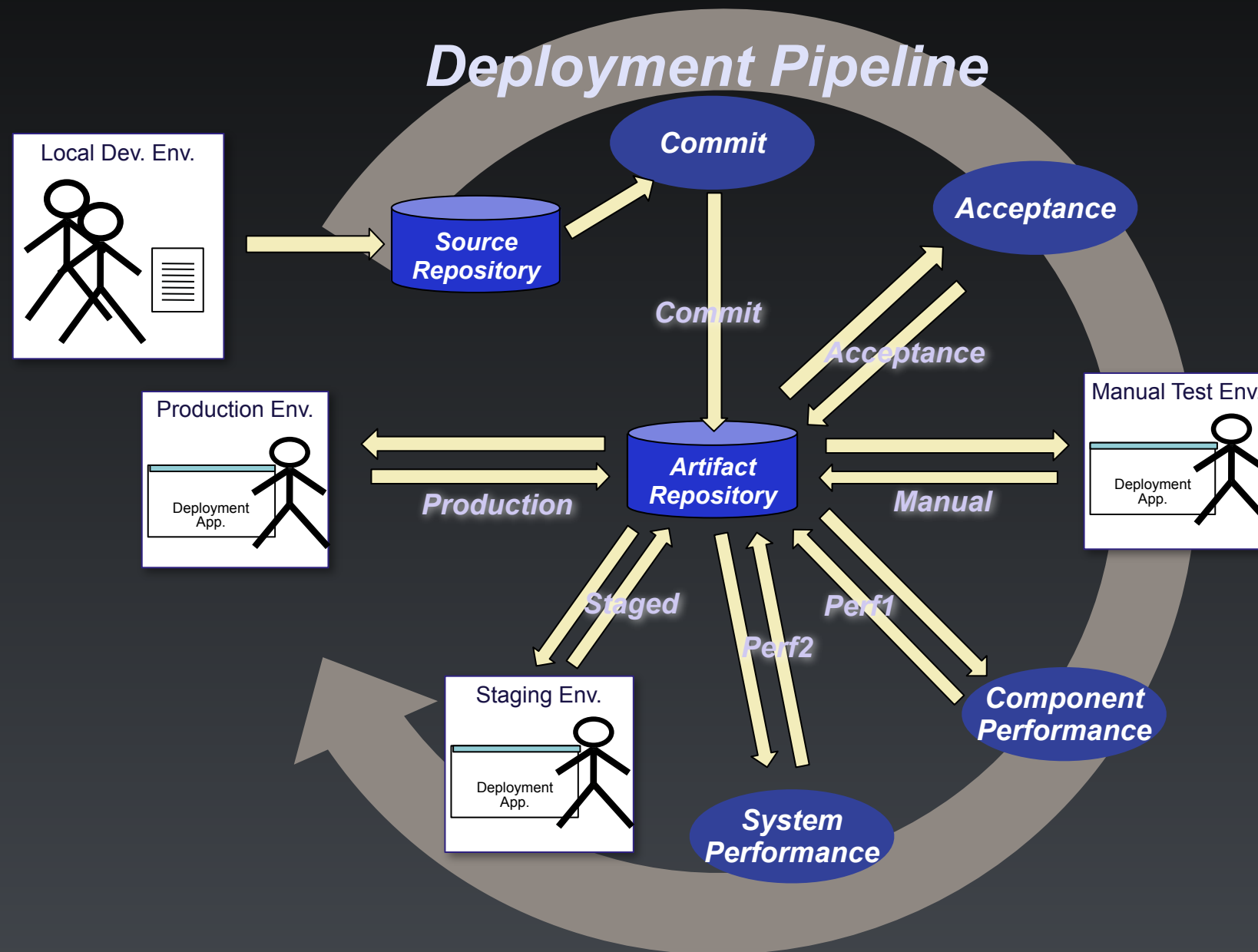
<http://www.continuous-delivery.co.uk>



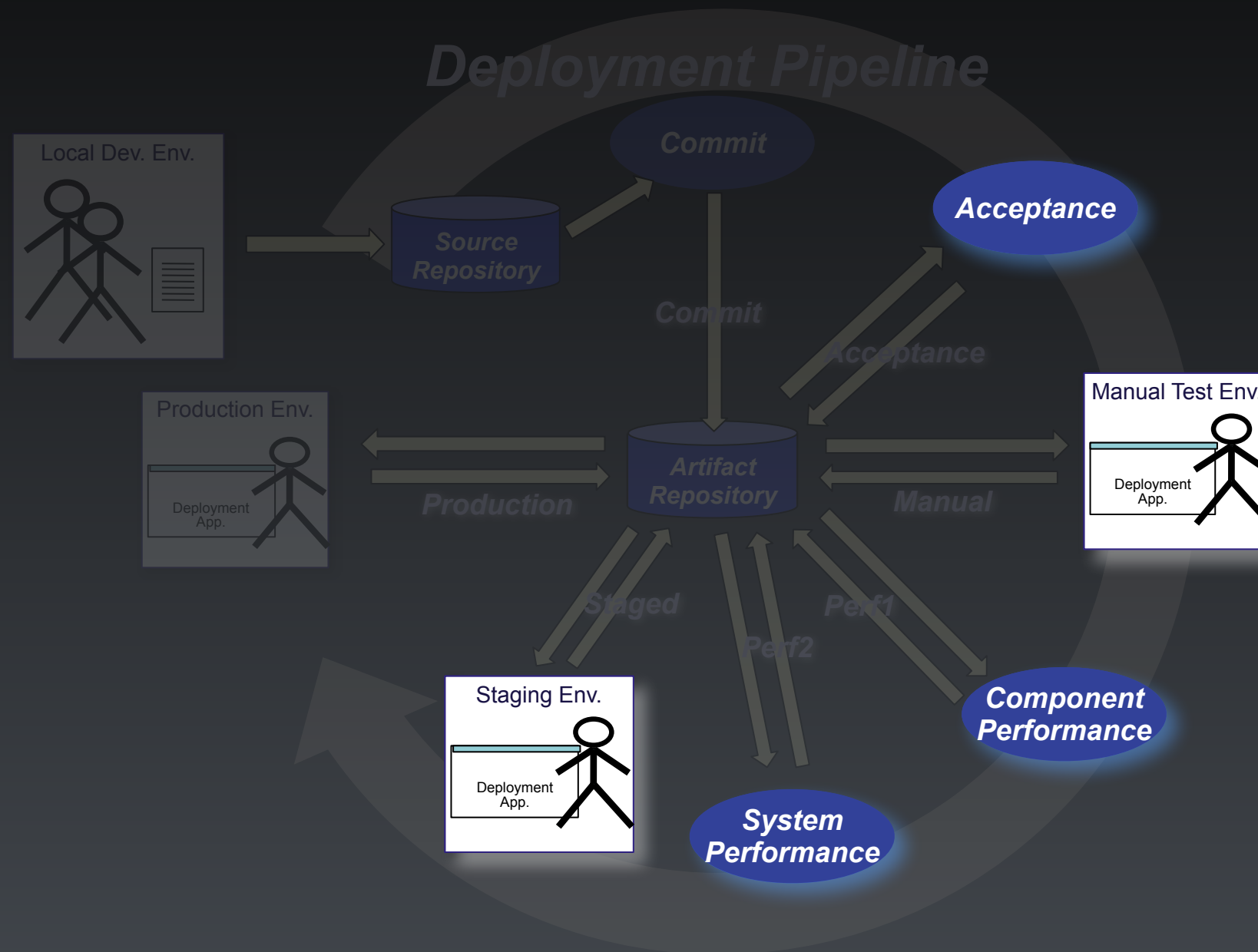
The Role of Acceptance Testing



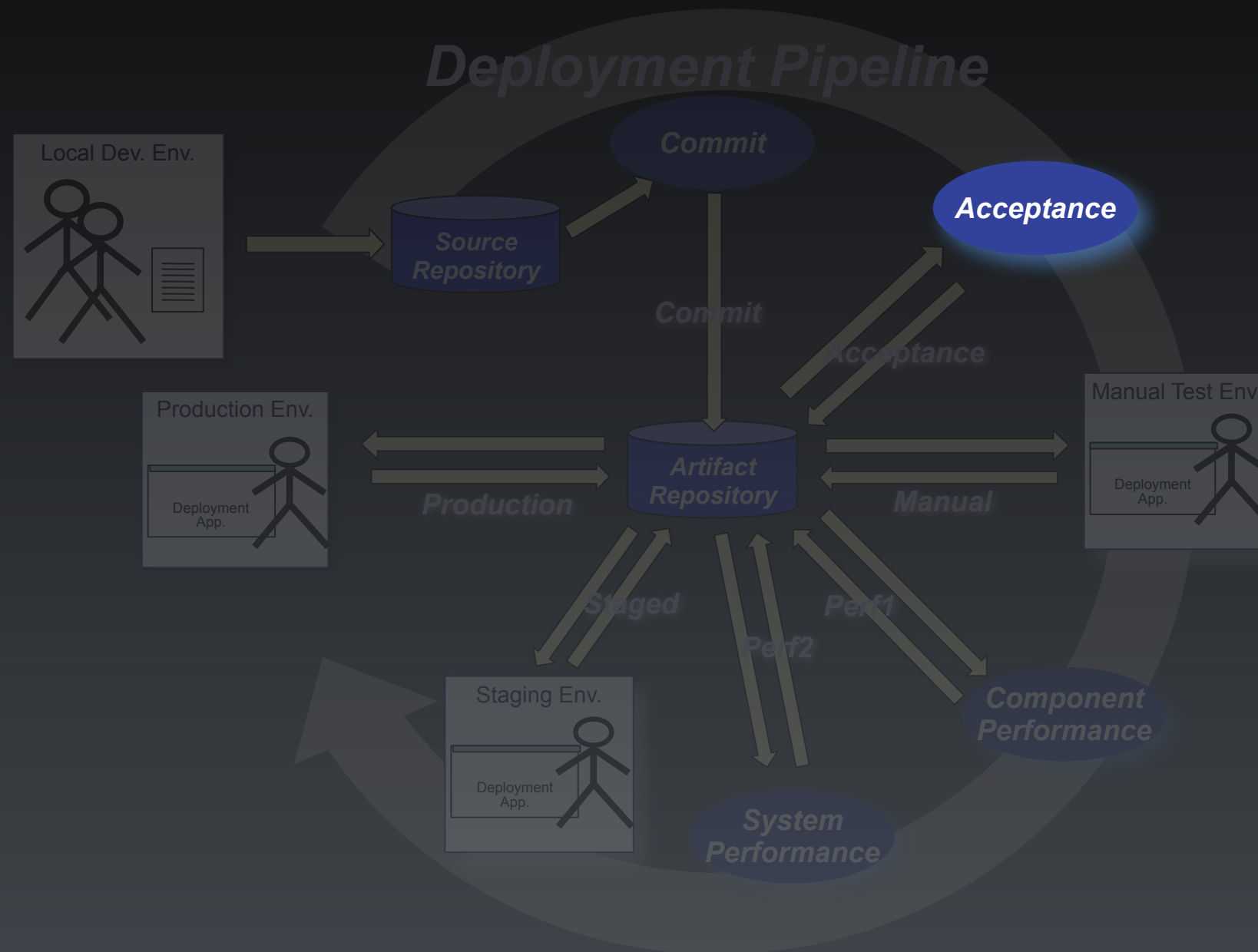
The Role of Acceptance Testing



The Role of Acceptance Testing



The Role of Acceptance Testing



What is Acceptance Testing?

- Asserts that the code does what the users want.
- An automated “definition of done”
- Asserts that the code works in a “production-like” test environment.
- A test of the deployment and configuration of a whole system.
- Provides timely feedback on stories - closes a feedback loop.
- Acceptance Testing, ATDD, BDD, Specification by Example, Executable Specifications.

What is Acceptance Testing?

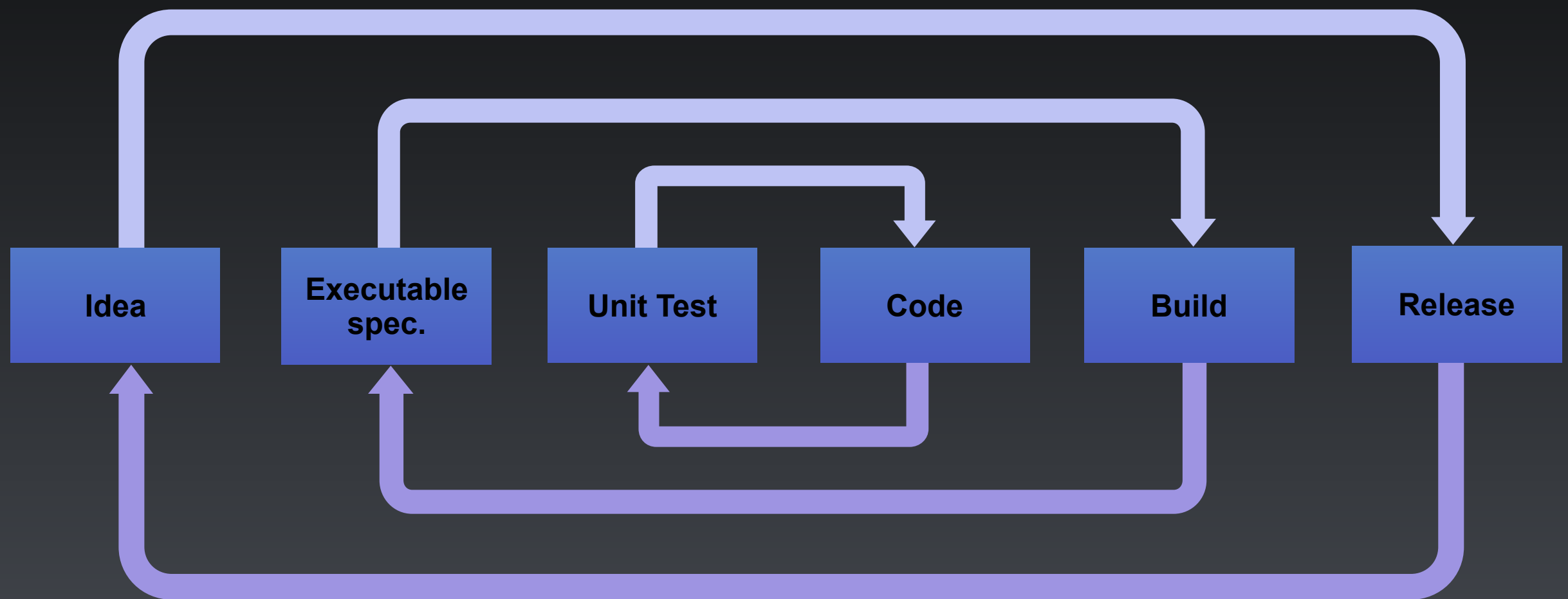
A Good Acceptance Test is:

**An Executable Specification of
the Behaviour of the System**

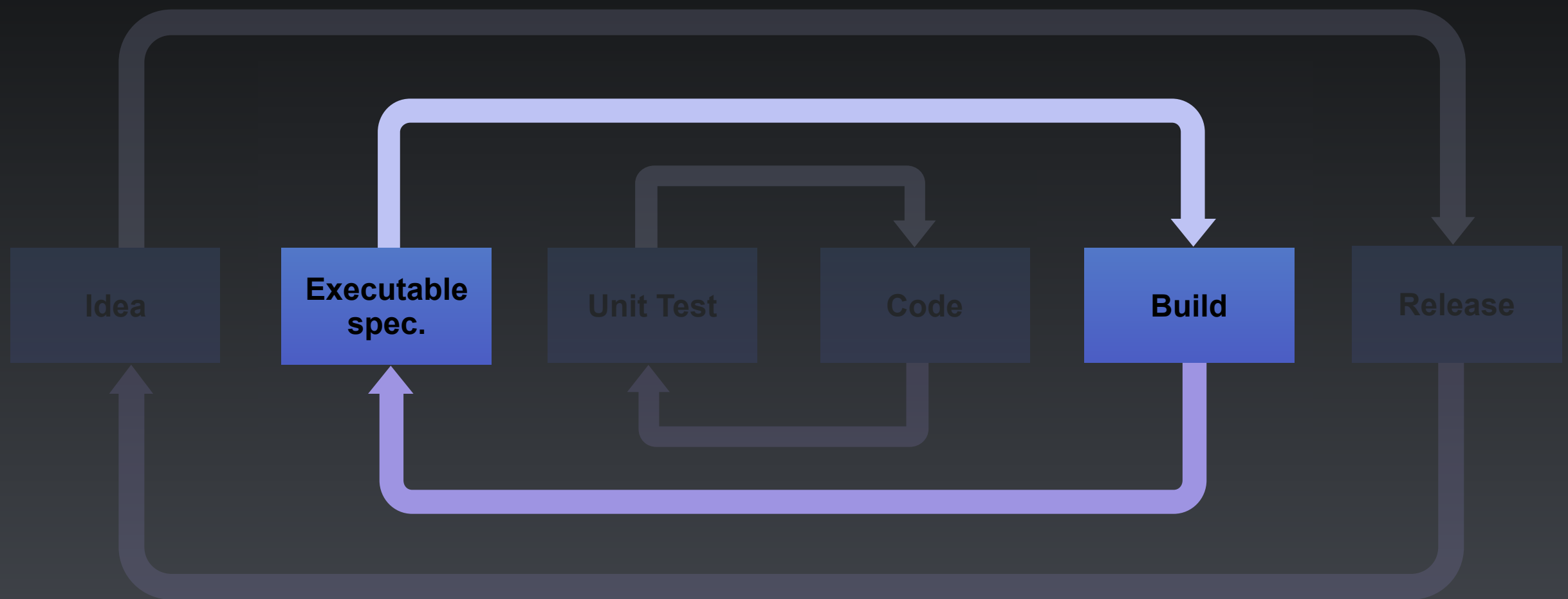
What is Acceptance Testing?



What is Acceptance Testing?



What is Acceptance Testing?



So What's So Hard?

- Tests break when the SUT changes (Particularly UI)
- Tests are complex to develop
- This is a problem of design, the tests are too tightly-coupled to the SUT!
- The history is littered with poor implementations:
 - UI Record-and-playback Systems
 - Record-and-playback of production data
 - Dumps of production data to test systems
 - Nasty automated testing products.

So What's So Hard?

- Tests break when the SUT changes (Particularly UI)
- Tests are complex to develop
- This is a problem of design, the tests are too tightly-coupled to the SUT!
- The history is littered with poor implementations:

- UI-dependent under-played Systems

- Recording production data

- Dumps of data to test systems

- Nasty and messy products!

Who Owns the Tests?

- Anyone can write a test
- Developers are the people that will break tests
- Therefore Developers own the responsibility to keep them working
- Separate Testing/QA team owning automated tests

Who Owns the Tests?

- Anyone can write a test
- Developers are the people that will break tests
- Therefore Developers own the responsibility to keep them working

- ~~Separate Testing/QA team writing automated tests~~

Anti-Pattern!

Who Owns the Tests?

