

# A Runtime Reconfiguration Model for (Executable) Models

Frank Trollmann  
frank.trollmann@dai-labor.de  
www.dai-labor.de

## Motivation

There is a growing need for today's software applications to adapt to the current context of use.

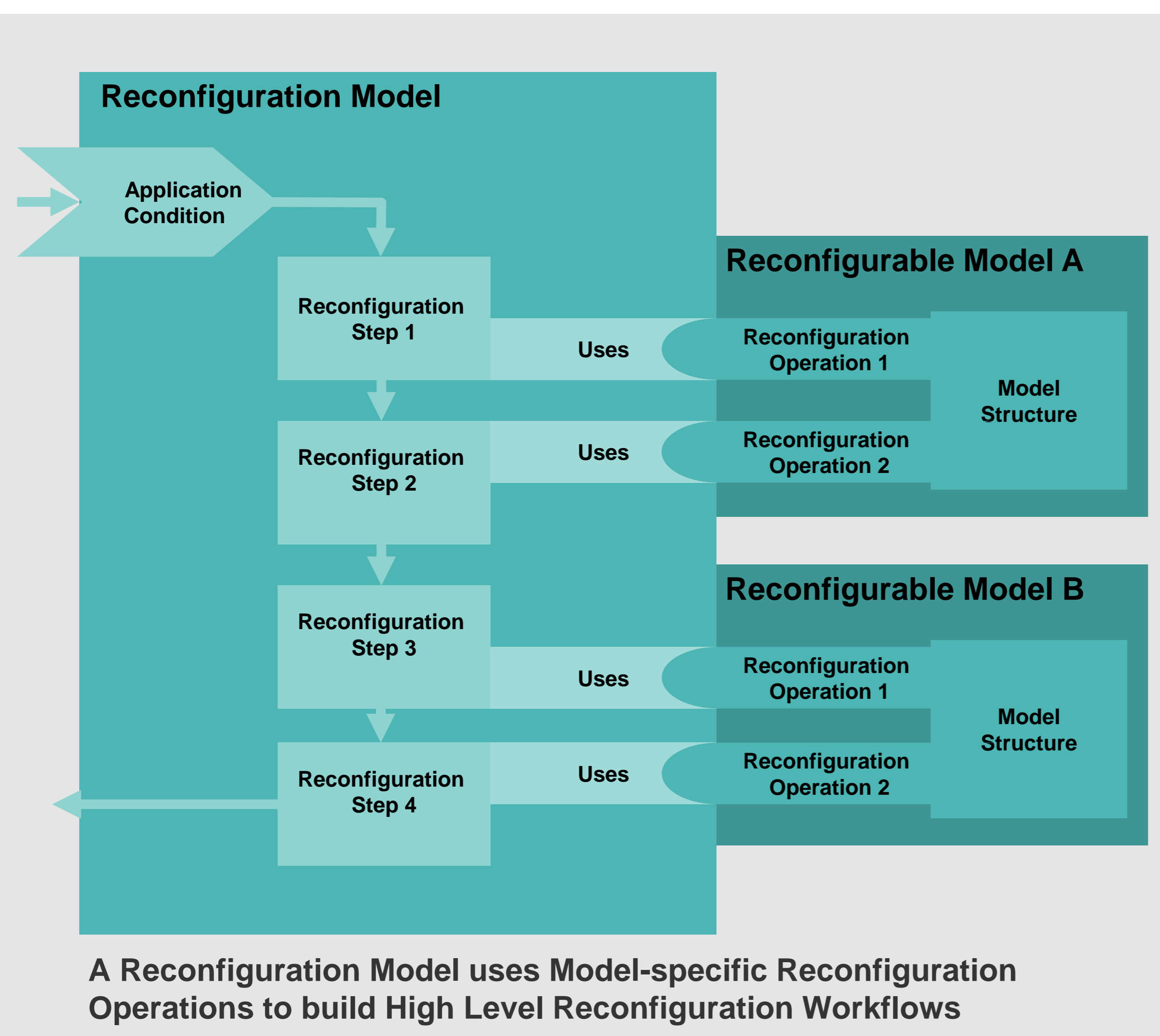
Especially in highly dynamic and personalized areas, such as smart homes, there are several possible causes for adaptations. These causes can be subsumed as the context of use. The context of use can contain the configuration of the smart home as well as the user himself.

The designer of an application running in such an environment can not foresee the context of use entirely. For example, it is impossible for her to determine the size of the display the application will be available on. She is therefore required to write her application in a way that enables it to be adapted to the display size.

Such an adaptation can range from simply changing the text size of user interface

elements to changing the whole interaction structure.

Other possible causes for adaptations are changes of the configuration of the smart home itself or adaptations to the user's abilities or disabilities. For instance, a newly introduced device might require the user interface to contain certain elements that enable the user to control this device.



## Problem

In a highly dynamic environment such as a smart home, the context of use is unpredictable and changes frequently. Each user arranges his furniture differently. For this reason the configuration of the smart home can not be foreseen at design time.

Additionally, this configuration is not fixed but may change at runtime. Such changes occur when the user moves furniture around or introduces a new device. The most frequent changes, however, are caused by the user's actions.

These changes can not be foreseen at design time. The application has to do this adaptation at runtime.

Such adaptations can be local (i.e. just change a certain aspect of the application, like its user interface), as well as global (i.e. changing several aspects or the whole application).

The complete set of possible adaptations of the application is very large and hard to handle. A technique for enabling the designer to comfortably specify adaptations to this unknown context is required.

## Approach

The models@run.time approach proposes the utilization of models during the runtime of an application. These models represent different aspects of the application and its environment on different levels of abstraction.

In this approach, there is a causal connection between an application and its models. This means a change in a model's structure can be the cause of a change in the application and vice versa.

A model offering certain reconfiguration operations that can be executed at runtime is called a *Reconfigurable Model*.

This dissertation aims at introducing a *Reconfiguration Model*. The purpose of this *Reconfiguration Model* is to steer the reconfiguration of the *Reconfigurable Models*, the application consists of.

This Reconfiguration Model should enable the designer to express complex workflows of joint reconfigurations of different models as well as their application conditions.

## Links

**Smart Personal Assistant**

<http://www.smartassistantsolutions.de/>

**DAI-Labor**  
Distributed Artificial Intelligence Laboratory

