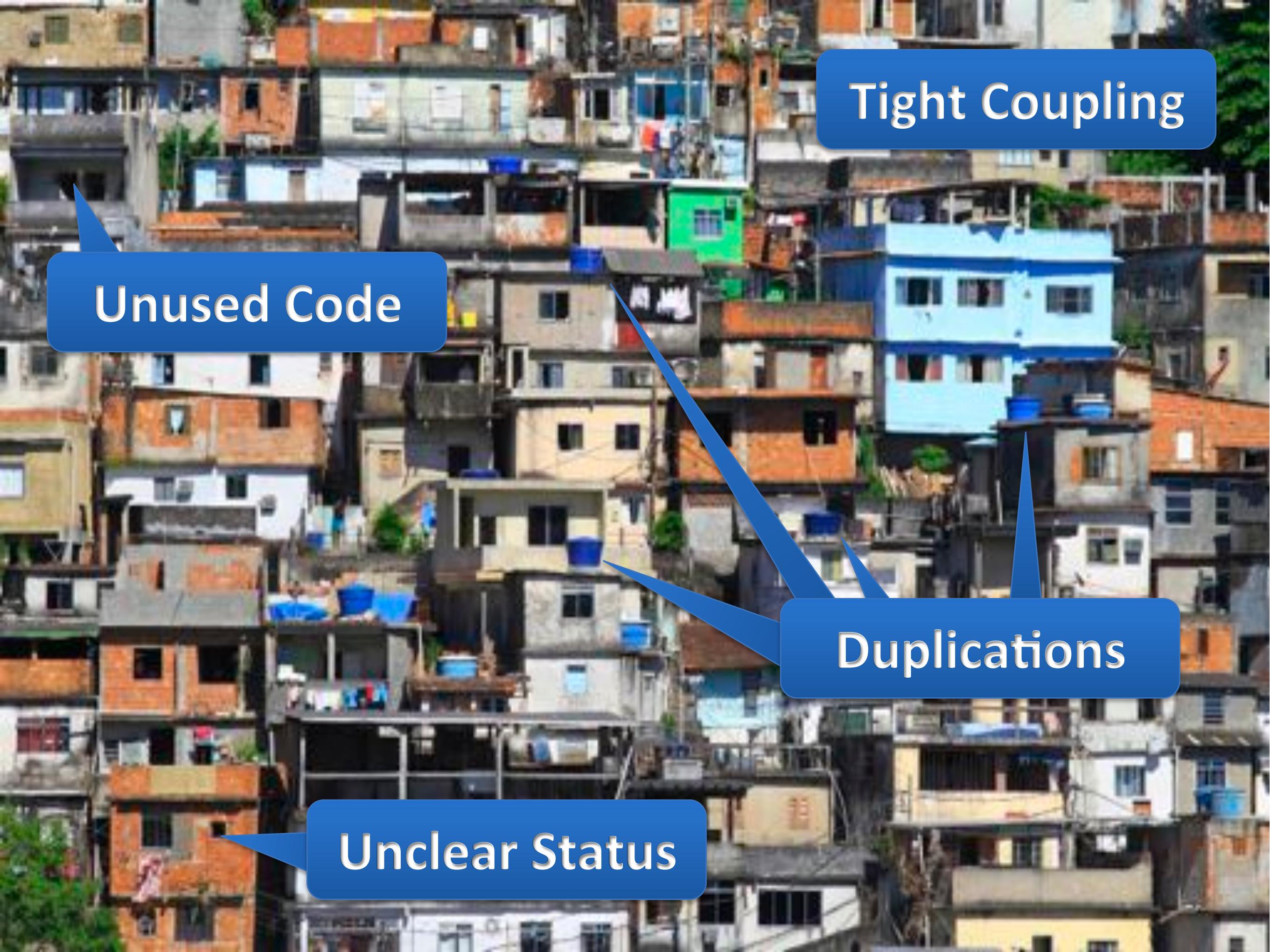
The background of the slide is a high-angle aerial photograph of a residential area. It shows numerous single-family homes with dark roofs and light-colored siding, arranged in a grid-like pattern. The houses are surrounded by green lawns and small trees. A network of paved roads with white markings cuts through the neighborhood. The overall scene is a typical suburban development.

Modularization of Large Projects Using Eclipse and OSGi

Marc R. Hoffmann • 16.10.2012 • Eclipse Finance Day Zurich



Let's Face Reality.

The background image shows a dense urban slum with many colorful, closely packed buildings. The buildings are built on top of each other, creating a complex and cluttered appearance. Some buildings have laundry hanging from their balconies. The overall scene is one of a crowded and perhaps underdeveloped urban area.

Tight Coupling

Unused Code

Duplications

Unclear Status

A woman with long blonde hair is shown from the side, wearing a dark jacket over a light-colored shirt. She is holding a black telephone receiver to her ear with her right hand. In front of her is a control panel with several computer monitors displaying various train-related information. One monitor shows a map of a railway network with lines and stations. Another monitor shows a close-up view of train tracks and signals. A third monitor shows a different perspective of the tracks or signal equipment. The overall environment suggests a railway control center.

