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PLACING RESEARCH INTO LIGHT

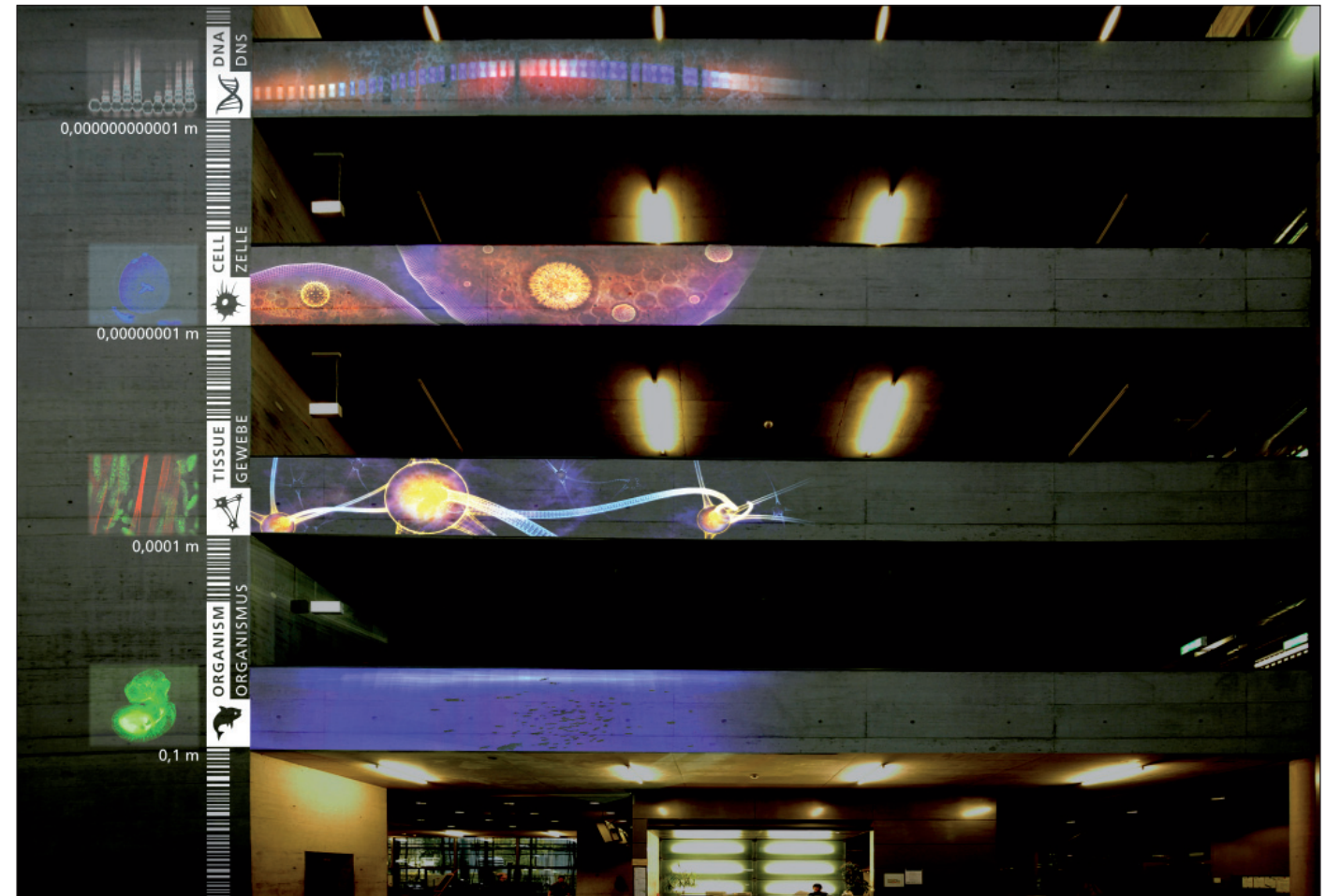
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