



---

## ShapeChange – a tool for model-driven development involving geographic data



---

Johannes Echterhoff and Clemens Portele, interactive instruments GmbH  
Data Modelling and Model Driven Implementation of Data Distribution Workshop  
Copenhagen, January 2015

# Outline

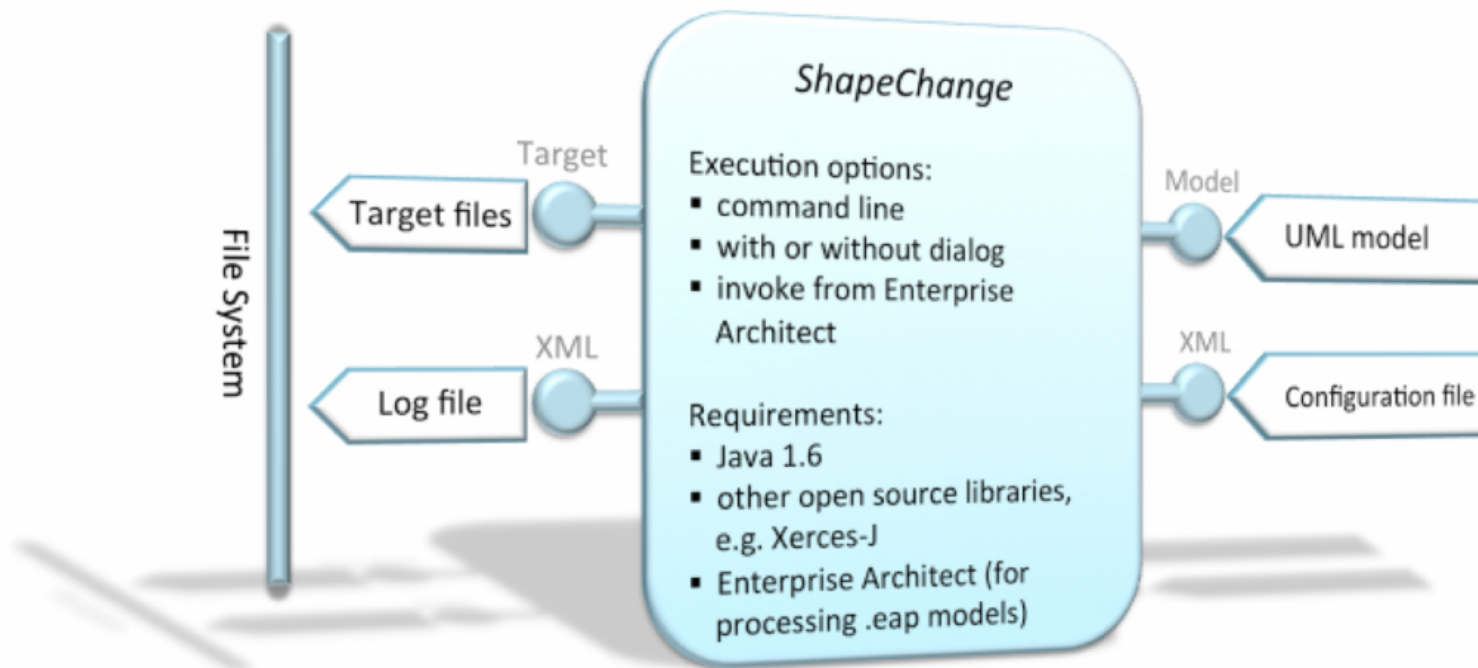
---

- ShapeChange Overview
  - with a focus on new Capabilities
- Example Workflow – Derive an ArcGIS Workspace
- Example Deployment – Automated data processing in the German WasserBLICK portal
- What's Next?
- Summary