Country Wide

2h Forecast
for all Trains

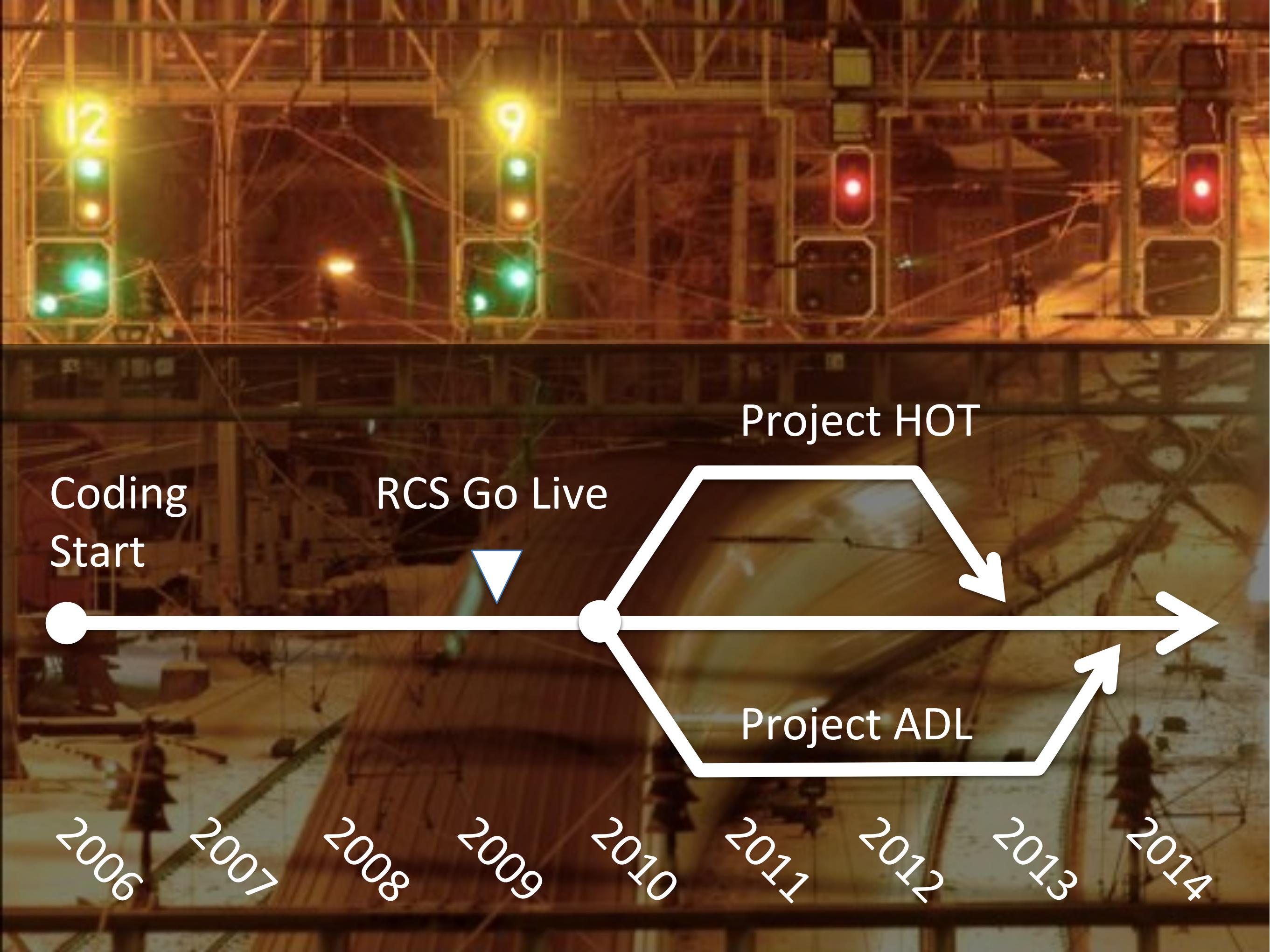
Real-Time
Operational Data

Level of Detail:
Tracks & Signals



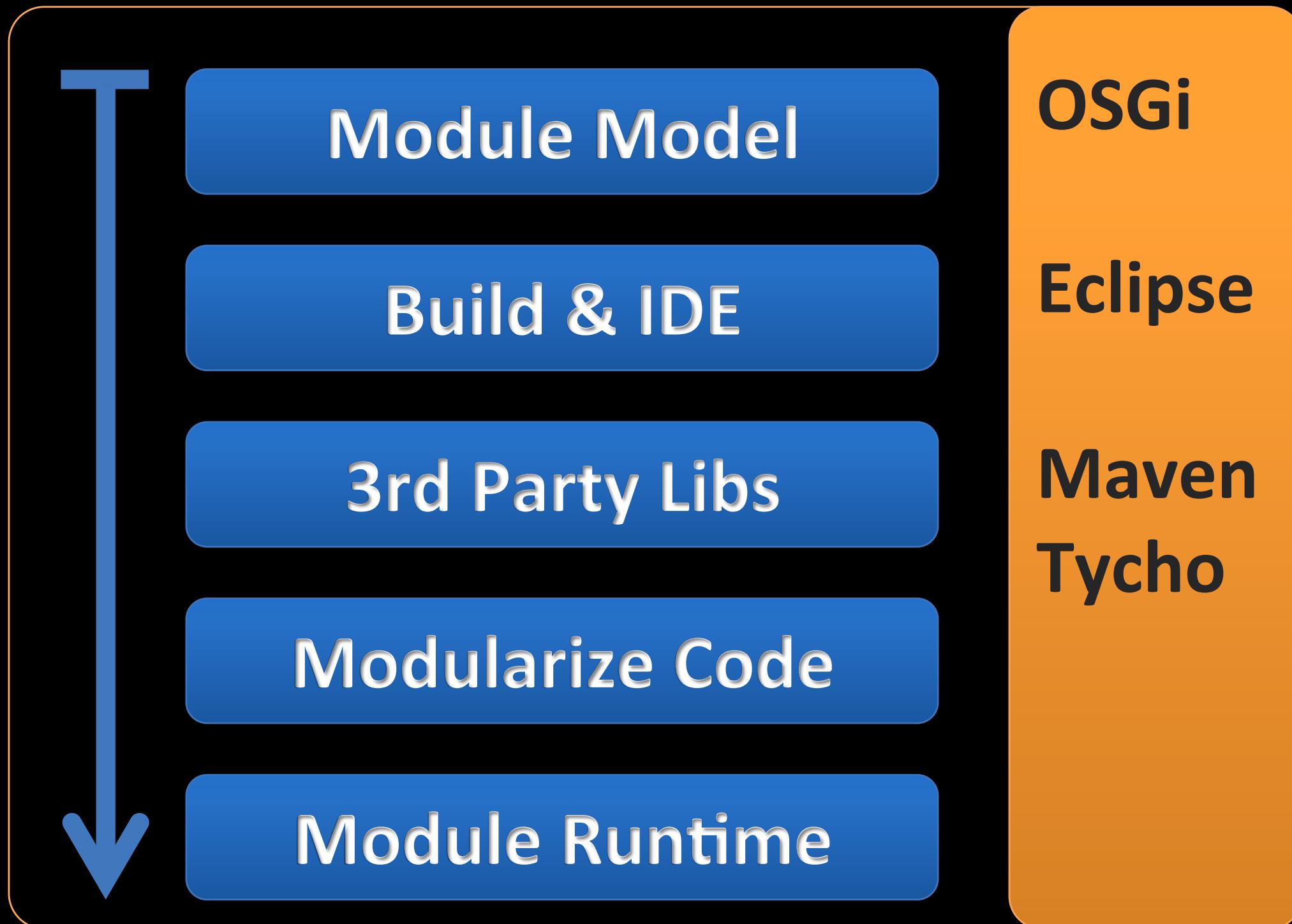
SBB CFF FFS

Rail Control System (RCS)



