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Management and Industrial Strategy

אסטרטגיה ניהולית ותעשייתית

פרופ' רון קנת

ד"ר יוסי רענן

Professor Ron Kenett - ron@kpa.co.il

Dr. Yossi Raanan - yossir@kpa.co.il

Part IV

מטרת הקורס

- הבנת חשיבות אסטרטגיה ניהולית ותעשייתית בסביבה עתירת טכנולוגיה להשגת:
  - כושר תחרות
  - התאמה לסביבה משתנה
  - יציאה ממשבר
  - כניסה לשווקים חדשים

מבנה הקורס

תנאי קדם: אין

שיטת הלימוד:

- הרצאות פרונטליות
- ביצוע פרויקט במסגרת צוות

הרכב הציון:

- עבודת גמר – 60% (40% עבודה, 20% מצגת)
- מבחן סיום – 40% (נדרש ציון עובר לשקלול)

נושאי הקורס - 1

מבואות:

התפתחות תפיסות ניהוליות ומיצוב הטכנולוגיה בתעשייה תוך ניתוח משמעויות המהפכה התעשייתית ומהפכת המידע (סולם האיכות).

מבוא לאסטרטגיות הניהוליות העיקריות המיושמות בתעשייה: ניהול איכות, שש סיגמה, מערכות ייצור גמישות, מערכות תוכנה תעשייתיות ומיכון ארגוני.

אסטרטגיה עסקית ושיווקית:

מודלים לניתוח אסטרטגי כגון: BCG, מקינזי, ארטור ד. ליטל, בוז אלן, אופציות ריאליות.

אסטרטגית שרות:

מערך השירות ותפקידו במחזור חיי המוצר. התמיכה הטכנולוגית הנדרשת במערך השירות. הצגת האסטרטגיות הניהוליות העיקריות בשירותים: שירות מבוזר / מרוכז, מוקדי שרות.

אסטרטגית משאבי אנוש:

מודלים למיפוי ארגוני, סקרי עמדות עובדים, מודלים למיפוי משאבי אנוש, הערכת עובדים ממוקדת תהליך.

נושאי הקורס - 2

אסטרטגית התפעול והאיכות:
ניהול זמין ושיטות ייצור ארגוניות יפניות. שש סיגמה.
מערכות ייצור גמישות, ייצור ברשתות ועקרונות הניהול הרב - מוצרי בתעשיות עתירות מיכון.
אסטרטגית מו"פ וניהול סיכונים:
CMMI, ניהול סיכונים, פרויקט MUSING.
אסטרטגית מערכות מידע ותקשורת:
אסטרטגית IT. תקשורת לסוגיה והשפעותיה על ההיערכות התעשייתית והשירותית.
ניהול השינוי:
מתודולוגית BEST ו EKD

6

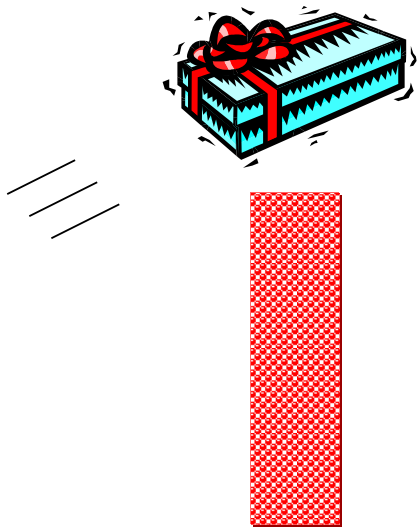
מו"פ

Software Deployment: the Problem

Producer

Consumer

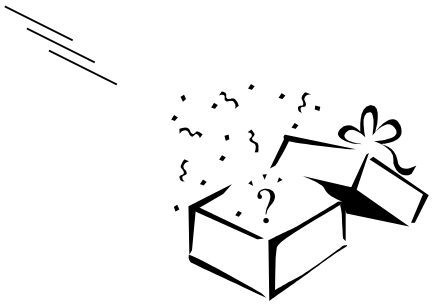
Software Deployment: the Problem



Producer

Consumer

Software Deployment: the Problem



Producer

Consumer

6

Software Deployment: the Problem

Producer

Consumer

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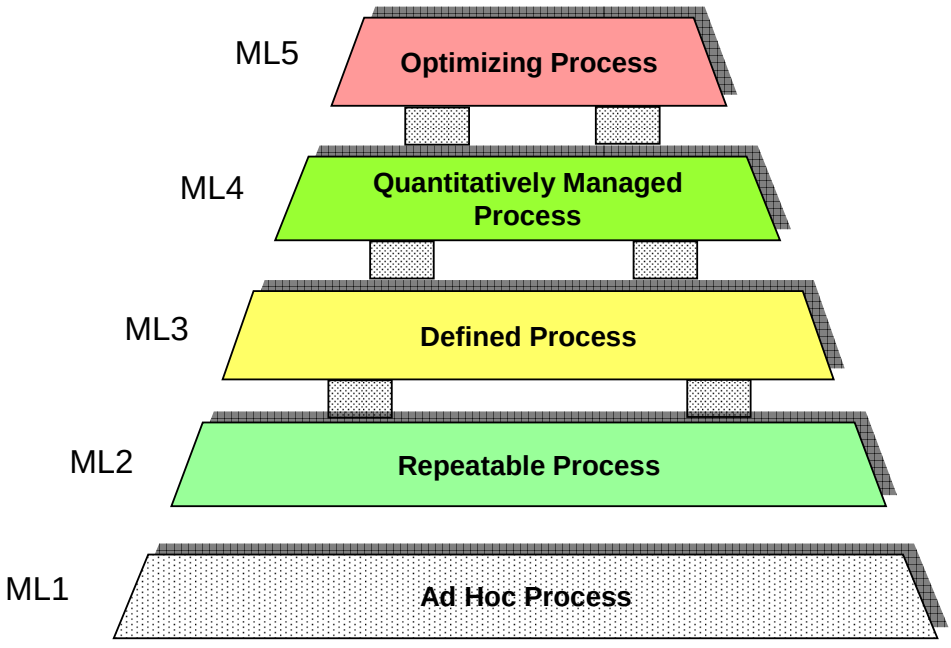
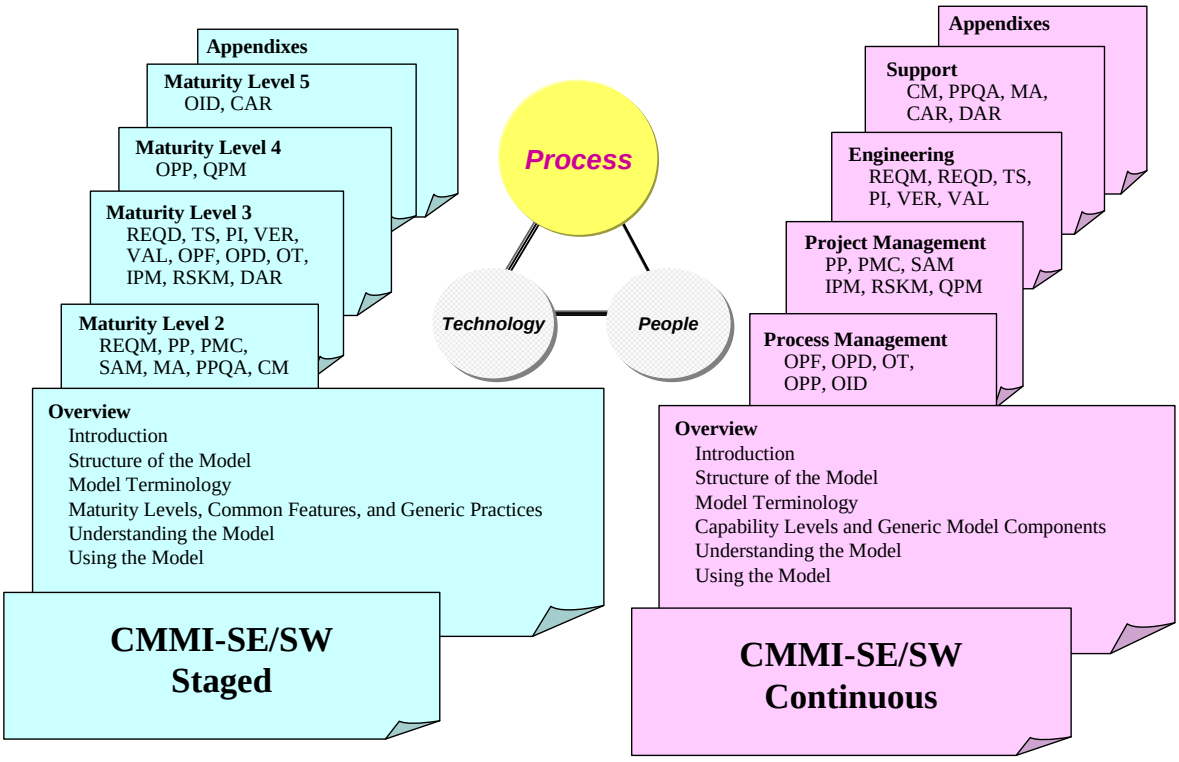
Capability Maturity Model Integrated (CMMI)

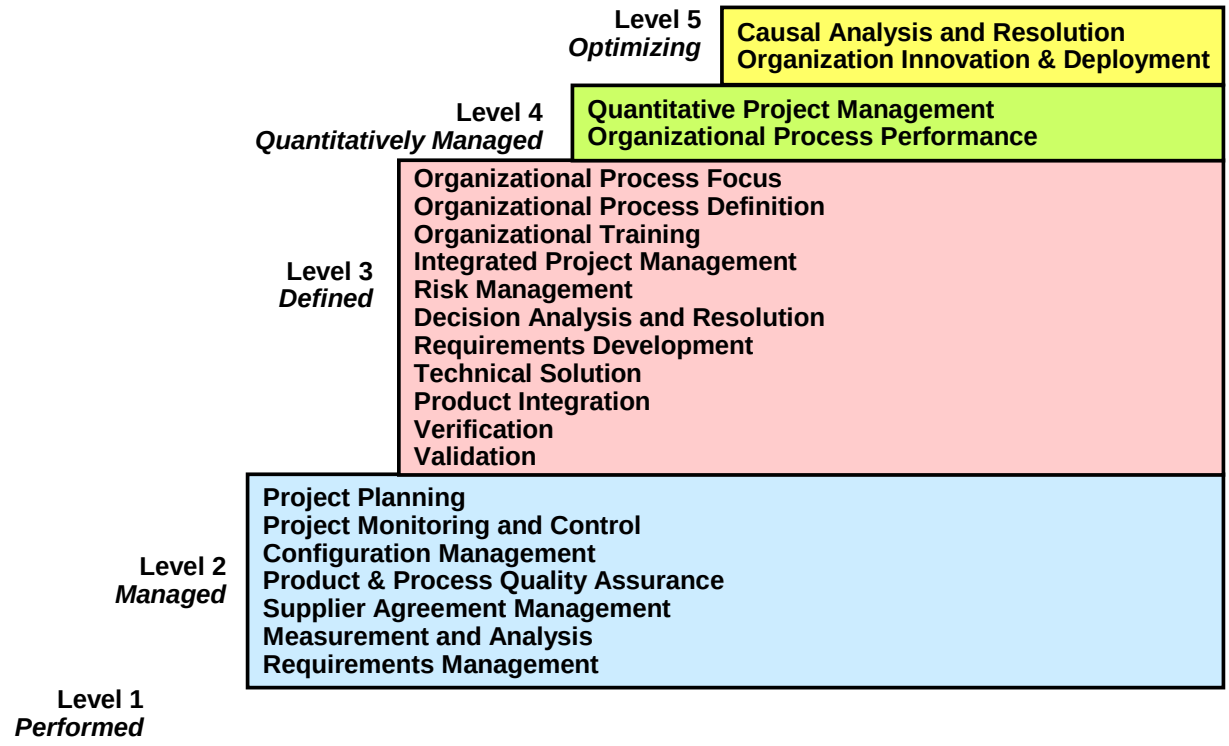
Capability Maturity Model



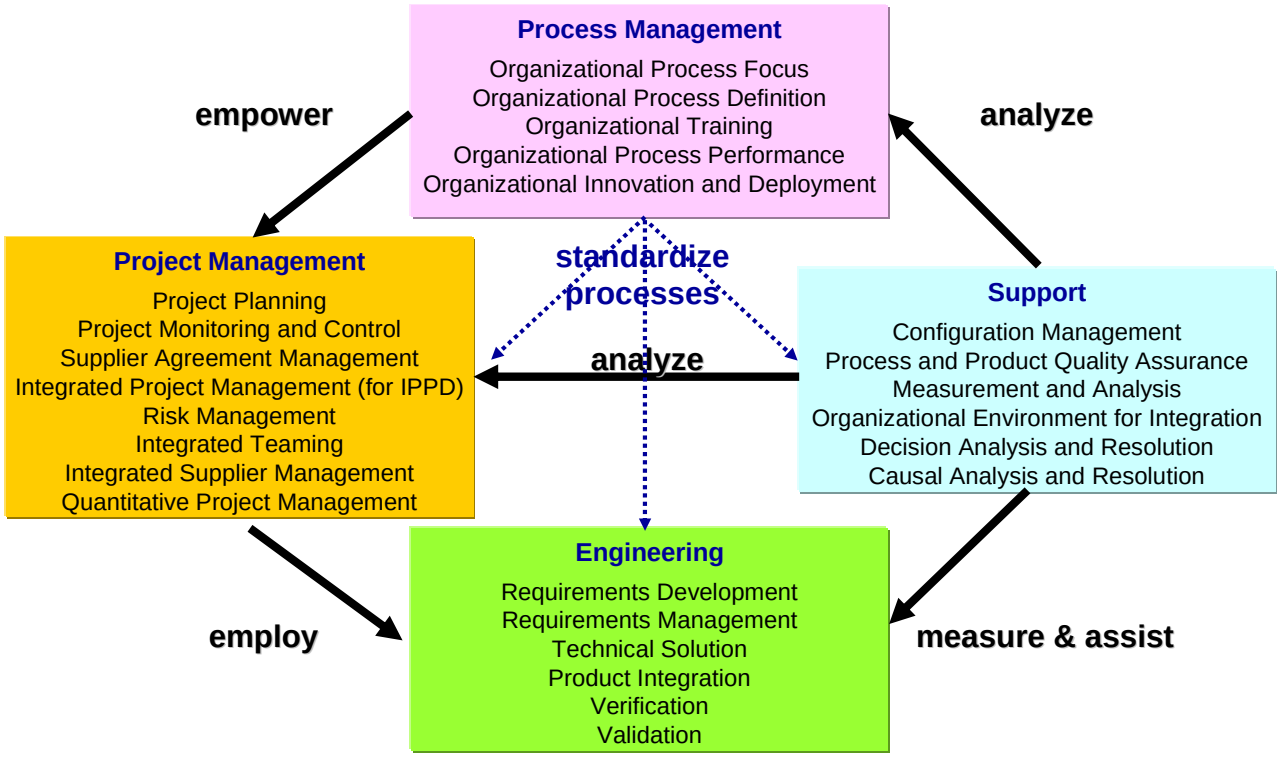
CMMI Structure



CMMI 22 Process Areas:



CMMI 4 Process Categories



CMMI Process Areas

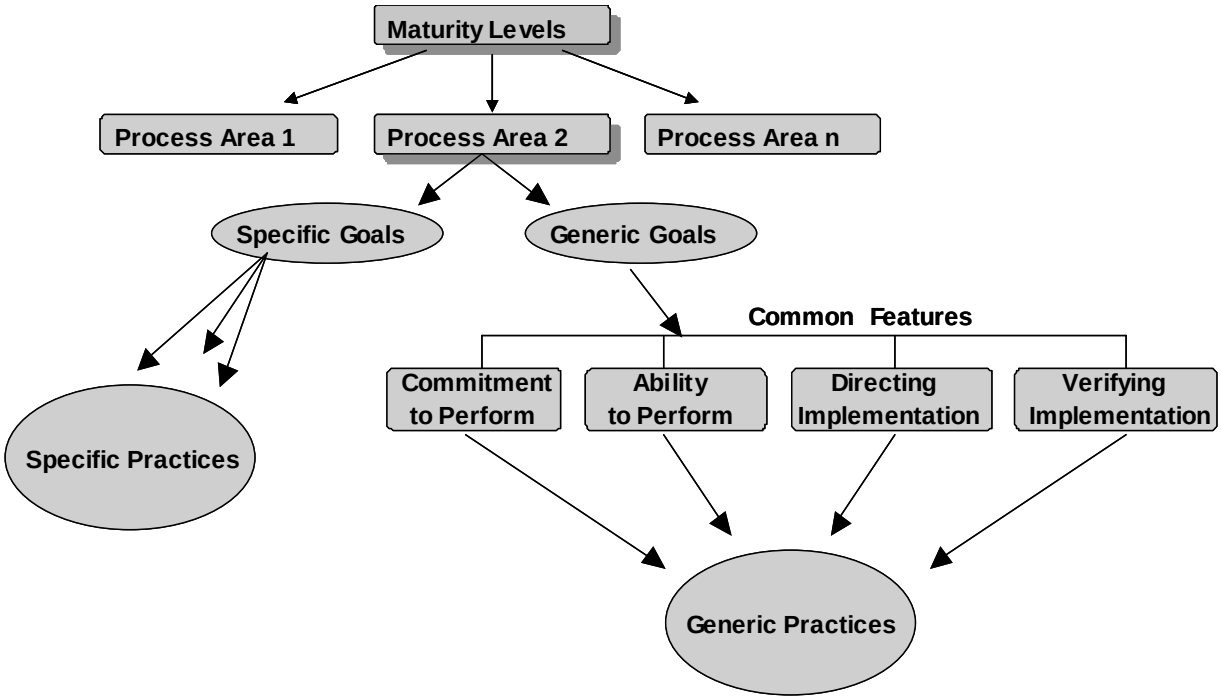
A process area (PA) is a cluster of related practices in an area that, when performed collectively, satisfy a set of goals considered important for making significant improvement in that area.

Practices are actions to be performed to achieve the goals of a process area.

