



VILNIUS GEDIMINAS
TECHNICAL UNIVERSITY



МОСКОВСКИЙ
ГОСУДАРСТВЕННЫЙ
ИНДУСТРИАЛЬНЫЙ
УНИВЕРСИТЕТ

Market Need Analysis for Built Environment Higher Education

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The VISION

for
Civil Engineering in
2025



Civil Engineering Body of Knowledge for the 21st Century

Preparing the Civil Engineer
for the Future

Which Attitudes?



- The ASCE Committee found three compelling reasons to include the subject of attitudes as one of the three essential components of the Body of Knowledge (BOK). First, there is a wealth of study and professional opinion on the role of attitude, that is, thinking and feeling, in individual and group achievement -attitudes affect achievement. Second, the teaching of attitudes is an integral part of educational practice. Most education and training programs include as part of the objective outcome a component of attitude revision.

- ASCE Committee assembled the following list of attitudes, that is, value-driven feelings or emotions, possibly conducive to effective professional practice of civil engineering.
- Numerous opportunities to teach and learn about attitudes naturally occur. Such opportunities occur within formal education via lecture, case studies of exemplars and failures, journaling, and faculty example; within co- and extra-curricular activities.

Table 2.5.3.1—Attitudes related to civil engineering practice

Unfavorable or Not Constructive	Favorable or Constructive	Comments
Sloppy Careless Imprudent	Thorough Disciplined	The Committee felt that this attitude had the most influence on achieving the outcomes. The favorable attitude is actually the acceptance of the importance of being thorough and disciplined.
Impetuous Passive	Persistent	There may be situations where the unfavorable attitude may be favorable.
Detached Disinterested	Committed	Being detached from certain organizational goals may be a favorable attitude.
Apathetic Pedantic	Curious Flexible	Being curious is perhaps a prerequisite to an attitude to pursue life-long learning.
Intolerant Cruel	Thoughtful Considerate	Is intolerance of sloppy work an unfavorable attitude?
Unsure	Confident	One can have too much confidence.
Condescending Arrogant Sarcastic	Respectful	It is difficult to see condescending, arrogant or sarcastic as ever being favorable.
Intolerant Narrow-minded Selfish	Tolerant	The special knowledge and skills of civil engineers make tolerance more difficult.
Negative Cynical	Positive Optimistic	Some quality control functions could benefit from a negative attitude.
Unethical	Ethical	Teaching the ASCE Code of Ethics and State Licensing laws is teaching knowledge and skills. Being ethical is an attitude.
Conceited	Modest Humble	Most old experienced practicing engineers have learned the hard way to be humble. Can it be taught?



American Society of Civil Engineers

- The diversity of our institutional approach to the teaching of attitudes is considered by the Committee to be one of the strengths of our higher education system.
- The Committee recommends that each employer and university civil and environmental engineering department select a set of constructive attitudes, possibly calling them professional attitudes.

American Society of Civil Engineers: Which Attitudes?

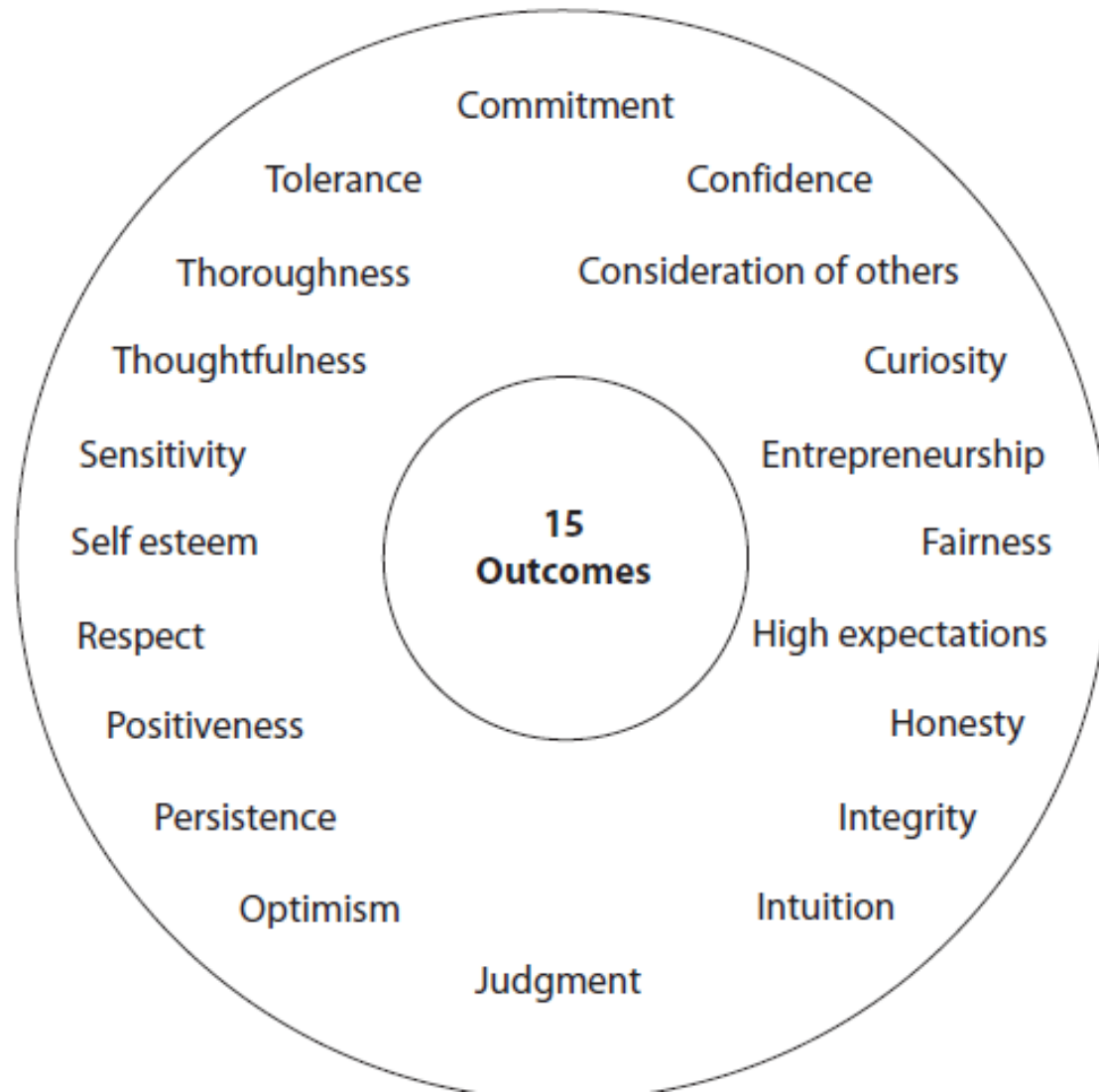
- Commitment
- Judgment
- Confidence
- Optimism
- Consideration of others
- Persistence
- Curiosity
- Positiveness
- Entrepreneurship
- Respect
- Fairness
- Self esteem
- High expectations
- Sensitivity
- Honesty
- Thoughtfulness
- Integrity
- Thoroughness
- Intuition



