**1st seminar: “Software quality challenge”**

Summary

* **The uniqueness of software quality assurance.**

The fundamental differences between software products and other products are caused by the higher product complexity, the invisibility of software and the nature of the product development and production process.

These differences create the need for an SQA methodology and tools to special and different challenges for the development and operation of quality assurance for software.

* **The environments for which SQA methods were developed.**

The SQA methods and tools are specially aimed at the needs of professional software development and maintenance, activities where quality problems appear in their most severe form, and where the most painful losses are expected.

Therefore any SQA method or tool is a subject to the environmental characteristics of their activities, namely:

* Contract conditions and commitments defining the contents and timetable.
* The conditions of the customer–supplier relationship, as realized by the need for consultation with the customer and the acquisition of his approval.
* Teamwork requirements.
* Need for cooperation and coordination with other software and hardware development teams both internally and externally.
* Need for interfaces with other software systems.
* Need to continue carrying out a project when team members change.
* Need to conduct maintenance of the software system for several years.

These environmental characteristics also apply to internal development of software and firmware, though only informal contract or informal customer–supplier relationships exist in these cases.

These characteristics demand that intensive and continuous managerial efforts be expended in parallel to the professional efforts that have to be invested in order to ensure the project’s quality and it’s success.

Review questions

* There are three major differences between software products and other industrial products.
* Identify and describe the differences.
* Discuss the ways in which these differences affect SQA.

-Diferențele dintre software și alte produse: Complexitate: sistemele software au adesea numeroase componente interdependente. Invizibilitate: Spre deosebire de produsele fizice, software-ul este intangibil, ceea ce face defectele mai greu de identificat. Proces de dezvoltare: natura iterativă și continuă a dezvoltării, care necesită actualizări și îmbunătățiri constante.  
Acești factori necesită o abordare SQA distinctă care implică metodologii care pot gestiona medii dinamice și schimbări continue.-

The fundamental differences between software products and other products are caused by the **higher product complexity**, **the invisibility of software** and the .

These differences create the need for an SQA methodology and tools for SQA that will meet the special and different challenges for the development and operation of quality assurance for software.

* It is claimed that NO significant SQA activities are expected to take place during the phase of production planning for software products.
* Discuss this claim.
* Compare the required production planning for a new automobile model with the production planning efforts required for a new release of a software product.

-Software production planning differs significantly from planning for physical products like automobiles. While automobiles require physical assembly lines, software requires a different focus on ensuring code integrity, version control, testing, and deployment.-

* The need to carry out work by a team demands additional investment in coordination of the team members. Whether these managerial efforts could be saved if the work were performed as a “one-man project”?

-Conducerea unei echipe introduce nevoia de coordonare, comunicare și consecvență. Un proiect cu o singură persoană ar putea economisi eforturile de coordonare, dar poate suferi de lipsa dezvoltării paralele, a testării și a expertizei specializate.-

* Seven issues characterize the professional software development and maintenance environment.
* Identify and describe these characteristics.
* Which of these environmental characteristics mainly affect the professional efforts required for carrying out software development and maintenance projects? List the characteristics and explain why a professional effort is needed.
* Which of these environmental characteristics mainly affect the managerial efforts required for carrying out software development and maintenance projects? List the characteristics and explain why such efforts are needed.

-Cele șapte caracteristici de mediu:

-Conditii contractuale.

-Relația client-furnizor.

-Cerințe de lucru în echipă.

-Coordonare intre echipele de dezvoltare.

-Interfețe cu alte sisteme.

-Continuare în ciuda schimbărilor de echipă.

-Întreținere pe termen lung.-

-Efortul profesional este necesar pentru a asigura calitatea codului, testarea și implementarea caracteristicilor, în timp ce eforturile manageriale asigură că proiectele rămân pe drumul cel bun, iar coordonarea între echipe este fără probleme.-

The SQA methods and tools are aimed at the needs of professional software development & maintenance, activities where (a) quality problems appear in their most severe form, and (b) the most painful losses are expected.

The environmental characteristics of SQA activities:

* **Contract** conditions and commitments defining the contents and timetable.
* The conditions of the **customer–supplier relationship**, as realized by the need for consultation with the customer and the acquisition of his approval.
* **Teamwork** requirements.
* Need for **cooperation & coordination** with other software and hardware development teams both internally and externally.
* Need for **interfaces** with other software systems.
* Need to continue carrying out a project when **team members change**.
* Need to conduct **maintenance** of the software system for several years.