# ShapeChange Overview

# ShapeChange



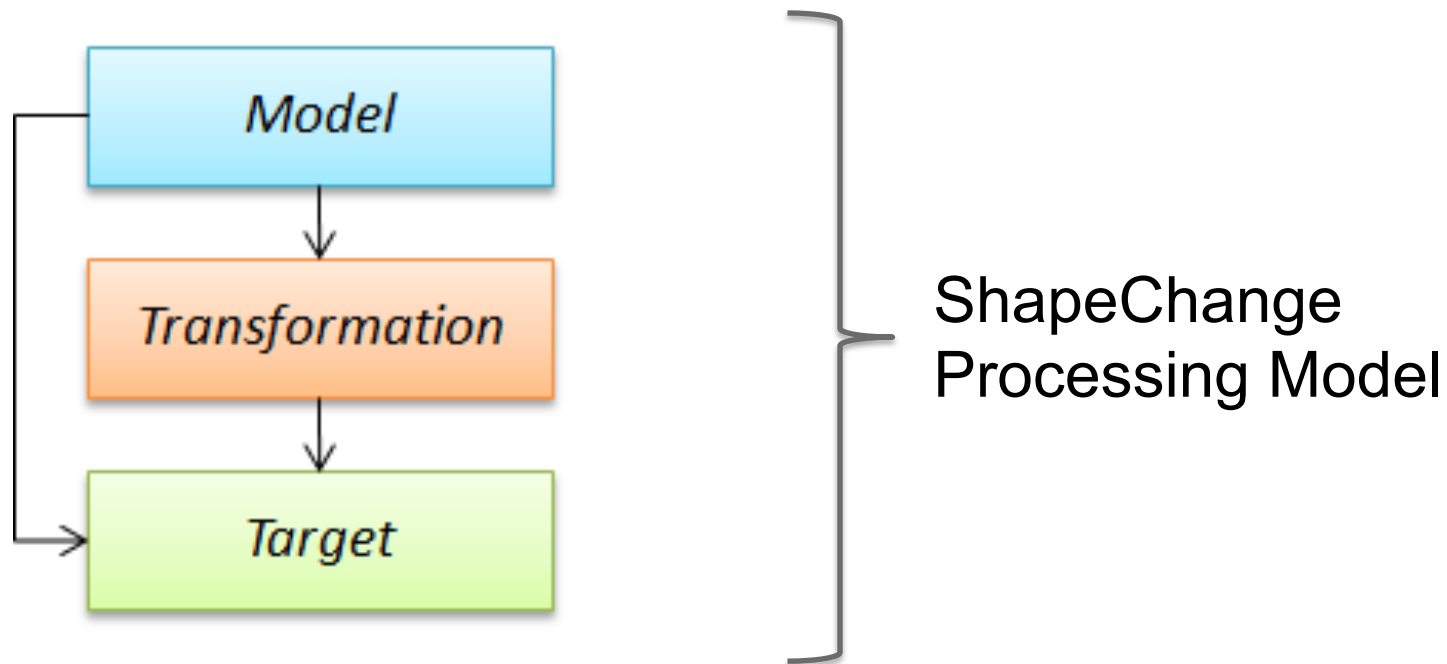
Just released: ShapeChange 2.0.0

Core functionality:

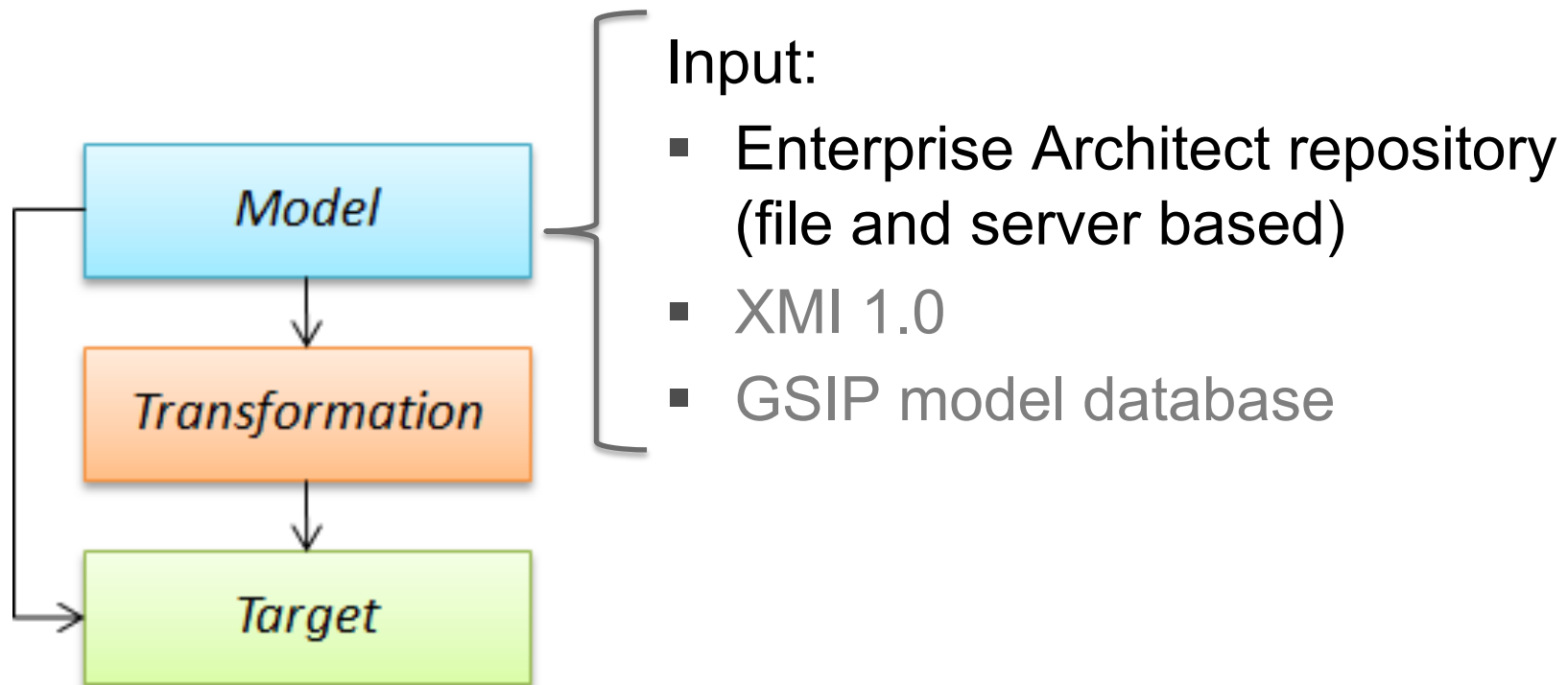
- processing an ISO 19109 compliant application schema
- deriving implementation schemas as well as supporting documentation

Original main output: XML Schema (especially GML application schemas)

