



Test och kvalitetssäkring

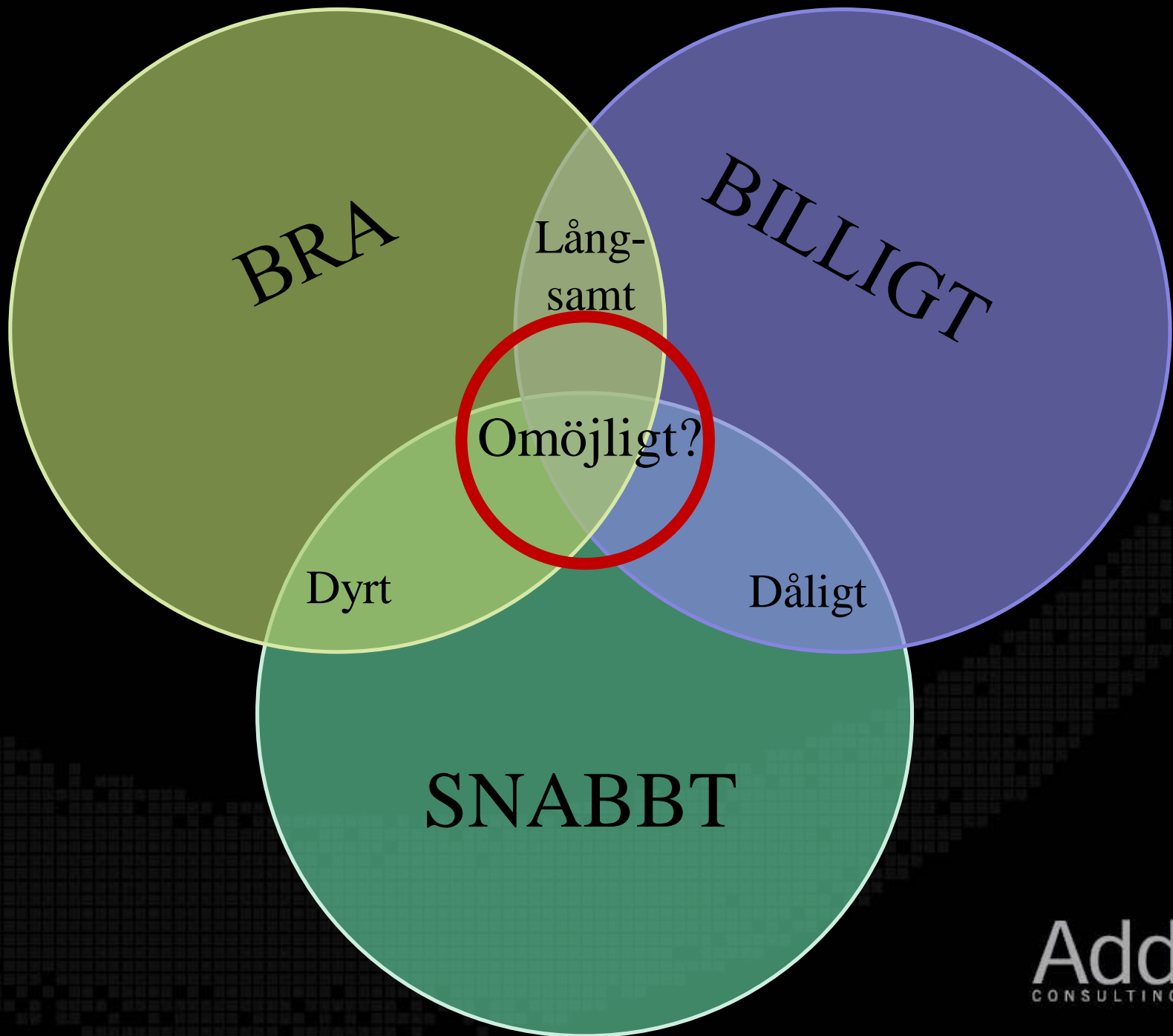
# Continuous Integration

Hur man bygger mjukvara

-Bättre, snabbare, billigare – och tryggare

*Av Thomas Olsson  
AddQ Consulting*

“ Med fokus på kvalitet och effektivitet bidrar vi till att underlätta människors vardag. ”



# Agenda

- Vad är Continuous Integration – CI?
- Varför CI?
  - Vad skall det vara bra för?
  - Vad kan det göra för mig?
- Hur funkar det?
  - Exempel
- Komma igång med CI

# Integration

Kod integrerad – För varje ändring



Integration

Delivery

Fungerar på målsystem



Klar för  
release





Integration

Delivery

Deployment

Klar för start i produktionsmiljö



Integration

Delivery

Deployment

**Continuous Development**

Unit  
test

Integration  
tests

Functional-,  
system-  
test

Acceptance  
test

Deploy  
(go live)



# Varför Continuous Integration?

Agenda Progress



**Om det gör ont  
– Gör det oftare!**

# Bättre

Testad ofta

Feedback

Demo tidigt



# Snabbare



The diagram illustrates the Snabbare process flow. It consists of three horizontal arrows pointing to the right, stacked vertically. The top arrow is solid blue and contains the word 'Utveckling'. This arrow and the word 'Snabbare' above it are enclosed in a red oval. The middle arrow is outlined in blue and contains the word 'Test'. The bottom arrow is also outlined in blue and contains the word 'Bygge'.

Utveckling

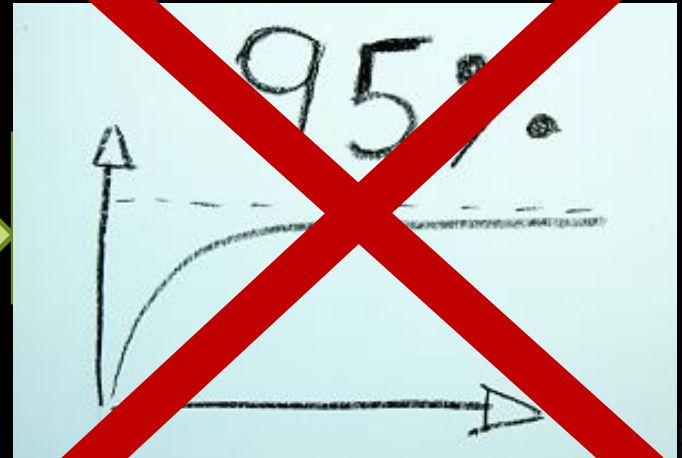
Test

Bygge

**Billigare**

**Utveckling**

95 % klar

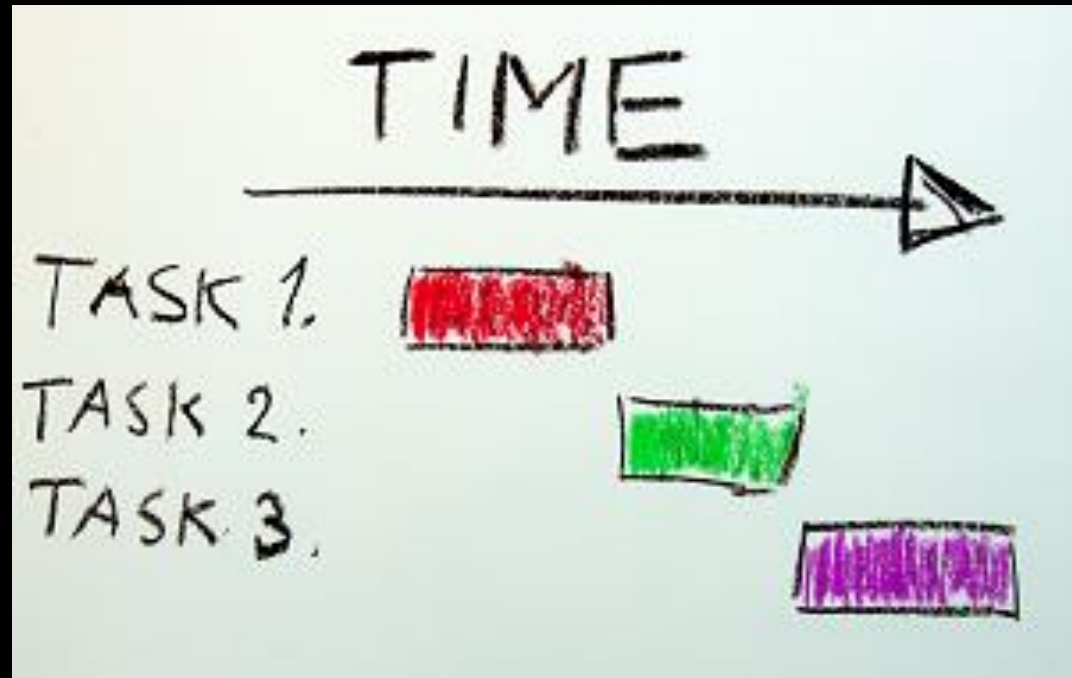
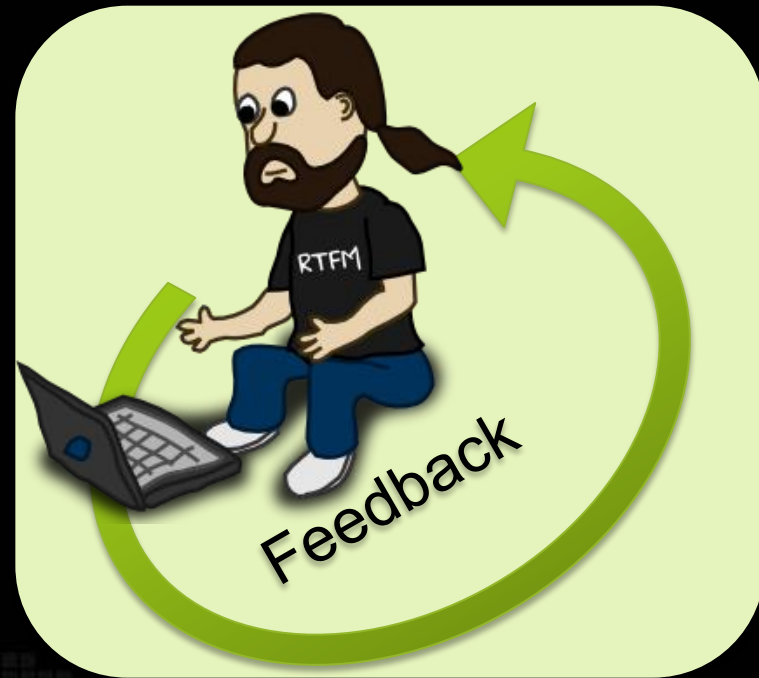


