Compatibility Prediction of Eclipse Third-party Plug-ins in new Eclipse Releases

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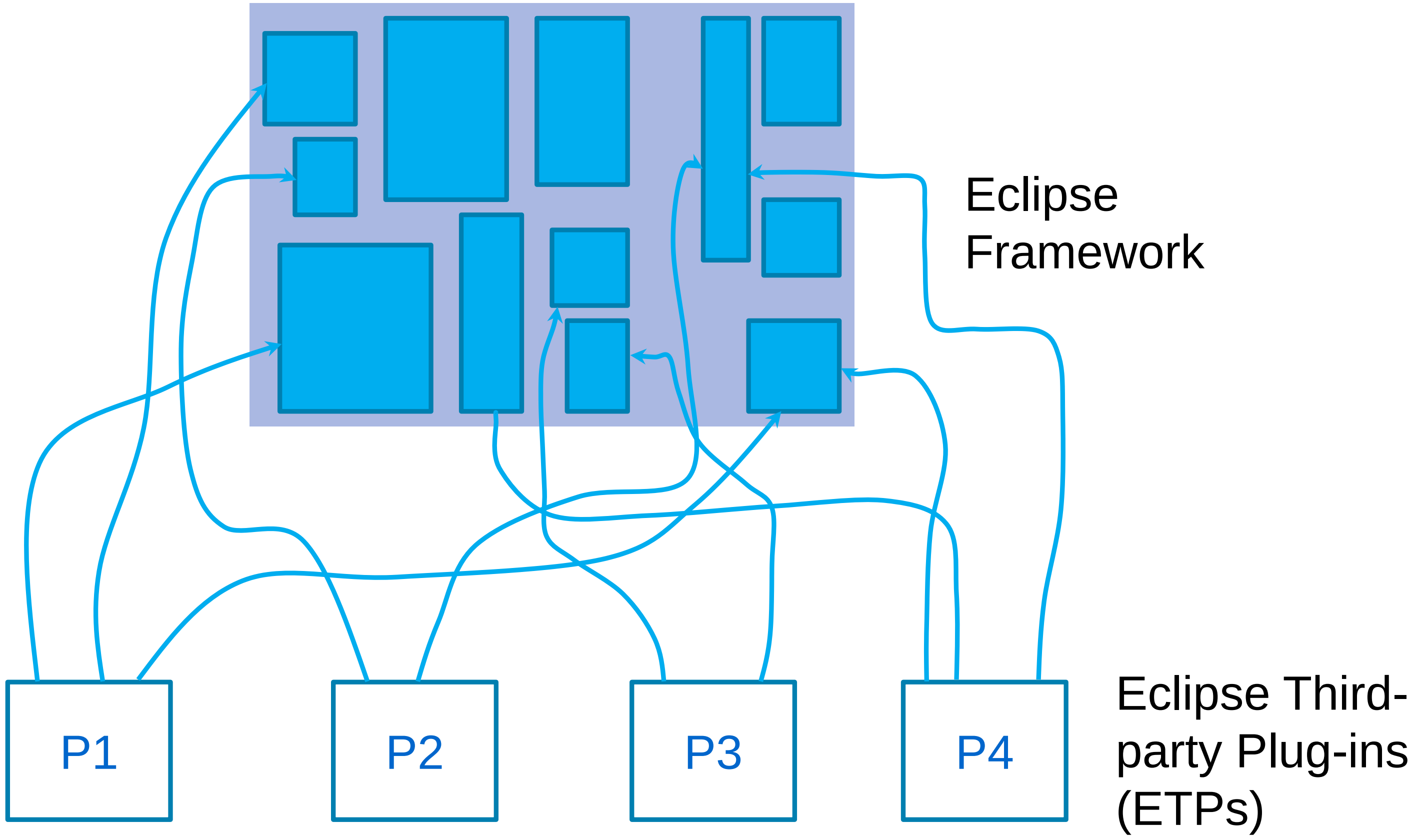
Where innovation starts

The Eclipse Framework



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The Eclipse Framework …

Eclipse APIs(“**good**”)

- no “internal”
- stable,
- supported

Eclipse non-APIs (“**bad**”)

