

# Transformation based dependability evaluation - a complement to modeling

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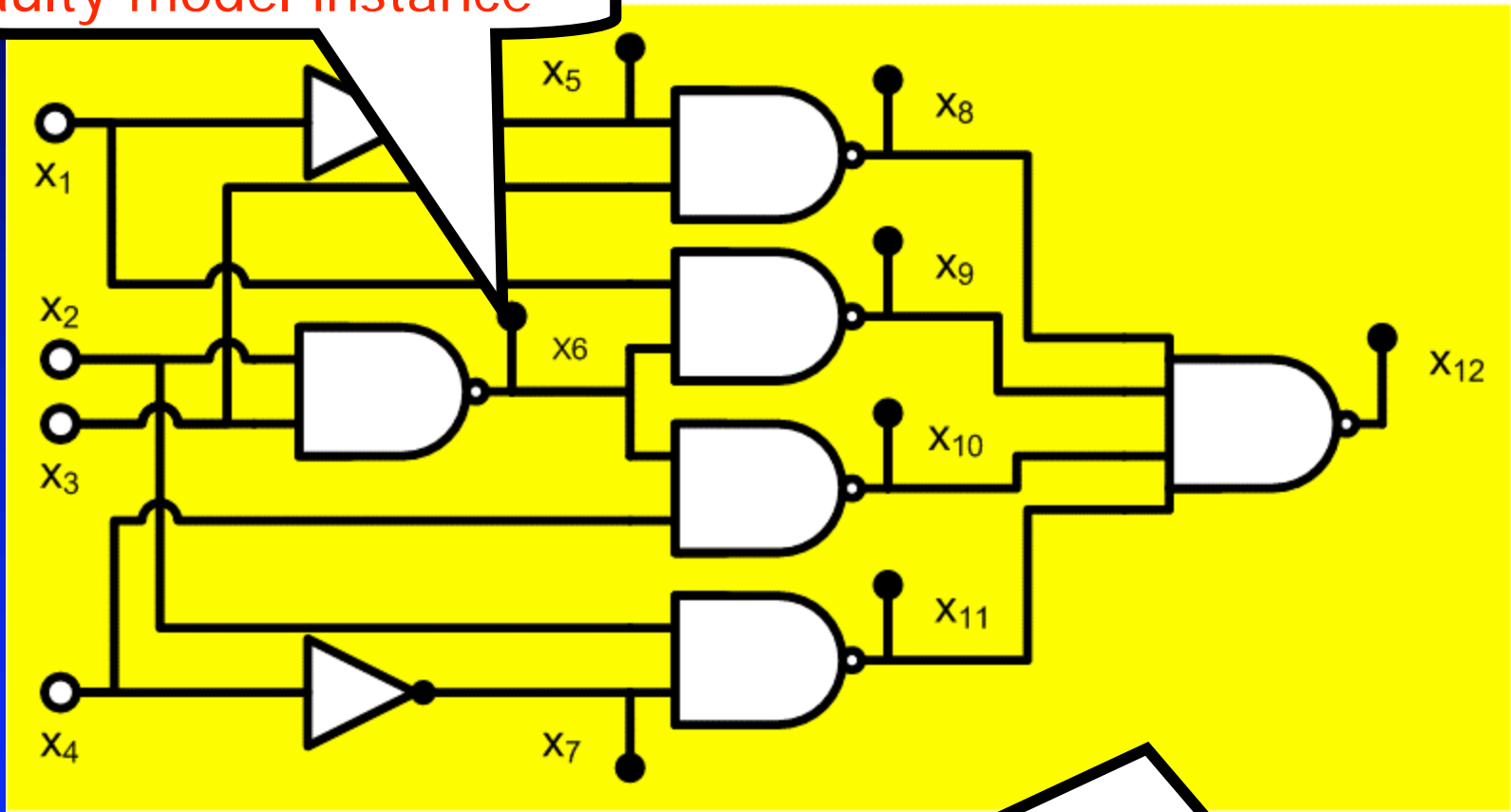
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# The old days

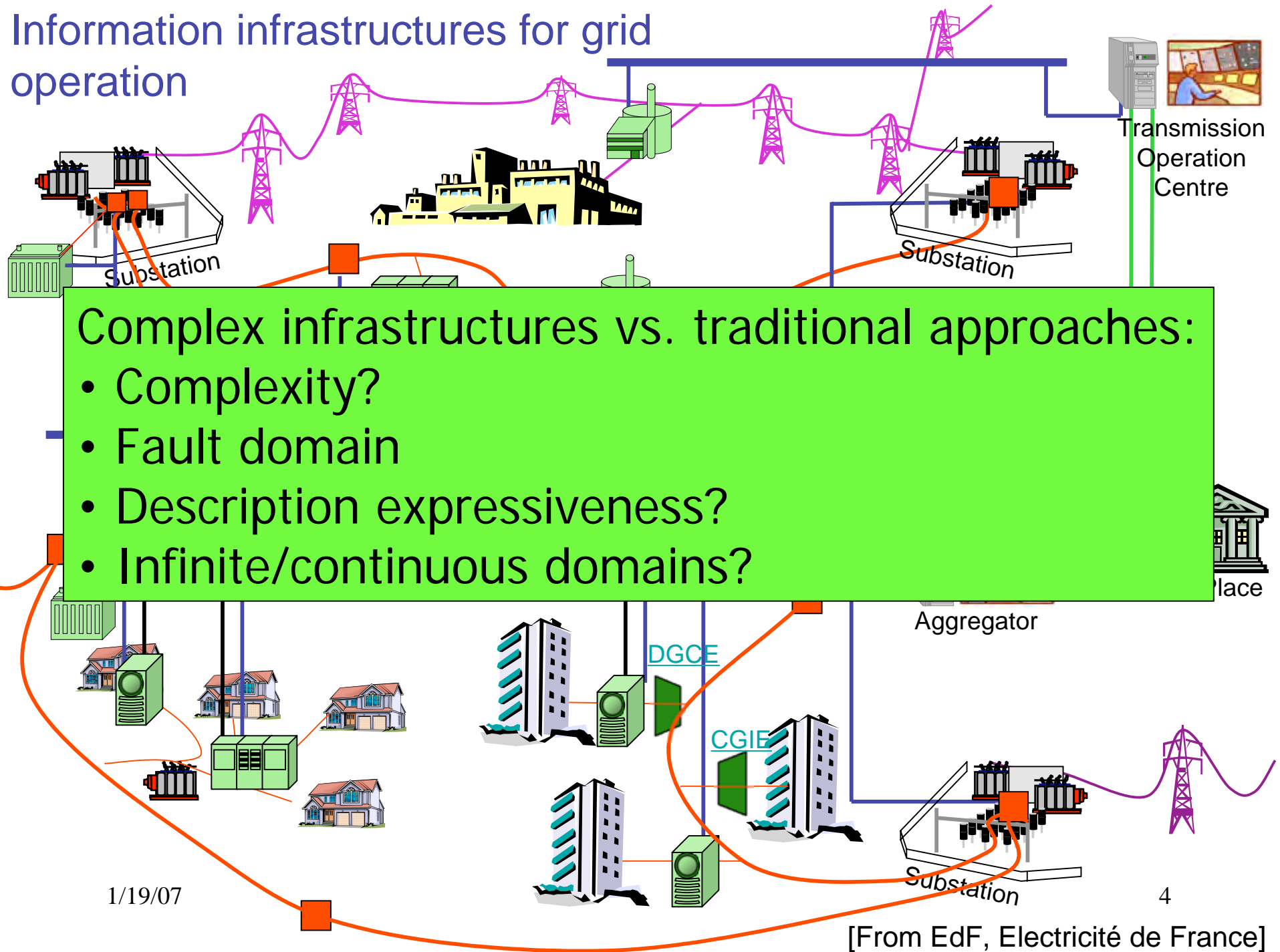
Fault (meta-)model s-a-x derived from the technology