Ethical behavior

- **Ethical behavior** including client confidentiality, codes of ethics within and outside of engineering societies, anti-corruption and the differences between legal requirements and ethical expectations, and the profession's responsibility to hold paramount public health, safety, and welfare
- Without exception, the one subject that should be taught is professional ethics. While in the strict sense, this is providing the student with knowledge and skills about ethical behavior (learned and performed, perhaps without thinking or feeling ethical); nevertheless, the ethical behavior of a civil engineer is required by law and enhanced by the ASCE Code of Ethics. Since engineering ethical behavior is defined, it is appropriate for students to receive formal class work on the subject.
- During employment, both before and after licensure, there are many opportunities for professional attitude development. Most organizations use knowledgeable and skilled specialists in the motivational and behavioral fields to train employees.

Success in teaching and learning and in applying the 15 outcomes will be highly dependent on supportive teacher and learner attitudes

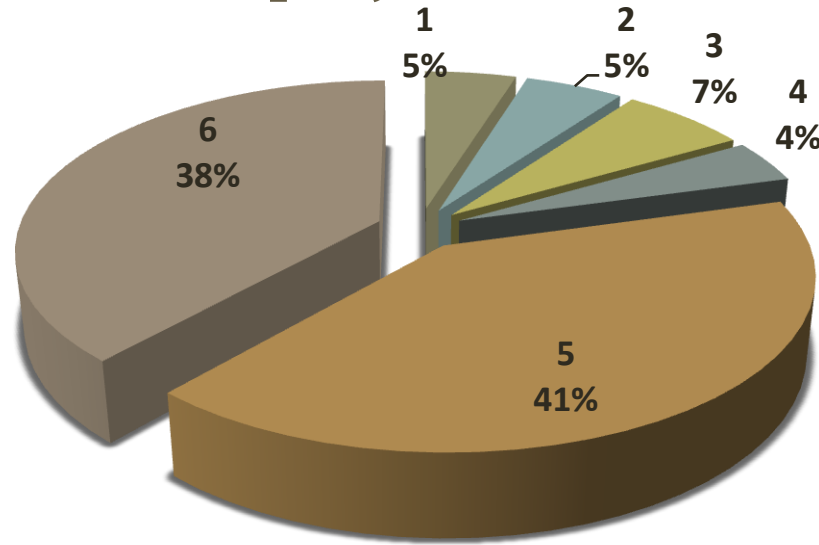


Theatre?



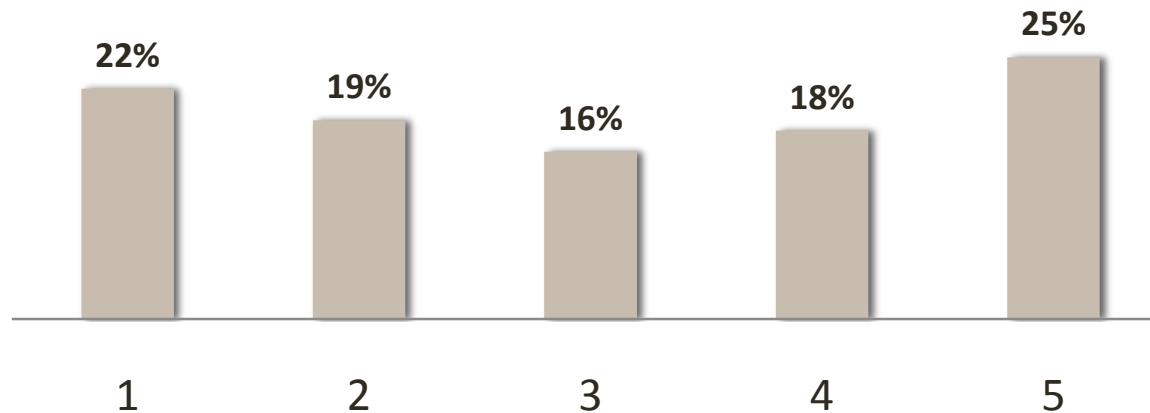
- Lecturer eager to interest students intellectually shall be an expert of his sphere; shall interestingly, humorously, clearly, inspirationally and enthusiastically organize and lecture.
- The Lecturer shall pay his attention to the intellectual interest and to the understanding of interrelation importance.
- Ability of lecturers to interest students includes two main components: definiteness of material taught and stimulation of emotional state of students.