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- discouraged,
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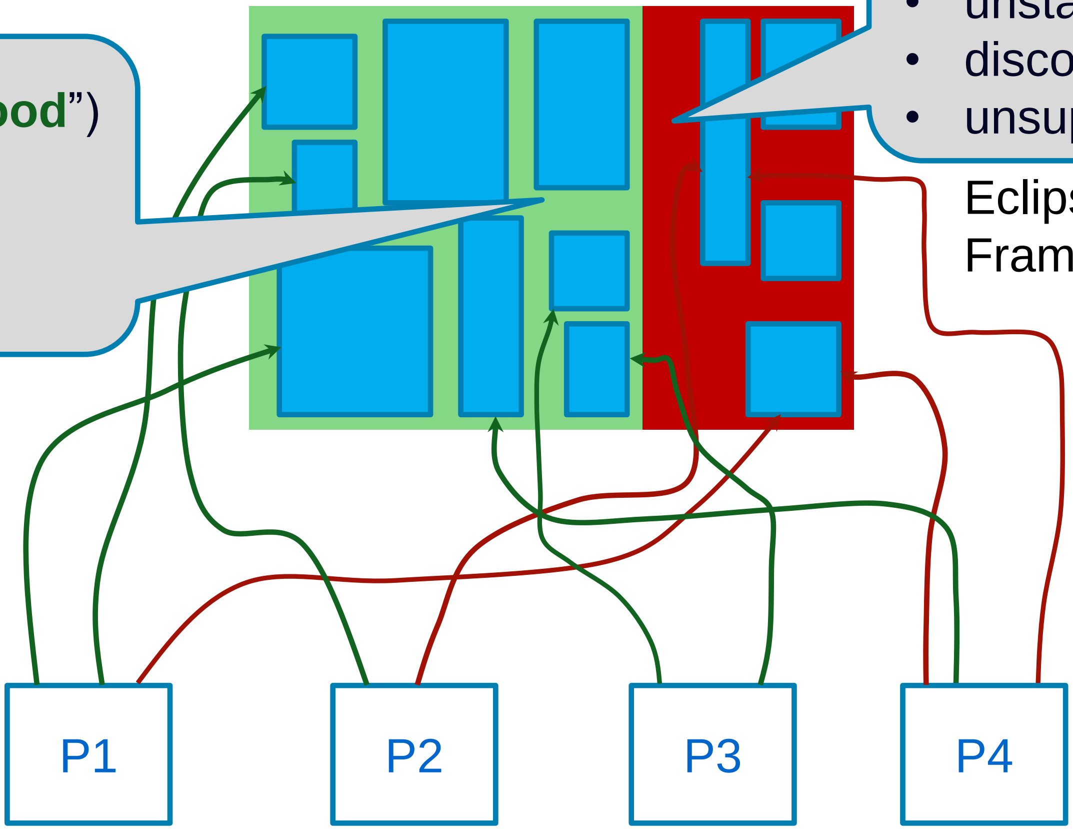
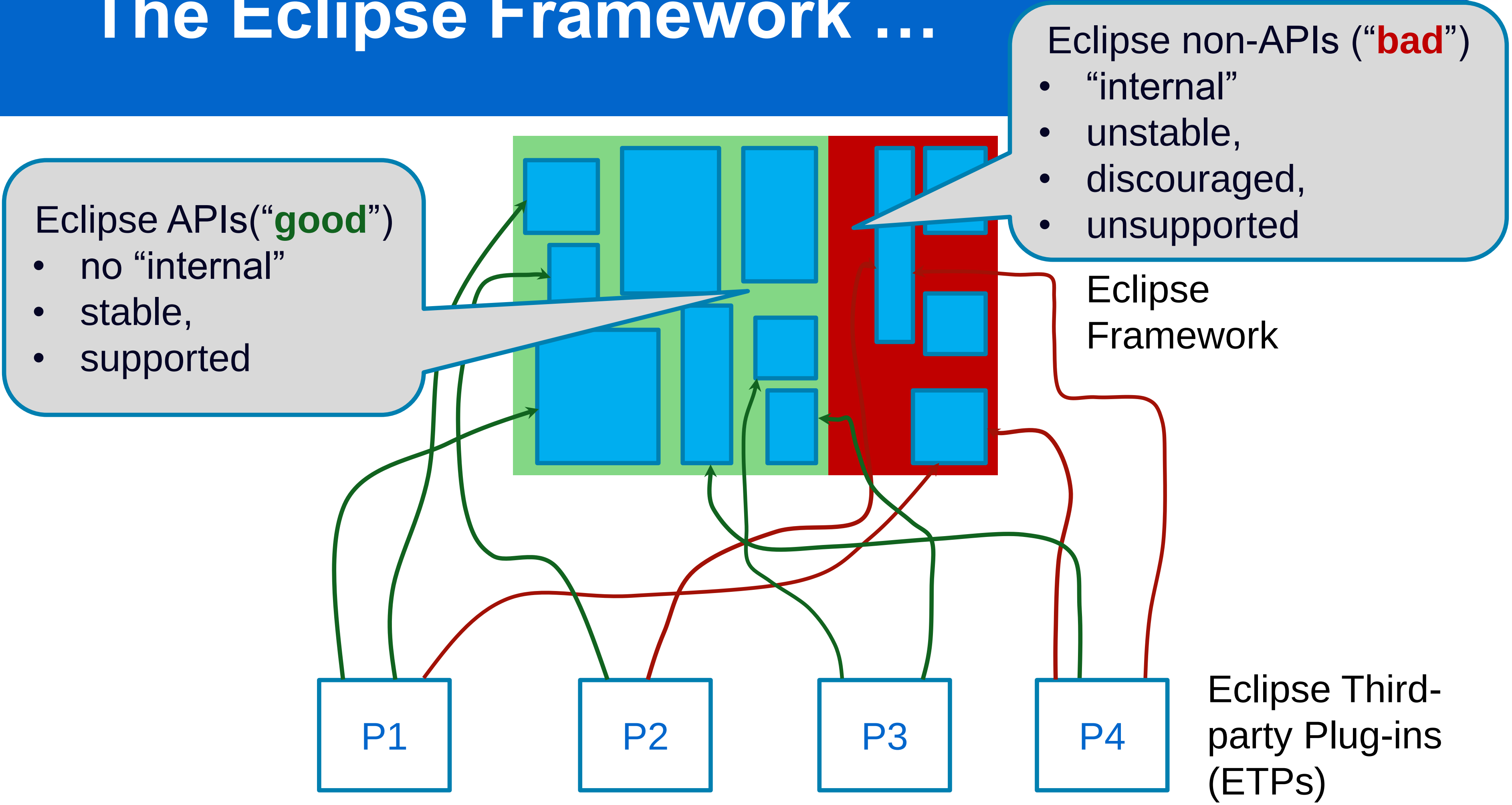