Faulty model instance



Functional/structural model

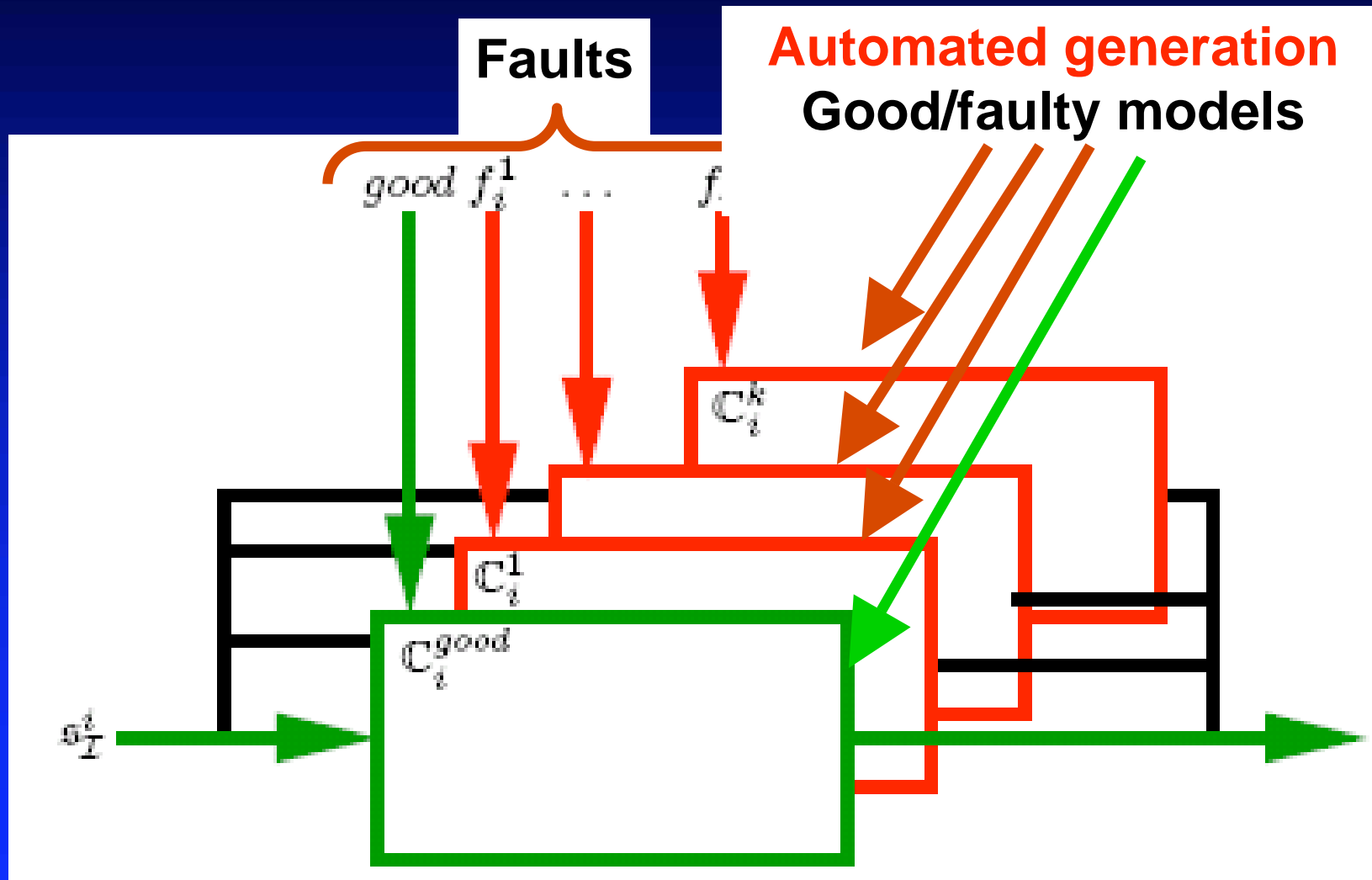
# Information infrastructures for grid operation



# The analysis context: the need for mathematics

WHY and HOW to analyze complex systems by **mathematics**?