The graduates shall have sufficient knowledge and skills for the implementation of the following projects



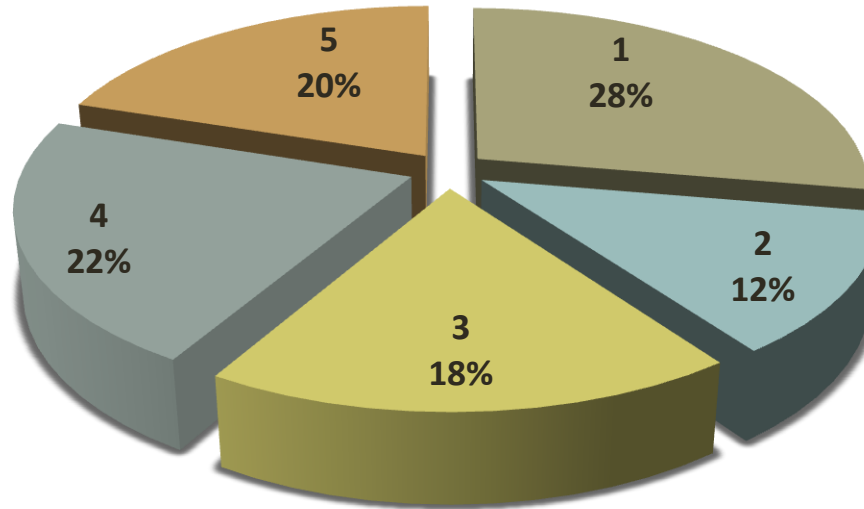
1	-	Investigation and definition of the issue, determination of limits set for external environment, balance, health, safety, risk of the Project
2	-	Understanding of costumers' needs, importance of esthetical and other qualitative parameters
3	-	Determination and management of costs and expenditures
4	-	Creative determination of modern decisions
5	-	Ensuring effective implementation of team goals within the whole life cycle of the project (production, management, supervision, disposal, etc.)
6	-	Management of Project development process and assessment of the results gained

The Graduates shall be able to assess economical, social and environmental context



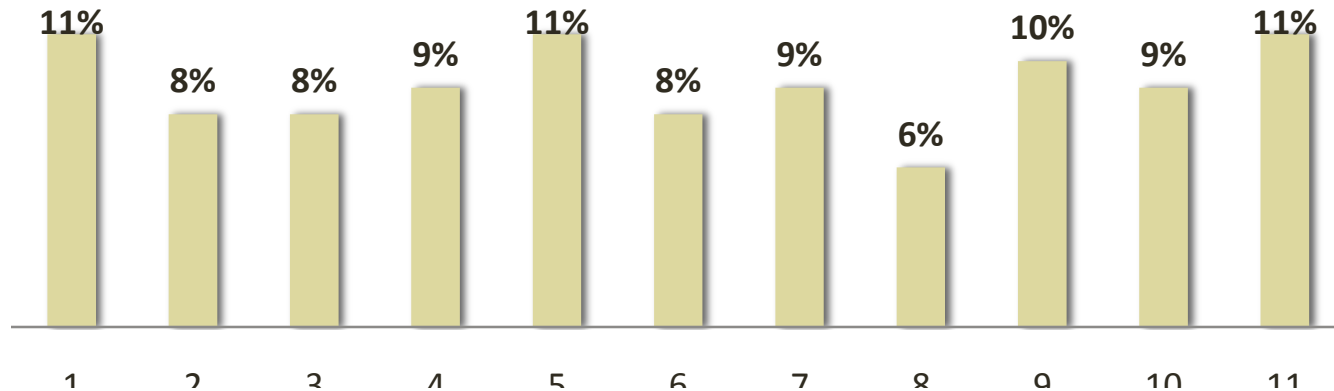
1	-	Understanding of commercial and economical context of engineering process
2	-	Knowledge about management methods, in order to gain engineering goals within the particular context
3	-	Understanding of the requirements set for engineering activity required in order to stimulate balanced development
4	-	Understanding of legislative requirements, regulating engineering activity (regarding personnel, health and risks issues)
5	-	Understanding of the importance of high level professional and ethical behaviour for civil engineering

The graduates shall have particular practical skills



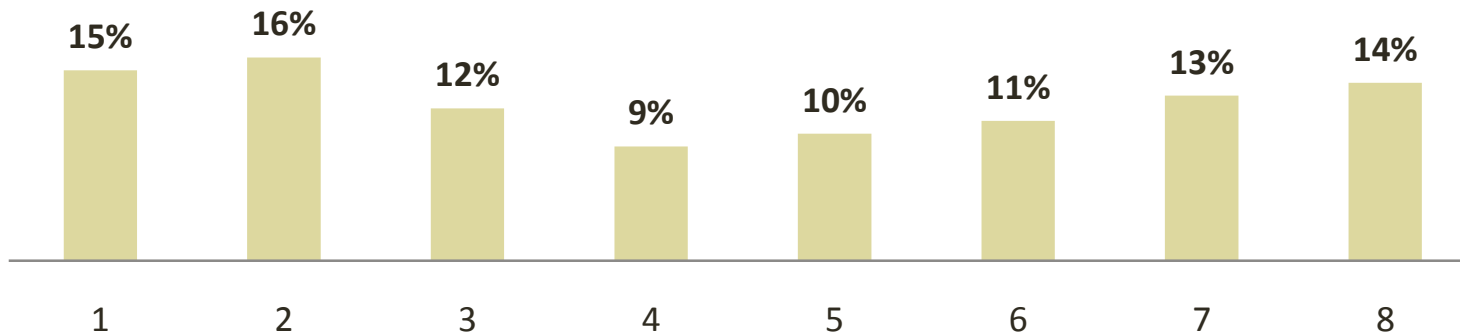
1	-	Knowledge about precise materials, products, tools, processes, and technologies
2	-	Experience got from activities in laboratories or seminars
3	-	Ability to apply knowledge about engineering (operations and management, development of technologies) for particular spheres
4	-	Knowledge about effective application of technical literature or other information sources
5	-	Understanding of legislative acts and industrial standards, regulating engineering activity

