Conference Program

Project Poster Display
5:30 pm – 6:00 pm

Presentations
6:00 pm – 7:00 pm

Opening Remarks
David Ashley

ATK
BD
Lockheed Martin

Closing Remarks
Dr. Nicole Coomber

Dinner
7:00 pm – 8:00 pm
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ABOUT QUEST
Quality Enhancement Systems and Teams (QUEST) is a multidisciplinary
engineering, technology and management program at the University of Maryland.
Students participate in a challenging course of study that focuses on quality
management, process improvement, and system design. Funded in 1992 by a grant
from IBM to establish total quality on university campuses, the University of
Maryland has continued the program which has produced excellent graduates
prepared to face the changing landscape of business, engineering, and technology.
**PROJECT SUMMARY**

ATK Defense Group is an industry leader in ammunition, precision and strike weapons, missile-warning solutions, and tactical rocket motors across air, sea and land-based systems. The group is the largest U.S. producer of small-caliber ammunition, as well as a leading producer of medium- and large-caliber ammunition and medium-caliber gun systems.

During the creation of a prototype at their facility project engineers utilize a very fluid process. This process involves many road blocks, based on other project requirements, which compound man hours and overall cost. Our project is to chart the flow of the process, as well as identify the major problem areas. Through a better understanding of the process we can then proceed to eliminate unnecessary road blocks and streamline the process. This will eventually lead to a cut in overall cost of the processes.

**CONTRIBUTIONS AND RECOMMENDATIONS**

Our method was to initially do secondary research on process types, their benefits and flaws. We then collected data by having in person interviews with project managers, engineers, and quality management. This was followed up with a survey that was based off our preliminary interviews.

Through the analysis of this data we have provide two main recommendations to be completed over the period of three phases. Step one is to introduce a checklist at the beginning of the process to better inform everyone as to what major road-blocks to be prepared for. After this has been integrated into the system we will analyze which points of the process are still causing major delays by mitigating unnecessary risk for this process. We finally provide the company with a trimmed streamlined process that only relies on those parts of the process that are necessary.
**Streamlining Prototype Development Process**

**ATK Defense Group** is an industry leader in ammunition, precision and strike weapons, missile warning solutions, and tactical rocket motors across air, sea and land-based systems.

**Scope**
To identify procedures that contribute to the high cost of prototype development.

**Goal**
Reduce the overall cost of developing the prototype by 50%.

1. Embracing Process Fluidity
   - **High-variability**
     - Idealized
   - **Low-variety**
     - Current
   - Low cost
   - High cost
   - **Production process**

2. Reducing Approval Points
   - Human Approval
   - Mandatory forms

3. Realizing Potential Savings
   - 50% reduced cost of prototype production
   - *Completion date for streamlining process can be accomplished in half the cost.

**Methodology**

**Features**
- Flexibility with unique output
- Controlled scientific variation
- High changing environment

**Survey Results**
- Avg. time employee spends completing forms: 42 hours
- 2 employees did not find these forms useful

**Research**
**Gather Data**
**Analyze Results**

**Ideal State**
- Temporary Fix Planning Checklist
  - Reinforces project aim
  - Enables collaboration
  - Encourages preparation

- Permanent Solution
  - Structural Changes
  - Approval risk mitigation
  - Remove redundant roadblocks
  - Control and improve

**Implementation**
- Metrics for Success
  - Overall process time & cost
  - Employee satisfaction
  - Success of development efforts

**Phase I**
- Develop planning checklist
- Optimize roadblocks

**Phase II**
- Phase III
- Develop streamlined process
- Optimize roadblocks

**Acknowledgements**
- **Champion:** Kevin Schoendorf
- **Advisor:** Dr. Jermey Hermann
- **October Sky Consulting**
  - Ashley Knox, Accounting '14
  - Zach Schwartz, Aerospace '15
  - Aftym Sehmi, Computer Science '15
THE QUEST - BD PROJECT

IMPROVING THE EFFICIENCY OF THE INSPECTION PROCESS

QUEST STUDENT TEAM: TrendSETTERS

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Bioengineering

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Project Champion:
Sharon Wilson
Quality Management Associate Engineer, BD Diagnostics

Faculty Advisor:
Dr. Joseph Bailey
Executive Director, QUEST Honors Program

PROJECT SUMMARY

When nonconforming parts are identified in incoming inspection or on the manufacturing floor, they are taken out of inventory and placed on a shelf with a bright red tag, signaling a Quality Notification, which is fully investigated by Quality Engineers to find root cause and eventual remedy. BD Diagnostics produces thousands of Quality Notifications per year to prevent poor performance, spending millions of dollars on this process.