# Fault model



# Abstraction: qualitative modeling

- Formal methods **have strict complexity limitations**
  - **Efficient, but faithful abstractions are needed**
- Qualitative **abstraction**:
  - **A few of qualitative values out of an enumerated data type set**
  - No **detailed** data representation
  - Drastic **state space (analysis complexity)** reduction
- Systematic **methodology**: predicate abstraction

# Example

Full model: rich (continuous) data domain

## Full model:

```
IF credit_requested < 2.000.000 THEN approval(director)
ELSE approval(board)
```

Predicate abstraction: Only a single binary value- operation domains

## Qualitative model with control flow preservation:

```
IF minor_credit_requested THEN approval(director)
ELSE approval(board)
```

Nondeterministic abstraction: Random choice, control flow saved

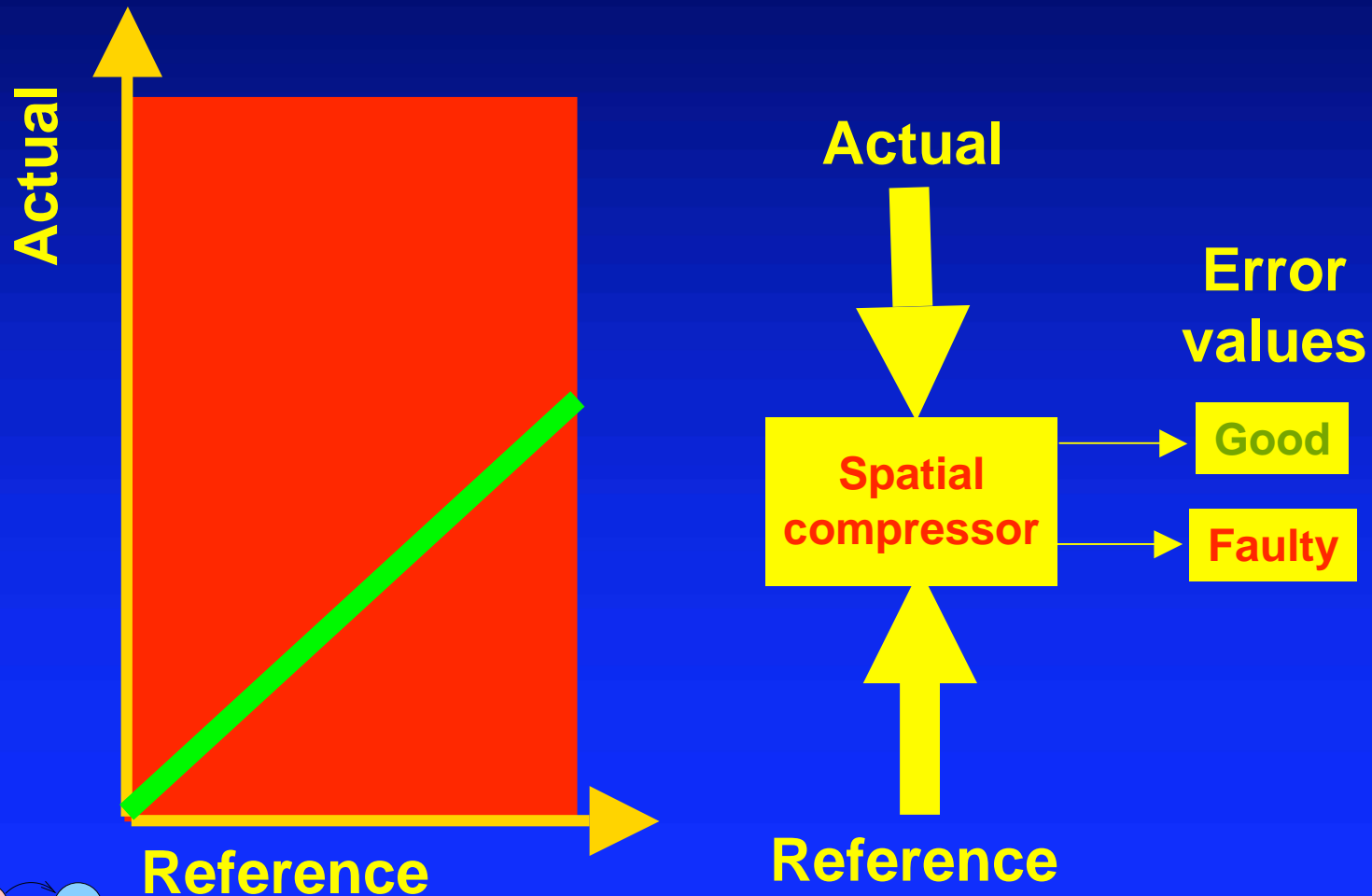
## Non-deterministic model:

CHOOSE

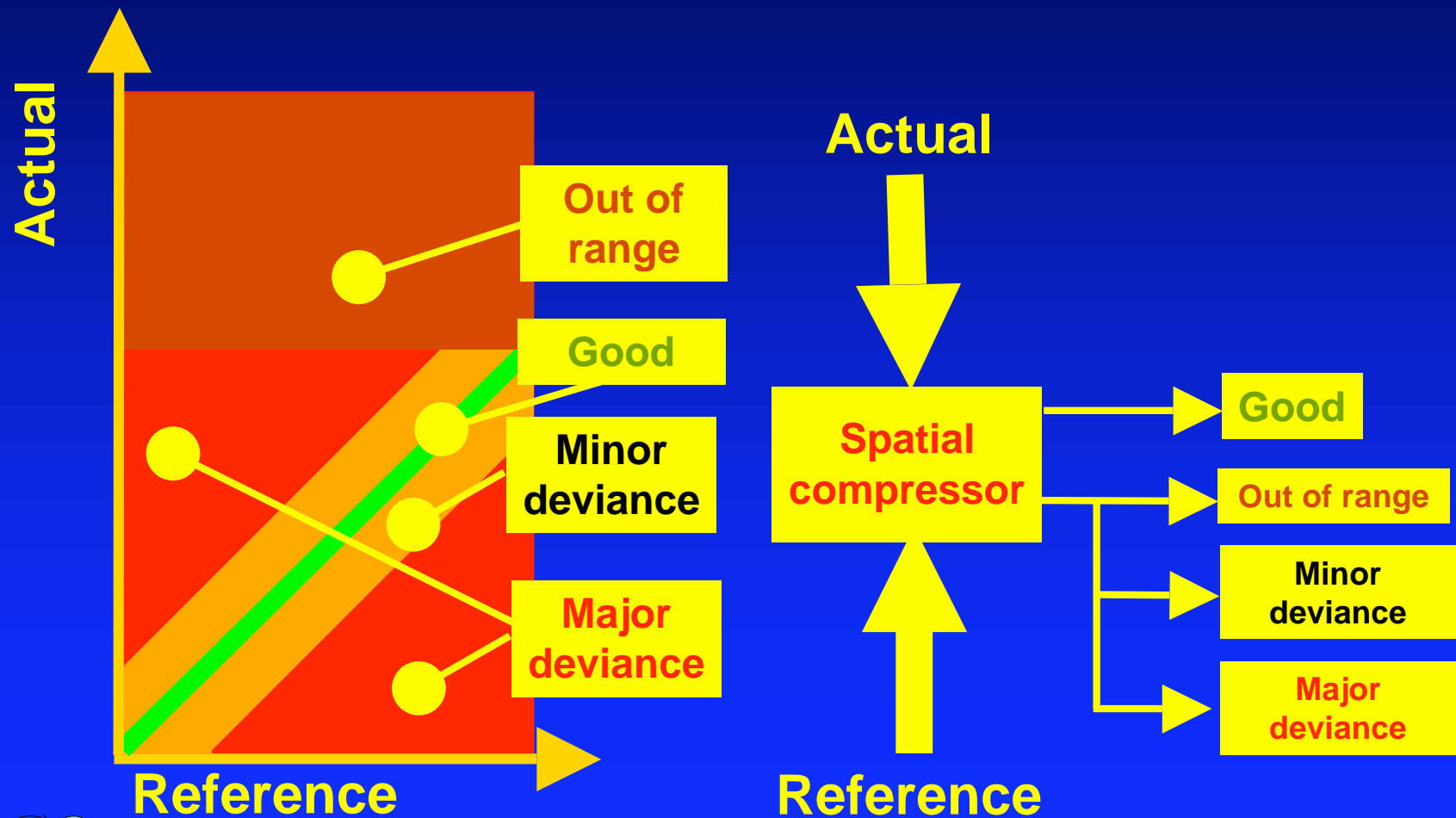
```
( approval (director),
  approval (board) )
```



