inedo

…because it's more than just code.

CI++

Going Beyond Continuous Integration

QCon Beijing

Alex Papadimoulis
@apapadimoulis

THE DAILY WTF

Curious Perversions in Information Technology

- Software Disaster Stories
- Interviews Gone Bad
- Bad Code
- Funny Error Messages
- And sometimes... serious content!

- The day job

- BuildMaster
  - release management & automation
  - continuous delivery platform

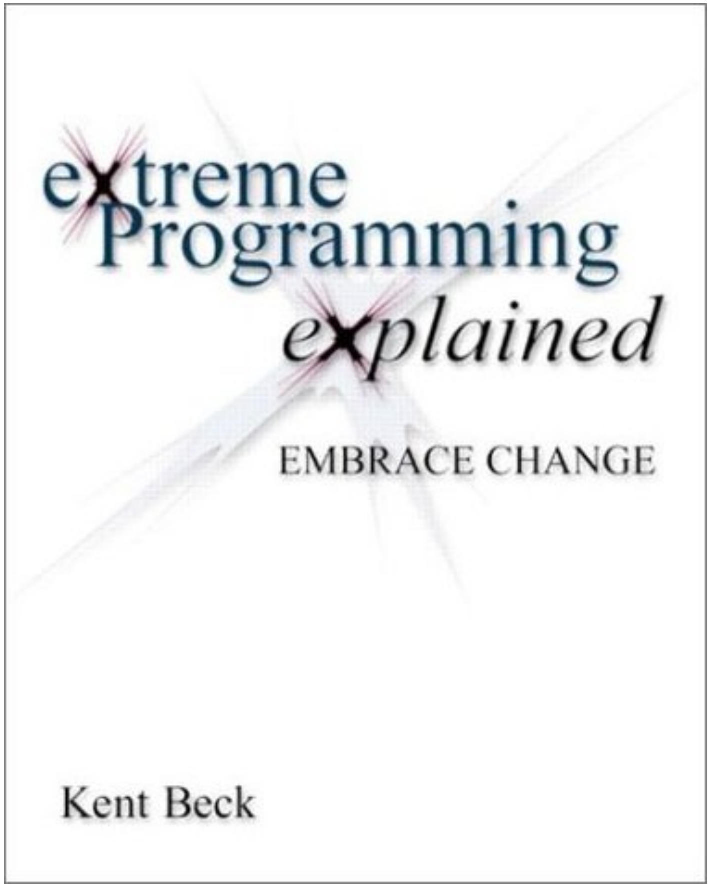
My 3 Bullet Point Résumé

- Been in software for a while
- Worked on a bunch of different systems
- Worked at a bunch of different places

Continuous Integration?

What is CI?

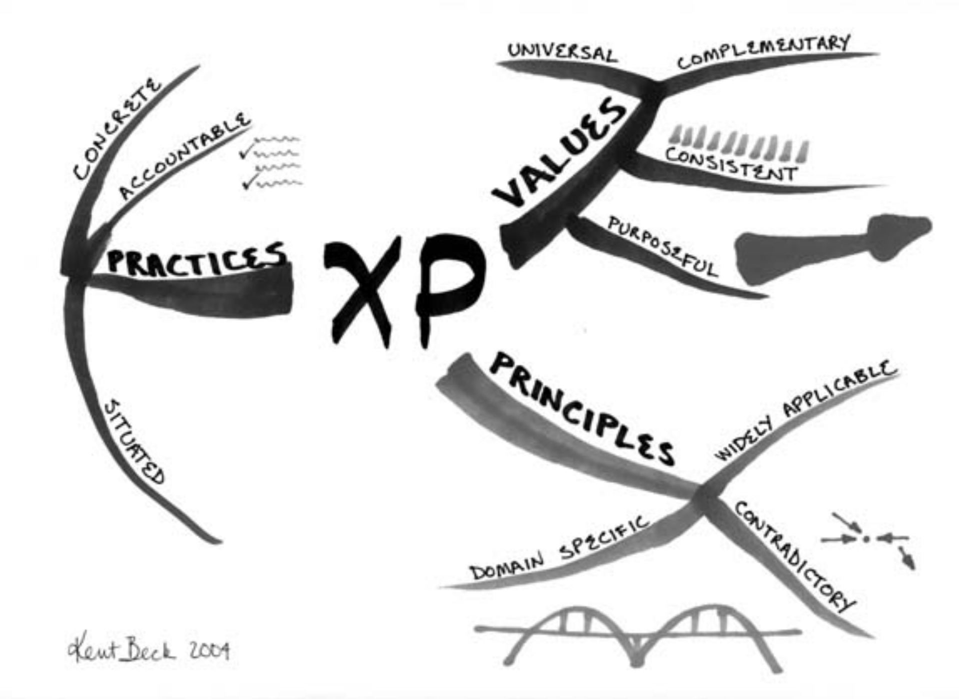
Continuous Integration



extreme Programming explained

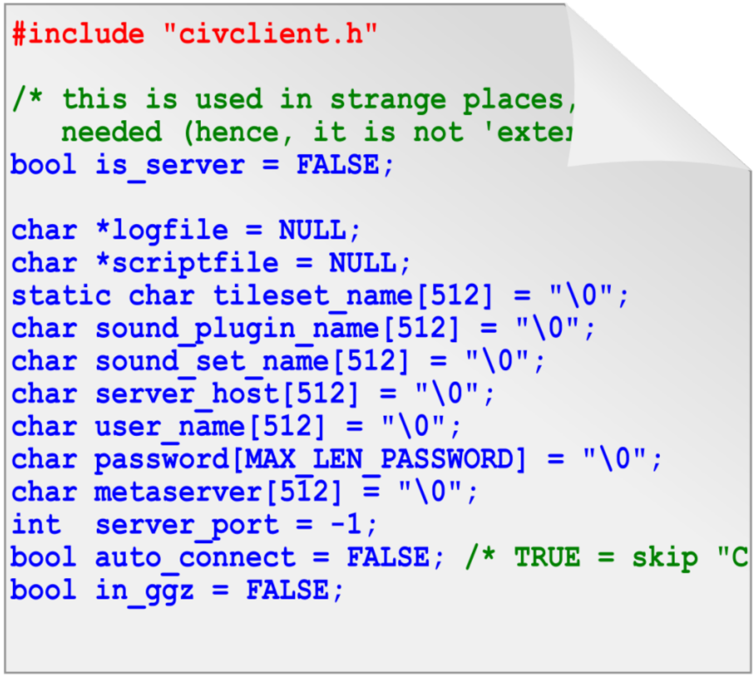
EMBRACE CHANGE

Kent Beck



"Integration"

Code

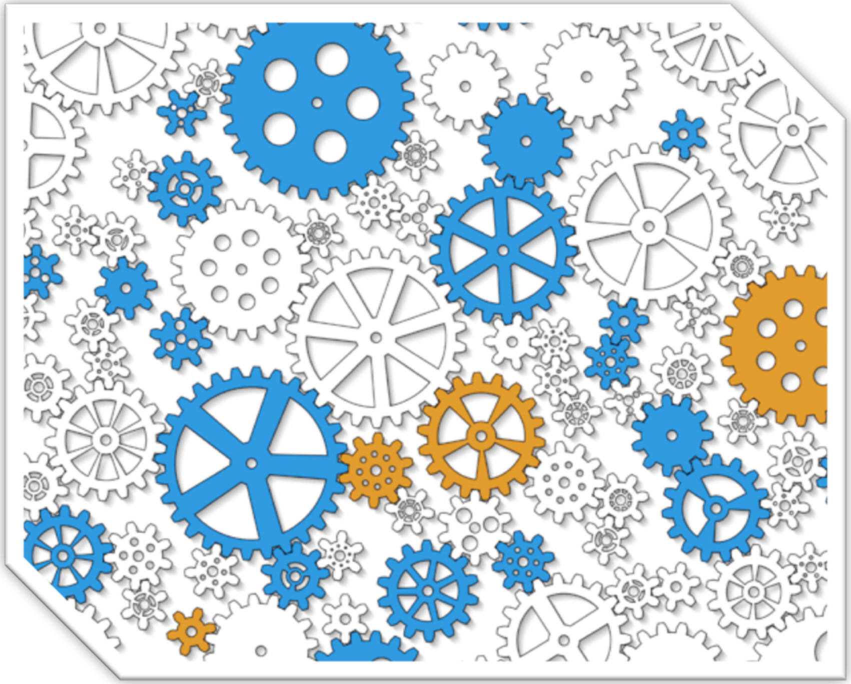


```
#include "civclient.h"

/* this is used in strange places,
   needed (hence, it is not 'exter
bool is_server = FALSE;

char *logfile = NULL;
char *scriptfile = NULL;
static char tileset_name[512] = "\0";
char sound_plugin_name[512] = "\0";
char sound_set_name[512] = "\0";
char server_host[512] = "\0";
char user_name[512] = "\0";
char password[MAX_LEN_PASSWORD] = "\0";
char metaserver[512] = "\0";
int  server_port = -1;
bool auto_connect = FALSE; /* TRUE = skip "C
bool in_ggz = FALSE;
```

Component



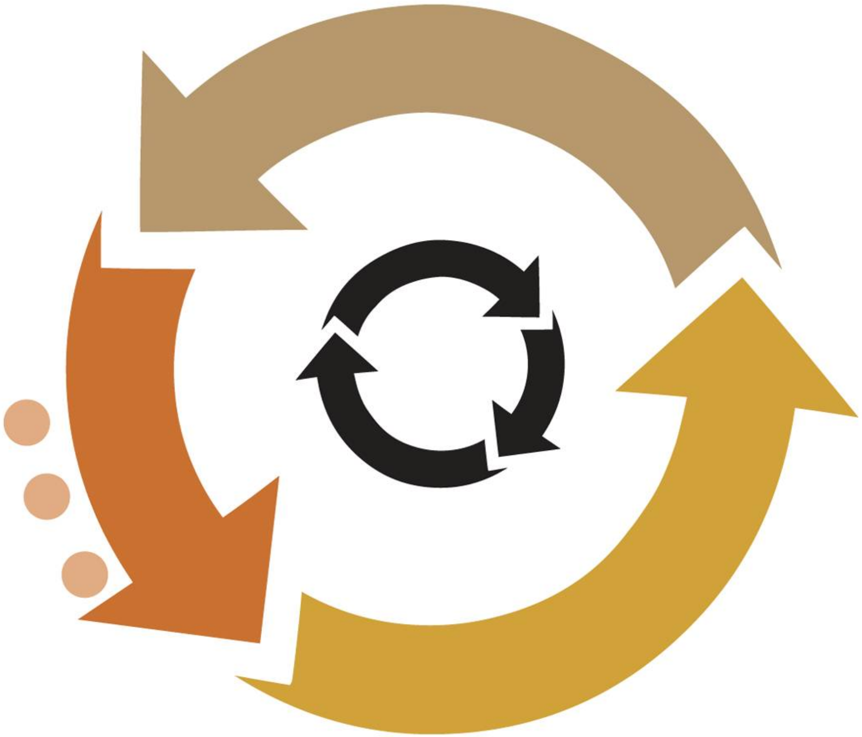
Integration Testing

1. Get the Code

2. Build the Code

3. Test the Code

"Continuous"