Incoming inspection has a “Dock-to-Stock” designation for certain materials that demands zero inspection for shipments. BD Diagnostics is looking to prevent the creation of Quality Notifications while maintaining conformance levels and top machine performance. We aim to increase incoming inspection levels to identify Quality Notifications before materials reach the manufacturing floor, streamlining investigation and build procedures.

CONTRIBUTIONS AND RECOMMENDATIONS

We have designed a tool for Quality Engineers at BD Diagnostics that will flag materials that receive “Dock-to-Stock” designation, which should be revisited and considered as returning candidates for the traditional incoming inspection method. Our tool filters through incoming inspection and Quality Notification data to determine which materials should receive flags and be discussed at weekly Quality meetings. It is a monitoring system that detects chronic trends that may otherwise be overlooked. We have also offered training to Quality Engineers on how to use and maintain the tool.

Our tool flags materials that receive Dock-to-Stock designation which should be reconsidered for the traditional incoming inspection method. Our tool filters based on 3 criteria in the Venn Diagram above. It is a monitoring system that detects chronic trends that may otherwise be overlooked.
**TRENDSETTERS**

**IMPROVING THE EFFICIENCY OF THE INSPECTION PROCESSES**

**BD Diagnostics**

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**CLIENT BACKGROUND**

BD Diagnostics is a medical technology company that manufactures and sells medical supplies, devices, laboratory equipment and diagnostic products. BD Diagnostics identifies incoming invoices, inventories of parts and new physical build of machines in a manufacturing facility. These machines are critical in testing for the presence of certain deadly diseases, and are used in medical facilities throughout the world.

**OPPORTUNITY**

When nonconforming parts are identified in incoming shipments, or in the manufacturing area, they are returned to inventory and placed on a shelf with a bright red tag. This tag signifies a quality notification (QN), which is fully processed by Quality Engineers to find root causes and eventual remedies. BD Diagnostics is looking to prevent the creation of these notifications on the manufacturing floor while maintaining performance levels and machine performance.

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**INSPECTION PROCEDURE**

**Analyzing the Two Methods**

<table>
<thead>
<tr>
<th>METHOD</th>
<th>SAMPLE SIZE</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREE MATERIALS</td>
<td>50 units</td>
<td>Materials are inspected at delivery</td>
</tr>
<tr>
<td>BAGS TO STOCK</td>
<td>0</td>
<td>Materials are rejected from incoming</td>
</tr>
</tbody>
</table>

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**HYPOTHESIS**

Currently, BD spends more money on QNs than Quality Notifications than on non-conforming materials at arrival.

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**OUR GOAL**

We strive to balance out the cost of Quality Notifications and materials sampled.

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**FEEDBACK LOOP**

Current method of getting an item is manual.

---

**SUMMARY
dspraunder@bd.com**

Project Champion: Sharon Williams

Project Manager: Dr. Joseph Maciel

BD Correspondent: Robert Kaufman, Daniel Harman
**CONTRIBUTIONS AND RECOMMENDATIONS**

In order to produce the highest quality product possible, our team adopted an agile development methodology; we regularly iterated through the steps of requirements gathering, prototyping, and presenting to the client. After our presentation, we would analyze client feedback and repeat the cycle. Our final prototype dashboard provides value to our client on four levels: 1) it consolidates a centralized perspective from disparate data sources; 2) it increases IPV customer responsiveness by dynamically updating to customer activity; 3) it significantly cuts internal data reporting time; 4) through running focus groups and requirements gathering, we spurred interest in further implementations of iDashboards for item and site managers within IPV.

We believe further growth lies in the business needs of other IPV members, and custom dashboards should be built for them. We also believe email alerts should be paired with iDashboards functionality to allow semi-automated reporting.

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**PROJECT SUMMARY**

Lockheed Martin is a major supplier of logistics systems and performance-based logistics services to military and civil government customers. The corporation provides solutions for platform maintenance, modifications and repair, material readiness and distribution, and global supply chain command and control. Their Industrial Product-Support Vendor (IPV) Program manages all hardware consumables for 3 US Air Force production depots, restocking over 295,000 bins with over 90,000 unique items to help support US Air Force operations.

In early December, IPV obtained a license for a data visualization software known as iDashboards, one that is already in use by other departments within Lockheed Martin. In order to test effectiveness and spur change, IPV looked to develop a dashboard for the deputy site managers as well as explore the capabilities and functionality of iDashboards. To help IPV achieve this goal, Lockheed Martin asked our team to design and develop a dashboard for the deputy site manager as well as explore the potential impact of iDashboards for other team members.

