Advanced Visual Modeling: Beyond UML

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With the adoption of UML by the OMG and industry as the linguae-francae of visual systems modeling, one begins to ponder what will come next in this field? This tutorial brings a vision for visual modeling beyond UML. We present and consolidate radical new notations, proposed in a series of research papers and with quickly increasing adoption by industry, for the specification of complex systems in an intuitive visual, yet precise manner. The recurring theme of these notations is the upgrading of familiar, grammar school diagrams into a powerful visual language. "Spider diagrams" considerably extend Venn-diagrams to the specification of OO-systems. Most familiar OO-concepts are being translated to set theoretical terms: class into set of objects, inheritance corresponding to subset, and even Harel's statecharts interpreted as the set of objects in that state. "Constraint diagrams" enhance the arrow notation to describe static system invariants, such as "the enemy of my enemy is my friend", which cannot be described by UML class-object diagram. Finally, "3D-diagrams" show how the third dimension and VRML modeling can be used for a conceptual modeling of dynamic system behavior. Much of the tutorial will be based on a case study developed in industry, illustrating how the new notations are combined with those of UML, including OCL.

The tutorial will start with a crash critical overview in UML, stressing its weaknesses and strengths. Based on this we present the rich visual constraint language and an insight into subtle issues that arise when defining a visual language, for applying the popular design-by-contract using a visual formalism. The presentation will use a case study and a demonstration of a graphical editor for the constraint-diagrams language. We then will show how the language can extend into three dimensions, in a series of 3D notations for providing rich visualizations of dynamic behavior. We finally give the vision for visual modeling tools of the future.