

Adaptive User Interfaces for Smart Environments

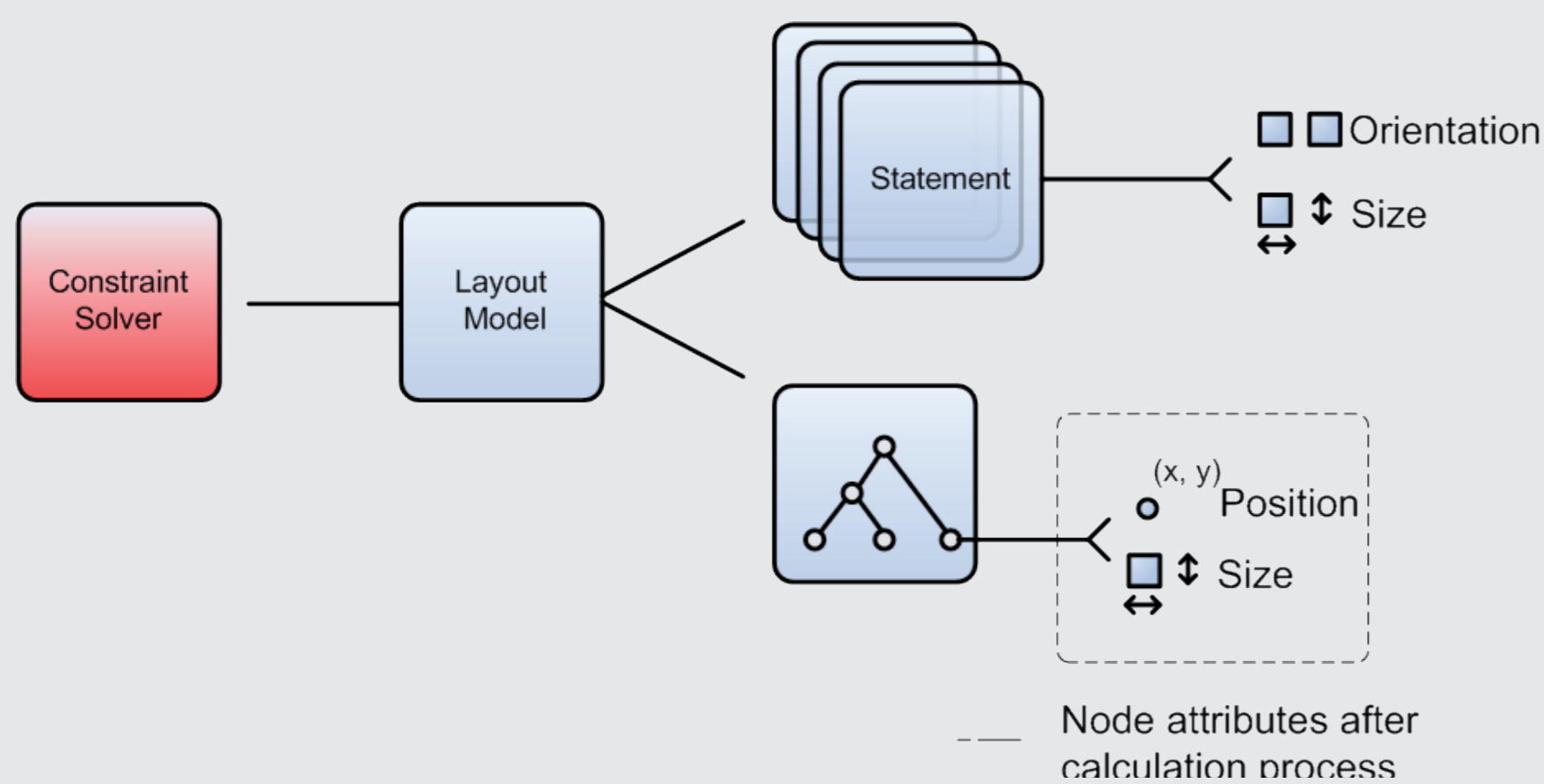
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Motivation

Our environment is equipped with a variety of interaction devices, appliances and a various sensors. This increasing complexity of our environment makes the development of application interfaces for smart environments a challenging and time-consuming task. In order to overcome the problem of the unknown context at design time, this work use the information from the user interface (UI) models and relations between the different abstraction layers to derive a **layout model** which is flexible enough for most of the **situations**. Because the design of a user interface is a creative process, the designer must be involved into the design process. The development process is supported by a **layout model generator** tool to simulate different possible situations and to define application specific layout statements. At runtime the **adaptive application** is faced with the real world. Because there could be unconsidered user characteristics like color blindness, which affects the visualization of the user interface, the user needs a **possibility** to change the behavior of the layout algorithm.

