ICSEA Tutorial

From Software Engineering to IT Service Management

Agenda

• Module 1: Introduction
• Module 2: Incident management
• Module 3: Problem Management
• Module 4: Change Management
• Conclusion
Module 1: Introduction

Welcome to the world of IT services

Goals of the tutorial

This tutorial shall

- provide an insight into IT service management
- describe the service lifecycle
- present the overview of the most popular IT service management processes and concepts.
- explain the relationship between software development and IT service management through the application management function.
- provide lessons learnt from ITSM process improvement case studies with IT service provider organizations
About us

• UEF is one of the largest universities in Finland.
  – 15,000 students and 2,800 members of staff
• Three campuses are located in Joensuu, Kuopio and Savonlinna.
• Three areas of expertise:
  – Forests and the Environment,
  – Health and Well-being, and
• School of Computing
  – Software engineering (IT Service Management)
  – Health care information systems
  – Computational intelligence

About us

• Keys to IT Service Management and Effective Transition of Services (KISMET) is a research project funded by TEKES ERDF and industrial partners.
• The goal of the KISMET is to
  1. Examine the transition of IT services and service management processes
  2. Enhance the knowledge sharing on IT service management procedures, methods and concepts both in IT service provider organizations and IT customer organizations
  3. Provide organizations a discussion forum to share experiences in IT service management
Software Engineering vs. IT Service Management

• **Software engineering**: the systematic **design** and **development** of **software products** and the **management** of the **software process**
• **IT Service Management**: The **implementation** and **management** of **Quality IT Services** that meet the needs of the Business.
• IT Service Management is performed by IT Service Providers through an appropriate mix of **People**, **Process** and **Information Technology**.
  – ITIL V3 Glossary, 2007

Project-oriented business → Product-oriented business → Service-oriented business
Why to shift focus from SE to ITSM?

- IT service management is a world-wide trend:
  - Transition from software products to IT services (competition)
  - Outsourcing of service operations to lower-cost countries
- Global adoption of ITSM practices
  - 74% of federal, 37% of state and 17% of local government IT organizations in Australia are very knowledgeable about ITSM *
  - Nearly 60% of 100 U.S. CIOs polled (n=370) confirmed that they are working with ITIL
- There is a strong demand for ITSM professionals

*Forrester Consulting 2012: Next-Generation IT Service Management in the Australian Government Sector
The context of IT Service Management

- IT Service Suppliers
  - Underpinning Contracts
- IT Service Provider
  - IT Service Catalogue
    - Workstation services
    - Application services
    - User support services (Service desk)
- Server services
  - Service Contracts
  - Service Level Agreements

Example of a service provider network

- Energy customers
- IT Department
  - Energy company
  - Customers and Billing product
- Server services
- Application services
- Main IT Service Provider
  - Third Party IT Service Provider
  - Savon Voima
  - IT Department
- enfo
- heto
IT Service Management Big Picture

Service Desk
- Service Desk cases
  - Incidents
  - Software Failures
  - Hardware Failures
- Service Requests
- Solutions

Service Request Teams
- Workarounds & Permanent Solutions
- Problem Management
  - Problem Control
  - Proactive PM
- Change Management
- Problems

Release Management
- Release Packages
- Back-office
  - Repeating incidents
  - Software & Hardware failures

Configuration Management
- Application Development
- Third Party providers

IT Services
- Server services
- Desktop services
- Network services
- Service desk services
- Application services

CMDB

Customers & Users
- Service Desk cases
- Incidents
- Software Failures
- Hardware Failures
- Service Requests

IT Infrastructure Library (ITIL)

IT Infrastructure Library v2
- Planning to Implement Service Management
- Service Strategy
- The Business Perspective
- Service Management
- Application Management
- Service Operation
- Service Transition
- Service Design
- IT Infrastructure Management
- Security Management
- Continual Service Improvement

IT Infrastructure Library v3
How Software Development is visible in IT Service Management?

- Requirements
  - Functional requirements
  - Non-functional requirements
  - Data requirements
  - Use case model

Service Management
- Application Review
- Optimise
- Design
- Application Development
- Build
- Testing
- Deploy

Application Management Lifecycle
- SLA Levels

UML Sequence Diagram

1. Report incident
2. Record incident
3. Assign incident (ID-P1)
4. Resolve incident
5. Close incident
Tutorial exercise

• Discuss the following questions in small groups:
  1. Why IT companies are interested in providing IT services instead of creating software products?
  2. What elements would you like to add to the IT triangle?
  3. How does the application development cycle differ from a service lifecycle?

