

# STEMcloud

ecoMachines series

Project proposal for Biacs3 //Youniverse//  
3rd International Biennial of Contemporary Art of Seville  
by Marco Poletto and Claudia Pasquero  
/ecoLogicStudio/

## DATABASE

[en]  
environments

[br] branding and events  
[co] contexts  
[cu] cultural  
[dt] data  
[ec] economic  
[mp] maps  
[of] operational fields  
[pg] photo galleries  
[pr] processes  
[tr] trips  
[un] unit

[mc]  
machines

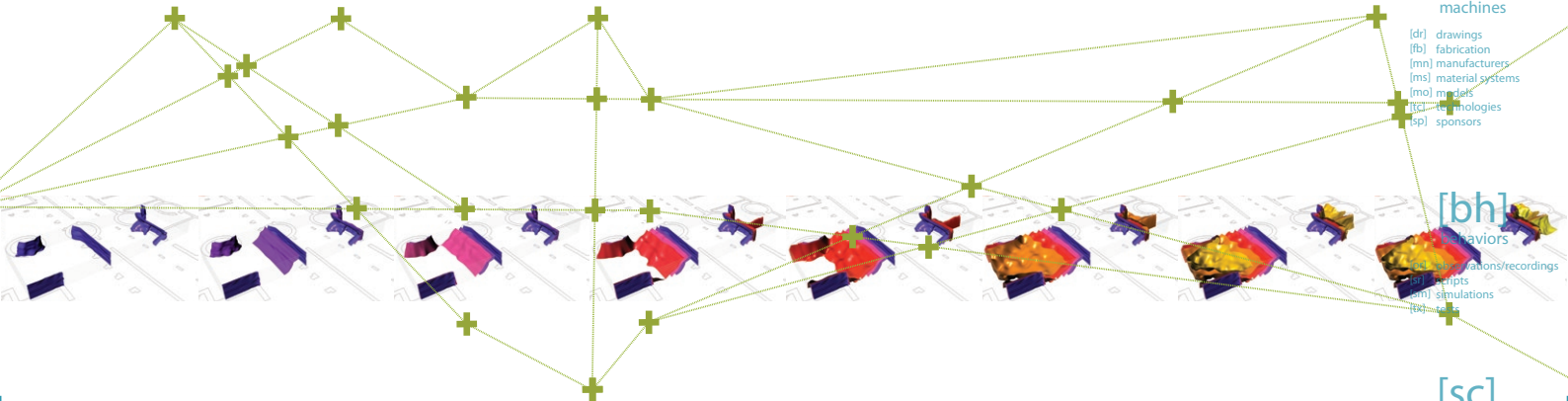
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[ms] material systems  
[mo] models  
[tc] technologies  
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[bh]  
behaviors

[ca] conversations/recordings  
[sc] scripts  
[sim] simulations  
[tr] trips

[sc]  
scenarios

[is] installations  
[pj] projects



## intro

The science of complexity has shaped enormously our vision of the world and of our position within it; the repercussion of such a discovery has clearly influenced all the other disciplines, from philosophy, to engineering, art and architecture. The Corbusian “machine for living” is still at the center of the contemporary debate on the architecture of prototypes, but its philosophical, technological and methodological significance is radically altered. The mechanical paradigm has given up to the so-called machinic one: linearity substituted by non-linearity, control by communication.

*The new architectural machine is more like an agent of local interaction, designed and developed as a component part of a larger self organizing system.*

Within this context the designer is both the creator of the new artificial system and unavoidably part of it; self organization can be informed and managed but never directly shaped or controlled. This means that while technology is enabling society to surge at the role of creator of artificial nature, also imposes the need to quickly learn how to be up to the task. If nature is not any more a fixed given, whose conservation always provides a clear ethical reference for the evaluation of our actions, where can we find the criteria for the development of a new social ethic of transformation? Perhaps in technology itself but, in our opinion, in the development of a cultural technology, composed not only of hardware and controlling software, but of a series of techniques and of “manuals” for the production and evaluation of artificial transformational processes.

Clearly a transdisciplinary technology, capable of driving society out of this primitive phase of our technological existence (from the industrial revolution till now) into a new era where the technocratic paradigm of control over natural processes is substituted by a cultural paradigm of systemic co-evolution of hybrid matrixes, has the potential to constantly affect the processes of evolution and therefore to manipulate our potential futures. Within this scenario architecture plays a clear role, as the discipline that manages processes operating at different scales, as the physical manifestation of the link between single agents and large infrastructures. The mechanical paradigm of architecture sees architectural systems as environmental modulators controlled by their users; each unit is individual and retains total flexibility and no feedback is developed across scales; thus no *collective behavior*

can emerge. Without transcultural feedback we have no chance of building a systemic understanding of the potential effects of our actions and of the value of our technological development.

[en]

[CU] cultural

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## ecoMachines

[mc]

[mo] models

\_STEMcloud socio/economic scenario artistic behavior once considered characteristic of small marginalized groups foreign to the business world, has now gained a new centrality in the social economy. While traditional forms of business, typical of the age of the machines, were defined by strong, stable and centralized organizational models, artistic business proliferate following fields of an energy that is more relational than productive. The phenomenon is easy to observe in larger post-industrial areas, where new crowds have occupied territories once devoted to heavy material production. For most of them profit is produced through a renewed capacity to expand their network of relations and platforms of interaction. Such a socio-economic model actualizes in the urban territory like a form of weather, constantly agitated by the changes in the gradients fields of estate market, service connectivity, environmental pleasure. The creative urban dweller reads the city as an experiential rather than as a formal reality, his space filled with products able to generate open and temporary systems, sensorial and perceptive structures;

*artificial clouds providing atmospheric and operational re-functionalization of space in real time.*

Our proposal STEMcloud will engage its artificial surrounding environment, developing an architectural system capable of introducing concentrated urban oxygenation as a mean to promote novel creative man-nature interaction.

\_experiencing systemic architecture STEMcloud provides a structure for the organization and manipulation of local flows of information, matter and energy. *Processes of catalytic co-action (systemic feedback) are triggered among single components and with local ecosystems, defining the potential emergence of larger infrastructures, or artificial ecologies.*

STEMcloud is part of the ecoMachines series. Eco-Machinic prototypes differ both from traditional architectural models and from industrial design prototypes: on one side they refuse a purely representational role but rather derive their material definition from a form of direct engagement with the surrounding environment. On the other hand they seek for progressive refinement through an open process where both performances and targets co-evolve and differentiate. As technical platforms they allow further incorporation of knowledge coming from field traditionally alien to architecture such as cybernetics.

Cybernetics provides an operational framework to deal with *change and transformation*, the two main defining qualities of our new ecologic understanding of architecture; moreover it allows the organization of interaction between heterogeneous systems, such as the architectural ones. Architectural prototypes can now be conceived as a further component within an extended relational model containing using, user and used systems.

