

Inventory Planning in the Telecommunications domain

British Telecom has a long history of applying AI and OR technologies in optimising the utilisation of its engineering field force. However, complex human resource management can only be successful when all other dependencies can be relied upon to deliver on time as well. All of BT's order and repair journeys have some dependence on stores, spares or parts to support the engineering effort at delivery. At present processes are disparate, strategies for forecasting too simplistic, and links to delivery of human resource manual or non-aligned. The BT Research & Technology team is working on a new theme to explore how inventory management and resource management can be effectively linked to improve service, increase cycle time and reduce cost and seek a full time Research Master student to further this work.

This research aims to review, investigate and propose effective ways to synchronise the logistics provision of physical inventory with the provision of human resource in meeting customer driven demand on the company. A challenging problem is the ability to make cost-effective decisions about inventory replenishment. Inventory replenishment addresses questions such as "when to renew equipment A used for service X? Should equipment be bought on the second-hand market or not? How many items should be bought? Where should equipment be held? How long for? Such decisions mix procurement aspects (what, where and when to purchase) and logistics aspects (what, where and when to store), they are driven by demand forecasts and customer service strategies, and they must comply with service life-cycle, budget, and supply chain constraints (hub-and-spoke configuration, transfer lead-times, etc).

This decision problem may be cast as capacity/inventory planning - a type of combinatorial optimisation problem concerned with the allocation of capacity/inventory to different warehouse facilities based on confirmed/forecast order volumes over a chosen time frame (operational, tactical or strategic). The proposed activity will focus on tactical (ie, medium-term) planning and first carry out a detailed analysis of the problem in order to formulate a fine-grained model of the requirements. Constraint programming and/or meta-heuristics approaches will then be developed and compared on concrete problem instances based on this analysis. The main criteria will be the ability to handle rich data models, large-scale instances and conflicting objectives.

The student will be based at BT Adastral Park (Ipswich, UK). He will interact with BT's resource management domain experts, operational managers and will be directed by experts within the BT Research & Technology team as well as the university supervisor. It is expected that the student will, after support to establish contacts within the business, drive much of the information gathering activity within both the BT and University context his or herself. The project will provide useful insights into how OR and AI techniques are applied to solve business challenges in the telecommunications industry.

Candidates should have a solid background in discrete optimisation, particularly in constraint programming and meta-heuristics, as well as strong modelling and programming skills. Good communication and English writing skills are mandatory.

Interested applicants should send their detailed curriculum vitae to Prof. David Lesaint (david.lesaint@info.univ-angers.fr).