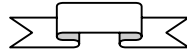


CAN THO UNIVERSITY
COLLEGE OF SCIENCE

UNIVERSITY OF AMSTERDAM
FACULTY OF SCIENCE



UNIVERSITEIT VAN AMSTERDAM



**REQUIREMENTS FOR A
COMPUTER AIDED SYSTEM FOR
TEACHING, LEARNING AND
EXAMINATION
(CASTLE)
FOR CANTHO UNIVERSITY**

by

Le Anh Tuan

**MHO – 3 PROJECT
NATURAL SCIENCES**

Project Technical Document

Version 03/15/04 (castle.doc)

BASIC DATA OF THE PROJECT

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SUMMARY

This document contains the general requirements and procedures for establishing an educational system named “Computer Aided System for Teaching, Learning and Examination” (CASTLE), with emphasis on the Examination module. CASTLE will be implemented at the CoS and may be used later at other departments of CTU.

“The introduction of modern teaching facilities like a so-called Computer Aided System of Teaching, Learning and Examination (= CASTLE) should create possibilities for the students for self-study and training. It provides the staff with a system of examination additional to the traditional one. In this way it will also supply the CoS with a less time consuming system to handle the big number of entrance and interim examinations of a still growing number of students. “

[quoted from the project document MHO3 second phase, page 14]

The teaching and learning materials will be put into CASTLE like lecture notes, additional study materials, exercises and homework. Staff members of the CoS easily can add or change study materials. A register of keywords will make all the materials easy assessable. This will stimulate and facilitate the self-activity learning of the students.

CASTLE will serve the teachers as a tool for constructing examinations from the items test bank. It can do the marking of examinations in case the questions have the format of multiple choice, true/false, matching, etc. It will serve the students as a tool for self-testing when preparing for examinations.

This report describes a/o. the requirements of CASTLE, the decision-making procedure, the plan of implementation and the required support.

Amsterdam, October 11, 2000

CONTENTS

BASIC DATA OF THE PROJECT	2
SUMMARY	3
CONTENTS	4
1. INTRODUCTION	6
2. CONTEXT	7
2.1. Short description of CTU	7
2.2. Present education system	7
3. PRESENT EDUCATION SYSTEM AND EXAMINATION PROCEDURES OF CTU.....	8
3.1. Academic organization of CTU	8
3.2. Examination / Evaluation forms and procedures	9
4. CASTLE CONCEPT	10
5. CASTLE REQUIREMENTS	11
5.1. Functional requirements	11
5.2. Technical requirements	14
5.3. Performance requirements	15
5.4. Data requirements	15
5.5. Future development requirements	16
5.6. User requirements	16
5.7. Organizational requirements	16
5.8. Security and control requirements	16
5.9. Reliability requirements	17
5.10. Interface requirements	17
5.11. Integration requirements	17
5.12. Maintenance requirements	17
5.13. Economic requirements	17
5.14. External requirements	18
5.15. Supplier requirements	18
6. SELECTION PROCEDURES	18
6.1. Organization	18
6.2. Inventory of supplier and packages	19
6.3. Selection criteria: the requirements	19
6.4. Weights: necessities and wishes	19
6.5. Selection procedures	20
7. IMPLEMENTATION PLAN	21
7.1. Acquisition	21
7.2. Technical implementation	21
7.3. Functional implementation	21
7.4. Writing of operator manuals	21
7.5. Staff training	22
7.6. Organizational implications	22
7.7. Data plan	22
7.8. Test plan	22
7.9. Trial period and full implementation	23
7.10. Review and maintenance	23
7.11. Implementation planning	23

8. COST-BENEFIT ANALYSIS	23
8.1. Costs	23
8.2. Expected benefits	24
9. REQUIRED SUPPORT	24
Annex 1 List of persons visited during the CASTLE mission	25
Annex 2 Basic data of CanTho University	26
Annex 3 Procedures for CTU Semester examination	29
Annex 4a Advantages and Disadvantages on the Essay examination	30
Annex 4b Advantages and Disadvantages on the Objective examination	30
Annex 5 Fig.1 INTERNET/CTU/CoS Computer Networks Architecture	32
Annex 6 Fig.2 CASTLE organisation structure in the first version	33
Annex 7 Example of a Control Panel (Blackboard)	34
Annex 8 CTU Educational Needs Analysis	35
Annex 9 CASTLE Implementation Plan	36
Annex 10 Additional Reading	37

1. INTRODUCTION

This document contains the general requirements and procedures for establishing an educational system named “Computer Aided System for Teaching, Learning and Examination” (CASTLE), with emphasis on the Examination module. CASTLE will be implemented at the CoS and may be used later at other departments of CTU.

The document is a part of the activities within the framework of the MHO-3 project * (Natural Sciences) under the terms of the co-operation between the College of Science (CoS), Can Tho University (CTU), Vietnam and the University of Amsterdam (UvA).

The procedure described here starts from a needs analysis based on the present academic situation of CTU and results into a specification of the system requirements. These requirements are then used to implement CASTLE including a software package, upgraded CoS local area networks, training of staff members and students, etc. Finally a step-plan has been added, describing the steps to be taken and the time frame to realise CASTLE.

References for this report are listed below:

- CTU - UvA, 2000, *The MHO-3 project in the 2nd phase (Natural Sciences)*.
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- MoET, Department of Higher Education, 1996, 2nd edition, *Testing and Educational Measurement* (adapted while translating into Vietnamese from the book of Quentin Stodola and Kalmer Stordahl, USA, by Nghiem Xuan Hung and Dr. Lam Quang Thiep).
- Some *technical documents and demonstration software* download from Internet that is described in 7.2.
- TU Delft, Bui Quoc Chinh, 2000, *A Prototype for Computer Aided Examination System at the College of Science, CanTho University*, Master of Science Thesis.
- University of DaLat, Department of Academic Affairs, Quang An, 1997, *Objective tests and University Entrance Examination* (in Vietnamese).

This report was prepared in the Netherlands, from August - October 2000 by CTU staff:

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Discussion have been held with UvA staff and other persons (See Annex 1).

* MHO : Medefinancierings programma Hoger Onderwijs

2. CONTEXT

2.1. Short description of CTU

CTU is a medium-sized public university founded in 1966 and located in Can Tho City, in the Mekong River Delta (MD), the South of Vietnam. It has 3 campuses that cover more than 850,000 m². The largest one is Campus II, including colleges/schools, institutes/centres and administration management departments. At the present time, Campus I is the second one, mainly for the University Guest House, the School of Economics and Business Administration, and for Staff Dormitories. Campus III, the smallest one, is managed by the College of Information Technology. Can Tho University is the biggest higher education institution in the MD that is full-fledged and multidisciplinary. In the year 1999, 2 new universities in the region have been established: An Giang State-University (ASU) and the Mekong Private-University (MPU). CTU, ASU, MPU and 6 other Community Colleges (CCs, as continuing in-service training centres) in the provinces of the MD (i.e. Tien Giang, Dong Thap, Vinh Long, Can Tho, Bac Lieu, Kien Giang) are the institutions for higher education and higher vocational training in the MD.

CTU currently has 8 colleges/schools and 4 institutes/centres and 2 companies and 10 functional departments/offices. In the academic year 2000 – 2001, CTU offers 37 Bachelor studies to students in agriculture, engineering, medicine, economics, law, and pedagogy for high schools (see Annex 2). Beside education, CTU conducts research in many subjects relevant to the region and is actively taking part in the transfer of technical know-how to various sectors of the society.

During the years 1995 –1999 the MHO-programme made it possible that Can Tho University could improve its education programmes considerably as well as the general facilities of the University. The second phase of the MHO co-operation, from 2000 – 2003, is expected to continue these developments with more attention to research and transfer of knowledge to the region.

2.2. Present education system

CTU is offering 37 undergraduate training programs leading to degrees equivalent to a Bachelor's degree in agriculture, engineering, education, medicine, economics and law. The Bachelor-equivalent programs last from 4 to 5 years, and the medical program lasts for 6 years. Since the school year of 1997-1998, the undergraduate programs have been divided into two cycles. The first cycle (of one-and-a-half year) offers general basic sciences for all students. The second cycle (of two-and-a-half to four-and-a-half years) offers programmes in medicine, technology, etc. leading to Bachelor degree. Between the two cycles there was an examination. This examination became a heavy burden for both the students and the teachers. Therefore, the Ministry of Education and Training (MoET) has decided to cancel this “hard rule”. But the training programmes are still divided in two cycles. The students already know their domain of the second cycle program when entering the university. Each student is evaluated through semester examination. Students have to pay tuition fees. They can get the university scholarship if they have high marks.

Besides regular training programs, CTU is organising many short-term training programs, workshops, and seminars on its campuses, at the Community Colleges (CCs) as well as at provincial locations and in villages. The campuses in Can Tho have become the centre for dissemination of scientific and technological knowledge, and for cultural

activities in the MD. Its on-the-spot training groups, equipped with portable slide projectors, have since long become familiar to farmers in remote areas.

