OPENCHAIN

Reference Automation Slides

Open Source Training for OpenChain 2.1 (ISO/IEC 5230:2020)

These slides follow US law. Different legal jurisdictions may have different legal requirements. This should be taken into account when using these slides as part of a compliance training program.

These slides do not contain legal advice

What are the Reference Automation Slides?

OPENCHAIN

- Explanation…

Learn more at: `https://www.openchainproject.org`

Contents

1. Automation Use Cases
2. Automation Types

CHAPTER XX

Automation Use Cases

Introduction

- Why we would need tools?
- First demand and process, then the tool
- A tool cannot provide (difficult) decisions
- Only data for decisions
- Many cases where expert knowledge is required

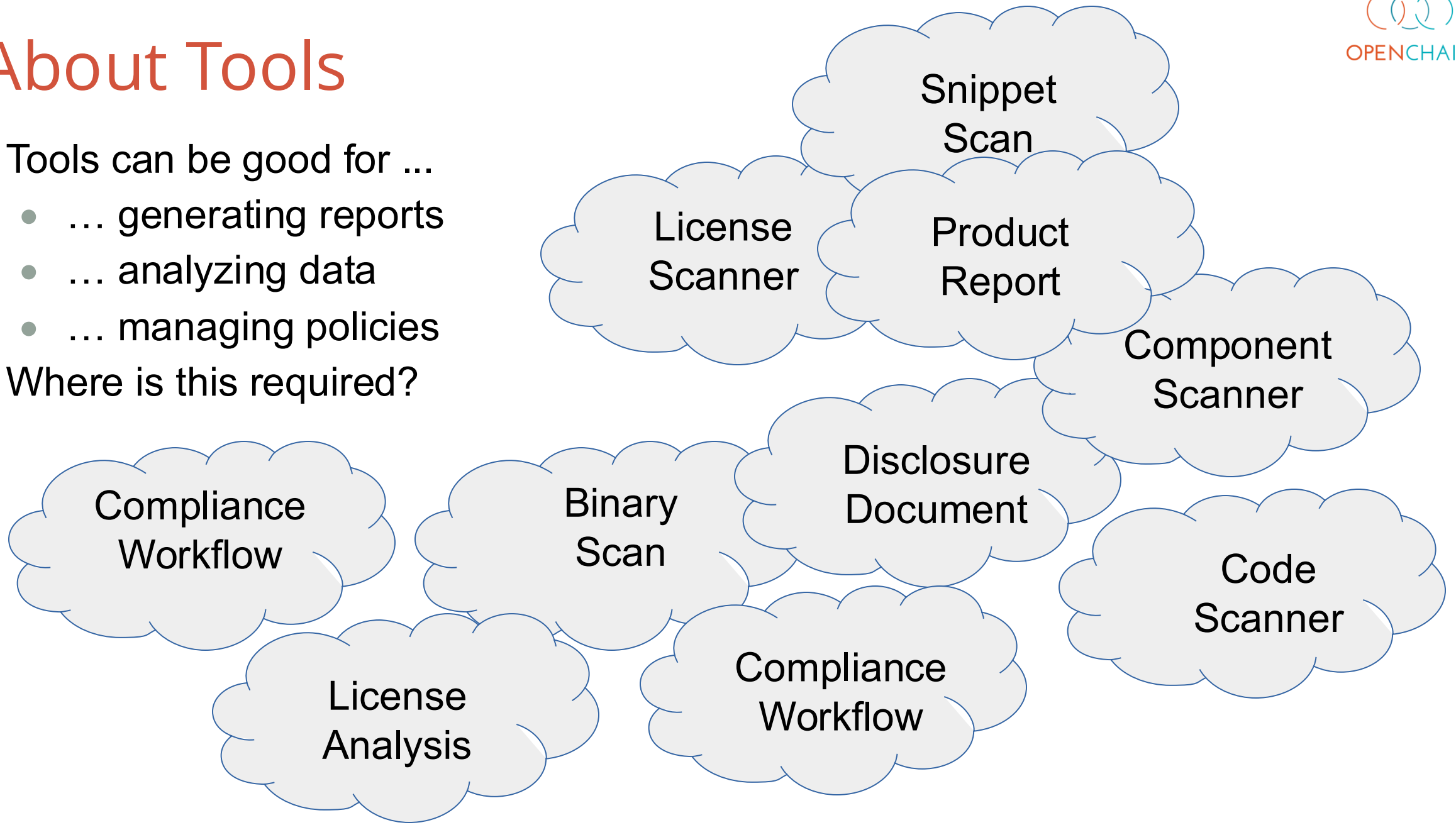
“A fool with a tool is still a fool” (from the hardware world)

About Tools

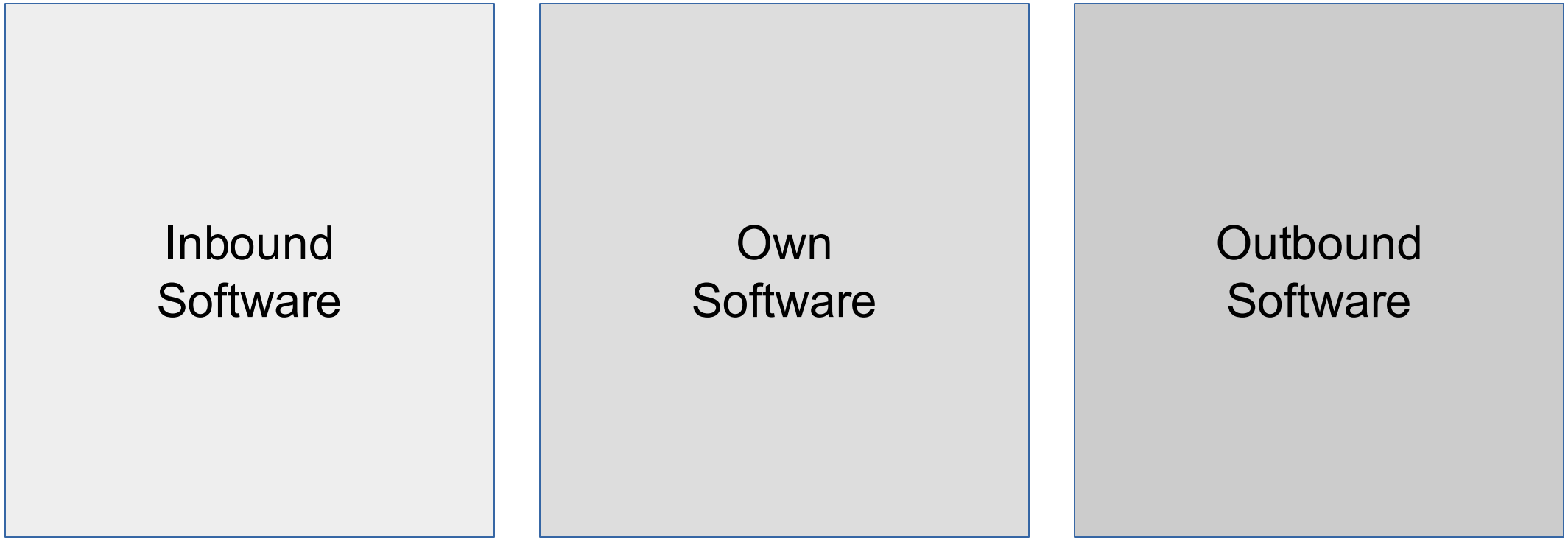
Tools can be good for ...

- … generating reports
- … analyzing data
- … managing policies

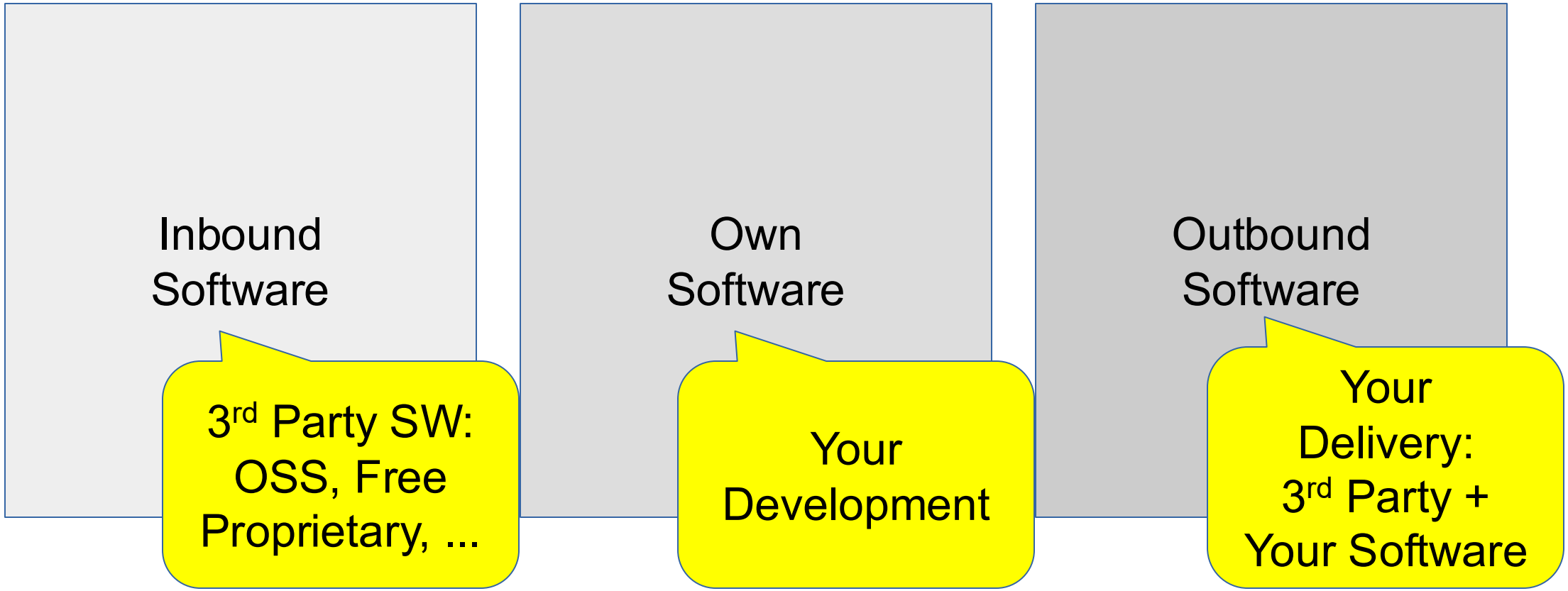
Where is this required?



