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Negotiated Grammar Transformation

eXtreme Modeling Workshop 2012
Vadim Zaytsev, SWAT, CWI

 2012

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Extreme Metamodel Evolution

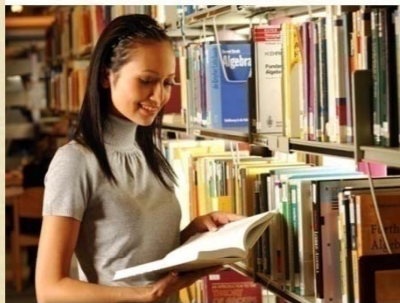
eXtreme Modeling Workshop 2012
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 2012

Models & Evolution



JOHANNES KEPLER
UNIVERSITY LINZ | JKU



Consistent Model Evolution – Facts and Myths

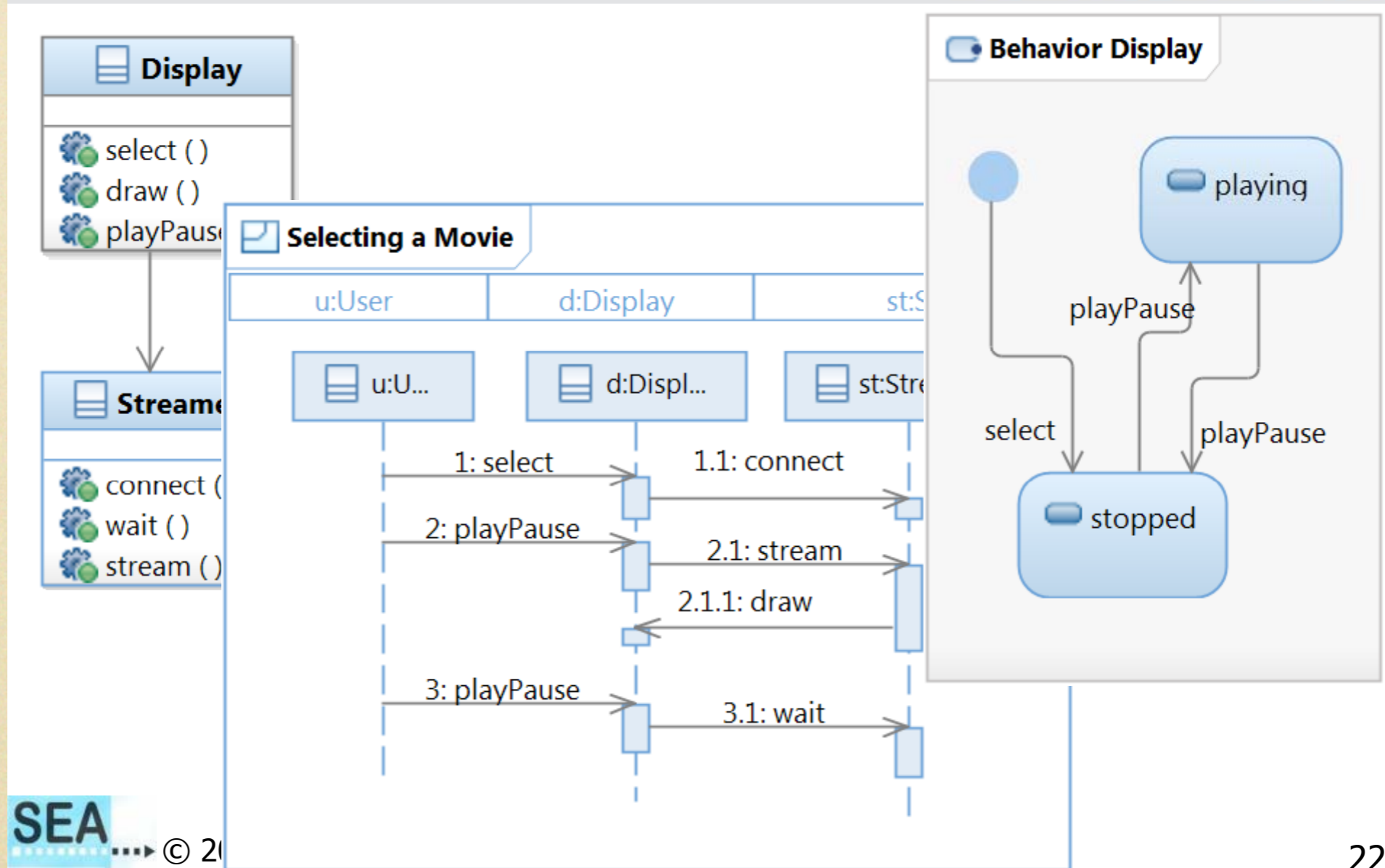
Alexander Egyed

Johannes Kepler University (JKU), Linz, Austria

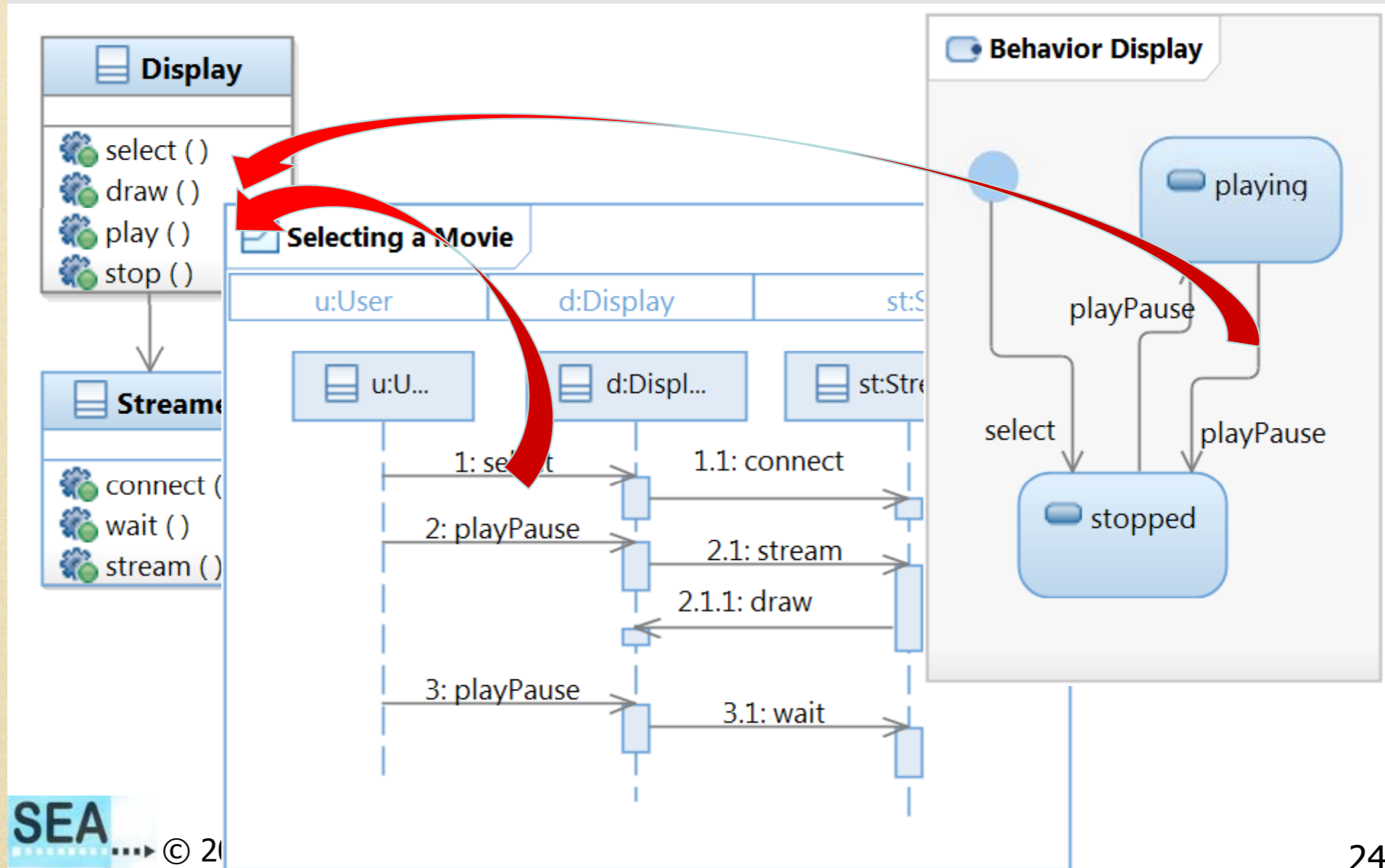
<http://www.sea.jku.at>