Scheduled

Triggered

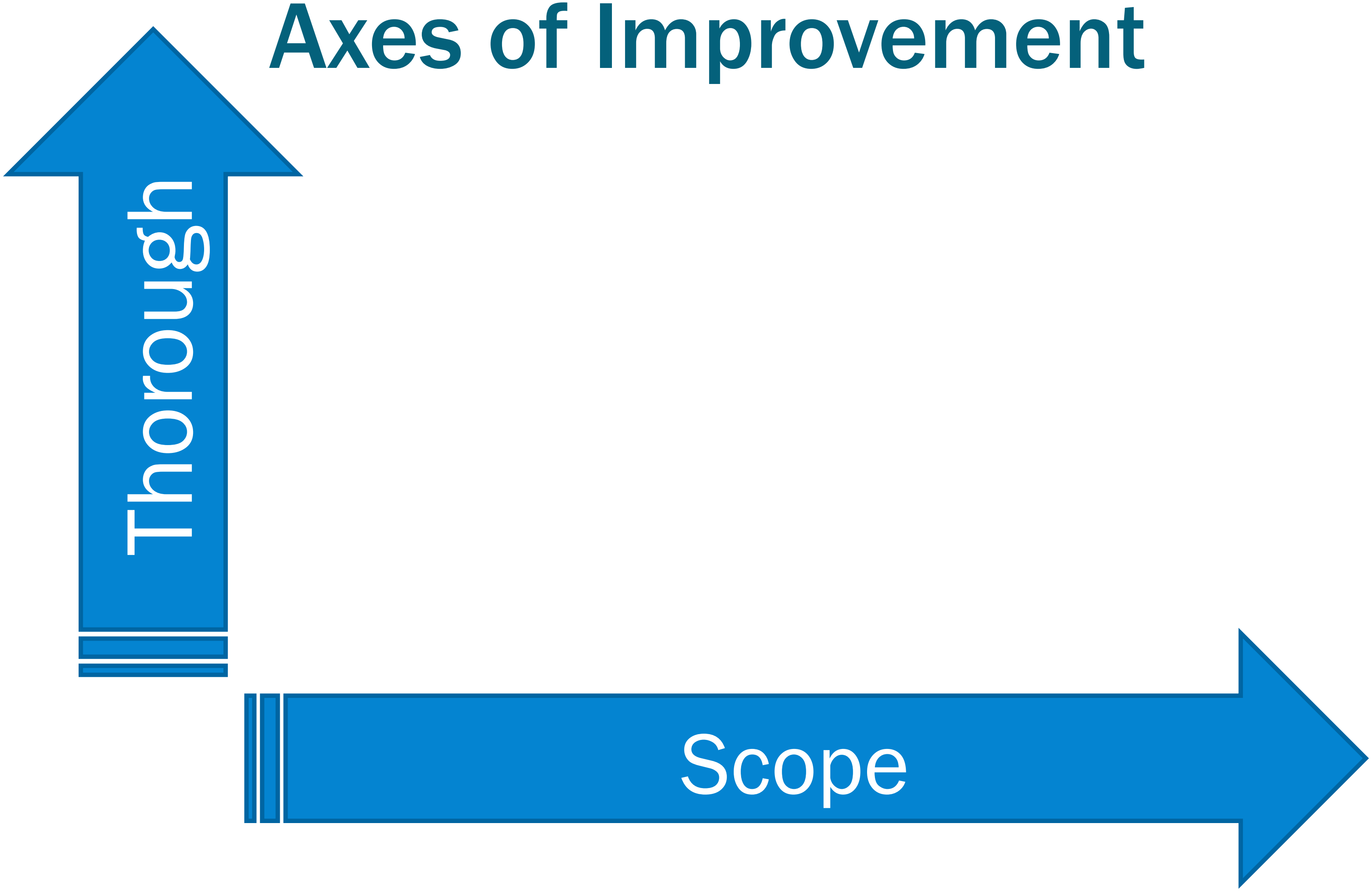
Automation

Why does CI work?

Small Changes = Less Risk

One Last Thought on CI

Axes of Improvement



Thorough

Scope

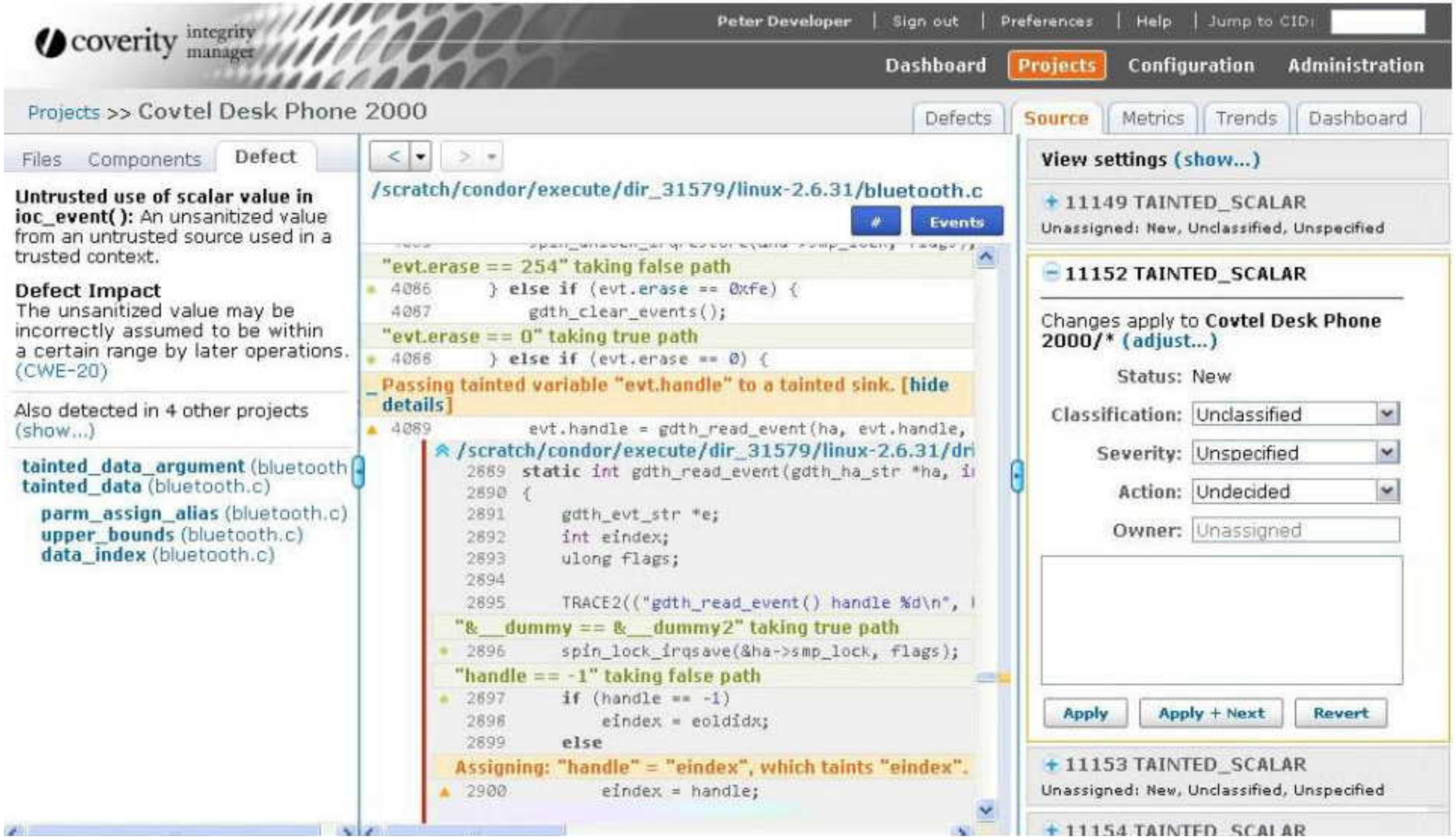
Textbook Continuous Integration

- Daily Commits
- Rollback Failed Commits
- Multi-stage Builds
- Clone Production

Automated Validation & Testing

- Static Analysis
- Unit Testing
- Code Coverage

Static Analysis



Projects >> Covtel Desk Phone 2000

Untrusted use of scalar value in ioc_event(): An unsanitized value from an untrusted source used in a trusted context.

Defect Impact
The unsanitized value may be incorrectly assumed to be within a certain range by later operations. (CWE-20)

Also detected in 4 other projects (show...)

tainted_data_argument (bluetooth
tainted_data (bluetooth.c)
parm_assign_alias (bluetooth.c)
upper_bounds (bluetooth.c)
data_index (bluetooth.c)

/scratch/condor/execute/dir_31579/linux-2.6.31/bluetooth.c

"evt.erase == 254" taking false path

```
    } else if (evt.erase == 0xfe) {
        gdth_clear_events();
```

"evt.erase == 0" taking true path

```
    } else if (evt.erase == 0) {
```

Passing tainted variable "evt.handle" to a tainted sink. [hide details]

```
        evt.handle = gdth_read_event(ha, evt.handle,
```

/scratch/condor/execute/dir_31579/linux-2.6.31/dri

```
static int gdth_read_event(gdth_ha_str *ha, i
{
    gdth_evt_str *e;
    int eindex;
    ulong flags;

    TRACE2(("gdth_read_event() handle %d\n",
```

"&__dummy == &__dummy2" taking true path

```
    spin_lock_irqsave(&ha->smp_lock, flags);
```

"handle == -1" taking false path

```
    if (handle == -1)
        eindex = eoldidx;
    else
```

Assigning: "handle" = "eindex", which taints "eindex".

```
        eindex = handle;
```

View settings (show...)

