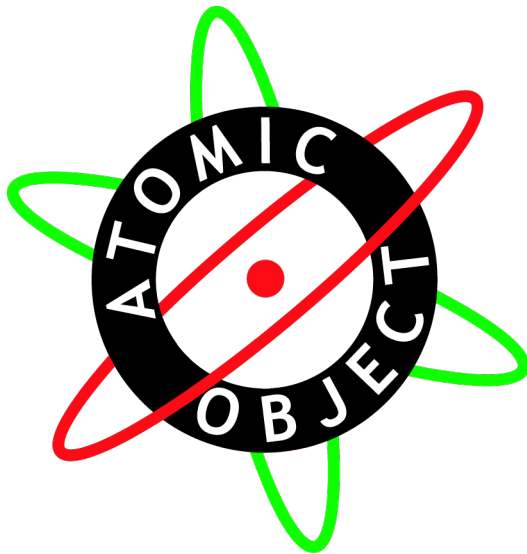# Acceptance test automation to support story driven development

From customer stories to greenbar

Carl Erickson, PhD

Karlin Fox

Chaos

The price we pay

NIST - industry losses
$60 billion a year
Doesn't even count…
government
education
home
loss of life

Therac-25

Denver Airport

Ariane 5

USS Yorktown

FBI Virtual Case File

Successful software projects

Paid for itself per the business needs (ROI)

Met important deadlines

Produced software that

    satisfies end users

    is stable and reliable

    performs acceptably
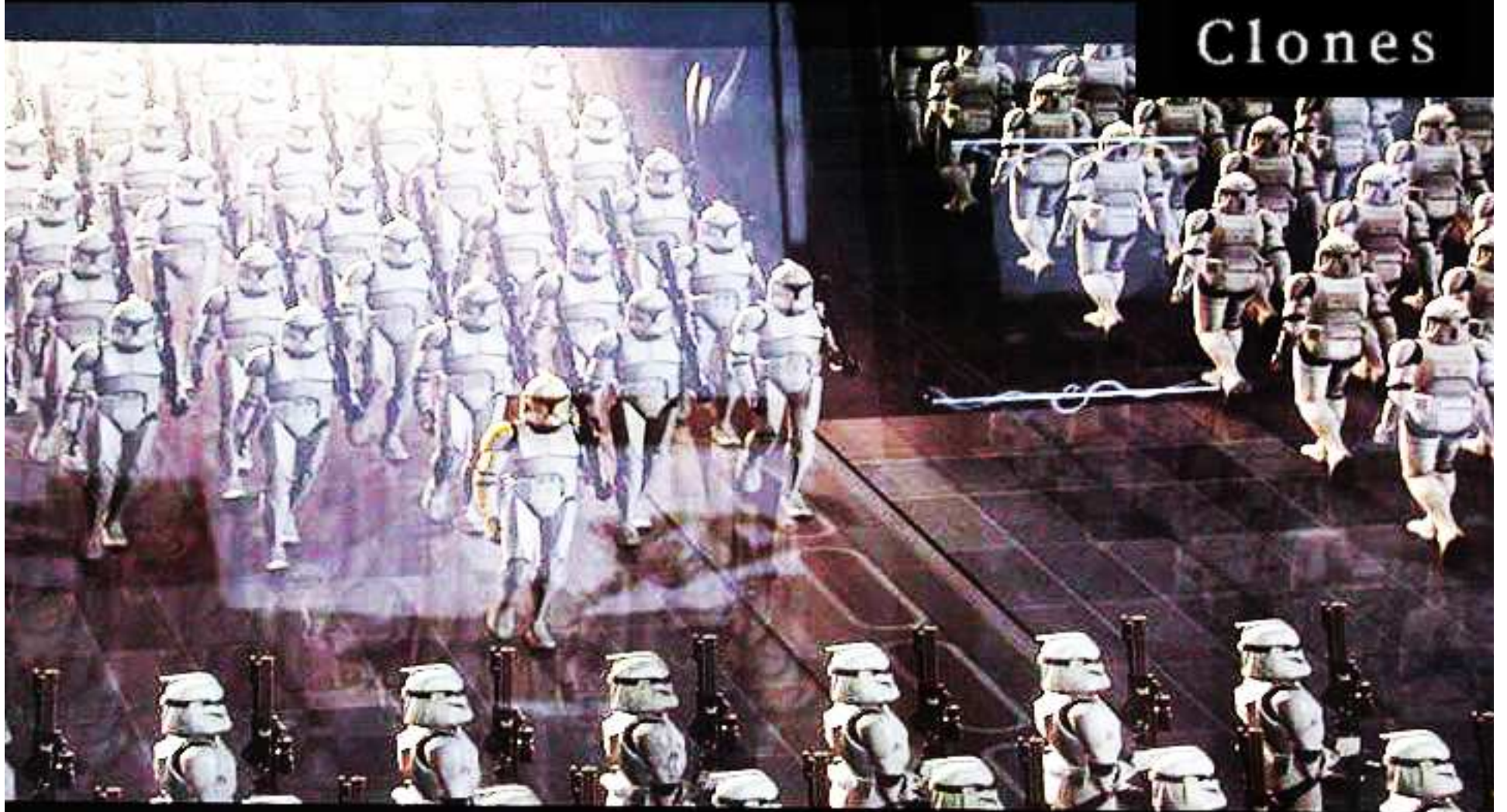
    is extensible and maintainable

