

From EMBRC Infrastructures to Innovation Biodiversity - Challenge of Transfer – Products

Dr. Christian Hamm / Dr. Christof Baum



The Potential Role of Regions in the
Development of European Research
Infrastructures:

The Example of the European Marine Biological
Resource Centre (EMBRC)

European Commission – 21 Rue du Champ de
Mars Bruxelles, 29 March 2012

EMBRC: Exploring marine life for the benefit of mankind

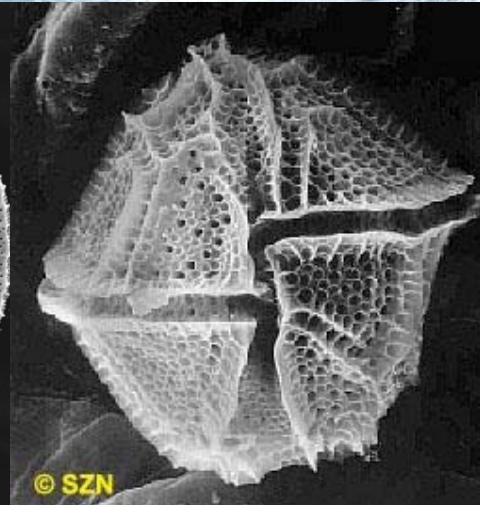
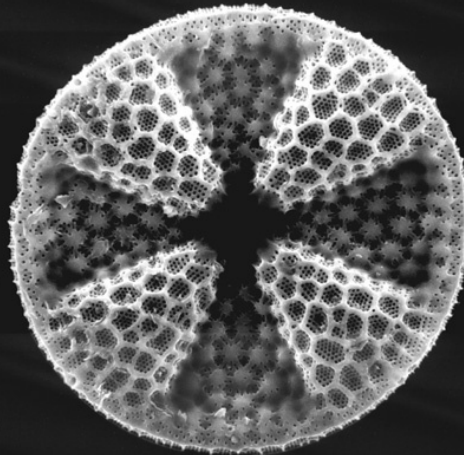
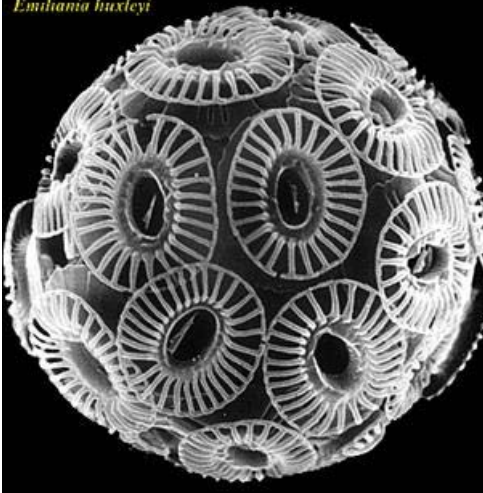


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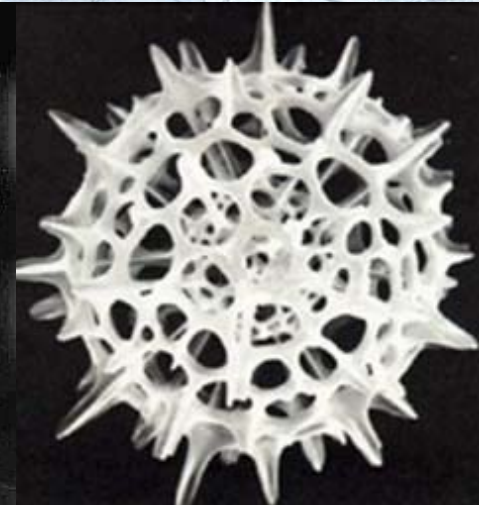
Exploring marine life for the benefit of mankind

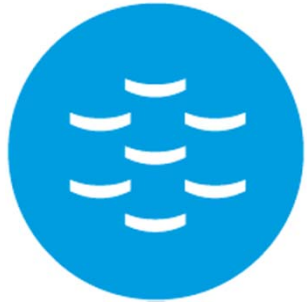


Emiliana huxleyi



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End-user communities:
Academia, Industry, SME's, Policy makers

