

Software Quality from the Trenches

Maiborn
Wolff
Mensch IT



TU Darmstadt
Darmstadt, 19. June 2018

Richard Gross
SW-Archeologist
richard.gross@maibornwolff.de

IT-Consulting & Software-Engineering

We're hiring

Maiborn
Wolff
Mensch IT

450 Employees in
Munich, Frankfurt, Berlin,
Augsburg



How to get legacy software

Software Quality

Legacy Highlights

The best way to avoid technical debt

Testing tipps

Wrap up



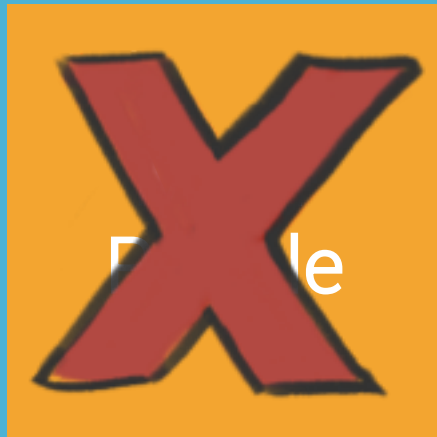
How to get *legacy* software

Imagine you are
developing **Phoenix**¹

¹) Phoenix is the perfect system. It's got MicroServices, AI, Blockain and React.

