

Local Government Institution of Culture – Innovation Centre Mill of Knowledge

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DETAILED DESCRIPTION OF THE CONTRACT SUBJECT-MATTER

EXHIBITION “ON THE REVOLUTIONS”

PART I – GENERAL REQUIREMENTS

1 Basic information

Innovation Centre Mill of Knowledge is a local government institution of culture established by the municipality of the City of Toruń. It shall be located in two historic buildings in so-called pre-war Richter Mills on their first 6 storeys. Two remaining floors of the building where the exhibitions shall be located are designed for another institution. Location of the Centre in Toruń and in historic buildings shall determine the nature of permanent exhibitions presented: “On the Revolutions,” “The River,” “Power and Energy,” and “Ideas”.

The Exhibition “On the Revolutions” (hereinafter Exhibition) shall consist of 18 sites with interactive exhibits located in accordingly arranged exhibition area on the first floor of the building. The Exhibition shall be adjacent to the exposition “Foucault Pendulum,” which along with the Exhibition constitute a thematic whole, and comprises the Foucault Pendulum placed in the shaft running through the entire height of the building, and multimedia exhibit associated with the Foucault Pendulum in terms of the subject matter, located in the place of the Pendulum motion, which is most convenient for observation, at the main viewing gallery on the first floor of the building. The background for the Foucault Pendulum shall consist of appropriately arranged space of the ground floor facilitating observations of changes in the

vibration plane of the Pendulum from the ground floor level and above-mentioned viewing gallery on the first floor.

1.1 Exhibition audience

The Exhibition is aimed at individuals and organized groups:

- Children and adolescents
- Adults and full families.

Children under 12 years of age will have to visit the Innovation Centre Mill of Knowledge under adult supervision. Organized groups will visit the Innovation Centre Mill of Knowledge only with carers.

1.2 Exhibition specification

The main subject of the Exhibition is rotational motion and its practical applications as well as associated phenomena, such as occurrence of inertial forces in rotating frames of reference, including the Earth. The rotational motion is a reference to the revolutionary work of Nicolaus Copernicus “De revolutionibus...” and the predominant exhibit of the Innovation Centre Mill of Knowledge – the Foucault Pendulum. Still lively in Toruń, the Copernican tradition shall also find its reflection in exhibits presenting contemporary methods of searching for planets or the Solar System structure.

1.3 Exhibition components

1.3.1 Sites.

The Exhibition shall comprise 18 sites, thematically associated with the wheel, rotational motion, space travelling, divided into two zones of uniformly arranged exhibition area:

- a. Zone One, *Machinery*, shall include sites related to applications of the wheel and selected simple machines and shall be located on one side of the main viewing gallery, facilitating observations of the Foucault Pendulum motion;
- b. Zone Two, *Revolutions*, shall contain exhibits related to searching for planets and space travels and shall be located on the other side of the viewing gallery and opposite the entrance.

Within Zone One, near the children's exhibits, a small area for parents with children shall be separated for fun and relaxation.

1.3.2 Exposition messages.

Each site shall bear an exposition message merged with the site or the arrangement in the immediate vicinity.

An exposition message includes:

- a. The site name in Polish and English;
- b. The experiment execution instructions for the visitor (step by step) in Polish and English;
- c. Description of the phenomenon presented in Polish and English;
- d. The curiosity name in Polish and English;

1.3.3 Exhibition area arrangement.

The Exhibition sites shall be organized within appropriately arranged exhibition area. The arrangement requires integration of additional components to stimulate the visitors' imagination, such as fragments of texts, graphics, riddles, jigsaws, or quizzes with the purpose to expand the information conveyed by the exposition messages.

1.4 Technical description of the building

1.4.1 The building

Ultimately, the Innovation Centre Mill of Knowledge shall be located in the buildings of mill and grain elevator under conversion, originating in the 1940s, which are located at streets Łokietka 5 and Dworcowa 8-10 in Toruń. The building consists of two main functional parts, which will be used by two different owners: Innovation Centre Mill of Knowledge and Technological Incubator of Toruń. For the Centre of the art Mill Knowledge, there is seven-storey exhibition space designed (the building of the former elevators – building “E”, see section T_A_W_P_01, axis 7-10) and the scientific labs for the general public (in a part of the former grain mill – building “D”, see section T_A_W_P_01, axis 1-6) separated by communication zone (two stairways and lift unit). Third floor has a double height. Technological Incubator of Toruń is to occupy the uppermost eighth storey of elevator part (building “E”) and two uppermost levels of the mill (building “D”).

In the ground part, the building is based on the shape of a rectangle with sides of 29.6 m and 37.3 m. It uses reinforced concrete framing. It is supported on reinforced concrete columns featuring rectangular cross section and transverse dimensions various on individual floors. Horizontally, at the level of ceilings, between the columns, stretch joists with distinctive change (increase) of height at the supports. The deck panel with reinforcement features a thickness of 12 cm, 15 cm on the flat roof. Roof panel featuring thickness of 15 cm is provided to transfer loads from air conditioning equipment. On the roof panel, above a number of holes, there is a steel structure turret provided. It shall be used to suspend the Foucault Pendulum. The ceiling operational load in the exhibition part amounts to 5.0 kN/m², while in the roof section – 3.0 kN/m². External doorway leading to the main lobby features dimensions of 216.5 cm width and

250 cm high; it is followed by another doorway, 195 cm wide and 250 cm high. (see the ground floor plan T_A_W_R_01).

The scheduled Exhibition “On the Revolutions” will be located in the exhibition space (building “E”) on the first floor. It shall be adjacent to the multimedia site of the Exposition “Foucault Pendulum,” which shall also be located on the first floor, at the viewing gallery.

1.4.2 The exhibition space

The Exhibition “On the Revolutions” shall stretch in the area of 320 m² of the exhibition space on the first floor along with the Exhibition outskirts of 102 m². In the central point of the space, there is a hole in the ceiling of 157 m² area surrounded by a balustrade of laminated glass with a handrail at a height of 1.10 m to protect the zone where the Foucault Pendulum shall be presented (see the first floor plan T_A_W_R_02). The height between the floor and the ceiling in the exhibition space on the first floor is 2.70 m from the south (the room entrance) and 3 m from the north. However, due to finishing and design works, that height is subject to slight change.

