

Samorządowa Instytucja Kultury - Centrum Nowoczesności Młyn Wiedzy
[Self-Government Cultural Institution – the Innovation Centre Mill of Knowledge]

Toruń, ul. Władysława Łokietka 5,
Tel. +48 56 690 49 90
www.mlynwiedzy.org.pl
www.centrumnowo.kei.pl

A DETAILED DESCRIPTION OF THE SUBJECT OF THE CONTRACT

EXHIBITION

"... it's so simple!"

PART I — GENERAL REQUIREMENTS

Basic information on the intended use and location of the exhibition in the exhibition area and description of the object of the contract:

The Innovation Centre Mill of Knowledge (ICMK) is a self-government cultural institution founded by the commune of the city of Toruń. It is located in the historical part of the so-called Richter Mills, dating back to the 1940's. The building consists of two parts – the former mill and grain elevators having 8 and 10 floors respectively, wherein the ICMK occupies 6 and 7 floors respectively. The remaining two floors of the mill, in which the exhibitions will be located, have been assigned to the needs of another institution. The Centre's location in historical buildings of Toruń will determine the character of permanent exhibitions presented there: 'On the Revolutions', 'The River', '...it's so simple' and 'Ideas', two of which, namely 'On the Revolutions' and 'The River' have already been installed.

Under the object of the contract the Contractor will design and make the exhibition '...it's so simple' consisting of 26 exhibits together with exhibition messages and appropriately designed space and deliver it to the Ordering Party's seat. The exhibition is to be located on the fifth floor of the building but it is intended as a portable modular structure, so the arrangement of the entire exhibition and its respective zones must be transferable to a different location with appropriate dimensions and technical parameters.

1 Basic information

1.1 The audience of the exhibition

The exhibition is addressed to individual persons and organised groups of:

- children and youth;
- adults and whole families;

Children under the ages of 13 will stay on the premises of Innovation Centre Mill of Knowledge under adult supervision. Organised groups will stay on the premises of Innovation Centre Mill of Knowledge only with their group leaders.

1.2 Topics of the exhibition

The exhibition '...it's so simple' will include portable stations covering the following themes:

- physics, with a particular emphasis to the notions of force and energy,
- brain-teasers and skill tasks,
- DIY and technology,
- contemporary technologies in the service of man.

1.3 Characteristics of the exhibition

The exhibition is intended to be portable, which means that the exhibition and its respective zones, both individually or in threes and fours, will be rented out to other institutions and centres. Stations and design elements, with respect to their size, should be adapted for being quickly assembled and disassembled and transportation, which also includes the possibility of dismantling during transportation. The assembly time in a new location should not exceed four days, whereas the assembly of exhibits and design elements of an individual zone should be possible within one day.

At the initial stage the exhibition will be located in the building of the Innovation Centre Mill of Knowledge, in the former Richter Mills on the 5th floor of the building in the designated place, with the total exhibition area of 373.17 m² and the pre-area of 129.57 m² (a view of the exhibition area included in the appendix). The exhibition is to be located between the north wall of the building around the banisters that secure the Foucault Pendulum zone.

One of the most important factors that influence the shape of the exhibition will be the creativity and innovation of the visitor who may be able to discover his aptitude for science, construction and invention on account of well-suited thematic zones and exhibits. Many of the stations will be "co-created" by the visitors who will be able to choose the kind of activity or the tasks they wish to perform. The majority of the exhibition stations will invite the visitors to cooperation, as the end result (the accomplishment of the task) will only be possible if performed jointly. The exhibition space is to be divided into four zones the working titles of which are: 'Brainy', 'Mechanical Playground', 'Think, understand, do' and 'TechnoWorld'. Each of the zones will be composed of 6 or 7 exhibits which together form a coherent thematic whole, and they will be focused on a particular activity of the visitor. The passage through all the zones of the exhibition will constitute a journey through the world of riddles and puzzles (zone one) which shape and develop the ability to think logically, which in turn is indispensable for the acquisition and understanding of simple physical laws and definitions (zone two), through constructing independently (zone three). The knowledge and skills acquired in zones 1-3 are essential for the creation of modern technologies, which the visitors will experience in zone four.

1.4 Elements of the Exhibition

1.4.1 Stations

The exhibition will include interactive multimedia stations and hands-on stations.

1.4.1.1 Hands-on stations

In each of the zones the Ordering Party provides for hands-on stations, requiring greater involvement of the user to achieve the desired result. The main purpose of these stations is to stimulate the visitors' thought and creative processes. Stations of the kind will not have multimedia devices. Some of the hands-on stations require the application of additional fixtures and fittings for the sake of the visitors' safety.

1.4.1.2 Multimedia stations

The Ordering Party provides for typical multimedia stations at the exhibition, with their content referring to e.g. modern technologies, such as GPS. Multimedia stations will be mounted as infokiosks. Stations of this kind will chiefly include multimedia devices

1.4.1.3 Interactivity types of the stations

All the stations of the exhibition will be interactive. Stations which meet this requirement will be considered as such if they represent at least one of the following types of interactivity:

- Manual: station requiring the work of hands;
- Motor: station requiring the movement of the whole body and motor coordination;
- Sensory: station requiring the use of senses (e.g. sight, touch, smell, etc.);
- Intellectual: interaction using the visitors' knowledge.

1.4.2 Exhibition messages and interesting facts

Each station has to be accompanied by an exhibition message in the form of infographics built in the station or stand alone. In the case of multimedia stations the exhibition message should blend in with the multimedia application.

The message should contain:

- a. name of station in Polish and English,
- b. instructions for the visitor to conduct an experiment (step by step) in English and Polish,
- c. explanation of the observed phenomenon/phenomena/information on technology (depending on the station theme) in Polish and English.

The content of the exhibition message has to be understandable and encourage to use the station with regard to both the information included and the volume/length of the text. Furthermore, the messages have to be prepared in such a way as to enable the Ordering Party to modify the content later on (if there is such a need). The messages have to be made in Polish and English.

The interesting facts, the content of which will be suggested by the Contractor and verified by the Contracting Party, will be available at each station in the form of collectible double-sided flashcards in the A6 size on matte, coated paper with a weight of 135 g, 50 000 pieces for each station. The interesting facts, hereinafter referred to as flashcards, should be available in Polish and English (Polish on one side and English on the other). A set of flashcards will be an exhibition souvenir. In the future, the content of the flashcards may be modified by the Ordering Party for additional prints. Each station requires a specially designated place where the flashcards can be collected (depending on the station layout it may be a pocket placed on the side, a hollow in the table or some other solution as suggested by the Contractor).

Exhibition messages at the stations and the flashcards with interesting facts must be coherent in terms of the graphic form that is typical for the entire exhibition in accordance with the accepted design concept.

1.4.3 The design concept and the arrangement of the Exhibition space

The stations for each zone as well as the additional elements of the design that are included in it should have a recognisable design concept for the entire zone. It is important to note that the exhibition is coherent thematically and that it may be displayed in its entirety in one space, thus it is essential that the design concept in respective zones should be consistent through e.g. the materials used, or colours.

The design must include elements that distinguish: the entire Exhibition, e.g. a pictogram and an illuminated wall that includes information about the entire Exhibition comprising all four zones (in Polish and English), as well as the given zone, e.g. a pictogram, zone information walls (in Polish and English). In the course of designing the entire Exhibition space the Contractor should designate respective zones e.g. with elements of little architecture or recreational places (min. four in the space of the entire exhibition, i.e. one for each of the zones) optimising the mutual localization of the

stations. It is important to note that each of the zones may be presented separately, which is why the design elements (e.g. walls) must not belong to two zones simultaneously.

1.5 Technical description of the building

The building of Innovation Centre and the Toruń Technological Incubator is an adaptation of mills and grain elevators built in the 1940's. The building consists of two parts having 8 and 10 floors with the height of 33.4 m and 40.35 m respectively, i.e. it is a tall building. The building consists of two functional parts which are used by two different Users – the Innovation Centre Mill of Knowledge and the Toruń Technological Incubator. The Centre is located on the 1st floor (partly) and on the floors from the 2nd to 6th and partly on the 7th floor. The Incubator's seat is on the 1st and 7th floors (partly), on the 8th floor and partly on the 9th floor. At present there is a multi-storey exhibition space in the Innovation Centre (in the former grain elevators) and popular science studios (in the part of a former grain mill).

The part used by the Centre is a seven-storey space consisting of mezzanines opening to a cone-shaped space defined by a plane parallel to the plane of movement of the Foucault's Pendulum. In the popular science studios zone there are didactic, experimental and workshop rooms. Mobility is ensured by two staircases and two lift systems with vestibules. Dimensions of the elevator cubicle: length 2 m x height 2.10 width 0.9 m; dimensions of the elevator entrance height 2 m x width 0.9 m. The zone is also a passage place from the exhibition space to the studios zone. The building in its part over the ground is in the form of a rectangle with sides sized 29.6 m and 37.3 m. It is based on a reinforced frame structure. and supported by reinforced pillars, rectangular in cross-section and their cross-section dimensions varying on particular floors. On the level of ceilings there are ceiling joists with a characteristic change (increase) in their height near the supports. The floor slab with the reinforcement is 12 cm thick (15 cm on the flat roof). The 15 cm thick roof plate is designed to shift the weight from the air-conditioning devices. On the roof plate, above a number of inlets, there is a space provided for a steel structure turret, where the Foucault Pendulum is hung.

The ceiling's payload in the exhibition part is 5.0 kN/m², while the roof's payload equals 3.0 kN/m². The exhibition space occupies: FOREGROUND OF THE EXHIBITION natural granite 129.57 m², EXHIBITION natural granite 373.17 m², TECHNICAL ROOM rubber floor-finish 4.09 m². In the central place of the space there is a 27.71 m² hole in the ceiling, surrounded by banisters made of laminated glass with a handrail at the height of 1.10m, protecting the zone in which the Foucault's Pendulum is exhibited. The height between the flooring and the ceiling in the exhibition area on the 5th floor is 257 cm at the lowest and 295 cm at the highest point. The dimensions of the entrance openings leading from the passage vestibules to the exhibition room are: 180 x 200 cm and 90 x 200 cm. Ironworks of the internal doors leading to the exhibition space are made of aluminium profiles (colour RAL 9003), filled with a translucent glass. The flooring is made of 30 x 60 cm granite slabs. The granite floor had not been impregnated. The tiles were installed with the use of 'Atlas' elasticated mortar. The grout used is Baumit Premium Fuge. The brick walls are filled with polyurethane foam, reinforced from the inside with a reinforced wall. The interior has been thermally insulated with the use of foam concrete boards of a low multipore thickness. There are no window openings in the whole exhibition space. In the central part there are two reinforced pillars with their cross section of 62.5 x 63 cm and 62 x 62. Proprietary suspended ceilings made of plates with perforated core made of mineral fibre and a coating of acoustic fleece (thickness of the plates – 19 mm). At the walls and around the pendulum zone there is a suspended ceiling made of G-K boards (thickness of the board 1 x 1.25 cm), CD 60 on the ceiling profiles, wall UD 30. The Contractor undertakes to ensure that the Ordering Party will not lose the guarantee of the General Contractor of construction works or the Contractor undertakes to ensure guarantees for the executed works connected with damage of construction works already carried out, for the period not shorter than the guarantee given by the General Contractor. All costs connected with such a change will be borne by the Contractor. Furthermore, the building provides for the following installations, systems and devices:

- SAP fire alarm system;

- DSO voice alarm system;
- BMS automatic ventilation and building management system;
- telecommunications installation of intrusion detection system signalling;
- SSWiN [IDS], access control;
- KD, CCTV surveillance television;
- installation of a structural network (computers, telephones and network equipment and of a switchboard).