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behavior

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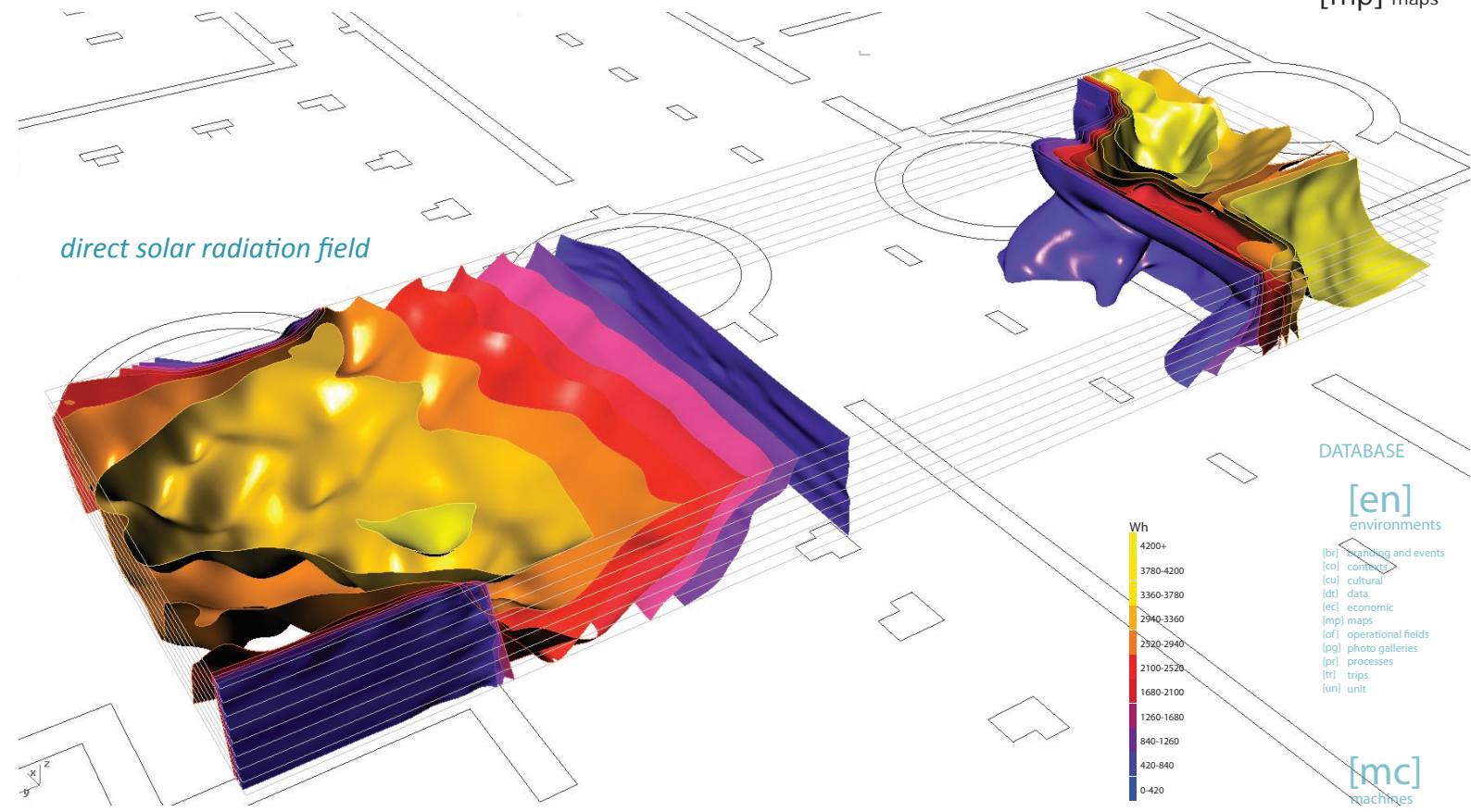
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environments

[en]  
[mp] maps

direct solar radiation field



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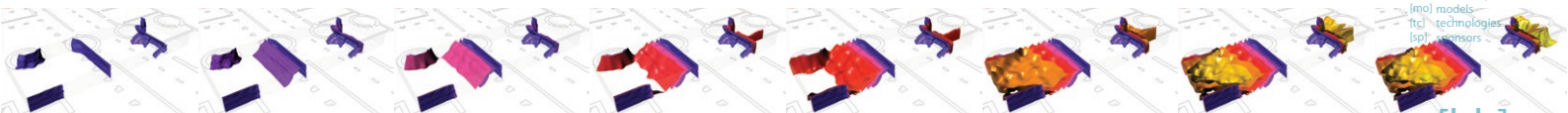
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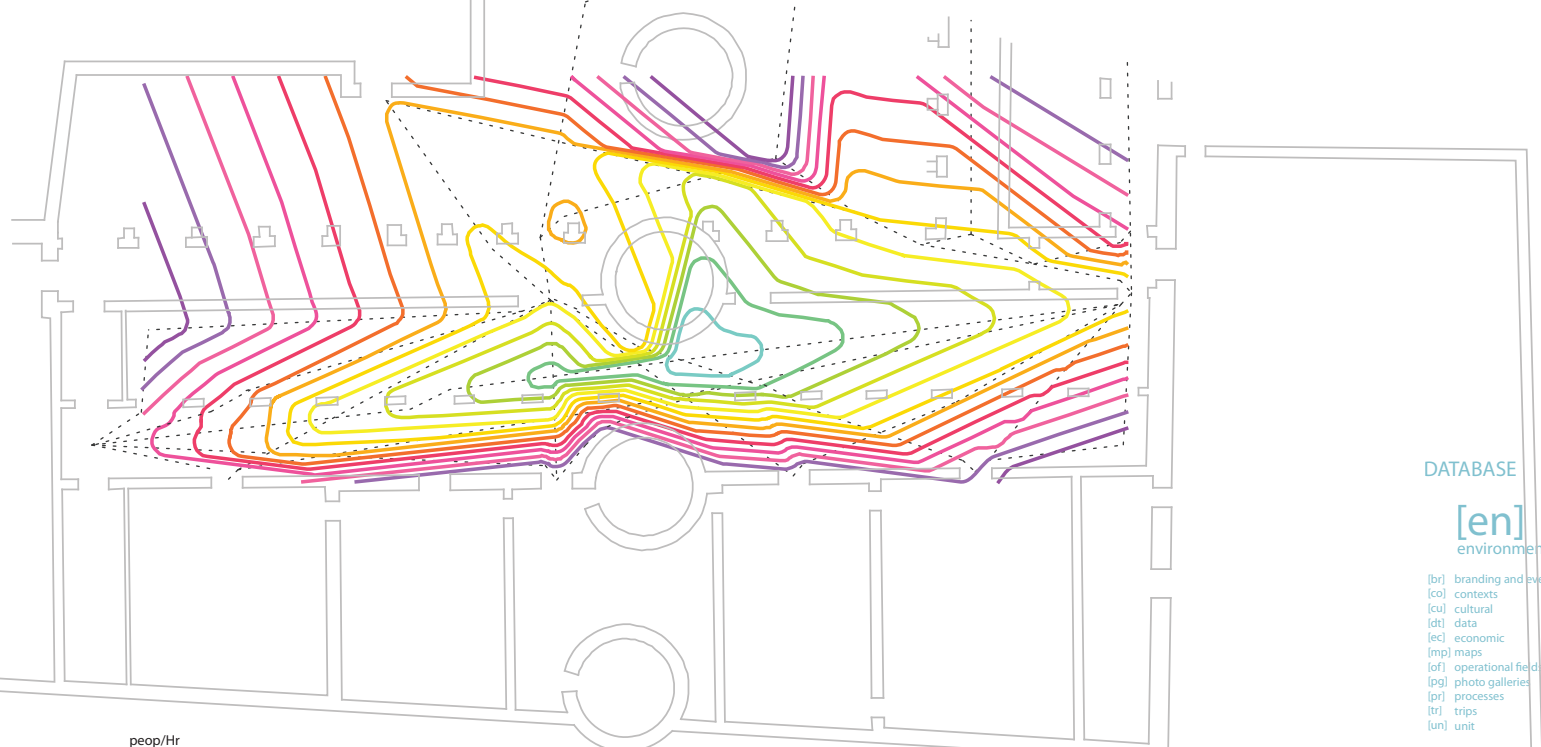
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radiation levels