Entrance openings leading from entrance enclosures to the exhibition room feature the following dimensions: 180x200 cm and 90x200 cm. Hardware of interior doors leading to the exhibition space made of aluminium sections in RAL 9003 colour, filled with sight glass.

The exhibition space floor made of natural granite NERO IMPALA (slabs featuring dimensions of 60x60 cm), thickness at least 2.5 cm. Brick walls filled with polyurethane foam, reinforced from inside with reinforced concrete wall. The interior thermally insulated using low-density foamed-concrete panels – multipor. The entire exhibition space is free from window openings. The middle part of the first floor includes two reinforced concrete columns, section 80x80cm. The system suspended ceilings made of panels with mineral-fibre perforated core and coating with acoustic non-woven fabric, panel thickness of 19 mm. At walls and around the Pendulum zone, gypsum system suspended ceiling, panel thickness 1x1.25 cm, on ceiling sections CD 60; wall UD 30 (see ceilings plan of the first floor T_A_W_S_02).

The Contractor agrees to ensure that the Employer shall not lose the guarantee of the General Contractor of construction works or that the Contractor shall provide guarantees for works completed, related to breach of works already completed, for a period of not less than the guarantee provided by the General Contractor. All costs associated with such a change are on the Contractor's account.

In the event that any finishing works are implemented at the same time and place that the Contractor install the sites, the Contractor is obliged to do so with approval of the General Contractor of construction works in a manner that ensures safe operation and proper aesthetics. All costs involved are on the Contractor's account. In the event that the Contract

subject is implemented after completion of the construction works, the Contractor is obliged to fulfil all the necessary engineering processes related to the foundation of the Exhibition and to restore the original state, or another one providing aesthetics and safe use.

1.4.3 Media

1.4.3.1 Electrical systems

The internal electrical system shall run on the walls of the floor and on both reinforced concrete columns (in 18 points in total) where sockets 2P+Z 230V shall be installed (see the arrangement of sockets plan R_03). Additionally, similar sockets shall be deployed in the entire exhibition space in 20 floor boxes UDH3 wict cartridges HBKK Q06. The floor sockets shall be powered from below rooms. In the wall, in six points, industrial sockets (400 V) shall be installed. Next to the above-mentioned sockets, in 12 points of the wall and in each floor box, telecommunication sockets RJ-45 shall be provided.

General electrical sockets mounted at a height of 0.3 m, industrial sockets 400V at a height of 0.5 m, while in the bathrooms and utility rooms at a height of 1.1 m with buffer zones of 60 cm from the edge of the tub or shower. The circuits of sockets are protected with residual current circuit breakers ($\Delta I = 30 \text{ mA}$).

1.4.3.2 Lighting

In the exhibition space and on the ground floor of the building, the lighting level at the working plane shall be provided, i.e. at a height of 0.85 m from the floor level, featuring illumination of about 400 lx. The design also covers the Exhibition lighting system control – control cabinets are located in the technical room from the east (see lighting system plan Rys_E01_elektryka_zmiany).

In addition, the building shall feature low illumination LED emergency lighting.

1.4.3.3 Water and sanitary systems

Directly in “On the Revolutions” Exhibition area there are 11 water intakes mounted on walls near the plumbing system lines.

On the first floor, horizontal distribution plumbing pipes are scheduled. The power supply vertical cables shall run through installation shafts or enclosed wall trenches along with the hot water supply system and air circulation air circulation. The plan of plumbing system on the first floor of the building is shown on Figure RYS_2_wod-kan_zmiany.

1.4.3.4 Ventilations and air conditioning

Mechanical intake and exhaust ventilation with air-conditioning of rooms. The core of the system shall consist of three roof ventilation units and one suspended unit in the attic, which shall direct the external air to relevant rooms. The ventilation system for the entire exhibition

space has been designed as a laminar flow system using base displacement supply diffusers. Such a system is designed to eliminate the influence of ventilation air motion on the exhibits' operation. The plan of ventilation and air-conditioning system on the first floor is shown on Figure T_S_W_S_02.

Ceiling and wall mounted air conditioners Fan-Coil featuring a functionality of air cooling shall be used in office rooms, conference rooms and computer rooms. The server rooms shall be equipped with an internal air cooling system using freon systems.

1.4.4 The building shall also include the following equipment, systems and devices:

- Fire alarm system
- Audible warning system
- Automation system of ventilation and building management
- Telecommunication system for intrusion detection system, access control, CCTV
- structural network system (computers, telephones, network equipment and telephone exchange);

There is also scheduled a distribution of WiFi network available in the building excluding the exhibition rooms (exhibition space) through the use of overhead Access Points.

It is required that network devices comply with the communication protocol IPv6.

1.4.5 Conditions of works course in the building

Scheduled date of works completion, of the entire investment, is November 2012. The works on the first floor should be accomplished by August 2012: machine gypsum plasters laid until May this year, flooring works (primer) until June this year, and troweling painting of walls until July this year, just like installation of system suspended ceilings. Finishing of granite floors and installation of door woodwork on the first floor is scheduled by August 2012. Installation works related to electrical and telecommunication systems in the exhibition part on level +2 are expected to last until October 2012 and shall include laying of cable routes, pipes, trays – May this year, sockets and fixtures – mid-August this year. The installation of elevators is expected to be completed by October this year. Sanitary systems and ventilation system should be mounted by November this year. These terms are prognoses only and are subject to change.