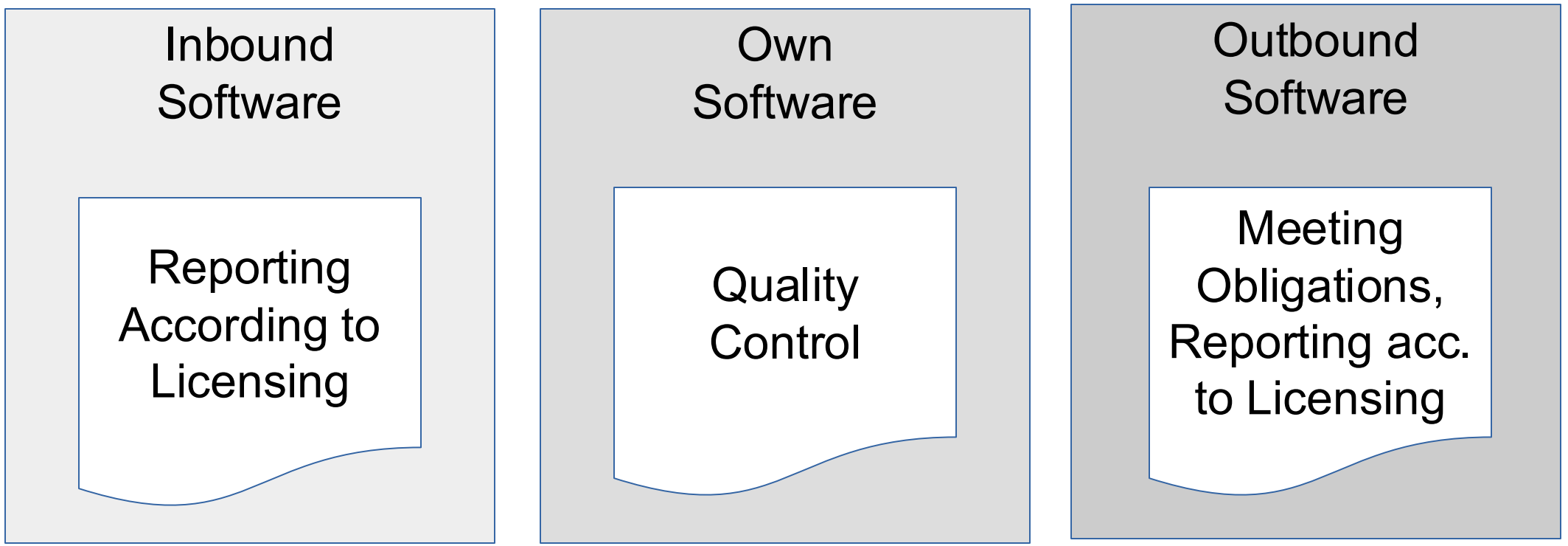
Software Situation



Software Situation – What it Means



OSS License Compliance from 10k Feet



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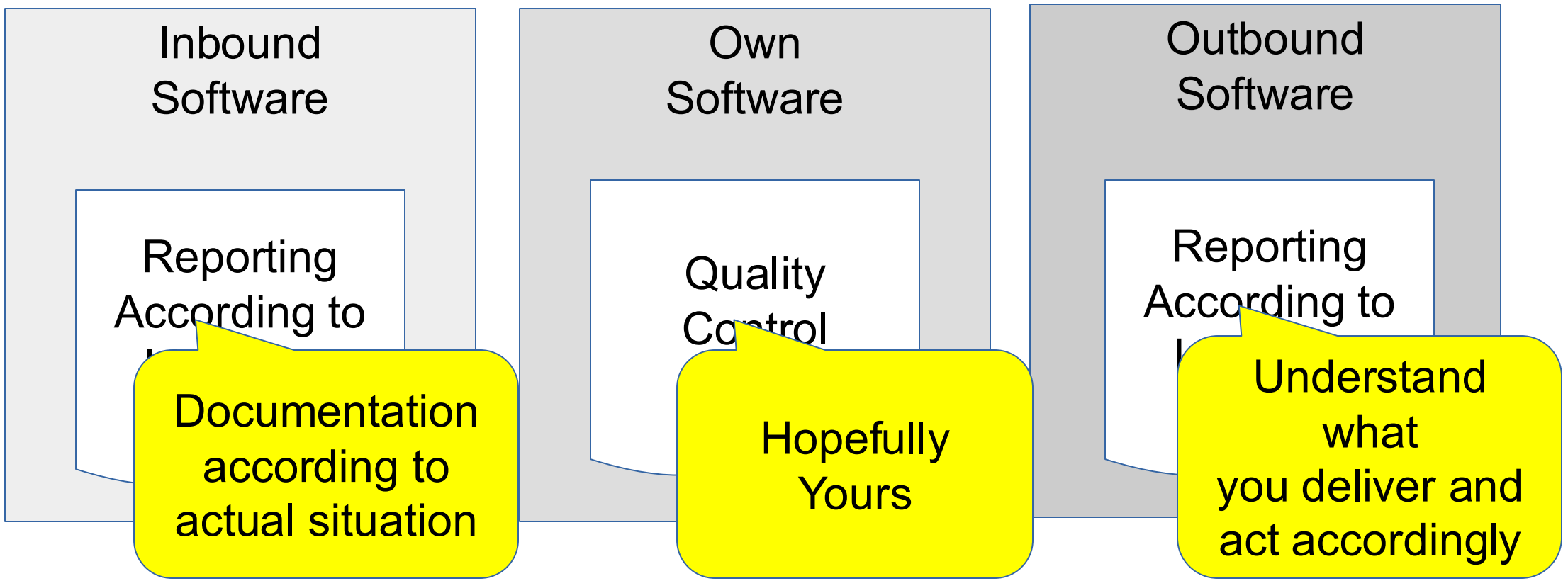
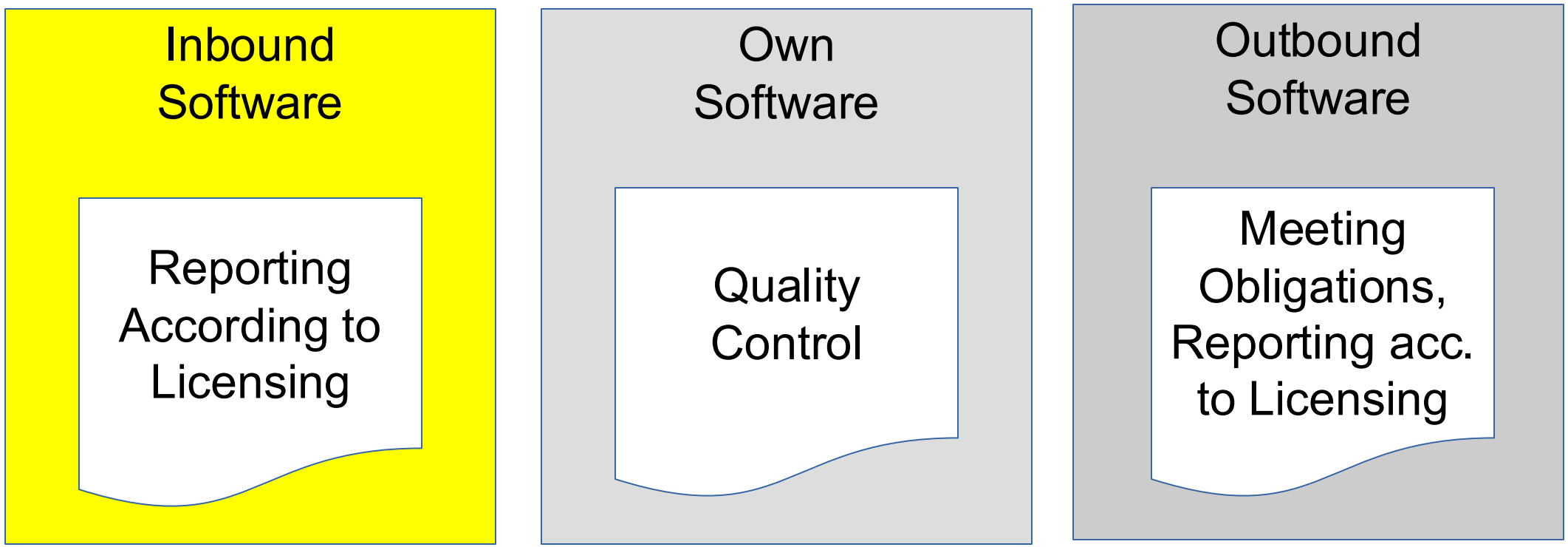


Part I: Analysing Inbound



Understanding Inbound

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- Determining which software is used (commercial + OSS actually)
- Because commercial software can contain OSS as well!
- OSS components involved and their involved licensing
- Identifying licenses
- Identifying authorships and copyrights
- Determining any further points from licensing obligations

How to Understand What is Inbound

- Depends on the software technology used
- Modern software projects use dependency management
  - Declaration of imports, dependencies, used libraries, etc.
  - Defined dependencies can be extracted
  - In some cases for OSS, used component source code can be extracted
- However, involved software can be also in form of binaries
  - Origin and contents of binaries must be determined
- “Manual dependencies”: commercial software added

Identifying Licensing within Inbound Software: Easy Cases

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- License, copying or notice document provided along with software
- At infrastructure, home page or project pages
  - e.g. Github or Sourceforge metadata
- Project definition file
  - e.g. in Java pom.xml
- Already provided license info
  - e.g debian-copyright or SPDX documentation

Identifying Licenses within Inbound Software: The Problem (1)

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- License proliferation
  - About 350 „main“ licenses exist
  - A lot more out there
  - Existing licenses come at new versions
- Licenses in different languages (e.g. the French CeCILL)
- License obligations must be understood
- Commercial licenses such as an EULA lack standardization

Identifying Licenses within Inbound Software: The Problem (2)

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- OSS = reuse
  - OSS components are not (always) homogeneous
  - If OSS exists, pull it from elsewhere
  - Code from many sources, different licensing
- Main license does not apply to all contents
  - If project does not enforce common licensing for all contributions
  - CLA: contributor license agreements

Identifying Licenses: The Fun (1)

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Identifying license statements is not straightforward ...

* See README and **LICENS**E files in bz/ directory
* for more information
* about bzip2 library code.
*/

This file is part of Jam - see jam.**c** for **Copyright** information.

---

* See **LICENS**E.qla2xxx for **copyright** and **licens**ing details.

/* **Licens**ing details are in the COPYING file accompanying popt source **distribut**ions, available from ftp://ftp.rpm.org/pub/rpm/dist. */

Copyright (c) Insight Software Consortium. All rights reserved.
See ITK**Copyright**.txt or http://www.itk.org/HTML/**Copyright**.htm for details.

---

* See wps_upnp.**c** for more details on **licens**ing and code history.

Identifying Licenses: The Fun (2)

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… or just very difficult statements

```
* Copyright (c) 1998-1999 Some Company, Inc. All Rights Reserved.
*
* This software is the confidential and proprietary information of Some
* Company, Inc. ("Confidential Information").  You shall not
* disclose such Confidential Information and shall use it only in
* accordance with the terms of the license agreement you entered into
* with Some Company.
*
* Some Company  MAKES NO REPRESENTATIONS
* OR WARRANTIES ABOUT THE SUITABILITY OF THE
* SOFTWARE, EITHER EXPRESS OR IMPLIED,
* INCLUDING BUT NOT LIMITED TO THE ….
```

Identifying Copyright

Some licenses ask for copyright notice or author listing

- Resulting obligation of providing these
- Generally, there is software for these problems
- Challenge: wrongly expressed copyright statements

Identifying Copyright: Fun (again)

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Identifying copyright statements is not less fun:

```
Copyright by many contributors; see http://babel.eclipse.org/
---
 *  Original Code <s>Copyright (C) 1994, Jeff Hostetler, Spyglass, Inc.</s>
 *  Portions of Content-MD5 code <s>Copyright (C) 1993, 1994 by Carnegie Mellon
 *     University</s> (see Copyright below).
 *  Portions of Content-MD5 code <s>Copyright (C) 1991 Bell Communications
 *     Research, Inc. (Bellcore</s>) (see Copyright below).
 *  Portions extracted from mpack, John G. Myers - jgm+@cmu.edu
 *  Content-MD5 Code <s>contributed by Martin Hamilton (martin@net.lut.ac.uk)</s>
```

Identifying Licenses: Binaries

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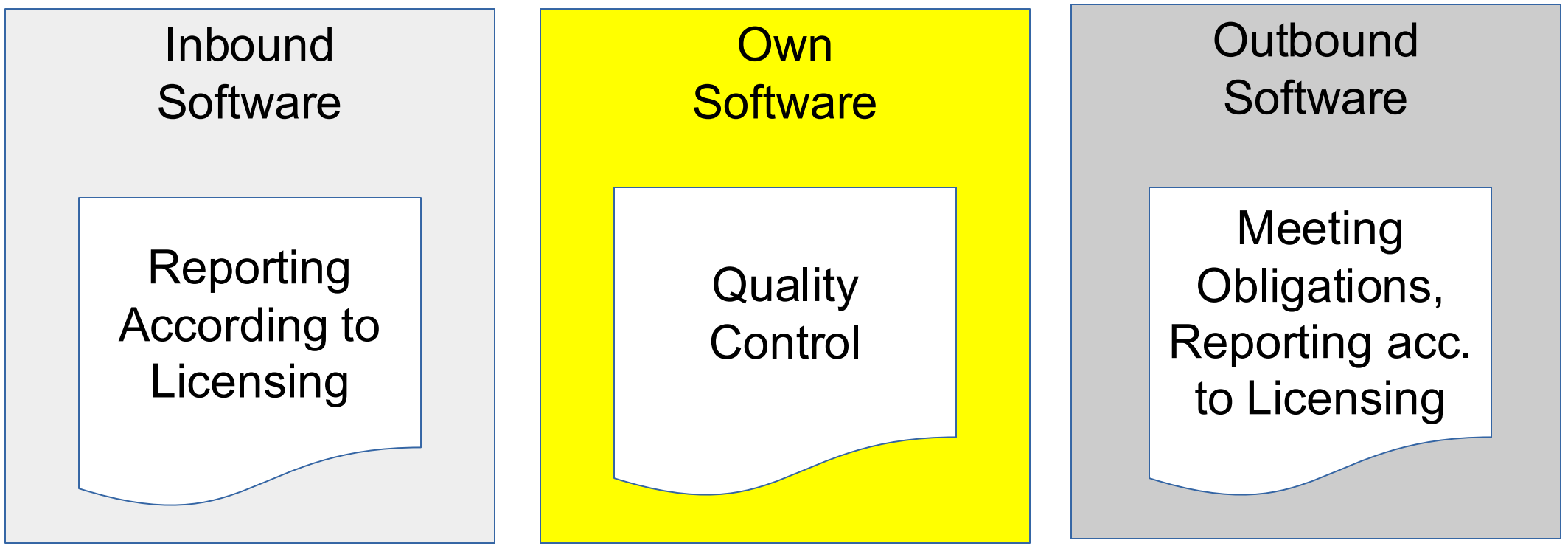
Binaries are compiled applications, libraries, software that can be used

- Binary = code translated from programming language to executable code by processor → information encoded
- Binaries can be part of an OSS component distribution
- Binaries can include OSS

How to understand what is contained in a binary?

- Main problem 1: different binary technologies
- Main problem 2: small variations, new binary

Part II: Your Own Software



What is the Issue with Your Software?

