# Uncertainty-Enabled Model Web Albatross

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## Introduction

Uncertainty in forecasting can be attributed to two basic sources: input uncertainty and model uncertainty. Input uncertainty is concerned with the effects of changes in input data, due to measurement error or scenario uncertainty, on the ultimate forecasts of the model. In contrast, model uncertainty concerns two types of errors: specification error and calibration (or estimation) error. Specification error results from a failure of the researcher to identify the true model, a simplification of the model or the statistical distribution of random components. Estimation error involves error in estimating the values of various constants and parameters in the model structure. If we have some confidence in the specification of the model, calibration error can be determined by standard statistical procedures. This poster summarizes some results of the UnertWeb project, which developed web processing services to investigate uncertainty in complex model chains, using Albatross (Arentze and Timmermans, 2000, 2003) as an example. In order to deploy the Albatross model in UncertWeb, two Web service interfaces for the Albatross model were developed. The first Web service allows users to create a synthetic population of households, while the second service Web service was built to execute the Albatross model.

## Web processing services

### Model Uncertainty

Figure 1 illustrates how these Web Processing Services (WPS) can be used to investigate model uncertainty. Model uncertainty stems from the probabilistic decision tables employed in Albatross to predict different facets of activity-travel patterns of individuals.

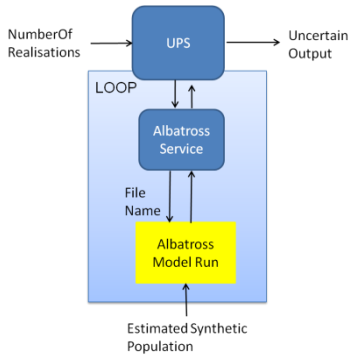


***Figure 1***: Model uncertainty estimation in the Albatross Service chain. Blue boxes represent Web Services, yellow box represent the executable that encapsulates the Albatross Model.

### Input Uncertainty

Figures 2 and 3 show different ways of how these services can be used. In particular, Figure 2 shows the web service composition for examining sample bias. Bootstrapping is used to generate different samples, which are used to create synthetic populations. Albatross is then used to examine the impact of sampling bias on uncertain forecasts of activity-travel behavior.

Further input uncertainty may arise from error or inherent variability in the representation of the urban and transportation system. Albatross uses Land-use data (Number of employees in different sectors) as input to measure the attractiveness of locations. These data are uncertain. In addition, uncertain travel time data is also used in model estimation. This data is based on average flow speed on links of the transportation network throughout the day, which obviously varies from time to time, day to day, etc. Figure 3 shows the WPS for this input uncertainty analysis.

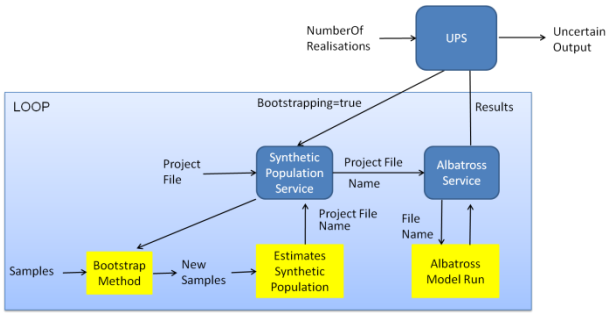


***Figure 2***: Web Service composition for sampling bias estimation in the Albatross Workflow. Blue boxes show the Web Service components, yellow boxes show executables that encapsulate the model components.

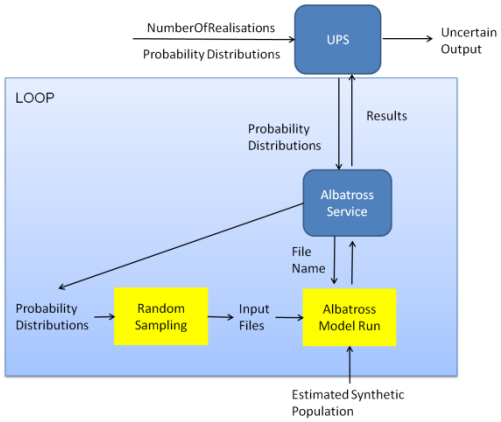


***Figure 3*:** Land-use/Travel time uncertainty estimation in Albatross Service

## Acknowledgement

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