Since its foundation in 1966, CTU has graduated more than 13,600 students and the CCs have also graduated more than 4,800 students holding bachelor's degrees. According to CTU's statistic data, in the academic year of 2000-2001, CTU has more than 14,900 full-time undergraduate students, among which are approximately 5,900 students in the first-cycle, of which 3,600 are new students. The new students are selected from 36,600 applicants via an entrance examination at CTU. They are distributed into 37 different studies. It is proposed that in the next year, 2000-2001, the total of training programs of CTU will be 45. The rapid increase of the number of students will bring a heavy load for CTU in the coming years.

Graduate programs

In the 1999-2000 school year, CTU has more than 330 graduate staff members taking training programs leading to Master degrees. A few staff members are taking programs leading to PhD degrees in microbiology, soils science, agronomy, environment and education.

3. PRESENT ACADEMIC ORGANIZATION AND EXAMINATION PROCEDURES OF CTU

3.1. Academic organisation

At the institutional level, the Rector of CTU is the highest administrator in the whole university for taking the final decisions in educational policies. He has the responsibility for all the academic activities towards the Ministry of Education and Training (MoET).

In daily practice, CTU's educational system is mainly managed by the Department of Academic Affairs (DoAA). DoAA is a unit having the responsibility to implement almost all academic activities in the whole university and in a part of CCs' system. The main tasks of the DoAA are:

- to make the academic reports to the CTU Rectorate Board and the MoET, periodically.
- to inform the teaching staff and students about the academic plans such as the course calendar, practical schedules, examination plans, ...
- to manage the student files: personal data, studying procedures, results, ...
- to advise the Rector, the Dean in educational policies.

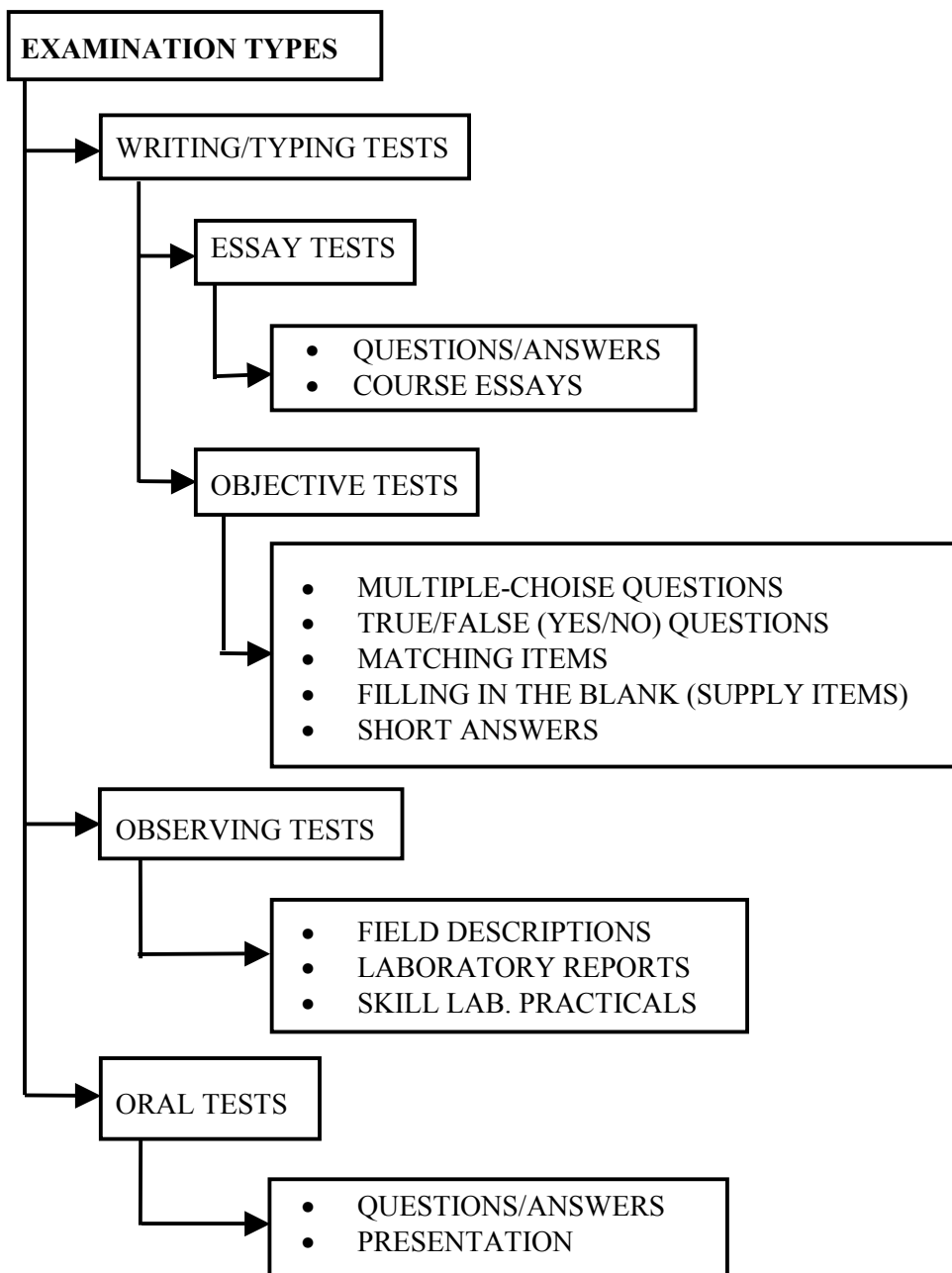
Each college/school, has one Vice-Dean and one staff member (called Academic Affairs Assistant, AAA) who are responsible for all the educational activities involved in its field of study. They have a close co-operation with DoAA and teaching staff members inside and outside their college/school in the implementation of academic procedures.

In the present time, course instructor(s) have encouraged to release many new versions of lecture-note(s), some new teaching methodologies have been introduced and applied (learning by discovering, student-oriented teaching, problem-based learning, ...). Some new ways for evaluation have been applied as multiple-choice questions (around 20 – 25% of the examination). The paper-essay way of examination is being used popularly (around 60%) as a traditional method. Other ways of examination (oral test, reports, ..) count around 15 – 20%.

3.2. Examination / Evaluation forms and procedures

In each semester, there are many tests as exercises, assignments, practical tests, course reports, mid-term examination. Course instructors manage these activities. The results of these kinds of tests may be used as a part of the final course marks. At the end of each semester, the DoAA organises a final semester examination. They inform the teaching staff and students about the examination calendar including the examination date and time, room numbers, course names and ID numbers. A temporary Semester Examination Committee (SEC) is established in order to control the procedures of tests. The Head of the SEC is the Rector or the Vice-Rector, others members are the Head of DoAA and the Deans of Colleges/Schools. (see Annex 3).

There are many types of examination in CTU, they can be classified in the following way:



Almost all tests are done on paper by hand writing (essay and multiple-choice tests) except the oral test and some field/lab. reports or presentations. SEC and DoAA manage all the examination procedures (organising the examination places /dates /times / supervisors, giving exam-paper codes, distributing to the course instructors for marking and then inputting course marks to computer and informing the final results to students). The student can require the DoAA/ and course instructors to re-mark their results. They can ask for the second examination in their course(s) one time in each semester.

(See annex 4: Advantages and Disadvantages on Essay and Multiple Choice Examinations).

4. CASTLE CONCEPT

MoET and CTU estimate that, in the year 2010, CTU will have about 20,000 students and will take care of the first cycle (basic sciences subjects) of another 10,000 students divided over 9 community colleges and in-service/continuing training centres in the region. It means that for the CTU-staff a really heavy workload in teaching, examination and evaluation is foreseen. The institution is prepared to use all its abilities to face this new challenge. CTU's financial system, the administration and the work related to academic affairs need computerisation as a necessary condition.

Developing a system named Computer-Aided System for Teaching, Learning and Examination (CASTLE) has to meet CTU's developing requirements and should cope with the increasing number of students and academic activities in the present and near future.

It is foreseen that CASTLE will not be a Master Tool for taking over all academic activities. However, it may be one of the tools to be used for speeding up firmly the examination and evaluation procedures. Moreover, it will also be an opportunity for upgrading knowledge and skills of teaching staff members.

At the moment, CTU has developed a CTU computer network that has access to Internet. Each college has a local area network that may link to CTU system. This basis infrastructure allow us to think on a distance education system with software packages containing lecture-notes, exercises, tests and other items for lecturers and students and administrators. CASTLE may play an important role in this education system.

For a start, CASTLE will consist of a Teaching module, a Learning module, an Examination module and a System management module. However, the most urgent one is the Examination module. In the near future, other modules like Academic Planner and Designer, Students and Staff Managers, Library Linkage, Internet Tools, ... may be added.

The system should enlarge the number of learning and teaching tools, thus providing the quality of the education process. All databases (courses, exercises and items test banks) can only accessed and edited by authorised persons. The input and output (on monitors, files, or papers) should be Vietnamese.

