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A Framework to Manage and Evaluate Remote Software Testing Using the CMMI for Services Constellation

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CMMI Technology Conference and User Group

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Acknowledgements

- This work was developed for the SAS Institute, a private FORTUNE 100 Software Development Organization based in Cary, NC
- Process presented was used during the development and release of two SAS Products for the Manufacturing Solutions Group in 2006

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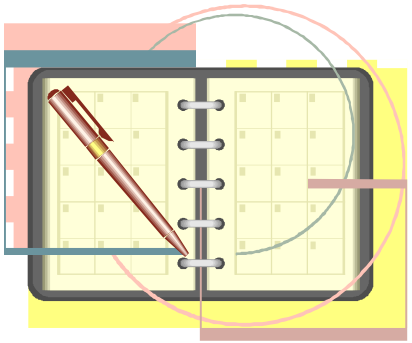
Agenda



- Introduction
- Geographically Distributed Product Development and Service Delivery
- Analysis of a Real-world Case Study
- Use of SAM PA for Product Development and Service Delivery
- Conclusions

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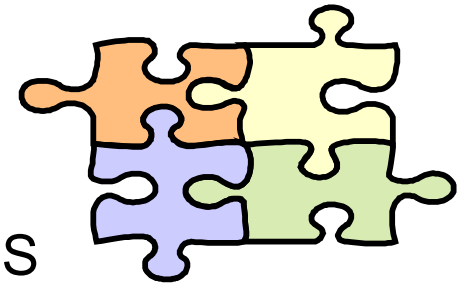
d Development Scenario at SAS Manufacturing Solutions Group



- Software development typically driven from the US
- Remote development organizations located in India
- System/Integration Software Testing performed in India

- Product Management owns product roadmap and is located in US
- Senior Management for Development organization located in US
- Consulting Group responsible to customize and implement software solutions in the field

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Geographic Distribution

- Software (Product) Development
  - Project Management
  - Development Manager
  - 2/3 Development Team

US

  - 1/3 Development Team

India

- Software Verification
  (System and Integration Testing)

India

- Consulting Group
- Product Management
- Release Engineering
- R&D Senior Mgmt

US

Improve Collaborative Development and Service Delivery

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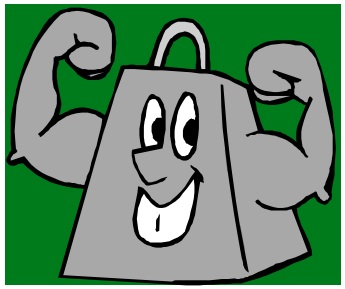
Findings CMMI Internal Appraisal – 1 –



- Strengths
  - **Organizational policy to manage external suppliers exist**
  - **Supplier Agreements for COTS products are developed**
  - **COTS products are evaluated against requirements**
  - **Supply Chain Management handles the purchasing of commercial components for HW, SW and contractors**
  - **All teams use common RE, CM, and Defect Tracking tools**

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Findings CMMI Internal Appraisal – 2 –

- Weaknesses
  - **No organizational policy/procedure to manage remote product development**
  - **No organizational policy/procedure to manage remote service delivery (Testing)**
  - **No formal collaboration agreements are established with remote teams**
  - **Transition of work products (and services) provided by remote organization performed in informal manner**