Eclipse Framework

Eclipse Third-party Plug-ins (ETPs)

The Eclipse Framework …



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- P3 – ETP-APIs
- P1, P2 and P4 – ETP-non-APIs

Motivation

- Previous study (Survival of ETPs – ICSM 2012), we tested compatibility of 345 ETP-APIs and 288 ETP-non-APIs with different Eclipse releases.
- Our observations:
  1. ETP-APIs always compatible in new Eclipse releases.
  2. Bad interfaces are the main cause of incompatibilities.
  3. Informally, found old bad interfaces stable.
- Formally verified observation 2.
- Trained prediction models
- Tested the prediction models.

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Compatibility prediction

- Requirements of compatibility prediction:
  - Current SDK compatible with ETP
  - Later SDK to make prediction
- We built 36 prediction models in total
- Models are bases on bad interfaces used by ETPs

ETP-non-APIs supported in Eclipse Releases

Eclipse	2.1	3.0	3.1	3.2	3.3	3.4	3.5	3.6	Total
# ETPs	29	48	34	40	38	36	33	30	288

Model Training

- Statistics – Binary Logistic Regression

$$\boldsymbol{P}(event) = 1/(1 + e^{-\boldsymbol{z}})$$

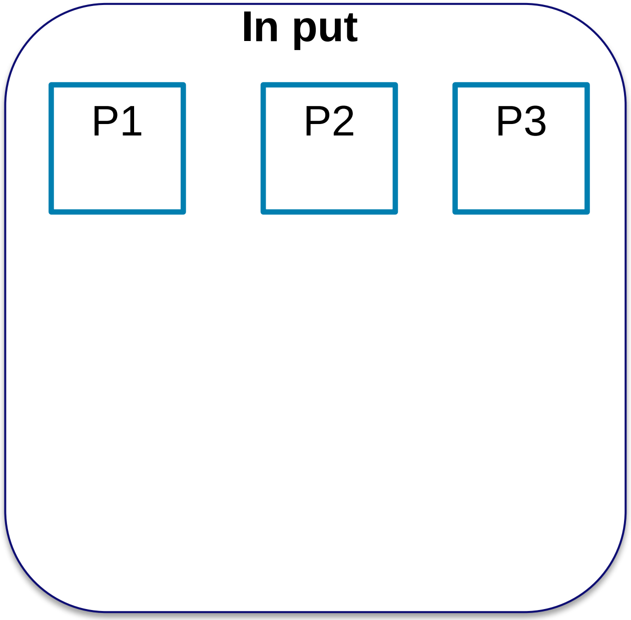
$$\boldsymbol{z} = b_0 + b_1X_1 + \ \dots + b_pX_p$$