(bara 95 % kvar)

Buggar hittas tidigt

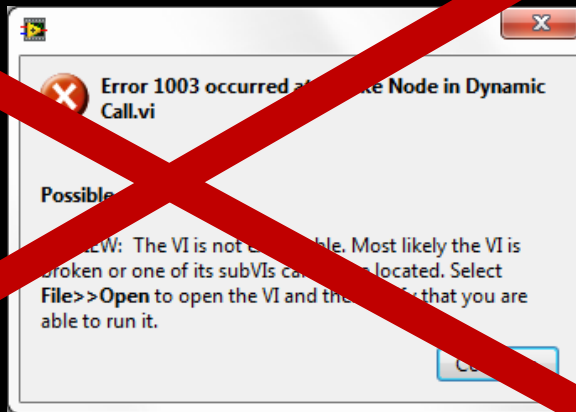


# Tryggare – Minskad Risk





# Tryggare – Minskad Risk



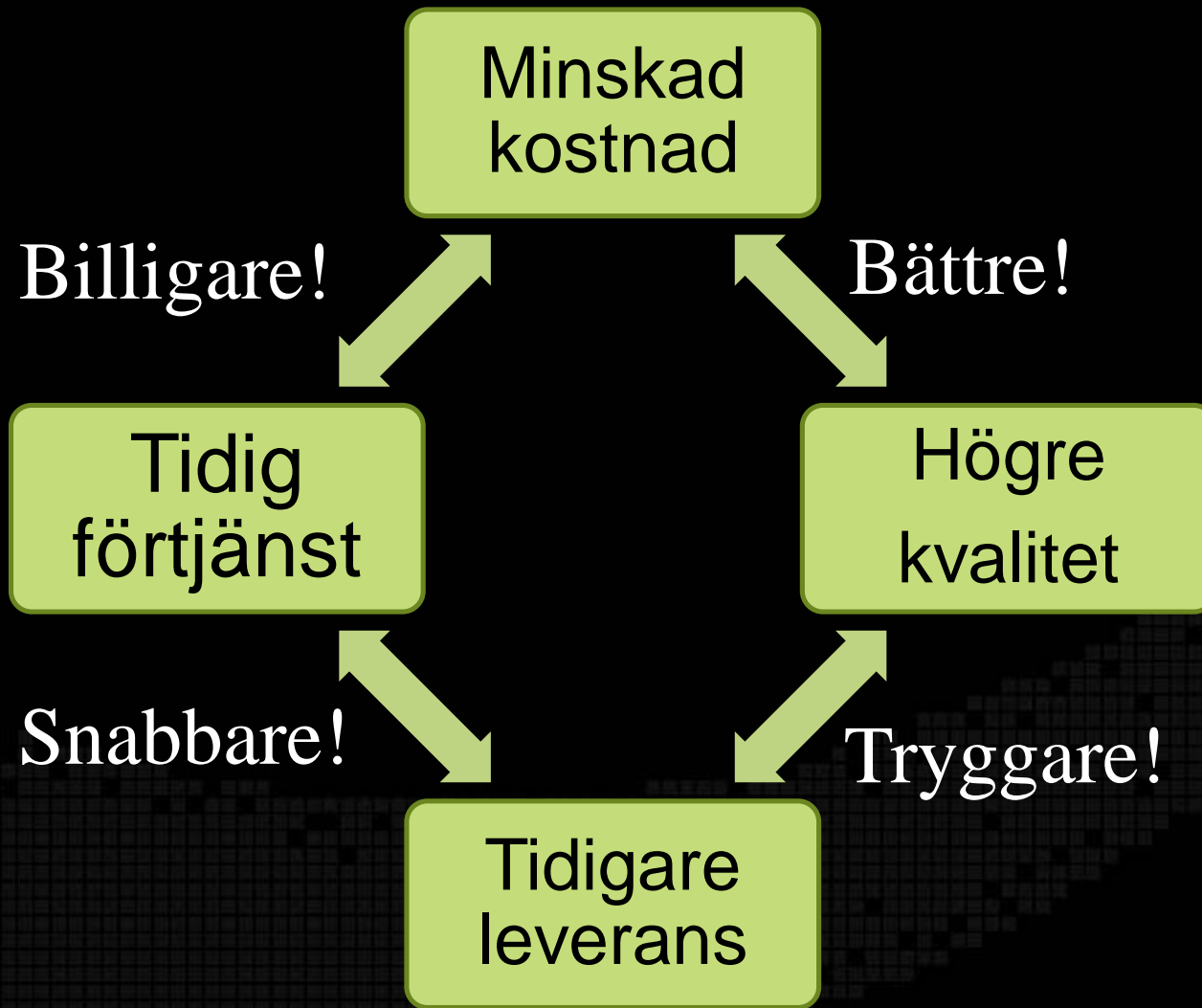
Build History		(trend)
#2229	16-Feb-2012 09:41:40	
#2228	16-Feb-2012 09:03:23	★★★★★
#2227	16-Feb-2012 08:29:11	★★★★★
#2226	16-Feb-2012 08:23:27	

# Vad gör CI för mig?

- Kan fokusera på att utveckla
- Vet att min kod fungerar
- Kan leverera när som helst
- Kan bättre förutse när jag är klar
- Får feedback och kan förbättra min programmering