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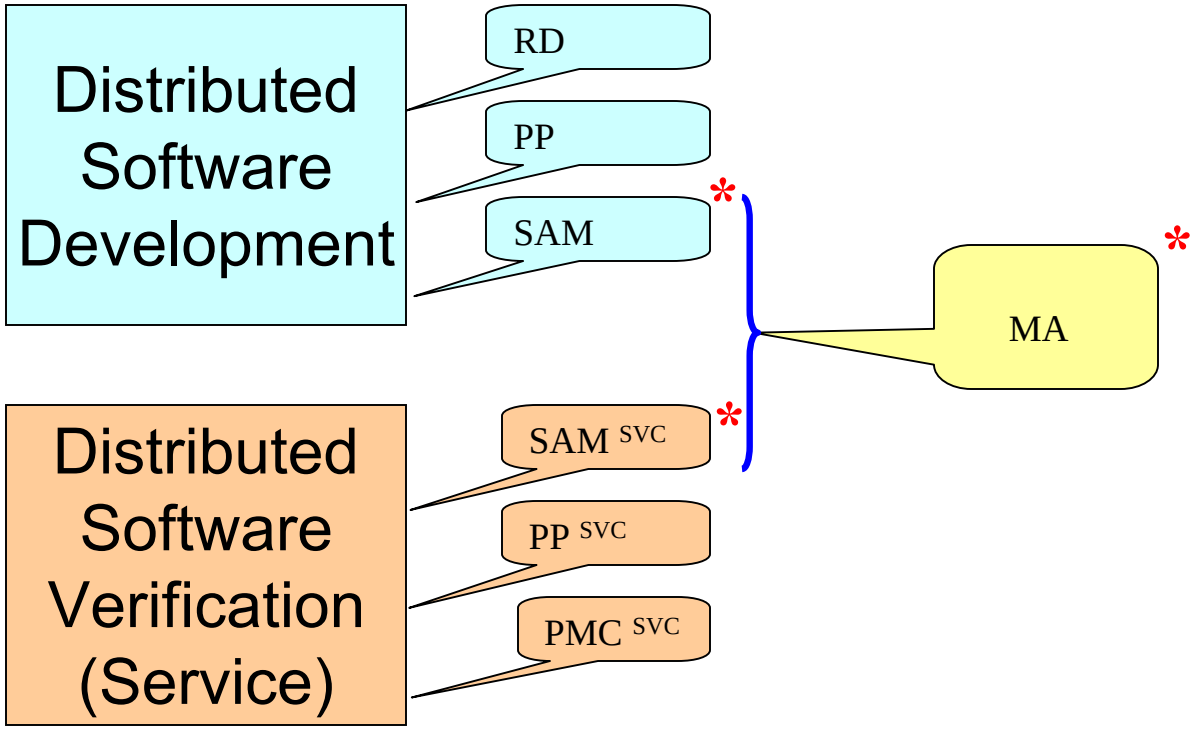
CMMI Practices



* **Note:** SAM for Product Development and Service Delivery and MA will be the focus of this presentation

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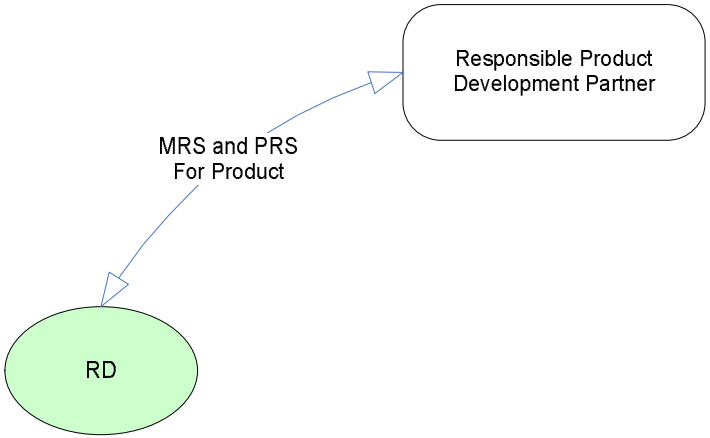
Process Area Relationships Stage 1



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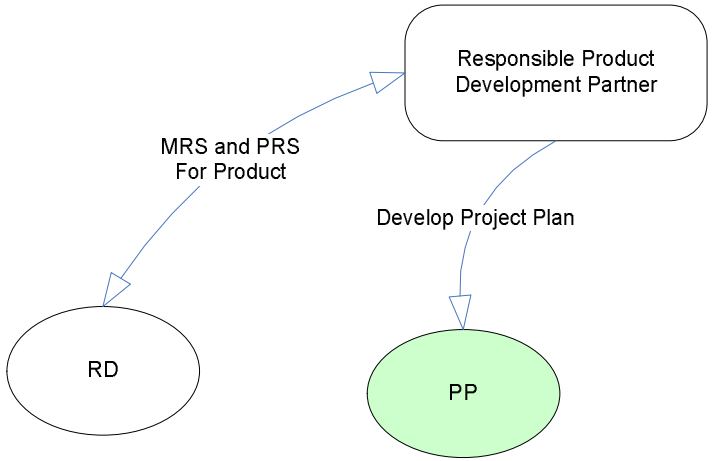
Process Area Relationships Stage 2