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Sometimes, genuinely written software is expected
but “copy & paste” solution can be very near

- Open source projects are publicly available
- But also other files are valuable: scripts, icons, images, css files
- and code copied from Web sites for best practices and snippets

Copy paste of source code from the Internet in your code can be done:

- Respecting the author’s interests required: licensing, copyright
- Generally, reuse is good - opposed to reinventing the wheel

Code Scanning

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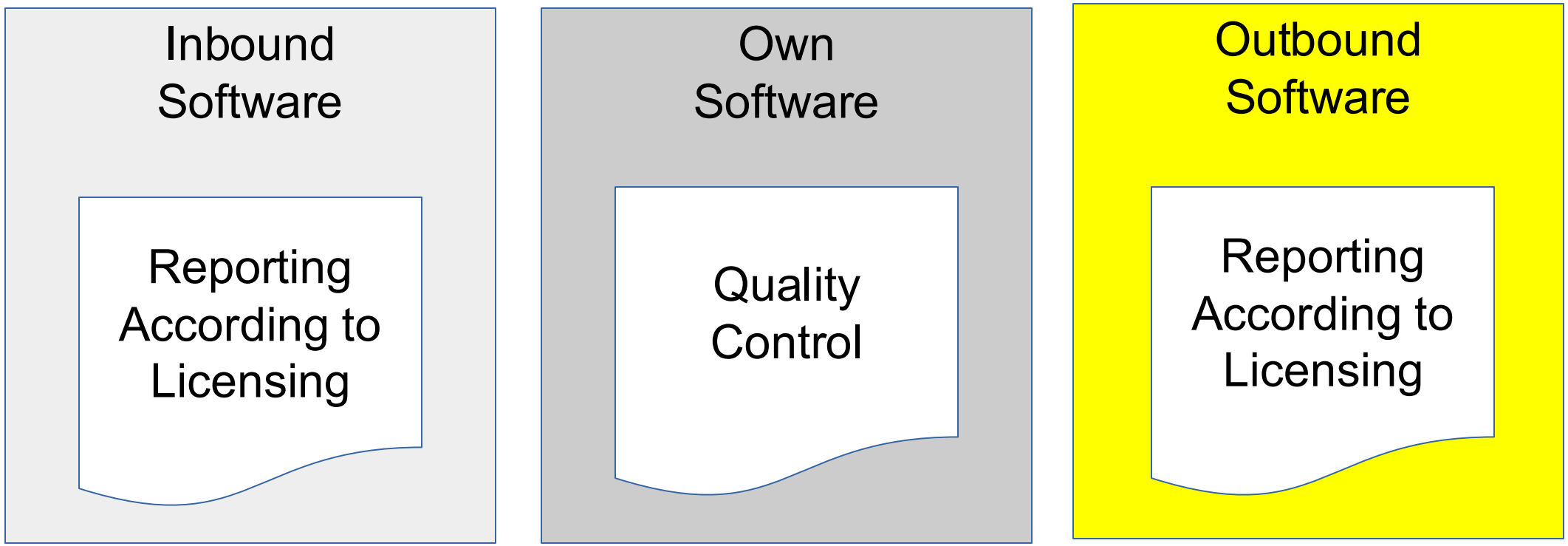
Good education and engineering codex can be solution

- Plain “copy & paste” of source code is bad practice anyway today
- Duplicated code reduces maintainability
- Engineers like clean dependency management

For all other cases

- Scanning tools for source code based on comparing text portions
- Using a database of already published source code (by other party)
- What is in Internet, tutorial code from vendors, Github
- Licensing: scan for licensing statements again

Part III: Outbound Software



Case 1: Distribution of OSS (1)

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Distributing OSS as part of product or project

- E.g. requires notice file
  - Listing all licenses, listing copyright notice
  - … as a basic and common license obligation
- E.g. written offer to provide the OSS code

Builds upon knowledge on

- Which OSS components are in (here comes the BOM!)
- Which licenses in there, copyright notices

Case 2: Quality Management

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Project or product documentation can require, e.g.

- All tests passed
- But as well: all licenses checked?
  - For their obligations, for their compatibility
- Or: All OSS required material ready for distribution

Requires (as well)

- Which OSS components are in
- Which licenses in there, copyright notices

Case 3: Ensuring Distribution Rights

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Some licenses are not compatible

- That is life, for example GPL <-> EPL incompatibility
- *Distribution based on GPL works and EPL works: maybe a problem*

Some license statements are ambiguous

- For example „Licensed under BSD”
- *Requires legal decision how did you decide this statement*

Besides Delivering, Internal Work

Some license statements need documentation

- For example: „for license conditions, see Web site”
- *Web site needs to be archived*

Some licenses are not compatible with the business case

- E.g. Start up implements medical analysis algorithm after years of research, danger of being copied by market leaders
- *License obligations need to be compatible with business goals*

Excursus: Not OSS only, all 3rd Parties

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Also with commercial software, appropriate licensing must be ensured:

- Does contract cover rights for intended commercial use?
- Where is the contract by the way?

Ensuring distribution obligations is required, for example:

- Documentation of distribution
- Time- / volume-limited licensing
- Logo printed on box necessary

BOM Documentation (1)

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BOM: „Bill of Material”

- It is a general question what is in the delivery
- Understand the nature of the delivery (How much OSS?)
- Understand potential issues (IP)
- How else to ensure license compliance?
- Basics of supply chain issues actually apply also to software
- Software Package Data Exchange (SPDX) specifies one implementation how to express a BOM of a software package [1]

[1] https://spdx.org/

BOM Documentation (2)

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Bill of material can be general obligation, for example at:

- USA: Cyber Supply Chain Management and Transparency Act of 2014
- Germany: KRITIS: BSI-Kritisverordnung [2]
  - Obliged to report service disturbances
  - Obliged to implement information security
  - Requires knowledge about BOM

[2] https://www.bmi.bund.de/SharedDocs/pressemitteilungen/DE/2017/06/nis-richtlinie.html

Your Own Software as OSS (1)

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Yes, it is true: sometimes software developers want to publish their work

- Excursus: Motivation 3.0 [3]
- How to publish? - A process topic
- But documentation is required (besides the publication)
  - What are the involved licenses
  - What is the own license
  - Are formal aspects met?

[3] https://www.youtube.com/watch?v=u6XAPnuFjJc

Your Own Software as OSS (2)

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Analysis here has the goal to

- Confirm involved OSS licensing, business compatible?
- Identify dependencies and binaries
- Checking if all the source code is of our origin?

General quality points (including, but not limited to):

- Do all files have headers? (disclaimers for config files)
- Do all files have copyright and authorship statements
- Is the documentation of the licensing appropriate?

Summary of Tool Support

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Tools are there, but requirements and purpose require understanding

- First comes the definition of what is needed and then the tool
- Tools are there for analysis, reporting and management

Different tools serve different purposes

- Requires integration of different functions
- Integration poses classic IT problems
- Interfaces must be understood to avoid manual effort

CHAPTER XX

Automation Types

Overview

Main types of tools in the area of license compliance include (but are not limited to):

- Source code scanning
- License scanning
- Binary scanning
- Dev Ops integration
- Component management

1. License Scanner

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License Scanner: Introduction

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- Purpose:
  - Identifies licenses and license relevant statements
- Other Identifications:
  - Copyright statements, author statements, acknowledgements
- Also of interest:
  - Export control statements, more static code analysis

License Scanner: Solved Problem

OPENCHAIN

- Problem: Identify licensing in Open Source Software packages

- Licensing in Open Source Software
  - Licensing of OSS can be heterogeneous, different licensing applies to parts of OSS
  - Licensing statements are not uniform
  - Many licenses exist, number growing

- Tool based licensing identification required for complicated licensing situations

License Scanner: Technical

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- Mode of operation: Tool searches in content
- for license relevant keywords, phrases, license texts

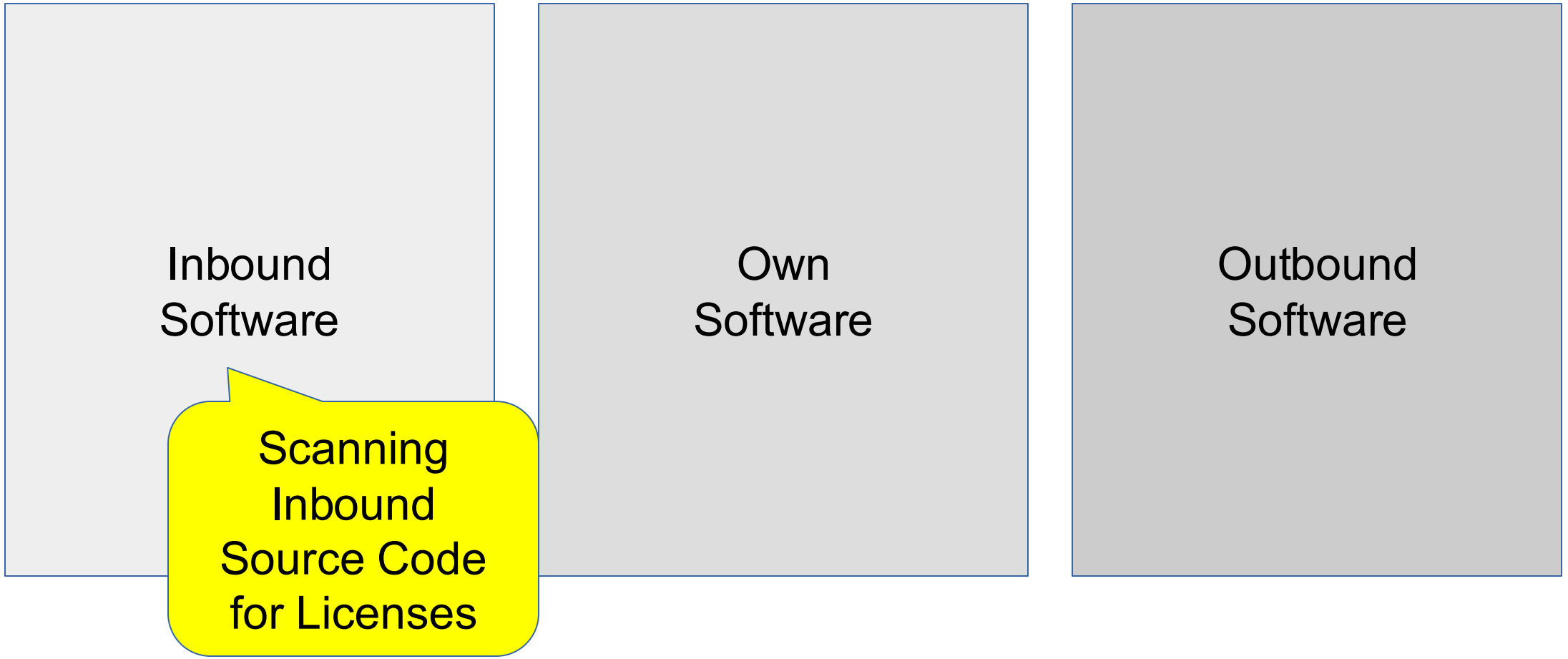
- Searching in every file of software uploaded: requires source code distribution
- Different approaches can be applied: regular expressions, text comparison, phrase collection
- Requires database of license texts, licensing statements
- Comparison with existing license texts enables exact identification
- Licensing information can summarized for open source packages

License Scanner: More Remarks

OPENCHAIN

- License scanning does not require huge database
- However, updates are necessary as licensing statements evolve and new licenses are still created
- Identified licensing information of a software package can be exchanged using SPDX files
- Approach makes sense for OSS licenses, commercial licensing is even more heterogeneous
- License identification precision depends on available licensing information and may require expert knowledge for analysis

License Scanner: Main Usage



2. Binary Scanner

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Binary Scanner: Introduction

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- Purpose:
  - Identifies used software packages in software binaries
- Other identifications:
  - Can also determine the versions of software packages
- Also of interest:
  - Identifying used software packages for creating the binary also enables identification of vulnerabilities

Binary Scanner: Solved Problem

OPENCHAIN

- Problem: A binary is comprised of different software packages, but if not declared, not obvious to determine

- Applies in compiled programming languages: programming language code is translated (=compiled) into machine executable code (machine = processor)
- Script languages (e.g. JavaScript) are not compiled
- Binaries are usually not readable, understanding contents difficult
- However, identification of contents can be inevitable for understanding required license compliance tasks

Binary Scanner: Technical

OPENCHAIN

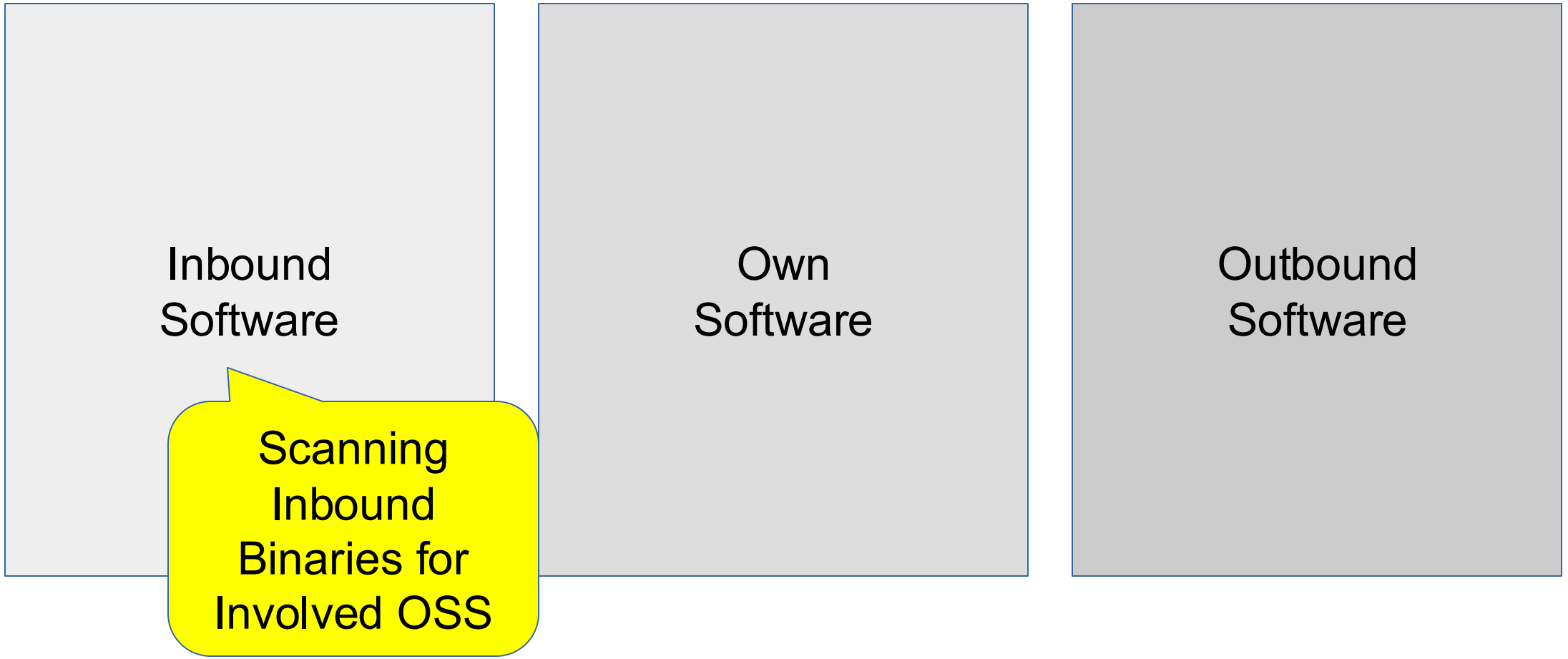
- Compiled machine language can contain characteristic elements
- For example used string variables (=text)
  or other content compiled into the binary
- Simpler method: capturing file names,
  or for run-time code (e.g. Java): method and field names
- Requires database of mapping
  from source code to resulting artifacts in binary