11149 TAINTED_SCALAR
Unassigned: New, Unclassified, Unspecified

11152 TAINTED_SCALAR

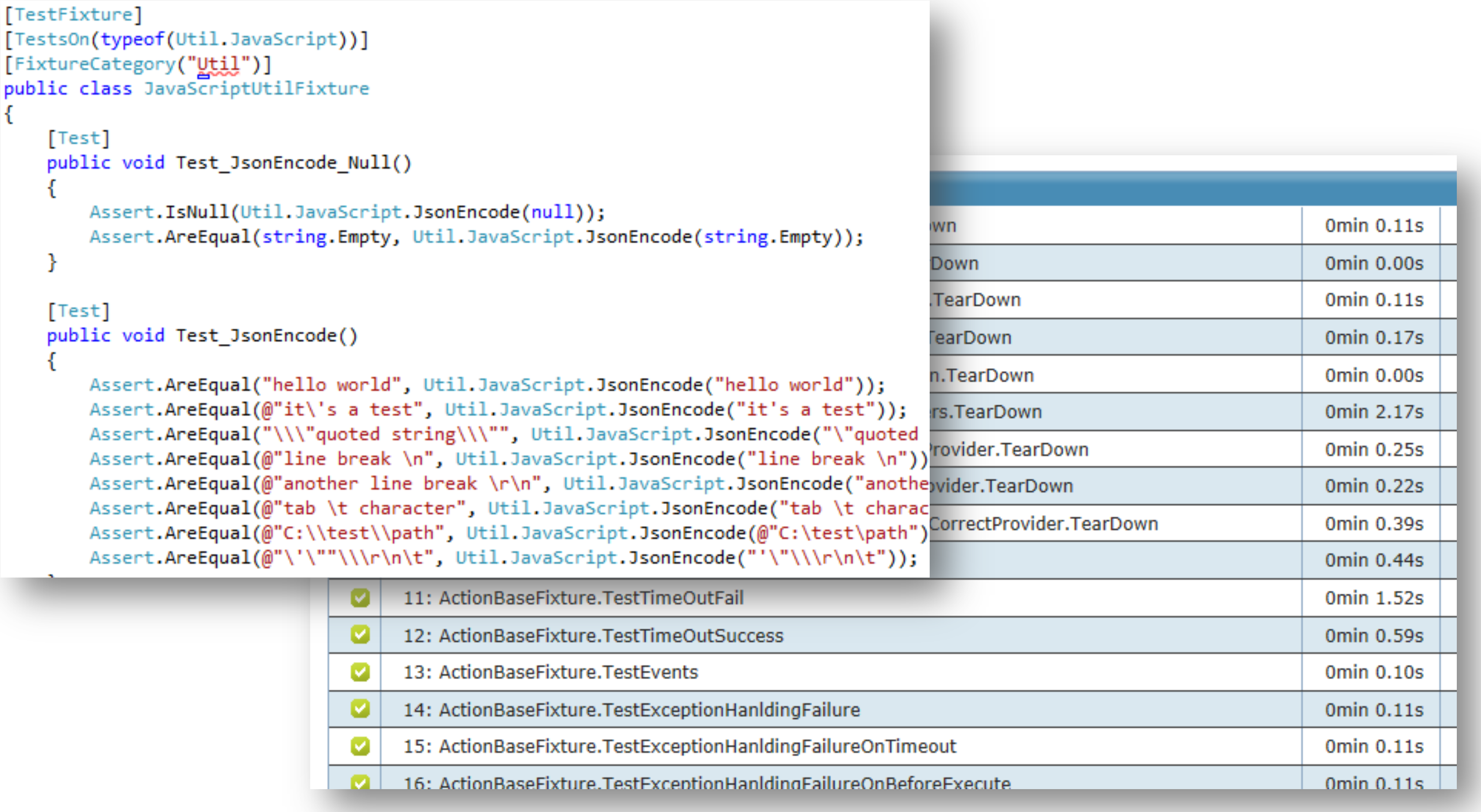
Changes apply to **Covtel Desk Phone 2000/*** (adjust...)

Status: New
Classification: Unclassified
Severity: Unspecified
Action: Undecided
Owner: Unassigned

11153 TAINTED_SCALAR
Unassigned: New, Unclassified, Unspecified

11154 TAINTED_SCALAR

Unit Testing

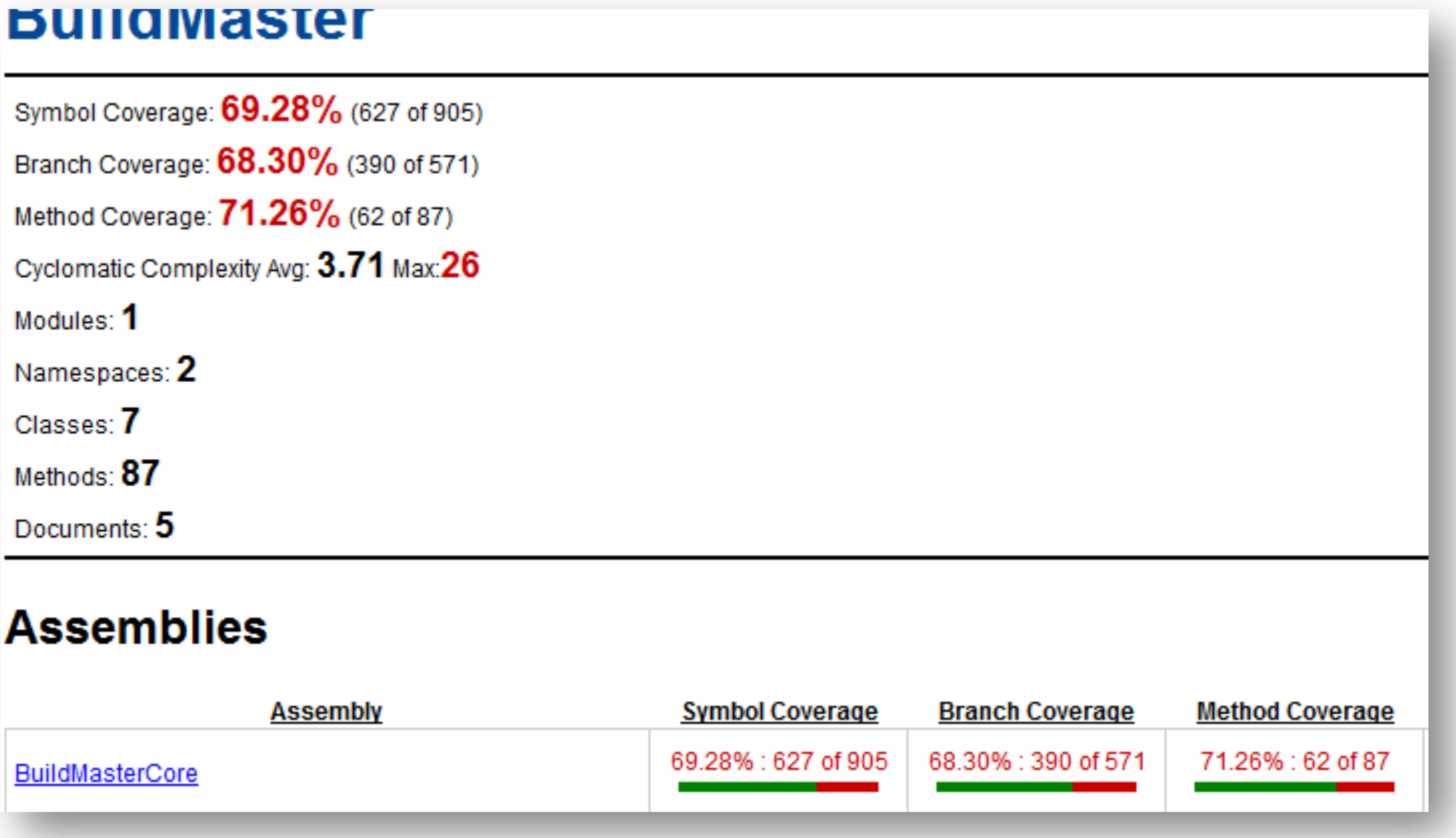


```
[TestFixture]
[TestsOn(typeof(Util.JavaScript))]
[FixtureCategory("Util")]
public class JavaScriptUtilFixture
{
    [Test]
    public void Test_JsonEncode_Null()
    {
        Assert.IsNull(Util.JavaScript.JsonEncode(null));
        Assert.AreEqual(string.Empty, Util.JavaScript.JsonEncode(string.Empty));
    }

    [Test]
    public void Test_JsonEncode()
    {
        Assert.AreEqual("hello world", Util.JavaScript.JsonEncode("hello world"));
        Assert.AreEqual(@"it\'s a test", Util.JavaScript.JsonEncode("it's a test"));
        Assert.AreEqual("\\\"quoted string\\\"", Util.JavaScript.JsonEncode("\"quoted
        Assert.AreEqual(@"line break \n", Util.JavaScript.JsonEncode("line break \n"))
        Assert.AreEqual(@"another line break \r\n", Util.JavaScript.JsonEncode("anothe
        Assert.AreEqual(@"tab \t character", Util.JavaScript.JsonEncode("tab \t charac
        Assert.AreEqual(@"C:\\test\\path", Util.JavaScript.JsonEncode(@"C:\test\path")
        Assert.AreEqual(@"\'\""\\r\n\t", Util.JavaScript.JsonEncode("'\"\\\r\n\t"));
```

	wn	0min 0.11s
	Down	0min 0.00s
	.TearDown	0min 0.11s
	TearDown	0min 0.17s
	n.TearDown	0min 0.00s
	rs.TearDown	0min 2.17s
	Provider.TearDown	0min 0.25s
	ovider.TearDown	0min 0.22s
	CorrectProvider.TearDown	0min 0.39s
		0min 0.44s
✓	11: ActionBaseFixture.TestTimeOutFail	0min 1.52s
✓	12: ActionBaseFixture.TestTimeOutSuccess	0min 0.59s
✓	13: ActionBaseFixture.TestEvents	0min 0.10s
✓	14: ActionBaseFixture.TestExceptionHanldingFailure	0min 0.11s
✓	15: ActionBaseFixture.TestExceptionHanldingFailureOnTimeout	0min 0.11s
✓	16: ActionBaseFixture.TestExceptionHanldingFailureOnBeforeExecute	0min 0.11s

Code Coverage



BuildMaster

Symbol Coverage: **69.28%** (627 of 905)

Branch Coverage: **68.30%** (390 of 571)

Method Coverage: **71.26%** (62 of 87)