Engineering programmes shall train students in the following subjects



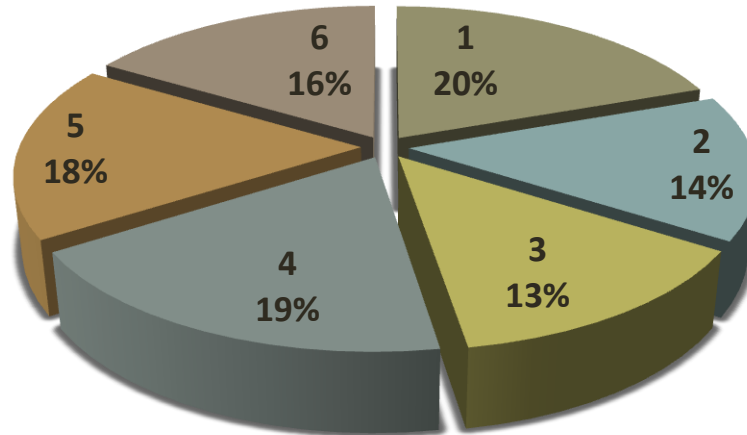
1	-	Ability to apply knowledge of mathematics, natural science and engineering
2	-	Ability to design and execute experiments, analyze and interpret/explain obtained results
3	-	Ability to design systems, components or processes in accordance with the results to achieve, in order to meet real economical, environmental, social, political, ethical, health and safety, production and stability limitations
4	-	Ability to carry out interdisciplinary team work
5	-	Ability to recognize, formulate and solve engineering issues
6	-	Understand professional and ethical liability
7	-	Ability to communicate effectively
8	-	Have wide education in order to understand the influence of engineering solutions within international, economical, natural and public context
9	-	Wish and recognition of the importance of the education lasting the whole life
10	-	Knowledge about modern problems
11	-	Ability to apply modern engineering technique, technologies, skills for engineering practice

Engineering programmes shall train students for competent execution of research tasks



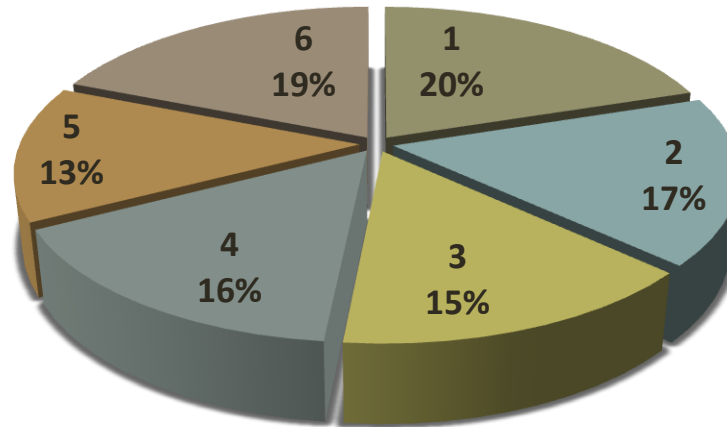
1	-	Reformulation of poorly formulated research tasks. Pays attention to limits of the system. Justifies new interpretations and alternatives for concerned parties
2	-	Students shall be attentive and observant, creative and able to solve every day engineering issues in accordance with the requirements of the concerned parties
3	-	Students shall be able to execute research researches under supervision
4	-	Students shall be able to work at various abstraction levels
5	-	Students shall understand the importance of interdisciplinary knowledge and knows how to apply it
6	-	Students shall understand varying direction of research researches induced by external factors or improved understanding
7	-	Students shall be able to evaluate the availability of particular research researches
8	-	Students shall be able to participate in the development of research knowledge of one or several related engineering spheres

All students shall assimilate principles of research during studies



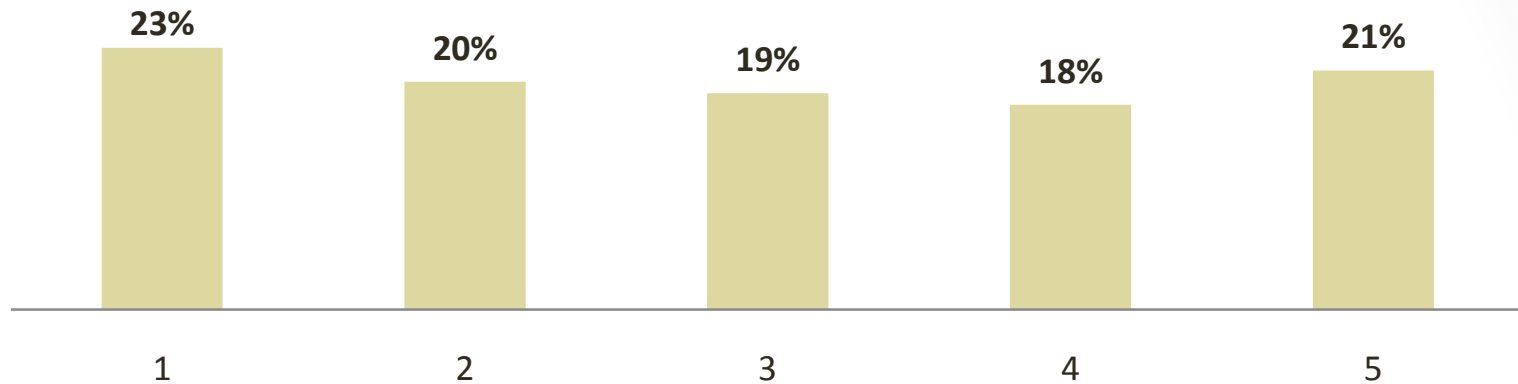
1	-	Students shall be curious and biased towards continuous study
2	-	Students shall solve tasks applying theories, models and interpretations of system approach
3	-	Students shall be able to apply practically different models
4	-	Students shall understand the basis of engineering science and technologies (essence, methods, differences and similarities of research spheres, nature of laws, theories, descriptions, objectivity, role of the experiment)
5	-	Students shall understand research practice (research systems, relations with clients, information systems, integration importance)
6	-	Students shall be able to document research and project results, take part in the development of engineering knowledge base

