Scala in Practice

3 years later...

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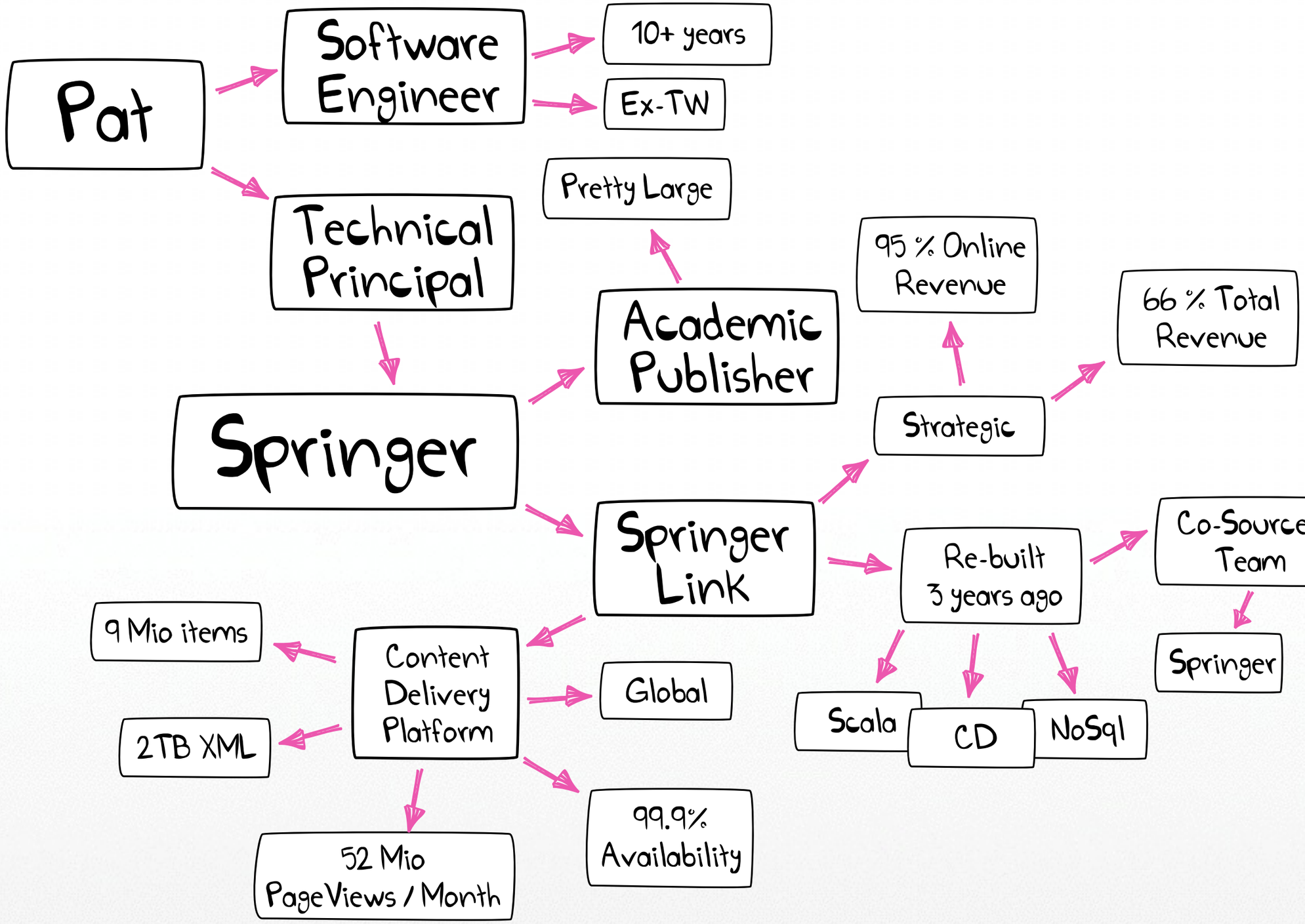
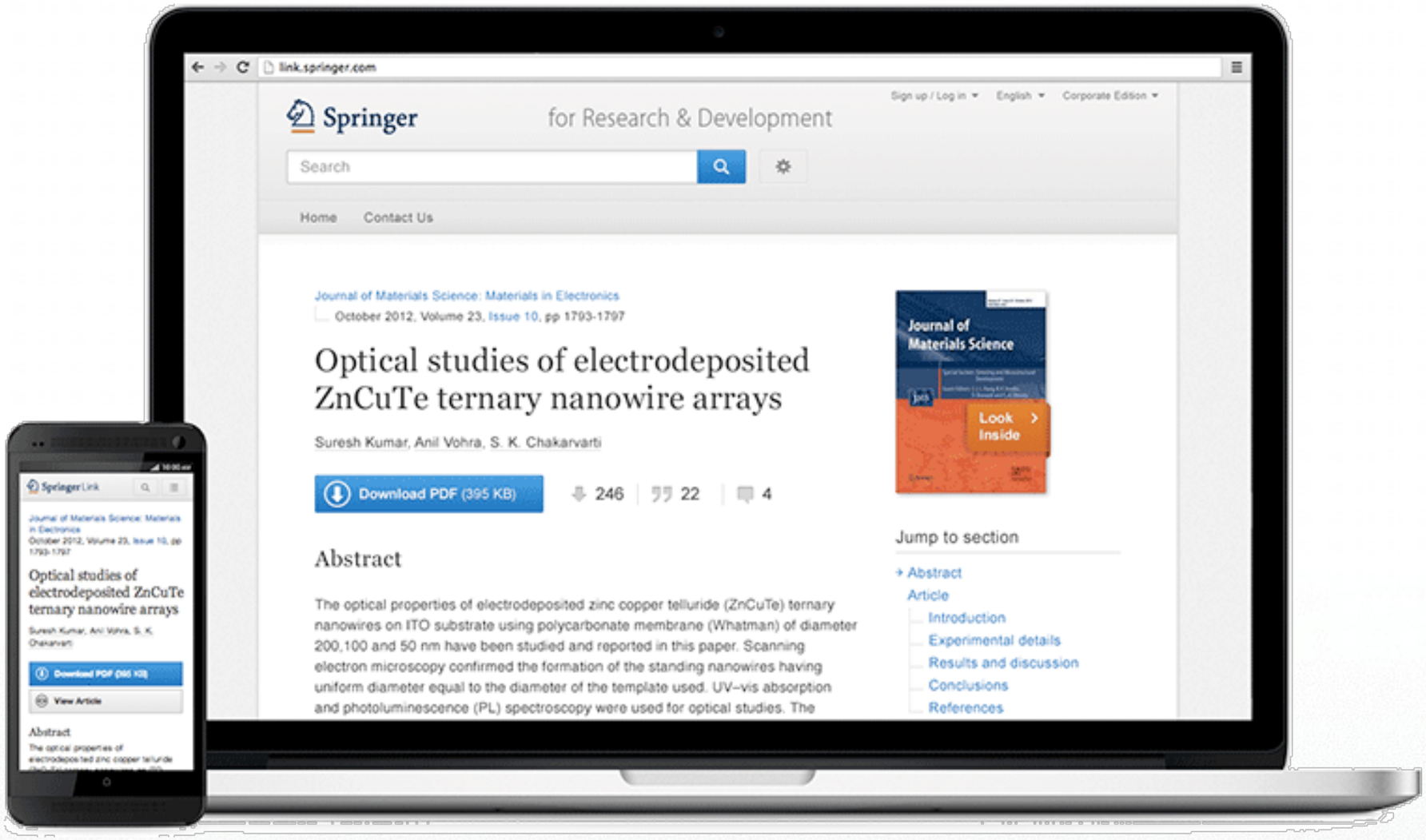
Context