Types of applied research
that **strongly depend** on
access to marine (model)
organisms
(Research Infrastructure)

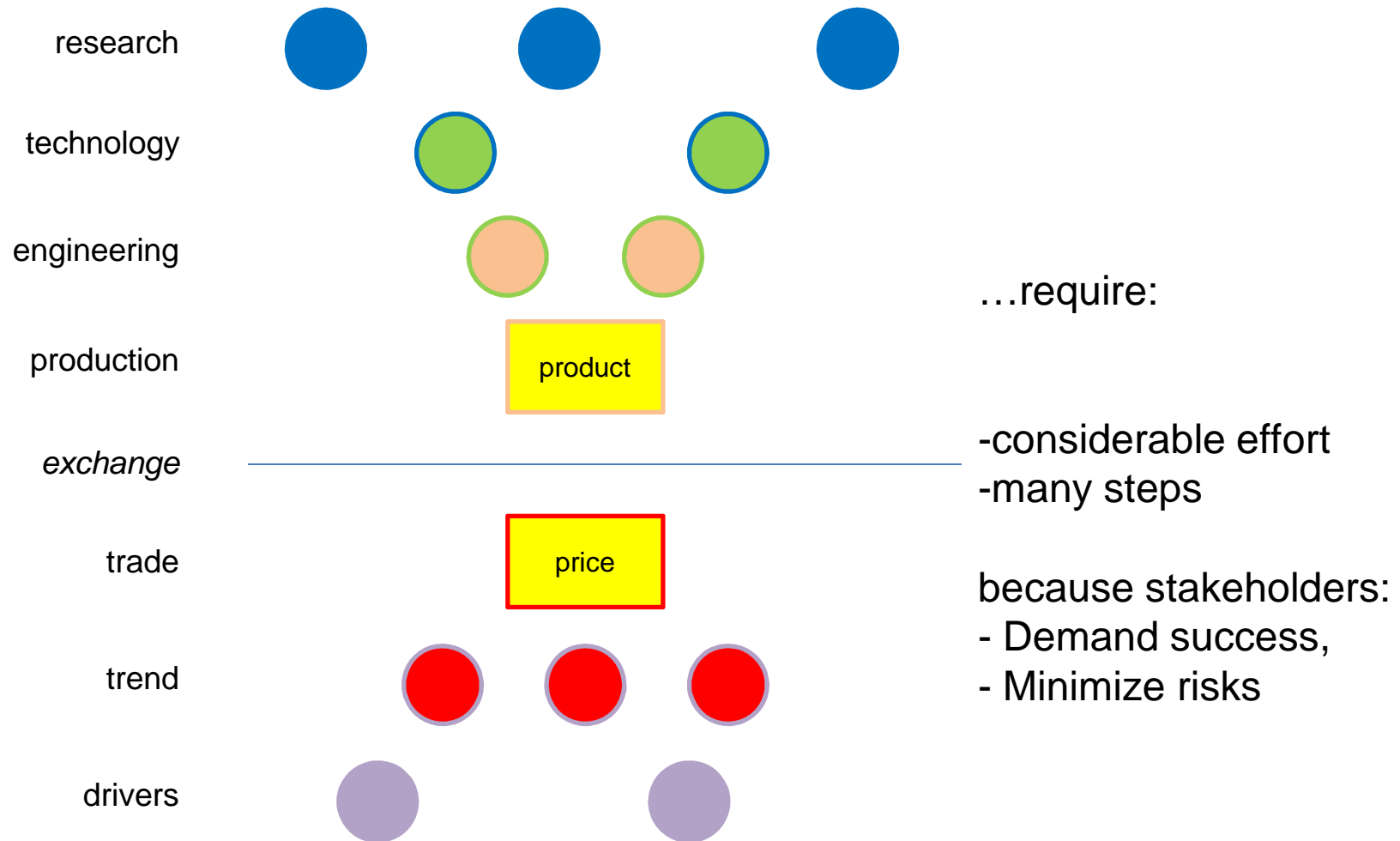
Biomedical - pharmaceutical research
"Omics" research
Biomimetics / bionics
Bio-engineering technologies
Environmental engineering
Natural products research
Mariculture research



