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A Pythonic Approach to Continuous Delivery

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Europython 2015

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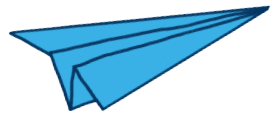
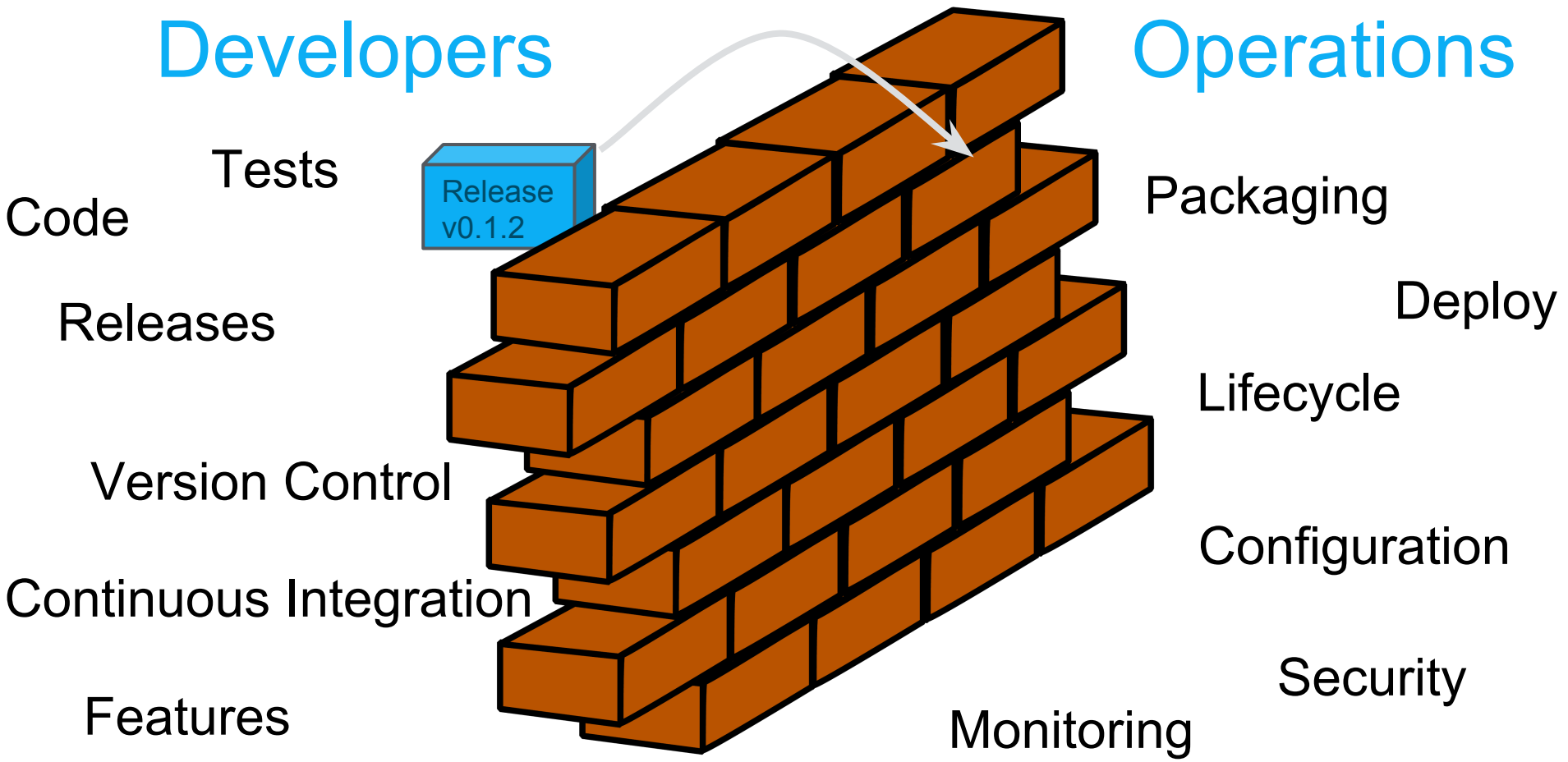
Overview