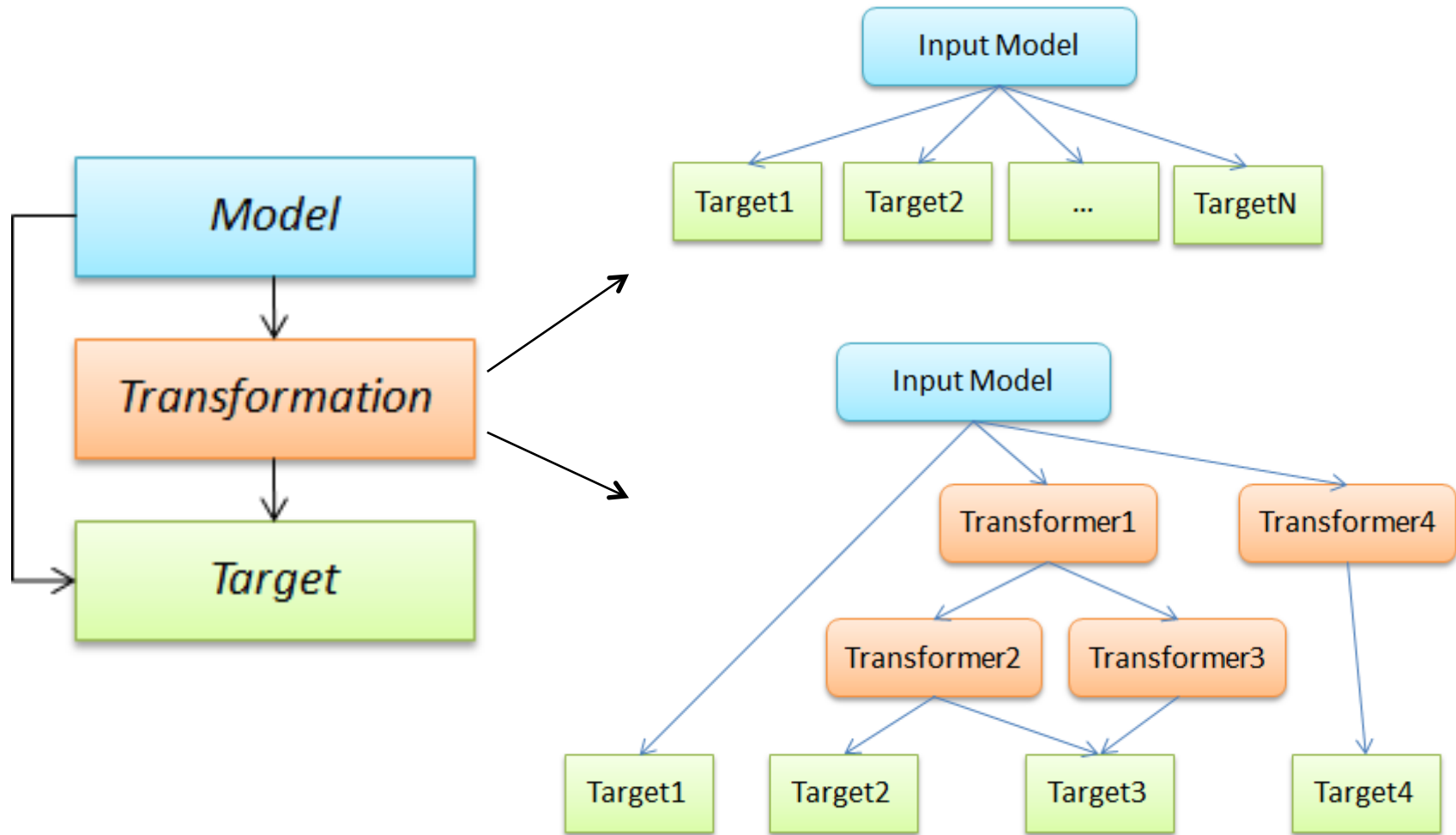
# ShapeChange – Supporting Model-Driven Implementations



