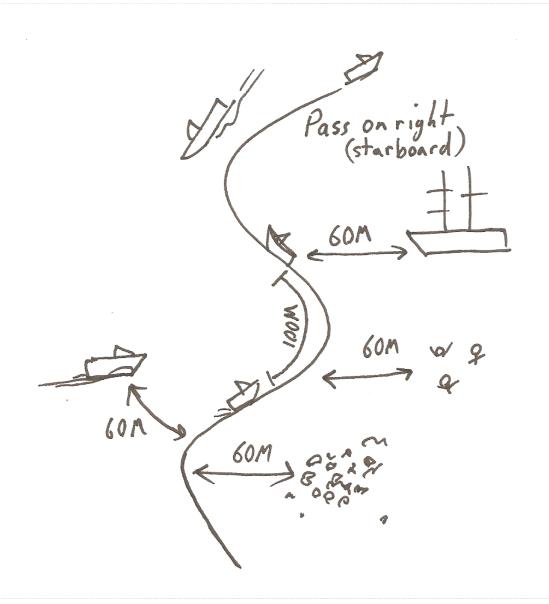# Sleeping Easy

Validating Success of Change

Daniel Harrison
Network Engineer

This Presentation is ...

- … not a product launch

- … not a packaged solution

- … a discussion

  *… of an idea we find useful
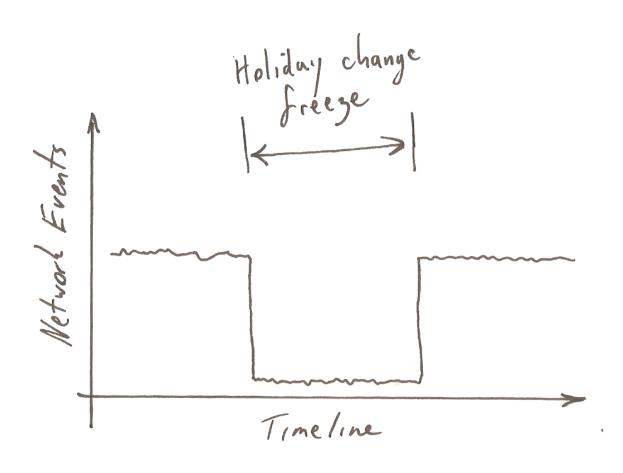 and we think you might too*.

How do we audit networks?

- Do we audit the static

- Do we audit the dynamic

- Soluble

- Easy

- Unrealistic

We have met the enemy and he is us.

\- Walt Kelly

Change Process

Part of the network life cycle

Google

- Change is healthy

- Lowers the stability of the network
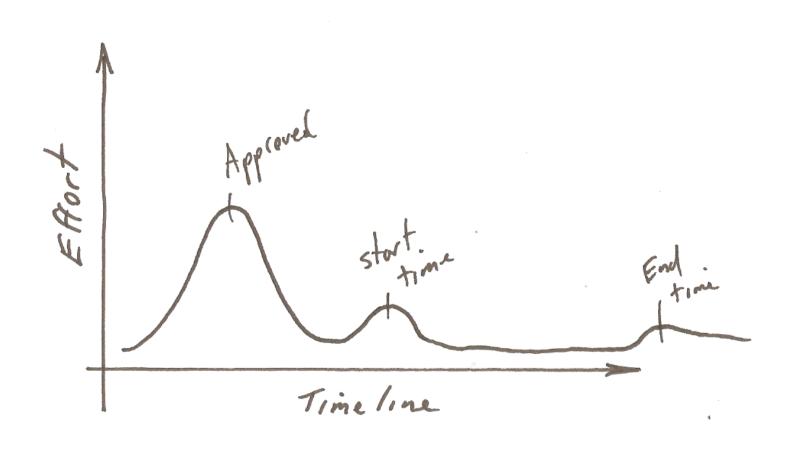
A Typical Solution

Google

Change requests:

- Impact assessment
- Notification to impacted parties
- Pre-change review

Post change verification

- Expected outcomes
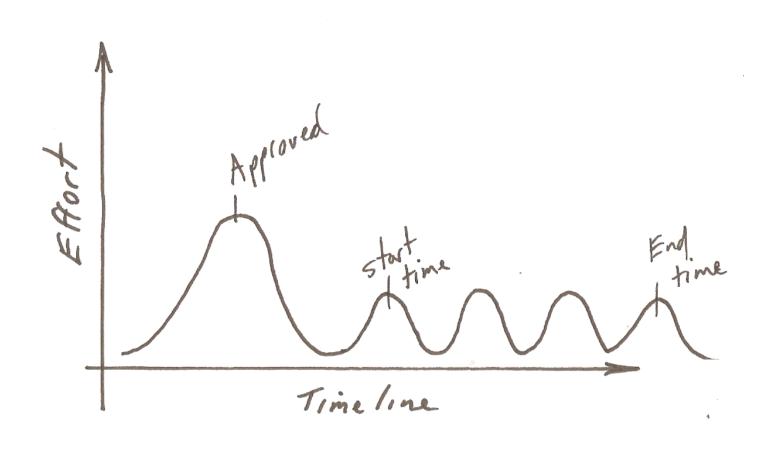- Dashboards

Disparity of effort between pre & post review

- Expected outcomes - too narrow
- Dashboards - too broad
- Undermined by:
    - Time pressure
    - Fatigue
    - Emotion

Limited validation of intermediate stages

Alerting Suppressed during change

Process Auditing

A Coders Approach

Unittests consist or four basic building blocks

- Test case
  Individual tests

- Test suite
  Collection of test cases

- Test fixture
  Setup and teardown housekeeping
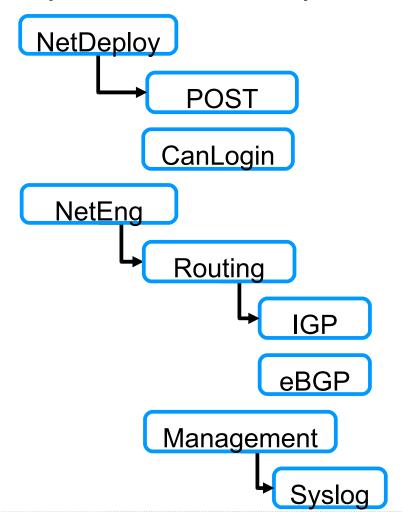
- Test runner
  Runs and outputs test results

Unittest library provides assertions

- Assertions return a boolean result
  - `failUnless`
  - `failUnlessEqual`
  - `failIfEqual`

- Inherit and add new assertions
  - `failUnlessPOST`
  - `failUnlessEBGP`
  - `failUnlessCorrectOS`
  - `failUnlessIntfUp`
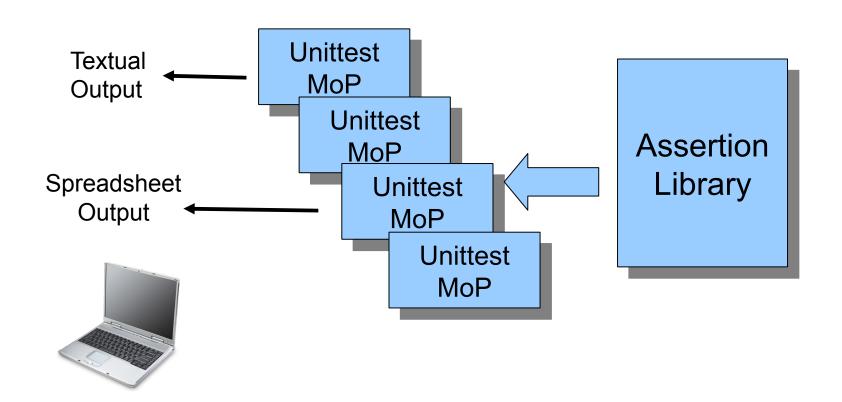
- Group tests to model process

Test Runner - Text

```
NetDeploy:
  (TestName: All NetDeploy tasks - Optional and Mandatory?)
  ================================================================
  CanLogin:
    (TestName: CLI can be accessed and command output extracted?)
  ================================================================
NetDeploy:CorrectOS:
  (TestName: Is the correct OS installed on device?)
  ================================================================
NetDeploy:BaseConfig:
  (TestName: Base config transferred and running?)
  ================================================================
NetDeploy:NetDeployMandatory:
  (TestName: All NetDeploy tasks required for handoff to Neteng?)
  ================================================================
  NetDeploy:NetDeployMandatory:Inband:
    (TestName: Serial port is configured with expected name?)
  ================================================================
  NetDeploy:NetDeployMandatory:OOB:
    (TestName: Out of Band Access is available?)
  ================================================================
  NetDeploy:NetDeployMandatory:OpticAttenuation:
    (TestName: All optical interfaces are the right light level?)
  ================================================================
  NetDeploy:NetDeployMandatory:IntfDescription:
    (TestName: Interface descriptions have correct format?)
  ================================================================
  NetDeploy:NetDeployMandatory:LoopbackAssigned:
    (TestName: DNS and address has been allocated for Loopback 0?)
```