- What is Continuous Delivery?
  - definitions, analogies...
- How does a delivery pipeline look like?
  - deep dive into boring details…
- I have working python code, how do I start now?
  - we assemble exemplary building blocks to a working production line the pythonic way
- What could possibly go wrong?
  - traps, tips & tricks, failures, unsolved problems, dangers…
- What should the future bring?
  - wishes and dreams of brighter days
- Summary

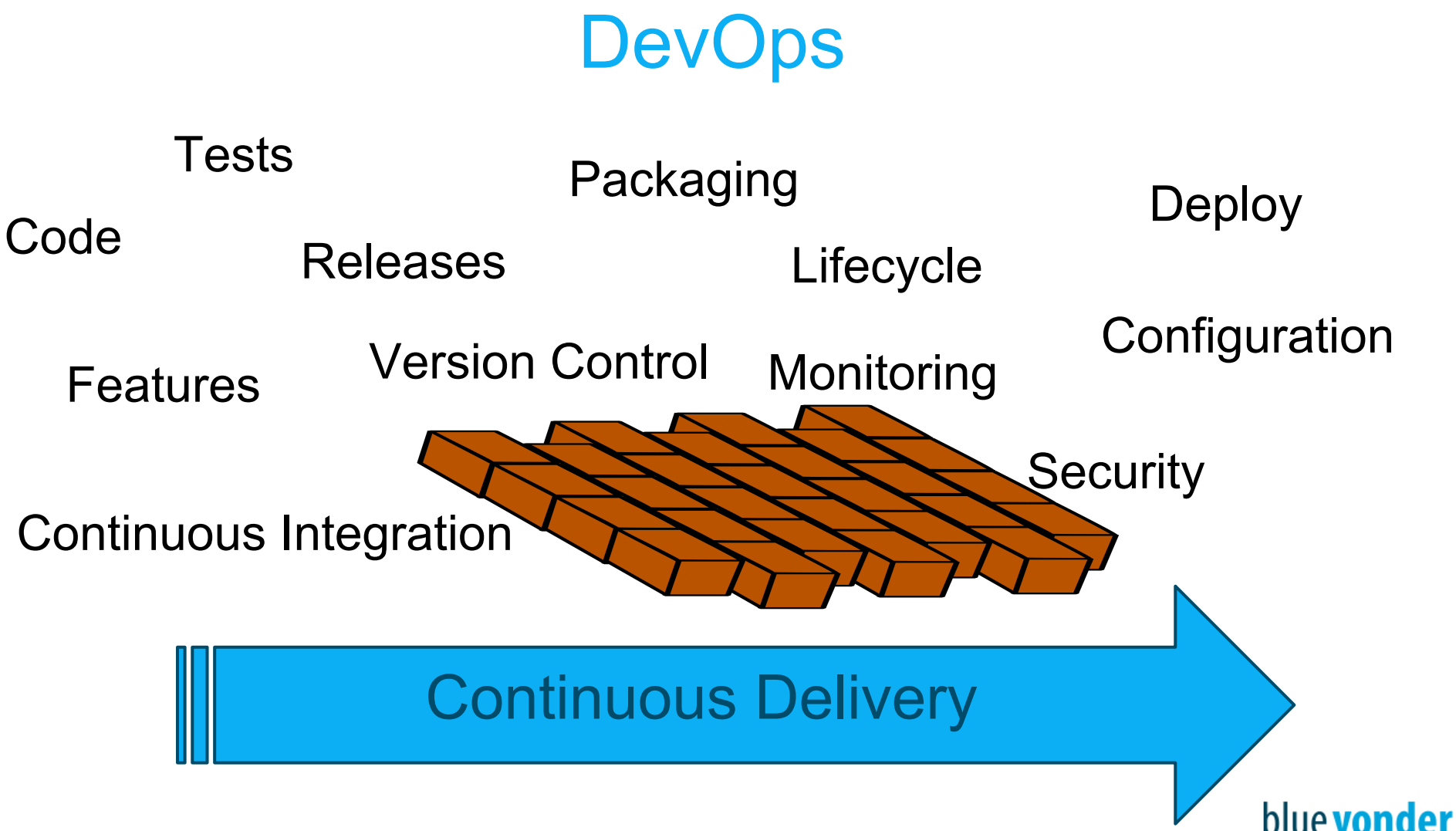


What is Continuous Delivery?