Task 1: Why IT companies are interested in providing IT services?

• Increasing need to outsource service operations
• Product-based business model faces a lot of competition
• Customers aim at focusing on core business processes instead of managing IT
Task 2: Information Technology Triangle

IT/ Software Projects
- Project milestones
- Unified Modelling Language
- Project Failure /Success
- Work Breakdown Structures (WBS)
- Software Architecture
- Software Product Lines
- Product Releases

IT/ Software Products
- Configuration Baseline
- Software Change Order

Software Development
- Components
- Documentation

IT/ Software Services
- Service Catalogue
- Service Desk
- Service Levels
- Service Incidents
- IT Infrastructure Library (ITIL)

PRINCE2
- IT Project management
- Effort Estimation
- Rational Unified Process
- Inception
- Elaboration
- Construction
- Transition

PMBOK

Project Management

IT Service Management

How does the application development cycle differ from a service lifecycle?

Service Lifecycle
- Service Strategy
- Service Design
- Service Transition
- Service Operation

Application Management Lifecycle
- Requirements
- Design
- Build
- Operate
- Display

Continual Service Improvement
- Change Management
- Configuration Mgmt
- Release Management

Incident Management
- Problem Management
- Service Request Management

Service Strategy
- Availability Management
- Capacity Management
- Service Level Management

Service Design
- Service Strategy

Service Transition
- Service Design

Service Operation
- Service Transition
Module 2: Incident management

The primary goal of Incident Management process is to
- restore normal service operation as quickly as possible and
- minimize the adverse impact on business operations,
- ensure that the best possible levels of service quality and availability are maintained.
Incident management concepts

• Basic concepts
  – Incident = “an unplanned interruption to an IT service or reduction in the quality of an IT service”
  – Escalation = assigning the case to other teams or management
  – Major Incident = an incident with a major impact
  – Service Request = request from a User for information or advice, or for a Standard Change or for Access to an IT Service (e.g. reset a password, or to provide standard IT Services for a new User)

<table>
<thead>
<tr>
<th>Incident types</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware failures</td>
<td>Connection failures (network, internet)</td>
</tr>
<tr>
<td>Software failures</td>
<td>Security breaches</td>
</tr>
<tr>
<td>Service Requests</td>
<td>Email failures</td>
</tr>
<tr>
<td>User rights changes</td>
<td>Application failures</td>
</tr>
<tr>
<td>Hardware orders</td>
<td>Installation requests</td>
</tr>
<tr>
<td>Requests for version updates</td>
<td></td>
</tr>
</tbody>
</table>

Examples
Service Desk and Service Channels

Customers

Events

Automatic alerts

Service desk types
- Global
- Centralized
- Local

Single Point of Contact (SPOC)

IT Service Management

Web

SMS

Telephone

Email

Bug tracking software

Software Engineering

Application Developers

Incident Management Process

Source: ITIL v2 Service Support, OGC

Incident management activities

- Incident detection and recording
- Initial classification and support
- Service Request
- Service Request procedure
- Investigation and diagnosis
- Resolution and recovery
- Incident closure

Source: ITIL v2 Service Support, OGC
Incident management roles

- Incident Manager
  - Drive the efficiency and effectiveness of the Incident Management process
  - produce management information
  - manage the work of Incident support staff (first-and second-line)
  - monitor the effectiveness of Incident Management
- 1st level specialist
  - Recording incidents
  - Incident solving based on workarounds available
- 2nd level specialist
  - Detailed investigation of incidents
  - Identification of workarounds

Measuring incident management performance

Metrics in ITIL v3
- Total numbers of Incidents (as a control measure)
- Breakdown of incidents at each stage
- Number and percentage of major incidents
- Mean elapsed time to achieve incident resolution or circumvention, broken down by impact code
- Percentage of incidents handled within agreed response time
- Average cost per incident

Key Metrics for IT Service and Support (Gartner, 2008)
- Average speed to answer
- First-contact resolution
- Number of contacts per month per employee
- Channel delivery mix
- Abandonment rate
- Number of incidents caused by improper changes
- Which services and configuration items drive the most incidents
Case: Finnish Tax Administration

- Case type: Government agency
- Number of employees: 5700
- Improvement target:
  - Incident management
  - Problem management
- Core business:
  - We will ensure the tax revenue by providing proactive guidance and good service as well as by conducting credible tax control.
  - Our customers can contribute to their tax issues with as little cost and inconvenience as possible.