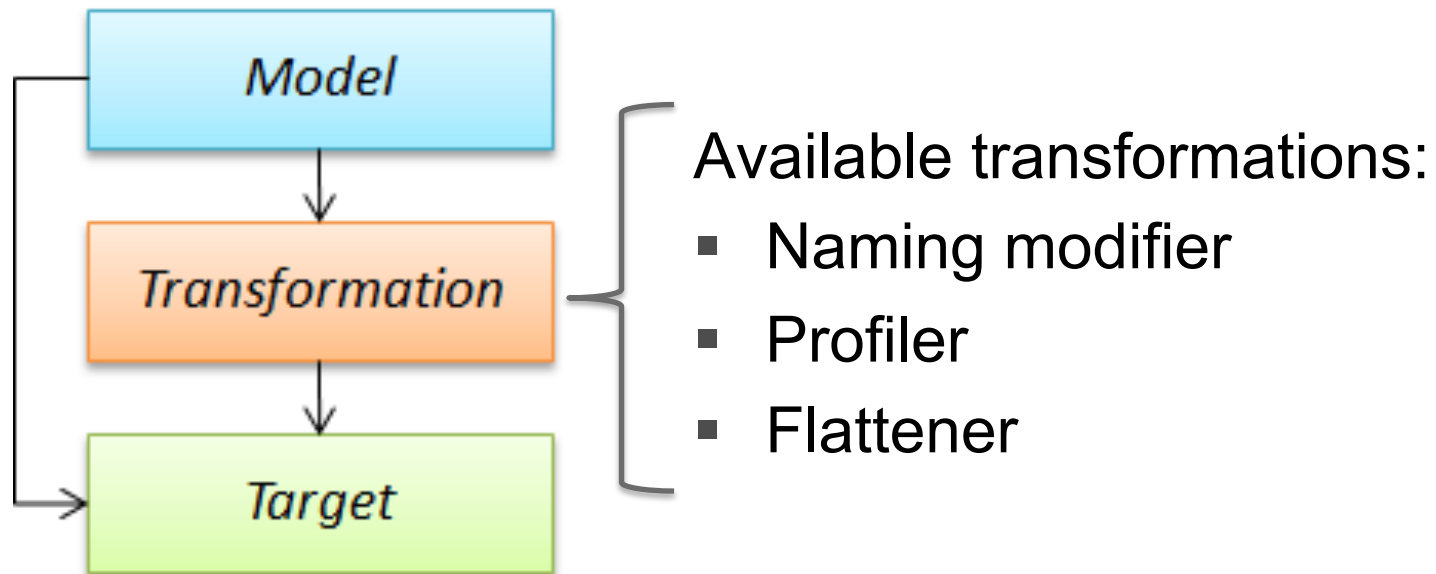
# Inputs



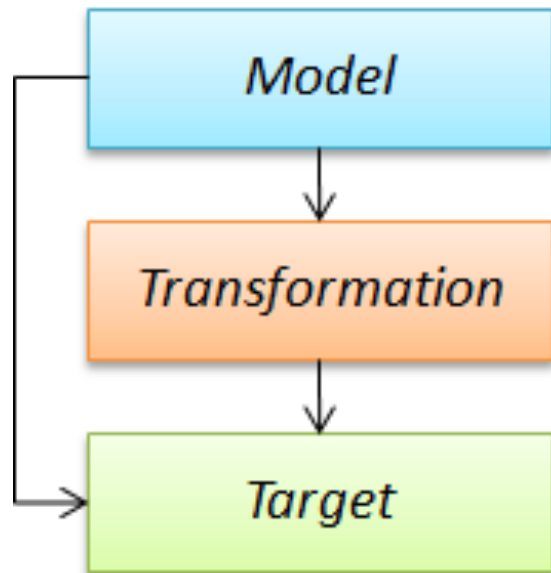
# Transformations



# Transformations

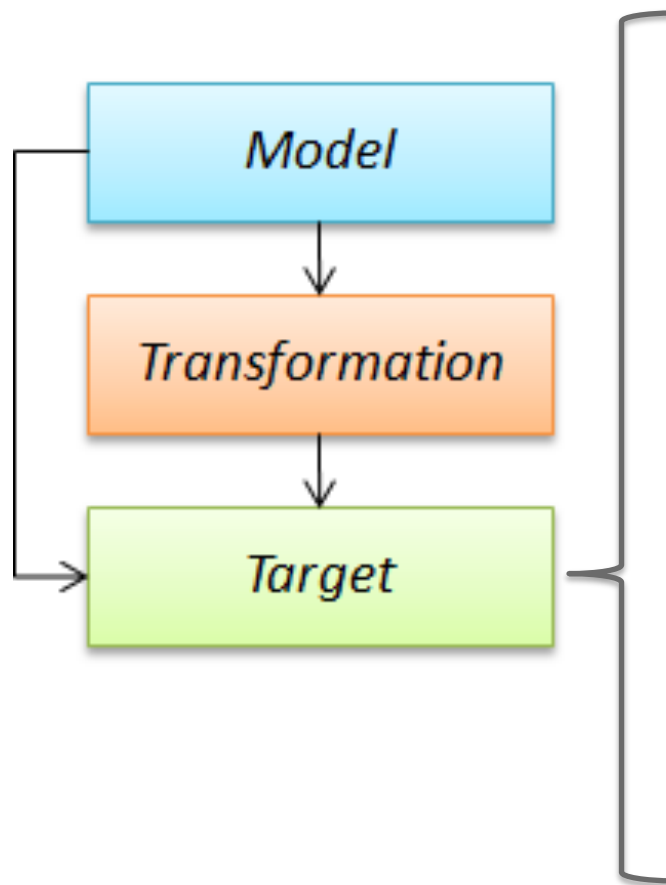


# Targets (General)

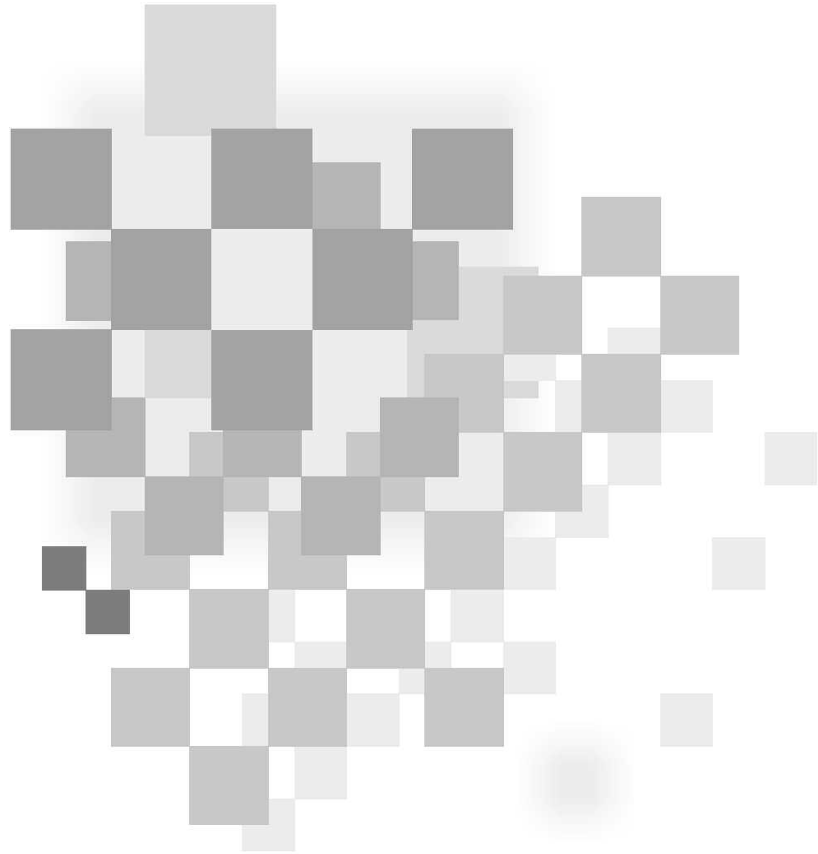


- XML Schema
  - Encoding rules: GML 3.2, GML 3.3, ISO/TS 19139, SWE Common, community specific (e.g. INSPIRE)
  - Schematron
- Feature catalogues
  - HTML, DOCX, XML
  - localizable, customizable styles, tracking changes, include UML diagrams
- RDF schema (for application schema)
- SKOS (for code lists)