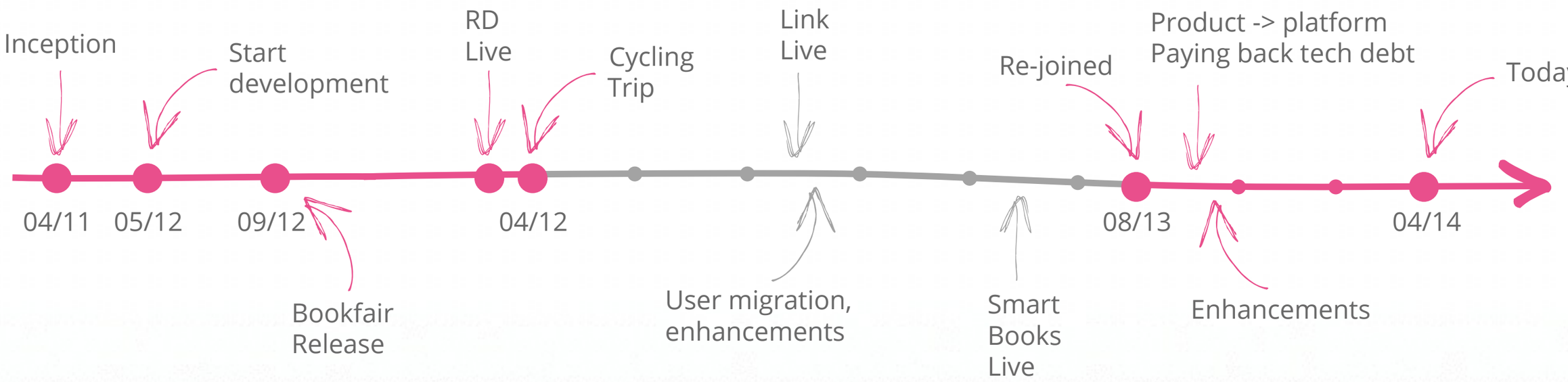
Context


Pat
Software Engineer
10+ years
Ex-TW
Technical Principal
Pretty Large
Academic Publisher
95 % Online Revenue
66 % Total Revenue
Springer
Strategic
Springer Link
Re-built 3 years ago
Co-Sourced Team
Springer
TW
Scala
CD
NoSql
9 Mio items
Content Delivery Platform
Global
2TB XML
99.9% Availability
52 Mio PageViews / Month

SpringerLink



Timeline


Inception
Start development
RD Live
Cycling Trip
Link Live
Re-joined
Product -> platform
Paying back tech debt
Today
04/11
05/12
09/12
04/12
08/13
04/14
Bookfair Release
User migration, enhancements
Smart Books Live
Enhancements

Looking back: why scala?