**Developers Own
Acceptance Tests!**

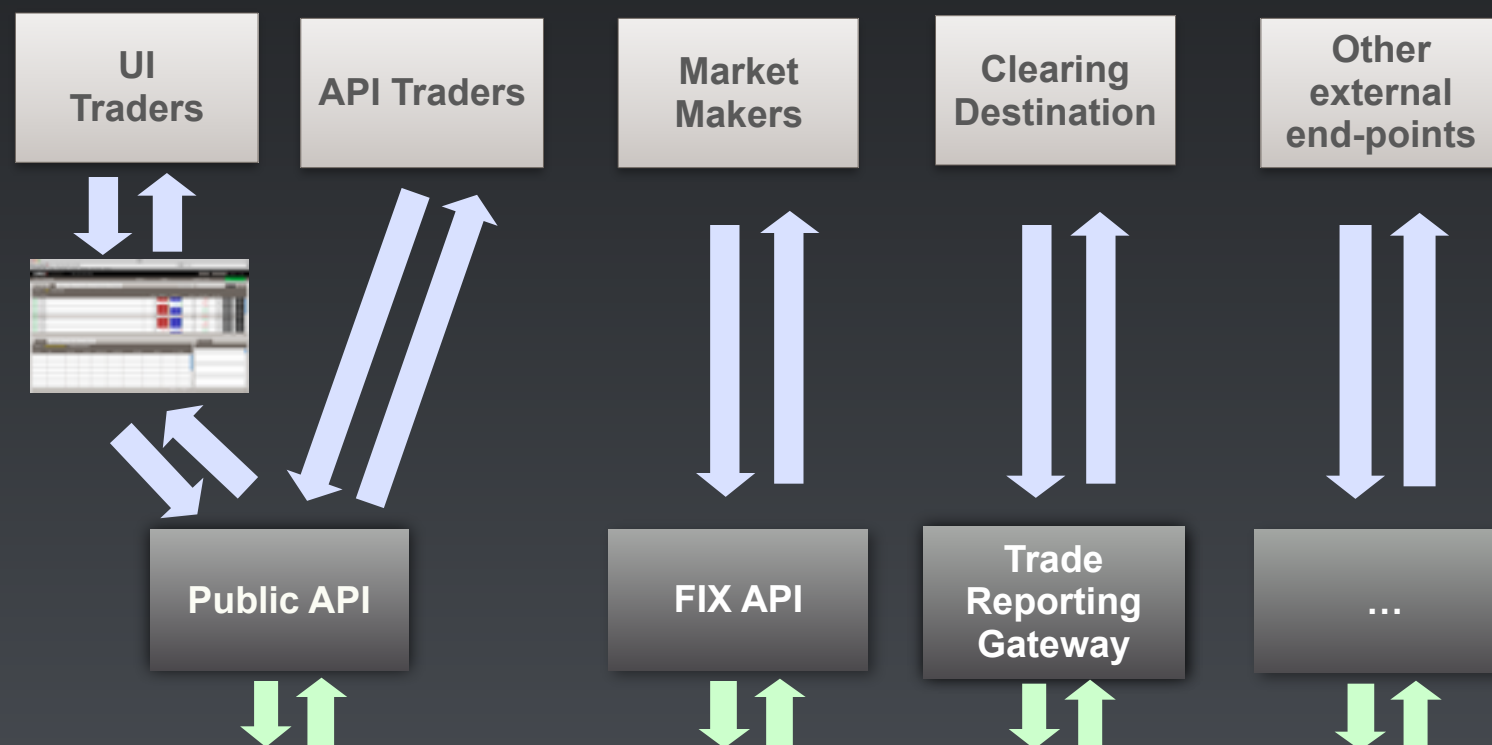
Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

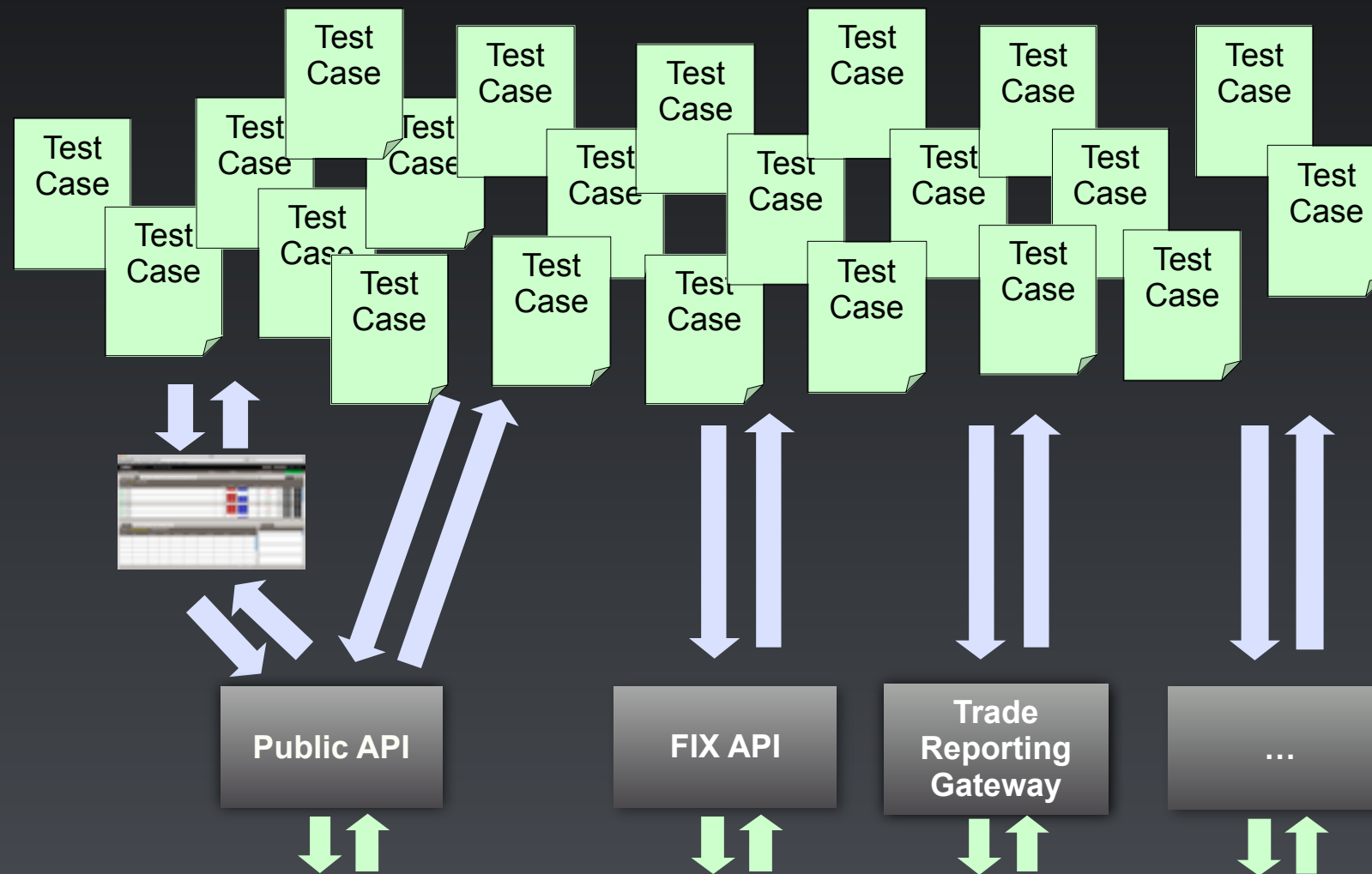
Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

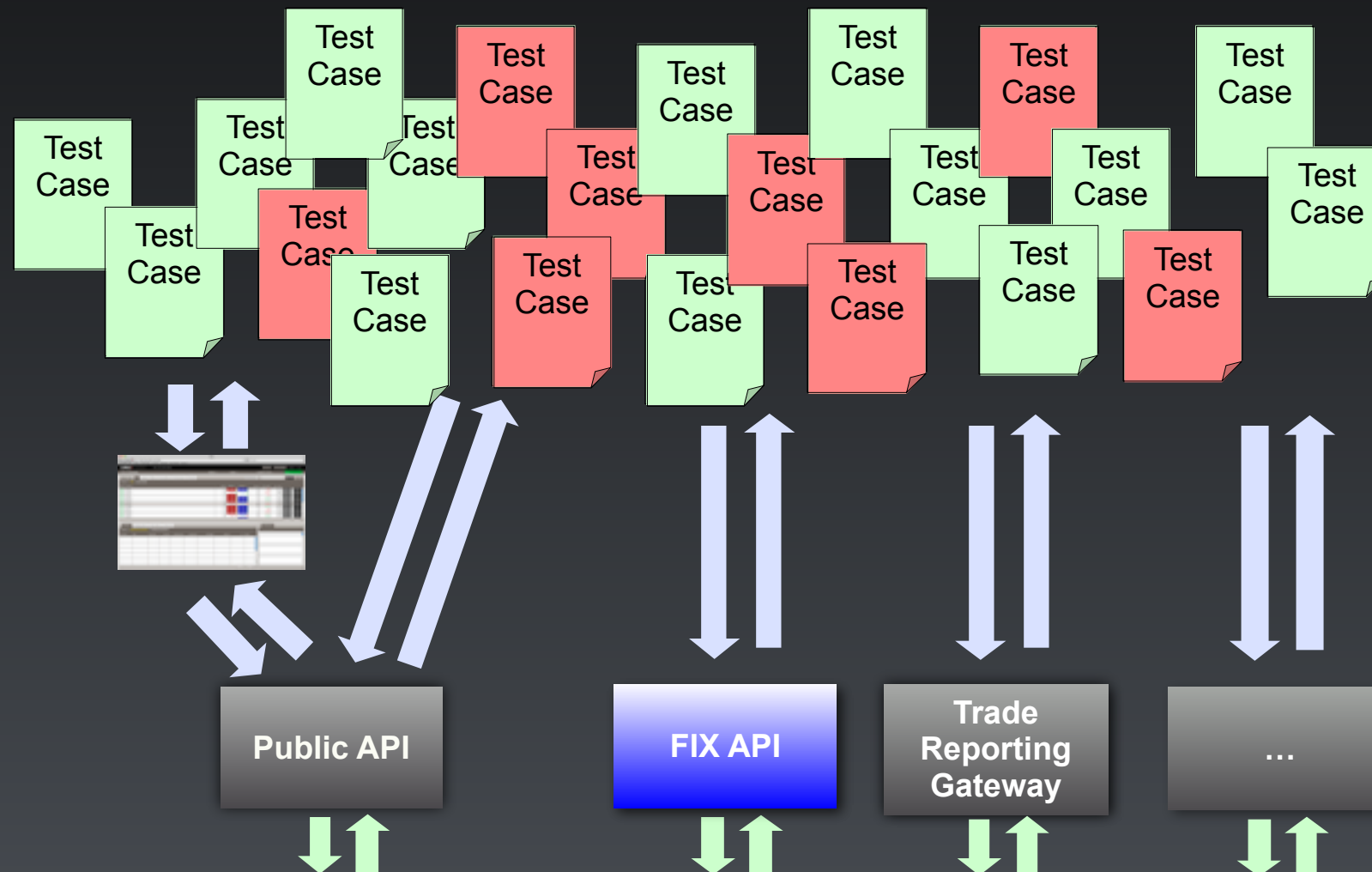
“What” not “How”



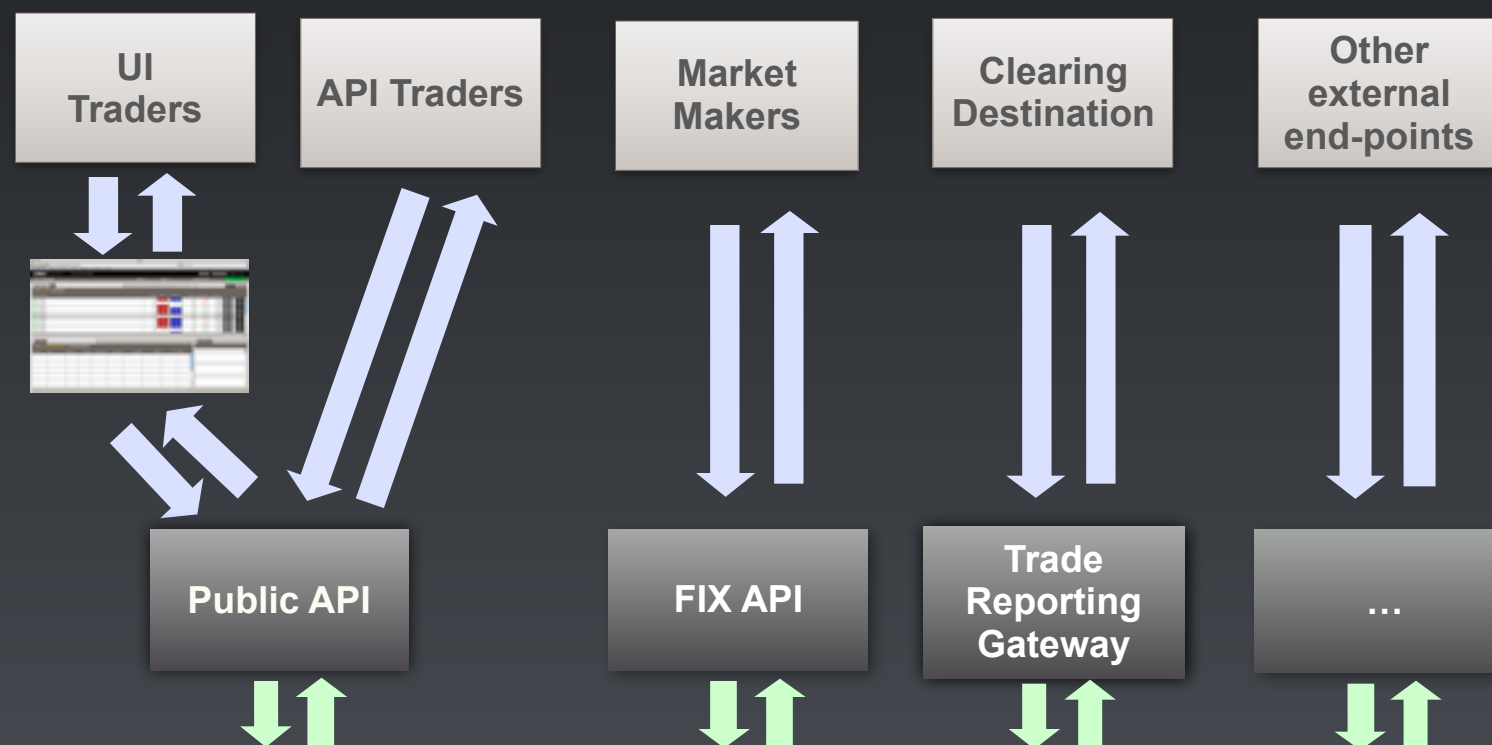
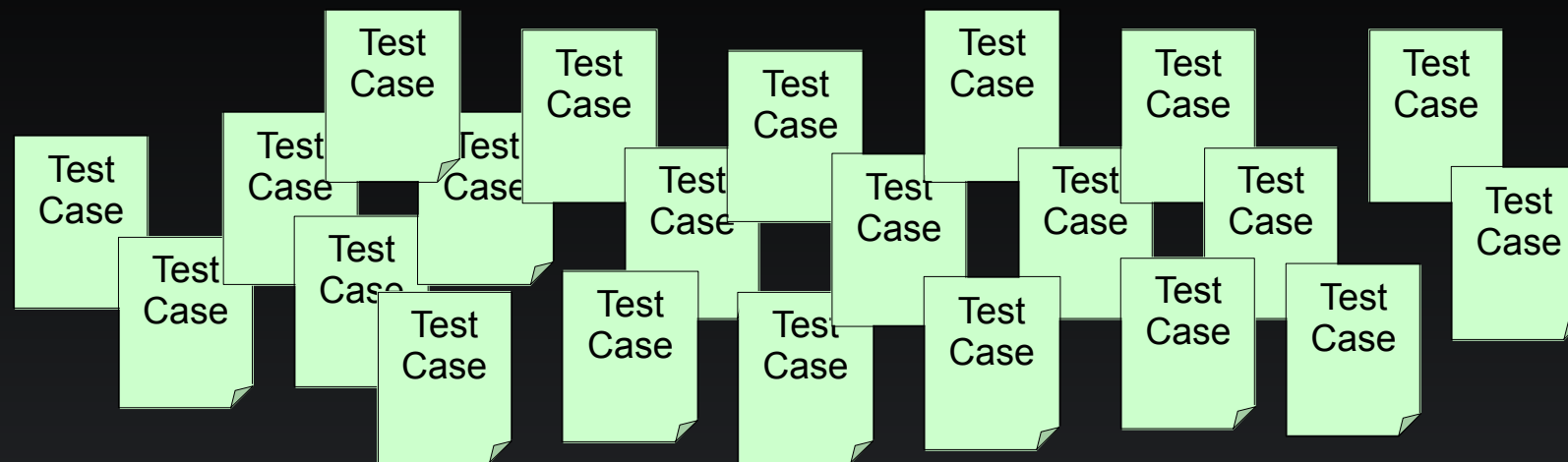
“What” not “How”