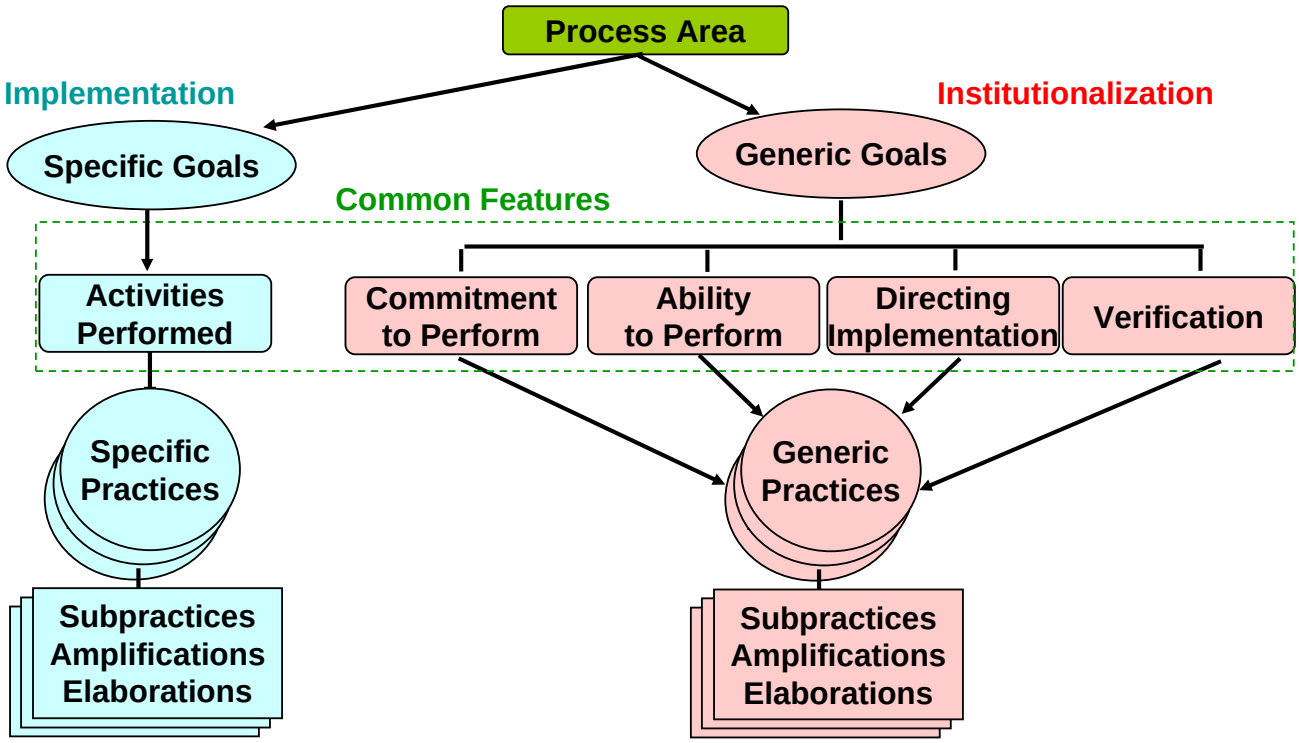
All CMMI process areas are common to both continuous and staged representations.

A process area is NOT a process description

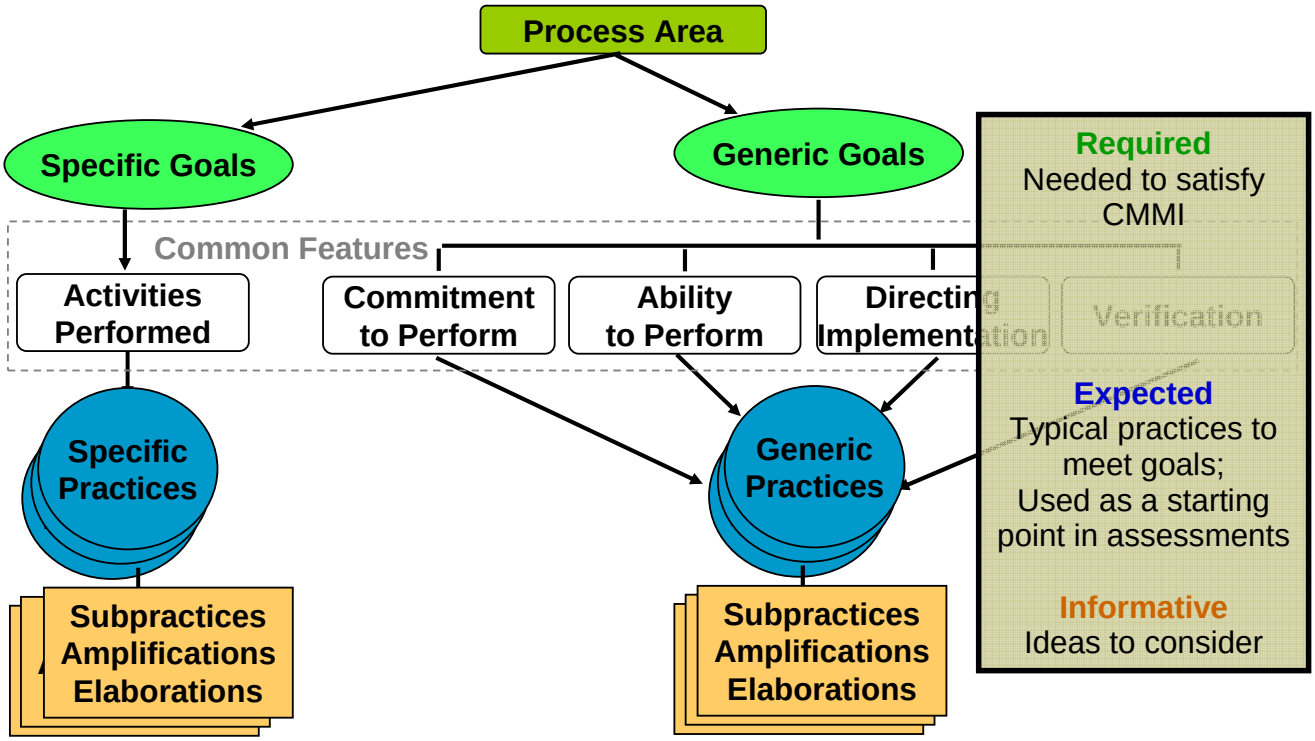
CMMI Architecture



Process Areas Components

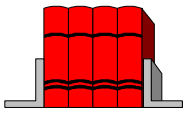


Required, Expected and Informative PA Components



Organizational Process Areas Level 3

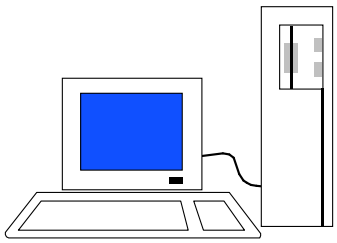
- **Organizational Process Focus**
  - Establishes and maintains an understanding of the organization's processes and process assets, build an infrastructure to support their use, and plan and coordinate the organization's process improvement activities.



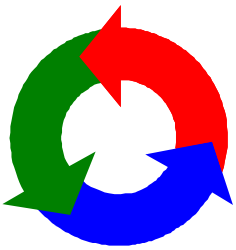
- **Organizational Process Definition**
  - Establishes and maintains a usable set of organizational process assets.

- **Organizational Training**
  - Develops the skills and knowledge of people so they can perform their roles effectively and efficiently.

Organizational Process Areas Levels 4 & 5

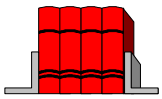


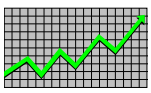
- **Organizational Process Performance**
  - Establishes and maintains a quantitative understanding of the performance of the organization's set of standard processes
  - Provides the process performance data, baselines, and models to quantitatively manage the organization's projects.



- **Organizational Innovation and Deployment**
  - Selects and deploys incremental and innovative improvements that measurably improve the organization's processes and technologies.

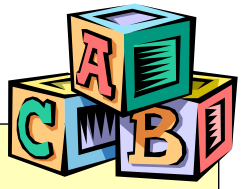
Common Features





- Commitment to Perform **includes practices that ensure the process is established and will endure.**
  - **Establishing organizational policies and leadership.**
- Ability to Perform **includes practices that establish the necessary conditions for implementing the process completely.**
  - **Resources, organizational structures, and training.**
- Activities Performed **includes practices that directly implement a process area.**
  - **Developing plans and procedures, performing work, tracking work, and taking corrective actions as necessary.**
- Directing Implementation **includes measurement practices that are necessary to collect and analyze data related to the process.**
  - **Insight into the performance of the process.**
- Verification **includes practices that ensure compliance with the process that has been established.**
  - **Reviews and audits.**

Practices



- Practices are the building blocks of the process areas

Example - Project Planning Process Area

Specific Practice 1.1 - Establish a top-level work breakdown structure (WBS)
to estimate the scope of the project.

- To satisfy the required goals, you are expected to perform the practices
  - Most commercial and defense projects/organizations will implement as written
- You may perform equivalent practices if they have an equivalent effect toward satisfying the generic or specific goal
  - These are termed “alternative practices”
  - Less prevalent in CMMI than in SW-CMM, because the CMMI practices are at a slightly higher level of abstraction
  - “Equivalent” is a judgment call – discuss with your appraiser

Specific Practices vs. Generic Practices

- Apply to a single process area
- Describe activities that implement the process area

Example – Requirements Mgmt.

SG 1 Manage Requirements

SP 1.1	Obtain an Understanding of Requirements
SP 1.2	Obtain Commitment to Requirements
SP 1.3	Manage Requirements Changes
SP 1.4	Maintain Bidirectional Traceability of Requirements
SP 1.5	Identify Inconsistencies between Project Work and Requirements

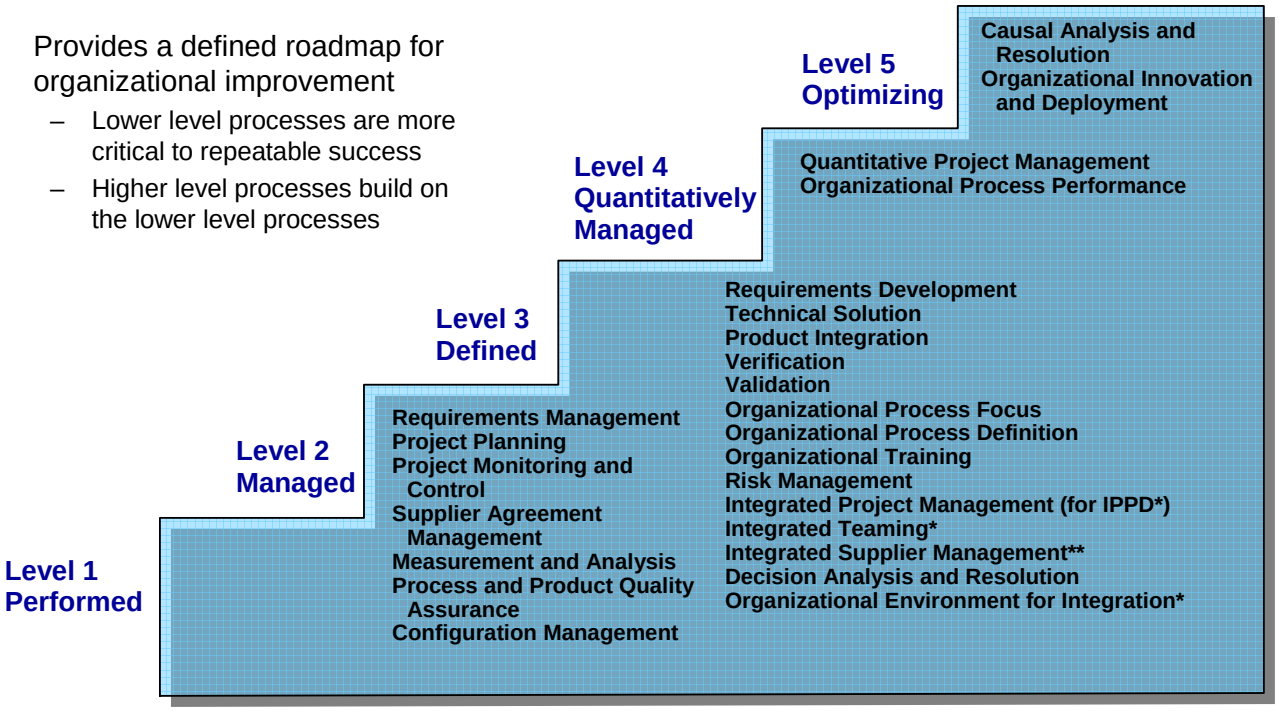
- Apply to all process areas
- Describe activities that institutionalize the process areas

GG 2 Institutionalize a Managed Process
- GP 2.1 Establish an Organizational Policy
- GP 2.2 Plan the Process
- GP 2.3 Provide Resources
- GP 2.4 Assign Responsibility
- GP 2.5 Train People
- GP 2.6 Manage Configurations
- GP 2.7 Identify and Involve Relevant Stakeholders
- GP 2.8 Monitor and Control the Process
- GP 2.9 Objectively Evaluate Adherence
- GP 2.10 Review Status with Higher Level Management

GG 3 Institutionalize a Defined Process
- GP 3.1 Establish a Defined Process
- GP 3.2 Collect Improvement Information

Staged Representation

- Provides a defined roadmap for organizational improvement
  - Lower level processes are more critical to repeatable success
  - Higher level processes build on the lower level processes



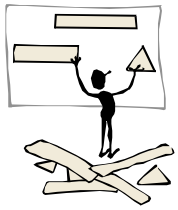
Continuous Representation

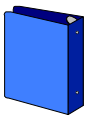
- Measures maturity (capability level) of each process area
- Permits maturing of selected processes

			Requirements Management	Project Planning	Project Monitoring and Control	Supplier Agreement Management	Measurement and Analysis	Process and Product Quality Assurance	Configuration Management	Requirements Development	Technical Solution	Product Integration	Verification	Validation	Organization Process Focus	Organization process definition	Organizational Training	Integrated Project Management	Risk Management	Decision Analysis and Resolution	Organizational Process Performance	Quantitative Project Management	Organizational Innovation and Deployment	Causal Analysis and Resolution
GG 5	Institutionalize an Optimizing Process																							
	GP 5.1	Ensure Continuous Process Improvement																						
	GP 5.2	Correct Root Causes of Problems																						
GG 4	Institutionalize a Quantitatively Managed Process																							
	GP 4.1	Establish Quantitative Objectives for the Process																						
	GP 4.2	Stabilize Subprocess Performance																						
GG 3	Institutionalize a Defined Process																							
	GP 3.1	Establish a Defined Process					■																	
	GP 3.2	Collect Improvement Information																						
GG 2	Institutionalize a Managed Process																							
	GP 2.1	Establish an Organizational Policy					■																	
	GP 2.2	Plan the Process		■			■																	
	GP 2.3	Provide Resources					■	■	■															
	GP 2.4	Assign Responsibility	■				■	■																
	GP 2.5	Train People					■	■																
	GP 2.6	Manage Configurations					■																	
	GP 2.7	Identify and Involve Relevant Stakeholders		■			■		■															
	GP 2.8	Monitor and Control the Process	■		■		■				■			■										
	GP 2.9	Objectively Evaluate Adherence	■				■								■									
	GP 2.10	Review Status with Higher Level Management														■				■				
GG 1	Achieve Specific Goals																							
	GP 1.1	Perform Base Practices	■	■	■	■	■	■	■	■	■				■									

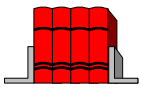
Organization's Process Assets

- Organization's standard process (including the process architecture and process elements)
- Descriptions of life cycles approved for use





- Guidelines and criteria for tailoring the organization's standard process
- Organization's process database (historical cost and schedule data)
- Library of process-related documentation

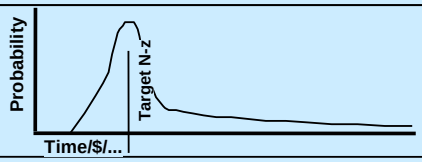
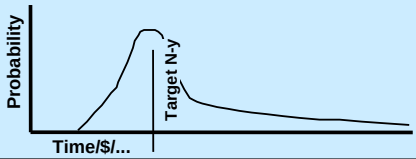
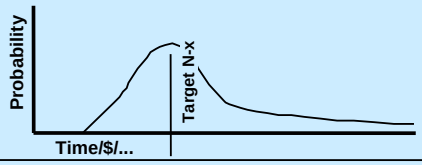
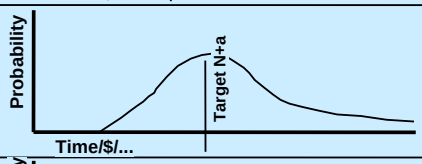
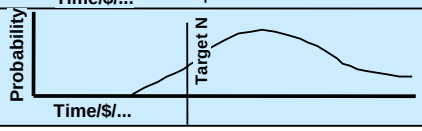


The process assets are available for use by the projects in developing, maintaining, and implementing their defined software process.

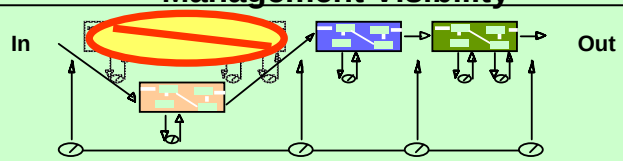
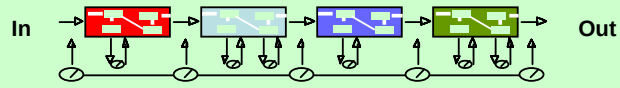
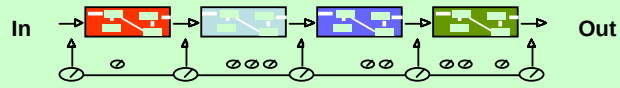
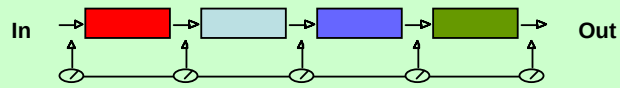
CMMI Staged Representation Overview

Level	Process Characteristics	Process Areas
5 Optimizing	Focus is on quantitative continuous process improvement	Causal Analysis and Resolution Organizational Innovation and Deployment
4 Quantitatively Managed	Process is measured and controlled	Quantitative Project Management Organizational Process Performance
3 Defined	Process is characterized for the organization and is proactive	Requirements Development Technical Solution Product Integration Verification Validation Organizational Process Focus Organization Process Definition Organizational Training Integrated Project Management Integrated Teaming Organizational Environment For Integration Integrated Supplier Management Risk Management Decision Analysis & Resolution
2 Managed	Process is characterized for projects and is often reactive	Requirements Management Project Planning Project Monitoring and Control Supplier Agreement Management Product and Process Quality Assurance Configuration Management Measurement and Analysis
1 Initial	Process is unpredictable, poorly controlled, and reactive	

Process Capability Prediction

Level	Process Characteristics	Predicted Performance
Optimizing	Focus is on continuous quantitative improvement	
Quantitatively Managed	Process is measured and controlled	
Defined	Process is characterized for the organization and is proactive	
Managed	Process is characterized for projects and is often reactive	
Initial	Process is unpredictable, poorly controlled, and reactive	

Management Visibility

Level	Process Characteristics	Management Visibility
Optimizing	Focus is on continuous quantitative improvement	
Quantitatively Managed	Process is measured and controlled	
Defined	Process is characterized for the organization and is proactive	
Managed	Process is characterized for projects and is often reactive	
Initial	Process is unpredictable, poorly controlled, and reactive	

Technology Implications

Level	Process Characteristics	Technology Implications
5 Optimizing	Focus is on continuous quantitative improvement	Technology causes process to change, which causes a new search for complementary technology
4 Quantitatively Managed	Process is measured and controlled	Organization has quantitative basis for applying technology
3 Defined	Process is characterized for the organization and is proactive	Organization has qualitative foundation for applying technology
2 Managed	Process is characterized for projects and is often reactive	Technology can help for established tasks
1 Initial	Process is unpredictable, poorly controlled, and reactive	Introduction of new technology is risky

People Implications

Level	Process Characteristics	People Implications
5 Optimizing	Focus is on continuous quantitative improvement	Focus on "fire prevention"; improvement anticipated and desired, and impacts assessed
4 Quantitatively Managed	Process is measured and controlled	Sense of teamwork and inter-dependencies
3 Defined	Process is characterized for the organization and is proactive	Increased reliance on defined process; investment in people and process as corporate assets
2 Managed	Process is characterized for projects and is often reactive	Overreliance on experience of good people – when they go, the process goes
1 Initial	Process is unpredictable, poorly controlled, and reactive	Focus on "fire fighting"; effectiveness low – frustration high