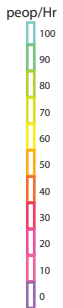
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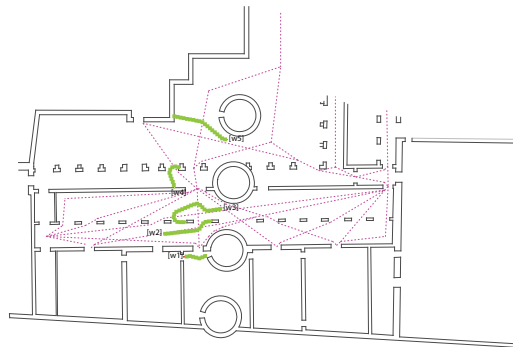
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human interaction field

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machines

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distribution scenario in relationship  
to human potential interaction field

[sc]  
scenarios

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behavior

[fbh]  
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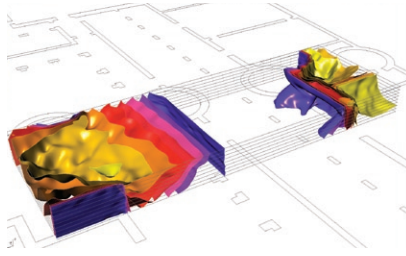
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- [fbh] observations/recordings
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[sc]  
scenarios

- [sc] installations
- [sc] projects



+cybernetic diagrams+ [bh]  
[sm] simulations

[org|rad]

machinic feedback cycle 1  
organic growth, photosyntesys  
--- radiation field

photosyntesys/GROWTH  
+organic component

machine  
STEMcloud

user/density and frequency fields  
wide spectrum radiation/ oxygenation  
system2

[diff|int]

machinic feedback cycle 2  
organic growth, photosyntesys ,  
oxygenation --- frequency of use

system1  
environment/radiation field  
wide spectrum radiation

+organic component  
oxygenation/GROWTH

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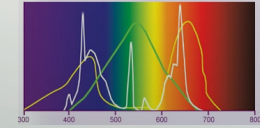
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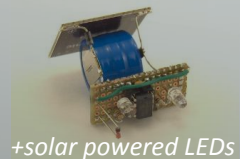
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scenarios

[in] installations  
[pr] projects



+RGB wide spectrum  
LED lights

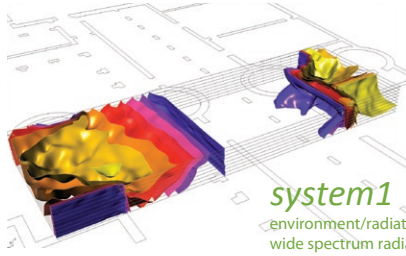


+solar powered LEDs

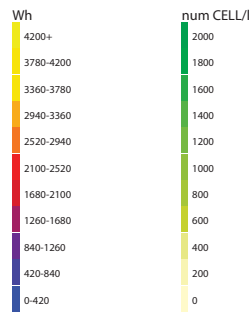
+oxygen levels sensor

+human presence sensor

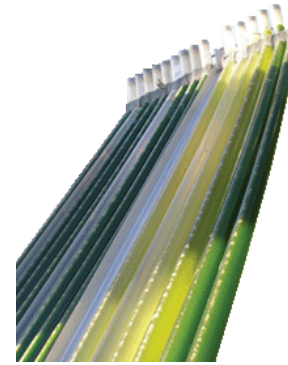
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**system1**  
environment/radiation field  
wide spectrum radiation