Overcoming the wall of confusion

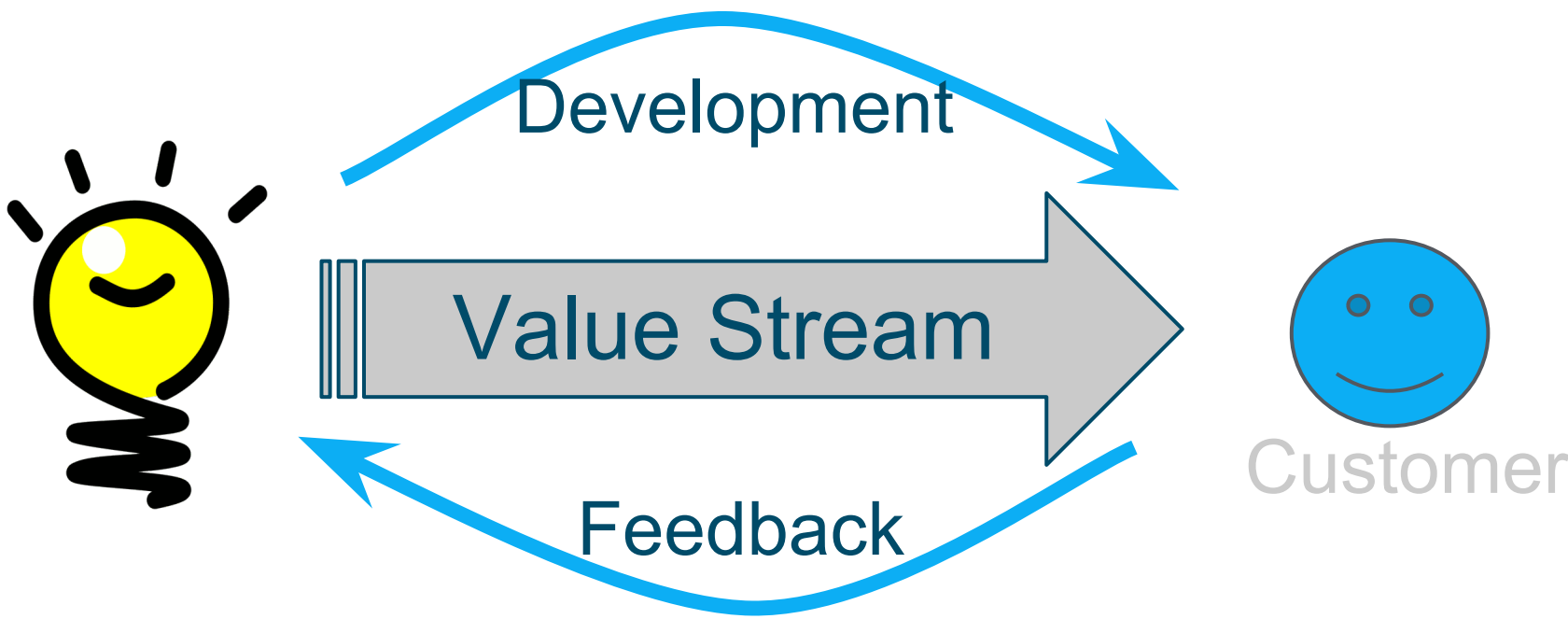


The “DevOps” thing…



Continuous Delivery

- Extending the development into production
- And extending operations into development
- Development includes the entire value stream
- Enables development cycles including customer feedback



