ManPraSim v04 (r23/02/2011) Readme.doc

This simulation model is associated with the JASSS paper "A First Approach on Modelling Staff Proactiveness in Retail Simulation Models" by Peer-Olaf Siebers (pos@cs.nott.ac.uk) and Uwe Aickelin (uxa@cs.nott.ac.uk). It is currently under review but a draft of the paper can be obtained from the authors.

Paper Abstract:
There has been a noticeable shift in the relative composition of the industry in the developed countries in recent years; manufacturing is decreasing while the service sector is becoming more important. However, currently most simulation models for investigating service systems are still built in the same way as manufacturing simulation models, using a process-oriented world view, i.e. they model the flow of passive entities through a system. These kinds of models allow studying aspects of operational management but are not well suited for studying the dynamics that appear in service systems due to human behaviour. For these kinds of studies we require tools that allow modelling the system and entities using an object-oriented world view, where intelligent objects serve as abstract "actors" that are goal directed and can behave proactively.

In our work we combine process-oriented discrete event simulation modelling and object-oriented agent based simulation modelling to investigate the impact of people management practices on retail productivity. In this paper, we reveal in a series of experiments what impact considering proactivity can have on the output accuracy of simulation models of human centric systems. The model and data we use for this investigation are based on a case study in a UK department store. We show that considering proactivity positively influences the validity of these kinds of models and therefore allows analysts to make better recommendations regarding strategies to apply people management practises.

Keywords: Agent-based modelling, simulation, retail performance, management practices, proactive behaviour, service experience

Required Software:

- There are two versions of the model:
  - Source code: Requires AnyLogic 5.5 (XJTek) to run. This is an old version of the AnyLogic software and is only be available on request from XJTek.
  - Applet version: Requires Java 6.
- Spreadsheet software (e.g. Excel) for model setup and output analysis
- The model has been tested with Windows XP only, the applet has been tested with Windows XP and Windows 7

Execution:

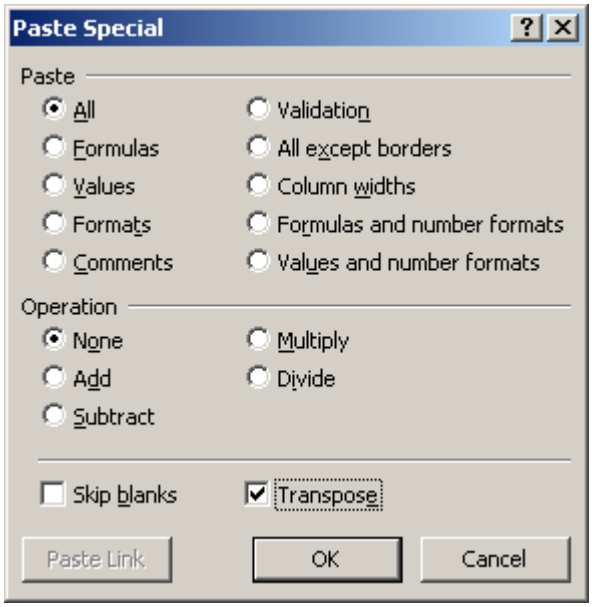
- Make sure the folder [results] exists in the program directory – if not, create it
- Open the file {manprasim v4 settings.xls} to set up the experiment. Only yellow fields are relevant for running the experiments described in the paper.
- Decide which format to use: The model is provided in two formats:
  - Source code: If you have a copy of AnyLogic 5.5 installed on your computer you can open the provided *.alp file in AnyLogic. You will find two experiments defined in the [Project] window: {Simulation} and {ParamVariation}. While the first is an experiment that executes a single run with always the same random number seed the second is an experiment for running multiple (default: 20) replications using varying random

number seeds. You can choose either of them by clicking them with the right mouse button and selecting {Set as current} from the context menu. Then press F5 to execute the simulation.