Students shall have the following general intellectual skills



1	-	Students shall be able to evaluate own thinking, decision making and activity critically under supervision and change the above attitudes in accordance with the internal and external deviations of the activity
2	-	Students shall be able to think logically and answer questions „What if“ and „Why“ raised for own and related engineering spheres
3	-	Students shall know how to apply inductive, deductive, analogy methods for their activity
4	-	Students shall ask particular questions, shall have critical and constructive point of view for task analyzing and solving
5	-	Students shall be able to form reasonable point of view in case of uncompleted or indirect information
6	-	Students shall be able to take part in research discussions of related topic effectively

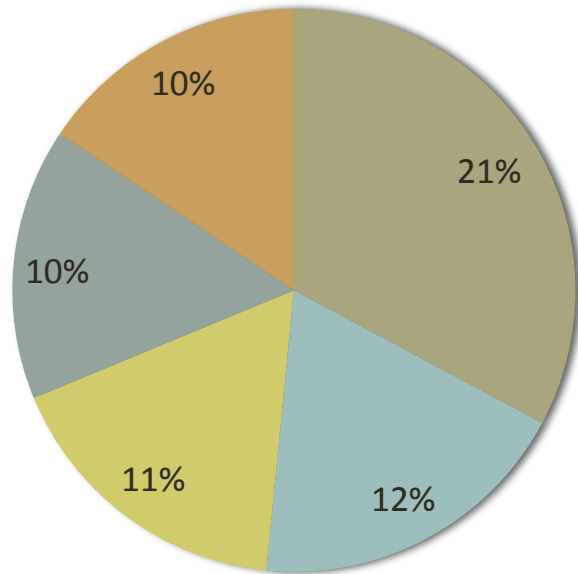
Graduates shall have skills to be applied for other spheres



1	-	Students shall be able efficiently to work on their own or in team
2	-	Students shall be able to perform effective communication with engineering community and broad public with the help of different methods
3	-	Students shall know about: legal issues concerning health and safety, engineering practice liability; influence of the engineering solutions on public and environment; professional ethics, obligations of the engineering activity and standards
4	-	Students shall understand project management and business practice, including all limitations (for example, risk management and deviation management)
5	-	Students shall understand the importance of continuous studying and shall have the intention to do it all the life

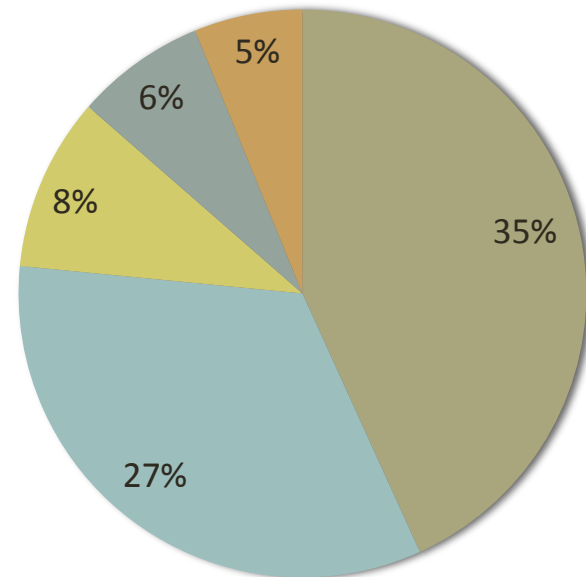
Set of skills for the project manager (by FMI Project Management Survey)

