Applying MDE for the Validation of Correct Eclipse Plugin Bundles

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Plan

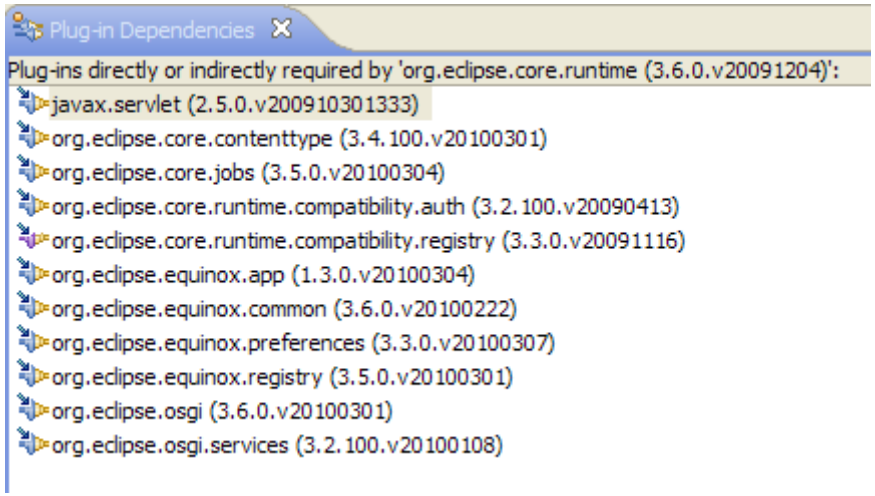
- **Introduction**
- Eclipse Configuration Discovery
- Eclipse Configuration Validation
- Global Plugin Management
- Questions

Introduction -Context of study

- Complex systems build by assembling components from repositories
  - Large set of interconnected components
    - Different versions of them
    - Strong dependencies between some
    - Incompatibilities between some others
  - Examples:
    - Eclipse platform (OSGI system)
    - Linux systems
    - …

Introduction -Context of study

- Need tooling for easier management of components and dependencies
  - Illustrating example:
    - Eclipse core runtime plug-in
    - → 11 dependencies
    - → Specific versions for required plug-ins…



Introduction -Context of study

Idea

- Using MDE and Configuration techniques for:
  - Components and links representation
  - Building consistent set of components
  - Validating existing distributions

Introduction – Use Case

Eclipse Platform use case

- Implementing OSGI framework
- High extension and integration abilities
- Huge number of plug-ins
  - Wide community of tool provider
  - Rapid adoption by users

  → Acceleration in the plug-in development

  → Increasing number of possible platform configuration

Introduction – State of the Art

Eclipse Platform use case

- Existing plugin management solutions (1)
  - P2:
    - Current Eclipse plug-in management tool
    - Create a constraint problem from plug-ins metadata
    - Use SAT4J for the solution creation
    - Failure explanation presentation if problem

Introduction – State of the Art

Eclipse Platform use case

- Existing plugin management solutions (2)
  - b3:
    - Focus on the build management
    - Represents build informations into models
      - From dependencies to build scripts
    - Goal:
      - Making build processes simpler, repeatable, reproducible and adaptable
    - Currently no implementation, only proposal

