how to replace a legacy tool with 100k installations ...

... and 50 reverse package dependencies

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maintainers of community distributions (no BDFL). case study is Debian-specific, but lessons are generic
an iteratively updated **design doc** is **key to consensus** for **and** testability of a change with cross-package impact
case study: update-inetd

- perl script and module written in 1994
- is invoked by maintainer scripts of server packages that run via inetd, to manage service entries in inetd.conf
- increasingly irrelevant, like inetd itself, but nevertheless installed in 85% and actually used in 32% of all Debian installations (popcon vote)
- broken by design (uses only service name as key to manage inetd.conf entries)
bug report #24043, opened in 1998:

update-inetd can only add one entry for a service

mail to debian-devel list, 2001:

RFC: new update-inetd

msg #10 in bug report #179318, 2003:

this bug will not be investigated because update-inetd is supposed to be rewritten from scratch, some day.
msg #91 in bug report #8927 sent in 2007, opened 1997:

*the reason why no conclusion has been reached is because no one has written the code for any of the various reasonable solutions that have been proposed.*

mail to debian-devel list, Sept 2009:

*RFC: update-inetd migration to dpkp-triggers*

mail to debian-devel list, Feb 2011:

*DEP9: inet-superserver configuration by maintainer scripts*
come up with an idea and send it to the largest mailing list
how to make a proposal with cross-package impact

- draft a design doc
- discuss it with someone who won’t call you names for having a silly idea
- try a proof of concept implementation
- discuss it with people directly impacted by the changes
- if all goes well, then tell the whole world
- iterate whenever necessary

- people not yelling at you is a good sign
- being ignored until you show some code is normal
a process to keep track of (lack of) progress

see http://dep.debian.net/ for listing and status of current Debian Enhancement Proposals
### Design Doc Excerpt: Overview of Operation

<table>
<thead>
<tr>
<th>server program exists</th>
<th>status of inetd.conf entry</th>
<th>matching reconf-inetd fragment</th>
<th>shadow fragment status</th>
<th>reconf-inetd action</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>no</td>
<td>disabled</td>
<td>no</td>
<td>identical</td>
</tr>
<tr>
<td>1</td>
<td>no</td>
<td>enabled</td>
<td>no</td>
<td>identical</td>
</tr>
<tr>
<td>2</td>
<td>yes</td>
<td>disabled</td>
<td>yes</td>
<td>different</td>
</tr>
<tr>
<td>3</td>
<td>yes</td>
<td>disabled</td>
<td>yes</td>
<td>identical</td>
</tr>
<tr>
<td>4</td>
<td>yes</td>
<td>missing</td>
<td>yes</td>
<td>n/a</td>
</tr>
<tr>
<td>5</td>
<td>commented-out inetd.conf entry</td>
<td>commented-out inetd.conf entry</td>
<td>commented-out inetd.conf entry</td>
<td>none</td>
</tr>
<tr>
<td>6</td>
<td>any other combination</td>
<td>any other combination</td>
<td>any other combination</td>
<td>none</td>
</tr>
</tbody>
</table>

How to replace a legacy tool with 100k installations ...
### Design Doc Excerpt: Overview of Operation

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</table>
program behaviour is described in terms of **features**

- every feature is described with one or more **scenarios**
- every scenario is a given/when/then sequence of **steps**:
  
  **Given** context
  
  **When** event
  
  **Then** expected outcome

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**Parenthesis: One slide intro to Behaviour-Driven Dev’t**

1. **Describe behaviour in plain text**
   
   **Feature:** Addition
   
   In order to avoid silly mistakes
   
   As a math idiot
   
   *I want to be told the sum of two numbers*

   **Scenario:** Add two numbers
   
   Given I have entered $a$ into the calculator
   
   And I have entered $b$ into the calculator
   
   When I press `add`
   
   Then the result should be $a+b$ on the screen

2. **Write a step definition in Ruby**
   
   ```ruby
   Given /^I have entered\(.*\) into the calculator/ do
   calculator = Calculator.new
   calculator.push($1.to_i)
   end
   
   Scenario: Add two numbers
   
   Given I have entered $a$ into the calculator
   
   And I have entered $b$ into the calculator
   
   When I press `add`
   
   Then the result should be $a+b$ on the screen
   ```