These characteristics also apply to internal development of software & firmware, though only informal contract or informal customer–supplier relationships exist in these cases.

These characteristics demand that intensive and continuous managerial efforts be expended in parallel to the professional efforts in order to ensure the project’s quality and it’s success.

* It has been claimed that environmental characteristics create the need for intensive and continuous managerial efforts parallel to the professional efforts that have to be invested in order to ensure the project’s quality and it’s success.

What are the reasons behind this claim, including an analysis of the managerial effort created by each of the SQA environmental characteristics?

-Latura managerială implică urmărirea termenelor limită, gestionarea resurselor, asigurarea comunicării între părțile interesate și adaptarea la orice schimbări în mediul proiectului (cum ar fi modificări ale membrilor echipei sau cerințe noi ale clienților).-

Topics for discussion

* Educational systems are assumed to prepare the students to cope with real-life conditions. Examine the procedural requirements of a software development project or final software project, and determine which of the requirements could be considered as preparatory to professional life situations as discussed above.

-Sistemele educaționale ar trebui să pregătească elevii prin introducerea cerințelor procedurale din viața reală, cum ar fi controlul versiunilor, managementul configurației și revizuirea documentației. Aspecte cheie precum munca în echipă, relațiile client-furnizor și planificarea proiectelor reflectă practicile din industria din lumea reală.-

**Procedural requirements** – demands to the procedures of elaboration, development, test, delivery & support of the system.

* High contribution:
* Configuration management tools for control of versions, revisions and software installation.
* Document review session (presenter + scriber, who records the defects)
* Limited contribution:
* Use of updated and full documentation (prevents maintenance errors caused by incomplete and/or inaccurate documentation, especially if the design has been revised several times).

**Preparatory requirements** - the steps taken prior to initiating work on the project itself.

* Contract review – these activities must include a detailed examination of (a) the **project proposal draft** and (b) the **contract** drafts (type: development / maintenance):
* Clarification of the customer’s requirements
* Review of the project’s schedule and resource requirement estimates
* Evaluation of the professional staff’s capacity to carry out the project
* Evaluation of the customer’s capacity to fulfill his obligations
* Evaluation of development risks
* Development (SPDP) & Quality Plans (SPQAP)

The project development plan (SPPDP) usually includes:

* Schedules
* Required manpower and hardware resources
* Risk evaluations
* Organizational issues: team members, subcontractors and partnerships
* Project methodology, development tools, etc.
* Software reuse plans.

The project’s quality plan (SPQAP) includes:

* Quality goals, expressed in the appropriate measurable terms
* Criteria for starting and ending each project stage
* Lists of reviews, tests, and other scheduled verification and validation activities.
* The interfaces of a salary processing system are shown in figure below.



* What are the main benefits of applying computerized interfaces instead of transferring printouts?
* Give two additional examples where input interfaces are applied.
* Give two additional examples where output interfaces are applied.
* Suggest additional situations where the use of input and output interfaces is not applied and should be recommended.
* Would you advise all information transfers from one organization to another be performed by computerized interface? What are the reasons behind your answer?

-Eficiență: interfețele computerizate reduc semnificativ timpul necesar transferului de date. În loc să introduceți manual datele din imprimări, informațiile sunt transmise instantaneu, permițând o procesare mai rapidă.

-Precizie: transferul automat de date minimizează erorile umane, care sunt frecvente la introducerea manuală din imprimări. Acest lucru asigură rezultate mai fiabile în procesarea salariilor și operațiunile financiare.

-Securitate: Datele transferate electronic pot fi criptate și protejate, reducând riscul de interceptare sau falsificare în comparație cu documentele tipărite.

-Reducerea costurilor: interfețele computerizate elimină nevoia de materiale fizice (de exemplu, hârtie), spațiu de depozitare și muncă manuală, ceea ce duce la economii de costuri.

-Scalabilitate: Pe măsură ce organizațiile cresc, gestionarea datelor digital este mai scalabilă decât gestionarea înregistrărilor fizice și a tipăririlor.