When developing the “On the Revolutions” Exhibition, the Contractor shall in no way affect the design, structure, systems, arrangement and finishing works completes thus far, etc., or execute other works that could in any way violate the conditions of the guarantee provided by the General Contractor of construction works named Pol-Aqua, or otherwise compromise the standard of the building. In case any changes to the Investment Detailed Design are necessary, the Contractor is obliged to agree upon them in advance with the Investor, i.e. the Municipality

of the City of Toruń and obtain a written consent of the General Contractor and the Design Supervision to any interference and/or change. Any and all costs involved are on the Contractor's account. Also, any changes of designs, even if necessary for the implementation of the Contract subject, shall be on account of the Contractor, who agrees to incur all the costs involved. The Contractor is responsible for any damage that may possibly arise during the implementation of the Contract subject, even if revealed at a later date, but were resulted from the Contractor's activities. When delivering the Contract subject the Contractor is obliged to implement it in accordance with Polish regulations, including those related to fire protection and safe use of the building, H&S rules and standards. During the period of the Contract implementation the Contractor agrees to cooperate with the General Contractor of construction works and other contractors who will perform subcontracted works at the construction site. Until the completion of the works by the General Contractor, the Contractor's employees are responsible to the management of the construction site with regard to H&S and fire protection issues. Prior to commencing the "On the Revolutions" Exhibition, the Contractor is obliged to verify all necessary measurements in real world.

2 Description of the Contract subject matter

2.1 Designs

2.1.1 Develop and provide the Employer with graphic and detailed designs of individual components of the Exhibition, in particular:

2.1.1.1 Develop and provide the Employer with graphic and detailed designs of sites of the Exhibition.

2.1.1.2 Develop and provide the Employer with graphic design of the entire Exhibition space arrangement.

2.1.1.3 Create and provide the Employer with graphic designs of the Exposition messages for all sites, comprising the following

- a.** The site name in Polish and English;
- b.** The experiment execution instructions for the visitor (step by step) in Polish and English;
- c.** Description of the phenomenon presented in Polish and English;
- d.** The curiosity in Polish and English;

2.1.2 Develop and deliver updated visualizations of sites along with exposition messages and the entire Exhibition, showing the Exposition from each side, day and night times, based on the designs referred to in Sections 2.1.1.1, 2.1.1.2 and 2.1.1.3, following the final acceptance by the Employer:

- 2.1.2.1** in electronic form featuring parameters enabling production of prints of size 0.7 m × 0.5 m, without compromising their quality. The files prepared must hold appropriate parameters providing clear and accurate picture when printed. Required parameters: CMYK colour, resolution min. 300 dpi in 1:1 scale, files saved as “tif” in 1:1 scale;
- 2.1.2.2** in the form of overprint on PVC board sized 0.7 m × 0.5 m for three visualizations selected by the Employer from among electronic visualizations provided by the Contractor.
- 2.1.2.3** Develop and provide the Employer with a design of all presentations meant for the multimedia sites. In particular, for each site, the designs must include the following:
- a.** A list of all presentations, including specifications of their contents and a list of means of multimedia communication
 - b.** Graphic designs of the presentations
 - c.** A sample of video for use in a presentation
 - d.** A sample of animation for use in a presentation
 - e.** The structure of the entire multimedia software detailing the transitions between subsequent presentations.
- 2.1.3** Provide the Employer with an estimate including prices of Exhibition components, listed in Section 1.3 and all other expenses necessary for the implementation of the Contract subject (following the final acceptance of the designs by the Employer).
- 2.1.4** Providing the Employer with information on expected yearly costs of the Exhibition operation.

2.2 Execution and delivery of the Exhibition components

- 2.2.1** Complete all components of the Exhibition as per designs listed in Section 2.1, with necessary tests, accepted by the Employer.
- 2.2.2** Test in the presence of the Employer representatives all Exhibition components and, based on the test results, introduce necessary changes.
- 2.2.3** Develop exposition messages prepared against designs of point 2.1.1.3 approved by the Employer.
- 2.2.4** Create fully functional multimedia site software with animations, videos and other interactive software deployed, according to designs listed in Section 2.1 approved by the Employer, in a form that allows software changes as well as adding new videos and animations.
- 2.2.5** Delivery of all Exhibition components, i.e. sites, exposition messages, components of space arrangement to the Employer premises.
- 2.2.6** Delivery to the Employer of fully functional multimedia site software with animations, videos and other interactive software deployed, according to designs listed in Section 2.1

approved by the Employer, in a form that allows software changes as well as adding new videos and animations. In particular, the Contractor shall provide the following:

- a. A list of all presentations, including specifications of their contents
- b. Graphic designs of the presentations
- c. All animations used in electronic form on a CD or DVD
- d. All videos used in electronic form on a CD or DVD
- e. All computer programs developed for presentation in electronic form on a CD or DVD
- f. All other presentation components produced using means of multimedia communication in electronic form on a CD or DVD
- g. The structure of the entire multimedia software detailing the transitions between subsequent presentations.

2.3 Installation and commissioning of all Exhibition components as well as documentation and personnel training

2.3.1 Delivery, commissioning and integration of the Exhibition components.

2.3.2 Delivery of spare parts that can be used for repairs (referred to in Section 2.3.5), carried out during the guarantee period by trained employees of the Employer.

2.3.3 Delivery of all consumables for individual components of the Exhibition for four initial months of its presentation, from the date when it is accepted by the Employer, Innovation Centre Mill of Knowledge.

2.3.4 Deployment of exposition messages in the Exhibition space, prepared against designs of point 2.1.1.3 approved by the Employer and delivery to the Employer of messages on CD or DVD, in an electronic form that allows any modifications.

2.3.5 Create and provide the Employer with documentation of the Exhibition containing at least the following information (as-built documentation):

- a. A list of the Exhibition components (sites and arrangement items)
- b. Names of sites, adherence to the Exhibition and its thematic zone
- c. Purposes of the sites
- d. Graphic and detailed designs of the Exhibition and its individual components
- e. Detailed method of operation of individual sites
- f. Detailed descriptions of phenomena presented at individual sites
- g. Number of visitors able to use a site simultaneously
- h. Detailed information on the media and consumables necessary for proper operation of the sites

i. A list of repairs that may be performed by the personnel of the Innovation Centre Mill of Knowledge trained by the Contractor during the guarantee period, without compromising the guarantee conditions.

2.3.6 Create and provide Employer with manuals, rules of control, service and maintenance of individual Exhibition components in Polish as a hard copy and electronic form as well as the guarantee cards.

2.3.7 Handover to the Employer of the test results referred to in Section 2.2.2.

2.3.8 Transfer onto the Employer of software licenses and copyrights for the photos, graphics, drawings, fragments of source texts, videos and animations, and other software and works used in all Exhibition components.