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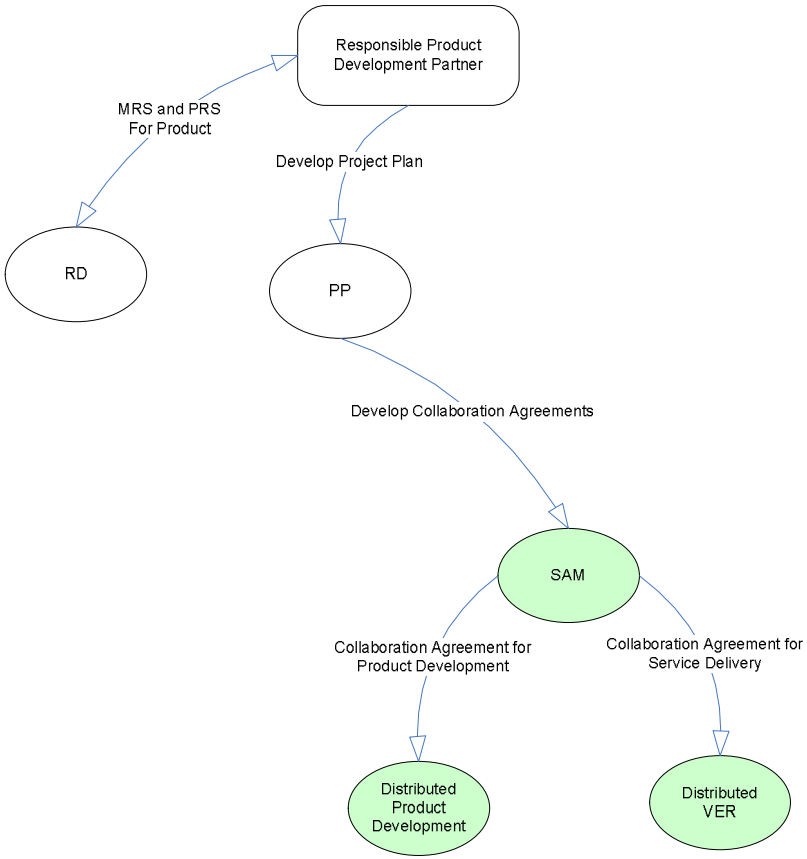
Process Area Relationships Stage 3



