# Template Based Authoring for AR based Service Scenarios

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# Outline

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# Motivation

The well known challenge of product development:

Increase of complexity, but decrease of development time

Speed up product development by using Virtual Reality!

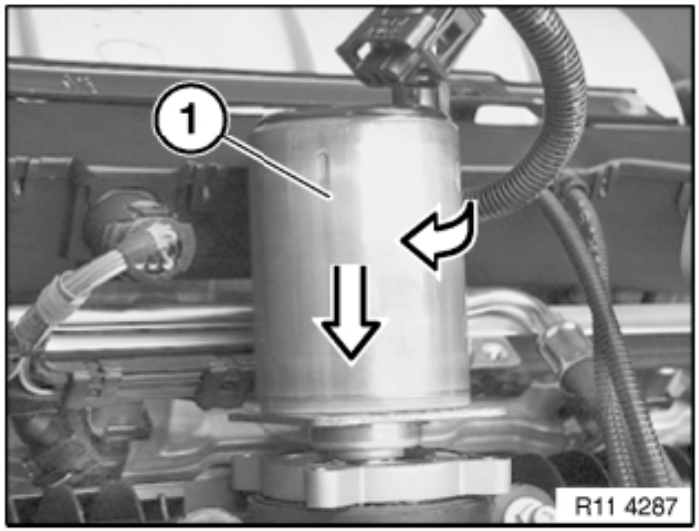
But the process doesn't end with development!

- Production
- Service and Maintenance

# Motivation

## Service and Maintenance:

- Training takes time
- Writing manuals takes time
  - Photos of real car
  - Translation in other languages
- Using the manuals is complicated




*Installation:*
Replace sealing ring on spacer.
Install servomotor (1) and screw in up to spacer.
Rotate servomotor (1) into correct installation position.
Install and tighten down screws.

# Motivation

## Trend towards Augmented Reality, because

- context sensitive information presentation
  - ↳ Reduce training
  - ↳ Reduce errors
- Graphical (universal language)
- Mobile

# Motivation

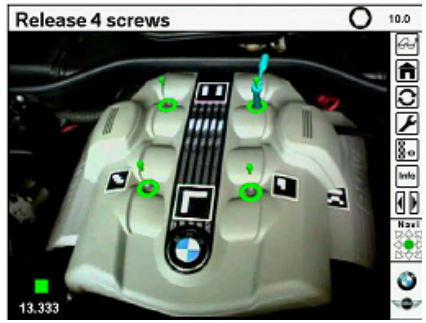
Sounds good, but where is the data coming from?

- Modeling in 3DS Max
- Position models relative to markers
- Writing Javascript code
- Integrate in AR-System

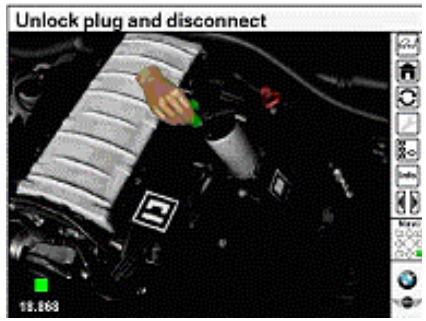
Drawbacks

- It takes a lot of time
- You need to be a programmer
- Technical writers are **not** programmers!

Top priority: It must be a tool for technical writers!







# Some existing solutions

## AMIRE (Zauner et. al., ISMAR2003)

- Markers are objects and can trigger actions
- Fields and Routes concept
- It is a good programmers tool…

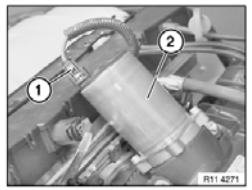
## PowerSpace (Haringer, Regenbrecht, ISMAR02)

- Powerpoint based scene description, then rearrange in PowerSpace
- Interactive placement of annotations
- No linkage between annotation and scene objects

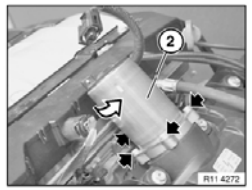
# A short look into reality

## Real world scenarios (Focus on automotive)

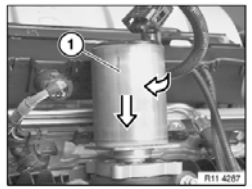
- Change oil filter
- Replace driving belt
- Valvetronic motor replacement




Unlock plug (1) on servomotor (2) and disconnect.




Unfasten screws.
Rotate servomotor (2) until no longer engaged in spline teeth of eccentric shaft.