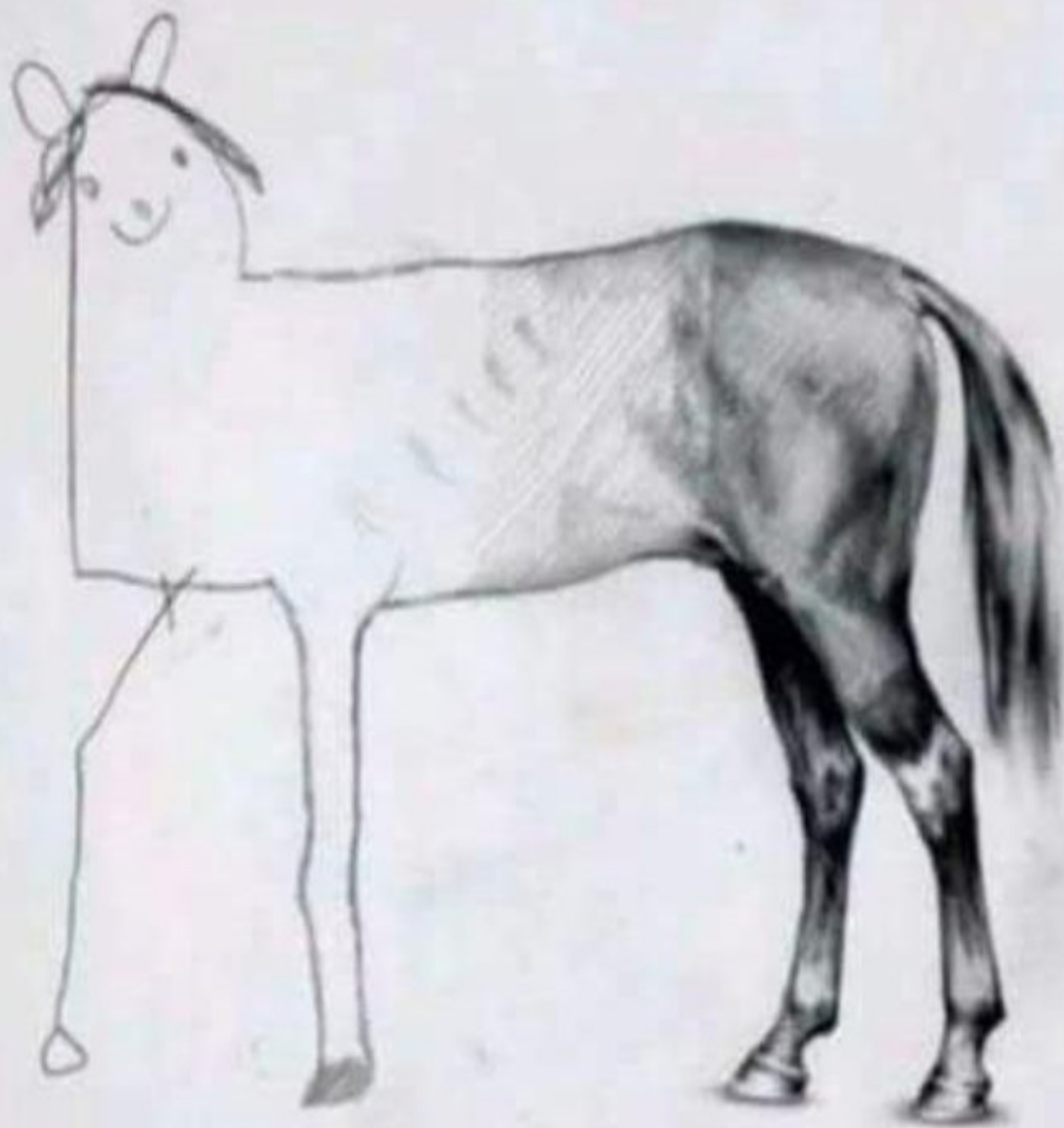
What do you do





Maiborn
Wolff

Mensch^{IT}



Maiborn
Wolff
Mensch IT



Philino Ritz from New York, NY, USA - NYFD Hook and Ladder #8 (Ghostbusters Firehouse)

Features