Left developrs and managers happy

To the rescue?

HLL

Structured D/P

4GL

OO

AI

Java

Client/Server

N Tier

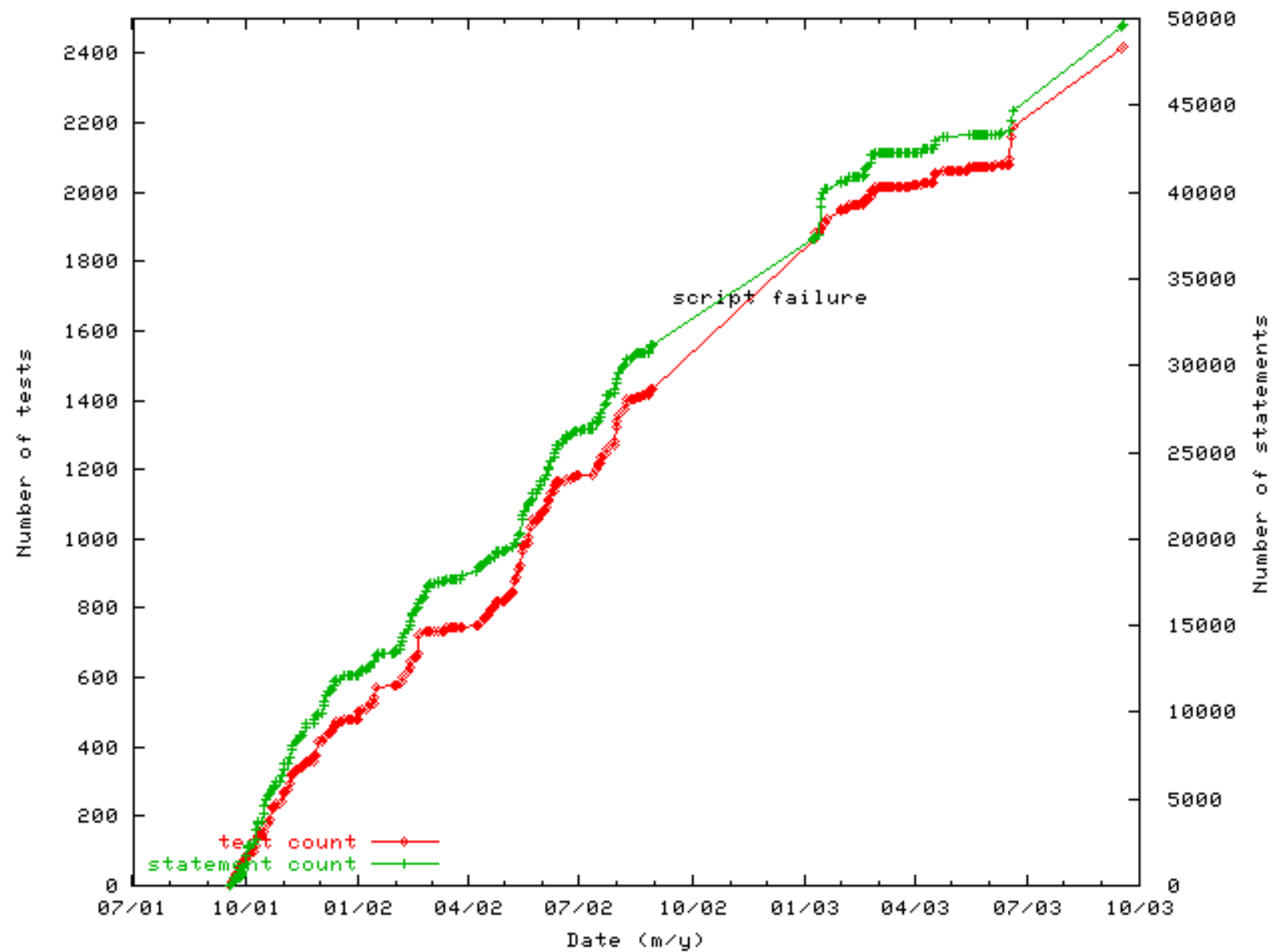Visual XXX

.NET

AOP

Clones

Agility

Test-Driven Development

- White box, by the developers, concurrently
- Much more than finding bugs
  - JIT specification of a class/method
  - Useful documentation
  - Means towards improved design
  - Knowing when you're done
  - Improving morale, feeling confident

TDD Loop

1. Write a test, run it, watch it fail.
2. Write the simplest possible code to pass the test.
3. Run it, watch it pass, refactor as necessary.

(Automation is necessary, not very difficult.)