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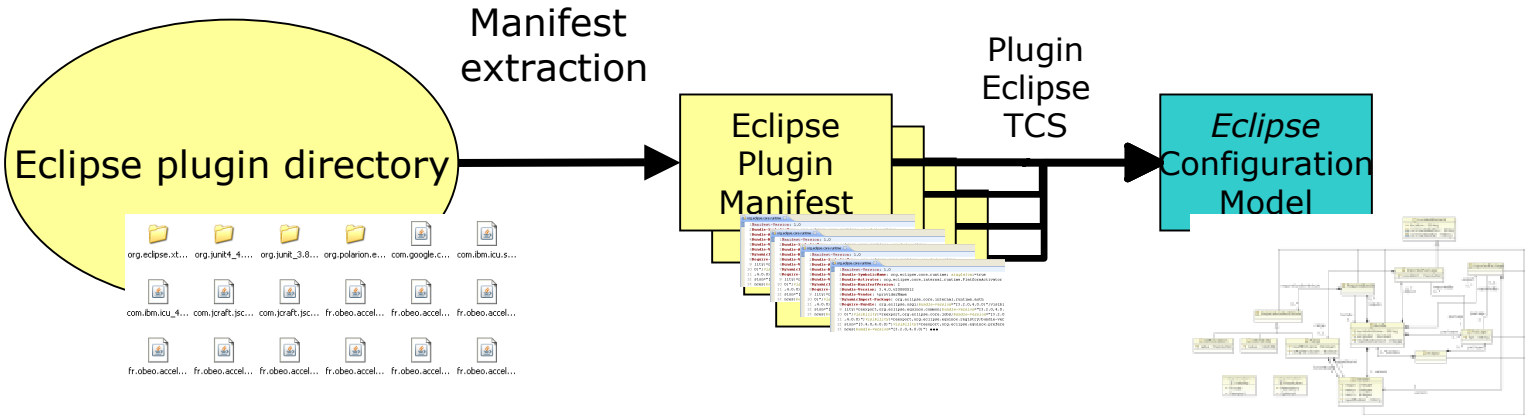
Eclipse Configuration Discovery

- Idea:
  - Using platform information to build a complete platform model



Eclipse Configuration Discovery

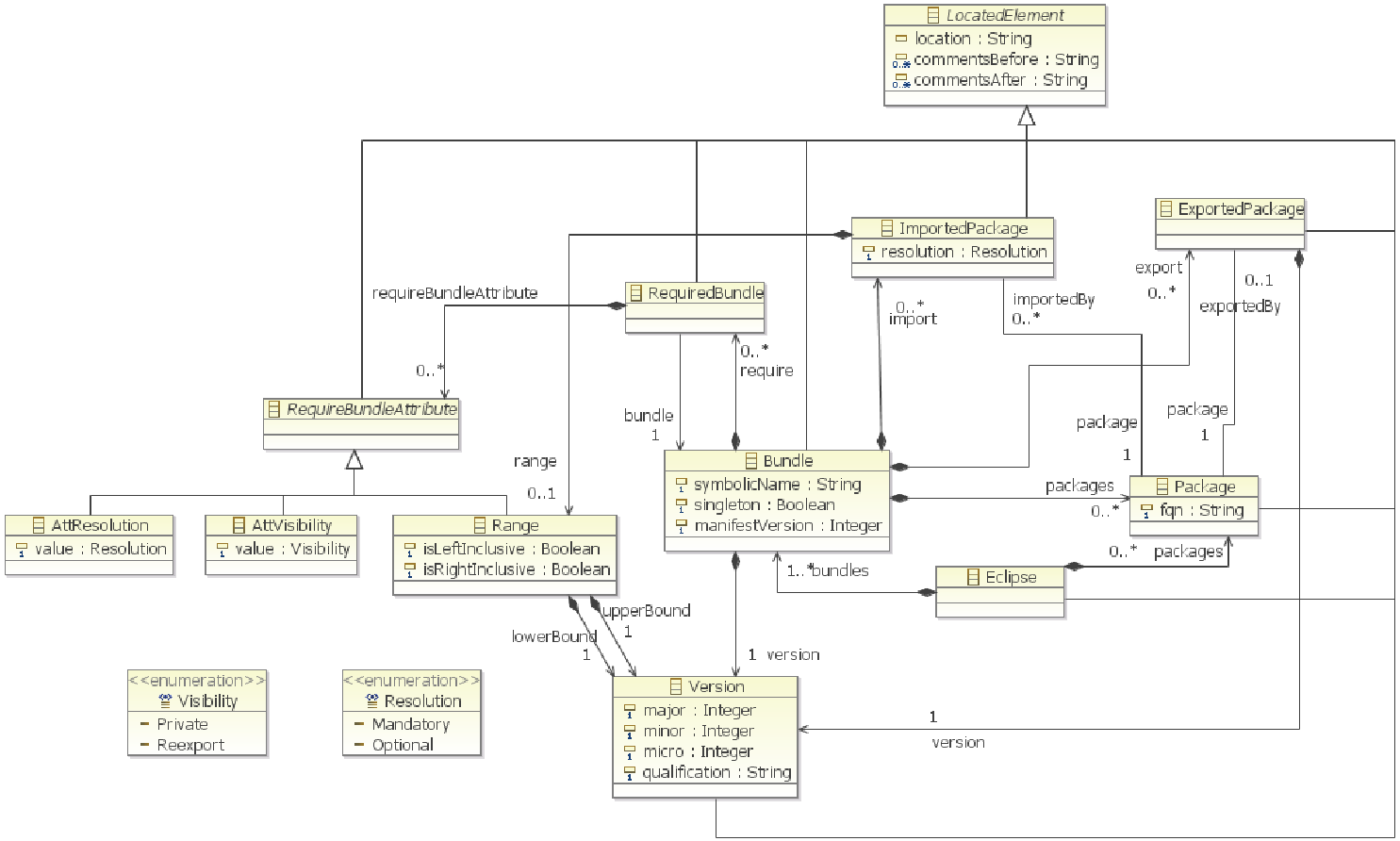
- Eclipse plug-ins *manifest*
  - Simple declarative format
    - Describes dependencies with versions