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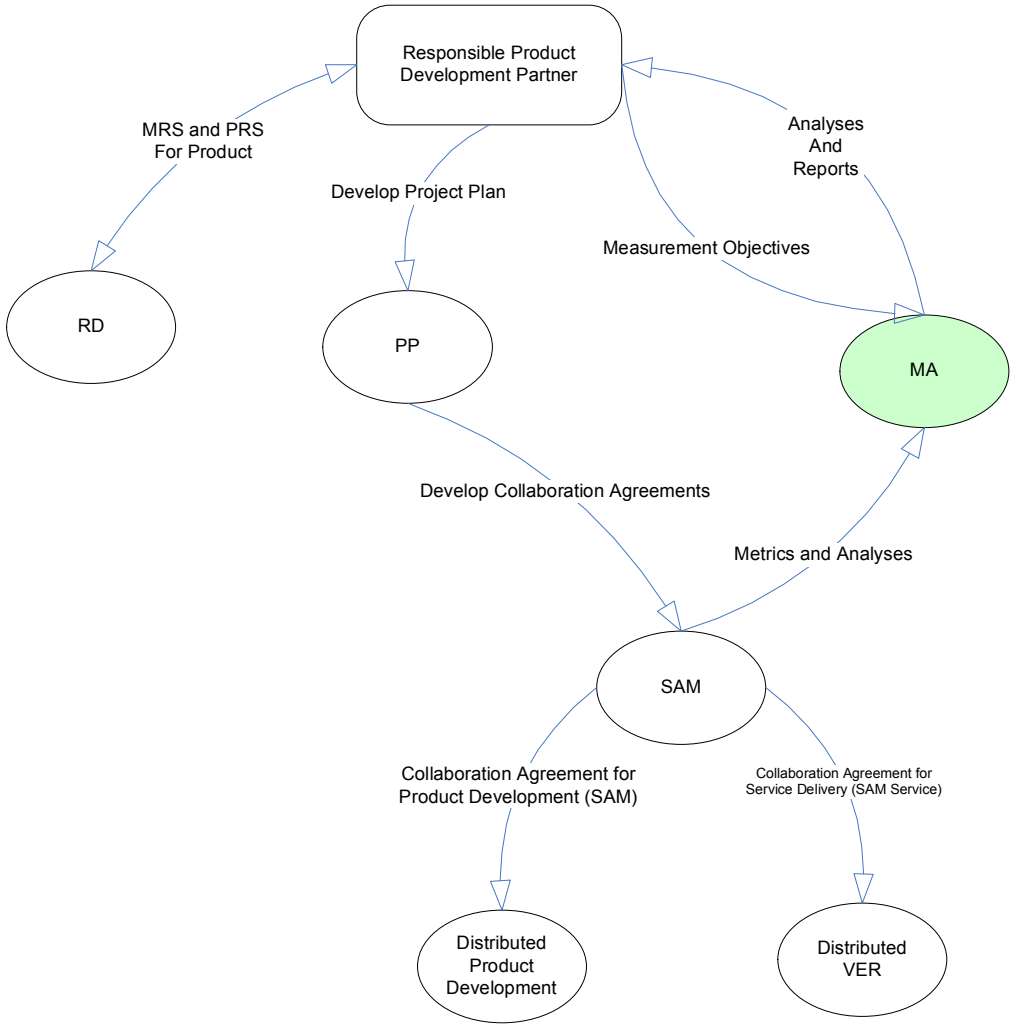

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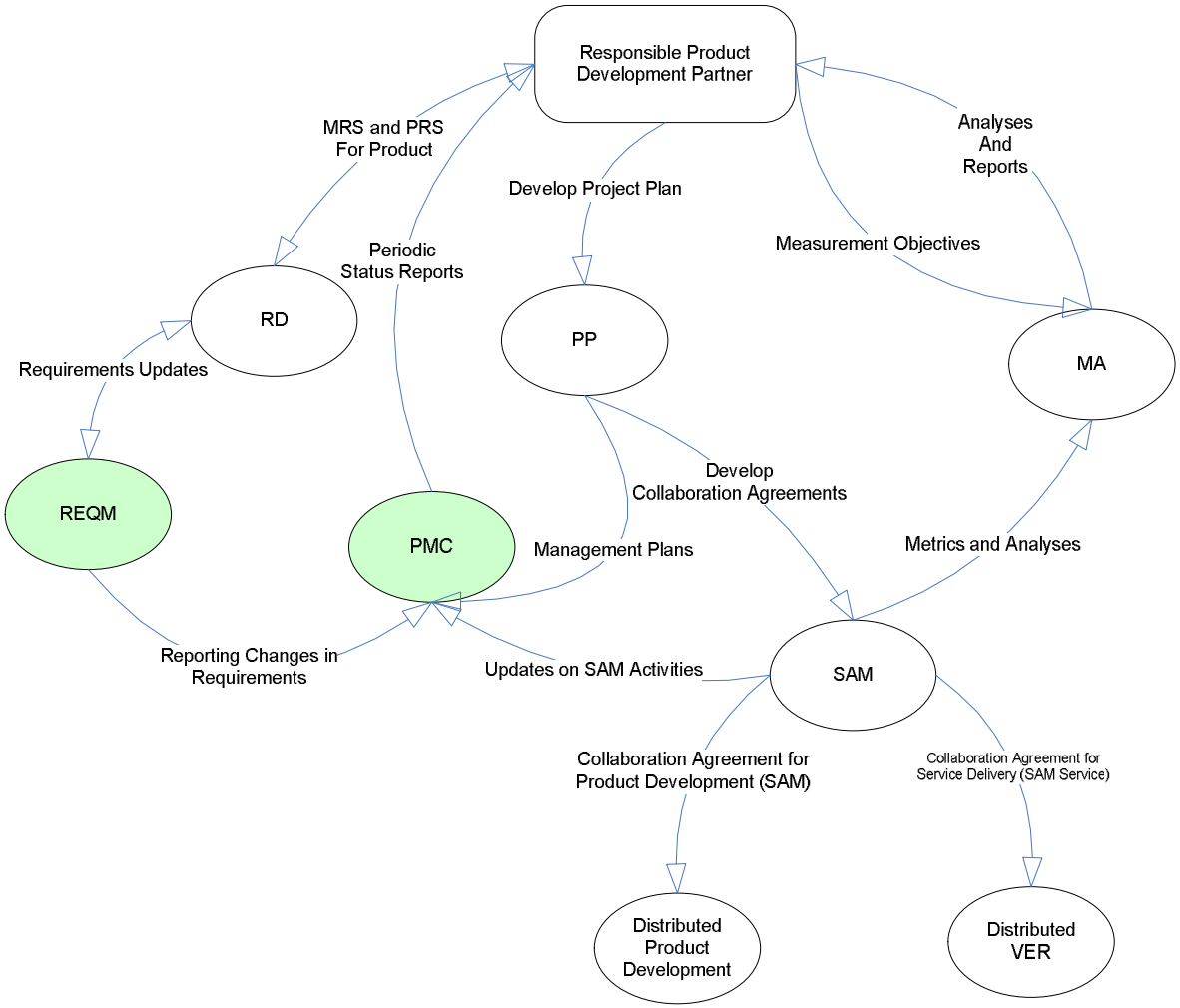