The building has a mechanical intake and exhaust ventilation with air-conditioning of the rooms. The core of the system is the three roof air handling units and one suspended air handling unit in the attic, directing the outside air to proper rooms. The installation of ventilation of the whole exhibition space has been designed as an installation with a laminar flow, with the use of skirting displacement flow diffusers. Such a system is aimed at eliminating the influence of ventilation air movement on the exhibits' work.

The lighting level applicable in the exhibition space of the building is the working plane, i.e. the height of 0.85 m from the level of the floor, with the intensity of about 400 lx. The lighting system control has also been designed. The exhibition's control cabinets are situated in the technical room on the eastern side. Moreover, the building provides for LED emergency lighting of a small intensity. The internal electrical installation is routed on the 4th floor in the walls and in floor boxes; lamps – 70 pieces, halogen bulbs – 60 pieces, floor boxes – 36 pieces. 400V sockets – 6 pieces, 230V sockets – 15 points. (appendix no 1 – installation of sockets) (appendix no 2 – electrical switchgears– installation power TCK4.1 and TC4/2) Additionally the Ordering Party included basic plan views of the floor, yet it has to be noted that as-built documentation contains alterations in relation to original documentation. The details of as-built documentation will be available at the Ordering Party seat.

2 Description of the object of contract

2.1 Designs

2.1.1 Creating graphic and working designs of the particular elements of the Exhibition and delivering them to the Ordering Party, in particular:

2.1.1.1 Creating graphic and working designs of stations and delivering them to the Ordering Party,

2.1.1.2 Creating graphic and working designs of the Exhibition arrangement elements, including areas of recreation and delivering them to the Ordering Party.

2.1.2 Creating a graphic design of the arrangement of the whole Exhibition space and delivering it to the Ordering Party.

2.1.3 Creating a preliminary graphic design of the exhibition messages including: the colouring of a given zone, pictograms, graphic template and the name of the station in Polish and English, and delivering it to the Ordering Party.

2.1.4 Creating and delivering the updated visualisations of the stations together with the exhibition messages and of the whole Exhibition, presenting the Exhibition from each side, during the day and at night, on the basis of designs mentioned in clauses 2.1.2, 2.1.3 and 2.1.4, after their final acceptance by the Ordering Party in the electronic form with the parameters which enable the creation of printouts sized 0.7m x 0.5m without deterioration in their quality

2.1.5 Handing over a cost estimate including the prices of Exhibition's elements mentioned in clause 1.4. and all the other costs necessary to execute the object of contract (after the final acceptance of the designs by the Ordering Party) to the Ordering Party.

2.1.6 Providing the Ordering Party with the information concerning the yearly cost of the Exhibition's operating.

2.1.7 Handing over a list of all spare elements meant for all stations, together with their quantity, to the Ordering Party.

2.2 Manufacture, delivery and installation of the Exhibition's elements

- 2.2.1** Creating exhibition messages for all the stations, which consist of information boards blended in with stations or infographics placed on the stations, in such places that do not cause interference with functionality, containing:
- a.** the name of the station in Polish and English,
 - b.** instructions for the visitor to conduct an experiment (step by step) in English and Polish,
 - c.** explanation of the observed phenomenon/phenomena/information on technology (depending on the station theme) in Polish and English.
- 2.2.2** Creating flashcards with interesting facts containing a graphic design and the content suggested by the Contractor.
- 2.2.3** Creating applications for the multimedia stations, which comprise the content suggested by the Contractor. Each station has to include in particular:
- a.** a list of all applications used at the station together with presentations and other means of multimedia messaging used together with their map and a specification of their content,
 - b.** graphic designs of the applications, presentations, animations and other means of visual message,
 - c.** text content used in the applications.
- 2.2.4** Providing the Ordering Party with the content of exhibition messages, interesting facts and applications including the elements required in clauses 2.2.1, 2.2.2, 2.2.3 in order to obtain their acceptance and make necessary changes on the basis of the Ordering Party's observations.
- 2.2.5** Manufacturing of all the Exhibition's elements according to the designs accepted by the Ordering Party and mentioned in clause 2.1.
- 2.2.6** Testing of all the Exhibition's elements at the Contractor's seat in the presence of the Ordering Party's representatives and making necessary changes on the basis of the test's results.
- 2.2.7** Delivering all the Exhibition's elements to the Ordering Party's seat, i.e. the stations, and elements space design together with the elements that are included in the recreational set, which had previously been tested and approved by the Ordering Party, as well as the exhibition messages and flashcards with interesting facts that had also been approved by the Ordering Party. The flashcards should be delivered as double-sided coloured printouts in the A6 size on matte coated paper with a weight of 135g, 50 000 pieces for each station.
- 2.2.8** Providing the complete software for the multimedia stations, together with texts, animations, films, sound files, games and other multimedia software used in them, which have been approved by the Ordering Party, in the form allowing for the change of software, as well as for adding new films and animations.

The Contractor should deliver, in particular:

- a.** a list of all applications used at the station together with presentations and other means of multimedia messaging used together with their map and a specification of their content,
- b.** graphic designs of the applications, presentations, animations and other means of visual message,
- c.** all the animations used in electronic form on a CD or DVD,
- d.** all the films and programs used in electronic form on a CD or DVD,
- e.** all the computer programs together with source files created for the needs of the Exhibition in electronic form on a CD or DVD,
- f.** all the other elements of the presentations created with the use of means of multimedia messaging in electronic form on a CD or DVD.

2.2.9 Installation, start-up and integration of all the Exhibition's elements, i.e. the exhibition stations, space design, exhibition messages, [are] according to the designs referred to in clause 2.1.

2.2.10 Testing all the elements of the exhibition (on selected groups of target audience) and removing any faults arising from these tests.

2.3 Delivery of spare parts, post-completion documentation and training of the staff

2.3.1 Delivery of spare parts which can be used for repairs (referred to in clause 2.3.4.) made during the warranty period by trained employees of the Ordering Party.

2.3.2 Delivery of all consumables for the particular elements of the Exhibition for the first six months of its presentation, beginning from the day on which it would be received by the Ordering Party, the Innovation Centre Mill of Knowledge.

2.3.3 Providing the Ordering Party with the content and graphics of the exhibition messages and interesting facts on a CD or DVD, in electronic form allowing for their free modification.

2.3.4 Creating documentation of the Exhibition and delivering it to Ordering Party. The documentation should include at least the following information (post-completion documentation):

- a. a list of Exhibition's elements (stations and elements of the design),
- b. names of the stations, their belonging to the Exhibition and its theme zone,
- c. purposes of the stations,
- d. graphic and working design of the Exhibition and its particular elements
- e. a detailed manner of functioning of the particular stations,
- f. a detailed description of the phenomenon/phenomena/technologies presented at the particular stations,
- g. number of people who can use one station at the same time,
- h. detailed information concerning the media and consumables necessary for the proper functioning of the stations,
- i. a list of repairs which can be made during the warranty period without prejudice to the warranty conditions by the employees of the Innovation Centre Mill of Knowledge, trained by the Ordering Party.

2.3.5 Creating an operating manual, rules of control, service and maintenance of particular elements of the Exhibition in Polish, in paper and electronic form, as well as the warranty cards and delivering them to the Ordering Party.

2.3.6 Handing over the results of tests referred to in clause 2.2.6 to the Ordering Party.

2.3.7 Transfer of software licence and copyrights to the photos, graphics, drawings, fragments of source texts, films and animations as well as other software and creations used in all the elements of the Exhibition, to the Ordering Party.

2.3.8 Handing over a declaration of the object of contract's conformity with the applicable regulations and standards to the Ordering Party; the elements of the Exhibition and of the design have to meet the European safety standards, whereas all the materials and devices used for their manufacture must have proper declarations of conformity shown by the CE marking, or declarations which are equivalent to them.

2.3.9 Transfer of copyrights to the object of contract to the Ordering Party under the terms and conditions defined in the contract.

2.3.10 Training of the Innovation Centre Mill of Knowledge employees in the scope of management, inspection, maintenance, servicing, transportation, assembly and disassembly of the Exhibition's elements made by the Contractor to the extent enabling the workers to make repairs (referred to in clause 2.3.4), also during the warranty period. A training for a group of maximum 20 people will be conducted at the Ordering Party's seat, in Polish or English. The duration of the training will be suggested by the Ordering Party in the schedule.

2.4 Characteristics of the stations

The Ordering Party has prepared a list of 26 stations. The stations have been divided into zones.

No.	Name of station	Zone	Type of station
1.	Tangram	Mr. Brainy	hands-on
2.	The Tower of Hanoi	Mr. Brainy	hands-on
3.	Mosaic	Mr. Brainy	hands-on
4.	The memo floor	Mr. Brainy	hands-on
5.	Sphere maze	Mr. Brainy	hands-on
6.	Woven brain-teaser	Mr. Brainy	hands-on/multimedia
7.	Everyone pulls ... their way?	Mechanical playground	hands-on
8.	You too can become a Hercules!	Mechanical playground	hands-on
9.	Levitation	Mechanical playground	hands-on
10.	Hovercraft	Mechanical playground	hands-on
11.	Tournament	Mechanical playground	hands-on
12.	Manual power station	Mechanical playground	hands-on
13.	Brush race	Mechanical playground	hands-on
14.	Roller-coaster	Think, understand, do	hands-on
15.	Amazing structures	Think, understand, do	hands-on
16.	Electric puzzle	Think, understand, do	hands-on
17.	Mechanical theatre	Think, understand, do	hands-on
18.	The domino effect	Think, understand, do	hands-on
19.	Solar aircraft	Think, understand, do	hands-on
20.	Moving images	Think, understand, do	hands-on/multimedia
21.	Robot	TechnoWorld	multimedia
22.	Friend from the future	TechnoWorld	multimedia
23.	Wonderland	TechnoWorld	multimedia
24.	Man of the future	TechnoWorld	multimedia
25.	Vehicle from the future	TechnoWorld	multimedia
26.	Space technology	TechnoWorld	multimedia

3. Requirements of the Ordering Party concerning the subject matter of the contract

3.1 Requirements concerning the arrangement of the exhibition and the space around it

The Ordering Party requires that the exhibition space be visually and spatially divided into four zones by means of e.g. additional design elements such as partition walls with infographics (exhibition messages), as well as appropriate arrangement of the stations. The design concept should be consistently applied in the whole exhibition space and should include the design of the stations, meet the character of the stations' descriptions, the suggested pictogram of the Exhibition and the zones, as well as the additional elements of the space design (e.g. information walls). The design concept ought not to hinder the visitors from using the stations, nor can it distort the educational message.

The design should attract the visitor's eye welcoming to engage him in interaction, without distracting him. The Ordering Party requires that the Contractor arranges the surface of the walls within the exhibition space, as the Exhibition will initially be displayed at the Innovation Centre Mill of Knowledge. Furthermore, the Ordering Party requires that the Exhibition's design, including the colour scheme:

- be consistent, with the colours used consistently in the whole design of the zones and the Exhibition;
- not be monotonous, nor too glaring;
- has no aggressive themes;
- includes themes connected with the subject scope of a given zone;

3.2 Requirements concerning additional elements of the space design

When planning the design of additional elements it is necessary to consider the harmony and uniformity of location of the Exhibition's stations, as well as the general location of the Exhibition. It is necessary to create at least two places of recreation in the form of portable seats, suited in terms of the design and colours to the whole Exhibition. The purpose of the additional elements of the designs is to separate out the individual zones of the Exhibition. They must be evenly distributed across the exhibition space but it is essential that they distinctly belong to a particular zone of the Exhibition, as they will be rented out to other institutions together with the exhibits. The contracting party should ensure that portable design elements, e.g. accent lighting belong separately to each of the zones. The Contractor will design an LED lit information wall that provides information concerning the entire Exhibition, as well as additional design walls with information about the given zone. It is important to note that the additional elements of the design, as well as the stations, should be easy to dismantle and transport.