Continuous Delivery

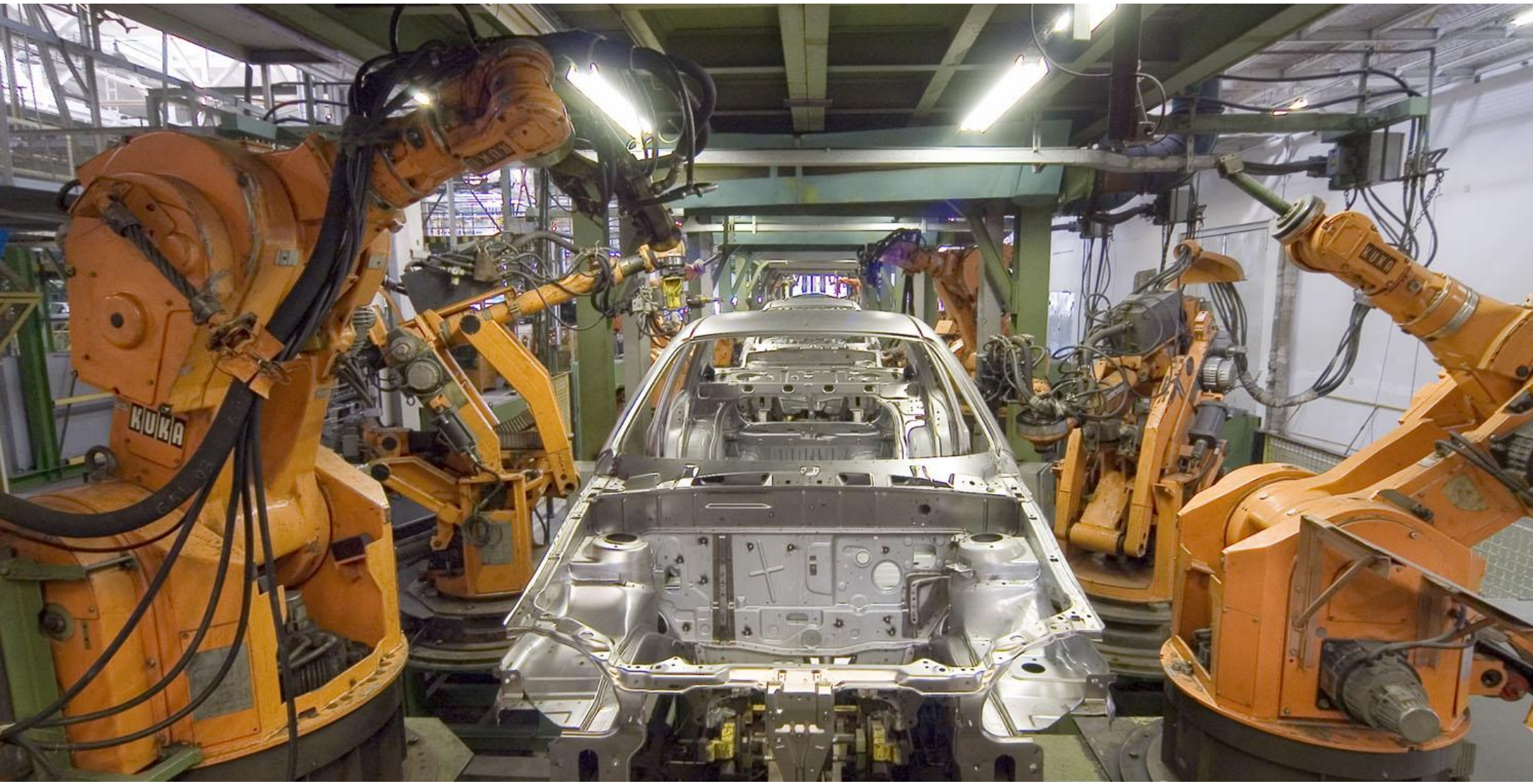
- Release early, release often!
- “Continuous” is far more often than you think
- Explosion of complexity due to increased demands on security, safety, failover, monitoring, tests

Poka-yoke (ポカヨケ)

“A poka-yoke is any mechanism in a lean manufacturing process that helps an equipment operator avoid (*yokeru*) mistakes (*poka*). Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human errors as they occur.”