- Increase productivity
- Be more attractive employer
- Team decision

Looking back: good vs bad

Good

- Functional programming
- Terse syntax
- JVM ecosystem
- Gentle learning curve
- DSL friendly syntax
- Motivated team

Bad

- Tool support
- Compilation times
- Language complexity #moreRope

Fast-forward

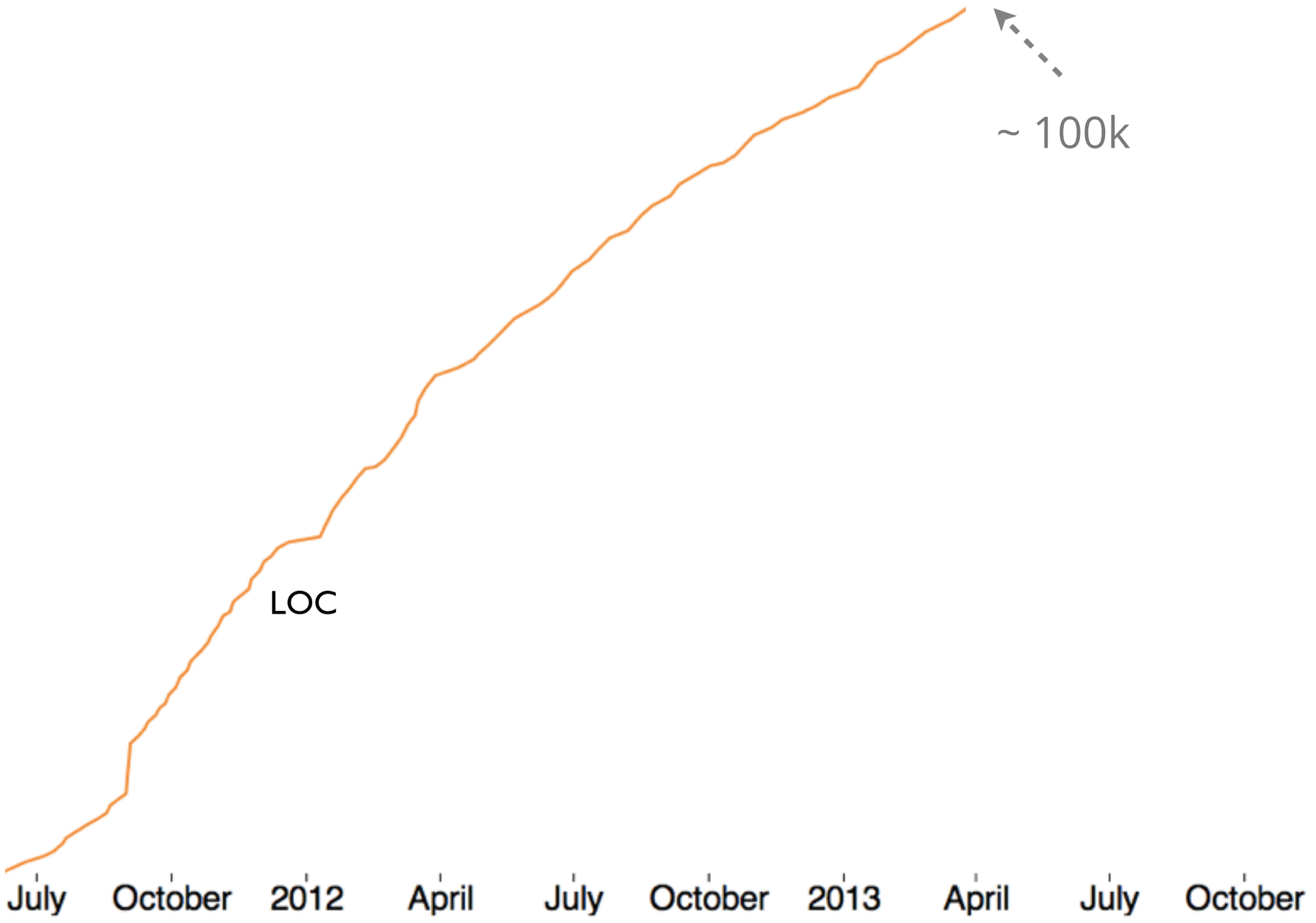
Fast-forward (Aug 2013)

- 2.5 years into project
- 1.5 years of weekly live releases
- 100k LOC
- >10k commits
- >90 committers

