AUTONOMIC LOGISTICS

An Infrastructure Approach:
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AUTONOMIC LOGISTICS

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Current posting (Reserve) - Project Officer, Regimental Headquarters 7th Signal Regiment [Army]
Logistics Officer (RACT) - Major
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25 yrs. U.S. DoD- DCMC (DLA); AFCMD (AFLC)
Majority (15 yrs.) at Pratt & Whitney Florida; Price/Cost Analyst, Estimating System Specialist, Administrative Contracting Officer
Programs – Joint Advanced Strike Tech./Joint Advanced Strike Fighter; F100-PW-100 thru 229 (F-15, F-16); F117-PW-100 (C-17), TF-30 (F-111,F-14); J52 (A-4)
Space Shuttle Main Engine Alternate Turbo Pump Development; RL-10 Rocket Engine
Scope

- Autonomic Logistics (AL) defined
- Assumptions – cost of (Australian) program
- PHM Vs Infrastructure
- Australian resource drivers
- AL skills base
- Skills threats
- Challenges for Australian Consortium
- Human capital and intellectual capability
Definition

Autonomic – functioning involuntarily

Logistics – art of moving, lodging and supplying troops and equipment

Autonomic Logistics (AL) suggests logistics happening automatically.

In JSF this might apply if only one aircraft is being supported but as soon as two or more are involved, trade-off and consolidation (tactical) decisions need to be made.

Data such as in-flight prognostics and inventory levels may be automatically fed into the Autonomic Logistics Information System (ALIS) to determine what maintenance and/or repairs are needed. However, determining when, where, and even if, these occur will be made based on required operational availability.

AL is an infrastructure that is based on a feedback matrix with prognostics and status automatically fed in.
AJSF AL COSTINGS

- Per unit cost of an aircraft (A/C) – US$50 Million
- Australian program uses a 100 aircraft buy equating to US$ 5 Billion
- Support costs generally represent approximately 67% of a program and aircraft costs equal 33%.
- Based on the above, the support costs would be US$10 Billion.
- Lockheed estimates a 20% savings on the normal support costs due to AL.

The unique INFRASTRUCTURE of the JSF program (including automated PHM and status systems) results in the US$ 2 Billion savings to the Australian JSF.
The accuracy and amount of Prognostics and Health Monitoring (PHM) data is very important. However, PHM has been around for decades. The F100 engine (Pratt & Whitney) program utilised the Electronic Engine Control (EEC) then the Digital Electronic Engine Control (DEEC) followed by the Improved DEEC (IDEEC) and finally the Full Authority Digital Engine Control (FADEC). Diagnostic units were the Engine Diagnostics Unit (EDU) and the Ground Diagnostics Unit (GDU).

What is different is the autonomic linkage between the aircraft and the base/factory and back.

The old concept of:

FACTORY to FOXHOLE

Is redefined as:

FOXHOLE to FACTORY to FOXHOLE
ALIS as a metacognitive system

- **Metacognition**
  - Three levels of ‘knowledge’
    - 1<sup>st</sup> level – knowing something
      - Data from PHM
    - 2<sup>nd</sup> level – knowing that you know something
      - That a component is approaching the end of its service life and will require replacement
    - 3<sup>rd</sup> level – knowing that you know that you know something
      - That replacement component/s is/are required; designation of place, date and time for maintenance/repair; check availability of technician, equipment and consumables. This includes Local Operational Analysis Decisions (LOADs) where the Logistician determines supplementary actions due to unscheduled repairs (battle damage, bird strikes, etc.)

- Provides basis for Logistician/Warfighter communication/negotiation re OP tempo/airframe availability etc.
ALIS as a predictive system

- **4Ds of Sustainment logistics**
  - Demand
    - What elements are required to perform a service event
  - Destination
    - Where the service event will take place, (base)
  - Distance
    - From OEM component supply, technician, equipment
  - Duration
    - Time required to bring component elements to base for duration of the service event
AUSTRALIAN JSF RESOURCE DRIVERS
- Normal Support for AJSF
  Bases
  Manufacturers
  Transport/Warehousing
- Production, Sustainment & Follow-on Development (PSFD) MoU ensures AJSF can utilise program data
- Future Business Potential
  Any credible option requires an Australian capability
- Australia - Regional JSF Centre
SKILLS BASE

- Logisticians
  - Defence
  - Transport
  - Manufacturing

- Technical
  - Software Development
  - Hardware Specialists
    - PHM
    - Transport (RFIDS, etc.)
SKILLS COMPETITION

SKILLS POOL

AJSF

AWD

Wedge tail

International

Civil Aviation

Resources Sector

Amphibious Ships

Retrofits (C17, etc.)

Automotive

International Resources Sector

Automotive

Civil Aviation

Resources Sector

Amphibious Ships

Retrofits (C17, etc.)

Automotive

International Resources Sector

Automotive

Civil Aviation

Resources Sector
Human capital & intellectual capability

- Lead time (commencing 2008)
  - Academic development/approval of AL
  - Graduates (2010/11)
- Intense competition for AL human capital
- Lead time short to prepare AL capability for JSF
- Industry OJT and Internship necessary
- Skill Base essential for PSFD success
AUSTRALIAN CONSORTIUM

DEFENCE
- OJT
- Internships
- Academic Programs
- Skilling Australian Defence Industry (SADI)

INDUSTRY
- AWD
- Amphibious Ships
- Retrofits

ACADEMIC
- JSF
- OJT
- Internships
- Academic Programs
- Skilling Australian Defence Industry (SADI)

INDUSTRY RESOURCE SECTOR
Civil Aviation
Conclusion

- AL is:
  - Estimated to produce AJSF program savings = US$2 Billion
  - Based on a matrix using prognostics and auto status feeds
  - a metacognitive Information System
  - a foxhole to factory to foxhole logistic concept
- Emerging intense competition AL skills base
- Australian capability must be developed now
- AJSF and Government/Industrial/Academic development support required to ensure skills base for PSFD