Academic Collaboration with the US Coast Guard

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(all projects co-authored with Professor Deshpande)

Projects between 2001 and 2009 Resources

- Five Sponsored Projects between ARSC (Elizabeth City) and Purdue University
- All projects focused on the Air Assets Supply Chain (ARSC) at Elizabeth City and airstations
- Masters Students from the Krannert School of Management and School of Industrial Engineering at Purdue University
- PhD student from the Krannert School
- Student interns worked at ARSC in the summer and went to airstations when necessary
- Faculty – Professors Deshpande and Iyer
- USCG officers at Krannert for MSIA degree – independent study projects to test completed projects and push results

Focus on one project

- **HH-65 B to C conversion and CG2 to CG4 conversion**
- Initial problem – Timeline for conversion, shortage of Gearbox conversion kit
- Possible Choices – full flexibility, partial flexibility
- Rate of conversion of aircraft, overhaul interval for converted aircraft
- Model showed the impact of kit constraint, overhaul interval, repair time on aircraft availability
- Mathematical programming model generates performance estimates, shadow prices, impact of changes in parameters
- Decisions regarding number of new kits to purchase and impact on performance
- Justification for congressional request for additional funding for gearbox kits

Academic Impact

- Modeling product transitions in a supply chain
- General model and results
- Doctoral thesis (Asima Mishra) who now works for Intel Research
- Two academic papers under review or revision
- The general problem of product transitions is now being applied to EPA regulation and product impact (another thesis)
- This is a new emerging area in Supply Chain research
- It is now taught in Supply Chain courses at Krannert and will be in a textbook I am writing (for McGraw Hill)

Our Approach

- **Original problem definition by USCG officers**
- **Collaborative definition (USCG and Purdue) of technical solution approach**, software used, tasks and timeline
- **Collaborative Definition of the scope** of the prototype solution – to be comprehensive, enable estimation of benefit, cover a range of assets
- All **projects data intensive** – focus on use of **raw data at the transaction level**
- **On site Purdue student interns** - to learn about data specifics from personnel who enter data, interpret data etc (Crucial)
- Models used (Optimization, Simulation, Statistical) and **software used coordinated with licenses at Elizabeth City**
- **All solutions, code etc handed over to USCG** – none of the solutions were property of Purdue
- **Scale up** of the prototype solutions **contracted with private companies**

Timeline of Project vs Academic Output Issues to Manage

- Project Entire Timeline usually within one year
- Academic Calendar vs Project Calendar
- Data Analysis and feedback from USCG – crucial
- On site visits and discussion with users
- Masters students role (project focused) vs doctoral students role (long term research contributions)
- Submit results for independent review (peer review), prizes (Edelman Award)
- Two papers published, two in the pipeline, one doctoral thesis
- Presentations at over 20 universities worldwide and conferences - to collect feedback

Issues to consider

- How do we keep USCG relationships beyond specific project completion ?
- Can the work with USCG be used for other USCG assets (ships) - for DHS, or at other Defense entities (Navy, Airforce) ?
- Are there mechanisms other than project based approaches that could work ?
- Any other suggestions.

THANK YOU

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