Customer Satisfaction Impacts

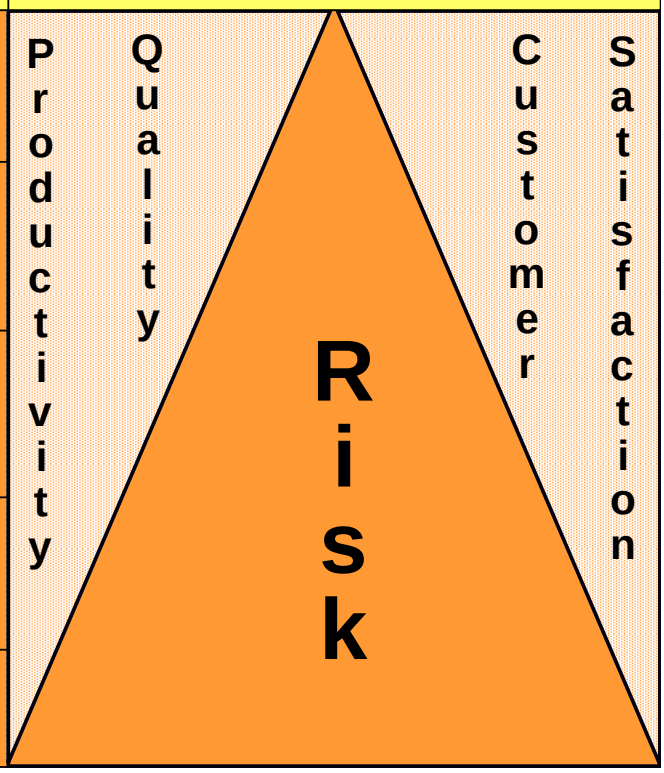
Level	Process Characteristics	Impacts on Customers
Optimizing	Process improvement is institutionalized	Customer receives full benefit of the organization's ability to improve quality and productivity on every project
Quantitatively Managed	Product and process are quantitatively controlled	Customer can ask for and expect quantifiable improvements in product quality – Product delivery schedule is shortened with no loss of functionality or quality
Defined	Technical practices are integrated with management practices and institutionalized	Customer understands and supports the organization's software process – Desired functionality with good quality is delivered on schedule
Managed	Project management practices are institutionalized	Customer can expect reliable schedules – Functionality and quality of the product are improved
Initial	Process is informal and ad hoc	Customers cannot depend on schedule, functionality, or quality of product

Measurement Implications

Level	Process Characteristics	Measurement Implications
5 Optimizing	Process improvement is institutionalized	Continuing improvement is based on business objectives and cost-benefit analysis
4 Quantitatively Managed	Product and process are quantitatively controlled	Data analysis is based on the principles of statistical process control. Actuals are compared to expected values of mean and variance
3 Defined	Technical practices are integrated with management practices and institutionalized	Consistent definitions exist across projects. Management and Quality data is collected across the organization
2 Managed	Project management practices are institutionalized	Projects collect management data about cost, effort, size, schedule, etc. Different projects may use different definitions
1 Initial	Process is informal and ad hoc	Measurement is haphazard, but may yield cost and effort data

Risk Implications

Level	Process Characteristics	Results
5 Optimizing	Focus is on continuous quantitative improvement	
4 Quantitatively Managed	Process is measured and controlled	
3 Defined	Process is characterized for the organization and is proactive	
2 Managed	Process is characterized for projects and is often reactive	
1 Initial	Process is unpredictable, poorly controlled, and reactive	

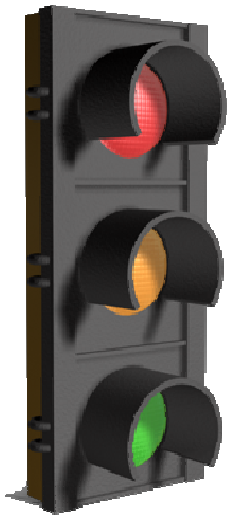


The **S**tandard **C**MMI **A**ppraisal **M**ethod for **P**rocess **I**mprovement (**SCAMPI**)

The SCAMPI Class A Method is:

- **Similar to CBA IPI method used for benchmarking**
- **Calls for a process to support INTEGRATED data collection and CONTINUOUS consolidation**
- **STRONGLY Data Driven**
  - **Expectation is that the organization being appraised prepares and qualifies a database of objective evidence to support process implementation**
- **The CMMI Product Suite provides a foundation for enterprise wide improvement**

Determining Readiness



How do you know when you're ready? How can the readiness be assessed across multiple instantiations?

Though readiness criteria is defined in a required SCAMPI activity conducted prior to the onsite period… potential problems arise in **monitoring readiness across multiple appraisal efforts!**

Requirements Management

Purpose

To manage the requirements of the project's products and product components and to identify inconsistencies between those requirements and the project's plans and work products.

Requirements Management

- Specific Goal:
  - Requirements are managed and inconsistencies with project plans and work products are identified.

Requirements Management

- This PA involves:
  - Manage Requirements
    - Obtain and Understanding of Requirements
    - Obtain Commitment to Requirements
    - Manage Requirements Changes
    - Maintain Bi-directional Traceability of Requirements
    - Identify Inconsistencies between Project Work and Requirements

Project Planning

Purpose

To establish and maintain plans that define project activities

Project Planning

- Specific Goals:
  - Estimates of project planning parameters are established and maintained
  - A project plan is established and maintained as the basis for managing the project
  - Commitments to the project plan are established and maintained

Project Planning

- This PA involves:
  - Establish Estimates
    - Estimate the Scope of the Project
    - Establish Estimates of the Project Attributes
    - Define the Project Life Cycle
    - Determine Estimates of Effort and Cost
  - Develop a Project Plan
    - Establish the Budget and Schedule
    - Identify Project Risks
    - Plan for Data Management
    - Plan for Project Resources
    - Plan for Needed Knowledge and Skills
    - Plan Stakeholder Involvement
    - Establish the Project Plan
  - Obtain Commitment to the Plan
    - Review Subordinate Plans
    - Reconcile Work and Resource Levels
    - Obtain Plan Commitment

Project Monitoring and Control

Purpose

To provide understanding into the project's progress so that appropriate corrective actions can be taken when the project's performance deviates significantly from the plan

Project Monitoring and Control

- Specific Goals:
  - Actual performance and progress of the project is monitored against the project plan
  - Corrective actions are managed to closure when the project's performance or results deviate significantly from the plan

Project Monitoring and Control

- This PA involves:
  - Monitor Project Against Plan
    - Monitor Project Planning Parameters
    - Monitor Commitments
    - Monitor Project Risks
    - Monitor Data Management
    - Monitor Stakeholder Involvement
    - Conduct Progress Reviews
    - Conduct Milestone Reviews
  - Manage Corrective Actions to Closure
    - Analyze Issues
    - Take Corrective Action
    - Manage Corrective Action

Supplier Agreement Management

6

Purpose

To manage the acquisition of products and services from suppliers external to the project for which there exists a formal agreement

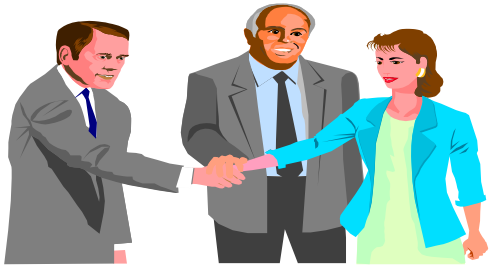
Supplier Agreement Management

6

- Specific Goals:
  - Agreements with the suppliers are established and maintained
  - Agreements with the suppliers are satisfied by both the project and the supplier

Supplier Agreement Management

- This PA involves:
  - Establish Supplier Agreements
    - Analyze Needs and Requirements Determined by the Project
    - Select Suppliers
    - Establish Supplier Agreements
  - Satisfy Supplier Agreements
    - Acquire COTS Products
    - Execute the Supplier Agreement
    - Conduct Acceptance Testing
    - Transition Products



Process and Product Quality Assurance

Purpose

To provide staff and management with objective insight into the processes and associated work products

Process and Product Quality Assurance

- Specific Goals:
  - Adherence of the performed process and associated work products and services to applicable process descriptions, standards and procedures is objectively evaluated
  - Noncompliance issues are objectiv and communicated, and resolutio

Process and Product Quality Assurance

- This PA involves:
  - Objectively Evaluate Processes and Work Products
    - Objectively Evaluate Processes
    - Objectively Evaluate Work Products and Services
  - Provide Objective Insight
    - Communicate and Ensure Resolution of Noncompliance Issues
    - Establish Records

Configuration Management

Purpose

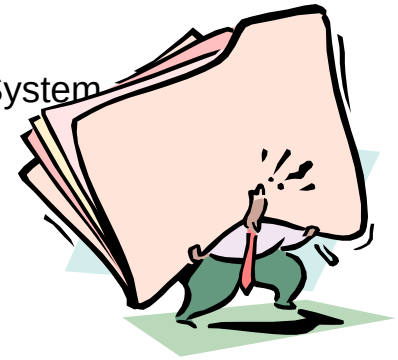
To establish and maintain the integrity of work products using configuration identification, configuration control, configuration status accounting, and configuration audits

Configuration Management

- Specific Goals:
  - Baselines of identified work products are established and maintained
  - Changes to work products under configuration management are tracked and controlled
  - Integrity of baselines is established and maintained

Configuration Management

- This PA involves:
  - Establish Baselines
    - Identify Configuration Items
    - Establish a Configuration Management System
    - Create or Release Baselines
  - Track and Control Changes
    - Track Changes
    - Control Changes
  - Establish Integrity
    - Establish Configuration Management Records
    - Perform Configuration Audits



Measurement and Analysis

Purpose

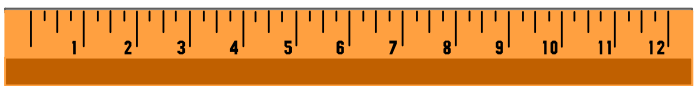
To develop and sustain a measurement capability that is used to support management information needs.

Measurement and Analysis

- Specific Goals:
  - Measurement objectives and practices are aligned with identified information needs and objectives
  - Measurement results that address identified information needs and objectives are provided

Measurement and Analysis

- This PA involves:
  - Align Measurement and Analysis Activities
    - Establish Measurement Objectives
    - Specify Measures
    - Specify Data Collection and Storage Procedures
    - Specify Analysis Procedures
  - Provide Measurement Results
    - Collect Measurement Data
    - Analyze Measurement Data
    - Store Data and Results
    - Communicate Results



Requirements Development

Purpose

To produce and analyze customer, product and product component requirements.

Requirements Development

- Specific Goals:
- Stakeholder needs, expectations, constraints, and interfaces are collected and translated into customer requirements.
- Customer requirements are refined and elaborated to develop product and product component requirements for the product life cycle.
- The requirements are analyzed and validated, and a definition of required functionality is developed.

Requirements Development

- This PA involves:
  - Development of Customer Requirements
    - Elicit Needs
    - Transform Stakeholder Needs, Expectations, Constraints, and Interfaces into Customer Requirements
  - Development of Product Requirements
    - Establish Product and Product Component Requirements
    - Allocate Product Component Requirements
    - Identify Interface Requirements

Requirements Development

- This PA involves:
  - Analyze and Validate Requirements
    - Establish Operational Concepts and Scenarios
    - Establish a Definition of Required Functionality
    - Analyze Requirements
    - Evaluate Product Cost, Schedule and Risk
    - Validate Requirements with Comprehensive Methods

Technical Solution

Purpose

To develop, design, and implement solutions to requirements. Solutions, designs and implementations encompass products, product components, and product related processes either singly or in combinations as appropriate.

Technical Solution

- Specific Goals:
- Product or product component solutions, including applicable product related processes, are selected from alternative solutions.
- Product or product component designs are developed.
- Product components, and associated support documentation, are implemented from their designs.

Technical Solution

- This PA involves:
  - Select Product Component Solutions
    - Develop Detailed Alternative Solutions and Selection Criteria
    - Evolve Operational Concepts and Scenarios
    - Select Product Component Solutions

Technical Solution

- This PA involves:
  - Develop the Design
    - Use Effective Design Methods
    - Establish a Complete Technical Data Package
    - Design Comprehensive Interface
    - Perform Make, Buy, or Reuse Analysis
  - Implement the Product Design
    - Implement the Design
    - Establish Product Support Documentation

Product Integration

Purpose

To assemble the product from the product components, ensure that the product, as integrated, functions properly and deliver the product.

Product Integration

- Specific Goals:
- The strategy for conducting product integration is established and maintained.
- The product component interfaces, both internal and external, are compatible.
- Verified product components are assembled and the integrated, verified, and validated product is delivered.

Product Integration

- This PA involves:
  - Prepare for Product Integration
    - Establish a Product Integration Strategy
    - Establish the Product Integration Environment
    - Define Detailed Product Integration Procedures

Product Integration

- This PA involves:
  - Ensure Interface Compatibility
    - Review Interface Descriptions for Completeness
    - Manage Interfaces
  - Assemble Product Components and Deliver the Product
    - Confirm Readiness of Product Components for Integration
    - Assemble Product Components
    - Checkout Assembled Product Components
    - Package and Deliver the Product or Product Component

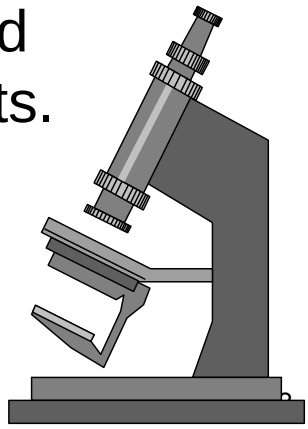
Verification

Purpose

To assure that selected work products meet their specified requirements.

Verification

- Specific Goals:
- Preparation for verification is conducted.
- Peer reviews are performed on selected work products.
- Selected work products are verified against their specified requirements.



Verification

- This PA involves:
  - Prepare for Verification
    - Establish a Verification Strategy
    - Establish the Verification Environment
    - Define Detailed Verification Procedures

Verification

- This PA involves:
  - Perform Peer Reviews
    - Prepare for Peer Reviews
    - Conduct Peer Reviews
    - Analyze Peer Review Data
  - Verify Selected Work Products
    - Perform Verification
    - Analyze Verification Results and Identify Corrective Action
    - Perform Re-Verification

Validation

Purpose

To demonstrate that a product or product component fulfills its intended use when placed in its intended environment.

Validation

- Specific Goals:
- Preparation for validation is conducted.
- The product or product components are validated to ensure that they are suitable for use in their intended operating environment.

Validation

- This PA involves:
  - Prepare for Validation
    - Establish a Validation Strategy
    - Establish the Validation Environment
    - Define Detailed Validation Procedures
  - Validate Product or Product Components
    - Perform Validation
    - Capture and Analyze Validation Results

Organization Process Focus

Purpose

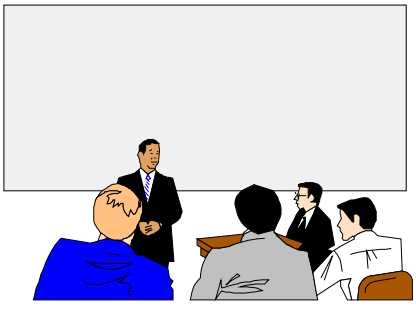
To establish and maintain an understanding of the the organization's processes and process assets, and to identify, plan, and implement the organization's process improvement activities.

Organization Process Focus

- Goals:
- Strengths, weaknesses and improvement opportunities for the organization's processes are identified periodically and as needed.
- Improvements are planned and implemented, process assets are deployed, and process-related experiences are incorporated into the organization's process assets.

Organization Process Focus

- Process Group (PG) charter
  - Captures and disseminates intergroup best practices
  - Focuses organization on process definition and process improvement
  - Provides a report to upper management on status of process definition improvement activities
  - Assists projects to develop their own process based on organizational process



Organization Process Focus

- This PA involves:
  - Determine Process Improvement Opportunities
    - Establish Organizational Process Needs
    - Assess the Organization's Processes
    - Identify the Organization's Process Improvements

Organization Process Focus

- This PA involves:
  - Plan and Implement Process Improvement Activities
    - Establish Process Action Plans
    - Implement Process Action Plans
    - Deploy Process and Related Process Assets
    - Incorporate Process-Related Experiences into the Organization's Process Assets

Organization Process Definition

Purpose

To establish and maintain a usable organizational set of process assets.

Organization Process Definition

- Goals:
- A set of organizational process assets is available.
- Process assets that support the use of the organization's set of standard processes are available.

Organization Process Definition

- This PA involves:
  - Create Organizational Process Assets
    - Establish Standard Processes
    - Establish life cycle Model Descriptions
    - Establish Tailoring Criteria and Guidelines
  - Make Supporting Process Assets Available
    - Establish and Organizational Measurement Repository
    - Establish an Organizational Process Asset Library

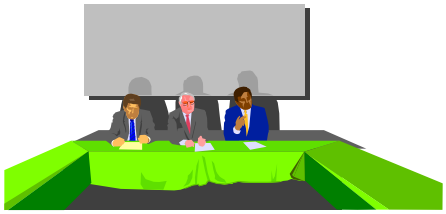
Organizational Training

Purpose

To develop the skills and knowledge of people so they can perform their roles effectively and efficiently

Organizational Training

- Goals:
- Training to support the organization's management and technical roles is identified and made available.
- Training necessary for individuals to perform their roles effectively is provided.



Organizational Training

- This PA involves:
  - Identify Training Needs and Make Training Available
    - Establish the Strategic Training Needs
    - Determine Which Training needs are the Responsibility of the Organization
    - Establish Organizational Training Tactical Plan
    - Establish Training Capability
  - Provide Necessary Training
    - Deliver Training
    - Establish Training Records
    - Assess Training Effectiveness

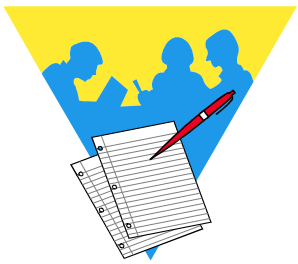
Integrated Project Management

Purpose

To establish and manage the project and the involvement of relevant stakeholders according to an integrated and defined process that is tailored from the organization's set of standard processes.

Integrated Project Management

- Goals:
- The project is conducted using a defined process that is tailored from the organization's set of standard processes.
- Coordination and collaboration of the project with relevant stakeholders is conducted.

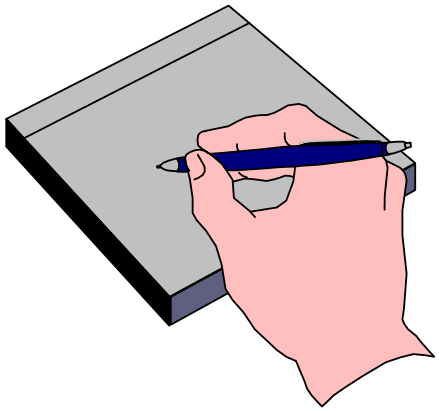


Integrated Project Management

- This PA involves:
  - Use the Project's Defined Process
    - Establish the Project's Defined Process
    - Use the Organizational Process Assets for Planning Project Activities
    - Integrate Plans
    - Manage the Project Using the Integrated Plans
    - Contribute to the Organization's Process Assets
  - Coordinate and Collaborate with Relevant Stakeholders
    - Manage Stakeholder Involvement
    - Manage Dependencies
    - Resolve Coordination Issues

Integrated Project Management

- This requires that a documented procedure for all Level 2 management activities is in place such as:
  - Critical dependencies and critical paths are defined and managed

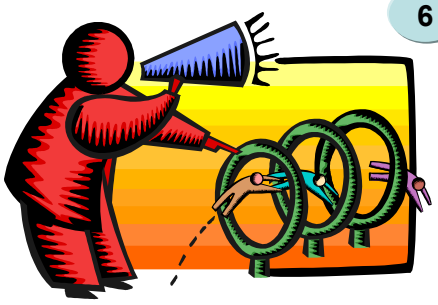


Risk Management

Purpose

To identify potential problems before they occur, so that risk-handling activities may be planned and invoked as needed across the life cycle to mitigate adverse impacts on achieving objectives.

