SYSTEMS MISSILES & SPACE GROUP

System Engineering Process Improvement using the CMMI in Large Space Programs

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Largest industrial company in Israel

Missiles, Satellites, UAVs, Avionics, Upgrades, RADARS, etc.

Activities encompassing: Development, Production, Maintenance and Service of Aerospace Systems

IAI divisions are certified for ISO9000 and AS9100
Process Improvement – WHY?

“The Quality of a System is Governed by the Quality of the Process Used to Develop it”

Watts Humphrey,
“Software Process Program” founder at the Carnegie Mellon’s Software Engineering Institute
Starting activities for project management process improvement

Starting CAI activities and NPI development

Starting Software Process Improvement Program (SPIP) based on CMM

Starting System Process Improvement (SYSPI)

Starting Advanced System & SW Technology: based on CMMI

CMMI ML 5:
1 Group
1 Division

CMMI ML 3:
1 Groups
1 Division

2010
Current Status

SW-CMM

SE-CMM

CMMI

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The CMMI implementation is *managed as a program* for process improvement at the group level.

**SAPIR** – *Standard Annual Process Improvement Roadmap*

The *management concept* is based on the CMMI ORG and Support PAs.
CMMI & SEPG Program - Group Level (2)

- Discipline based PITs - Process Improvement Teams
  - PM, SE, SW, HW, QA, CM, SAM, ORG
- PIT members = Process Leaders and Project Representatives
- Each PIT conducts meetings and activities, managed by PIT Leader
- ORG PIT comprises of all PITs Leaders
- CMMI Integrated plan consisting of all PITs’ plans
**IAI Process Improvement Strategy**

**IAI Corporate Level**
- IAI VP Operations Engineering & Development
- CMMI Program Office
  - Sponsorship
  - Coordination
  - Budget
  - Process Assets Development

**IAI Groups and Divisions**
- Process Improvement Activities
  - Local Sponsorship
  - Budget & Resources
  - Process Assets Adaptation and Development
  - Process Implementation
  - Process Feedback
Process Definition and Tailoring Method

IAI Corporate level
Company HDQ

A set of SE standard processes, methodologies, tools, tailoring guidelines & training material

At the Group level
within the SE PIT

Tailoring

Feedback

Tailored HDQ SE set

Deployment

Feedback

Project SE

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Space Systems

The Satellite Program = A System of Systems Program

- TECSAR Synthetic Aperture Radar
- OFEQ
- OPTSAT 3000
- EROS C
- Venus

Observation satellites

Communication satellites

- AMOS 1,2
- AMOS 3
- AMOS 4 Advanced comm. Sat.

Shavit launch vehicles

Ground control stations

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Decentralized SE at the group level –
The **SOS and the Systems SE** are part of the program office, also managing the Sub-Contractors.

The **Sub Systems SE** are part of the Engineering Departments

Different views and meanings of SE activities adequate to each level of the system: SOS, System, Subsystem.

Large project teams (often, geographically dispersed)
FORMAL *mutual commitment* between the Program office and the Engineering Groups supports implementation of *PP SP3.3, PMC SP1.2, REQM SP1.2 & IPM SP2.2*:

- The Program Office issues Internal Customer–Supplier Agreements
- The Program Office allocates budget for the engineering groups against their commitment to supply adequate products on time
- The program establishes Integrated teams consisting of different disciplines (IPT = Integrated Product Teams)
• Complex coordination
  - Internal (IAI) sub contractors
  - External sub contractors
  - Suppliers

Supports implementation of
**IPM SP2.1, SP1.5; SAM SPs; TS SP2.4; DAR**

• Complex System Integration aspects – Integration
  Strategy planning requires special attention (**PI SP1.1**):
  - Scheduling
  - Sub Contractors Monitoring
  - Interfaces definition correctness and completeness (**TS SP2.3, PI SP2.1**)
  - Integration Readiness Review (**PI SP3.1**)

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Each Satellite is “One of a Kind” however …

Verification & Validation are limited, especially by the ability to simulate the environmental conditions.

Support implementation of **VER & VAL SP1.1, SP1.2, SP1.3**

Once Launched – Repair activities are limited to SW corrections and updates. Requires special attention to:

- Requirements validation at early development stages (**RD SP3.5**)
- Analysis of Failures found on PI, VER & VAL stages (**PI, VER SP3.2, VAL SP2.2**)
Conclusions & Lessons Learned

- The IAI process deployment method relies on a Corporate Level processes definition, followed by Group/Division Level tailoring and implementation.

- The products and projects characteristics require special attention to the RD, PI, VER & VAL process areas

- Using the internal Customer–Supplier Agreements and IPT’s ensure
  - Better definition and management of the commitment
  - Integrated team work along the projects’ life cycle
Thank you

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