

THE UNIVERSITY IN TIMES OF CULTURAL SCHOCK

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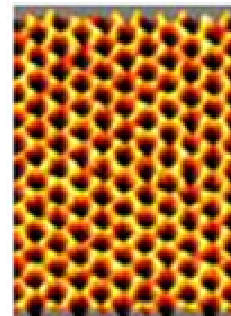
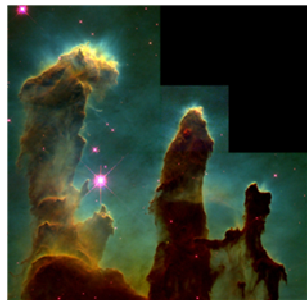
THE EXTRAORDINARY ADVANCE OF SCIENCE AND TECHNOLOGY IN THE XX CENTURY

TWO KEY ISSUES

- **THE DRIVING FORCES**
- **THE “NEW SCIENCE AND THE NEW TECHNOLOGY”**

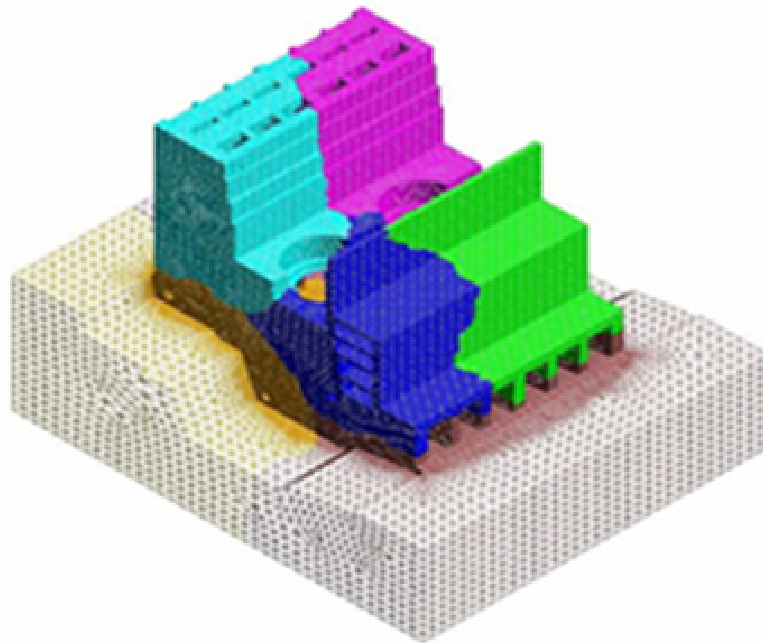
Science & Technology Driving Forces

- The extraordinary capacity to scrutinize the microcosms and the macrocosms
 - Images of individual atoms can be obtained with atomic force microscopes with high resolution.
 - Huge telescopes installed on earth or on satellites



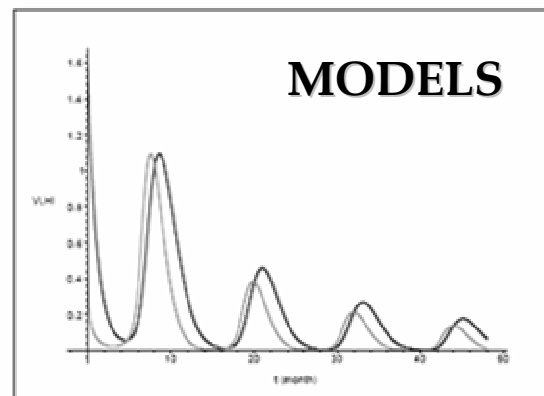
Science & Technology Driving Forces

- The extraordinary capacity to calculate
 - Growing capacity of storing data and processing speed.

