



Dear Sir:

Thank you for your interest in Program Advancement Group, (PAG) Inc. We are a small, Veteran-Owned business and have been providing analytical services to U.S. Federal, State and Local Government since 1994. PAG's principal, Mr. Robert Rubin has over 25 years experience, supporting strategic decisions through innovative solutions in the design, development, affordability, procurement, delivery, installation and maintenance of state-of-the-art technologies for complex systems.

This firm is dedicated to providing the most superior expertise available. Our province is the application of operations research, and techniques of management science to military operational and logistics/business problems. Applicable NAICS/SIC codes are:

NAICS	SIC
54133: Engineering Consulting	8711: Engineering Services
541618: Business Consulting	8741: Management Services
541614: Process Consulting	8742: Management Consulting Services

Attached please find a summary of the services PAG has performed. Particular areas of expertise are:

Operations Research Analysis

- Metrics Development and Analysis
- Measures of Effectiveness
- Risk Analyses
- Queuing theory
- PERT methodology
- Wargaming
- Simulation
- Modeling and Simulation
- Linear programming
- Information theory
- Pre and Post Exercise and Demonstration Analyses
- Systems Performance Assessments
- CONOPS
- Warfare Requirements Studies

Systems Analysis

- Systems concept validation
- Systems requirements determination
- Systems documentation
- Systems concept development

Systems Engineering & Integration

- Installation Planning
- Systems Integration Planning
- Cryptology Requirements Analysis
- Logistics support for Hardware

Operational Concept Development

- Scenario Development
- Net-Centric Warfare Concepts
- Joint / Coalition Operations
- Command and Control Headquarters Design
- Design of Operational Planning Systems
- Littoral Operations

Other Technical Areas

- Feasibility Studies
- Performance/Design Concepts
- Functional Analysis
- New Hardware/Software Technology Integration

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Our experience spans over the last 16 years in support of SSC-SD in codes 200, 210, 241, 244, 264, 272, and 280 as well as SPAWAR HQ 04, 05, 08, and PMW 179, 176, and PEO C41. Mr. Rubin also has performed numerous tasks supporting Office of Naval Research development and demonstration 6.2/6.3 C4ISR technologies.

PAG has held subcontracts with SAIC, Titan, Northrop Grumman (formally PRC), General Dynamics, C-Cubed, L-3 Government Services, ComGlobal, and others.

If you have any questions, please do not hesitate to contact us!

Sincerely,

A handwritten signature in black ink that reads "R.L. Rubin". The letters are cursive and fluid, with the first name and last name clearly legible.

Robert L. Rubin
President & CEO

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OVERVIEW OF PROGRAM ADVANCEMENT GROUP, INC.

Program Advancement Group, Inc. (PAG) is a California Corporation which was founded in 1995. Expertise within PAG covers a wide spectrum, providing technical and management support to government sponsored, scientific and engineering developments applied to military operational and government business systems.

PAG has supported a number of project sponsors in a variety of assignments:

- Space and Naval Warfare Systems Command (SPAWAR)
- Space and Naval Warfare Systems Command, Systems Center, San Diego (SSC, San Diego)
- Office of Naval Research (ONR)
- Naval Research Laboratory (NRL)
- Defense Advanced Research Projects Agency (DARPA)

Additionally, PAG, Inc. has supported the following companies as a subcontractor:

- ComGlobal Systems, Inc.
- General Dynamics Advanced Technology Systems Inc.
- L3 Government Services Inc.
- Metron, Scientific Consultants, Inc.
- Northrop-Grumman Information Technology (formerly PRC Inc.)
- SAIC
- Syzygy Inc.
- The Sullivan Group
- Titan
- TRW

TECHNICAL STAFF

- **Robert L. Rubin, President & CEO, Senior Operations Research Analyst**
- **M.S., Operations Research, 1989, U.S. Naval Postgraduate School**
- **B.S., General Engineering, 1982, U.S. Naval Academy**
- **Clearance: TS/SCI**

Mr. Rubin served 11 years on active duty with the U.S. Navy as a Surface Line Officer in various shipboard billets and possesses a broad operational background in all facets of Naval Warfare. Approximately half of his active duty career was directed at managing applied research work in Naval Surveillance Systems.