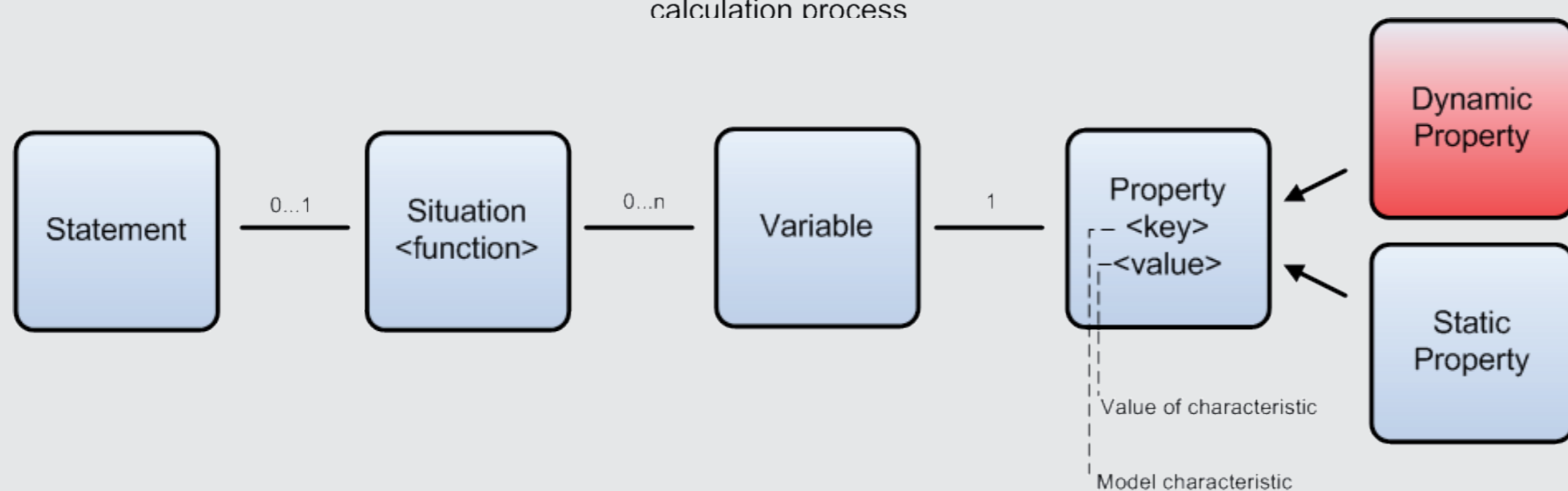
The Layout Model

A graphical user interface consists of a set of elements like buttons, images and text. The layout model defines the spatial relationship between these elements and sets its width and height depending on platform, environment and user characteristics. Each user interface follows a logical structure, intended to transport its meaning to the user. Based on this tree-like structure, the layout model defines constraints for the presentation in terms of position and size of elements. As such constraint systems can become very complex and difficult to handle the constraint system is automatically created from a set of statements about the user interface elements.