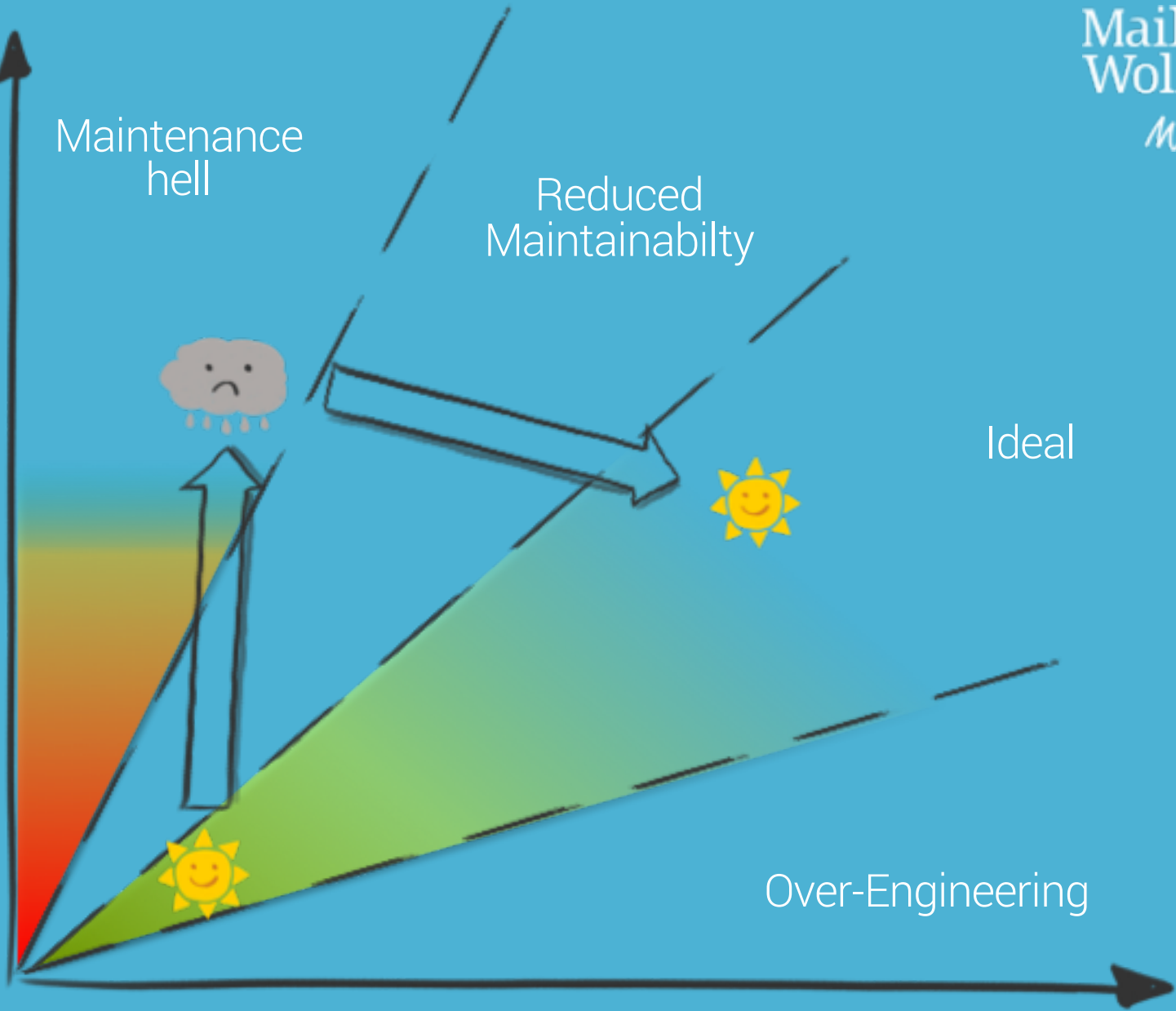
Maintenance
hell

Reduced
Maintainability

Ideal

Over-Engineering

Tech



Learn from the mistakes
of others. You can never
live long enough to make
them all yourself.