-Sistemul de comenzi de vânzări: Sistemul de comenzi al unei platforme de comerț electronic introduce automat date în sistemele de gestionare a stocurilor pentru a actualiza nivelurile stocurilor.

-Senzori dintr-o linie de producție: Datele senzorilor, cum ar fi valorile de temperatură sau de performanță a mașinii, sunt transmise electronic către un sistem de monitorizare pentru analiză în timp real.

-Generarea facturii: Un sistem de contabilitate generează facturi care sunt trimise electronic către sistemele de e-mail ale clienților, evitând tipărirea fizică.

-Sisteme de depunere a impozitelor: software-ul fiscal exportă date către sistemele guvernamentale pentru depunerea electronică a formularelor fiscale.

-Sisteme de asistență medicală: Transferul înregistrărilor pacienților de la clinici la spitale ar trebui să se facă electronic și nu manual, asigurând acuratețea și rapiditatea datelor în situații de urgență.

-Lanțul de aprovizionare: Datele de inventar de la furnizori ar trebui să actualizeze automat sistemele de vânzare cu amănuntul pentru a preveni lipsa stocurilor sau supracomenzile.

-Da, în cele mai multe cazuri, este recomandabil ca transferurile de informații între organizații să fie efectuate prin interfețe computerizate. Motivele principale includ:

-Eficiență îmbunătățită în gestionarea datelor, reducând întârzierile.

Precizie îmbunătățită, minimizând erorile umane.

Securitate sporită, asigurând că informațiile sensibile rămân protejate în timpul transmiterii. Cu toate acestea, acest lucru s-ar putea să nu se aplice în toate scenariile, în special în organizațiile low-tech sau la scară mică, unde implementarea unor astfel de sisteme ar putea să nu fie rentabilă. În plus, backup-uri critice (de exemplu, copii pe hârtie) ar putea fi în continuare necesare din motive legale sau de conformitate.-

**Input interface:** In order to calculate salaries, one needs the **employees’ attendance information**, as captured by the time clocks placed at the entrance to the office building and processed later by the attendance control software system.

Once a month, this information (the attendance lists including the overtime data) is transmitted electronically from the attendance control system to the salary processing system.

This information transmission represents an input interface for the salary processing software system; at the same time it represents an output interface to the attendance control system.

**Output interface:** One of the outputs of the salary processing system is **the list of “net” salaries**, after deduction of the income tax and other items, payable to the employees.

This list, including the employees’ bank account details, has to be sent to the banks.

The transmission of the list of salary payments is done electronically, representing an output interface for the salary processing system and an input interface for the bank’s account system.

* A software development project carried out by a software house for a specific customer is carried out under content and timetable obligations, and is subject to the customer–supplier relationship.
* Whether a customer–supplier relationship is expected when the software developed is to be sold to the public as a software package?
* Whether a customer–supplier relationship is expected when software is developed for in-house use, as in the case where a software development department develops an inventory program for the company’s warehouses?
* Some managers claim that the closer relationships are to a formal pattern, the greater the prospects are for the project’s success.

Whether implementing customer–supplier relationships in the situations mentioned in (a) and (b) are a benefit for the company (referring to the internal customer and supplier) or an unnecessary burden to the development team.

-O relație formală client-furnizor nu este la fel de directă ca în dezvoltarea de software personalizat. Cu toate acestea, există încă mecanisme de servicii pentru clienți, asistență și feedback care mențin această relație în mod indirect.

-Dezvoltarea internă implică încă o dinamică client-furnizor, în care departamentele interne acționează ca client (de exemplu, echipele de depozit pentru software-ul de inventar). Această relație asigură claritatea cerințelor și așteptărilor.

-Implementarea relațiilor formale client-furnizor atât în ​​proiecte externe, cât și interne poate fi benefică:

-Comunicare îmbunătățită, print-ro structură formală asigură că ambele părți sunt clare cu privire la așteptări, reducând riscul de neînțelegeri.  
-Responsabilitate ajută la responsabilizarea echipelor pentru livrabile și termene.

Cu toate acestea, în proiectele interne la scară mică, modelele formale pot crea uneori o birocrație inutilă, încetinind dezvoltarea agilă. Echilibrul depinde de amploarea, complexitatea și criticitatea proiectului.-