Risk Management



- Specific Goals:
- Preparation for Risk Management is Conducted.
- Risks are identified and analyzed to determine their relative importance.
- Risks are handled and mitigated, where appropriate, to reduce adverse impacts on achieving objectives.

Risk Management

- This PA involves:
  - Prepare for Risk Management
    - Determine Risk Sources and Categories
    - Define Risk Parameters
    - Establish a Risk Management Strategy

Risk Management

- This PA involves:
  - Identify and Analyze Risks
    - Identify Risks
    - Evaluate, Classify, and Prioritize Risks
  - Mitigate Risks
    - Develop Risk Mitigation Plans
    - Implement Risk Mitigation Plans

6

Decision Analysis and Resolution

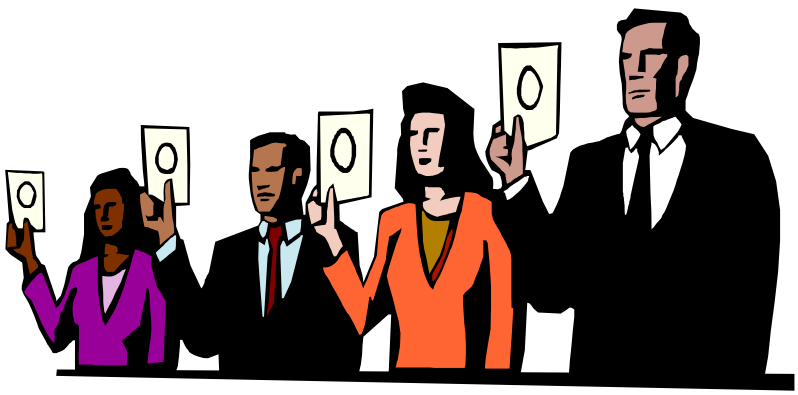
Purpose

To make decisions using a structured approach that evaluates identified alternatives against established criteria.

6

Decision Analysis and Resolution

- Specific Goal:
- Decisions are based on an evaluation of alternatives using established criteria.



Decision Analysis and Resolution

- This PA involves:
  - Evaluate Alternatives
    - Establish and Use the Guidelines for Decision Analysis
    - Select Evaluation Techniques
    - Establish Evaluation Criteria
    - Identify Proposed Alternatives
    - Evaluate Alternatives
    - Select Solutions

Requirements Management (REQM)

- A review of system requirements allocation is conducted before work begins
- Work content and planning documents are based on requirements
- Updates are included in both system requirements documents and software requirements documents
- The process is conducted without referring to a written procedure. The general impression is that a written procedure exists
- The responsibility for software requirements is shared by the R&D manage and the system engineering group
- Reviews are conducted in order to audit software requirements documents
- The system requirements are not always detailed enough
- There is an interaction software-system in order to clarify requirements - sometimes too late
- The software implementation does not always accurately reflect the needs of the customer

Project planning (PP)

- There are no methods to derive estimates, except personal experience
- The final schedule target is a constraint that R&D tries to meet to although it is sometimes impossible
- Work plans include schedule, manpower, equipment, milestones and development phases. The project costs are evaluated by management
- The plans do not include risk analysis, critical resources, vacations, reserve duties etc.
- Upgrades, small features, special versions, small changes and bugs fixes are not taken into account in the work plans
- The versions are released on time, but not at the time that was determined in the plan
- There is no sufficient time allocated for preparation of the work plan
- Lack of critical resources
- The customer doesn't receive the promised product, on time

Project Monitoring and Control (PMC)

- There is a project status update once a month. At a certain stage a weekly status meeting is also taking place
- The detailed plans are not updated - the master plan reflects the reality
- People don't know if measurements concerning PTO are used
- In late stages, when difficulties arise, a follow up is conducted tracking risks and critical resources
- In case of deviation:generally features are taken out, schedule is changed and uncritical bugs are left unfixed. In special cases additional employees are added
- Updates are made in status meetings. In order to be fully updated actual presence in the meeting is required
- In the past, there were more "post-mortem" meetings after version release
- The development manager is "highly aware" of the projects status
- The process improvement effort is not efficient
- There is no early warning ability

Configuration Management (CM)

- There is an effective control of documents and test scripts
- Software versions are controlled ineffectively by manual CM with some tools.
- Tools are partially controlled
- In some of the units, there are specific people in charge of CM. In other cases the team leader is responsible for CM
- Customer versions can be reconstructed in an effort that depends on the extent of the version distribution
- Version release document connects between content of the version, code and known bugs
- Bug Tracker is used as a tool to efficiently track version's PRs
- The manually operated CM processes cause mistakes
- "When a version is released - there are missing and unnecessary features included in the version"

Product and Process Quality Assurance (PPQA)

- Implementation of QA procedures create a balance between "develop and finish on time" versus organized development
- In some cases, QA activities seem like slowing down the work
- QA activities mainly seem like product testing activities and action items tracing and not as a process monitoring
- The control of documents and action items is done well
- Most of the known procedures are implemented. There is no implementation of code reading
- There is no processes control
- Limited ability to warn about quality problems

רשימת ספרות

1) Third Generation R&D, Roussel, Saad, Erickson, Harvard Business School Press

2) Strategic Management of Technology and Innovation, Burgelman, Maidique, Wheelwright, IRWIN, 2nd edition, 1998.

3) Software process Quality: management and control, Kenett R. and Baker,E.,M. Dekker, 1999.

4) Eiron: A Revolutionary Office Chair by Herman Miller - A Classical Example of Quality by Design (in Hebrew), Kenett, R., Mashabei Enosh, 98, pp. 32-34, February 1996.

5) Improvement Projects of Israeli Software Development Processes (in Hebrew), Kenett, R., Kesher Haeihut, 27, pp. 16, August 1998.

6) On Creativity, Innovation, Quality and Profitability (in Hebrew), Kenett, R. and G. Shalgi, Status, 167, pp. 38-43, May 2005.

7) Achieving Robust Design from Computer Simulations, Kenett, R., D. Steinberg, R. Bates and H. Wynn, Journal of Quality Technology and Quantitative Management, , 3, pp 161-177, 2006.

ניהול סיכונים
Risk Management

Concepts

- Operational Risk management does not embrace all the risks that face a particular enterprise.
- It is concerned with those *that are most appropriate in a given scenario.*
- A risk management system must be:
  - Practical.
  - Realistic.
  - Compliant with internal and external standards.
  - Cost efficient.
  - Coherent with current methodology

Main Activities

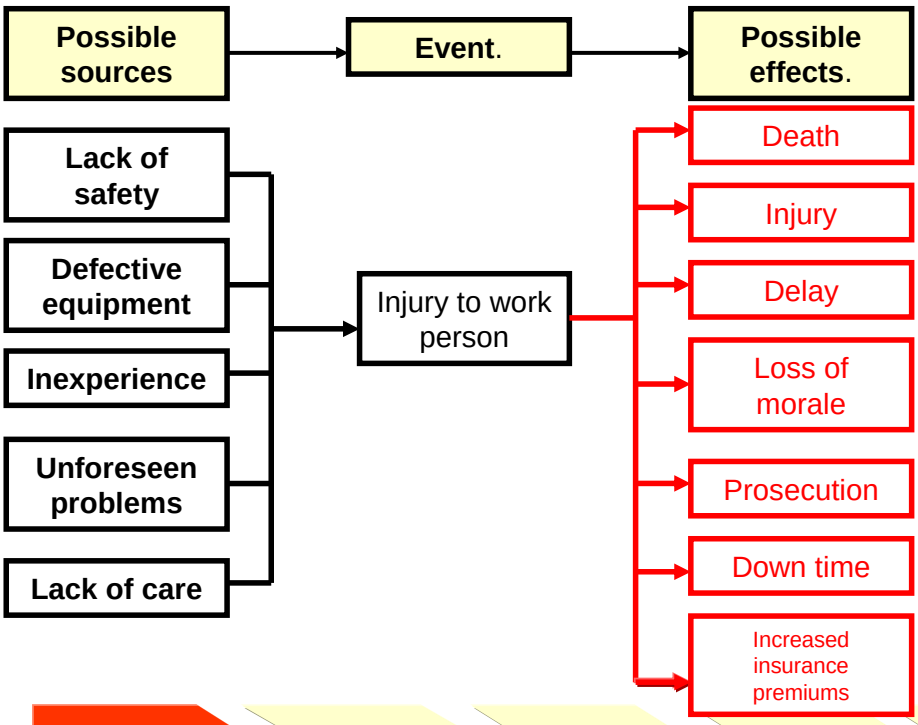
1. *Risk identification* isolates the source and type of risk.
2. *Risk Classification* considers the type of risk and its effect on the person or organisation.
3. *Risk analysis* evaluates the consequences and likelihood of risk using analytical techniques.
4. *Risk attitude* is concerned with the attitude of the decision maker and the effects that this can have on the assessment of risk.
5. *Risk response* considers how the risk should be managed (keep it or transfer it).

1. Risk identification

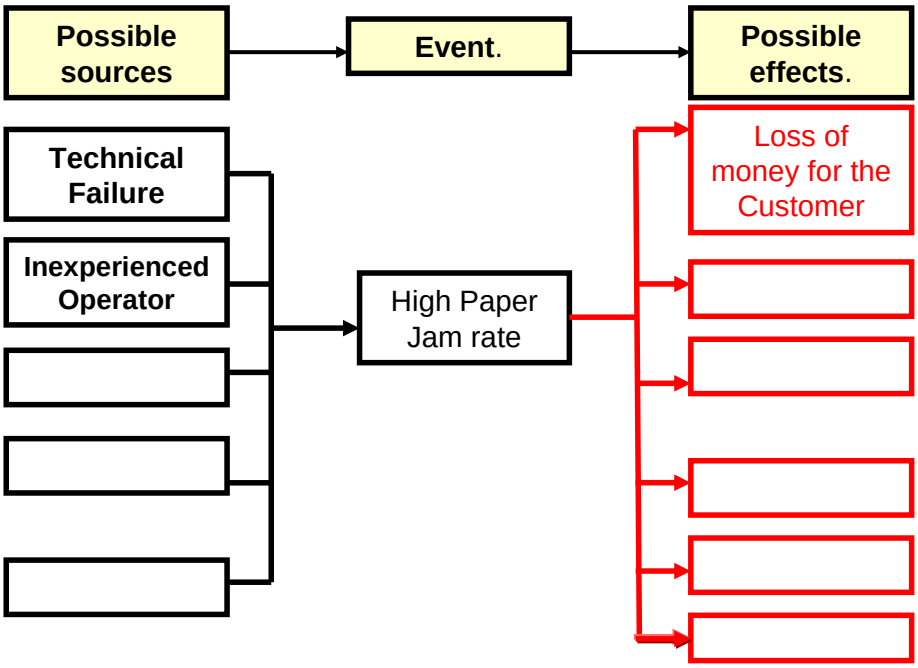
- Identify all the potential risk areas

- The identification must focus on the ***source*** of the risk.
- This is because we may be able to control the source of the risk.
- We may not be able to control the event probability or effect

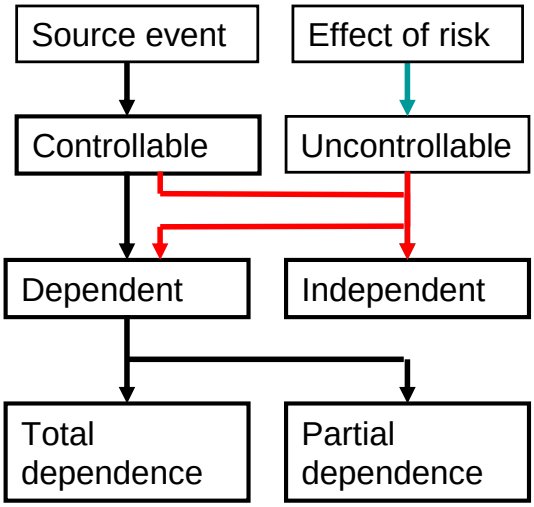
Example - Source-event- effect



Example - Source-event- effect



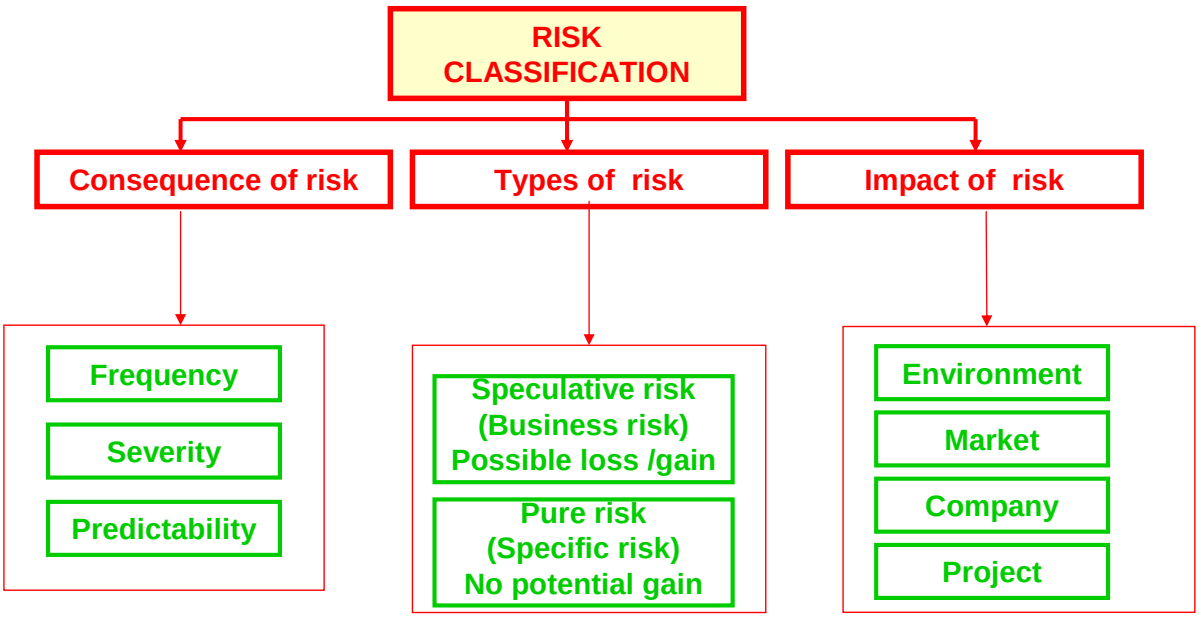
Source Event and Effect of risk



Risk Identification techniques

- Delphi Method
  - A panel of experts make individual predictions on a particular risk
  - Each expert receives feedback on the collective answer and make a new prediction based on that
- Nominal Method
  - A panel is convened and is asked to generate ideas in writing
  - Each panel member prioritises the ideas, which are then ranked mathematically

2. Risk classification



3. Risk Analysis

- Risk analysis is based on the capture of all feasible options and to analyse the various outcomes of any decision.

- Risk analysis comprises six basic steps.

The six steps of risk analysis

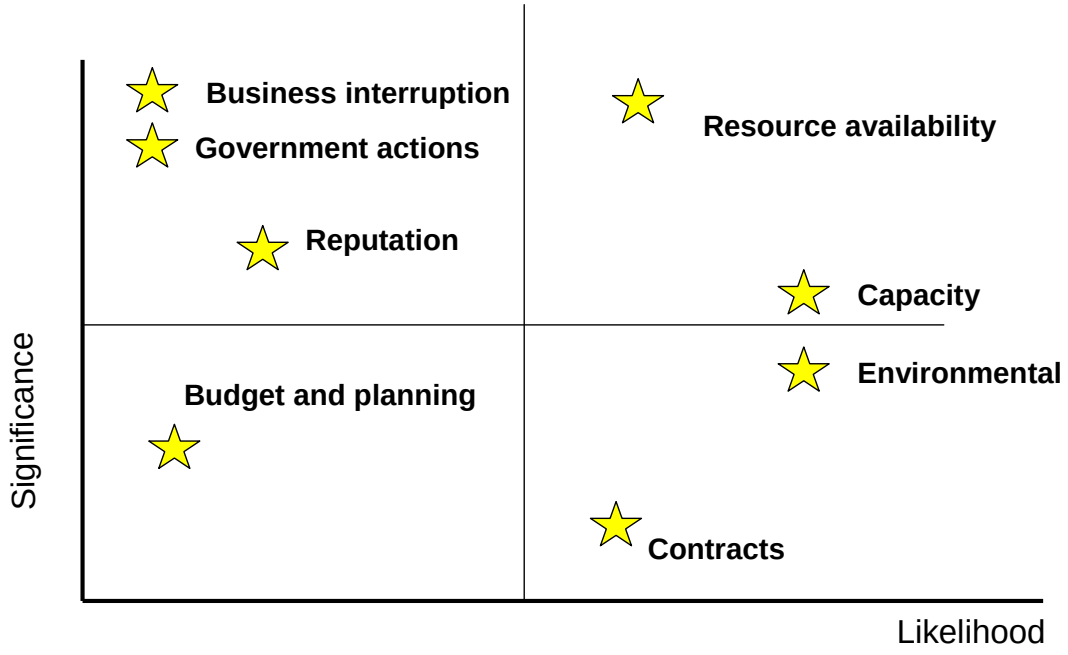
- **Step 1:** All the various options should be considered.
- **Step 2:** Consider the risk attitude of the decision maker.
- **Step 3:** Consider what risks have been identified, which are controllable and what the impact is likely to be.
- **Step 4:** Measurement (qualitative and quantitative).
- **Step 5:** Interpretation of the results of the analysis and development of a strategy to deal with the risk.
- **Step 6:** Decide what risks to retain and what risks to allocate to other parties.

Risk analysis example

Weather Conditions	Weight (Likelihood)	Unit Rate	Weighed Cost	Time	Weighed Time
Very dry	0.10	2.60	0.26	12.0	1.20
Fairly dry	0.20	3.00	0.60	15.0	3.00
Wet	0.50	6.00	3.00	25.0	12.50
Very wet	0.20	8.00	1.60	35.0	7.00

Probable cost:£5.46 Probable time: 23.70

Risk map example



Impact

	Consequence	Impact Description
1	Marginal	Response will cause disruption to the program
2	Significant	Aborts a significant mission need
3	Serious	Aborts a critical mission need
4	Very Serious	Failure in Key Performance Indicators
5	Catastrophic	Can cause abortion of of current phase

Impact

	Schedule Impact		Cost Impact		Technical Impact	
RATING	SLIP PROBABILITY	AMOUNT	PROBABILITY	AMOUNT	ALTERNATIVES	PERFORMANCE
0.9	Certain, program threatening.	> 8 months	Certain, program threatening.	>9%	Cannot achieve.	Unacceptable.
0.8	Extensive, program threatening.	> 7 months	Extensive, program threatening.	>8%	Redesign or alternate reqd to achieve.	Inadequate.
0.7	Probable program threat.	> 6 months	Probable program threat.	>7%	No adequate backup.	Significantly degraded.
0.6	Possible program threat.	> 5 months	Possible prog. threat.	>6%	Inferior backup.	Degraded.
0.5	Potential program threat.	> 4 months	Within uncertainty range.	>5%	Several adequate alternatives.	Reduced.
0.4	Serious subsystem slip with alternatives.	> 3 months	Well within acceptable range.	>4%	Several adequate alternatives.	Slight reduction.
0.3	Subsystem slip requires workaround.	> 2 months	Within budgeted range.	>3%	Adequate alternatives exist.	Minor reduction.
0.2	Minor subsystem slip.	> 1 month	Minor.	>2%	Many adequate alternatives.	Minor to none.
0.1	Possible minor slip, noncritical path.	> 1/2 months	Negligible.	>1%	Many adequate alternatives.	No significant impact.
0.0	No schedule impact.	None	None.	None	Many adequate alternatives.	None.