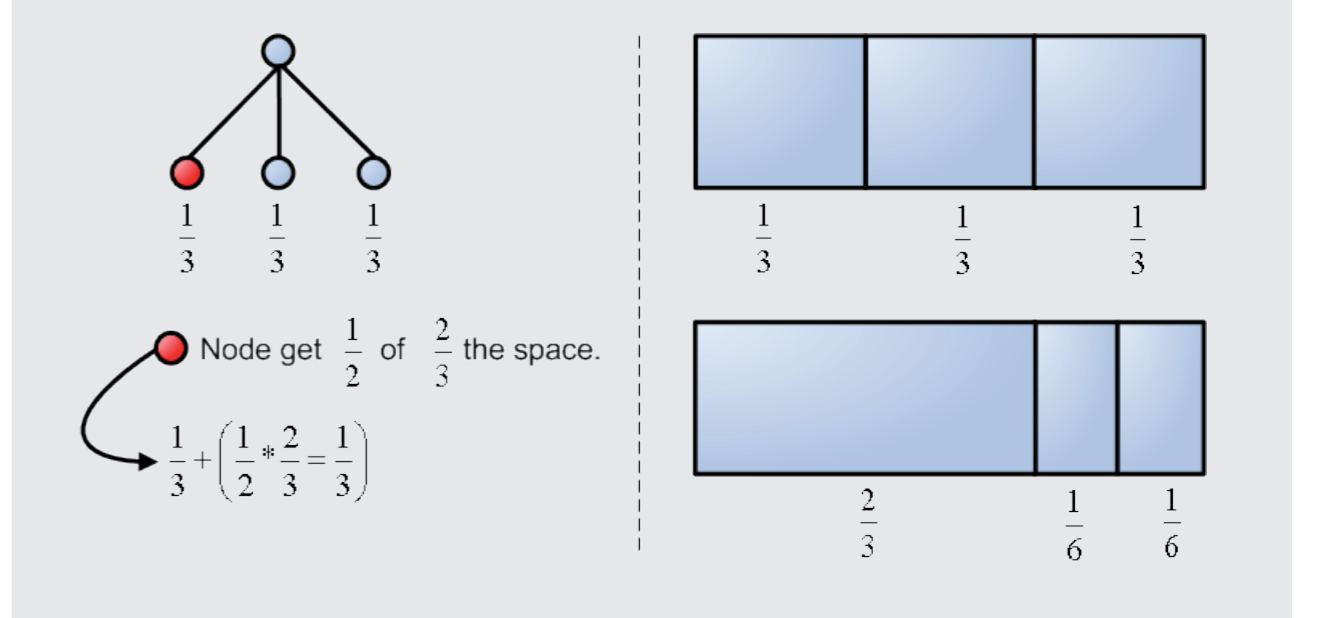
Situations

Statements can be bound to different situations. The situation is defined by a function describing the relation between the different context variables. Context model changes pushed into the layout model and initiates a recalculation.



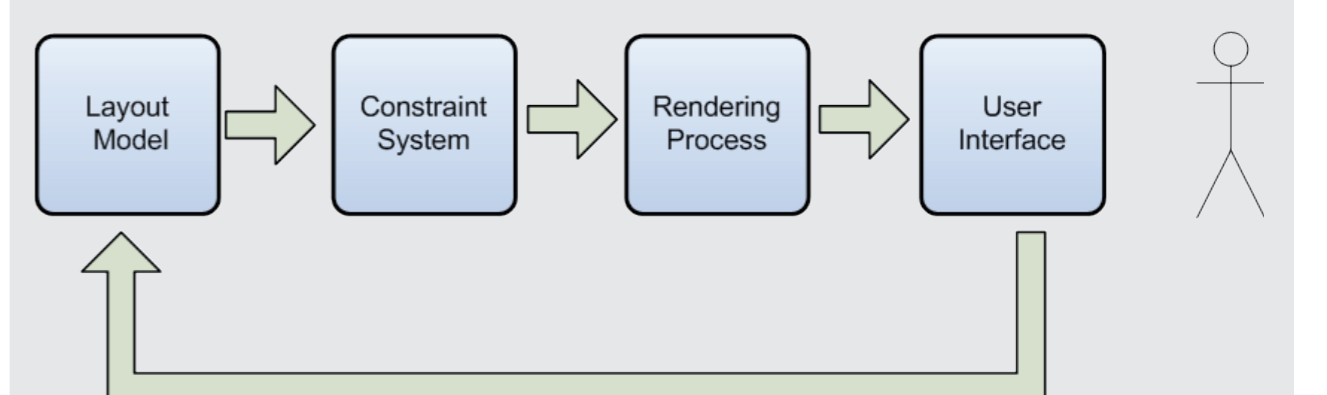
Context Adaptation

The described layout model support context specific statements. The basic idea for all adaptations is to highlight the context relevant parts of the user interface by increasing the size of these elements. A prioritize value characterize how much additional space an element can use compared to the rest of the interface.



