

# From the Foundation Act to the Corporate Culture of a BME Teaching Institute

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**Abstract**—This paper describes the concept and application of the organizational culture of a BME teaching institute, based on the specificity of biomedical engineering. Selected values and behavioral patterns typical for this profession were endorsed to reinforce the mutual cooperation and understanding of students, university staff and employers as partners in the educational process. Besides of building a professional pride and reputation of the teaching institute, the corporate culture is proved to be useful in imposing of the attitudes required in future career of the biomedical engineer as a partner of a medic in his efforts aimed at the wellness and safety of the patient. Five years since the foundation of the Multidisciplinary School of engineering In Biomedicine we still do not have a quantitative measure of the educational outcome quality, nevertheless the presented idea may be very useful and worth sharing with all BME educators.

## I. INTRODUCTION

**I**N presence of competition, ubiquitous also in the educational area, universities and high education institutes have to be managed with use of methods practiced by leading North American corporations. They apply the modern marketing or strategic management and built their liaisons with industrial partners, being recipients of the educational outcome. Despite of numerous similarities, the university-specific organizational culture [1] differs from the corporate life in several considerable aspects. Elements typical for the corporate culture building as logos and brands, certainly effective at a corporate level, are no longer sufficient at an academic level, where students must feel confident intellectually in their community.

The development of an university or educational institute is not easily measurable by economical factors, as it is in case of commercial bodies. The stimulation of progress is therefore much more relied on university- or faculty-specific culture, favoring the professional development and personal investments towards the future career. Although this aspect

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was not particularly highlighted in the past, the worldwide recognized high schools - in particular British and North American - fostered since centuries their traditions, particular customs and ceremonies. The specific ambience is beneficial for students learning the professional attitudes and pride besides the knowledge and skills. It is also advantageous for the university employees, in particular the teaching staff, since the relation between their efforts and effects is not as straightforward as in business or industry. Finally, the higher education is a multistage process involving several people playing their specific, mutually complementary roles. In this aspect, including all teaching staff and students as partners in the team building programme is favorable for the university to better face his aims and challenges.

The peculiar role of the organizational culture in the area of biomedical engineering results from three aspects [2-3]:

- multidisciplinary approach, integrating around a common aim the activity of people of various professions and ways of thinking,
- specific orientation towards the technical support for the improvement of quality of life and health care, focused on the human being in a wide range of circumstances.
- relative novelty and broad development perspectives.

Consequently, conscious of the relevance of organizational culture in the career of biomedical engineer, we strive to impose the BME-specific ideas and behavioral norms to the students.

This paper discloses how the organizational culture was introduced in the Multidisciplinary School of engineering In Biomedicine (MSIB) [4] being one of newly created faculties at the AGH-University of Technology in Krakow, Poland. The School was founded in June 2005 as Poland-first academic institution offering the Bachelor (Engineer) and Master degrees accordingly to new Governmental regulations [5] defining the BME as a separate faculty and complying with the Bologna declaration for the European compatibility of higher education.

## II. SPECIFICITY OF BME-RELATED CORPORATE CULTURE

Although every profession has its proper best practices for relations with his business environment, the biomedical engineering reveals several relevant aspects of specificity. This relatively new discipline bridges the gap between the

medicine and technology, and applying various technological achievements directly influences the quality of life. Consequently, a single medical act involves multiple actors, many of which, essentially the engineers, usually remain behind the scene. Their cooperation may succeed only if all share some common understandings about their roles and mutual dependencies. Moreover, the medical act has to be as appropriate as possible, what - among the other aspects - requires the technical excellence and high ethical awareness of participating engineers. Finally, the clinical engineer frequently works shoulder to shoulder with medics in emergency and under the pressure of time, where common feelings, ideas and behavior are decisive, not only improving factors for the final result. Therefore three key aspects may be identified as BME-related professional culture:

- understanding within a multidisciplinary team,
- striving for the technical excellence,
- human-centric ethical background.

As such circumstances are profession-specific, the need for the organizational culture is fairly high [6]. In case of biomedical engineer, however, the relations are far more complex than the schemes sketched by corporate culture promoters for a typical customer service.

#### *A. Understanding within a multidisciplinary team*

The biomedical engineering integrates various technical disciplines, but also assumes the presence of the engineer in every situation where medicine is practiced. Therefore, one of the principal requirements is the ability of working in a multidisciplinary team, in which common ideas, values and behavioral patterns have a very practical implication guaranteeing responsiveness to the emergency, adaptation to conditions of any healthcare mission and curiosity after the technological development. In such teams various professional learning-related particularities are present, and the mutual understanding is the key meaning supporting the members complementary to each other in the cooperation instead of competition.