Modularization Objectives

- Multiple projects with different life cycles
- Improved code re-use
- Manage 3rd party dependencies



Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

OSGi & Eclipse

Product



Feature

Bundle

Bundle

Fragment

Bundle

Fragment

Bundle

Fragment

Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

Flat Repository
Layout

trunk/source/

ch.sbb.project/

ch.sbb.testproject/

ch.sbb.project.subproject.bundle/

ch.sbb.project.subproject.bundle.test/

ch.sbb.project.subproject.bundle/

ch.sbb.project.subproject.bundle.test/

ch.sbb.project.subproject.bundle/

ch.sbb.project.subproject.bundle.test/

org.apache.commons.logging/

org.slf4j/

Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

Component
Life Cycle

In Production

ch.sbb.project.a/

ch.sbb.project.subproject.bundle/

ch.sbb.project.subproject.bundle.test/

ch.sbb.project.subproject.bundle/

ch.sbb.project.subproject.bundle.test/

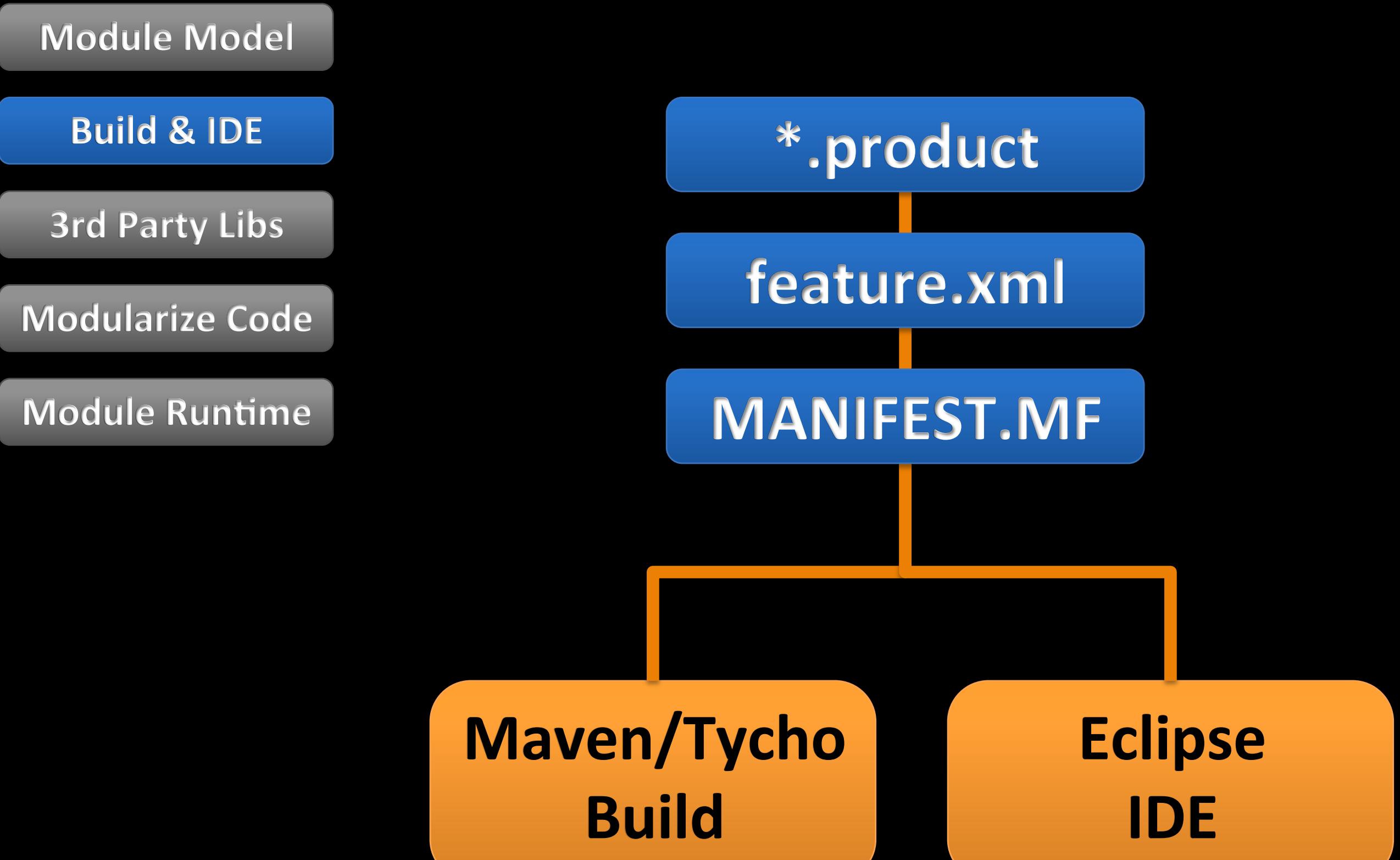
In Development

ch.sbb.project.b/

ch.sbb.project.subproject.bundle/

ch.sbb.project.subproject.bundle.test/





Single
Source

Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

pom.xml

```
<project>
  <modelVersion>4.0.0</modelVersion>
  <groupId>ch.sbb.project</groupId>
  <artifactId>ch.sbb.project.bundle</artifactId>
  <description/>
  <packaging>eclipse-plugin</packaging>
  <parent>
    <groupId>ch.sbb.rcs</groupId>
    <artifactId>master.pom</artifactId>
    <version>3.4.0-SNAPSHOT</version>
  </parent>
</project>
```