Cyclomatic Complexity Avg: **3.71** Max:**26**

Modules: **1**

Namespaces: **2**

Classes: **7**

Methods: **87**

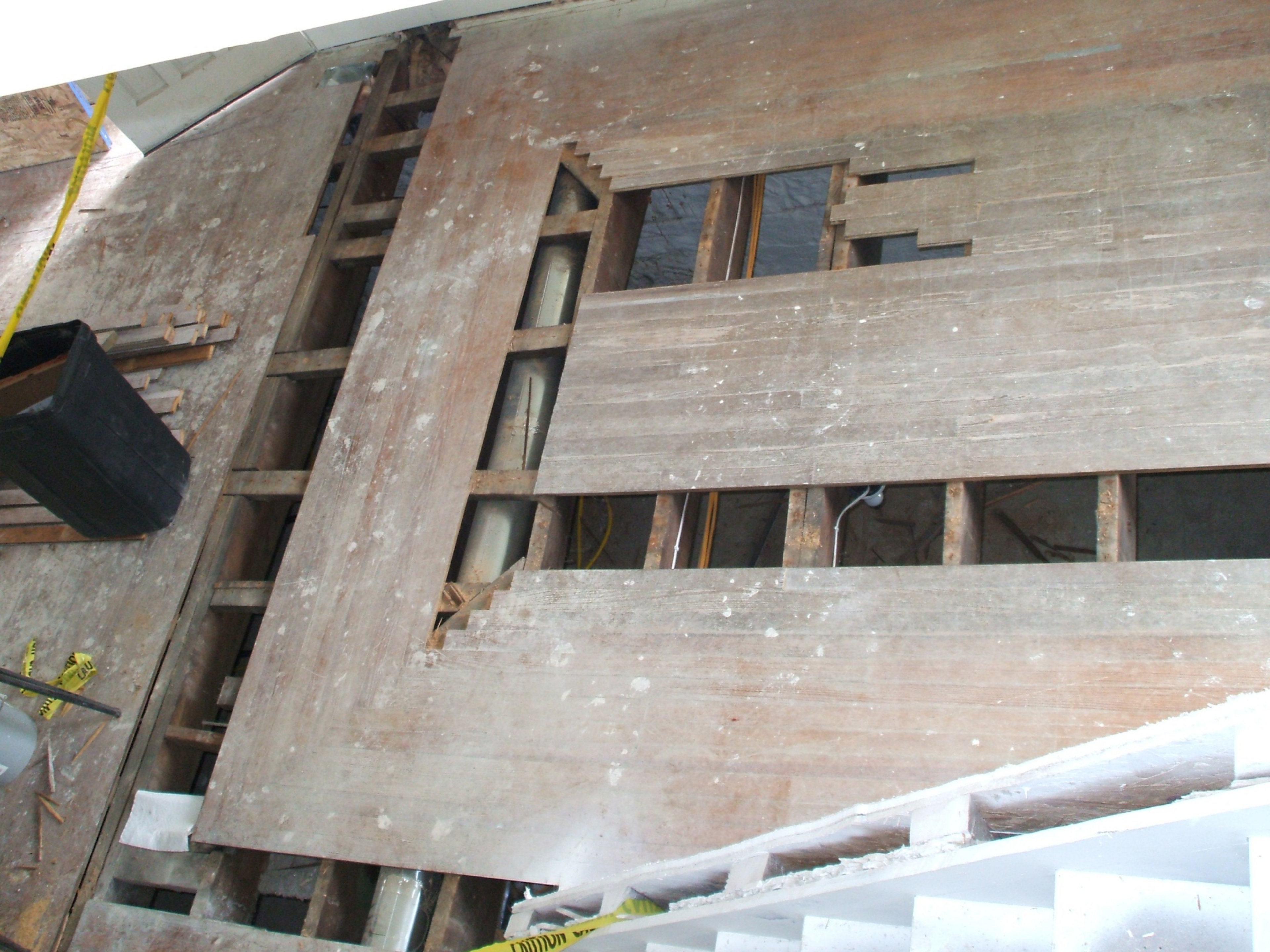
Documents: **5**

Assemblies

Assembly	Symbol Coverage	Branch Coverage	Method Coverage
BuildMasterCore	69.28% : 627 of 905	68.30% : 390 of 571	71.26% : 62 of 87

“There’s no excuse for *not* having 100% code coverage”

“There’s no excuse for ~~not~~ having 100% code coverage”


CAUTION

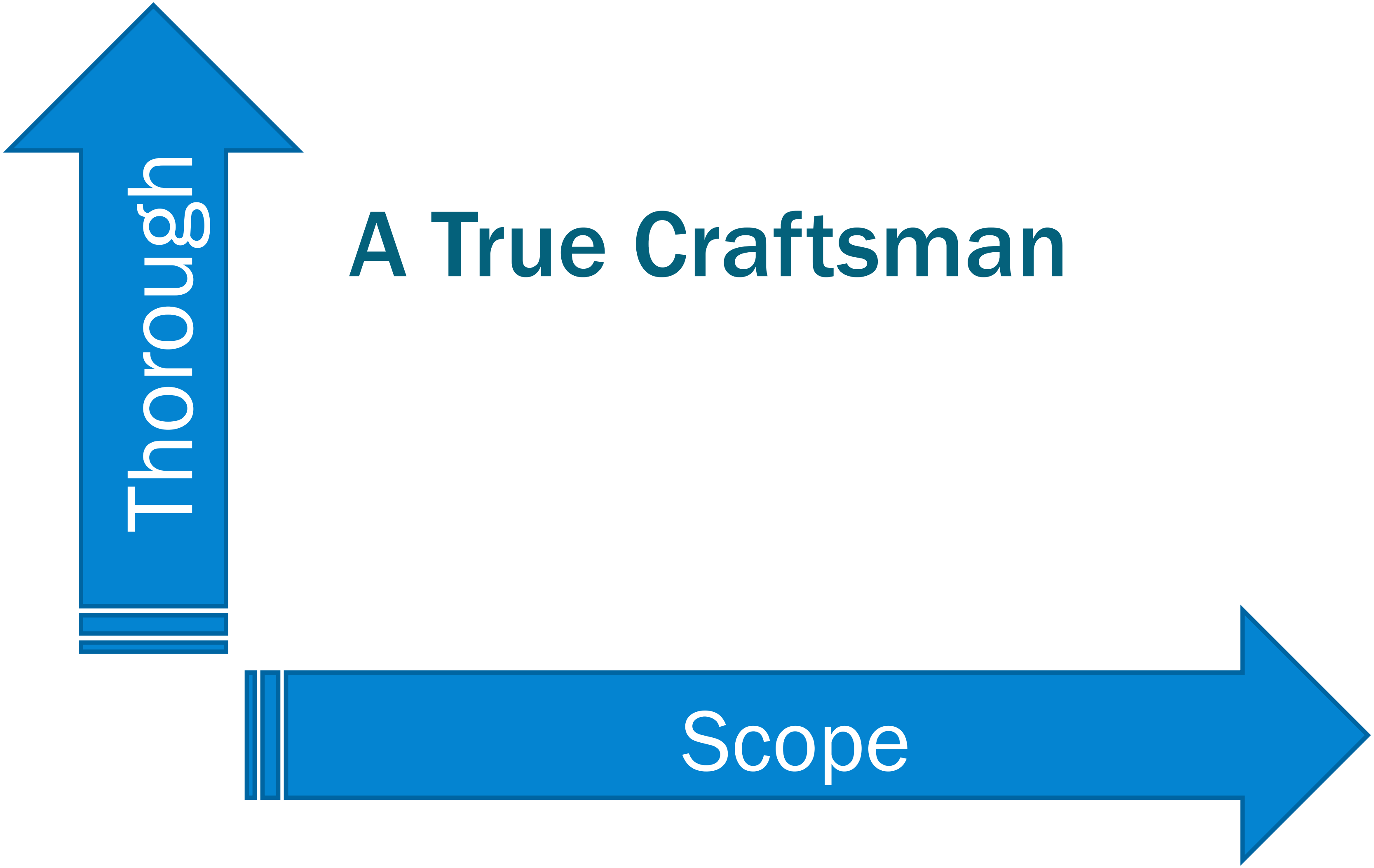
My Carpenter

Shelves?