Mr. Rubin's master's thesis was entitled *The Optimal Allocation of SOSUS Display Resources* (June, 1989). Following graduate school, he was assigned as a project officer in the Surveillance Concepts and Analysis Branch of the then Naval Ocean Systems Center and subsequently designated a Proven Operations Analyst Sub-Specialist.

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Mr. Rubin served as project manager for the Spotlight Advanced Technology Demonstration (ATD) building a tactical decision aid for IUSS and SURTASS tracking and search optimization. He was responsible for the management and development of the ATD technical and operational concept, system test scenarios, operational tests, operator training, and evaluation of human operator performance. He was awarded the Navy Commendation Medal for outstanding performance as the Spotlight ATD project manager.

Mr. Rubin left the Navy in 1993 and joined Metron, Inc. as a Senior Operations Analyst. There, he developed mathematical models of land warfare, designed a methodology for the Composite Warfare Model simulation of Land Combat Attrition using Lanchester Equations, and researched existing mathematical decomposition algorithm approaches applied to optimal distributed (non-centralized) planning.

In 1994, Mr. Rubin became an independent consultant and incorporated Program Advancement Group in 1995. Since founding the company, Mr. Rubin has performed a wide range of work focused on systems engineering, information engineering and analysis efforts in support of DoD programs.

The summaries presented below encompass the wide range of capabilities offered by PAG, Inc.

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SUMMARY OF PROJECTS

Since its founding in 1994, PAG has performed a wide range of tasks summarized below. Please note that Naval Command and Control and Ocean Surveillance Center, RDT&E (NRaD), and Naval Ocean Systems Center (NOSC) are former names for SPAWAR Systems Center, San Diego.

Office of Naval Research/COMPACFLT Operational Readiness Metrics and Assessments

February 2004 - Present

Subcontracted with L-3 Government Services, Inc.

This work requires the development of metrics which measure above-unit-level and unit-level warfighting proficiency. Working with Carrier Strike Group Staffs, and the PACFLT Training CARGRU, Mr. Rubin is responsible for development of key metrics and their measurement criteria. As CSGs work through their training cycles, assessments utilizing the developed metrics take place at sea. Both the deploying CSG Staff and the Training CARGRU are pre and post briefed on the findings. The metrics and their criteria continue to be refined with each assessment conducted. The eventual product is a warfare area-specific set of metrics which can be collected and compared amongst battle groups to improve proficiency and training. Warfare areas covered include Surface Strike, Surface ASW, Expeditionary Warfare, SUW, and Mine Warfare.

SPAWAR 05 (Chief Engineer) FORCEnet Advanced Tactical Datalink Analysis Support

September 2003 – April 2004

Subcontracted with SAIC, under SPAWAR SEI FEDSIM Contract

Assist SPAWAR TIB Board in development of future tactical data links investment strategies with consideration of operational impacts, technical risks, investment risks, and schedule. PAG co-authored a briefing which RADM Slat delivered to CNO N6.

PAG was responsible for the collection, summary, and characterization of stakeholder post-FORCENet Assessment evaluations. Clarification of specific comments was obtained from stakeholders and subject-matter-experts. PAG worked with the FORCEnet staff and program office subject-matter-experts to formulate plans for resolution of addressable assessment issues. Plans were also formulated for addressing issues which had no immediate resolution.

The deliverable consisted of a report which summarized the post-Assessment comments received; documents interviews conducted, recommended program changes to resolve issues, and provided possible solutions to the issues which remained outstanding. Recommendations for follow-on work to resolve issues were provided.