$\boldsymbol{P}(event)$ –Dependent variable

p # Independent variables

Model Training Example

ETPs supported in Eclipse 3.0 – Prediction in Eclipse *X*, where *X* > 3.0



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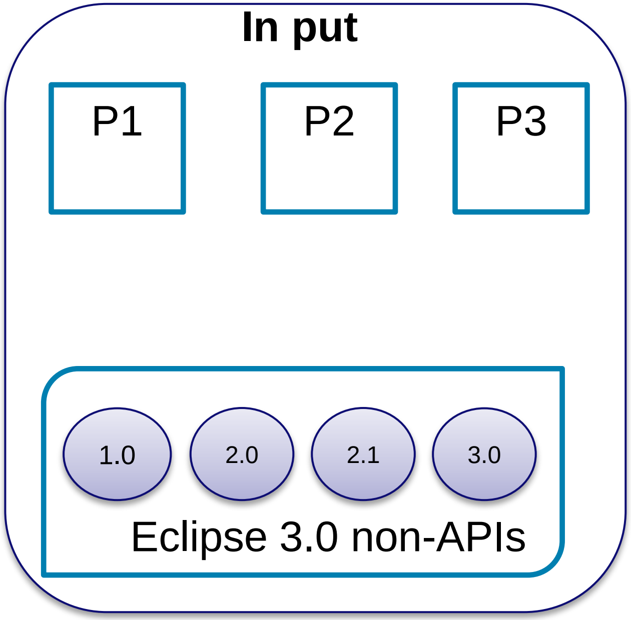

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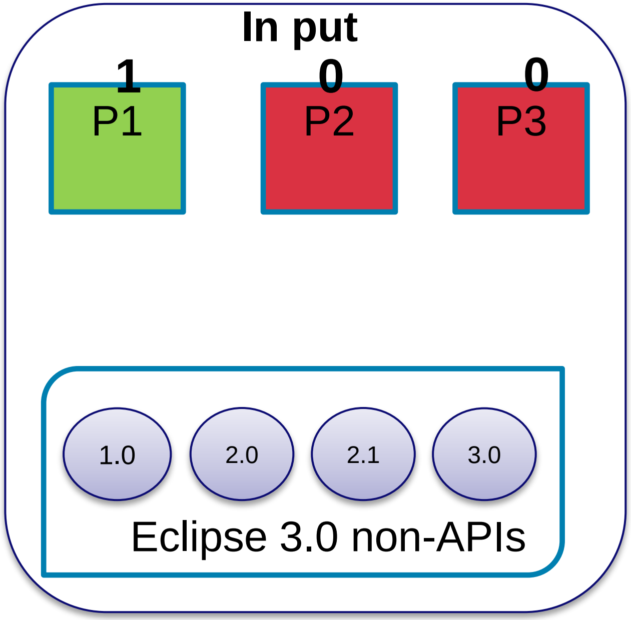

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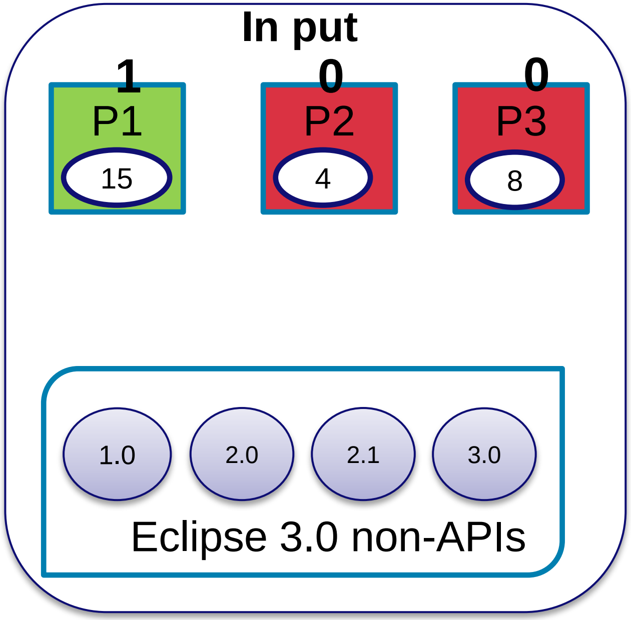