Shelves

BERRY CROW

A True Craftsman

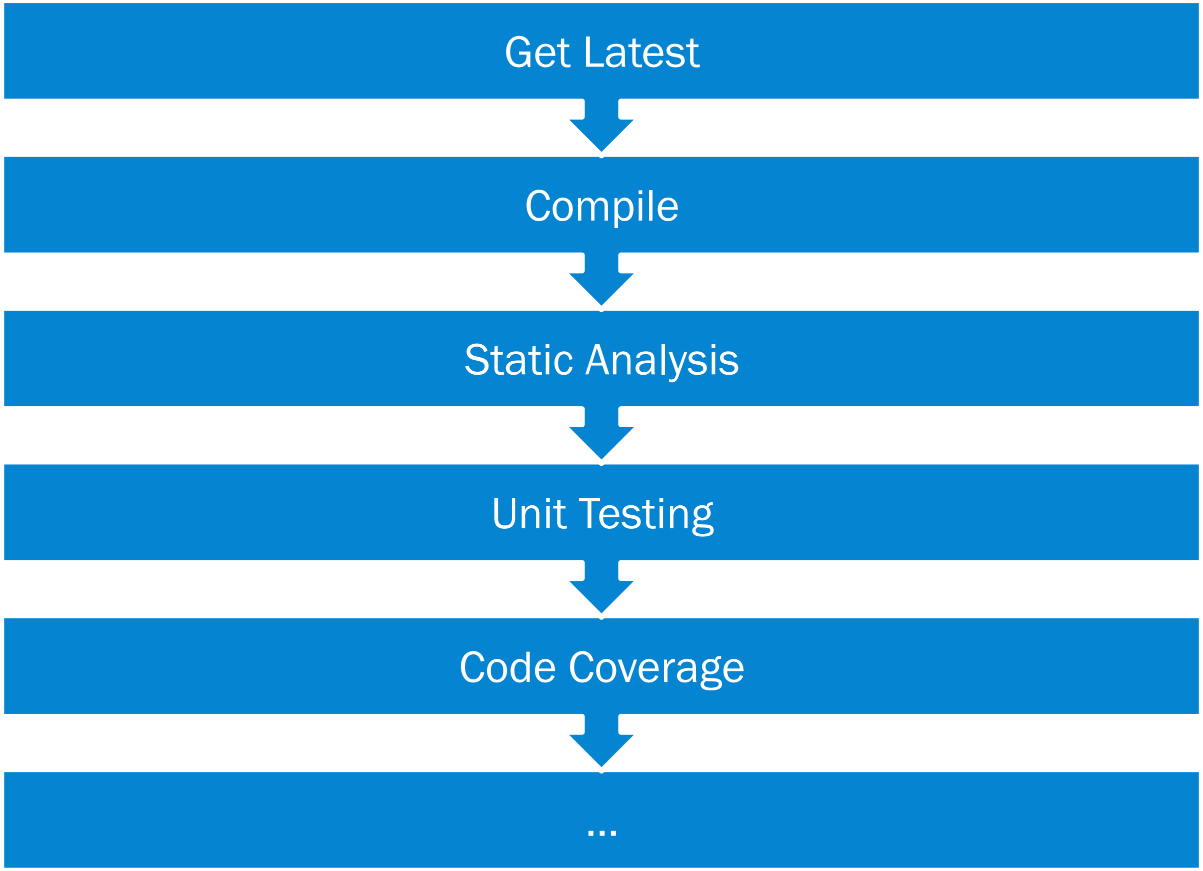


Thorough

Scope

Quality Code
!=
Good Software

Integration testing



Get Latest

Compile

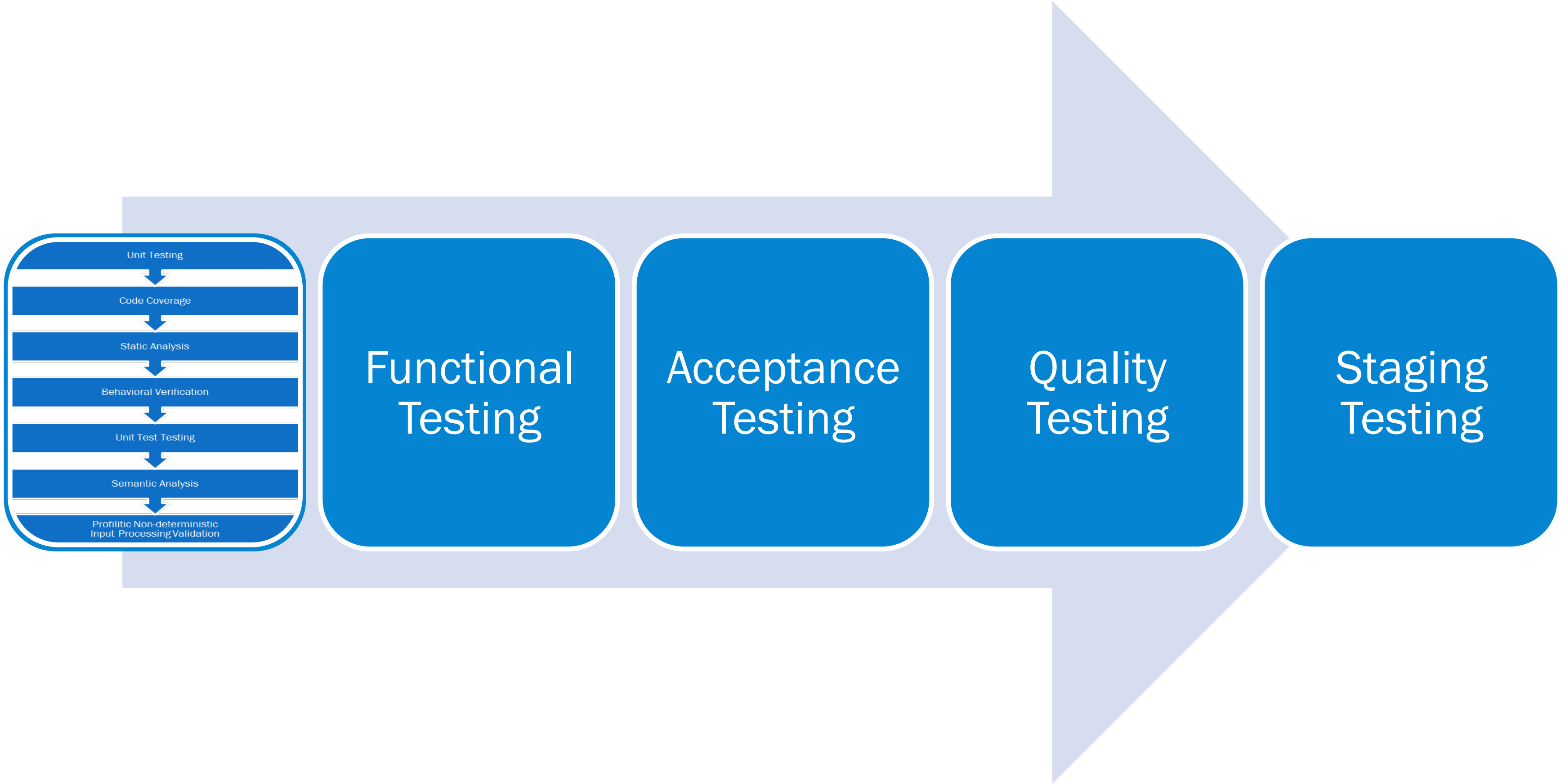
Static Analysis

Unit Testing

Code Coverage

…

All Testing



Unit Testing

Code Coverage

Static Analysis

Behavioral Verification

Unit Test Testing

Semantic Analysis

Profilitic Non-deterministic Input Processing Validation

Functional Testing

Acceptance Testing

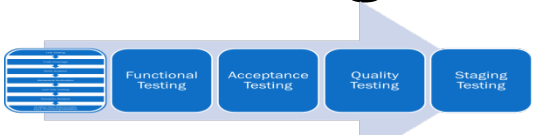
Quality Testing

Staging Testing

...because it's more than just code.

Software Development

- Project Management
- Requirements Analysis
- Product Management
- Release Management
- Source Control
- Issue Tracking
- Dependencies
- Artifact Management

- Build Management
- 

- Environments
- Approvals/Sign-offs
- Configuration Files
- Database Changes
- Change Controls
- Traceability & Auditing

Software Development

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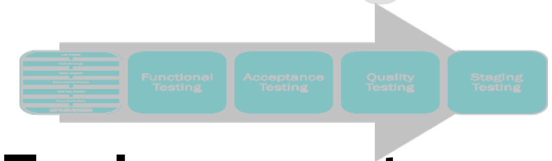
- 

- **Environments**
- Approvals/Sign-offs
- **Configuration Files**
- Database Changes
- Change Controls
- Traceability & Auditing

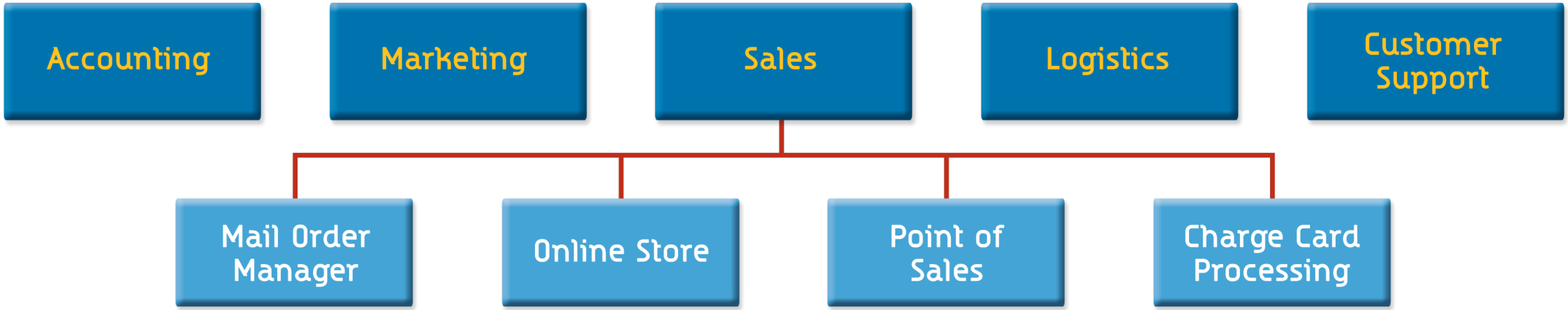
ENVIRONMENTS

RELEASE MANAGEMENT

Applications

- Accounting
- Marketing
- Sales
- Logistics
- Customer Support

Applications



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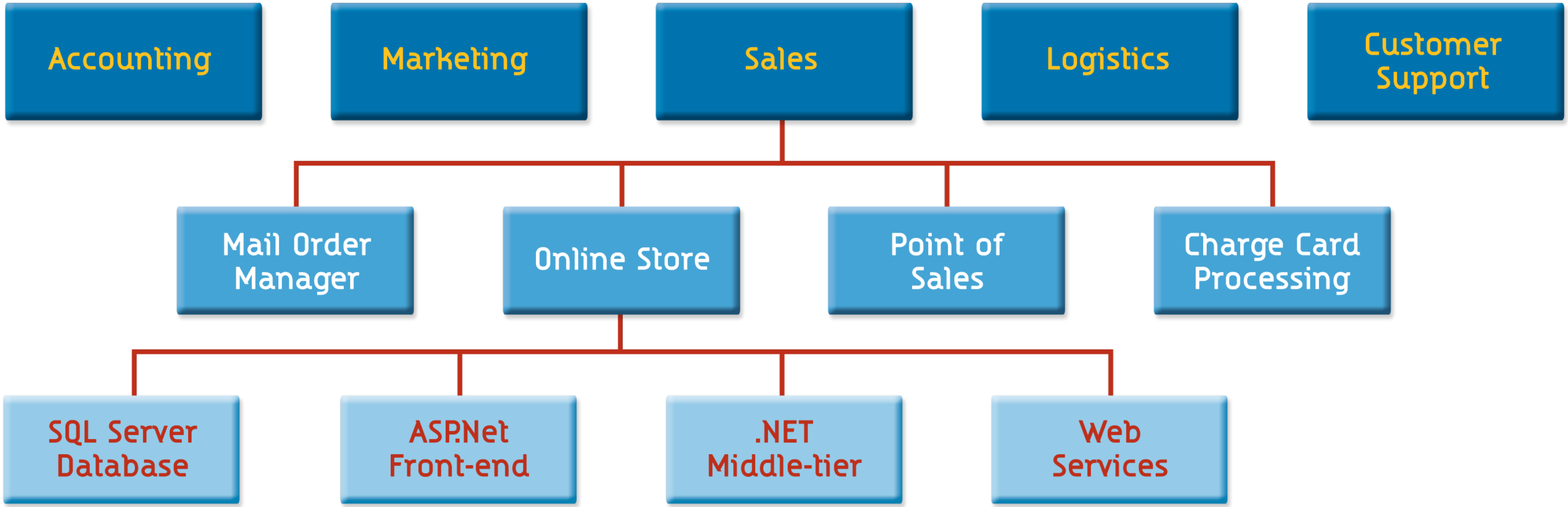
…because it's more than just code.