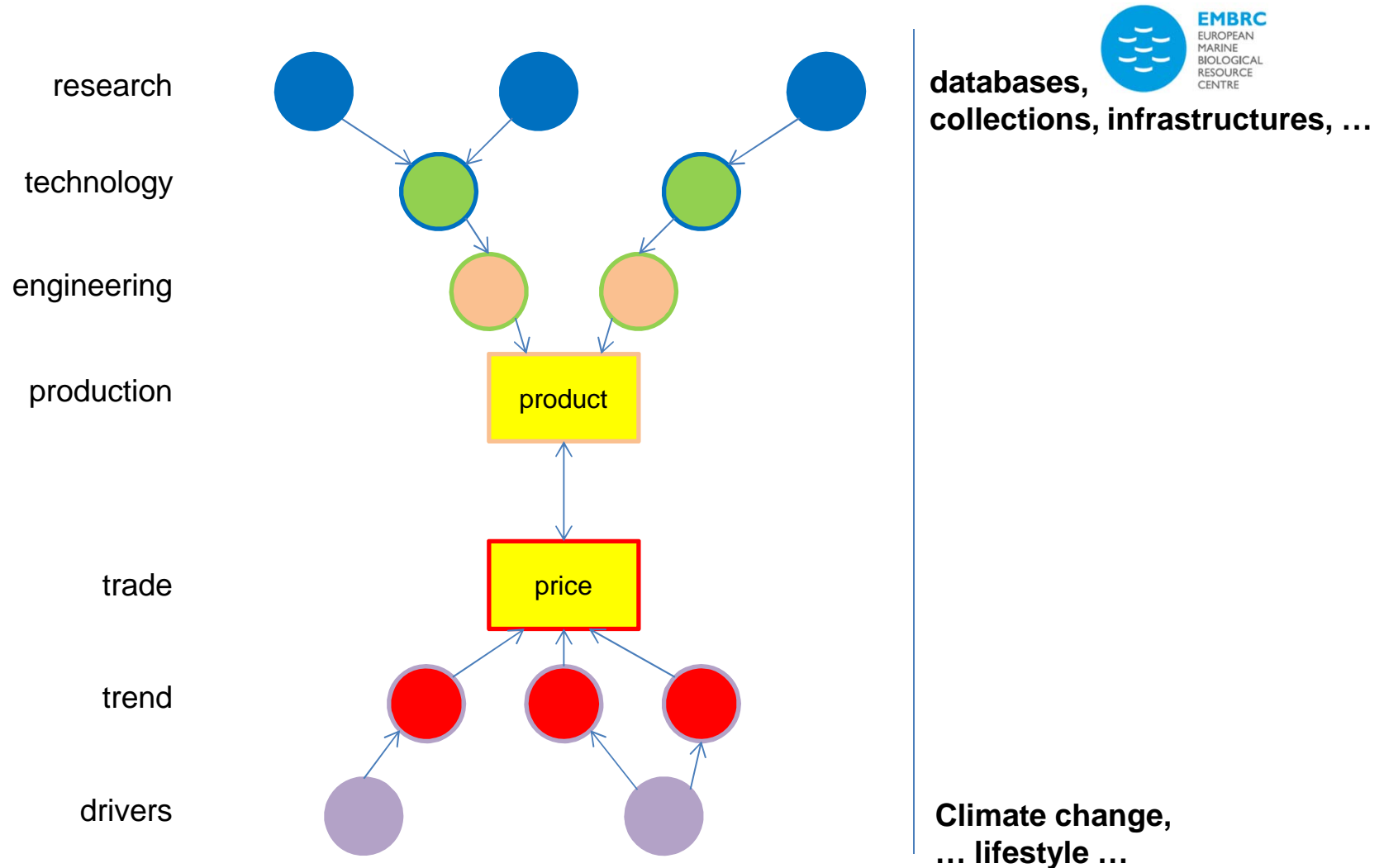
Technological development
Regional industrial innovation
New products
Regional economic growth
Employment

But *how*
is this
realized?