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**PROJECT CHAMPION:**

Sandy Stein  
IT Manager, Lockheed Martin

**FACULTY ADVISOR:**

Dr. Jim Purtilo  
Associate Professor, Computer Science
Designing a Data-Driven Dashboard

Client
Lockheed Martin's Industrial Product-Support Vendor (IPV) Program manages all hardware consumables for 3 US Air Force production depots, restocking over 295,000 bins with over 90,000 unique items to help support US Air Force operations.

Opportunity
To design and implement custom dashboards utilizing iDashboards, a data visualization software, for IPV deputy site managers across the country.

Methodology
- Define
- Research
- Design
- Analyze
- Receive Feedback

Final Prototype

Value Added
- Provides a top-level status of any site at any given time
- Assists in daily responsibilities by reducing exploratory report generation
- Easily answers commonly asked questions by clients
- Improves the response time of employees
- Generates interest in further iDashboard customization

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QUEST
Good Practices Innovative Strategies
**QUEST Faculty and Leadership**

**Dr. Pamela Armstrong**  
**Tyser Teaching Fellow of Management Science**  
**Robert H. Smith School of Business**

Pamela Armstrong is a Tyser Teaching Fellow of Operations Management at the Smith School. She teaches courses in operations management, operations strategy, decision analytics and project management. Her areas of interest include service operations, quality, and performance management. Prior to joining the Smith School, Dr. Armstrong ran a management consulting firm that provided operational analysis, strategic planning, and performance management services to federal clients. Before consulting, she served on the faculty at Georgetown University’s McDonough School of Business, where she taught courses in operations management, service management, and quality. Dr. Armstrong has also worked as an engineer at IBM, AT&T Bell Laboratories, and Hughes Aircraft Company. She completed her doctoral degree at the Wharton School of the University of Pennsylvania.

**David Ashley**  
**Executive in Residence, QUEST Honors Program**  
**Robert H. Smith School of Business**

David Ashley is an adjunct professor and an Executive in Residence at the University of Maryland’s Smith School of Business. He is also a program analyst for the Federal Emergency Management Agency (FEMA) within the Department of Homeland Security where his duties involve developing business models, performance measurement and survey work, and program management and program reviews. Before joining FEMA, Professor Ashley also worked at the Department of Homeland Security, Customs and Border Protection (CBP), the U.S. Small Business Administration (SBA), and the Small Business Development Center at the University of New Mexico. Additionally, he served as president of the University of Georgia’s Marketing Research Institute International and he served two terms as president of the Mid-Atlantic Chapter of the Marketing Research Association. Professor Ashley has many publications including a marketing research college textbook published by Kendall Hunt Publishing. He holds an undergraduate degree from the University of North Carolina and a graduate degree from the University of New Mexico.
DR. JOSEPH P. BAILEY
EXECUTIVE DIRECTOR, QUEST HONORS PROGRAM
RESEARCH ASSOCIATE PROFESSOR OF DECISIONS, OPERATIONS & INFORMATION TECHNOLOGIES
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Joseph Bailey has been a faculty member at the University of Maryland since 1998 and with the QUEST Honors Program since 2009. In addition to advising three teams of QUEST seniors this semester, he teaches the required QUEST sophomore course on design and quality and the mentor class which it complements. Dr. Bailey also teaches in the Smith School’s Executive Program including a class on Strategic Information Systems in the EMBA program. His research focuses on Internet commerce and digital platform competition. Dr. Bailey has numerous peer-reviewed publications and was co-editor of the book “Internet Economics” from MIT Press. He has a Ph.D. from the Technology, Management and Policy Program at MIT, an M.S. in Engineering-Economic Systems from Stanford University, and a B.S. in Electrical Engineering and Engineering and Public Policy from Carnegie Mellon University.