wikipedia.org

Automated Software Production Line



The Delivery Pipeline

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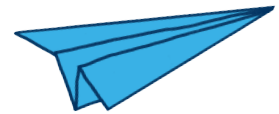
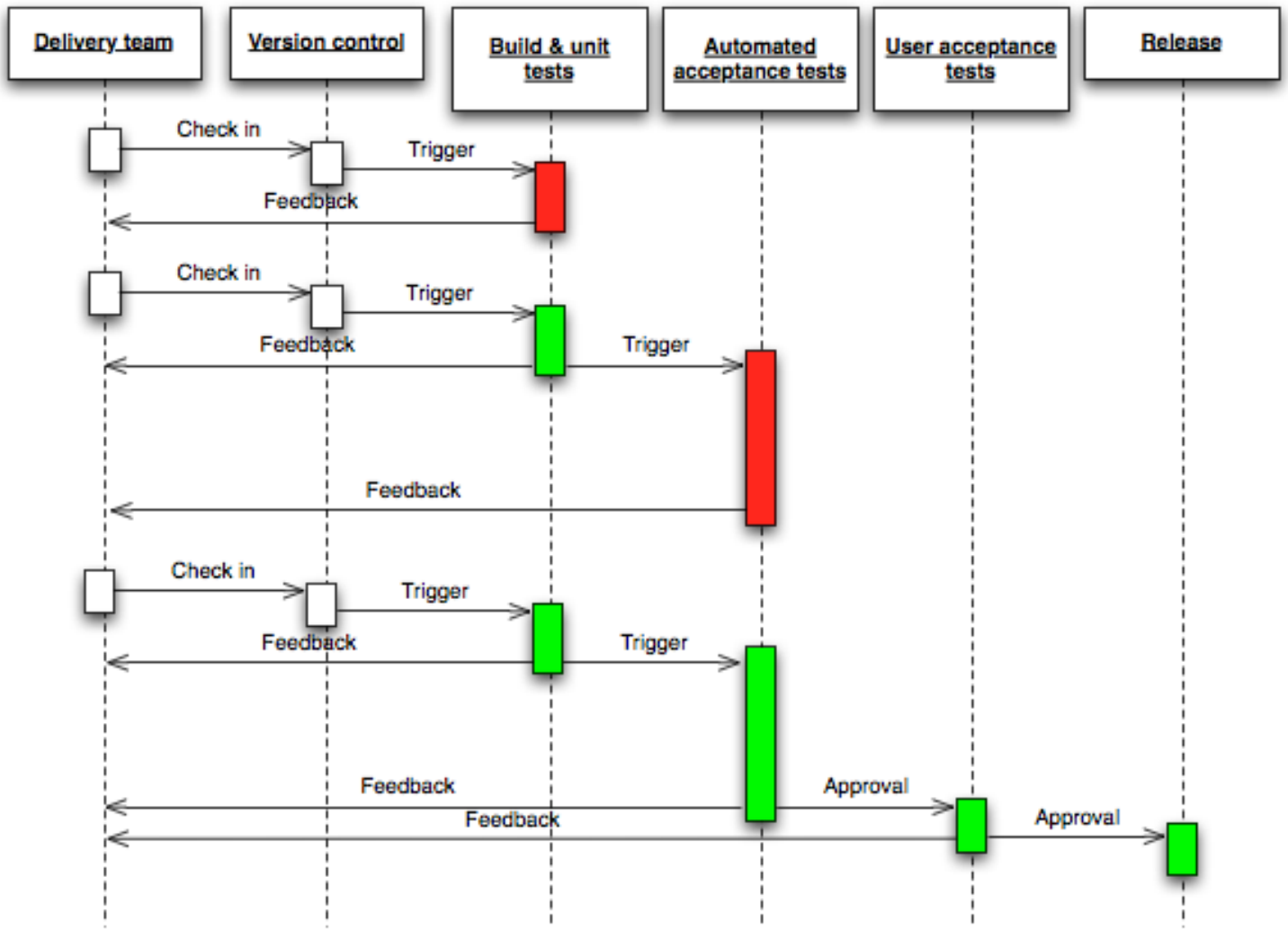


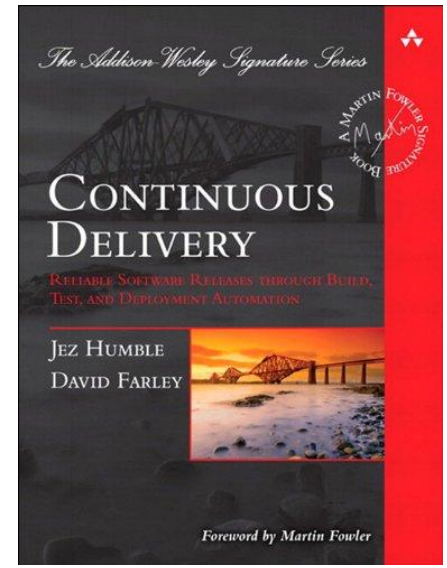
How does a **delivery pipeline** look like?

It's up to you!