Manifest
First

Module Model

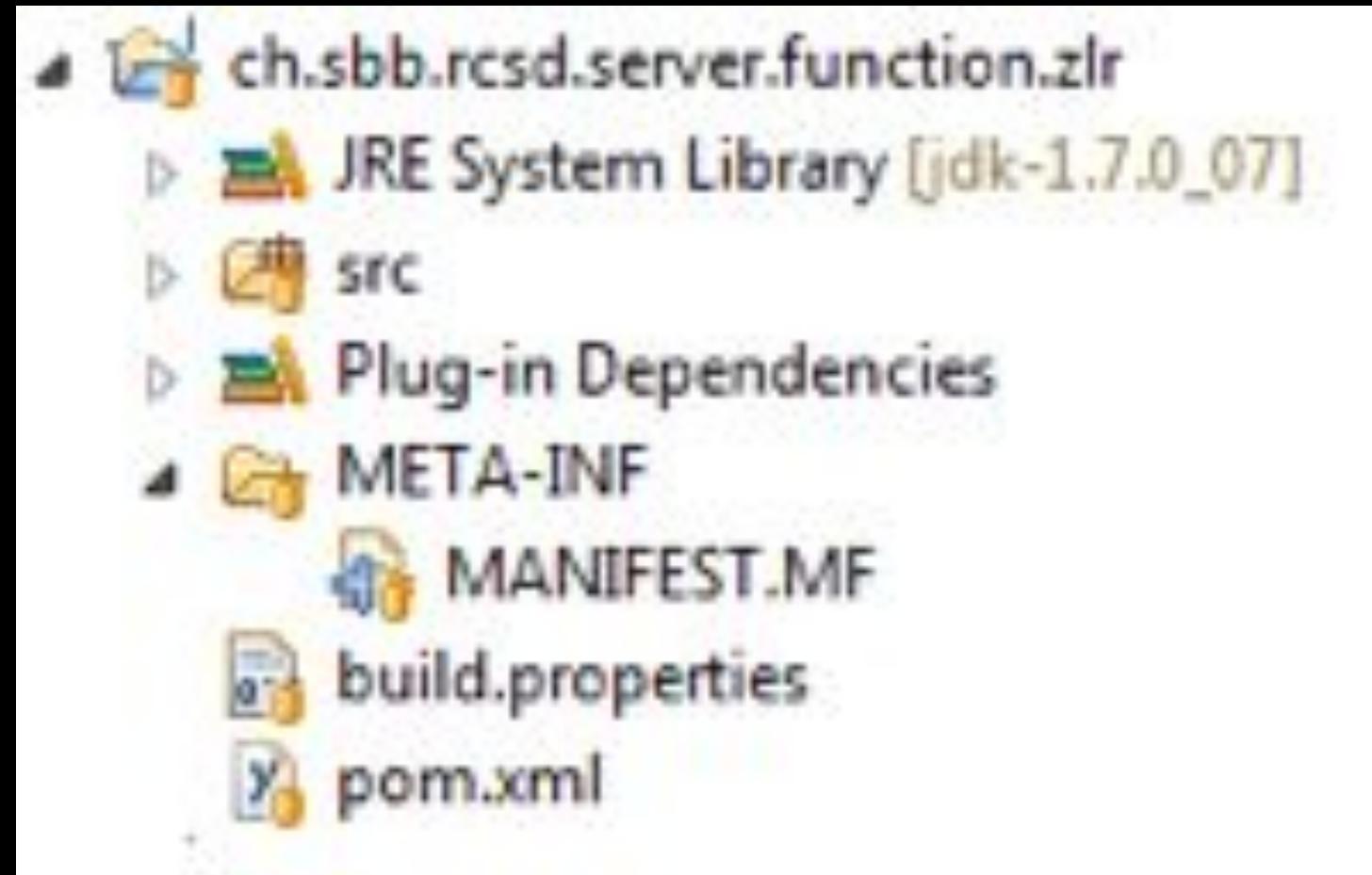
Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

Eclipse
IDE



- Unified project layout
- Shared project settings
- Project Sets generated from features