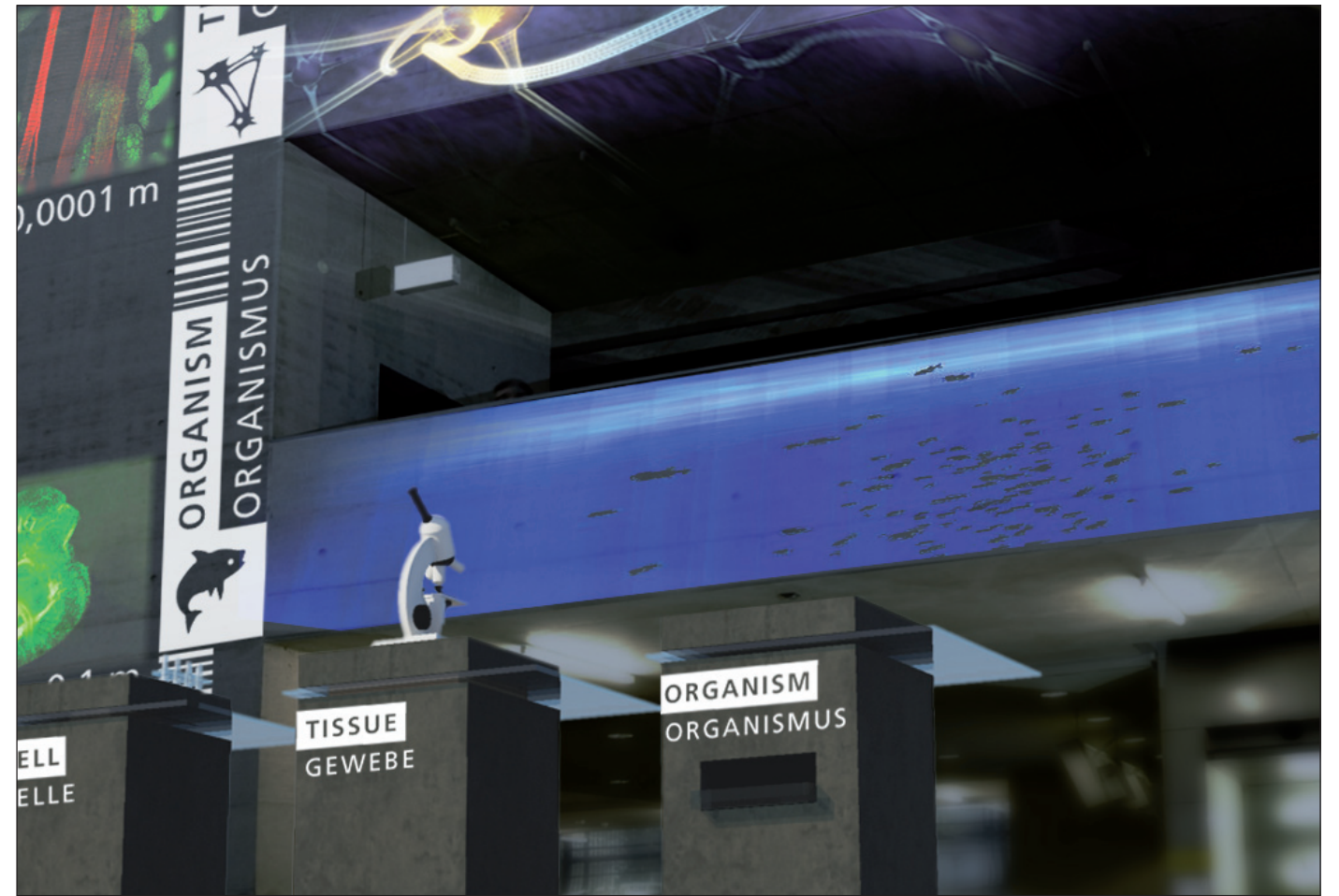
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PLACING RESEARCH INTO LIGHT