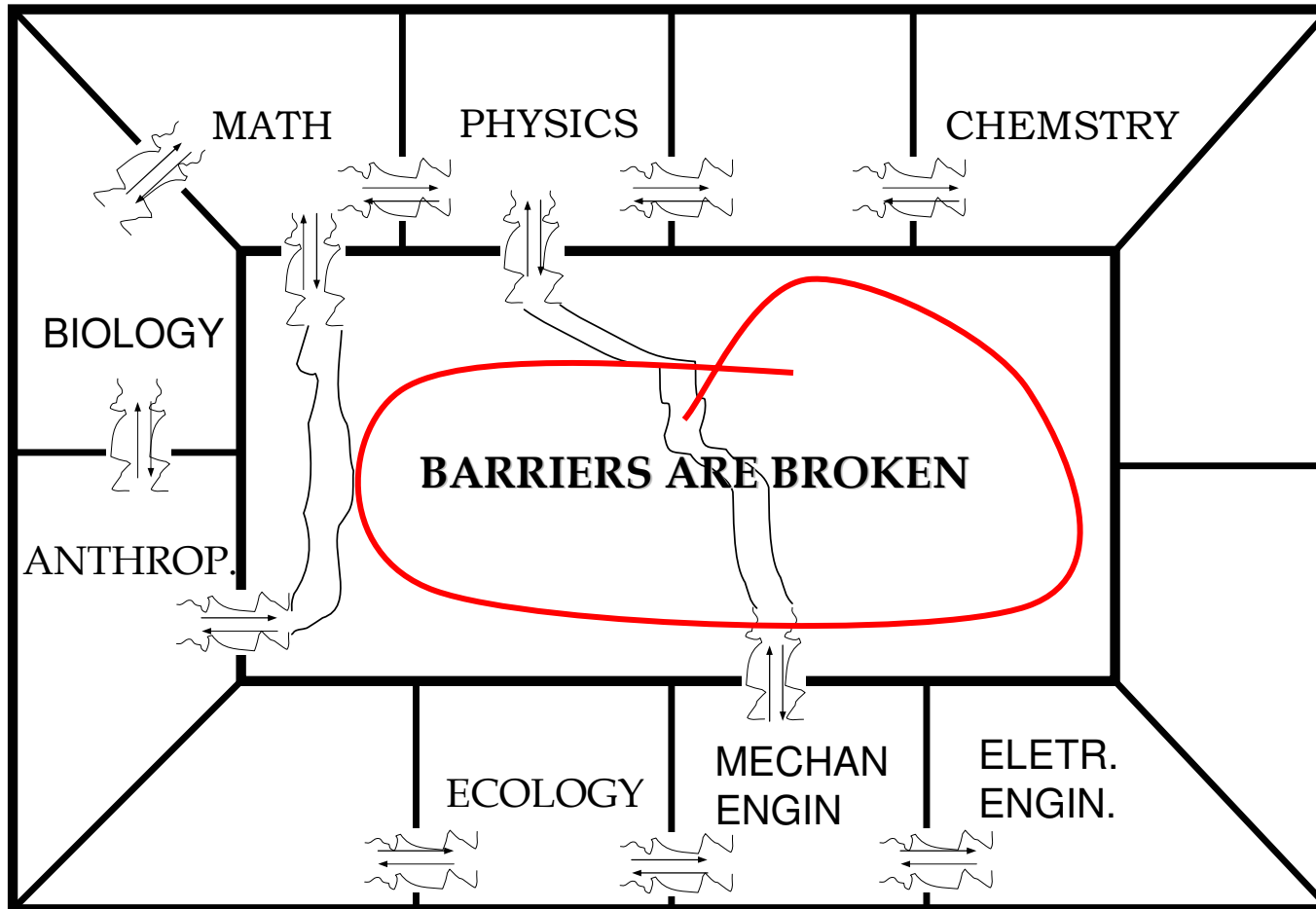


Interaction among different fields of knowledge

- Renewed methodology to deal with science.
- Windows were opened up between several knowledge compartments
- This new approach to deal with scientific and technological challenges is called multi- inter- or trans-disciplinary.
- Biology, ecology, medicine, economics, archeology associated with other disciplines as physics, chemistry and mathematics



THE EMERGING “NEW SCIENCE AND NEW TECHNOLOGY”



THE CULTURAL SHOCK

SPEEDING UP

More than the era of knowledge we are living in times of an uncontrolled and unpredictable advance of science and technology.