The system will run on an existing LAN platform and should work under a Windows environment with multiple users.

5. CASTLE REQUIREMENTS

5.1. Functional requirements

In the proposed CASTLE, a Control Panel for the system is the most important one and needs to be implemented first. The Control Panel should be designed in such a way that other modules could be added. At least the modules mentioned below should be built into the first version. (See annex 6 + 7 + 8):

- + *Teaching Module.*
- + *Learning Module.*
- + *Examination Module.*
- + *System Module.*

These modules should be linked to others.

General requirements:

- The input screens and all output on screen, file, or print should be Vietnamese.
- CASTLE must be able to serve users many types of testing questions for many subjects.
- Data may be stored in CASTLE server or in user's own-diskettes or other storage.
- Multiple choice test banks may be accessed randomly by students or the questions may be sorted following each teacher's orders.
- CASTLE should store all the answers, scores, and results in MS. Excel or SQL databases.
- CASTLE should allow many teaching staff members to work together. They can exchange their data and information regulated by authorisations.

Teaching Module

The Teaching Module contains the tools for creating and managing the Staff Information and Announcements, Course Structures and External Links, Course Documents, Homework, Test Bank.

- Each teaching staff is allowed to access to CASTLE with his/her password.
- All the tools in the Teaching Module are designed and managed by the course instructor with the support from the system (creating folders, inserting and merging file, converting Vietnamese fonts, default options).
- Teaching staff is allowed to share or exchange their own-data and course documents to all persons, group of persons, or nobody.
- CASTLE should allow students to access to the Teaching module for reading or copying, however they cannot change / delete any data in it.
- Test Banks should be prepared by teaching staff members. Their items can be stored in hard disks, zip-files or floppy-diskettes with an authorised security protection and access right.

Staff Information and Announcements

This tool contains personal data of each course instructor, including his/her full name, academic levels, position, office address, course names, working hours, telephone number, e-mail address.

Announcement is an area for the instructor giving announcements to students/ other persons.

Course Structures and External Links

This is a place containing basic information of the course such as course code and contents, general out-lines, pre-course requirements (codes and names), course time and credits, course testing forms, reference books and documents. This information can be linked to others like HTML techniques.

Course documents

This contains lecture-notes / syllabus involved the courses. Instructors give them.

Homework

This contains course quiz, questions, exercises, homework; discussion problems involved the course that given by instructor periodically.

Test Bank

Test Bank is supports tool that instructors can store and manage *objective test* files with his/her codes and passwords.

Learning Module

The Learning Module contains the Training Programmes, Discussion Box, and Homework Submits, Self-Test.

Training Programmes

This contains many curricula from many training studies in CTU. This also has Yearly Academic Agenda and Semester Course TimeTables. They are input by DoAA and the Colleges/Schools and can be freely accessed or copied or printed into the system.

Discussion Box

This is a forum that students and course instructors can exchange their questions and answers, ideas, comments, suggestions via text forms. Course instructors will define the student names that they can access the box. Instructors can delete any text in his/her box area.

Homework Submits

This part is also linked to the Homework/Teaching Module. Each student can access into this area with Identified number (ID No. is an academic file-code of a student that given by the DoAA) for submitting his/her homework answers. They can edit their submits up to the date defined by the course instructors.

Self-Test

Self-Test is a tool allowed for everyone checking his/her knowledge. It can be a part or outside of the Test Bank. The Self-Test is made by the course instructor(s).

Examination Module

The Examination Module area is the most urgent one. It contains all the tools necessary to create and manage the tests and the surveys. They are the Test Generator, the Test Examiner, and the file with the Test Records and Statistics.

- Each course instructor is allowed to access to the Examination Module with his/her own-passwords to create and edit their testing folders/files in Test Generator, to view the students' results in the Test Records and Statistics file.

- Each student is allowed to access to the Examination Module /Test Examiner with his/her own student-ID-code and course-ID-code that have been approved and transferred to the system by DoAA after registering for the course in each semester.

Test Generator

It is a tool that supports the course instructor(s) to build a quiz/item-test question with all the options associated with the *objective test* methodology.

- + Multiple-choice questions
- + True/ False (Yes/ No) questions
- + Matching items
- + Filling in the blank (Supply items)
- + Short answers

A general problem united with many types of questions may be given by instructor(s). Problem should appear in monitor associated the question(s).

Each quiz/item-test question can be classified at least in 3 levels in the first version: basic (easy) level, core (medium) level and advanced (hard) level. All the questions should be stored in the Test Bank/Teaching Module with course instructor's passwords.

Course instructor(s) can define percentages of questions level to be appeared in the monitor for the students.

The Test Generator can only be used by course instructors. It is protected strictly to the students as an Examination Questions security.

Test Examiner

Test Generator is an instructor's representative to test students following his/her order. Each test for each student should be generated randomly from the Test Bank.

Each test should be done in a limited time defined by the course instructor(s). A time-counter should run and appear in monitor when testing. The system should auto-submit when the time is over. Then, a marking procedure will be carried out.

When testing, the system should give numbers and bullets to questions for students. By using a mouse, student can choose easily any question for answering. The system should inform to student all done answers on the monitor.

Test Records and Statistics

It contains the results of Test Examiner. Course instructor(s) should define their test grading scores. The system automatically counts the right and wrong answers for each question in each test and for each student. Its data can be stored and copied in MS. Excel and SQL database files for reports and statistics purposes.

Student's marks are counted and rounded up automatically into 0-10 marking system (intervals 0,5). Each student will receive his/her record(s) in monitor or printed paper after testing.

The student is not allowed to access to the Test Records and Statistics.

System Module

The System Module contains User Management, Online Help-Desk, Printing Service, and File Management.

The User Management

Its features are specifically for teachers and students administration. Instructors design the working groups for each exercise or semester paper.

Online Help-Desk

It is a tool to guide the course instructor(s) and students how to use the system, how to do when troubleshooting, ...

Printing Service

It defines what kind of printers the system has, and which printer can be used.

File Management

It works as a File and Directory Explorer. The System administrator will distribute the access-right for each user to his/her directory.

5.2. Technical requirements

In the first stage, CASTLE will run in the computer rooms of the Department of Informatics (DoI)/CoS in the pilot case. At the present time, each computer room in DoI is provided with a Local Area Network (LAN) with a server and 18 workstations. There are 6 computer rooms.

+ 5 computer rooms were installed in 1997 with a same design: Server Compaq ProSignia 300 Model 5/120: Pentium, Intel CPU, Processor 120 MHz, RAM 32 MB (ECC Memory), Storage 2,1 GB Fast SCSI-2 HDD, Network Interface PCI Integrated Netflex-L (RJ45 & BNC). WorkStations: AUSTIN POWER 5/120, Processor 100 MHz, Pentium (Intel CTU), Chipsets: Intel TRITON II (with WCC), RAM 8 MB (EDO Memory), no harddisk inside. In the future, upgrading of RAM and a hard disk is desirable for each workstation.

+ The 6th room is modestly equipped (in 1999), Server HP E60, Processor 400 MHz, Pentium (Inter CPU), RAM 128 MB, Storage 4.3 GB, Fast SCSI-2 HDD. WorkStation: Intel LX440, CPU Celeron 400 MHz, RAM 32 MB, Storage 4.3 GB.

The LAN network operating system in use is the Novell Network 4.11. It can be connected to each other via a backbone line (UTP). When video will be available the cabling inside each LAN should change to UTP. It is possible, for the time being, to use the PC that is available at the CoS (Pentium III, 450 MHz) as Web/Data Server for the whole system. The system should run under the Windows shell.

A special server (HP or Compaq) is highly preferable (800 MHz, 128 MB RAM, HDD 10 GB at least). It is highly recommended to add a *raid array – 5 discs device* to the server which must be hot swapable. For safety reasons a separate hard disk is badly needed for the automatic back up system (see section 5.8) and/or a CD-writer (plexore) to regularly make a mirror of the hard disk.

5.3. Performance requirements

The system is intended to serve multiple clients in the first stage, about 100 students and staff and then 250 at the same time. Therefore the requirements for the performance are critical. Here the performance is considered good if the system can provide services to clients and responds for their requests with an acceptable response time.

The system should allow on-line entering and automatic queing. The system should use the available hardware to its best potential. The aim is that with 18 simultaneous users response time in displaying standard input screens should not be exceed 2 seconds, and that queing on individual transactions should not take more than 3 seconds.

It should be possible to save user-defined output formats for later use.

For time-consuming activities (like printing an elaborate overview) it should be possible to define scripts which can be executed automatically after office hours or during user-defined hours.