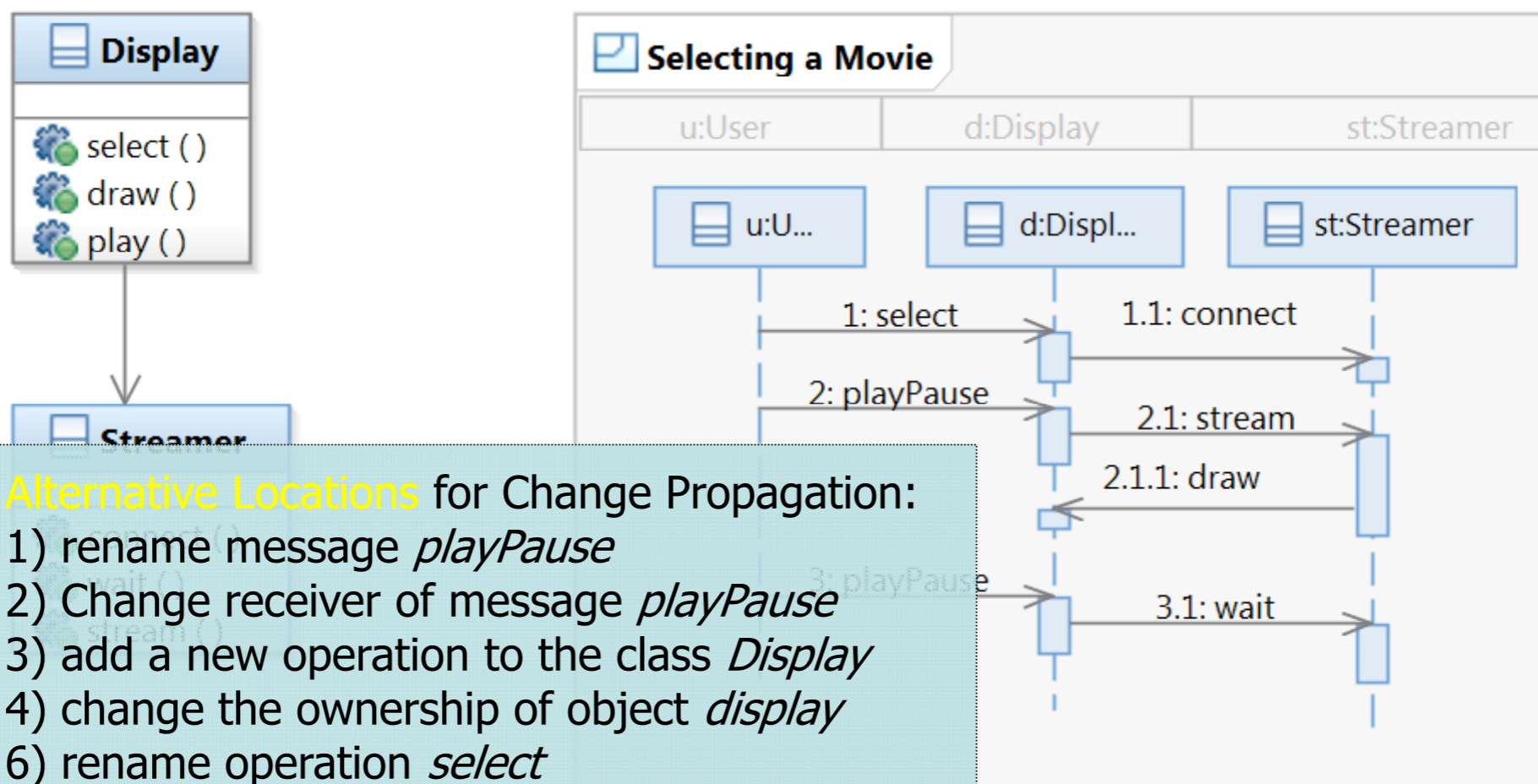
1

Modeling Languages are Diverse



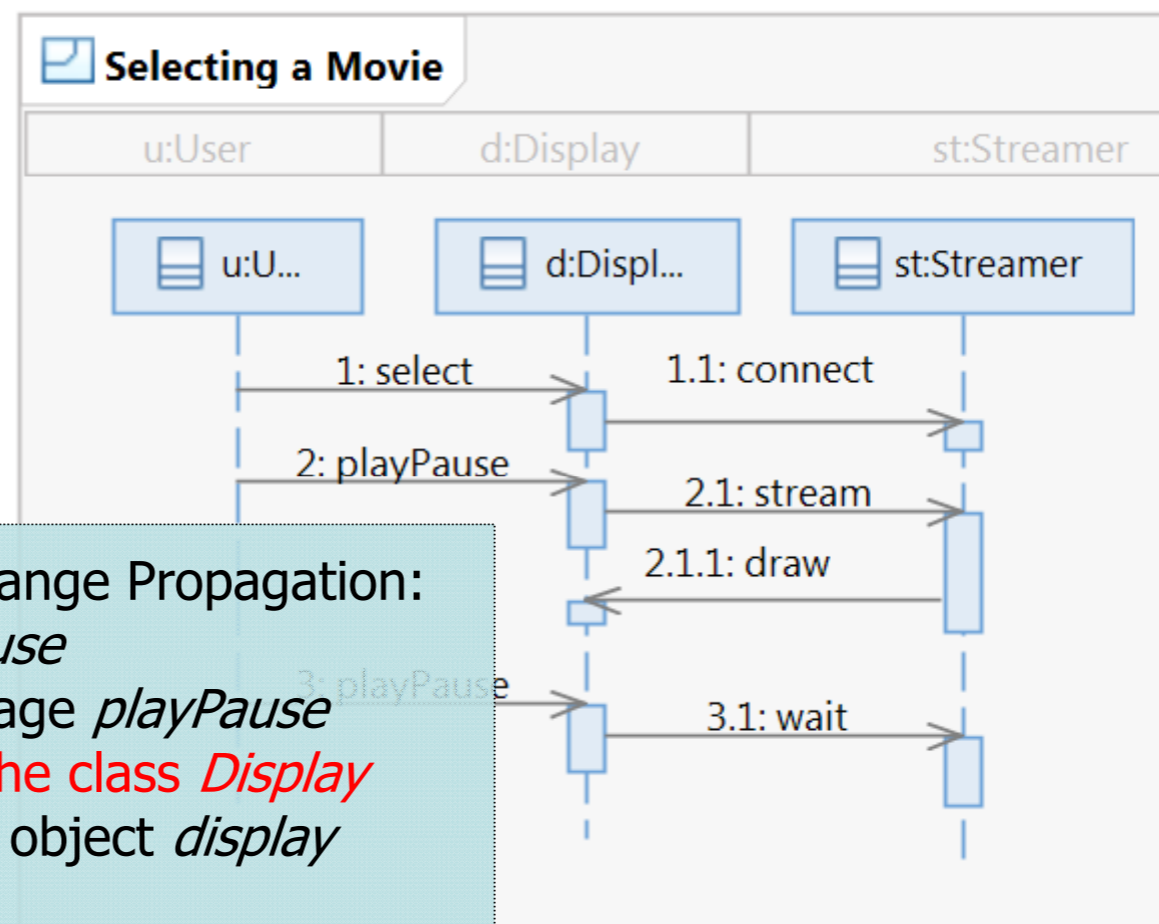
Modeling Languages are Diverse





Alternative Locations for Change Propagation:

- 1) rename message *playPause*
- 2) Change receiver of message *playPause*
- 3) add a new operation to the class *Display*
- 4) change the ownership of object *display*
- 6) rename operation *select*
- 7) rename operation *play*
- 8) rename operation *draw*
- 9) delete message *playPause*

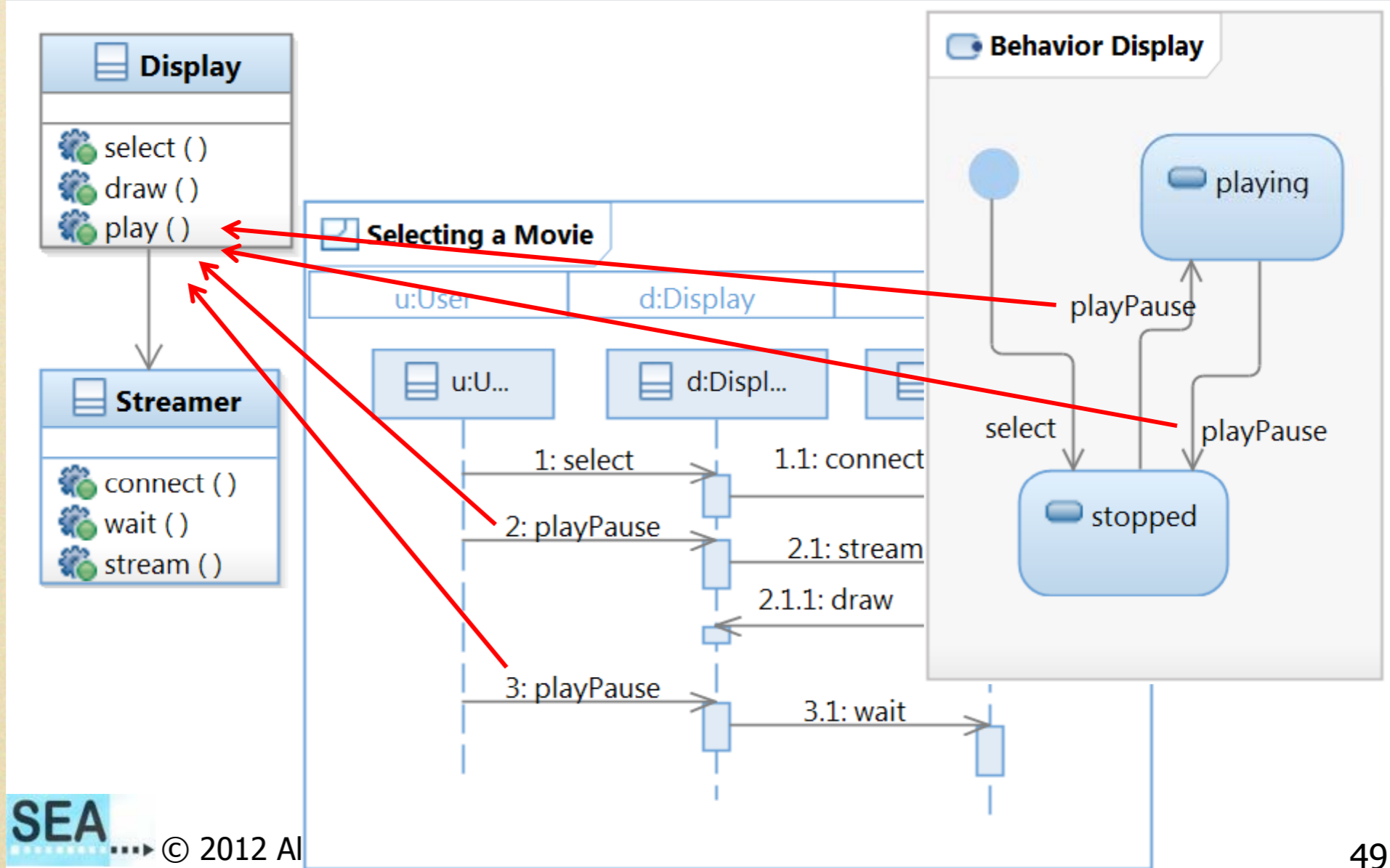


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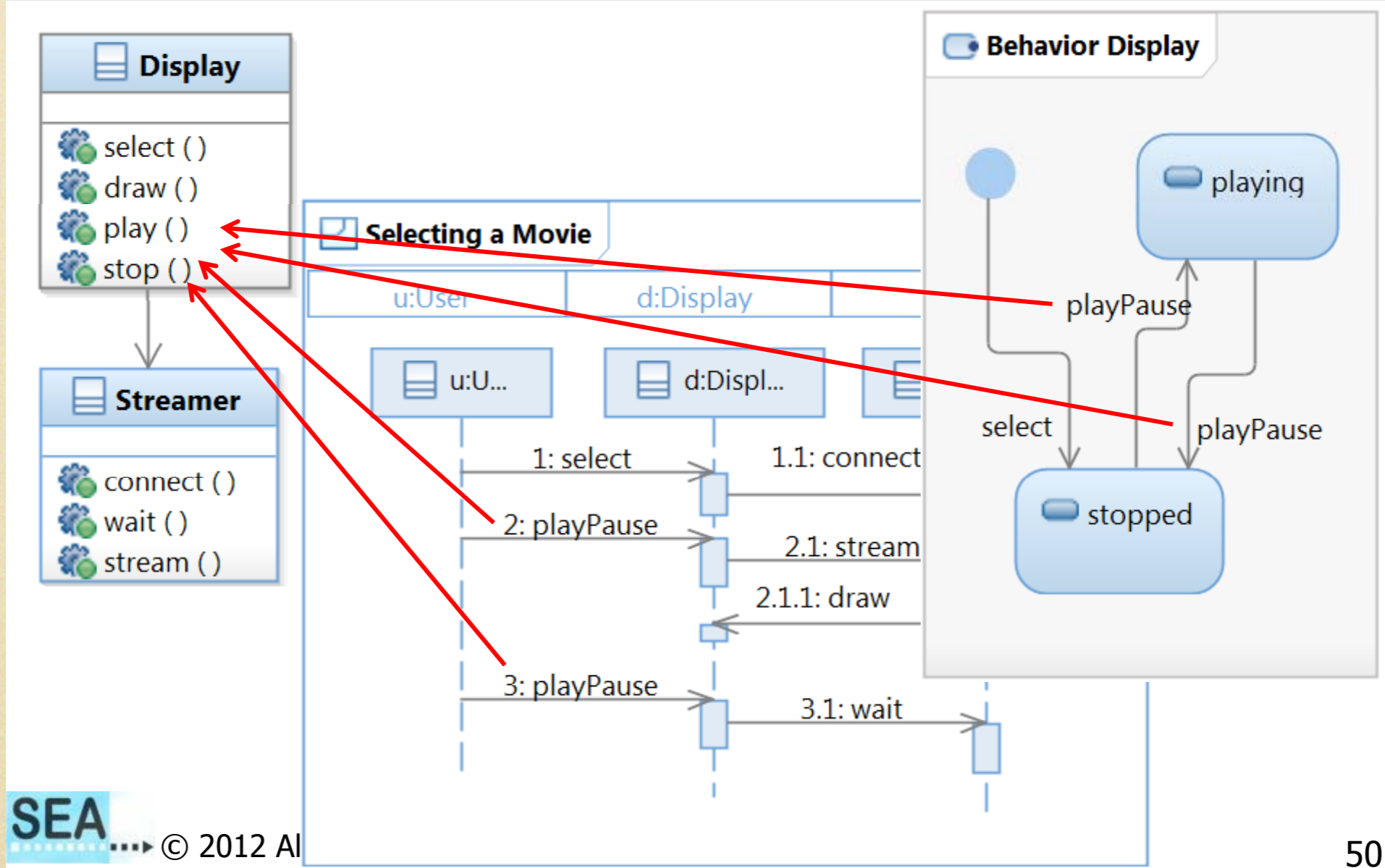
Change 1