Past tends to penetrate into the future making the present to burst into pieces. Technically a genuine shock wave. We are living the era of a cultural shock wave

TIMES OF CULTURAL SCHOCK WAVE



FROM PAST TOWARDS FUTURE

**SURFING IS THE RIGHT WAY TO MOVE
ACROSS A SCHOCK WAVE**



**SURFING IS NOT A NEW SWIMMING STYLE
WE NEED A BOARD**

THE CHALLENGES OF THE NEW ERA

- **THE TRADITIONAL UNIVERSITY ORGANIZATION IS GONE**
- **THERE IS NO MUCH TIME TO THINK AND TO DECIDE**
- **WE HAVE TO TAKE RISKS**
- **WE HAVE TO BE PREPARED TO MAKE QUICK PATH CORRECTIONS**
- **IT IS NECESSARY TO CHALLENGE THE OLD RULES AND FIGHT FOR A NEW STATUTE MUCH MORE FLEXIBLE AND FITTED TO THE DYNAMICS OF OUR TIMES.**
- **IT IS NECESSARY TO FIND A PROPER BOARD**
- **WE HAVE TO BE PREPARED TO FALL DOWN**

THE IMPACT ON UNIVERSITIES

Implies substantial changes, it is not only a question of reviewing the curriculum, introducing or suppressing a couple of disciplines.

DEPARTMENTS SHOULD BE SUPRESSED

Departments should be supressed in the New University. The academic organization of the S&T division may be supported by three schools

School of Natural Sciences and Humanities. *To discover*

School of Mathematics and Computation. *To criticize*

School of Engineering and Social Sciences. *To invent*

REORGANIZE THE CONTENTS OF NATURAL SCIENCES COURSES AND MATHEMATICS

Classical organization that breaks up the so called hard sciences into **physics, chemistry, biology, computer science and mathematics** should be reviewed. The creation of courses following a new profile would help the **interaction of people with different backgrounds and would enforce collaborative and interdisciplinary research.**

THE NEW GUIDELINES

To foster the implementation of the new science, courses are organized along new guide- lines

❖ Structure of matter

➤ *From the continuum to elementary particles*

❖ Energy

➤ *Mechanical, thermal, electromagnetic, quantum*

❖ Information and communication

➤ *The physical support, information contents, meaning*

THE NEW GUIDELINES

❖ Transformation processes

- *Non-controlled or controlled by external action, cosmology, geophysics, physical and chemical processes*
- *Self-controlled, reactive, conscious, biology, life*
- *Collective, evolutionary, history of civilization, religion, building of nations, globalization*

❖ Representation and simulation

- *Pure mathematics, mathematical and computational modeling*

NEW AVENUES

❖ Cognitive Sciences

- *Neurosciences, psychology, communications, mathematical modeling*
- *Rational knowledge*
- *Insight, creativity, memory, attention*
- *Transcendental knowledge, faith, myths, beliefs*
- *Arts, emotion*

CHALLENGING QUESTIONS IN SCIENCE, TECHNOLOGY AND HUMANITIES

- *God: existence, conceptions, consequences*
- *The religious influence on human behavior, political actions, and ethical attitude*
- *The biosphere, surviving on the planet earth, risks and mitigation measures. The Amazon Forest as a complex thermodynamic system.*
- *Globalization, socio-economic issues, science, technology*
- *The role of sports on the interaction among nations*

EDUCATION

- Fostering creativity – More individual work and less classes – Think.
- Building self-confidence – To dare and to reduce risk aversion.
- Learning to take decisions and to take initiatives – Less complaints and more solutions.

STUDENTS AND FACULTY MOBILITY

- Students exchange: Graduate and Undergraduate
- Faculty exchange: Universities, Industry and Consulting Comp.
- Break the sharp stratification, professors, graduate students, technicians, undergraduate students and build up a more open and fruitful academic community.

ENGINEERING EDUCATION HAS TO BE CENTERED ON THE LESS OBSOLESCENT SUBJECTS

- The speed of the technological development makes it impossible to guarantee a long-lasting competence for the new graduates.
- Provide the students with the necessary tools to open their own ways.
- The continued sophistication of software requires a deep knowledge of mathematics, computation and of the fundamental concepts
- Applied disciplines in the engineering curricula should be taught by competent engineers working in the industry as part time collaborators.

SCIENCE DIFFUSION PROGRAMS

I believe that it is one of the University's obligations to translate into a language accessible to all educated citizens even those that have had the opportunity to acquire only the most basic education the new advances of science. Implementation of cultural programs in cooperation with other organizations should also be within the University's scope.

TO SUCCESSFULLY ACCOMPLISH ITS MISSION

- Not only the almost unconditional support from the State
- The students who are embedded in a completely new cultural environment
- The Industry that has to see the University within its proper mission primarily as an actor responsible for the advancement of knowledge,
- Society in general that has to understand that the University is not a bureaucratic institution that confer a diploma but is a place proper to acquire knowledge and competence and to gain human experience living in a community with a very broad cultural spectrum.

