Agile Information Security Management in Software R&D

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Information Security from the Perspective of Agility
Business Rationale for Agile Adoption

"Why is your organization using or considering using Agile processes?"

- To improve productivity/time-to-market: 14
- To reduce costs: 10
- To improve quality: 9
- To build better relationships with business partners: 6
- To quantify the value the development organization delivers to the business: 3
- Don’t know: 1

Base: 21 companies using or considering using Agile processes
Source: October 2005 Forrester Executive Research Panel Survey

The better quality often increases security too!
Change is the Only Certainty in Software Research & Development

The production of Technical Specifications for a 3rd Generation Mobile System based on the evolved GSM core networks.

Change management is very important from security point-of-view
Fact corner: Agile is not an absolute Concept.

Source: prof. Pekka Abrahamsson / VTT

Goal: Balanced Information Security
Proactive Security Solutions Have Most Impact!

The Most Impact (development of new architectures, new technologies)

The Least Impact (only "emergency patches")

Maturity of technology

Design vulnerabilities

R &D

Products and maintenance

Implementation vulnerabilities

Research

Time
Introduction

The Horizontal Nature of Information Security

- **Telecom engineers**: security is protocols, cryptography, key exchange techniques
- **Software engineers**: security means secure SW architectures
- **Content providers**: security is DRM
- **IT department**: security means proxies, firewalls and audits and if really needed, security policies
- **Lawyers**: security means how you conform to privacy legislation
- **Process addicts**: security is a business process
- **Managers**: security is OK, but it cannot cost anything
- **Quality people**: security is realized as one or more quality attributes, the meaning of which can be described in an ontology
- **Written definition “everywhere”**: security is confidentiality, integrity, availability, non-repudiation, authentication
Security vs. Agility?

- **Agility**: developers are more responsive to business concerns
- **Security**: developers are more responsive to business **risk** concerns

Tradeoffs to be managed

Two steps that should be taken care of:

- **Increase security awareness** among developers and managers
- **Build security in** the processes, practices and tools
The 12 Agile Principles – Good for Security too!

1. Satisfy customer through early and frequent delivery
2. Welcome changing requirements even late in the project
3. Deliver working software frequently
4. Business people and developers work together daily throughout the project
5. Build projects around motivated individuals
6. Place emphasis on face-to-face communication
7. Working software is the primary measure of progress
8. Promote sustainable development pace
9. Continuous attention to technical excellence and good design
10. Simplicity is essential
11. The best results emerge from self-organizing teams
12. Team reflects regularly where and how to improve

"Security rating"

Source: prof. Pekka Abrahamsson / VTT
II
Some Information Security Challenges and Trends
Security Threats are Increasing

**COMPLEXITY AND CONVERGENCE...**
Products, value nets, services and telecommunication networks are getting more and more complex
- Holistic understanding of security needed
- Challenge for agility too!

**TIGHT TIME SCHEDULES...**
Market sets tight time schedules to product development and the quality and security of products is in danger.
- Security awareness should increased

**REACTIVE RACE IS BECOMING TOUGHER...**
Security threat picture changes all the time. Security work has been lately a race between the attackers and the protection developers.
- Emphasis from reactive to proactive solutions
- Break the passive “build-break-fix” cycle!
- Agility helps!
Security Threats are Increasing

DIFFUSION OF ICT SOLUTIONS
ICT solutions are being used in other fields
- Security awareness and careful planning needed
- Agility cannot be applied much

DEPENDENCE OF CRITICAL INFRASTRUCTURES ON ICT
In critical infrastructures, such as electricity distribution, ICT solutions are used more and more
- Understanding of interdependencies needed
- Agility cannot be applied much
III

Security Assurance and Agile Security Development
Security assurance activities are needed in agile SW R&D too, and should be integrated into the agile processes!

Examples of security assurance techniques:

- **Security Analysis**: threat and vulnerability analysis important, its connection to requirement engineering should be improved, forms the basis for assurance!
  
  **THERE ARE CHALLENGES IN CARRYING OUT SECURITY ANALYSIS IN THE AGILE PROCESSES! (and even in traditional R&D processes!)**

- **Security Testing**: tools available for network level and some for application level testing

- **Security Auditing**: perspectives: information security management; security engineering

- **Security Monitoring**: beyond IDS/IPS systems, holistic monitoring, mobile versions (mainly maintenance phase!)
Information Security Management vs. Security Engineering

- “Information security management (ISM)” is targeted at the security processes and practices in the organisation.
- “Security engineering” is targeted at the R&D of security solutions in products / services / technical systems.
- Both of them should be addressed in Agile Software Development.

Business-level security practices

- Cost-benefit analysis on security
- Trust in business collaboration
- Business level risk analysis and management
- Information security management (ISM)
- Security engineering (products, services, technical systems)
VTT’s Agile Security Development (ASD) Framework

• **FOR WHOM:** the **client** – organization, which wants to develop/verify the level of information security of the subcontractors; an **SME**, which wants to develop information security from its own baseline

• **WHAT:** an **agile** process model for developing an information security management system, **fast and effective** improvement of the current information security state and level, **ISO 17799 compatibility**

• **WHY:** a **clear and feasible model**, **efficient** working model, a) **improving** and b) **maintaining** the subcontractor’s or SME’s **information security level**

• **HOW:** the **guidance and consultation of experts**, high utilization of the company’s own resources, **targeted** to the right need, **integrated** with the organization’s guidance system

• **ASD** = Agile Security Development
Agile Security Development (ASD)
Agile Security Development (ASD)

Management meeting
- Requirements in terms of overall organizational function
- Management's statement of commitment

Information security policy
- Definition and execution
- Compatibility with interest groups
- Communications

Strategic security
- Information security organization, clarification of liabilities
- Asset classification and controls
- Personnel safety
- Physical safety

Operational safety
- Access control
- Systems usage, development, maintenance, acquisition
- Actions in case of information security incidents

Measurement
- Definition of the measures,
- Testing and execution

Education
- Definition, materials
- Execution

Instructions
- Definition and execution
- Communications
- Scope

Continuity planning
- Definition and execution
- Creation of the scenarios
Background material of ASD

- ISO 17799, 2700x
- Common Criteria
- Cobit
- ITIL
- ISF
- SSE-CMM
- BSI
- PK-RH
- OCTAVE
- CISSP
- etc. Best Practices documents applied
Conclusions

• Agility and security have tradeoffs, the biggest difference is the emphasis of risks in security.
• Security should be built in to the agile process, practices and tools (e.g. security solution patterns, standard solutions, taking security into account proactively).
• Both information security management (ISM) and security engineering practices are needed in the Agile Software R&D.
• Security assurance should be an integral part of SW R&D.