org.eclipse.core.runtime

```
1 Manifest-Version: 1.0
2 Bundle-SymbolicName: org.eclipse.core.runtime; singleton:=true
3 Bundle-Activator: org.eclipse.core.internal.runtime.PlatformActivator
4 Bundle-ManifestVersion: 2
5 Bundle-Version: 3.4.0.v20080512
6 Bundle-Vendor: %providerName
7 DynamicImport-Package: org.eclipse.core.internal.runtime.auth
8 Require-Bundle: org.eclipse.osgi;bundle-version="[3.2.0,4.0.0)";visibi
9  lity:=reexport,org.eclipse.equinox.common;bundle-version="[3.2.0,4.0.
10 0)";visibility:=reexport,org.eclipse.core.jobs;bundle-version="[3.2.0
11 ,4.0.0)";visibility:=reexport,org.eclipse.equinox.registry;bundle-ver
12 sion="[3.4.0,4.0.0)";visibility:=reexport,org.eclipse.equinox.prefere
13 nces;bundle-version="[3.2.0,4.0.0)"; ●●●
```

Eclipse Configuration Discovery

- Eclipse configuration metamodel



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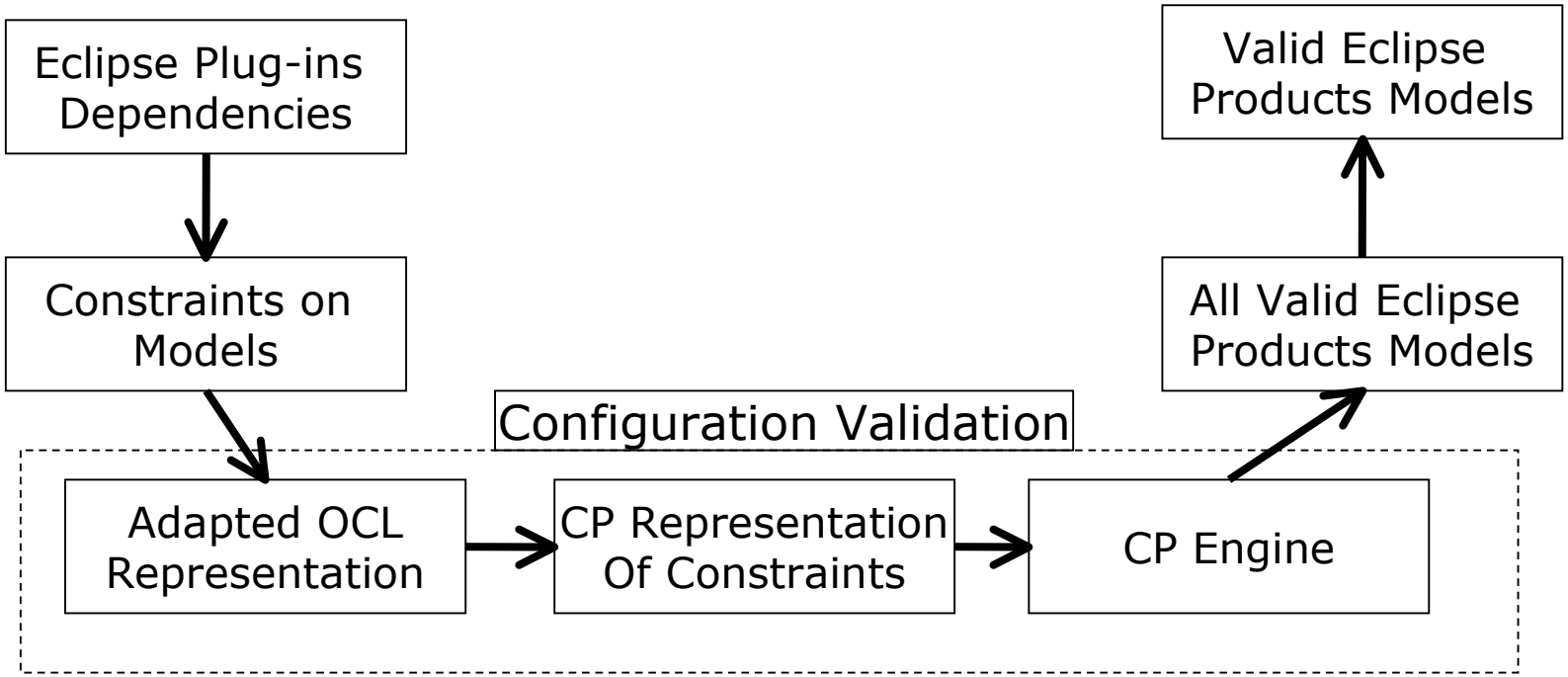
Eclipse Configuration Validation