The Ordering Party requires that the Contractor provides room for a children corner within the exhibition space, with 7-piece blocks made of durable, light, waterproof material. Each element should be made with a different colour, and the colours should be consistent with the colours of the entire Exhibition. The shape of each element should allow for the assembly of a cube with all the available elements. The minimum dimensions of the cube on assembly are: 1m x 1m x 1m. The Ordering Party requires that the Contractor provide wear-resistant surface (that would enable maintenance with the use of standard detergents) sized 2m x 2m. The Contracting Party will place infographics on the surface, that demonstrate the appearance of individual walls of the cube as it should look like after proper assembly.

3.3 The requirements concerning the content of the exhibition, exhibition messages and interesting facts

3.3.1 All stations must have exhibition messages in the form of infographics which should be blended in with the stations or stand alone, as well as flashcards with interesting facts. In the case of multimedia stations the exhibition message should blend in with the multimedia application. The multimedia stations ought to have appropriately selected multimedia presentations. The messages, interesting facts and animations ought to be consistent in terms of the graphic solutions and have a characteristic appearance, consistent with the adopted design concept. The exhibition messages have to be placed in such a way so that they can be visible to the visitors, whereas the flashcards must be placed in/on the station or near it, in a place where they can be easily collected, but will not interfere with visitors using the station. The Ordering Party allows for a possibility of changing the content of the messages in the later period of its activity, which is why they have to be made in such a way so that their replacement or modification does not interfere with the stations. The Ordering Party requires that the Contractor hands over the exhibition messages and interesting facts in electronic form allowing for the modification of the content.

3.3.2 The content of the exhibition messages, interesting facts, animations, films and multimedia presentations has to include scientific and educational texts; they cannot include

explanations of phenomena which are contradictory to the environmental knowledge. Fairy tale, quasi-scientific content or content violating moral norms cannot be introduced to the content of the Exhibition.

3.3.3 Selection of content of the exhibition messages and interesting facts has to be suited to the wide audience, yet without overlooking the basic knowledge. The texts have to be written in a comprehensive way, with the use of understandable vocabulary. The whole content of the exhibition messages has to be presented in a readable and organised way.

3.3.4 All the other texts (e.g. voice messages, instructions on the multimedia stations, quizzes) have to be accessible for visitors in at least two languages: Polish and English.

3.4 Requirements concerning the elements of the Exhibition

3.4.1 All elements of the Exhibition being the object of this contract ought to be unique, created particularly for the Innovation Centre Mill of Knowledge, with the exception of the elements that are available on the market that are incorporated within the exhibit or are its part.

3.4.2 Elements of the Exhibition have to be resistant to visitors' actions, both the ones compliant and non-compliant with the description included in the exhibition message or the operating manual of the multimedia station.

3.4.3 Elements of the Exhibition have to operate smoothly despite their daily multiple mass use.

3.4.4 All stations should be designed in a simple enough manner for the visitors to understand how to operate them (their use should be intuitive), while at the same time they should be interesting enough for the visitors to focus on them for no shorter than 2 minutes and invite them to interaction.

3.4.5 The stations and design elements must be simple in assembly and dismantling, easy for transportation, light and durable.

3.4.6 The shapes of all elements such as tables, chairs, exhibit casings should have uniform and consistent shapes in line with the entire Exhibition with the assumption that each zone may be able to function as a separate Exhibition.

3.5 Educational requirements

3.5.1 Elements of the Exhibition have to be designed in such a way as to allow people with various kinds of disabilities to access it as fully as possible; the tables should be designed in such a way as to enable people on wheelchairs to use the exhibits.

3.5.2 Elements of the Exhibition should be suited to visitors of all ages and different intellectual, manual or mobility abilities.

3.6 Technical and operating conditions

It is assumed that the Exhibition can be visited daily by about 2000 people. The aforementioned information is to be taken into consideration when planning the Exhibition in terms of technical and operating conditions.

3.6.1 Elements of the exhibition have to be durable and resistant to the visitors' actions:

- a. they have to operate smoothly despite their daily multiple mass use;
- b. they have to be resistant to the visitors' actions, both the ones compliant and non-compliant with the exhibition messages;
- c. they have to be easy to clean, in particular in case of being scribbled with a marker pen, pen, paint, etc.;

3.6.2 The contents of the Exhibition have to meet the EU standards concerning lights and lighting, also with regard to the workplace. The lighting sources ought not to dazzle the visitors or put their eyesight at risk. In order to allow for a more complete reception of the Exhibition's contents and in view of the partial lack of natural lighting of the exhibition space, individual

lighting of the Exhibition's elements ought to be considered. The lighting is to expose the most important elements of the Exhibition, yet it cannot hinder the usage of the stations.

- 3.6.3** Elements of the Exhibition have to be made in such a way so that staying in the exhibition's space will not expose the visitors to danger and so that the elements can be used safely also by the untrained persons and without the help of the maintenance staff.
- 3.6.4** It is necessary to ensure unobstructed passageways between the Exhibition's elements, which ought to be accessible also for the disabled moving on wheelchairs.
- 3.6.5** The materials used for making the Exhibition's elements must have safety approvals and meet European standards for objects of the kind, must be wear-resistant, washable and easy to maintain. The materials and technical solutions used for making the Exhibition's elements, as well as possible operating materials ought to be ecological and energy efficient.
- 3.6.6** The Ordering Party requires that the Contractor:
 - a)** Fix all the elements of electrical installation in the exhibits, in which proper operation is ensured by electricity, under podiums, in tables or exhibit casings in such a way as to ensure access through the installation of lockable valves or access eyes in the casings, podiums and tables.
 - b)** Fix low-voltage installations in the exhibits in which they are required.
- 3.6.7** All doors, cabinets and small doors fitted as parts of the Exhibition's elements, protecting the equipment installed inside, made for the management or servicing of the Exhibition's elements ought to be equipped with locks and keys. The Contractor will hand over the keys, together with a spare set, to the Ordering Party.
- 3.6.8** Operation of the Exhibition (all its elements at the same time) has to meet the standards concerning the level of noise in workplaces and public utility places.
- 3.6.9** It is necessary to provide for the production of spare parts which can be used for repairs (referred to in clause 2.3.4.) made during the warranty period by trained workers of the Ordering Party, for each element of the Exhibition.
- 3.6.10** It is necessary to provide for the protection of consumables for a six months' activity of the Innovation Centre Mill of Knowledge, for each element of the Exhibition which requires it.
- 3.6.11** The Contractor will provide consumables and finishes, as well as maintenance materials that ensure technical and visual maintenance of the exhibit. Maintenance of the exhibition's elements ought to be possible to be carried out by the Ordering Party with no external help.
- 3.6.12** The Contracting Party requires that all the movable elements of the stations or the elements of design have magnetic stripes or stickers that protect against theft, compatible with the system of anti-theft gates installed in the Ordering Party's seat.
- 3.6.13** On account of its portability, the Exhibition must fit into a heavy goods vehicle with the loading capacity of 24 t.

PART II - EXHIBITS SPECIFICATION

Zone I Mr. Brainy

The zone is to encompass 6 exhibits along with space arrangement. Mathematical issues in the form of brain teasers are the main theme of this zone. The exhibits are to allow simultaneous activity of two or more Visitors. The purpose of the zone is to develop the ability of logical thinking and cause and effect problem solving. The Contractor is to determine the central exhibit which is to be distinguished among other exhibits with e.g. its size.

1	Tangram
Location	Mr. Brainy
Theme	Logics, mathematics – geometry (the notion of area, symmetry of shapes).
Educational aim	Developing the ability to think logically. Encouraging such features as patience and pursuit of the goal. Acquaintance with basic mathematical figures: rectangle, diamond, square, triangle, etc. The station can be operated by an individual user as well as an entire group.
Size of the station	The minimum dimensions of the station: length of the table 2.0m, width of the table 1.2m. The height is suited for 7-year-olds.
Elements	<p>The station consists of:</p> <ul style="list-style-type: none"> • a table where the Contractor will place coloured graphics of min. 10 geometrical shapes such as a bird, a padlock etc. whose dimensions will adapted to the dimensions of the blocks. • five sets of 'tangram' blocks with freely chosen contours, made of safe, not too heavy, wear-resistant and shock-resistant material, e.g. plywood or wood. One set must contain at least 6 blocks. The thickness of each element should be at least 1.5 cm, the diameter or the length of the verge of the puzzle (depending on the contour shape) must not be smaller than 30 cm • Spare elements in the form of two additional sets of 'tangram' blocks.
Use	Visitors approach the station. They solve logical problems while forming selected shapes with the use of blocks. The users select the blocks and try to fill the contours with the blocks so that the blocks ideally fit the graphic contour.
General Requirements	The Ordering Party requires that the Contractor secure all the sharp edges

of the Ordering Party	of the table and the blocks.
Special requirements of the station arrangement	The graphics suggested by the Contractor must be colourfully appealing, and attract the visitors to active play. The arrangement of the station must engage the visitors in a collective activity.

2	The Tower of Hanoi
Location	Mr. Brainy
Theme	Logics, mathematics – geometry (the notion of volume, symmetry of solid figures)
Educational aim	Developing the ability to think logically. Encouraging such features as patience and pursuit of the goal. The Visitor's task is to replace the elements of a tower from one segment to the other, while a bigger disc must not be placed on a smaller one. The station may only be attended by one person at a time or many people working together.
Size of the station	The dimensions of the entire station: Min. length: 2m, min. width: 1m, 2m, min height: 0.8m
Elements	<p>The station consists of:</p> <ul style="list-style-type: none"> • One set of 'the Tower of Hanoi' blocks composed of seven elements shaped as e.g. rings, with each element made of safe, light and durable material. The diameter size of the smallest element is min. 20cm, with each consecutive element having the diameter longer by 10 cm. The thickness of a single element is 10 cm. • The randomly shaped base of the exhibit has three segments on which the visitor places the tower elements. The size of the base must be adapted to the size of the largest block of the tower. • Spare elements in the form of one set of 'the Tower of Hanoi' blocks that are matched with the original set. • A suitable surface with the dimensions aptly suited to the dimensions of the exhibit base.
Use	Visitors approach the station. Their task is to solve the logical problem of the Hanoi tower. The visitors are to replace the elements from one segment to the other so that the elements of the tower are arranged in the same order. However, while replacing, the user may not put a bigger element on a smaller one.
General Requirements of the Ordering Party	The material for the elements of the tower must be light enough for the children aged 7 and above to be able to use them.
Special requirements of the station arrangement	The Ordering Party requires that the Contractor choose 7 different colours for the blocks. The colours of the surface must be aptly matched with the colours of the blocks and the base of the exhibit.

3	Mosaic
Location	Mr. Brainy
Theme	Physics – optics, mathematics – geometry
Educational aim	Development of skills of logical thinking, creativity and problem solving. The task of the visitors is to complete a mosaic or a fractal from available blocks with the aid of the graphics displayed on the table. The station may be approached by more than one users simultaneously.
Size of the station	The minimum dimensions of the table top are 2.0m x 1.2m. The height must be adapted for children aged 7 and above.
Elements	<ul style="list-style-type: none"> • The station consists of an illuminated table. The table may be e.g. illuminated with LED strips from below. • Coloured, transparent and acrylic elements – flat blocks, with different sizes and shapes - minimum 300 pcs. The user should prepare blocks in at least 6 colours. Minimum element dimensions are 5cm in the case of the side length or the diameter, whereas the thickness of the blocks will be selected by the Contractor during exhibit tests, so that the durability of the elements is ensured on one hand, and the possibility of adequate illumination on the other. • Spare elements: 300 acrylic blocks in different colours and shapes that match the original set • Containers for the blocks mounted to the table in a manner that is not intrusive during the tasks performed by visitors.
Use	The visitors approach the station and arrange the acrylic elements provided into geometric shapes of their choice and thus creating coloured mosaics and fractals. The users may use infographics to accomplish their tasks.
General Requirements of the Ordering Party	<p>The Ordering Party requires that:</p> <ul style="list-style-type: none"> • the top of the table be translucent, the light intensity be high enough to achieve the effect of illumination for the elements placed on the table, • all the sharp edges of the table be protected so that they do not pose a threat to the visitors • the Contractor secure all the sharp edges of the acrylic elements.
Special requirements of the station arrangement	The Ordering Party requires that the Contractor places at least 10 coloured infographics of exemplary mosaic fractals and recurrent symmetric patterns.