# Främsta fördelarna med CI

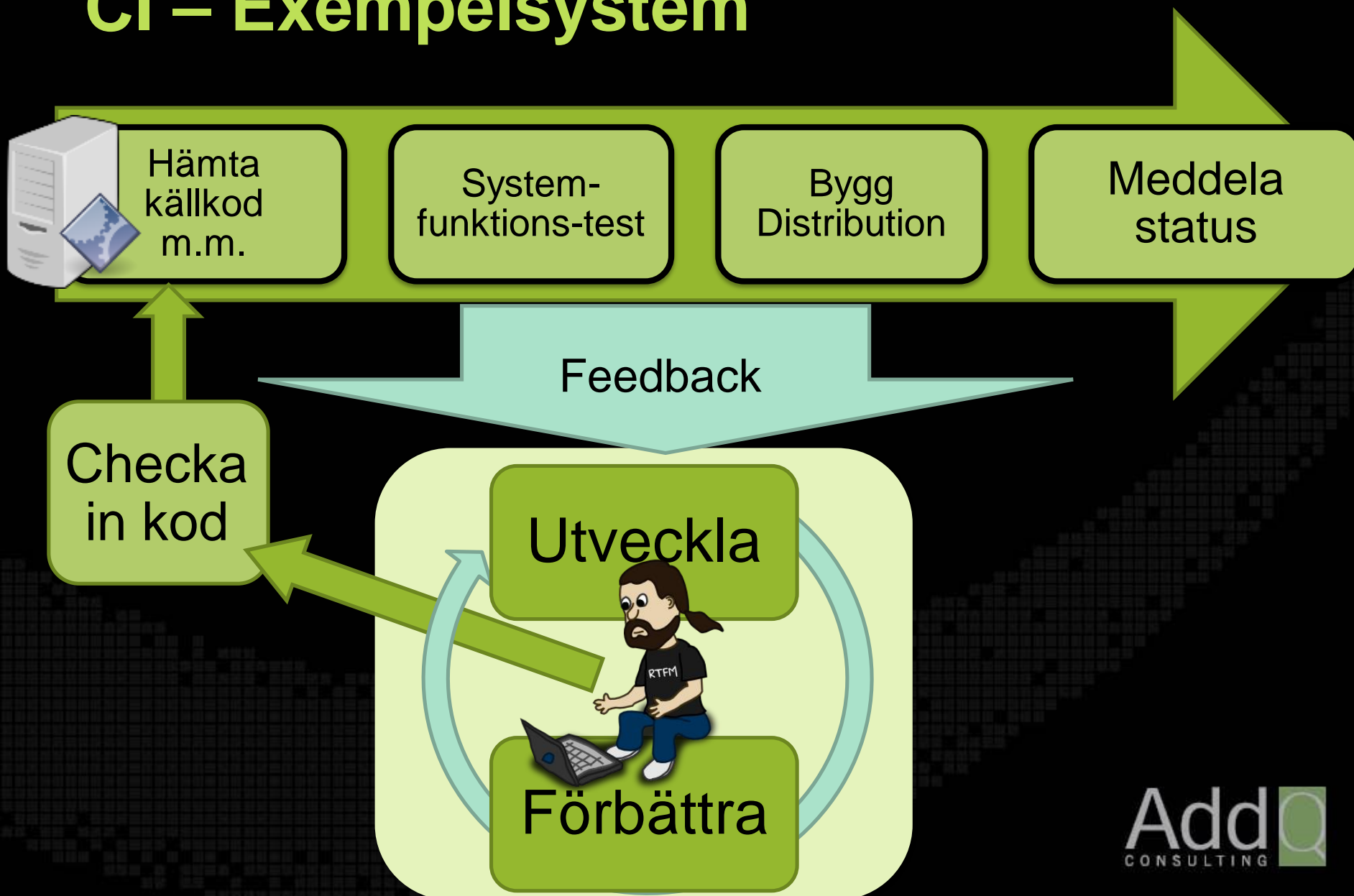


# Hur

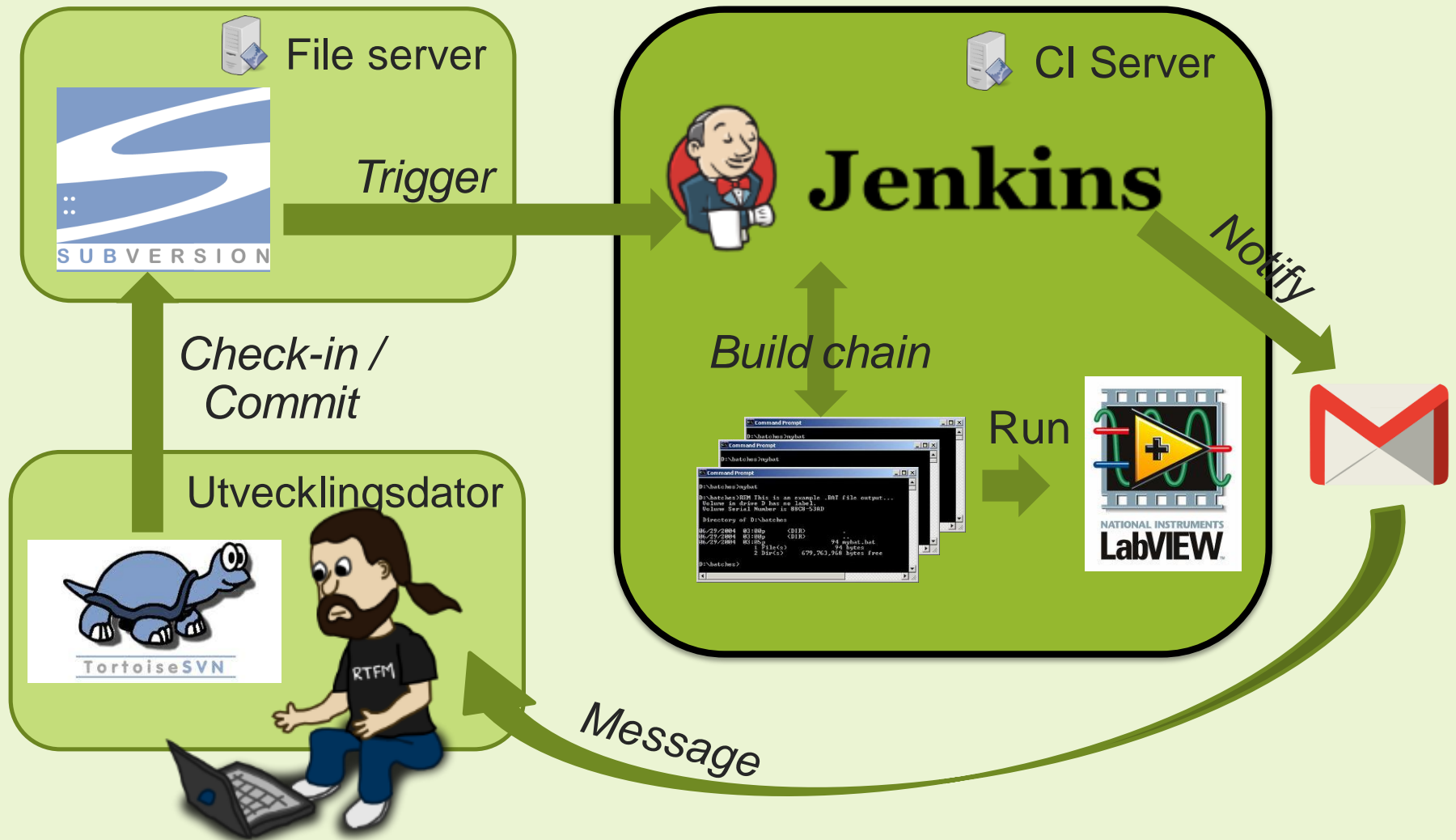
Agenda Progress



# CI – Exempelsystem



# Infrastruktur och applikationer





# Vad är Jenkins?



← → ↻ 172.16.16.10:8090/job/[redacted] /

## Jenkins

Jenkins

[Tillbaka till instrumentpanelen](#)

[Status](#)

[Förändringar](#)

[Arbetsyta](#)

[Starta bygge nu](#)

[Ta bort Project](#)

[Konfigurera](#)

### Project [redacted]

[redacted] project. Builds any deliverables like e

[Arbetsyta](#)

[Senaste förändringar](#)

#### Build History (trend)

#330	<a href="#">2014-okt-11 00:01:01</a>
#329	<a href="#">2014-okt-10 00:01:02</a>
#328	<a href="#">2014-okt-09 00:01:01</a>
#327	<a href="#">2014-okt-08 00:01:01</a>
#326	<a href="#">2014-okt-07 00:01:01</a>

[RSS för alla](#) [RSS för misslyckade](#)

### Permalänkar

- [Last build \(#330\), 11 hr sedan](#)



# Meddelande om status

Build failed in Jenkins: SystemTestExecution #204

█ @gmail.com

Till: █ @gmail.com



den 29 sep

See <<http://addqgbg:8090/job/SystemTestExecution/204/>>

-----

[...truncated 6503 lines...]