2.3.9 Handover to the Employer of declaration of conformity of the Contract subject with applicable regulations and standards; the components of the Exhibition and arrangement must conform to European safety standards and have attached declarations of conformity proven by CE marks.

2.3.10 Transfer onto the Employer of copyrights for the Contract subjects under the conditions specified in the Contract.

2.3.11 Training of Innovation Centre Mill of Knowledge for the operation, control, maintenance and service of the Exhibition components, produced by the Contractor, to the extent enabling the employees to perform repairs (referred to in Section 2.3.5), also during the guarantee period. Training for a group of up to 10 persons shall be carried out at the premises of the Employer in Polish or English. The Contractor shall propose the training duration in the schedule.

3 The Employer requirements regarding the Contract subject matter

3.1 General requirements

The design concept should be consistently applied throughout the Exposition space and include design of the Exhibition components and spatial arrangement, consider the nature of the exposition message and graphic development of the multimedia sites. The design solutions applied and the arrangement components should not hinder the visitors from accessing the sites. Neither, should they interfere with the educational communication.

The Employer requires that the design convention and the Exhibition arrangement:

- are consistent and colours are consistently used throughout the entire arrangement
- are not monotonous nor too provocative
- include no aggressive themes
- is consistent with the Exhibition subject matter in terms of contents.

The Exhibition must be arranged so that the communication solutions do not interfere with the freedom of access to the components for both fully fit persons and the disabled. The arrangement should consider the accessibility for both single persons and groups, ensuring passable halls and corridors throughout the Exhibition area.

3.2 The requirements regarding the Exhibition interactiveness

All sites comprised by the Exhibition must be interactive.

As meeting this requirement shall be regarded those sites that present at least one of the following interactiveness types:

- manual – a site involves manual work
- movement – a site requires moving of the whole body and physical coordination
- sense – a site requires acute senses
- intellectual – a site requires expertise from the visitors.

3.3 The requirements for the Exhibition contents, animations, multimedia presentations, videos and Exposition messages

3.3.1 All sites must have exposition messages, located in the immediate vicinity, merged with the surroundings, while multimedia sites must have appropriately selected multimedia presentations. The messages and multimedia presentations must be consistent in terms of graphic solutions and have a distinctive appearance consistent with the arrangement concept established. The exposition messages must be attached in such a way as to be visible to the visitors. The Employer allows the possibility of changing the messages contents at a later period of operation, hence they must be constructed in such a way that the replacement or alteration does not cause interference in the sites. The Employer requires the Contractor to submit the exposition messages also in electronic version, enabling the content modifications.

3.3.2 The contents of the exposition messages, animations, videos and multimedia presentations must contain scientific and educational texts; they cannot include explanations of the phenomena, which are contrary to scientific knowledge. The Exhibition content cannot contain fairytale or science fiction elements, or those that breach moral norms.

3.3.3 The choice of the exposition messages must be adapted to a wide audience, but not disregarding the foundations of knowledge and texts must be approachable, using comprehensible vocabulary. The whole content of the exposition messages must be presented legibly (orderly).

3.3.4 Any other texts (e.g. voice messages, guidelines at the multimedia sites, quizzes) must be available to visitors in two languages at least: Polish and English.

3.3 The requirements regarding the Exhibition components

General requirements for all Exhibition components:

- All the Exhibition components, which are the subject of this Contract should be unique, created especially for the Innovation Centre Mill of Knowledge.
- The Exhibition components must remain efficient despite daily mass and multiple uses.
- The Exhibition components must be resistant to the actions of the visitors, both conforming and non-conforming with descriptions on Exposition messages, or in the manual of the multimedia site.
- All movable components, comprised in the sites, arrangement items and relaxation points and not permanently merged with them, must be protected against theft by means of internally placed magnetic strips.

3.3.1 The Education requirements

3.3.1.1 The Exhibition components must be designed in such a way that their reception by persons with different kinds of disability is the fullest.

3.3.1.2 The Exhibition components should be adapted to needs of persons of different ages and different intellectual, manual or physical abilities.

3.3.2 The technical and operational requirements

It is assumed that the Innovation Centre Mill of Knowledge each day may be visited by approximately 700 persons. The above information should be taken into account when designing the Exhibition for technical and operational requirements.

3.3.2.1 The Exhibition components must be durable and resistant to the actions of the visitors:

- must remain efficient, despite daily mass and multiple use
- must be resistant to the actions of the visitors, both conforming and non-conforming with the Exposition messages
- must be easy to keep clean, especially in the case of scribbling with a marker, ink, paint, etc.

3.3.2.2 The Exhibition contents must meet the EU standards concerning the lamps and lighting, also for the workplace. The lighting sources should not dazzle the visitors nor expose their eyes to any risk. For more full reception of the Exhibition contents and due to partial lack of the natural lighting of the Exhibition area, individual lighting of the Exposition components should be considered. The lighting shall emphasize the most important components of the Exhibition, but may not interfere with the use of sites.

3.3.2.3 The Exhibition components must be made in such a way that the presence in the exhibition area does not expose the audience to danger and that their use is safe even for persons without training or without the aid of the animator.

3.3.2.4 Please ensure passable halls and corridors between the Exhibition components, which should be also available for persons with disabilities, using wheelchairs.

3.3.2.5 The materials used for the implementation of the Exhibition components must have safety approvals and comply with European standards for this type of facilities, be resistant to wear, washable and easy to maintain. The materials and technical solutions applied to the implementation of the Exhibition components and possible consumables should be ecological and energy efficient.

3.3.2.6 The Exhibition components maintenance should be internally feasible for the Employer.

3.3.2.7 Any and all doors, cabinets or other items fitted as part of the Exhibition, protecting the equipment installed inside, intended for the operation or servicing of the Exhibition components, should be equipped with locks with keys. The contractor shall hand over the keys to the Employer, including spare ones.

3.3.2.8 The Exhibition operation (all items at the same time) must meet the requirements of standards of noise levels in places of work and public use.

3.3.2.9 Each of the Exhibition components should have scheduled production of spare parts, which can be used for repairs (referred to in Section 2.3.2), performed during the guarantee period by trained employees of the Employer.