Groucho Marx



Software *quality*

"Quality is defined by your users."
@henrikkniberg compares LEGO Universe
with Minecraft. #AgileQualityDays





External



Internal

What happens when
internal quality dips



Customers only
care about
internal quality
when it **affects**
external quality.





Why so optimistic about Phoenix? What do you think it will bring? Everything seems so messed up.

I think it will bring flowers

Yes? How come?

Because I am planting flowers

Reckless

Prudent

Maiborn
Wolff
Mensch IT

„No time
for Design

„We Must Ship!
Then handle
Consequences

Deliberate

Inadvertent

„What's a Race
condition?

„Now we know
how to do that.

Tech
changes

Reckless

Prudent

Maiborn
Wolff
Mensch IT

Your
Debt

Technical
Debt

Deliberate

Inadvertent

„Company
Debt

Dark
Debt

changes

Reckless

Prudent

Maiborn
Wolff

Mensch IT

Courage
for Design

Track,
communicate,
Schedule debt
relief

Deliberate

Inadvertent

Technical Debt
"Training
condition:"

Continuously
Refactor

Tech
changes



Legacy Highlights

30

Audits
per year

Lots of future
features.

Features take
forever

New Feature
creates bugs



What problems do our
audits find



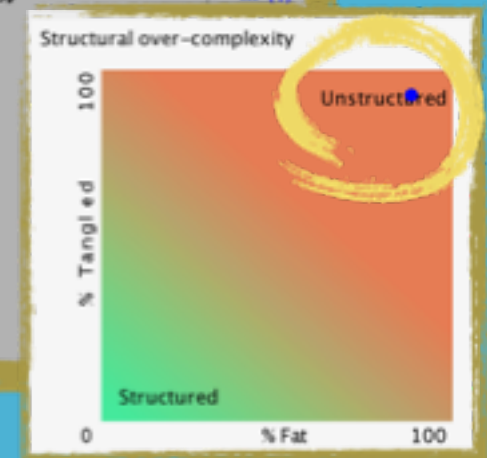
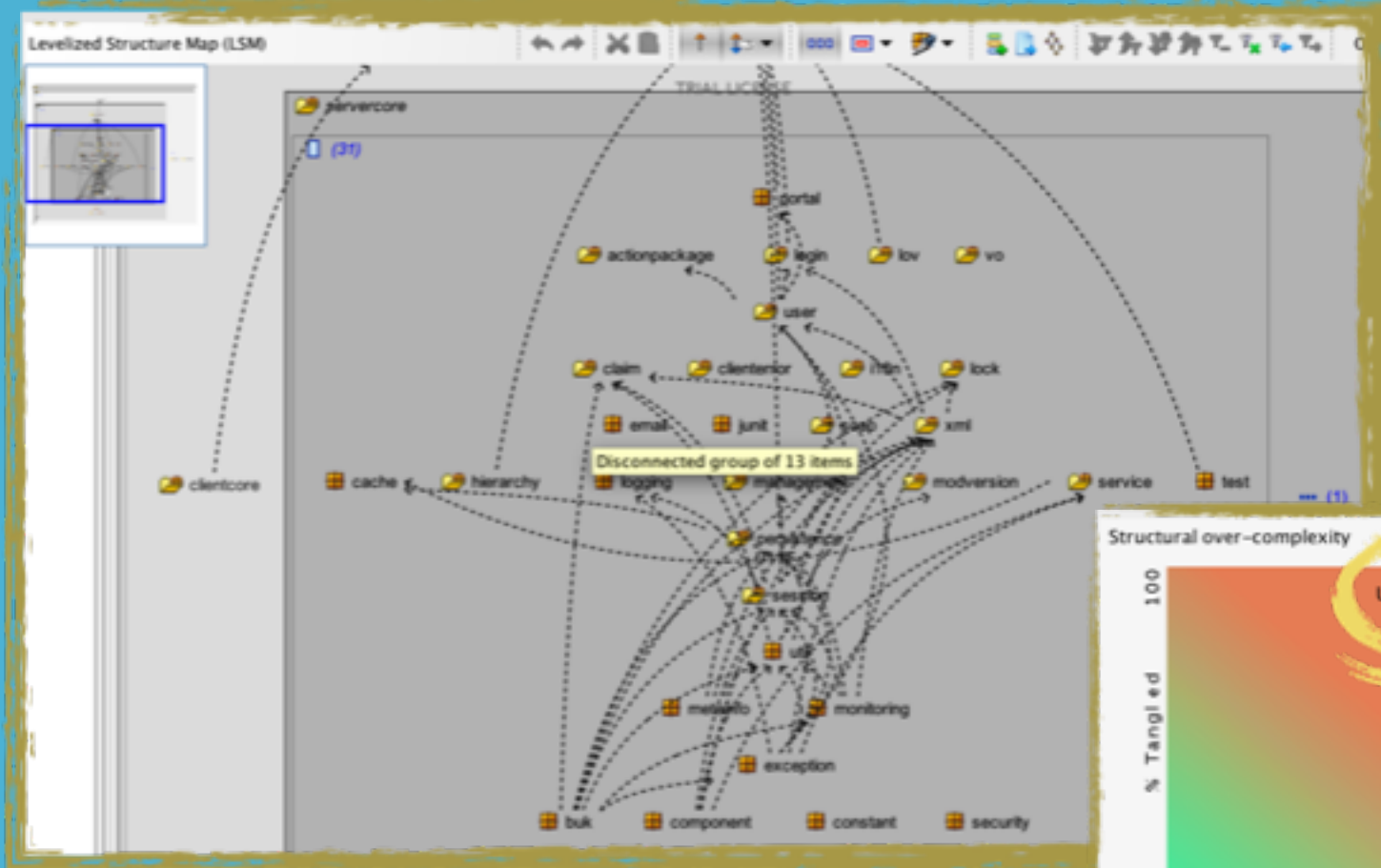
collarge - Copy	20.01.2016 15:24	ASP-Datei
collarge -13062014	20.01.2016 15:26	ASP-Datei
collarge	20.01.2016 15:26	ASP-Datei
collarge.asp.bak	20.01.2016 15:26	BAK-Datei
collarge.asp_bkp28Oct2014	20.01.2016 15:24	ASP_BKP28OCT201...
collarge.asp_bkp29Oct2014	20.01.2016 15:26	ASP_BKP29OCT201...
collarge_10NOV2014	20.01.2016 15:24	ASP-Datei
collarge_12Feb2014	20.01.2016 15:25	ASP-Datei
collarge_22Feb2015	20.01.2016 15:26	ASP-Datei
collarge_28Jun2015	20.01.2016 15:24	ASP-Datei
collarge_22032015	20.01.2016 15:26	ASP-Datei
collarge_28082011	20.01.2016 15:26	Opera Web Docum...
collarge_Bk_eg_05272014	20.01.2016 15:26	ASP-Datei
collarge_bkp08092011	20.01.2016 15:26	ASP-Datei
collarge1	20.01.2016 15:24	ASP-Datei
collarge16Oct2014	20.01.2016 15:26	ASP-Datei
collarge27OCT2014	20.01.2016 15:26	ASP-Datei

