

# The QUESTE-VET Project

## Quality Model, Developmental Process and External Evaluation

René-François Bernard<sup>1</sup>, T.R. Phillips<sup>2</sup>

<sup>1</sup>ENQHEEI coordinator, 139, rue de Bercy F-75572, Paris, France ([rene-francois.bernard@industrie.gouv.fr](mailto:rene-francois.bernard@industrie.gouv.fr))

<sup>2</sup> Director, Soutenir ltd, 831 Fairfield Ct., 10598 Yorktown, NY, USA ([soutenir.ltd1@verizon.net](mailto:soutenir.ltd1@verizon.net))

### Abstract

The presentation will expand on these points:

- **QUESTEM** *Quality model*: The school and responsible departments are expected to have an explicit rationale, strategy, and objectives for the programs offered in an engineering discipline. They should have a clear sense of core values embedded in the teaching and learning process, and above all, in its *Learning Outcomes*.
- **QUESTEP** is a developmental process based upon a rigorous self-assessment of degree program(s). The Department must determine the extent to which it has achieved its qualitative objectives. This is measured in terms of a five-point action cycle that runs from strategic decision-making, to planning, implementation, evaluation, and improvement.
- Based on the merits of the self-assessment, departments that wish to pursue formal QUESTE recognition may qualify for an external assessment by an audit team comprised of members from European industry, HE institutions and qualified experts from European quality assurance agencies.
- Candidates for **QUESTE** recognition must demonstrate an understanding of the regional, national, and international context in which they operate; their competitive strengths and weaknesses; successful cooperation with industry and society; and in keeping with the Lisbon strategy, the acceptance of their graduates by industry, the profession, and technological business.

*Keywords: Quality improvement, evaluation, cooperation models, competencies*

## 1. INTRODUCTION

The Lisbon Strategy assumes an environment of global competition in which excellence in engineering education must be identified. Efforts and resources may then be focused on academic institutions that offer fertile ground for technological education, research, and innovation. In March of 2006 the European Commission affirmed its support for the QUESTE label of excellence in scientific and technical education.

During a trial phase, 10 EU pilot institutions were involved in testing the QUESTE assessment process. Each was invited to select a unit from among 4 engineering disciplines: Mechanics and materials, Biological and Chemical engineering, ICT, and Civil Engineering. The range of disciplines has been expanded in 2008.

The pilot program focused on two issues: first, the extent to which the QUESTE concept could be applied to the workings of institutions and departments, and second, the extent to which QUESTE would support institutional strategies for quality improvement. As a result of the pilot, the initial developmental audited self-assessment has been designated as **QUESTEP**. It is intended to help schools and departments to identify strengths, weaknesses, and areas for improvement. It provides a referential for use in setting standards for internal quality assurance.

The **QUESTEM** Quality model, the **QUESTEP** developmental assessment, and the **QUESTE** recognition process are supported by *EFEED* -- the *European Foundation for Engineering Education development*, a cooperative effort of European industries, universities and the European networks of excellence.

## **2.THE MODEL, PROCESS AND EXTERNAL ASSESMENT**

**QUESTE** is not an accreditation program; rather, it is a step beyond the existing national accreditation systems. The process begins with an audited self-assessment. Educational programs that substantially exceed basic quality requirements may then seek formal **QUESTE** recognition. The final phase gives particular attention to cooperation with industry and society [1], the international dimension, the relationship of research to education and innovation, and the presence of a pro-active quality management system.

The presentation will expand on these points:

- **QUESTEM** *Quality model*: The institution and responsible department are expected to have explicit strategies and objectives for the programs offered in an engineering discipline. There should be a clear sense of the core values embedded in the teaching and learning process, and in the *Learning Outcomes and competencies defined by the faculty*.
- The **QUESTEP** process is oriented to improvement. It begins with a rigorous self-evaluation by the Department or Unit responsible for the program(s) offered for review. The issue is the extent to which the program has achieved the qualitative objectives set forth in the **QUESTE** Dimensions. Achievement is measured in terms of an action cycle, running from strategic decision-making, to planning, implementation, evaluation, and improvement.
- Based on the strengths shown in the self-evaluation, departments that wish to pursue formal **QUESTE** recognition may apply for an external assessment. The audit team is comprised of members from European industry, engineering associations and institutions, trade unions, students, engineering practitioners, and qualified experts from European quality assurance or accreditation agencies
- Candidates for full and formal recognition must demonstrate an understanding of their regional, national, and international context in which they operate; their competitive strengths and weaknesses; productive cooperation with industry, the profession, and society; the crucial relationship of research to education and innovation; and in keeping with the Lisbon strategy, the acceptance of graduates by industry, the profession, and technological business.
- Quality assurance in European higher education will be a priority of the next French EU-Presidency. Accordingly, a *developmental* quality process – **QUESTEP** - is proposed for all European higher scientific and technical education institutions that wish to improve the performance of their Departments or Discipline Units.