5.4. Data requirements

- Faulty entries should automatically be refused by the system (automatic consultation of master files for listing the existence of master data, checking of data type, data ranges, obligatory entries, double entries of master data, ...).
- *Data Management*: the system must have the ability to store and manage the relevant information, it must be able to answer any requests concerned with data such as who creates a test, a question belongs to which course, who is the author of this question, etc. In addition, the data consistency must also be taken into account. Here are some basic operations:
 - Search: allow user searching for information on the database within their authorisation. The system should be able to search, provide information to the user according to their request. The information can be of any type, such as questions, student records, and staff members.
 - Browse: the system should allow the users to browse the database, view or check the data they have entered.
 - Storage: the system must be able to store huge amounts of data, in a variety of formats such as text, image, voice, and video. The system provides for the efficient storage and manipulation of multimedia data.
 - Recovery: the system must be able to recover from intentional or unintentional incidents.
 - Fault-tolerance: the system must be able to provide a certain level of fault-tolerance.
- *Input data*: the system must provide facilities to course instructors to enter the new data or insert and convert available data on a file from a floppy disk.
- *Edit data*: when data have been put into the system, it must also provide the possibility to modify (cut/copy/paste), or delete the existing data.
- *Exchange data*: the system should have ability to exchange information with other existing systems, it should import data/export data to/from other formats or other systems.

5.5. Future development requirements

The system source code and the system development tools should be known to adapt/further expand the system to fit CTU's specific needs (see Annex 8).

5.6. User requirements

It is unrealistic to set the requirement that all CTU teaching staff members and students have a computer literacy. Therefore the system should meet the following criteria:

- Friendly and easy in use (every function must be clear, can not be ambiguous, or make the user confused).
- User-interface (menu's, input screens, output screens) in Vietnamese
- Error messages in Vietnamese
- On-line help functions available in Vietnamese.
- User-training regularly (at least in Vietnamese User-Guide manuals).

5.7. Organisational requirements

By introducing CASTLE for examination, it requires official recognition by the DoAA and the CTU Rectorate Board. The most important aspects of that recognition (after a trial period and full implementation) are:

- CASTLE is an official educational tool of CTU.
- All lecture notes, exercises, tests on CASTLE are considered as official teaching materials.
- Marks obtained by semester testing through CASTLE are considered as a part of official academic grades of each student.
- Staff time for system operation is part of the official task.

5.8. Security and control requirements

The security and control requirements that should be available within the system:

- Only authorised users have user-access rights through their own-passwords.
- User-access rights to data need to be defined at data element (field) level, where the following rights can be distinguished:
 - + viewing data
 - + adding and changing data
 - + deleting data
- To prevent data loss in case of calamities (fire, humidity, etc, ..) the system needs to be equipped with an automatic back-up to be kept in a different place. In addition, periodic back-up data needs also to be stored elsewhere.
- To prevent any sudden power failure, System's Server should have an UPS (Uninterruptible Power Supply) facility.
- To prevent computer virus infection, the system should be protected by regularly updated anti-virus software.

5.9. Reliability requirements

The system must be reliable, since it contains very sensitive information. Furthermore, the system must also be stable, when there are many users connected to the system. If the system has a problem, an automatic data-save mechanism should prevent the loss of (many) data.

5.10. Interface requirements

The system should allow to import and export data in a Window environment, to “Copy/Cut and Paste”, to “Drag-and-Drop” data between the CASTLE system and other Windows applications.

5.11. Integration requirements

Any input and output data should automatically pass the Control Panel.

5.12. Maintenance requirements

For system maintenance, the following is required:

- At least 2 teaching staff working as system managers and 2 technical assistants.
- Technical documentation and system management manuals.
- Source code and system development tools should be available.
- At least 1 person per department should be responsible for the training of and service to staff and students.

5.13. Economic requirements

The total MHO-3 budget of CASTLE is 40,000.- Dutch Guilder (# 15,000 USD). This should cater for:

- Payment to a software company and to CTU staff to develop the CASTLE system, to write user manuals, and/or to buy software packages.
- Funds for staff time to build up the Test banks (only in the first year).
- Funds for staff time related to system development, selection, testing and implementation.
- Funds for upgrading partly the existing computer networks of CoS (adding back-up system, RAM, ...).
- Connecting the 6 LAN's to the main server.
- Funds for CASTLE-involved seminar and core-staff training.

In addition to funds needed for developing and establishing the CASTLE system, the following activities will need support from the CTU/CoS budget or from other items of the project:

- Funds for upgrading and repairing partly the existing computer networks of CoS (RAMs, harddisks, ...).
- Funds for staff time to further build up the Test banks (next years).
- Funds for other unforeseen payments involved with the system.

5.14. External requirements

CASTLE has to meet the requirements of the MoET in Rules and Regulations on Educational Management (course structures, mark grading, ...).

No other external requirements are known at this moment.

5.15. Supplier requirements

The Supplier of the CASTLE should have the ability for producing a high quality system. The supplier should:

- Have a Legal Certificate in business.
- Have prestige in the market (number of years have been active in software development).
- Have some CASTLE-like software products.
- Have contact with CTU during the last years.
- Give an acceptable price.
- Exist for a number of years more (service purpose).

6. SELECTION PROCEDURES

6.1. Organisation

CTU/CoS, through the support of the MHO-3 Project, should establish a working group, named CASTLE Team, to carry out the project. The CASTLE Team will:

- organise the CASTLE-involved seminar.
- translate the CASTLE documents into Vietnamese.
- explain the CASTLE requirements for concerned persons.
- discuss and receive all the comments related the system.
- complete the final requirements.
- call for software development companies.
- point out a selected software developer / supplier.
- check the draft versions of the ordered system.
- help teaching staff to input data to system.
- help students to access to the system.
- evaluate the final version of the ordered system.
- report the process and results to CTU and MHO-3 project.

The CASTLE project will be developed and implemented under the total responsibility of the CASTLE Team of the CoS. The CASTLE Team comprise Mr. Le Anh Tuan (CoS, Group Leader), Mr. Bui Quoc Chinh (CoS, deputy group leader and Technical Supervisor), Mr. Nguyen Vinh An (Vice-Head of DoAA, Education Supervisor) and some Core-members (teaching staff members and administrators). Dr Le Quang Minh will be invited to join the team as policy adviser on behalf of the Rectorate. The tasks of all the group members will be defined in detail in November 2000.

The CASTLE Team may be funded partly from the budget of the MHO-3 project. (see Section 5.13).

6.2. Inventory of supplier and packages

There are many suppliers involved Teaching, Learning and Examination Tools in computer software market. During the visit of L.A. Tuan in the Netherlands, some systems have been introduced:

- BlackBoard 5 (University of Amsterdam, Delft University of Technology)
- Virtual Classroom (Educational Faculty, Hogeschool van Amsterdam)
- Computerised Case-Based Testing Project (Faculty of Medicine, University of Maastricht)
- Wonder BOX (BioMedia, Amstel Institute, UvA)
- CITO (Netherlands National Institute for Educational Measurement)

An inventory of suppliers and their systems was made on Internet:

- BlackBoard 5 (<http://www.blackboard.com>)
- Question Mark TM (<http://www.qmark.com>)
- AusWeb95 (<http://www.scu.edu.au/sponsored/ausweb/ausweb95/>)
- CITO Testing Program (http://www.cito.nl/engels/eind_fr.htm)
- Computer Based Testing (<http://www.ets.org/cbt/index.htm>)
- Talc 2000 Automated Testing (<http://www.aig.co.uk/msg8.htm>)

In Vietnam, there are some Software Developers such as HCM City PolyTechnics University, Saigon Information Company (SIC), ... Their products may be used as an examination tool with Vietnamese language in some special cases, (the prices in general, may be acceptable if compared with others from American/ European products). Vietnamese software products should meet a high-weighted consideration.

On return to Vietnam, CASTLE Working Group will continue investigating existing systems in the Netherlands, other educational bases introduced on Internet and Vietnamese products.

6.3. Selection criteria: the requirements

CASTLE Working Group can use the list of requirements described in Chapter 6 as selection criteria. It is proposed to have at least 2 supplier selection rounds. The aim of the first round is to shortlist the number of potential suppliers to not more than 3, based on a rather general analysis. In the second round the final selection is made, based on a detailed analysis.

6.4. Weights: necessities and wishes

During the first assessment round, it is proposed to simply chose 3-most prospecting suppliers based on the requirements of section 6.14.

During the second round, the 3 selected suppliers will be assessed in more detail on the requirements of chapter 6. At this stage it may be necessary to collect more detailed information about the shortlisted suppliers. CTU may also decide to add weights to each of requirements, as some may be absolute necessities while others may be wishes. This should result in the final selection of one supplier.

6.5. Selection procedures

<i>Items</i>	<i>by</i>	<i>Finish</i>	<i>Remarks</i>
Inventory of suppliers and available systems	Tuan+Chinh	15 Nov.	
Calling for suppliers	Minh+Tuan	30 Nov.	
First selection round	CASTLE Team	15 Dec.	Report to MHO-3
Attach weights to requirements	CASTLE Team	30 Dec.	Report to MHO-3
Second selection round	CASTLE Team	15 Jan.	Report to MHO-3
Draw up draft contract	CASTLE Team	30 Jan.	Report to MHO-3
Sign contract	Minh /Tuan	15 Feb.	Fax to MHO-3

7. IMPLEMENTATION PLAN

7.1. Acquisition

The selection procedure as described in chapter 6, finalised with signing the contract with the selected supplier, is the first step towards CASTLE implementation. The contract will describe aspects like:

- Guaranteed functionality.
- User numbers and other rights.
- Guaranteed service levels.
- Provision of training facilities.
- Assistance with technical implementation.
- Assistance with functional implementation.
- Price and Payment stages.
- Conditions for using source code of the system.
- Copy-right of the system.
- A clause on how to solve possible conflicts.