Additionally, under this same task order, PAG, as a team-member, conducted a study of the MIDS/JTRS Digital Radio program. Upon studying the proposed integration into surface and aviation platforms, the PAG's analysis, presented to the team, identified a possible cost savings through modification of the existing MIDS radio which could potentially save the Navy \$500 million in design, procurement, and integration. SPAWAR 052 briefed PEO C4I and the proposed changes to the program were taken under advisement by the MIDS/JTRS program office.

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Syzygy Corporation Proposal Management

August 2003 - Present

Proposal Manager for follow-on PMTO Small Business Major Services Acquisition (solicitation N00039-03-R-0033). PAG provided services in all aspects of the proposal development to include managing MSA Team Subcontractor inputs, writing, conducting interviews, holding Blue and Red Teams, and guiding the proposal development through a Multi-Step Advisory Process.

DARPA IXO Technology Transition

June - July 2003

SSC-SD Code 4121 is developing a business area aimed at transition of advanced technologies to programs of record. DARPA Information Exploitation Office (IXO) is a developer of these candidate advanced technologies.

The tasking for PAG is to perform the following services in conjunction with this effort:

- Develop prototyping requirements and define requirements for advanced technology demonstrations.
- Develop Information Exchange Requirements (IER) for integration into fledged IT applications.
- Develop Operational Concepts toward production of Capstone Requirements Documents and MNSs.
- Develop Test and Evaluation Procedures to include metrics and key performance parameters.
- Perform Post Demo/Test analysis and reporting

C-Cubed Corporation Proposal Management

June - July 2003

Provided proposal management services to C-Cubed Corporation in response to Solicitation N00039-03-R-0018 for Fleet Systems Engineering Team (FSET) underway systems engineering support. Mr. Bob Rubin (PAG) was chosen by C-Cubed to be the prospective FSET Program Manager.

PAG provided services in all aspects of the proposal to include authoring, resume review, past performance write-up and review, Blue Team and Red Team.

SPAWAR 08 Knowledge Management and Corporate Applications Support

March 2002 - December 2002

Subcontracted with SAIC, Point Loma Technology Center under SPAWAR SEI Contract

PAG was tasked by the SPAWAR CIO (SPAWAR 08) Corporate Knowledge officer with the requirement to build a technology roadmap for business process re-engineering of SPAWAR corporate business processes. The requirement is to perform a Systems Engineering Analysis of the processes, software, infrastructure, as well as a review of previous analysis to produce functional requirements for the 'To-Be' SPAWAR Business Architecture.

As part of this work, we were presented with a list of over 400 separate databases and applications that manage the entire process. Much of the labor-intensive work, for which the databases and applications are used, involve answering data calls from superiors in the Department of Defense and Congress. Through an analytical approach of my design, involving an examination of redundant data elements in

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just those applications that are used in the data calls, we identified a labor-cost savings of \$400,000.00 per annum through elimination of the redundancies. The following steps were applied:

- Interviews with personnel to determine target applications/databases.
- Examination of the data dictionaries for each of the targeted applications/databases.
- Raw counting of the redundant data elements.
- Observation of day-to-day operations with the applications/databases. Recording the time to fill in the redundant fields, and the pay-level of the personnel doing the report generation.
- Obtained salary data and calculated the labor-dollars.

Systems Engineering Support to Fleet Battle Experiments Installation and Integration

November 2000 - February 2002

Provision of SSC-SD, D10 with engineering support services as follows:

1. Serve as an assistant to the Navy's Director for Fleet Battle Experiment (FBE) Installation and Integration. The scope of this work included: program management, planning, engineering, integration, and technical liaison with operational forces as well as the Naval Warfare Development Center.
2. Conducted analysis and identified aspects of the EDIP process that were leading to inefficiencies. After briefing and obtaining consensus on recommendations. Improvements to the process streamlined the systems engineering aspects of the then current and future FBEs.