TDD Impact

10x

Whole
Team

Coding
Standard

Collective
Ownership

Test-Driven
Development

Customer
Tests

Pair
Programming

Refactoring

Planning
Game

Continuous
Integration

Simple
Design

Sustainable
Pace

Metaphor
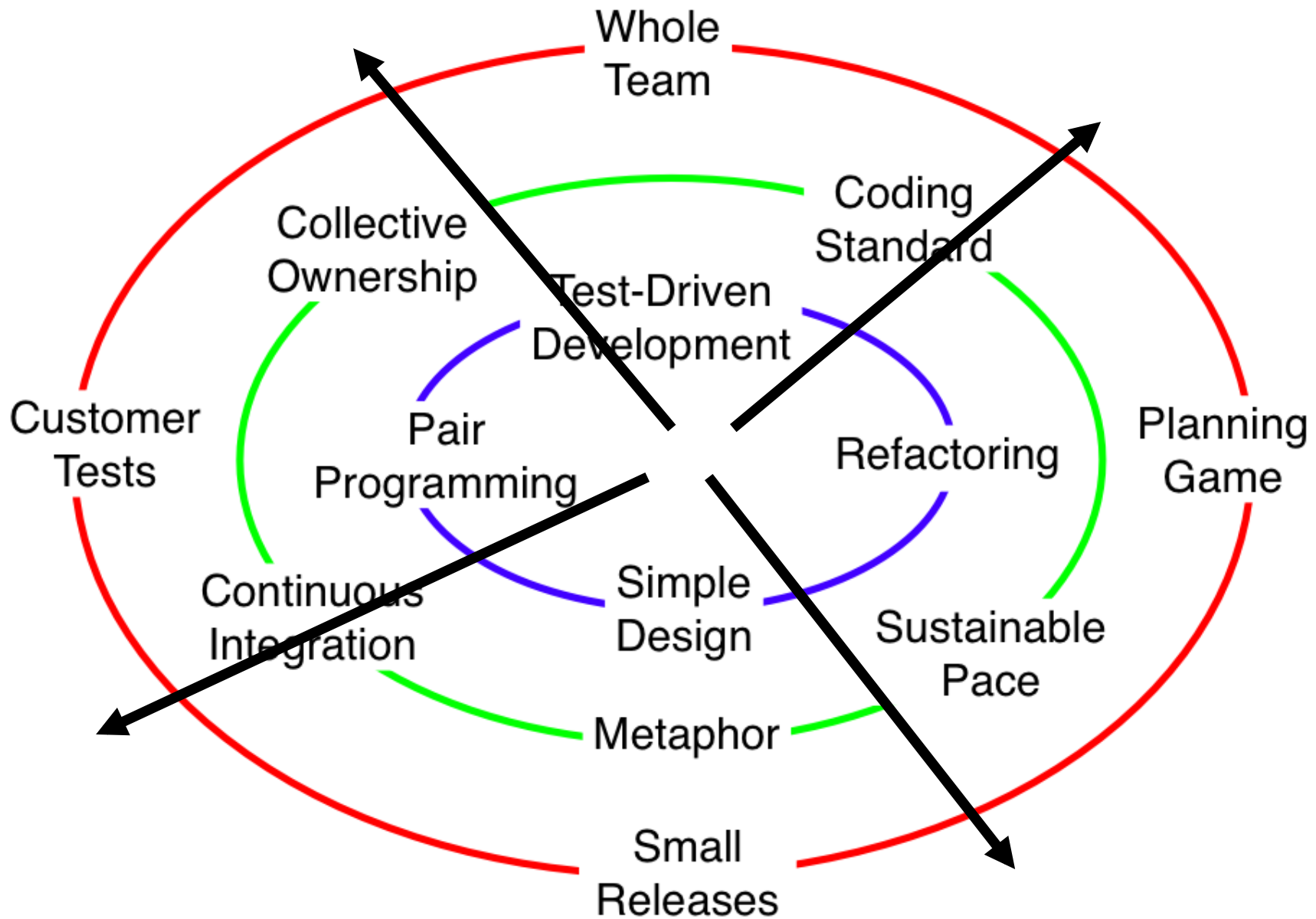
Small
Releases

Story-driven Development

Development tasks
Simple design
Unit tests

Customer stories
Customer priorities
Customer tests

1. Customer dependency

2. Testing difficulty

Major Benefit #1

Requirements

When you need them

In small chunks

Actionable, unambiguous, useful

With an opportunity to learn-as-you-go

Major Benefit #2

Data-driven project management

Iteration rituals and rhythm

Stories can be estimated (small chunks)

Measuring project velocity

Measuring team efficiency

Dynamometer Project

- 9 months
- 5 pairs of developers
- C#/.NET GUI client,   C++ server

Bepco Dyno Host

| Dashboard | Iterations | Backlog | Story Tree | Milestones | Team | Features | Charts | | Projects | Users |

| | | | | | | | | | Tags |

New Iteration

(Edit) (Delete)

- Current Iteration
- Previous Iteration

Completed Iterations:

- 9/23/2005
- 9/16/2005
- 9/9/2005
