

# Visualization of Configurations: Simplifying Configuration User Interfaces

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## Abstract

End users of an application that uses configuration need to be presented with an interesting and easy to use interface that simplifies the complex configuration problem the application is solving. For many problems the visualization of the configuration problem is the best interface the users can interact with. For applications in which the user needs to enter more of the complex details a combination of visualization and standard Windows user controls gives the user a simpler interface to interact with than standard configuration interfaces today. The demonstrations shown illustrate this with physical and logical views being visualized and the details being handled by more conventional user interfaces. The visualization application Baan used is an industry standard product, Visio<sup>®</sup>, which is fully integrated with BaanConfiguration (a Sales Configurator)<sup>i, ii</sup>.

complexity of the configuration problem is needed but an overview of the total problem is still wanted. Both of these problems can be solved with visualization of some or all of the configuration problem space with that same visualization configuration.

Different users want different types of visualization also. Looking across the many types of users of configuration there are 3 types of visualization that need to be supported to make configuration easier to use. These 3 types of visualization are Multimedia (photos, AVIs, animations, etc), Schematic Layout drawings, and CAD drawings<sup>iii</sup>. Each one of these 3 types of visualization have their own imaging, positioning and user interaction problems to solve. Each one of these 3 visualization problems also have a common configuration problem, which can be solved using a configuration engine.

## Introduction

In the applications field today we see many different types of eye catching user interfaces. The problem with most of these is that they are custom-built user interfaces for the customer specific problem being solved. The price of having these custom interfaces is large cost of coding the interface to begin with and the maintenance problems they cause through the lifecycle of the application. Due to the rapid pace of changes to the configuration models, the custom coded interface cause maintenance problems with the application, which the configuration community has tried to overcome by using more declarative approaches for product modeling. We here present a generic and maintainable approach to visualization of configuration. Different users need to have different levels of interaction with the complexity of a configuration solution. If the configuration is being presented to an external person with limited knowledge of the complexity of the configuration problem, a user interface that is simple to that user needs to be presented. This is the case with sales configuration that is used face to face with customers to help solve their problems. If the user is very experienced with the configuration problem then a more detailed view into the

## Types of Visualization

Looking at Sales configurators, there is need for different types of visualization for different industries and situations in which configuration is used. In some sales situations it is very important to hide the complexity from the user of the application just as it is as important to have all of the complexity and details correct for the manufacturing or engineering of the product.

### Multimedia

If a look is taken at the automotive industry the user is the end consumer and a visual of the car comes to mind. The picture that the users see is one of a real car with the correct colors, body shape, interior colors etc. It is placed on a background that may be of the users or sellers choice. The user can easily change the color, body and interior. The user may even be able to rotate the car to see it from various angles. This requires photo-realistic images of the car and multimedia effects to achieve this. This type of visualization is commonly found in interactive selling solutions for products that end consumers interact with.





## Modeling Visualizations

The mapping from the configuration model to the visuals can become very complex rather quickly. The modeling environment may need to handle various external visualization tools to cover the 3 types of visualizations needed. The BaanImager created such an environment in which both the configuration model and visual model can be seen. Then the user can easily create the rules needed between the two models for visualizing a configuration (Figure 3). To use the visual modeling environment the user first creates the visuals for the product in the drawing tool, in our case that is Visio®. It is also assumed that the configuration model is already completed in the configuration modeling tool, which is aimed at solving product configuration problems, not visual configuration problems. The visual modeling environment presents both the product configuration model and the visuals needed to visualize the product and all of its combinations. The user then uses drag and drop to create the rules needed for visualization. The rules can be created without the user

even seeing the rules for basic visual problems or the user can write their own rules within the rule editor for complex problems. Maintenance was a big factor in the usability of the visual modeler. The visualization is based on declarative approach, which makes it easier to maintain and update as changes occur. The separation of product model rules and visual rules ensures the product configuration does not become any more complex or less maintainable. The visuals are maintained in an external application that is interfaced with the visual modeler, which allows them to be easily maintained. The visual modeler then has two mechanisms, which alerts the modeler of changes. First when a product model is reloaded it is checked for addition, deletions, and changes of model objects that would affect the visual declarations. These are presented to the user so that intelligent decisions can be made on how to handle the changes. Secondly that visuals are checked in the visual modeler to insure that none have been removed, added, or changed in such a way that it would adversely affect the visual of the product.