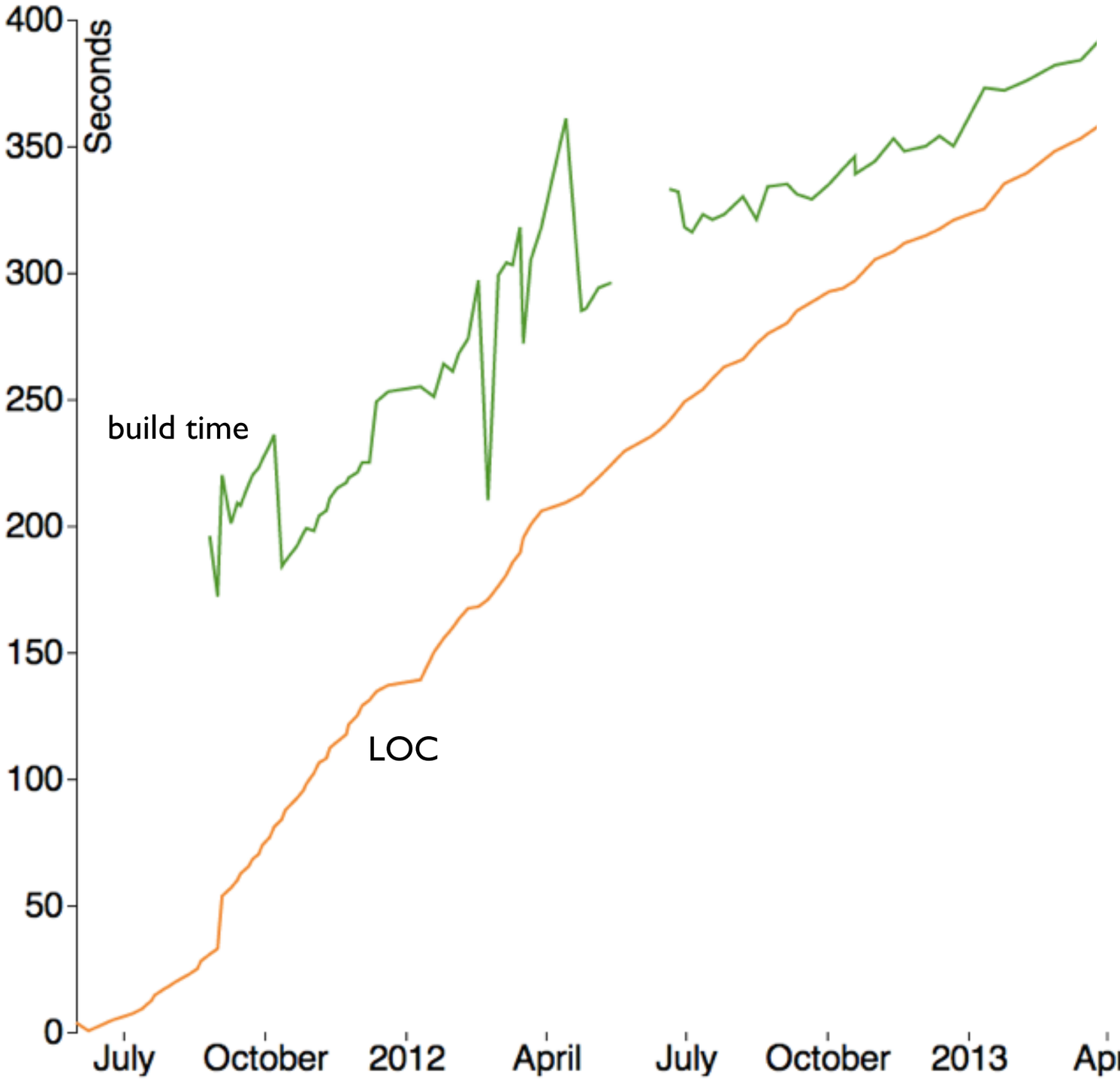
- **Poor feedback loops ✳**
- **Lots of accidental complexity✳**

✳ not all related to Scala - to be fair

Trend (2 years)



Trend (2 years)



- 1:34 min src/main
- 6:44 min src/test
- 8:18 min total

What did we do?