Likelihood

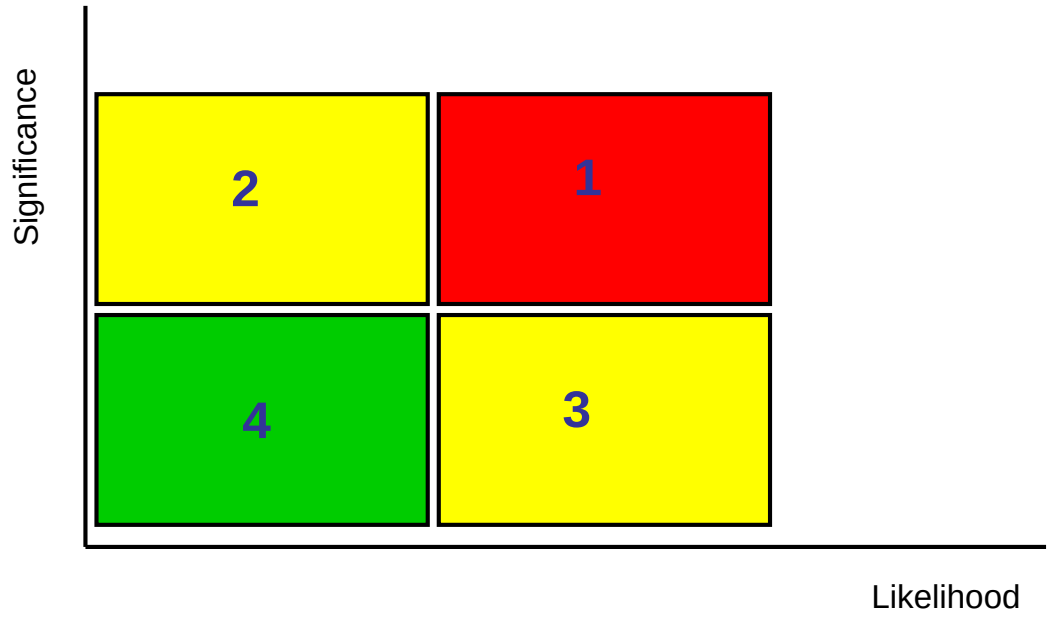
Rating	Likelihood	Occurrence	Prob.
1	Negligible	Assume no occurrence	<10%
2	Unlikely	Possible but less than likely	10%-40%
3	Likely	Significant chance	40%-65%
4	Highly Probable	Very high chance	65%-90%
5	Near Certainty	Assume occurrence	>90%

Likelihood

RATING	SOFTWARE	TECHNOLOGY	HARDWARE	REQUIREMENTS	TESTING	FREQUENCY
0.9	Extensive new complex S/W for new untested applications.	Maximum technology/ maximum capability.	Theoretical design based on advanced research.	Good probability of significant deficiencies in meeting requirements.	Technology not tested.	Frequent * Likely to occur Frequently ** Continuously Experienced.
0.8	Extensive S/W development, new approach, new language.	Theoretical technology.	New theoretical design.	Good probability of some moderate deficiencies in meeting all requirements.	Approach not tested.	
0.7	Extensive S/W development, - beyond experience base.	Newer technology.	All new design.	Moderate chance of moderate deficiencies in meeting all requirements.	Unimproved design has been tested.	Probable * Will occur several times in lifetime ** Will occur frequently
0.6	Major changes in S/W development approach and application.	Available technology, feasible by analogy.	New design to moderately improve existing design.	Moderate chance of minor requirement deficiencies.	Other analogous items have been tested.	
0.5	Readily adaptable S/W approach, conversion from similar application, expanded to new application.	Existing technology and feasibility studies.	Major design change.	Some chance of minor requirement deficiencies.	Old design has been tested.	Occasional * Likely to occur Sometime in the life of an item ** Will occur several times
0.4	Extensive modification and tailoring of existing approach.	Proven technology and approach. Feasibility analysis complete.	Redesign, significant modifications.	Slight chance of minor requirement deficiencies.	Similar designs and technology have been tested.	
0.3	Slightly modified approach, language conversion.	Proven technology and approach, used some by design agent.	Existing proven components, recombined or minor mods in function.	Should meet all requirements with little margin.	Limited testing done on existing components.	Remote * Unlikely, but possible to occur in life of an item ** Unlikely, but can be reasonably expected to occur
0.2	Some modification of existing S/W approach.	Proven technology and approach with significant design agent experience.	Existing proven components, repackaged and/or minor usage variation.	Should meet all requirements, and exceed many.	Testing has been done on existing components.	
0.1	Minor revision and checkout of existing S/W.	Proven technology and approach with significant design agent experience.	Functional hardware. Mods in form only.	Will meet all requirements, exceeding many.	Thoroughly tested hardware.	Improbable * So unlikely, assume it may not occur ** Unlikely to occur but possible
0.0	Use of existing, checked out S/W.	Off the shelf hardware proven to operational environments.	Functional hardware.	Will exceed all requirements with margin.	Thoroughly tested and exceed reqmts.	

Mil-Std-882B: * Specific Individual Item ** Fleet or Inventory

Risk Maps



Quadrant 1: Red zone (High severity/high likelihood)

- No business can survive accepting these risks at this critical level over the long term.
- The firm's management of them is therefore a strategic imperative.
- The strategy should be evidenced by specific action plans.
- Risk owners should be accountable for these plans.
- If the firm cannot manage these risks effectively over the long term, then avoidance strategies should be considered.

Quadrant 2: Upper Yellow zone (High severity, low likelihood)

- These risks are not as crucial as those in the red zone.
- However, they require close attention as they include the severe effects of extraordinary events such as earthquakes or hurricanes (high severity, low likelihood)
- These risks are often driven by external or environmental factors beyond management control.
- Contingency planning is particularly appropriate for these risks.

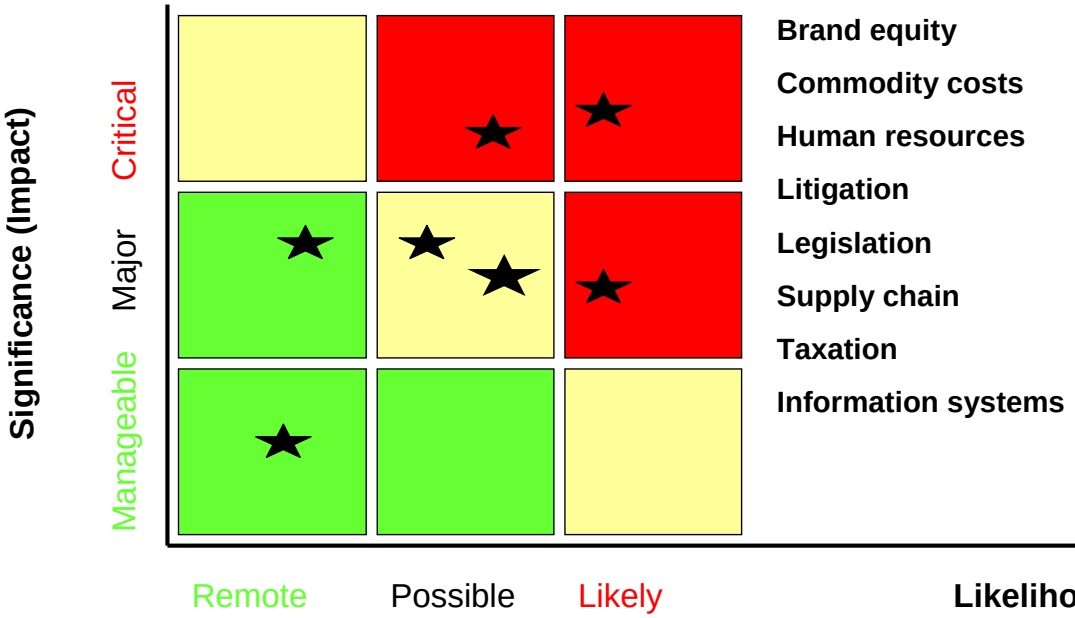
Quadrant 3: lower Yellow zone (Low severity, high likelihood)

- These risks often relate to day-to-day operations and compliance issues.
- The net effect of these risks, if left unmanaged, is as great as the risks in quadrant 2.
- They are the ‘unmanaged hurricanes’.
- Cost control procedures fall into this category - based on monitoring and detection.
- Cost overruns are virtually certain to occur.

Quadrant 4: Green zone (low severity/low likelihood)

- They are not of sufficient stature to allocate specific resources.
- They are generally insignificant and are acceptable at their present level.
- They represent areas that may be outsourced.

Expanded Risk Map



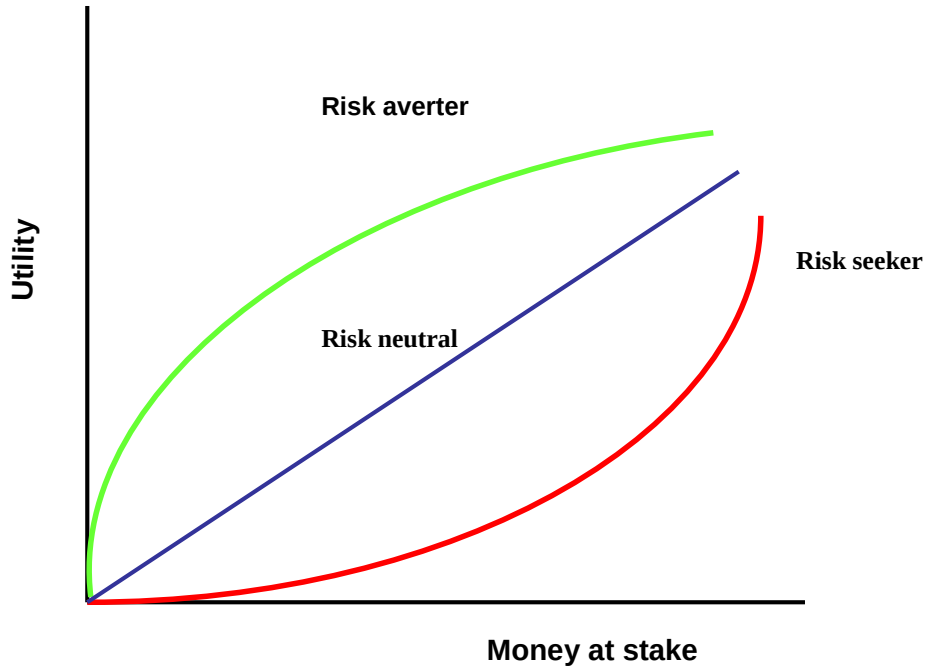
Risk map interpretation

- Risk maps mean nothing if they are no translated into action.
- This means incorporation into the business plan.
- Some risks are unavoidable.
- Risk taking is the genesis of value creation.
- Nothing ventured nothing gained.

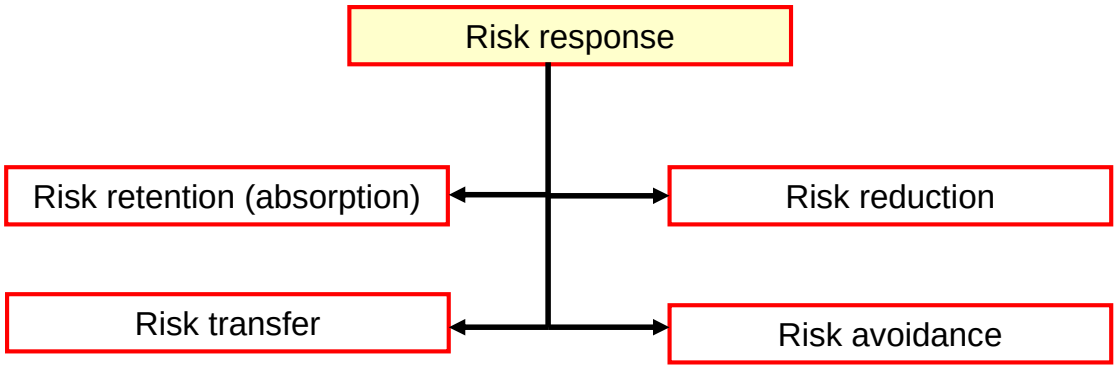
4. Risk Attitude

- Risk attitude relates to the attitude of the decision maker.
- The general attitudes are;
  - Risk loving.
  - Risk averse.
  - Risk neutral.

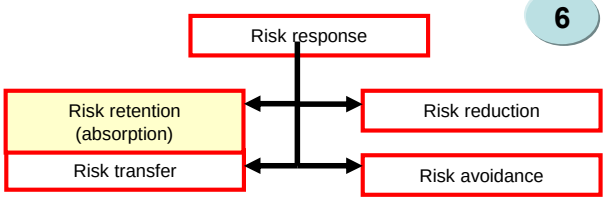
4. Risk Attitude



5. Risk Response

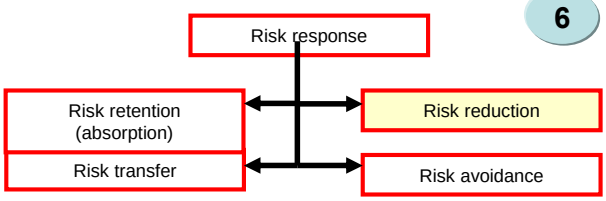


5.1. Risk retention



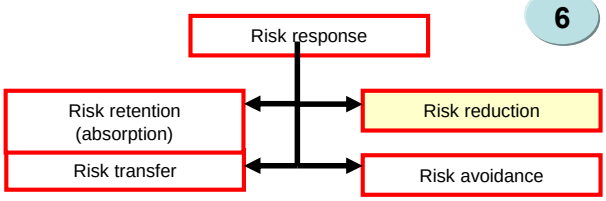
- Risks that produce small and repetitive losses are most suited to risk retention.
- A good example is people's willingness to accept a $50 excess of any insurance premium.
- Some will be happy to bear $200 in return for a smaller premium.
- Another example would be third party vs. comprehensive insurance.
- The level of retention is dictated by financial circumstances and by the likelihood of loss.
- It may be uneconomical to transfer some risk, in which case it has to be retained.

5.2. Risk reduction



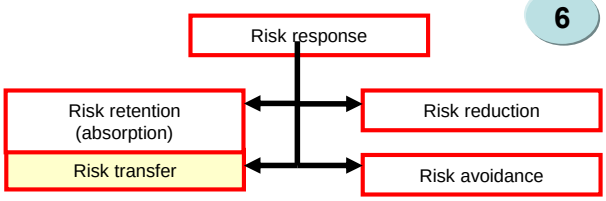
- One way of reducing risk exposure is to share it with other parties
- It may be possible to engineer risk out of the equation.
- Risk may be reduced by training.
- Further possible outcomes may be considered.
- If you can't reduce car crashes, you can design your cars to be stronger.

Risk reduction classification



- Risk reduction falls into four main categories;
- ***Education and training.***
- ***Physical protection to reduce the likelihood of loss.***
- ***Systems for contingency and WHIF considerations.***
- ***Physical protection to people and property.***

5.3. Risk transfer

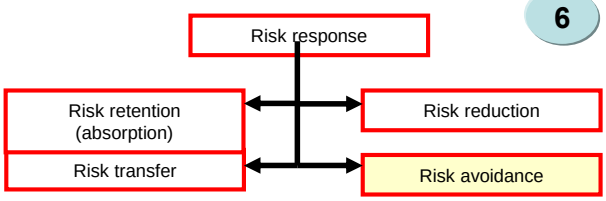


- Risk transfer simply transfers the risk to another party.
- The most common form of risk transfer is through ***insurance.***
- Another common format is through ***damages.***
- Most standard forms of contract transfer risk to some extent to sub-contractors and suppliers.

The insurance consideration

- In general terms, the relevant factors are;
- ***The cost of the insurance premium.***
- ***The maximum probable loss.***
- ***The likely cost of the loss.***
- ***The likely cost of paying for the loss if uninsured.***

5.4. Risk avoidance



- Risk avoidance is synonymous with refusal to accept risks.
- It is normally associated with pre-contract negotiations.
- However, it might also include rescission (or determination) following a fundamental breach.
- Another example would be exemption clauses.

Summary

- Risks have to be identified, classified and analysed before any response is made.
- An identified risk is no longer a risk. It is a management problem.
- Beware of using the purely intuitive approach (or gut feel) to manage risk.
- Risk management needs to be continuous from the start of a project to the end.
- A poorly defined risk structure will breed more risk.

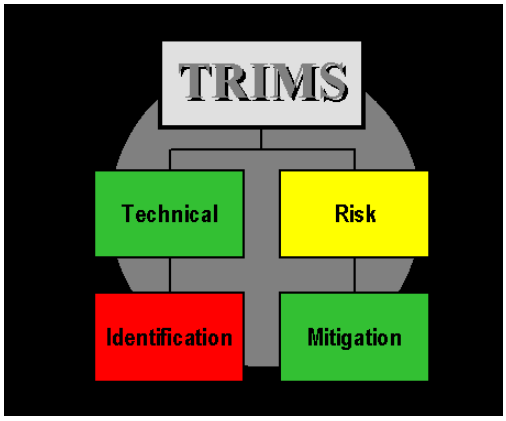
Overview of the six-step process.

1. Identify	***Identify risks*** based on a generic model Create ***risk awareness***.
2. Source	Detect origins and threats ***(Risk drivers)*** Identify ***risk holders***.
3.Measure	Assess ***significance and likelihood*** of risk. Design ***actual risk map***.
4. Evaluate	***Decide on options*** for risk management strategies Design ***actual risk map***.
5. Manage	Assess ***significance and likelihood*** of risk. Design ***target risk map.***
6. Monitor	***Continuous Consideration*** of risk profile and control ***Regular reporting*** on key risks (red quartile).