3. **Run and watch it fail**

4. **Write code to make the step pass**
   
   ```ruby
   class Calculator
     def push(c)
       @reg << c
     end
   end
   
   $ cucumber features/addition.feature
   ```

5. **Run again and see the step pass**

6. **Repeat 2-5 until green like a cuke**

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how to replace a legacy tool with 100k installations ...
reuse the design doc for system tests

Feature: service removal

Scenario: service removal-01
Given an inetd.conf file with an enabled entry ftpd_ssl,tcp,/usr/sbin/ftpd_ssl
And a matching server file that does not exist
And no matching reconf-inetd fragment for the service ftpd_ssl,tcp,/usr/sbin/ftpd_ssl
And a matching shadow fragment with identical server arguments for the ftpd_ssl,tcp,/usr/sbin/ftpd_ssl

Then I run reconf-inetd
Then the ftpd_ssl,tcp,/usr/sbin/ftpd_ssl service entry is removed from inetd.conf
And the matching shadow fragment with identical server arguments for ftpd_ssl,tcp,/usr/sbin/ftpd_ssl is removed
And inetd is restarted

Scenario: service removal-02
Given an inetd.conf file with a maintainer_disabled entry ftpd_ssl,tcp,/usr/sbin/ftpd_ssl
And a matching server file that does not exist
And no matching reconf-inetd fragment for the service ftpd_ssl,tcp,/usr/sbin/ftpd_ssl
And a matching shadow fragment with identical server arguments for the ftpd_ssl,tcp,/usr/sbin/ftpd_ssl

Then I run reconf-inetd
Then the ftpd_ssl,tcp,/usr/sbin/ftpd_ssl service entry is removed from inetd.conf
And the matching shadow fragment with identical server arguments for ftpd_ssl,tcp,/usr/sbin/ftpd_ssl is removed
And inetd is restarted
write a program to write all scenarios for you

```python
for conf_entry_status in conf_entry_status_values:
    for server_path in server_path_values:
        for reconf_fragment in reconf_fragment_values:
            for shadow_fragment_status in shadow_fragment_status_values:

                # service addition scenarios
                [ .. ]

                # service removal scenarios
                [ .. ]

                # service enable scenarios
                [ .. ]

                # no action scenarios
                [ .. ]
```
translate scenario steps to code

```python
@step('a matching server file that exists')
def a_matching_server_file_that_exists(step):
    server_path = world.scc.service.get_server()
    server_dir = os.path.dirname(server_path)
    os.path.exists(server_dir) or os.makedirs(server_dir)
    open(server_path, 'w').close()

@step('a matching server file that does not exist')
def assert_missing_server_file(step):
    server_path = world.scc.service.get_server()
    assert not os.path.exists(server_path)
```

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how to replace a legacy tool with 100k installations ...
make the tests pass

Feature: service addition

Scenario: service addition-01

Given an inetd.conf file with a missing entry ftpd_ssl,tcp,/usr/sbin/ftpd_

And a matching server file that exists

And a matching reconf-inetd fragment for the service ftpd_ssl,tcp,/usr/sbin/

When I run reconf-inetd

Then a new entry is added to inetd.conf for service ftpd_ssl,tcp,/usr/sbin/

And a matching shadow fragment with identical server arguments for ftpd_ssl

And inetd is restarted

4 features (4 passed)
40 scenarios (40 passed)
244 steps (244 passed)
behavioural driven development test tools

http://lettuce.it (python)
http://cukes.info (ruby)

DEP9

http://dep.debian.net/deps/dep9 (design doc)
http://git.debian.org/?p=collab-maint/reconf-inetd.git (code)
some words of wisdom from the DPL

<liw> what’s your foremost suggestion for making Debian development more fun for everyone?
<zack> be *bold*!
<zack> spot something that needs improvement
<zack> take responsibility for improving that
<zack> and do that