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**PLACING RESEARCH INTO LIGHT****financials****Technology which can be reused without the installation**

Projector with 4000-5000 Ansi Lumen	4	2400	9600
PC with Multicore and good GFX	3	600	1800
VGA Cable, very long	4	30	120
Ambient Lights	8	20	160
Total			11480

All cost in Euro

The ownership of all used parts will be transferred to the MPI-CBG after construction is complete.

**Materials dedicated to building**

Plot and Application onto concrete	1	500	500
Webcam	3	100	300
Microphone	1	50	50
Midi Keyboard	1	70	70
Construction Supply for Terminals (wood, paint, plastics)	1	150	150
Technical Supply for Terminals (cables, controllers, interfaces)	1	250	250
Total			1320

**Estimated Total 13000**

## PLACING RESEARCH INTO LIGHT

### project goals



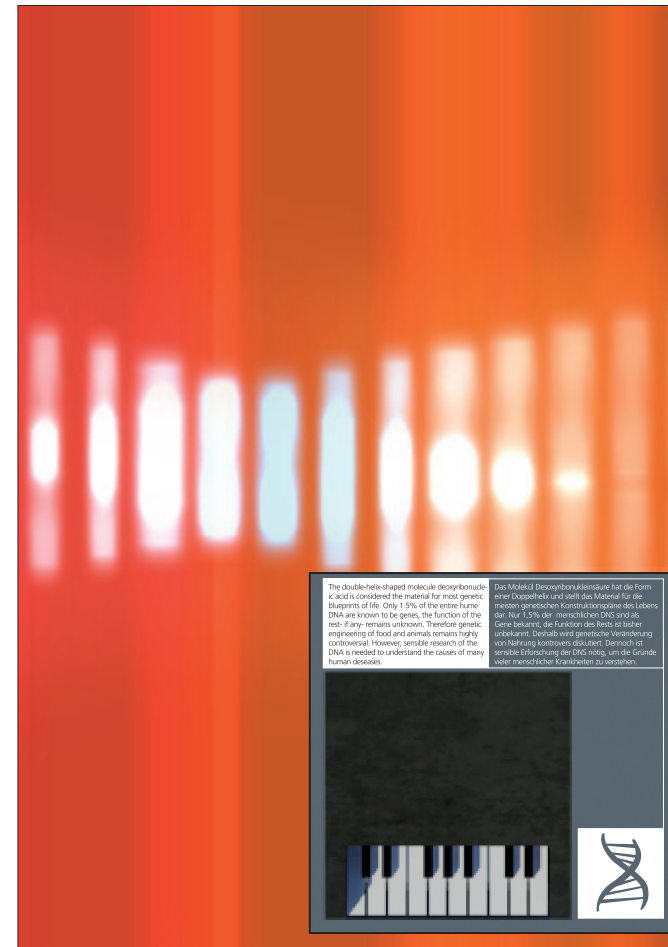
The aims of this project are various, but the main aspects can be formulated by four simple questions:

1. How can the work of CBG's scientist be explained to a broader public in a graphic and playful way?
2. How can the research being carried out in the labs be illustrated to visitors and laymen in a fascinating manner?
3. How can the lobby be illuminated at night, while improving the ambience for everybody working at that time?
4. How can CBG's dedication to multidisciplinary innovation be presented?

This detailed concept of the project is considered both an answer to these question and a binding specification for making it all happen.

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level of dna



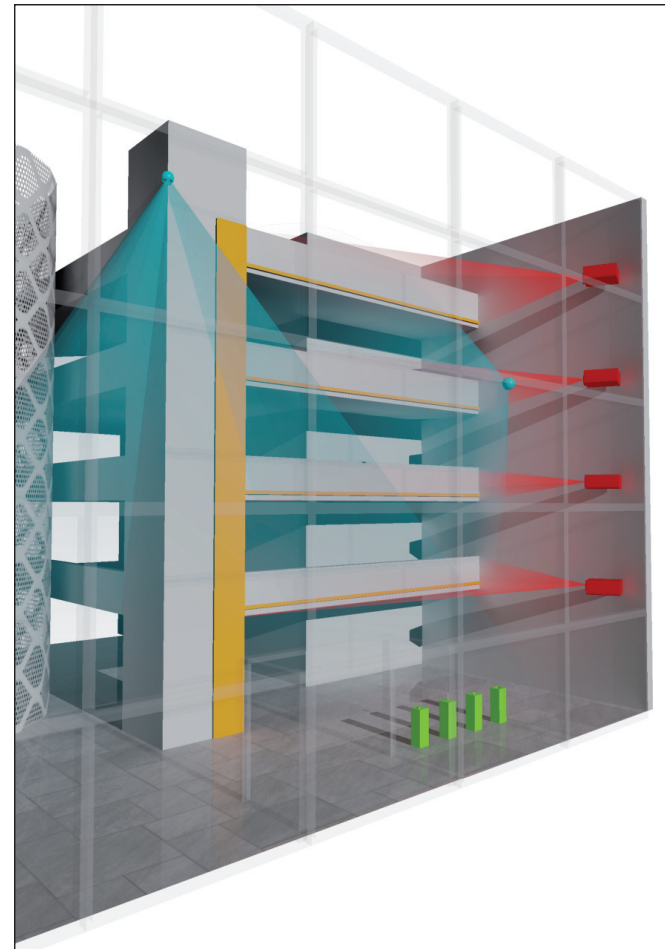
After much consideration about which molecular process to exhibit on this level, an abstract DNA-sequence will be shown. Genetical engineering is probably the most controversial thing being done at the CBG and therefore sensitive exposure of it to the public is needed for meaningful future discussions. Seven active genes on that sequence can be deactivated and five deactivated genes can be activated.