- Need for validation of the configurations
  - Valid configuration:
    - All dependencies satisfied
    - Each bundle activable
    - Not just a running Configuration
- Approach:
  - Using configuration techniques for the solution build.

Eclipse Configuration Validation

- Approach Overview



Eclipse Configuration Validation

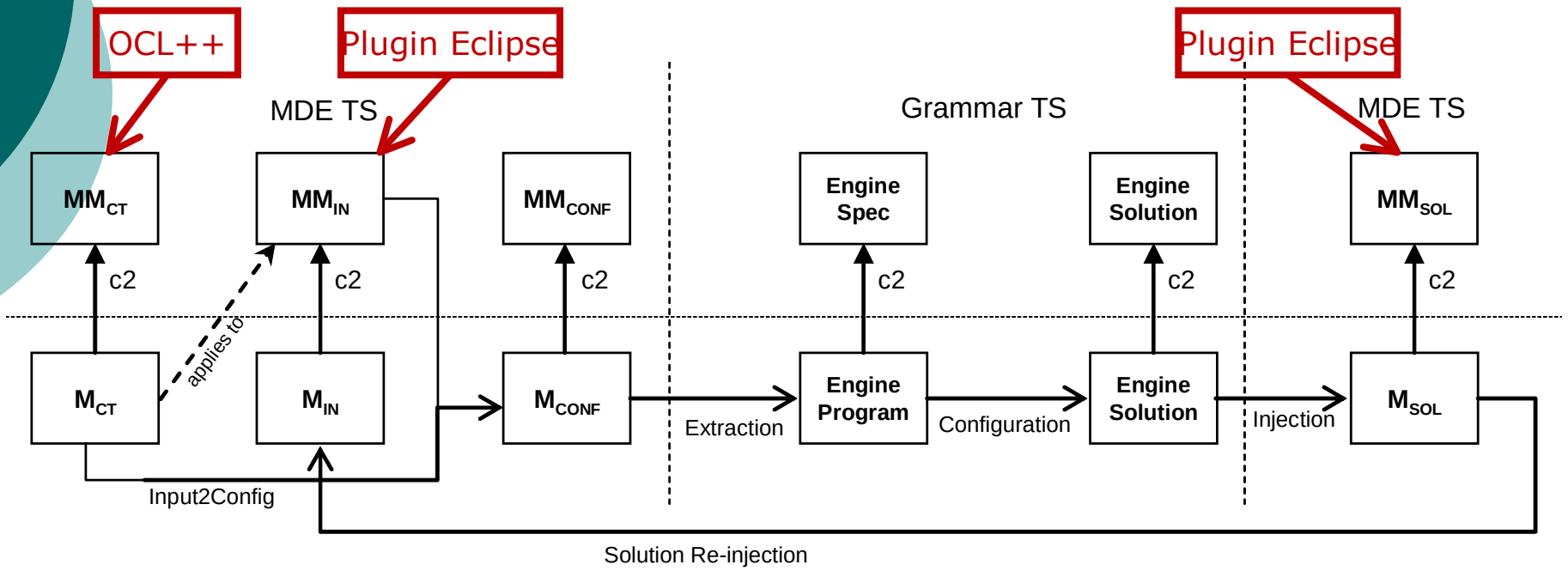
- Constraints on models expressed in OCL++

```
package SPL {
        context  Class inv :
                name == "Watch" ;
        context        m1 : Method , m2 : Method inv :
                m1 != m2 implies m1.name != m2.name  ;
        context Class inv :
               methods.exists ( m | m.name == "start" ) ;
        context Class inv:
               methods.exists ( m | m.name == "displayTime" )  ;
}
```