- 9/2/2005
- 8/26/2005
- 8/19/2005
- 8/12/2005
- 8/5/2005
- 7/29/2005
- 7/22/2005
- 7/18/2005
- 7/11/2005
- 7/5/2005

9/30/2005 - 10/6/2005

Summary | Report

Budget:	80 points		**Completed:**	11 points
Planned:	71 points		**Worked:**	6 points
Available:	9 points		**Remaining:**	60 points
			Time Remaining:	2 days

Story Cards

Assign Story Cards

Move Selected Story Cards to: Backlog ⬍ (Go)

Print All (Print Selected Stories)

	Scid	Title	Points	Worked	Category	Status	Owner	Prioritize		
☐	SC129	Update Drive Curve Editor	8	5	Story	Complete	None (take)	⬇⬆⬇⬇	Edit	Delete
☐	SC123	System Normal Stop	16	0	Story	Defined	None (take)	⬇⬆⬇⬇	Edit	Delete
☐	SC118	Disconnect and Reconnect Controller Update	4	0	Story	Defined	None (take)	⬇⬆⬇⬇	Edit	Delete
☐	SC124	Drive Curve Import	8	0	Story	Defined	None (take)	⬇⬆⬇⬇	Edit	Delete
☐	SC136	Message Box Update	2	1	Story	Complete	None (take)	⬇⬆⬇⬇	Edit	Delete

Dyno Host
Burke Porter

Acceptance Tests

Not Done – Writing Drive Curve to Controller

When a sequence is executed, the Host will write all Drive Curves in the BEP standard format to the Controller in the /dyno3/ic/sequences/drivecurves directory.