The terminal is one octave of a piano, and each key corresponds to one gene. As one plays the piano, beautiful ambient lights will illuminate the topmost balustrade. However, if keys are hit in a special, untold way (which is playing one of the 12 dur chords), a specific mutation of the zebrafish on the level of organism can be observed: fins elongate, scale texture changes, size varies, behaviour changes.

The influence of any passer-by on the graphical barcode representation of the gene sequence highlights the section just below her.

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## synopsis of the rough concept



The interactive video installation consists of four basic components:

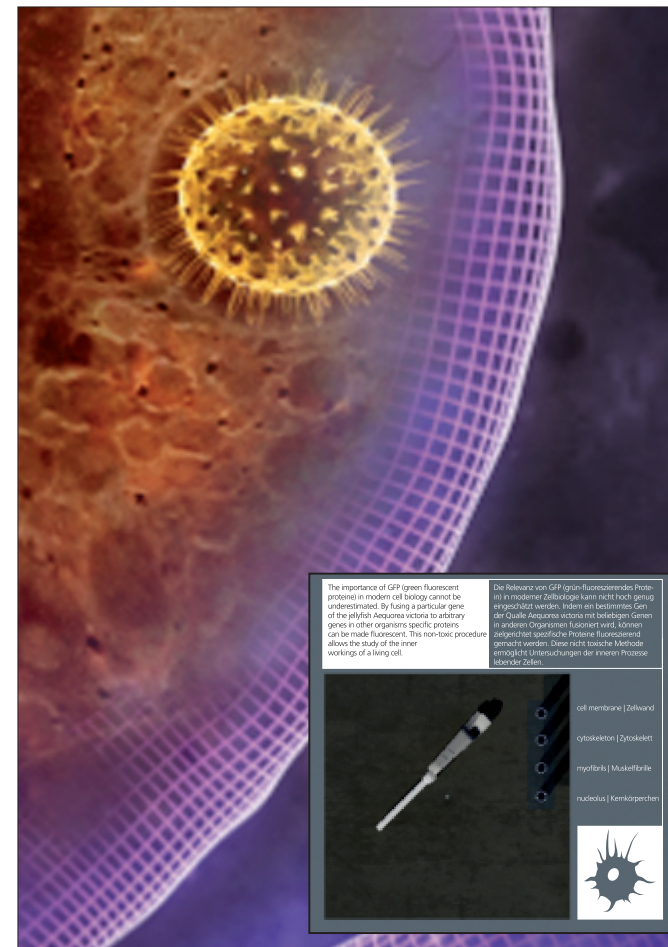
- \_ A permanent plot, applied to the elevator shaft
- \_ An array of projectors, illuminating the elevator shaft and the balustrades leading to the northern lab wing
- \_ Motion detectors observing the movements of passing people
- \_ Four terminals made from fair-faced concrete, that stand beside the main entry

The installation will only be activated when light conditions allow. This means, it is only fully functional in twilight and at night.

Decidedly no music nor other accoustics is used.

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## level of cells



This level is regarded of great importance to the institute, because it is the core of every CBG research conducted: What makes Cells tick? Therefore this level will be used to map out the different parts of the cell and show the complexity of a cell's inner workings. A huge cell is projected on this level, with surrounding membranes, the cytoskeleton, and of course the cell nucleus.