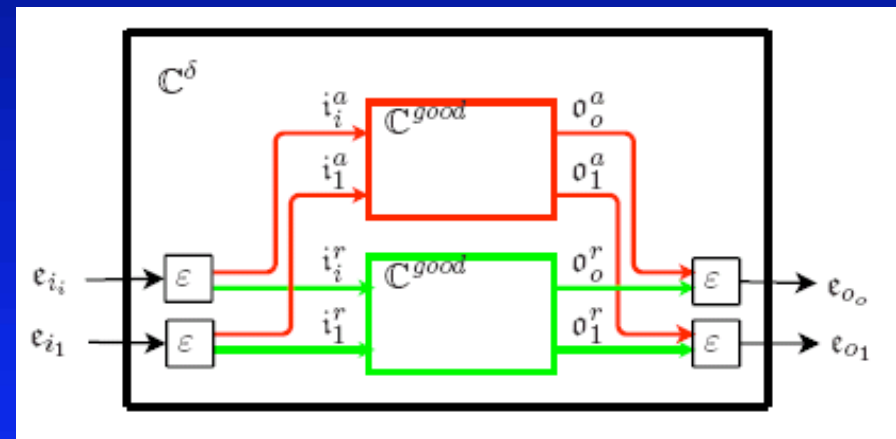
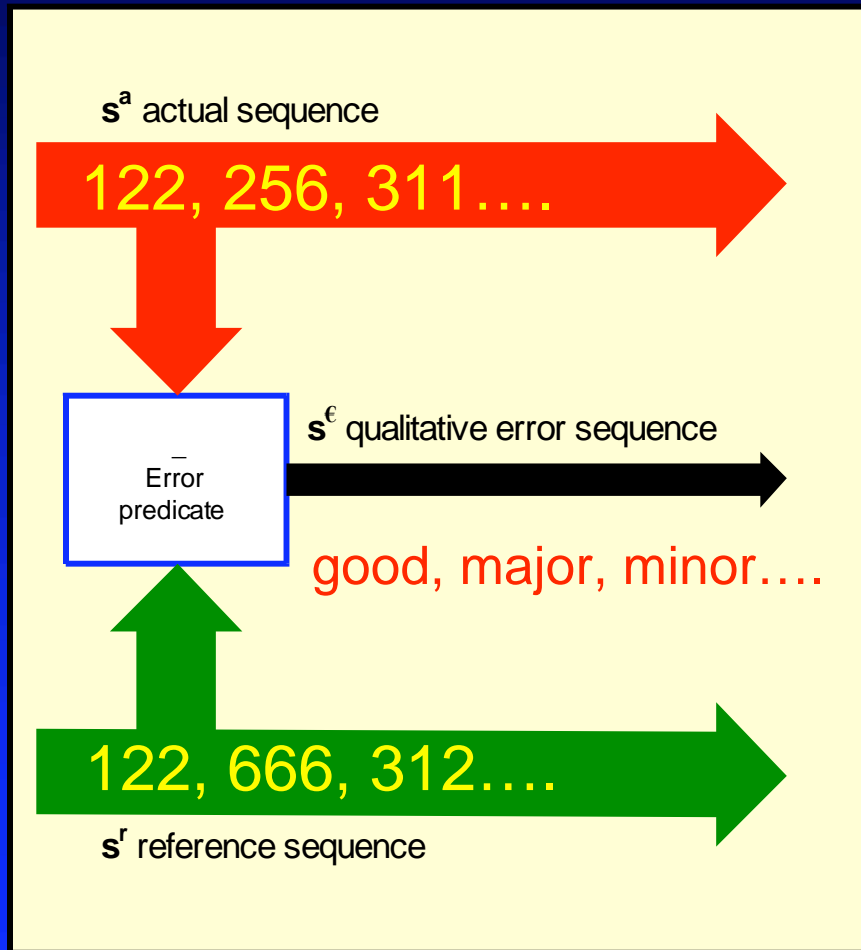
# Qualitative abstraction-spatial