Backup Hell

0%

Test
coverage

Hell of tests



Hell of coupling

```
29 <PARAM NAME="EnableAnimationControl" VALUE=1>
30 <PARAM NAME="EnableZoomControl" VALUE=1>
31 </OBJECT>
32
33 <SCRIPT LANGUAGE="VBScript">
34 <!--
35 Sub Window_Onload
36     On Error Resume Next
37     Dim webBroker
38     Set webBroker = CreateObject("WebReportBroker9.WebReportBroker")
39     if ScriptEngineMajorVersion < 2 then
40         window.alert "IE 3.02 users on NT4 need to get the latest version of VBScript or install IE
41         4.01 SP1. IE 3.02 users on Win95 need DCOM95 and latest version of VBScript, or install IE
42         4.01 SP1. These files are available at Microsoft's web site."
43     else
44         Dim webSource
45         Set webSource = CreateObject("WebReportSource9.WebReportSource")
46         webSource.ReportSource = webBroker
47         webSource.URL = "rptserver.asp"
48         webSource.PromptOnRefresh = True
49         CRViewer.ReportSource = webSource
50     end if
51     CRViewer.ViewReport
52 End Sub
53 -->
54 </SCRIPT>
```

Support Hell

```
// TODO: Bisschen tief, das looping. Könnte man bestimmt schöner machen.  
Thread.Sleep(200); // milliseconds  
continue;
```

```
605 DbDataReader reader = null;  
606 try  
607 {  
608     checkCurrentTransactionIsActive(sqlStrgFunc);  
609     try  
610     {  
611         reader = cmd.ExecuteReader();  
612         _lastSqlCmdFunc = sqlStrgFunc;  
613         s_dblog.Info(m => m(MODUL + sqlStrgFunc() + " ... executed."));  
614     }  
615     catch (System.Exception e)  
616     {  
617         string sqlCmdStrg = sqlStrgFunc();  
618         s_dblog.Info(m => m(MODUL + sqlCmdStrg + " ... cancelled."));  
619  
620         // DBExceptionCheck.PrintException(e);  
621         DBExceptionCheck.CheckTransactionCompletedException(e, getTransactionNo());  
622         DBExceptionCheck.CheckOnDBServiceBusyException(e, ConnectionStrg);  
623         DBExceptionCheck.CheckOnDBServiceFailsException(e, ConnectionStrg);  
624         DBExceptionCheck.CheckTransactionDeadlockVictimException(e, sqlCmdStrg);  
625         if (DBExceptionCheck.IsCommandTimeoutExpired(e))  
626         {  
627             checkCurrentTransactionIsActive() => sqlStrgFunc()+"->Exception";  
628             // Caution: TimeoutExpired-Exception occurs after ca. 32 s  
629             // SQLCommand.CommandTimeout: 30s (default)  
630             // TransactionScope-Timeout is 60s (default)  
631             if (loops < 2 && !multiSql)  
632             {  
633                 s_log.Warn(MODUL + "SQL-Command timed out after " + loops + ". attempt (after "  
634                     + tt.ElapsedSeconds + " s) in SQL: " + sqlCmdStrg);  
635  
636                 // TODO: Bisschen tief, das looping. Könnte man bestimmt schöner machen. Z.B.  
637                 Thread.Sleep(200); // milliseconds  
638                 continue;  
639             }  
640         }  
641     }  
642 }  
643 }
```

10+
Nesting Level

Nesting Hell

```
// maximale rekursionstiefe für zusammenbau
private const int ZUSAMMENBAUMAXDEPTH = 25;

private const int ID_TBBEMITYP = 2;

// aktuelle user session id
private int session;

#endregion

#region DataAccess for Betreuung
```

```
///
///
///
string sql =
    @"select t1.*
    FROM tk3.tk3rsnravo t1, tk3.tk3rsnr t2
    WHERE t1.ID_SACHNR = t2.ID AND t2.ID = @ID and KZ_AVOARTEN = 'P' AND t1.TBIS >= current date";

string sql =
    @"select t1.*
    FROM tk3.tk3rsnravo t1, tk3.tk3rsnr t2
    WHERE t1.ID_SACHNR = t2.ID AND t2.ID = @ID AND t1.TBIS >= current date";

var data = new ArbeitsvorgangDataSet();

var command = GetSqlCommand(sql);
ConfiguredDB.AddInParameter(command, "@ID", DbType.Int32, snrId);
InternalLoadDataSet(command, data, data.TK3RSNRAVO.TableName);
return data;
}
}
}
```