7.2. Technical implementation

The system will most likely be delivered on CD-ROM. From there it should be installed on the LAN and under Windows so that the system is accessible to the users. This is the technical implementation. The technical implementation can be the responsibility of the supplier, or the system can be delivered with a self-installation programme. This is an aspect to be covered by the contract.

Technical implementation usually is a rather straightforward activity, as the application of selection criteria should have filtered out the systems that cannot be easily implemented on the CoS/CTU's network.

7.3. Functional implementation

Whatever system will be acquired, it will need to be targeted towards the CoS/CTU environment. Functional implementation should be estimated, especially in case of a first-time implementation. It is strongly recommended that CASTLE should be provided at least 3 kinds of data information for each tool in each module in the first year after installation.

7.4. Writing of operator manual

For the CASTLE operations, system-managers manual should be written. These manuals describe the real situation of the system, how to install the system, how to manage the data bank, how to distribute each access-right, how to solve the troubleshooting, ... This needs to be done by the supplier.

The system should also have user manuals. These manuals can be written following the CoS/CTU teaching, learning and examination methodology. They should associate with staff training operation. This needs to be done by a combination between the suppliers and CASTLE Working Group.

7.5. Staff training

There are two forms of staff training: a system-managers training and a users training.

First, a “system-transfer” training will be held for system managers when the functional implementation of the system is complete. The supplier should prepare a system-managers manuals.

Second, CASTLE Working Group will organise users training. At least 2 teaching staff in each department will be pointed out to attend the course. They are provided CASTLE with users manuals. They should practice to input their lecture notes, exercises, test bank, ... following the format of system and to test the system in many aspects as an expected result. Then, they can train the other staff in their departments.

7.6. Organisational implications

The following organisational implications may be expected:

- Creation of a CASTLE Team to guide selection procedure and system implementation. It is proposed the Team comprise members as indicated in section 6.1.
- The appointment of a system manager: an appointed staff member in the DOI/ CoS who will responsible for overall system use and the correctness of the data in the system.
- If possible, another staff member in the DoAA may be appointed, who will advise the system manager to adjust any aspect involved CTU’s educational system and policy.
- CTU/DoAA/CoS should estimate staff times and finance for CASTLE tasks.
- It is foreseen that some of the educational procedures and policies may have to change as a result of the introduction of the CASTLE. Then, DoAA and Mr. Tuan, and CTU Rector (if necessary) will have to decide how these should be handled.
- Staff needs to be trained, and time needs to be reserved for this. This may temporarily disrupt daily teaching works of the staff.
- Some of the staff’s tasks and responsibilities may change: on the one hand because of the demands made by the system, on the other hand because some staff may be more competent and confident with the new system than others.

These organisational implications should be planned for in advance.

7.7. Data plan

During the first year of system development, installation and implementation stage, a lot of data will need to be input and converted from many files to the system to be able to operate (lecture notes, test banks, images, texts...). This will be a time-consuming job, which may only be possible through temporarily hiring additional staff.

7.8. Test plan

For training purposes a special system environment needs to be created. In this environment pre-defined test cases need to be tested. System testing is not a one-day activity: especially when the system’s install base is small, system testing may take up to several weeks before it can be considered safe to go live.

7.9. Trial period and full implementation

CASTLE needs a trial period before it will be introduced widely. During the trial period, the system is checked not only for finding the errors but also for staff to make acquaintance with a computerised system for teaching, learning and examination. During this period, the system should be introduced to students, too. Any feedback comment is necessary to re-check and adjust the system.

During full implementation, the system manager is responsible for overall use of the system and the data contained in it.

7.10. Review and maintenance

CASTLE needs to be reviewed regularly to determine whether:

- Its functionality is as intended.
- The data exchange does not contain errors.
- The technical (hardware) system is stable.

Based on these reviews, carried out by the system manager, decisions are made on possible adjustments to either the system's data relationship, or the systems program coding. It is advised that review of possible system errors and correct operation is carried out continuously, and that questions of functionality are assessed periodically, e.g. once every six months.

7.11. Implementation planning

The planning of the implementation is proposed in Annex 9. The Group leader of the CASTLE team is in charge of authorising the access to the different modules and possibilities of the system for the users (staff and students). At least during the first stage (probably one year) the system will only serve as an Intranet. Connection to Internet and connections with the satellite colleges of CTU will be managed by the webmaster.

8. COST-BENEFIT ANALYSIS

8.1. Costs

The following costs (in USD) can be identified roundly with the system implementation:

• software costs to supplier (price for system, training, source code license, ...)	7.000
• seminar and training costs	500
• support cost for CASTLE Team (staff time, travel to HCM, papers, ...)	2.000
• translation and writing and printing cost for users-manuals	500
• data input costs in the first year	3.000
• hardware acquisition costs and depreciation	2.500
<hr/> Total	<hr/> 15.000

Other staff time costs will be estimated by the CTU budget:

- costs of data (lecture notes, exercises, test banks) input in the 2nd year implementation
- costs of employing a system manager
- costs of yearly hardware maintenance fee
- costs of system upgrade

8.2. Expected benefits

The expected immediate benefits are almost entirely of a non-monetary nature. It is expected that through the introduction of CASTLE:

- CoS/ CTU will receive a new computerised system that supports the existing educational system. With the foreseen growth of the university, CASTLE may become a useful tool for the proposed CTU Testing Centre.
- Yearly examination costs of the university may be reduced partly after some year's implementation of the system.
- CASTLE may be used for distance education system.
- This will reduce a time-consuming job for academic administrators and instructors, who will eventually save staff time.
- CASTLE may become one of education measure tools of the university.
- CASTLE may be introduced to other colleges/ universities.

9. REQUIRED SUPPORT

CoS requires support from the MHO-3 Project and CTU budget for CASTLE implementation. It may include:

- Financial support for purchase and implementation system (see section 8.1).
- Dutch expert support to the CoS for CASTLE's data.
- CTU/ DoAA and other departments' staff support to CASTLE Team for development the system such as consultant, staff time, data supply, and extra cost.

ANNEX 1**LIST OF PERSONS VISITED DURING THE CASTLE MISSION**

- **Ir. Peter de Goeje**, UvA Office for Development Co-operation
Co-ordinator of the MHO-3 project on the Dutch side
- **Drs. Arend van Leeuwen**, UvA Office for Development Co-operation
Secretary of the MHO-3 project on the Dutch side
- **Frank Benneker**
ICT specialist. Information Centre UvA. Blackboard webmaster UvA
- **Bui Quoc Chinh**
CTU staff, MSc. student in Delft Technology University
- **Dr. Wolter Kaper & Natasa Brouwer & Dr. Martin Goedhart**
Webmaster Blackboard-alike Chemistry Department, UvA
- **Drs. Willem Bustra**
Hogeschool van Amsterdam, Education Faculty (TTC). Physics Software, Virtual Classroom, ...
- **Robert Peperkamp** (Ing. AGW Peperkamp, Com. Sc. Engineer, Programmer)
Dr. Lambert W.T. Schuwirth (Assistant Professor in the Department of Educational Development and Research, Chairman of Computerised Case-Based Testing project)
Faculty of Medicine, University of Maastricht
- **Dr. Leendert van Gastel**
Amstel Institute, Information Centre, SARA
- **Floris Hekma**
BioMedia, Art Director, Amstel Institute
- **Leo Trippelwitz & Drs. Cornelis Kaaij**
DOS, Vrije Universiteit, Amsterdam
- **Dr. Annemarie de Knecht-van Eekelen, Wim Pont, Gerard Boeijen, Angela Verschoor**
CITO, National Institute for Educational Measurement, Arnhem
- **Floris Hekma, Derk Kuiper, Daniel Goudvis, Diederik Slob**
Team Computer Supported Education (COO/ICT), Amstel Institute/ BioMedia
- **J.M.D. Chardet, mw S.E. Clason, T.H. van Wissen**
Informatisering & Computerfaciliteiten