Test Runner - Spreadsheet

E	P	Q	R	S	T
Only if needed.					
PCR #	**IntfNotErrored**	**OspfNeighbor**	**CorrectOS**	**PostOK**	**IBGP**
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	FAILURE	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	FAILURE
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	FAILURE	FAILURE
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	FAILURE
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS
	SKIPPED	SKIPPED	SKIPPED	SKIPPED	SKIPPED
	SUCCESS	SUCCESS	SUCCESS	SUCCESS	SUCCESS

Textual

Unittest
MoP

Unittest
MoP

Spreadsheet

Unittest
MoP

Unittest
MoP

Assertion
Library

- Delta between then and now

- Sub elements assessed individually

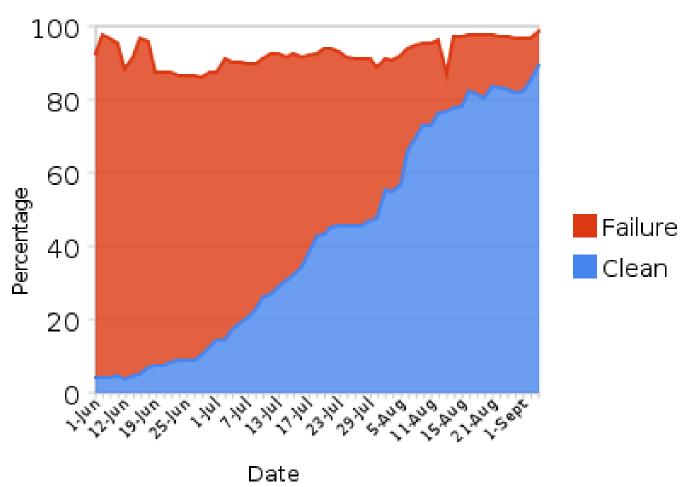| Initial	End	Delta
Pass	Pass	Pass
Pass	Fail	Fail
Fail	Pass	Pass
Fail	Fail	Pass

- Auditing changes can be applied to static elements for a retrospective assessment
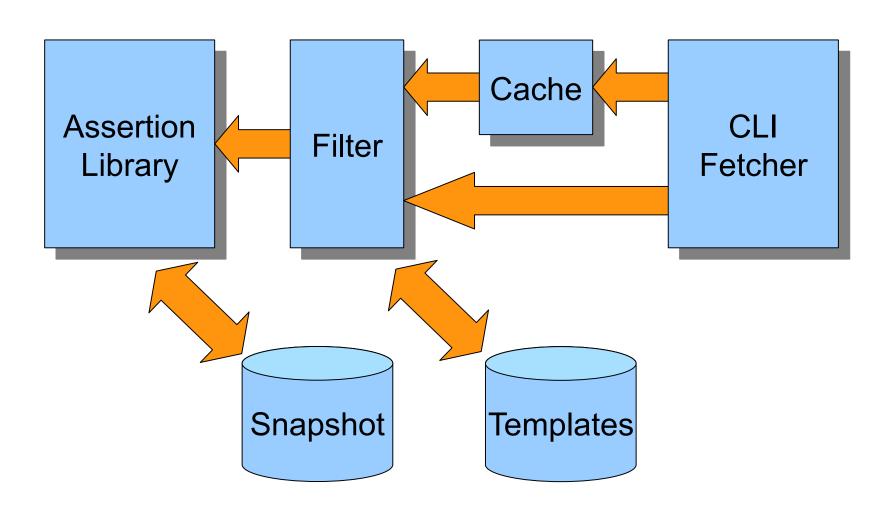
Nuts & Bolts

In the engine room

Backend Components

- CLI fetcher
  Retrieve command output from devices

- Cache responses
  Serve repeated requests from cache

- Filter
  Parse semi-structured data into data structures!

- Snapshot
  Assertion based on delta between iterations

Roll Your Own

- ## PyUnit
  http://pyunit.sourceforge.net/pyunit.html

- ## Rancid
  http://www.shrubbery.net/rancid/

- ## Google Code

  - ### Spreadsheets API
    http://code.google.com/apis/spreadsheets/overview/

  - ### IP Address Library
    http://code.google.com/p/ipaddr-py/

  - ### Proto buffers
    http://code.google.com/apis/protocolbuffers/docs/overview.html

Thank You!

Q&A