natural photosynthesis [bh]  
[sm] simulations

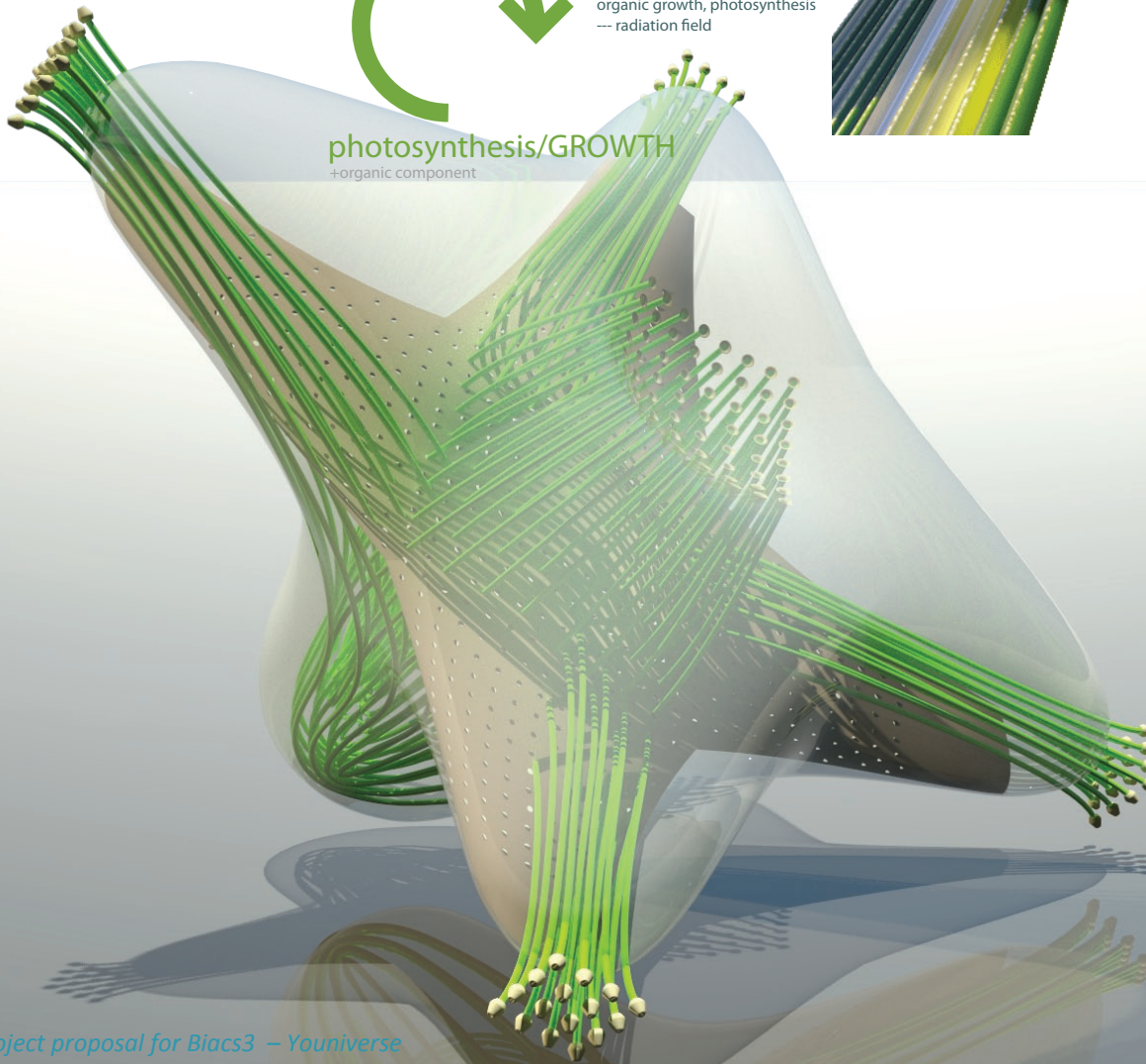


[rad|org]

machinic feedback cycle 1  
organic growth, photosynthesis  
--- radiation field



photosynthesis/GROWTH  
+organic component



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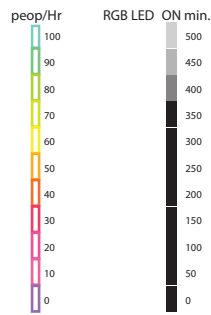
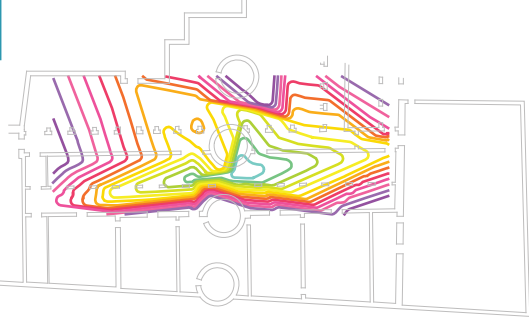
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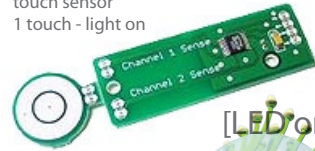
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- [i] installations
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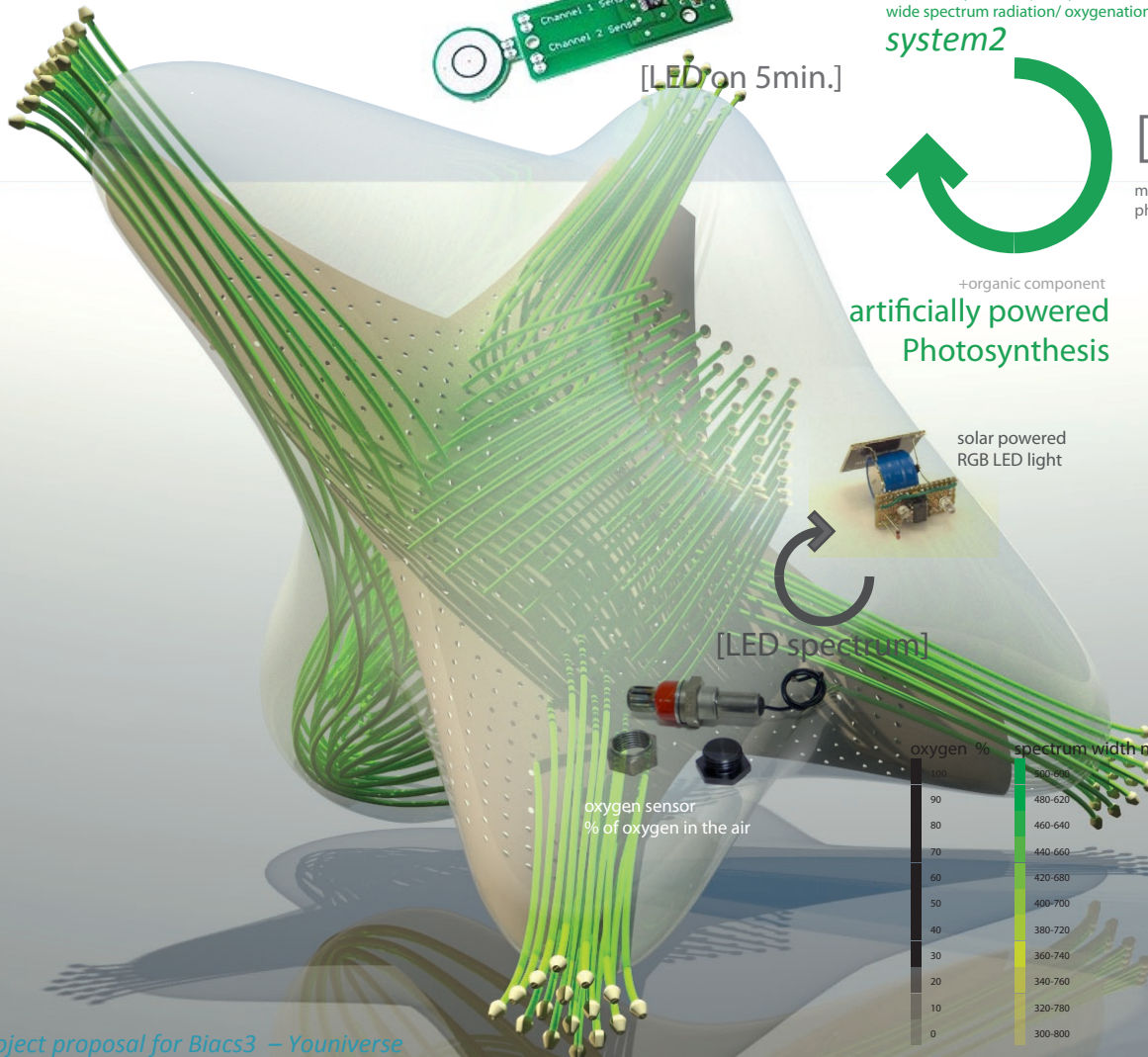


artificial photosynthesis [bh]  
[sm] simulations

touch sensor  
1 touch - light on



[LED on 5min.]



user/density and frequency fields  
wide spectrum radiation/ oxygenation  
system2