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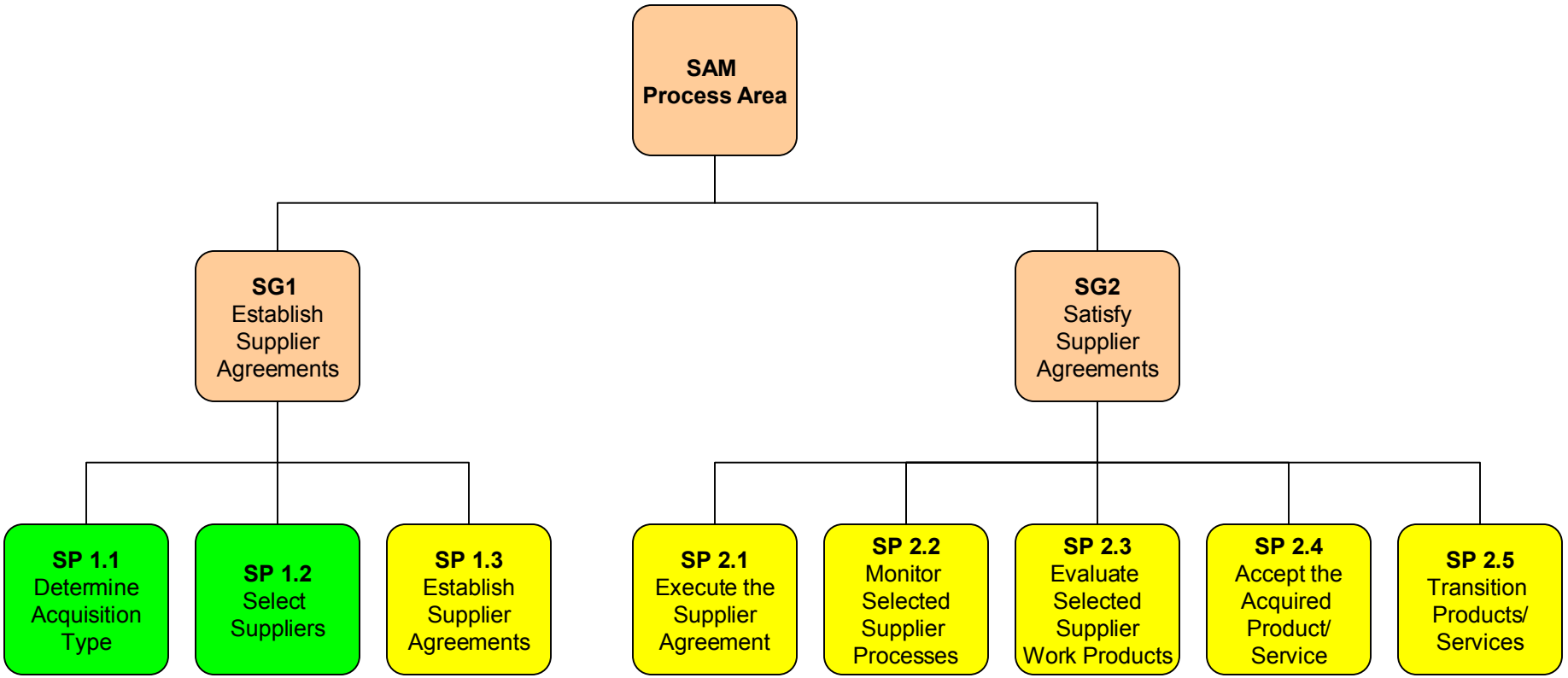
SAM Specific Goals/Practices - Appraisal Results