Risk Management Tools

- Incorporates project-specific data for risk assessment, tracking, and mitigation
- Process-Oriented tool - works throughout all phases of the project's transition
- Reporting features designed to provide different functions in the company with the information they need

Technical Risk Identification and Mitigation (TRIMS)



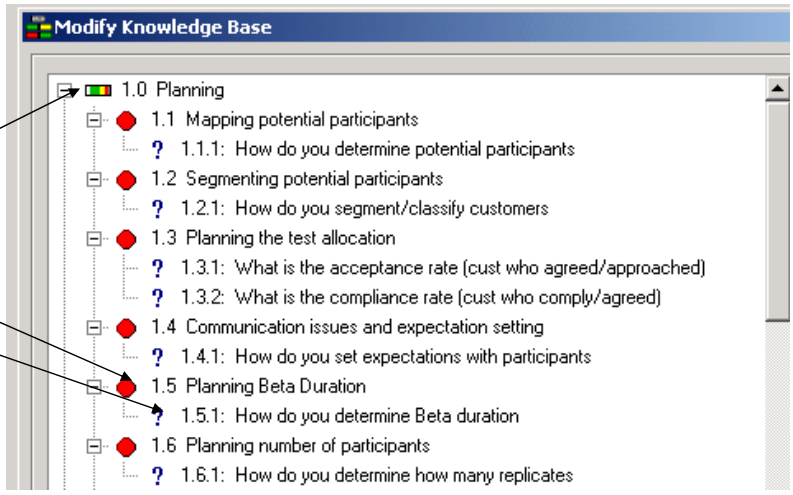
http://www.bmpcoe.org/pmws/download/trims4_v403_setup.exe

TRIMS Hierarchy

- System file
  - –Element File
    - Category
      - –Template
        - >Question – Single area of risk

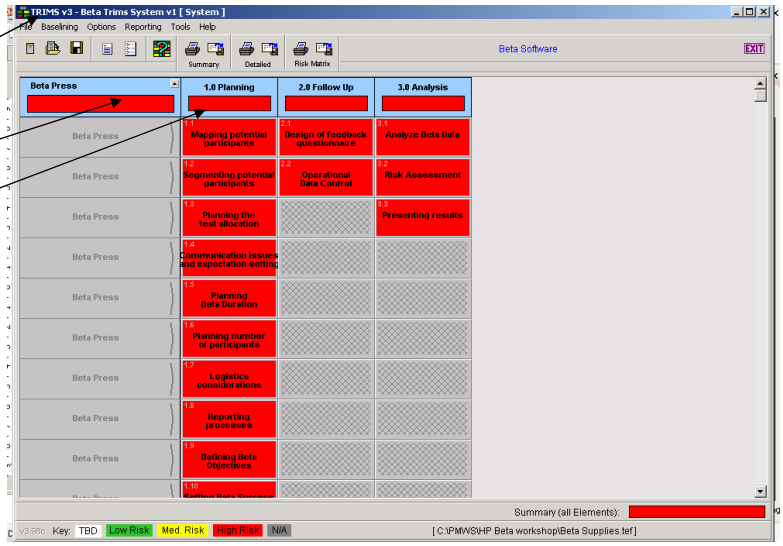
Templates

- System file
  - – Element File
    - Category
      - – Template
        - >Question

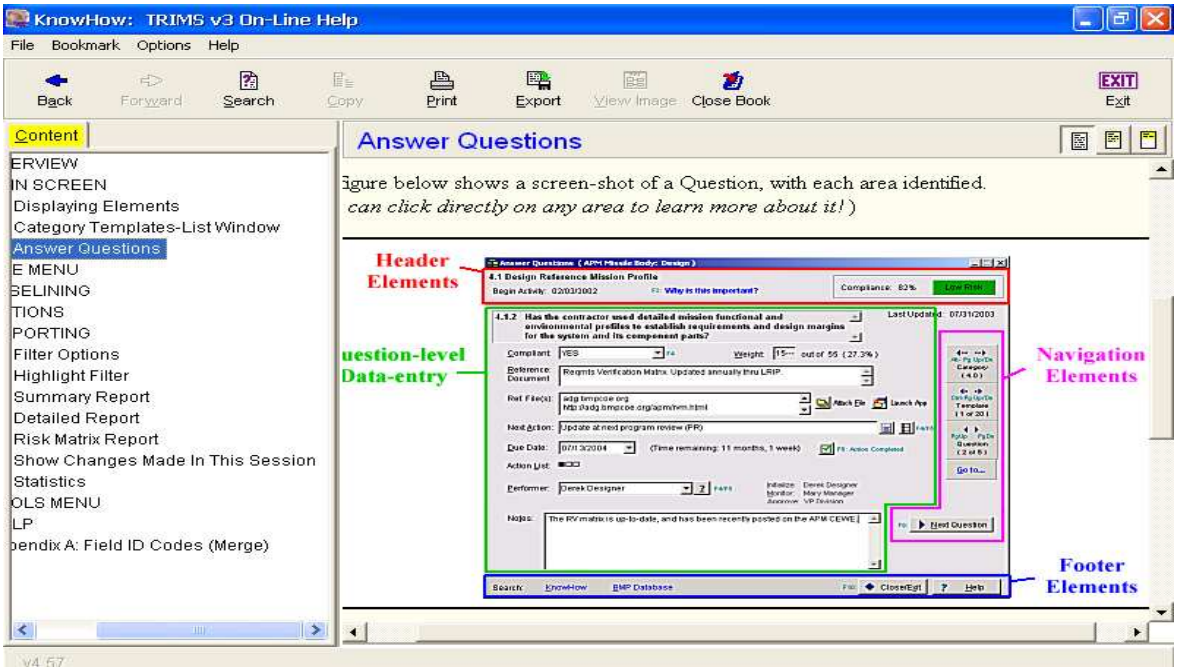


Templates

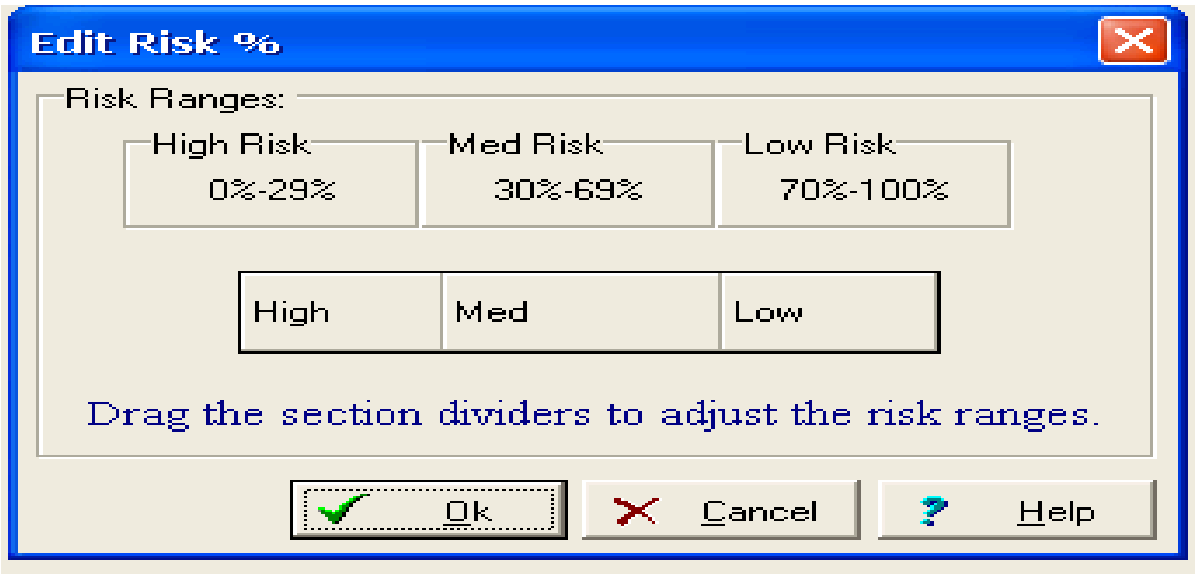
- System file
  - Element File
    - Category
      - Template
        >Question



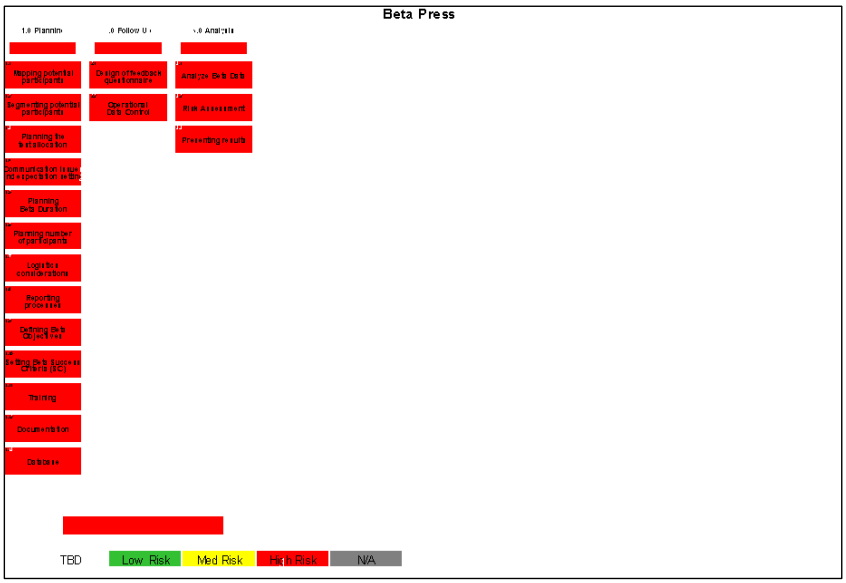
Example: Answer Questions



Example: Edit Risk



Example: Reporting of Task's Elements' Risk 1



Example: Reporting of Task's Elements' Risk 2

Beta Press
1.0 Planning

1.1 Mapping potential participants **(High Risk - 0%)**

Notes: *None*

Initialize:
Monitor:
Approve:
Begin Activity: 07/10/2006
Last Update: 07/10/2006

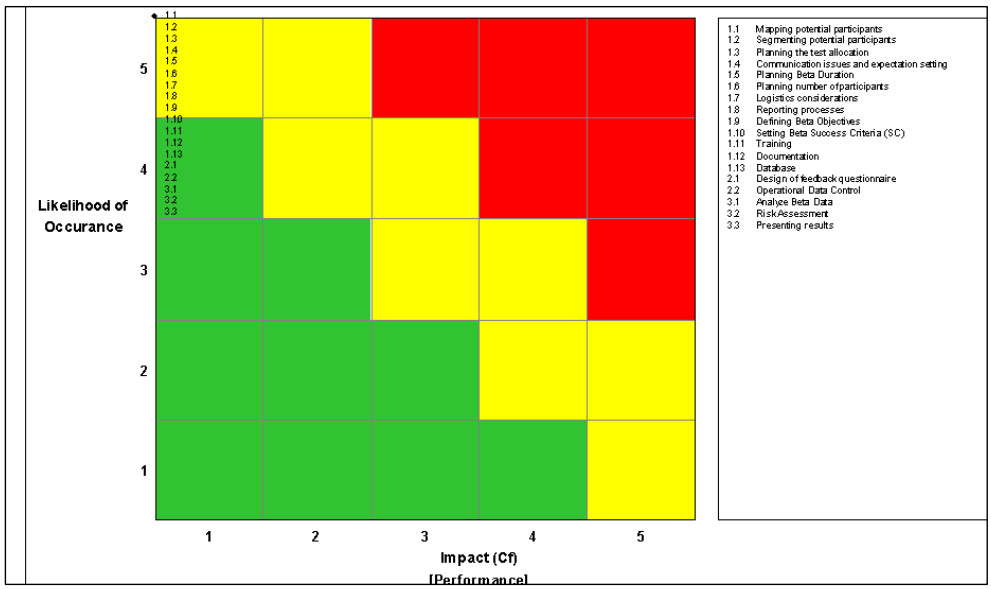
1.1.1 How do you determine potential participants

Notes: *None*

Compliant: Unknown *(0/10)*
Reference: None
Performer:
Next Action: None
Due Date: None

Last Update: / /

Example: Reporting of Task Elements Risk 3



Next Generation Business Intelligence

MUSING (MUlti-industry, Semantic-based next generation business INtelliGence)

Operational Risks

"Operational Risks are rising out of the ever-growing Information and Communications Technology systems. Operational Risk (OpR) is everywhere in the business world and, indeed, even in our households. When computing technologies encompass so much of our daily work life the risks associated with them lead frequently to unwanted and hazardous results. In extreme cases, these risks may become catastrophic and cause bankruptcy or other grave consequences. Thus, it is a very important to address OpR in a systematic, scientific, experience-based and results-driven approach…

from *http://www.musing.eu/download-area/musing-public-documentation/*

Operational Risks

…MUSING's target cutomers are Small and Medium sized Enterprises (SMEs). Large corporations, while a potential for becoming MUSING's clients as well, usually develop in house OpR systems and implement tailor-made software tools. SMEs usually lack the awareness, the funds and the knowledge for dealing with these issues. MUSING will assist SMEs in finding the right solutions without their having to resort to alternative solutions beyond their means or reach."

from *http://www.musing.eu/download-area/musing-public-documentation/*

Operational Risks

The Risk Manager

"The person, in an organization, charged with managing all aspects of risk: identification; classification; suggesting mitigating techniques or solutions; reporting the risk; verifying that the risk, once recognized, is handled properly; logging the risk; logging the handling of the risk till complete possible resolution; creating organizational procedures for avoiding risk, and forms and computerized systems for reporting loss events"

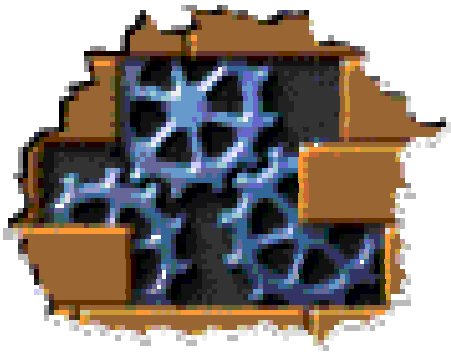
from *MUSING D8 3-4-5 KPA WP8.doc*

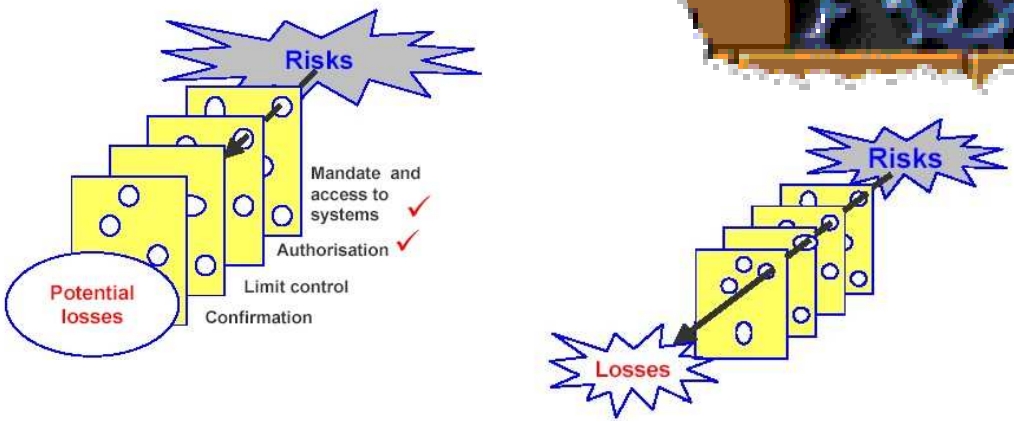
Operational Risks

Where are our risks?

Are we getting better or worse?

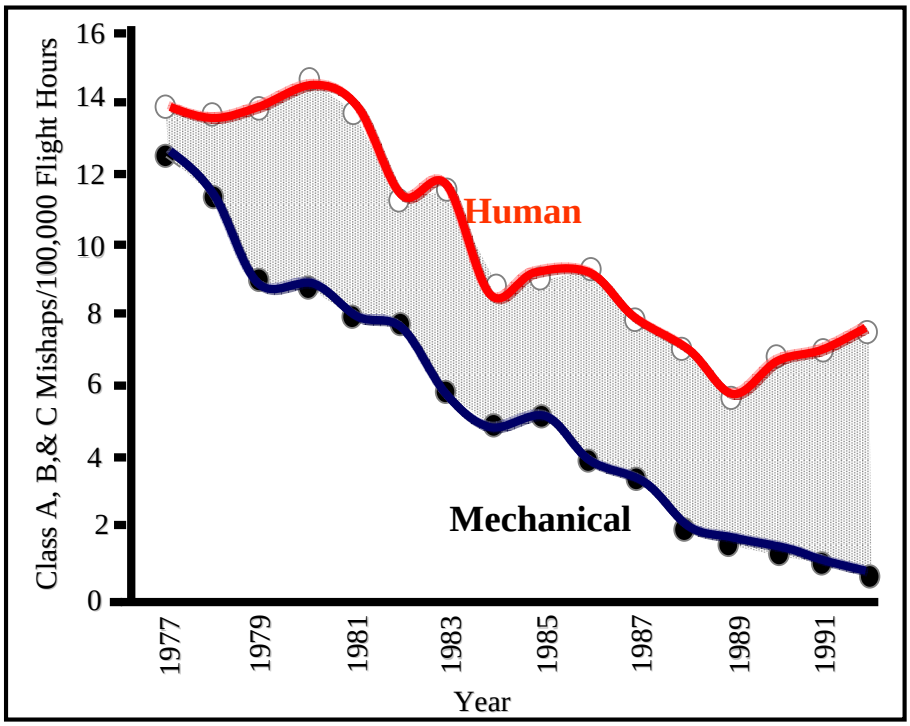
What are we doing about it?





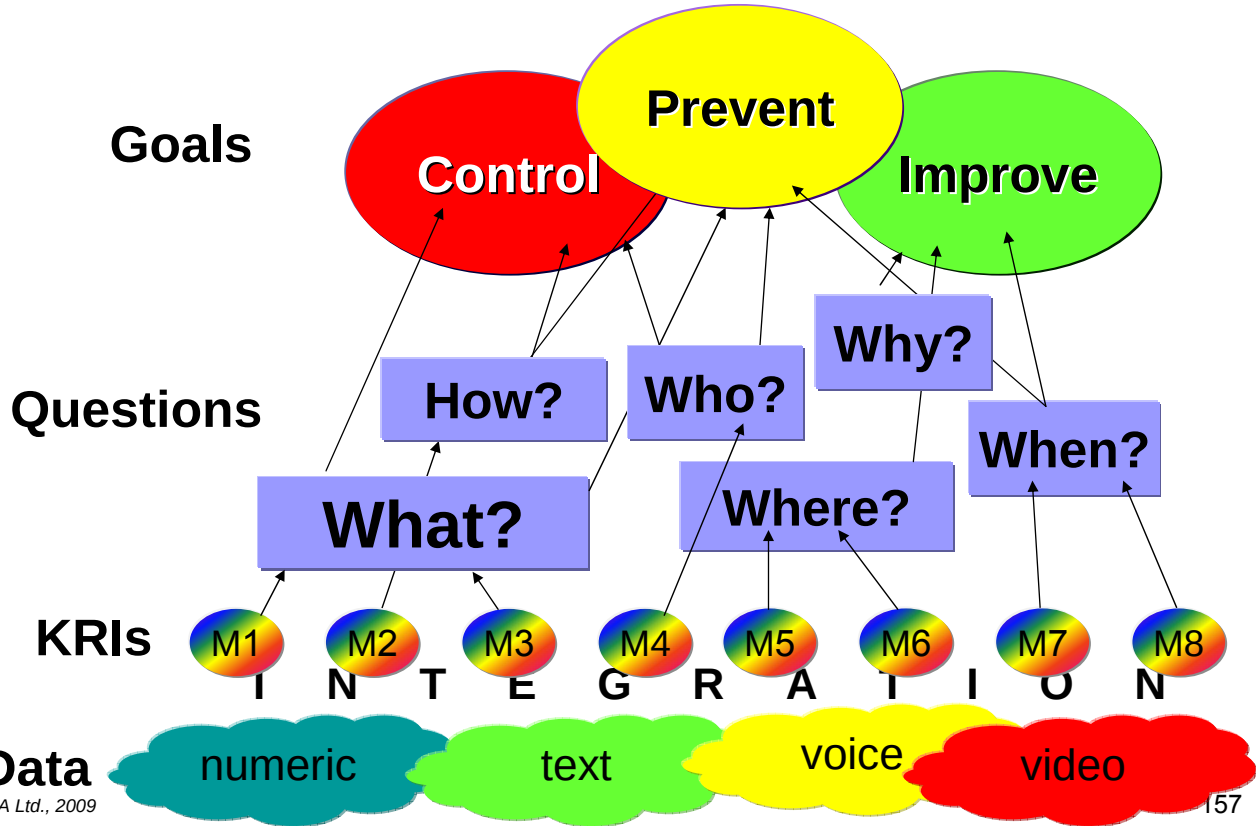
Graphics adapted from Reason, J.: *Managing the Risks of Organizational Accidents*, Aldershot: Ashgate, 1997

Operational Risks



Shappell, S. and Wiegmann, D. (1996). U.S. Naval aviation mishaps 1977-1992, *Aviation, Space, and Environmental Medicine*, 67, 65-69.