#### *B. Striving for the technical excellence*

Working in a team with the doctor, nurse and pharmacist, the biomedical engineer is a representative for all technology-related ideas, and is expected to solve issues in this area. No other application of technology could be compared as having a direct relation with the human, his well-being and fundamental values, as the support of life. Consequently, a particular presumption of excellence is distinguishing the biomedical engineer among other engineers. Moreover, since the technology is currently fast enlarging the ability and efficiency of medicine, it also bears a particular responsibility for unfortunate medical acts.

#### *C. Ethical background*

The engineer is rarely as closely related to the human in

various life circumstances (birth, adolescence, impairment, disease, pain, death and others), as the biomedical engineer. Therefore, particular education forms should stress on attitudes supporting the understanding of the human in general. Since the engineering in biomedicine is always a part of medical act, simultaneous or intended in the future, the ethical background proper for the medicine should be also a mandatory element of lectures and practice in the BME educating institute.

The above listed examples of BME specificity justifies the need for the profession-specific corporate culture and the implementation of its pattern as early as in course of studies.

### III. IMPLEMENTATION OF MSIB CORPORATE CULTURE

The BME-specific attitudes are difficult to be taught using a classical educational approach. Therefore we assume the influence of an organizational example of the School and personal example of teachers as elements of the archetype of future graduates' workplace [7]. In such approach the organizational culture of the School, besides of its integrative role for the academic community, becomes an important component of education.

#### *A. Opportunities and threats for the School*

The external dependencies in Poland in 2005, when the Multidisciplinary School of engineering In Biomedicine was founded, provided several opportunities and threats [8]:

- local industry was rather weak; we estimate the number of local medical technology-related enterprises for 100, but most of them were micro-enterprises (1-5 employees, 40%), or small enterprises (6-50 employees, 30%); bigger enterprises were usually sales- or service representatives of international corporations, without independent human resources management,
- the relation of research and industry was weak; the way from a technical innovation to marketing of a final product was very formalized,
- the research offer of technical universities was expensive and did not match the industry needs; managers from the industry preferred performing the independent research than cooperating with an university.
- the average technological level of the health care was low, with some brilliant exception in selected centers,
- the experience with two-degree studies was very weak; there was no procedures for curricula and examinations, nor for teaching quality measurements; existing government regulations were insufficient,
- there was no practice with teaching in English, but the professional bibliography in Polish was very limited,
- the organization chart of a multidisciplinary school was new and rarely implemented by universities, the university funds distribution mechanisms were not

adequate,

- the biomedicine-related research was performed in several faculties in frameworks of other disciplines: computer or material sciences, electrical or mechanical engineering; professors and assistant-professors with quality field-oriented output were quite numerous,
- the organization principle of the school allows for quality-based staff selection not constrained by state employment regulations,
- there is a growing interest for the medical technology from good candidates,
- selected recent governmental regulations, aiming at increasing the health care quality, prefer the employment for clinical engineers,

Issues of both categories were (and still are) reinforcing the inter-university cooperation and integrating the society. Representatives of eight Polish universities strived for the educational standards in biomedical engineering as a separate faculty and currently this faculty is in the offer of 11 universities in Poland for ca. 1000 candidates each year.

The MSIB authorities designed the purposely conceived and balanced corporate culture and nurture it successively. This was a starting-from-scratch teaching institution based on principles of learning organization. The formation of a new institution was an opportunity for creating a profession-specific, independent system of shared values and beliefs implying and reinforcing a collective identity centered on a mission of the biomedical engineer. Our aims exceeded beyond a "standard faculty" providing the youth with government-designed minimal curriculum. We assume the foundation of a leading research and educational center [9]. Despite celebrating its only fifth anniversary of foundation, the School is recently fairly recognized in Poland and abroad. This was possible thanks to:

- invitation to teaching for only best professionals in the field,
- active creation of cooperation links with other universities in Poland and abroad,
- issuing a BME-student quarterly - a magazine promoting the profession and reinforcing the intellectual confidence and emotional commitment with the group.
- leadership and promotion of common activities, exchanges, staff and students mobility, lectures etc.
- dissemination of the knowledge and participation of the staff members in international conferences and their activity in commissions and others bodies of opinion.

### B. Team building of students, tutors and professionals

The high quality of educational outcome is of a vital interest of students, their industrial employers and the university staff. All three groups of partners aim for the common goal using different approaches and capabilities. Cultivating the understanding of the School as a common

value and sharing of the collective identity and commitment reinforce the mutual compatibility and multi-professional team building. Such training field for the interpersonal learning reveals three self-amplifying feedback loops (fig. 1):

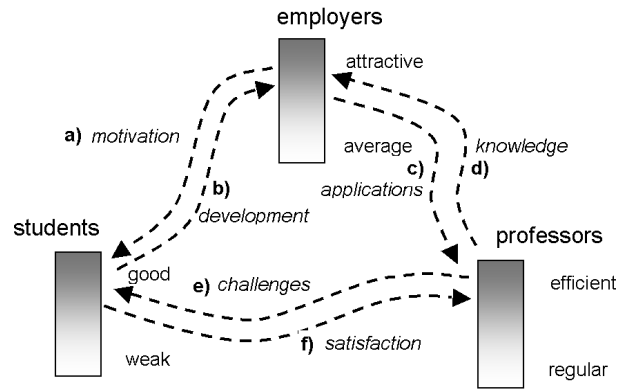


Fig. 1. Block diagram of fundamental feedback loops between the partners of BME educational process.

