**Deep modelling.**

*Research papers summary.*

1. **Colin Atkinson. Meta-level Independent Modelling**  
   UML is overloaded with a number or redundant concepts regarding modelling level interaction. In other words, on each level of modelling different approaches of instantiation are used (example, from M1 to M0 instantiation the ‘instance-of’ relation is used whereas from M2 to M1 the stereotype concept is utilized).  
   **Goal:** This paper attempts to specify a uniform format of instantiation regardless of its level in UML.  
   **Techniques:** Introduced 2 fundamental properties of meta-modelling. Specified and described the notion of clabjects.  
   **Results:** Presented a way to represent clabjects in terms of Generalized UML. Claims that in order to get rid of the current confusions in UML, it should be based on level-independent modelling techniques.
2. **Colin Atkinson. The Essence of Multilevel Metamodeling**  
   This paper emphasizes the limitations of UML in terms of its shallow instantiation mechanisms and its inability to treat an object both as an instance and a class.  
   **Goal:** Pinpoint the limitations of the UML instantiation mechanisms as well as its ambiguous classification. Provide techniques to overcome the aforementioned problems.  
   **Techniques:** The problem of shallow instantiation is described (if an element is instantiated then in a classical UML all its attributes become slots as well as all its associations become links which makes it impossible to model across more than one level without introducing of extra components in the metamodel). Provided and compared known techniques to deal with the shallow instantiation problem.  
   **Results:** Introduced the ‘Deep Instantiation’ concept as well as the notion of ‘potency’ (potency is an integer value that shows a depth to which a certain model element can be instantiated). Introduced an M3 model for modelling multiple meta-levels.