- JSON Schema
- Enterprise Architect model
- SQL/DDDL (beta)
  - For PostgreSQL and Oracle
- ArcGIS Workspace (beta)

# Targets (Community / Project Specific)

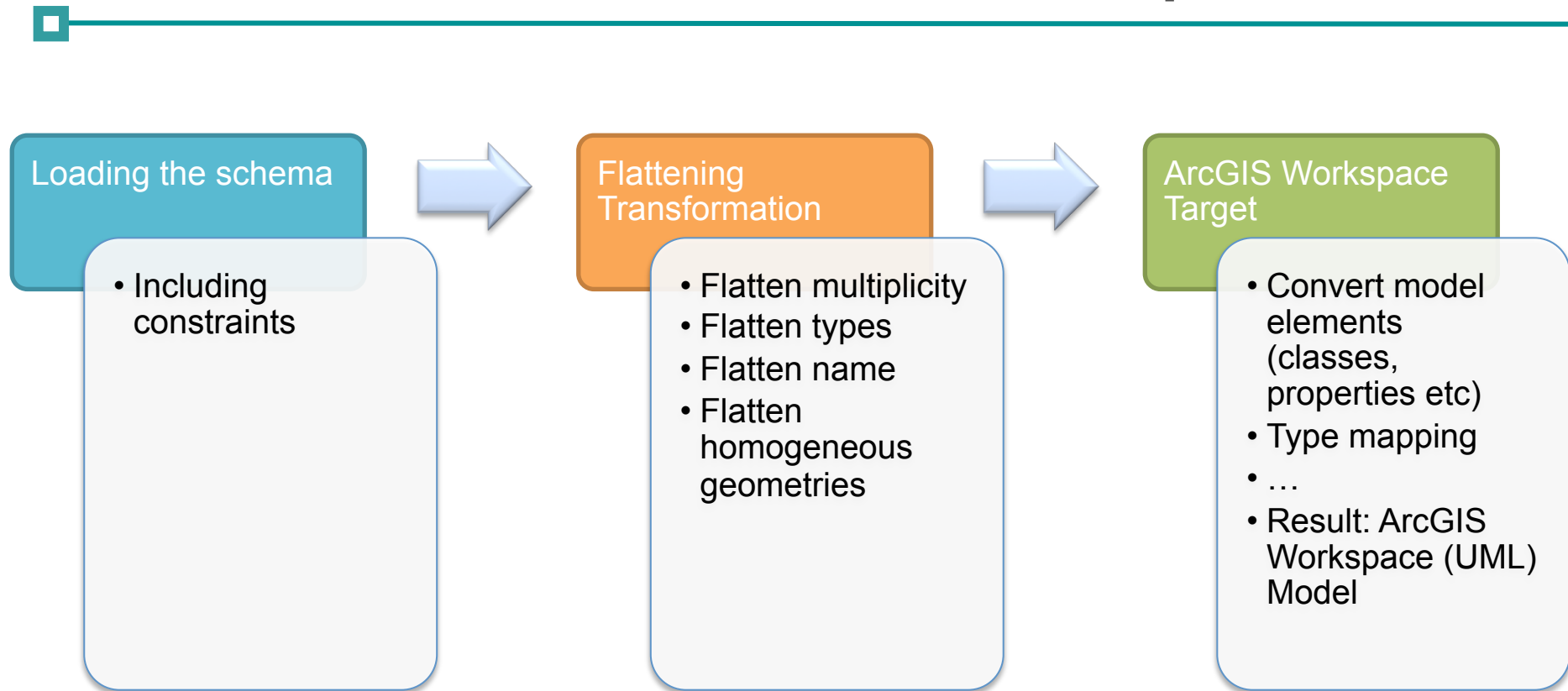


- Excel tables of application schemas
  - Support documenting mappings to/from other schema – e.g. INSPIRE (data provider schema to INSPIRE)
- FME workbenches to validate data
- Deriving a code list registry
- GML to KML stylesheets
- WFS configurations for XtraServer software
- Tools for AFIS-ALKIS-ATKIS (German mapping and cadastral agencies)
- ...