[int|pht]

machinic feedback cycle 2  
photosynthesis --- frequency of use

+organic component  
artificially powered  
Photosynthesis



solar powered  
RGB LED light

[LED spectrum]

oxygen sensor  
% of oxygen in the air



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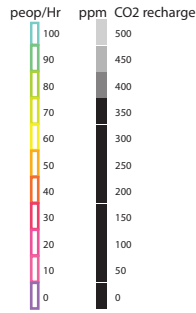
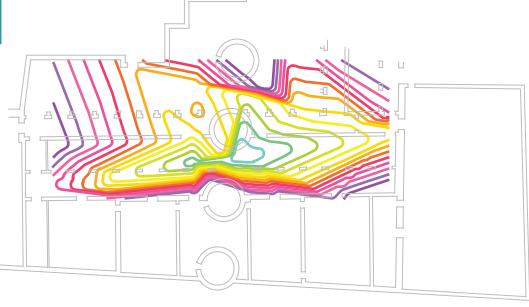
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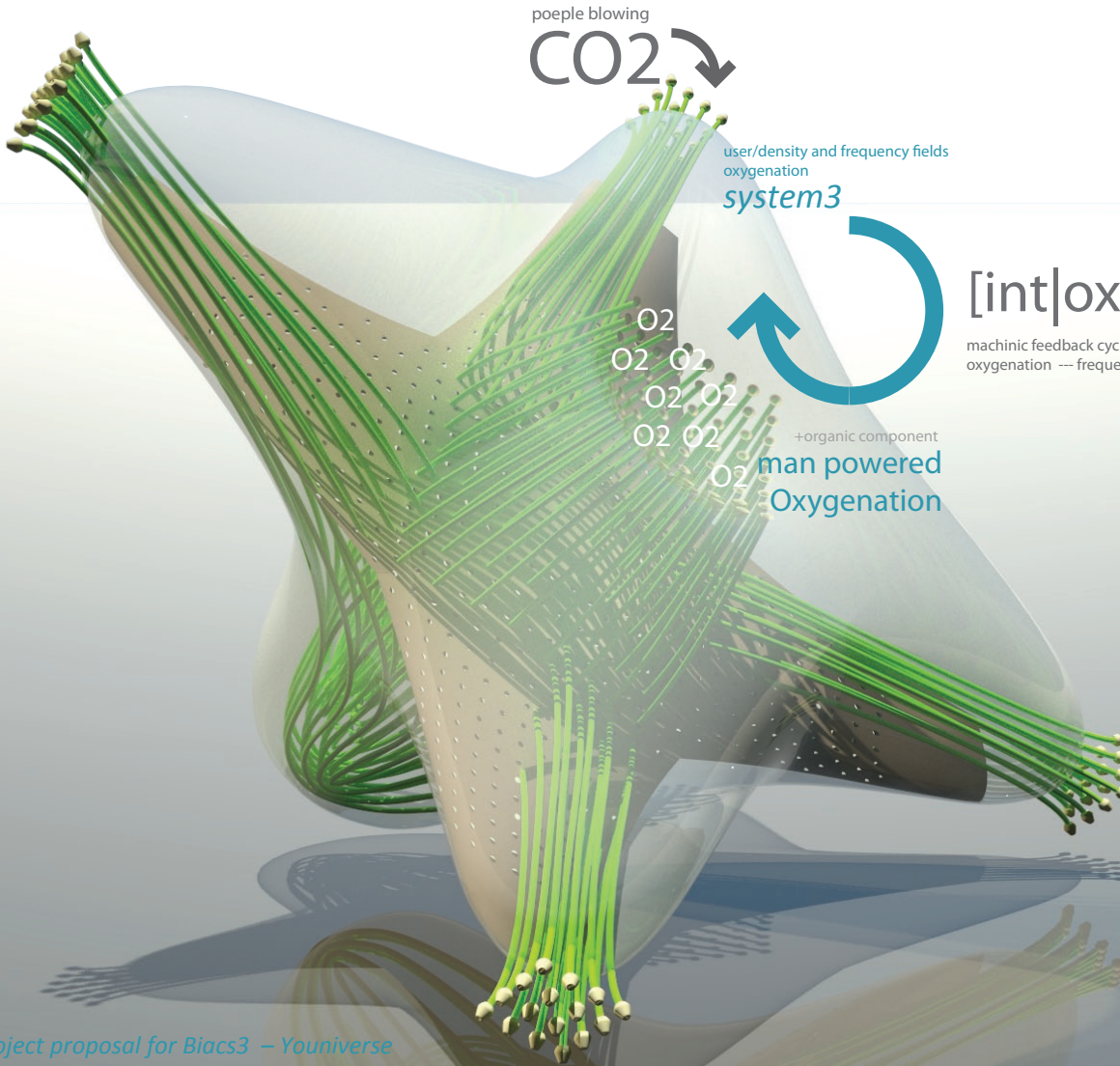
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Oxygenation

[bh]  
[sm] simulations



[int|oxy]