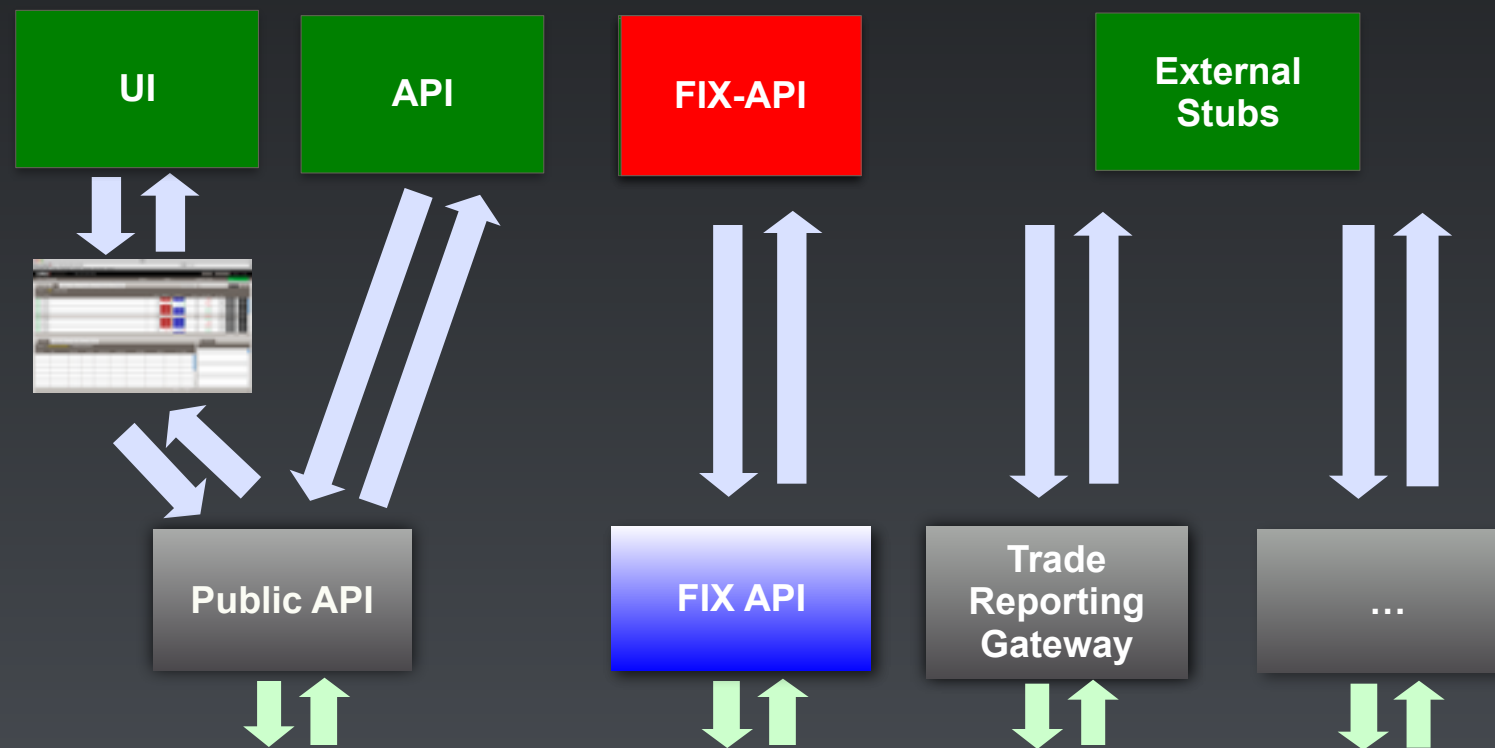
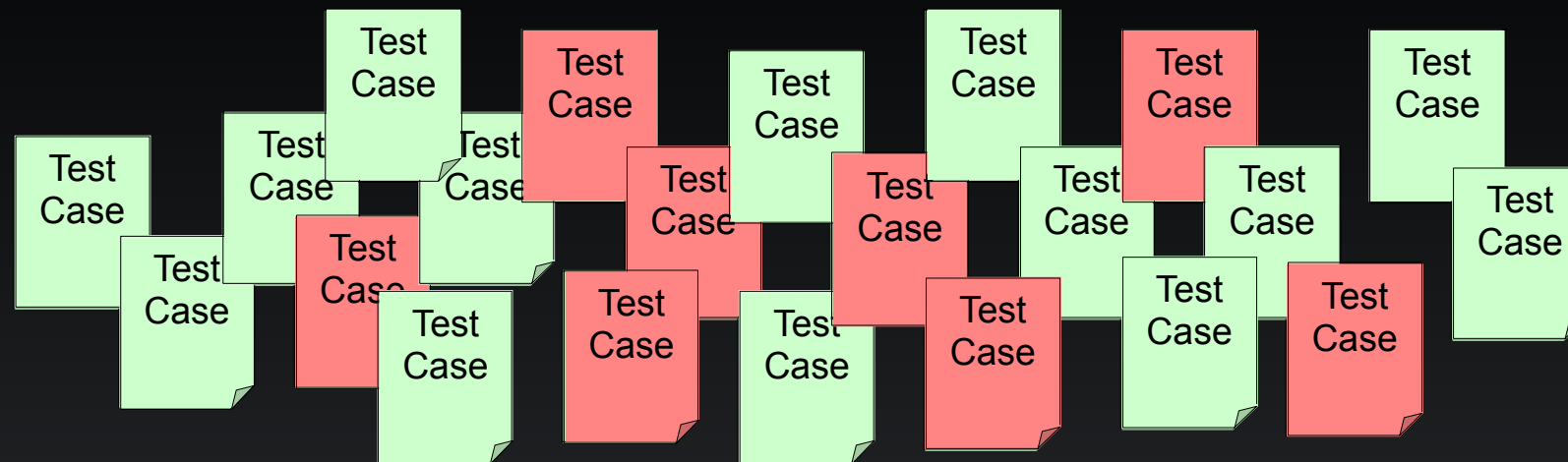
“What” not “How”



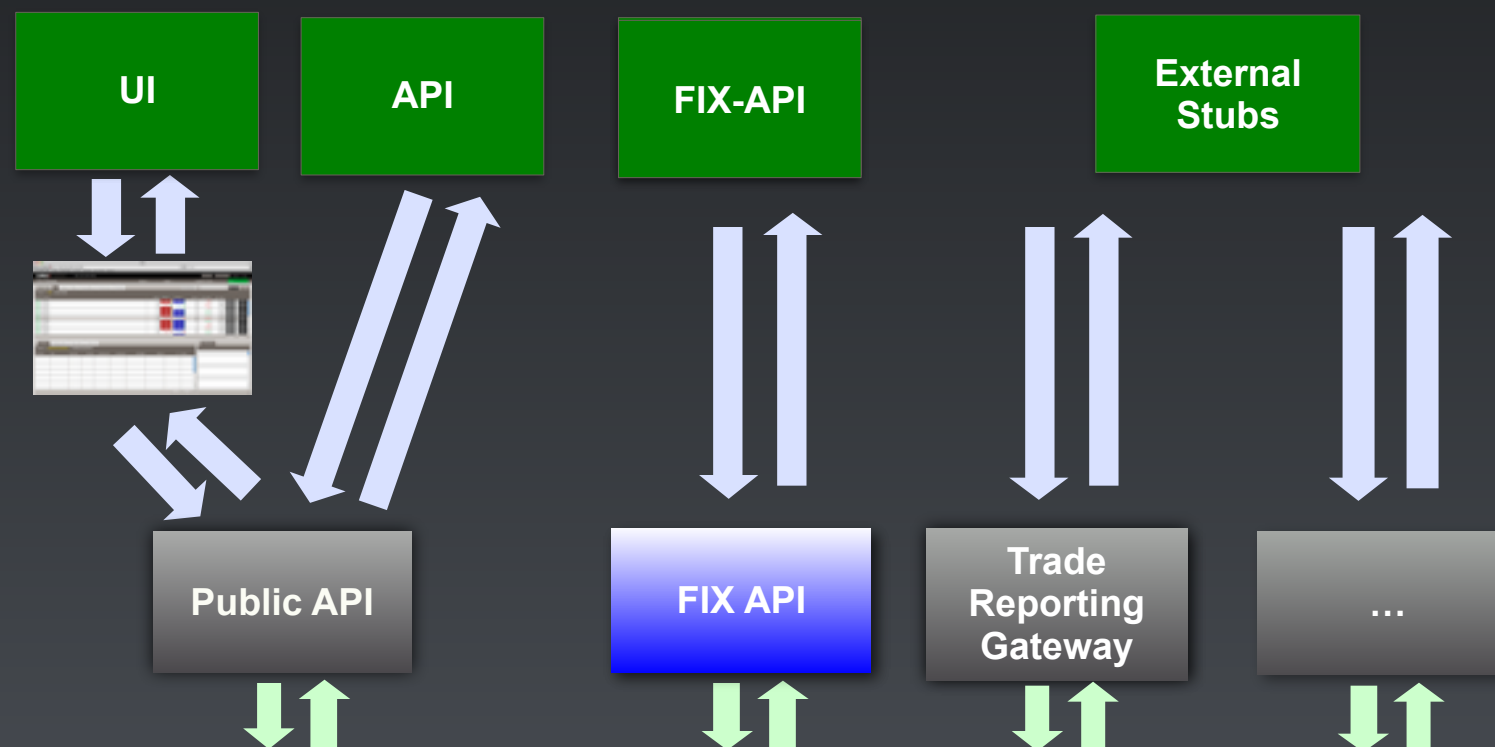
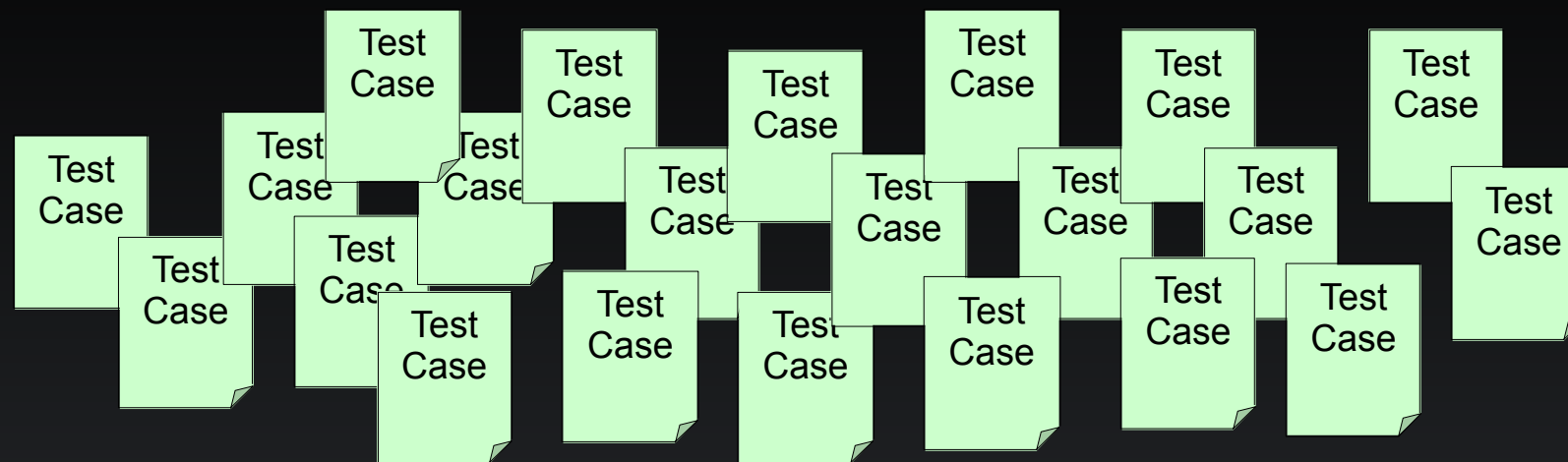
“What” not “How”



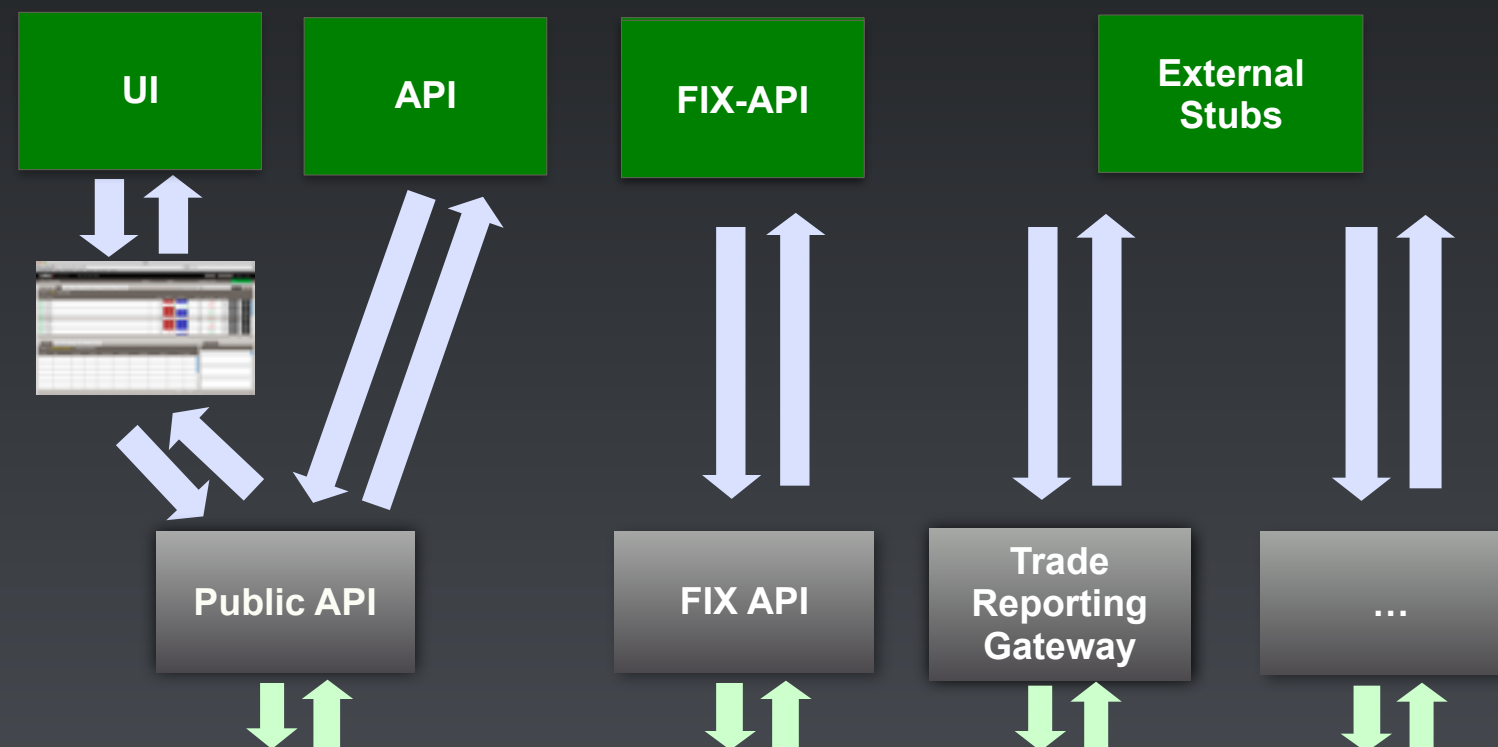
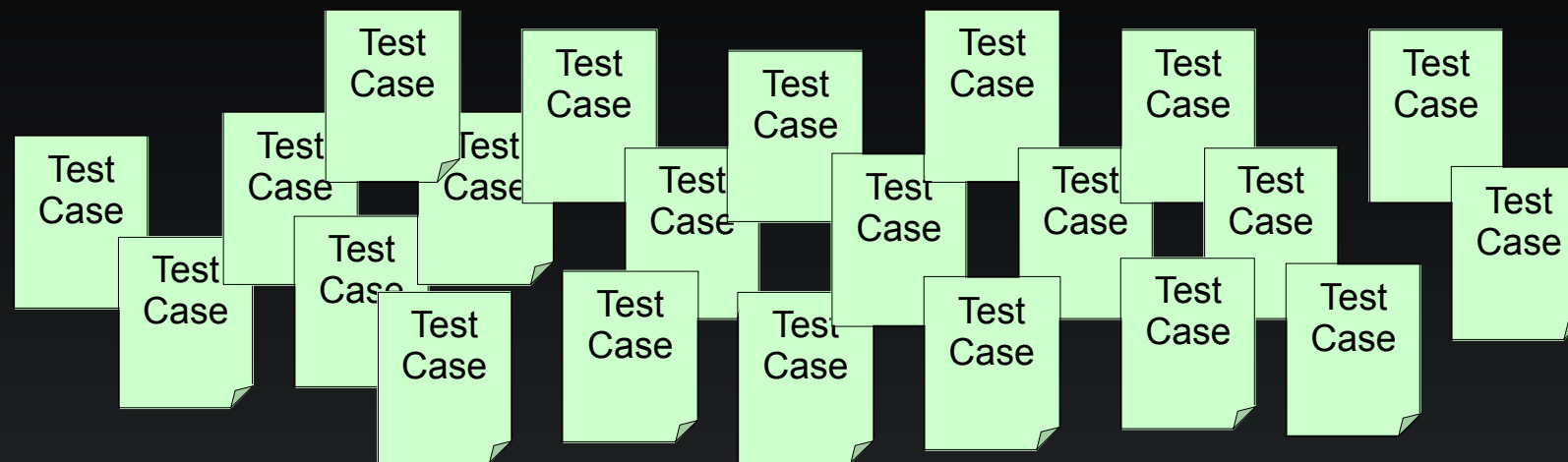
“What” not “How”



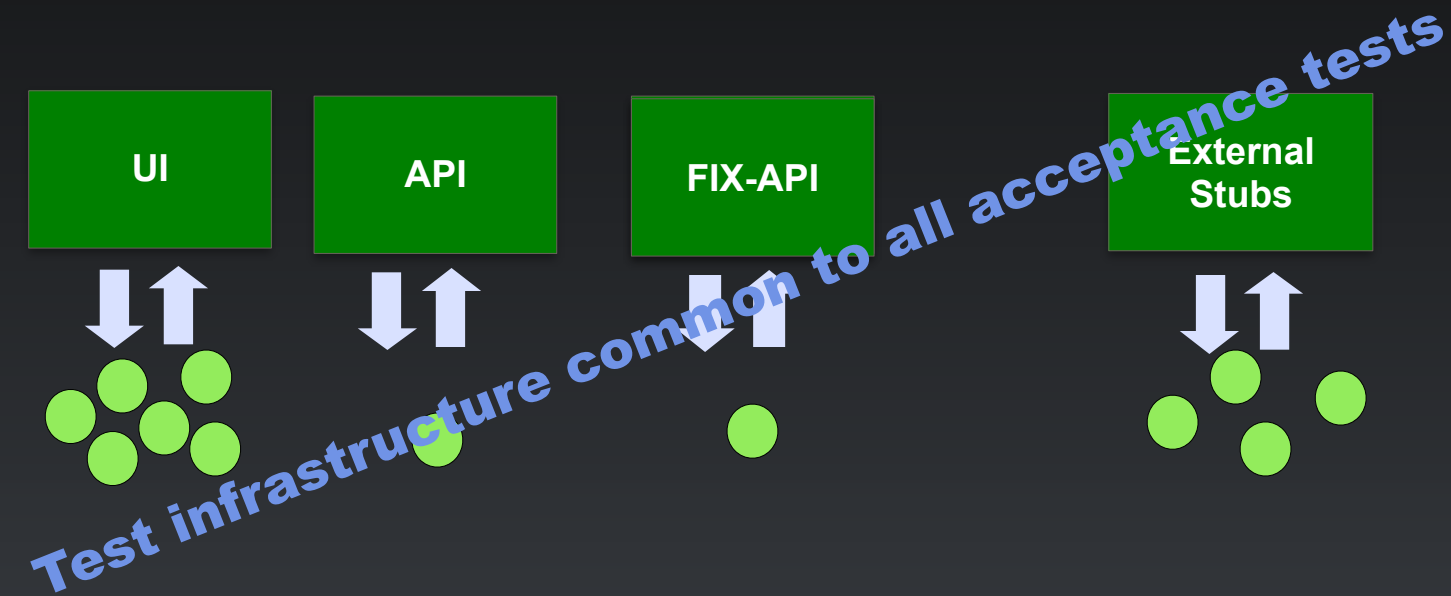
“What” not “How”



“What” not “How”



“What” not “How”



“What” not “How” - Separate Deployment from Testing

- Every Test should control its start conditions, and so should start and init the app.
- Acceptance Test deployment should be a rehearsal for Production Release
- This separation of concerns provides an opportunity for optimisation
 - Parallel tests in a shared environment
 - Lower test start-up overhead

“What” not “How” - Separate Deployment from Testing

- Every Test should control its own conditions, and so should start and init the app

Anti-Pattern!