Monolith Hell

13277 LoC

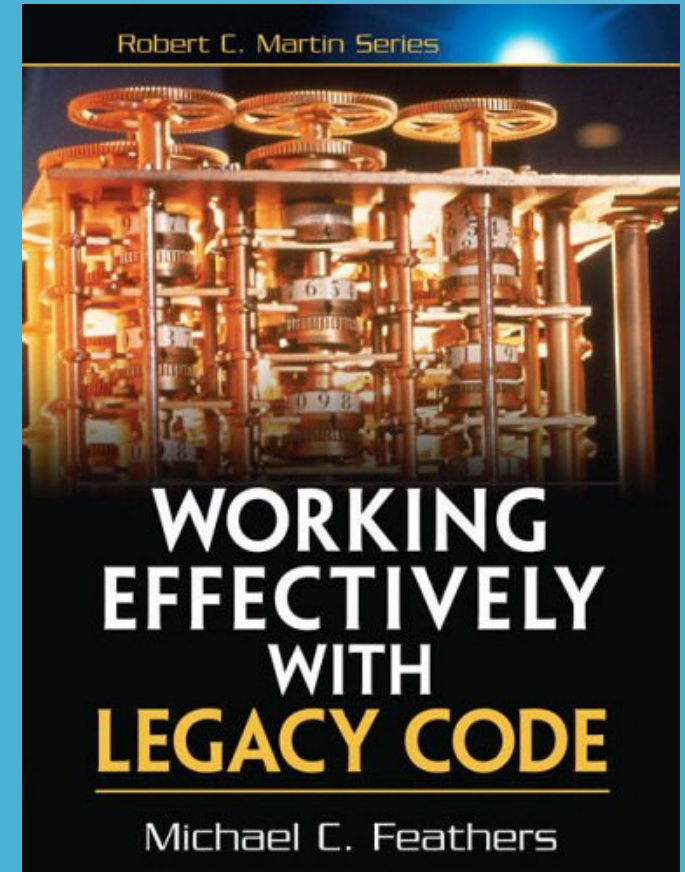
```
else
{
    //Response.Write("<BR> Single AirLine / Single Class " ) ;
    //Response.Write("<BR> strArrFareMainRouteSectorAirLineXid[y] = " + strArrFareMainRouteSectorAirLineXid[0] ) ;

    FareMainRouteSectorAirLineXid = strArrFareMainRouteSectorAirLineXid[0] ;
    //Response.Write(" strArrBookingClass[0] = " + strArrBookingClass[0] ) ;
    strBookingClass1 = strArrBookingClass[0] ;
}
//Response.Write(" strValidOn = " + strValidOn ) ;
/* comments added on dt 20-may-2003
 * to make changes for Multi Airline/Multi Class and Days of the week issues
 * sent by Mr. Paul on date 20 may 2003
 * Cases
 * 1. There can be single class and single Airline
 * 2. there can be multiple classes and single airline. e.g. class VQ and airline BA
 * 3. there can be multiple classes and multiple Airline e.g V/Q and BA/AA
 * */
//FareMainRouteSectorAirLineXid = GetAirLineXid( FareMainRouteSectorAirLine ) ;
//Response.Write("<BR> y = " + y + " strArrSector.Length = " + strArrSector.Length) ;
//Response.Write("<BR> strValidOn = " + strValidOn ) ;
SQL_FareMainRouteSectors = "insert into FareMainRouteSectors" +
" ( FareMainRouteXid, [Sequence], AirportXid, ValidOn, CabinClassXid, OptionalYN, TransferOnly, FreeStopOver,
LastEdit, LastEditByXid, CompanyXid)" +
" values ( @FareMainRouteXid, " + yy + ", @AirportXid, '" + strValidOn + "', " + CabinClassXid + ", 'N', 'B', '
T', getDate(), " + LastEditByXid + ", " + CompanyXid + " ) " ;
swRate.WriteLine(SQL_FareMainRouteSectors) ;
InsertTransErrorStatement(swRate) ;
strFromDate = strFromDate.Insert(6, "/");
strFromDate = strFromDate.Insert(4, "/");
```

Hell



Embrace hell





The best way to avoid
technical debt

High-quality code is *modular*, loosely-coupled, has high-cohesion, good separation of concerns, and exhibits *information-hiding*.

Dave Farley

~~Design through experience~~

TDD is a *process* that applies
design *pressure*



Password should be
longer than 5
characters

```
@Test
public void pw_should_be_longer_than_5_chars()
{
    PasswordValidator pv = new PasswordValidator();
    assertThat(pv.isLongEnough(„Longer“)).isTrue();
}

```

```
@Test
public void pw_should_be_longer_than_5_chars()
{
    PasswordValidator pv = new PasswordValidator();
    assertTrue(pv.isLongEnough(„Longer“)).isTrue();
}
```

```
public class PasswordValidator
{
    public boolean isLongEnough(String password)
    {
        return false;
    }
}
```

```
@Test
public void pw_should_be_longer_than_5_chars()
{
    PasswordValidator pv = new PasswordValidator();
    assertTrue(pv.isLongEnough(„Longer“)).isTrue();
}
```

```
public class PasswordValidator
{
    public boolean isLongEnough(String password)
    {
        return true;
    }
}
```

```
@Test  
public void pw_should_be_longer_than_5_chars() { }
```

```
@Test  
public void pw_should_not_be_shorter_than_5_chars() { }
```

```
public class PasswordValidator  
{  
    public boolean isLongEnough(String password)  
    {  
        return true;  
    }  
}
```



```
@Test  
public void pw_should_be_longer_than_5_chars() { }
```

```
@Test  
public void pw_should_not_be_shorter_than_5_chars() { }
```

```
public class PasswordValidator  
{  
    public boolean isLongEnough(String password)  
    {  
        return password.length() > 5;  
    }  
}
```

```
@Test  
public void pw_should_be_longer_than_5_chars() { }
```

```
@Test  
public void pw_should_not_be_shorter_than_5_chars() { }
```

```
@Test  
public void pw_should_contain_upper_chars() {}
```

```
public class PasswordValidator  
{  
    public boolean isLongEnough(String password)  
    {  
        return password.length() > 5;  
    }  
}
```

```
@Test  
public void pw_should_be_longer_than_5_chars() { }
```

```
@Test  
public void pw_should_not_be_shorter_than_5_chars() { }
```

```
@Test  
public void pw_should_contain_upper_chars() { }
```

```
public class PasswordValidator  
{  
    public boolean isLongEnough(String password)  
    {  
        return password.length() > 5  
            && password.matches(„[A-Z]+“);  
    }  
}
```

```
@Test  
public void pw_should_be_longer_than_5_chars() { }
```

```
@Test  
public void pw_should_not_be_shorter_than_5_chars() { }
```

```
@Test  
public void pw_should_contain_upper_chars() { }
```

```
public class PasswordValidator  
{  
    public boolean isValid(String password)  
    {  
        return password.length() > 5  
            && password.matches(„[A-Z]+“);  
    }  
}
```