# Bygge – Status


← → ↺ 172.16.16.10:8090/job/SystemTestExecution/205/ ☆ 🔌 ABP ☰

## Jenkins

sök ? logga in | sign up

Jenkins SystemTestExecution #205 [ENABLE AUTO REFRESH](#)

[Tillbaka till Projektet](#)  
[Status](#)  
[Förändringar](#)  
[Konsollutskrift \[raw\]](#)  
[View Build Information](#)



### Bygge #205 (2014-okt-06 19:46:17)


Startad för 4 days 14 hr sedan  
Tog [3 min 22 sec](#) på [-BUILD-W8](#)

Revision: 2140  
Förändringar

1. Check run time flag and remove error dialog, temporarily ([detaljer](#))

Started by upstream project [\[redacted\]](#) build number [403](#)  
originally caused by:

- [Started by an SCM change](#)




## Förändringar

### Sammanfattning

1. Check run time flag and remove error dialog, temporarily

**Revision 2140 by [nikham](#):**  
Check run time flag and remove error dialog, temporarily

 /trunk/ [\[redacted\]](#) /SourceCode/View/MainPanel.vi



# Output – Log

Jenkins SystemTestExecution #205

```
c:\jenkins\workspace\SystemTestExecution\ContinuousIntegration\SystemTestExecution>"C:\Program Files (x
2013\LabVIEW.exe" "c:\jenkins\workspace\SystemTestExecution\ContinuousIntegration\SystemTestExecution\
path:path:...\TestSystem\SourceCode\SystemTest\ModelLoadTest_class\Main.vi" "\ConfigurationID:string:1"
"\Configuration:string:Platform_Configuration_TC" "\ResultStatusPath:string:c:\jenkins\workspace\SystemTest
"\ErrorPath:string:c:\jenkins\workspace\SystemTestExecution\TestCase_Error.txt"

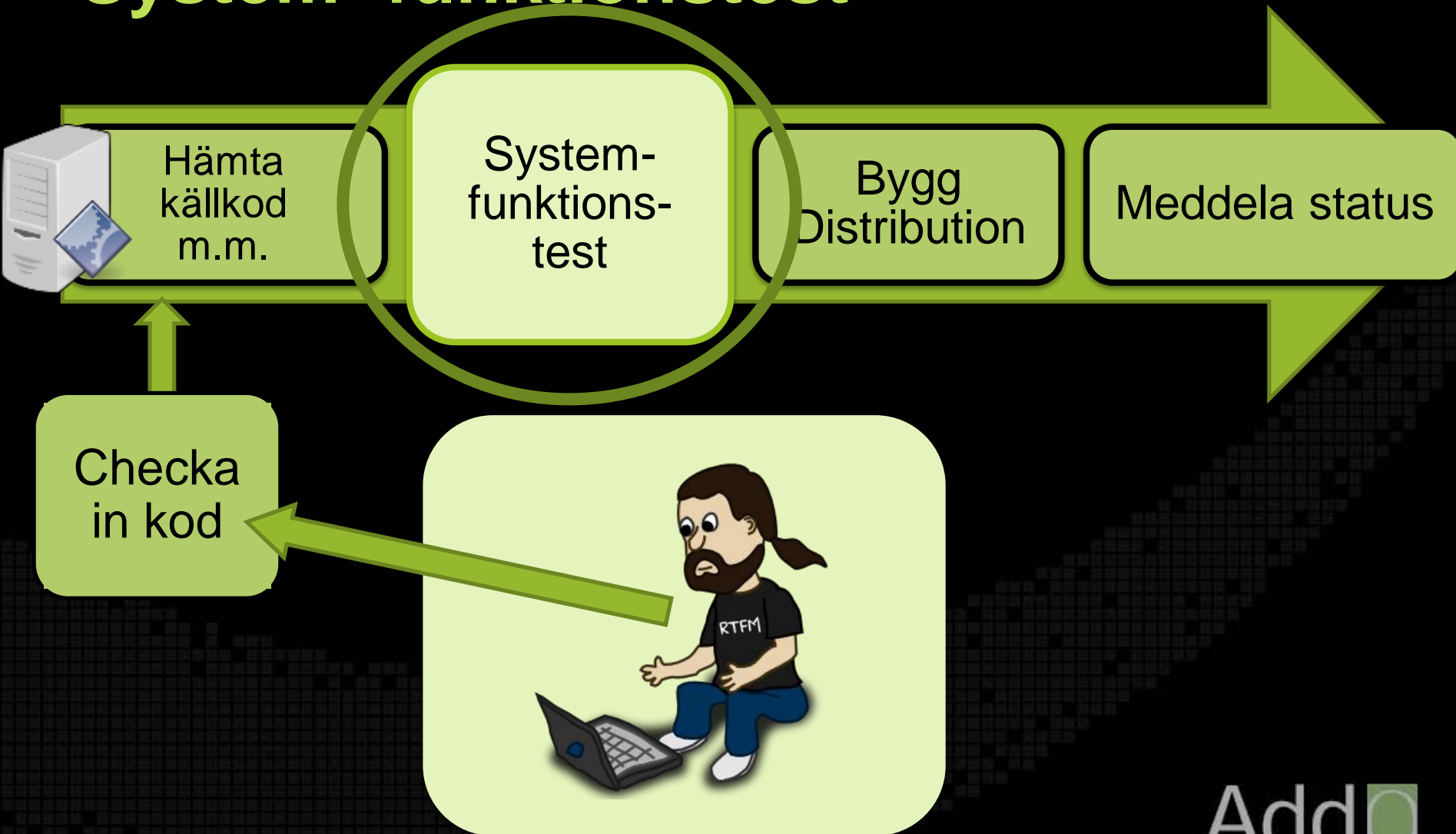
c:\jenkins\workspace\SystemTestExecution\ContinuousIntegration\SystemTestExecution>Type
c:\jenkins\workspace\SystemTestExecution\Testcase_Results.txt
The system cannot find the file specified.

c:\jenkins\workspace\SystemTestExecution\ContinuousIntegration\SystemTestExecution>Type
c:\jenkins\workspace\SystemTestExecution\TestCase_Error.txt

c:\jenkins\workspace\SystemTestExecution\ContinuousIntegration\SystemTestExecution>REM -- Check Status

c:\jenkins\workspace\SystemTestExecution\ContinuousIntegration\SystemTestExecution>findstr /L "TRUE"
c:\jenkins\workspace\SystemTestExecution\Testcase_Results.txt
FINDSTR: Cannot open c:\jenkins\workspace\SystemTestExecution\Testcase_Results.txt
Build step 'Execute Windows batch command' marked build as failure
Sending e-mails to: @gmail.com
Finished: FAILURE
```

# System- funktionstest





# Funktionstest– Jenkins Setup

## Build

### Execute Windows batch command

Command `rd /S /Q %WORKSPACE%\ContinuousIntegration\Results`

See [the list of available environment variables](#)

### Execute Windows batch command

Command `"%WORKSPACE%\ContinuousIntegration\SystemTestExecution\ModelLoadTest_1.bat"`

## Batch File

```
27 REM -- Start Testcase
28 "%ExecPath%\National Instruments\LabVIEW 2013\LabVIEW.exe" "%~dp0..\Common\CI_VIStarter.vi" -- "\vi
path:path:..\..\TestSystem\SourceCode\SystemTest\ModelLoadTest class\Main.vi" "\ConfigurationID:string:1"
"\Configuration:string:Platform_Configuration_TC" "\ResultStatusPath:string:%resultfile%" "\ErrorPath:string:
%errorfile%"
29
30 Type %resultfile%
31 Type %errorfile%
32
33 REM -- Check Status
34 findstr /L "TRUE" %resultfile%
```