Binary Scanner: More Remarks

OPENCHAIN

- Binary scanning is a heuristic,
  secure mapping not supported for every possible binary
- Topic connected with reproducible builds
  - (then, binaries can be compared more efficiently)
- Database requires updates because,
  because new software is published every day
  - (similar with source code scanning)

Binary Scanner: Main Usage



3. Source Code Scanner

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Source Code Scanner: Introduction

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- Purpose:
  - Can identify published origin of source code and other files
- Other Identifications:
  - Icons, images, style descriptions, XML schemes, documentation
- Also of interest:
  - Programming examples, from blogs and best practise Websites

Source Code Scanner: Solved Problem

OPENCHAIN

- Problem: how to understand that source code or other files have been taken from elsewhere, not self-created, and not declared

- If "own" software is not entirely own software and not understood:
  - Missing rights for business case in "own" software
  - But distribution requires distribution rights are available
  - Identification of origin is first step to understand available rights

Source Code Scanner: Technical

OPENCHAIN

- Mode of operation: upload source code or just files or fingerprints of it, get origin in case it is captured by database

- File contents are compared
  with contents from (huge) database of published contents
- Fingerprinting of file contents (“hashing”)
  allow for accelerated search and storage in database
- Not only coverage of entire files, but fragments of it
- Database requires updates: every day new published OSS
- Content is large (e.g. the entire GitHub)

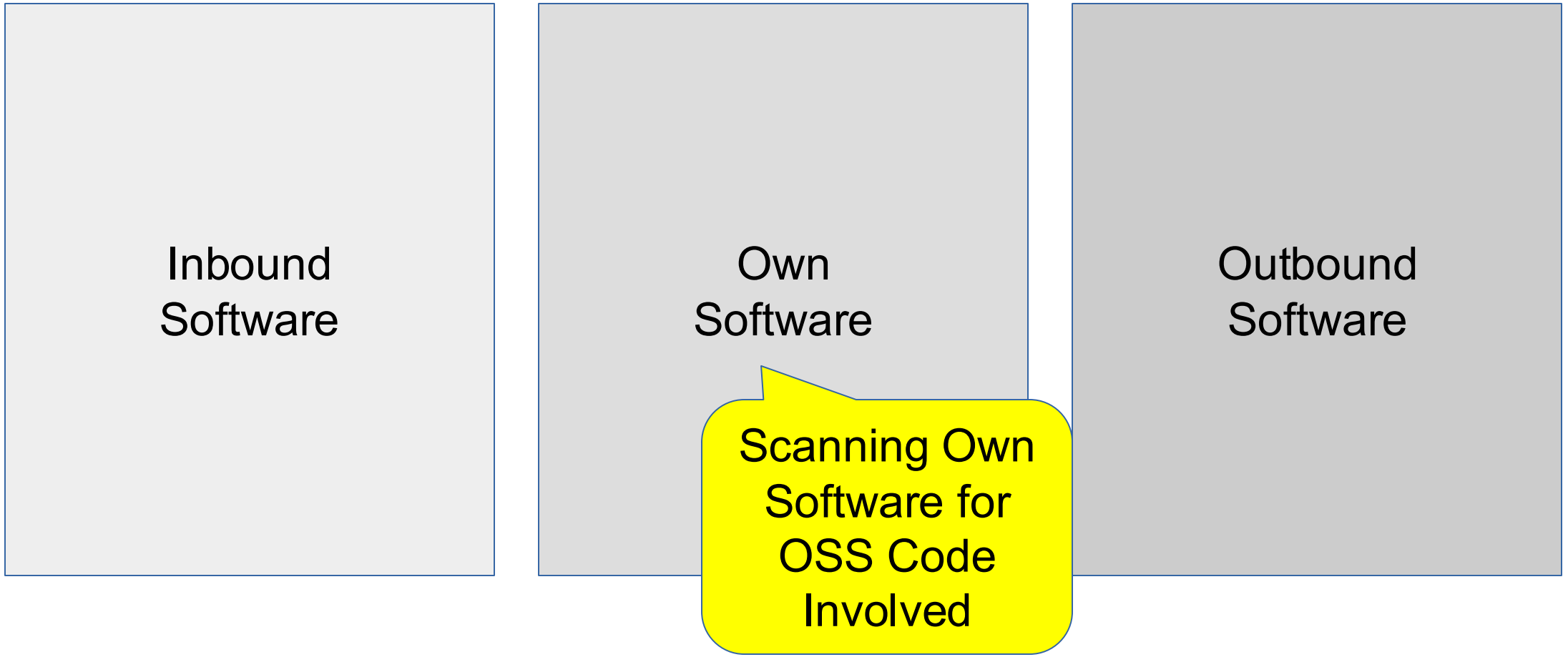
Source Code Scanner: More Remarks

OPENCHAIN

- Once origin of source is identified, more metadata can be made available:
  - Licensing
  - Vulnerabilities
- Potential for integration:
  - Development toolchain
  - Reporting, BOM

- Matched content may require expert knowledge to determine relevance

Source Code Scanner: Main Usage



4. Dev Ops Integration

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Dev Ops Integration: Introduction

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- Purpose:
  - Uses the information from building the software to determine OSS used
- Other identifications:
  - Can be combined with source code scanning, license scanning, binary scanning
- Also of interest:
  - Resulting identification of elements during building the software enables the creation of a bill of material (BOM)

Dev Ops Integration: Solved Problem

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- Problem: for larger software projects a tool based approach is inevitable to understand involved OSS

- Modern software building environments have defined dependencies
- During compilation, dependencies can be captured to understand used dependencies
- License compliance integrated into the Dev Ops tooling implements automation
- Reporting as part of Dev Ops tooling reduces manual efforts
- Enables short release cycles in an agile environment

Dev Ops Integration: Technical

OPENCHAIN

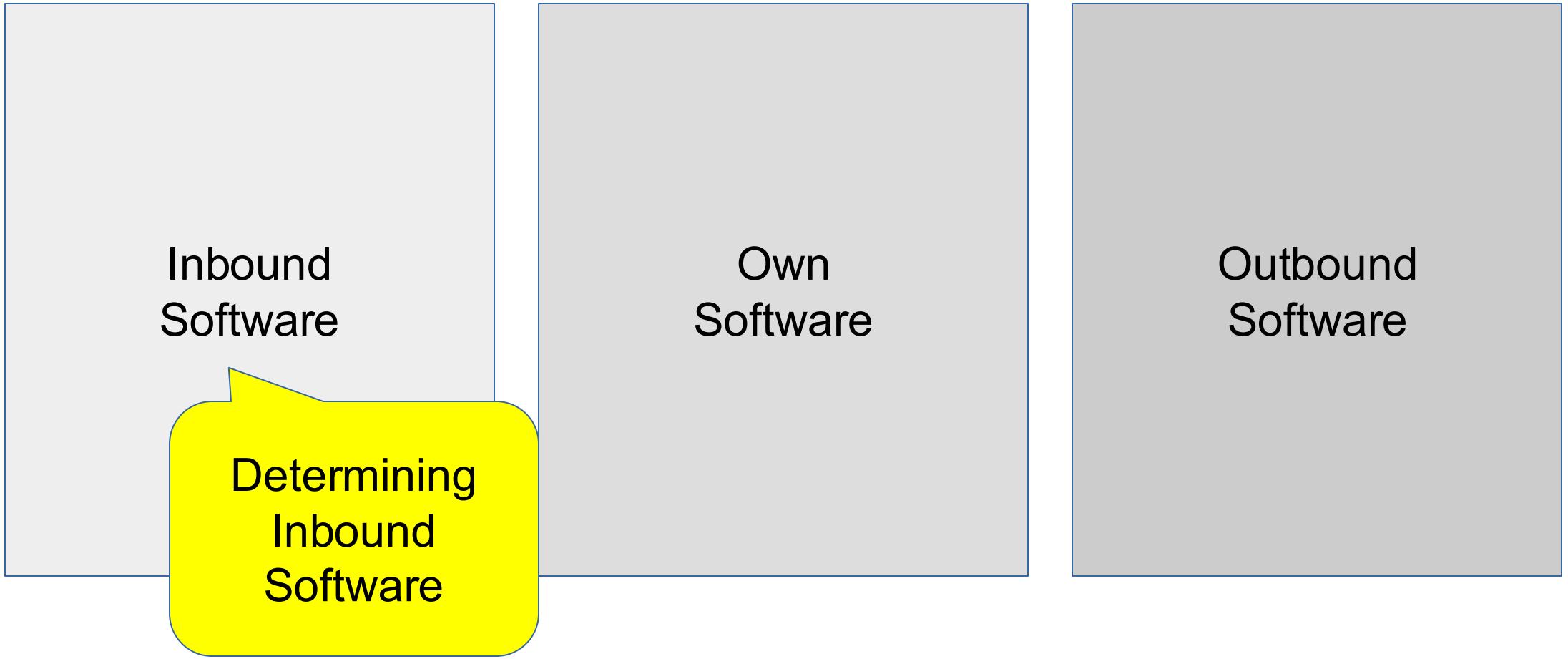
- Integration into Dev Ops tooling requires customization
  - Building software depends on used technology as well as individually setup tooling
  - Additional efforts, if software is comprised of different technologies
  - Today, building environments sometimes contain already metadata about licensing of involved OSS software
  - Identified software elements may require additional checks to determine actual licensing information
    - (in case of heterogeneous licensing)

Dev Ops Integration: More Remarks

OPENCHAIN

- Today, a custom task, nothing to "download and double-click"
- Tooling approach allows for differential approach: once setup and checked, only new dependencies require additional coverage

Dev Ops Integration: Main Usage



5. Component Catalogue

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Component Catalogue: Introduction

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- Purpose:
  - Collect information about used software components and their use in products or projects is centrally collected and can be reused
- Other purposes:
  - A component catalogue captures also the used components in a product or project, maintains a so-named BOM
- Also interesting:
  - Enables also vulnerability management or reuse of export classifications

Component Catalogue: Solved Problem

OPENCHAIN

- Problem: Once analysed component w.r.t. license compliance shall not require repeated analyses, but reuse of information shall be possible

- Component catalogue:
  - Maps component usage in products or projects
  - Makes sense if an organisation has actually multiple products
  - Shows organisation the important software components
  - Allows for a comprehensive overview about involved licensing per product

Component Catalogue: Technical

OPENCHAIN

- A component catalogue can be viewed as a portal
- Database holding the catalogue information
- Another use case is archiving OSS distributions / source code
- Storing also multiple other files,
  for example license analysis reports, SPDX files
- Provides reporting output, for example OSS product documentation
- Component catalogue can be implemented as Web portal, thus accessible from various client computers in organisation