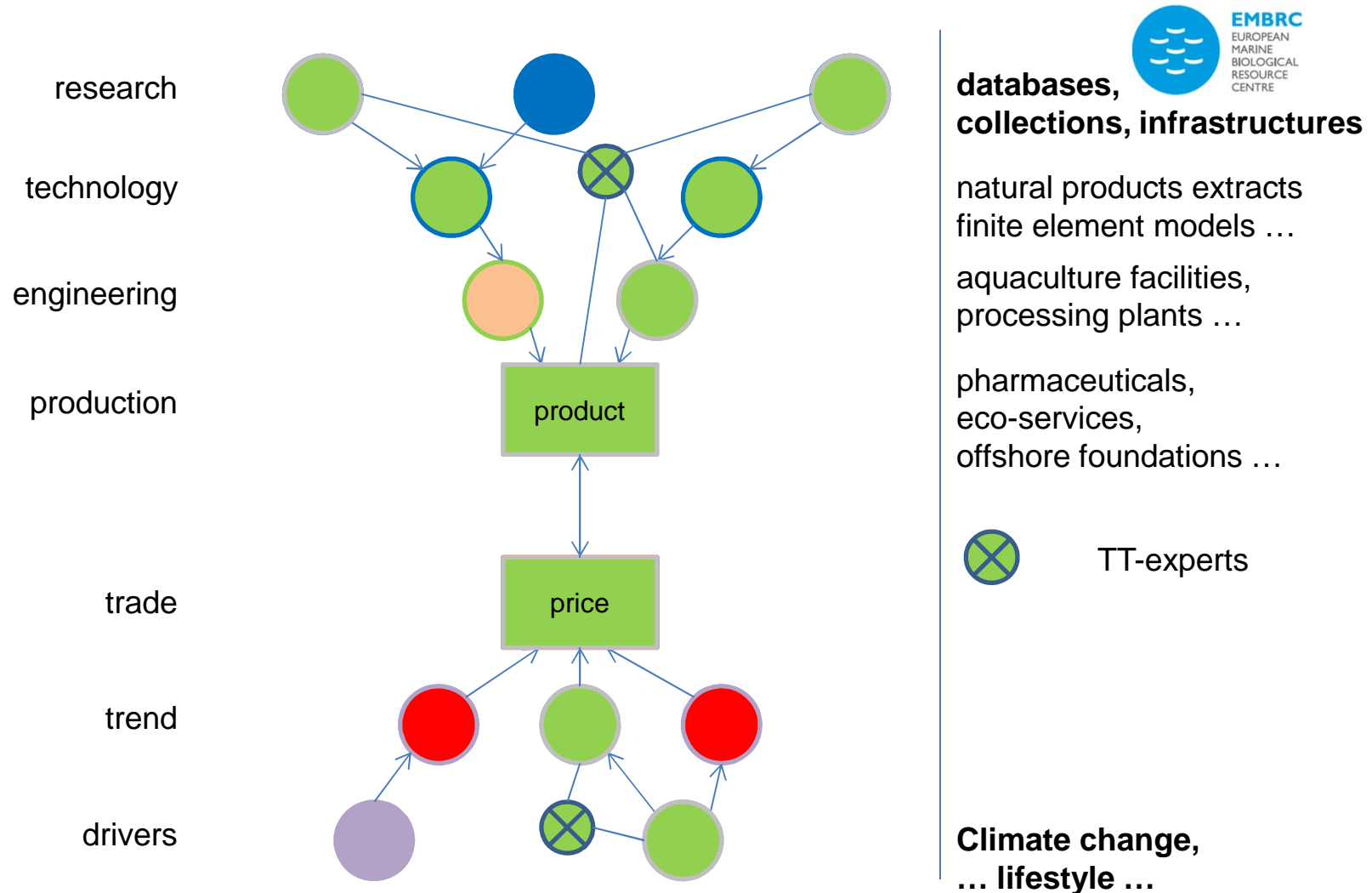
Commercial transactions...