machinic feedback cycle 2  
oxygenation --- frequency of use

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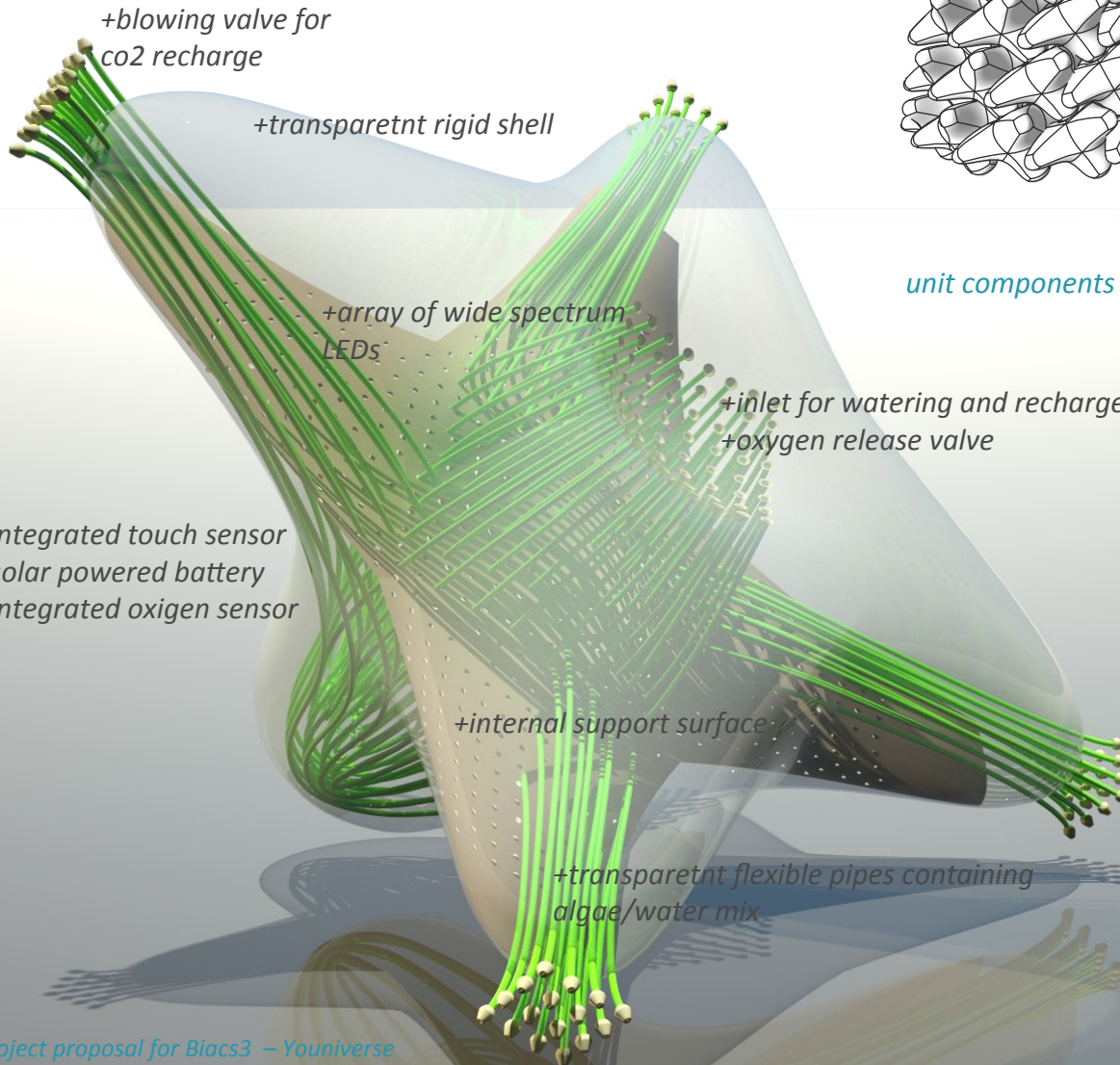
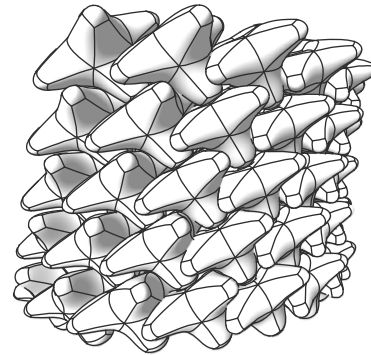
[sc]  
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[sc]

[IS] installation

layout logic



+blowing valve for  
co2 recharge

+transparent rigid shell

+array of wide spectrum  
LEDs

+inlet for watering and recharge  
+oxygen release valve

+integrated touch sensor  
+solar powered battery  
+integrated oxygen sensor

+internal support surface

+transparent flexible pipes containing  
algae/water mix

unit components

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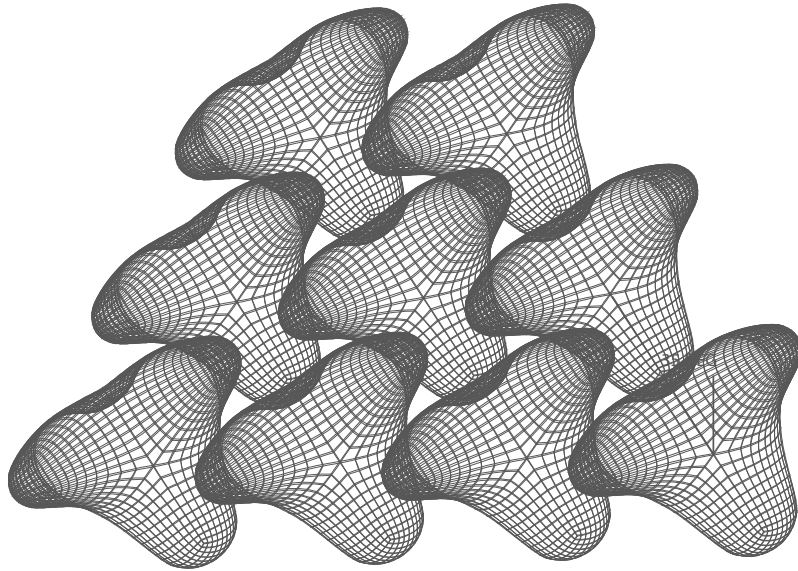
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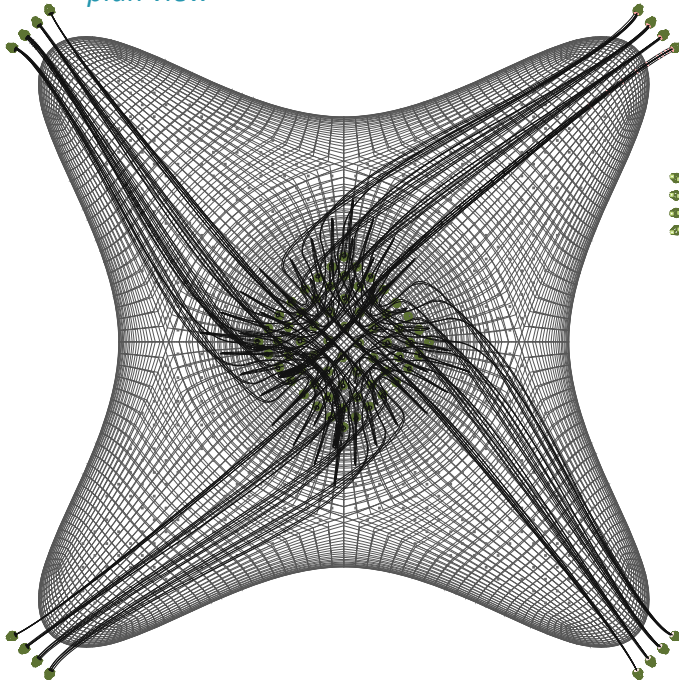
unit component

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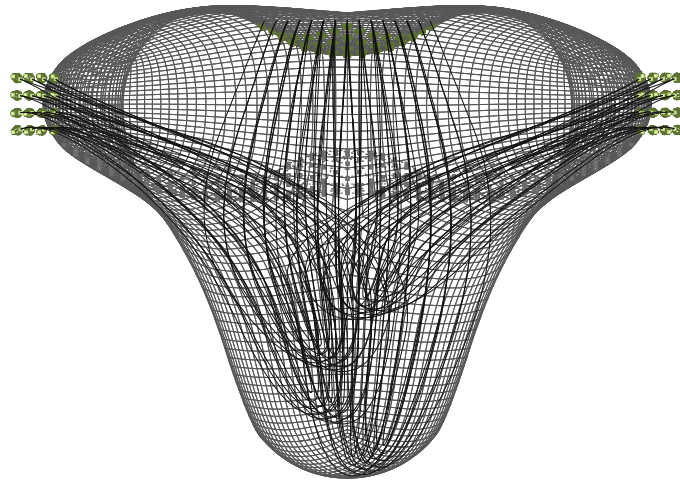
[is] installation