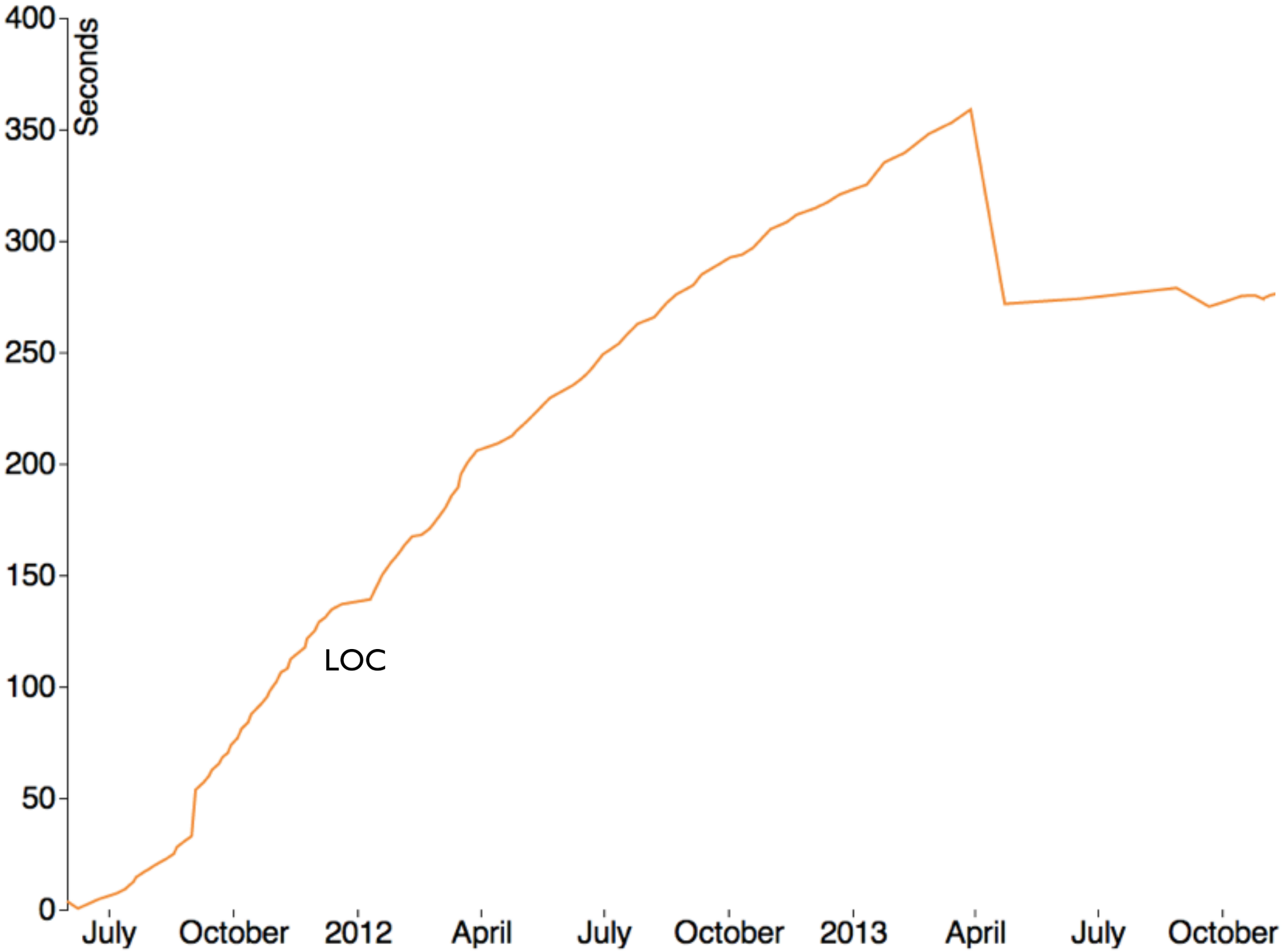
What did we do

- Reduced build time
- Improved feedback loops
- Reduced accidental complexity

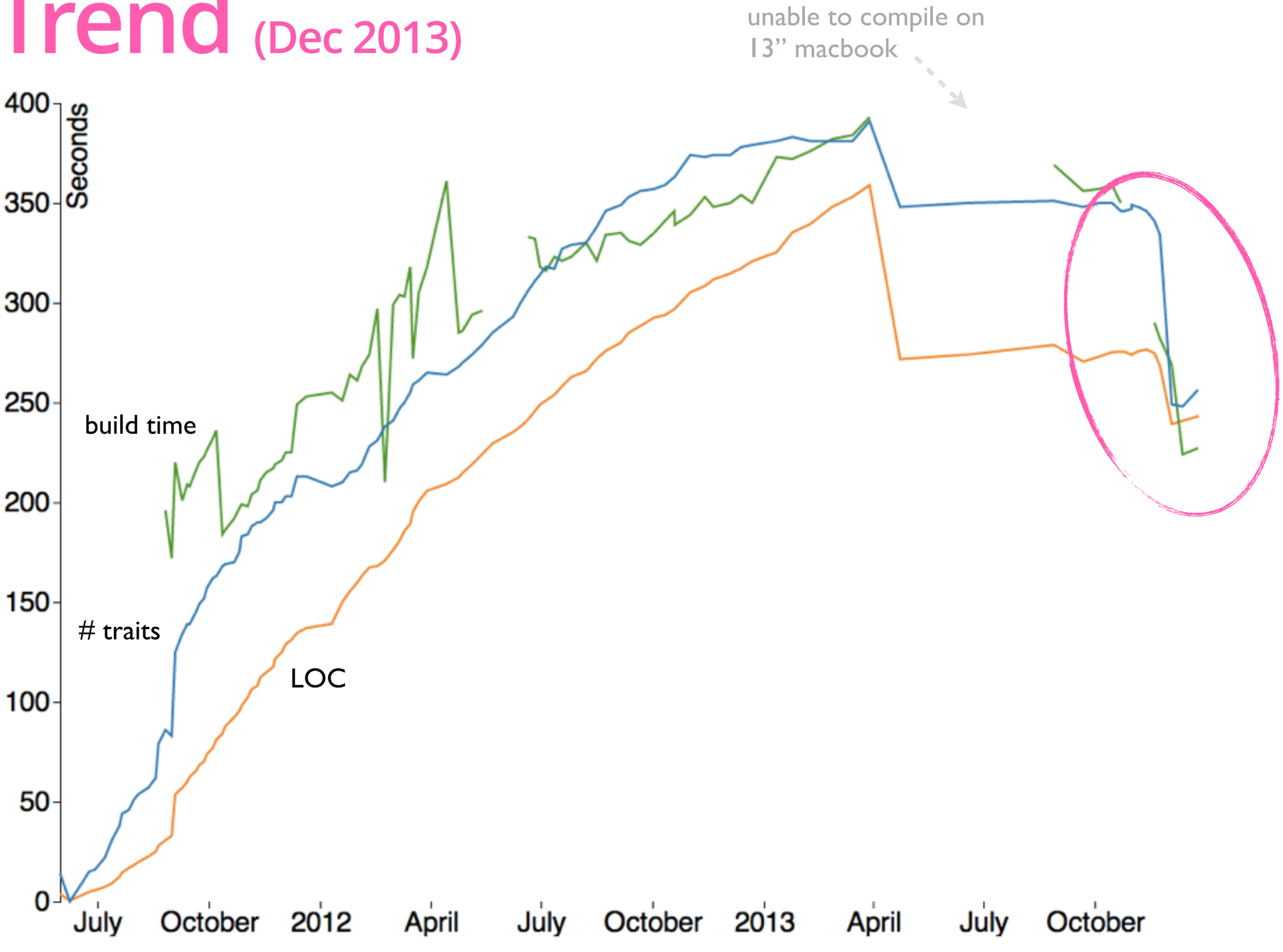
Build time

- Reduced size of codebase (broke off vertical slices, pulled out APIs, pulled out libraries, removed unused features, removed low-value tests, etc.)
- Reduced usage of certain language features (esp. traits and implicits)