- Acceptance Test deployment should be a rehearsal for Production Release
- This separation of concerns provides an opportunity for optimisation
 - Parallel tests in a shared environment
 - Lower test start-up overhead

Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Properties of Good Acceptance Tests

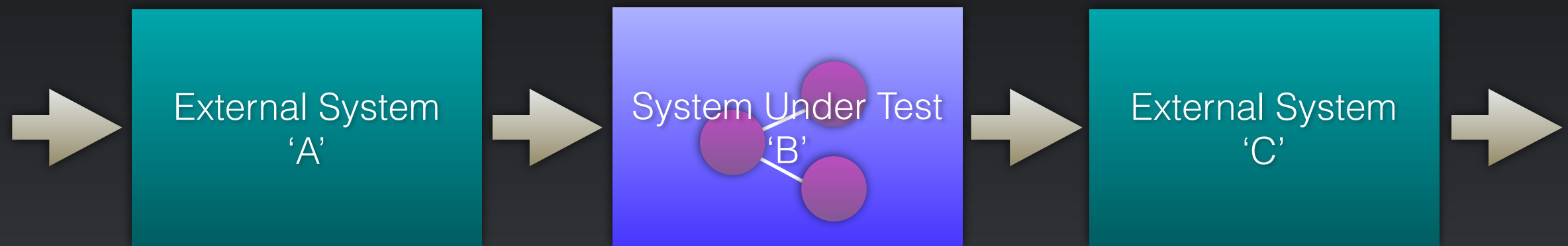
- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Test Isolation

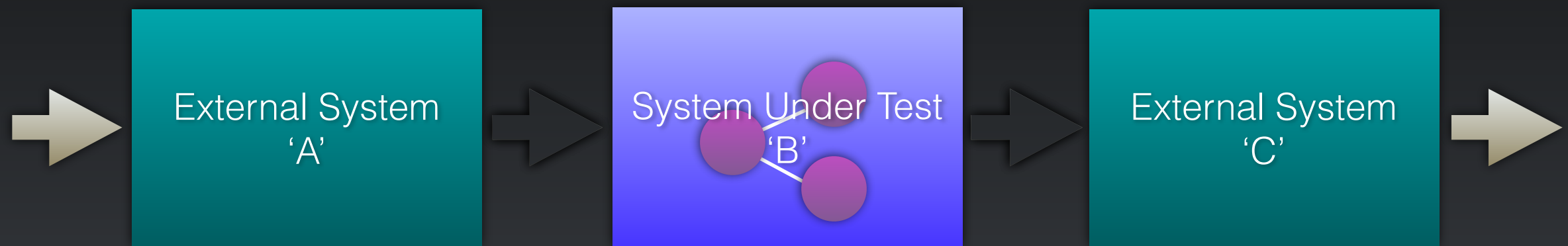
- Any form of testing is about evaluating something in controlled circumstances
- Isolation works on multiple levels
 - Isolating the System under test
 - Isolating test cases from each other
 - Isolating test cases from themselves (temporal isolation)
- Isolation is a vital part of your Test Strategy

Test Isolation - Isolating the System Under Test

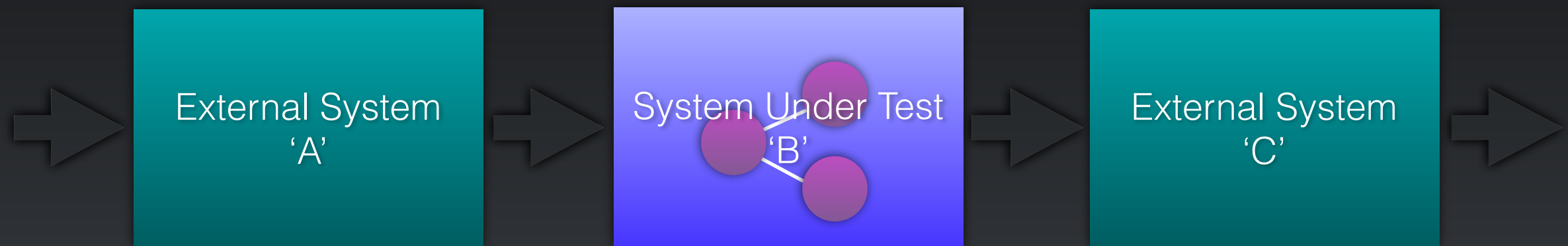
Test Isolation - Isolating the System Under Test



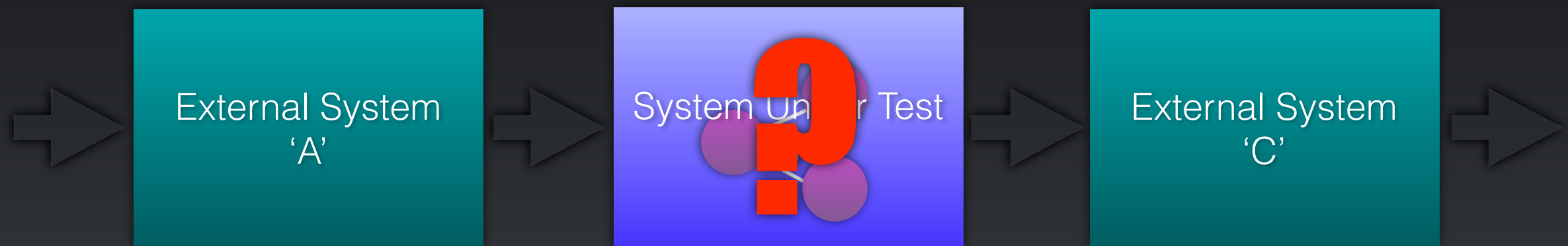
Test Isolation - Isolating the System Under Test



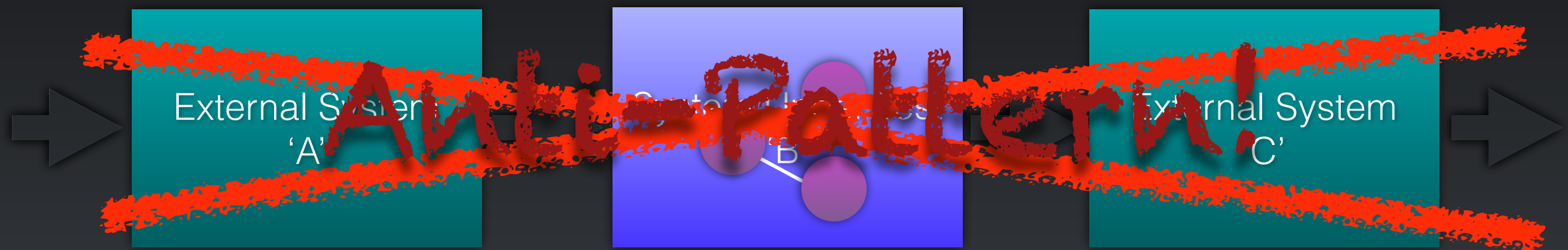
Test Isolation - Isolating the System Under Test



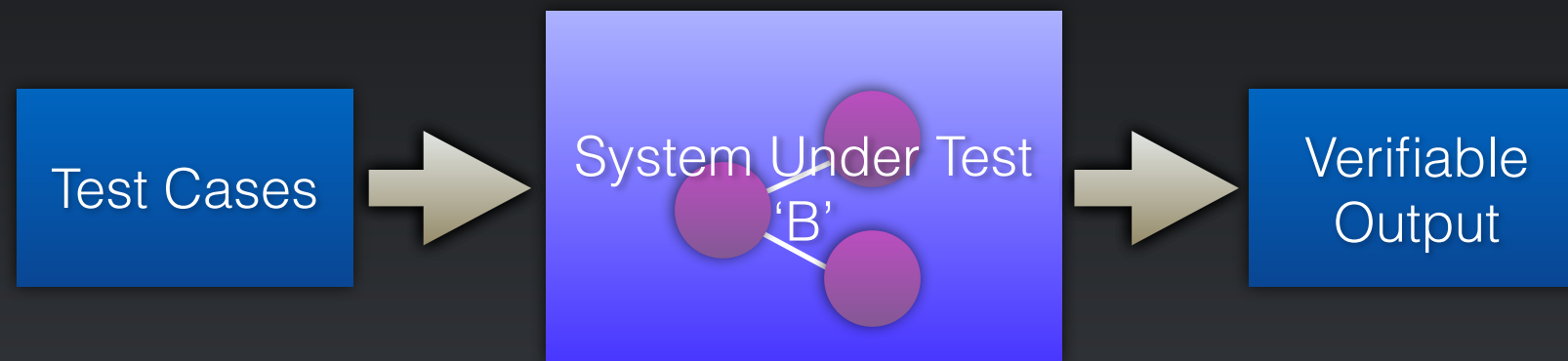
Test Isolation - Isolating the System Under Test



Test Isolation - Isolating the System Under Test

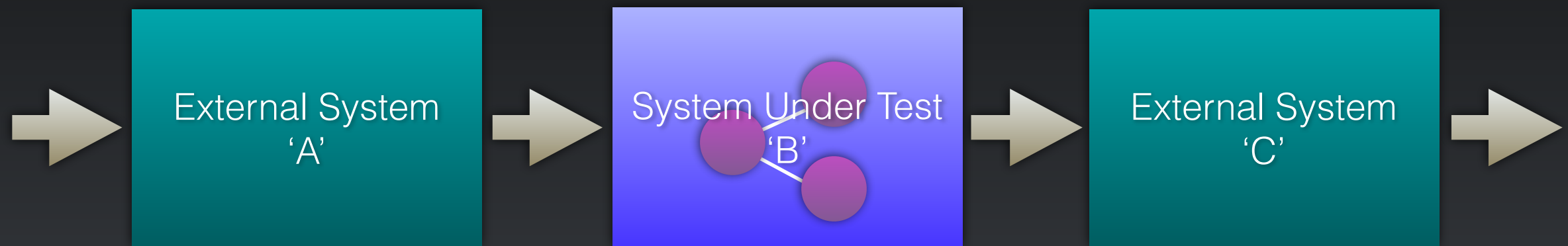


Test Isolation - Isolating the System Under Test

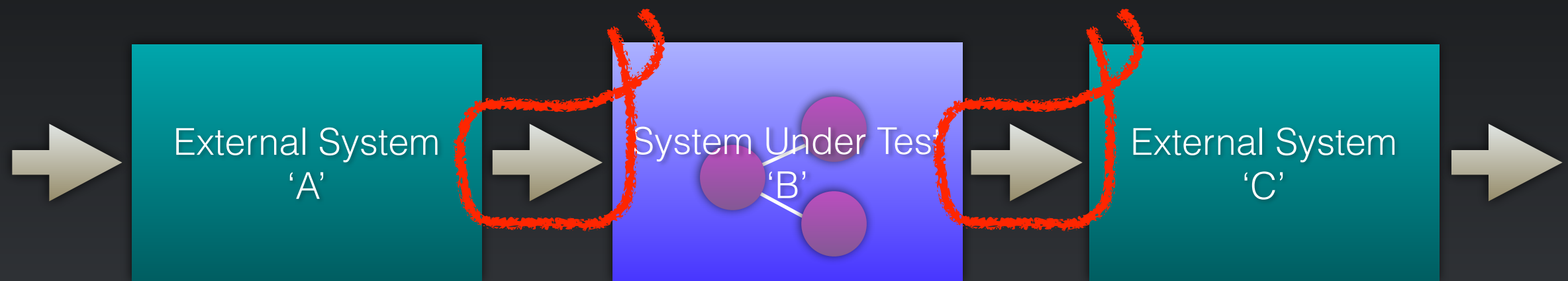


Test Isolation - Validating The Interfaces

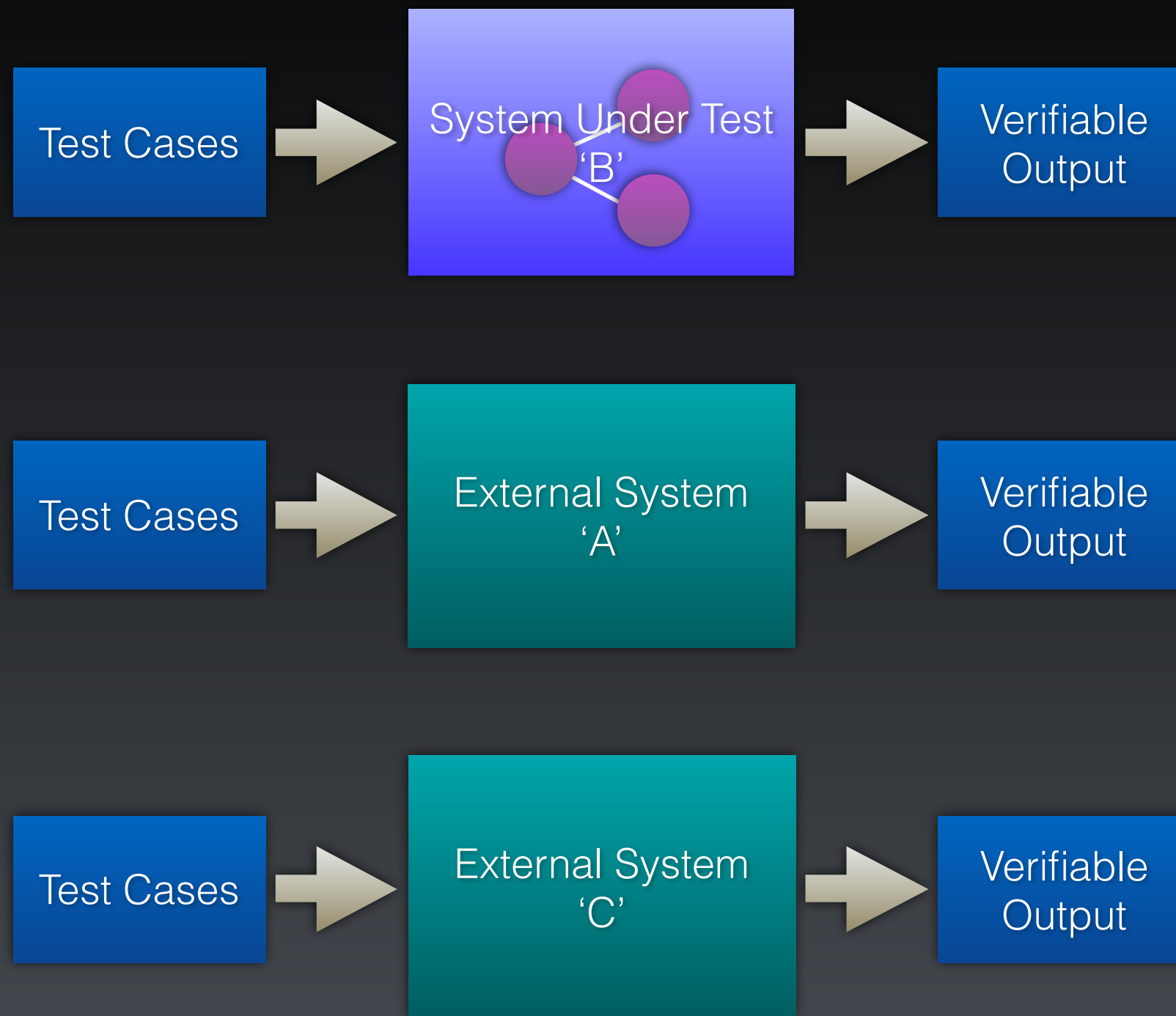
Test Isolation - Validating The Interfaces



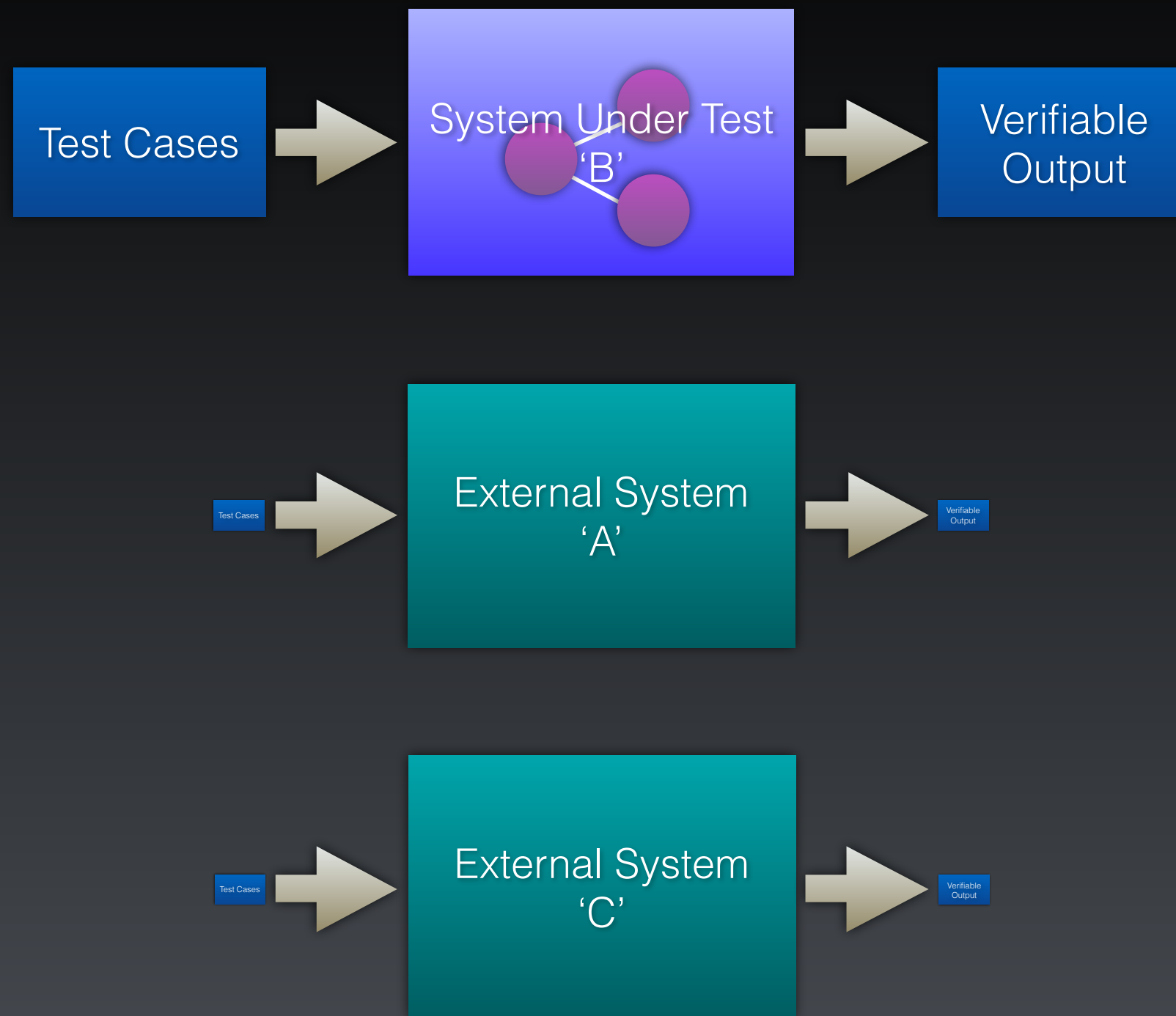
Test Isolation - Validating The Interfaces



Test Isolation - Validating The Interfaces



Test Isolation - Validating The Interfaces



Test Isolation - Isolating Test Cases

- Assuming multi-user systems...
- Tests should be efficient - We want to run LOTS!
- What we really want is to deploy once, and run LOTS of tests
- So we must avoid ANY dependencies between tests...
- Use natural functional isolation e.g.
 - If testing Amazon, create a new account and a new book/product for every test-case
 - If testing eBay create a new account and a new auction for every test-case
 - If testing GitHub, create a new account and a new repository for every test-case
 - ...