4	The memo floor
Location	Mr. Brainy
Theme	Mathematics – geometry
Educational aim	Developing the ability of quick memorisation. The task of the visitors is to memorise a tune and its adequate rendering. Only one person may be engaged in the station at a time.
Size of the station	Total station size encompasses the min. 2.5m x 2.5m.
Elements	<ul style="list-style-type: none"> • Interactive, illuminating, audio floor that consists of 25 active elements. The minimum dimensions of one active element are 50cm x 50cm. • The devices and applications essential for a working operation of the exhibits • A suitable surface with the dimensions aptly suited to the dimensions of the floor.
Use	The visitor approaches the exhibit and activates the exhibit with one of the active elements. The elements on the floor illuminate and form a path, while at the same time each illuminated element emits a given sound that forms a simple tune. The visitor memorises which of the elements have been illuminated and in which order and then recreates the tune by jumping from one element to another. If the visitor correctly recreates the tune from the exhibit, an adequate sound should follow e.g. a fanfare. If the visitor makes a mistake, he should be informed about it by an adequate sound from the exhibit, e.g. booing. A correct recreation of the tune should be followed by another, a more complex combination of sounds.
General Requirements of the Ordering Party	The Ordering Party requires that the Contractor install a suitable surface (podium, base, casing) should the construction of the interactive floor require it. The Contractor will provide a particular design solution which will retain the portability and functionality of the exhibit. The Ordering Party requires that the audio game have at least five different tracks with gradating level of difficulty.

5	Sphere maze
Location	Mr. Brainy
Theme	Mathematics – logics
Educational aim	Developing creativity, ability to think logically, manual skills.
Size of the station	The dimensions must be adapted to the potential of the exhibition space. The exhibit is to make maximum use of available space. Total station size encompasses the min. length of 1.2 m, width 1.5 m, height 1.6 m.
Station elements	<ul style="list-style-type: none"> • The station consists of a metal frame. The frame must be constructed in a manner that enables a secure standing position of the exhibit without the necessity of fixing it to the ground. The Contractor may employ a different solution, e.g. a round base with the frame mounted on it in a manner that does not hinder the functionality of the exhibit. • A transparent sphere with the minimum diameter of 0.8m mounted on the frame in a manner that enables its rotation in a direction of choice. The casing of the sphere should contain a small-sized access eye which enables the replacement of little balls. • A 3D maze positioned within the sphere is made of wear-resistant material. The maze should be constructed in such a manner that the visitor is aware of where it starts and where it ends. • A small ball with a size adapted to the size of the maze made of wear-resistant material. • Spare elements: 10 balls
Use	The visitors approach the station, turn the transparent sphere, set the small ball at the beginning of the maze and move the transparent sphere in various directions trying to carry the little ball across all the stages of the maze until its finishing.
General Requirements of the Ordering Party	The Ordering Party installs a maze inside the sphere making sure that the difficulty level of the maze does not discourage the visitors.
Special requirements of the station arrangement	The exhibit must be arranged in such a manner that would encourage interplay between at least two users.

6	Woven brain-teaser
Location	Mr. Brainy
Theme	Mathematics – logics
Educational aim	Developing creativity, cause and effect problem solving
Size of the station	Size of the station is to be adjusted to the capacities of the exhibition space, the safety requirements applicable to playgrounds, as well as allow free movement around the table of a number of people permissible with regard to safety requirements. Total size of the station, the spatial construction, encompasses the min. length of 1.5 m, width 1.5 m, height 1 m.
Elements	<ul style="list-style-type: none"> • A spatial construction of woven and randomly convoluted pipes. The pipe diameter and its material must be selected in a manner that will prevent it from being bent, woven, twisted or damaged by the visitors' actions. One of the elements of the maze is a line. The shape of the construction may be modelled on small brain-teasers available on the market. The shape and the manner of the convolution must enable it to stand securely. The Ordering Party allows for any solutions provided by the Contractor as long as they do not require a permanent fixing to the floor and do not hinder the functionality of the exhibit. • The line or a similar material is placed inside the maze in such a manner that, after having been adequately woven and carried across the maze, it enables its complete pulling out of the maze or installation of a previously pulled out line. • Spare elements: two sets of properly sized lines
Use	Visitors approach the station. Their task is to pull a line out of the maze so that it is not attached to it by any means. The user may rearrange and move the line across the maze. One of the requirements of unravelling the brain-teaser is the necessity for the visitors to twist the line around themselves in any manner available. The visitors may get in between the elements of the construction for the purpose of solving the brain-teaser.
General Requirements of the Ordering Party	<ul style="list-style-type: none"> • the maze should consist of at least 10 bends • the exhibit must be safe, the construction must prevent jamming, immobilising a leg, fingers or the head

Zone II Mechanical playground

The zone consists of seven exhibits. Each of the devices enables individual play, cooperation or competition of two or more visitors. Playing at the stations requires the users to become acquainted with selected laws and principles of mechanics which make it possible. Thus, a passage through the zones is a non-standardised lesson of physics that explains the world around us.

7	Everyone pulls ... their way?
Location	A mechanical playground, a dominant/a distinguishing feature of the zone, the exhibit should be visible from different places of the Exhibition.
Theme	Force vector and its traits (the point of application, direction, turn, value), net force
Educational aim	Experimental illustration of the net force vector
Size of the station	Size of the exhibit must be adjusted to the capacities of the exhibition space and the safety requirements applicable to playgrounds, as well as allow free movement around the table of three people. Table diameter should not be less than 1.5 m. Table height should ensure independent use of the exhibit for children aged 7 and above. The minimum height of the extension arm with the lines hung on it: 2.5 m max. 2.8 m.
Elements	<p>The station consists of:</p> <ul style="list-style-type: none">• A round table with three extension arms distributed in equal intervals on the edge of the table. On the table top there must be infographics with the exhibit description. To the upper part of the extension arms is mounted a rigid, durable, scratch-resistant, smooth-surfaced, translucent plate, on which the disc will slide. The plate should be placed at such a height that the visitors will have to look up while playing with the exhibit. The plate should be slightly illuminated from below with adequately installed and hidden away LED strips, so that the effect of light diffusion on the plate material is accomplished.• A functional part of the exhibit: a round, coloured illuminated disc with the diameter of 30cm fitted to the translucent plate on three ropes in a manner that prevents its collapse. The lines go through pulleys fitted on the extension arms, hang along the extension arms and are available for the visitors outside the edge of the table. For safety reasons the endings of the ropes should be mounted to the base of the extension arms by ringlets made of stainless steel, but they should remain loose so that the visitors can freely grab hold of them. The ropes should be made of durable material, i.e. wear-resistant, impossible to collapse, safe for the visitors, and they should not cause discomfort while holding them. The disc should move across the surface of the plate without causing any scratches (slide smoothly); the ropes should be secure so that they do not collapse as a result of rubbing

	<p>against the edges of the pulleys, whereas the mechanism of the pulleys should include limiters that prevent the ropes from pulling off the track. The surface of the plate should contain at least three markers (coloured pictures or shooting targets), printed or stuck (wear-resistant and durable graphics), which enable the cooperation of the visitors in the task of placing the disc at a marked spot.</p> <ul style="list-style-type: none"> • The Contractor should suggest a simple and effective way of cleaning the top side of the plate. • Additional elements: a spare disc, a set of lines together with rings and elements used for fitting the disc in place and securing it, spare infographics (pictures or targets) to be stuck on the plate. • Maintenance materials and consumables used for maintaining the exhibit in the proper technical and visual shape (lubricants, paints, detergents, a brush for cleaning the top part of the plate).
Use	<p>The visitors experience the existence of forces and discover the method of changing the direction of net force. Three of the visitors approach the station, each of them snatches the ending of the rope and pulls the object towards themselves. The interplay may include forming 'two on one' alliances in order to pull the disc in their direction. Once the manner of the exhibit operation is familiar, together with the mechanism of obtaining the net force vector with a desired direction, turn and value, the trio are trying to place the disc within the selected marker.</p>
General Requirements of the Ordering Party	<p>The station should invite the visitors to interact between each other so that the desired effect is accomplished.</p>

8	You too can become a Hercules!
Location	Mechanical playground, situation with regard to other exhibits within the zone is to be proposed by the Contractor
Theme	Work and energy, change of mechanical energy, Pascal's law
Educational aim	Example of using laws and principles of mechanics in daily life – the working of a pneumatic lift
Size of the station	Size of the station is to be adjusted to the capacities of the exhibition space, the safety requirements applicable to playgrounds, as well as allow free and safe use of the station by two people. The size of the seat must be fit for an adult.
Elements	<p>The station consists of:</p> <ul style="list-style-type: none"> • A podium with an inflated seat for the visitor, • A securely and permanently inflated seat with a backrest, fixed to the podium, as well as a safety belt that protects the visitors against falling out (like on a roundabout). The inflated seat, just like the pneumatic lift, will be used for lifting cars so it should be encased with a frame that ensures safety for the visitors on one hand (prevention of falling out), and keeps the inflated seat in place on the other. The seat should not be in direct contact with the frame. It is worth considering the use of ball bearing drawers connecting the seat with the frame and protecting the seat against sustaining damage. • A manual pump with a piston and one non-return valve, which should be placed on the podium in front of the seat and permanently combined with it. The purpose of the device is for the other visitor to pump the seat manually. The piston of the pump, together with other elements used by the visitors should be durable; the piston should be designed in such a manner that it enables rotation around its own axis in order to prevent any mechanical damage or extraction. The T-shaped piston handle should be painted red. The handle should be placed at a height that enables a free operation by children aged 7 and above. • The kind of the pump and its technical parameters will be selected by the Contractor during the trial sessions of the exhibit, so that the desired effect is attained (lifting the sitting visitor to the height where his feet do not contact the ground, as well as enabling a parent-child pair to use the exhibit, with the child being in a position to pump the seat). The Ordering Party emphasizes the need for observing all safety norms for playgrounds and select the dimensions of the device in a manner that will make them compliant. • A separate release mechanism, marked in red and placed next to the pump, that will slowly deflate the seat (preferably in the form of a button) and return the exhibit to the initial position. The air should be pumped out in the direction of the person in charge of

	<p>pumping, with a distinct wheezing sound.</p> <ul style="list-style-type: none"> • All the installations that link the pump with the seat and the release mechanism should be hidden under the podium, • Additional elements: a spare seat and other elements provided for by the Contractor, • Consumables and maintenance materials deemed necessary by the Contractor, ensuring proper technical and visual condition of the exhibit.
Use	<p>Two visitors may be engaged in the station at a time. One of them is sitting on the seat, the other uses the pump to inflate the seat causing him to lift above the podium together with the other visitor sitting on it too. After the seat has been fully inflated it is lifted until the release mechanism is triggered and the seat is deflated again.</p>
General Requirements of the Ordering Party	<p>A special attention should be paid to the places where the visitors might put their fingers and hands (adequately sized gap between the seat and the frame; adequately sized gap between the piston and its base, etc.). The places should be designed so that security is ensured.</p> <p>The seat, the pump and the mechanism should be permanently connected, and the connectors properly secured so that the installation was tight during transportation. All power supply elements and connectors are to be placed under the podium with access ensured with removable lids.</p>