3.3.2.10 Each of the relevant Exhibition components shall have scheduled securing of consumables for four initial months of the Exhibition presentation.

PART II – THE SPECIFICATION OF EXHIBITION COMPONENTS

1. Sites

The Exhibition shall comprise 18 sites, divided into two thematic zones. For the list of sites with zone assignments see Table 1.

Table 1 The Exhibition sites

Zone	Site*	Comments
MACHINES	1. Machinarium	
	2. The work in full swing	
	3. Balance beam	
	4. Tug-of-war	
	5. If not the wheel, than what?	
	6. Gear jigsaw	
	7. Hamster wheel	

* names of zones and sites are working names and are subject to change in the course of the Exhibition organization, in particular following the Contractor proposals.

Zone	Site*	Comments
REVOLUTIONS	8. Solar System	
	9. New planetary systems	
	10. Methods of searching for planets	
	11. Space station	On one hand, the Space station shall be an independent site, but on the other hand it shall belong to arrangement of the interior comprising the sites 12 through 15.
	12. Spectroscopic helmets	
	13. Vacuum	
	14. Radiation	
	15. Space flight	
	16. Gyroscopic rodeo	
	17. Coriolis on the hemisphere	
	18. Centrifugal force	

* names of zones and sites are working names and are subject to change in the course of the Exhibition organization, in particular following the Contractor proposals.

1.	Machinarium
Location	One of walls of the exhibition space
Educational purpose	The site shall present effect of various kinds of gear wheels and gearboxes assemblies, transmission belts, jacks, ratchets, etc. The Contractor is responsible for choosing their kinds and modus operandi. The site shall be kind of puzzle for a visitor, since only execution of appropriate sequence of mechanisms actions may lead to specific results, e.g. a transfer of colourful ball from one installation point to another.
Dimensions	Adjusted to wall size, not less than 6 m in width and 2.8 m in height.
Components	Wall mounting of the installation behind a plexiglass cover – the wall can be used for installations of gear wheels, gearboxes, components of rotational winches with or without bearings, transmission belts, jacks, etc.
Usage	The Contractor is responsible for a proposal of interaction method (starting mechanisms, possible light and sound effects as well as type of task for a visitor to accomplish).
The Employer requirements	The installation shall include components and their assemblies featuring interesting, remarkable shape and arrangement, determining additional artistic dimension, complementing educational one, of the site. The site shall enable manual interaction (setting in motion) and intellectual interaction (solving of logical task, riddles).

2.	The work in full swing
Educational purpose	A comparison of effects of three different types of gearboxes operations, leading to the same result for a visitor, for instance to hoist a weight to a specific height.
Dimensions	The site shall be merged or immediately neighbored with the Machinarium installation, hence its dimensions should be adjusted against the latter, but not too small so as a visitor could freely interact with the site.
Components	Located side by side, three types of gearboxes to be proposed by the Contractor, weights or other items possible for a visitor to lay down on a stand or hang, cranks enabling three persons to start the gearboxes at one time.
Usage	The Contractor shall offer a detailed method of starting the systems
The Employer requirements	The site should enable both, collaboration/competition of two or three visitors and individual usage. A visitor, having fun on the site, should discover how each device works.

3.	Balance beam
Educational purpose	The site shall show a working principle of two-side lever and conditions of balance (equality of torques of forces acting on both arms of the lever).
Dimensions	The minimum height of the exhibit 2 m, minimum width 3 m.
Components	The Balance beam shall consist of support and two different length arms, which shall be used to hang ropes in appropriately selected distances from the fulcrum. Both ropes shall be ended with for instance clamps to place appropriately selected weights or chairs for visitors.
Usage	In clamps hanged in several points of the longer arm, a visitor shall be able to place weights or there will be chairs hanged for a visitor to sit. The other arm shall be ended with e.g. appropriately selected weight of a chair for another visitor to sit. The distances between ropes on the longer arm should be selected so as show that the balance condition is met when the arms lengths and hanged weights are appropriately selected. The Contractor is also encouraged to offer different solution leading the visitors to discover the lever balance conditions.
The Employer requirements	The site should enable usage by two visitors at a time. The height to hoist weights or chairs should be safe for visitors of different ages so as to minimize a risk of bruising or injury in case of possible fall.

4.	Tug-of-war
Educational purpose	Demonstrate the effects of pulley blocks system application in a game well known as tug-of-war.
Dimensions	The minimum length of the site 2 m, minimum height 1 m.
Components	An exhibit consisting of a rope mounted on pulley blocks horizontally. The whole placed in an enclosure made of transparent plastic material. The only items for visitors to grasp are the ropes.
Usage	One person competes with few others in a tug-of-war. Due to pulley blocks system application, the single person is capable of winning the competition.
The Employer requirements	The site should enable usage by many visitors at a time. The enclosure shall be made of transparent material enabling observation of ropes movements and pulley blocks system during the competition.

5.	If not the wheel, than what?
Educational purpose	The visitors shall learn about the effects of application of various shapes of “wheels” on differently profiled surfaces and independently discover why we use round wheels in practice.
Dimensions	The table height should enable visitors aged from 6 to use the site with no assistance. Smaller children shall play under supervision of adults.
Components	The site in a form of flat or slightly inclined table with at least three separated tracks featuring various shapes of surfaces: flat and undulating, vehicles equipped with “wheels” adapted to different roads: wheel-shaped – flat surface, triangle-, square-, pentagon-, ellipse-shaped – accordingly undulating surfaces.
Usage	A visitor objective is a selection of vehicle for relevant surface so as to get to from one to another end of the table.
The Employer requirements	The site should enable usage by two visitors at a time. The exposition message should include concise information on the history of wheel.

6.	Gear jigsaw
Educational purpose	Due to freedom in gear wheels systems construction, the site promotes the children's creativeness and provides information on gearbox <i>modus operandi</i> .
Dimensions	The table height should enable children aged 5-10 to use the site.
Components	The site shall consist of a table with vertical wall in the rear; the table and on the wall shall enable placing of colourful blocks – values size gears, laying them on pins protruding from the table and wall or inserting in the table holes. Next to or within the table there will be lockable box for keeping blocks – wheels. The pins system shall enable receiving of several wheel combinations. When constructed, the whole system shall be set in motion using a crank installed on one of the wheels.
Usage	A child builds own wheel system, independently discovers a method of their arrangement ion the table and/or wall i setting in motion. They observe behaviour of wheels with smaller and greater diameters.
The Employer requirements	The site should enable usage by two children at a time.