Challenges in incident management

- Classification of support requests is difficult for customers
- Customer support is too reactive
- Identification of repeating incidents from the service desk system.
- Lack of Configuration Management Database (CMDB).
Incident record

- Incident (failure or error),
- Request (feedback),
- Request (improvement idea),
- Request (order),
- Request (other service request),
- Request (advise),
- Request (information/notification)

Reason for contact

Customer Service Contact channel

Status Group

Failure end time

Closure code

Failure start time

Call back time

Reported by

Description

How can I get answered calls visible in software phone? The list is empty although I have answered many phone calls.

Improving service areas

- Three different elements identified in classification
  - Service area: Application services
  - Configuration item: Application – Tax applications - Tax card in web
  - Support request type: Incident
- A service area tree was created together with the case organization
Tutorial exercise

- Discuss the following questions in small groups:
  1. What kind of service desk experiences have you had? Identify a good service desk service and a bad service desk service.
  2. What type of challenges do IT service providers have regarding the service desk & incident management?

Module 3: Problem Management

What is a root cause?
Main objectives

- Problem Management is the process responsible for managing the lifecycle of all problems.
- The primary objectives of Problem Management are to
  - prevent problems and resulting incidents from happening,
  - eliminate recurring incidents and
  - minimize the impact of incidents that cannot be prevented.
- In software engineering, this process is often called defect prevention

Key concepts

- Problem is “the unknown underlying cause of one or more incidents”
- A known error is “an incident or problem for which a root cause is known and for which a temporary work-around or a permanent alternative has been identified”
Differences between software engineering and IT service management (Defects vs. problems)

- In Software Engineering,
  - a software defect is “any flaw or imperfection in a software work product or software process”
  - developers could directly contact the customers and vice versa
- In IT service management, incidents (hardware / software failures) should be first reported to the service desk.
- If the 1st level and 2nd level incident management cannot solve the case, a separate problem record should be opened.
- Customers’s cannot directly contact the development team and interrupt their work

Problem Management Activities

- **Inputs**
  - Incident details from Incident Management
  - Configuration details from CMDB
  - Any defined Work-arounds

- **Major activities**
  - Problem Management (PM) Process
    - Problem control
    - Error control
    - The proactive prevention of problems
    - Identifying problem trends
    - Producing information to managers
    - Problem reviews

- **Outputs**
  - Known Errors
  - A Request for Change
  - An updated Problem record (including a solution/Work-around)
  - A closed Problem record for a resolved Problem
  - Response from Incident matching to Problems and Known Errors
  - Management information
Problem control and error control

1. Problem control
2. Error control

3. Proactive problem management

Benefits

- Benefits from problem management
  - Better IT service quality.
  - Permanent solutions
  - Increased learning within the organization
  - Better first-time fix rate in Service Desk
Challenges in problem management

• More challenges
  – “Linking incidents to problems is difficult”
  – “Lack of good metrics”
  – “We have no experience in implementing a knowledge base”

How to make it simple

It is not a problem...

...when we have a solution.
Problem Management Roles

- Problem Manager
  - Improves the problem management process
  - Reviews the efficiency and effectiveness
  - Produces performance reports for management
  - Allocates resources
- Problem Management Team Member
  - Identifies and investigates problems
  - Creates RFCs (Requests for Change) to solve problems
  - Monitors the progress of Known Error resolutions

Problem Ticket
Lessons learnt from improving IT Service Problem Management

- Identified challenges in problem management
  - “Employees do not understand the difference between an incident and a problem”
  - “There is no problem record in the IT service desk tool”
  - “The organization does not have a documented problem management process”
  - “Lack of a person who improves problem management”
  - “No time for finding root causes. The support is always fire-fighting with increasing number of incidents”
Lessons learnt from improving IT Service Problem Management

- Discuss PM concepts with service desk, product development teams, testers, customers and other relevant stakeholders
- Pilot the introduction of Problem management with one team
- Market problem management ideology and benefits continuously
- Collect improvement ideas regarding problem management to the IT service management tool