Operational Risks



MUSING Services

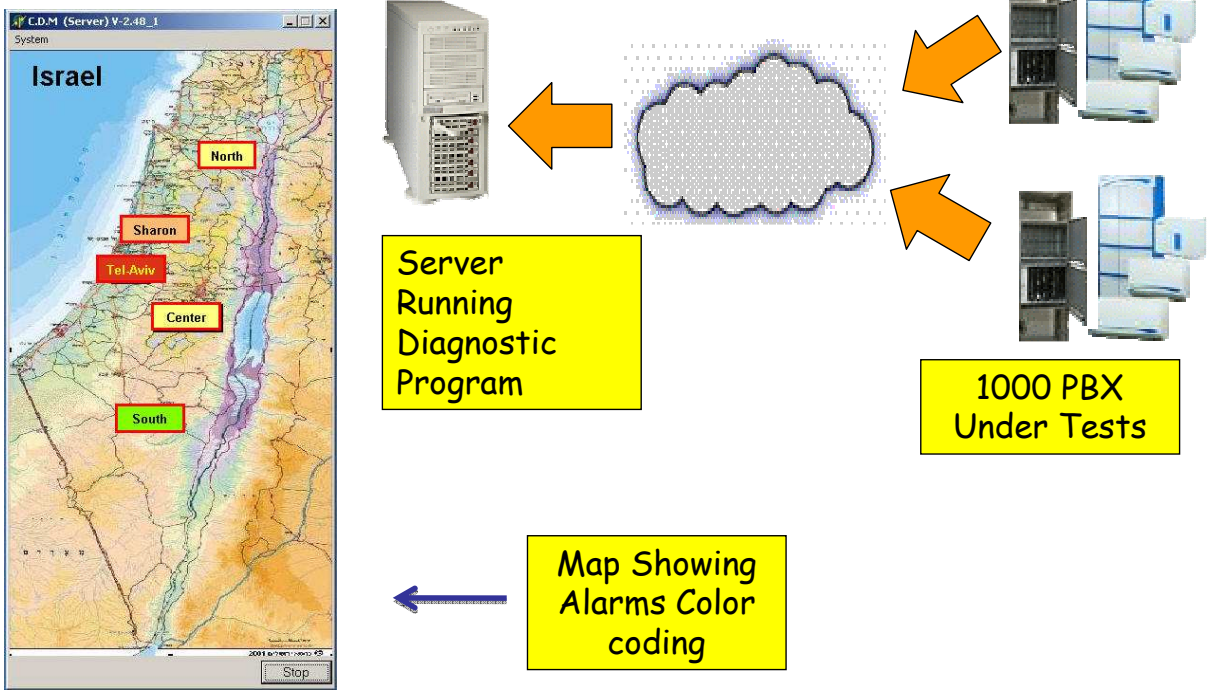
Use Integrated Data from different type and origins in order to:

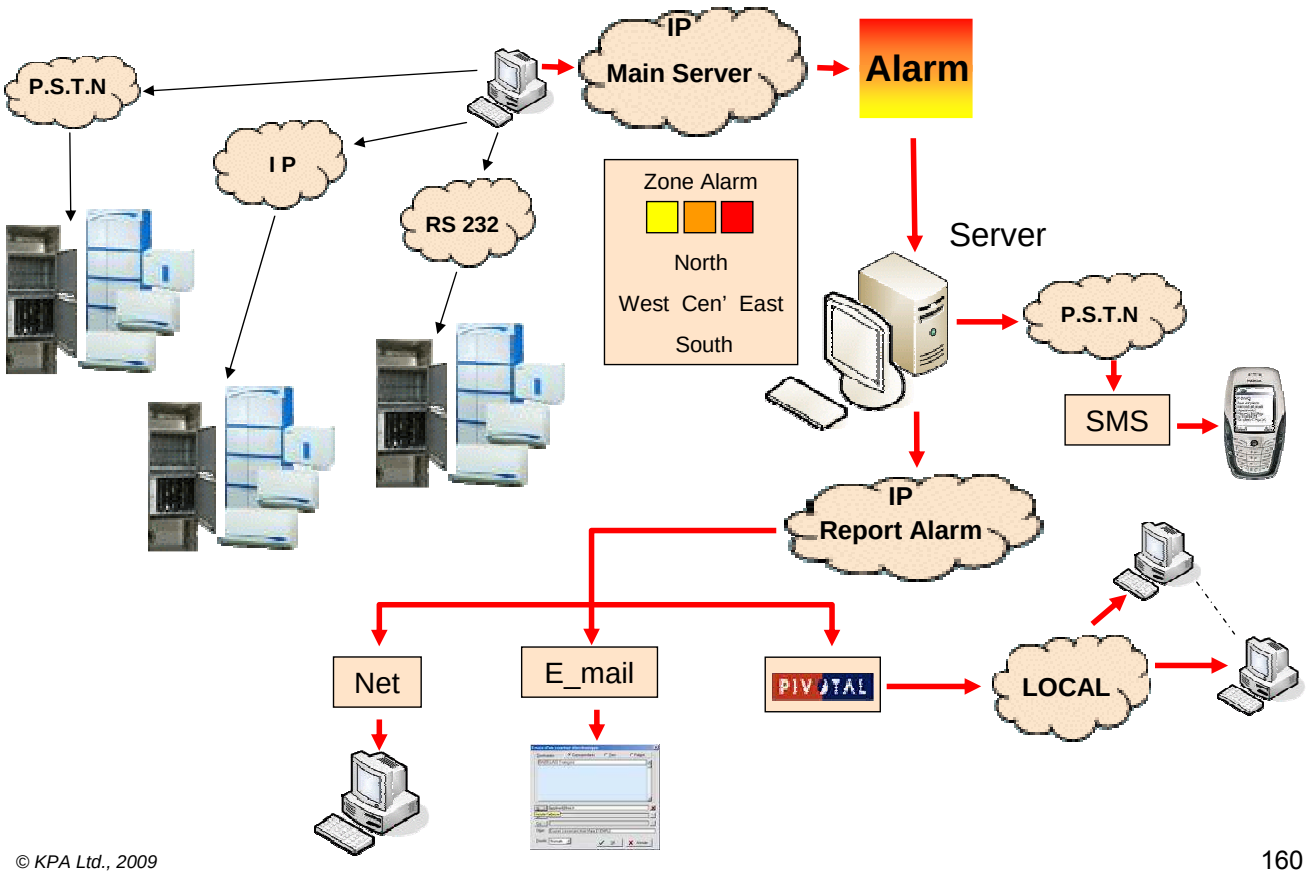
- Identify and map risks
- Provide business impact analysis
- Develop a mitigation plan

From *MUSING D8 3-4-5 KPA WP8.doc*

"the MUSING IT OpR workstream is truly innovative and has a large potential impact among European Public Administration and private organisations." Bank of Italy Operational Risks Regulator, 27.2.2008

A Telco Case Study





PBX Log

SITE NAME	CCS VERS	SYS. TYPE	GC DUP	GC VER	LAST BOOT & CAUSE	DC_ SNAP	SNAP SHOT	NET	ALARMS	POOL FAULT	RESOURCES	SYSTEM & TASK RESTART	TESTI DATE-TI
90006	14.66.35	HDC		8.4	2-SEP -2007 09:20		0			pl4_tab-177 cpn_tab-10	DTMF-15	RESET_POWER_UP-1 TOTAL_RESTARTS-1	11-Sep-2 04:00:51
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90021	11.11.17	MEX		38.13	6-JUN -2006 11:38		0			pl4_tab-235			11-Sep- 04:10:2
90033	11.11.16	SX		7.19	14-FEB -2007 05:56		0		PCM TIME SLOT	pl4_tab-39			11-Sep-20 04:13:13
90049	11.11.17	SX		7.23	4-AUG -2007 13:29		0			status-255 features-255 timers-255 ts_pool-255			11-Sep-20 04:17:20
90067	11.11.17	SX		7.23	25-MAY -2007 10:31		0			pl4_def-1 pl4_tab-177 call_tab-1 call_rec-1	DTMF-9	OVERLOAD-1	11-Sep- 04:32:
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CRM Output Data

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90009	High Tech	956	246	116	[illegible]	
90009	High Tech	956	246	116	[illegible]	[illegible]
90009	High Tech	956	246	116	[illegible]	[illegible]
90009	High Tech	956	246	116	[illegible]	[illegible]
90021	Municipalities	66	34	2	[illegible]	[illegible]
90033	Transportation	491	316	123	[illegible]	[illegible]
90033	Transportation	491	316	123	[illegible]	[illegible]
90033	Transportation	491	316	123	[illegible]	[illegible]
90033	Transportation	491	316	123	[illegible]	[illegible]
90033	Transportation	491	316	123	[illegible]	[illegible]
90033	Transportation	491	316	123	[illegible]	[illegible]
90033	Transportation	491	316	123	[illegible]	[illegible]
90049	Municipalities	423	114	119	[illegible]	[illegible]
90049	Municipalities	423	114	119	[illegible]	[illegible]
90049	Municipalities	423	114	119	[illegible]	[illegible]
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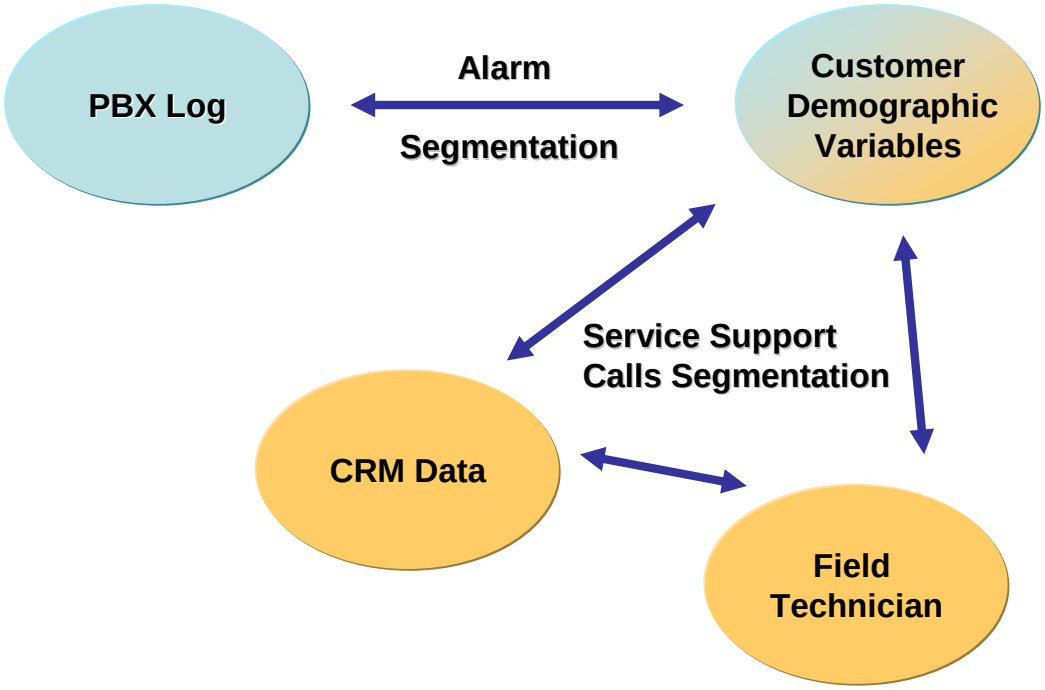
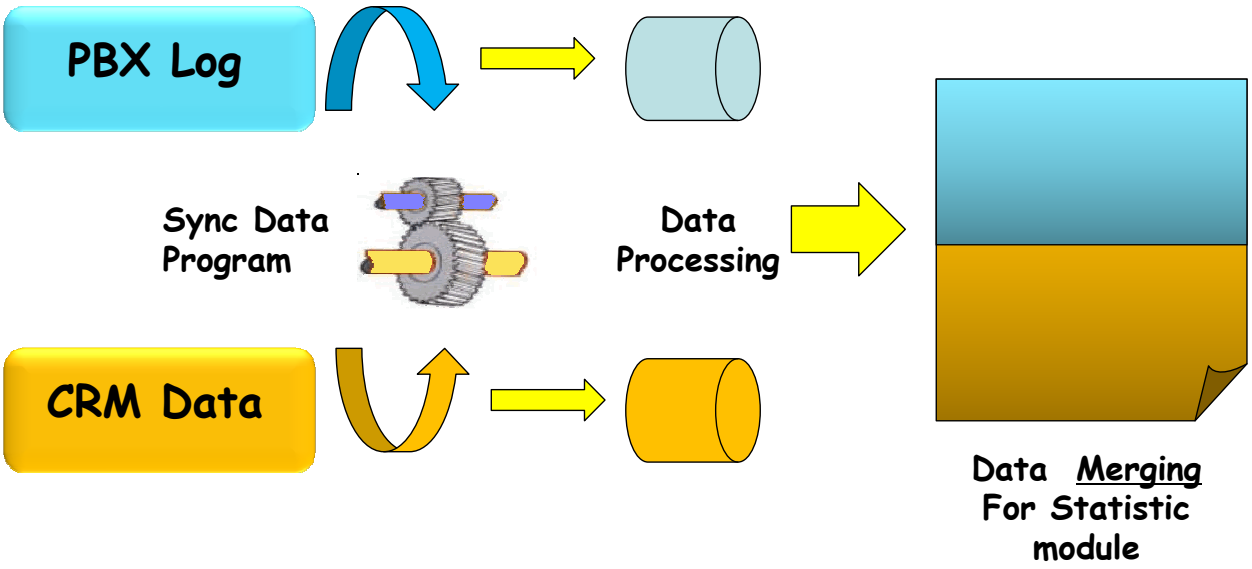
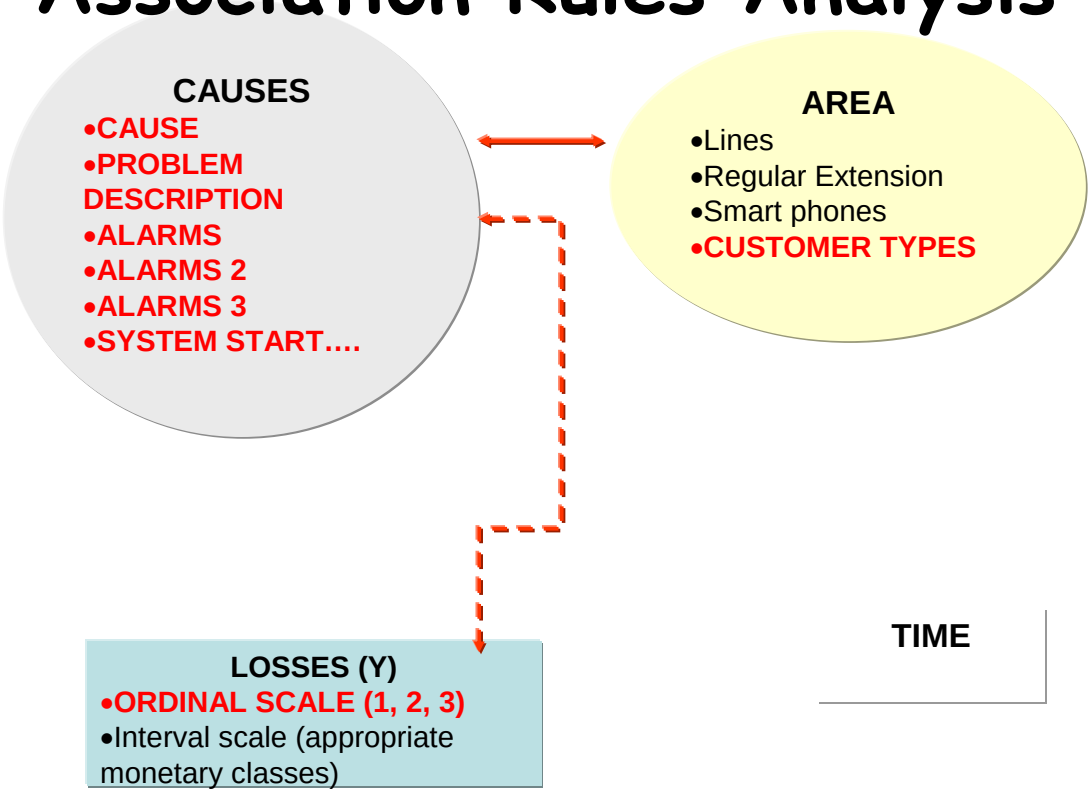
Data Integration