7.	Hamster wheel
Educational purpose	The site shall be a place of fun and shall illustrate mechanical energy (physical work) transformation into an energy required to set into motion another mechanical device or into electrical power (electrical equipment).
Dimensions	Minimum wheel diameter 2.2 m.
Components	Platform, wheel, offered by the Contractor mechanical or electrical equipment set in motion with physical work of a visitor, along with essential technical and/or electrotechnical solutions.
Usage	The site primarily shall be a place of fun, but via interaction (walking inside the wheel), the visitors shall start offered by the Contractor mechanical or electrical equipment (a hydraulic jack, radio, etc.), that is to say, they will learn how the mechanical human strength can be used.
The Employer requirements	The device should enable safe use by both, children and adults. The site plays an educational role, therefore all mechanisms should be as visible as possible (e.g. covered with a transparent plexiglass shield).

8.	Solar System
Location	The wall opposite to entrances to the exhibition space on the first floor.
Educational purpose	The site shall demonstrate the Solar System structure. The site shall embed an orrery showing the Earth travel around the Sun and around its axis as well as of the Moon around the Earth.
Dimensions	Adjusted to wall size, but not less than: 15.7 m in width, 2.8 m in height
Components	<ul style="list-style-type: none"> – Movable components: an orrery with the Earth travelling on the circumsolar orbit and around its axis and moving around the Earth – the Moon. – Fixed items: Sun, System planets (excluding the Earth), planetoid belt, and background. <p>All items should be possible to lighten, and the backlight and/or lack of it initiated by a visitor.</p>
Usage	<p><u>The Employer proposal:</u> Visitors use the site in two ways:</p> <ul style="list-style-type: none"> – Starts the orrery as proposed by the Contractor. The movements of the Earth and Moon should last long enough to enable observation of complete cycle (rotation of the Earth around the Sun), but this time should not be too long so that the visitor does not lose interest. Therefore, the Earth velocity around the Sun should be selected accordingly. During the movement, the orrery and other items are not highlighted. – Once the orrery is still, visitors have the chance of highlighting other celestial bodies and observing possible background effects. The Contractor shall offer a method to initiate this action. <p>NOTE: Due to the complexity of the site, its effect may be modified in a manner proposed by the Contractor and <u>accepted by the Employer.</u></p>

The Employer requirements

– *Sizes and scales*

The Employer is aware that due to the real sizes of the Sun and Planetary system and the distance scales between them, it is not possible to deliver the site in a way as to keep the right balance of distances and sizes of each of the celestial bodies.

Sizes of the Solar System and sizes of different celestial bodies are to be selected in a way to show the approximate relationships between the sizes of the planets, while the distance scale shall not be preserved.

– *Appearance and structure*

Models of the Earth and the Moon should be 3D and constructed so as to enable showing their movements.

Models of the Sun and other planets of the Solar System should be so constructed as to show the differences in structures and appearances of the building matter to imitate their actual appearance as far as possible. They may be therefore, for example, illuminated, 3D reliefs enabling touch interaction or multimedia projections on displays embedded in the site background.

– *Background*

The background arrangement should refer to the appearance of the sky and take account of other celestial bodies visible when travelling through the Solar System, or periodically visible from the Earth, including the Halley's comet. Motion of the Halley's Comet can be simulated, for example, through a system of LEDs subsequently enlightening, accordingly located in the wall.

Because of its size, the site shall be the dominant component of the exhibition space. This gives the chance to use a variety of artistic techniques in order to obtain an effect of a maximum stimulation of the visitors' imagination.

The Employer allows the use of other solutions than the above sample ones. Their implementation shall be feasible following the final approval of the design by the Employer.

9.	New planetary systems
Educational purpose	Presenting the most important methods of searching for new planetary systems: radial velocities, transits, gravitational microlensing, imaging and astrometric method, and their brief characteristics. The site is to emphasize the role of Toruń astronomers (from Copernicus to Wolszczan, Konacki, etc.) have played in the subject of searching for planets. The role of Copernicus as the first “discoverer” of heliocentric planetary system shall be emphasized.
Dimensions	The intelligent kiosk height should be 100-120 cm, width up to 60 cm, depth up to 60 cm diagonal of high-resolution touch panel should be at least 32”.
Components	An interactive multimedia kiosk, consisting of a server in a standard basic configuration and high-resolution touch panel with a diagonal minimum of 32”.
Usage	The exhibit shall allow direct interaction with the visitors, who will be able to choose the presentations viewed on the touch panel.
The Employer requirements	<ol style="list-style-type: none"> 1. The assembly based on anchoring to the ground, made of a material that provides daily mass and multiple use. The intelligent kiosk working on the base of electrical system featuring voltage of 230 V and structural network through RJ45 connector. 2. Standard configuration of the central unit (server located in intelligent kiosk enclosure) based on the leading technology processor, equipped with RAM DDR2 1 GB 400 MHz, hard disk drive with a capacity of at least 100GB 7200rpm, DVD-ROM, USB 2.0 slot, graphics and sound cards, network adapter 10/100/1000 Mb/s, service keyboard and mouse hidden inside the enclosure, ventilation system, active stereo speakers.

The Employer requirements cont.

3. Operating system MS Windows 7 or equivalent. A monitor resistant to daily, multiple, and mass use, with touch panel 32", high-resolution minimum 1280x1024 pixels, brightness ca. 300 cd/m², contrast about 600:1. Additionally, the Contractor should provide the following: external keyboard and trackball intended for daily, mass and multiple use, camera, microphone, magnetic and chip card reader.

Multimedia software running on the operating system installed on the intelligent kiosk server made in technology using all benefits provided by format Flash, Java or any other multimedia format, in a manner suitable for each age group of visitors through the intuitive interface. The software should include an option for upgrade of installed applications or individual modules with additional features according to the Employer's needs.