The key challenges are related to understanding concepts (Incident, Problem, Service Request, Change) and differences between them
- Incident and problem management as too strong processes may cause difficulties for change management
- Focus should be set on proactive support instead of reactive one
- Interfaces between problem management and incident management & change management must be crystal clear
Lessons learnt from improving Problem Management

- Identification of problem sources is essential
  - Incident management (incidents that reoccur, incidents that are complex)
  - Third party service providers
  - Testing, projects and product development (Development Known Errors)
  - Release management
  - Other technical specialist groups (server, network, application services)

Tutorial exercise

- Discuss the following questions in small groups:
  1. How would you transform the reactive support to proactive one?
  2. What is the main difference between incidents and problems?
  3. How would you measure the performance of problem management?
Module 4: Change Management

Management of Change or Change of Management?

Goals

- The goal of the Change management process is to ensure that standardised methods and procedures are used for efficient and prompt handling of all Changes (ITIL v2, OGC 2002)
- Why changes are needed?

Implement problem solutions

Respond to customers’ and users’ changing needs
Key concepts

- In IT service management
  - Request for Change
  - Change categories
    - Normal change
    - Standard change
    - Emergency change
    - Major change
- In Software Engineering
  - Software Change Order
  - Categories
    - Error correction
    - Enhancement
    - New feature

7 Rs for change management

<table>
<thead>
<tr>
<th>Raised</th>
<th>Relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason</td>
<td>Responsible</td>
</tr>
<tr>
<td>Resources</td>
<td>Return</td>
</tr>
<tr>
<td>Risks</td>
<td></td>
</tr>
</tbody>
</table>
Change Management Activities

Change management roles

• Change Manager
  – agree with Service Management on a goal of the Change management process
  – measure efficiency and effectiveness of change management
  – improve change management methods and tools

• Change Advisory Board
  – Assist change manager in evaluating changes
  – Provide recommendations for implementing change

• Emergency Change Advisory Board
Istekki Oy

- Established in 2009, operation started 1.1.2010
- Owners: Northern Savo Healthcare District and City of Kuopio
- Provides ICMT (Information, Communication & Medical Technology) services
- ISO/IEC 20 000 certificate
- Turnover 2012 29.4 M€
- Number of employees: 220

Figure: Infusion pumps under maintenance

Lessons learnt from improving change management

- No reports implemented for change management
- Solution: Implement the following change management reports
  - Number of change requests (by service area)
  - Number of major changes
  - Change throughput time
- Evaluation of changes is not visible
- Solution: Add new datafields to the change record in the ITSM tool
  - Reason for change as a separate field
  - Post-implementation review of change
- Change management is not measured systematically
- Solution: Define 3 key metrics what you can measure
Tutorial exercise

- Discuss the following questions in small groups:
  1. Why change management is so difficult?
  2. What is the main difference between a change request and a service request?
  3. How would you measure the performance of change management?

Conclusion

What did we learn?
Tutorial conclusion

- Software engineering and IT service management concepts
  - Need for concept mapping (e.g., Software Change Order = Request for Change; Known defect = Known Error)
- Application Management creates a link between software development and IT service management
- Application developers participate in designing new or changed services
- ITSM improvement starts typically from incident management
- Problem management is a key to proactive support
- Change management is a complicated process due to various types of changes

Attachment 1: Keys to IT Service Management Excellence Technique

1. Create a process improvement infrastructure
2. Perform a process assessment
3. Plan process improvement actions
4. Improve / Implement the process
5. Deploy and introduce the process
6. Evaluate process improvement
7. Continuous process improvement

Case Study Method
- Documentation (process descriptions, service catalogue)
- Archives (incident, problem, RFC and service request records)
- Interviews/discussions (discussions in work meetings, coffee table discussions, process manager interviews)
- Participative observation (field visits, process improvement meetings and workshops)
- Physical artefacts (Service desk tools, intranet)

Action Research Method
Attachment 2 a: How to measure IT service management

Attachment 2 b: How to measure IT service management
Thank you!!!

Questions, comments?

Marko Jäntti, PhD.
(marko.jantti@uef.fi)
School of Computing,
Kuopio campus
Software Engineering Research
Unit, KISMET project