OSD PA&E Cost Analysis Improvement Group (CAIG)
Thesis Topics for FY 2004

	Source	Description
1.	Economic and Manpower Analysis Division	**Transformation of DoD healthcare programs to best meet current and projected needs**. There are five echelons of care, ranging from the field to CONUS facilities (e.g. Walter Reed). How should these echelons be staffed and provisioned, especially in light of future modifications to the "two theater" concept of military planning? ***This work may require a security clearance (SECRET or higher).***
2.	Operations Analysis and Procurement Planning Division	**Cost analysis of the Evolved Expenditure Launch Vehicle (EELV).** Two contractors (Boeing and Lockheed) provide EELV capability to DoD, which they also provide to non-DoD clients such as commercial SATCOM. Commercial clients once accounted for about two-thirds of EELV business, but this has been declining. DoD must therefore decide how it will continue to support its EELV providers. In particular, what are the risks and costs of supporting only one provider, instead of two?
3.	Operations Analysis and Procurement Planning Division	**Analysis of resource phasing and allocation models.** How should resources be allocated to a project over an extended period of time, until completion? There are several mathematical models that are used to answer this question. The Rayleigh model, which is widely used, leads to peak allocation somewhat early in the lifetime of the project, then gradual tapering in a long, right-hand tail in the allocation profile. However, the assumptions underlying the Rayleigh model are overly simplistic. The project would entail comparing different allocation models, with validation against actual project data.
4.	Operations Analysis and Procurement Planning Division	**Simulation-based schedule analysis.** Using a network model to describe the development of a weapon system, the objective is to conduct a quantitative risk assessment based on the duration of the project's phases. How should project activities be scheduled (and funded) to best manage risks?

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5.	OSD/PA&E/CAIG	**Analysis of MDAP cost-growth factors**. CAIG has assembled a large database of the costs of major defense acquisition projects (MDAPs) over their development phases. There are many opportunities to conduct statistical analyses with these data to quantify cost growth in relation to a set of factors that have also been collected.
6.	OSD/PA&E/CAIG	**Development of predictive models for operating and support (O&S) costs.** CAIG is interested in supporting thesis research that leads to the development of such models for selected commodity classes.
7.	OSD/PA&E/CAIG	**Selected topics on improving cost estimation.** CAIG has identified a number of areas for potential thesis research: • Exploring projected and actual percentage of software requirements satisfied through the use of existing code • Identifying the most accurate means for costing integration of new applications to existing hardware and software. Conducting sensitivity analyses for variables that are cost drivers (number of interfaces, platforms, etc). • Logistics: comparing costs of single inventory points versus distributed inventory points, encompassing inventory levels, item costs, carrying costs, shipping, etc. • Networks: developing models to investigate the maximum number of sensor input devices or radio channels to include in a system with a human in the loop who must act in response to the inputs. Compare to an unmanned system that has a computer-generated response. • Developing methodologies for estimation of development and procurement costs for titanium and composite structures for land and air systems.

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8.	Strategic and Space Programs Division	**Cost-optimal test durations for C4ISR and weapon systems.** How much testing should be conducted to establish the effectiveness of a C4ISR or weapon system? There is particular interest in joint interoperability testing. ***This work may require a security clearance (SECRET or higher).***
9.	Strategic and Space Programs Division	**Retrospective study of intelligence assessment.** What is "actionable intelligence"? Can the concept of "quality of intelligence" be formalized? This work would require a retrospective study of intelligence assessments, possibly with regard to lessons learned in Iraq. ***This work will require a security clearance (TOP SECRET or higher).***
10.	Naval Forces Division	**Cost analysis of large ship programs and associated weapons systems**. The Naval Forces Division is interested in several topics in this area. One topic would entail a cost analysis of upgrades to missile launchers. Another would entail a cost analysis of shipbuilding using non-steel "composite" alloys, which would be applicable to the building of the Littoral Combat Ship (LCS) that is in the developmental stage.
11.	Land Forces Division	**Future Combat System (FCS) cost analysis of Key Performance Parameter (KPP) tradeoffs.** Thirty one critical technologies have been identified for the FCS, each tied to a set of KPPs. Research would focus on tradeoffs between KPPs and their effects on cost, with the aim of developing an optimization concept. ***This work may require a security clearance (SECRET or higher).***
12.	Land Forces Division	**FCS and water recovery from engine exhaust.** When diesel fuel is burned, recoverable water is released (up to 0.5 gallons of water per gallon of diesel fuel). FCS is being designed to recover this water to support the drinking water needs of its units of action (UAs). Recovery rates vary significantly with vehicle usage patterns, engine idle time, etc. Can enough water be recovered to support a UA on a defined mission? What is the best way to utilize vehicles to meet drinking water requirements? ***This work may require a security clearance (SECRET or higher).***

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13. Land Forces Division	**Analysis of tradeoffs in spending more to obtain improved reliability.** Mean time between failure (MTBF) or system abort (MTBSA) are used to measure the reliability of systems such as command and control vehicles (C2Vs). Research would focus on a particular system and mission profile to study the tradeoffs between cost and improved reliability.
14. Land Forces Division	**Optimal positioning of sensors and weapons.** The objective is to acquire and maintain surveillance and engagement capability within a 75 km $\times$ 75 km battlespace. What is the best way to position a known set of sensors and weapons in order to meet this objective?