Module Model

Build & IDE

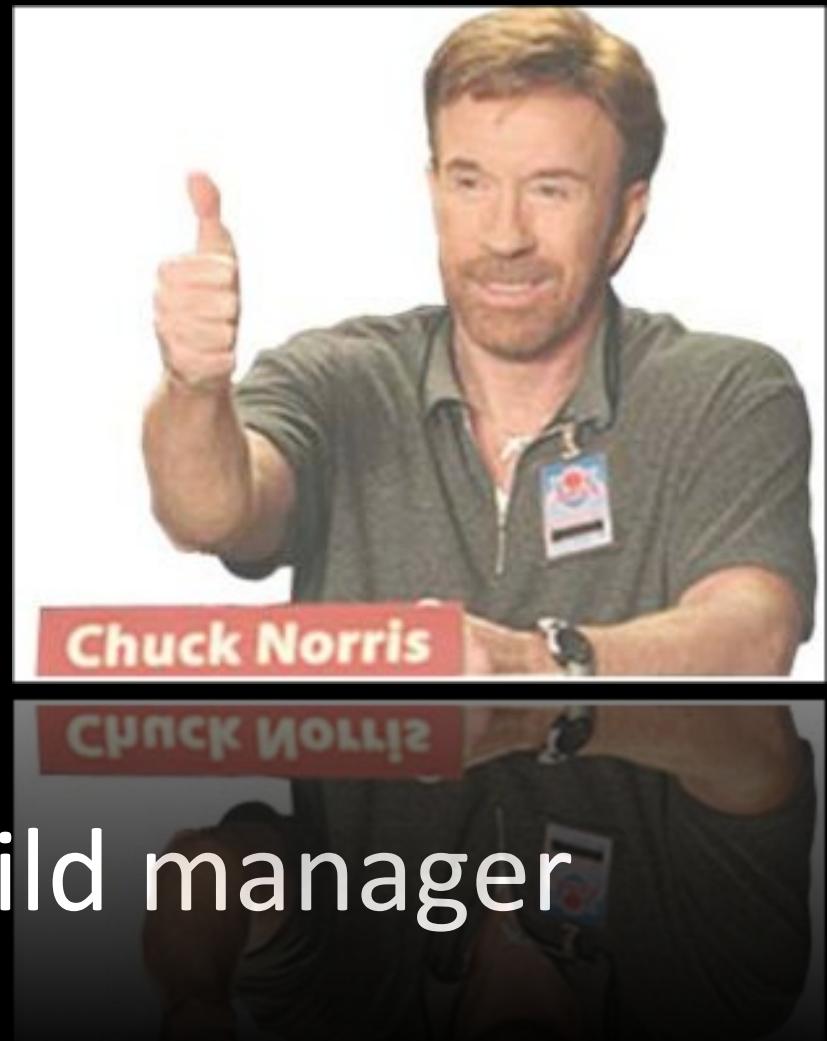
3rd Party Libs

Modularize Code

Module Runtime

Build Best Practices

- Dedicated build manager
- Automation is the key
- Keep tools up-to-date
- Regularly collect requirements from dev teams



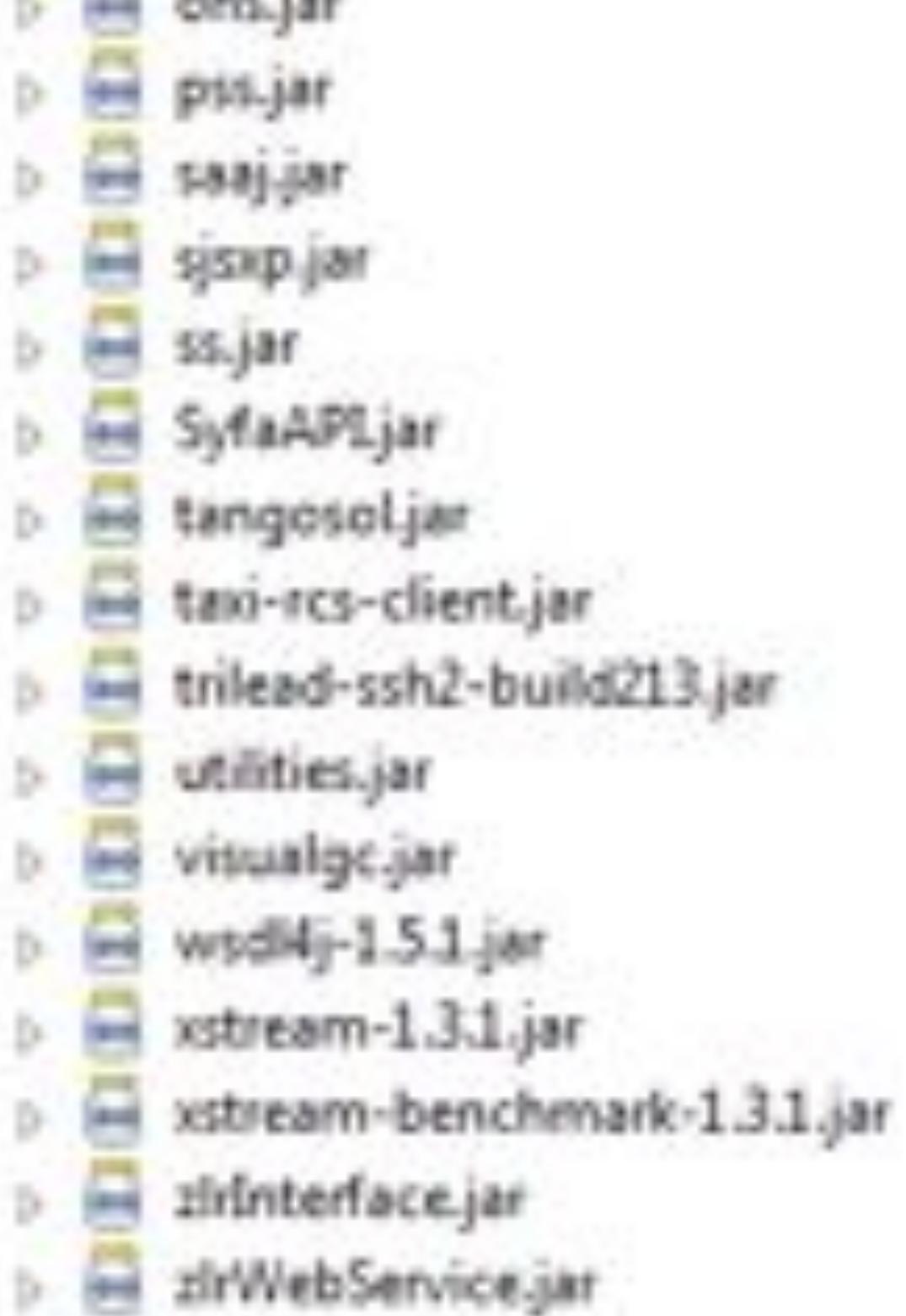
Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime



The End
(of your project's lifecycle)

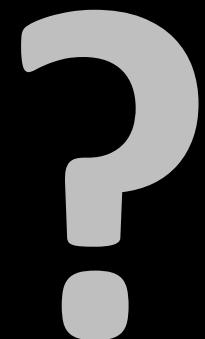
Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime



- What exact version do we use?
- Who depends on this library?
- What dependencies exist between libraries?
- Should we upgrade?
- What licenses do we use?

Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

- Identify each library's coordinates
- Create a separate bundle for each library incl. source JARs
- Minimize dependencies

The
Hard Work

Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

pom.xml

```
<artifactId>org.apache.commons.collections</artifactId>
<packaging>eclipse-plugin</packaging>
<bundle.version>3.2.1</bundle.version>

<dependencies>
  <dependency>
    <groupId>commons-collections</groupId>
    <artifactId>commons-collections</artifactId>
    <version>${bundle.version}</version>
  </dependency>
</dependencies>
```

tycho-packaging-plugin:generate-bundle

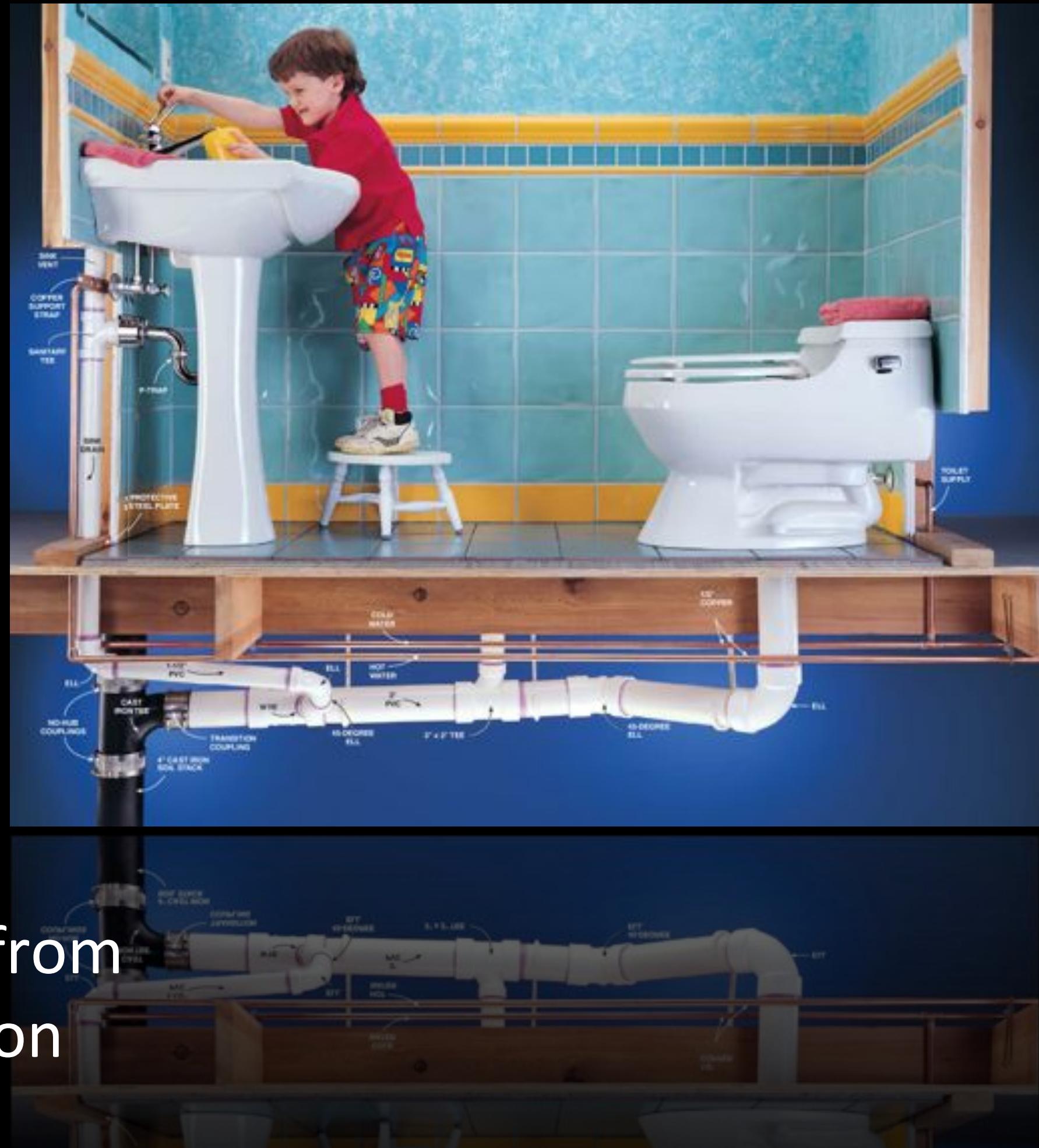
Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime



Separate API from Implementation

Module Model

Build & IDE

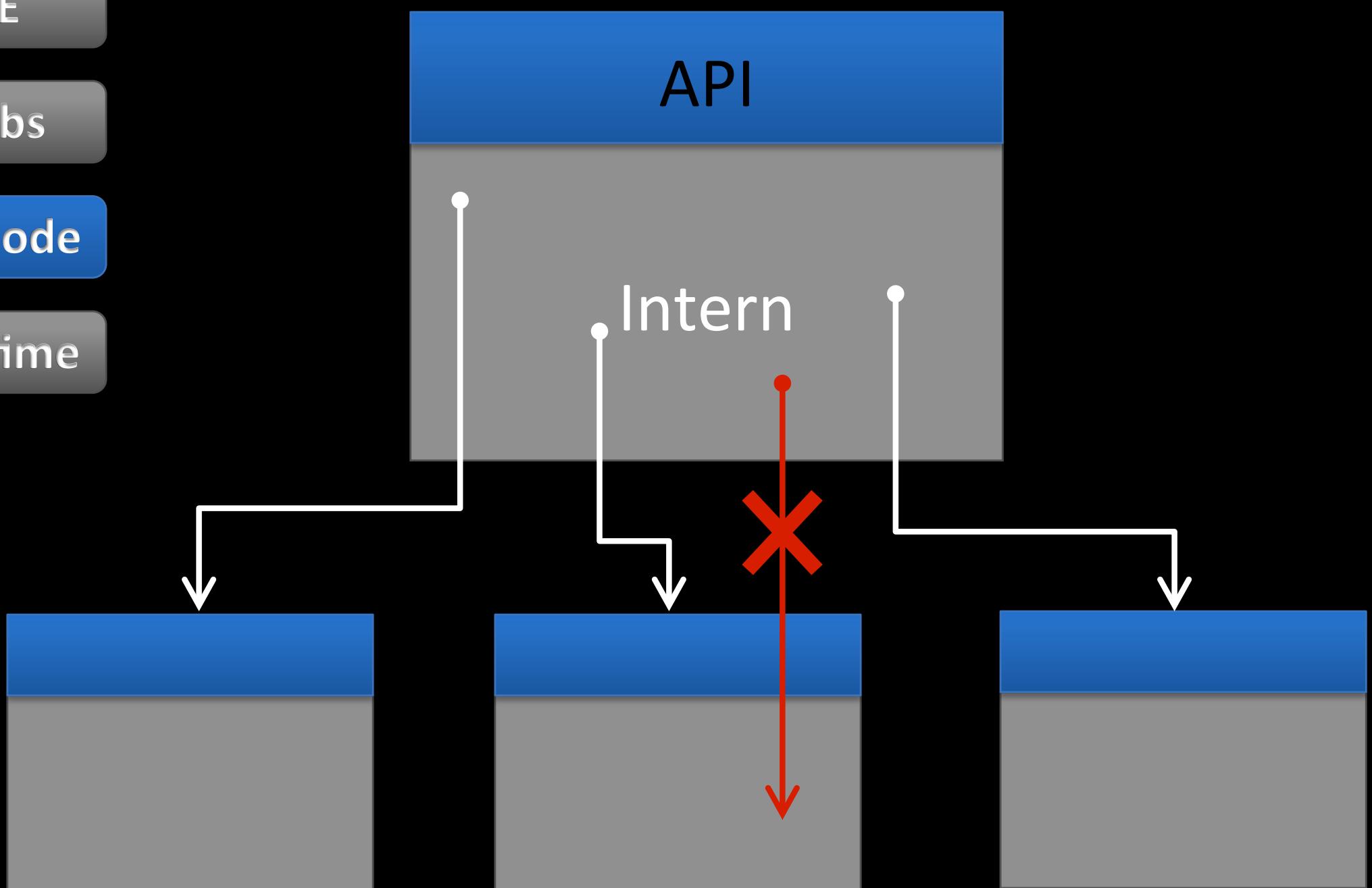
3rd Party Libs

Modularize Code

Module Runtime

API

Intern



Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

Good Reasons

- New features
- Existing implementation needs to be re-used for new modules
- Re-design required for new requirements

When?

Module Model

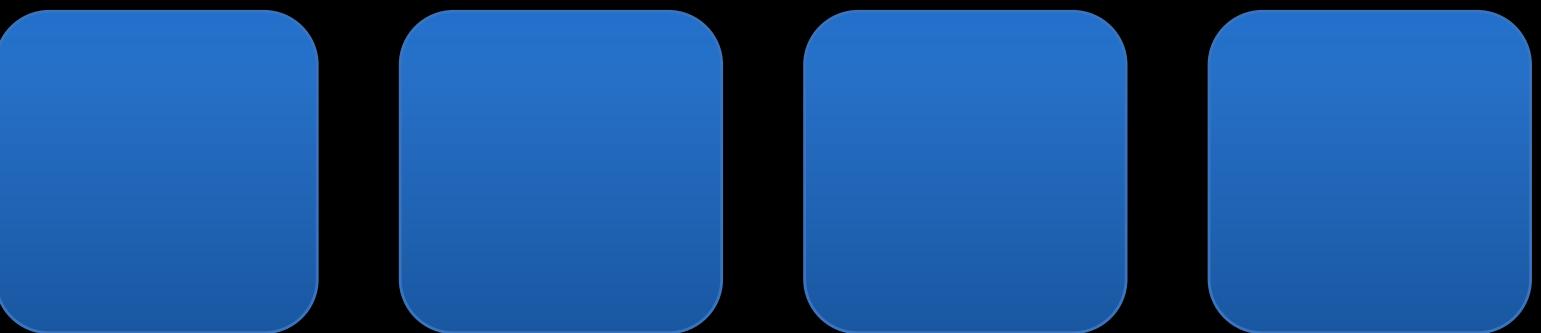
Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

Domain



Technology



Guidelines

Module Model

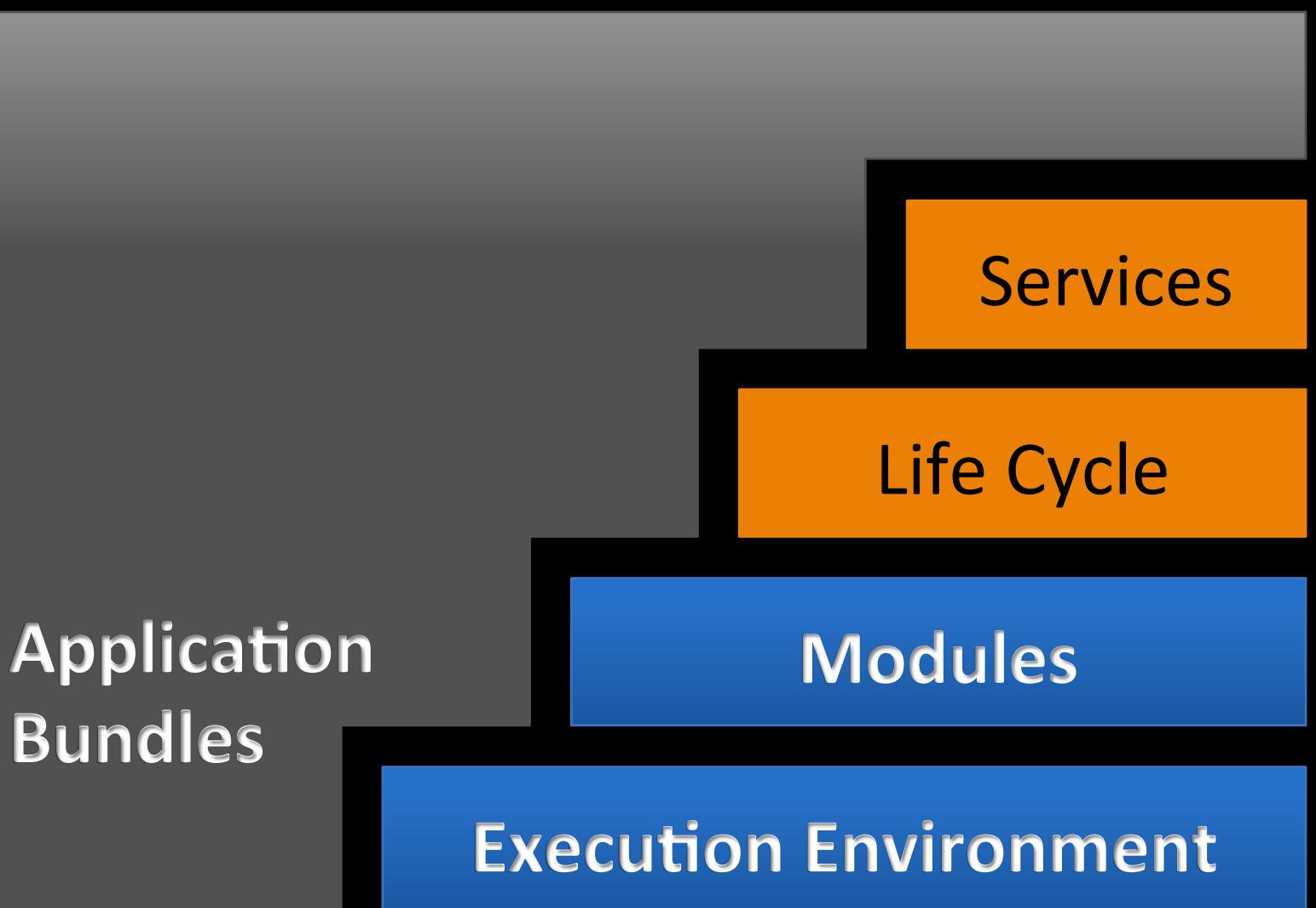
Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