layout logic

unit components  
plan view



unit components  
front view



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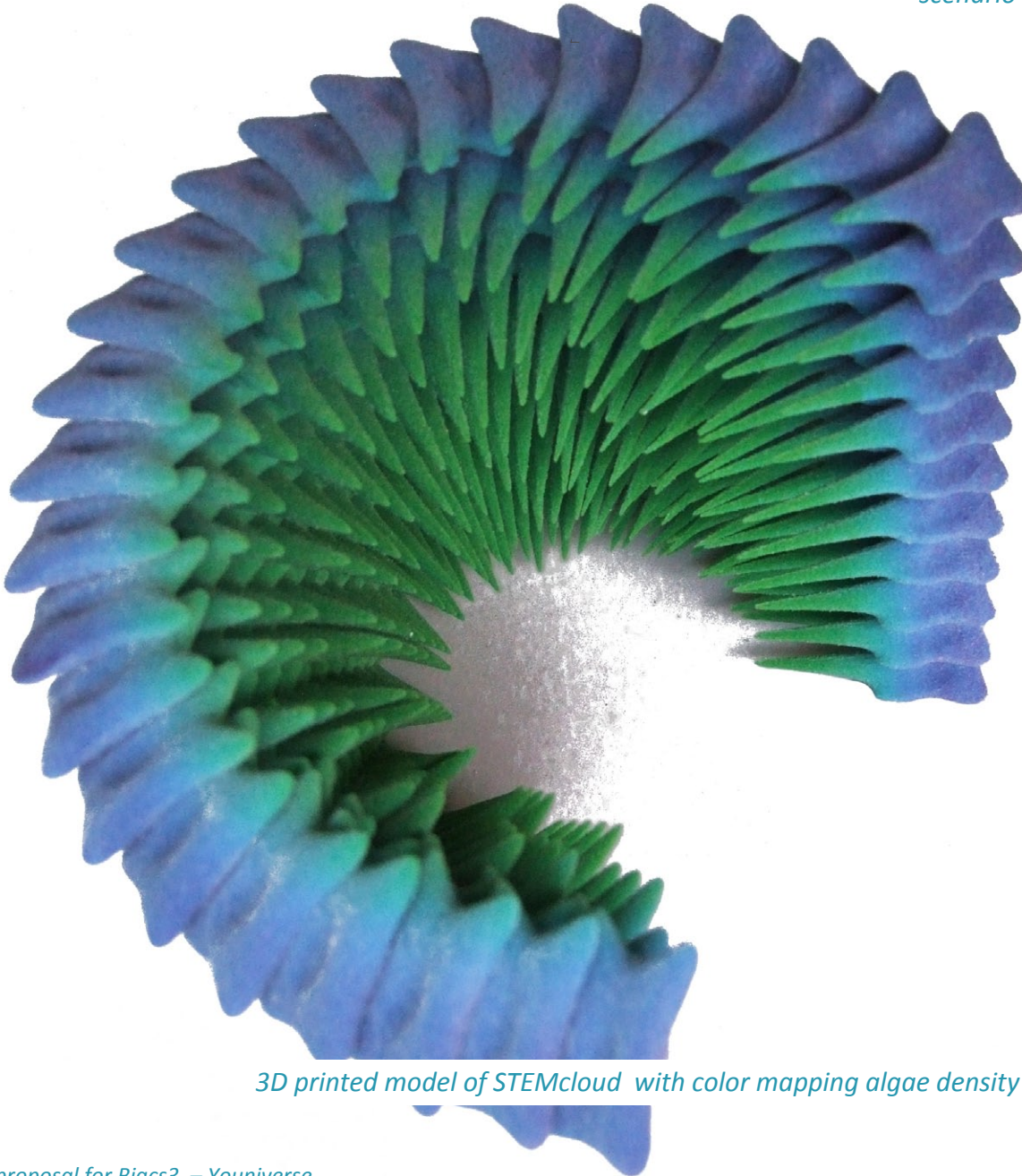
scenarios

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scenario

[sc]

[IS] installation



3D printed model of STEMcloud with color mapping algae density

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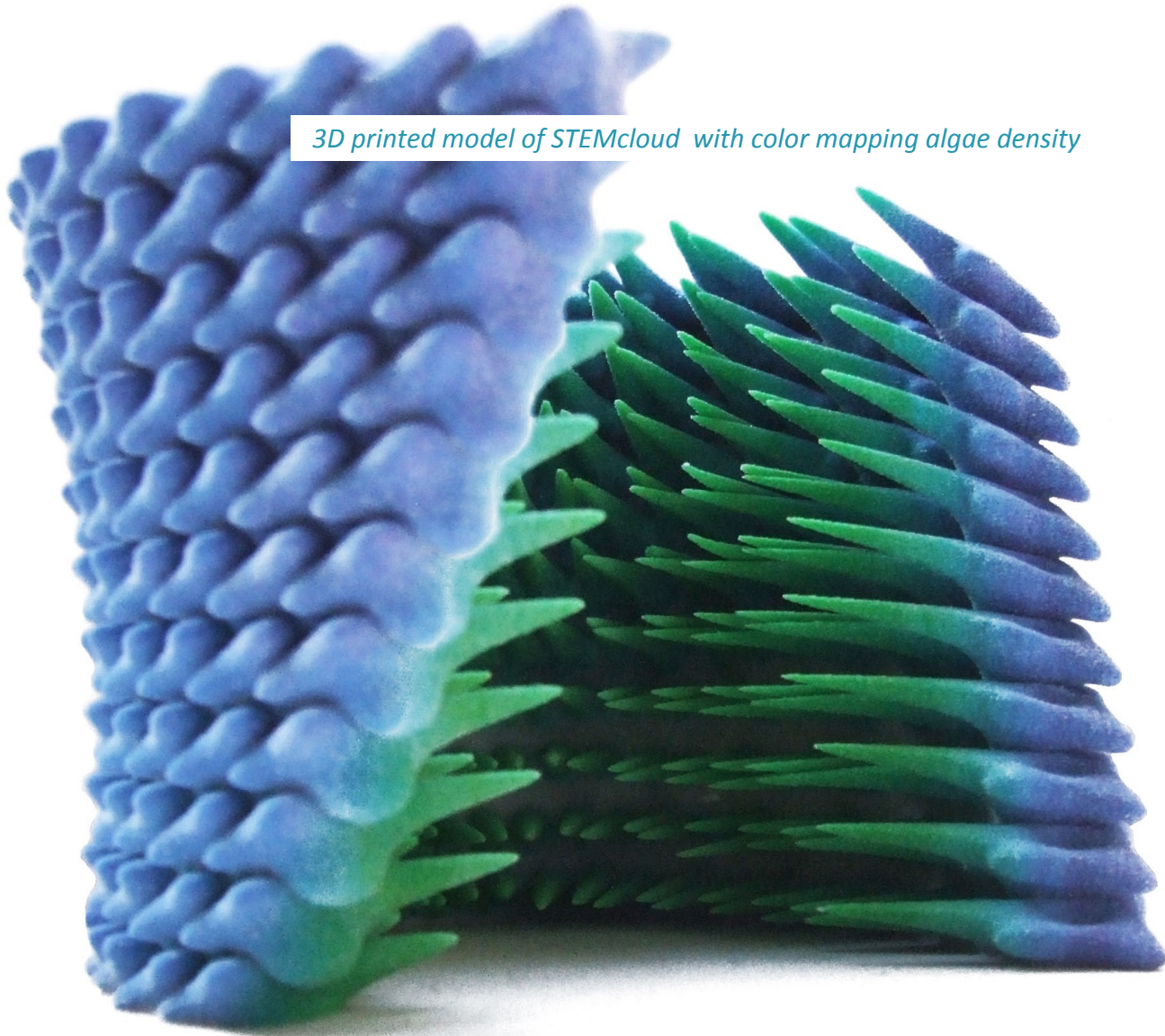
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scenario