The top five weakest skill sets of the project manager



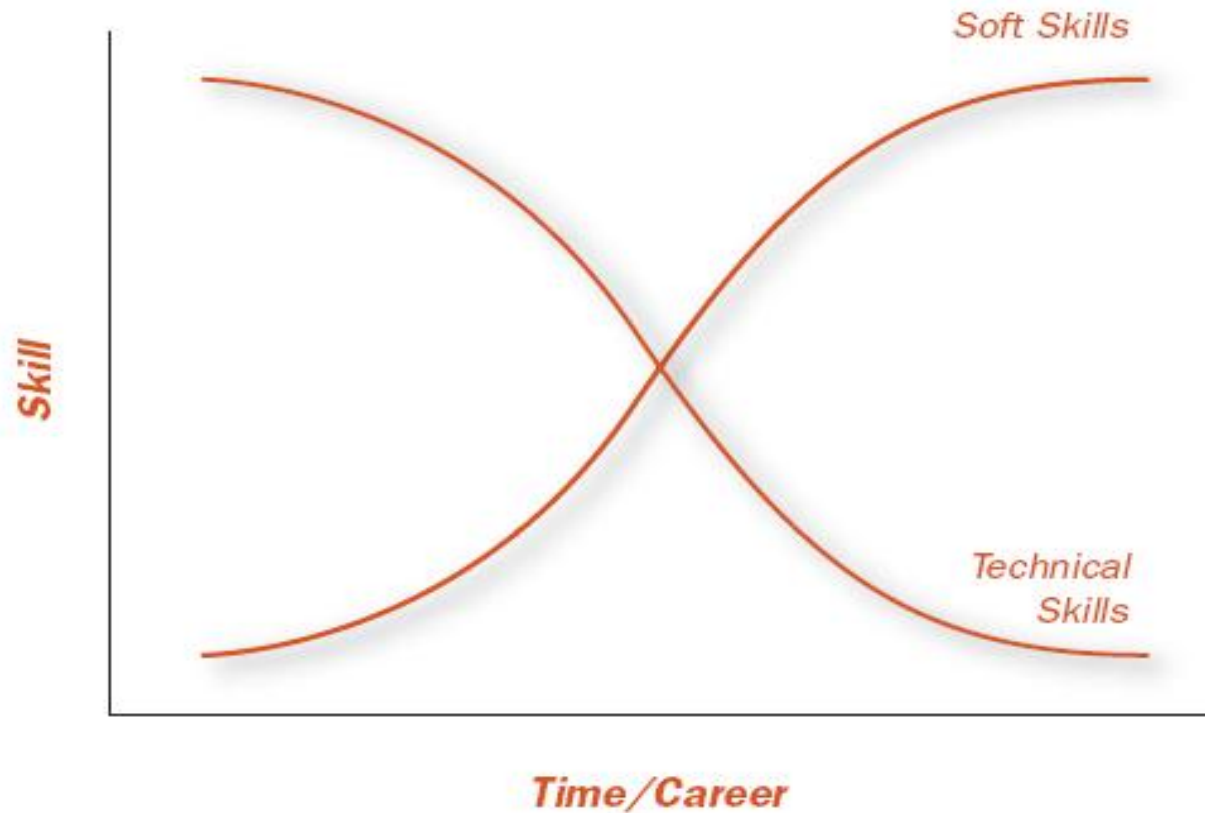
- Cost to complete and profit projections
- Time management
- Closeout skills
- Communication (written)
- Change order management

The top five strongest skill sets of the project manager



- Client/customer relations
- Understanding the building process
- Change order management
- Cost to complete and profit projections
- Communication (written)

Project leader skills change over the course of a career



The universities that offer study programmes promoting energetically and ecologically sustainable, affordable and healthy built environment



<u>University</u>	<u>Country</u>	<u>Programme title (Qualification)</u>
<u>Birmingham City university</u>	UK	<u>Planning, Environment and Development (BSc)</u> <u>Environmental Sustainability (PgCert/PgDip /MSc)</u> <u>Environmental Sustainability (Design and Construction) (PgCert/PgDip /MSc)</u>
<u>University of Central Lancashire</u>	UK	<u>Sustainable Energy Management (BSc)</u> <u>Building Services (MSc)</u> <u>Urban Environmental Management (MSc)</u>
<u>Sheffield Hallam University</u>	UK	<u>Built Environment (BSc)</u> <u>Building surveying (MSc)</u>
<u>The Hong Kong University of Science & Technology</u>	PRC	<u>Environmental Management and Technology (BSc)</u>

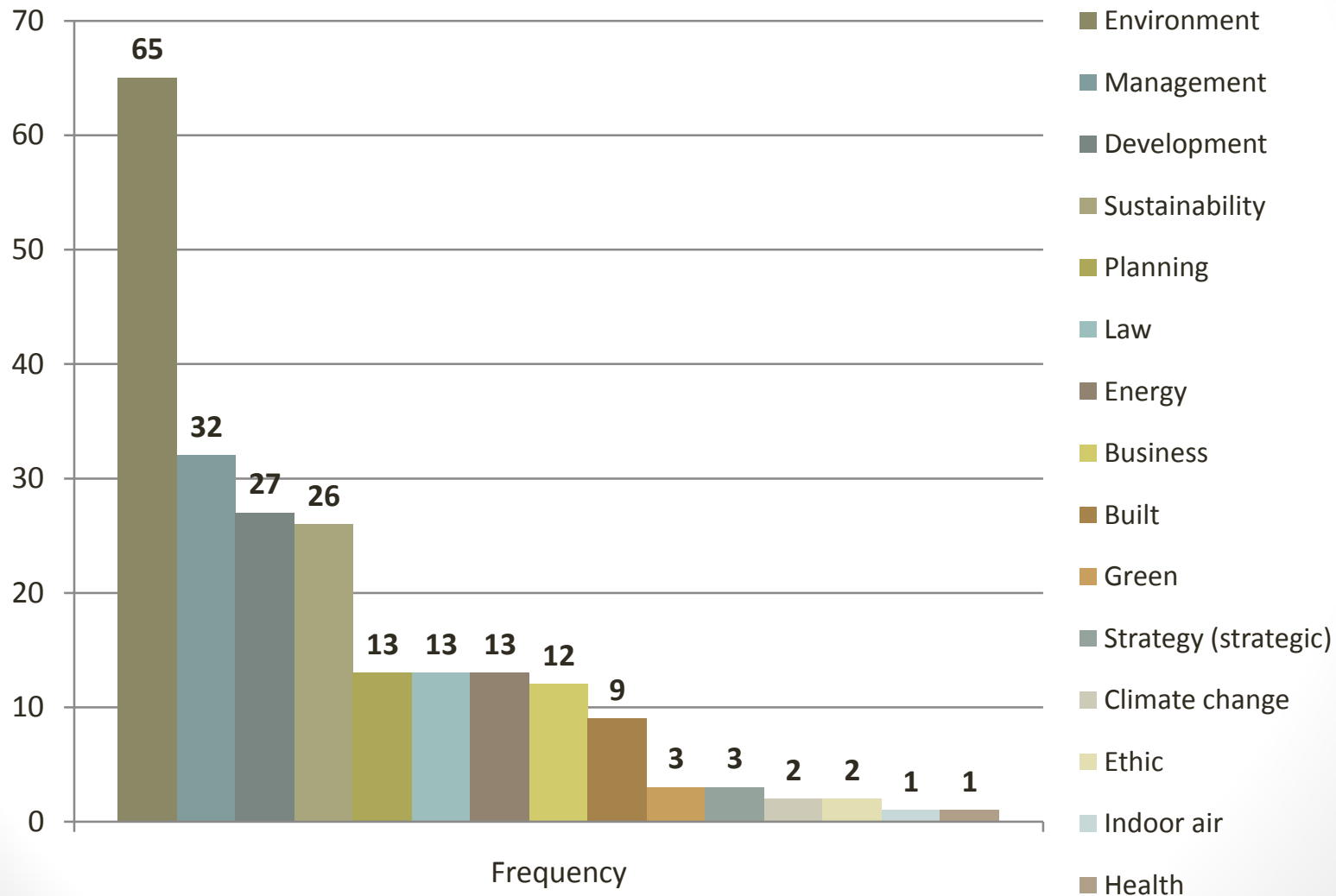
The universities that offer study programmes promoting energetically and ecologically sustainable, affordable and healthy built environment