*Installation:*
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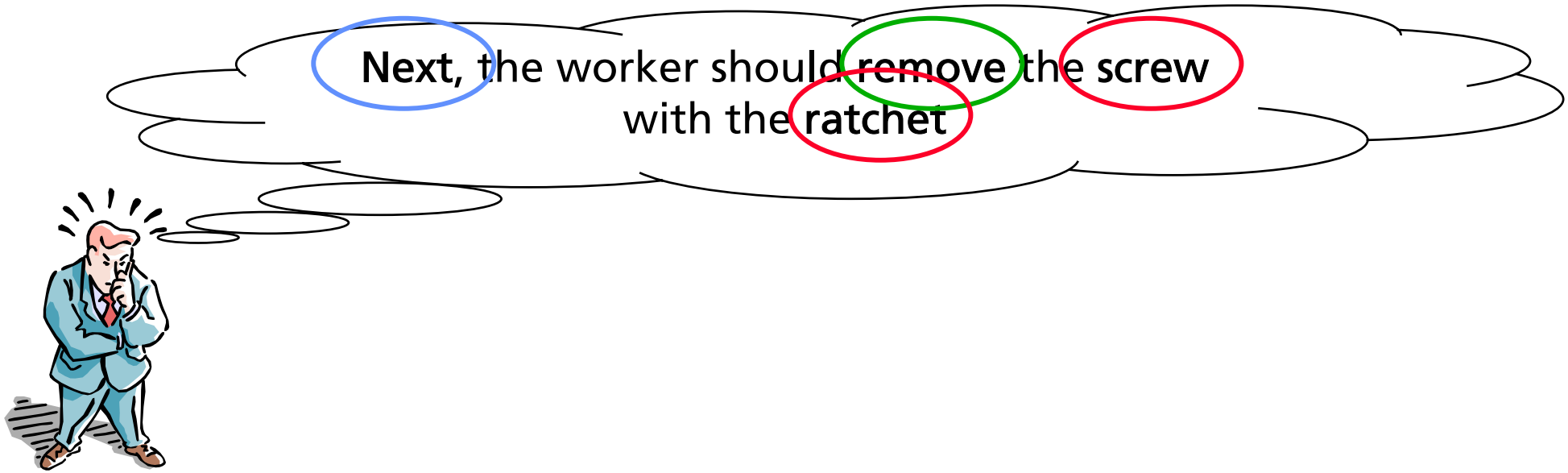
## Similarities:

- Consist of atomic work tasks (called “operations”)
  - ↳ Loosen part, remove part, screw, measure, …
- Most operations are similar they only differ in their parameters, e.g. release takes parameter *tool* and *part*
- Specific chronological order