[sc]

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3D printed model of STEMcloud with color mapping algae density



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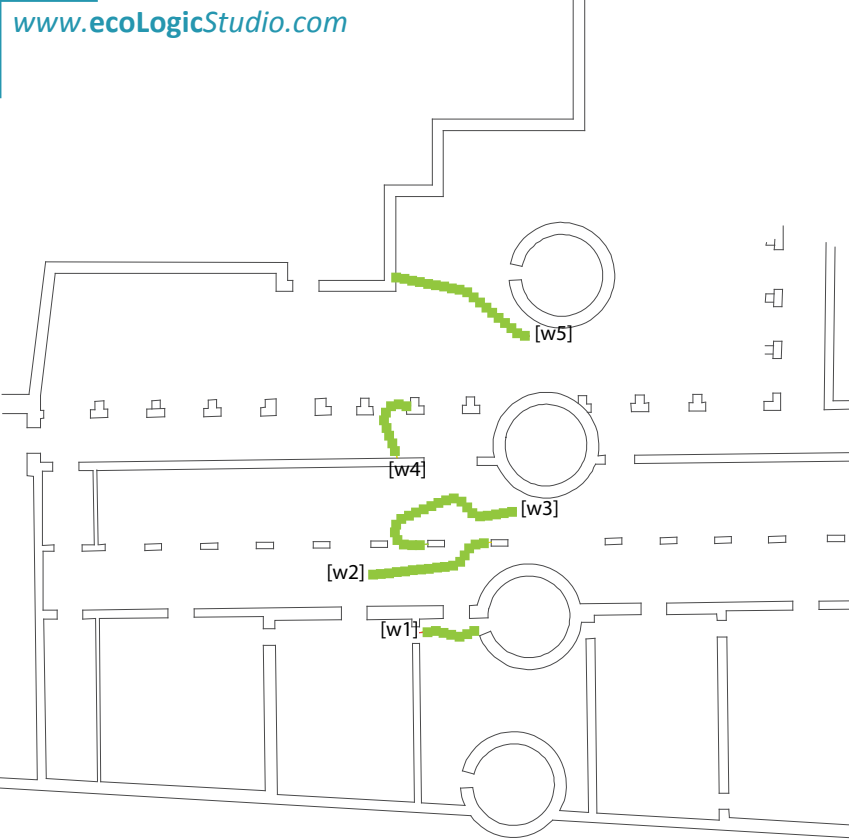
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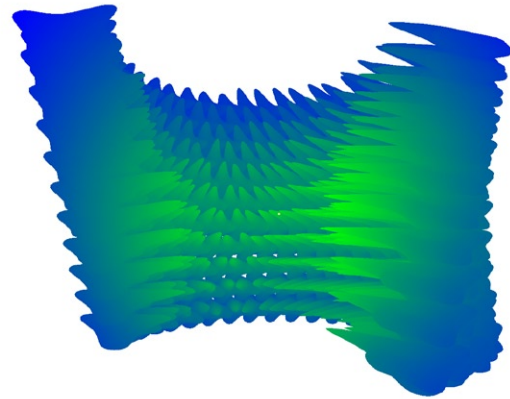


scenario

[sc]

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differentiation scenario



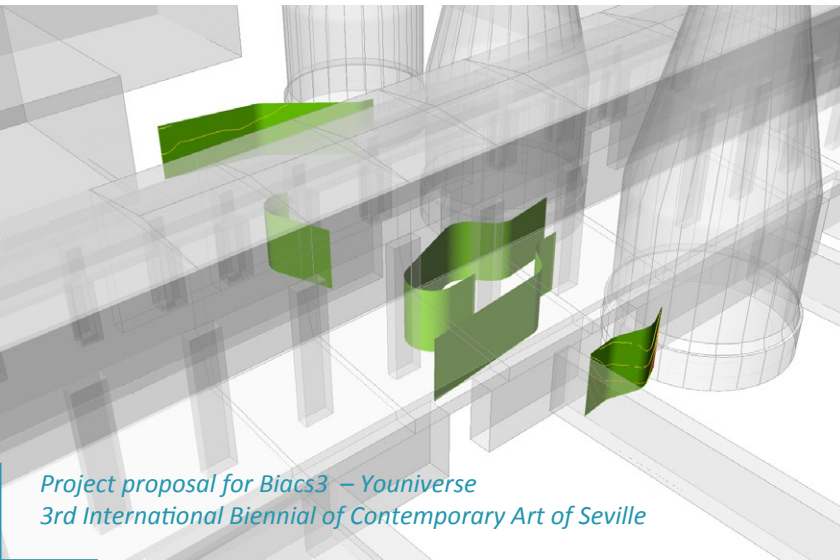
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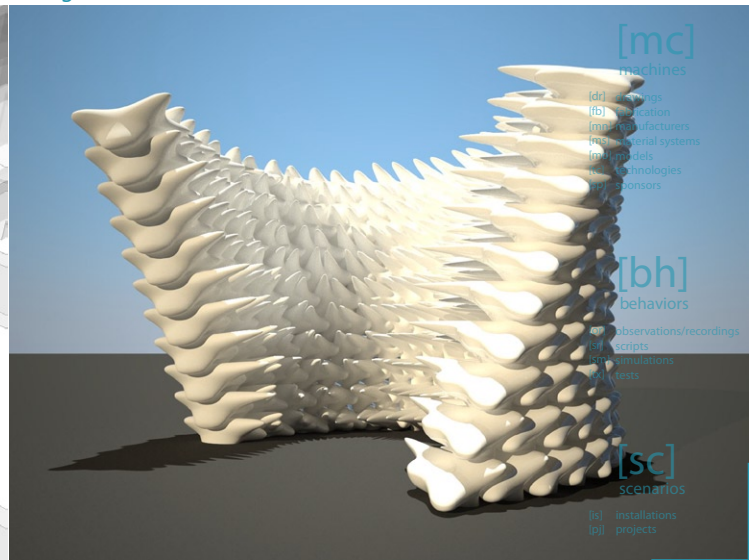
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distribution scenario



tiling scenario



[mc]

machines

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behaviors

- [ob] observations/recordings
- [sc] scripts
- [sm] simulations
- [te] tests

[sc]

scenarios

- [is] installations
- [pr] projects