<u>University</u>	<u>Country</u>	<u>Programme title (Qualification)</u>
<u>Plymouth University</u>	UK	<u>Environmental Construction Surveying (BSc)</u> <u>Building Surveying and the Environment (BSc)</u> <u>Environmental Consultancy (MSc)</u> <u>Learning for Sustainability (MSc)</u>
<u>Stony Brook University</u>	USA	<u>Environmental Design, Policy and Planning (BSc)</u>
<u>Kingston University London</u>	UK	<u>Sustainable Development (BSc (Hons))</u> <u>Sustainability for Built Environment Practice (PgCert/PgDip/MSc/MA)</u>
<u>Northumbria University</u>	UK	<u>Sustainable Development in the Built Environment (MSc)</u>
<u>London's Global University</u>	UK	<u>Facility & Environment Management (Singapore) (MSc)</u>

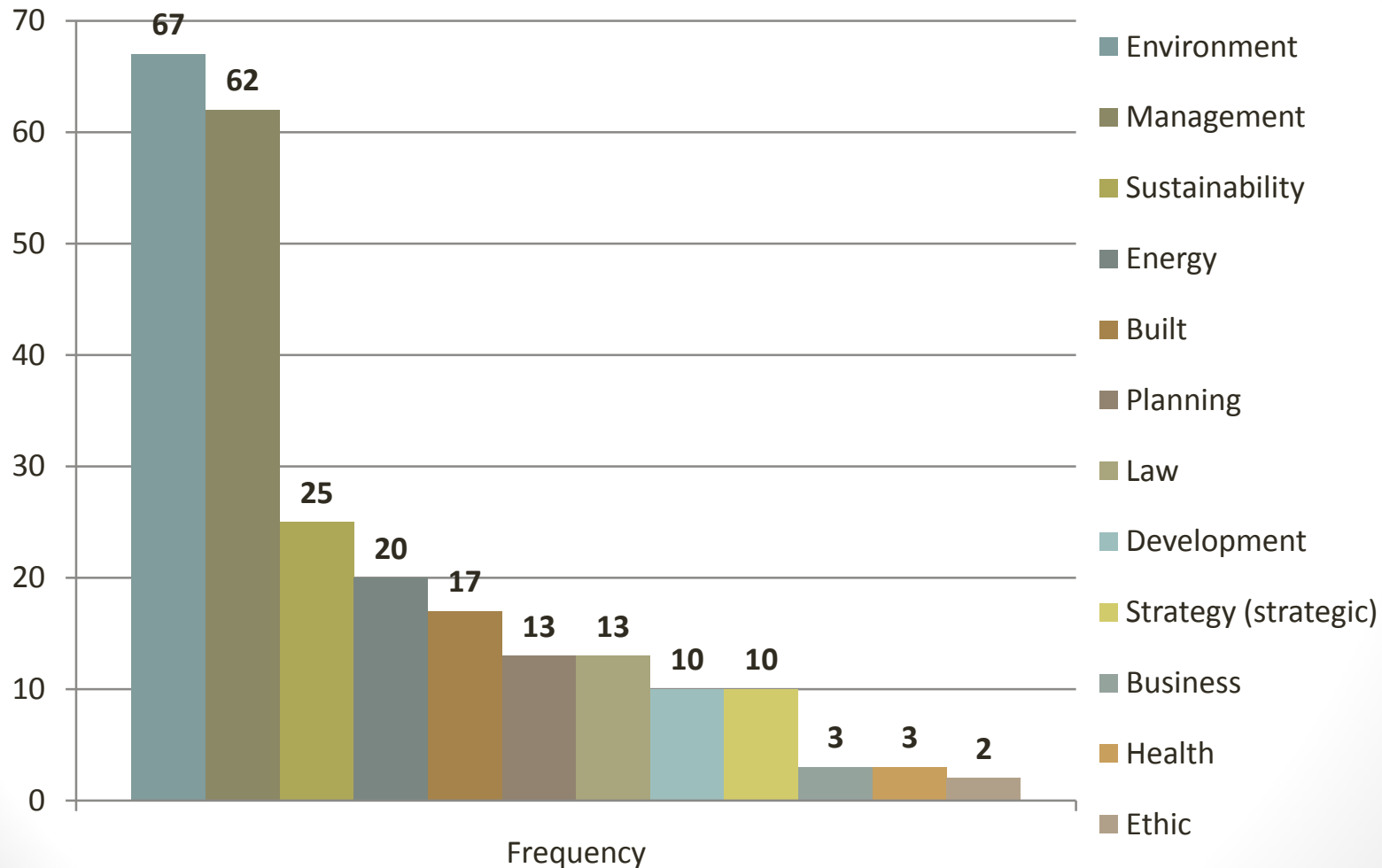
The universities that offer study programmes promoting energetically and ecologically sustainable, affordable and healthy built environment