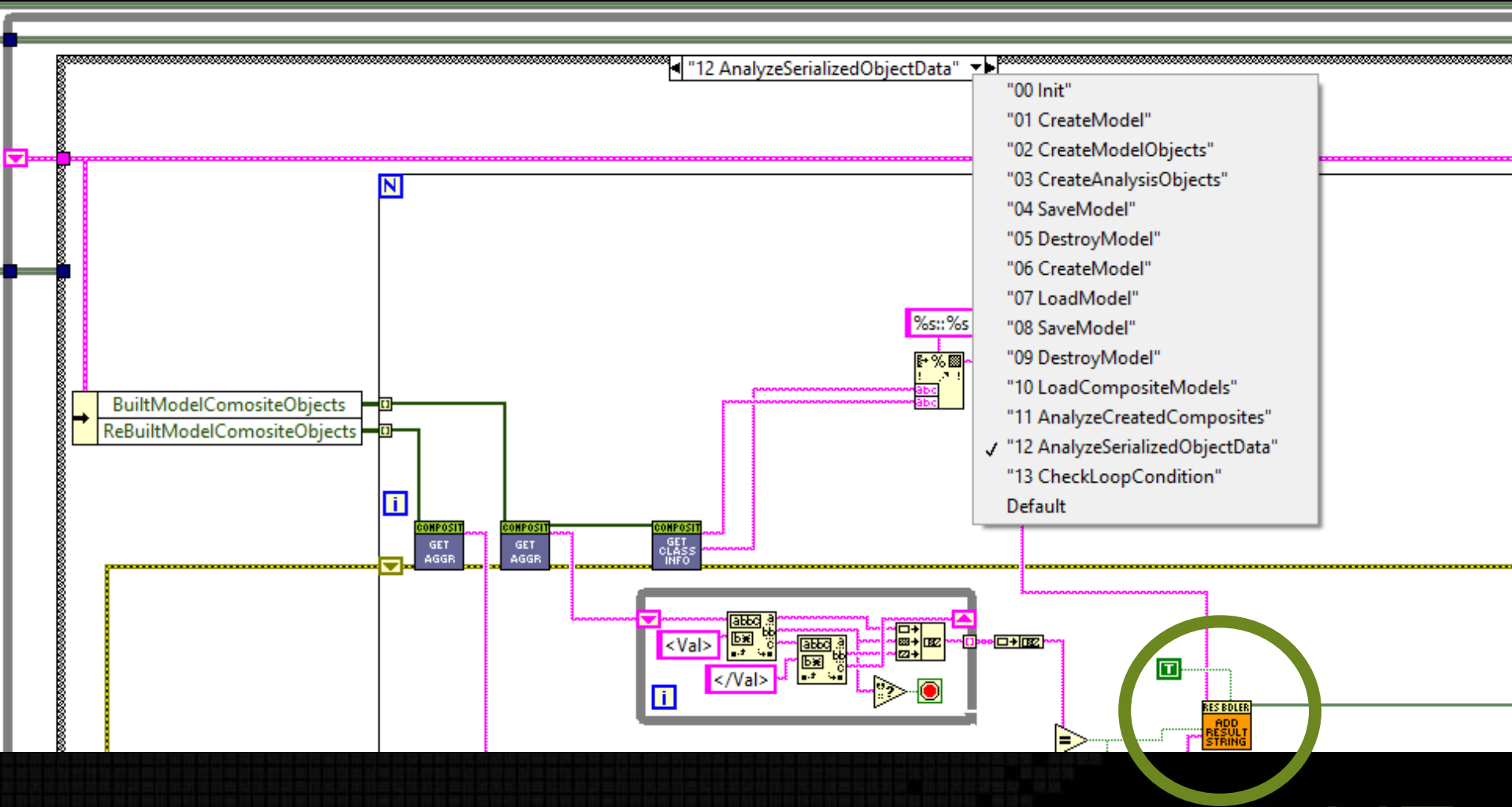
```
Command Prompt
D:\batches>mybat
D:\batches>REM This is an example .BAT file output...
Volume in drive D has no label.
Volume Serial Number is 88C8-53AD

Directory of D:\batches
06/29/2004  03:00p    <DIR>          .
06/29/2004  03:00p    <DIR>          ..
06/29/2004  03:05p                94 mybat.bat
               1 File(s)                94 bytes
               2 Dir(s)          679,763,968 bytes free

D:\batches>
```



# Funktionstest– LabView-kod



# Funktionstest– resultat

## Log

```
Jenkins SystemTestExecution #205
c:\jenkins\workspace\SystemTestExecution\ \ContinuousIntegration\SystemTestExecution>"C:\Program Files (x
2013\LabVIEW.exe" "c:\jenkins\workspace\SystemTestExecution\ \ContinuousIntegration\SystemTestExecution\
path:path:...\TestSystem\SourceCode\SystemTest\ModelLoadTest_class\Main.vi" "\ConfigurationID:string:1"
"\Configuration:string:Platform_Configuration_TC" "\ResultStatusPath:string:c:\jenkins\workspace\SystemTest
"\ErrorPath:string:c:\jenkins\workspace\SystemTestExecution\TestCase_Error.txt"

c:\jenkins\workspace\SystemTestExecution\ \ContinuousIntegration\SystemTestExecution>Type
c:\jenkins\workspace\SystemTestExecution\TestCase_Error.txt





c:\jenkins\workspace\SystemTestExecution\ \ContinuousIntegration\SystemTestExecution>REM -- Check Status

c:\jenkins\workspace\SystemTestExecution\ \ContinuousIntegration\SystemTestExecution>findstr /L "TRUE"
c:\jenkins\workspace\SystemTestExecution\Testcase_Results.txt
FINDSTR: Cannot open c:\jenkins\workspace\SystemTestExecution\Testcase_Results.txt
Build step 'Execute Windows batch command' marked build as failure
Sending e-mails to: @gmail.com
Finished: FAILURE
```

## Översikt för alla projekt






AddQ CI Administrator Server



All Build Pipeline View

S	W	Name ↓
		<u>Build</u>
		<u>push-trigger</u>

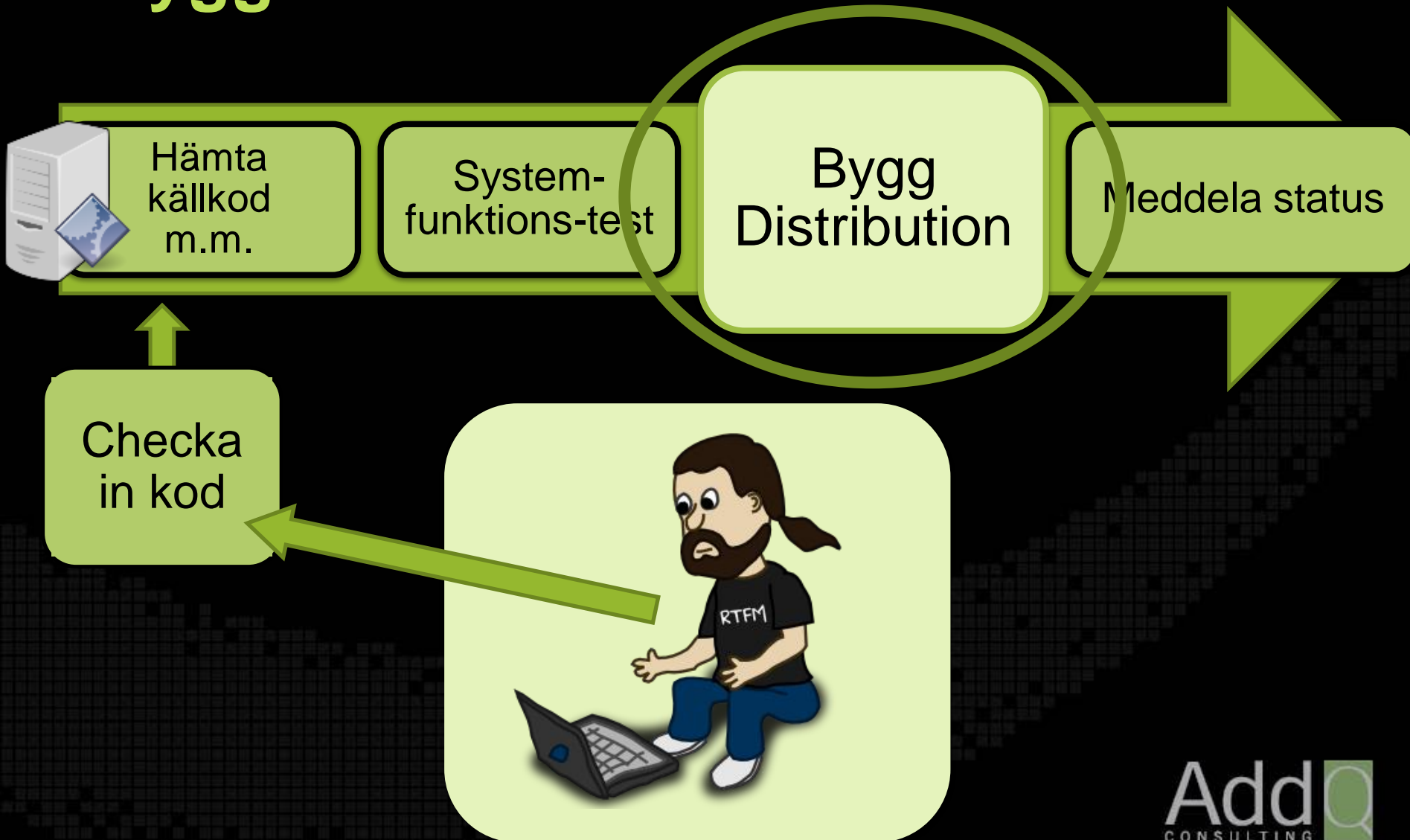
## Historik

Build History (trend)

	#330	<a href="#">2014-okt-11 00:01:01</a>
	#329	<a href="#">2014-okt-10 00:01:02</a>
	#328	<a href="#">2014-okt-09 00:01:01</a>
	#327	<a href="#">2014-okt-08 00:01:01</a>
	#326	<a href="#">2014-okt-07 00:01:01</a>

 [RSS för alla](#)  [RSS för misslyckade](#)