Component Catalogue: More Remarks

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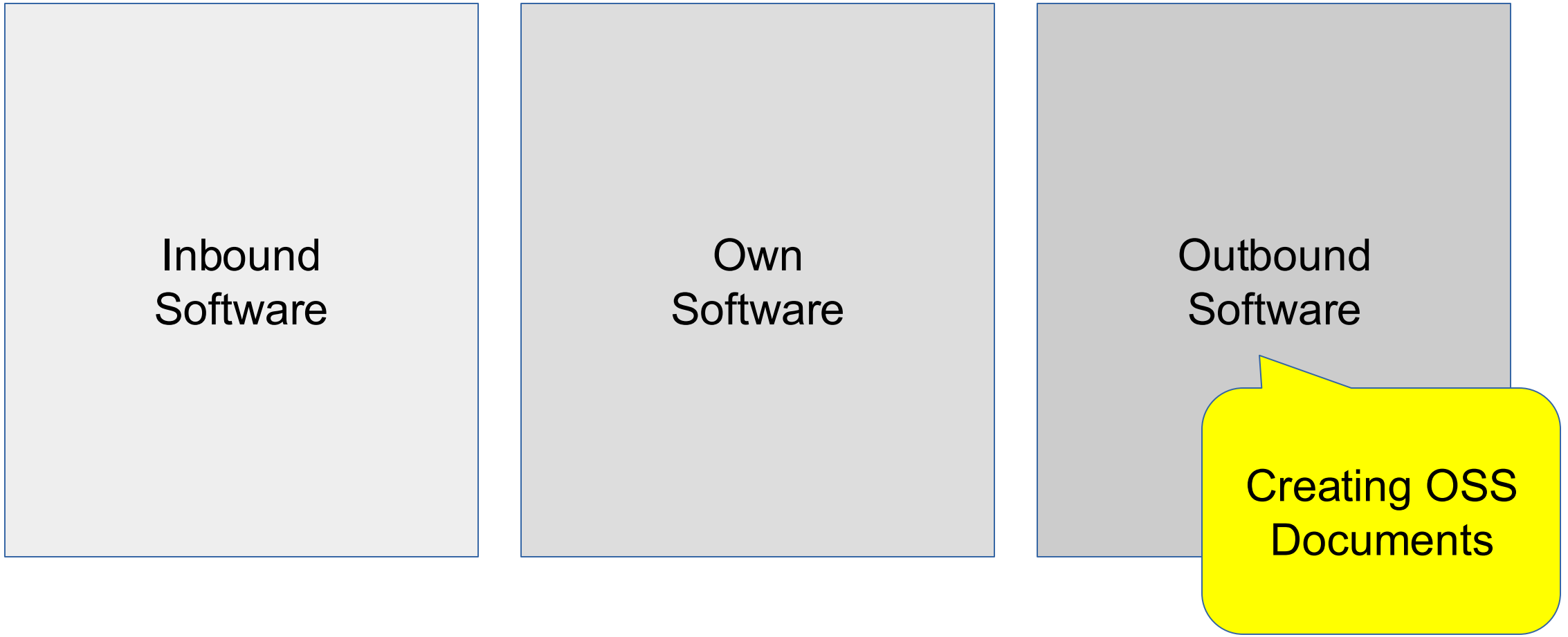
- Component catalogue can be integrated with other license compliance tooling: scanners can directly feed the analyses
- Also integration in Dev Ops tooling is useful to automatically create BOM of products
- Component catalogues can also serve uses cases for vulnerability management
- Another related topic is license management and license metadata

Component Catalogue: Main Usage



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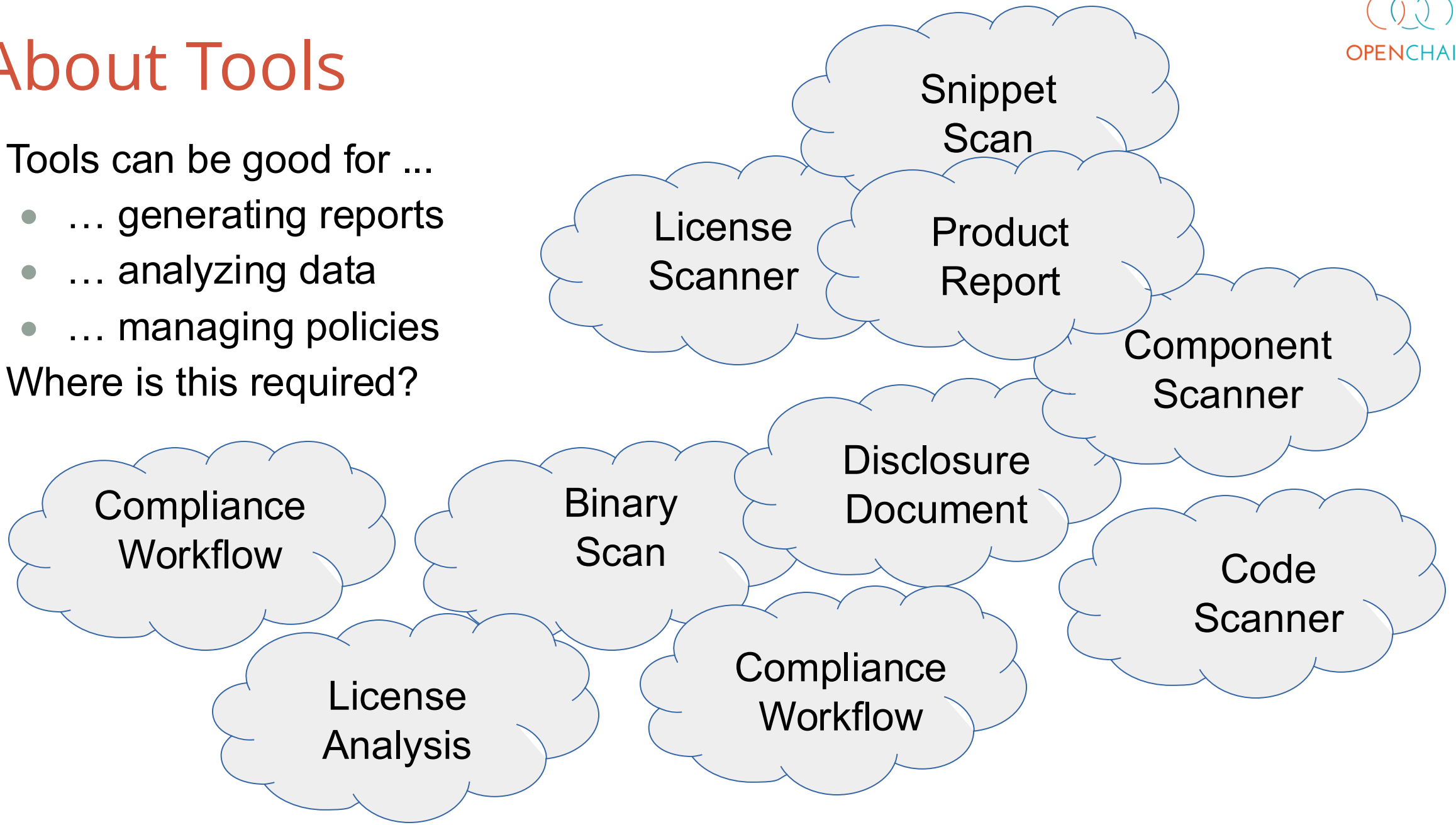

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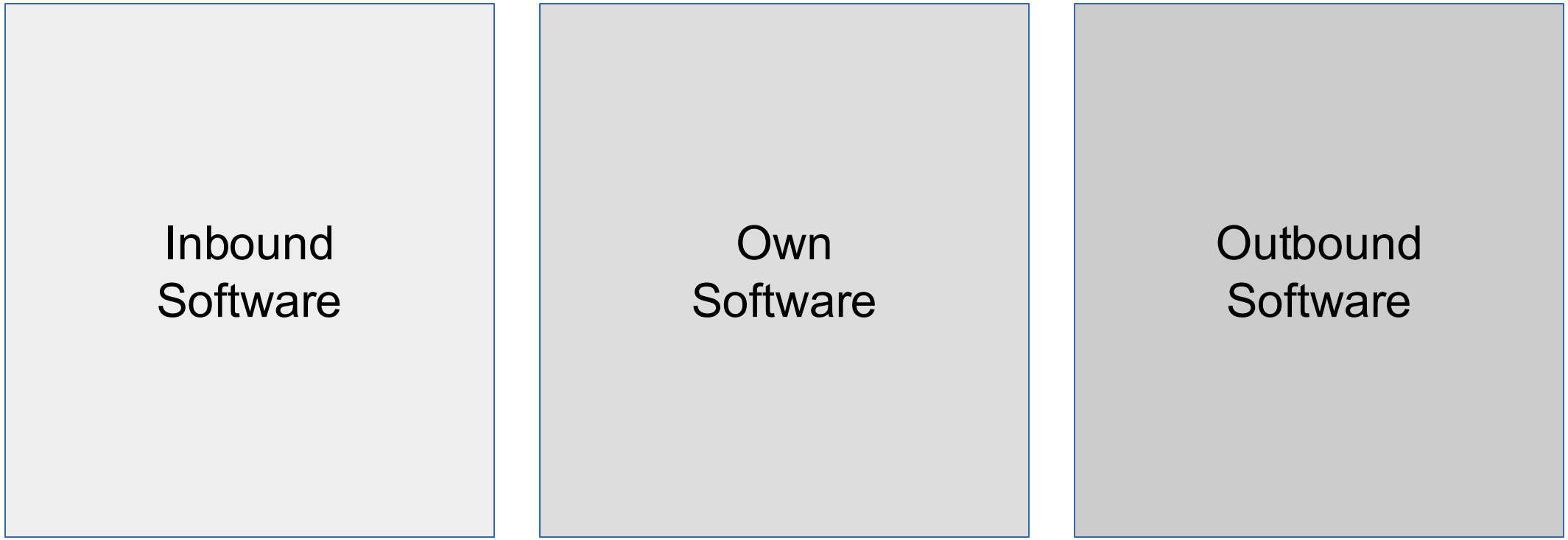

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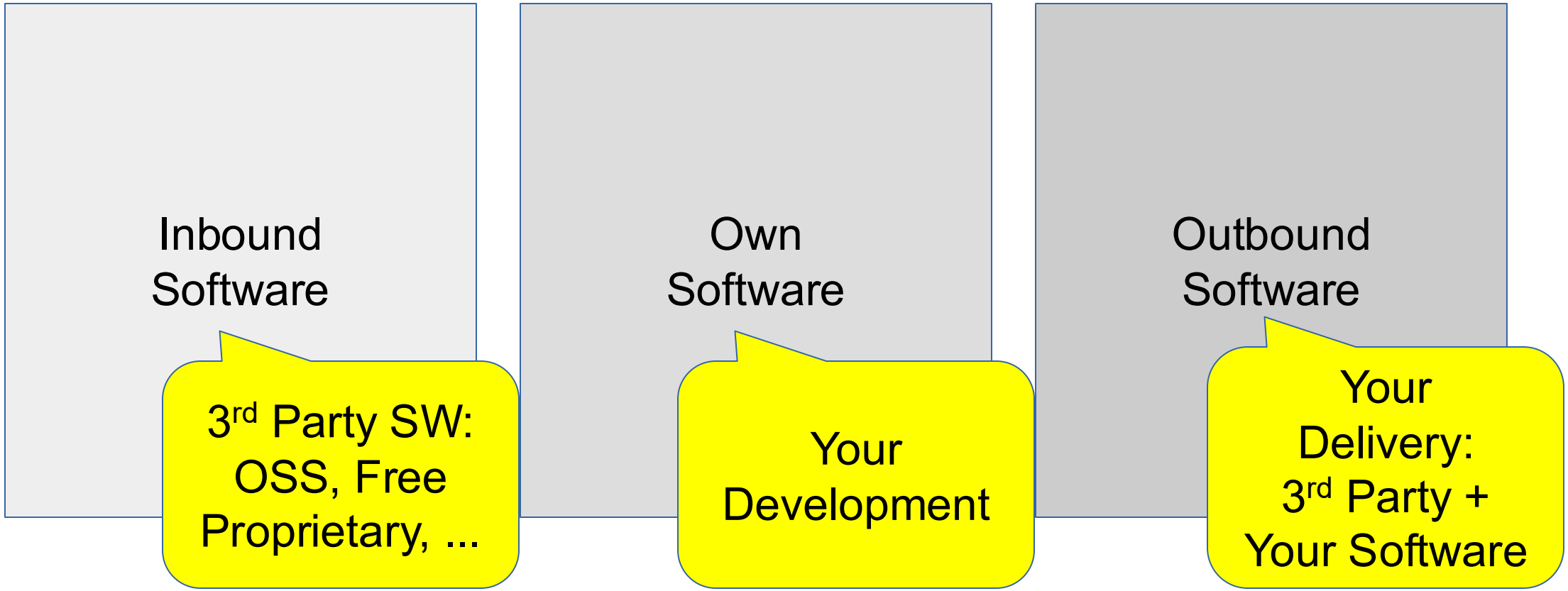