Inconsistencies: 4 cause



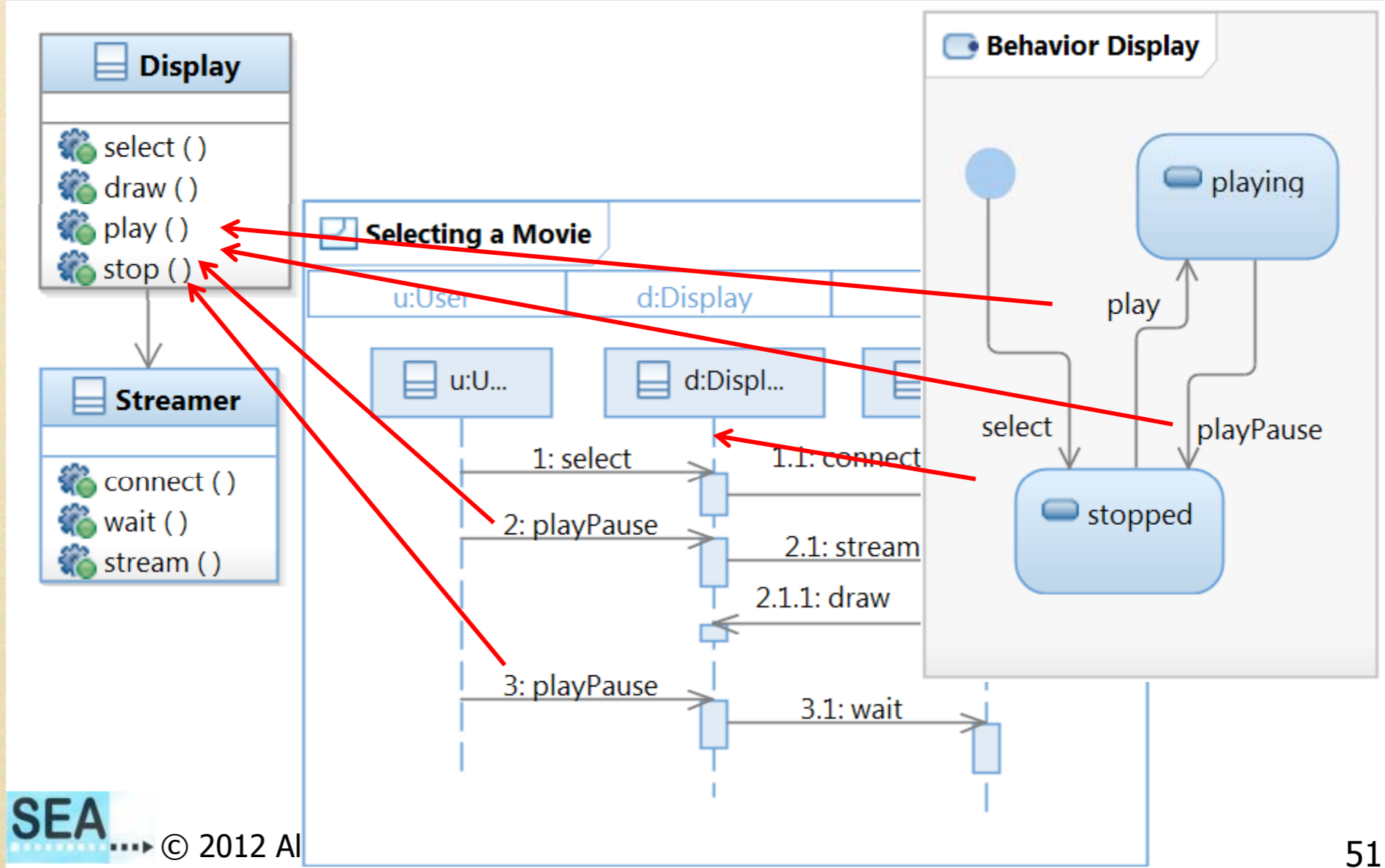
Change 2

Inconsistencies: no change



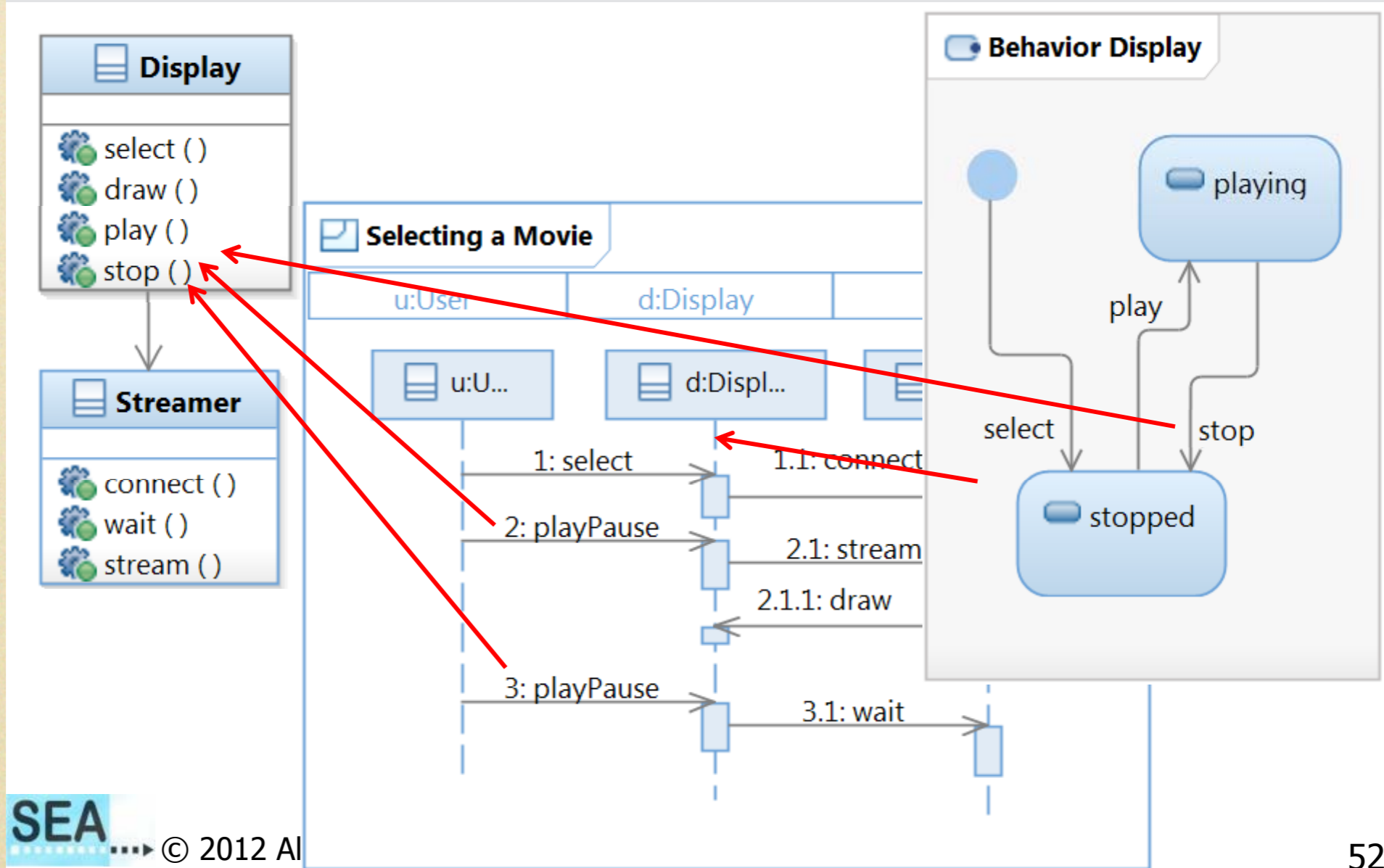
Change 3

Inconsistencies: 1 cause/1 repair



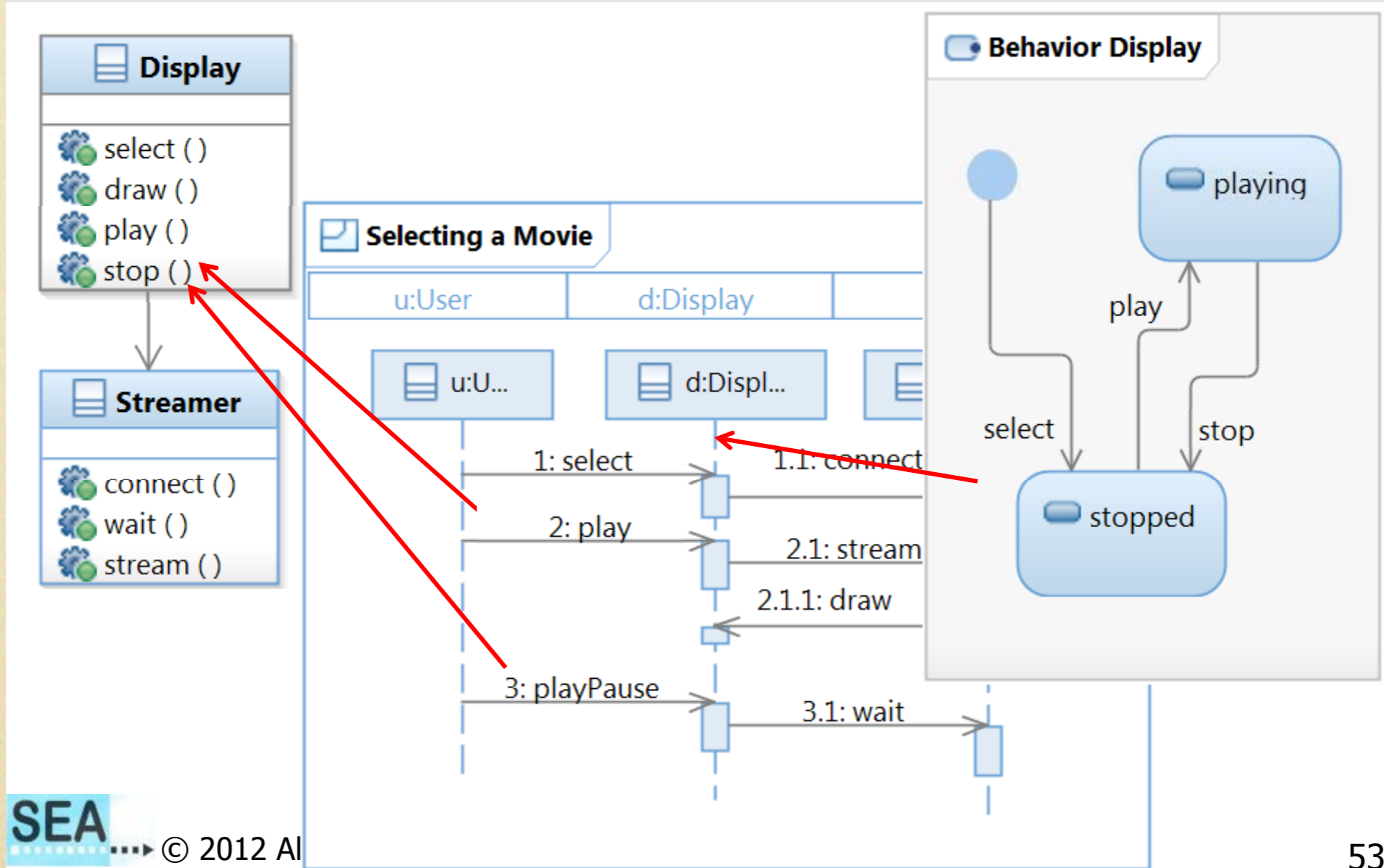
Change 4

Inconsistencies: 1 repair



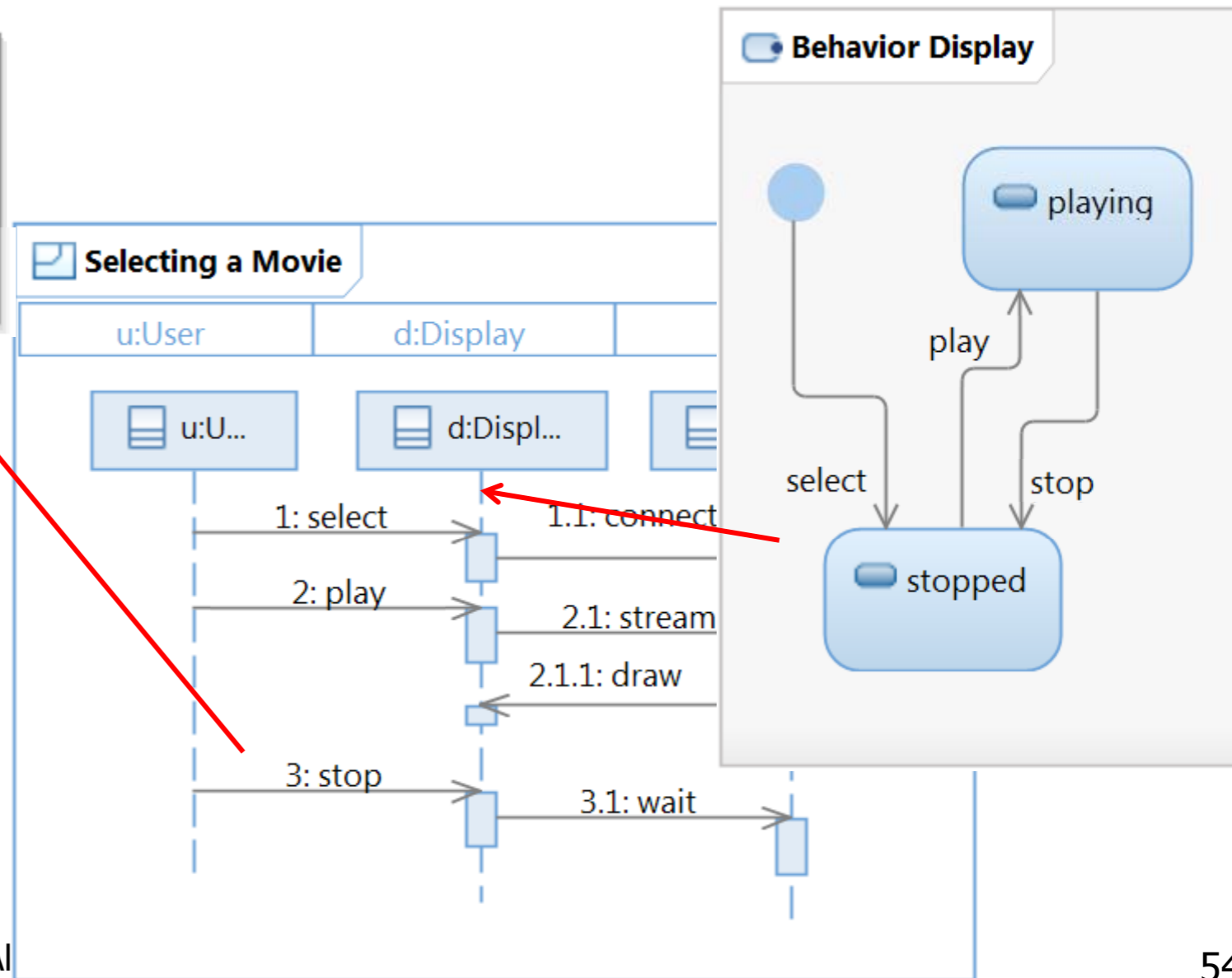
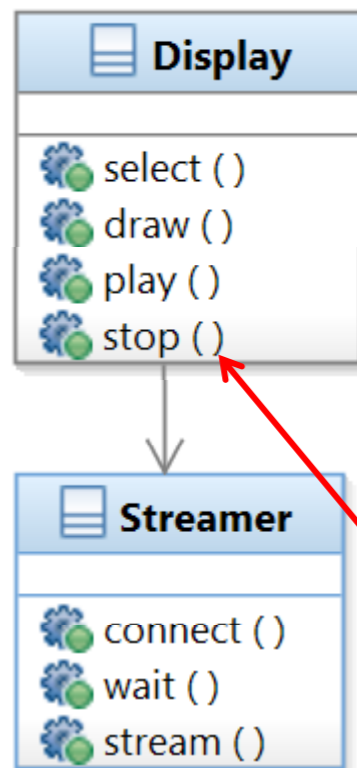
Change 5

Inconsistencies: 1 repair



Change 6

Inconsistencies: 2 repair



Grammar Transformation

~~Grammar~~

Transformation