Note: No procedures for collaboration/sub-contracting of products/services only for COTS

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SAM Process Area -1-

- SG1 - Establish Supplier Agreements
  - SP 1.1 - Determine Acquisition Type
    - Acquisitions may be COTS from third-party vendors, components developed by internal or external partner, or services delivered by internal or external partner
  - SP 1.2 - Select Suppliers
    - Establish criteria for selection of partners and also list of preferred suppliers/collaboration partners
  - SP 1.3 - Establish Agreements with Suppliers
    - Establish formal agreements with suppliers and collaboration partners (service agreements, product development agreements, license agreements, etc)
    - For internal partners the formal Supplier Agreement is a Collaboration Plan, which is part of the Project Plan

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CMMI Process Area -2-

- SG2 - Satisfy Supplier Agreements
  - SP 2.1 - Execute the Supplier Agreement
    - For internal partners the formal Supplier Agreement is a Collaboration Plan, which is part of the Project Plan
  - SP 2.2 - Monitor Selected Supplier process
    - For internal collaboration partners use internal release process
  - SP 2.3 - Evaluate Selected Supplier Work Products
    - This applies to internal developed components or services such as testing
  - SP 2.4 - Accept the Acquired Product
    - Services such as testing are also considered
  - SP 2.5 - Transition Products
    - Services such as testing are also considered

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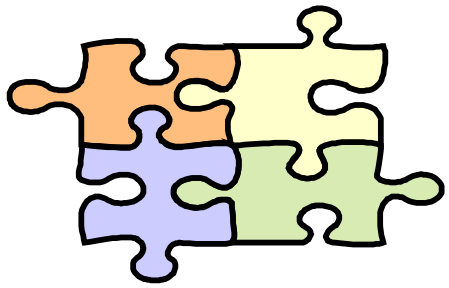
Verification as a Service Activity - SAM^{SVC}



- System and Integration Testing considered as a Service Delivery activity in the organization
- SAM ^{SVC} not Implemented in the past in the organization
  - Service Delivery
  - Capacity and Availability Management
  - Problem Management
  - Incident and Request Management

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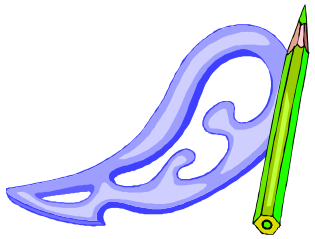
Sample Collaboration Agreement Templates



- Sample Templates derived from SAM PA to be distributed and discussed with attendees:
  - Collaboration Agreement for Remote Product Development
  - Collaboration Agreement Template for Remote Service Delivery (Software Testing/Verification)

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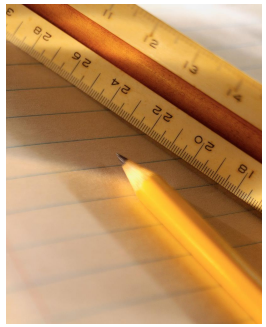
MA Process Area – 1 –



- Measurement Objective
  - To improve “partner’s” satisfaction
- Measures
  - Number of “partner’s” complaints
    - Party or stakeholder involved in collaboration can enter a complaint after a week of not having received response to an issue
  - Level of severity of “partner’s” complaints
    - Low - first entry associated with a complaint
    - Medium - second entry associated with a previous complaint
    - High - more than two entries associated with a previous complaint