Standard Format: Time (Seconds) TAB (0×09) Speed (MPH) Carriage Return (0×0D) Linefeed (0×0A).

Notes:

Acceptance Tests:
1. Run a sequence and validate that all of the drive curves from the solution appear in the /host/ic/sequences/drivecurves directory.
2. Open each of the drive curves and validate that they follow the BEP standard format.

Posted by Kevin Hykin | | Post a comment

Not Done – Sending Sequence to Controller

The Host will be responsible for using ftp to place the sequence file onto the Controller in the /dyno3/ic/sequences directory when the Run is selected by the user. The file format is dictated by the interpreter on the Controller.

Notes:
I am assuming that the ftp session is using the login of the root.
If you would like to change the directory, just shoot me an E-mail with the logic and I will run it by the Controller group for approval.
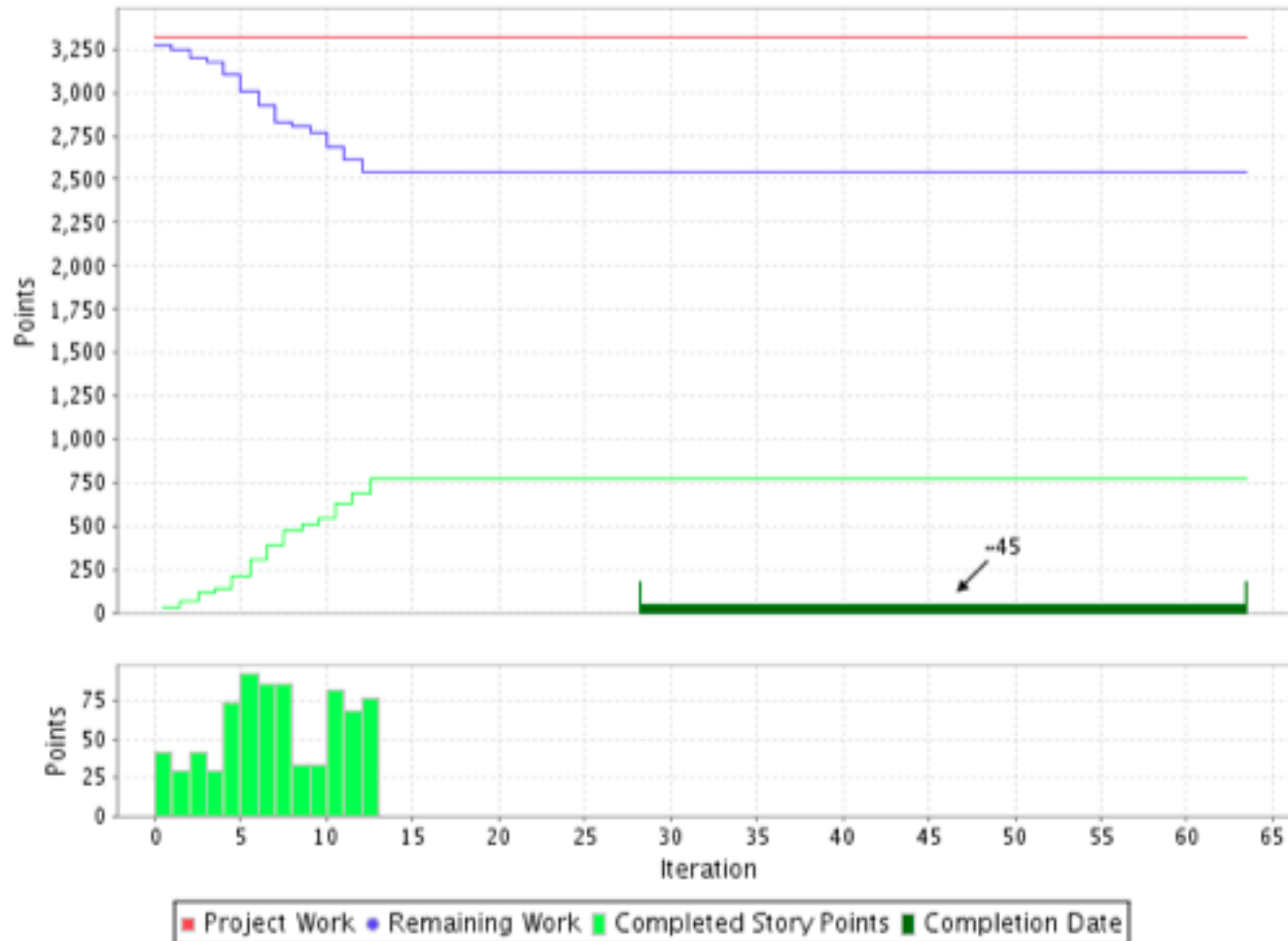
Acceptance Tests:
1. Open a sequence. Depress the Run button. Open a session to the controller and validate that the drive curve is under /root/host/ic/sequences directory.
2. Validate that the file is properly formatted.
3. Validate that the Controller could run the file and that it executed as expected.