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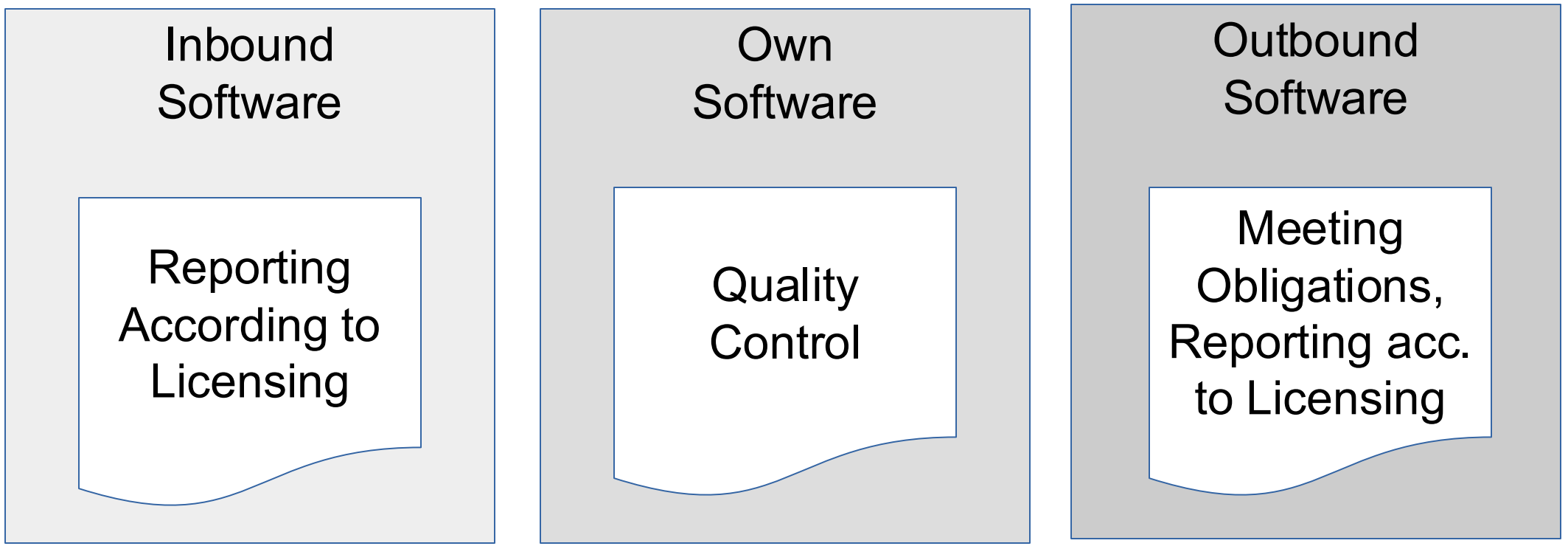

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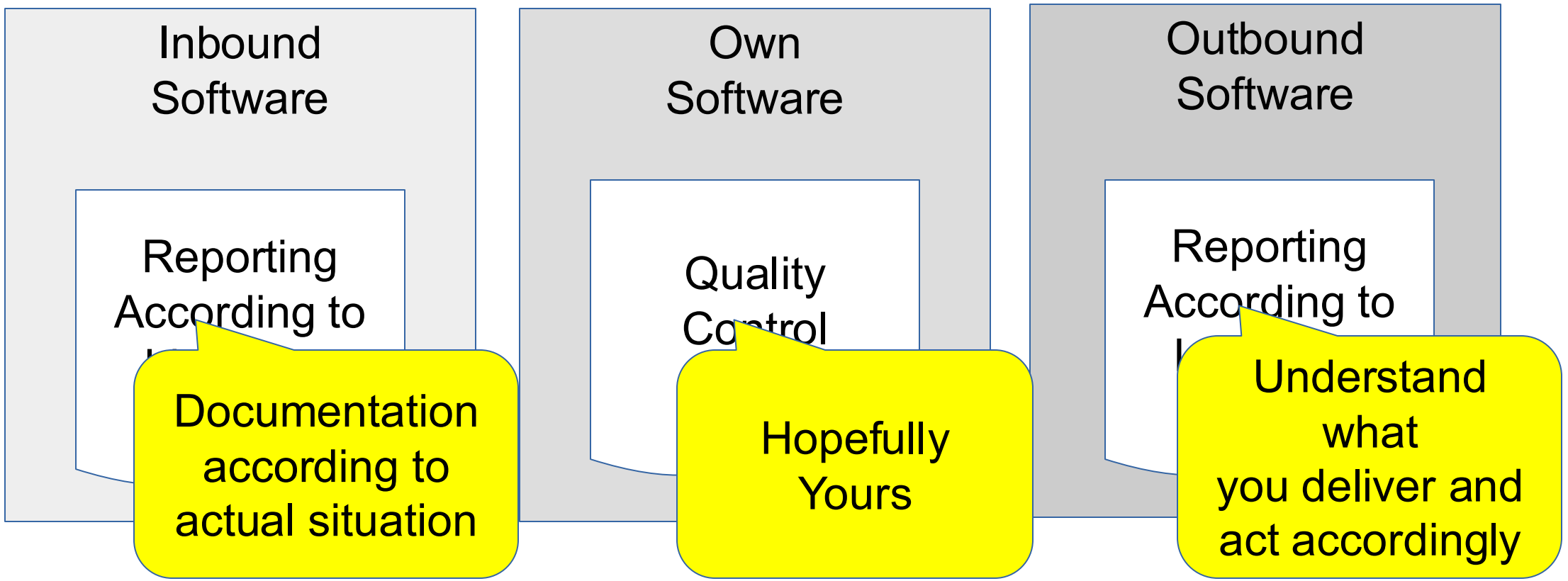

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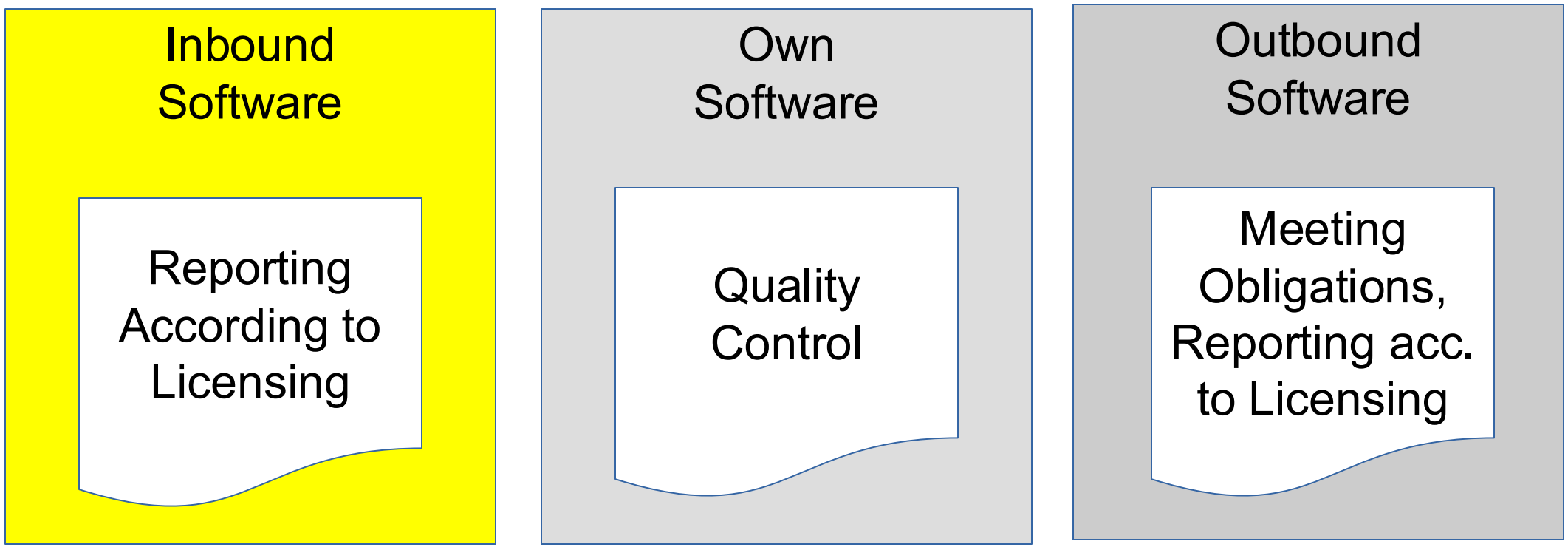

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Identifying Licensing within Inbound Software: Easy Cases

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- License, copying or notice document provided along with software
- At infrastructure, home page or project pages
  - e.g. Github or Sourceforge metadata
- Project definition file
  - e.g. in Java pom.xml
- Already provided license info
  - e.g debian-copyright or SPDX documentation

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  - OSS components are not (always) homogeneous
  - If OSS exists, pull it from elsewhere
  - Code from many sources, different licensing
- Main license does not apply to all contents
  - If project does not enforce common licensing for all contributions
  - CLA: contributor license agreements

Identifying Licenses: The Fun (1)

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Identifying license statements is not straightforward ...

* See README and **LICENS**E files in bz/ directory
* for more information
* about bzip2 library code.
*/

This file is part of Jam - see jam.**c** for **Copyright** information.

---

* See **LICENS**E.qla2xxx for **copyright** and **licens**ing details.

/* **Licens**ing details are in the COPYING file accompanying popt source **distribut**ions, available from ftp://ftp.rpm.org/pub/rpm/dist. */

Copyright (c) Insight Software Consortium. All rights reserved.
See ITK**Copyright**.txt or http://www.itk.org/HTML/**Copyright**.htm for details.

---

* See wps_upnp.**c** for more details on **licens**ing and code history.

Identifying Licenses: The Fun (2)

OPENCHAIN

… or just very difficult statements

```
* Copyright (c) 1998-1999 Some Company, Inc. All Rights Reserved.
*
* This software is the confidential and proprietary information of Some
* Company, Inc. ("Confidential Information").  You shall not
* disclose such Confidential Information and shall use it only in
* accordance with the terms of the license agreement you entered into
* with Some Company.
*
* Some Company  MAKES NO REPRESENTATIONS
* OR WARRANTIES ABOUT THE SUITABILITY OF THE
* SOFTWARE, EITHER EXPRESS OR IMPLIED,
* INCLUDING BUT NOT LIMITED TO THE ….
```

Identifying Copyright

Some licenses ask for copyright notice or author listing

- Resulting obligation of providing these
- Generally, there is software for these problems
- Challenge: wrongly expressed copyright statements

Identifying Copyright: Fun (again)

OPENCHAIN

Identifying copyright statements is not less fun:

```
Copyright by many contributors; see http://babel.eclipse.org/
---
 *  Original Code <s>Copyright (C) 1994, Jeff Hostetler, Spyglass, Inc.</s>
 *  Portions of Content-MD5 code <s>Copyright (C) 1993, 1994 by Carnegie Mellon
 *     University</s> (see Copyright below).
 *  Portions of Content-MD5 code <s>Copyright (C) 1991 Bell Communications
 *     Research, Inc. (Bellcore</s>) (see Copyright below).
 *  Portions extracted from mpack, John G. Myers - jgm+@cmu.edu
 *  Content-MD5 Code <s>contributed by Martin Hamilton (martin@net.lut.ac.uk)</s>
```

Identifying Licenses: Binaries

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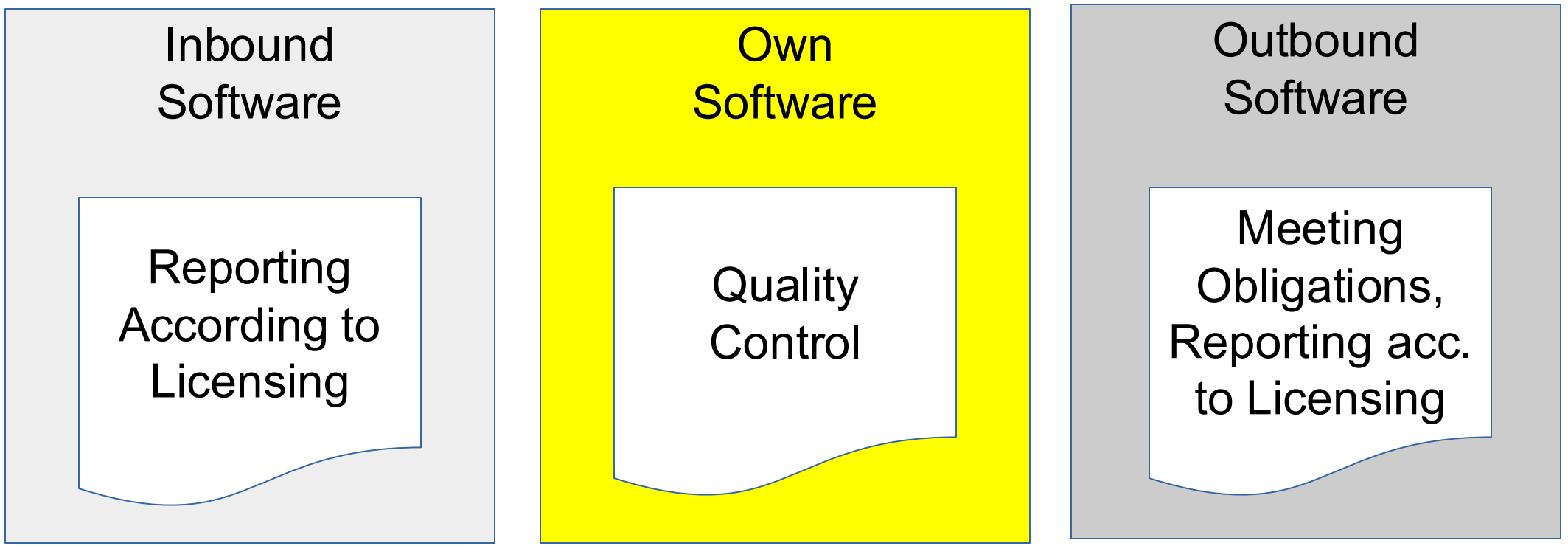
Binaries are compiled applications, libraries, software that can be used

- Binary = code translated from programming language to executable code by processor → information encoded
- Binaries can be part of an OSS component distribution
- Binaries can include OSS

How to understand what is contained in a binary?

- Main problem 1: different binary technologies
- Main problem 2: small variations, new binary

Part II: Your Own Software



What is the Issue with Your Software?

