



### 3.1. Academic works

Automatic programming and software generation are two fields where the scientists and ICT technician have worked in the past years.

These techniques are applied to different fields in real life and they do not only refer to user interface and web application generators.

#### 3.1.1. WebML

Web Modeling Language[XXX-Web Modeling Language (WebML): a modeling language for designing Websites] is a notation for specifying complex websites at the conceptual level, enabling high level description of a website considering its structural model, composition model, presentation model and personalization model. It is associated with a graphic notation and a textual XML syntax, platform independent and guarantees a model-driven construction of complex sites.

It was invented at Politecnico di Milano by Stefano Ceri and Piero Fraternali.

WebML is based on different previous work including HDM [XXX-HDM - A Model-Based Approach to Hypertext Application Design.], HDM-Lite [XXX-A Conceptual Model and a Tool Environment for Developing More Scalable], RMM [XXX-RMM: A Methodology for Structured Hypermedia Design],OOHDM [XXX-Web Application Models are More than Conceptual Models] and Araneus [XXX-Design and Maintenance of Data-Intensive Web Sites].

A first CASE environment, Autoweb System [XXX-Model-Driven Development of Web Applications: the Autoweb System] has been detailed in the year 2000. It is based on HTM-Lite and it consists in two phases, the generation of the database and meta-database and the implementation of the web application.



### 3.1.2. IFML

Interaction Flow Modeling Language[XXX-IFML- Model Drive UI Engineering of Web and Mobile Apps with IFML] is the successor of WebML[XXX- Designing data-intensive web applications] and has been built by a team at Politecnico di Milano, including Roberto Acerbis, Aldo Bongio, Marco Brambilla, Sara Comai, Stefano Butti and Maristella Matera.

It has arrived at the beta2 version and in March 2013 has been adopted by the Object Management Group.

It is supported by WebRatio [XXXX- [www.webratio.com](http://www.webratio.com)] solution and by IFML-Editor [XXX- <http://ifml.github.io/>] , an open source editor based on Sirius and Eclipse.

The goal is to provide a graphic tool that permit to define the behavior of the UI with respect to the final user. The tool will then generate the code to fulfill that goal.

IFML supports the platform independent description of graphical UI for web applications as the language allows the description of the view layer.

User interface is described by different ViewContainers that can contain SubContainers and ViewComponents. ViewComponents can have input and output parameters and can be associated with Events, user action mapped in the backend software.

There exist other tools that support MDE development on similar principles of IFML, like Mendix [XXX- [www.mendix.com](http://www.mendix.com)], Outsystems [XXX- [www.outsystems.com](http://www.outsystems.com)], OrangeScape [XXXX- [www.orangescape.com](http://www.orangescape.com)], LongJump/AgileApps Live ([www.softwareag.com/special/longjump/](http://www.softwareag.com/special/longjump/)), Tersus ([www.tersus.com](http://www.tersus.com)) and Softfluent Entities ([www.softfluent.com](http://www.softfluent.com)).