9	Levitation
Location	Mechanical playground, situation with regard to other exhibits within the zone to be proposed by the Contractor
Theme	Bernoulli's principle, uplift force
Educational aim	Illustration of the use of the laws and principles of mechanics in everyday life - ball "levitation" in a stream of air as an example of application of lift force
Size of the station	Size of the station must be adjusted to the capacities of the exhibition space and the safety requirements applicable to playgrounds, as well as allow free movement around the table of three people. Table diameter should not be less than 1.2 m. Table height should ensure independent use of the exhibit by children aged 7 and above.
Elements	<p>The station consists of:</p> <ul style="list-style-type: none"> • A round, built-up table (the space under the table should be used as a place for elements feeding the air pumps and other technical elements of the installation), • Three air pumps with built-in ventilators placed concentrically on the table, permanently fixed and directed in three different directions beyond the edge of the table, • Three hollow areas – ball containers placed in the vicinity of air pumps, • Durable balls of light plastic material in different sizes and colours, the smallest in the size of a tennis balls (diameter ca. 6.5 cm), the largest in the size of a beach ball (diameter ca. 40 cm), in the following quantities: 3x10 the smallest, 3x1 the largest, 3x10 medium-sized balls. The type of material and precise sizes of the balls are to be determined by the Contractor in the course of device testing to ensure that each ball is lifted after being placed in the stream of air, in the case of the smallest balls it should be possible to place several of them simultaneously in the air stream. • Additional elements: a set of spare balls.
Use	The station is used simultaneously and independently by three visitors. Each of them attempts to place one or several balls in the stream of air blown out from the pump. Visitors may play together, for example by placing a specified number of balls within a specified time limit in the stream of air. The Contractor is to propose and test at least 3 games based on competition and/or interaction between the Visitors for the purpose of achieving a common purpose.
General Requirements of the Ordering Party	All power supply elements are to be placed under the table with access ensured through a lockable door.

10	Hovercraft
Location	Mechanical playground, situation with regard to other exhibits within the zone is to be proposed by the Contractor
Theme	Friction, principles of dynamics
Educational aim	Experimental illustration of Newton's first principle of dynamics
Size of the station	Size of the station is to be adjusted to the capacities of the exhibition space, the safety requirements applicable to playgrounds, as well as allow free movement around the table of 4-5 people. Table diameter should not be less than 1.5 m. Table height should ensure independent use of the exhibit by children aged 7 and above.
Elements	<p>The station consists of:</p> <ul style="list-style-type: none"> • A round table covered with a smooth-surface board used for sliding colourful CDs or other specially designed round objects (slides). The board is to provide openings with the diameter of ca. 1 mm provided every 20 mm allowing blowing of the air and thus creating a thin layer which lifts the slides (board thickness and precise sizes of the openings and their concentration is to be determined by the Contractor in the course of exhibit testing in order to ensure proper smoothness and durability of the board and to make sure that the length and diameters of the openings prevent their clogging, the edges of the openings are to have a smooth finish and be safe for hands). The surface of the table is to be gently illuminated with the use of LED strips for the purpose of obtaining an additional visual effects, however the ventilator placed under the surface of the table is not to be visible to Visitors. A barrier against which the slides are to bounce is to be provided around the table. The barrier should be made from proper durable materials (e.g. steel with neoprene rubber provided in the internal part with the thickness of ca. 5 mm). The barrier is to be provided with a lifting or closing lid/door which the visitors may lift/open and thus direct the majority of air blown out by the ventilator to the outside of the table. This will ensure playing with slides moving "with friction" and comparing their movement on the surface in both situations. The lid is to close automatically upon the lapse of 30 seconds so that the device is available in "no friction" mode to consecutive Visitors. An essential element ensuring correct operation of the exhibit rests in the levelling of the table, therefore the Contractor is to ensure such possibility, for example, with the use of properly constructed legs with infinitely adjustable height. The base of the table is to be built up and equipped with lockable door with a ventilator placed inside it along with all other technical elements of the installation. • Fans – ventilator, inaccessible to visitors, placed under the surface of the table, blowing out air through the openings provided in the surface of the table. The type of ventilator ensuring proper effect is to be selected by the Contractor in the course of device testing.

	<ul style="list-style-type: none"> • CDs or other round objects sliding on the surface with similar diameters in the quantity of 5 sets comprising 10 pcs in different colours. • Additional elements provided by the Contractor • Consumables and maintenance materials ensuring proper technical and visual condition of the exhibit.
Use	<p>Visitors approach the station operating in "no friction" mode, activate the movement of slides, observe their free movement, they may push the slides thus altering their direction and speed, observe the behaviour of slides upon lifting of the lid/opening of the door as they move on the surface of the table without the layer of air and observe the impact of friction on their speed.</p>
General Requirements of the Ordering Party	<p>The market offers for sale ready-made devices of a similar type, however the Ordering Party requires the device to be designed and performed for the purposes of the Exhibition in such a way as to be distinguishable from those available in other places.</p>

11	Tournament
Location	Mechanical playground, location with regard to other exhibits within the zone is to be proposed by the Contractor with particular attention to safety considerations.
Theme	Mechanical energy and its transformations
Educational aim	Experimental illustration of transformation of potential energy into kinetic energy
Size of the station	Size of the station must be adjusted to the capacities of the exhibition space and the safety requirements applicable to playgrounds. Since the interactivity of the station is to rely on performing target shots with a crossbow and trebuchet (or catapult) it is necessary to designate a suitable area within the space with the use of partitions or support frames holding nets of specified sizes. The length of the track is to be at least 4 metres. The Contractor is to test the ranges of devices and estimate particular dimensions of the track. Sizes of the devices are to allow safe use by children aged 7 and above.
Elements	<p>The station consists of a crossbow and catapult (or trebuchet) placed on separate tracks and pointed towards targets set at the same distance:</p> <ul style="list-style-type: none"> • The balls are to be released from the crossbow in the direction of the target (target or wheel). The balls with the use of which the Visitors will shoot the target is to be placed in a tunnel-bearing constituting a part of the crossbow and released by pulling back the cord by the user, e.g. in the following manner: the part of the cord that will have an impact on the ball is to be provided with, for instance, a flat piece of wood or metal with a handle of a shape adjusted to the size of the ball, used for pulling back the crossbow and releasing the ball in the direction of the target. The arms of the crossbow are to be performed from thin, durable, elastic and safely finished steel sheet with the length of ca. 80 cm (accurate measurements are to be specified by the Contractor during the testing phase) or in a different manner ensuring proper functionality; the cord used for pulling back the crossbow is to be elastic, however not too thin in order to avoid potential harm. • The catapult is to release towards the target balls placed in a furrow provided in the upper part of the arm with the use of energy principles (e.g. a spring). Instead of a catapult, the Contractor may propose a more educationally or historically valuable device - a trebuchet for hurling the balls. Trebuchets are characterised by a high trajectory, hence it is necessary to make sure that the ball will not hit the ceiling placed at the height of 3 m. The suggested trebuchet dimensions (counterweight and arm) are not to exceed 1.3 m. Both in the case of the trebuchet and the catapult the Contractor is to propose a safe and functional construction. • Targets at which visitors will shoot are to be durable. Targets are to take the form of a bullseye with colourful markings of the

	<p>centre and the fields located at various distances from the centre. Markings are to be particularly durable in order to prevent their damage due to the impact of balls/arrows. It is required to fix a basket to the target, similar to that used in basketball games however closed at the bottom so that the balls do not fall out. Targets and baskets are to be placed at the height enabling shooting the balls into them and taking the balls out of the baskets by children at the age of 7.</p> <p>In the case of use of a wheels as targets it is required to fix nets to them. The nets are to be used to catch the balls and enable their easy retrieval at the end of the game. Visitors' task is to hit with the ball the field enclosed with the wheel. The wheels are to be used only in the case of choice of the option with balls for both machines.</p> <ul style="list-style-type: none"> • Colourful balls with soft surfaces and diameter enabling proper operation of both shooting machines, however not less than 5 cm, placed in a basket located between the shooting station, in the amount of 50. • The Contractor is to propose the method and ensure the possibility of holding a tournament, as well as deliver proper equipment for counting and presentating the hits. • The Contractor is to supply: Additional elements – spare balls in the amount of 100, 2 spare baskets, 1 set of targets and cords, consumables, trimmings and maintenance materials enabling preservation of the exhibit in proper technical and visual condition.
<p>Use</p>	<p>Visitors approach the station, familiarise themselves with the structures, history and use (historical information is to make a reference to Toruń as a city with Medieval history and the place of location of a Teutonic Knights Castle). Next, they are to release the balls/arrows towards the targets. Visitors are to have the possibility to organise a tournament consisting in shooting the targets (e.g. competition related to the number of hits within a specified time limit) or a game of a different type as proposed by the Contractor.</p>
<p>General Requirements of the Ordering Party</p>	<p>It is required to pay special attention to the safety of users and spectators in the course of using the station. It is required to eliminate the hazard of hitting people standing in the vicinity of the station with a ball or an arrow. The range of movement of the devices is to allow for a slight deviation of the trajectory in relation to the target (it should not cause too large or dangerous dispersion). On the other hand, it should allow for having fun (it should be possible to miss the target), and at the same time eliminate the possible danger.</p>

12	Manual power station
Location	Mechanical playground, situation with regard to other exhibits within the zone to be proposed by the Contractor
Theme	Transformation of mechanical energy in electric energy, generator
Educational aim	Experimental illustration of transformation of potential energy into electric energy
Size of the station	Size of the station must be adjusted to the capacities of the exhibition space and the safety requirements applicable to playgrounds, as well as allow free movement around the table of three people. Table diameter should be no less than 1.5 m, depending on the testing phase results. Table height should ensure independent use of the exhibit for children aged 7 and above.
Elements	<p>The below solution proposed by the Ordering Party may be altered by the Contractor within the methods of current generation for the purpose of providing the power supply to the installation (it is possible to use a bicycle, stepper or another device). Nonetheless, it is required to preserve the basic functionality of the station focused around the concept that by generating electrical power the Visitors are able to observe the installation on the table.</p> <p>The proposed station consists of:</p> <ul style="list-style-type: none"> • A round, built-up table (the space under the table should be used as a place for the technical elements of the installation), • Three power generators driven by various types of safe cranks positioned on the surface of the table in such a way as to enable their use by children at the age of 7. It is required to propose three different crank drives, safe for visitors. • Generator activation should be additionally demonstrated with changes in the indications of three analogue ammeters placed behind the cranks on the table. • An illuminated model of a building, bridge or a different installation placed in the central part of the table on a platform, secured with e.g. a Plexiglas casing. Each generator should cause, for instance, lighting of LED lights placed in particular levels or particular parts of the building or bridge, switching on of a sound effect or activation of movable elements. Obtaining of the whole effect should be attainable only by cooperation of three visitors. The type of the building or another installation, attractive for visitors is to be proposed by the Contractor. • Additional elements deemed necessary by the Contractor, including elements of the installation. • Consumables and maintenance materials deemed necessary by the Contractor in order to ensure proper technical and visual condition of the exhibit.

Use	The station is used simultaneously and independently or via interaction of three visitors. Each of them, by using one of the cranks illuminates/activates one of the parts of the installation. However, it is only possible to illuminate/activate the entire installation by acting jointly.
General Requirements of the Ordering Party	All power supply elements are to be placed under the table with access ensured through a lockable door.