Bepco Dyno Host

Dashboard	Iterations	Backlog	Story Tree	Milestones	Team	Features	Charts	Users
							Tags	Projects

Project Burndown

-45

Points

Iteration

- Project Work • Remaining Work ■ Completed Story Points ■ Completion Date

eXPlain Project Management Tool - 1.8.2

This software is licensed under the terms of the GPL.

But wait, there's more!

Automating acceptance tests gets you…

Executable requirements (even more unambiguous)

Inexpensive for developers to run

Regression testing ability

Release process confidence

A few more bugs

Ways to automate system tests

1. Commercial record/playback tools
   - Tied to specific UI controls
   - Tests are often brittle
   - Code generation gone wrong
   - Script language is more like GPL
2. Language-of-the-app tests
   - Done by developers
   - Expensive to develop

Domain Specific Languages

- a.k.a tiny, very high level, or application
- Do one thing, but do it well
    - More expressive, and efficient, but limited
- Historical goal: lay programmers
- Tim Menzies criteria
    - 1 day productivity
    - Elbow test

DSL for Acceptance Testing

- Describe tests in the language of the app
- Lots of recent interest
- Goals of DSL approach to acceptance tests

	Customer	Developer	Tester
Readable	✓	✓	✓
Writeable	?	✓	✓

Example 1: Fantasy sports

Reality = sports teams

Realty$'$ = fantasy sports teams

Realty$''$ = drafting fantasy sports teams

Realty$'''$ = mock drafting fantasy sports teams

Complex multiplayer Java server with
   XML transaction engine,
   database persistence, TCP sockets

Our challenge: extend functionality and
   improve performance of legacy codebase

Live Draft | ◎   Atomic PunchIt

If draft room does not load within 30 seconds, you probably don't have Flash installed. _Download_ it for free.
If you see "Connecting To Server" for more than 30 seconds, your connection is being blocked by a software firewall or proxy server. _Learn More_

Mock Draft Central
participate or sign up to

Draft:	KFFL Expert League	Your Team:	MockDraftCentral.com
Current Pick:	Draft complete	Picks Until Your Turn:	
Next Pick:		Your Remaining Picks: 0	🔊

Left Panel:

CBS Sportsline
RB   R1 P1   SD
Tomlinson, Ladainian

ffchamps.com
RB   R1 P2   SEA
Alexander, Shaun

Yahoo Sports
RB   R1 P3   KC
Holmes, Priest

KFFL.com
RB   R1 P4   BUF
McGahee, Willis

RotoTimes
QB   R1 P5   IND
Manning, Peyton

ESPN.com
RB   R1 P6   IND
James, Edgerrin

FLF Yearbook
RB   R1 P7   NO
McAllister, Deuce

CreativeSports
QB   R1 P8   MIN
Culpepper, Daunte

RT Sports
RB   R1 P9   NE
Dillon, Corey

MockDraftCentral.com
RB   R1 P10   HOU
Davis, Domanick

footballinjuries.com
RB   R1 P11   WAS
Portis, Clinton

The Huddle
WR   R1 P12   OAK
Moss, Randy

Center Panel:

search | Sort by ... ▾ | All ▾ | ☐ **show drafted**

Name	Pos	Team	Bye
Dilfer, Trent	QB	CLE	4
Gordon, Lamar	RB	PHI	6
Robinson, Koren	WR	MIN	5
Orton, Kyle	**QB**	**CHI**	**4**
Jones, Matt	WR	JAX	7
Rattay, Tim	QB	SF	6
Garner, Charlie	**RB**	**FA**	