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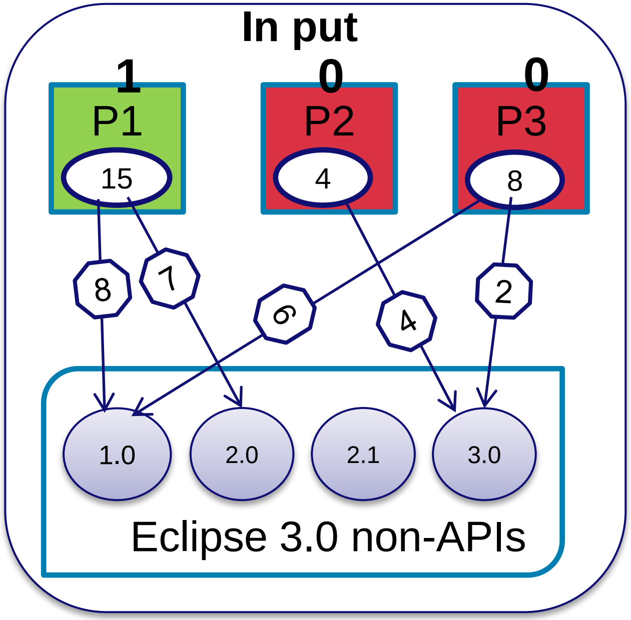

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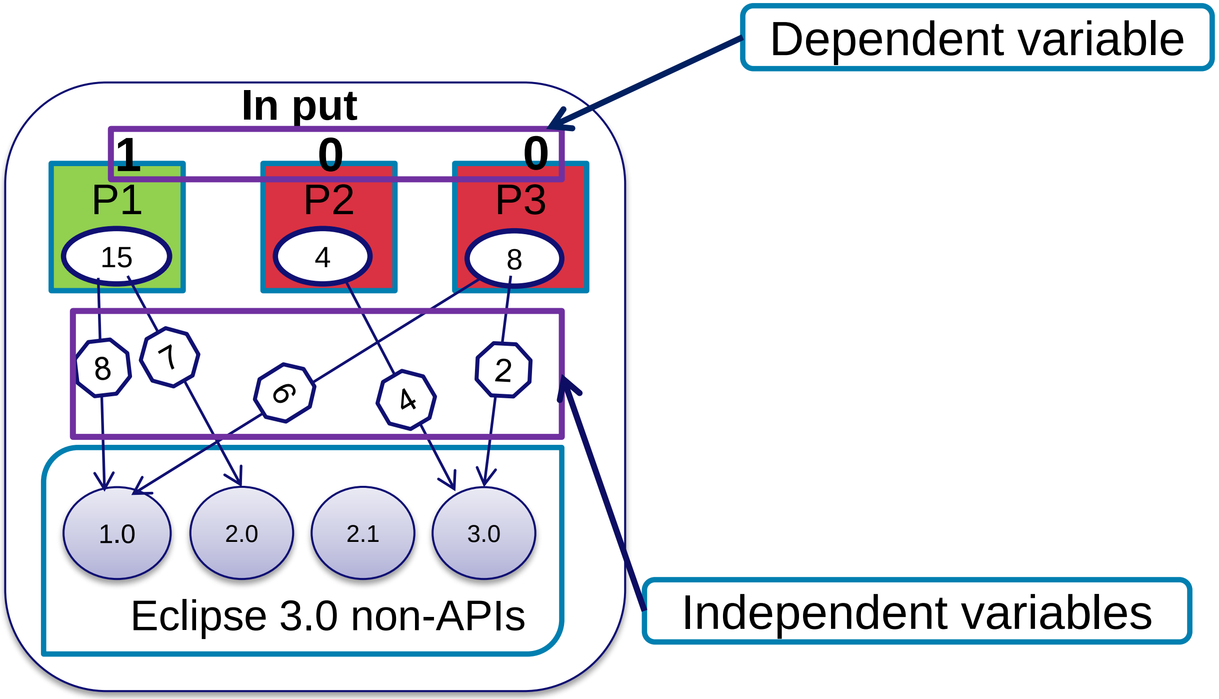