THE UNIVERSITY FOR THE XXI CENTURY

The main commitment of the New University toward society is to **recover the appreciation for scientific learning**, to show the beauty inherent in the mysteries of nature and hidden in a mathematical object. It was founded on the assumption that knowledge is not only a means to response to market demands but **above all for the enlightenment of the human spirit.**

THE UNIVERSITY FOR THE XXI CENTURY

The project of a university for the XXI century should be sustained by the **freedom to explore new paths** that will lead the University closer to its **original and universal purpose**: to discover, to invent and to think critically. The education system should encourage students to make **their own choices, to take risks, to accept challenges and to think creatively.**

BRAZILIAN CULTURAL ENVIRONMENT

- Predominance of diploma over competence. People are rewarded by the diploma rather than by the competence.
- Lack of self-confidence leading to the tendency to super-valorize foreign products as compared with endogenous products.
- Agreement among persons and institutions are established under a suspicious attitude.

BRAZILIAN CULTURAL ENVIRONMENT

- Need a large number of colleges offering excellent professional training in engineering.
- No salaries discrimination.
- Obstacle posed by the professional associations has delayed considerably the implementation of new engineering competences.

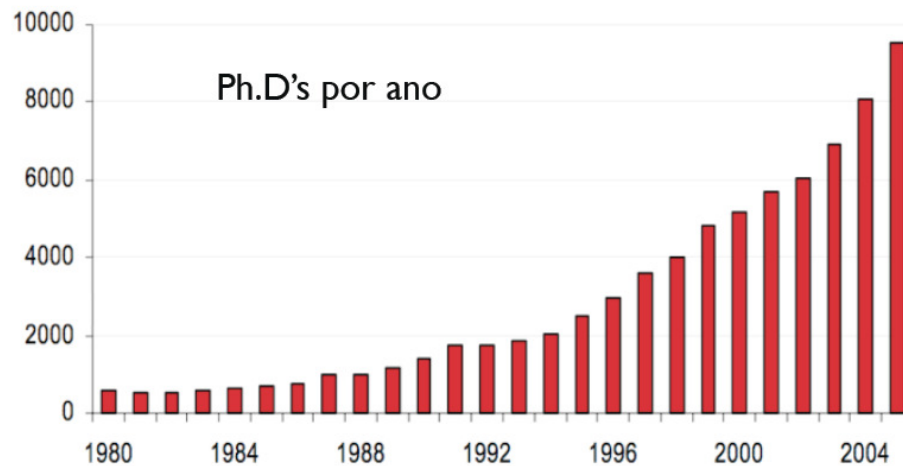
PROMISING NEWS

- A new attitude is underway: growing self-confidence, presence in the international community, ability to compete internationally
- Leading industrial production in some fields: aeronautics, oil exploration, biotechnology, agrobusiness
- Capacity to explore the enormous natural resources.
- Growing presence in the international scientific community