### 3. THE QUESTE CONCEPT

**Questep** is designed for engineering schools and departments that wish to be more competitive in the higher education marketplace. Institutions or schools that wish to engage in Questep must be recognized or accredited by an appropriate and nationally-recognized agency. The *program* itself should have basic accreditation, if available. In systems that provide only institutional accreditation, the institutional quality assurance system must extend to the department and program.

#### Focus of assessment

Questep focuses on programs in specific engineering disciplines. The self-assessment delves into the planners' perception of needs, the options they considered, key decisions, the formulation of credible objectives, and the results achieved. **Questep** is also interested in how programs function in the context of the department and school, for a successful assessment process reflects well on the entire organization.

#### A closer view of the QUESTE concept

##### 3.1. Strategic focus

The department should have a strategic rationale for its programs. There should be a 'contextual awareness' in planning programs with regard to the needs of industry, technological business, and the engineering profession. Accordingly, the acceptance of graduates in the labour market or by schools of advanced studies should be a strategic objective. QUESTE takes the position that...

- ❖ The most desirable graduates are prepared to meet future, and possibly unknown needs, as opposed to present and possibly outdated needs.
- ❖ The professional outcomes for engineering graduates should be based more upon **general profiles** than on precise professional positions.
- ❖ The graduates should have a capacity for **leadership** in projects within industry, technological business, and the profession; moreover, they should be viewed as **value creators** (through innovation and entrepreneurship).

##### 3.2. Core values of the institution, its faculty, and programs

**Questep** is keenly interested in the values embraced by the department and program faculty, the school and institution. These values or "spirit" may be expressed in curricular features, program content, and the choice of teaching and learning approaches.

The institution must be oriented to 'scientific' education that prepares graduates for leadership in technological projects and enables them to anticipate and adapt to changes in technology, industry, the economy, and social milieu. This orientation may be reflected in various ways:

- An understanding and respect for the scientific paradigm of experimentation, identification, application, and confirmation of principles. Departments and programs may be differentiated by the attention given to research and experimentation and by the graduates' awareness of current research.
- An emphasis on engineering synthesis, the tangible and successful application of acquired knowledge and skills. In this lies the engineering touch, which differs from purely scientific education

At the same time there should be:

- Respect for the uniqueness of the individual student and his/her attitudes, talents, and potentials. Each student should be imbued with the self-confidence needed to achieve at a high level.
- A human dimension in the educational process, e.g.
  - coaching, i.e., encouraging individuals in the development of their talents
  - mentoring by experienced scientists and industrialists
  - the encouragement of innovative and creative attitudes

- efforts to cultivate student awareness of external developments in technology, in industry, the economy, and society

*These are a few examples of ways in which schools and departments may be differentiated.*

### **3.3. Educational objectives and measurable outcomes**

Departments and program units are expected to define educational programs in terms of objectives & outcomes, the requisite content, appropriate teaching & learning methods, and not least, proper assessments.

Unlike the simpler and more general propositions of accreditation bodies, these objectives & outcomes should focus on the functional and professional capabilities that differentiate engineering graduates. They should assert the intellectual and practical competencies that the graduates should possess, given the roles that they may play in the profession, the economy, and society.

Some competencies are “hard,” such as mastery of a technical field, the ability to apply acquired knowledge to specific problem-solving and design tasks, the ability to use computing tools in a professional manner, the ability to plan and conduct research, or the ability to evaluate and manage risk. No less important are the non-technical competencies that underpin successful careers, such as communication, teamwork, time management, and the capacity for continuous learning and professional development

### **3.4. Quality assurance and improvement processes**

Provisions for quality assurance and improvement are central to the **Questep** process. Outcomes assessment is essential for *competitive* improvement, in that it serves to validate the chosen educational objectives and to inform the improvement and planning process.

