In this paper we present skylineEngine, an urban procedural modelling tool developed as a testbed for new algorithms and techniques in urban modelling. In spite of being a starting open project, it has many features only available on high-end commercial modelling systems, like pattern-based district styling definitions, possibility to import city maps from images or from OpenStreetMap files, parameterizable models of cities and buildings, global city control through image maps (districts, land-use, height, etc.), and a user-friendly building modelling module based on shape grammars. This system also presents some novel features that make it a unique system, like a graph-based paradigm that allows the user to create content-rich cities with distinct districts, major and minor roads, blocks, lots and buildings, but also other urban elements like streets, sidewalks, parks, bridges and landmarks. Also, during its development we have developed new ways of generating urban content which increase the realism of the resulting environments.