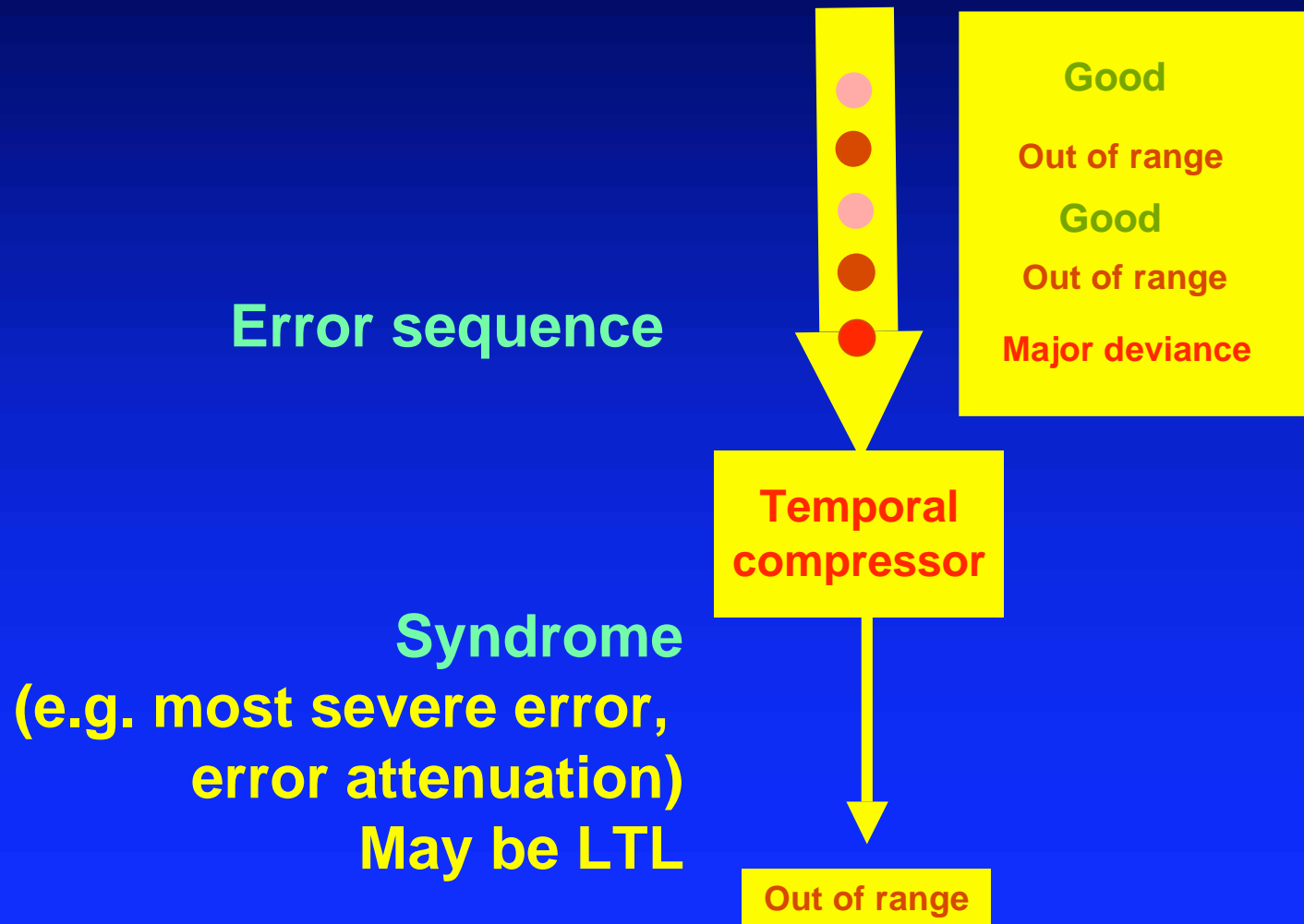
# Qualitative abstraction-spatial



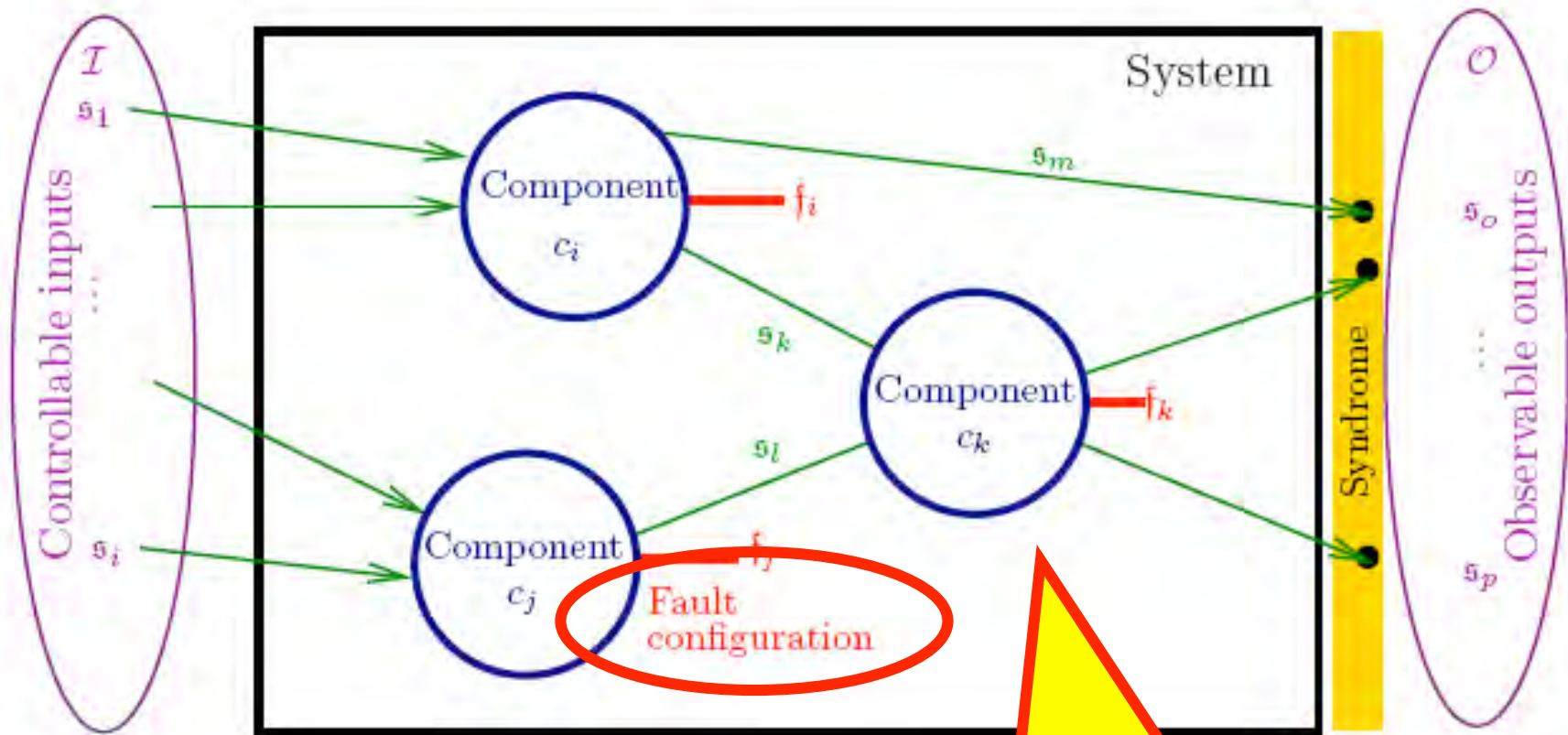
# Qualitative error propagation model: (bounded) model checking