Furthermore the cell is filled with organelles such as mitochondria, golgi apparatus, myofibrils, nucleolus, etc.

The terminal for this level enables the user to identify certain parts of the cell by highlighting them with GFP. Even though in reality adding GFP-genes to other genes in organisms needs quite some time for growth before the chosen parts of the cell become fluorescent, this terminal takes the artistic freedom to do this process instantly.

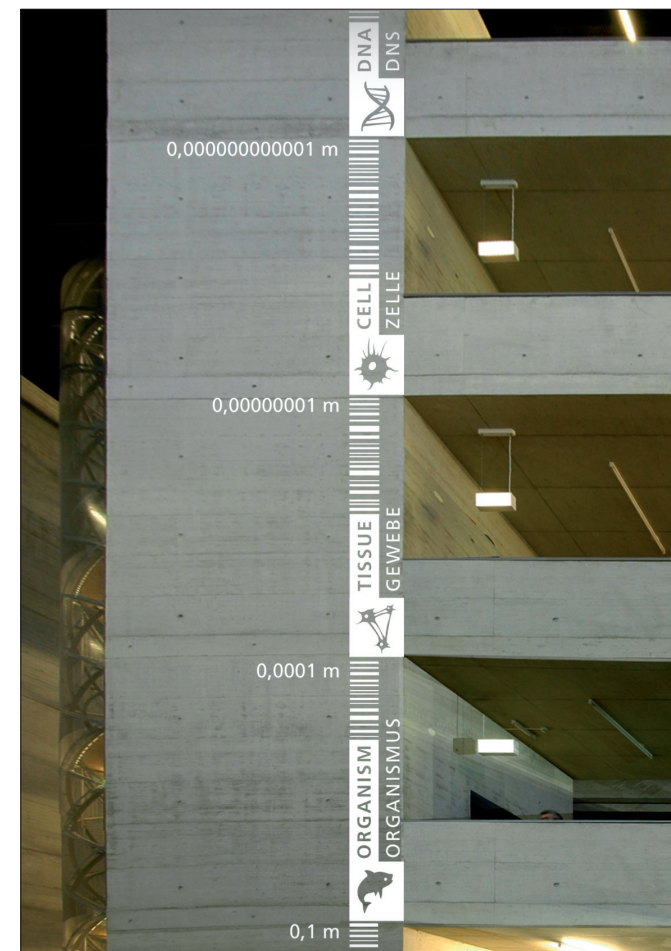
Adding GFP can be done by using the provided pipette with one of the labeled test tubes- each test tube corresponds to a certain vital part of the cell.

Passersby will influence diffusion and osmosis of small particles within the cell plasma.



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## order of things



The application of a foil plot onto the elevator shaft graphically orders the installation:

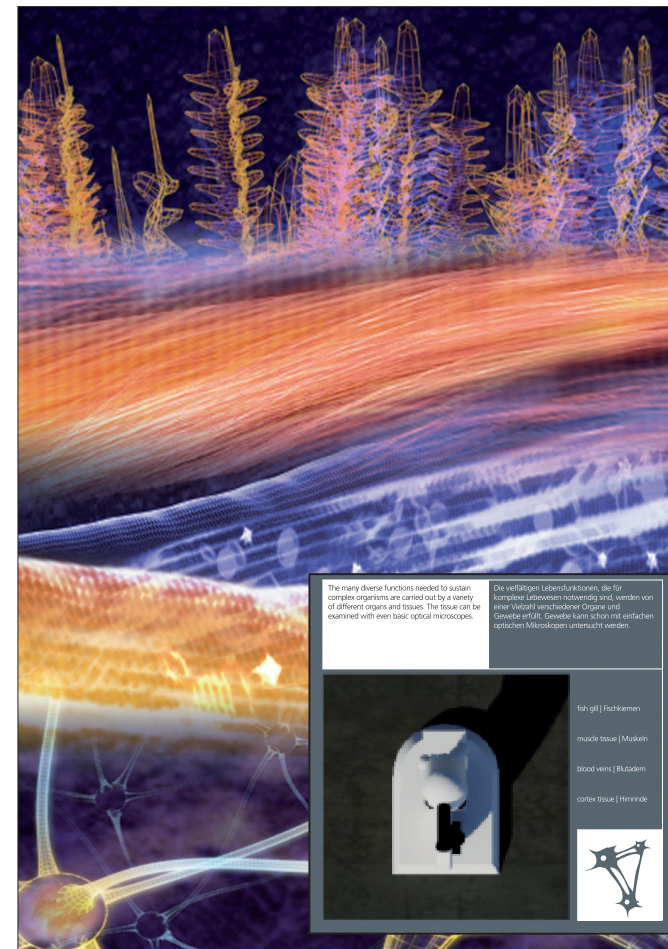
Horizontally it separates science to the left from art to the right.