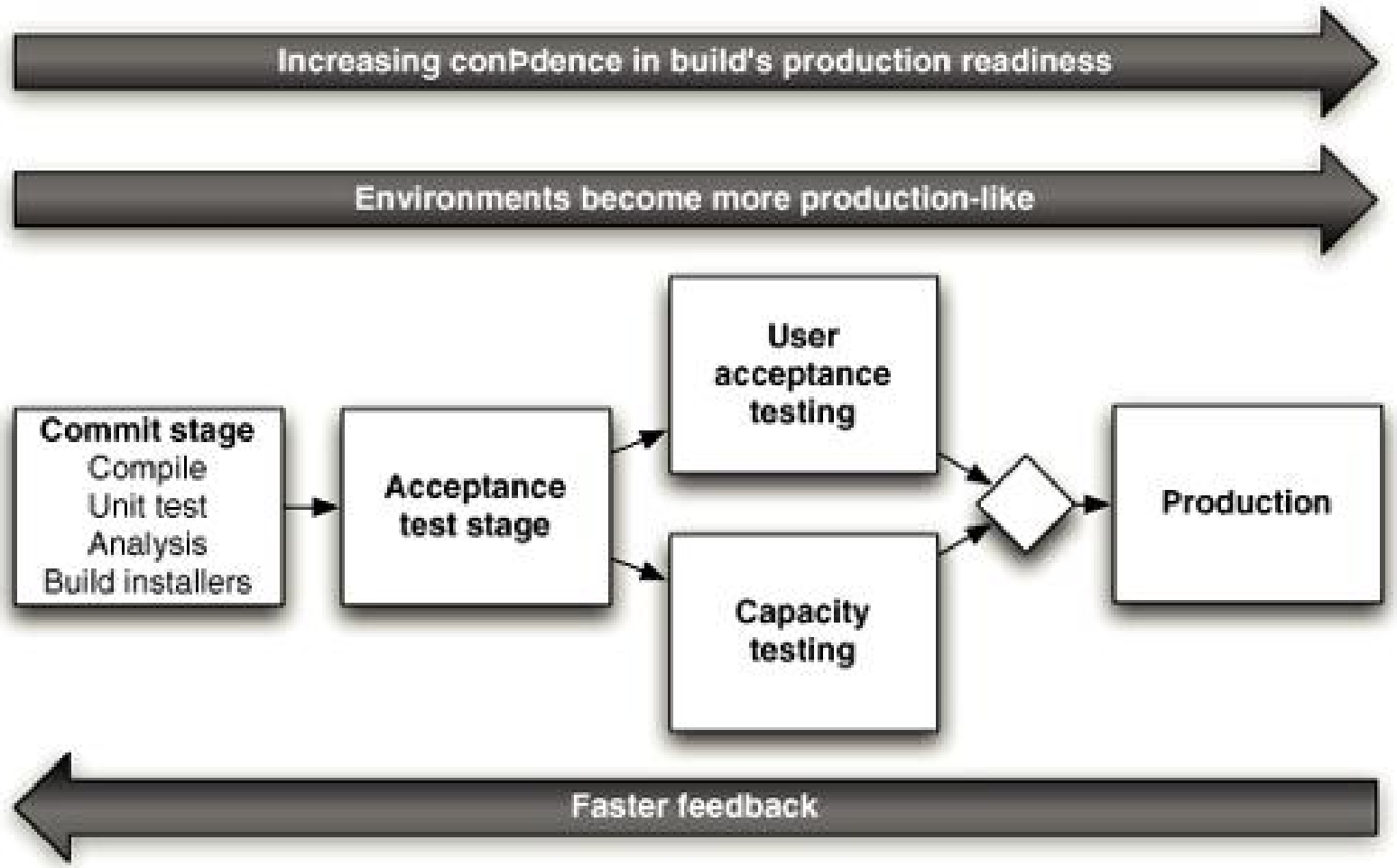
- Each change (commit) is deployed to production unless it is proven to be not production ready
- Design the automated challenges well
- Try to get feedback (failure) as soon as possible
- Start with a walking skeleton

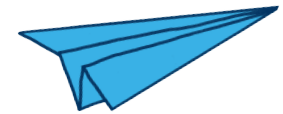
A Typical Pipeline





The Stages


Increasing conPdence in build's production readiness
Environments become more production-like
Commit stage
Compile
Unit test
Analysis
Build installers
Acceptance test stage
User acceptance testing
Capacity testing
Production
Faster feedback



I have working **python code**,
how do I start now?