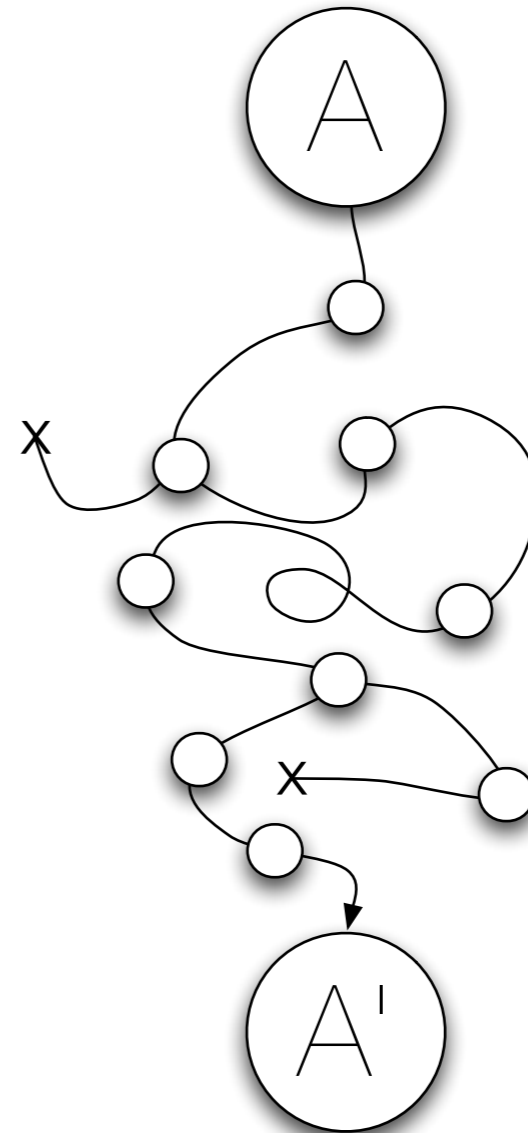
Metamodel Transformation

Not *that* metamodel evolution

What is Metamodel Evolution?

In practice; organic, trial and error,
manual

Rarely written as a model
transformation

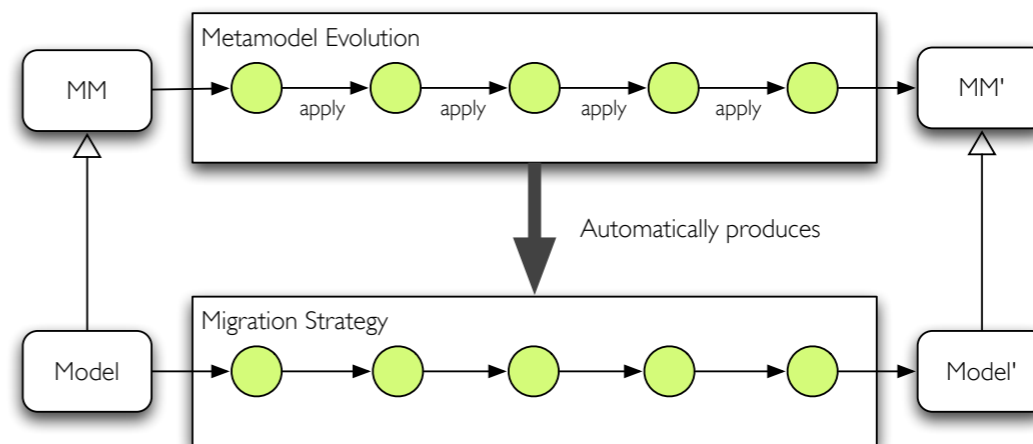


Operator-based

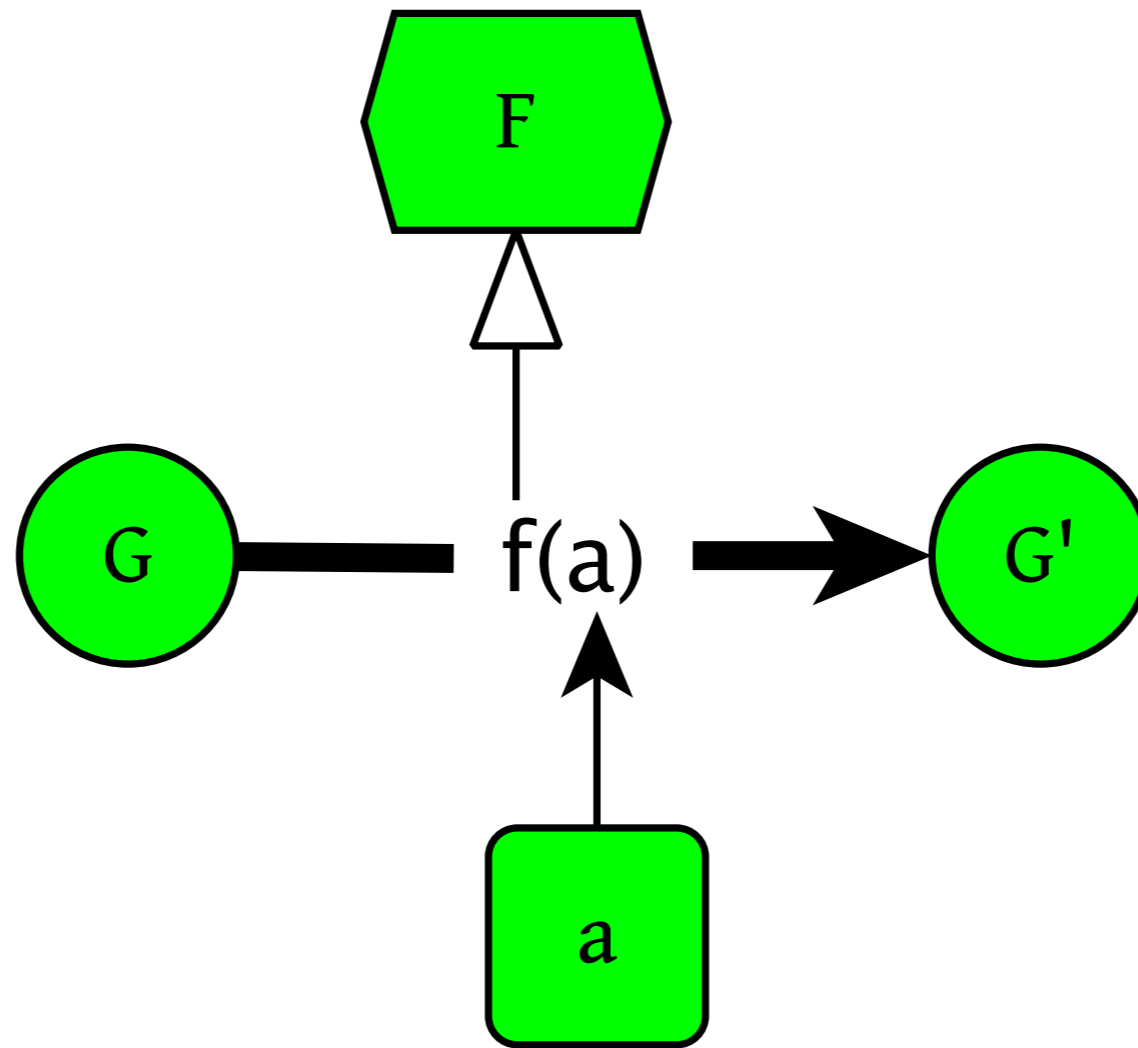
Model Migration Approaches:

Operator-based co-evolution

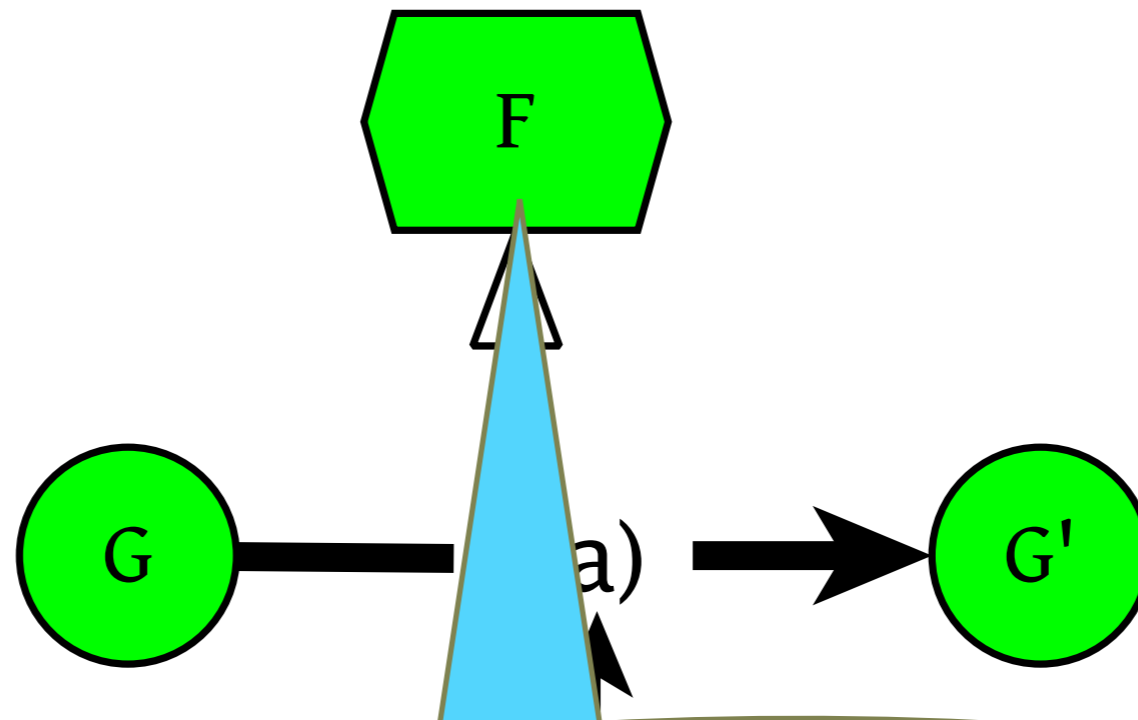
- + migration strategy is “free”
- tool lock in
- operator set completeness
- reverse engineering challenging