ANNEX 2

BASIC DATA OF CAN THO UNIVERSITY

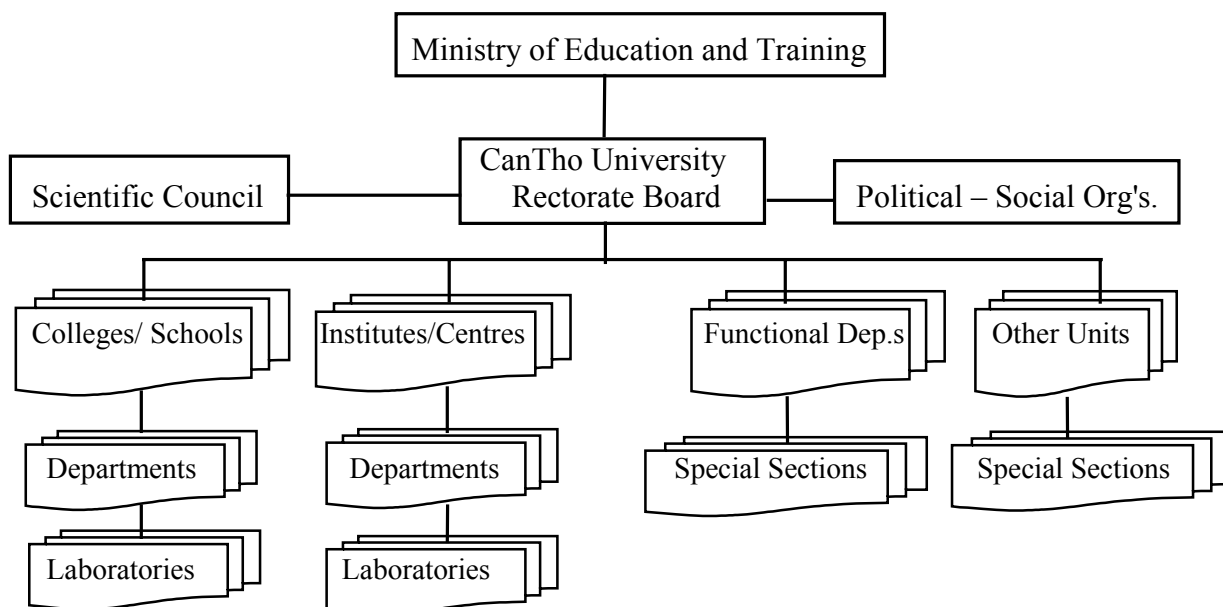
- Founded in 1966
- Located in Can Tho City, the Mekong River Delta, Vietnam
- **Estimated staff and students from year 1995 to year 2010**

Up to Year	No. of Students	Teaching staff / Total staff
1995	6 988	592 / 934
2000	10 016	835 / 1211
2005	15 040	1253 / 1817
2010	20 200	1623 / 2441

- **Present physical facilities**

Items	Campus I		Campus II		Campus III		Total	
	Q'ty (units)	Area (m ²)	Q'ty (units)	Area (m ²)	Q'ty (units)	Area (m ²)	Q'ty (units)	Area (m ²)
Classrooms	2	168	58	8060	1	192	61	8420
Auditoriums	2	321	4	2479			6	2790
Lab. & Workshops	2	454	33	6913	27	2006	63	9373
Central Library			1	5303			1	5303
Experimental Farm			1	7300			1	7300
University Inn	9	1874					9	1874

- **Organisation chart of CanTho University**



- **CTU 's Academics and Administration Units**

COLLEGES / SCHOOLS

1. College of Agriculture
2. College of Technology
3. College of Information Technology
4. College of Natural Sciences
5. College of Social Sciences (new)
6. School of Economics and Business & Administration
7. School of Education
8. School of Law
9. School of Medicine

SPECIALIZED RESEARCH CENTERS

1. BioTechnology Research and Development Institute
2. The Mekong Delta Farming System Research and Development Institute
3. Science and Technology Information Centre
4. Foreign Languages Centre

FUNCTIONAL DEPARTMENTS

1. General Administration Office
2. Department of Academics Affairs
3. Department of Financial Affairs
4. Department of Personnel and Security
5. Department of Physical and Equipment
6. Department of Science and Graduate Programs
7. Department of Politics and Recreation
8. Department of Catering
9. Central Library
10. Dormitory
11. Mekong Construction Co., Ltd
12. Insecticide Co., Ltd

- **CTU Training programmes specialisation**

AGICULTURE

1. Agronomy
2. Animal Husbandry & Veterinary Medicine
3. Fisheries
4. Food Technology
5. Land Management
6. Environment & Natural Resources Management

EDUCATION

7. Mathematics
8. Mathematics - Informatics
9. Physics
10. Physics – Informatics
11. Biology
12. Letters
13. History
14. Geography
15. English
16. French

ENGINEERING

17. Agro-Mechanics
18. Mechanical Technology
19. Irrigation & Drainage Engineering
20. Hydraulic Engineering & Rural Engineering
21. Electricity Technology
22. Chemistry Technology
23. Environmental Engineering

ECONOMICS

24. Foreign Trade
25. Finance and Banking
26. Accounting - Auditing
27. Business Administration
28. Marketing

INFORMATION

29. Electricity & Electronics
30. Informatics

MEDICINE

31. Medicine
32. Dentistry
33. Pharmaceuticals (new)

LAW

34. Administration Law
35. Registration Law (new)
36. Economics Law (new)

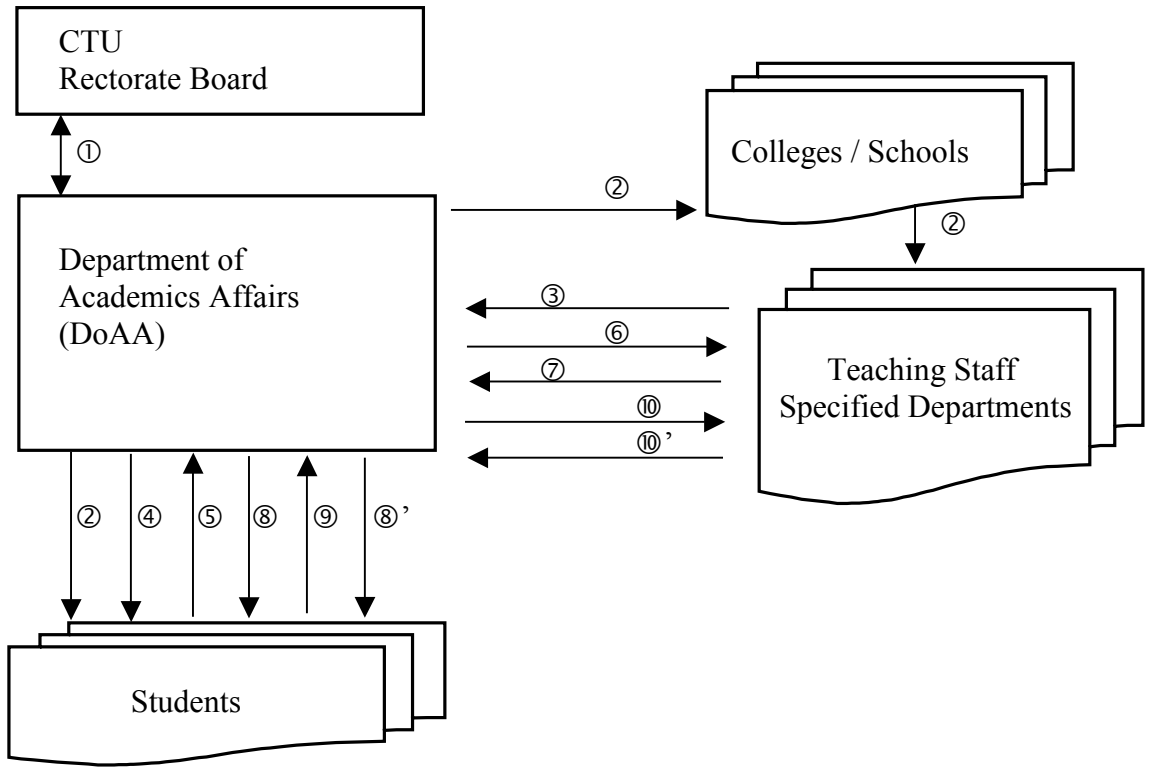
NATURAL SCIENCES

37. BioTechnology (new)
38. Applied Chemistry (new)
39. Applied Mathematics (new)
40. Applied Physics (new)

SOCIAL SCIENCES

41. Humanity (new)

ANNEX 3

PROCEDURES FOR CTU SEMESTER EXAMINATION

- ① Establish a (Temporary) Semester Examination (SEC) / Reports
- ② Announce the Semester Examination Calendar
- ③ Send the Examination Questions
- ④ Organise and Carry-Out the Semester Examination
- ⑤ Collect the Examination Papers from Students and Cut up the Examinee's name
- ⑥ Hand over the Examination Papers to Teaching Staff for Marking
- ⑦ Submit back the Marks and Examination Paper to the DoAA
- ⑧ Announce the Examination Results to Students
- ⑨ Complains/ Ask for re-mark (if possible)
- ⑩ Send Complains/ Ask for re-mark to Teaching Staff
- ⑩' Re-mark/ Submit the Marks (2nd time)
- ⑧' Announce the Results (2nd time) to Students

ANNEX 4

4a. ADVANTAGES AND DISADVANTAGES ON THE ESSAY EXAMINATION

An essay test item is one that poses a rather general question and then permits the students to write freely in answering the question. The essay examination has been the most widely used test in CTU until quite recently as a traditional test. It has a number of advantages, including the followings:

- It seems easier to construct the items than other types. It is an excellent way to test the students' ability to "explain", "compare", "summarise", "contrast", "describe", and "evaluate".
- Essay allows students maximum freedom in answering the questions. It gives students an opportunity to practice writing, to organise and express ideas, and to think creatively and critically. Essay is an excellent way to evaluate the student's writing skills.
- It is practically impossible for students to guess the right answer on an essay test.
- The essay item may be useful in testing for more advanced levels of cognitive and effective learning. Since it allows maximum freedom of response, the essay item permits students to exhibit their level of learning.
- Essay papers can be considered as a firm evidence for any complain later.