13	Brush race
Location	Mechanical playground, situation with regard to other exhibits within the zone is to be proposed by the Contractor
Theme	The station is to be used mainly for fun and show in a non-standard manner how electrical energy may be converted into mechanical drive of the track and next "passed on" to the brushes.
Educational aim	Playful, experimental illustration of transformation of electrical energy into mechanical energy.
Size of the station	The size of the station is to be adjusted to the capacities of the exhibition space, the safety requirements for playgrounds, however it is required that the tracks are at least 2 m long each, and their height allows the station to be used by children at the age of 7.
Elements	<p>The station consists of:</p> <ul style="list-style-type: none"> • Two parallel and adjacent racing tracks with clearly designated start and finish lines, supplied with barriers preventing turning of the brushes and their falling out of the track; the surface of the tracks is to comprise overlapping plates as it is the case of a baggage transportation belt found at airports. However, the tracks are not to move forward but vibrate continuously as it is demonstrated in the film illustrating a prototype device model: https://youtu.be/WUTHriW9NNc. The plates are to be performed in such a way as to be adjacent and at the same time cause the brushes to move with a plane motion by catching on their bristle. Track plates are to be made from light, stiff plastic material. The tracks are to be performed in a durable manner, enabling easy cleaning of the plates and removal of contamination between them. The principle of mechanism operation is similar to that applied in the case of small robot toys with limbs in the form of bristle driven by mini engines, however here it is the vibrations of the track that cause the brushes to move. • Large hair brushes of with different kinds and sizes of rubber insets and bristle, diversified density and thickness, colours, in the amount of 2 sets of 10 pcs. • Two baskets/containers for the brushes – located at the start point of each track and two baskets/containers placed at the finish points. • Wear resistant, durable and reliable mechanism causing the track surfaces to vibrate, activated by Visitors. • Additional elements deemed necessary by the Contractor, including spare plates and other installation elements as well as a spare set of 2x10 of brushes. • Consumables and maintenance materials deemed necessary by the Contractor in order to ensure proper technical and visual condition of the exhibit. The Contractor is to propose an efficient and uncomplicated method for cleaning the tracks and, if they are not standard, provide appropriate instruments (e.g. a brush of a

	proper shape and size).
Use	The station is used simultaneously and independently or via interaction of two visitors. Each of them places a brush/brushes on the track and observes their movement from the start to the finish point. Visitors may organise competitions to find the fastest brush.
General Requirements of the Ordering Party	All track elements (barriers, endings, places of contact between the plates) are to be performed in a manner preventing jamming of fingers and hands. All power supply elements are to be placed under the tracks with access ensured with a lockable door. The track is to be designed in such a manner as to enable its transportation in whole.

Zone III Think, understand, do

The zone consists of seven exhibits and relates to DIY practices. Visitors are to feel as constructors creating their works from simple, interestingly designed and effectively looking elements. The Contractor is to determine the central exhibit which is to be distinguished among other exhibits with, for instance, its size, choice of colours, illumination, depending on the proposed form.

14	Roller-coaster
Location	Think, understand, do. Location in relation to other exhibits is to be proposed by the Contractor
Theme	DIY, mechanics
Educational aim	Demonstration of speed changes in vehicles depending on the length and complication level of a previously prepared track. The exhibit is to be used by several people, hence it allows to develop the skills necessary in team work.
Size of the station	Size of the station is to be adjusted to the capacities of the exhibition space, the safety requirements applicable to playgrounds, as well as allow free movement around the table of a number of people permissible with regard to the safety requirements. The exhibit is to make maximum use of the available space. The dimensions of the entire station along with the space used for construction purposes of vehicle tracks are to be in minimum: length 2.5m x width 2.5m.
Elements	<ul style="list-style-type: none">• The Contractor is to propose proper pavement of suitable non-flammable class and appropriate for use in public utility facilities;• Elements for individual composition of racing tracks; the racing tracks are to be performed from durable material; the tracks are to be combined with one another, e.g. with the use of built-in magnets; the Contractor is to ensure at least 4 starting positions at different heights and 40 diversified elements (each ca. 30 cm long) for individual track construction. All elements are to be delivered along with 1 additional spare set.• The Contractor is to supply small vehicles/balls compatible with the racing tracks; the Contractor is to supply 30 vehicles/balls including 1 set of spare elements; the vehicles/balls are to be provided in 3 different colour versions consistent with the remaining elements of the Exhibition; the choice of an element moving along the track is to be made by the Contractor following a series of tests conducted to ensure efficient operation of the exhibit;• The Contractor is to ensure two containers: one for vehicle/ball storage, the other for tracks.
Use	Visitors approach the station, choose the starting point and begin to construct a racing track along which a given vehicle/ball will move.

General Requirements of the Ordering Party	Racing tracks are to be easy and quick to build as well as not prone to breakdown.

15	Amazing structures
Location	Think, understand, do. Location in relation to other exhibits is to be proposed by the Contractor
Theme	DIY, physics
Educational aim	Visitors are to build diversified structures thus developing their creativity and manual skills, spatial imagination and the ability to work in a team.
Size of the station	The exhibit is to comprise three types of stations. One of them is to be available on the table, the second and third on the floor. Stations on the floor are to have the following minimum dimensions: length 2m x width 2m. Station on the table is to have the following minimum dimensions: length 1.5m x width 1.5 m.
Elements	<ul style="list-style-type: none"> • The first station is to consist of light plastic straws/tubes in the amount of 1000 pcs, as well as large and at the same time stable connectors in the amount of 500 pcs; the connectors are to enable connection of at least 6 straws/tubes at once at various angles; Visitors should have the possibility to build a stable construction with the height of ca. 2 m. • The Contractor is to ensure proper surfaces allowing construction works, on which the visitors will be able to build various structures; • The second station comprises wooden "Jenga" blocks which may be placed on top of one another, thus creating diversified constructions resembling, e.g. towers, vehicles, aircraft; the Contractor is to supply at least 1000 pcs of blocks; the Contractor is to supply a table with proper dimensions, on which the visitors will be able to build particular structures; moreover, the Contractor is to supply instructions for the use of this station including model structures. • The third station is to comprise foam blocks made from durable material, highly resistant to mechanical damage. Visitors are to be able to use the blocks to construct arches and bridges. The Contractor is to propose the solution for this station. The elements are to be of proper sizes to enable construction of structures of the minimum height of 1.5 m. • The Contractor is to provide containers for storing elements from each station. • The Contractor is to submit to the Ordering Party 1 set of spare elements for each station. • All elements used for construction are to be non-toxic in any way; their safety is to be confirmed with proper certificates.
Use	Visitors approach the station and choose the type of activity in which they wish to participate. They have a choice between building various spatial structures with the use of straws and connectors or e.g. the construction of towers, houses, vehicles or aircraft with wooden Jenga blocks or building permanent and durable arches and bridges.

General Requirements of the Ordering Party	Due to the hazard of choking on small elements they are to be safe for visitors and have safety certificates for children at the age of 2. The station is to be compliant with the standards applicable to playgrounds.

16	Electric puzzle
Location	Think, understand, do. Location in relation to other exhibits is to be proposed by the Contractor
Theme	Physics, electricity, DIY
Educational aim	Visitors become familiarised with the structure of an electrical system, the term of electric current, voltage, current intensity. The station is to develop creativity and allow understanding of operation of electrical circuits.
Size of the station	A two-part station placed on a large table. Minimum dimensions of the table: length 2m x width 2m.
Elements	<ul style="list-style-type: none"> • The exhibit is to comprise two types of stations. The first station is to encourage experimenting individually or working in pairs, whereas the second requires cooperation with other people. • The first station takes up one half of the table. Conductive tape with free spaces is to be installed on the table, in which the Visitors are able to place other (equally fitted) elements. Visitors build an electrical circuit which is to provide at least 8 free spaces for the purpose of placement of various exchangeable elements. The station is to enable construction of simple circuits: serial and parallel connections. • The elements closing the circuit are e.g. a bulb, bell, switch, knife switch, potentiometer, voltmeter, engine, fan, resistor, conduits (larger than standard ones); All elements are to be universal and fit into each free space. Spare elements are to be supplied in 2 sets. • The second station is to take up the other half of the table. A low-voltage supply, two types of handles/plates of different potential are to be installed on the table. Between the handles a replaceable element is to be placed (e.g. bulb, fan, bell). The Contractor is to provide additional elements which may be lit up, buzz upon closure of an electrical circuit, e.g. the market provides ready-made solutions such as "energystick", "energyball". Visitors should be a part of an electrical circuit. • The Contractor is to supply to the Ordering Party 2 sets of spare elements.
Use	Visitors approach the station. With the use of a conductive tape which is already fixed to the table as well as the additional elements, such as a bulb, bell, engine, they close an electrical circuit. The activities are repeated until the intended result is obtained, e.g. lighting up of a bulb, activation of a sound effect. At the second station, visitors approach the table and form a chain by holding hands with one another. The first and the last person place one hand on the plates/handles causing an electrical circuit to close. This allows to achieve an atypical electrical circuit made from people.

General Requirements of the Ordering Party	<p>The Ordering Party requires that the station ensures complete safety of Visitors with regard to the applied technical solutions.</p> <p>All sounds emitted by replaceable elements are to be pleasing to the ear.</p> <p>The exhibit is to be appropriate for use of children at the age of 7. The effect of the second station is to be achievable with the participation of as many as 30 people closing an electrical circuit.</p>
---	--

17	Mechanical theatre
Location	Think, understand, do. Location in relation to other exhibits is to be proposed by the Contractor
Theme	DIY, physics, technology
Educational aim	The station develops creativity, technical and manual skills, understanding of causal links between actions
Size of the station	The stations is to be at least 2.5 m wide and 2 m high.
Elements	<ul style="list-style-type: none"> • The exhibit is composed of a two-sided, free-standing board (with multiple openings at equal distances), with the following dimensions: width 2.5 m x height 2 m, with replaceable elements fitted on one side, such as gears, racks and V-belts. The other side of the board is to be provided with elements converting the board into a theatre. In the upper part of the board there are to be provided four different puppets, which will be activated by using the movable elements provided with cranks positioned within the board. The active surface of the board is to have the following maximum dimensions: width 2.5 m x height 1.7 m. • In upper part of the board, at the height of 1.7-2 m the Contractor is to provide an empty space for the puppets visible from both sides of the board. • The board is to be divided into four zones. Each zone is to comprise 15 different replaceable elements. Each zone is to contain an element with a crank used to activate the machine, as well as an end element to be connectable to a puppet. • Gears, racks and V-belts are replaceable elements positioned on the board in the provided openings. Gears and other elements are to be such as to enable their easy and quick repositioning by removing them and placing in another opening. It is required to provide at least 60 elements for 4 zones; the Contractor is to supply spare elements (gears, racks, etc.) in 2 sets. • In upper part of the board there should be 4 types of differently looking puppets with the use of which the Visitors will be able to enact a scene comprising basic activities, such as jumping, bowing, walking, turning of the puppets. The puppets are to be as diversified as possible in order not to impose limits on the Visitors' creativity. Spare puppets are to be supplied in at least 1 set. • At the edge of the board the Contractor is to install an additional crank with which the Visitors will be able to use to play particular sounds. The station is to resemble a hurdy-gurdy playing melodies to accompany the enacted scenes. • Below the board one large or two smaller containers/boxes are to be provided for the purpose of storage of replaceable elements. • The Contractors may apply colour identification on replaceable elements, e.g. gears, racks. The elements are to suit a particular zone on the board as well as a particular puppet. • Detailed characteristics of the station are to be proposed by the Contractor. The Ordering Party allows for different solutions for

	the exhibit, however they need to fulfil its basic functionality.
Use	Visitors approach one or several zones of the station. They arrange the starting gears and racks in the lower part of the board in such a way as to enable enacting a simple scene in a mechanical theatre with the use of puppets in the upper part of the board. Other Visitors may construct their own gear system and activate the puppets or become the audience of the theatre by remaining on the other side of the board.
General Requirements of the Ordering Party	The station is to ensure safety of Visitors. It is crucial that the gears and racks are made from a proper material. There is a risk of finger being caught in the mechanism. At least 4 people should be allowed to use the station simultaneously.