Transformation components



Transformation components



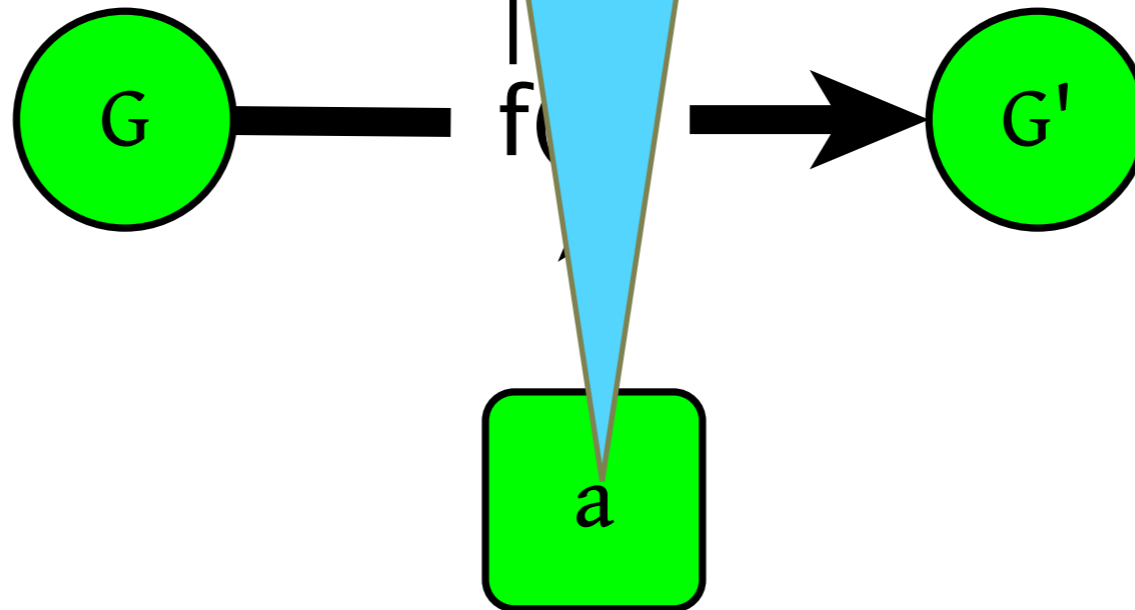
Operator

- known semantics, well-defined algorithm
 - rename, fold, factor, inject, remove, ...

Transformation components

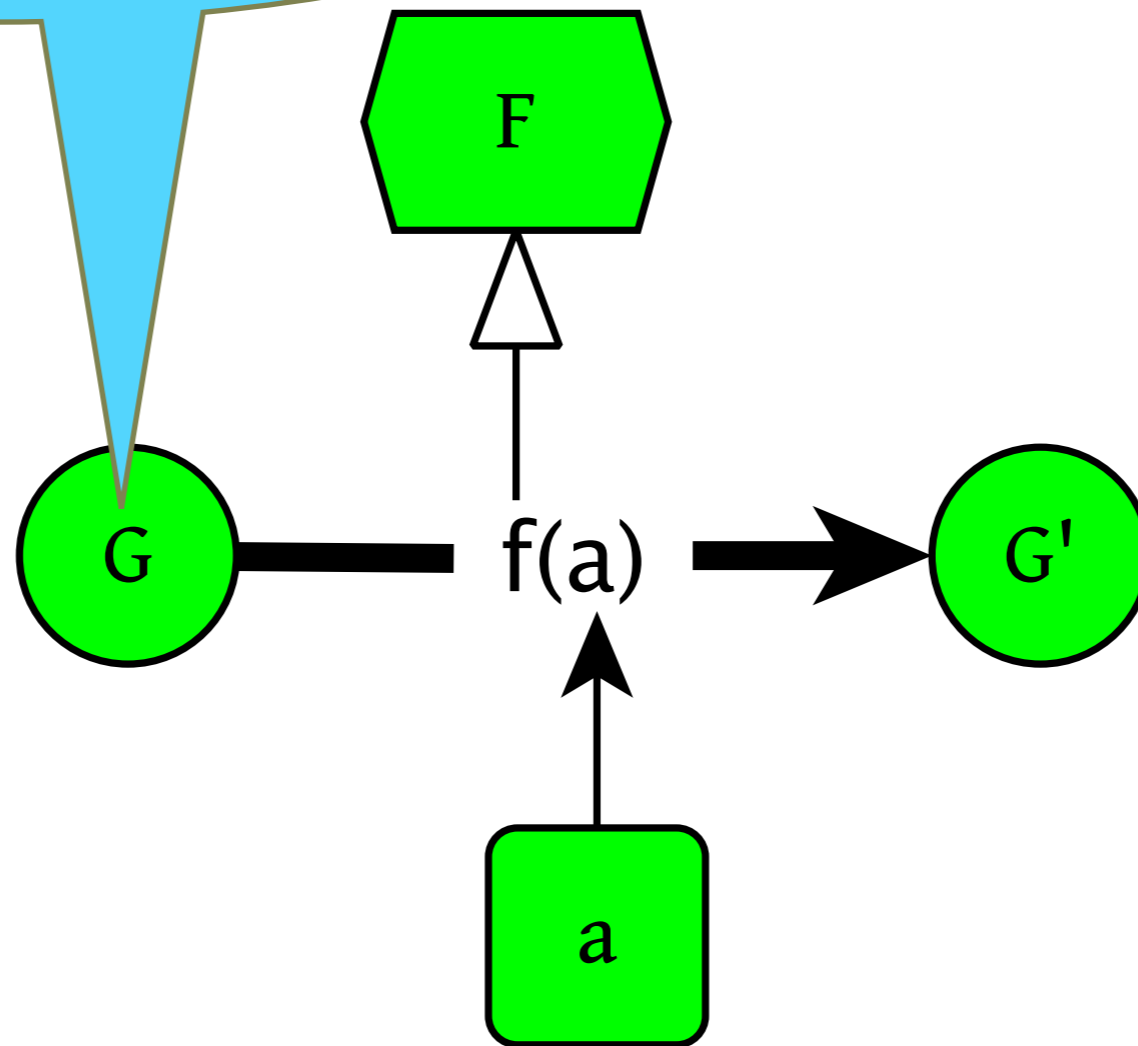
Arguments

- what exactly to rename/factor/inject/...?



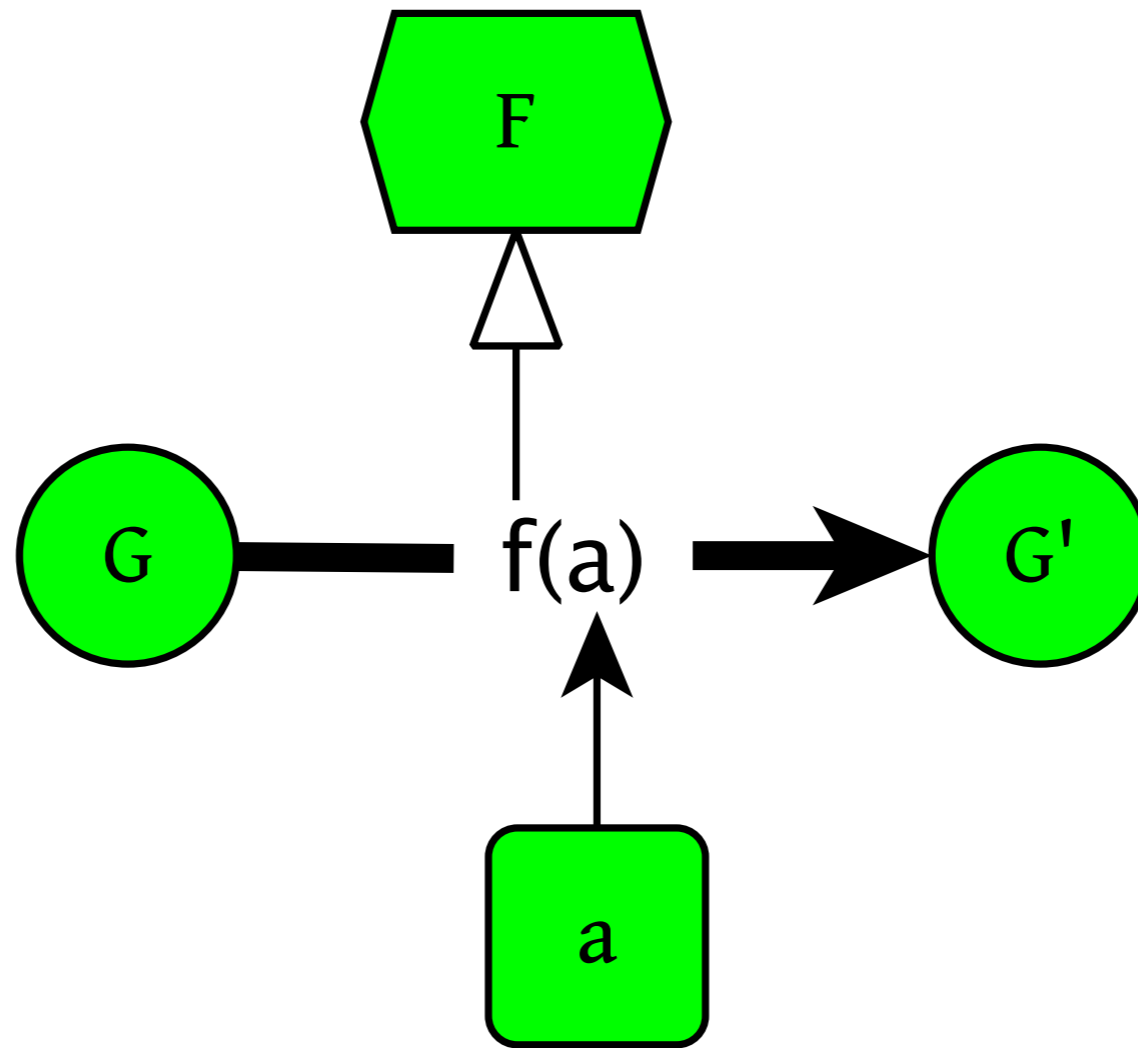
Input grammar

- determines applicability



n components

Transformation components



A transformation sequence

expr : ...;
atom : ID | INT | '(' expr ')';

abstractize

expr : ...;
atom : ID | INT | expr;

vertical

expr : ...;
atom : ID;
atom : INT;
atom : expr;