Trend (Dec 2013)



Trend (Dec 2013)



The problem with traits

- Will re-compile on every class the trait is mixed in
- Slows down dev-build cycle
- Will result in byte code bloat
- Will compile *a lot* slower

For faster compile times:

- Use pure traits
- Use old-school composition for code re-use
- Use pure functions via imports (e.g. import Foo._)
- If unavoidable, use inheritance for code re-use

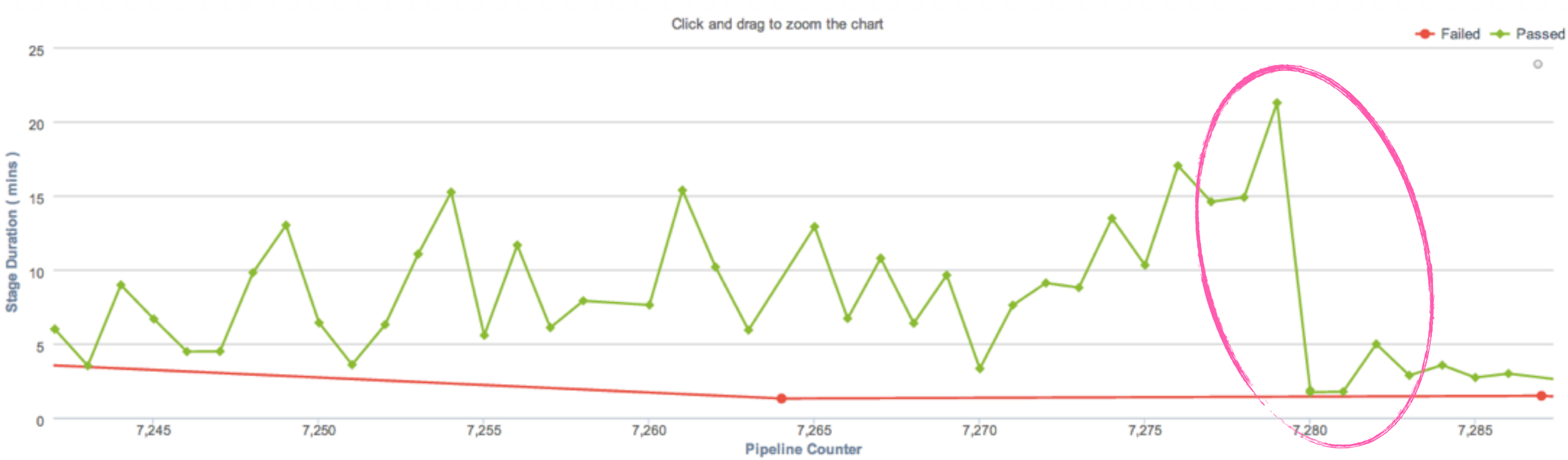
Build time

- 1:34 min src/main
- 6:44 min src/test
- 8:18 min total

- 0:24 min src/main
- 3:11 min src/test
- 3:35 min total

Build time (on CI server)

- Incremental compilation on CI
- Only one dedicated CI agent
- Physical build servers
- CPUs with higher clock speed



Complexity

Complexity

- There's still a lot of code in our codebase that is hard to read
- It seems to be very easy to shoot yourself in the foot with Scala
- Scala *is* complex (and that's why scalac will never be as fast as javac)

```
Invariant/covariant/contravariant types (T, +T and -T)
Refined types (new Foo {...})
Structural types (x: {def y: Int})
Path dependant types (a.B)
Specialized types (@specialized)
Self types (this =>)
Projection types (A#B)
Existential types (M[_])
```

```
                                Type bounds (<:, >:)
                  Type constraints (=:=, <:< and <%<)
                                Type members (type T)
                             Type aliases (type T = Int)
                  Type classes ( (implicit ...) )
                                View bounds (<%)
                             Higher kinded types (* => *)
F-Bounded type polymorphism (M[T <: M[T]])
```

http://nurkiewicz.github.io/talks/2014/scalar/#/16

Not opinionated

- Many ways to do the same thing
- Coding conventions help, but only so much*

```
def foo() = "foo"
def bar = "bar"

foo
foo()
bar
bar()              // won't compile

def baz(x: String) = x
“x”.charAt(0)
“x” charAt(0)      // won't compile
“x”.charAt 0       // won't compile
“x” charAt 0
baz("x")
baz “x"            // won't compile
```

```
list.foreach { x => println(x) }
list.foreach ( x => println(x) )
list.foreach { println(_) }
list.foreach ( println(_) )
list foreach { x => println(x) }
list foreach ( x => println(x) )
list foreach { println(_) }
list foreach ( println(_) )

if (foo) "x" else "y"

foo match {
 case true => "x"
 case _ => "y"
}
```

* For example: http://twitter.github.io/effectivescala/

Surprises

```
List(1, 2, 3).toSet
scala.collection.immutable.Set[Int] = Set(1, 2, 3)

List(1, 2, 3).toSet()
Boolean = false
```

http://dan.bodar.com/2013/12/04/wat-scala/

Implicits

- Can make it very hard to read code
- Tool support is very bad
- Impacts compilation time
- Surprising behaviour (esp. when used with overloaded methods or optional params)