OPENCHAIN

Sometimes, genuinely written software is expected
but “copy & paste” solution can be very near

- Open source projects are publicly available
- But also other files are valuable: scripts, icons, images, css files
- and code copied from Web sites for best practices and snippets

Copy paste of source code from the Internet in your code can be done:

- Respecting the author’s interests required: licensing, copyright
- Generally, reuse is good - opposed to reinventing the wheel

Code Scanning

OPENCHAIN

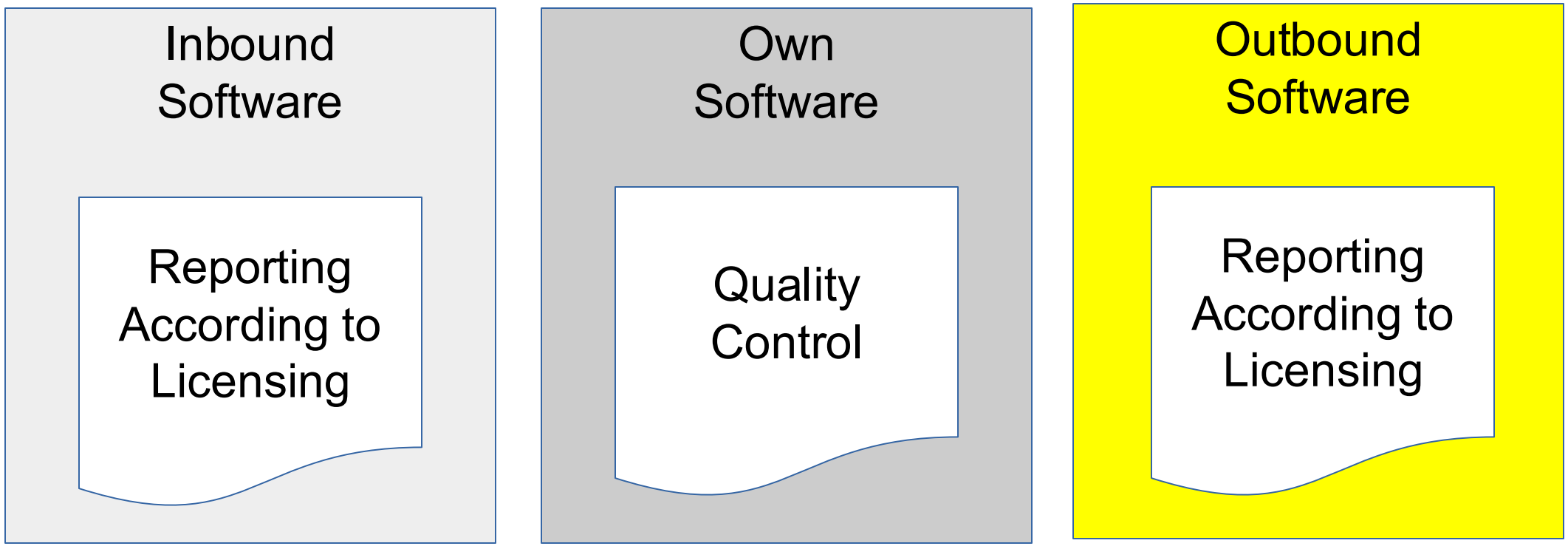
Good education and engineering codex can be solution

- Plain “copy & paste” of source code is bad practice anyway today
- Duplicated code reduces maintainability
- Engineers like clean dependency management

For all other cases

- Scanning tools for source code based on comparing text portions
- Using a database of already published source code (by other party)
- What is in Internet, tutorial code from vendors, Github
- Licensing: scan for licensing statements again

Part III: Outbound Software



Case 1: Distribution of OSS (1)

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Distributing OSS as part of product or project

- E.g. requires notice file
  - Listing all licenses, listing copyright notice
  - … as a basic and common license obligation
- E.g. written offer to provide the OSS code

Builds upon knowledge on

- Which OSS components are in (here comes the BOM!)
- Which licenses in there, copyright notices

Case 2: Quality Management

OPENCHAIN

Project or product documentation can require, e.g.

- All tests passed
- But as well: all licenses checked?
  - For their obligations, for their compatibility
- Or: All OSS required material ready for distribution

Requires (as well)

- Which OSS components are in
- Which licenses in there, copyright notices

Case 3: Ensuring Distribution Rights

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Some licenses are not compatible

- That is life, for example GPL <-> EPL incompatibility
- *Distribution based on GPL works and EPL works: maybe a problem*

Some license statements are ambiguous

- For example „Licensed under BSD”
- *Requires legal decision how did you decide this statement*

Besides Delivering, Internal Work

Some license statements need documentation

- For example: „for license conditions, see Web site”
- *Web site needs to be archived*

Some licenses are not compatible with the business case

- E.g. Start up implements medical analysis algorithm after years of research, danger of being copied by market leaders
- *License obligations need to be compatible with business goals*

Excursus: Not OSS only, all 3rd Parties

OPENCHAIN

Also with commercial software, appropriate licensing must be ensured:

- Does contract cover rights for intended commercial use?
- Where is the contract by the way?

Ensuring distribution obligations is required, for example:

- Documentation of distribution
- Time- / volume-limited licensing
- Logo printed on box necessary

BOM Documentation (1)

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BOM: „Bill of Material”

- It is a general question what is in the delivery
- Understand the nature of the delivery (How much OSS?)
- Understand potential issues (IP)
- How else to ensure license compliance?
- Basics of supply chain issues actually apply also to software
- Software Package Data Exchange (SPDX) specifies one implementation how to express a BOM of a software package [1]

[1] https://spdx.org/

BOM Documentation (2)

OPENCHAIN

Bill of material can be general obligation, for example at:

- USA: Cyber Supply Chain Management and Transparency Act of 2014
- Germany: KRITIS: BSI-Kritisverordnung [2]
  - Obliged to report service disturbances
  - Obliged to implement information security
  - Requires knowledge about BOM

[2] https://www.bmi.bund.de/SharedDocs/pressemitteilungen/DE/2017/06/nis-richtlinie.html

Your Own Software as OSS (1)

OPENCHAIN

Yes, it is true: sometimes software developers want to publish their work

- Excursus: Motivation 3.0 [3]
- How to publish? - A process topic
- But documentation is required (besides the publication)
  - What are the involved licenses
  - What is the own license
  - Are formal aspects met?

[3] https://www.youtube.com/watch?v=u6XAPnuFjJc

Your Own Software as OSS (2)

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Analysis here has the goal to

- Confirm involved OSS licensing, business compatible?
- Identify dependencies and binaries
- Checking if all the source code is of our origin?

General quality points (including, but not limited to):

- Do all files have headers? (disclaimers for config files)
- Do all files have copyright and authorship statements
- Is the documentation of the licensing appropriate?

Summary of Tool Support

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Tools are there, but requirements and purpose require understanding

- First comes the definition of what is needed and then the tool
- Tools are there for analysis, reporting and management

Different tools serve different purposes

- Requires integration of different functions
- Integration poses classic IT problems
- Interfaces must be understood to avoid manual effort

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CHAPTER 2

Tooling Types

Overview

Main types of tools in the area of license compliance include (but are not limited to):

- Source code scanning
- License scanning
- Binary scanning
- Dev Ops integration
- Component management

1. License Scanner

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License Scanner: Introduction

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- Purpose:
  - Identifies licenses and license relevant statements
- Other Identifications:
  - Copyright statements, author statements, acknowledgements
- Also of interest:
  - Export control statements, more static code analysis

License Scanner: Solved Problem

OPENCHAIN

- Problem: Identify licensing in Open Source Software packages

- Licensing in Open Source Software
  - Licensing of OSS can be heterogeneous, different licensing applies to parts of OSS
  - Licensing statements are not uniform
  - Many licenses exist, number growing

- Tool based licensing identification required for complicated licensing situations

License Scanner: Technical

OPENCHAIN

- Mode of operation: Tool searches in content
- for license relevant keywords, phrases, license texts

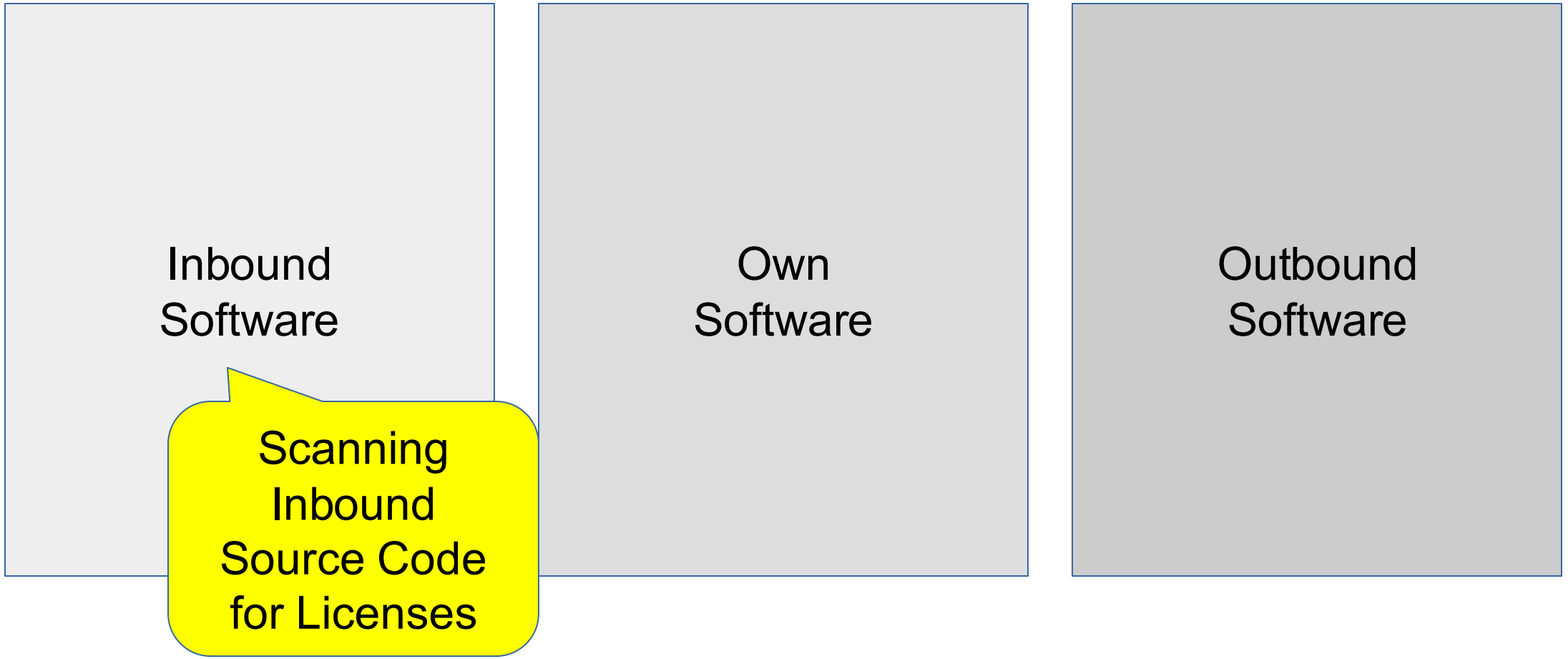
- Searching in every file of software uploaded: requires source code distribution
- Different approaches can be applied: regular expressions, text comparison, phrase collection
- Requires database of license texts, licensing statements
- Comparison with existing license texts enables exact identification
- Licensing information can summarized for open source packages

License Scanner: More Remarks

OPENCHAIN

- License scanning does not require huge database
- However, updates are necessary as licensing statements evolve and new licenses are still created
- Identified licensing information of a software package can be exchanged using SPDX files
- Approach makes sense for OSS licenses, commercial licensing is even more heterogeneous
- License identification precision depends on available licensing information and may require expert knowledge for analysis

License Scanner: Main Usage



2. Binary Scanner

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Binary Scanner: Introduction

OPENCHAIN

- Purpose:
  - Identifies used software packages in software binaries
- Other identifications:
  - Can also determine the versions of software packages
- Also of interest:
  - Identifying used software packages for creating the binary also enables identification of vulnerabilities

Binary Scanner: Solved Problem

OPENCHAIN

- Problem: A binary is comprised of different software packages, but if not declared, not obvious to determine

- Applies in compiled programming languages: programming language code is translated (=compiled) into machine executable code (machine = processor)
- Script languages (e.g. JavaScript) are not compiled
- Binaries are usually not readable, understanding contents difficult
- However, identification of contents can be inevitable for understanding required license compliance tasks