However, the essay test also has a number of disadvantages, including the followings:

- It is very difficult to grade objectively; in other words, it has a low grading reliability. In fact, a number of studies have shown that different teachers are likely to assign very different grades to the same essay test. Likewise, a teacher, upon rescoring the same essay test a second time, is likely to assign it quite a different grade.
- Only a limited number of topics can be covered on an essay examination.
- A considerable amount of students' time is required to take an essay test.
- Essay tests require a great deal of teacher's time to read and grade. CTU has spent about 1 month per semester for mainly essay examination.
- An essay test may tend to favour the student who has high verbal skills.
- Some students with a "gift of gab" may be able to bluff their way through an essay test by writing around the real question.
- Essay may require spending costly. CTU has paid about 300 million VN-dong per semester for examination.

4b. ADVANTAGES AND DISADVANTAGES ON THE OBJECTIVE EXAMINATION

The most familiar type of *the objective test* in CTU is the multiple-choice tests (MCTs). A multiple-choice question is a question in which the student is asked to select the best answer from a given list of alternatives in response to a question. A Multiple choice test has a number of advantages, including the following:

- MCTs are especially well suited for distinguishing between levels of learning. A question may simply challenge a student's ability to recall facts, to apply factual knowledge to given situations or, at a higher level, to evaluate given information.

- MCTs can be corrected very objectively. Since students are required to select one of the answers presented, the teacher does not have to make subjective judgements about poor spelling, poor writing skills, or alternative answers, etc.
- MCTs can be scored quickly. Statistical information on performance can be readily obtained.
- MCT is very flexible and can be used to measure about any quality or characteristic that the classroom teacher may be able to measure. This can provide feedback on the effectiveness of teaching and learning.
- The probability of guessing the correct answer to a multiple-choice test is relatively low.

These advantages of MCTs make it a very useful question for educational measurement. In particular, MCQs can be computerised. The disadvantages of MCTs include the following:

- Good multiple choice questions are very difficult and time consuming to construct. It is not easy to design good alternative choices to the correct answer. Each of these alternative choices, or *distracters* as they are often called, must have a degree of plausibility so that students will answer according to their level of understanding.
- It requires a good deal of time for students to complete a MCT; students must read all the alternative answers to see which is the best.

If a teacher uses only a MCT, the students may develop rather limited study habits. This might happen in cases where students feel they can recognise the correct answer or, by a process of elimination, arrive at the correct answer without a great deal of preparation.