# Qualitative abstraction- temporal



# Static, syndrome model: Constraint Satisfaction Problem (potentially extended by quantitative attributes)

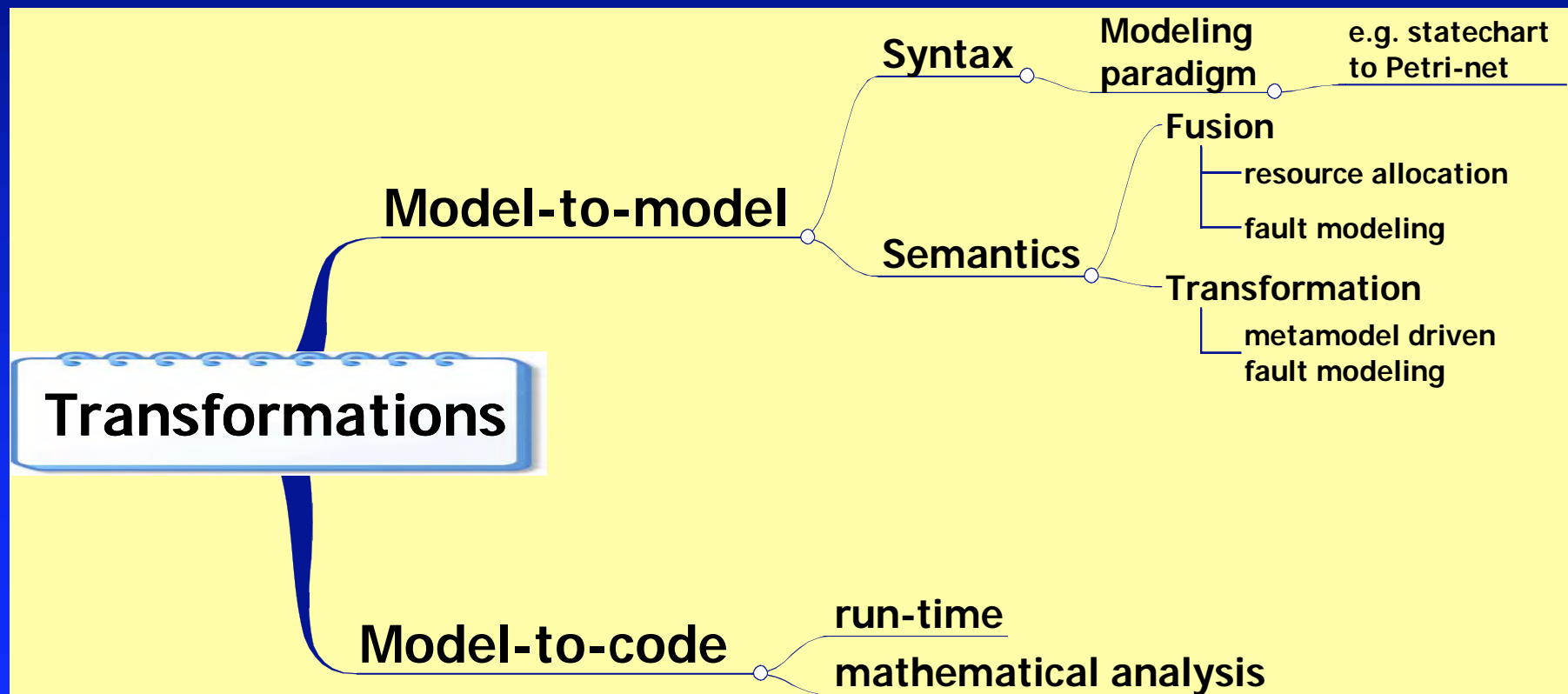


**CSP: Single/all/best solutions**

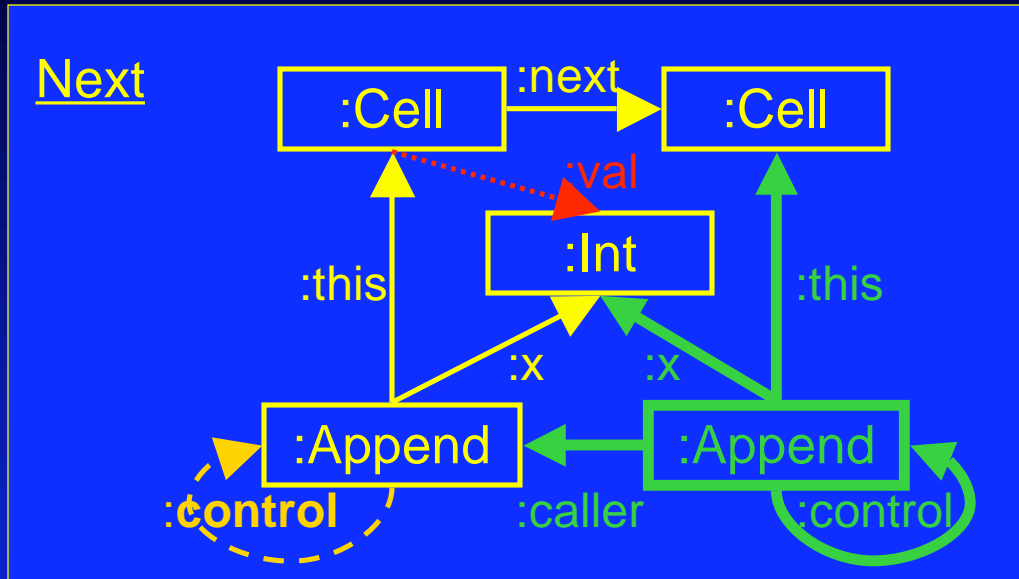
# Qualitative component models

- **Dynamic:** error propagation automaton
  - Same description paradigm, as the original one
  - Same set of states
- **Static:** error sensitivity combinations
  - Input-output syndrome relations
- **Common features**
  - Reduced domains for I/O
  - Drastic complexity reduction
    - False alarms possible
    - No dangerous case is lost
  - Automated derivation from the functional model