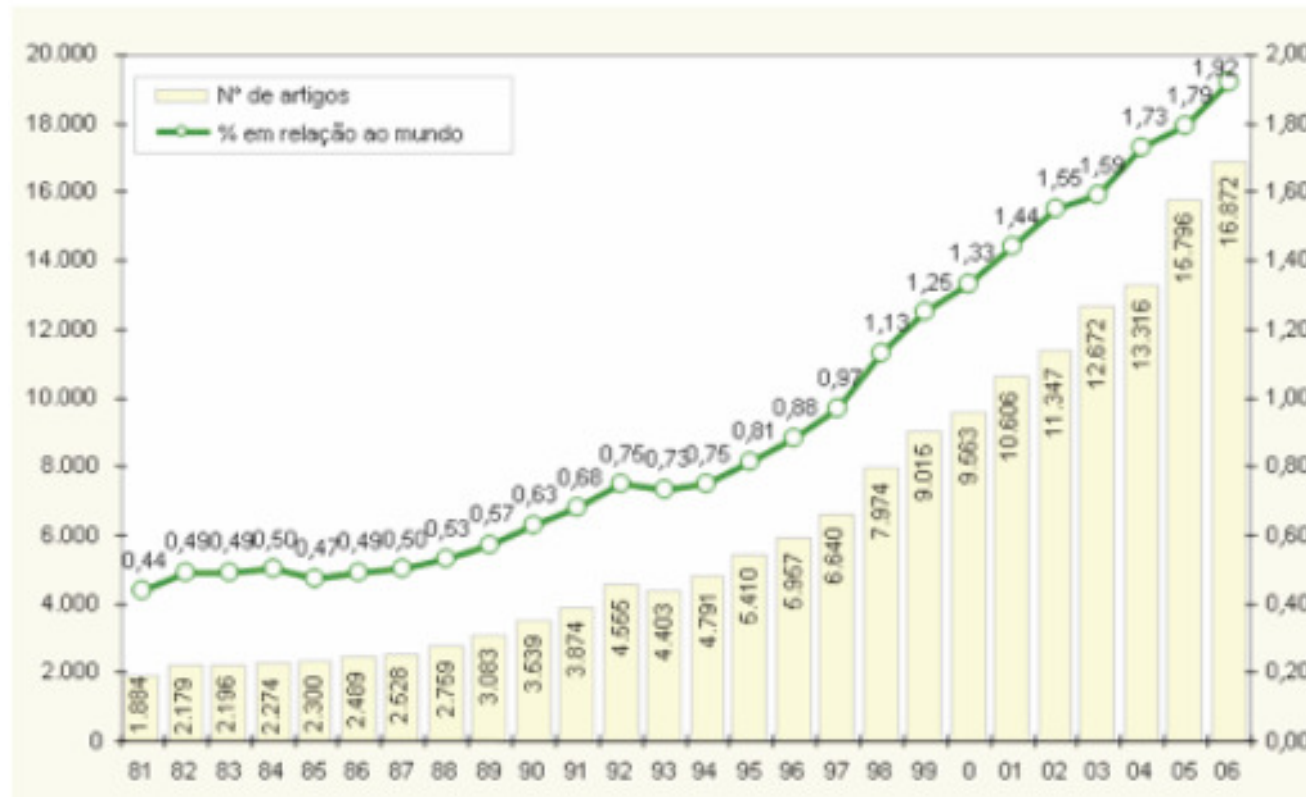
PROMISING NEWS

Science and engineering periodicals that were just a few in the middle sixties jumped to approximately 250 recognized by a joint committee CAPES/CNPq as have reached a good editorial standard. From these 27 belong to engineering fields approximately 11% of the total.

Scientific and Technological Achievements- After 1965



Scientific and Technological Achievements- After 1965



A WORD ABOUT OUR FUTURE

- After more than 30 years of hard work ABCM is reaching a position to effectively contribute not only with academic issues but also with industrial and educational policies.
- We should also be present in the discussion about the future of our planet This is a problem that concerns all of us.
- We should also to foster the appreciation for knowledge. The voracity to consume should be counterbalanced by the joy of learning.
- We could contribute with several actions as the development of equipments, software and game to be part of the achievements of live or virtual museums.

A WORD ABOUT OUR FUTURE

Our presence in the international community is equally important. Let us not ignore that the industrialized countries cannot avoid expanding their influence all over the world. We must also be present to defend our legitimate interests. We should not be a passive observer but an active member of the international engineering society. It is necessary to strength our cooperation among Latin American countries.