10.	Methods of searching for planets
Educational purpose	The site is to show the method of observation and detection of extra-solar planets using one of the methods of searching: the method of transits (eclipse). A star is a light source periodically covered with by two planets moving along the orbits of various periods. On the nearby intelligent kiosk panel, there are so-called light curves are drawn (the intensity of light reaching the photometer as a function of time).
Dimensions	Total height of the physical model should be 120-150 cm. The intelligent kiosk dimensions should be: height 100-120 cm, width up to 60 cm, and depth up to 60 cm. The diagonal of high-resolution LCD panel should be at least 32".
Components	The model of planetary system: star – light source, two models of planets of different sizes, one with a translucent shell simulating the atmosphere, mounted on the ends of arms rotating around the star. A simple photoelectric photometer suitable for the light source used to illustrate the changes (decreases) in the star brightness during the passage of planets in front of its disc. The multimedia intelligent kiosk acting as a control panel, actuating movements of the planets around the star and the LCD panel of diagonal min. 32", on so-called light curve are drawn (the amount of light collected by a photometer at given time).
Usage	A visitor initiates movement of the planets by pressing separate buttons that trigger movement 1 and 2 of the planet so to enable observing their move independently and simultaneously. Observes light curves drawn on the screen.

The Employer requirements

Multimedia intelligent kiosk

1. The assembly based on anchoring to the ground, made of a material that provides daily mass and multiple use. The intelligent kiosk working on the base of electrical system featuring voltage of 230 V and structural network through RJ45 connector.
2. Standard configuration of the central unit (server located in intelligent kiosk enclosure) based on the leading technology processor, equipped with RAM DDR2 1 GB 400 MHz, hard disk drive with a capacity of at least 100GB 7200rpm, DVD-ROM, USB 2.0 slot, graphics and sound cards, network adapter 10/100/1000 Mb/s, service keyboard and mouse hidden inside the enclosure, ventilation system, active stereo speakers, the operating system MS Windows 7 or equivalent. A monitor resistant to daily, multiple, and mass use, with touch panel minimum 32", high-resolution ca. 1280x1024 pixels, brightness ca. 300 cd/m², contrast about 600:1. Additionally, the Contractor should provide the following: external keyboard and trackball intended for daily, mass and multiple use, camera, microphone, magnetic and chip card reader.
3. Multimedia software working on the operating system installed on the intelligent kiosk server, made in a technology using all advantages offered by formats like Flash, Java or any other multimedia format, designed for each age group of visitors thanks to the interface intuitiveness, and featuring upgradeability of installed applications or individual software modules with additional functionalities according to the needs of the Employer.

The physical model of the planetary system:

Model of the planetary system should be large enough so visitors could easily make changes to the configuration of the system. The Contractor shall propose a model proportions and method of the light curve drawing (in real time or under simulation).

11.	Space station
Educational purpose	The visitors shall find out how the living conditions they can look at the space station, where, under microgravity, such as concepts “top”, “down”, “right” or “left” are irrelevant .
Dimensions	Sizes of station and sluice should enable free movements of adults and placement of the sites from 12 to 14 in the walls. The station should not be too great, either, so that its presence does not unduly overwhelm neighbouring sites. The maximum dimensions of the station - length 7.5 m, depth along with the entrance for the disabled 5 m, and height adjusted to the height of the exhibition space.
Components	<p>Two open, interconnected, rooms imitating the shape and appearance of the interior of a space station. The curved “walls” and “ceiling” of the first station room shall house devices such as astronaut berth, table with chair, toilet, box with an artificial plant that grows “upside down”, an astronaut suit attached to the wall , etc.</p> <p>The walls shall include sites 12 through 14, for which the station model will provide an arrangement background. One of the walls will include a passage – sluice, connecting the living room and research room of the station with smaller control room, which shall house site no. 15.</p> <p>The Contractor shall propose the detailed appearance and equipment of the station.</p>
Usage	A visitor watches the station and can take own picture wearing an astronaut suit.
The Employer requirements	<p>The solutions of arrangement, selection of materials and finishing of the station model are supposed to make it resembling a space station as much as possible, though not necessarily will it be a reflection of any particular real space station.</p> <p>Access to the equipment should be free also for people in wheelchairs – no front wall of the station, flat floor, and possible ramp.</p>

12.	Spectroscopic helmets
Educational purpose	A visitor will see that light means not always the same – various sources of light illuminate in different ways – and learn how you can analyse the emission spectra of different lamps.
Dimensions	Allowing by people of all ages for the site use (helmets should be two sizes – for a child and adult). Size of the lamps should be adjusted to the station size and to enable free observations of the spectra.
Components	Two helmets with glasses attached to the station ceiling and taken off by visitors for example, in a way similar to a submarine periscope. Instead of standard lens, the helmets shall be equipped with diffraction foils. In the station wall opposite the helmets, a set of lamps with a continuous and a discrete emission spectrum shall be placed (from regular light bulb through halogen lamps, fluorescent, LED, UV, with the noble gases, etc.). Choice of lamps will depend on the Contractor.
Usage	A visitor switches the lamps on in the manner proposed by the Contractor, put on the helmet and observes emission spectra.
The Employer requirements	The exhibit should allow visitors of any age for free use. It should contain at least six different types of light sources.

13.	Vacuum
Educational purpose	A visitor will see that the physical phenomena run in a different way in a vacuum than on the Earth.
Dimensions	Adapted to the station size, allowing the free use of the site of both adults and children.
Components	Built into the wall of the space station, the site shall include a vacuum pump under the shade, which visitor can use with a joystick to move different objects: for example, an electric bell or an alarm clock, partly inflated balloon, a vessel of water.
Usage	Visitors place under the shade items of their choice and watch what happens when the air gradually removed from the lamp shade. Changes of pressure under pump lump shade should be monitored and displayed for example, on a pressure gauge placed beside the pump or using other means proposed by the Contractor. The pumping air away should be accompanied by audible sound effect, such as hiss of the air removed.
The Employer requirements	Hoisting and lowering the pump shade, just as air pumping away should be initiated by a visitor. Items should be placed automatically using built-in joystick to be operated by visitors for instance with pressing a suitable button. The Contractor shall propose the final selection of the experiments conducted under the vacuum pump.