A Proper Deployment Artifact

- This means put up everything for a proper deployable artifact:
  - python package
  - debian package
  - fancy docker
- It should be uniquely versioned
- It should manage dependencies
- Hint: https://github.com/blue-yonder/pyscaffold

```
>pip install pyscaffold
>putup my_app
```

-> Talk by I. Măriș from Monday:

“Less known packaging features and tricks”

Continuous Integration

- All automated tests are executed each time someone commits to master

```
>python setup.py test
```

- Might be a good idea to split fast unit-tests, from slow integration tests
- Any CI system will do the job: buildbot, travis...

Jenkins

Continuous Integration

- Not creative enough for the challenges?
  - unit tests: only code, no environment dependency
  - integration tests/component tests: allowed to use some environment dependencies: filesystem, http, database
  - static code analysis: pylint, pychecker
  - test coverage
  - doctests
- The result of CI is a fixed artifact with a unique version

```
>python setup.py sdist
```

- If you use pyscaffold, a PEP440 compatible version is generated from the git commit and tag:

```
0.0.1.post0.dev15+g172635
```

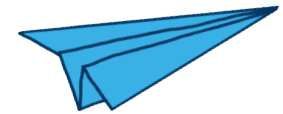
Fill up the Artifact Repository

- Ah, yes you need one, let's use the: http://doc.devpi.net/
- Devpi: secure, on-premise, open source, pypi compatible artifact repository (short: index)

```
>devpi upload
```

-> Talk by Stephan Erb today 12:30 B1

"**Release Management with Devpi**"



"That was the fun part! Now comes **pain, tears and configuration**"

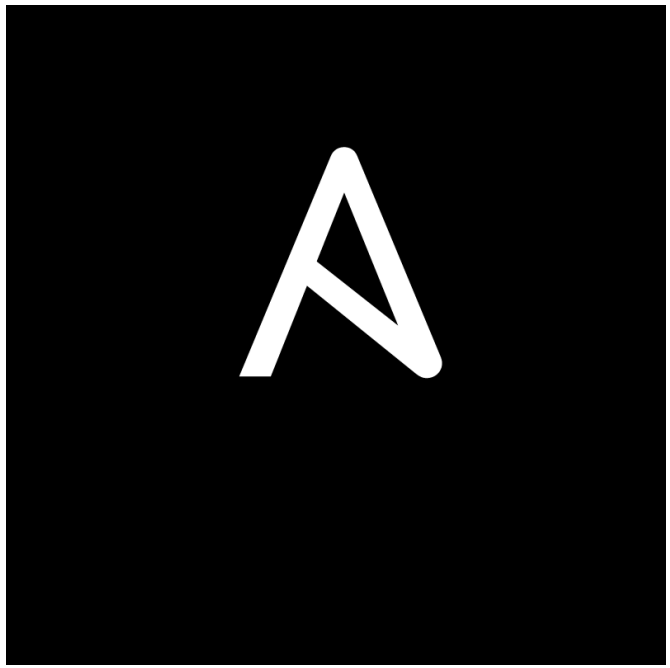
Automated Deploy

- For automated acceptance test, we need a fully functional running instance, deployed in a testing stage / test environment
- It is crucial, that the deployment code we use here, is the same we use later in production
- The testing stage needs to be as close to the production environment as possible
- Hint: After your first guesstimate of the time needed for automation:

Multiply by a factor of 3

Use Configuration Management

- You can use whatever you want for the deploy, even simple bash scripts, but....
- Config management tools will ease your automated deploy by orders of magnitude
- We use ansible, because it's: python, simple, lightweight, declarative,...



Example Ansible Playbook

```
---
- hosts: webservers
  tasks:
  - name: ensure my app is installed
    pip:
      name=my_app
      virtualenv=/my_app_home/venv
      extra_args='-i https://our_devpi/simple --pre -U'
      state=present

  - name: start the app
    shell: /my_app_home/venv/bin/my_app_started
```

Acceptance Tests

- Acceptance tests prove the correct behavior of your app
- Be aware: This behaviour earns your money
- It is your last chance: Bugs that pass here will end up in production!
- Tools you can use: plain unittest, behave, selenium,...