18	The domino effect
Location	Think, understand, do. Location in relation to other exhibits is to be proposed by the Contractor
Theme	Physics, DIY, technology
Educational aim	Development of creativity, technical and manual skills, ability to find causal links between actions
Size of the station	The size of the station is to be adjusted to the rest of exhibits, however the diameter of a found table should not be less than: 120 cm. Individual elements making up a Rube Goldberg machine of the minimum length of 20-30 cm.
Station elements	<ul style="list-style-type: none"> • The station is to be placed on a round table. The table is to be divided into 3 parts. Each part is to contain a working surface and a storage place for the elements of Rube Goldberg machines. The storage place for the elements necessary to construct an RG machine is positioned in the central part of the table. The Visitors will be able to use 20 elements provided for each part of the table. Total number of elements needed for the construction purposes at 3 stations is 60 pcs. • The Rube Goldberg machine (based on the domino effect) constructed by Visitors is to be of a multiple-stage kind, and the operational time of all devices is to not exceed 1 minute. • The elements are to be durable (performed from good quality materials) and make it easy to reset or modify the construction of the machine. The intermediary elements of the RG machine are not to be too small in order to avoid the risk of swallowing by children visiting the ICMK. The Contractor is to propose the composition of an RG machine with the use of an infographic fixed e.g. to the table, which will be used as a guide on how the Visitors are expected to arrange particular elements to make certain that the machine will work. • The elements of the RG machine are to include, e.g.: wooden blocks, light balls, small vehicles, small carts, a slide, a system of slides, boards, towers, springs, cups, baskets, spirals, ropes, fans and flash lights activated in a simple mechanical manner, plastic and PVC pipes, domino, Jenga blocks, Cuboro blocks, LEGO blocks, etc. • Visitors have one particular task – create a Rube Goldberg machine, i.e. an excessively expanded device or a series of mechanisms working on the basis of the domino effect, which uses a complex system to perform simple activities. One of the objectives may be e.g. to activate a fan, switch on a flash light, collect all balls, etc. The market offers a game called Mouse Trap which can serve as an inspiration. • The Contractor is to supply 2 sets of spare parts used in the construction of a Rube Goldberg machine. • Detailed characteristics of the station are to be proposed by the Contractor. The Ordering Party allows different solutions for the exhibit, however it is required that they fulfil its basic

	functionality.
Use	Visitors approach the table with component parts to be used in the construction of a Rube Goldberg machine. Visitors set the elements of devices in a starting position for the purpose of achieving the assumed result. Next, they activate one element/device which activates the consecutive ones. Visitors observe operation of their Rube Goldberg machine. They have the possibility to introduce quick modifications and assign a different target.
General Requirements of the Ordering Party	The station is to ensure full safety of Visitors. Small elements are to ensure sufficient safety to make sure that Visitors do not suffer any harm. The elements are to be as large as possible in order to facilitate their arrangement.

19	Solar aircraft
Location	Think, understand, do. Location in relation to other exhibits is to be proposed by the Contractor
Theme	Mechanics, technology, physics
Educational aim	Development of the skill to find casual links, energy transformations.
Size of the station	The station is to be positioned in such a way as to provide access from each side. The height of the vertical arm connected with a horizontal beam to which the aircraft is to be fixed is to be at least 2.8, max. 3 m.
Elements	<ul style="list-style-type: none"> • The aircraft placed on a stable standing structure; The structure is not to be mounted to the floor in any way but only additionally weighed down at the bottom, e.g. with the use of a platform. • The aircraft is to move on a horizontal arm around a vertical structure. Solar panels are to be placed on its wings. • Visitors should have the possibility to introduce slight changes in the position of solar panels in the quantity of min. 2 pcs placed e.g. beneath the plane's wings, with the use of simple key functions. Key functions enabling modification in the positioning of the solar panels are to be installed on a stand placed in the proximity of the vertical arm. • Light sources (activating the chemical reaction in solar panels and transforming them into electrical energy – moving the aircraft) min. 3 pcs, are to be positioned in such a way so that the Visitors, working individually or in a team, have the possibility of changing their position and easily direct the light towards the solar panels. • The Contractor is to provide the Ordering Party with 1 spare set.
Use	Visitors approach the station, adjust the position of solar panels installed at the bottom of the aircraft, next a Visitor works alone or in cooperation with others and directs the light source towards the solar panels setting in motion the plane placed at the top on the arm.
General Requirements of the Ordering Party	The exhibit is not to be too difficult to use by Visitors. The effect should be easily and relatively quickly achievable, however it is required to preoccupy the Visitor for at least 1 minute. The lamps are to be properly secured against touching by Visitors in such a way as to prevent burns. The lead mechanism must be simple in operation.

20	Moving images
Location	Think, understand, do. Location in relation to other exhibits is to be proposed by the Contractor
Theme	Technology, technology of animation
Educational aim	Development of skills of logical thinking and artistic competences
Size of the station	The size of the table on which it will be possible to make a film using the stop-motion technique is to have the following minimum dimensions: 1.2 width x 1.2 length or the diameter of a round table of 1.2 m
Elements	<ul style="list-style-type: none"> • The station comprises a table for making animated films using the stop-motion technique • Within the table there is to be a designated place in the form of a white rectangular plate with colour-marked (e.g. with the use of a dashed line) first, second and third ground. • Next to the white rectangular plate there are to be buttons allowing activation of an application (START) and take photographs (CAPTURE) after setting up proper history. The number of takes is to be limited, and the length of the film is not to exceed 30 seconds. • Additionally, a screen/display monitor is to be placed on the table allowing to see the recorded photographs with the use of the stop-motion technique, a ready film and sending it to a particular email address. • Elements made from plastic material enabling their proper positioning within the three grounds; mobile elements must not be too small, the minimum dimension is: 5 cm. Mobile elements are to be provided with anti-theft stickers. • The Contractor is moreover to supply a device (e.g. a camera) used for recording photographs in the form of a stop-motion film • On the table there is to be a clear and eligible instruction for the performance of a stop-motion film. • Two chairs are to be supplied with the table. • The Contractor is to provide the Ordering Party with 2 sets of spare elements, and in particular the mobile elements used for creating a stop-motion film.
Use	Visitors approach the station, sit on the chairs, press the START button, next choose proper mobile elements used for taking thematic photographs. Upon the placement of particular elements on the first, second and third ground, Visitors press the CAPTURE button. Next, they alter the positioning of blocks following a concrete planned pattern and press the CAPTURE button. Visitors may capture a limited number of takes. The recording device converts the photographs into a stop-motion film. The duration of a stop-motion film is maximum 30 seconds. On the completion of takes the film can be watched and sent by Visitors to a particular email address.
General Requirements of the Ordering Party	Access to any connecting and power supply elements of the computer is to be difficult for Visitors, and at the same time be easy for people

	performing repairs and maintenance works.
--	---

Zone IV TechnoWorld

The zone is to encompass 6 exhibits along with space arrangement. The exhibits are to allow simultaneous activity of two or more Visitors. The Theme of the zone is connected with matters related to the development and use of modern technologies in different domains of life. The Contractor is to determine the central exhibit which is to be distinguished among other exhibits with, for instance, its size, choice of colours, illumination, depending on the proposed form.

21	Robot
Location	TechnoWorld
Theme	Robotics, machine engineering
Educational aim	Familiarisation of visitors with the capabilities of modern robotic engineering.
Size of the station	Total station size encompasses the min. length of 0.8 m, width 0.8 m, height 1.1 m.
Elements	<ul style="list-style-type: none">• Robot with a head and body along with an infokiosk• Application• Central unit <p>The type of a robot, application and central units are to be selected by the Contractor in the course of tests and trials in order to ensure the intended effect.</p>
Use	Upon approaching the station the Visitor is to be able to hold a simple conversation with the robot. With the use of the interface integrated with the robot the Visitor will be able to choose one option of the application: communicative or integrative. Should the Visitors choose the informational option, the robot will present information concerning the zone and its character. By selecting this option the Visitor may also receive information on robot technologies and its application in various fields of life. Choosing the integrative function will enable the user to play a game of e.g. noughts and crosses.
General Requirements of the Ordering Party	<ul style="list-style-type: none">• application parameters and its type is to be such as to enable its updating for the period of min. 7 years.• parameters of the central unit are to be universal for the period of min. 7 years and not require hardware elements replacement due to technological "expiry".• the application is to enable simple communication with the robot resulting in obtaining different kinds of information. The application is to encompass at least the following functions• The Ordering Party requires that the application is executed both in Polish and English

	<p>1) inform:</p> <ul style="list-style-type: none"> - What kind of zone it is and what its objective, character and intended use - About the possibilities of robotic technology and its application in various fields of life, including medicine, everyday life, industry, communications, etc. <p>2) integrate the user with the robot by:</p> <ul style="list-style-type: none"> - providing three simple games in the application, such as noughts and crosses, scrabble and Rummikub, or other proposed by the Contractor.
<p>Special requirements of the station arrangement</p>	<p>The Ordering Party requires that the Contractor provides such an arrangement as not to make Visitors uncomfortable while using the station. Visitors are to feel as if they were holding a conversation with a friend. The Ordering Party requires that the arrangement of the station includes such elements as e.g. a table, a place to sit. The arrangement is to be suited to the station in such a manner that the robot and the interlocutor are positioned at a similar height. The arrangement is to enable free access to the infokiosk's interface integrated with the robot. The robot together with the infokiosk are to be built into the station arrangement.</p>

22	Friend from the future
Location	TechnoWorld
Theme	Robotics, machine engineering, artificial intelligence
Educational aim	Familiarisation of visitors with the capabilities of chat bot software. The user's task consists in holding a discussion with a computer programme – application. With the use of the application the Visitor will be able to hold a discussion on any subject with a mobile image of a virtual man, the chat bot.
Size of the station	Total station size encompasses the min. : width of the wall of infokiosk 0.9 m, height of the wall of infokiosk with the base 1.6 m. Thickness of the wall is to be determined by the Contractor in such a way as to enable installation of the elements specified below and preserve the stability, mobility and durability of the station.
Elements	<ul style="list-style-type: none"> • Infokiosk in the form of a rectangular wall. • The base of the infokiosk of any shape, ensuring stability of the exhibit without the need of it being fixed to the floor. • Two touch panels with the diagonal of min. 32" built into the infokiosk on its both sides in such a way as to prevent their protrusion from the wall. All external buttons of the touch panels are to be hidden in the casing and invisible to Visitors. • The chat bot application with graphic elements and text visualisation • Central unit
Use	Upon approaching the station the user activates the application by clicking on the indicated place. At first the panel is to display a textual content containing information on chat bot applications, their role and uses. Simultaneously, it should show graphic content showing how many users are communicating with chat bots at that particular moment (e.g. cleverbot, mitsuku, Eliza) and how many new chat bots are established within a specified time, e.g. a month. If the user does not want to read such information he should have the possibility to skip this phase and move on to the main application. In the main application the user is asked to provide his name in order for the chat bot to recognise with whom it is having a conversation. In the main part of the application the user may hold a conversation with the chat bot by use of the touch panel.
General Requirements of the Ordering Party	<ul style="list-style-type: none"> • application parameters and its type is to be such as to enable its updating for the period of min. 7 years. • the main chatbot application is to have the capacity of developing its own database (learning) through communication with the users. The Ordering Party requires that the application blocks the use of obscene words and phrases.