- Enable easy expression of constraints on models

Eclipse Configuration Validation

- Zoom on the configuration validation part



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Global Plug-in Management

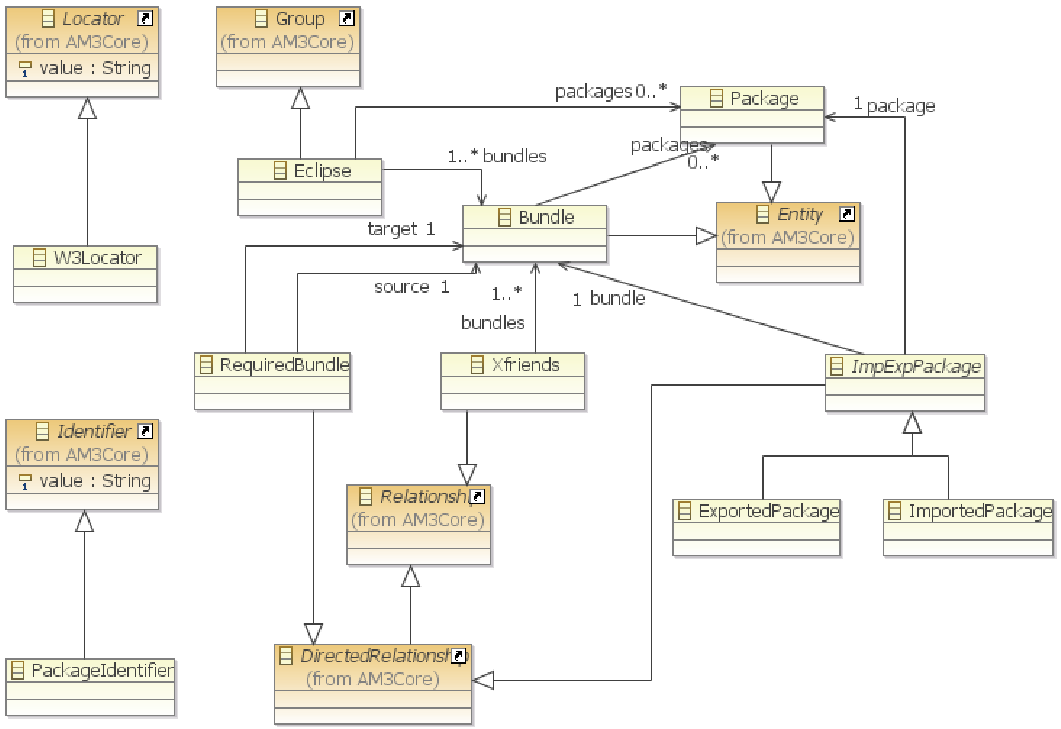
- Idea: managing plug-in in the same way as we manage models with AM3

- AM3 offers several generic facilities:
  - Navigation
  - Query support
  - Metrics Extraction
  - Visualization

These facilities are available for models or any other kind of supported entities