Most institutions have provisions for student feedback or evaluations of teaching. The real question is whether and how student input is utilized. Going further, a more robust quality process allows for external input from industry, employers, and working professionals, both in the planning stage and as part of formative or conclusive evaluations. The tracking of graduates is a key point in the QUESTE model, for their acceptance and career progress are key indicators of quality.

To sum up, an engineering department that wishes to succeed in the **Questep** process will have:

- provisions for internal quality management and self-assessment
- provisions for the external program review
- provisions for periodic updating and improvement

Such policies and practices may be an institutional, rather than departmental matter. If the quality process is institutional in nature, its effects should extend to the program level.

One further thought: **Queste** recognizes that many institutions are in the process of developing their internal quality system. In the **Questep** assessment, we hope to see at least a well-conceived effort that may be a work in progress, but one that is moving forward.

## **4. A SYNOPSIS OF THE QUESTE DIMENSIONS**

### **4.1 Phase I: Application for Questep**

The department must establish initial eligibility for the **Questep** process. A brief response to these points will normally suffice:

#### **A. Authorization: institution, department and degree programs**

The institution should be *currently authorized* to offer “scientific” or *research-based* Masters-level degree programs and to award degrees to graduates of the program(s) proposed for review. Institutional authorization or recognition may be obtained from a government agency, derived from the institutional charter, or both.

#### **B. Accreditation: institution, department and degree programs**

The institution, school, department, or program(s) under review, should be accredited within the national system by a recognized agency. If the national system does not include program accreditation, there should be an institutional quality system that extends to the program level.

### C. The Department

There should be an identifiable and coherent educational unit responsible for the degree program(s) under review. The functions of this department may include, but are not limited to:

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|--|---|
| 1. curriculum development                | 5. quality management                   |
| 2. program planning and implementation   | 6. industrial and professional linkages |
| 3. budgeting and resource allocation     | 7. research                             |
| 4. management of faculty & support staff | 8. continuing professional education    |

The application should indicate which of these functions, or others, are counted among the responsibilities of the department.

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## 4.2 Phase II: The QUESTE Dimensions and Questep self-assessment

The **Dimensions** should be read as objectives.

### Part I. Department & faculty

- IA. There is clear and cogent strategic planning in the endeavours of the school, department, and program faculty.
- IB. The pursuit of quality by the engineering school, department, and program is supported by a competent organization and effective leadership.
- IC. Programs should be effectively planned, managed, and delivered by a specific, stable, and well-qualified corps of faculty members.
- ID. There is a quality management process in place at the school, department, and program level.
- IE. The department has strong and active linkages with industry, the profession, and technological business. These linkages help to improve education, research, and the career prospects of graduates.
- IF. The department has an international dimension in its education and research activities.
- IG. There is a “research culture” within the school and department which has a substantive influence on the quality of education and faculty development.

### II. Education

- IIA. **Quality as a strategy:** The educational programs of the department are designed and implemented with competitive quality as a strategic objective.
- IIB. **Curricular coverage, sequence, coherence:** A coherent and complete curriculum ensures an effective coverage, sequence, and relationship of subject matter in the primary and supporting disciplines.
- IIC. **Program-level objectives and outcomes:** Each program under review has clear, credible, and attainable *program-level* objectives and outcomes, which reflect an understanding of the needs and expectations of the discipline, industry, and profession.
- IID. **Assessment of learning and student progress within an improvement process:** Each program is first planned, then implemented and evaluated in terms of *learning objectives and outcomes* that reflect the competencies of a professional engineer. Effective provisions have been made for the assessment of learning progress and for necessary improvements.

- II.E. **Support:** The program has the physical, financial, and human resources needed to realize a commitment to quality. This includes facilities, equipment, laboratories, work space, computing resources, and support staff.
- II.F. **Curricular integration and synthesis:** The program under review has a well-conceived and working plan for curricular integration, practical synthesis, and for the role of project-based or problem-led education. The educational experience must prepare graduates to function effectively in professional employment and advanced studies.
- II.G. **Continuing professional education and training:** The engineering school and/or department offer continuing professional education in order to meet the needs of industry, technological business, and the engineering profession.
- III. Students & Graduates**
- III.A. There is an active and productive dialogue between the engineering school, department, employers and practitioners concerning the broader professional aptitudes, attitudes, and capacities desired in candidates for employment.
- III.B. Student development and progress are actively monitored and promoted within a student advising system that is timely, effective, and integrated within the quality management process.
- III.C. Excellence is demonstrated by the record of the school, department, and program in the professional insertion of graduates, their admission to higher studies, and subsequent career progress.