# Transformation: THE key factor in all the MDA, integration and V & V models !



# Graph transformation: typed components + interconnections

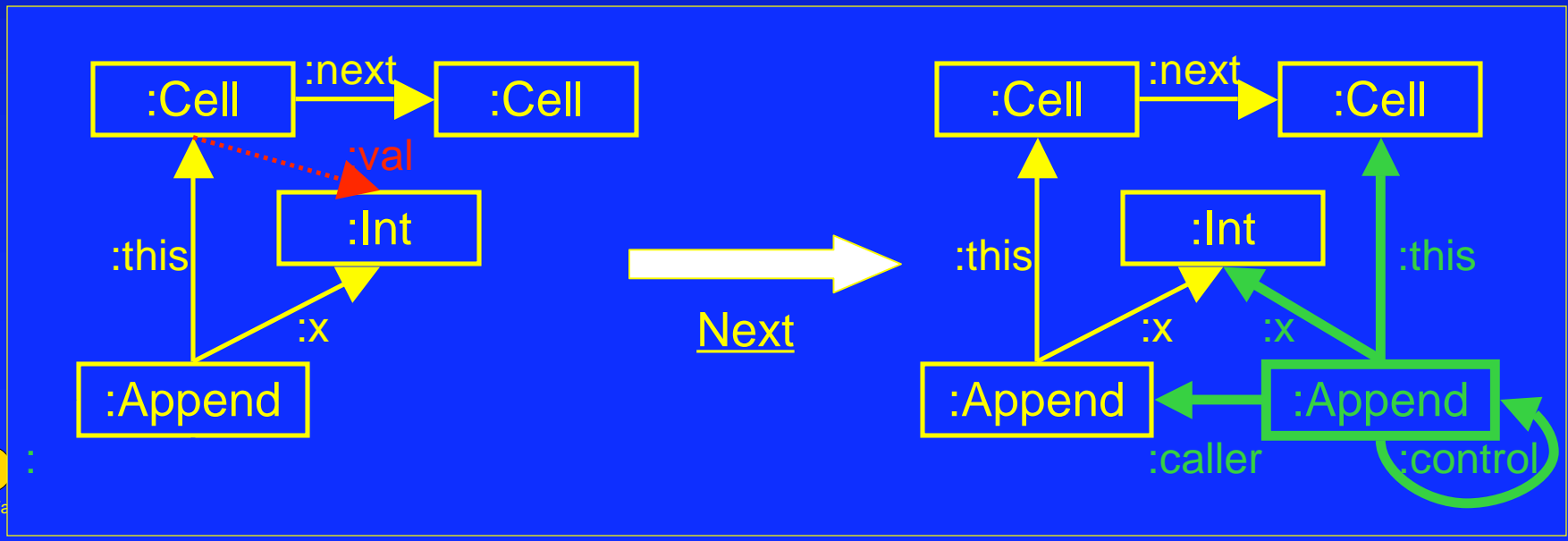


LHS+RHS ("reader")

LHS, not RHS ("eraser")

RHS, not LHS ("creator")

NAC ("embargo")





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# VIATRA2

What's New

- Sep 1<sup>st</sup> 2005** - A new ATL [plugin](#) is available: **Mgm**. It manages projectors (injectors and extractors). Initially, only XMLInjector, ATLInjector and XMLExtractor are available ([more details](#)). It is available in last release (see [download section](#)).
- Sep 1<sup>st</sup> 2005** - Start of a new GMT subproject: [VIATRA2](#).
- Aug 27<sup>th</sup> 2005** - **UMLX 0.0.0** available for evaluation as a graphical Ecore meta-model editor. [Download](#), [Installation Guide](#), [Examples](#), [Tutorial](#).
- Aug 23<sup>rd</sup> 2005** - New versions of the **KM3 User Manual** and the **ATL User Manual** are now available on the [ATL documentation page](#).
- Aug 18<sup>th</sup> 2005** - A new ATL transformation example, **Grafcet to PetriNet**, is now available on the [ATL documentation page](#).
- Aug 16<sup>th</sup> 2005** - Three new ATL transformation examples, [Microsoft Office Excel to Software Quality Control](#), [Software Quality Control to Bugzilla](#), and [Software Quality Control to Mantis Bug Tracker](#), are now available on the ATL documentation page.
- Aug 16<sup>th</sup> 2005** - Two new ATL transformations, providing [injection](#) and [extraction](#) facilities to/from **Microsoft Office Excel** models, are now available on the ATL documentation page.