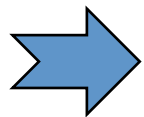
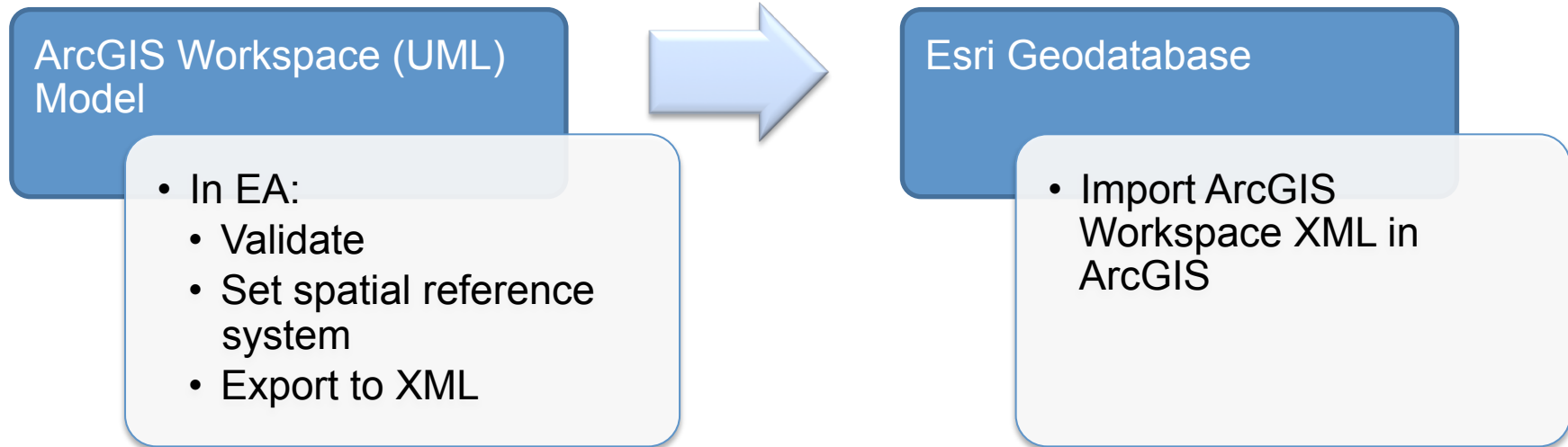