## 5. AN INTERPRETIVE GUIDE TO THE QUESTE<sup>®</sup> DIMENSIONS FOR QUALITY ASSESSMENT

The QUESTE Dimensions are ‘referentials’ for quality improvement in engineering education. They contemplate a well-managed and *therefore* competitive institution, known for the quality of its graduates and for productive linkages with the engineering profession, business, and industry.

Indicators may be used to describe performance at a given point in time. This gives an historical perspective that may provide a baseline, but quality is a dynamic phenomenon. With this in mind, the Dimensions are based upon an action principle.

The real issue is how an institution, school, or department both anticipates and reacts to internal and external needs, problems, challenges and opportunities. The **Questep** auditors will look for an action sequence that begins with the identification of needs, opportunities, or problems, moving then to the formulation of strategies, objectives, and plans. Provisions should be made for monitoring progress, evaluating results, and for using those evaluations to guide improvement and planning. Finally, there should be evidence that what has been achieved can be sustained.

As explained in the **QUESTE Compass**, each Dimension consists of an overall objective, interpretation, questions or indicators, and suggestions for supporting information.

### 5.1. Intent

The “added value” of **Questep** lies in a closer look at the rationale for decisions and their consequences, in the formulation and application of standards, and in peer review. Properly used, **Questep** can provide a tool for understanding organizational behaviors.

The goals expressed in the Dimensions may be achieved in steps and in different ways, so they should not be read as prescriptions. Decisions are often made in a national context and with deference to institutional stakeholders -- therefore, the self-assessment should explain how the rationale for decisions has been shaped by context.

Some of the Dimensions reflect “competencies” --- the ability of the school, department, faculty, students and graduates, to function in a desirable manner. Thus, it is important to distinguish between a *competency objective*, such as skill in analysis and problem-solving, from the *specific tasks* that must be performed and evaluated.

Departments and faculties are viewed in terms of *organizational performance*. Given a set of strategies and objectives, the issue is whether the school and department is organized and managed in a way that will deliver the intended results.

### 5.2 Analytical Approach

In brief, QUESTE is seeking a focused and analytical self-assessment. The data and information offered in support of arguments should be on point, especially where decisions, actions, and results are concerned. The department must decide how best to demonstrate the quality of its efforts. QUESTE encourages the use of *existing* reports and materials.

### 5.3 Assessment Scale

A self-assessment rating grid is provided with the QUESTE Dimensions. The issue is whether the various quality objectives are achieved in a way that is *above standard, at standard, or below standard* in terms of conception, execution, and results. Improvement efforts that are in progress may be noted in the report. Excellence is a composite of “above standard” ratings on a majority of the QUESTE Dimensions. Each of the major objectives is rated on a 1—5 scale within each step of the action cycle, and from this a composite score is determined. Continuation into the formal recognition phase assumes a 75% overall score with no items rated below standard.

## 6. CONCLUSIONS

Quality assurance in European higher education will be a priority of the next French EU-Presidency. Accordingly, a *developmental* quality process – **QUESTep** - is proposed for all European higher scientific and technical education institutions that wish to improve the performance of Departments or Discipline Units.

The **QUESTE label** is a mark of distinction for European engineering schools and departments that demonstrate these characteristics:

- Program objectives are set at a high level and have been fully realized.
- The program substantially exceeds existing national accreditation standards in the view of expert peers.
- There is a spirit or ethos of excellence in the endeavours of the department and teaching faculty.
- The department has moved from basic “quality assurance” into active quality management and improvement.
- The graduates are highly regarded by employers and schools of advanced studies.
- The department has strong and active linkages with industry, the engineering profession, and technological business.
- The department and faculty have a significant involvement in research.
- The department has an international dimension in its education and research activities.

The label is conferred by an Awarding Body comprised of outstanding personalities from the Academy, European industry, and the Profession.

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### References

[1] René-François Bernard, Cooperation between higher engineering education and industry and society, P.35-36 ISO Bulletin July 2003