14.	Radioactivity
Educational purpose	<p>Testing and comparing of different materials' radioactivity, occurring in human environment (samples of minerals containing uranium, jewel stone zirconium containing thorium, fertilizers such as superphosphate, heat and power plant furnace slag, potassium salt KCl, articles used in modern industries such as radioluminescent paints, grocery such as banana flour, dried beans, etc., and, for comparison, materials with negligible radioactivity). Observation of the effect of different types of diaphragms.</p> <p>The Contractor shall propose types of samples and diaphragms so that the effect observed by the visitors is the best possible.</p>
Dimensions	Adapted to the station size, allowing the free use of the site of both adults and children.
Components	GM counter, the samples of materials having different natural radioactivity (including increased values), the rails or tables for moving investigated materials under the counter and placing different types of diaphragms between the material and counter.
Usage	A visitors moving counter or rail (table) with samples locates a variety of materials under the counter and observes the LCD display indications on the GM counter. By moving various types of diaphragms on the test material, they explore their effectiveness.
The Employer requirements	<p>Moving of samples and diaphragms should be initiated by a visitor, however they should not have direct access to test materials and diaphragms.</p> <p>Particular attention should be paid to selection of samples safe for visitors. NOTE: a good source of information on natural radioactivity is edition: Andrzej Tomasz Solecki, <i>Radioaktywność środowiska geologicznego</i>, Wydawnictwo Uniwersytetu Wrocławskiego, Wrocław 1997.</p>

15.	Space flight
Educational purpose	Through computer simulation, visitors shall participate in a “space flight,” and get acquainted with its main stages.
Dimensions	Sizes of station and sluice should allow adults the freedom of movement inside and arrangement of comfortable chairs for visitors enjoying the site.
Components	Space flight simulator equipped with as standard with: two seats for the pilots, LCD screens (at least 3 pieces) with a diagonal 32-40” imitating the front and side windows, the control panel with system of buttons and joystick used to navigate the application.
Usage	Visitors can take a simulated flight into Space, sitting at the controls of a spaceship. By controlling with joystick and various buttons they initiate various stages of flight, from take off through landing.
The Employer requirements	The concept of arrangement should be consistent with the rest of the space station.

16.	Gyroscopic rodeo
Educational purpose	At the site, a visitor, through direct interaction in the form of fun, shall feel and learn how a gyroscope operates.
Dimensions	The site is intended for audiences from 7 upwards. Its size should allow this age group the free use (diameter of rotating platform – the site base min. 1.2 m)
Components	A device mounted on a rotating platform should consist of a rapidly spinning disc inside a transparent casing suspended on a suitable structure providing for changing positions of the disc and a saddle connected with the structure, on which a visitor sits. The entire unit should rotate on the platform against the ground thanks to manoeuvring by the visitor with the spinning disc.
Usage	A visitor sits on a chair and changes positions of the rotating disc. The entire structure begins to spin.
The Employer requirements	<p>The site should use the gyroscopic effect to reposition the visitor sitting on the saddle relative to the axis of the whole structure rotation. As a result, the visitor should “ride” on the rodeo by taking advantage of the principle of conservation of angular momentum, changing the location disk set in in rotation located in front of them and acting as a “rudder”.</p> <p>The sitting height for visitors should be such as to minimize a risk of bruising or injury in case of possible fall. The saddle should be fitted with belts or suspenders. The Contractor shall propose a method of disc spinning initialization.</p> <p>The exposition message should include concise information on the gyroscopic effect and devices that take advantage of it.</p> <p><u>NOTE: Detailed design solutions for the entire system will depend on the Contractor. Therefore, the Employer allows a different use of the gyroscopic effect for the rodeo construction.</u></p>

17.	Coriolis on the hemisphere
Educational purpose	The site will introduce visitors with the effect of Coriolis force on a liquid closed between two walls of the hemisphere.
Dimensions	The hemisphere diameter should be at least 1 m, the site height at least 1.4 m
Components	Hemisphere with double walls for thick, opaque liquid.
Usage	A visitor has the possibility of setting hemisphere in rotation. The liquid whirl shall be visible in the course of the hemisphere rotation
The Employer requirements	The site should allow both, children and adults to use it, initiating the hemisphere movement should not require too much force.

18.	Centrifugal force
Educational purpose	Observation of the centrifugal force on the liquid and the surface of a rotating liquid.
Dimensions	Size of the base related to design solution, but not less than 1 m. Tank dimensions: length of at least 0.7 m, a width of at least 0.2 m, height of at least 0.4 m.
Components	Rectangular tank with water or other liquid placed on a rotating disc, stand, and base.
Usage	By turning the base, a visitor sets the tank of fluid into rotation and observes the whirling surface.
The Employer requirements	Sealed cuboid should be half- filled with coloured liquid; the size and weight of the exhibit should be selected so that the rotational speed of the tanks allows the observation of the centrifugal force on the liquid.

2. Exposition messages

The exposition messages should be incorporated into the sites or placed on stands, or built in arrangement components in the vicinity of the sites. The size of messages, font typeface and size, size of graphics should allow both, children and adults free reception of the information conveyed. Graphic design of messages must be consistent with other components of the Exhibition. The exhibition messages content must be legible and appealing to take advantage of the site both, in terms of the information conveyed and the volume/length of the text.

3. Arrangement of the Exhibition space

When arranging the Exhibition, draw the attention to both, the distribution of sites according to thematic areas and the harmony and uniformity of sites distribution.

The Exhibition arrangement should also cover the walls and surfaces that are not developed for the sites. In each zone, establish at least one major or several minor relaxation areas in the form of benches or chairs. To this end, allowable is use of architectural details in the form of partitions or wall pieces. The Exhibition arrangement must include additional elements that spark the imagination and curiosity of Visitors, integrated into the arrangement, such as puzzles, riddles, quizzes, graphics, and short passages of text.

In the vicinity of sites 6 and 7, meant for children, secure a small area for parents with children shall be separated for fun and relaxation. The arrangement of this Exhibition section shall take into account children's themes, a place on the wall of the exposition of artwork done by children, placed on the walls or built-in the table, quizzes, riddles, and jigsaws designed specifically for children.