**WE WILL BE MORE THAN PLEASED TO
RECEIVE SUGGESTIONS AND POSSIBLE
COLLABORATION PROPOSALS:**

THANK YOU

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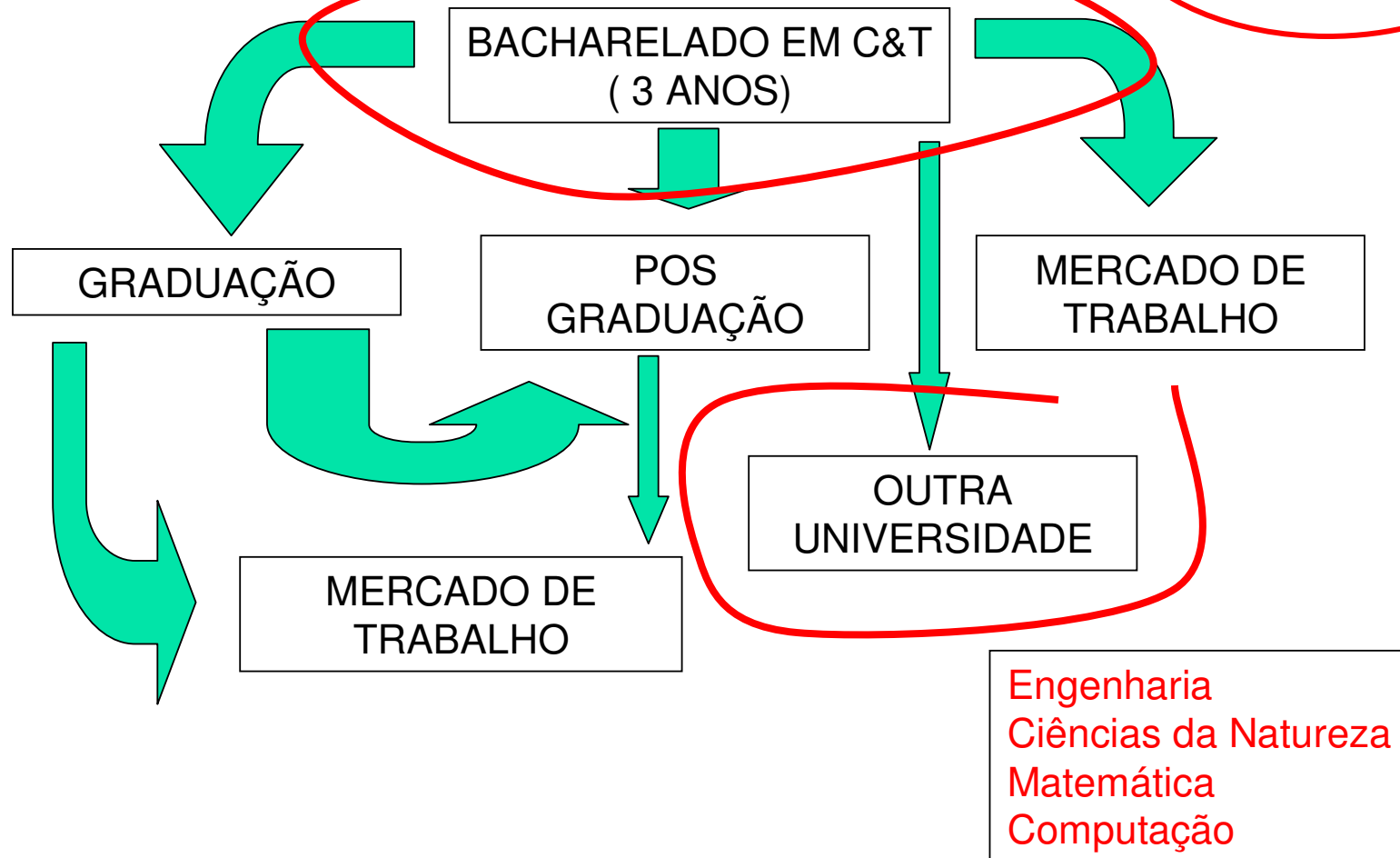
Engineering

- Environmental Engineering
- Space Technology
- Biomedical
- Automation and Control
- Energy
- Telecommunications

Emphasis on the most fundamental and enduring knowledge

Possible Paths

BSc in
Science and
Technology



E. SHRODINGER

Talking about

" But the spread, both in width and depth, of the multifarious branches of knowledge during the last hundred odd years has confronted us with a queer dilemma. We feel clearly that we are only now beginning to acquire reliable material for welding together the sum-total of what is known into a whole; but, on the other hand, it has become next to impossible for a single mind fully to command more than a small specialized portion of it. I can see no other escape from this dilemma (lest our true aim be lost for ever) than that some of us should venture to embark on a synthesis of facts and theories, albeit with second-hand and incomplete knowledge of some of them, and at the risk of making fools of themselves. So much for my apologize"

NEW CHALLENGES AND FORTHCOMING INITIATIVES

- To stress things that **make us similar** rather than things that makes us different from each others. There is just one **academic community** rather than a layered structure with professors, graduate and undergraduate students
- Show to society in general, that we are, at least, also **thinkers and not only consumers**. It will be impossible to save the planet with business as usual.
- To promote a **National Conference on Science for the Enlightenment of the Human Spirit**
- To create at the Federal University of Rio de Janeiro the **Alexandria Hall of Science, Technology Humanities and Arts**