BRAMSS - A Center for Applied Management Science
at the University of British Columbia
Martin L. Puterman, Director

The Bureau for Research on the Application of Management Science and Statistics (BRAMSS) carries out applied research in UBC's Faculty of Commerce. BRAMSS provides a bridge between the university and the business community by applying operations research methods to solve operational and planning problems. BRAMSS stimulates research in applied operations through student and faculty involvement in projects, internships, courses, seminars and a working paper series. BRAMSS is co-sponsoring the June 1998 MSOM meeting in Seattle.

Through its base in UBC's world class Management Science Division and its affiliations with faculty in other UBC centre's and institutions worldwide, BRAMSS provides innovative and timely solutions to a wide range of current operational problems. BRAMSS has carried out projects in collaboration with Avcorp Industries, BC Transit, BC Tel, Court Escort Services - BC Attorney General's Office, The BC Cardiac Registry, BC Maritime Employers Association, Canadian Tire Pacific Associates, ESCO Industries, UBC's Physical Plant and The Worker's Compensation Board of BC. Project details are described below. These projects have generated financial support from these organizations in addition to grant funding from the Natural Science and Engineering Research Council (NSERC) and the BC Advanced Systems Institute (BCASI). Projects have addressed issues in claims forecasting, scheduling and dead head reduction, job shop scheduling, maintenance, project prioritization and scheduling, inventory control and vehicle routing.

BRAMSS staff includes a full-time project manager - research associate, a full time financial manager-development officer, part-time analysts and computer systems administrators. Projects are supervised by faculty associates and are carried out by analysts and students. BRAMSS is run by a part-time director, an internal steering committee and an external advisory board. BRAMSS currently provides financial support for M.Sc. students, Ph.D. students and post-doctoral fellows through internships, grants and external projects. It anticipates many such opportunities in the future and is actively seeking additional students in the coming year.

Based on the success of BRAMSS, the Management Information Systems Division as developed the Bureau for Research on Information Technology (BRITE) to carry out applied research in information technology and collaborate with BRAMSS as necessary. BRAMSS and BRITE make up the Applied Research Services arm of the proposed Centre for Operations Excellence. Another key component of the COE is the Partners for Operations Excellence programme which will establish formal links between UBC and several public and private sector organizations.

Project details:

Avcorp Industries is a Richmond, BC based supplier of aerospace assemblies for Boeing, Canadair, de Haviland, Mc Donell-Douglas and other aircraft manufacturers. Faced with long and highly variable cycle times in its sheet metal fabricating facility, Avcorp contacted BRAMSS to develop procedures to reduce cycle time. Using a simulation model, BRAMSS developed The queueing Management Tool, a finite capacity planning model which enables Avcorp management to investigate the impact of staffing decisions, prioritization rules and release rules on work in process and cycle times over the short term.

BC Transit operates busses in Vancouver and it surrounding areas. BRAMSS developed an integer programming based model to assign bus routes to depots to reduce system-wide deadhead (time spent driving empty busses from the ends of routes to depots). This model was used to investigate the impact of new depot locations and the effect of closing existing depots on total deadhead. The model also enabled BC Transit to investigate the effect of allowing different busses on the same route to be assigned to different depots.

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BC Tel is the major telephone company in British Columbia and is facing many challenges in light of deregulation of telephone service. BRAMSS is working with BC Tel to deal with several of these operational challenges. It has carried out an operational review of its surveillance department and developed a simulation model of the call centre in its customer database administration area which investigates the impact of staffing, training and scheduling decisions on response times. Currently BRAMSS is developing an integer programming based corporate wide planning model which selects and schedules projects to implement subject to workforce and equipment availability and capital and operating budget constraints.

The Court Escort Services (CES) in BC Attorney General's Office moves prisoners between correctional centres and courts throughout BC's Lower Mainland. BRAMSS is working with CES to develop a new and more efficient system for prisoner movement. Issues being investigated include appropriate performance measures, flexible scheduling, decentralization of vehicle depots and combination of several existing escort services. The eventual goal is develop a dispatching system for vehicle and prisoner movement.

The BC Cardiac Registry maintains a database containing records for all cardiac operations performed in British Columbia. BRAMSS designed, provided ongoing consultation and assisted with data analysis for a reliability audit of the database. This audit compared information in the database to records in patients charts in selected fields. Measures of performance and factors with high error rates were detected. Recommendations for improving reliability were provided and a paper on this topic was published.

The BC Maritime Employers Association is responsible for training dock workers and maintaining detailed records of workforce activity, skills and availability. BRAMSS in collaboration with SCARL (The Statistical Consulting and Research Laboratory at UBC) carried out an investigation of causes for workforce shortages and provided recommendations on desirable skill mixes for workers. BRAMSS developed a set covering model to determine if by reallocating workers, all job could have been filled on days in which there were shortages.

Canadian Tire Pacific Associates operates 21 retail stores in BC's lower mainland. Faced with high levels of in store inventories, Canadian Tire contacted BRAMSS to design an inventory control system to reduce inventory costs and maintain high service levels. BRAMSS designed a data collection procedure and a model to efficiently compute optimal ordering policies which satisfied a service level constraint. Special attention was devoted to develop a model which worked well for "slow-moving" products. The research for this project was carried out as part of Brian Kapalka's MSc. Dissertation and was awarded a prize for the best student publication of the Canadian Association of Logistic Management.

ESCO Industries is a Portland, Oregon based manufacturer of hardware for the construction industry. ESCO contacted BRAMSS to develop a model to set inventory levels for its slow moving products. To account for long lead times, BRAMSS developed a model to determine optimal reorder points and order quantities using a stochastic simulation combined with a search algorithm. BRAMSS is working with ESCO to integrate this optimization module with its new enterprise wide information system.

UBC's physical plant operates boilers which deliver heat to all campus buildings. BRAMSS developed a computer simulation model to investigate whether the current configuration was adequate to meet projected needs and to compare different preventive maintenance strategies.

The Worker's Compensation Board of BC (WCB) provides employee's with benefits in the case of on the job injuries. BRAMSS developed a claim forecasting system which provides monthly forecasts of short term disability claims broken down into many sub categories. These forecasts are used by WCB for premium setting and staffing decisions. The forecasting engine determines optimal forecasts by pooling forecasts from Holt-Winters and automatic autoregressive models. Pooling weights are chosen to best fit a hold out sample of data. A quadratic programming model is used to balance sub-category and total forecasts.

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