ⓘ [_____]   (DRAFT) (Prepick)

Right Panel:

Prepicked Players   🔼 🔽 (Remove)

Player	Rules
Davis, Domanick (RB / HOU / 3)	◯
Martin, Curtis (RB / NYJ / 8)	◯
Harrison, Marvin (WR / IND / 8)	◯
Johnson, Rudi (RB / CIN / 10)	◯
Moss, Randy (WR / OAK / 5)	◯
Green, Ahman (RB / GB / 6)	◯
Jones, Julius (RB / DAL / 9)	◯

☐ **auto select is off**

(Commish) (Who's On) (? Help)

Chat/Roster Panel:

MockDraftCentral.com ▾   (+ / -)

▾ QB - 3/1 (3)
    Favre, Brett (Bye: 6) (R4 P5)
    Boller, Kyle (Bye: 3) (R9 P10)
    Smith, Alex (Bye: 6) (R13 P10)
▾ RB - 5/2 (5)
    Davis, Domanick (Bye: 3) (R1 P10)
    Green, Ahman (Bye: 6) (R2 P5)
    Droughns, Reuben (Bye: 4) (R8 P5)
    Duckett, T.J. (Bye: 8) (R12 P5)

(Send)

```
create_draft
    name 'test draft'
    starts now + 1.minutes
    sport 'football'
    num_rounds 15
    num_teams 6

    draft_type 'live'
    trading_allowed false
    draft_order 'serpentine'

draft_signup
    add_human_teams 6
    add_ai_teams 0

as_commissioner do
    connect_to_draft
    turn_autoselect_off
    wait_for_draft_to_start

    pause_draft_now
    change_pick_time_to 17.seconds

    wait 30.seconds

    pause_draft_now
    modify_pick 'R1P2' do
        set_player_to 'Peppers, Julius'
    end
    resume_draft
end
```

Example 2: Time Tracker

Atomic PunchIt II™

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	(total)	(billable)
	9.25	9.5	7.75	9.25	11			46.75	
	9.25	11.5	13	9.75	11.5		1.5	56.5	

Billing Period Total: 103.25 48.25 (47%)

Punch - Password - Sales - Admin - Reports - Invoicing - Logout

You are logged in as: erickson

Select A Project ▼

(no stories) ▼   Add Story

October ▼ | 06 ▼ | 2005 ▼ | Today

Start: [   ]   Stop: [   ]

Previous Period   Next Period

Mon Aug 29th 2005 - Sun Sep 11th 2005

Fri 09/09/2005

Start	Stop	Project	Notes	Ops
17.5	18	Atomic General	**Recruiting/Hiring**	Edit Delete
12.5	17.5	Bepco Robot	**Programming** Unit tests for InitDriverWithDriveCurve. Build and checkin processes.	Edit Delete
12.25	12.5	Atomic Lunch	**Taco Bell**	Edit Delete
11.25	12.25	Atomic Sales: Priority Health AppDev	**Contract / LOA** making a plan	Edit Delete
11	11.25	Atomic General	**Email**	Edit Delete
10.75	11	Atomic General	**MDC - ao ownership**	Edit Delete

```
login
verify_at_punch_page
verify_default_punch_form
clear_punch_list
fill_punch_form do
    set_date_to today + 1
    set_project_to 'FF PPO Project'
    set_task_to 'Meetings'
    set_hours_to 4.5
    set_notes_to 'Did some work'
end
submit_punch_form
```

```
verify_at_punch_page
verify_punch_list_size_is 1
punch_list.for_first_punch do
    verify_date_is today+1
    verify_project_is "FF PPO Project"
    verify_task_is "Meetings"
        verify_hours_is 4.5
        verify_notes_is 'Did some work
end
```

Example 3: Dyno Controller

Systir