Commercial transactions



Challenge of Transfer



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Antifreeze proteins from a polar diatom

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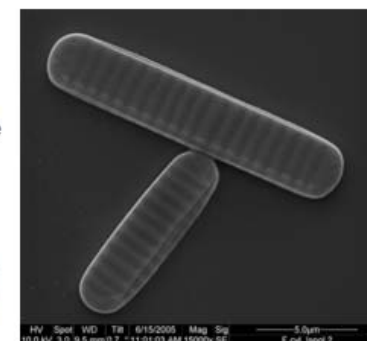
20. March 2012: **Antifreeze proteins from a polar diatom to protect frozen bread rolls from freezer burn**

Bremerhaven, 20 March 2012, The polar diatom *Fragilariopsis cylindrus* thrives where many other forms of life would succumb – namely in the sea ice of the Arctic and Antarctic. Its survival is guaranteed by an antifreeze protein, which the alga releases into its environment. Biologists from the Alfred Wegener Institute for Polar and Marine Research in the Helmholtz Association have now succeeded in decoding the genetic plan of this natural antifreeze agent and in bioengineering the protein. In a joint project with food researchers from ttz Bremerhaven, investigations will now be conducted to determine whether the algal antifreeze can also protect frozen bread rolls from the destructive force of ice crystals.

The polar diatom *Fragilariopsis cylindrus* has chosen one of the most extreme habitats on earth to live in: the sea ice of the polar regions. It populates the small brine channels and pockets that are formed when sea water turns to ice. The water in these tiny cavities cools down to minus 20 degrees Celsius in extreme cases and is then almost seven times as salty as normal sea water. The algae are virtually resilient to frost and brines, however. They protect themselves by producing a so-called antifreeze protein, which they release to their surroundings. "At the start of our investigations we knew that there were various naturally occurring antifreeze proteins, which also have quite different functions. In fish, for example, they reduce the freezing point of blood. In plants they ensure that, if ice does form, the individual, small crystals do not expand, avoiding mechanical damage of the tissue", says Dr. Maddalena Bayer-Giraldi, biologist at the Alfred Wegener Institute for Polar and Marine Research in the Helmholtz Association.

The scientist is investigating how organisms live in the ice, and during her research has recently discovered that the antifreeze protein of *Fragilariopsis cylindrus* did not belong in any of the known protein groups. "It has emerged that the antifreeze protein of this polar diatom belongs to a new group of antifreeze proteins. Whilst it also slightly reduces the freezing point of water, far more striking are its properties inhibiting the expansion of ice crystals and altering the microstructure, the texture of the ice.

We assume that the ice properties are changed, preventing the brine from being washed out of the ice cover. It stays in the channels and pockets, which thus hardly



Technology Marketing

PlanktonTech



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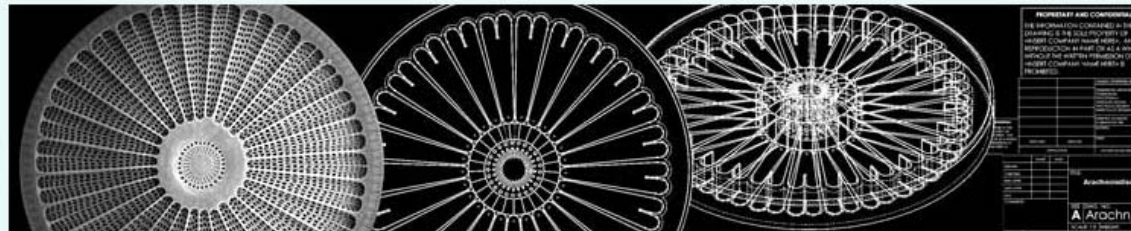


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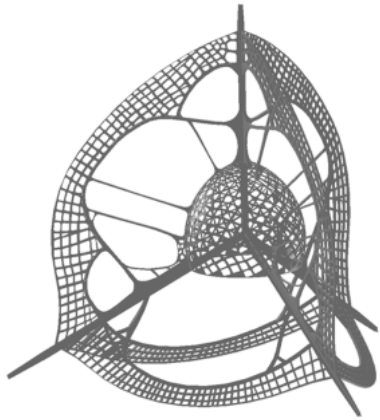


PlanktonTech - New approaches into bionics and evolution research

Evolutionary principles leading to high performance lightweight constructions in Marine Planktonic Organisms – fundamentals and technical applications

PlanktonTech is a Helmholtz Virtual Institute founded in 2008 at the Alfred Wegener Institute for Polar and Marine Science by the Helmholtz Society, the largest science organization in Germany. PlanktonTech concentrates on fundamentals of the evolutionary mechanisms leading to the optimisation of lightweight structures in marine plankton organisms. Newest methods in microscopy and modern computer engineering will help to understand the function and development of these structures. Additionally, their complex