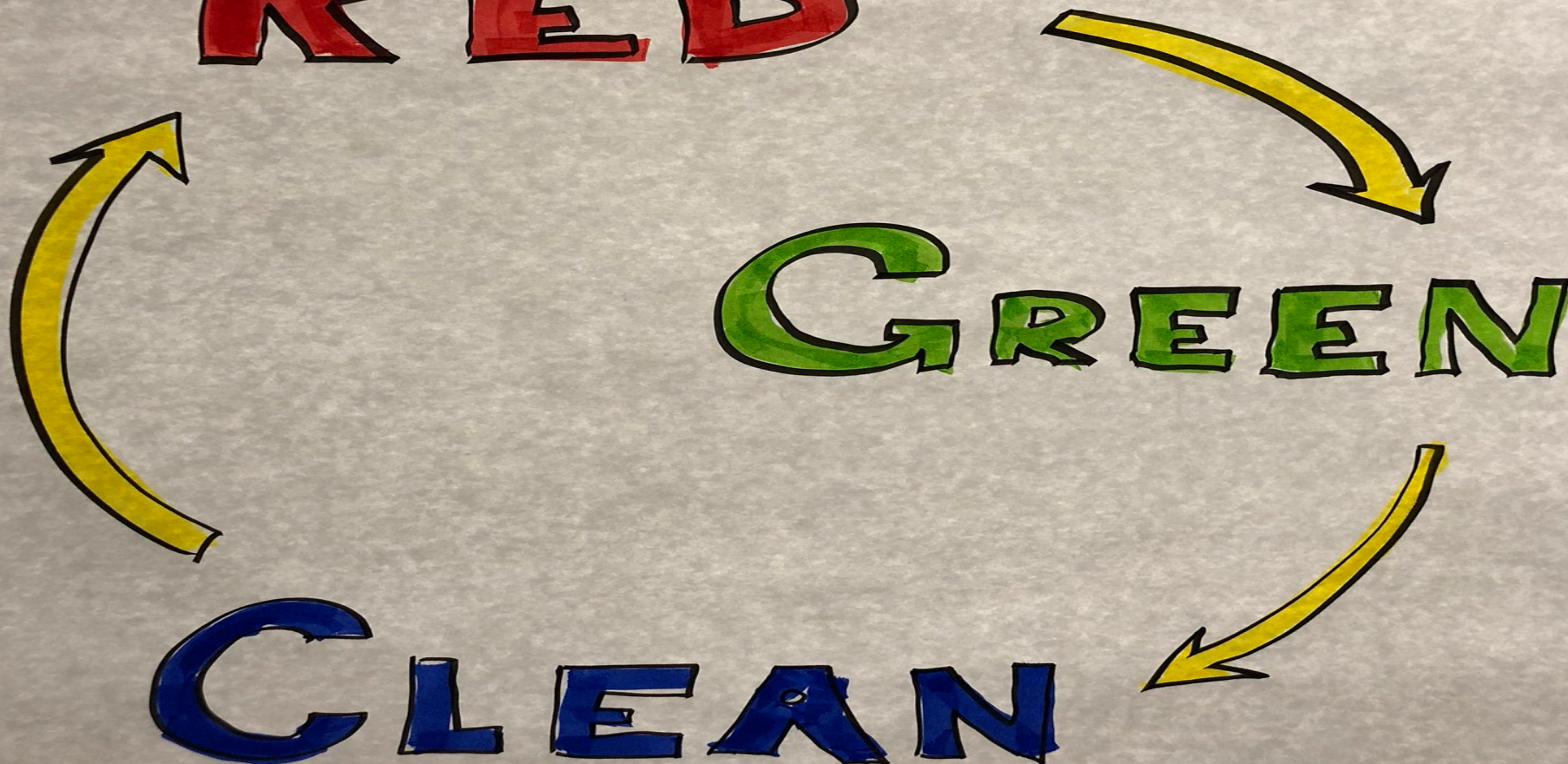


From specific to
generic code

RED

GREEN

CLEAN



What do you think about
this *process*?



Legacy Code is

“Code **without** tests

@mfeathers

High-quality code is *modular*, loosely-coupled, has high-cohesion, good separation of concerns, and exhibits *information-hiding*.