Last step to Production

- You might want to have some additional non-functional tests:
  - performance
  - security
  - explorative
- You might want to have some manual approval (feature flags)
- If possible perform a canary release

Steering of the Pipeline

- It is not trivial to keep control over the various deploy stages: which version passed which tests, where are which versions deployed...
- There are some few tool specialized for CD: go.cd or IBM UrbanCode...
- We use Jenkins, because we have it already
- Job dependencies reflect the stages
- A manual approval for production is done by clicking “Build” :-)

S	W	Name ↓	Last Success	Last Failure	Last Duration	Number of builds
		cds.ps.agent.prod_deploy_current	2 mo 23 days - #15	3 mo 1 day - #9	27 sec	11 0 4
		cds.ps.agent.prod_deploy_deprecated	2 mo 27 days - #4	3 mo 1 day - #3	41 sec	3 0 1
		cds.ps.agent.prod_deploy_latest	14 days - #53	7 days 6 hr - #54	32 sec	38 0 16
		cds.ps.agent.release	7 days 6 hr - #88	4 mo 21 days - #15	39 sec	83 0 5
		cds.ps.agent.staging_deploy_nightly	18 hr - #116	3 days 18 hr - #113	33 sec	96 0 20
		cds.ps.agent.staging_deploy_unstable	14 days - #96	7 days 6 hr - #97	31 sec	54 0 43
		cds.ps.agent.tests	7 days 6 hr - #3986	6 hr 18 min - #3987	49 sec	3955 0 32

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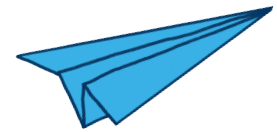
What could possibly go **wrong**?

Traps, Tips & Tricks, Dangers...

- Keep it simple stupid!
- Automate all the things, because:
  - you are lazy
  - the complete delivery pipeline is in git:
    - you have predictable recovery
    - you know what is happening
  - machines do it just better
  - you can concentrate on value delivery
- Maintain and refactor your deployment
- For automation you need everything-as-a-service:
  - no tickets, no “you just have to click on”....



What should the **future** bring?

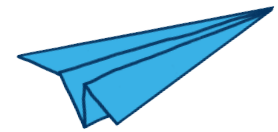
The not so perfect parts...

- Packaging and dependency management in python is not so perfect at the moment
- The two worlds should unite: OS package managers vs. pip
- A pythonic continuous delivery tool is still missing, jenkins is not sufficient:
  - what configuration is deployed where
  - access management
  - awareness of the delivery pipeline
- Many tools are still optimized for a manual workflow

Let's start hacking on it!

Summary

- CD rocks, because:
  - agile: faster feedback iterations
  - automated better than manual
  - collaboration better than silos
- You can build your own CD pipeline, just start today!
- Example building blocks are:
  - pyscaffold for python packages
  - devpi as artifact repository
  - jenkins for CI and steering
  - python unittest for tests
  - ansible for automated deploys
  - courage



Thank you!


If you think of
• literature when you hear **Kafka**
• mythology when you hear **Cassandra**
• animals when you hear **Zookeeper**
… then have a nice day.
If you think of distributed systems, then join us!
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Images:

slide 7: Cory Doctorow

https://www.flickr.com/photos/doctorow/17599851339/in/photolist-sPeQCK-8rL77m-5f8C9V-MxAHt-7L8phE-kN2oLW-kN24HW-4Le5L9-7m77Ag-8q6foW-5eB9a-iHD6Jx-uckeMj-48K71K-6iyUxC-bxrnpQ-9hZUBe-44LSH-sYFm9J-baBQvp-nTVXsi-7n9P22-9hZWcX-9hZVoM-66EEpg-sCfANm-6sGsY3-82ayUG-Mxs1C-8AharJ-4m2v48-nTW1k2-nTRhGu-q5MCm-nD3Wvv-PCCVj-oE51X-5V668Q-bpvXz-nBryWw-nTVZMi-nTVZv6-nTNrGY-c1z2Fo-c1z26J-6iuLbV-6gfqJX-aztFKe-4rT58o-nxPg3/

Slide 9 Mixabest

https://upload.wikimedia.org/wikipedia/commons/5/5e/KUKA_Industrial_Robots_IR.jpg