

Ground System Product Lines: Issues and Solutions

**GSAW2001
Breakout Session 4
Summary**

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Breakout Group Approach

- **Formal and informal presentations on product line experiences and issues**
- **Identification of key issues encountered implementing product lines for ground systems**
 - **Beginning with those identified at the Software Product Line Conference (SPLC1) workshop on Product Lines for C2 Ground Systems**
 - **Come to consensus on critical open issues**
 - **Group discussions about the issues**
 - **Are product lines being used effectively in satellite ground programs?**
 - **How are the major issues being addressed?**
- **Identify effective approaches and solutions**

Participants

- **Excellent, substantive contributions by all of the 32 participants, including presenters:**
 - **Mark Walker, The Aerospace Corp.,
Breakout Session Co-Chair**
 - **Bruce Bohannon, Raytheon**
 - **Paul Davis, TRW**
 - **Linda Martz, Raytheon**
 - **Neno Medvidovic, USC-CSE**
 - **Don Reifer, RCI**
 - **Dan Vanderwarker, The Aerospace Corp.**



Issues Discussed - Approaches and Solutions Identified

Evolution strategy for product line architectures

- **Need a vision - long-term and short-term - for where the product line wants to go**
 - Every year the market changes, and the product must change too
- **Always have a rolling 3 to 5 year vision – this is the detailed vision that has to fit into a long range plan**
 - This is being done by contractors today
- **Need a roadmap for evolving from legacy to future architecture**
- **Need a marketing strategy for this to fit into**
 - » *How well does government policy allow these (when the government is the customer)?*

What is the product line?

- **What is the scope of the product you are selling – a component or a system?**
- **Companies are trying to apply a product line architecture across multiple domains**
 - Issue of trying to scope domains – don't bite off more than you can chew
- **Different parts of the acquisition process have different views of the product line**
 - Customer, developer, and vendor objectives differ

Product line ownership

- **Who owns a product line architecture - the customer or the developer?**
 - The answer may depend on the contract
- **There are successful models where the customer owns the architecture**
- **There are successful models where the contractor owns the architecture**

Business models, acquisition strategies to support product lines

- **When there are too few customers, a product line is not a good idea**
 - e.g., one (or few)-of-a-kind ground systems
- **When you're selling multiple instances of a similar product, a product line may be effective**
 - Business case favors contractors that win multiple contracts for similar systems at the same time
- **Some (government) customers don't want to buy *products* – they want to own the software**

Business considerations in developing a product line

- **Is the goal the product line or the product?**
- **What information and how much information is needed to justify developing a product line?**
 - **Need standard templates for business cases for satellite ground system product lines**
 - **Reuse business models were developed (1995) -- are they applicable to product lines?**

Acquisition issues

- **Product lines are being demanded/required when the business case doesn't support them**
- **The government forces contractors to reuse in order to be competitive**
 - **Product line architecture is a method to reuse**
- **Acquirer wants developers to use architectures/components/systems they've already paid for**
- **Prime contractors are not COTS vendors in the eyes of the government**
 - **Data rights -- contractors are competitively inhibited from demanding data rights, yet they lose their investment if they don't get them**

Organizational changes to support a product line

- **Within an organization some one (person/organization) needs to control the architecture**
 - Chief engineer / chief architect
 - Architecture review boards
- **How are components owned and maintained within the organization?**
- **How do you get developers to reuse existing assets and work within a product line**
- **Training**

Technical Needs

- **Tools and processes to support product line development, instantiation, and evolution**
 - **Processes for technology insertion/refresh**
 - **Be able to throw out a whole component, and replace it**
 - **CM approaches and tools**
- **For the most part, these exist or are being worked**

Conclusions

- **Product lines are being implemented in the ground system domain**
- **There are still technical issues, but they are being addressed**
 - **By contrast, at GSAW2000 most PL issues identified were technical**
- **It is important to develop a business model with:**
 - **Agreement by all parties**
 - **Sufficient funding**
 - **Ready market**
- **The really difficult issues are cultural, political, organizational**

For next year

- **Many of these difficult issues have been solved by specific organizations in specific contexts**
- **Participants want to come to GSAW2002 and exchange solutions**
- **Group requested:**
 - **Case studies, successful and not, so attendees will have solutions to take away with them**
 - **Technical issues and solutions in the ground system architecture domain**
 - **Lessons learned**