Audience for the GMT Tools

The tools developed by this project will be useful for those who need

# Representative IST projects



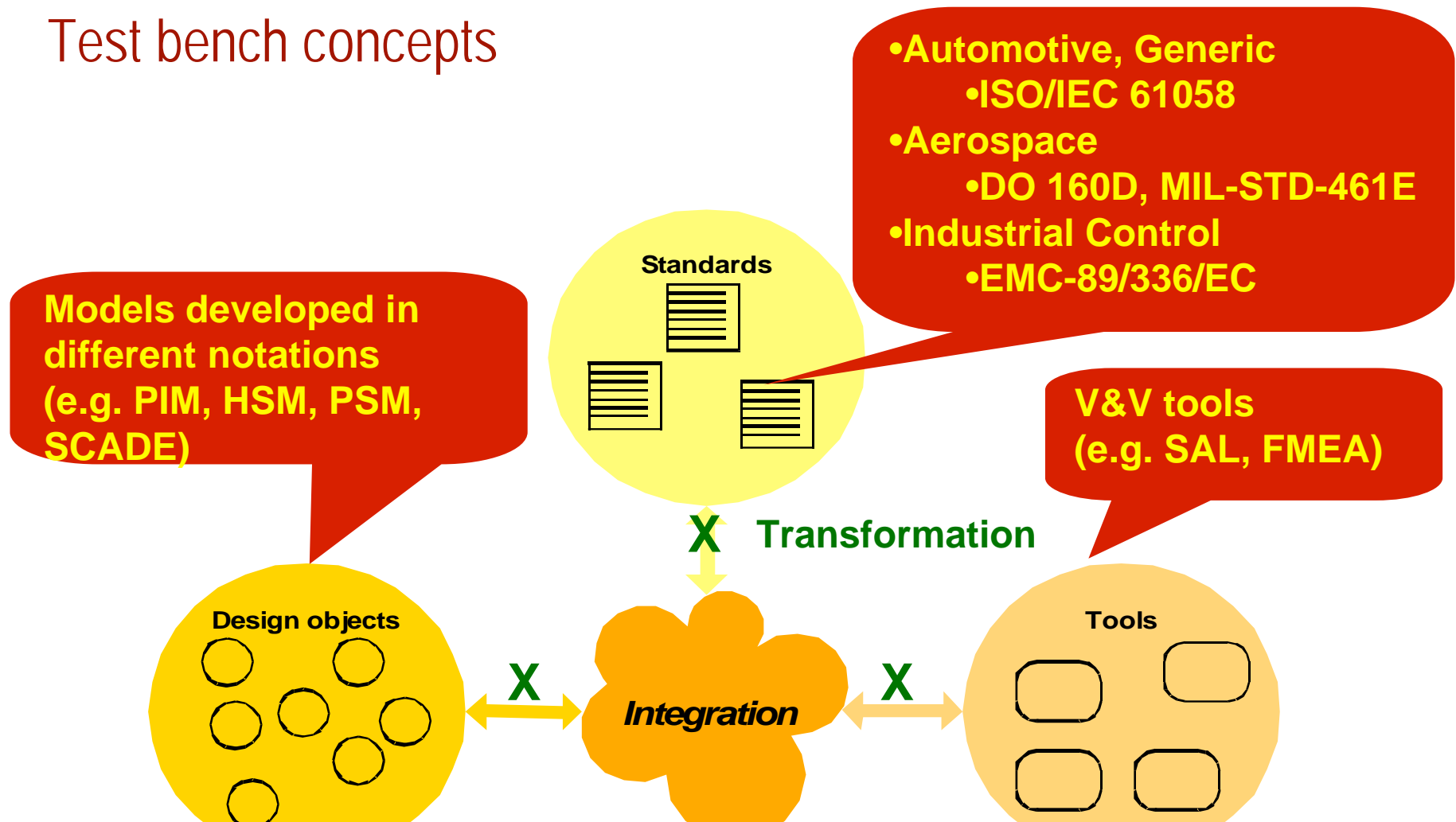
- **HIDENETS**  
Highly Dependable IP-based Networks and Services  
dynamic configurations
- **DESEREC**  
Dependability and Security by Enhanced Reconfigurability  
design of fast reactions
- **DECOS**  
Dependable Embedded Computer Systems
- **SENSORIA**  
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web services
- **DIANA**  
Java in safety critical applications



# WP 4.1 Test Bench Design and Specification: Workflow Based Integration

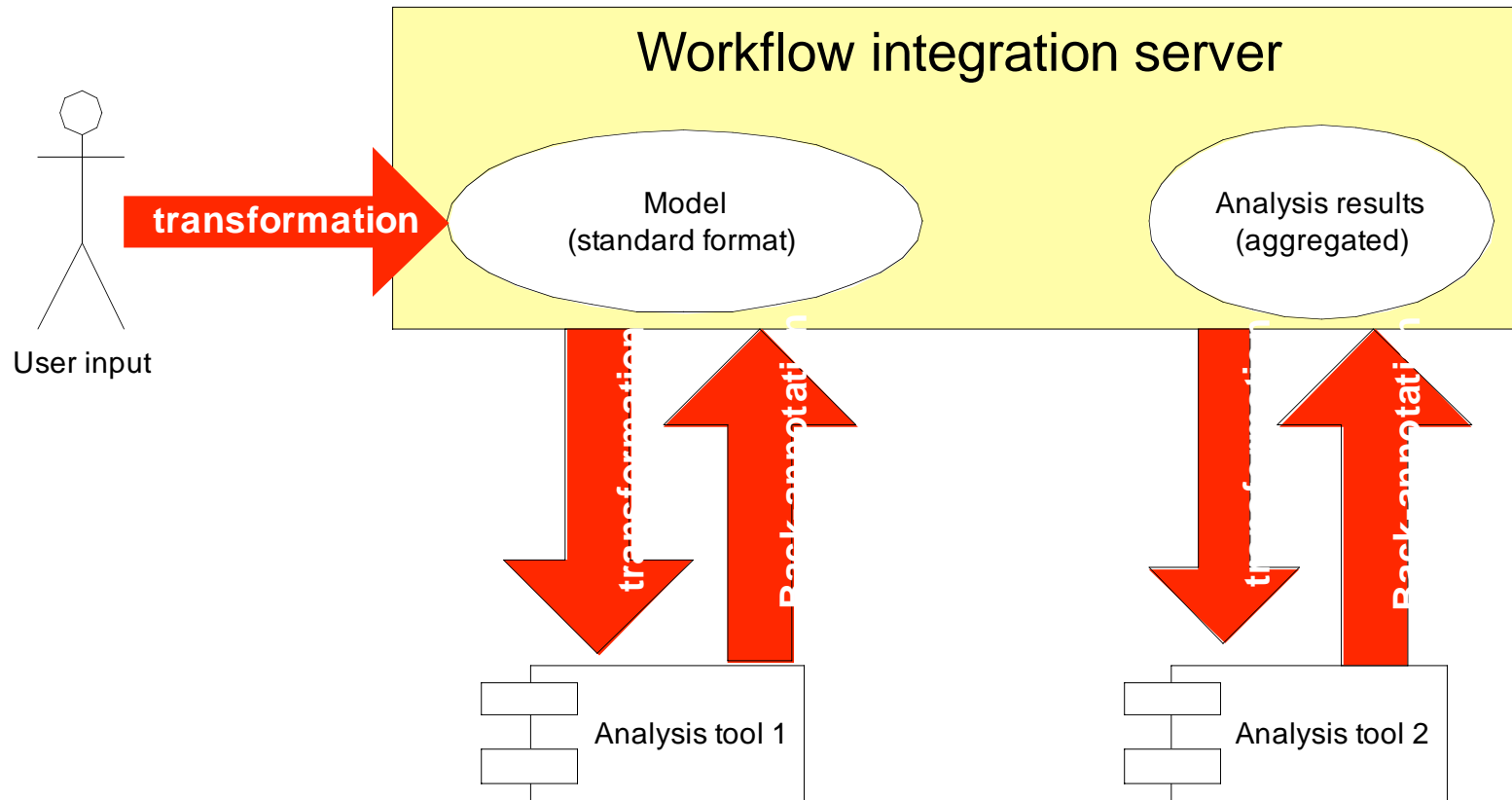


## Test bench concepts





## Transformation between different models/paradigms



# Conclusion

Are intelligent methods confined  
to academic thinking experiments ?





Pssst..Your talk was so attractive, that I got sleepy