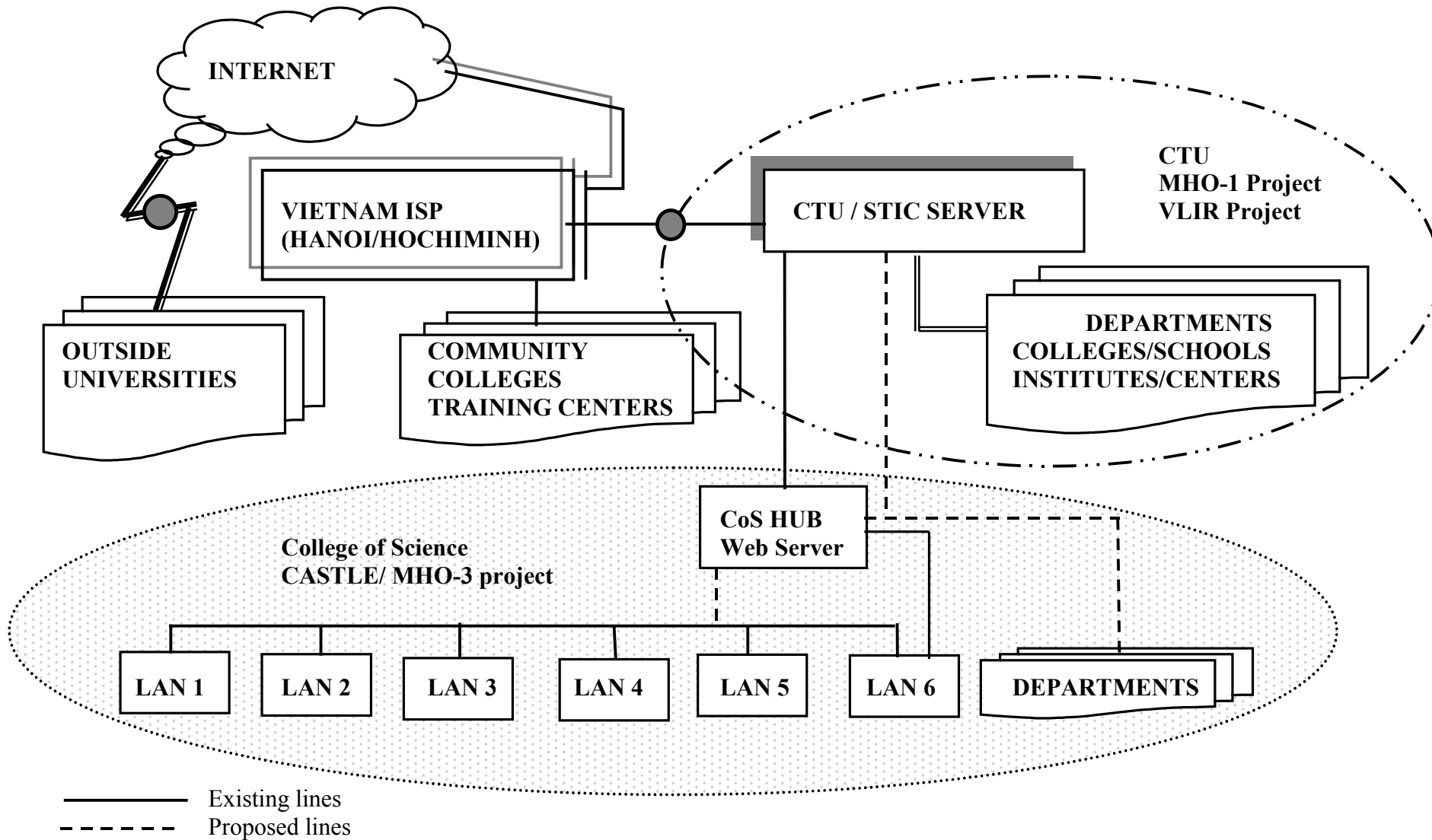


Figure 1: INTERNET / CTU / CoS Computer Networks Architecture

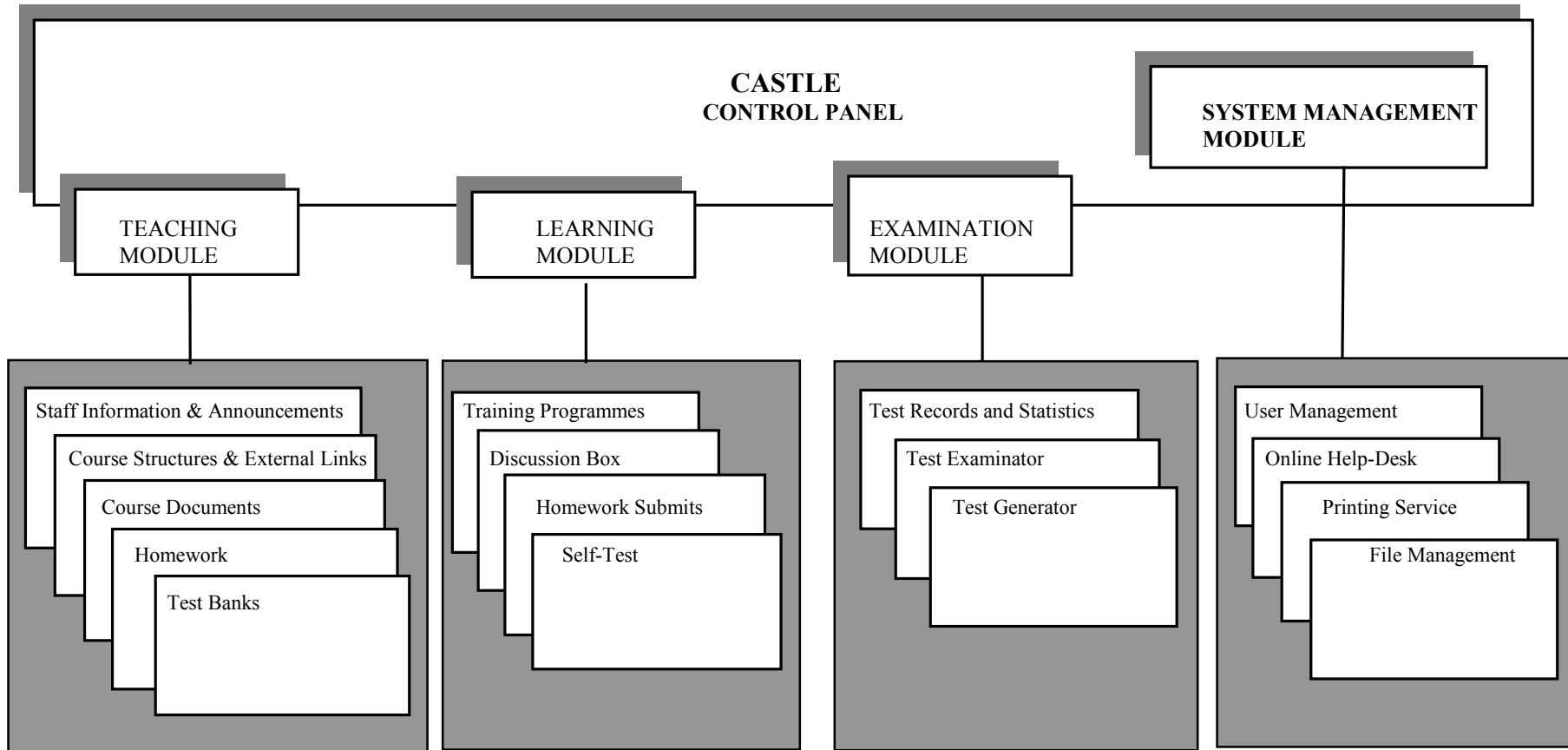
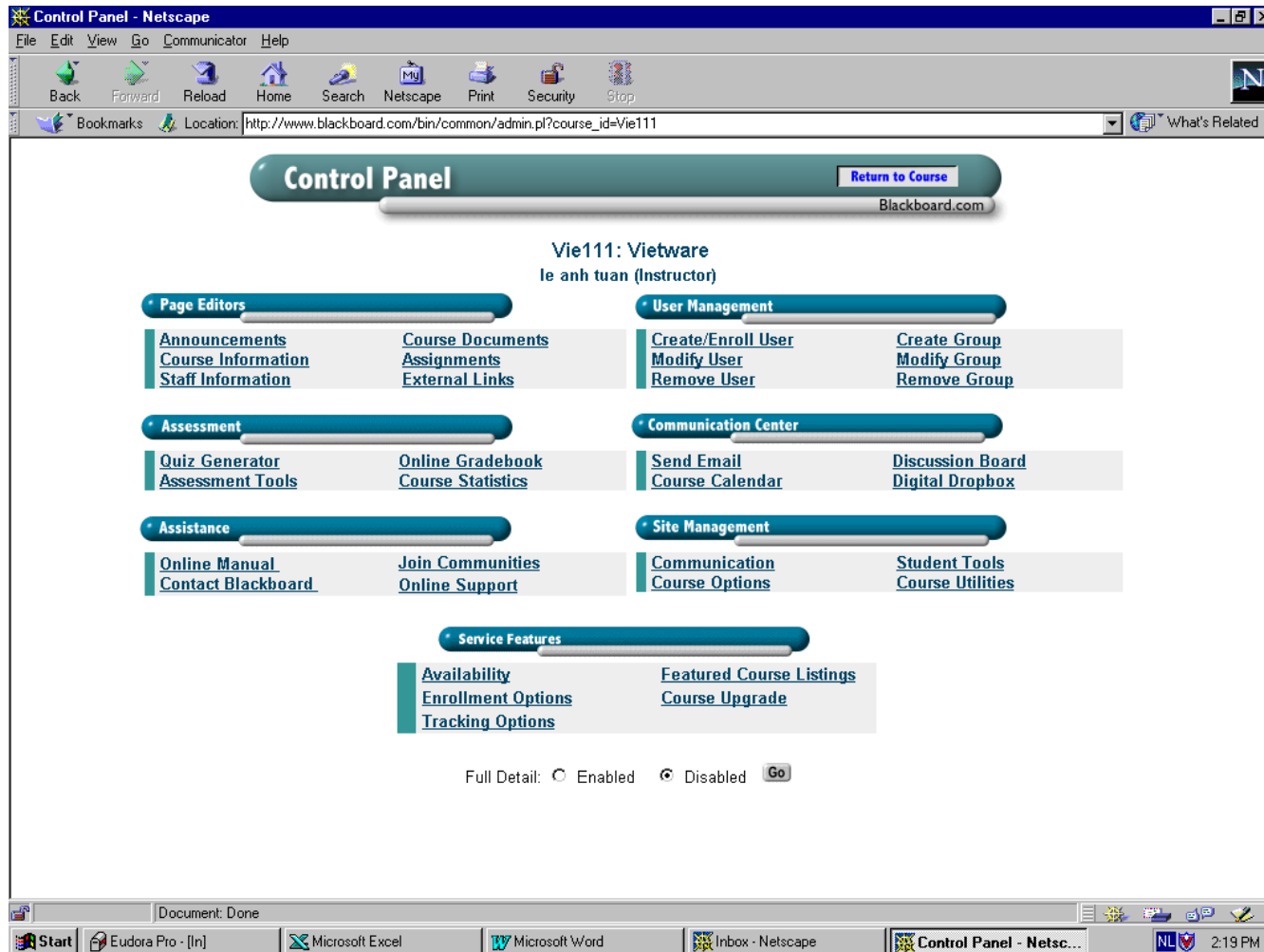


Figure 2: CASTLE organisation structure in the first version

EXAMPLE OF A CONTROL PANEL (BLACKBOARD)



CTU EDUCATIONAL NEEDS ANALYSIS

Items	Students		Teachers		Administrators	
	<i>Actual ?</i>	<i>Improve ?</i>	<i>Actual ?</i>	<i>Improve ?</i>	<i>Actual ?</i>	<i>Improve ?</i>
Study Programmes	OK	A little bit	OK	A little bit	OK	A little bit
Time Schedules/ Locations	OK	A little bit	OK	A little bit	OK	A little bit
Library User Guide	Moderate	A little bit	OK	A little bit	No	A little bit
Course information, including practicals, homework, exmaninations, ...	Poor	Yes	Moderate	Yes	No	No
Course registration	OK	A little bit	No	No	OK	A little bit
Lecture notes / Practical manuals / Homework	A little bit	Yes	Moderate	Yes	No	No
Discussion groups	Poor	Yes	Poor	Yes	No	No
Field / Out-side activities	A little bit	Yes	A little bit	Yes	A little bit	Yes
Examination time schedules	OK	A little bit	OK	A little bit	OK	A little bit
Checking course marks	OK	No	OK	No	OK	No
Year scholarship information	OK	A little bit	No	A little bit	OK	Moderate
Test Banks / Self-Test Tools	No	Yes	A little bit	Yes	No	Moderate
Test Generator	No	Yes	No	Yes	No	Moderate
Test Records and Statistics	Moderate	Yes	No	Yes	OK	A little bit
Student Services	Moderate	Yes	A little bit	Moderate	OK	A little bit

CASTLE IMPLEMENTATION PLAN

No.	Year → Months → Activity Items	2000												2001												2002												2003												Remarks (Responsibility)				
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12					
1	Initial sprouts	x	x	x	Arend, Tuan			
2	CASTLE Proposal	x	x	Tuan, Peter, Arend, Com. Experts
3	Documents Translation to VN'ese	x	Tuan	
4	Seminar in CASTLE	x	Tuan, Chinh, (+ Dutch expert ?)		
5	CASTLE Team Establishment	x	Minh, Tuan		
6	Selection of suppliers	x	x	x	CASTLE Team		
7	Contract with selected supplier	x	Minh, Tuan		
8	Technical implementation	x	x	x	x	x	x	x	x	x	x	x	x	x	CASTLE Team + Supplier
9	Functional implementation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	CASTLE Team + Supplier		
10	Writing manuals	CASTLE Team + Supplier		
11	Data input	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Teaching staff of CoS and others				
12	Training users	CASTLE Team + Supplier		
13	Testing – Trial period	CASTLE Team + Supplier		
14	Full implementation	CASTLE Team + Supplier		
15	Contract closed	CASTLE Team + Supplier		
16	Evaluation	Tuan + MHO-3 Committee		

ANNEX 10**ADDITIONAL READING**

1. Blackboard
2. Question Mark
3. AUSWEB 99
4. CITO Institutional Capability Statement
5. Introducing ... Talc2000
6. The Educational Testing Service Network
7. Wonder Box (in Dutch)
8. Objective Testing Methods in the University Entrance Examination
(in Vietnamese)