- \_ The science part consists of actual research video materials and movies of working scientists
- \_ The art content consists of four interactive video representations illustrating the areas of work of the CBG

Vertically the plot orders CBG's areas of work into four distinct levels of size. From top to bottom:

1. level of DNA
2. level of cells
3. level of tissues
4. level of organisms

Each of the four balustrades leading to the southern wing corresponds to exactly one of the levels. The ceilings are being used as canvas as well.



Tissue is versatile in function and therefore also manifold in structure. Even simple microscopes allow exploration of the tissue and its multifaceted looks. Therefore this level will be used to present a selection of different kinds of animated tissue. It is important to note, that unlike the tissues observed with microscopes, these virtual tissues are very much alive – one can see and even control the inner workings of the tissues. The four kinds of tissue that are shown are:

1. Gill tissue, with the flow of water used for respiration
2. Muscle fiber, with contracting motions
3. Blood Vein and Artery, with the flow of blood plasma and erythrocytes
4. Nervous tissue, with neural impulses travelling along the axons

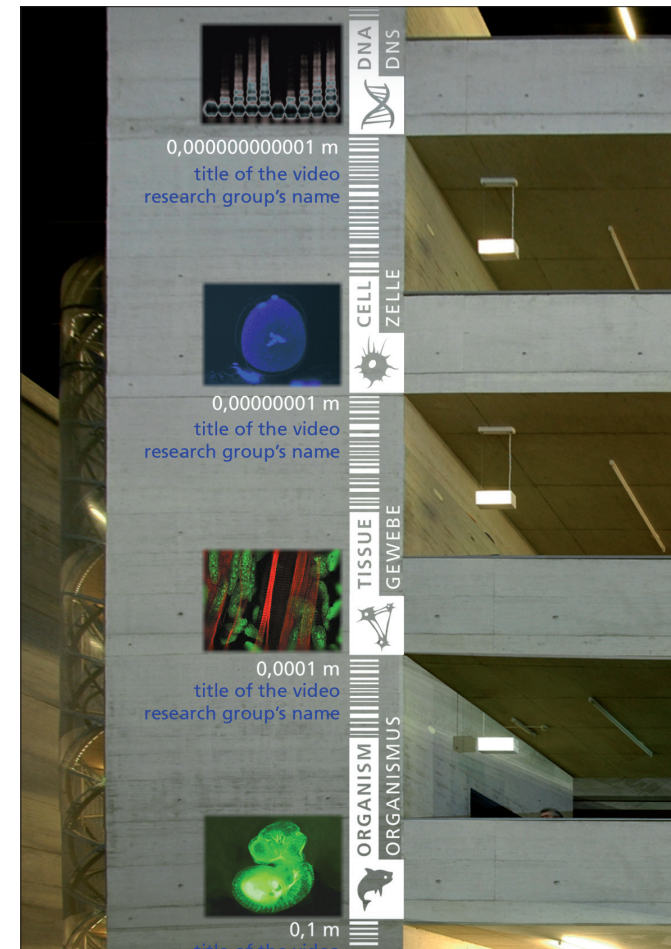
The corresponding terminal is a microscope. Its mean of interaction is a wheel to control the depth of field of the presentation- and just as on a real optical microscope the user can select exactly one of the tissues overlaying each other.