Test Isolation - Temporal Isolation

- We want repeatable results
- If I run my test-case twice it should work both times

Test Isolation - Temporal Isolation

- We want repeatable results
- If I run my test-case twice it should work both times

```
def test_should_place_an_order(self):  
    self.store.createBook("Continuous Delivery");  
  
    order = self.store.placeOrder(book="Continuous Delivery")  
  
    self.store.assertOrderPlaced(order)
```

Test Isolation - Temporal Isolation

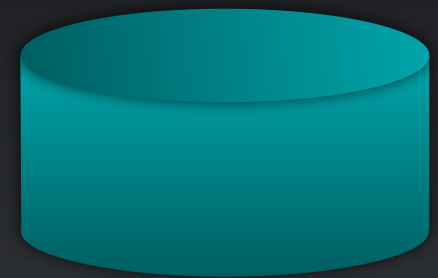
- We want repeatable results
- If I run my test-case twice it should work both times

```
def test_should_place_an_order(self):  
    self.store.createBook("Continuous Delivery");  
  
    order = self.store.placeOrder(book="Continuous Delivery")  
  
    self.store.assertOrderPlaced(order)
```

Test Isolation - Temporal Isolation

- We want repeatable results
- If I run my test-case twice it should work both times

```
def test_should_place_an_order(self):  
    self.store.createBook("Continuous Delivery");  
  
    order = self.store.placeOrder(book="Continuous Delivery")  
  
    self.store.assertOrderPlaced(order)
```



Test Isolation - Temporal Isolation

- We want repeatable results
- If I run my test-case twice it should work both times

```
def test_should_place_an_order(self):  
    self.store.createBook("Continuous Delivery");  
  
    order = self.store.placeOrder(book="Continuous Delivery")  
  
    self.store.assertOrderPlaced(order)
```



Test Isolation - Temporal Isolation

- We want repeatable results
- If I run my test-case twice it should work both times

```
def test_should_place_an_order(self):  
    self.store.createBook("Continuous Delivery");  
  
    order = self.store.placeOrder(book="Continuous Delivery")  
  
    self.store.assertOrderPlaced(order)
```



Test Isolation - Temporal Isolation

- We want repeatable results
- If I run my test-case twice it should work both times

```
def test_should_place_an_order(self):  
    self.store.createBook("Continuous Delivery");  
  
    order = self.store.placeOrder(book="Continuous Delivery")  
  
    self.store.assertOrderPlaced(order)
```



Test Isolation - Temporal Isolation

- We want repeatable results
- If I run my test-case twice it should work both times

```
def test_should_place_an_order(self):  
    self.store.createBook("Continuous Delivery");  
  
    order = self.store.placeOrder(book="Continuous Delivery")  
  
    self.store.assertOrderPlaced(order)
```



Test Isolation - Temporal Isolation

- We want repeatable results
- If I run my test-case twice it should work both times

```
def test_should_place_an_order(self):  
    self.store.createBook("Continuous Delivery");  
  
    order = self.store.placeOrder(book="Continuous Delivery")  
  
    self.store.assertOrderPlaced(order)
```



- Alias your functional isolation entities
 - In your test case create account 'Dave' in reality, in the test infrastructure, ask the application to create account 'Dave2938472398472' and alias it to 'Dave' in your test infrastructure.

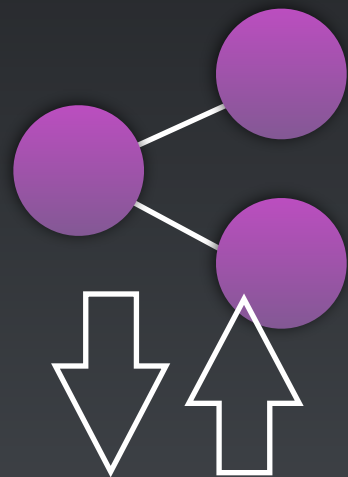
Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Properties of Good Acceptance Tests

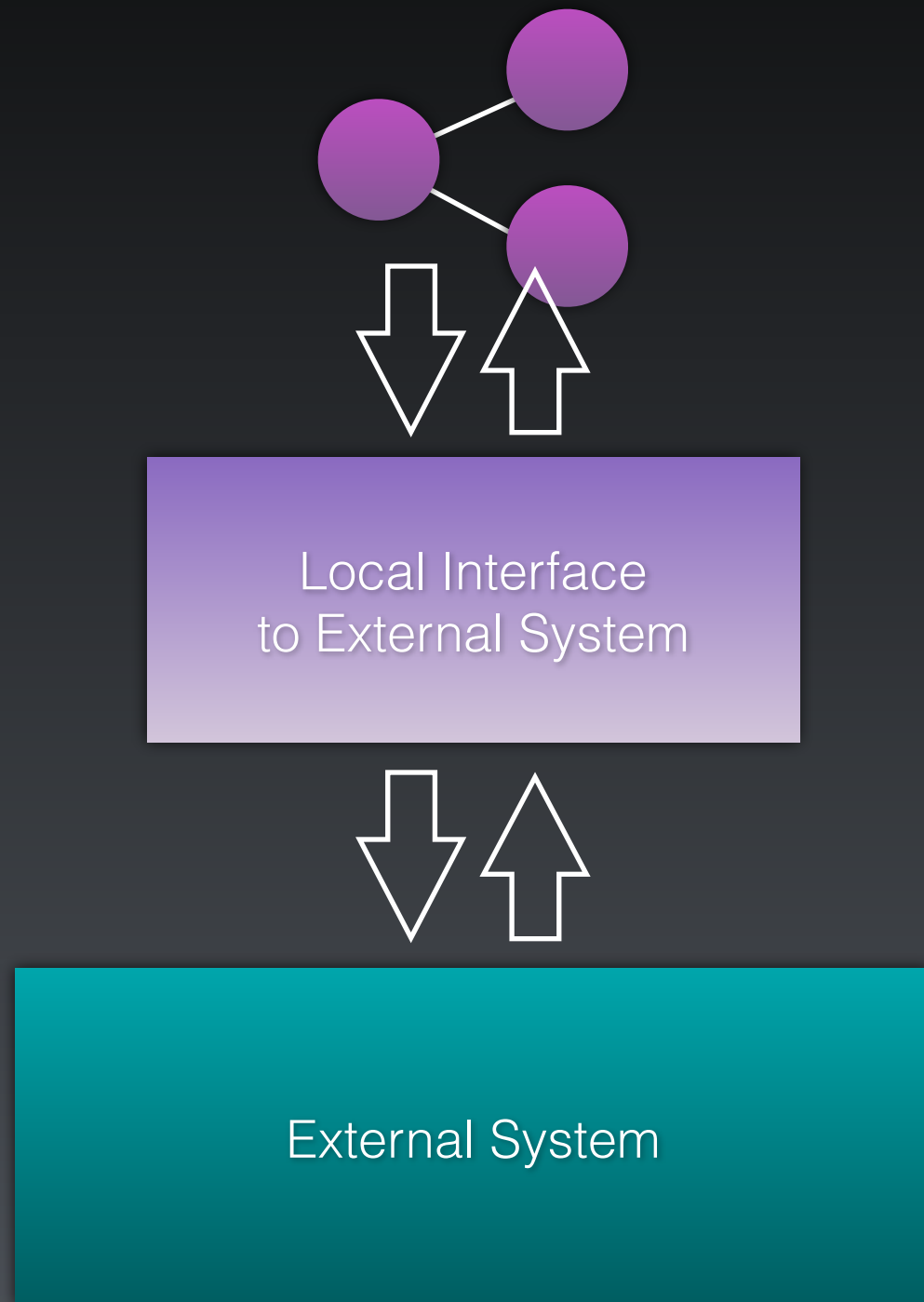
- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Repeatability - Test Doubles