Tooling

- Tool support is still very basic
- Makes it hard to continuously refactor (which means people are less likely to do it)

```
def handle(response: HttpResponse, request: HttpRequest)
```

no luck with “change signature”
refactoring support

Trait entanglements

- Makes it difficult to reason about behaviour

```
trait A {
  def foo = "a"
}
```

```
trait B extends A {
  override def foo = "b"
}
```

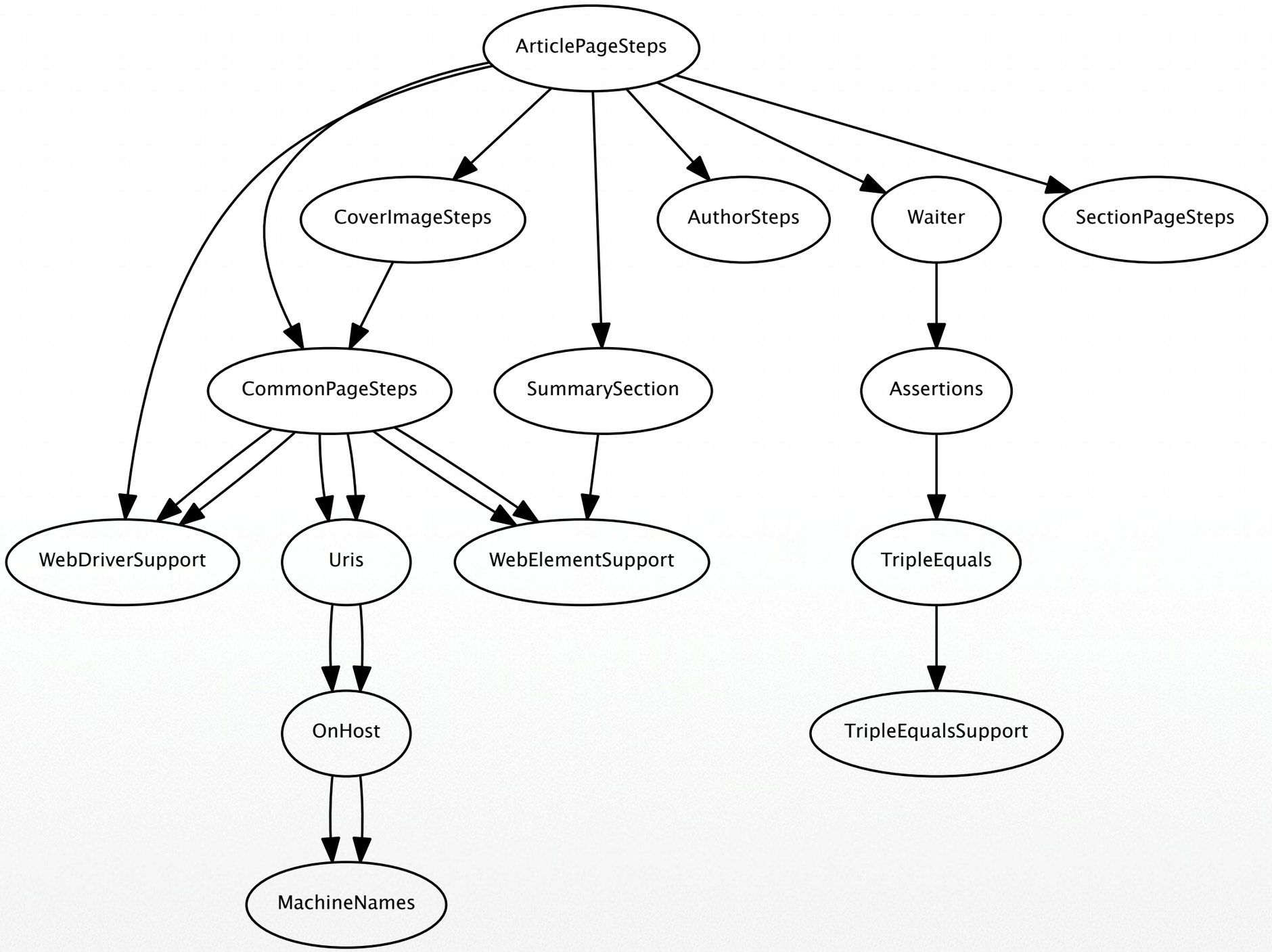
```
class C extends A with B
new C().foo
```

```
"b"
```