OSGi Stack



Module Model

Build & IDE

3rd Party Libs

Modularize Code

Module Runtime

What do
we get?

Modules

- Separate class loaders

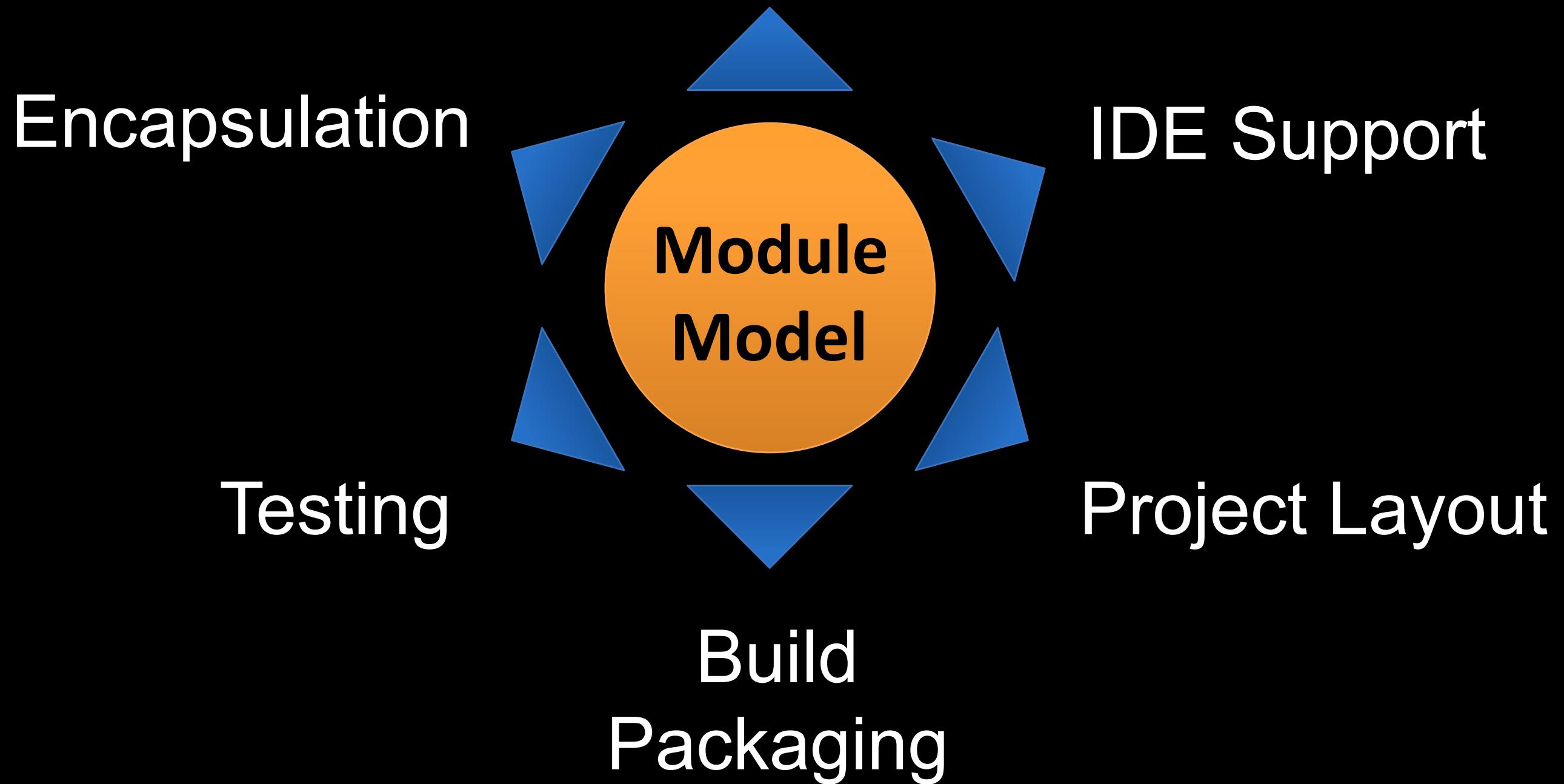
Bundle life cycle

- Explicit initialization

Services

- Extensibility

Dependency Management



RCS Project
500 Bundles
25 Products

Concepts Tycho Build OSGi Runtime



Modularization

2010 2011 2012 2013

The background of the slide is a high-angle aerial photograph of a suburban residential area. The neighborhood consists of numerous single-family homes with dark grey or black roofs, white siding, and well-maintained green lawns. The houses are arranged in a grid-like pattern, separated by paved streets. The overall scene is a typical American suburb.

Thank You! Questions?

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