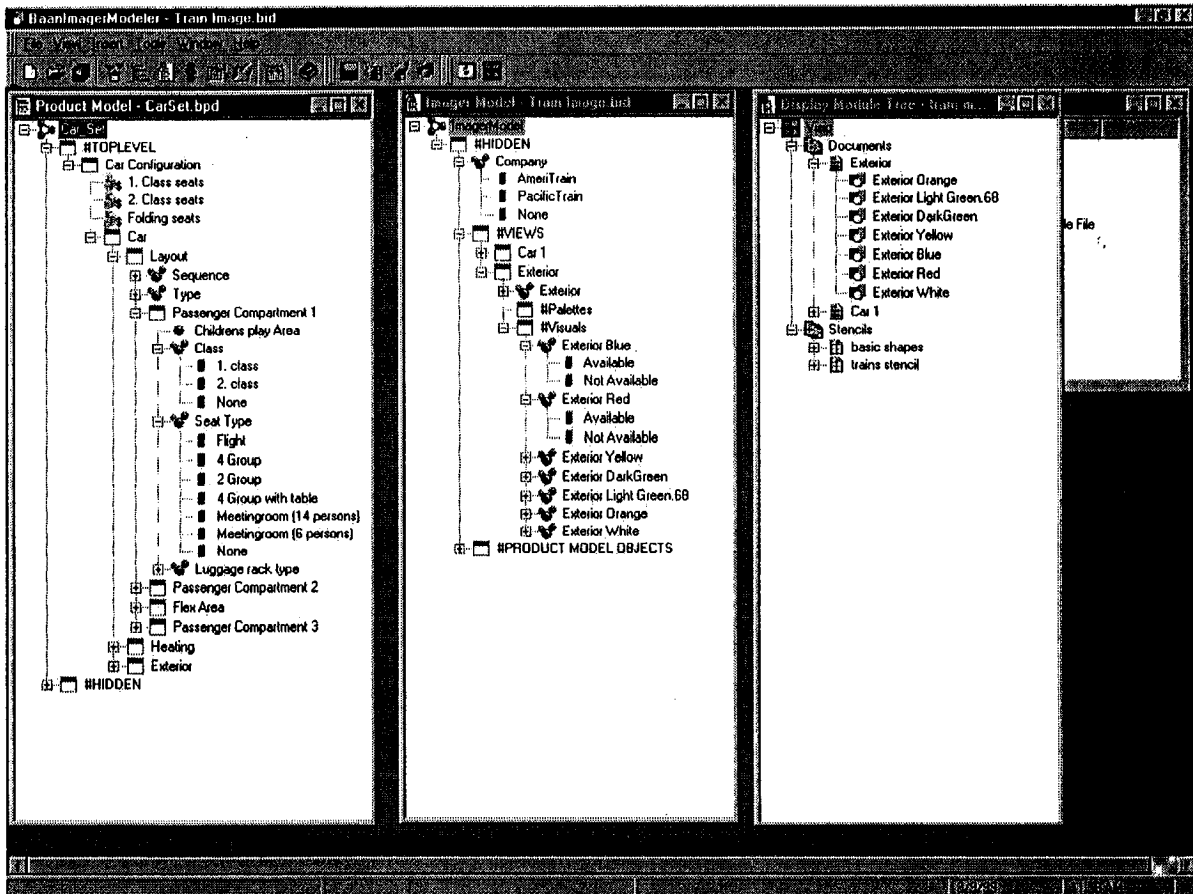


Figure 3

## Conclusion

Without making complex configuration more accessible to end users through simplifying user interfaces, configuration will continue having a hard time making inroads in certain industries and applications. For many problems the visualization of the configuration problem is the best and simplest interface users can interact with. Three types of visualization are Multimedia, Schematic Layout drawings, and CAD drawings. Each one of these 3 types of visualization have their own imaging, positioning and user interaction problems to solve and a common configuration problem.

Maintenance is also an issue with visual user interfaces, which needs to be solved so that the buyers of configuration applications more readily accept it. With our model this problem is alleviated so that configuration and visualization are less of a maintenance issue. The combination of configuration with an industry standard visualization tool and the maintenance tools that go with that solve the issues around visualizing configuration today.

The goal of visualization of configuration is to hide all the complexity of the configurator and give the user the feeling of using an easy to use application not a configurator. But there are still many problems that need to be dealt with in doing visualization of configuration correctly. The ability to visually configure over the web is asked for all the time but is hard because of bandwidth requirements and standard web enabled visualization tools are still immature. Integration with a multimedia tool needs definitions of standard interactions with visual object opens another challenge that needs to be taken up.

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<sup>i</sup> Skovgaard H.J., A New Approach to Product Configuration, Third International Conference ilce'95, Paris, 1995. ISBN 2-9509096-0-4, pp197-204.

<sup>ii</sup> B. Yu and Skovgaard, H.J., A configuration Tool To Increase Product Competitiveness, IEEE Intelligent Systems, Volume 13, Number 4, July-August 1998.

<sup>iii</sup> Foley, Van Dam, Computer Graphics, Second Edition, 1990 Addison Wesley.