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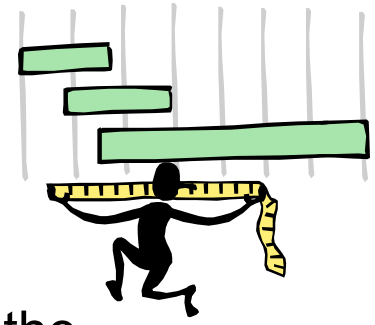
MA Process Area – 2 –



- Data Collection and Storage
  - A partner/stakeholder enters a written complaint in the Complaint Spreadsheet available in the Project Common repository
  - The Complaint Spreadsheet has several sections each regarding the identified type of collaboration
  - The complaints are reviewed weekly at the Senior Management meetings
  - Each manager is responsible to ensure any complaints are properly addressed
  - Complaint Spreadsheet is maintained by Director of Development under CM

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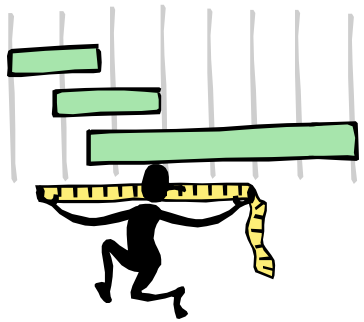
MA Process Area – 3 –



- Analysis of Measurement Data
  - Histogram showing number of complaints clustered by severity level are developed by Director of Development Solutions

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MA Process Area – 4 –

- Reporting of Measurement Data
  - Histogram charts are presented at the end of each month and discussed at the Senior Management Meeting
  - Any corrective actions are tracked to completion by Director of Development Solutions

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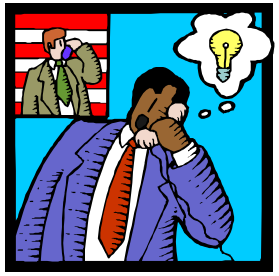
Discussion on Measurement and Analysis



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Sample of Complaints Sheet 2Q of 2006