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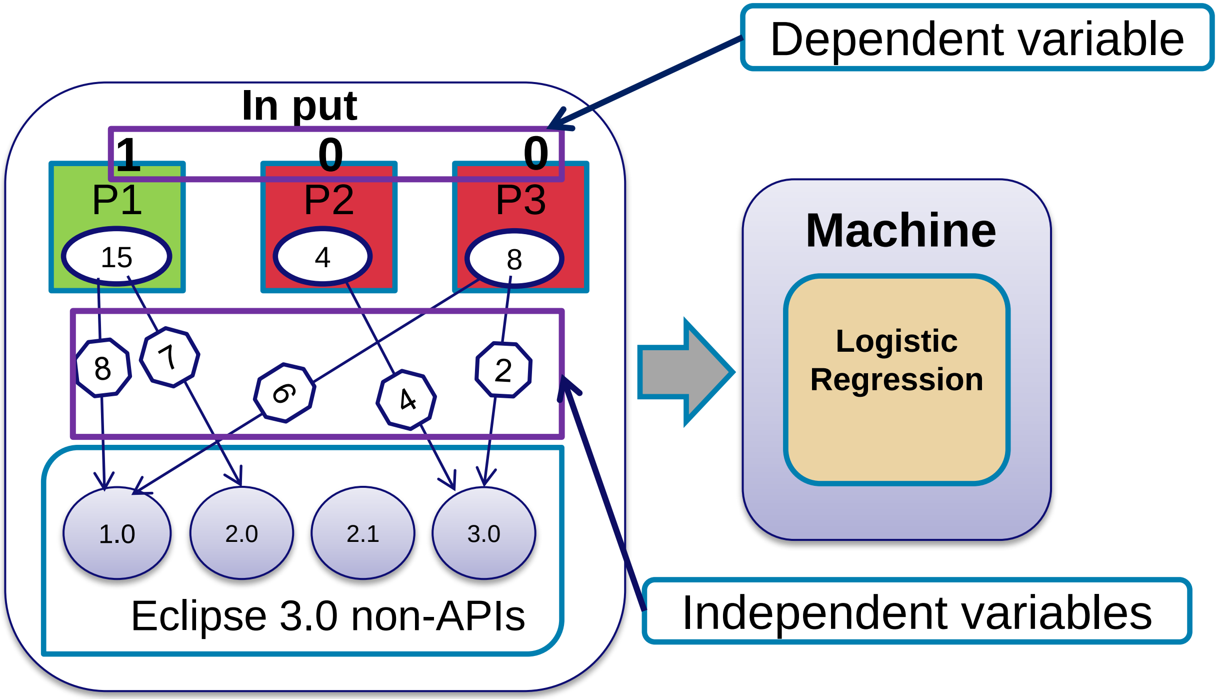