# Template based Authoring



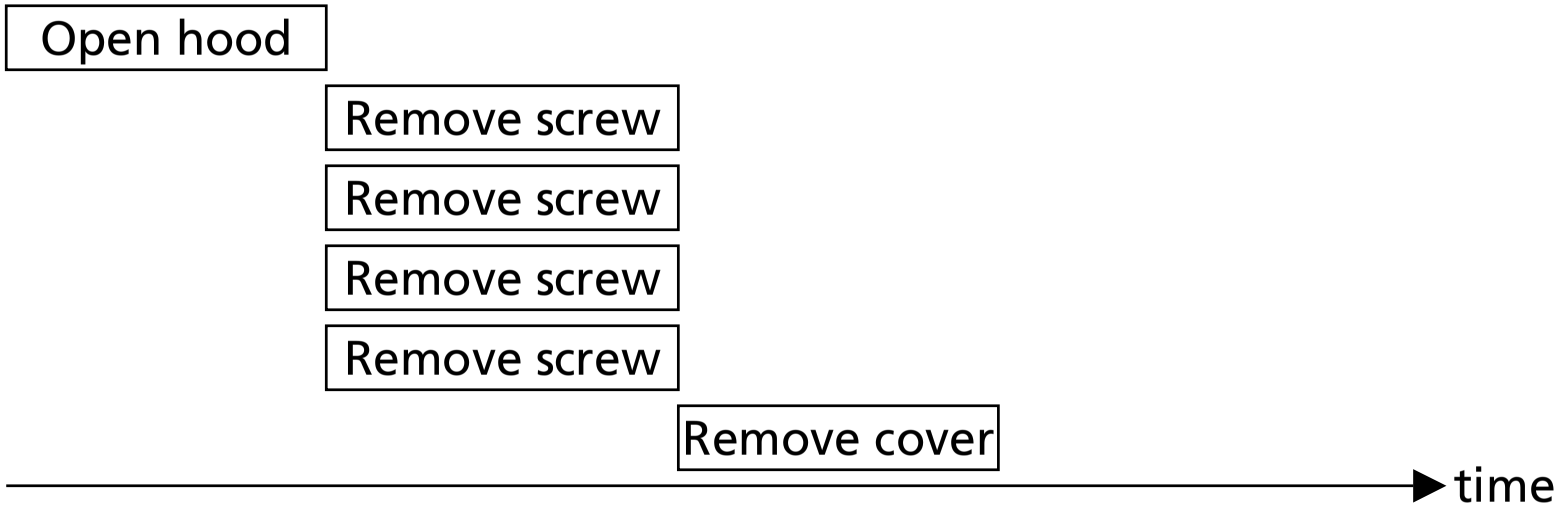

The building blocks:

- Timeline (temporal order of action playback)
- Actions (the operation)
- Objects (parts of scene, tools)

# Timeline

## Basic Concept:

- Similar to video editing programs
- Each action is wrapped in a time container
- Each container has a start time and a duration
- Each container could be positioned anywhere on the timeline



# Objects

## Concept:

- Represents a “real” part or tool in the virtual scene
- Include meta data, depending on their type, e.g.
  - **Screws:** Contact point, possible movement direction
  - **Tools:** Contact point, animation of tool and resulting effect on connected part
- Implementation: VRML97 prototypes with defined API

# Actions

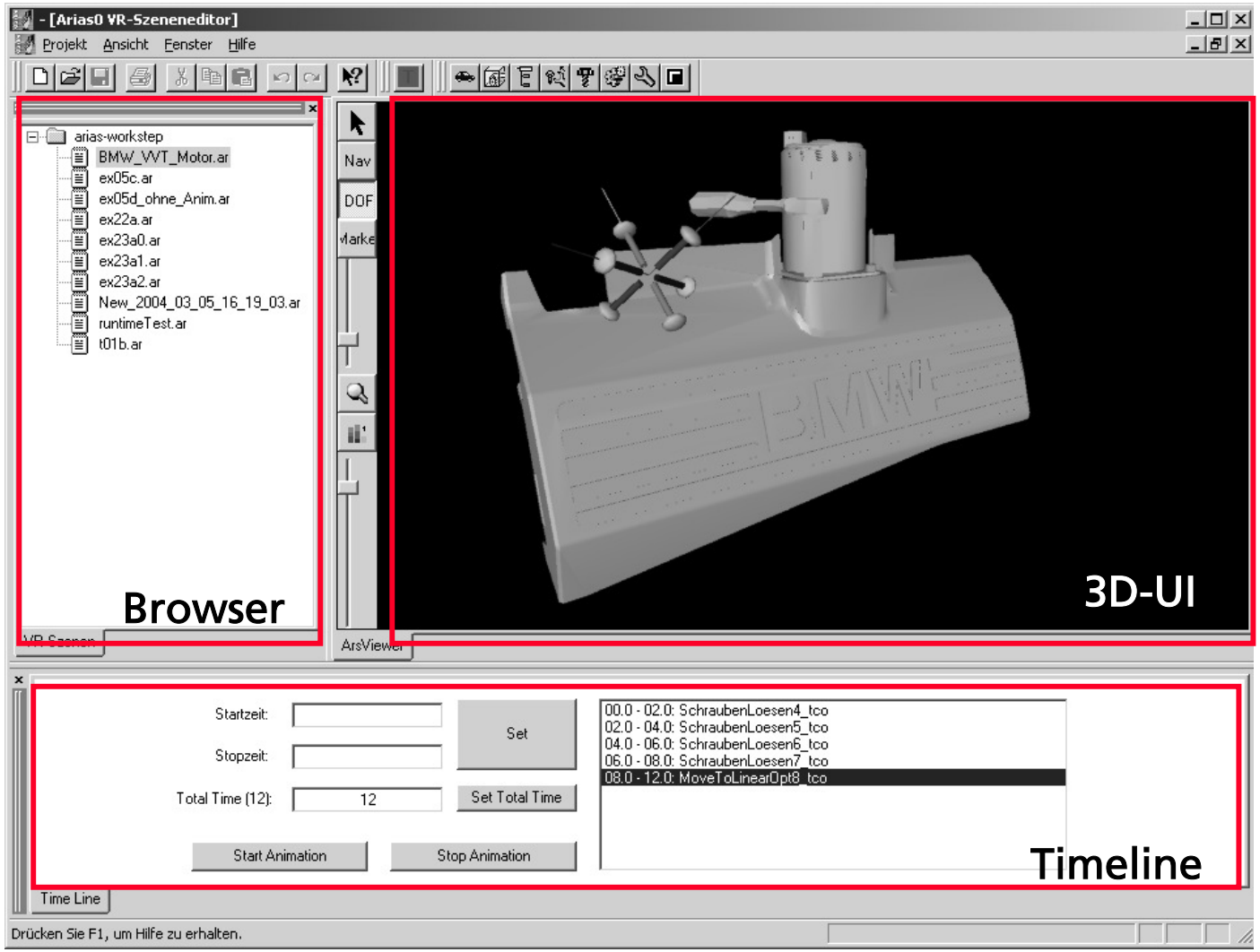
## Concept:

- Represents an operation
- Defines the graphical representation (e.g. additional arrows)
- Takes care of animations
- Meta data for parameter definition (kind of tools etc.)
- Implementation: VRML97 prototypes

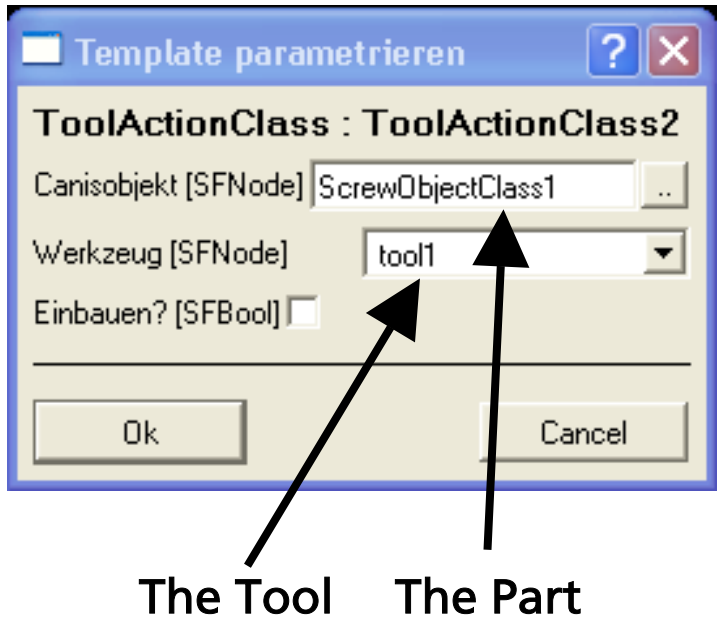
## Examples of actions:

- Release, Fasten
- Screw in
- Remove

# Everything put together in a GUI



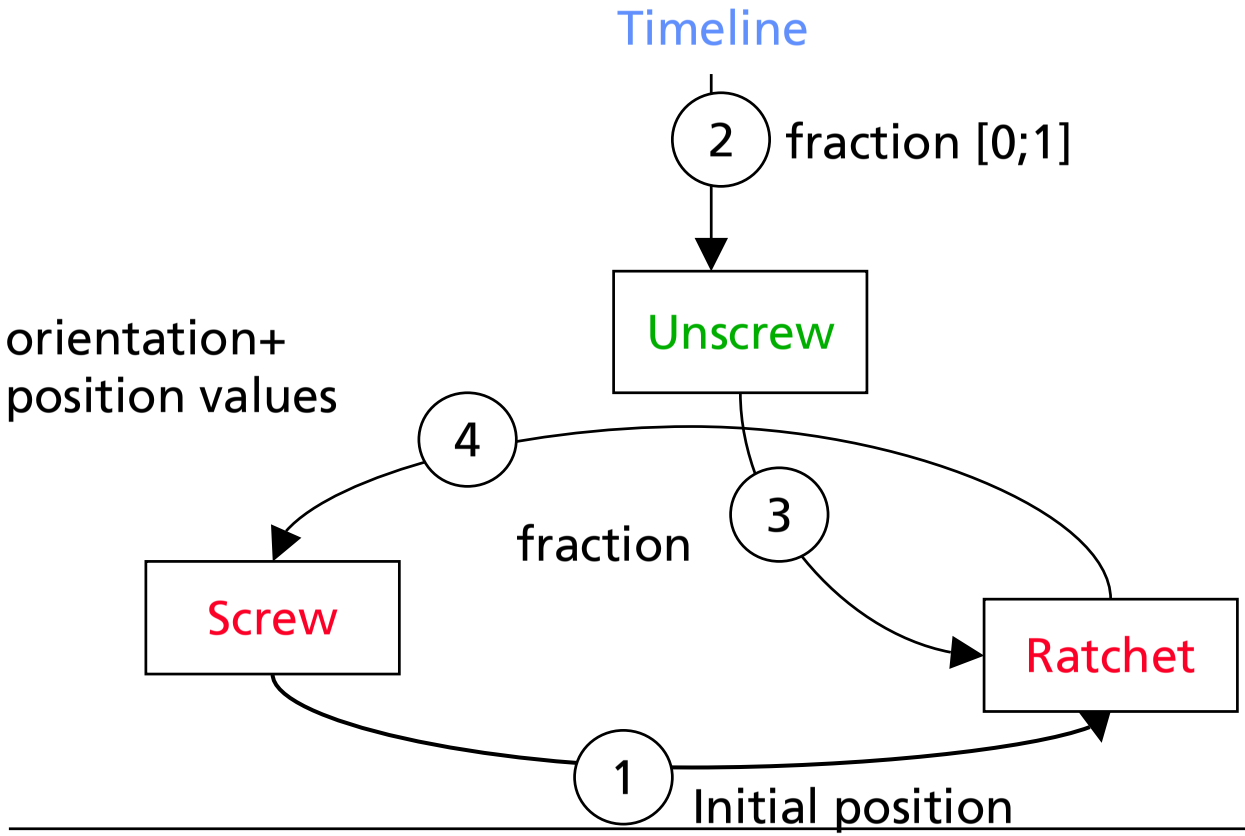

## Unscrew Action

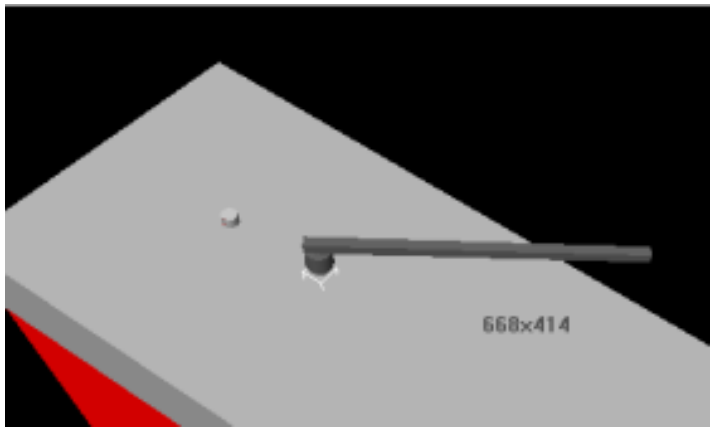


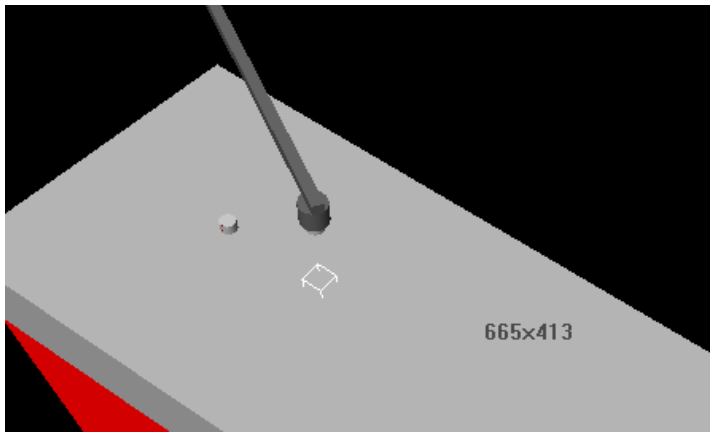

creation of Action-GUI is based on metadata

# Playback of actions

- Object defines initial pos and ori (time = 0)
- Tool defines subsequent pos and ori



# Application Demo

# The Advantages of Template Based Authoring

- High level authoring (well suited for non-programmers)
- No need to think about the graphical representation
- Easy realization of style guide
- Automatic creation of text descriptions

- Output:
  - Still images for pdf-Style documentation
  - Movies for VR documentation
  - Scene description for AR manuals

# Conclusion

- Flexible and extensible concept for creation of service manuals
- The basic blocks: Timeline, Object, Action
- Adapts the way technical writers think

- Move to X3D for better encoding of meta data
- Improve object interface (e.g. transparent objects)
- Object dependencies
- Ongoing work: IST-ULTRA (www.ist-ultra.org)

# Thanks for your attention!

# Questions?