- Applet: The program directory contains two batch files. {Experiment$Simulation.bat} executes a single simulation run and {Experiment$ParamVariation.bat} can be used for multiple (default: 20) replications. Choose the one you want to use and execute it in a DOS window. An animation window will appear upon successful execution and the simulation will start running in virtual time (VT). To slow down the execution time, use the slider in the top left corner. During the execution of multiple replications (ParamVariation) the animation window will be visible only during the first simulation run. For the replications only a counter will be displayed in the DOS window.

Results

- After each run or replication the parameter settings and the simulation outputs (weekly averages) are added to the file {Parameters+RuntimeMeasures.csv}. Furthermore, the file {DailyMeasures-xxxxxxxxxxxxx.csv} will be created where the xxx… represents a unique identifier. This file contains additional simulation outputs (daily averages). Both files are located in the [results] folder in the program directory.
- A tip: The data from the file {Parameters+RuntimeMeasures.csv} are much easier to read and analyse when you transpose them. In Excel mark and copy the relevant rows and then paste them using [Paste as …] and ticking [Transpose].



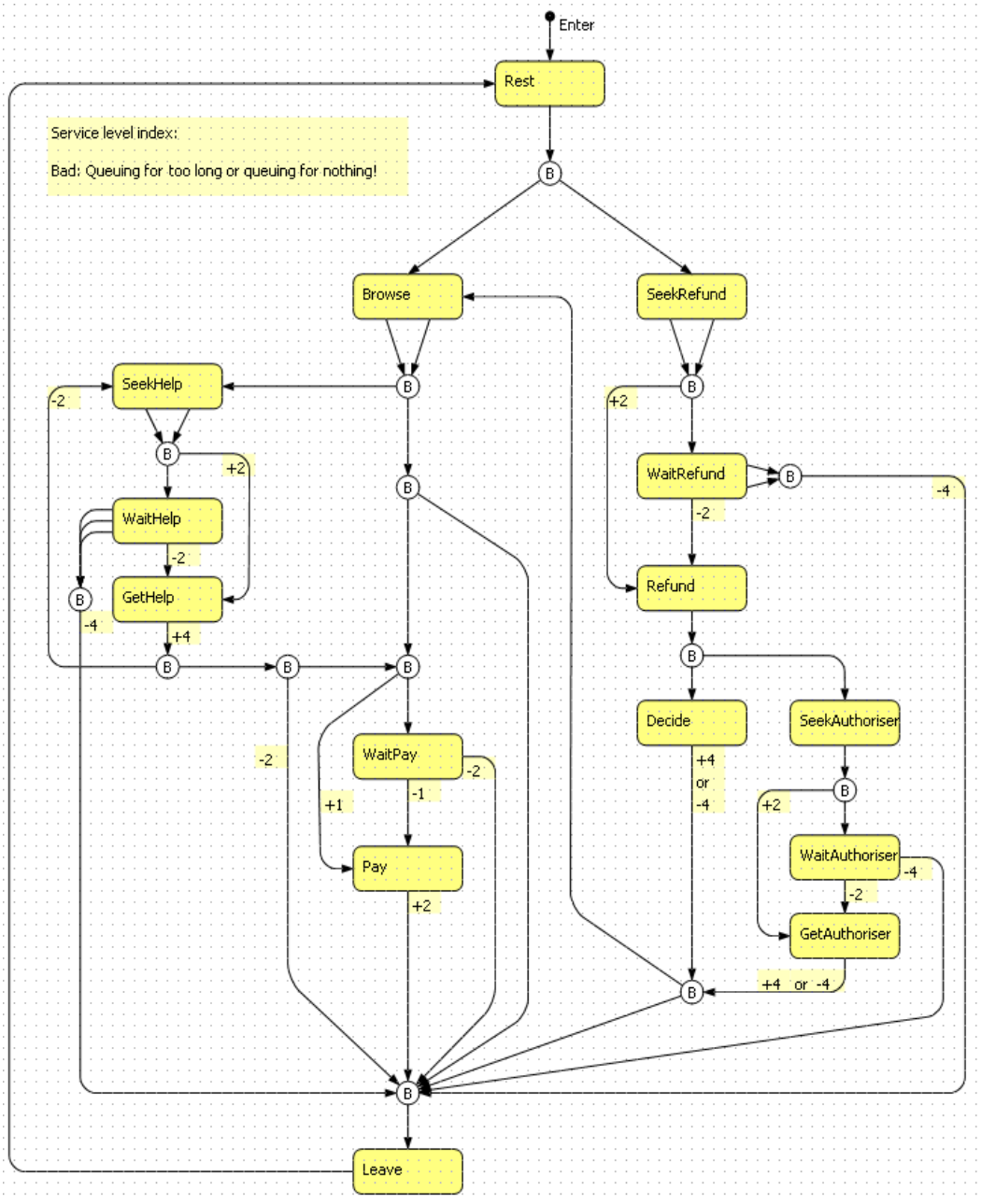
Known Bugs:

- The current version only runs in noise reduction mode, i.e. constant arrival rates, only full time employees etc. If you want to test noise actuating features, please use the previous version (v03) of the simulation model which is available upon request.

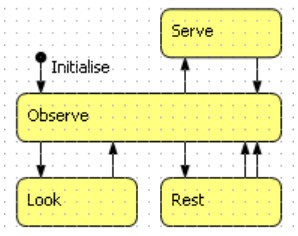
Appendix

State charts:

- Customer state chart: For this model only the left side (Browse) is relevant; the right side (SeekRefund) has been disabled.



- Staff state chart



Relevant hard coded model input data:

- Delay values: {{min, max, mode for A&TV}, {min, max, mode for WW}}
  - *dblTrLeaveBrowse={{1,15,7},{5,30,15}}*
  - *dblTrLeaveSeekHelp={{0,2,1},{0,2,1}}*
  - *dblTrLeaveWaitHelpNoPurchase={{4,20,10},{4,20,10}}*
  - *dblTrLeaveWaitExpertHelpNoPurchase={{2,10,5},{2,10,5}}*
  - *dblTrLeaveGetHelp={{3,30,15},{1,30,5}}*
  - *dblTrLeaveWaitPayNoPurchase={{5,20,12},{5,20,12}}*
  - *dblTrLeavePay={{2,10,5},{2,5,3}}*
  - *dblTrProactiveLookAroundTime={{1,3,2},{1,3,2}}*
- Probability values: {A&TV, WW}
  - *dblPrEnterSeekHelp={0.37,0.25}*
  - *dblPrAssistedSuccess={0.90,0.95}*
  - *dblPrAssistedPlanPurchase={0.56,0.76}*
  - *dblPrNonAssistedPlanPurchase={0.37,0.40}*
- Sales and productivity values: {A&TV, WW}
  - *dblConversionRateTemp={0.44,0.49}*
  - *dblAverageTransactionTemp={149.7,40.75}*
  - *dblNetProfitMarginTemp={0.15,0.40}*
- Sales and productivity values: {general}
  - *dblSalaryCashiers=6.0*
  - *dblSalarySellingStaffLevel1=6.0*
  - *dblSalarySellingStaffLevel2=8.0*
  - *dblOverheads=1.5*
- Customer type values: {A&TV, WW}
  - *intNumShoppingEnthusiastsTemp={400,4800}*
  - *intNumSolutionDemandersTemp={3200,0}*
  - *intNumServiceSeekersTemp={3200,0}*
  - *intNumDisinterestedShoppersTemp={400,1200}*
  - *intNumInternetShoppersTemp={800,0}*
- Execution parameter values
  - *dblRunTimeWeeks=52*
- Average settings in noise reduction mode {A&TV, WW}
  - *intTransactionsPerHourInNoiseReductionMode={32,56}*
  - *intHoursPerDayInNoiseReductionMode={8,8}*