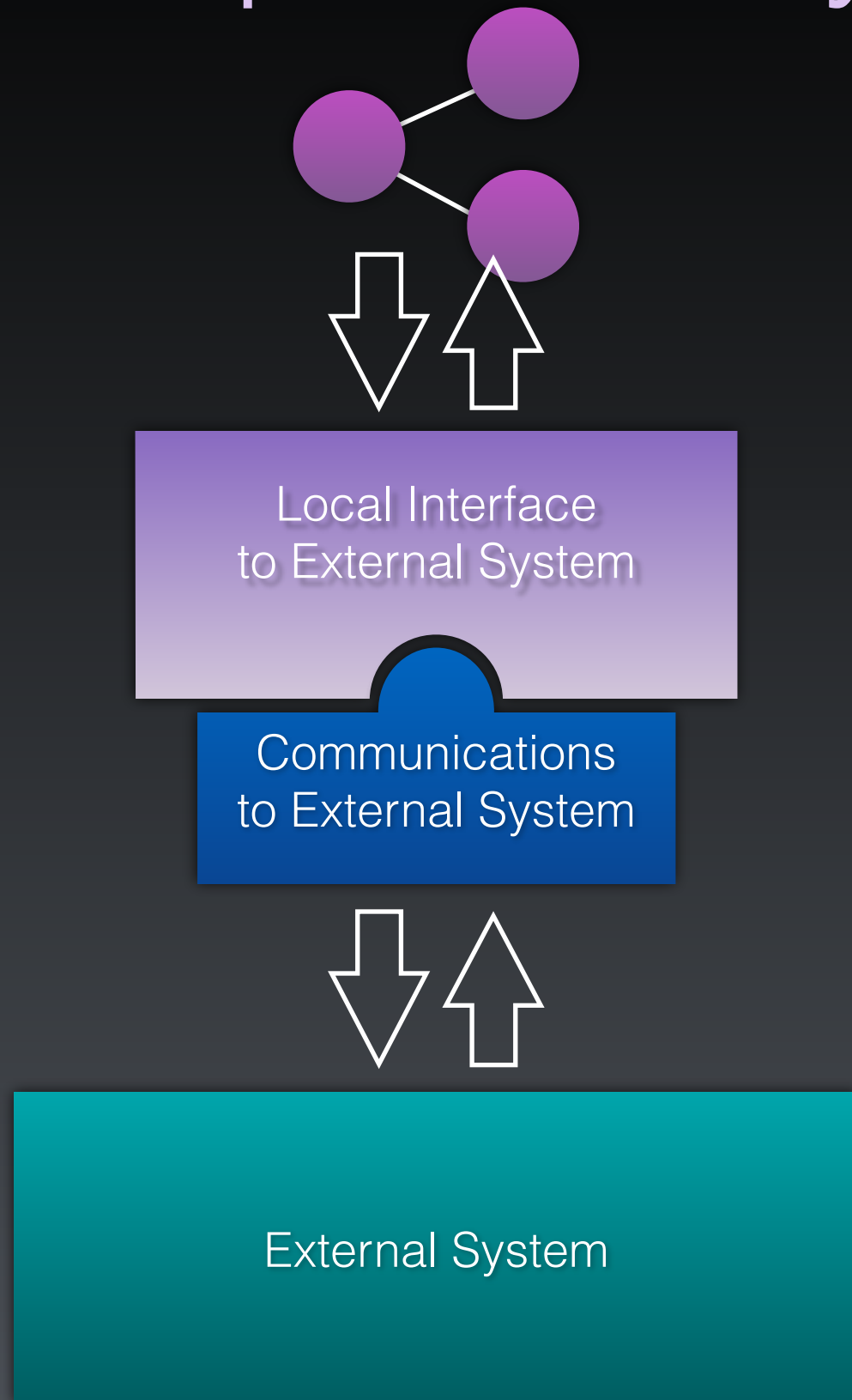


External System

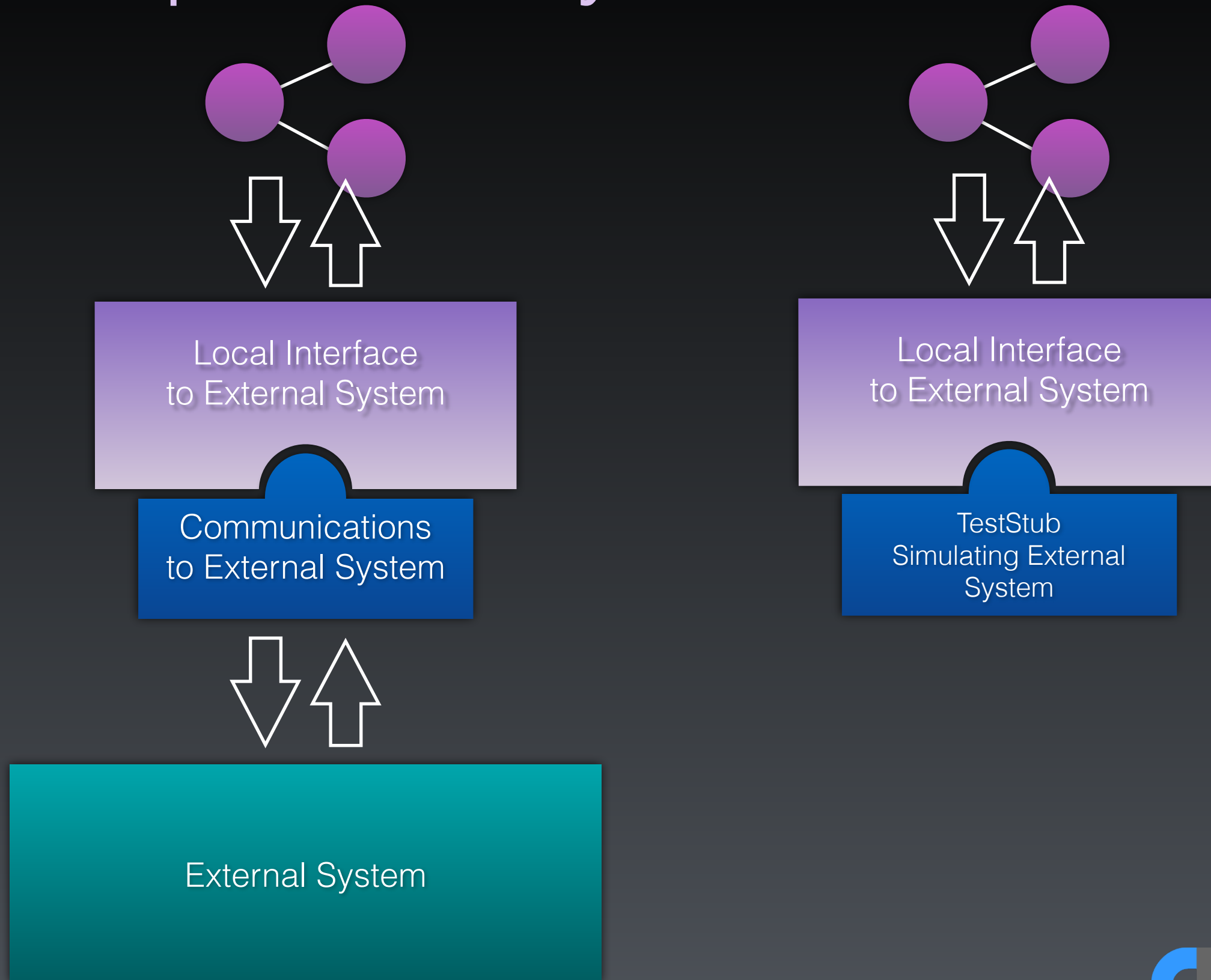
Repeatability - Test Doubles



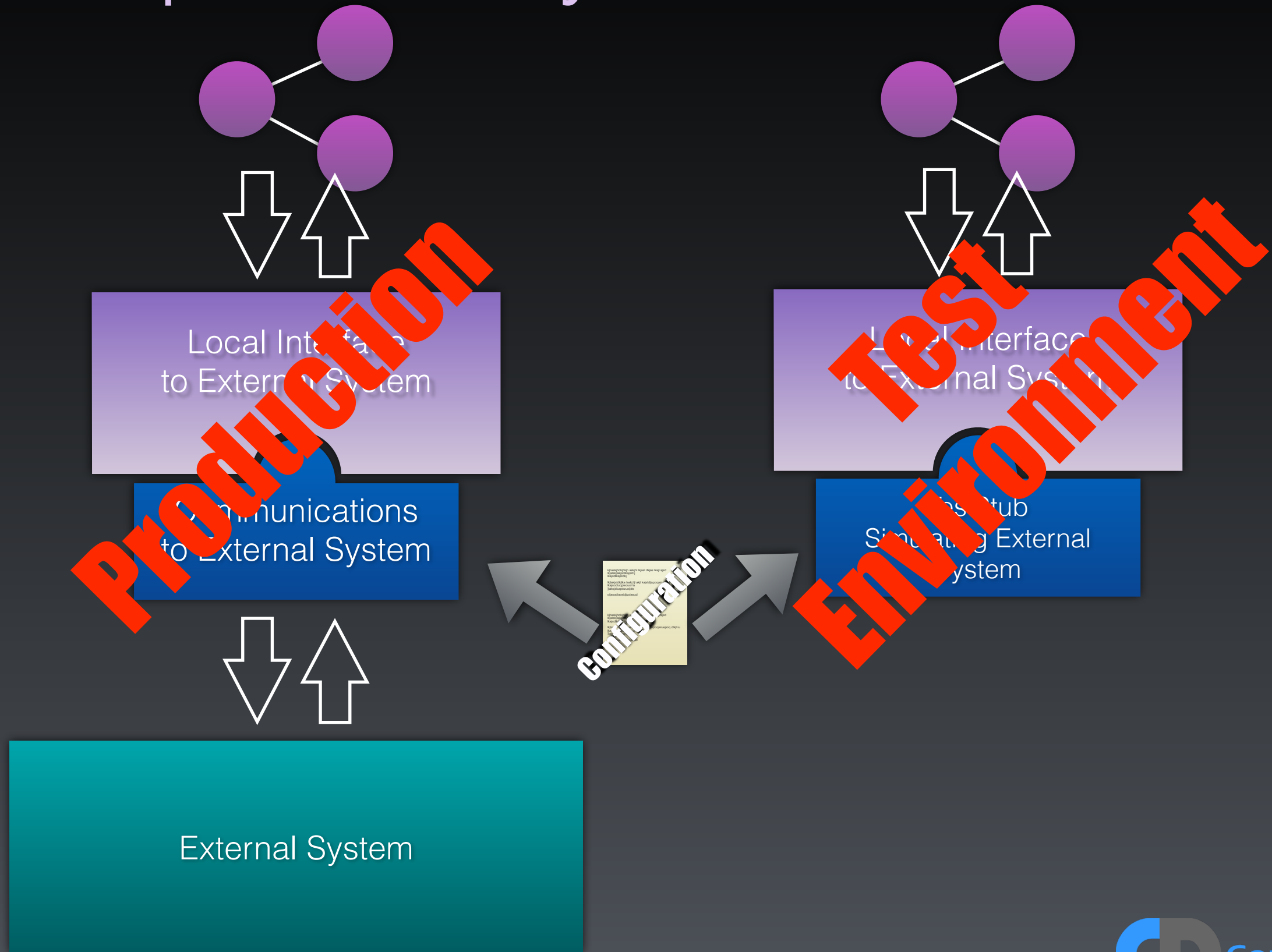
Repeatability - Test Doubles



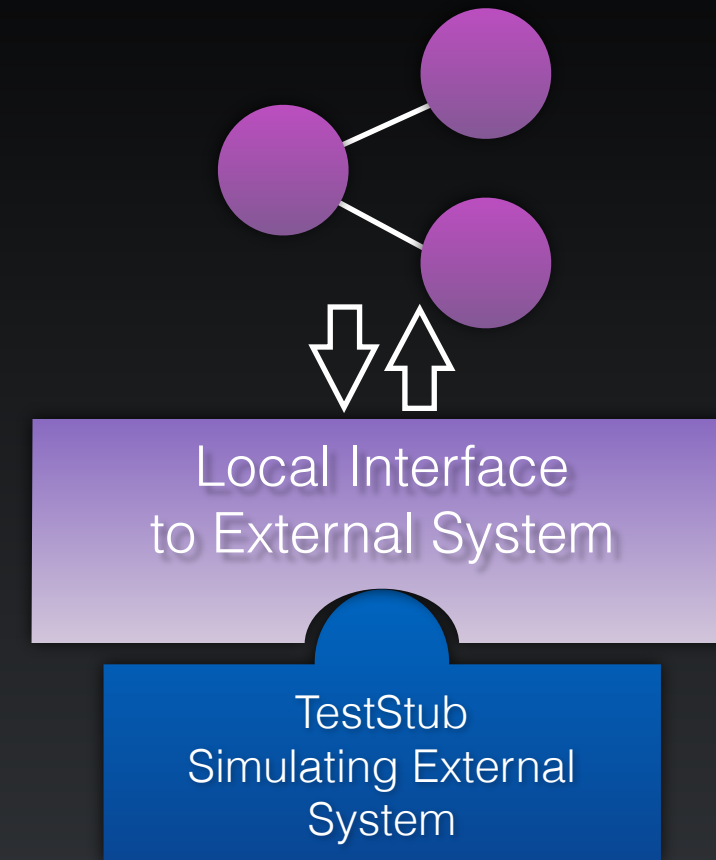
Repeatability - Test Doubles



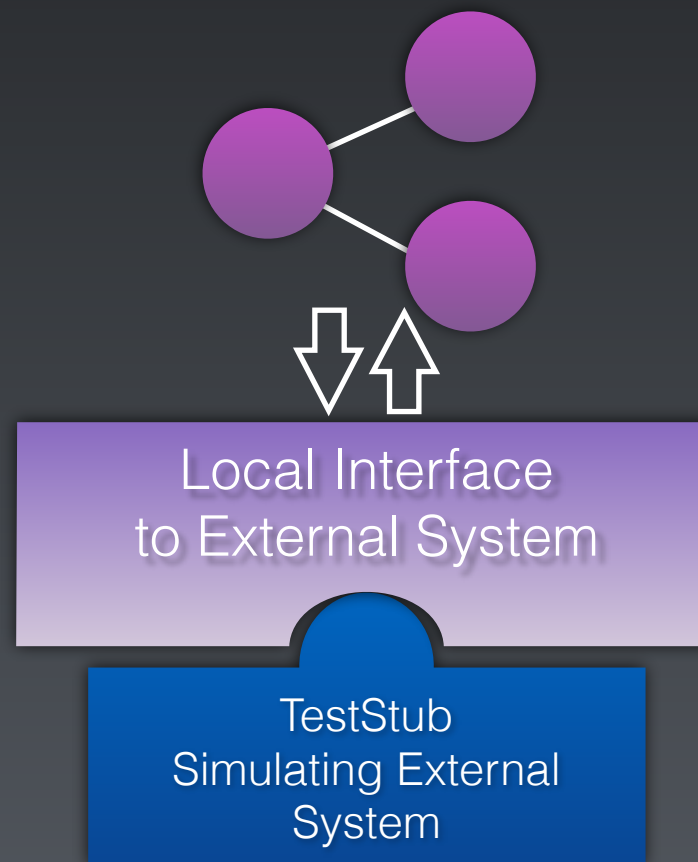
Repeatability - Test Doubles



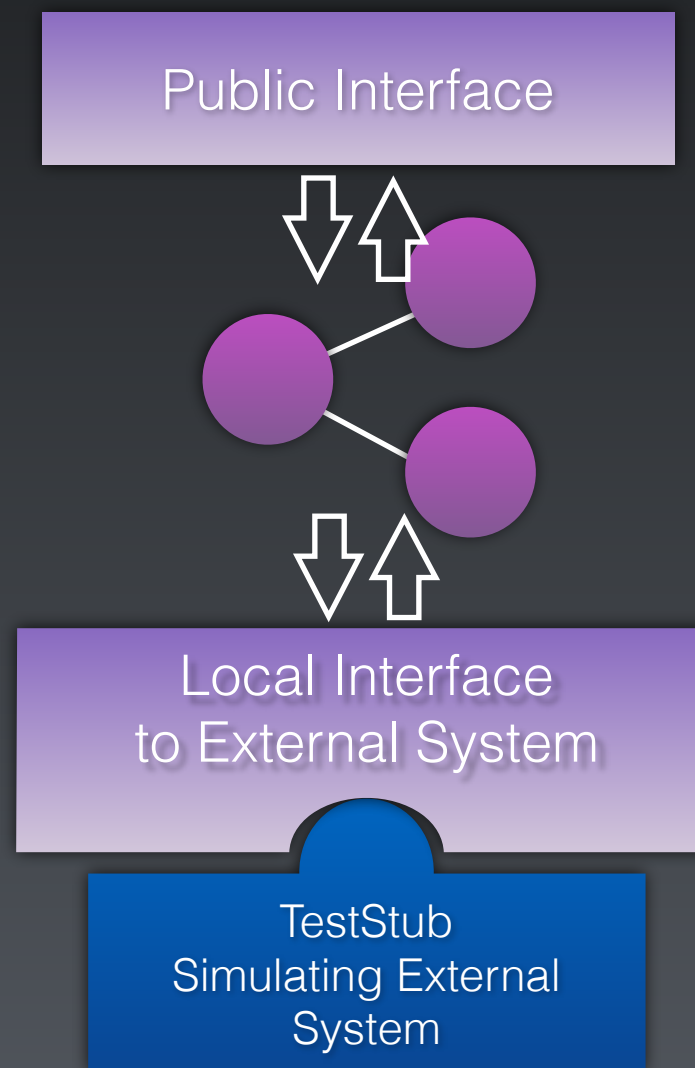
Test Doubles As Part of Test Infrastructure



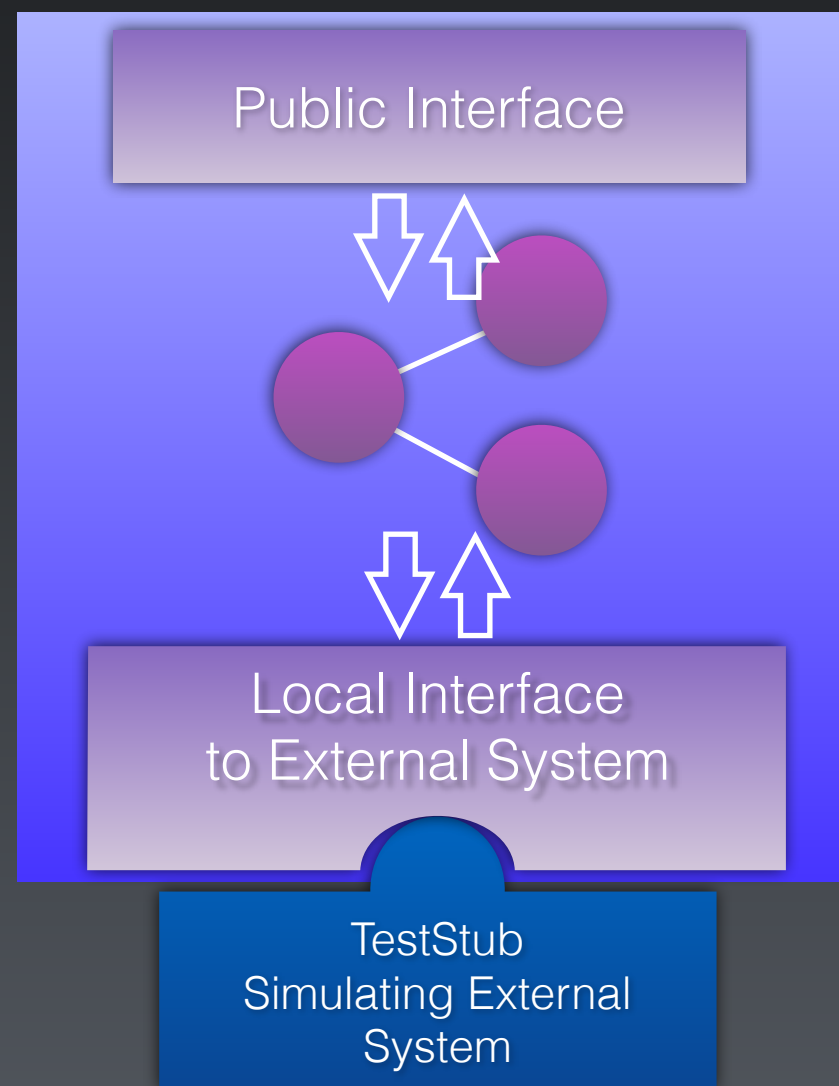
Test Doubles As Part of Test Infrastructure



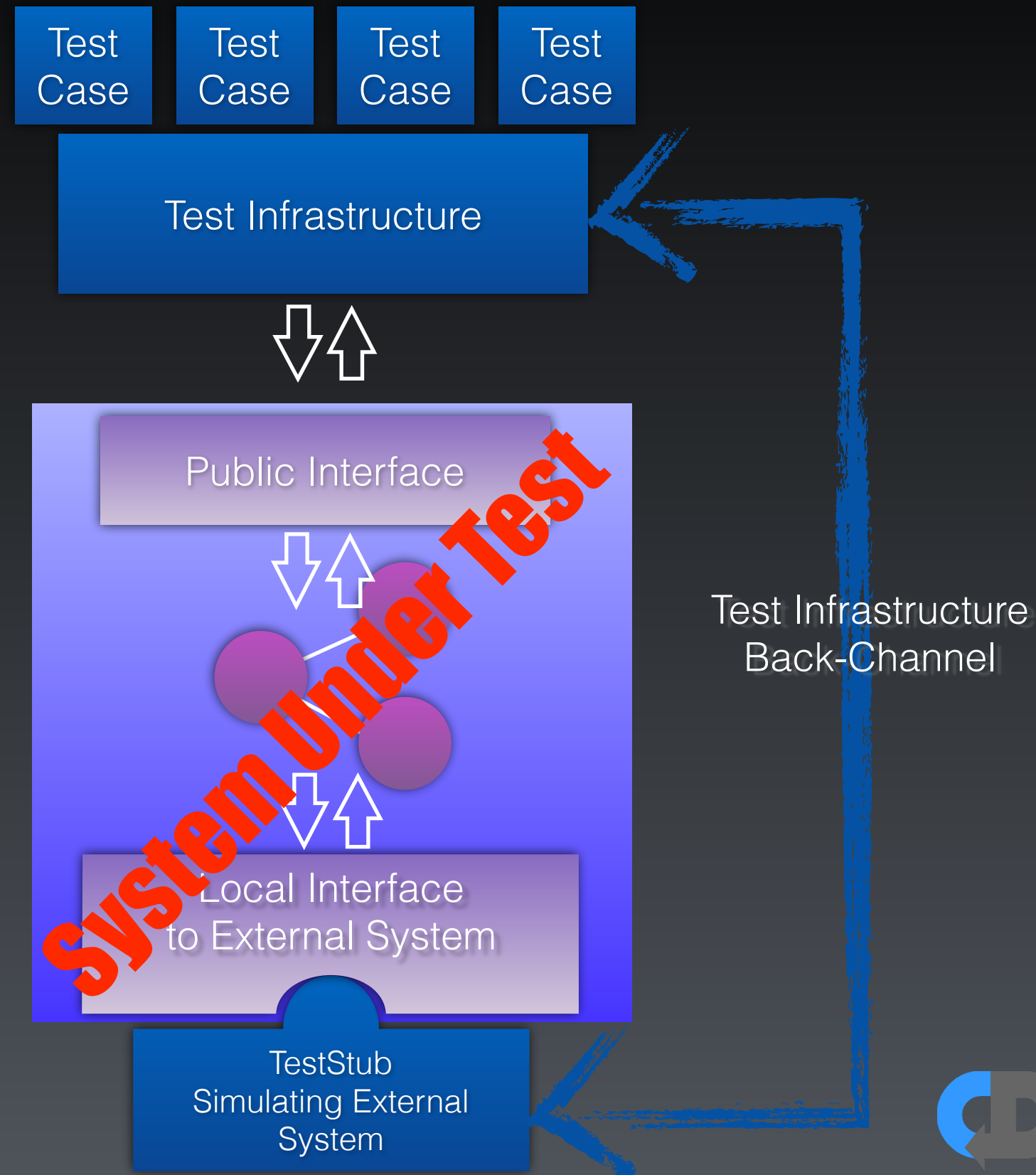
Test Doubles As Part of Test Infrastructure



Test Doubles As Part of Test Infrastructure



Test Doubles As Part of Test Infrastructure



Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Language of the Problem Domain - DSL

- A Simple 'DSL' Solves many of our problems
 - Ease of TestCase creation
 - Readability
 - Ease of Maintenance
 - Separation of "What" from "How"
 - Test Isolation
 - The Chance to abstract complex set-up and scenarios
 - ...

Language of the Problem Domain - DSL

```
@Test
public void shouldSupportPlacingValidBuyAndSellLimitOrders()
{
    trading.selectDealTicket("instrument");
    trading.dealTicket.placeOrder("type: limit", "bid: 4@10");
    trading.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to buy 4.00 contracts at 10.0");
    trading.dealTicket.dismissFeedbackMessage();

    trading.dealTicket.placeOrder("type: limit", "ask: 4@9");
    trading.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to sell 4.00 contracts at 9.0");
}
```

Language of the Problem Domain - DSL

```
@Test
public void shouldSupportPlacingValidBuyAndSellLimitOrders()
{
    trading.selectDealTicket("instrument");
    trading.dealTicket.placeOrder("type: limit", "bid: 4@10");
    trading.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to buy 4.00 contracts at 10.0");
    trading.dealTicket.dismissFeedbackMessage();

    trading.dealTicket.placeOrder("type: limit", "ask: 4@9");
    trading.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to sell 4.00 contracts at 9.0");
}
```

```
@Test
public void shouldSuccessfullyPlaceAnImmediateOrCancelBuyMarketOrder()
{
    fixAPIMarketMaker.placeMassOrder("instrument", "ask: 11@52", "ask: 10@51", "ask: 10@50", "bid: 10@49");

    fixAPI.placeOrder("instrument", "side: buy", "quantity: 4", "goodUntil: Immediate", "allowUnmatched: true");
    fixAPI.waitForExecutionReport("executionType: Fill", "orderStatus: Filled",
        "side: buy", "quantity: 4", "matched: 4", "remaining: 0",
        "executionPrice: 50", "executionQuantity: 4");
}
```

Language of the Problem Domain - DSL

```
@Test
public void shouldSupportPlacingValidBuyAndSellLimitOrders()
{
    trading.selectDealTicket("instrument");
    trading.dealTicket.placeOrder("type: limit", "bid: 4@10");
    trading.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to buy 4.00 contracts at 10.0");
    trading.dealTicket.dismissFeedbackMessage();

    trading.dealTicket.placeOrder("type: limit", "ask: 4@9");
    trading.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to sell 4.00 contracts at 9.0");
}
```

```
@Test
public void shouldSuccessfullyPlaceAnImmediateOrCancelBuyMarketOrder()
{
    fixAPIMarketMaker.placeMassOrder("instrument", "ask: 11@52", "ask: 10@51", "ask: 10@50", "bid: 10@49");

    fixAPI.placeOrder("instrument", "side: buy", "quantity: 4", "goodUntil: Immediate", "allowUnmatched: true");
    fixAPI.waitForExecutionReport("executionType: Fill", "orderStatus: Filled",
        "side: buy", "quantity: 4", "matched: 4", "remaining: 0",
        "executionPrice: 50", "executionQuantity: 4");
}
```

```
@Before
public void beforeEveryTest()
{
    adminAPI.createInstrument("name: instrument");
    registrationAPI.createUser("user");
    registrationAPI.createUser("marketMaker", "accountType: MARKET_MAKER");
    tradingUI.loginAsLive("user");
}
```

Language of the Problem Domain - DSL

```
public void placeOrder(final String... args)
{
    final DslParams params =
        new DslParams(args,
            new OptionalParam("type").setDefault("Limit").setAllowedValues("limit", "market", "StopMarket"),
            new OptionalParam("side").setDefault("Buy").setAllowedValues("buy", "sell"),
            new OptionalParam("price"),
            new OptionalParam("triggerPrice"),
            new OptionalParam("quantity"),
            new OptionalParam("stopProfitOffset"),
            new OptionalParam("stopLossOffset"),
            new OptionalParam("confirmFeedback").setDefault("true"));

    getDealTicketPageDriver().placeOrder(params.value("type"),
        params.value("side"),
        params.value("price"),
        params.value("triggerPrice"),
        params.value("quantity"),
        params.value("stopProfitOffset"),
        params.value("stopLossOffset"));

    if (params.valueAsBoolean("confirmFeedback"))
    {
        getDealTicketPageDriver().clickOrderFeedbackConfirmationButton();
    }

    LOGGER.debug("placeOrder(" + Arrays.deepToString(args) + ")");
}
```

Language of the Problem Domain - DSL

```
@Test
public void shouldSupportPlacingValidBuyAndSellLimitOrders()
{
    tradingUI.showDealTicket("instrument");
    tradingUI.dealTicket.placeOrder("type: limit", "bid: 4@10");
    tradingUI.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to buy 4.00 contracts at
    tradingUI.dealTicket.dismissFeedbackMessage();

    tradingUI.dealTicket.placeOrder("type: limit", "ask: 4@9");
    tradingUI.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to sell 4.00 contracts at

}

@Test
public void shouldSuccessfullyPlaceAnImmediateOrCancelBuyMarketOrder()
{
    fixAPIMarketMaker.placeMassOrder("instrument", "ask: 11@52", "ask: 10@51", "ask: 10@50", "bid: 10@49");

    fixAPI.placeOrder("instrument", "side: buy", "quantity: 4", "goodUntil: Immediate", "allowUnmatched: true");
    fixAPI.waitForExecutionReport("executionType: Fill", "orderStatus: Filled",
        "side: buy", "quantity: 4", "matched: 4", "remaining: 0",
        "executionPrice: 50", "executionQuantity: 4");
}
```


Language of the Problem Domain - DSL

```
@Test
public void shouldSupportPlacingValidBuyAndSellLimitOrders()
{
    tradingUI.showDealTicket("instrument");
    tradingUI.dealTicket.placeOrder("type: limit", "bid: 4@10");
    tradingUI.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to buy 4.00 contracts at");
    tradingUI.dealTicket.dismissFeedbackMessage();
    tradingUI.dealTicket.placeOrder("type: limit", "ask: 4@9");
    tradingUI.dealTicket.checkFeedbackMessage("You have successfully sent a limit order to sell 4.00 contracts at");
}
```

```
@Test
public void shouldSuccessfullyPlaceAnImmediateOrCancelBuyMarketOrder()
{
    fixAPIMarketMaker.placeMassOrder("instrument", "ask: 11@52", "ask: 10@51", "ask: 10@50", "bid: 10@49");
    fixAPI.placeOrder("instrument", "side: buy", "quantity: 4", "goodUntil: Immediate", "allowUnmatched: true");
    fixAPI.waitForExecutionReport("executionType: Fill", "orderStatus: Filled",
        "side: buy", "quantity: 4", "matched: 4", "remaining: 0",
        "executionPrice: 50", "executionQuantity: 4");
}
```

Language of the Problem Domain - DSL

```
@Channel(fixApi, dealTicket, publicApi)
@Test
public void shouldSuccessfullyPlaceAnImmediateOrCancelBuyMarketOrder()
{
    trading.placeOrder("instrument", "side: buy", "price: 123.45", "quantity: 4", "goodUntil: Immediate");

    trading.waitForExecutionReport("executionType: Fill", "orderStatus: Filled",
                                   "side: buy", "quantity: 4", "matched: 4", "remaining: 0",
                                   "executionPrice: 123.45", "executionQuantity: 4");
}
```

Language of the Problem Domain - DSL

```
@Channel(fixApi, dealTicket, publicApi)
@Test
public void shouldSuccessfullyPlaceAnImmediateOrCancelBuyMarketOrder()
{
    trading.placeOrder("instrument", "side: buy", "price: 123.45", "quantity: 4", "goodUntil: Immediate");
    trading.waitForExecutionReport("executionType: Fill", "orderStatus: Filled",
                                   "side: buy", "quantity: 4", "matched: 4", "remaining: 0",
                                   "executionPrice: 123.45", "executionQuantity: 4");
}
```

Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Testing with Time

- Test Cases should be deterministic
- Time is a problem for determinism - There are two options:
 - Ignore time
 - Control time

Testing With Time - Ignore Time

Mechanism

Filter out time-based values in your test infrastructure so that they are ignored

Pros:

- Simple!