# Bygg distribution



# Bygg distribution

## Application Builder

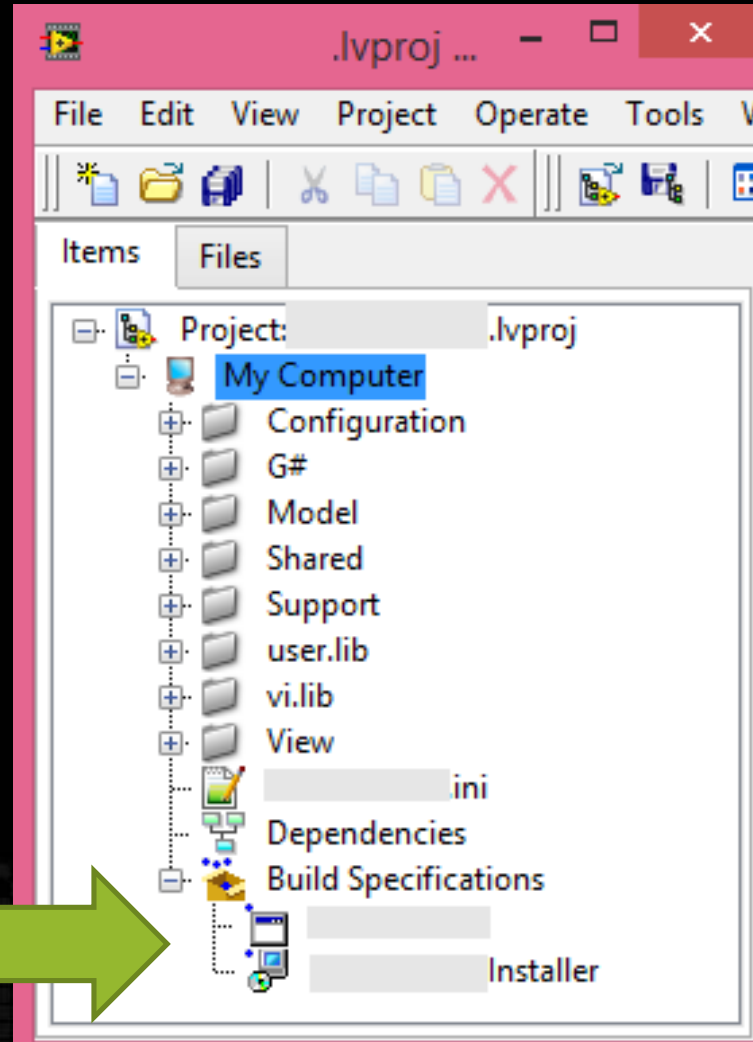
### Build Target VI

BuildTargetBuildSpecification.vi



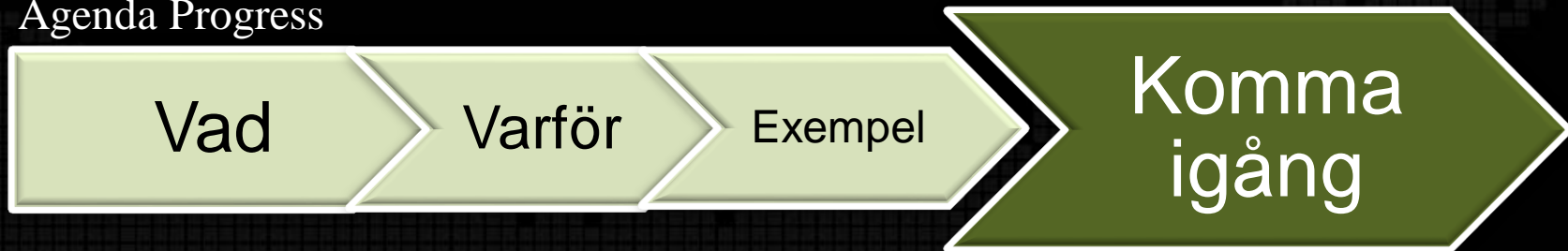
### App Builder API

vi.lib\AppBuilder\AB\_API\



# Komma igång

Agenda Progress



# CI administrator / build master

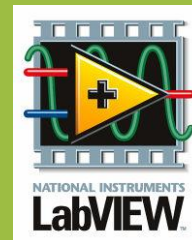
Befintlig server



Byggdator



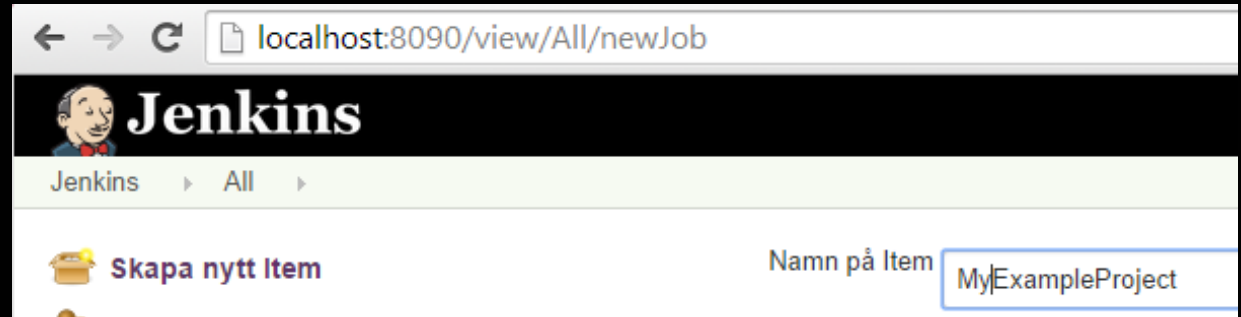
**Jenkins**



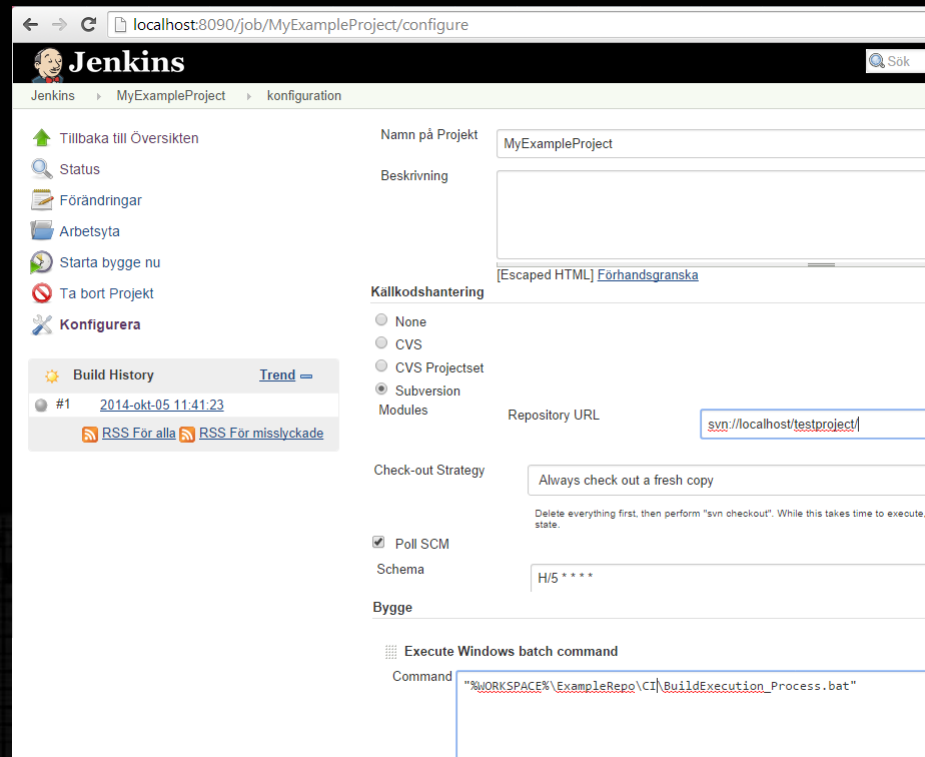


# Automatisera bygge

Skapa projekt

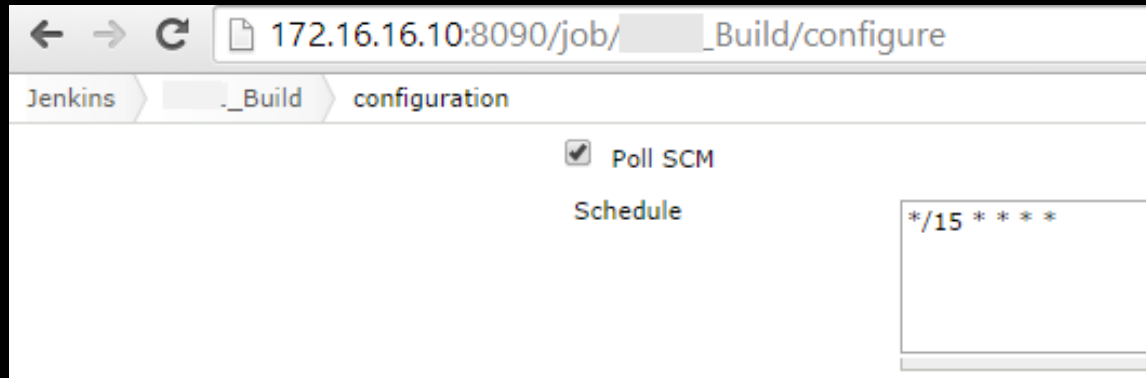


Konfigurera



# Trigga bygge

- Enklast: Polla repository



Ändringar?