Any passer-by will influence the animation of the currently activated tissue. At the passer-by's position this happens:

1. Gill tissue: Oxygen rich water flows down towards the gill, Carbondioxid-rich water flows up away from the gill tissue.
2. Muscle fiber: The state of muscle contraction is changed.
3. Blood Vein and Artery: Human movement will result in a higher local concentration of lymphocytes and monocytes.
4. Nervous tissue: The electrical potential of any nervous cells closeby to the indicated position is discharged

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### the elevator shaft



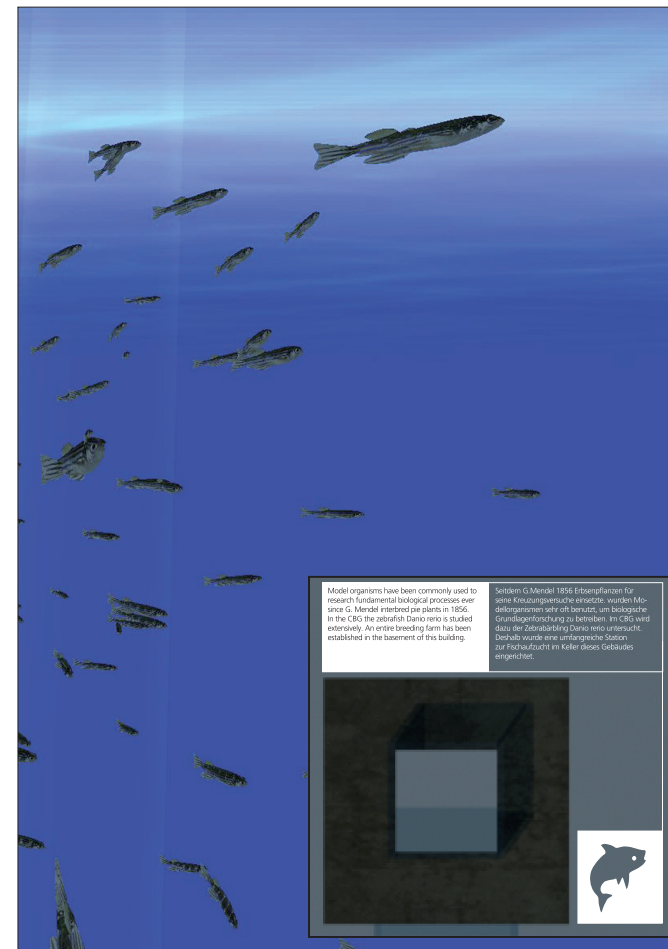
The 20 meters high elevator shaft is used as an essential part of the installation: Left to the plot structuring the whole installation, four slots are provided to showcase CBG's research video footage.

A system to upload video material will be provided to the CBG's scientific community, so researchers can present their current work in the lobby, along with a title of the video and their respective research group's name. An easy-to-use web interface allows to select the video, edit the title and the research group's name, and the estimated level of size to which it belongs (molecule, cell, tissue, or organism).

By default four randomly chosen videos are played, one of every size category. As soon as someone starts interacting with a terminal, video feeds of scientists in the labs are shown.

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## level of organism



Model organisms have been commonly used throughout biological research since 1856 by Mendel. Only them allow much of the fundamental research of functions and processes, that are needed to gain deeper understanding.

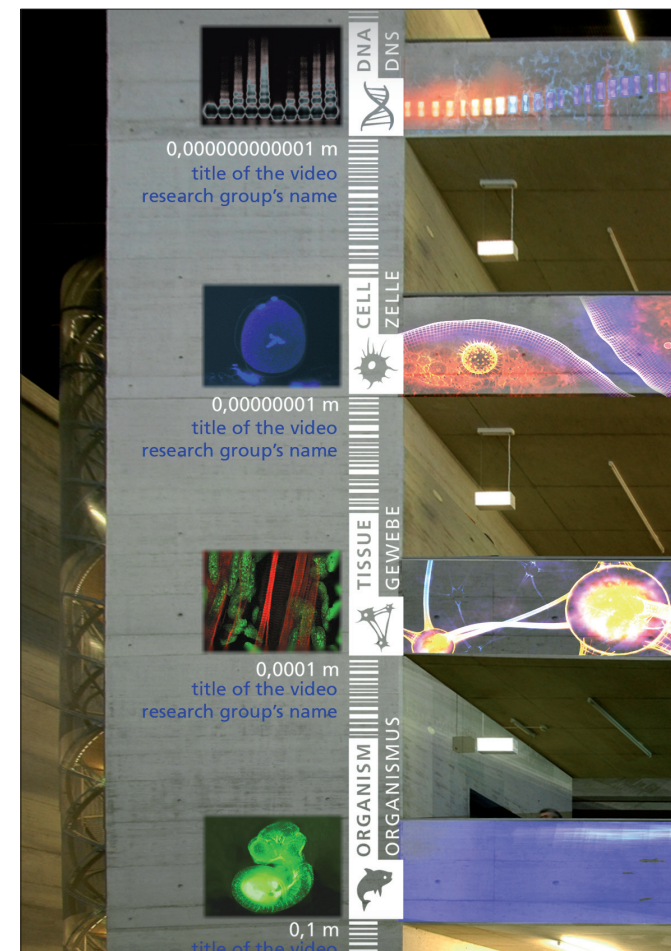
The zebrafish is one of the main model organisms used in CBG's research, so it will be the main theme of this level. Inspired by the many zebrafish aquariums in the institute's basement in this virtual aquarium the fish will swim and swarm around.