Cons:

- Can miss errors
- Prevents any hope of testing complex time-based scenarios

Testing With Time - Controlling Time

Mechanism

Treat Time as an external dependency, like any external system - and Fake it!

Pros:

- Very Flexible!
- Can simulate any time-based scenario, with time under the control of the test case.

Cons:

- Slightly more complex infrastructure

Testing With Time - Controlling Time

```
@Test
public void shouldBeOverdueAfterOneMonth()
{
    book = library.borrowBook("Continuous Delivery");
    assertFalse(book.isOverdue());

    time.travel("+1 week");
    assertFalse(book.isOverdue());

    time.travel("+4 weeks");
    assertTrue(book.isOverdue());
}
```

Testing With Time - Controlling Time

```
@Test
public void shouldBeOverdueAfterOneMonth()
{
    book = library.borrowBook("Continuous Delivery");
    assertFalse(book.isOverdue());

    time.travel("+1 week");
    assertFalse(book.isOverdue());

    time.travel("+4 weeks");
    assertTrue(book.isOverdue());
}
```

Testing With Time - Controlling Time

Testing With Time - Controlling Time

Test
Case

Test
Case

Test
Case

Test
Case

Test Infrastructure

```
public void someTimeDependentMethod()  
{  
    time = System.getTime();  
}
```

System Under Test

Testing With Time - Controlling Time

Test
Case

Test
Case

Test
Case

Test
Case

Test Infrastructure

```
include Clock;  
  
public void someTimeDependentMethod()  
{  
    time = Clock.getTime();  
}
```

System Under Test

Testing With Time - Controlling Time

Test
Case

Test
Case

Test
Case

Test
Case

Test Infrastructure

```
include Clock;
```

```
public void someTimeDependentMethod()  
{  
    time = Clock.getTime();  
}
```

```
public class Clock {  
    public static clock = new SystemClock();  
  
    public static void setTime(long newTime) {  
        clock.setTime(newTime);  
    }  
  
    public static long getTime() {  
        return clock.getTime();  
    }  
}
```

Testing With Time - Controlling Time

Test Case Test Case Test Case Test Case

Test Infrastructure

```
include Clock;  
  
public void someTimeDependentMethod()  
{  
    time = Clock.getTime();  
}
```

```
public class Clock {  
    public static clock = new SystemClock();  
  
    public static void setTime(long newTime) {  
        clock.setTime(newTime);  
    }  
  
    public static long getTime() {  
        return clock.getTime();  
    }  
}
```

```
public void onInit() {  
    // Remote Call - back-channel  
    systemUnderTest.setClock(new TestClock());  
}  
  
public void time-travel(String time) {  
    long newTime = parseTime(time);  
  
    // Remote Call - back-channel  
    systemUnderTest.setTime(newTime);  
}
```

Test Infrastructure
Back-Channel

Test Environment Types

- Some Tests need special treatment.
- Tag Tests with properties and allocate them dynamically:

Test Environment Types

- Some Tests need special treatment.
- Tag Tests with properties and allocate them dynamically:

```
@TimeTravel
@Test
public void shouldDoSomethingThatNeedsFakeTime()
...
```

```
@Destructive
@Test
public void shouldDoSomethingThatKillsPartOfTheSystem()
...
```

```
@FPGA(version=1.3)
@Test
public void shouldDoSomethingThatRequiresSpecificHardware()
...
```

Test Environment Types

- Some Tests need special treatment.
- Tag Tests with properties and allocate them dynamically:

```
@TimeTravel
```

```
@Test
```

```
public void shouldDoSomethingThatNeedsFakeTime()
```

```
...
```

```
@Destructive
```

```
@Test
```

```
public void shouldDoSomethingThatKillsPartOfTheSystem()
```

```
...
```

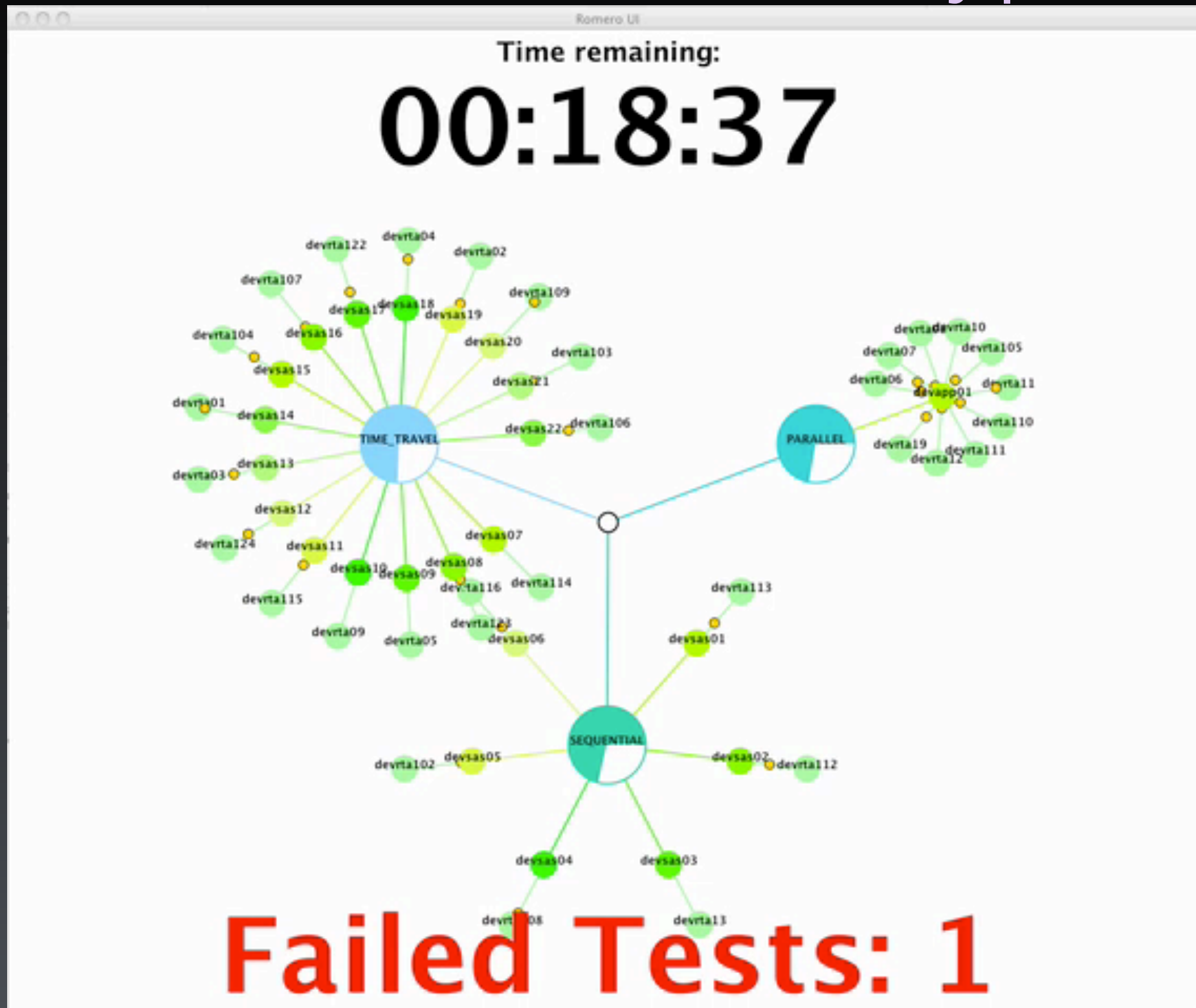
```
@FPGA(version=1.3)
```

```
@Test
```

```
public void shouldDoSomethingThatRequiresSpecificHardware()
```

```
...
```

Test Environment Types



Test Environment Types



Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Properties of Good Acceptance Tests

- “What” not “How”
- Isolated from other tests
- Repeatable
- Uses the language of the problem domain
- Tests ANY change
- Efficient

Production-like Test Environments



Production-like Test Environments



Production-like Test Environments



Production-like Test Environments



Production-like Test Environments



Production-like Test Environments



Production-like Test Environments



Make Test Cases Internally Synchronous

Make Test Cases Internally Synchronous

- Look for a “Concluding Event” listen for that in your DSL to report an async call as complete

Make Test Cases Internally Synchronous

- Look for a “Concluding Event” listen for that in your DSL to report an async call as complete

Example DSL level Implementation...

```
public String placeOrder(String params...)
{
    orderSent = sendAsyncPlaceOrderMessage(parseOrderParams(params));
    return waitForOrderConfirmedOrFailOnTimeOut(orderSent);
}
```


Make Test Cases Internally Synchronous

- Look for a “Concluding Event” listen for that in your DSL to report an async call as complete

Example DSL level Implementation...

```
public String placeOrder(String params...)
{
    orderSent = sendAsyncPlaceOrderMessage(parseOrderParams(params));
    return waitForOrderConfirmedOrFailOnTimeout(orderSent);
}
```

Make Test Cases Internally Synchronous

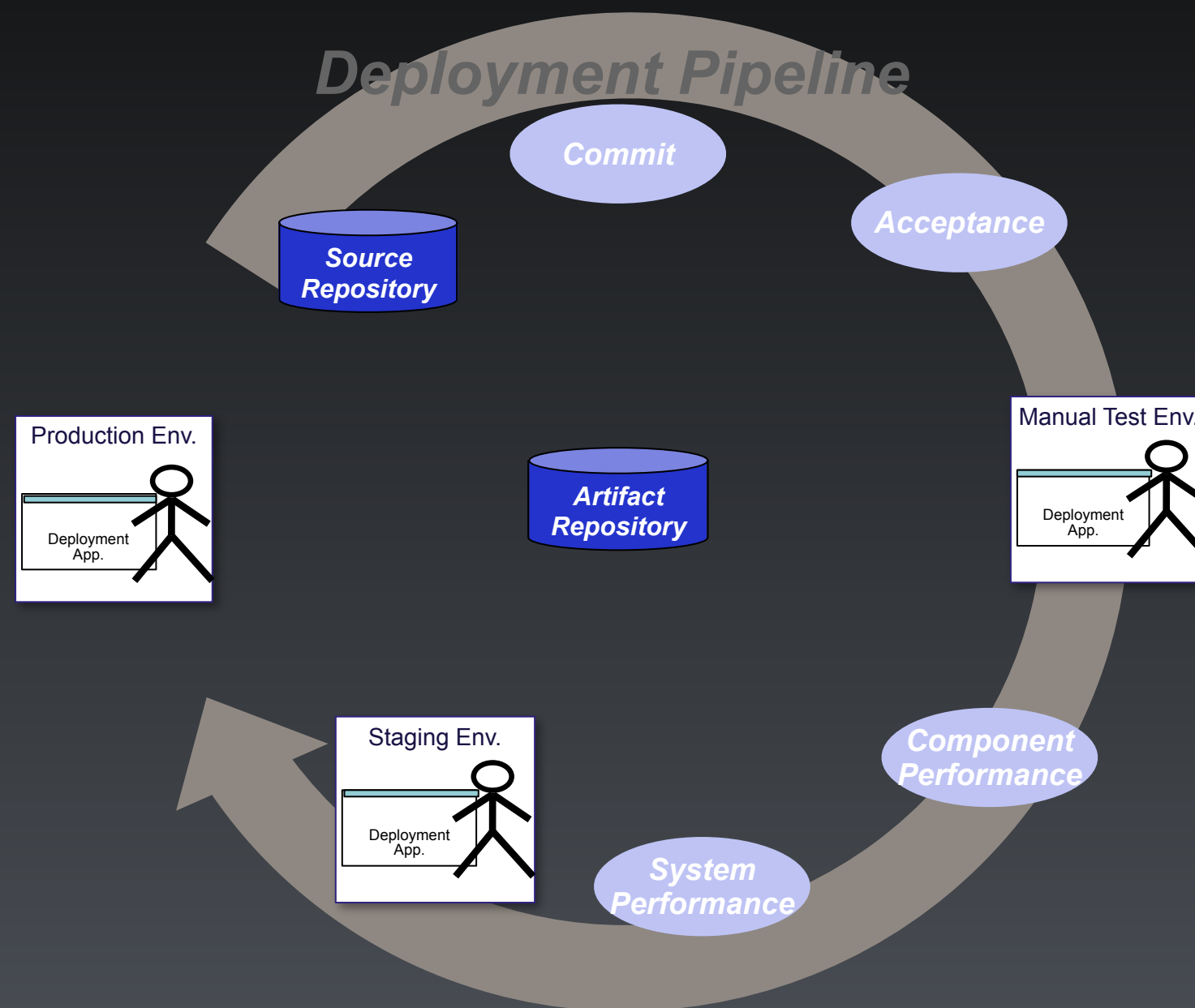
- Look for a “Concluding Event” listen for that in your DSL to report an async call as complete
- If you really have to, implement a “poll-and-timeout” mechanism in your test-infrastructure
- Never, Never, Never, put a “wait(xx)” and expect your tests to be (a) Reliable or (b) Efficient!

Make Test Cases Internally Synchronous

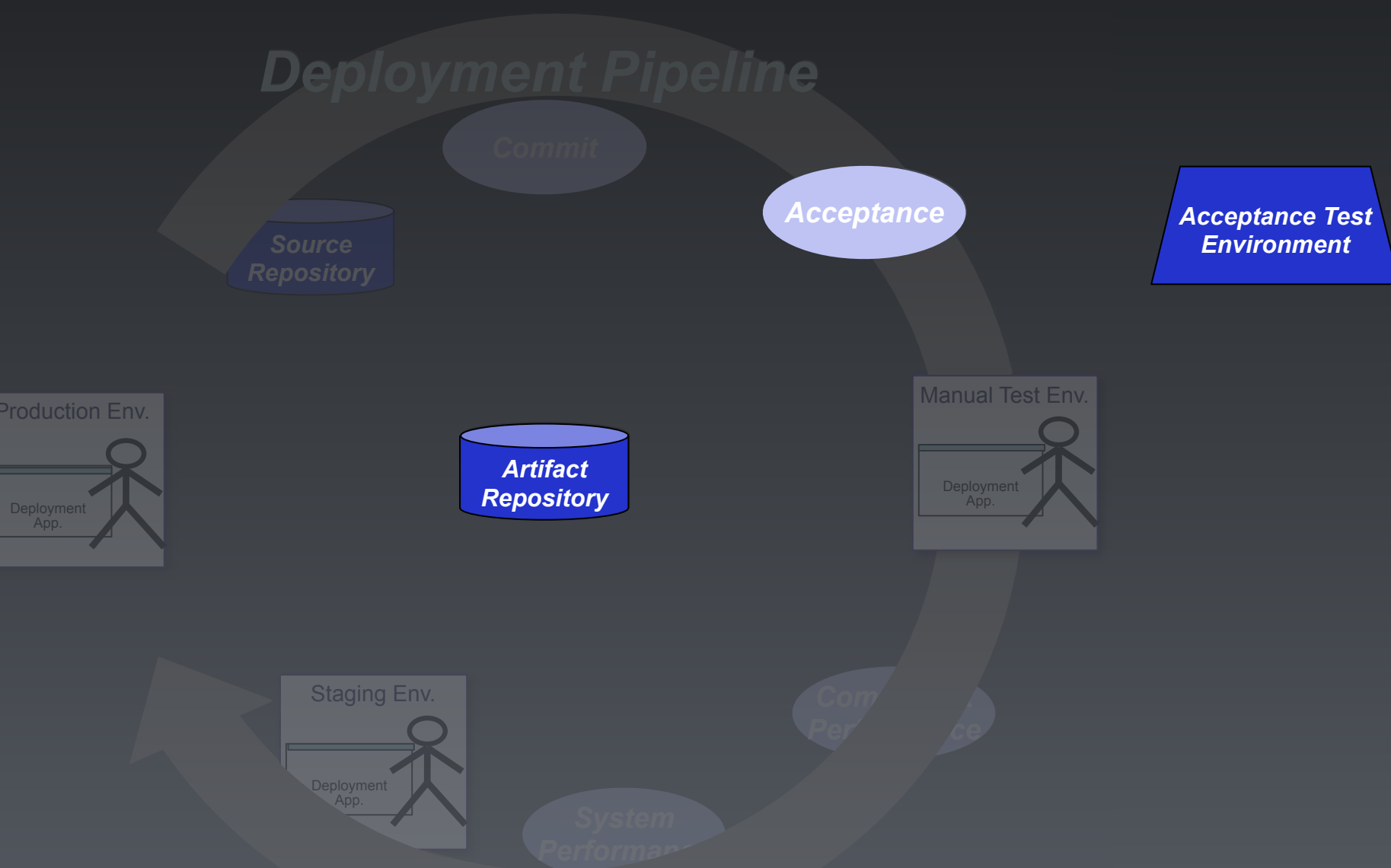
- Look for a “Concluding Event” listen for that in your DSL to report an async call as complete
- If you really have to, implement a “poll-and-timeout” mechanism in your test-infrastructure
- ~~Never, Never, Never, but a wait(x)” and expect your tests to be (a) Reliable or (b) Efficient!~~

Anti-Pollster!