# Batchfil för bygge

Execute Windows batch command



## Jenkins

Command

```
"%WORKSPACE%\ExampleRepo\CI\BuildExecution_Process.bat"
```

BuildExecution\_Process.bat

```
47 SET Bnr=%BUILD_NUMBER%
48 IF "%Bnr%"==" " SET Bnr=0
```

```
57 set "LVvar=!BuildSpecDir!prm;!Bnr!"
58 echo.
59 echo ===== Build Started =====
60 echo build !n!: !LVvar!
61 call build.bat "!LVvar!"
```

```
D:\batches>mybat
D:\batches>REM This is an example .BAT file output...
Volume in drive D has no label.
Volume Serial Number is 88C8-53AD

Directory of D:\batches

06/29/2004  03:00p    <DIR>          .
06/29/2004  03:00p    <DIR>          ..
06/29/2004  03:05p             94 mybat.bat
                        94 bytes
1 File(s)
2 Dir(s)          679,763,968 bytes free

D:\batches>
```

Build.bat

```
10 echo building %LabVIEWprm%
11 START "" "%ExecPath%\National Instruments\LabVIEW 2014\LabVIEW.exe" "%CIPath%
\Common\CI_class\ProgrammaticBuild.vi" -- %LabVIEWprm% %errorfile% %resultfile%
```

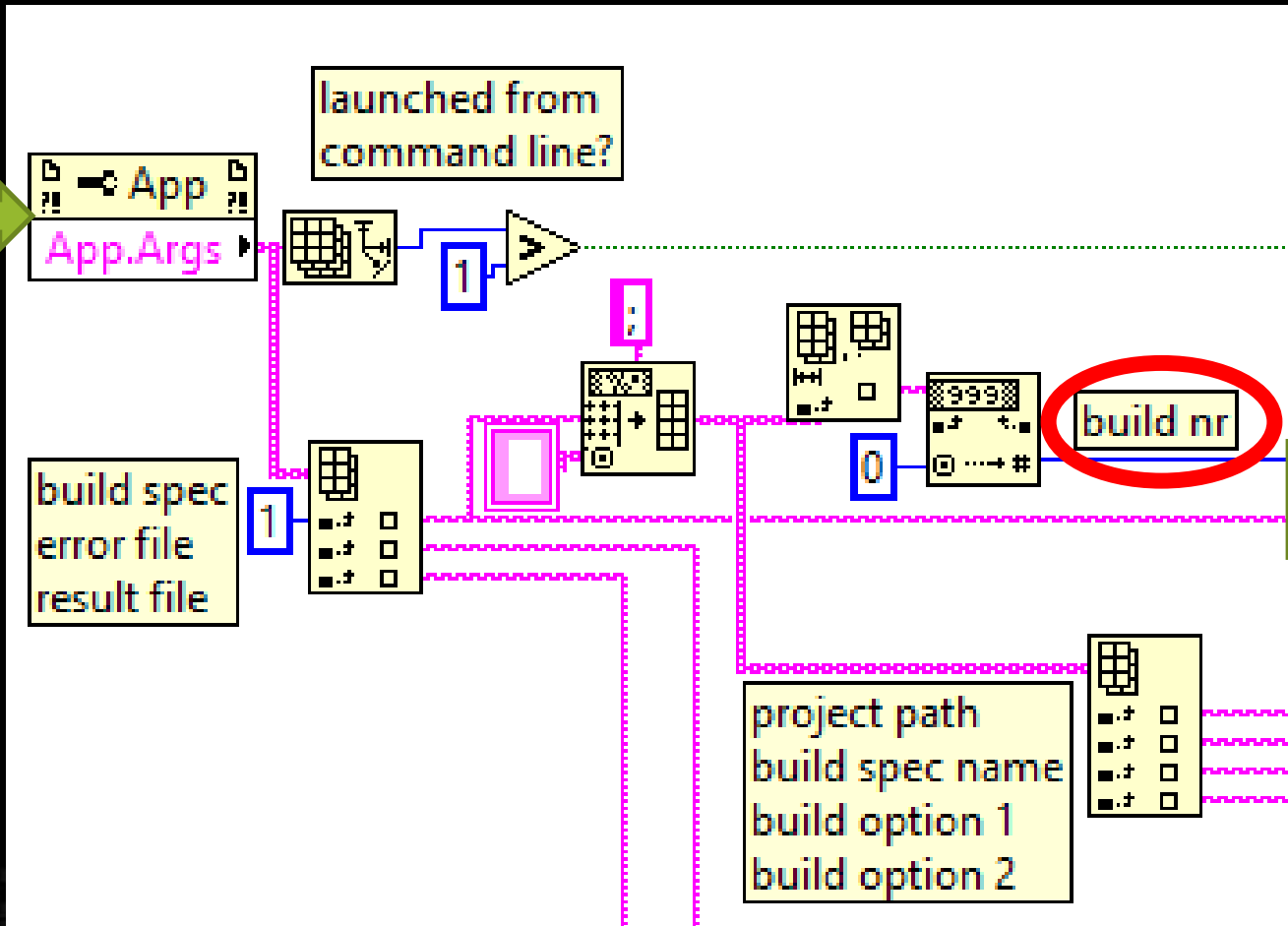
```
D:\batches>mybat
D:\batches>REM This is an example .BAT file output...
Volume in drive D has no label.
Volume Serial Number is 88C8-53AD

Directory of D:\batches

06/29/2004  03:00p    <DIR>          .
06/29/2004  03:00p    <DIR>          ..
06/29/2004  03:05p             94 mybat.bat
                        94 bytes
1 File(s)
2 Dir(s)          679,763,968 bytes free

D:\batches>
```

# LabVIEW Build VI



## BuildTarget



# Output

← → ↻ 172.16.16.10:8090/job/ /324/console ☆ 🔒 ABP

## Jenkins

sök ? thools | Logga ut

Jenkins Build #324

[Tillbaka till Projektet](#)  
[Status](#)  
[Förändringar](#)  
[Konsollutskrift \[raw\]](#)  
[Ändra bygginformation](#)  
[Ta bort det här bygget](#)  
[Tag this build](#)  
[Förgående bygge](#)

### Konsollutskrift

Skipping 1 237 KB.. [Full Log](#)

```
s:\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Quick Scale 2D.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Quick Scale.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real A x B (Optimized).vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real A x B.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real Compact Array to Matrix.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real Compact Cho Inverse Matrix.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real Compact Cho Linear Equations.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real Compact Cholesky Factor.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real Compact Tri-Matrix Inverse.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real Compact Tri-Matrix Linear Eqs.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real Determinant.vi
c:\Projects\builds\ \EXE\SourceCode\vi.lib\Analysis\baseanly.11b\Real Dot Product.vi
```

ERRORLEVEL = 0  
===== Build Done =====

===== Build Started =====  
build 2: c:\jenkins\workspace\ \ContinuousIntegration\BuildExecution\MainGUI\ .lvproj; \Installer; ;0;324  
Starting new build.  
building "c:\jenkins\workspace\ \ContinuousIntegration\BuildExecution\MainGUI\ .lvproj; \Installer; ;0;324"  
waiting for build to  
finish.....  
done

Checking for build errors  
"c:\jenkins\workspace\ \ContinuousIntegration\BuildExecution\Script\checkerror.bat"  
ERRORLEVEL = 0  
===== Build Done =====

===== Build Process Finished: 05/10/2014 2:05:37.33 =====  
Finished: **SUCCESS**