Evolutionary Light Structure Engineering (ELISE)



Clathrocorys

from biological precursors
towards lighter offshore foundations
and better distribution of stress

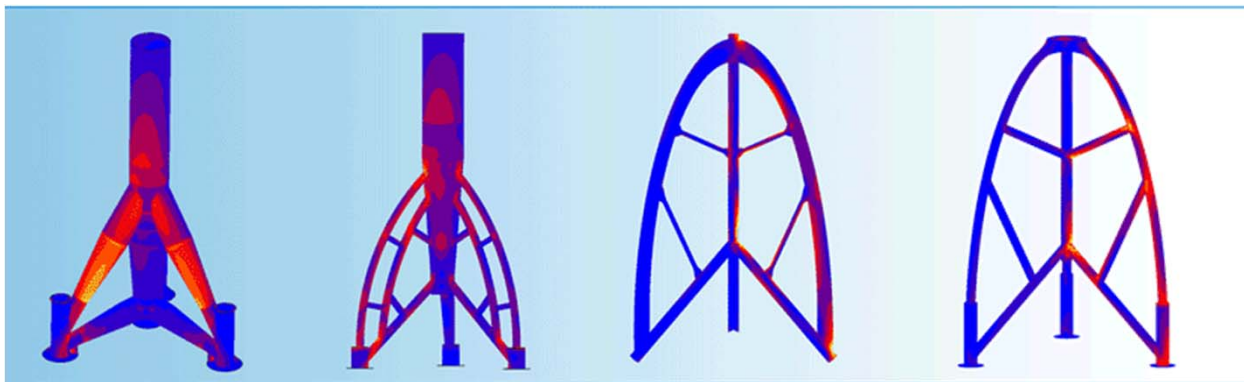


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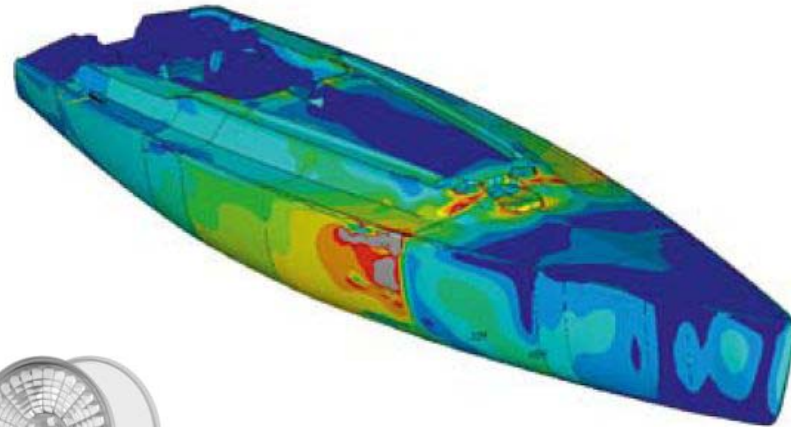




Light-weight plaster

ELISE products

... spreading into many industries



Transfer Institutes and networks

such as:

imare

Institute for Marine Resources GmbH

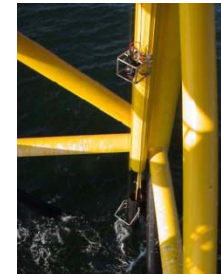
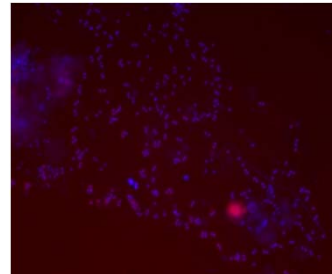
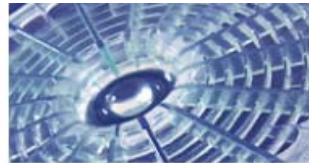
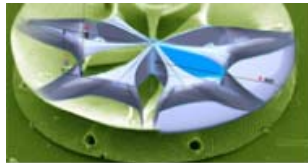


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International Conference

Marine Resources and Beyond

September 5-7, 2011, Bremerhaven, Germany

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