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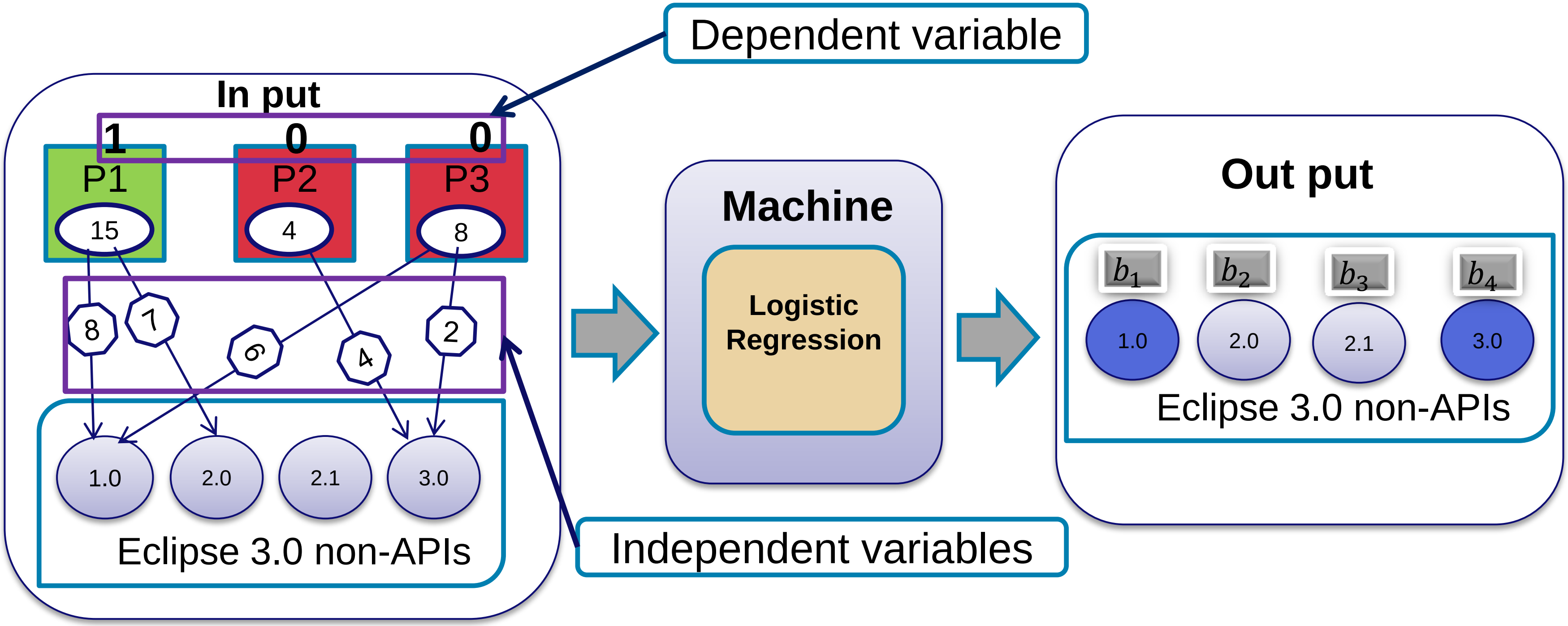

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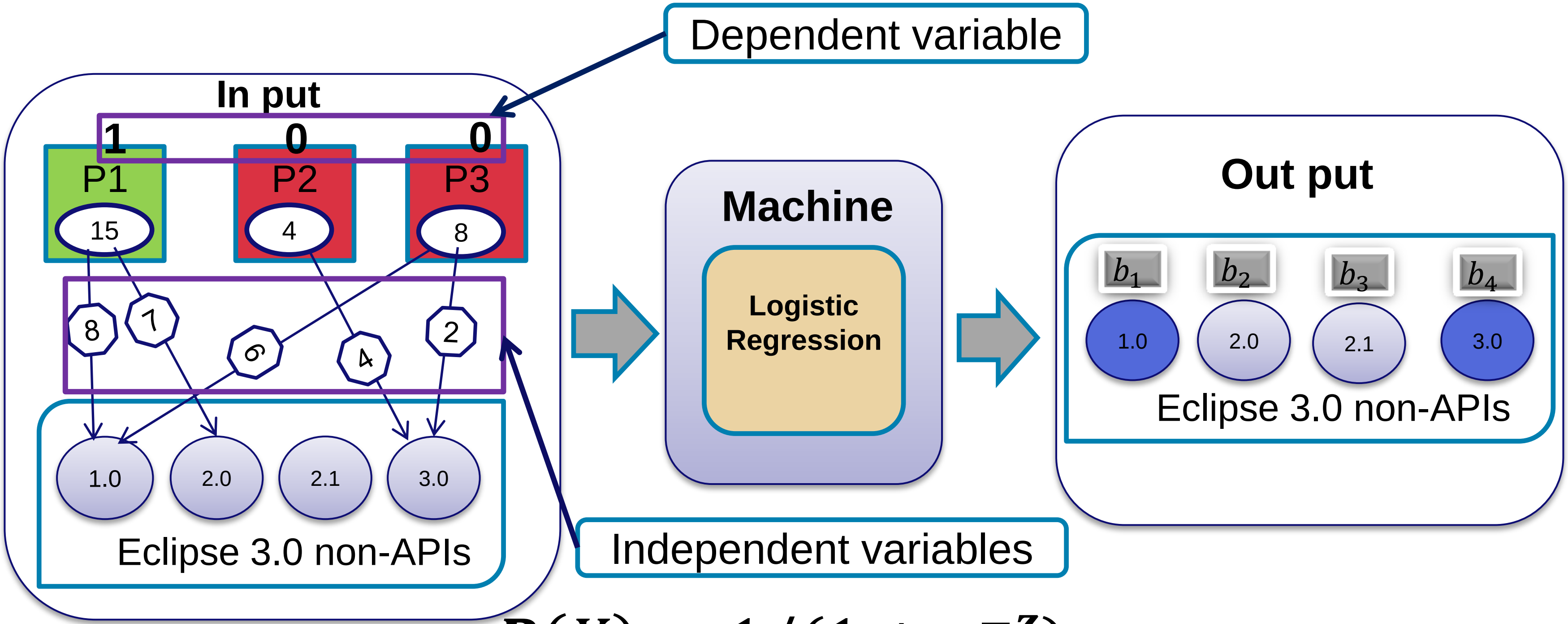