# Email notification



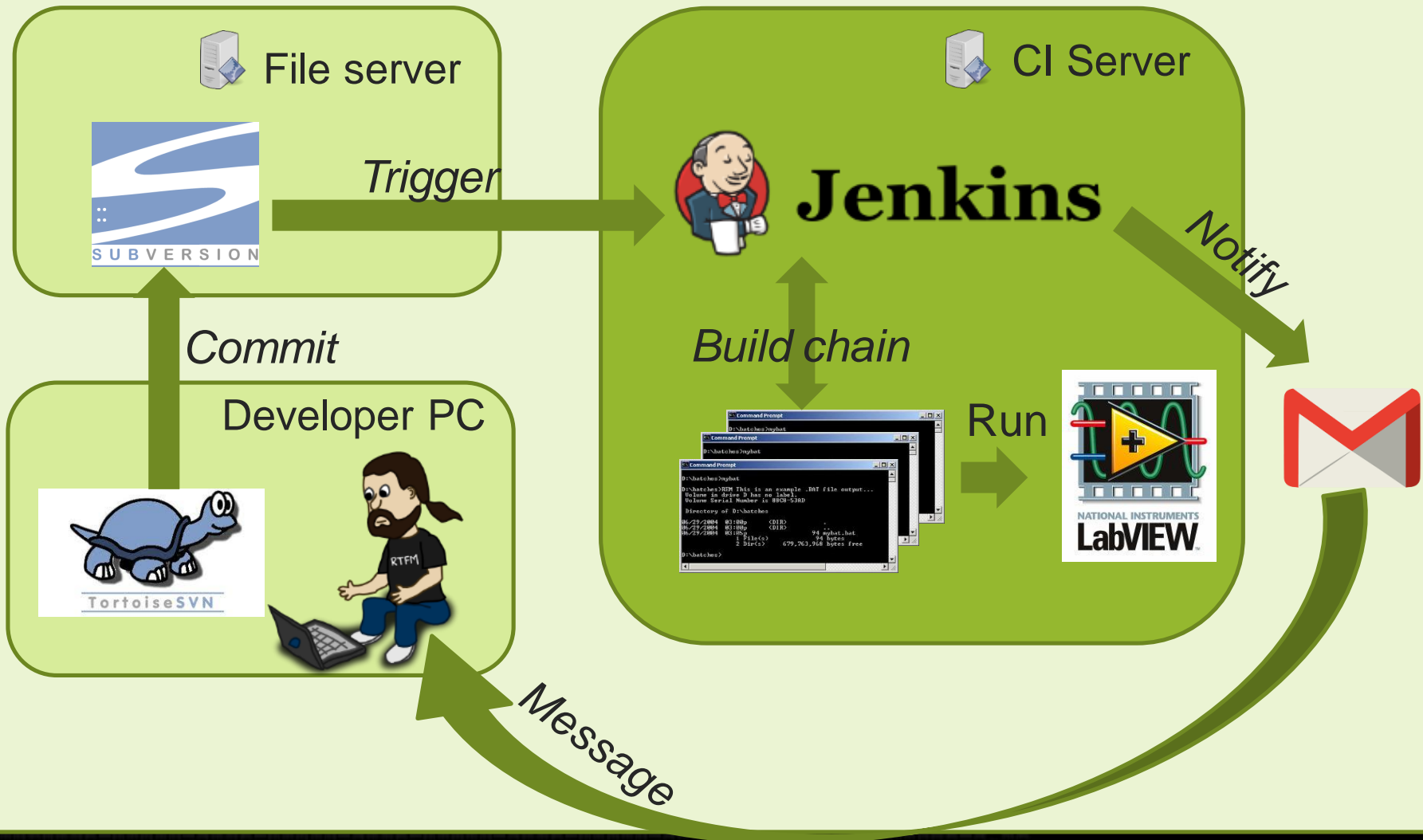
## Jenkins

## Add Post-Build Action

E-mail Notification	
SMTP server	<input type="text" value="smtp.gmail.com"/>
Default user e-mail suffix	<input type="text"/>
<input checked="" type="checkbox"/> Use SMTP Authentication	
User Name	<input type="text" value="REDACTED"/>
Password	<input type="password" value="REDACTED"/>
Use SSL	<input checked="" type="checkbox"/>
SMTP Port	<input type="text" value="465"/>
Reply-To Address	<input type="text" value="noreply@REDACTED"/>
Charset	<input type="text" value="UTF-8"/>

<https://support.google.com/mail/answer/13287?hl=en>

# Vad har vi fått ihop?



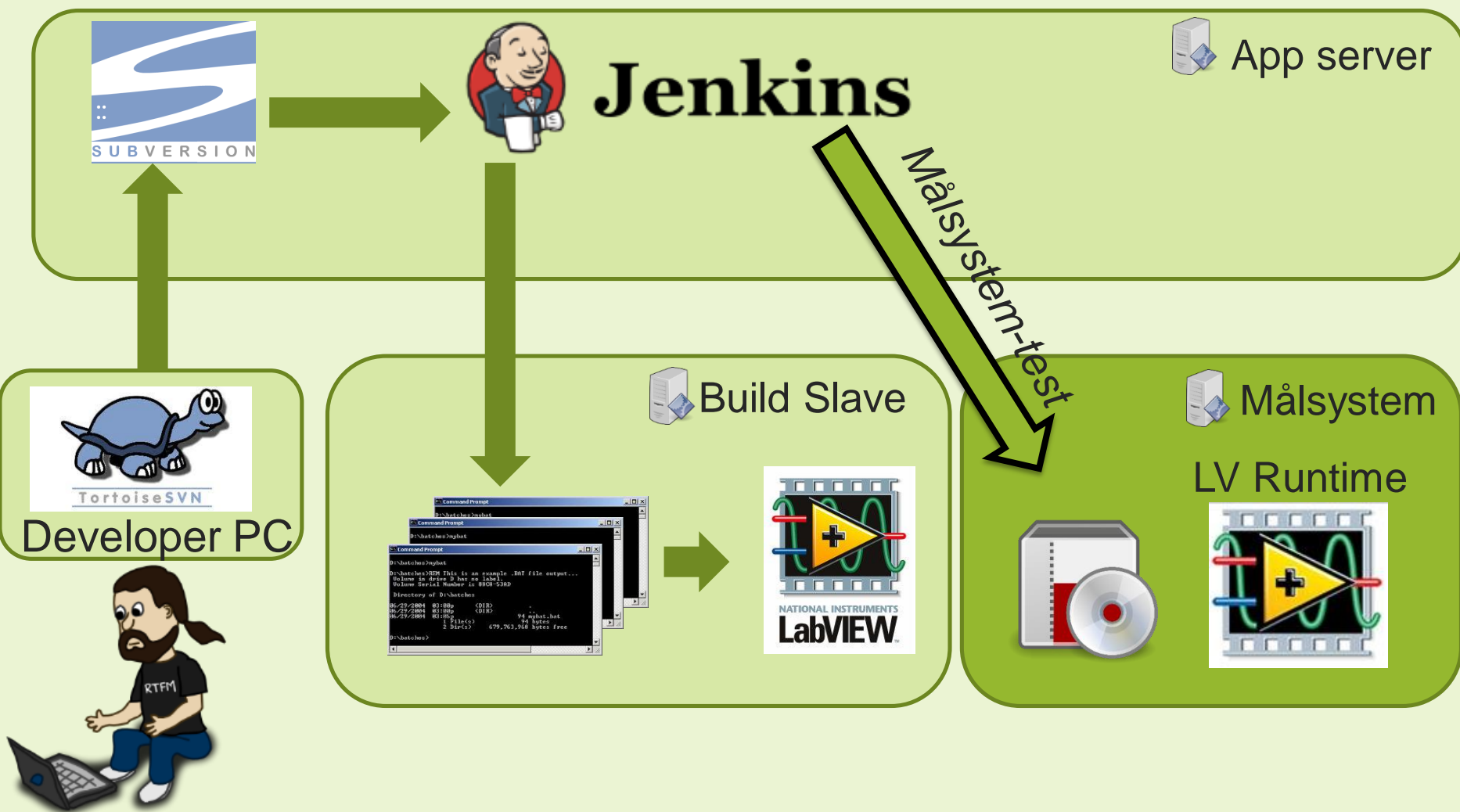


# Continuous Delivery

Fungerar på målsystem



# Infrastruktur – Test på målsystem



# Sammanfattning av CI

- Liten initial kostnad
- Bättre kontroll över projektet
- Större transparens mot kund
- Högre kvalitet ➡ Nöjd kund
- Kan fokusera på att utveckla

**Tack för intresset!**

Frågor ?

# Hjälp med CI?

AddQ tillhandahåller tjänster inom CI/CD

Kontakta oss!

[www.addq.se](http://www.addq.se)