	<ul style="list-style-type: none">• The Ordering Party requires that the application contains an informational module with graphic and textual content related to: technology, the history of creation and use of applications simulating artificial intelligence and virtual assistants such as Turing test.• parameters of the central unit are to be universal for the period of min. 7 years and not require hardware elements replacement due to technological "expiry".• The Ordering Party requires that the application is executed both in Polish and English
Special requirements of the station arrangement	The Ordering Party requires that the empty spaces within the infokiosk wall are arranged with the use of infographics or textual elements related thematically to the exhibit.

23	Wonderland
Location	TechnoWorld
Theme	Robotics, machine engineering, virtual reality
Educational aim	Familiarisation of Visitors with the capabilities of modern technologies in the area of VR devices
Size of the station	Size of the station must be adjusted to the capacities of the exhibition space and the safety requirements applicable to playgrounds. Minimum dimensions: total length of the station 1.6 m, total height 1.6 m, width adjusted to seat dimensions
Elements	<ul style="list-style-type: none"> • A stable spatial structure of futuristic shape selected in such a way as to make the station stable without being fixed to the floor. The structure is to allow installation of all station elements. The structure constitutes the casing of the station and the materials used in its construction are to be durable and resistant to mechanical damage. • A seat – couch allowing to assume a reclined position with side rests preventing Visitors from falling down. The seat is to have an automatically regulated backrest to enable the user to bend backward or forward. In the area of the headrest it is required to install the main element of the station, goggles, with the use of e.g. a movable arm or manual lever in such a way as to make sure they fit tightly to the Visitor's face. A mechanism activating the application is to be installed in the seat, e.g. in the form of a button placed in a side rest as well as a button used for application selection. • The main element of the station – goggles for the visualisation of virtual reality along with elements necessary for their proper operation. The delicate parts of the goggles are to be constructed in such a manner as to prevent their disassembly by users, the shape of their casing is to be proposed by the Contractor with regard to hygiene considerations, however the shape and construction of the casing is to be stylistically consistent with the station. The Ordering Party requires that the Contractor provides agents for maintaining daily hygiene and cleanness of the goggles and their casing. • Application – programme • A central unit, should it be necessary for proper functioning of the station.
Use	Upon approaching the station the Visitor sits on the seat, lowers the arm with goggles, adjusts the tilt of the backrest. With the use of the button provided in the side rest he selects application and activates it with the use of the button also found in the side rest.

<p>General Requirements of the Ordering Party</p>	<ul style="list-style-type: none"> • application parameters and its type is to be such as to enable its updating for the period of min. 7 years. • The VR theme used in the application is to be proposed by the Contractor, however the application is not to contain any elements of aggression or violence. The subject matter is to be selected in such a way as not to pose a threat to physical and mental health of Visitors. • The Ordering Party requires that the Contractor installs three different VR applications • parameters of the central unit (if such is required in the station) are to be universal for the period of min. 7 years and not require hardware elements replacement due to technological "expiry" • The Ordering Party requires that the application is executed both in Polish and English • The Ordering Party requires that the goggles are integrated with the sound system
<p>Special requirements of the station arrangement</p>	<p>The Ordering Party requires that the Contractor arranges the free spaces in the exhibit's casing with infographics related to the subject matter of the exhibit. The Ordering Party requires that the station contains warnings on possible hazards related to physical or psychic discomfort resulting from the use of the station. The content and location of the notification is to be determined with the Ordering Party in the phase of designing the exhibition.</p>

24	Man of the Future
Location	TechnoWorld
Theme	Modern technologies in medicine, biology
Educational aim	The user is to have the possibility to become familiarised with the capabilities of modern medicine in the field of implantology.
Size of the station	The minimum height of the man is to be 1.6 m; The width of the wall of the infokiosk 0.9 m; The height of the wall of the infokiosk along with the base 1.6 m; The thickness of the wall is to be determined by the Contractor to ensure station stability and durability.
Elements	<ul style="list-style-type: none"> • The silhouette of a man to the scale of 1:1 performed from transparent material, durable and resistant to mechanical damage (chipping off, denting) with elements imitating organ implants, bones and joints placed inside. • The base to which the model is mounted in a standing position. The shape and size of the base is to be selected in such a way as to ensure station stability without the need of fixing it permanently to the floor. • Elements that well imitate all body parts that became "replaceable" throughout the history of mankind with artificial parts, such as eyes, teeth, bone implants and prostheses, joints, artificial organs. The elements are to be placed inside in proper places of the model of human body in such a way as to be well visible and located in proper places. The elements are to be attached permanently to the model. • Infokiosk in the form of a rectangular wall. • The base of the infokiosk of any shape, ensuring stability of the exhibit without the need of it being fixed to the floor. • A touch panel with the diagonal of min. 32" built into the wall of the infokiosk in such a way as to prevent its protrusion from the wall. All external buttons of the touch panels are to be hidden in the casing and invisible to Visitors. • Application consisting of three modules • Central unit
Use	Upon approaching the station Visitors are able to see the model of a man and see how many organs, joints and bones can be replaced with artificial counterparts. In the first module of the application Visitors become familiarised with the field of medicine – implantology, technology and the related materials. In the second module the application is to display a model of a man with indicated organs, joints and bones which may be replaced with artificial counterparts. Upon clicking on a selected organ a text message is to appear containing information related to the implantation history of this organ, i.e. when the first implantation of this organ was conducted as well as the interesting facts connected with this

	event.
General Requirements of the Ordering Party	<ul style="list-style-type: none"> • application parameters and its type is to be such as to enable its updating for the period of min. 7 years. • parameters of the central unit are to be universal for the period of min. 7 years and not require hardware elements replacement due to technological "expiry". • The Ordering Party requires that the application consists of two modules: <ul style="list-style-type: none"> - The first module is to contain information on: the history of implantology as a scientific domain, its most vital achievements and possibilities, the technologies, devices and materials used in this field. - The second module is to display a model of man with indicated organs, joints, bones, etc, which may be replaced with artificial counterparts. Module elements are to be active and upon their indication information is to appear concerning the date when the first implantation of a given organ was performed as well as the related interesting facts. • The Ordering Party requires that the application is executed both in Polish and English
Special requirements of the station arrangement	The Ordering Party requires that the empty spaces within the infokiosk wall are arranged with the use of infographics or textual elements related thematically to the exhibit.

25	Vehicle from the Future
Location	TechnoWorld
Theme	Modern technologies, machine engineering
Educational aim	Familiarisation with the capabilities of modern technologies in vehicle design and construction.
Size of the station	Size of the station must be adjusted to the capacities of the exhibition space and the safety requirements applicable to playgrounds. Minimum dimensions: Total length of the station 1.6 m; Total height 1.6 m; Width adjusted to seat dimensions
Elements	<ul style="list-style-type: none"> • A stable spatial structure of futuristic shape selected in such a way as to make the station stable without being fixed to the floor. The structure is to allow installation of all of the station elements described below. The structure constitutes the casing of the station and the materials used in its construction are to be durable and resistant to mechanical damage. • A seat – couch allowing to assume a reclined position with side rests preventing Visitors from falling down. The seat is to have an automatically regulated backrest to enable the user to bend backward or forward. • Touch panel with the diagonal of more than 15" built into the internal casing of the station in such a way as to prevent its protrusion from the wall of the casing. All external buttons of the touch panels are to be hidden in the casing and invisible to Visitors. • Application – programme consisting of three modules • Central unit, should it be necessary for the proper functioning of the station.
Use	Visitors take position on the seat and activate the application with the indicated element on the touch panel. They use the application to design their own vehicle – car with consideration of its most important elements i.e. the shape of the body, engine type and model, fuel, type of tyres. Next, the user may test the vehicle on a specially designed by the Contractor testing track, taking into account the weather conditions. The user will be able to find out how the type of tyres or shape of the body influences the motion. Additionally, the application is to enable Visitors to familiarise themselves with the innovations within modern technologies related to vehicle design and construction.
General Requirements of the Ordering Party	<ul style="list-style-type: none"> • The Ordering Party requires that the distance between the seat and the touch panel enables Visitors comfortable use of the station. • The application is to contain three modules:

	<p>- the first module is to enable Visitors to design their own vehicle, e.g. a car. The application is to be based on a simple and intuitive solution. The user is to have the possibility to modify vehicle parameters, e.g. body structure, engine type and the corresponding fuel, type of tyres, etc. The application module is to provide at least 30 different combinations.</p> <p>- the second module is to allow Visitors to test their designs on a virtual track. The Contractor is to propose in the application several variants of tracks with different difficulty levels. The module is to provide the following information: weather conditions, i.e. wind speed, speeds of the vehicle's movement at each moment, distances that the vehicle covered, fuel consumption, power of the engine. The testing module is to take into account the weather conditions in the course of conducting the tests.</p> <p>- in the third module the user will find textual and graphic information related to innovations in the field of design and construction of modern vehicles.</p> <ul style="list-style-type: none"> • application parameters and its type is to be such as to enable its updating for the period of min. 7 years. • parameters of the central unit (should such be required at the station) are to be universal for the period of min. 7 years and not require hardware elements replacement due to technological "expiry" • The Ordering Party requires that the application is executed both in Polish and English
<p>Special requirements of the station arrangement</p>	<p>The Ordering Party requires that the Contractor arranges the free spaces in the exhibit's casing with infographics related to the subject matter of the exhibit.</p>

26	Space technology
Location	TechnoWorld
Theme	Modern technologies in communication, satellite navigation
Educational aim	Familiarisation of Visitors with the principle of operation of navigation equipment (GPS)
Size of the station	Total station size encompasses the min. The width of the wall of the infokiosk 0.9 m; The height of the wall of the infokiosk along with the base 1.6 m; The thickness of the wall is to be determined by the Contractor to ensure station stability and durability.
Elements	<ul style="list-style-type: none"> • Infokiosk in the form of a rectangular wall. • The base of the infokiosk of any shape, ensuring stability of the exhibit without the need of it being fixed to the floor. • Two touch panels with the diagonal of min. 32" built into the infokiosk in such a way as to prevent them from protruding from the wall. All external buttons of the touch panels are to be hidden in the casing and invisible to Visitors. • Application • Central unit
Use	Upon approaching the station Visitors are to activate the application. With the use of the touch panel the user selects the application module that he wishes to use. The application is to familiarise Visitors with satellite navigation technology, allow them to understand basic principles of physics that enable operation of GPS systems. Additionally, Visitors are able to play a game demonstrating the operation and capabilities of GPS devices.
General Requirements of the Ordering Party	<ul style="list-style-type: none"> • application parameters and its type is to be such as to enable its updating for the period of min. 7 years. • parameters of the central unit are to be universal for the period of min. 7 years and not require hardware elements replacement due to technological "expiry". • The Ordering Party requires that the application is executed both in Polish and English • application together with the GPS device is to comprise three modules. In the first module the user can obtain information in a graphic form on the number of satellites which are connecting with the GPS device at a given time. Satellite data (flight altitude, speed and trajectory) are to be displayed in a graphic form. The user is to have the possibility to display data (type, name, intended use, year of launching, etc.) in a textual form on all satellites that are available at a given time. The second module is to enable the user to obtain information on:

	<ul style="list-style-type: none">- the principle of operation of GPS; including the number of satellites needed to indicate precise location with the use of a GPS device, the significance of Einstein's special relativity theory in satellite navigation,- where and for what purpose GPS devices are used <p>The third module is to be proposed by the Contractor. The Contractor is to propose a game/application demonstrating the navigation capabilities of GPS devices. The Ordering Party requires that the game is simple and intuitive, with subject matter related to the use of GPS devices, e.g. while travelling, the application is to enable display of maps and routes, number of kilometres covered and to be covered.</p>
Special requirements of the station arrangement	<p>The Ordering Party requires that the empty spaces within the infokiosk wall are arranged with the use of infographics or textual elements related thematically to the exhibit.</p>