- attractive employers increase students' motivation (a) and good graduates extend the development perspectives of their employers (b),
- innovative employers open the implementation opportunities for good researchers in applied sciences (c) and more efficient professors provide a high quality knowledge to the industry (d) which, as a side effect, is contributing to the university reputation,
- good candidates are seeking for quality lectures and challenging projects (e), and provide a professional satisfaction to the professors (f) who make the lectures even better.

The mutual relations, demonstrated above in a simplified form, are fundamental for the team building, based on the assumption of the commitment of students, tutors and professionals in a quality-focused efficient education. In the MSIB, the healthcare professionals participate in preparation of curricula, give opportunities for one-month work experiences and formulate challenges for young scientist teams. The university staff cultivates the students' creativity by supervising the laboratory exercises and interim projects, which are partly applied in the healthcare and industry being in turn a demonstration of the graduates' skills. The excellence of the university staff in the scientific fields is also a personal example attracting best students and some of them try to follow or to participate in the research.

## IV. RESULTS

The organizational culture of the MSIB is based on an internal deeply motivated concept of quality teaching institute, aiming at education of sought-after BME professionals. The School is student-friendly and supports their proper educational initiatives, developing in multiple domains. The management requests the precisely defined

achievements from both the staff and students, however thanks to the common feeling of responsibility, the internal ambience supports the cooperation rather than the competition.

The most appreciated are education-oriented behavioral norms and values including self-learning and bottom-originated educational initiatives. Besides the knowledge, technical skills and human-oriented attitudes are important. The basics of human sciences, ethics and law are indispensable elements of education and practice in the School. Two other highlighted features are:

- flexibility - allowing the School to adapt to the trends on the employment market and the graduates to follow the fast developing technical sciences,
- information flow-oriented set of relations between the master and the subordinate the student and the dean etc. - these relations facilitate the administration but are also archetypes of future relations in the multi-professional environment.

Because of common meanings are not permanent, the organizational culture of the MSIB manifests itself in artifacts present in day-to-day living, even if some of them are not always pragmatic. These artifacts include:

- corporate ceremonies (immatriculation, commencement, new year dean address summarizing the achievements, misfortunes and future plans),
- corporate design (well recognized logo, precisely defined color, organizational badges for Board members, corporate T-shirts for students),
- common heroes - with no doubt this honor goes to professor Ryszard Tadeusiewicz, the founder of the School as the former Rector of AGH-UST, but also the pioneer of biomedicine-oriented curricula and author of several BME-related books since mid 70-ties,
- common informal activities (mountain trekking, sailing, skiing, student sport teams in various disciplines, volunteer-based events in hospital and hospices, disabled-dedicated initiatives, extramural student organizations and forums).

The corporate culture is built on selected values and behavioral norms that influence both the employees and students through the internal and external institution policy. The commonly accepted patterns constitutes the internal ambience and friendliness of the School, but as a long-term investment become everyday habits. We easily observe the teachers transferring these patterns to their primary faculties. This justifies the belief, that in the future the graduates will also promote them in their workplace.

We have also confirmed that the culture and its application contribute to a better educational performance. The effects of organizational culture are found to be considerable in magnitude and at least as large as the factors of management and financial structures.

## V. DISCUSSION

In this paper we analyzed the purposely created organizational culture of the BME teaching institute and examined the mutual relations of professors and students in context of typical requirements of the biomedical engineer's workplace. The Multidisciplinary School of engineering In Biomedicine founded in the AGH University of Science and Technology already took many benefits from the opportunities and with the support from the University Authorities is continuously developing through:

- acquiring the knowledge and innovating fast enough to survive and thrive in a rapidly changing environment,
- creating a culture that encourages and supports the continuous learning of students and staff, critical thinking, and risk taking with new ideas,
- allowing mistakes, and appreciating bottom-originated contributions,
- learning also from experience and experiment, and
- disseminating the new knowledge throughout the organization for incorporation into day-to-day activities.

Paraphrasing the Ritz-Carlton's mission stating: "Ladies and gentlemen serving ladies and gentlemen.", we continue to write: "In the MSIB good professionals work for good professionals".

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