unite

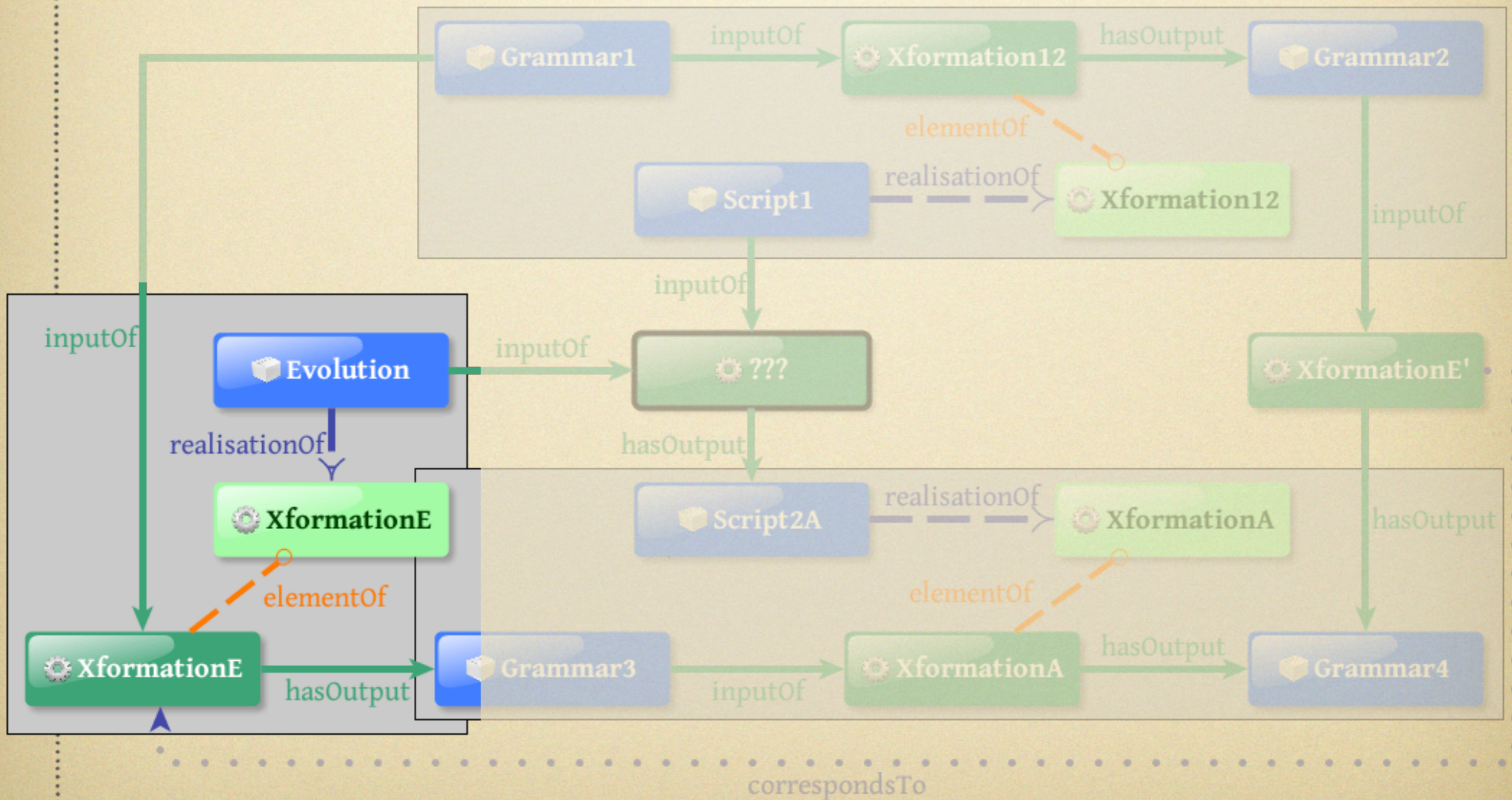
expr : ...;
expr : ID;
expr : INT;
expr : expr;

expr : ...;
expr : ID;
expr : INT;