<u>University</u>	<u>Programme title (Qualification), Country</u>
<u>Nelson Mandela Metropolitan University</u>	<u>Built Environment (MSc / PGD), ZA</u>
<u>The University of Nottingham</u>	<u>Sustainable Energy and Entrepreneurship (MSc), UK</u>
<u>University of Brighton</u>	<u>Construction Management (MSc/PGCert/PGDip)</u> <u>Facilities Management (MSc/PGCert/PGDip)</u> <u>Project Management for Construction (MSc/PGCert/PGDip)</u> <u>Environmental Assessment and Management (MSc/PGCert/PGDip)</u> <u>Sustainability of the Built Environment (MSc/PGCert/PGDip)</u> <u>Town Planning MSc (PGCert/PGDip), UK</u>
<u>University of Dundee</u>	<u>Advanced Sustainability of the Built Environment (MSc/PGDip), UK</u>
<u>University of Washington</u>	<u>The Built Environment (PhD), US</u>
<u>Clemson university</u>	<u>Planning, Design and the Built Environment (PhD), US</u>

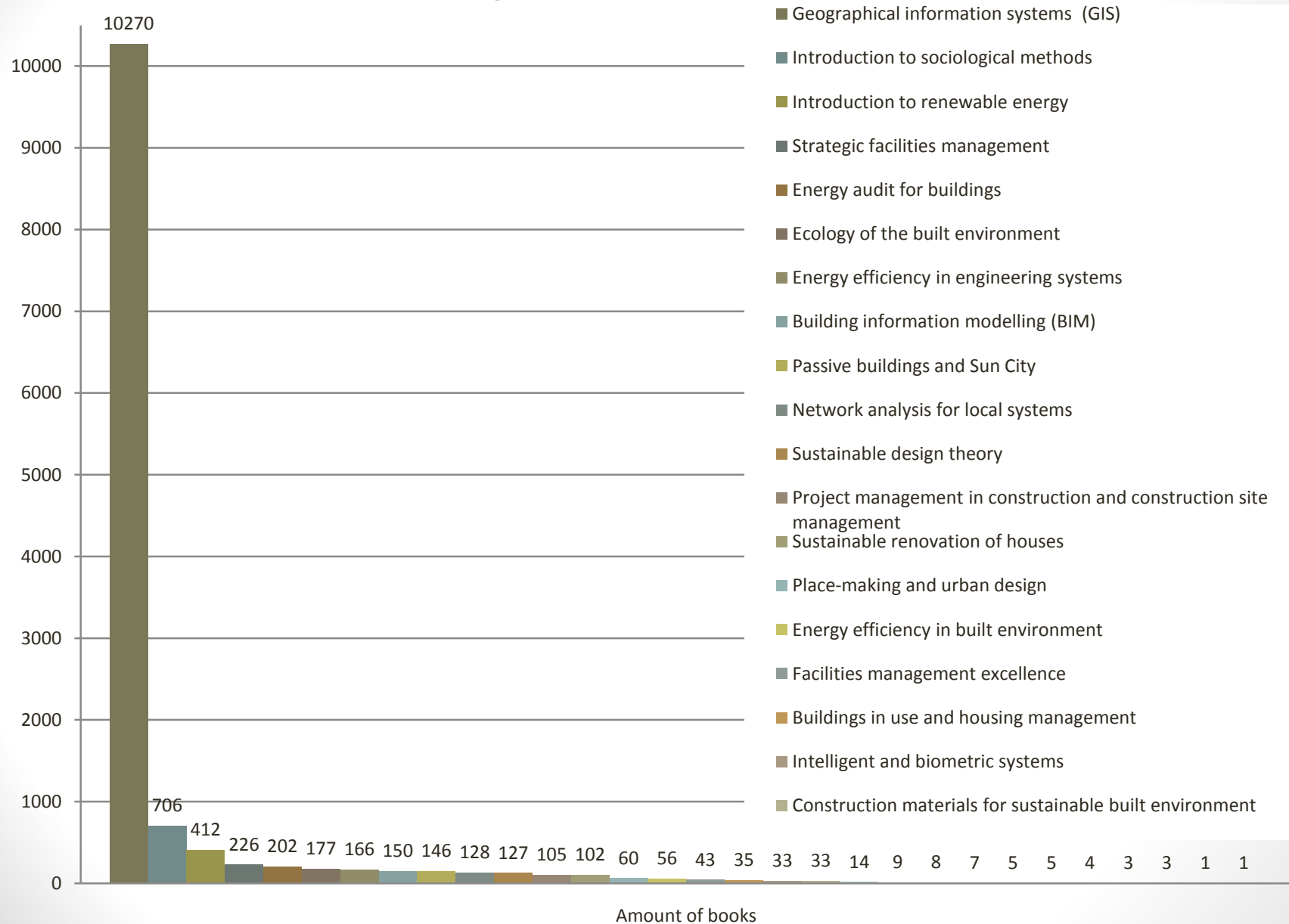
The most common keywords related to energetically and ecologically sustainable, affordable and healthy built environment in BSc study programmes offered by universities around the world



The most common keywords related to energetically and ecologically sustainable, affordable and healthy built environment in MSc study programmes offered by universities around the world



The number of books by the modules available in BSc, MSc and PhD cycles



Thank You!