Applications


Accounting

Marketing

Sales

Logistics

Customer Support

Mail Order Manager

Online Store

Point of Sales

Charge Card Processing

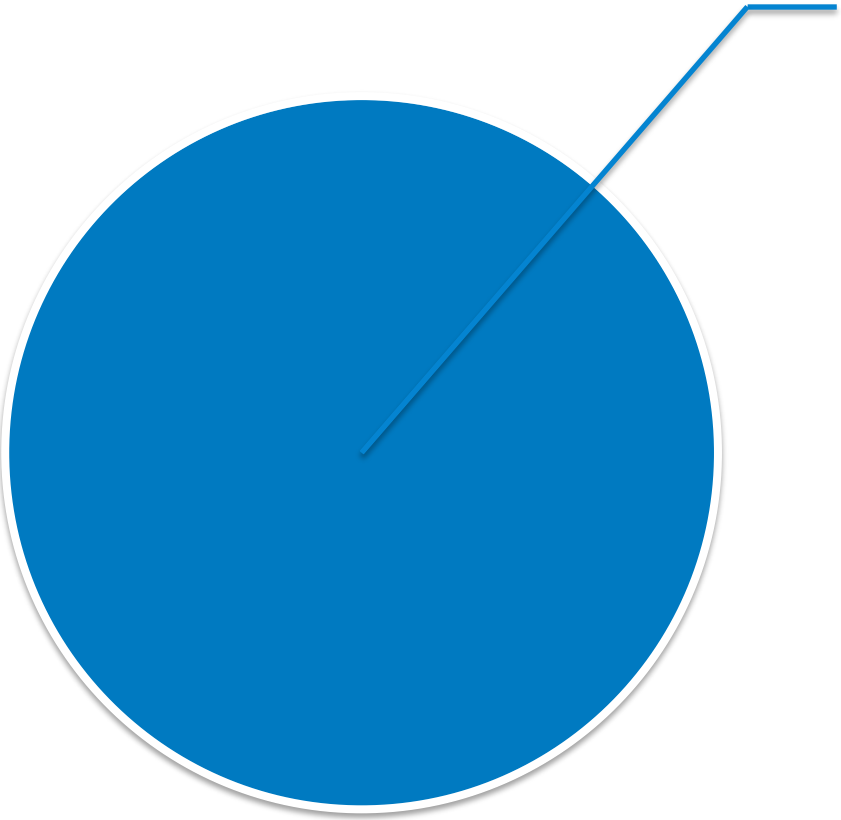
SQL Server Database

ASP.Net Front-end

.NET Middle-tier

Web Services

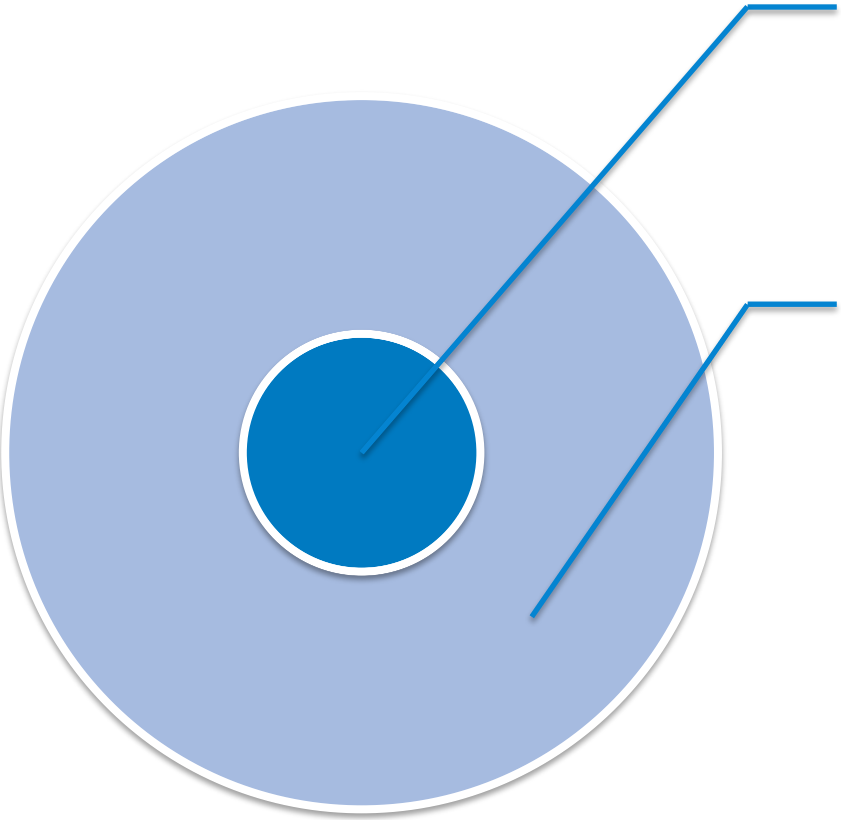
Releases



Initial Release

- Perfect

Releases

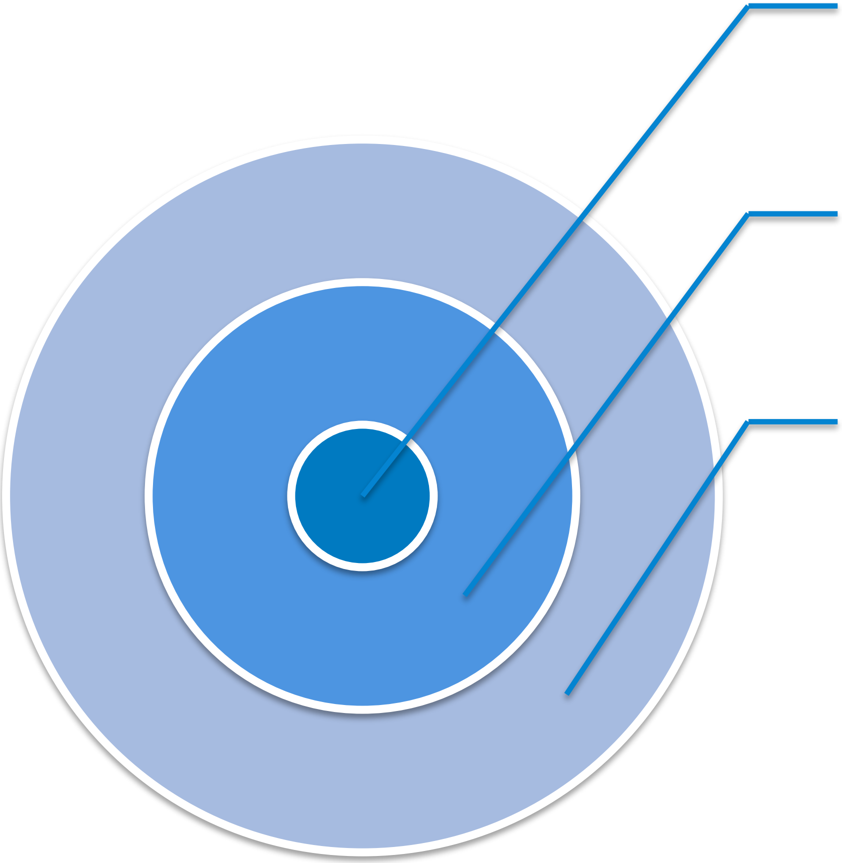


Initial Release

Emergency Fix

- Crashes when Credit Card is submitted

Releases



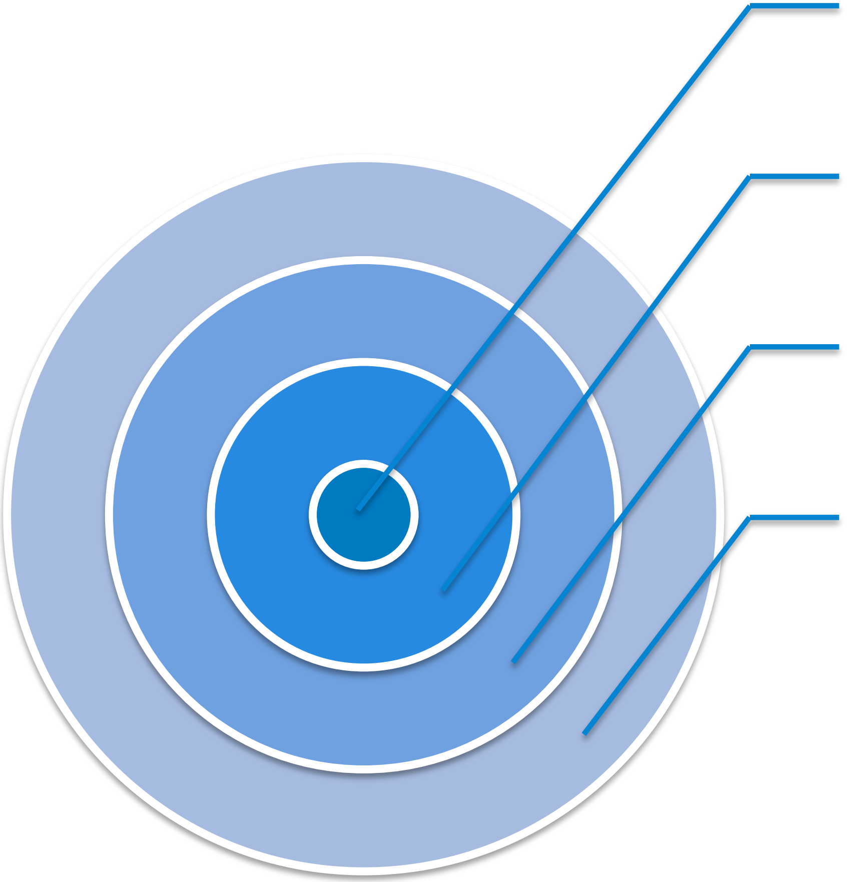
Initial Release

Emergency Fix

Another Emergency Fix

- Orders randomly go missing

Releases



Initial Release

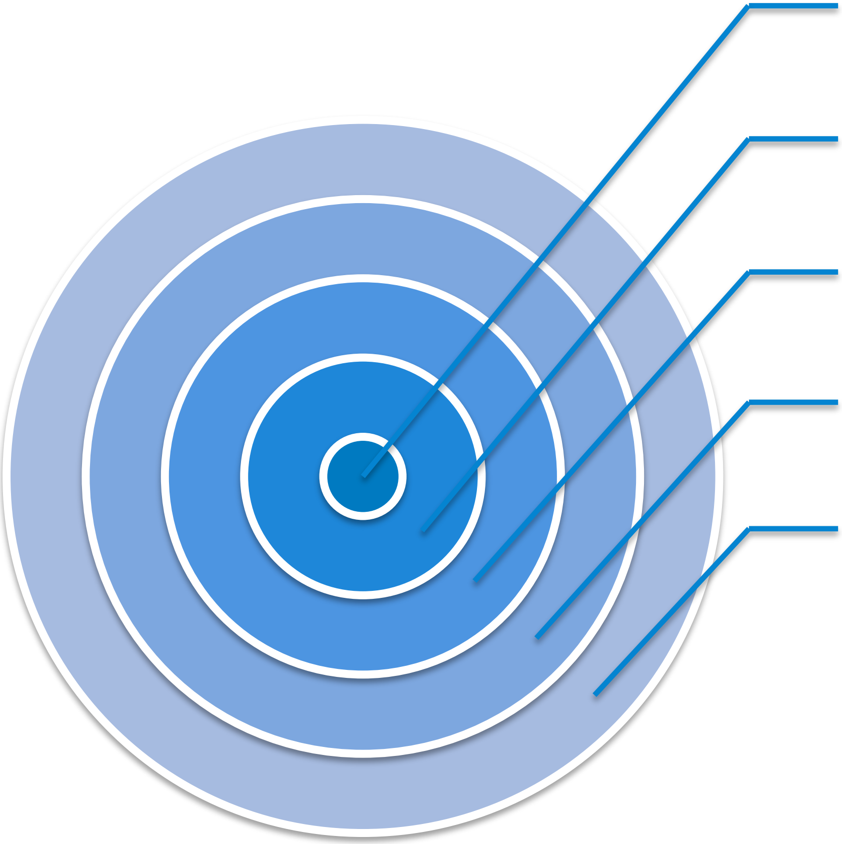
Emergency Fix

Another Emergency Fix

New Features

- RSS Feed
- Sub-categories
- Newsletter

Releases