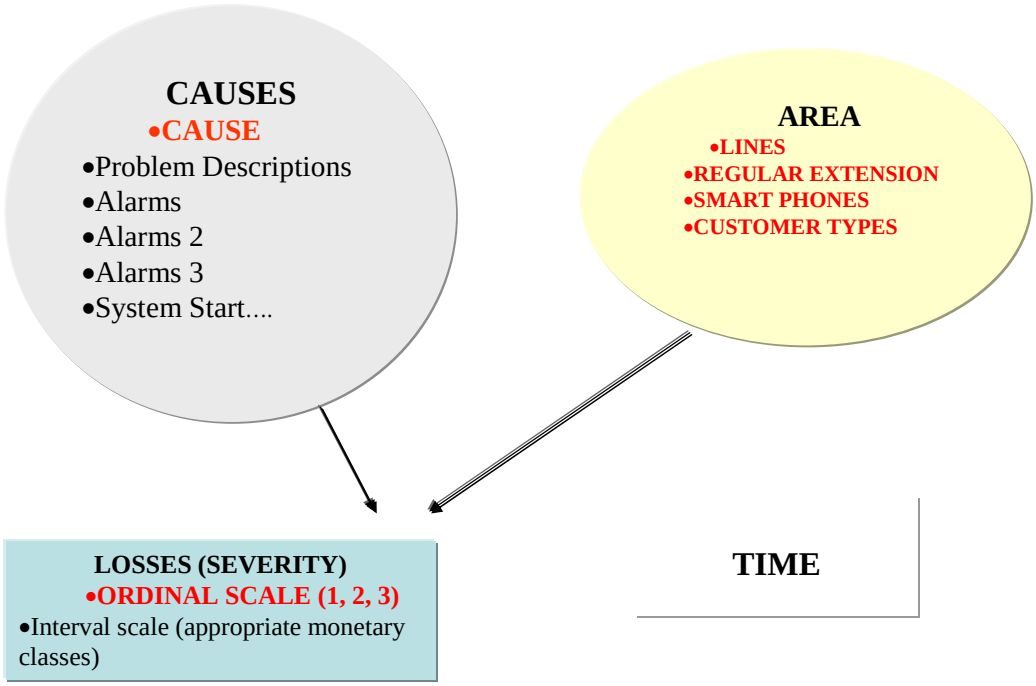
Data Processing



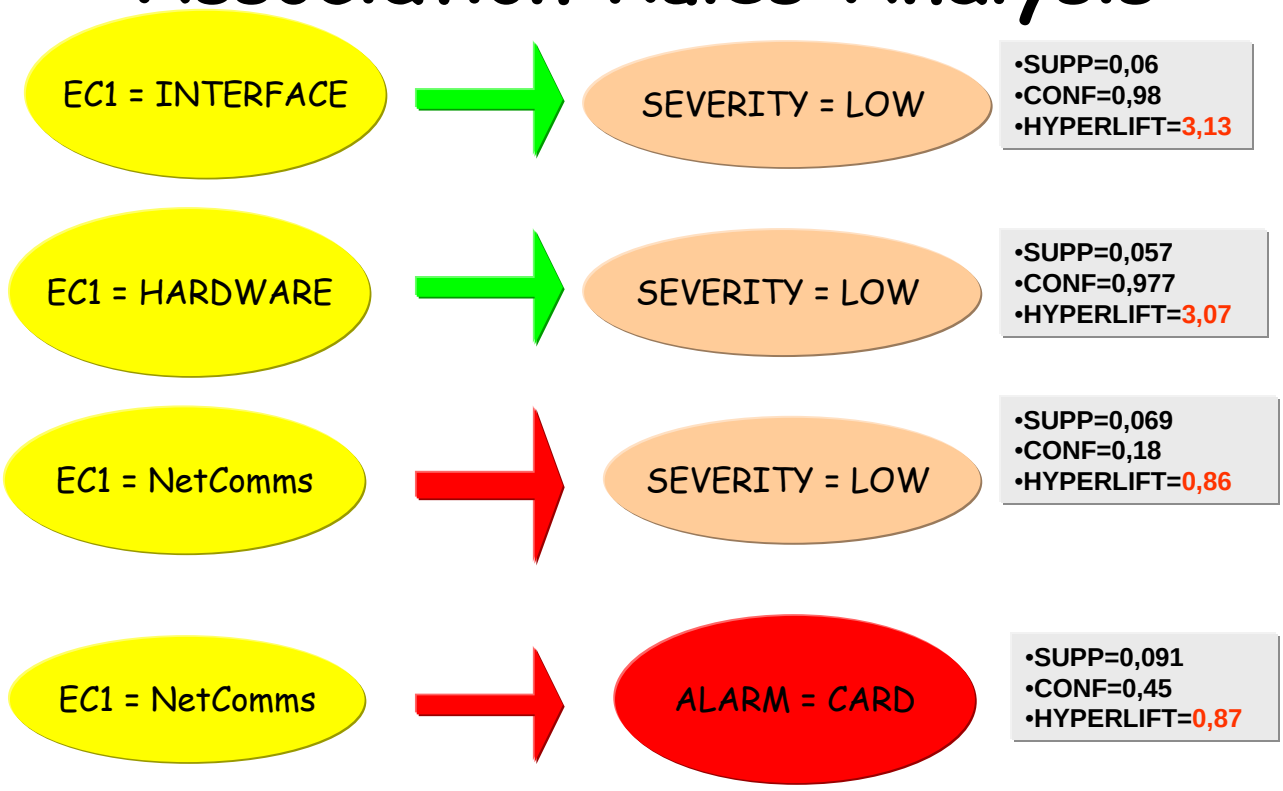
Association Rules Analysis



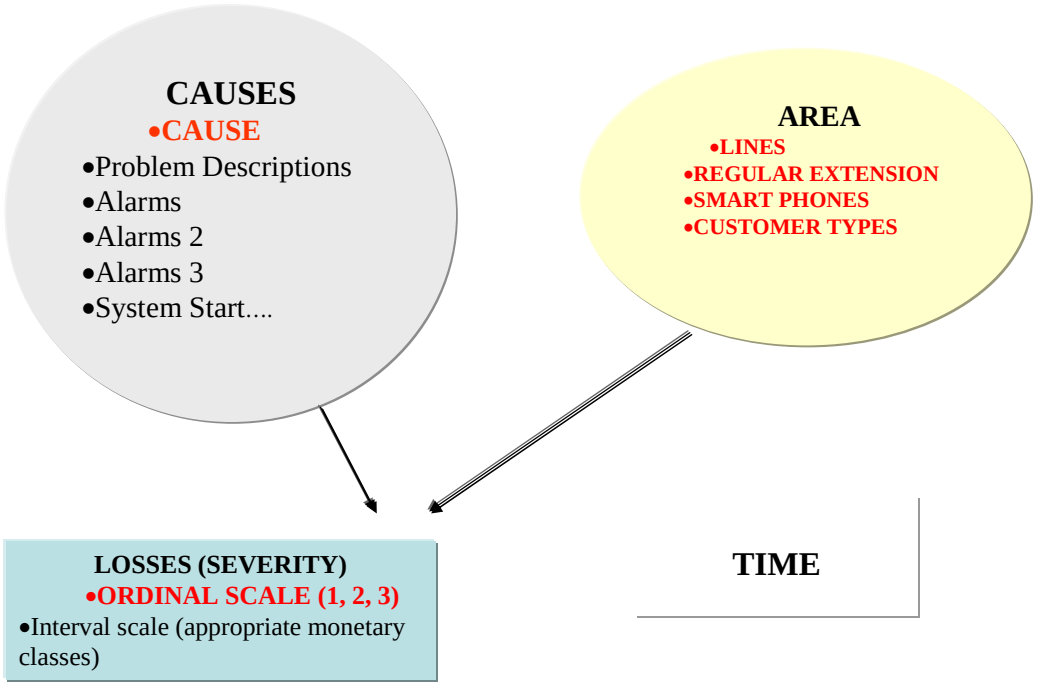
Bayesian Networks Analysis



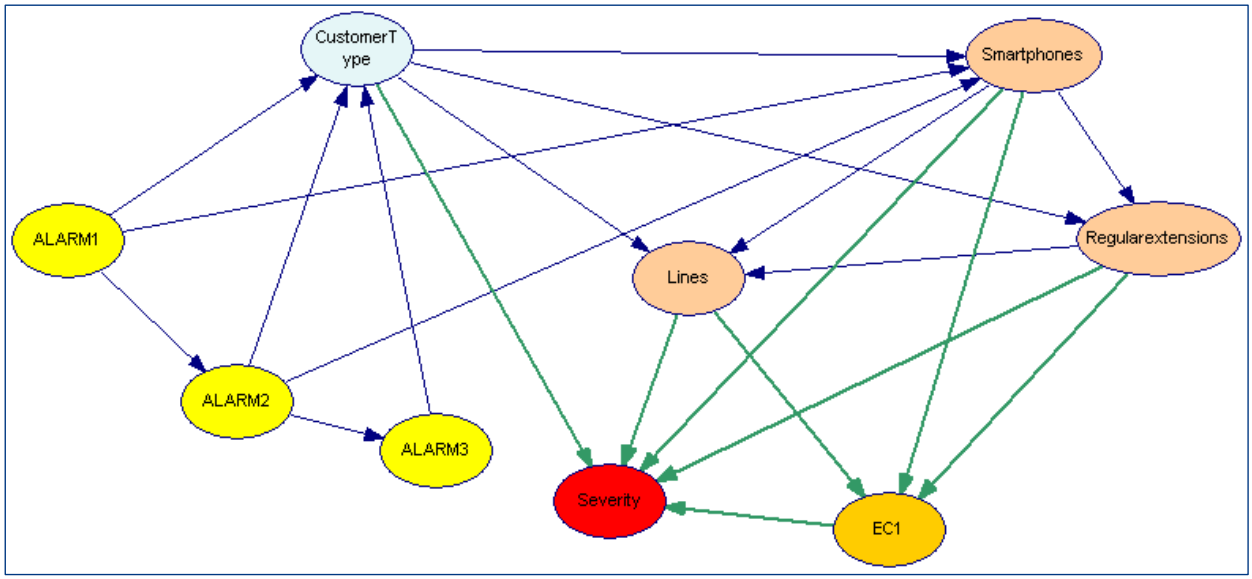
Association Rules Analysis

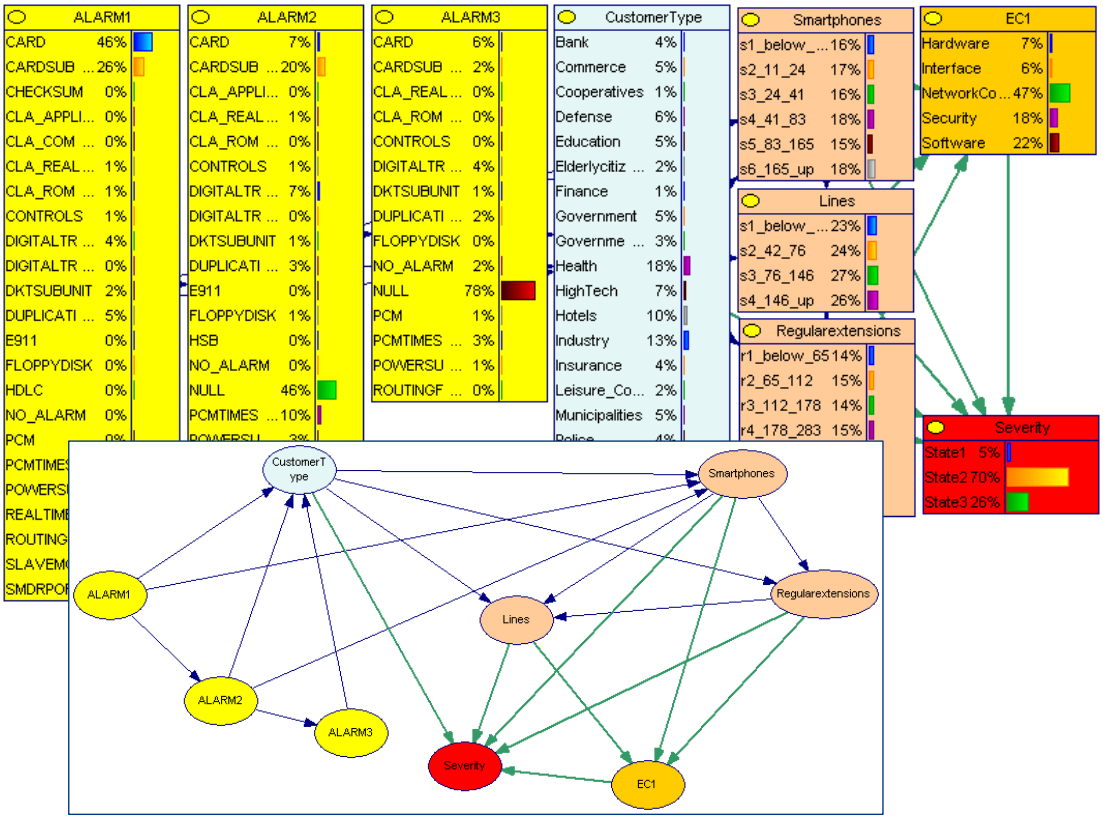


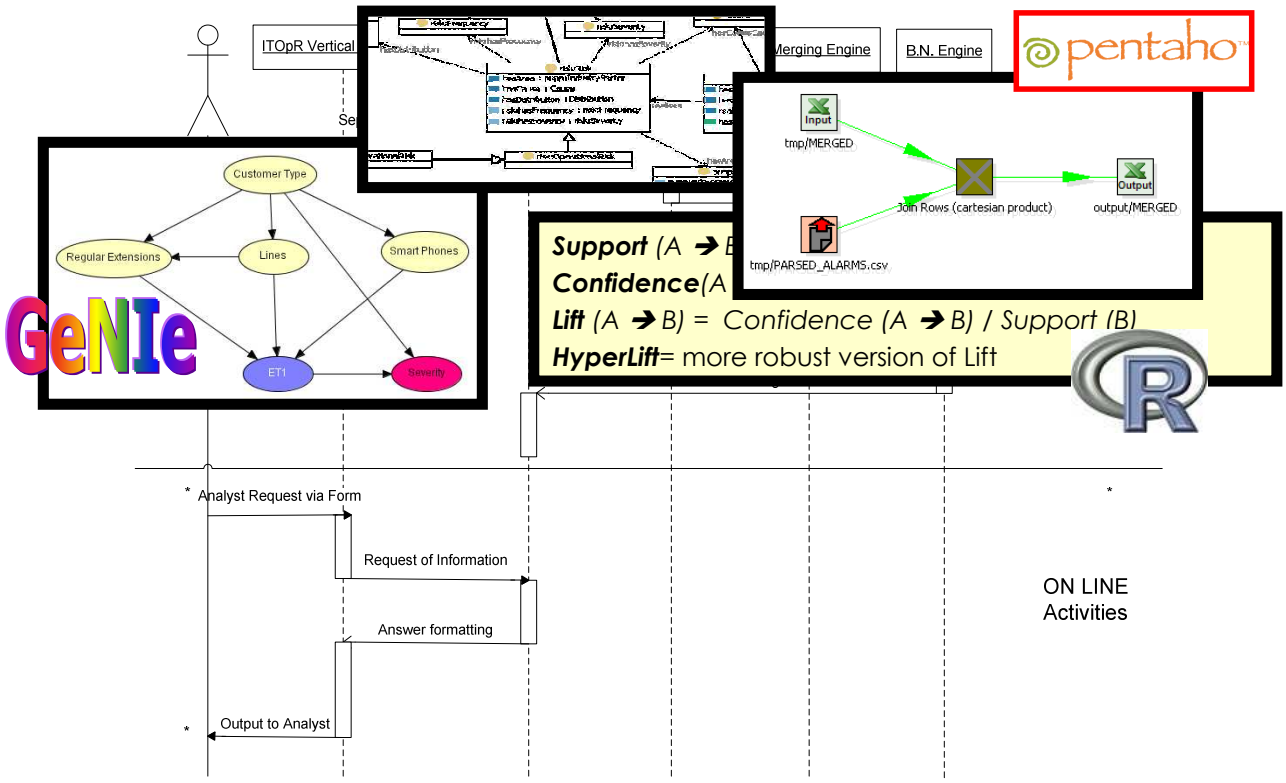
Bayesian Networks Analysis



Bayesian Networks Analysis







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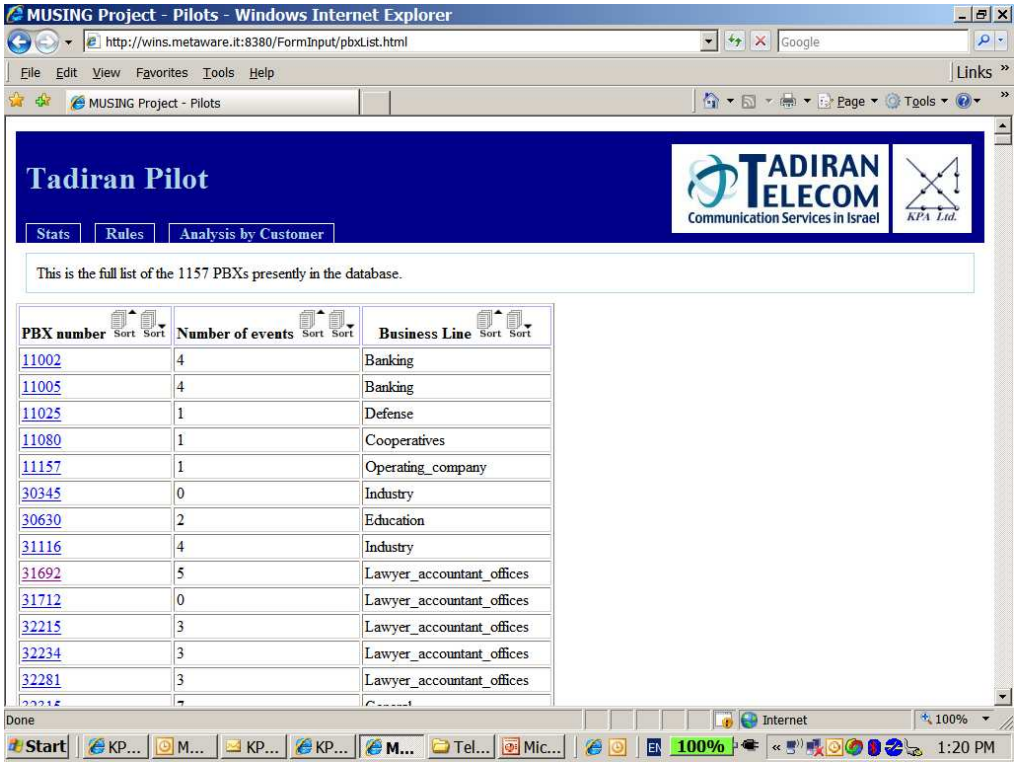
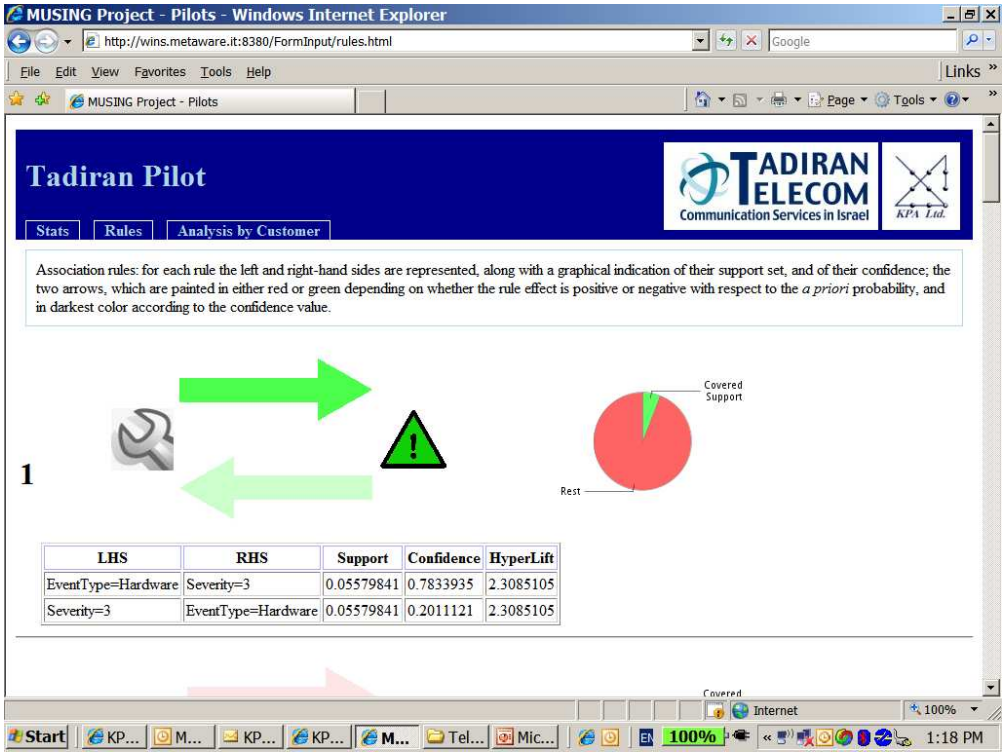


PBX number	Number of events	Business Line
11002	4	Banking
11005	4	Banking
11025	1	Defense
11080	1	Cooperatives
11157	1	Operating_company
30345	0	Industry
30630	2	Education
31116	4	Industry
31692	5	Lawyer_accountant_offices
31712	0	Lawyer_accountant_offices
32215	3	Lawyer_accountant_offices
32234	3	Lawyer_accountant_offices
32281	3	Lawyer_accountant_offices

Next Generation
Business Intelligence

http://wins.metaware.it:8380/FormInput/customerAnalysis.html



Next Generation
Business Intelligence

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