Complaint #	Severity Level	Description	Requestor Party	Requested Party	Date Created	Date Expected Resolution	Comments	Date Resolved	Date Second Entry	Date Second Entry
1	L	More detailed description of Requirement DS 0012 and no response from Development group in US	R&D India	R&D US	6-Jul-06	13-Jul-06	Details were obtained from Product Manager on 12-Jul-06-2006	12-Jul-06	-	-
2	H	Provide details about Performance Requirements and no response	Test Group India	Product Mgmt	6-Jul-06	13-Jul-06	Request passed by Director to Product Manager but no response as of 13-Jul-06.Second request by Director to Product Manager on 20-Jul-06 and no answer.	26-Jul-06	13-Jul-06	20-Jul-06
3	M	Review of general architecture document for Dashboard module without any response	R&D India	R&D US	12-Jul-06	19-Jul-06	Due to lack of time Dashboard Architecture Document was not reviewed until July 28 of 2006	28-Jul-06	19-Jul-06	-
4	M	Give presentation on new requirements on MRD without any response	R&D India	Product Mgmt	13-Jul-06	20-Jul-06	Director remindeded Product Manager to give presentation to R&D Group in India. Product Manager responded on July 21 of 2006.	26-Jul-06	20-Jul-06	-
5	L	Provide feedback on Test Plan and no feedback or notice received yet	Test Group India	R&D US	20-Jul-06	27-Jul-06	R&D group will review test Plan	25-Jul-06		
6										
7										
8										
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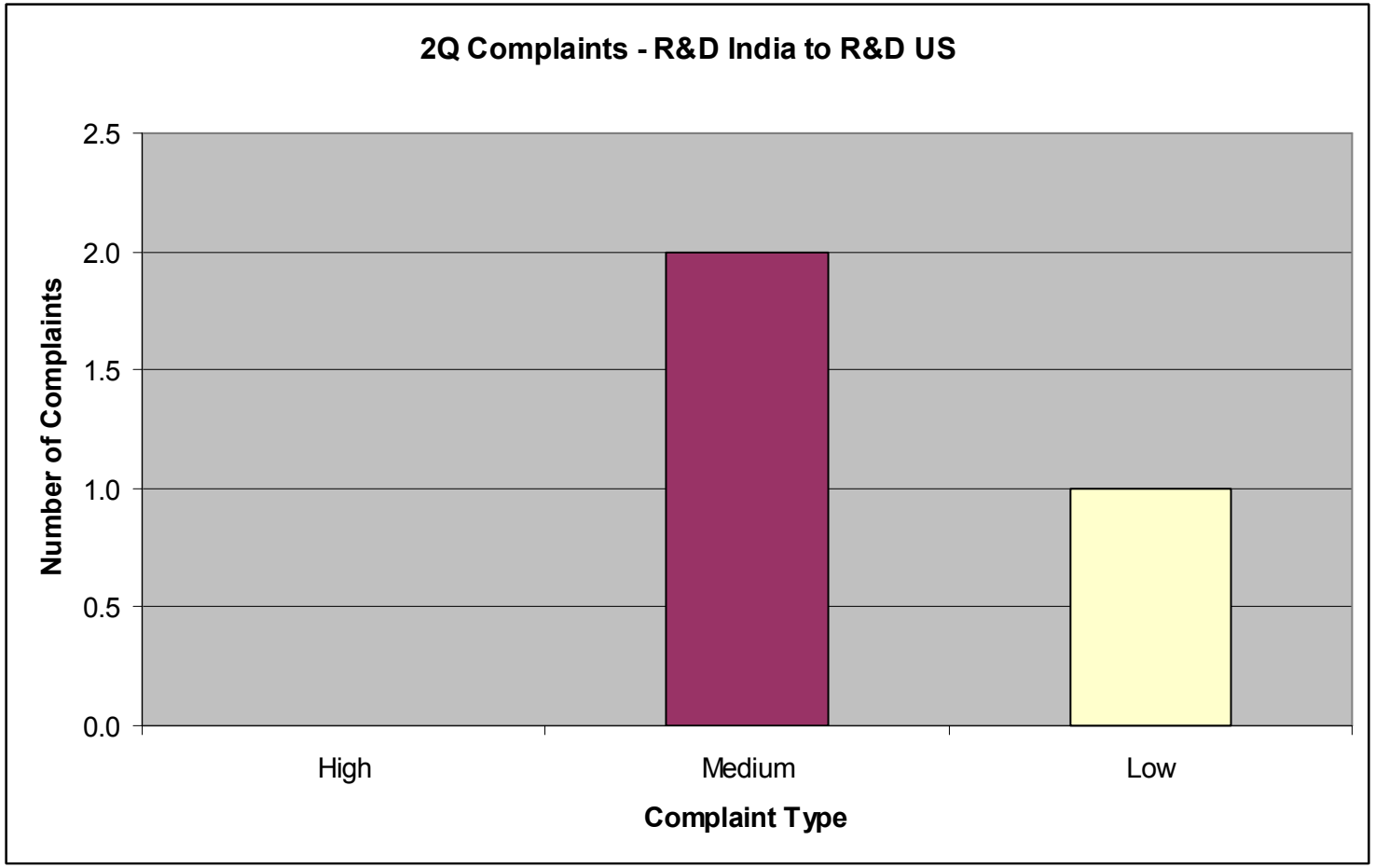
Sample Histogram of Complaints



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Conclusions 1

- Geographically dispersed teams at SAS:
  - Product Development
  - System/Integration Testing
- System /Integration Testing viewed as Service
- With a low number of distributed projects, an informal method to collaborate was sufficient
- SAM CMMI PA needed as number of projects increased
- The practices of the SAM CMMI process area are successfully being used to manage both remote product development and service delivery

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Conclusions 2

- Including the CMMI MA PA helps monitoring effectiveness of process
- Essential to build a lean process
- Focusing on the “most painful” areas was important for buy-in
- Use of SAM process reduced level of frustration in remote “sister” organizations
- Resistance on process came from “responsible” partner
- Use of templates facilitated implementation of SAM process
- Metric was identified by members of the development and testing organizations

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