Initial Release

Emergency Fix

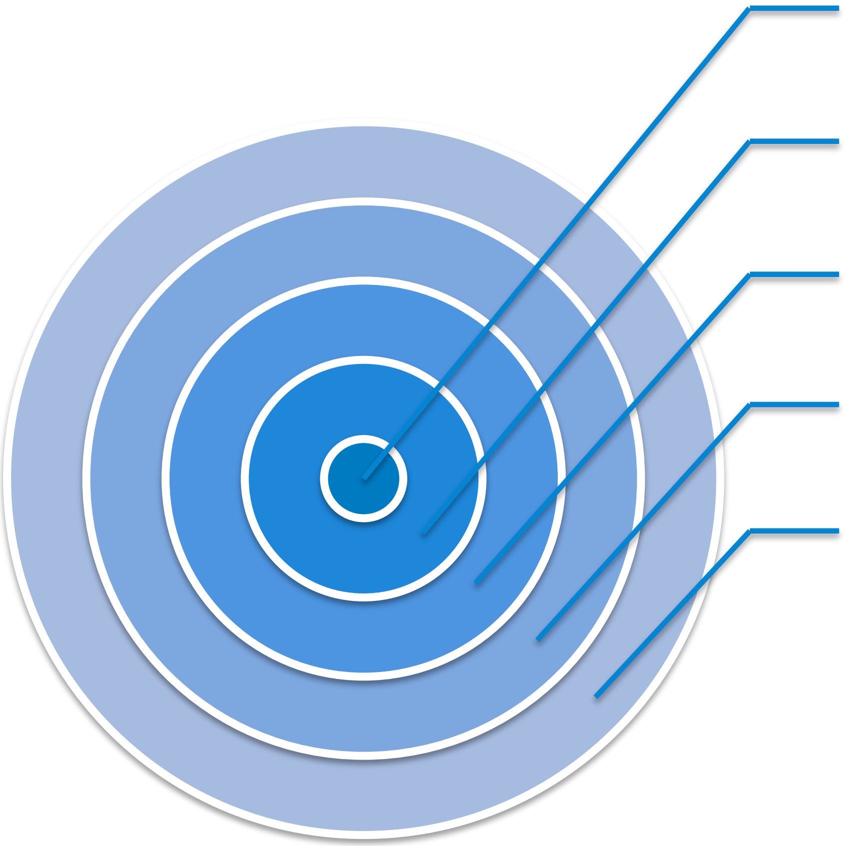
Another Emergency Fix

New Features

More New Features

- One-click Buy
- Renewals
- Favorites List

Releases



1.0 - Initial Release

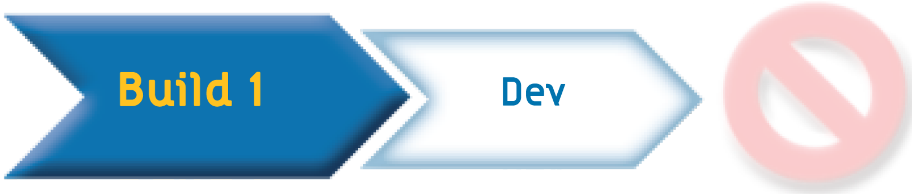
1.1 - Emergency Fix

1.2 - Another Emergency Fix

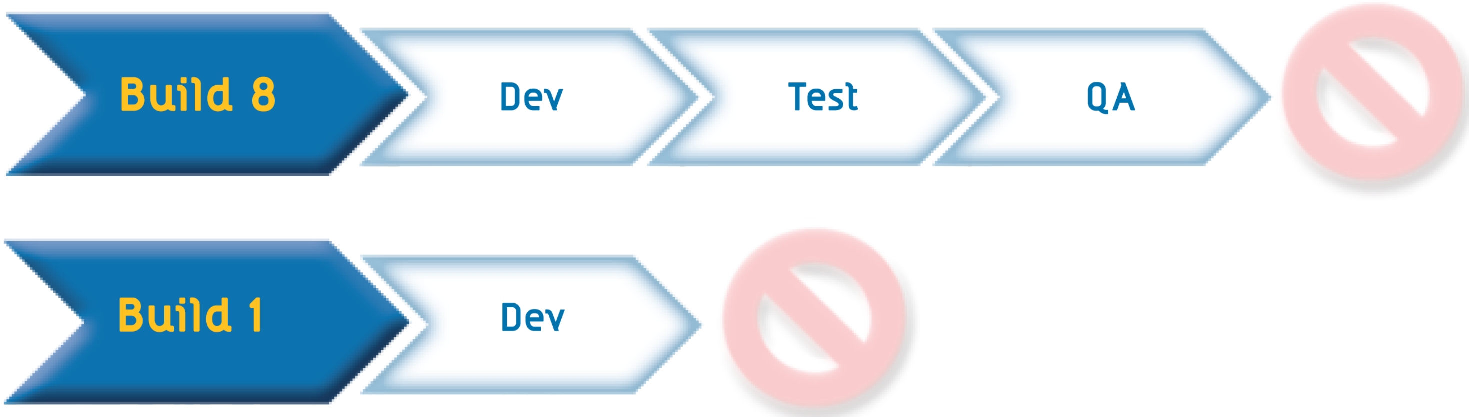
2.0 - New Features

2.5 - More New Features

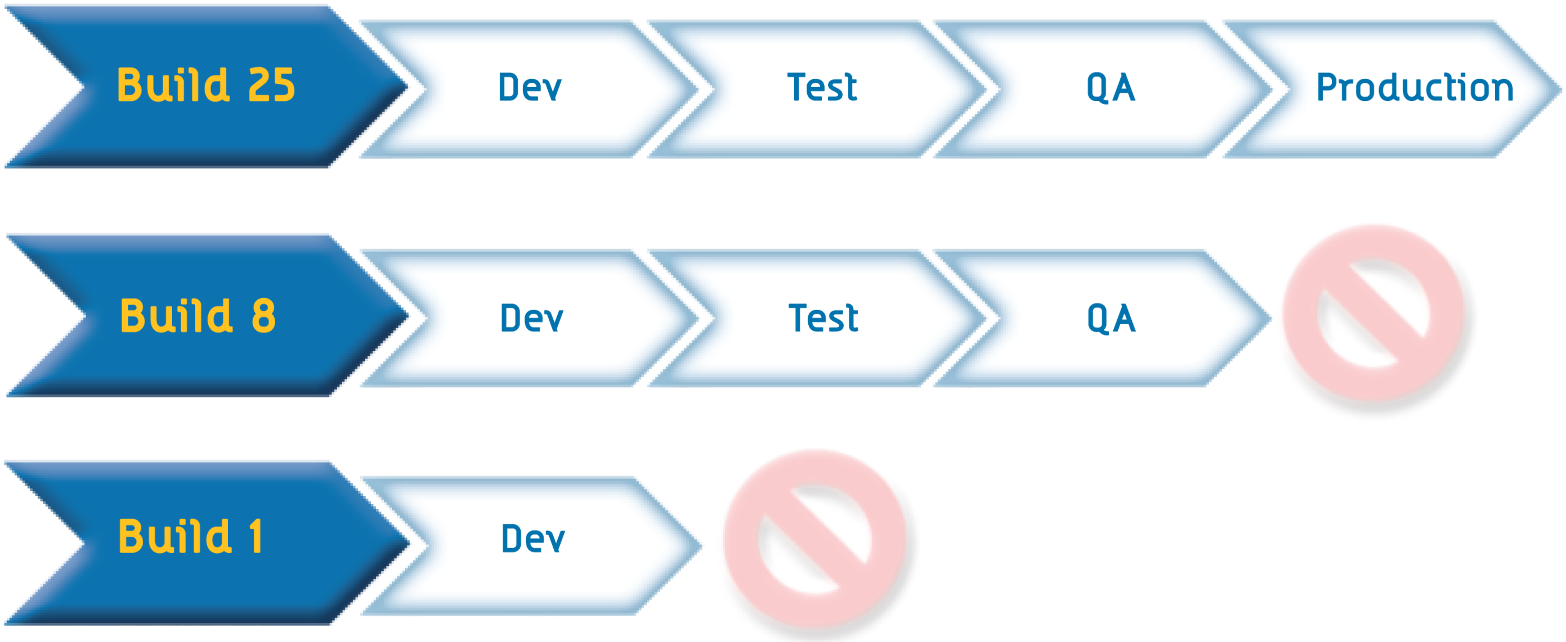
Builds



Builds



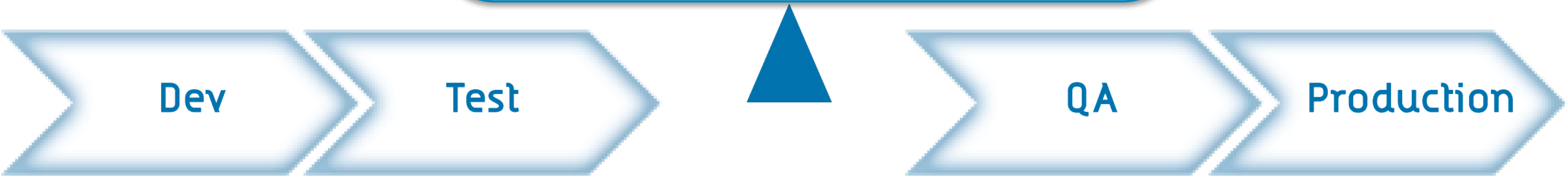
Builds


Build 25
Dev
Test
QA
Production
Build 8
Dev
Test
QA
Build 1
Dev

Promotions

Before QA Deployment:

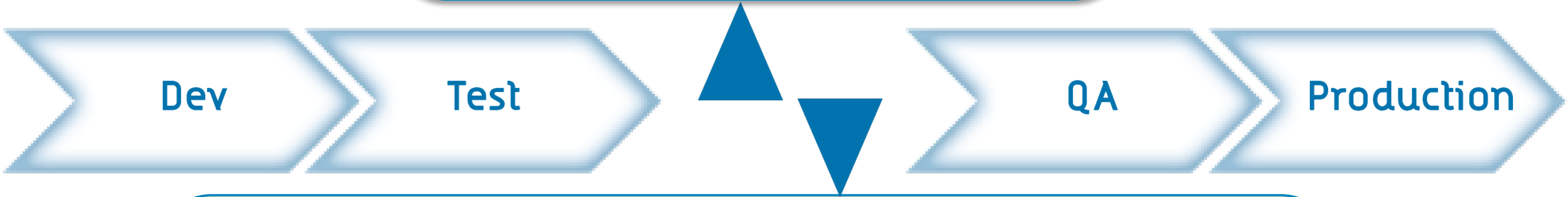
- ❑ Smoke Test Passed
- ❑ All Test Cases Passed
- ❑ Lead Developer Signed Off
- ❑ Two Testers Signed Off
- ❑ Load Testing Certified