Dave Farley

Let examples *guide* your
development



John Ferguson Smart

@wakaleo

Folgen



The best time to make your application testable was before you started coding. The second best time is now.

11:11 - 13. Juni 2018

How do you *know* it's
high-quality code





You test it 😊

Computers



You test it 😊

humans



45%

Testing

60%

Code Review

Maiborn
Wolff

Mensch IT

Pair

Programming

Mob

Programming





Testing tipps





Arrange, Act, Assert

What edge cases



QA ENGINEER

Marborn
Wolff

Mensch IT

```
// Walks into a bar;  
Orders a beer.  
Orders 0 beers.  
Orders 9999999 beers.  
Orders -1 beers.  
Orders a lizard.  
Orders a shfohshgofs.
```

Starting test parameters

Zero, One, Many, Strange,
null, Wrong

Do cover most edge
cases at

faster=cheaper
levels.

Maiborn
Wolff
Mensch!



<https://teespring.com/shop/sfdeijknesvbeer#pid=369&cid=6519&sid=front>



Parisa Tabriz 

@laparisa



Replying to @sempf

@sempf then the Pentester joins him. Orders
<script>alert('beer')</script>. Orders '); drop table orders;
--Orders AAAAAAAAAAAAAAAAAAAAAAAAAAAAA

5:37 PM - Sep 24, 2014



12



See Parisa Tabriz's other Tweets





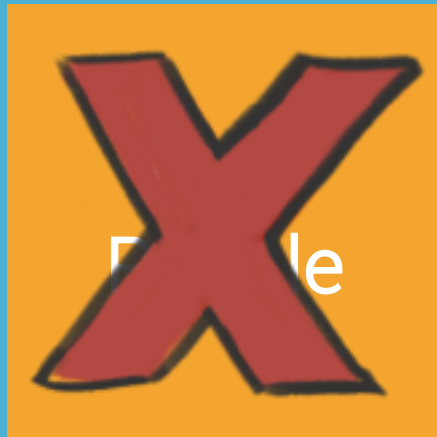
Edge cases: Property- based testing



Wrap-up



Whole-team quality process and culture



Long term is longer
than the short term

Study
group

Boy Scout
Rule

Continuous
Integration

Quality
Fridays

Code
Reviews

Pair
Programming

Test-driven
Development

Legacy Code is

“Code that’s too *scary* to update and
too *profitable* to delete

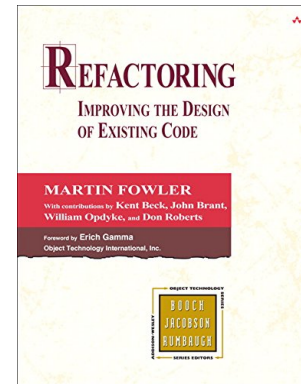
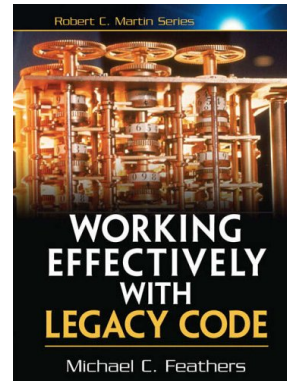
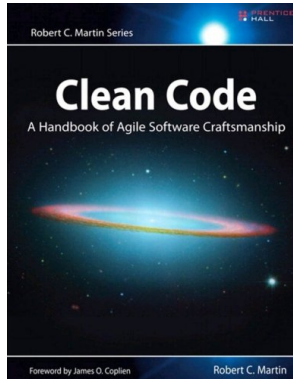
@dylanbeattie



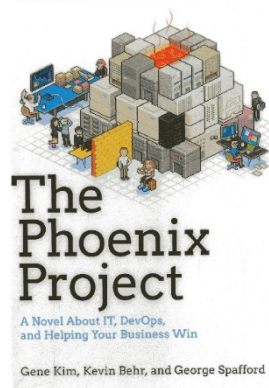
Maiborn
Wolff
Mensch!



Reading material



From the authors of *The Visible Ops Handbook*



- <https://martinfowler.com/articles/practical-test-pyramid.html#SociableAndSolitary>
- <https://www.maibornwolff.de/blog/it-sanierung-refactoring-schritt-fuer-schritt>
- <https://www.maibornwolff.de/blog/it-sanierung-grosse-aenderungen-strukturieren>
- <https://www.maibornwolff.de/blog/techniken-der-it-sanierung-der-golden-master-test>
- <https://www.maibornwolff.de/tags/it-sanierung>

Maiborn
Wolff
Menschen IT

We're
hiring

Thank you!
Questions?

450 Employees in
Munich, Frankfurt, Berlin,
Augsburg