Systems Engineering Support of National Communications System (NCS) Emergency Operations Center (EOC)

Feb 2000 – Jul 2000

Subcontracted with SAIC, Point Loma Technology Center under SPAWAR SEI Contract

PAG provided SSC-SD, D845 with systems engineering services. Demonstrated adaptation of commercial technology configured for experimental expeditionary warfare purposes for use in civil emergency communications. The adapted equipment will be exercised and demonstrated in conjunction with a "FEMA" type emergency exercise.

- Evaluated commercially available collaboration software.
- Developed test procedures and a test plan and conducted tests for the distributed, wireless communications system.
- Analyzed and reported test results with recommendations for further development.

Real-time Execution Decision Support (REDS) Meteorological, & Oceanographic (METOC) Data Integration

Dec 1999 – March 2000

Subcontracted with SAIC, Point Loma Technology Center under SPAWAR SEI Contract

PAG supported SSC-SD, D4522 with data analyses providing the following:

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- Analysis to determine the required METOC data elements.
- Research to determine whether those METOC data elements are currently collected and stored.
- Determination of viable data source locations and repositories along with data item descriptions for the stored data.
- The creation of an interface specification for the interface between the data sources and REDS intelligent agent architecture.

SPAWAR POM Support and Development of Acquisition Strategy

May 1999 – Oct 1999

Subcontracted with Titan Corporation, Titan Systems Division

PAG supported SPAWAR, PD-13's participation in the Navy's C4ISR technology development process. The results of this effort were:

- A scripted technology roadmap that took into account:
 - Milestones and timelines from ONR, DARPA, the POM process and IT 21 fleet installs.
 - Potential products from the Navy Warfare Development Command's Fleet Battle Experiment Series.
- Support to PD-13 in the development of a SPAWAR technology insertion/transition gameplan, including documentation of the current and developing navy technology programming, planning, and funding processes.
- The playing of an advisory role to a PD 13 IPT, established to build a POM '02 R&D Campaign Plan; helping to coordinate and facilitate the submission of issue papers to the appropriate sponsor.

Defense Technology Area Plan; Information Systems and Technology Area Support

March 1998 – May 1999

April 1995 – September 1995

PAG provided direct support to the Technical Director, SPAWAR Systems Center. Mr. Rubin authored the Information Systems and Technology (IST) Chapter of the 1999 Defense Technology Area Plan under the Director, Defense Department Research Engineering Directorate (DDR&E).

PAG authored the 1995 C3 Technology Area Plan (C3 TAP) Decision-Making Subarea document. A detailed, comprehensive briefing package for presentation by the JDL Technology Panel for C3 to OSD DDR&E for the Science and Technology Review of the 1995 C3 Technology Area Plan was produced.

Crisis Action Planning Project Demonstration Plan, Integrated Plan Representation, and Report of Collected Domain Knowledge

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April 1996 - February 2000

Development of Scenario Models. The collection, analysis, assimilation, and communication of domain knowledge related to the production of demonstration plans and a common plan representation, for the Crisis Action Planning system prototype. The result of this effort was delivery of specific domain knowledge to government personnel and CAPP contractors, a common plan representation for adaptation within the project, and a plan for the operational demonstration of the project.

PAG provided domain expertise essential to the goals of the CAPP Project as detailed in the report published in FY '96.

C2 Technology Management Support for ONR and SPAWAR Systems Center

Management of Technical Development Efforts for Office of Naval Research; Command and Control Exploratory Development (6.2) Program

April 1995 - September 1999

PAG was responsible for providing operational and technical analysis of the C2 projects being developed under the Office of Naval Research, Command and Control (ONR C2) Exploratory Development (6.2) program. From these analyses, schedules, milestones and strategies for scientific research and potential future developments leading to technology solutions were developed. Analyses of N RaD C2 project plans for operational relevance, technical strength, and project management effectiveness for ONR were conducted.

Responsibilities included selection of Technology alternatives through analyses to determine the extent to which the requirements were satisfied. The effort required development of innovative operational concepts that take advantage of new capabilities afforded by integration of new technology.