Binary Scanner: Technical

OPENCHAIN

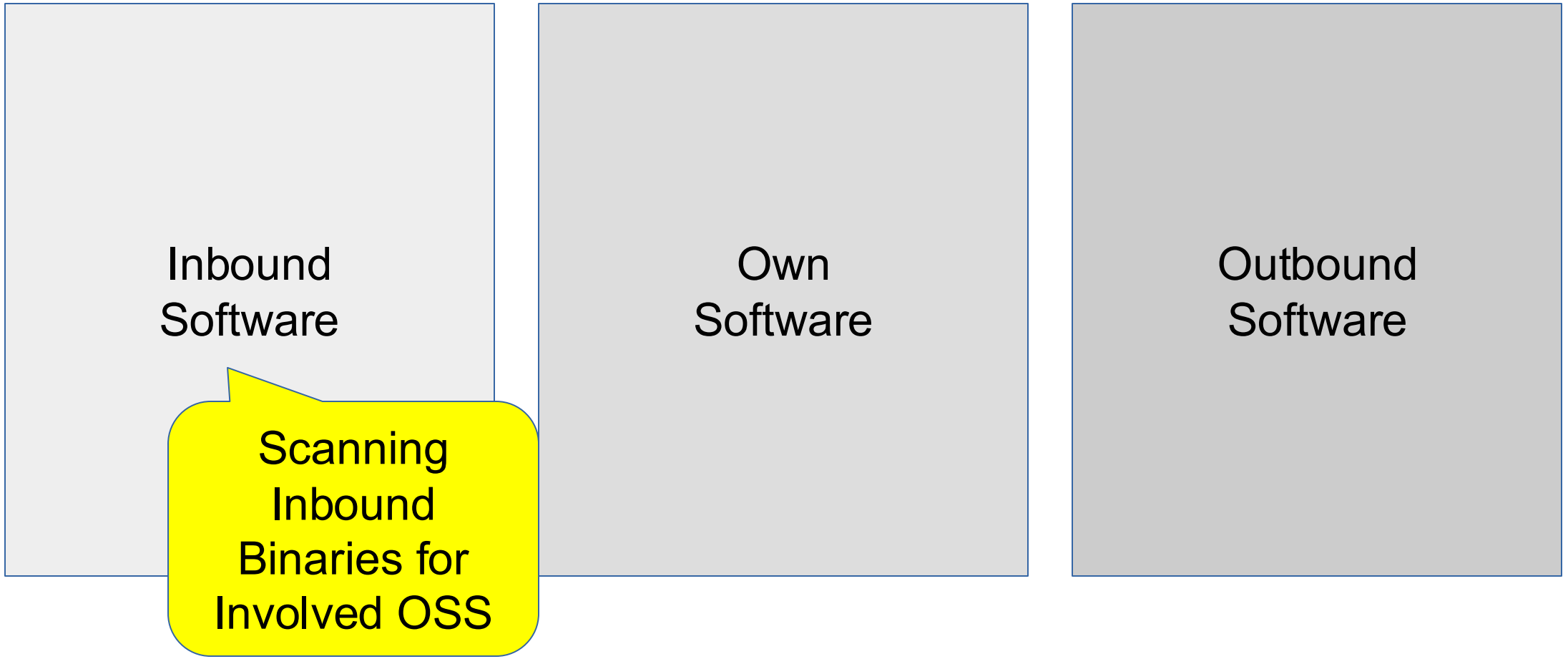
- Compiled machine language can contain characteristic elements
- For example used string variables (=text)
  or other content compiled into the binary
- Simpler method: capturing file names,
  or for run-time code (e.g. Java): method and field names
- Requires database of mapping
  from source code to resulting artifacts in binary

Binary Scanner: More Remarks

OPENCHAIN

- Binary scanning is a heuristic,
  secure mapping not supported for every possible binary
- Topic connected with reproducible builds
  - (then, binaries can be compared more efficiently)
- Database requires updates because,
  because new software is published every day
  - (similar with source code scanning)

Binary Scanner: Main Usage



3. Source Code Scanner

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Source Code Scanner: Introduction

OPENCHAIN

- Purpose:
  - Can identify published origin of source code and other files
- Other Identifications:
  - Icons, images, style descriptions, XML schemes, documentation
- Also of interest:
  - Programming examples, from blogs and best practise Websites

Source Code Scanner: Solved Problem

OPENCHAIN

- Problem: how to understand that source code or other files have been taken from elsewhere, not self-created, and not declared

- If "own" software is not entirely own software and not understood:
  - Missing rights for business case in "own" software
  - But distribution requires distribution rights are available
  - Identification of origin is first step to understand available rights

Source Code Scanner: Technical

OPENCHAIN

- Mode of operation: upload source code or just files or fingerprints of it, get origin in case it is captured by database

- File contents are compared
  with contents from (huge) database of published contents
- Fingerprinting of file contents (“hashing”)
  allow for accelerated search and storage in database
- Not only coverage of entire files, but fragments of it
- Database requires updates: every day new published OSS
- Content is large (e.g. the entire GitHub)

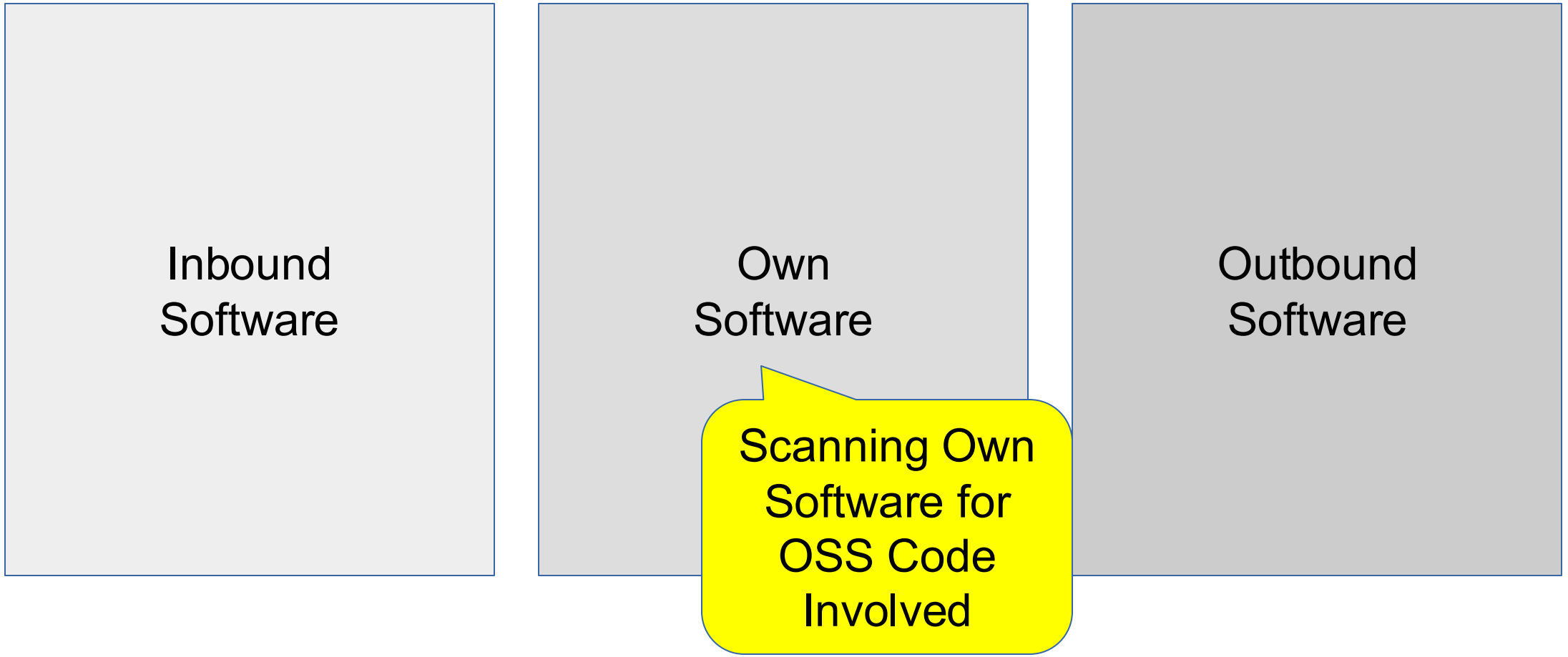
Source Code Scanner: More Remarks

OPENCHAIN

- Once origin of source is identified, more metadata can be made available:
  - Licensing
  - Vulnerabilities
- Potential for integration:
  - Development toolchain
  - Reporting, BOM

- Matched content may require expert knowledge to determine relevance

Source Code Scanner: Main Usage



4. Dev Ops Integration

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Dev Ops Integration: Introduction

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- Purpose:
  - Uses the information from building the software to determine OSS used
- Other identifications:
  - Can be combined with source code scanning, license scanning, binary scanning
- Also of interest:
  - Resulting identification of elements during building the software enables the creation of a bill of material (BOM)

Dev Ops Integration: Solved Problem

OPENCHAIN

- Problem: for larger software projects a tool based approach is inevitable to understand involved OSS

- Modern software building environments have defined dependencies
- During compilation, dependencies can be captured to understand used dependencies
- License compliance integrated into the Dev Ops tooling implements automation
- Reporting as part of Dev Ops tooling reduces manual efforts
- Enables short release cycles in an agile environment

Dev Ops Integration: Technical

OPENCHAIN

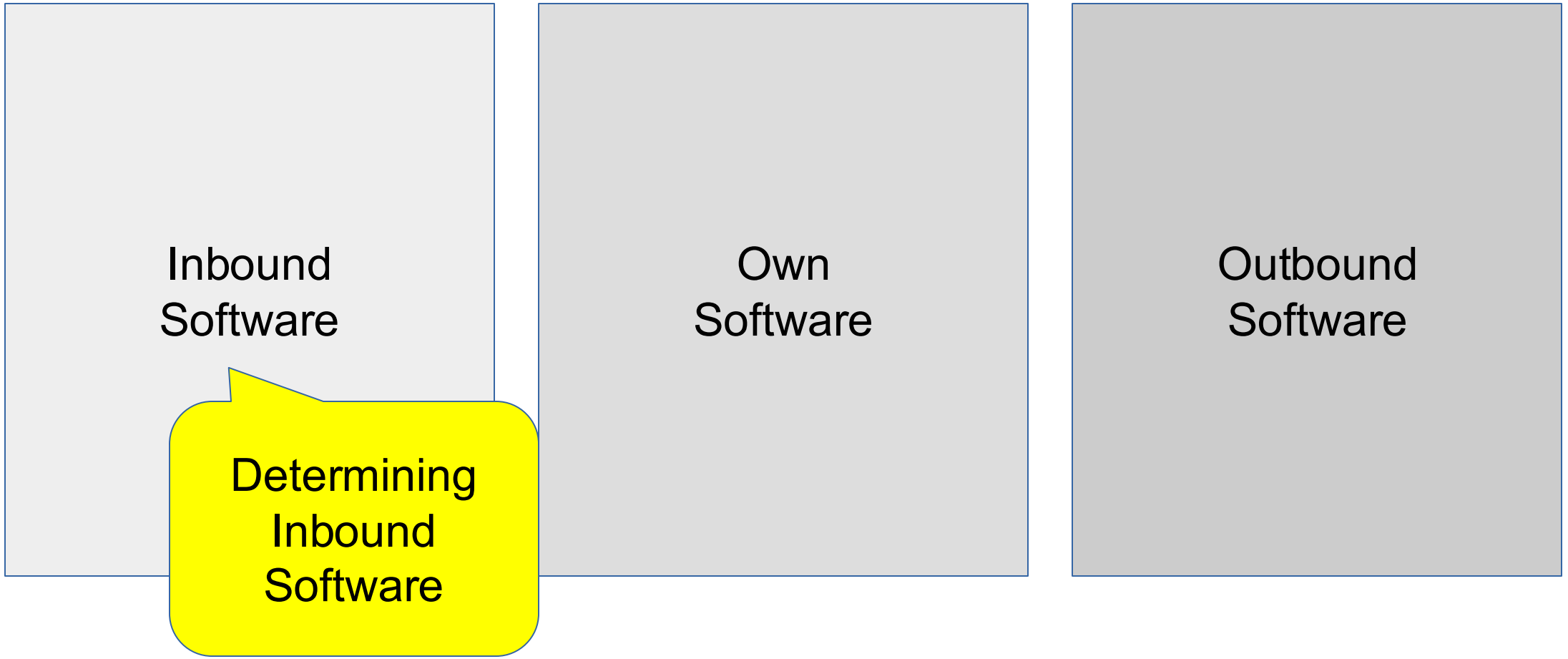
- Integration into Dev Ops tooling requires customization
  - Building software depends on used technology as well as individually setup tooling
  - Additional efforts, if software is comprised of different technologies
  - Today, building environments sometimes contain already metadata about licensing of involved OSS software
  - Identified software elements may require additional checks to determine actual licensing information
    - (in case of heterogeneous licensing)

Dev Ops Integration: More Remarks

OPENCHAIN

- Today, a custom task, nothing to "download and double-click"
- Tooling approach allows for differential approach: once setup and checked, only new dependencies require additional coverage

Dev Ops Integration: Main Usage



5. Component Catalogue

OPENCHAIN

Component Catalogue: Introduction

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- Purpose:
  - Collect information about used software components and their use in products or projects is centrally collected and can be reused
- Other purposes:
  - A component catalogue captures also the used components in a product or project, maintains a so-named BOM
- Also interesting:
  - Enables also vulnerability management or reuse of export classifications

Component Catalogue: Solved Problem

OPENCHAIN

- Problem: Once analysed component w.r.t. license compliance shall not require repeated analyses, but reuse of information shall be possible

- Component catalogue:
  - Maps component usage in products or projects
  - Makes sense if an organisation has actually multiple products
  - Shows organisation the important software components
  - Allows for a comprehensive overview about involved licensing per product

Component Catalogue: Technical

OPENCHAIN

- A component catalogue can be viewed as a portal
- Database holding the catalogue information
- Another use case is archiving OSS distributions / source code
- Storing also multiple other files,
  for example license analysis reports, SPDX files
- Provides reporting output, for example OSS product documentation
- Component catalogue can be implemented as Web portal, thus accessible from various client computers in organisation

Component Catalogue: More Remarks

OPENCHAIN

- Component catalogue can be integrated with other license compliance tooling: scanners can directly feed the analyses
- Also integration in Dev Ops tooling is useful to automatically create BOM of products
- Component catalogues can also serve uses cases for vulnerability management
- Another related topic is license management and license metadata

Component Catalogue: Main Usage