## **Example Workflow – Derive an ArcGIS Workspace**

# Workflow to derive an ArcGIS Workspace



# Workflow to derive an ArcGIS Workspace

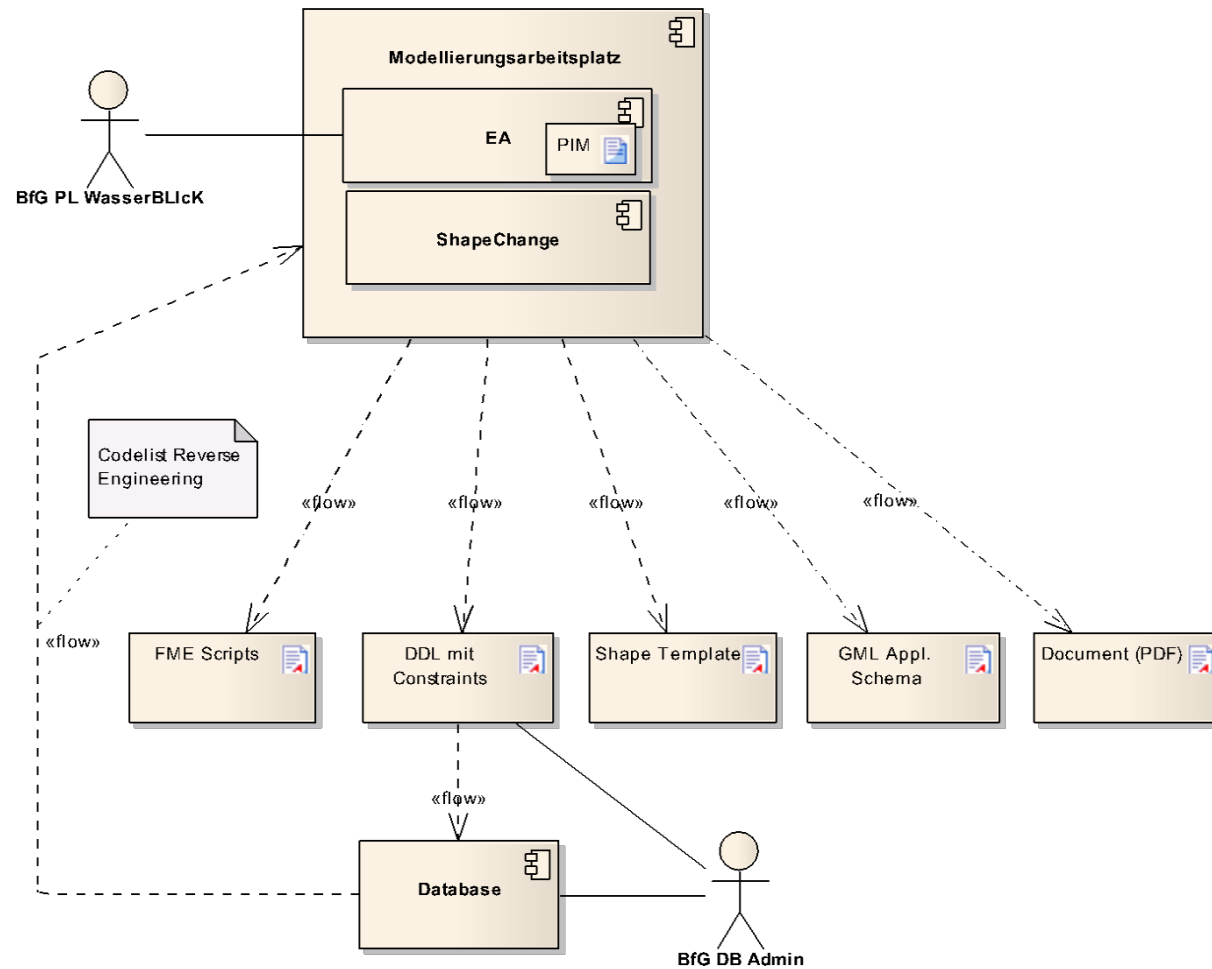


Geodatabase template that can store data according to the application schema in ArcGIS

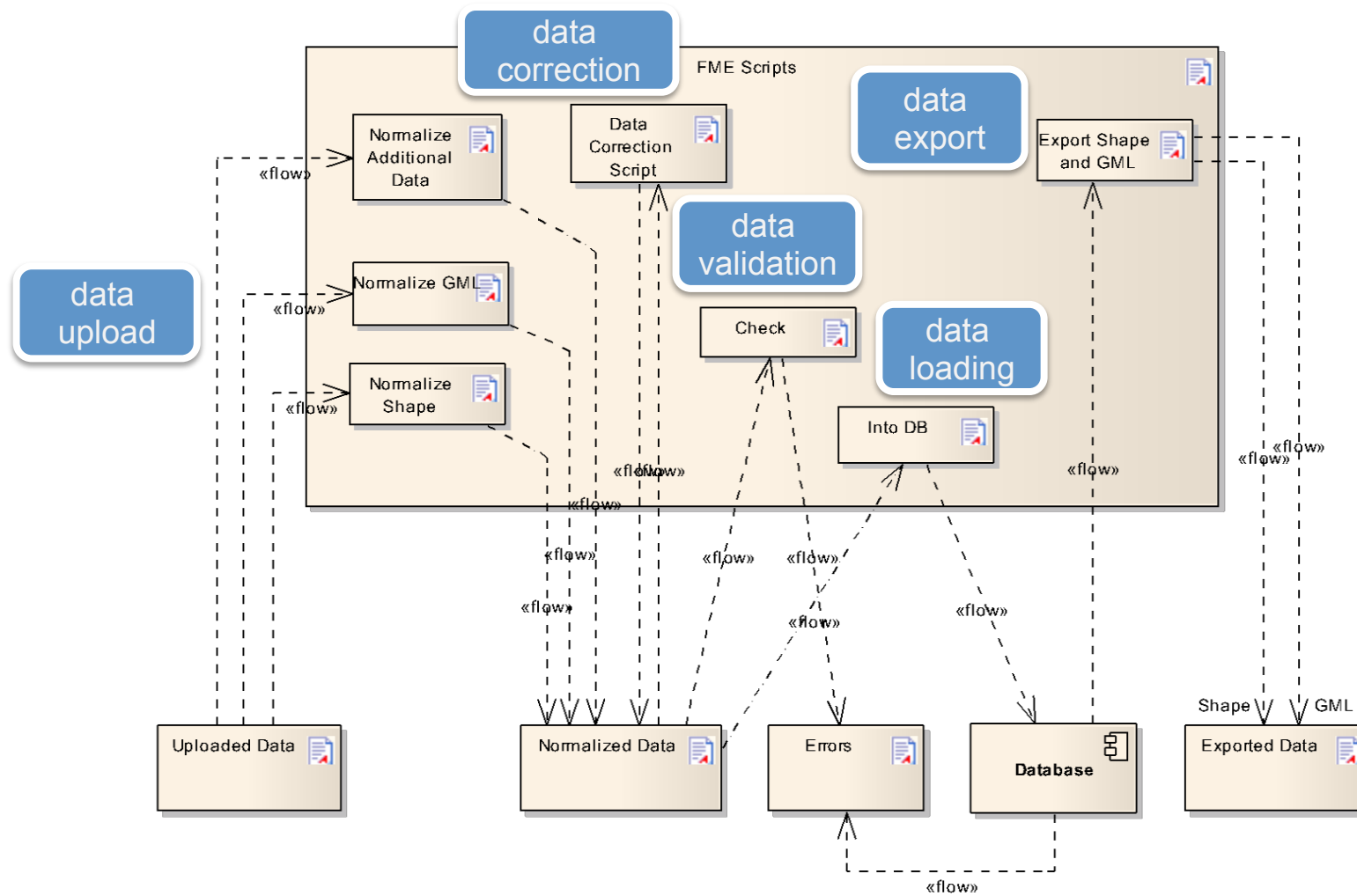


**Example Deployment –  
Automated data processing in  
the WasserBLICK portal of the  
German Federal Institute of  
Hydrology (BfG)**