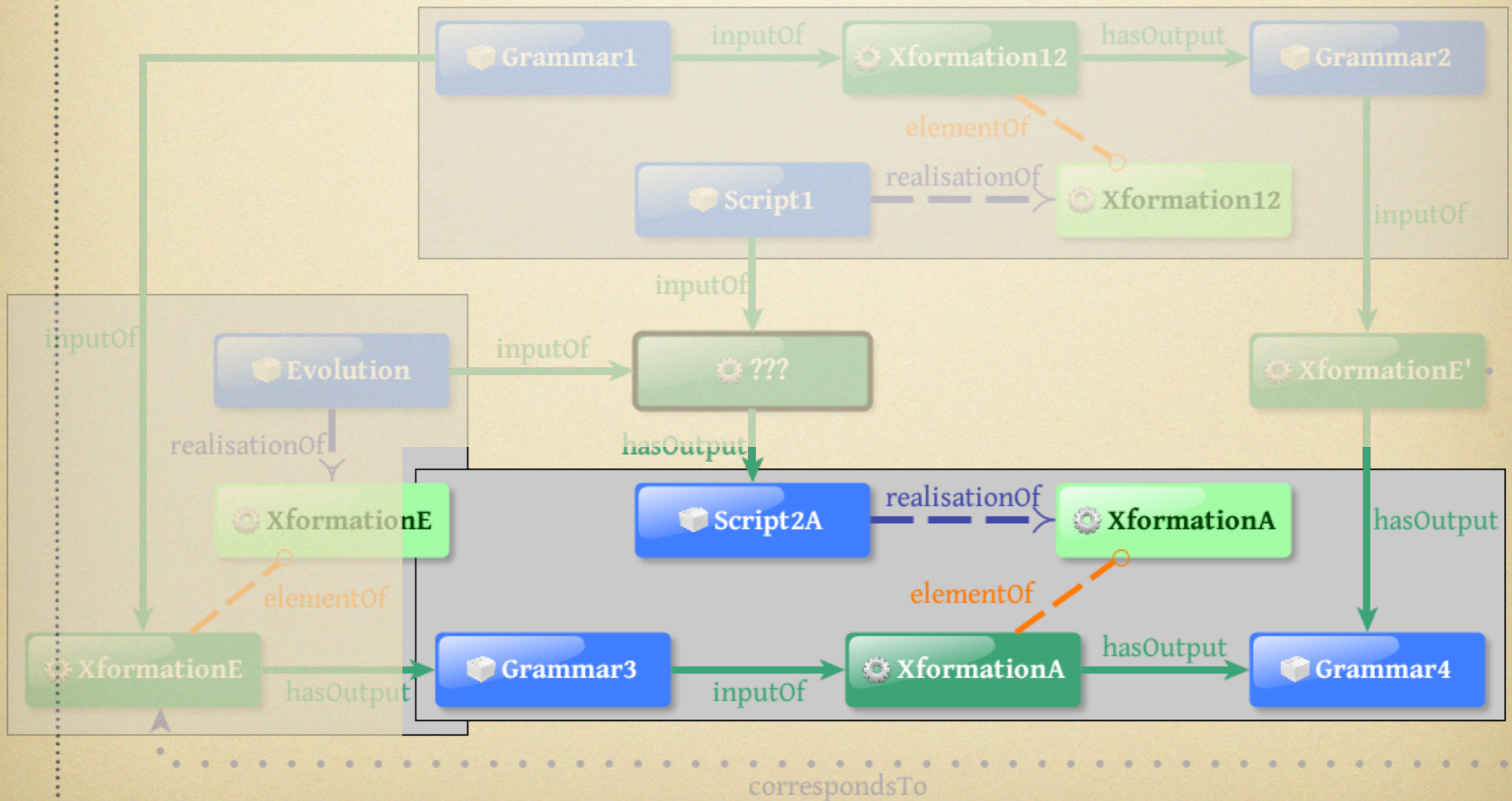
abridge

Adaptation

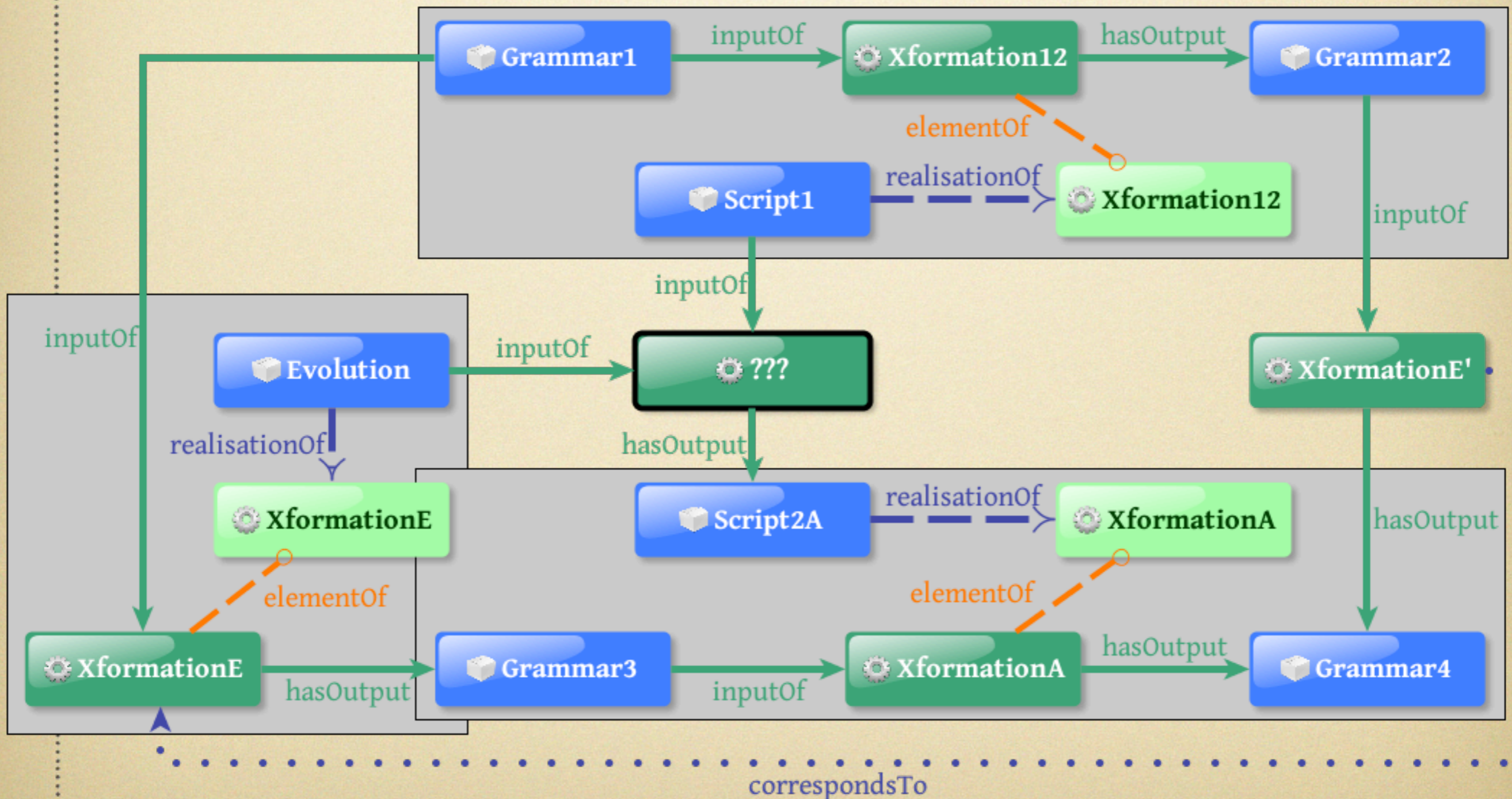
Adjustment



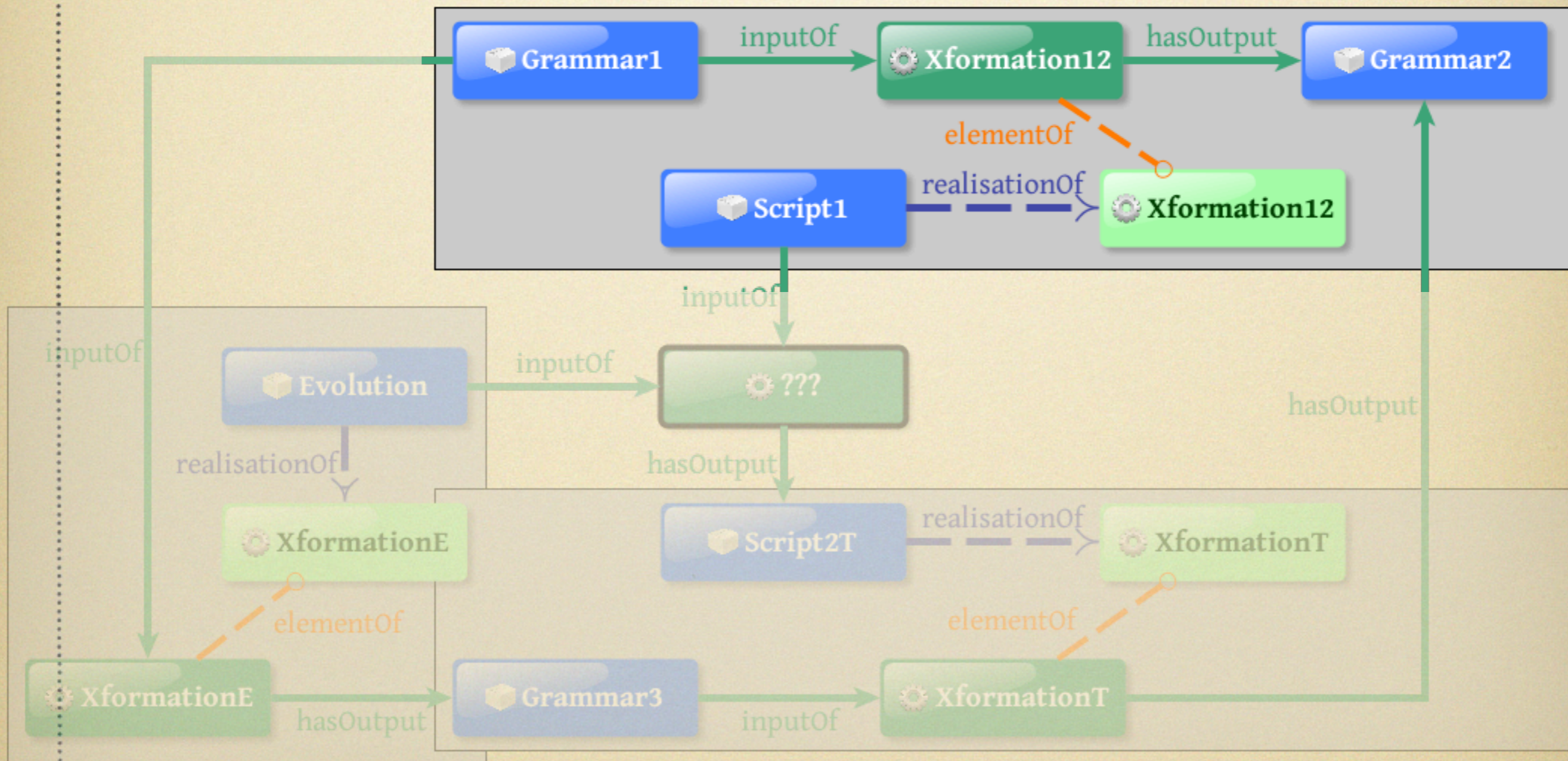
Adjustment



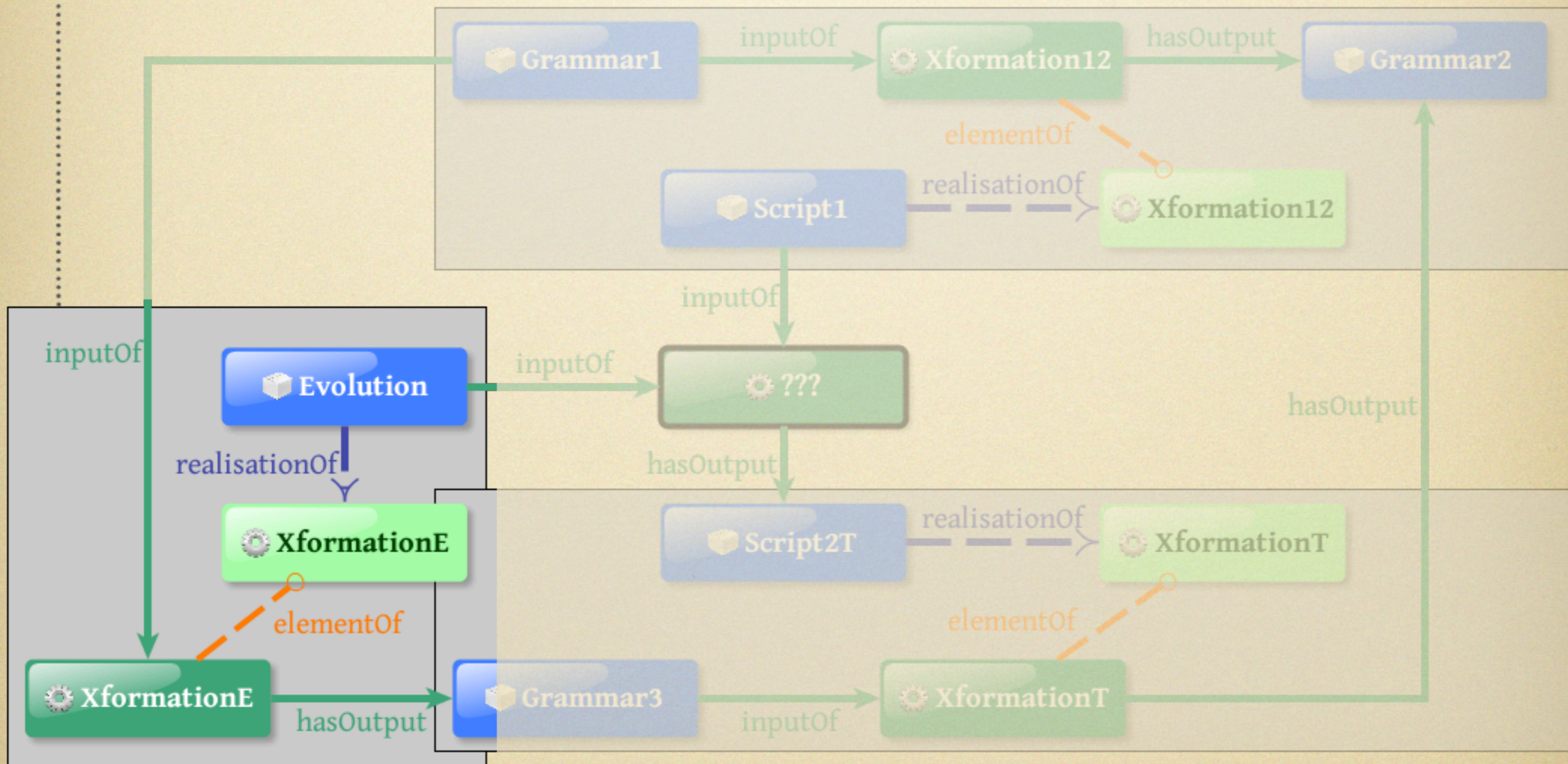
Adjustment



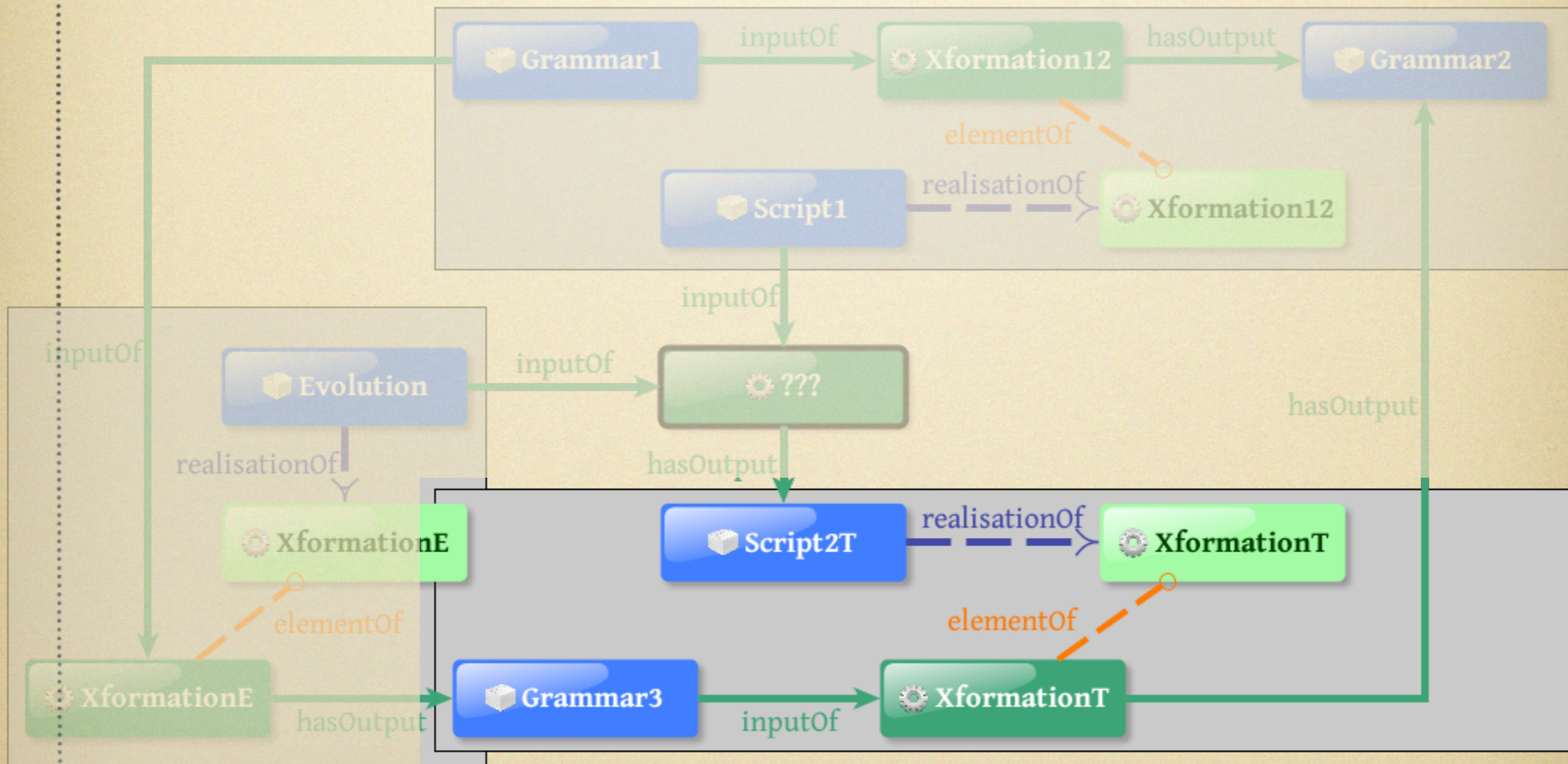
Tolerance



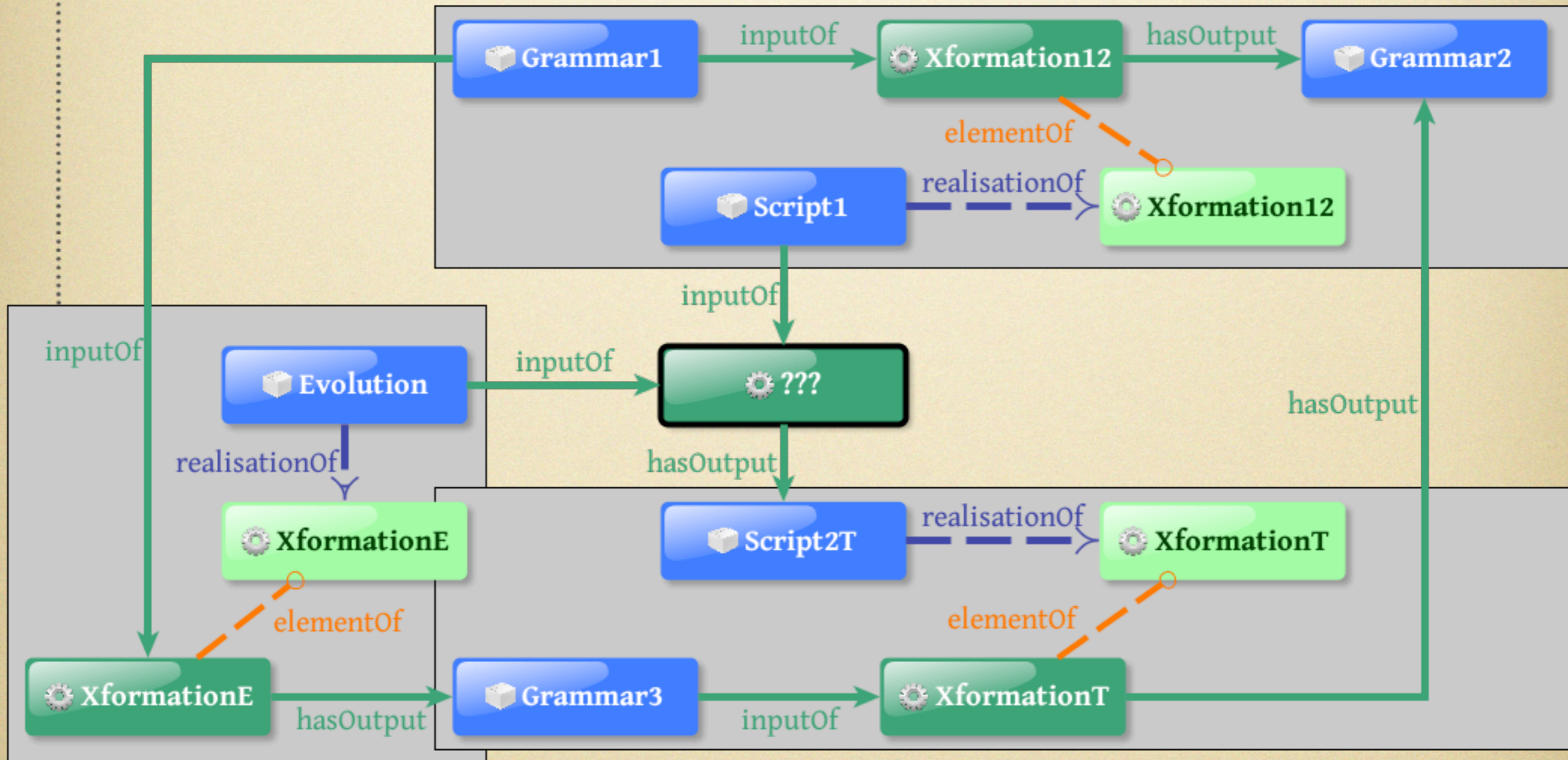
Tolerance



Tolerance



Tolerance

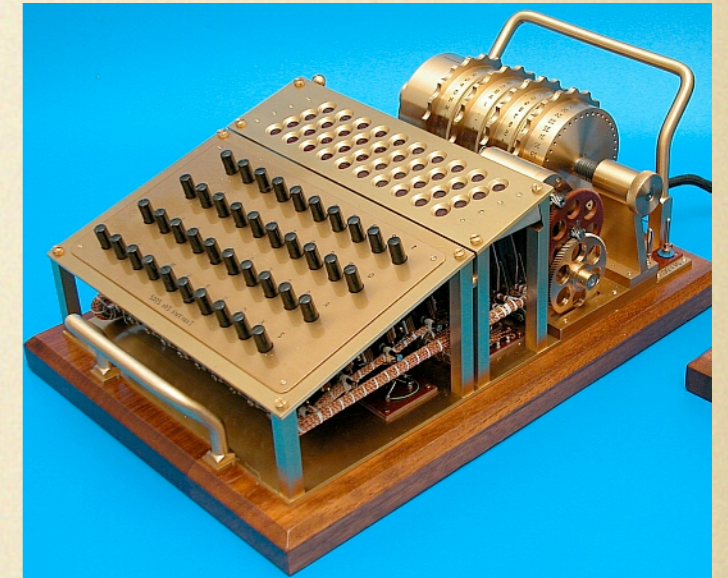


Examples

Rename a nonterminal



rename(*expr*, *Expr*)

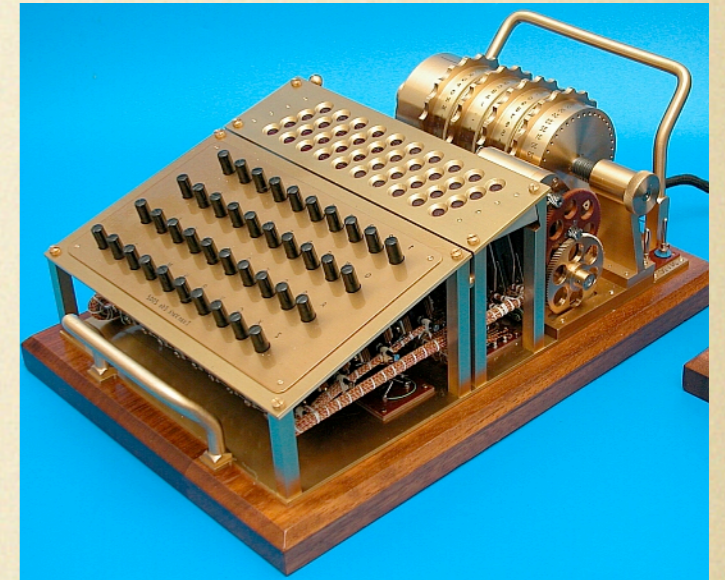


ok

Rename a nonterminal



`rename(expr, Expr)`



no expr!

Rename a nonterminal

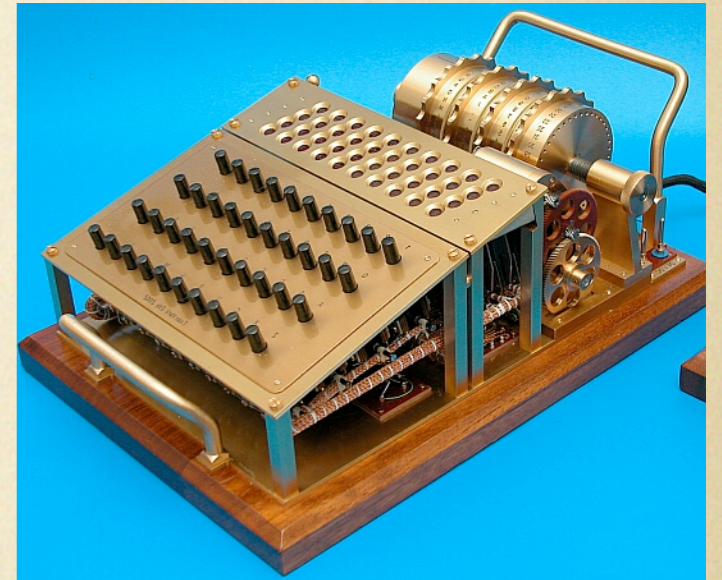


rename(*expr*, *Expr*)

no *expr*!

rename(*exp*, *Exp*)

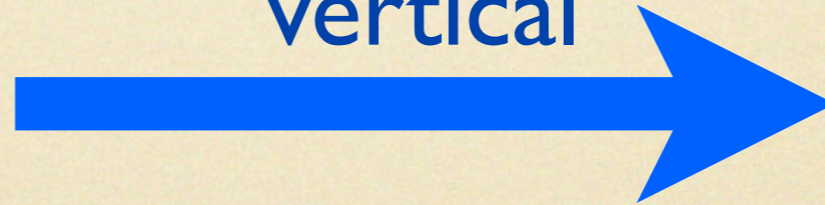
ok



Vertical vs. horizontal

- A is B or C

vertical



- A is B
- A is C

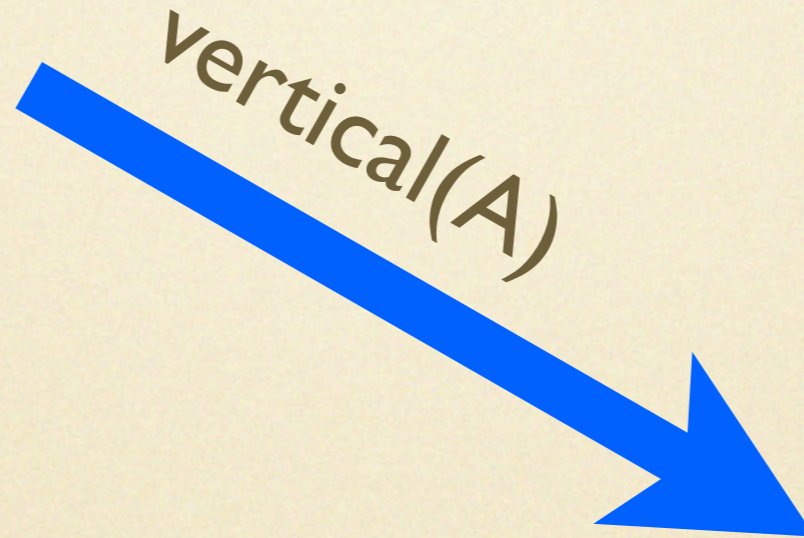
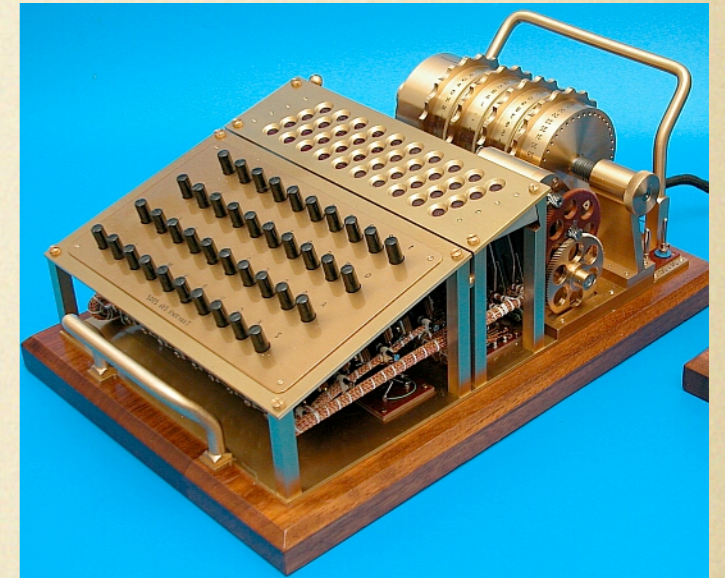
Vertical vs. horizontal