End-User-Development

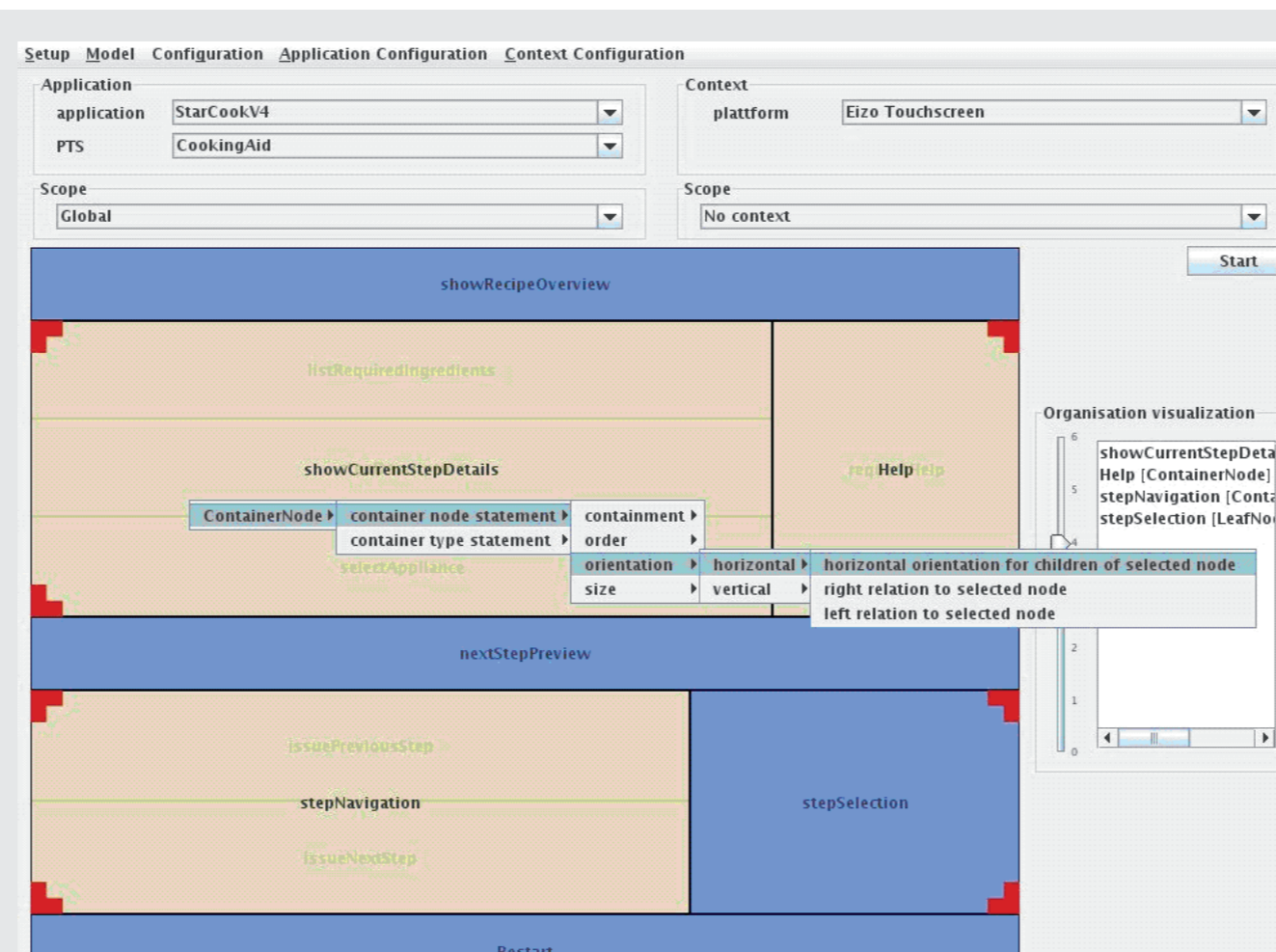
To integrate the user within layout generation process, end user development requires the alteration of the model and the contained statements by the user. As the models are available at runtime and can be manipulated, this becomes possible and "only" requires appropriate tools to abstract from the complexity of the models.



This tool makes the information from the user interface models visible and understandable for the user and allows the adding of statements to the layout model. The rendering process described above is enhanced by the possibility to create layout statements and add them to the layout model of the active application.

Layout Model Generator

Using the layout editor, the designer specifies all layout statements by using a context menu that is related to the box-based simulation area. Each statement that has been defined is written into the layout model and gets instantly evaluated to a set of constraints that is solved to update the box-based preview.



Links

MASP

<http://masp.dai-labor.de>