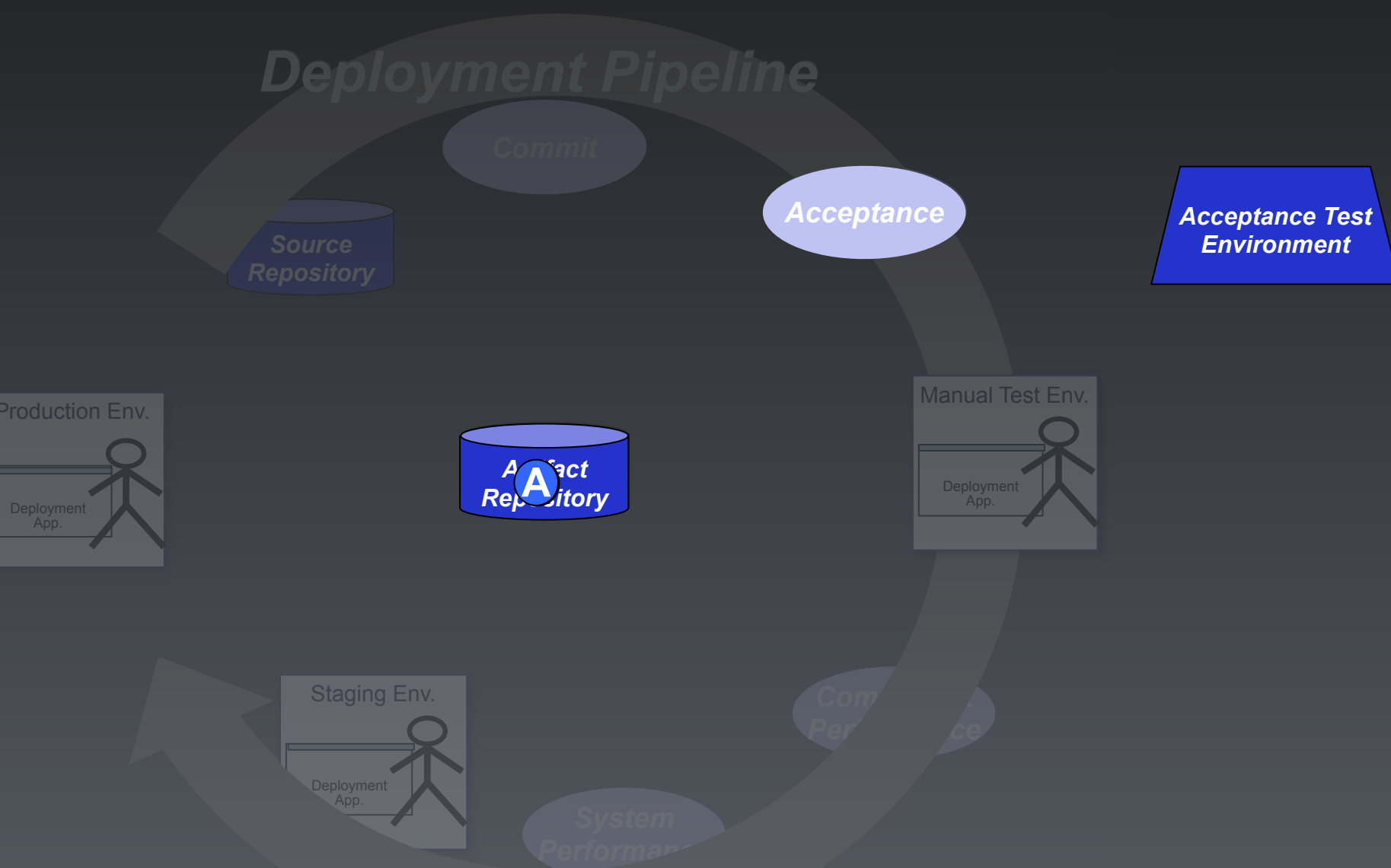
Scaling-Up



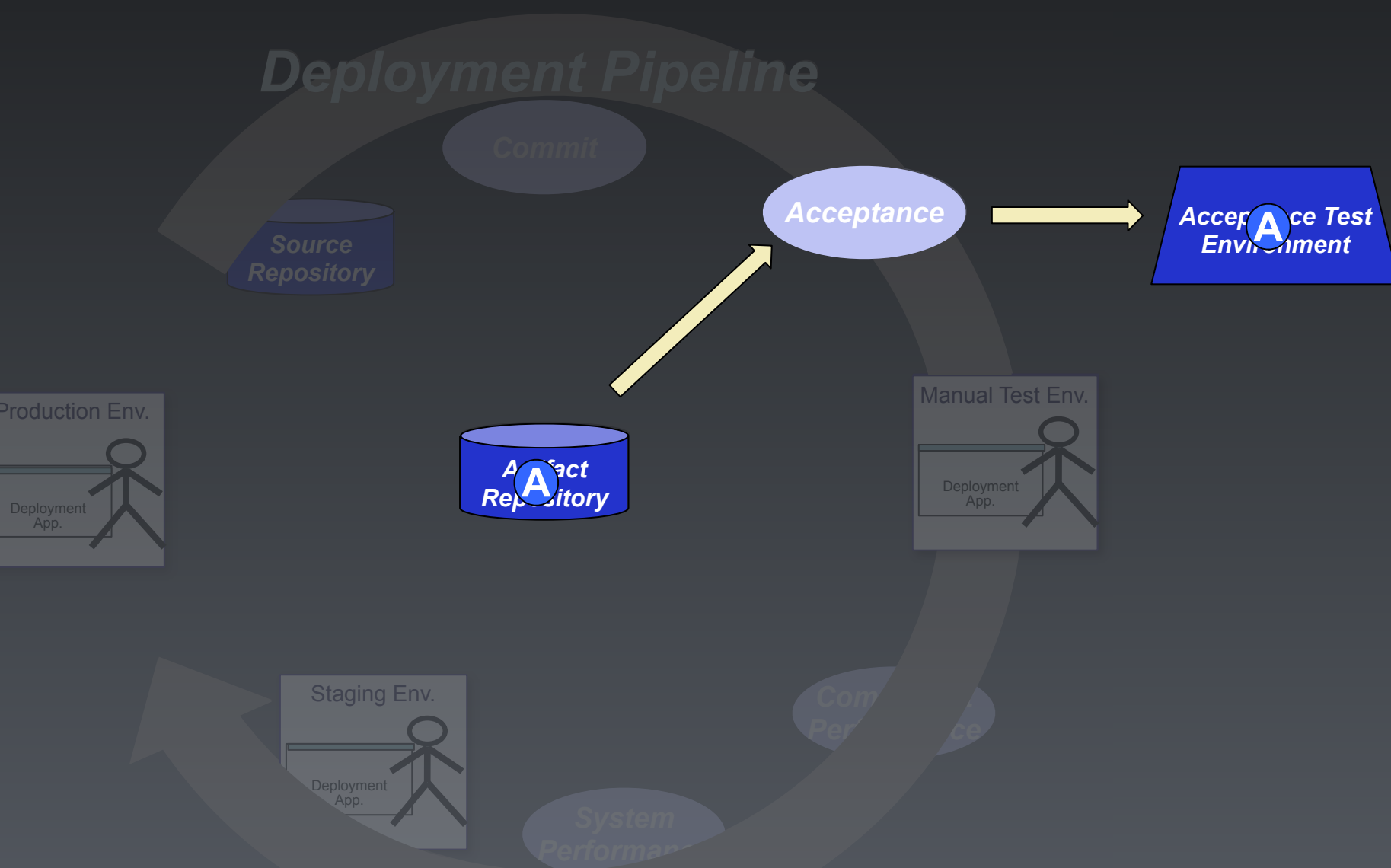
Scaling-Up



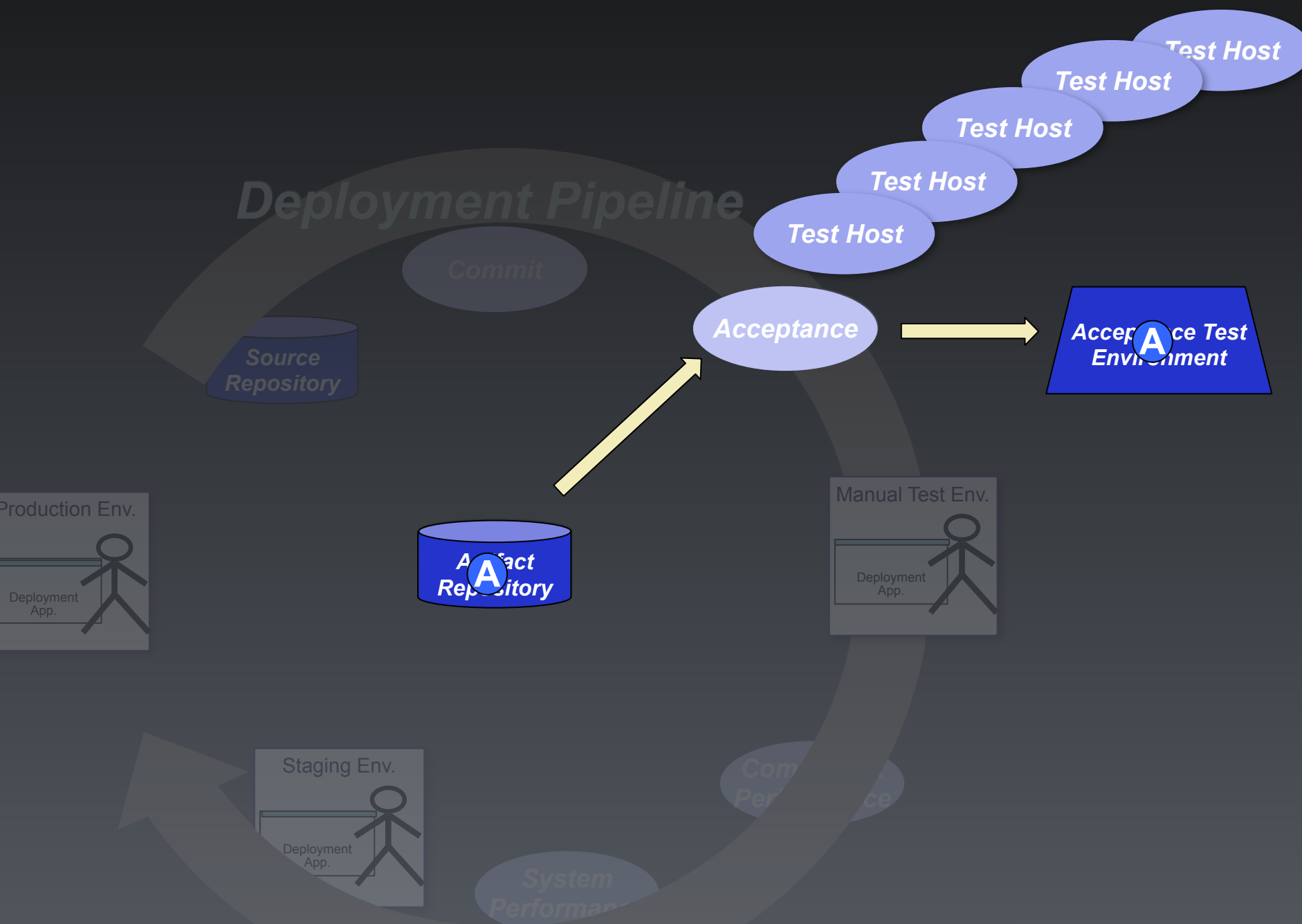
Scaling-Up



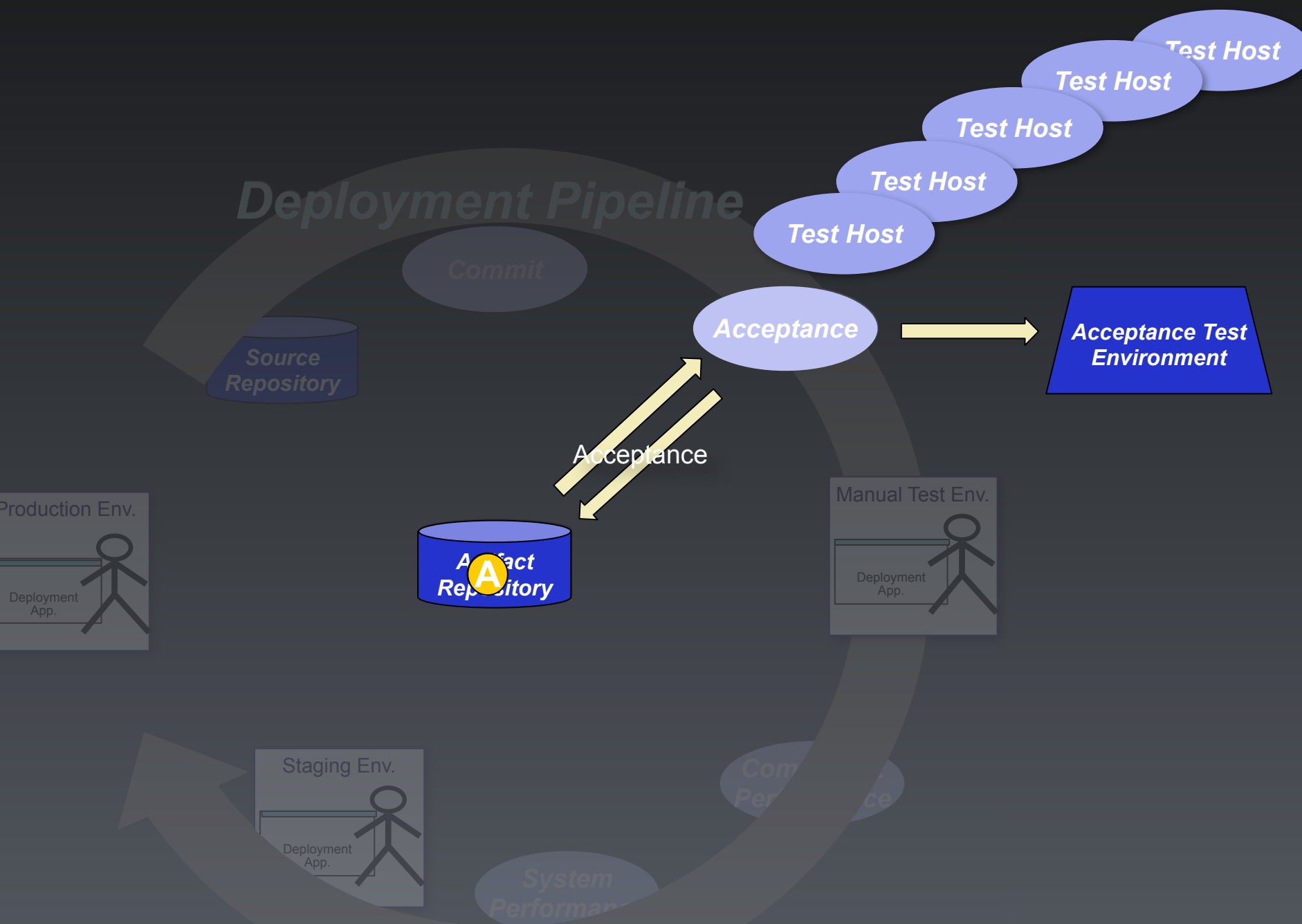
Scaling-Up



Scaling-Up



Scaling-Up



Anti-Patterns in Acceptance Testing

Anti-Patterns in Acceptance Testing

- **Don't** use UI Record-and-playback Systems

Anti-Patterns in Acceptance Testing

- **Don't** use UI Record-and-playback Systems
- **Don't** Record-and-playback production data. This has a role, but it is NOT Acceptance Testing

Anti-Patterns in Acceptance Testing

- **Don't** use UI Record-and-playback Systems
- **Don't** Record-and-playback production data. This has a role, but it is NOT Acceptance Testing
- **Don't** dump production data to your test systems, instead define the absolute minimum data that you need

Anti-Patterns in Acceptance Testing

- **Don't** use UI Record-and-playback Systems
- **Don't** Record-and-playback production data. This has a role, but it is NOT Acceptance Testing
- **Don't** dump production data to your test systems, instead define the absolute minimum data that you need
- **Don't** assume Nasty Automated Testing Products^(tm) will do what you need. Be very sceptical about them. Start with YOUR strategy and evaluate tools against that.

Anti-Patterns in Acceptance Testing

- **Don't** use UI Record-and-playback Systems
- **Don't** Record-and-playback production data. This has a role, but it is NOT Acceptance Testing
- **Don't** dump production data to your test systems, instead define the absolute minimum data that you need
- **Don't** assume Nasty Automated Testing Products^(tm) will do what you need. Be very sceptical about them. Start with YOUR strategy and evaluate tools against that.
- **Don't** have a separate Testing/QA team! Quality is down to everyone - Developers own Acceptance Tests!!!

Anti-Patterns in Acceptance Testing

- **Don't** use UI Record-and-playback Systems
- **Don't** Record-and-playback production data. This has a role, but it is NOT Acceptance Testing
- **Don't** dump production data to your test systems, instead define the absolute minimum data that you need
- **Don't** assume Nasty Automated Testing Products^(tm) will do what you need. Be very sceptical about them. Start with YOUR strategy and evaluate tools against that.
- **Don't** have a separate Testing/QA team! Quality is down to everyone - Developers own Acceptance Tests!!!
- **Don't** let every Test start and init the app. Optimise for Cycle-Time, be efficient in your use of test environments.

Anti-Patterns in Acceptance Testing

- **Don't** use UI Record-and-playback Systems
- **Don't** Record-and-playback production data. This has a role, but it is NOT Acceptance Testing
- **Don't** dump production data to your test systems, instead define the absolute minimum data that you need
- **Don't** assume Nasty Automated Testing Products^(tm) will do what you need. Be very sceptical about them. Start with YOUR strategy and evaluate tools against that.
- **Don't** have a separate Testing/QA team! Quality is down to everyone - Developers own Acceptance Tests!!!
- **Don't** let every Test start and init the app. Optimise for Cycle-Time, be efficient in your use of test environments.
- **Don't** include Systems outside of your control in your Acceptance Test Scope

Anti-Patterns in Acceptance Testing

- **Don't** use UI Record-and-playback Systems
- **Don't** Record-and-playback production data. This has a role, but it is NOT Acceptance Testing
- **Don't** dump production data to your test systems, instead define the absolute minimum data that you need
- **Don't** assume Nasty Automated Testing Products^(tm) will do what you need. Be very sceptical about them. Start with YOUR strategy and evaluate tools against that.
- **Don't** have a separate Testing/QA team! Quality is down to everyone - Developers own Acceptance Tests!!!
- **Don't** let every Test start and init the app. Optimise for Cycle-Time, be efficient in your use of test environments.
- **Don't** include Systems outside of your control in your Acceptance Test Scope
- **Don't** Put 'wait()' instructions in your tests hoping it will solve intermittency

Tricks for Success

Tricks for Success

- **Do** Ensure That Developers Own the Tests

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”
- **Do** Keep Tests Isolated from one-another

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”
- **Do** Keep Tests Isolated from one-another
- **Do** Keep Your Tests Repeatable

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”
- **Do** Keep Tests Isolated from one-another
- **Do** Keep Your Tests Repeatable
- **Do** Use the Language of the Problem Domain - Do try the DSL approach, whatever your tech.

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”
- **Do** Keep Tests Isolated from one-another
- **Do** Keep Your Tests Repeatable
- **Do** Use the Language of the Problem Domain - Do try the DSL approach, whatever your tech.
- **Do** Stub External Systems

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”
- **Do** Keep Tests Isolated from one-another
- **Do** Keep Your Tests Repeatable
- **Do** Use the Language of the Problem Domain - Do try the DSL approach, whatever your tech.
- **Do** Stub External Systems
- **Do** Test in “Production-Like” Environments

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”
- **Do** Keep Tests Isolated from one-another
- **Do** Keep Your Tests Repeatable
- **Do** Use the Language of the Problem Domain - Do try the DSL approach, whatever your tech.
- **Do** Stub External Systems
- **Do** Test in “Production-Like” Environments
- **Do** Make Instructions Appear Synchronous at the Level of the Test Case

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”
- **Do** Keep Tests Isolated from one-another
- **Do** Keep Your Tests Repeatable
- **Do** Use the Language of the Problem Domain - Do try the DSL approach, whatever your tech.
- **Do** Stub External Systems
- **Do** Test in “Production-Like” Environments
- **Do** Make Instructions Appear Synchronous at the Level of the Test Case
- **Do** Test for ANY change

Tricks for Success

- **Do** Ensure That Developers Own the Tests
- **Do** Focus Your Tests on “What” not “How”
- **Do** Think of Your Tests as “Executable Specifications”
- **Do** Make Acceptance Testing Part of your “Definition of Done”
- **Do** Keep Tests Isolated from one-another
- **Do** Keep Your Tests Repeatable
- **Do** Use the Language of the Problem Domain - Do try the DSL approach, whatever your tech.
- **Do** Stub External Systems
- **Do** Test in “Production-Like” Environments
- **Do** Make Instructions Appear Synchronous at the Level of the Test Case
- **Do** Test for ANY change
- **Do** Keep your Tests Efficient

Q&A



<http://www.continuous-delivery.co.uk>

Dave Farley

<http://www.davefarley.net>

@davefarley77