DR. NICOLE M. COOMBER
LECTURER, MANAGEMENT & ORGANIZATION
ASSOCIATE DIRECTOR, QUEST HONORS PROGRAM

Nicole Coomber is the Associate Director for the QUEST Honors Program and on the faculty in the Management & Organization area at the Robert H. Smith School of Business. As Associate Director, Dr. Coomber is the lead faculty member for the QUEST capstone course, BMGT/ENES490H, and aids in QUEST’s efforts in designing learning outcomes and assessments. Dr. Coomber completed her PhD in Education Policy and Leadership in May of 2012 at the University of Maryland’s College of Education. Her research interests include management education and experiential learning. Dr. Coomber teaches a variety of course outside of QUEST, including Managing People and Organizations, Non-Profit Consulting, and Cross-Cultural Challenges in Business. Before joining the faculty at Smith, she worked with the QUEST program as Assistant Director, leading efforts in curriculum and corporate development.
Kylie Goodell
ASSISTANT DIRECTOR, QUEST HONORS PROGRAM

Kylie Goodell is the Assistant Director of QUEST. In this role, she teaches a course on scoping consulting projects and works with students to identify QUEST clients and outline capstone projects. Kylie is currently working on publications related to QUEST’s learning outcomes assessment and the use of criteria in evaluating and improving upon the scopes of action learning projects. Kylie is currently pursuing a Ph.D. in Quantitative Methodology in Maryland’s College of Education. Her research interests include evaluating admission metrics and outcomes of high-achieving student programs. Previously, Kylie served as a graduate assistant with QUEST while earning her MA in higher education at the University of Maryland. Before joining QUEST, she received a BS in industrial and systems engineering from North Carolina State University and worked as an Industrial

Dr. Jeffrey W. Herrmann
ASSOCIATE DIRECTOR, QUEST HONORS PROGRAM
ASSOCIATE PROFESSOR, DEPARTMENT OF MECHANICAL ENGINEERING AND INSTITUTE FOR SYSTEMS RESEARCH
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Jeffrey Herrmann is an Associate Professor at the University of Maryland, where he holds a joint appointment with the Department of Mechanical Engineering and the Institute for Systems Research. Dr. Herrmann earned his B.S. in Applied Mathematics from Georgia Institute of Technology. As a National Science Foundation Graduate Research Fellow from 1990 to 1993, he received his Ph.D. in industrial and systems engineering from the University of Florida. His dissertation investigated production scheduling problems motivated by semiconductor manufacturing. He held a post-doctoral research position in the Institute for Systems Research from 1993 to 1995. His current research interests include operations research for homeland security and emergency preparedness, production scheduling, and improving decision-making processes.

Rose Jackson
GRADUATE ASSISTANT, QUEST HONORS PROGRAM

Rose Jackson joins is the QUEST Graduate Assistant. She is currently pursuing her M.A. in Higher Education here at Maryland. She works as the Student Experience Coordinator on the QUEST team, working with the various student leadership groups in QUEST to help develop student leaders. Rose earned her B.S. in Business Administration with a concentration in Finance and a minor in Management from Frostburg State University.
Dr. James Purtilo

Associate Professor, Computer Science Department
College of Computer, Mathematical, and Natural Sciences

Dr. James Purtilo specializes in software development and product assurance, and his research is currently funded by the Office of Naval Research on a cyber security systems project. With prior support from the National Science Foundation, Department of Defense Advanced Research Projects Agency and various corporate sources, Purtilo has studied and published on topics of software producibility, formal methods, rapid prototyping and testing. Purtilo has served on the Defense Biometric Support Team (an advisory group to the Office of the Secretary of Defense), is a member of the Arrhythmia and Cardiology Imaging Group at the UM Medical Center in Baltimore, and has consulted with the Division of Civil Rights within the Department of Justice. At the University of Maryland, he has served as the Associate Dean for Undergraduate Education in the College of Computer, Mathematical and Physical Sciences, chaired the undergraduate Computer Science program and directed the Master’s of Software Engineering Program. He received his Ph.D. in Computer Science from the University of Illinois at Urbana in 1986.

Dr. J. Gerald Suarez

Professor of Practice of Practice in Systems Thinking and Design
Fellow, Center for Leadership, Innovation and Change
Senior Executive Coach
Robert H. Smith School of Business

Dr. J. Gerald Suarez is a premier educator, speaker and consultant in the fields of Organizational Design, Systems Thinking and Total Quality Management. He joined Smith in 2005 as Executive Director of the multidisciplinary Quality Enhancement Systems and Teams (QUEST) Honors program. Dr. Suarez currently teaches the required QUEST class on “Systems Thinking for Managerial Decisions.” Additionally, he teaches at the corporate, executive MBA, custom EMBA, international, and undergraduate levels. From 2008 to 2010 Dr. Suarez served as Associate Dean of External Strategy, leading the offices of marketing communications, recruitment and career services. Prior to joining the Smith School, he served under two administrations in the White House as the Director of Presidential Quality. Dr. Suarez holds a master’s degree and a Ph.D. in Industrial-Organizational Psychology from the University of Puerto Rico.
QUEST would like to thank and acknowledge all of the individuals, committees, and organizations who have contributed to this event.

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