The terminal to control this level also takes up the theme of the aquarium: Users can take some of the granulate being provided and pour it into the hole on the top of the terminal to feed the virtual fish on the wall.

The fish will follow the motion of passersby. And eat whatever food is being poured into the virtual aquarium.

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illumination



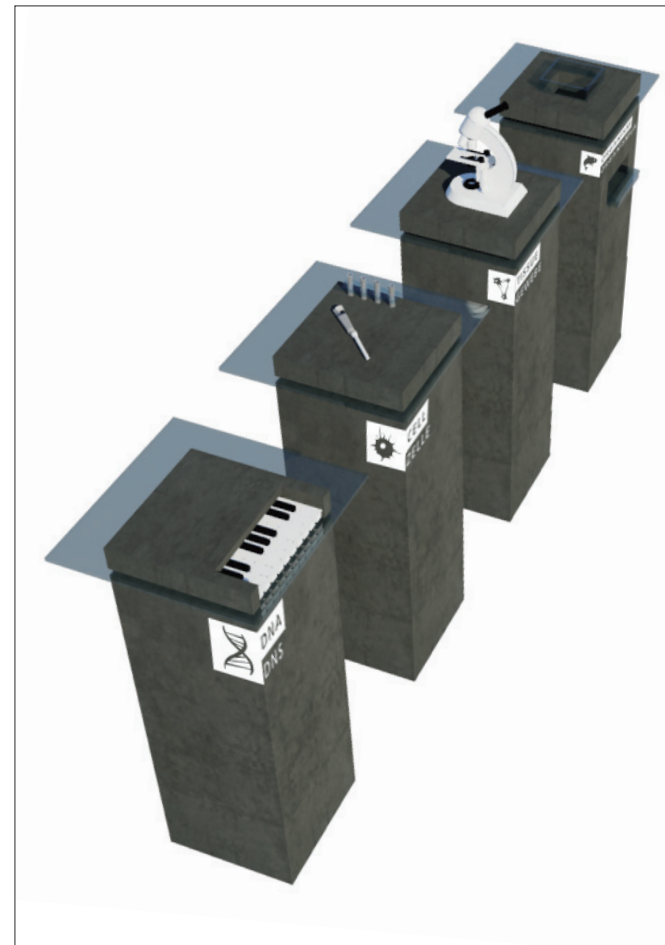
Four projectors illuminate the elevator shaft and the balustrades. While the elevator shaft is used as a canvas for showing a selection of movies created in the labs of the CBG, the balustrades and their ceilings are illuminated with interactive videos.

The videos can be affected by two means:

- \_ Motion of people walking to and fro the labs
- \_ Using one of the four terminals in the lobby

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### the terminals



Four steles made from fair-faced concrete allow direct manipulation of the video presentation. Additional transparent plexiglass, lit by white LEDs, is used as a carrier of scientific explanations and accompanying informations. The actual instruments of interaction are colored strictly black and white. Three of the four instruments are directly inspired by things used in the CBG, such as the microscope, the pipette and the zebrafish aquarium.

Each terminal is 110 cm by 32 cm by 32 cm and weighs more than 100kg. It houses all the needed technology, such as computers, custom-built platines, detectors, lights, etc.