# ShapeChange outputs that drive the data processing in the portal



# Automated model-driven data processing





**What's Next?**

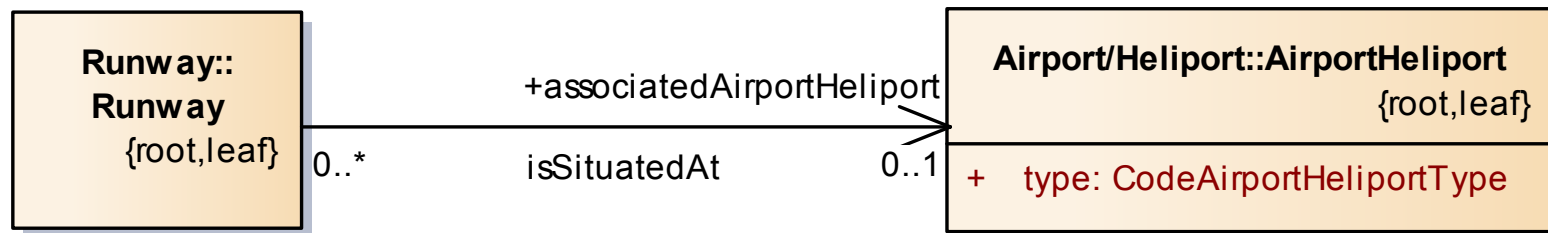
# SBVR to Schematron (in OGC Testbed 11)

- Semantics of Business Vocabulary and Business Rules (SBVR)

- Purpose:

- formal and detailed natural language (like declarative description of business rules)
    - easier to write and understand than OCL

- Example:

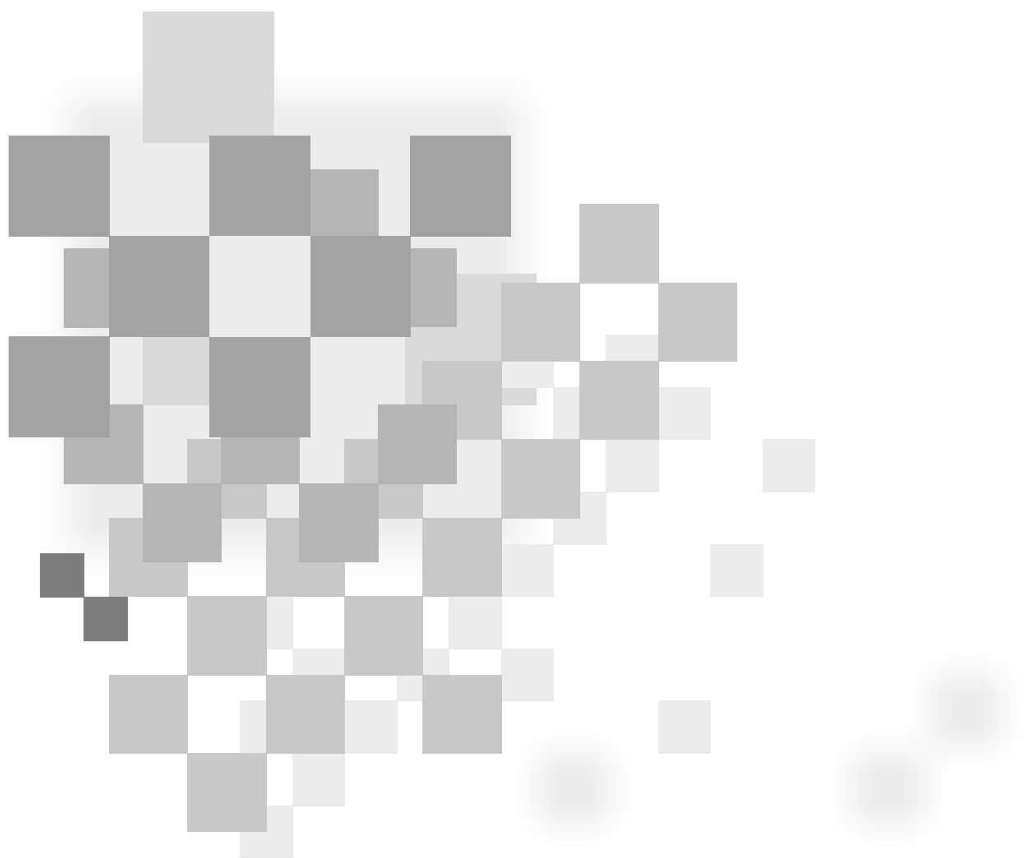


- Business rule: *“A Runway shall not be situated at AirportHeliport with type = ‘HP’”*

# SBVR to Schematron (in OGC Testbed 11)

---

- Goal for Testbed 11:
  - derive Schematron rules from AIXM business rules (expressed with SBVR) → improve validation of AIXM instance documents
- Goal beyond Testbed 11:
  - support of another - more user friendly - language to express constraints



# Summary



# ShapeChange

---

- Powerful tool for model-driven implementations
- Originally developed to support GML, since 2002
- Many additional capabilities have been added during previous years:
  - model transformations to derive implementation schemas
  - encoding implementation schemas for various environments (XML, JSON, RDF, SQL, ArcGIS)
  - create sophisticated schema documentation
- Open source
- Customizable - as needed
- Documentation and software: <http://shapechange.net/>
- Contact: [shapechange@interactive-instruments.de](mailto:shapechange@interactive-instruments.de)