Extended Littoral Battlespace ACTD; System Engineering and Integration

September 1997 – December 1998

This effort required the development of operational, technical, and systems architectures for the enhancement of the full range of Navy / Marine Corps mission areas. Particular emphasis was placed on the integration of new information system technologies to provide Navy / Marine planners with a distributed, collaborative decision making capability. Work included development of fires and targeting architectures for ELB Enhanced Combat Operations Center (ECOC).

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C3 Collaborative Workspace; Operational Concept Development

October 1996 – March 1997

Assimilation of technology developments in Multi-User Object Oriented Virtual Environments. The performance of this effort required the development and expression of operational and technical concepts in order to guide the enhancement and application of a Collective Action Tools (CAT) capability to Joint Military Operational Planning.

Support to Naval Research Laboratory for Realtime Support to Joint Power Projection Project

April 1995 - September 1995

PAG conducted an operational feasibility study of NRL Information Technology Division's Real-time Support to Joint Power Projection (RTS to JPP) core program. PAG conducted technical analyses and development of new operational concepts to support transition of NRaD 6.2 Exploratory Development work to the Joint Power Projection ACTD.

Operational concepts and scenarios for integration of the APPEX system into the NRaD Mobile Integrated Command Facility (MICFAC) were demonstrated during Joint Warrior Interoperability Demonstration (JWID) '95.

Tactical Picture Agent Accelerated Capabilities Initiative

October 1995 - December 1995

This effort required systems and engineering analyses of C3I tactical decision making and the development of a common methodology for assessing and expressing common Tactical Picture operational payoffs. This analysis generated criteria for measures of effectiveness (MOEs) and measures of worth (MOWs) for assessment of intelligent agent capabilities in the areas of information search/retrieval, information tailoring and information presentation.

Responsible for engineering analysis of the development of a common methodology for determining the operational payoff of tactical picture agents in quantitative terms. The common methodology will provide MOEs/MOWs for determining the aggregate operational payoff of cognitive agents, retrieval agents and presentation agents in the decision process.

Responsible for development and analysis of operational concept formulations consisting of process models with imbedded Intelligent Agent functionality and quantified payoff examples for multiple scenarios to include: Air strike operations (JFACC), Air defense operations (Aegis), and Amphibious Operations.

Direct Support to NRaD

April 1995 - September 1995

PAG conducted an Expeditionary Warfare Capabilities Assessment Study. This work required a technical assessment of all existing and planned 6.2 through 6.4 technology developments relevant to Naval Expeditionary Warfare. It required the mapping of capabilities to operational system requirements and of transition paths to fleeted systems, identification of research gaps, and production of recommendations to ONR and CNO (N-85) for research investment. The deliverable

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was a matrix covering requirements and recommendations for C4I, Battle/Crisis Management, Tactical Picture, Communications, Surveillance, Navigation, and planned efforts.

PAG assisted NRaD with overall operational and demonstration concept development during JWID '95, producing briefing materials for NRaD Code 40 in their capacity as hosts for the JWID '95 exercise.

Support to Advanced Research Projects Agency

January 1995 - September 1995

PAG conducted technical analyses, supporting the demonstration of the Maritime Campaign Operations Planning System (MCOPS) for ARPA, Maritime Systems Technology Office. PAG developed demonstration requirements and operational scenarios, and coordinated the integration of the MCOPS system into a shore demonstration site, and onboard PELELIU (LHA-5) during exercise Kernel Blitz '95 and JWID '95. This work required liaison with the staff of Commander, Amphibious Group Three, and with the staff of the First Marine Expeditionary Force, Camp Pendleton.

Performed services for Metron (Under a Metron Subcontract with Draper Labs) requiring the collection, analysis, assimilation, and communication of domain knowledge/Naval operational doctrine related to the production of demonstration plans for an Littoral/Expeditionary Warfare Decision Support Demonstration System.