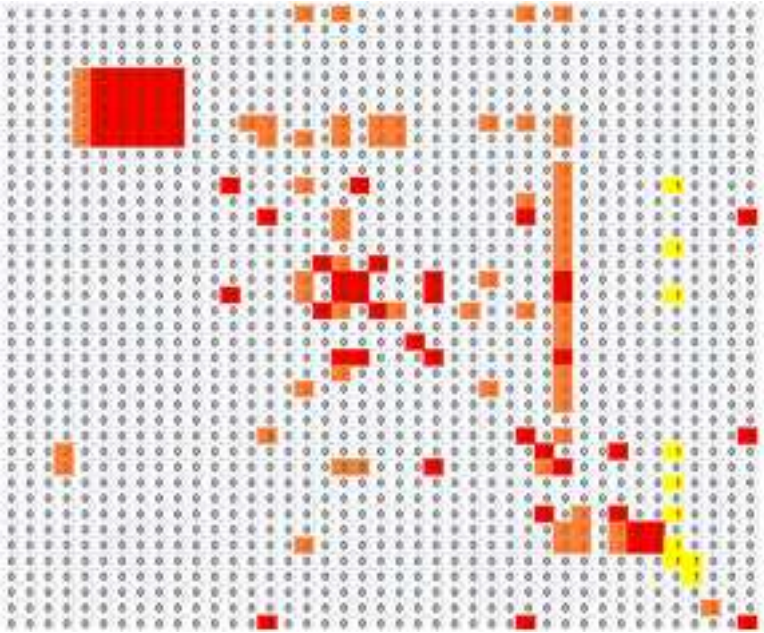
Global Plug-in Management

- Eclipse plug-in management extension for AM3



Global Plug-in Management

- Dependencies Matrix constructed from the megamodel



Bundles are crossfriend

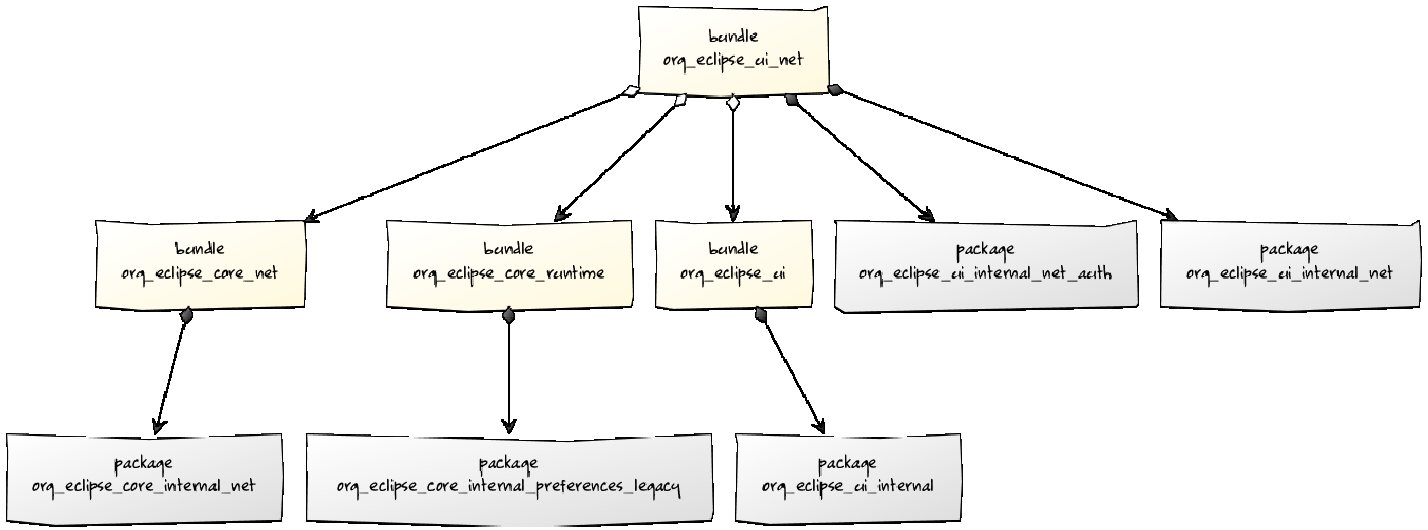
Line bundle requires column bundle

Line bundle imports package exported by column bundle

- Cycles detection

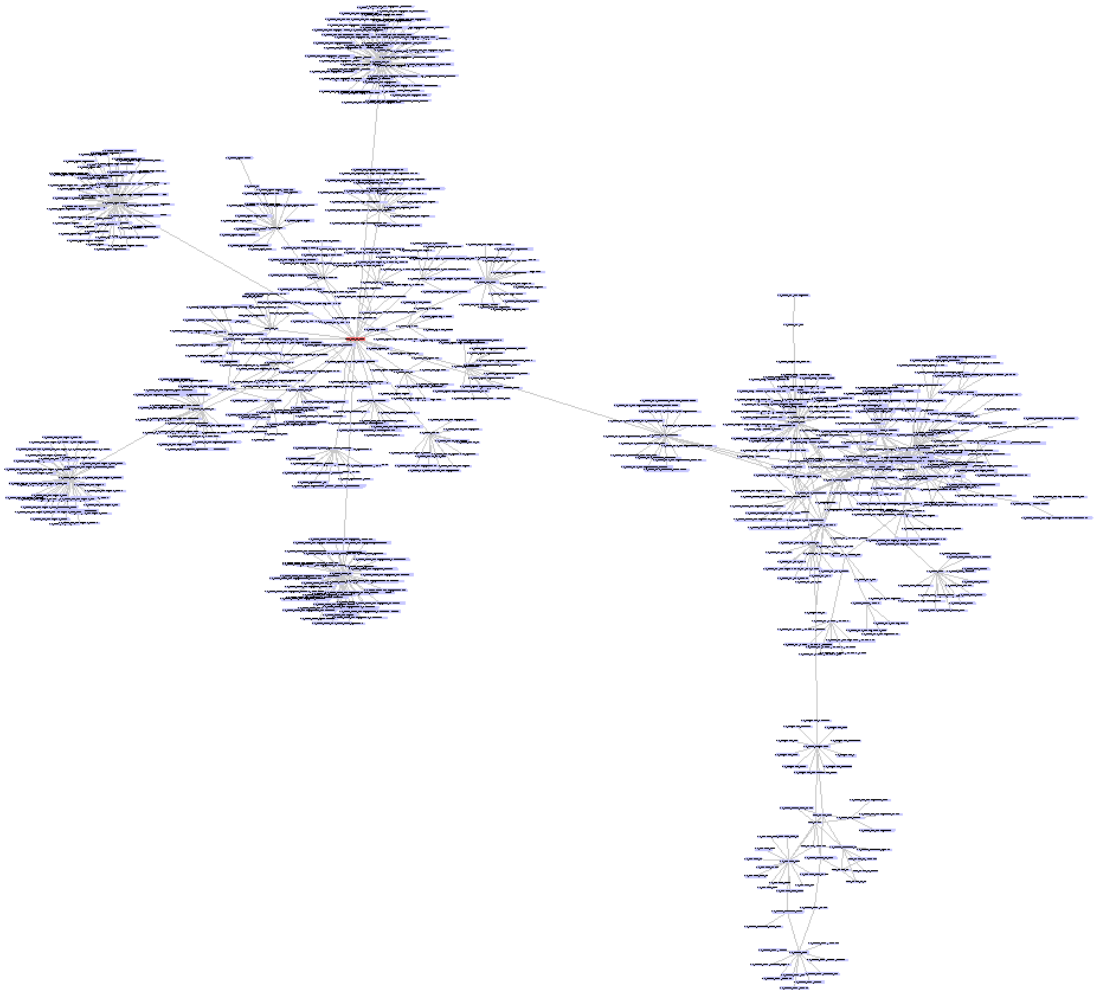
Global Plug-in Management

- Generated visualization of a Eclipse configuration excerpt
  - Required bundle and exported packages from the *org.eclipse.ui.net*



Global Plug-in Management

- Birdview of an Eclipse installation



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Questions

- If you have any questions…

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- Links:
  - http://www.emn.fr/x-info/idmpp/index.php/
  - http://www.eclipse.org/gmt/am3/