$$\boldsymbol{P}(X) = 1/(1 + e^{-\boldsymbol{z}})$$

$$\boldsymbol{z} = b_0 + b_1 * \boldsymbol{SDK}_{1.0} + b_4 * \boldsymbol{SDK}_{3.0}$$

Model Training Example

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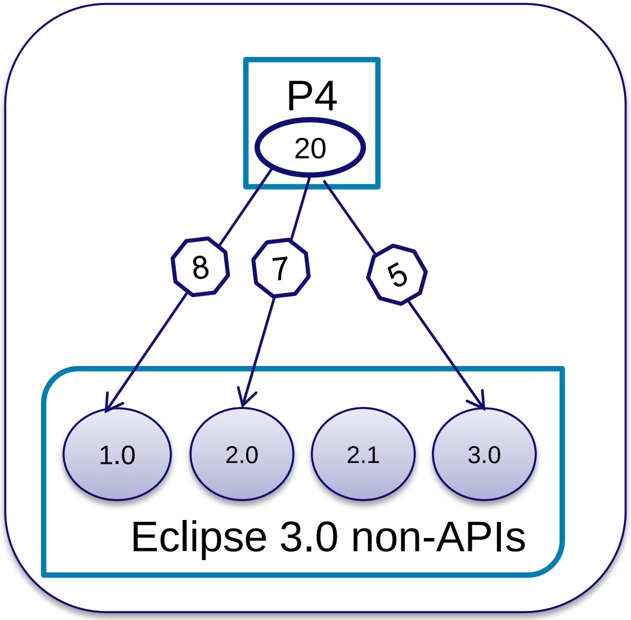

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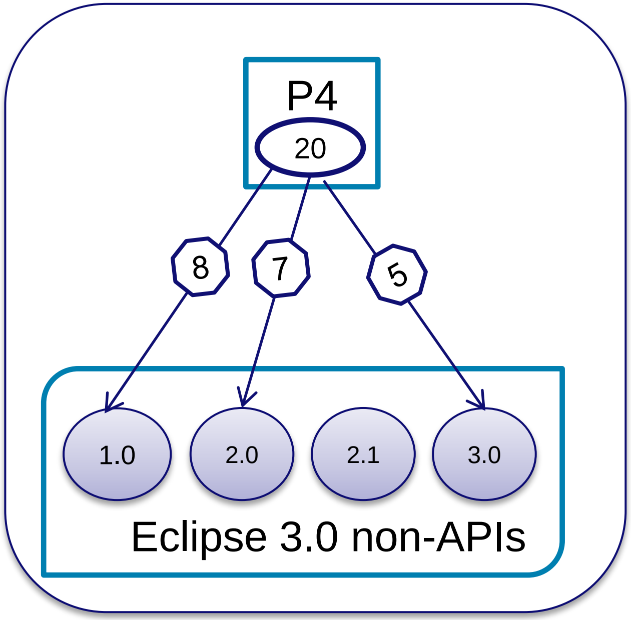

$\boldsymbol{P}(X) = 1/(1 + e^{-\boldsymbol{z}})$

$\boldsymbol{z} = b_0 + b_1 * 8 + b_4 * 5$

$\boldsymbol{P}(X)$<0.5 – incompatibility

$\boldsymbol{P}(X)$>=0.5 – compatibility

Results

- **In both model training and testing: High Precision, Accuracy, and Recall, where some were 80% and more**

	Model Testing Error Analysis								
	3.5			3.6			3.7		
	A	P	R	A	P	R	A	P	R
3.4	94	100	94	93	100	93	93	100	93
3.5				91	94	96	88	91	96

Conclusion and Future Work

- Mining interface usage from ETPs to detect or predict compatibility shows good results.
- Next, develop a domain specific tool to make predictions.
- Who can use the tool? users and developers of ETPs
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Thank you for listening