Deployments

Before QA Deployment:

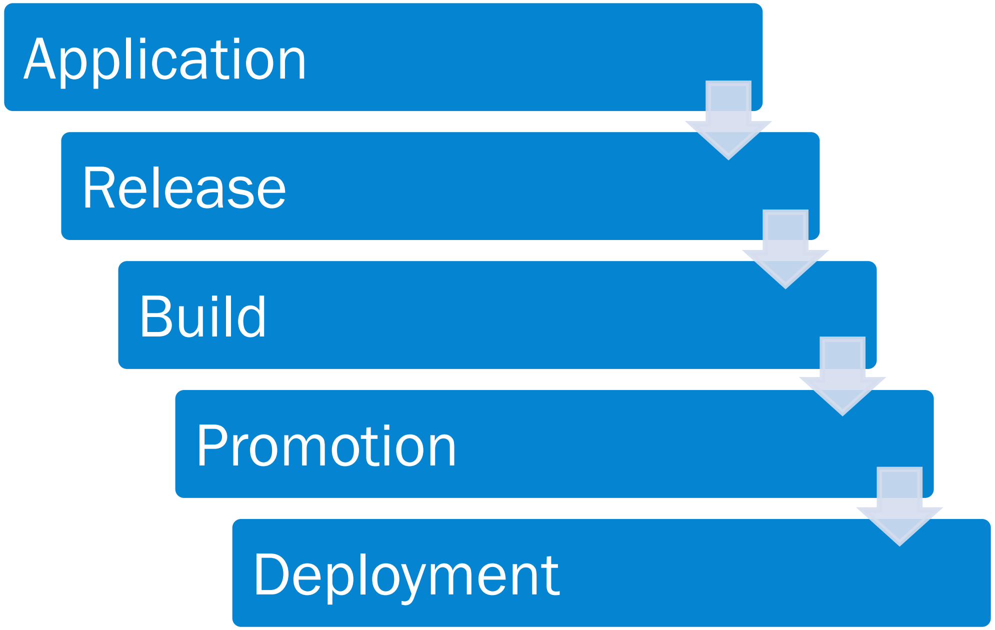
- ✓ Smoke Test Passed
- ✓ All Test Cases Passed
- ✓ Lead Developer Signed Off
- ✓ Two Testers Signed Off
- ✓ Load Testing Certified



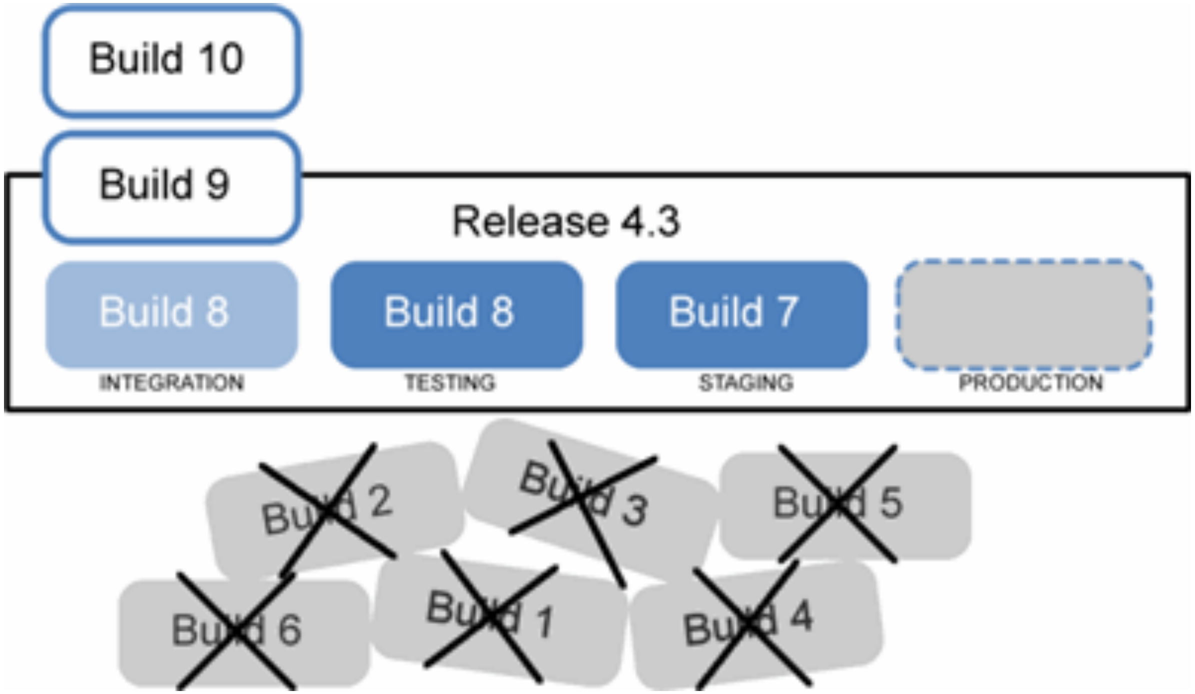
Deployment Procedure:

1. GET code labeled for QA from SCM to F:\SRC on BLDSV1
2. Edit AssemblyInfo.cs to include build number and new SNK
3. Compile with output of F:\SRC
4. Shutdown IIS on WEBSV1, WEBSV2, and WEBSV3
5. Back up old files on each web server to F:\BACKUP with…

Hierarchy



Releases -vs- Builds



Influencing Change

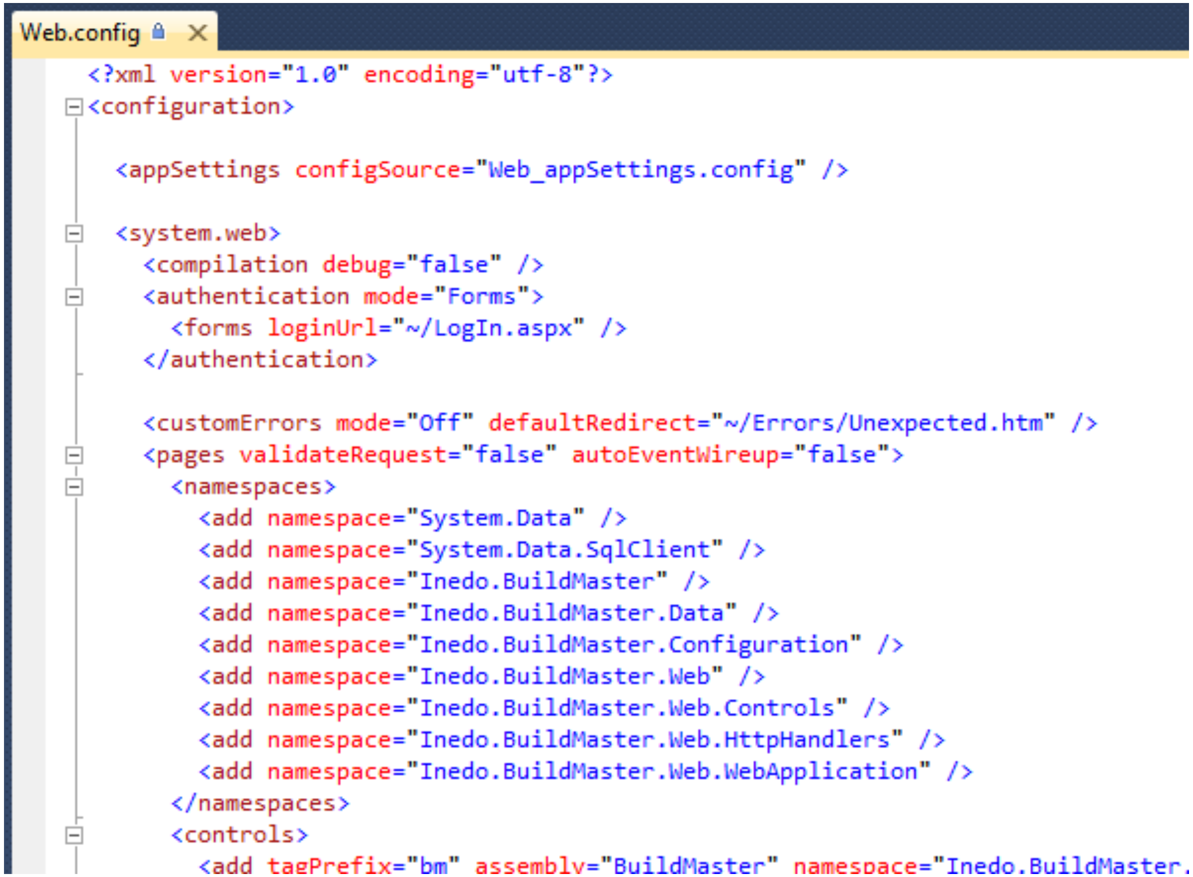
- Maintain a spreadsheet
- Forced Education
- Pointy Hair Bosses Love Process

CONFIGURATION FILES

Rule: Environment-specific Only

No Soft Coding

Watch for Fake Configuration Files



```
<?xml version="1.0" encoding="utf-8"?>
<configuration>

  <appSettings configSource="Web_appSettings.config" />

  <system.web>
    <compilation debug="false" />
    <authentication mode="Forms">
      <forms loginUrl="~/LogIn.aspx" />
    </authentication>

    <customErrors mode="Off" defaultRedirect="~/Errors/Unexpected.htm" />
    <pages validateRequest="false" autoEventWireup="false">
      <namespaces>
        <add namespace="System.Data" />
        <add namespace="System.Data.SqlClient" />
        <add namespace="Inedo.BuildMaster" />
        <add namespace="Inedo.BuildMaster.Data" />
        <add namespace="Inedo.BuildMaster.Configuration" />
        <add namespace="Inedo.BuildMaster.Web" />
        <add namespace="Inedo.BuildMaster.Web.Controls" />
        <add namespace="Inedo.BuildMaster.Web.HttpHandlers" />
        <add namespace="Inedo.BuildMaster.Web.WebApplication" />
      </namespaces>
      <controls>
        <add tagPrefix="bm" assembly="BuildMaster" namespace="Inedo.BuildMaster.
```

Rule: Key Value Pairs Only

Keep it simple

More Considerations

- Different Instances for Different Deployments
- Different Security for Different Instances
- Changes Should be Tied to a Release
- Deployment and Change history Logged

QCon

杭州站 · 2012年10月25日~27日

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