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Vertical vs. horizontal

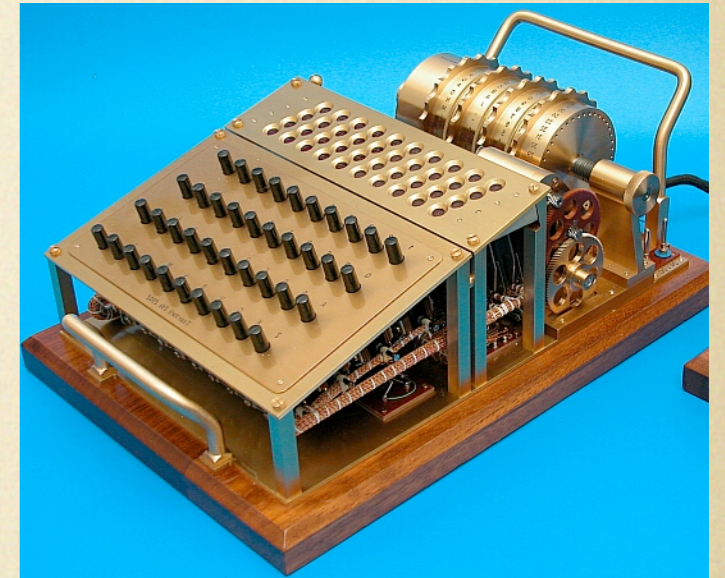


- A is B or C

Vertical vs. horizontal



vertical(A)



A is vertical!

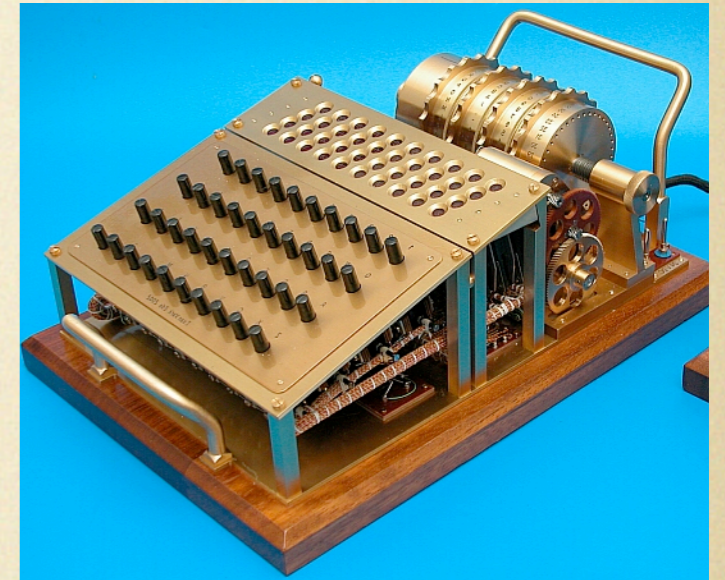
- A is B

- A is C

Vertical vs. horizontal



vertical(A)



A is vertical.

- A is B

- A is C

Conclusion

To summarise

- Some metamodel transformation paradigms are too rigid.
- Adaptation through:
 - tolerance
 - adjustment
- Isolate applicability assertions
- Negotiate the outcome
 - the oracle
 - the script
 - the user



Credits

- Some slides by Alexander Egyed: *Consistent Model Evolution*
- Some slides by James Williams: *Searching for Model Migration Strategies*
- Tatjavanavark-machine.jpg (GFDL, CC-BY-SA)
- Torii kiyoshige bando hikosaburo ii.jpg (PD)
- Software Language Processing Suite (CC-BY-SA)
- See the poster on renarration!
- Ask questions offline and online!

Questions?

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