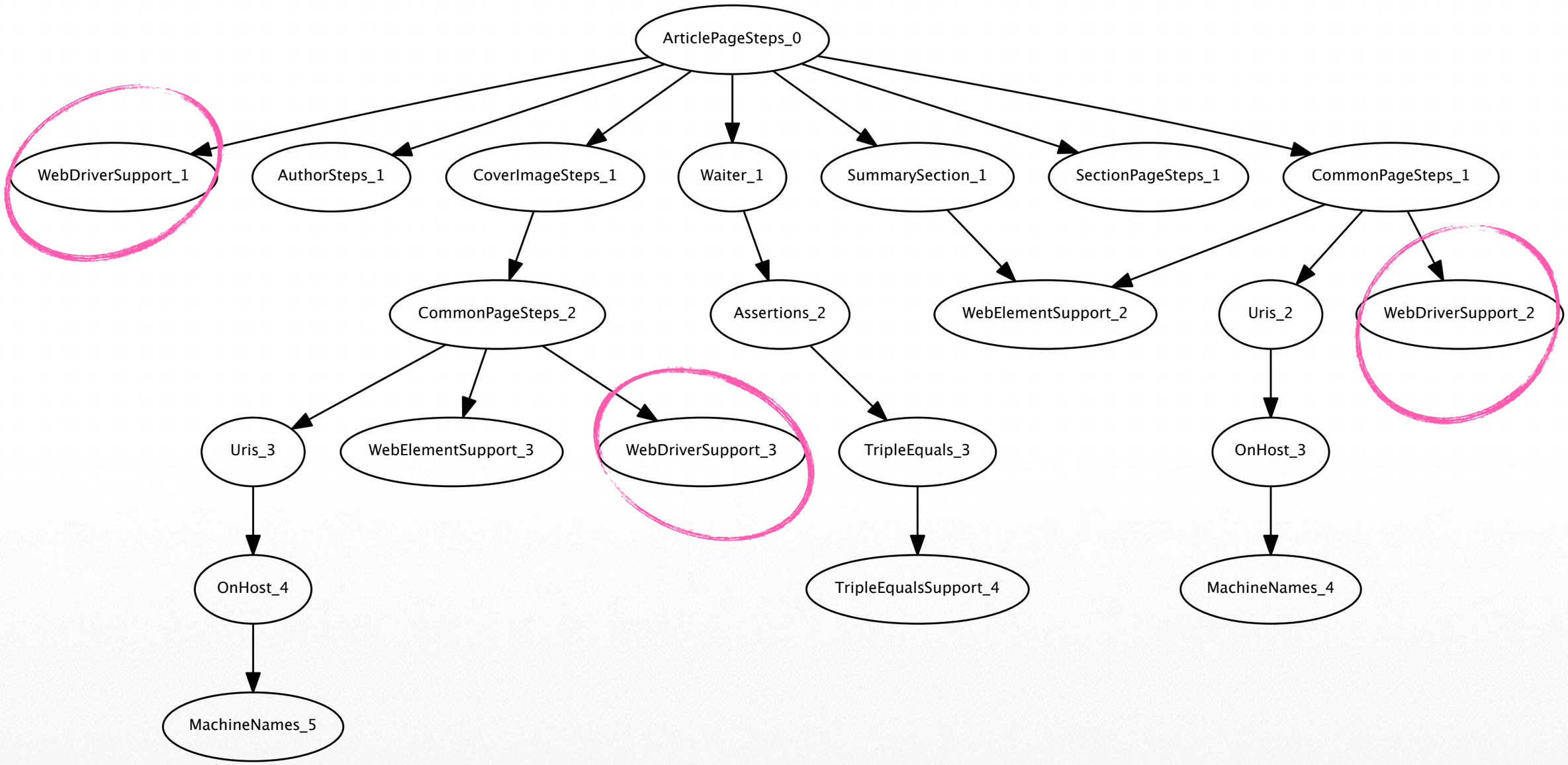
```
class D extends B with A
new D().foo
```

```
"b"
```

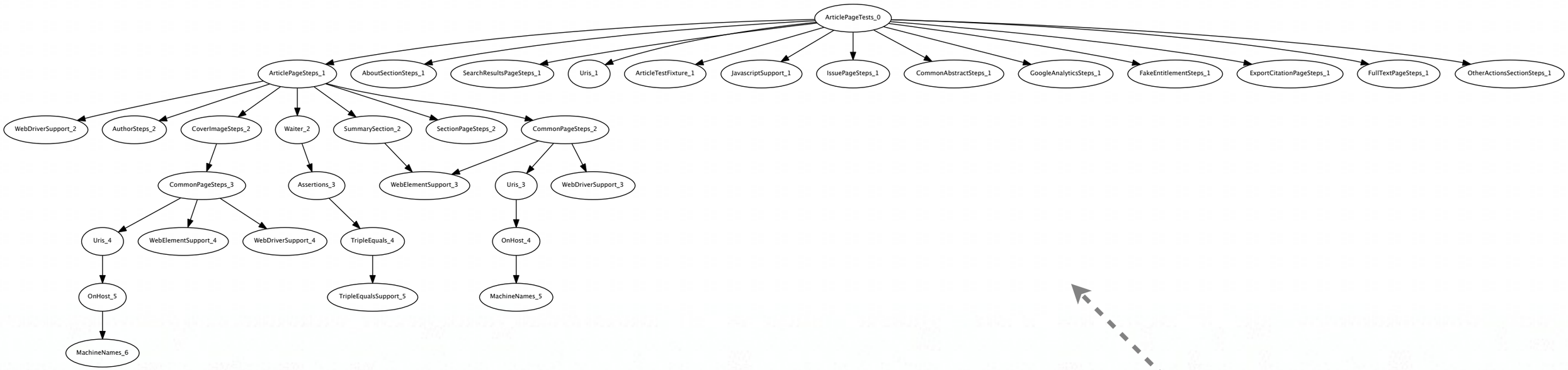
Trait entanglements (2)



Trait entanglements (3)



Trait entanglements (4)



Imagine many more circle here

So, what's next?

Today

- We've delivered successfully using Scala
- Don't think we're more productive (pure gut feeling, though)
- We try to stick to the good parts (conventions, functional programming, pattern matching, etc.)
- Complexity, slow compilation and lack of tool support are real problems

The future

- No urgency to move away from Scala or re-write existing systems
- Java 8 is an alternative
- Smaller teams and apps will probably lead to more polyglotism (and less Scala)

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