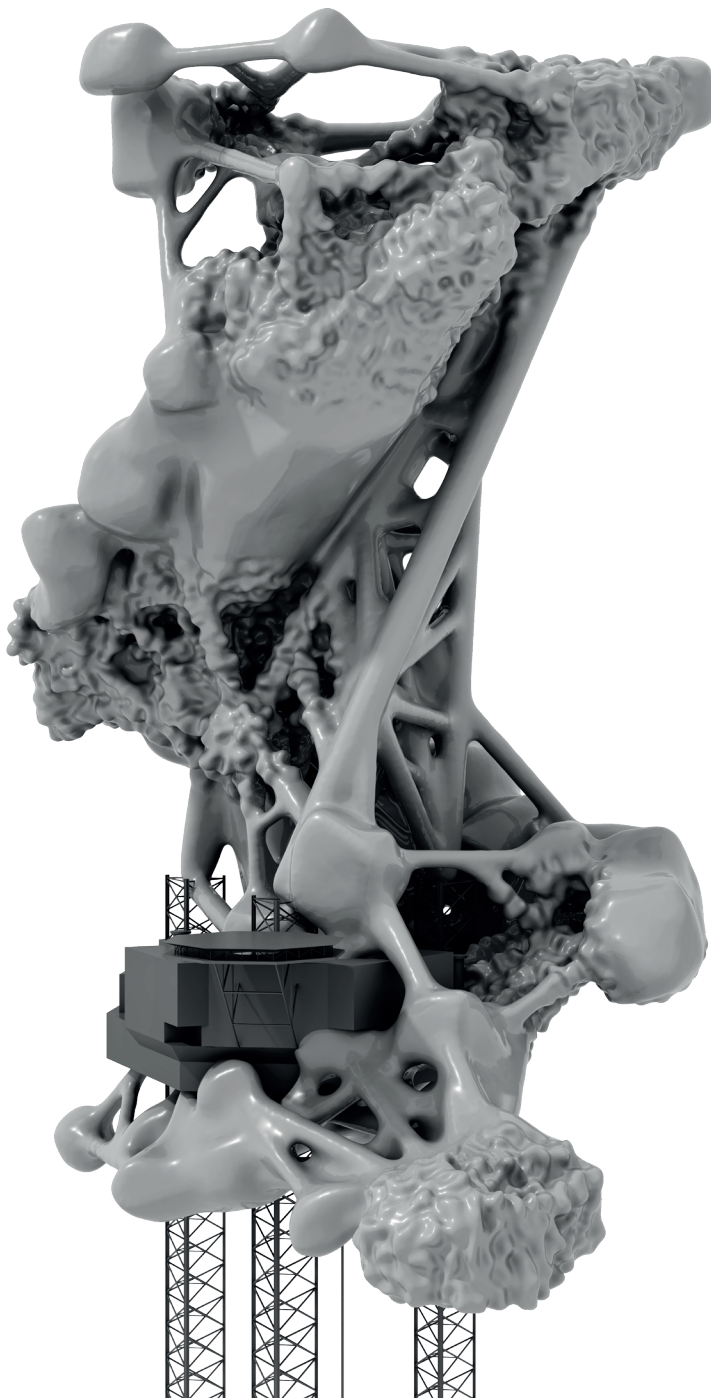


REFLECTION PAPER

Running Out Of Gas On The Fast Lane

Repurpose of abandoned drilling rigs in the North Sea



// fig. 01 // Elevation ROOGOTFL

ASPECT 1 - 3

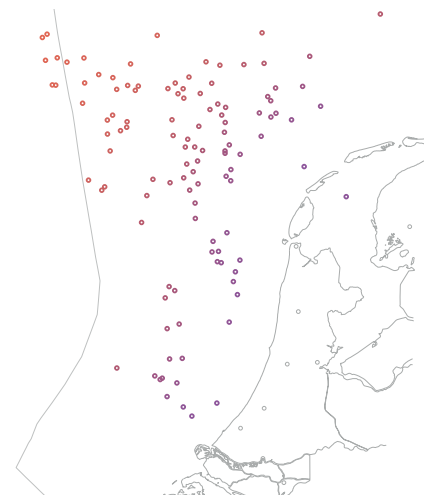
Through an iterative feedback-driven process, the project *Running Out Of Gas On The Fast Lane*¹ (*ROOGOTFL*) spans two main research fields, which informed the design. Feedback from both research and design were used to form a closed loop, where discoveries in one discipline informed decisions in the other, and vice versa.

The first topic addresses the dangerous consequences of climate change—especially for the population of the Netherlands, which faces rising sea levels. An undesired, nor not impossible scenario, would be the loss of livable land due to flooding. The loss of building and living area would result in drastic changes to the means of life. On the one hand, we need to research possibilities to slow down the process, and also change our way of life. However, on the other hand, we must look for concepts and design proposals to support a lifestyle with radical climate changes. Eventually either the oil and gas supply will be exhausted, or society will develop methods to rely completely on eco-friendly energy sources. What will then happen to the oil industry and their factories and structures? In this hypothetical situation, offshore drilling rigs, structures made of billions of Euros worth of steel and concrete, will need to be repurposed. These highly sophisticated platforms and jackets resist storms, frequent waves (resonance), and salt water. These abandoned rigs provide society with the opportunity to repurpose, and even extend the site over and under water. A more detailed article about this topic can be found in the *Atlantis Magazine* (vol. 28, 2017, p. 41-46, Benjamin N. Kemper: *ROOGOTFL: Running Out Of Gas On The Fast Lane*).

The second topic deals with changes in our society, with human behavior, and in cities due to the exponential progress of technological change. How are we going to live in a future, and which role will architecture play in an augmented world? It might emerge as a balancing act between utopia and dystopia, between the total dependency and repression of the machines and the freedom to achieve more than we ever imagined. Society's addiction to technical devices emphasizes the urgency at hand to begin to work with new technologies instead of denying the process categorically. The project *ROOGOTFL* showcases the possibilities and benefits of computational design on multiple layers. The design is carefully developed with the use of data gained through analytical methods. Agent based modeling helped to create an unconventional, however logical schematic framework. On a macro to micro scale, computational design strategies (i.e. topology optimizations, structural analyses, or function mapping) were combined with material computation and robotic manufacturing. As mentioned, feedback loops informed the computational model in both directions.

Over the past couple of decades, a paradigm shift in architecture towards non standard, intelligent, and interactive architecture has emerged. With the emergence of powerful computational tools such as Rhinoceros and Grasshopper, the era of nonstandard architecture appears to be blossoming. As we are at the beginning of the age of digitalization, where computational logic has become integrated into the field of architecture, we need to clarify how and why the new techniques and technologies, such as programmed architecture and robotic milling and printing, are to be incorporated in the design and build processes.

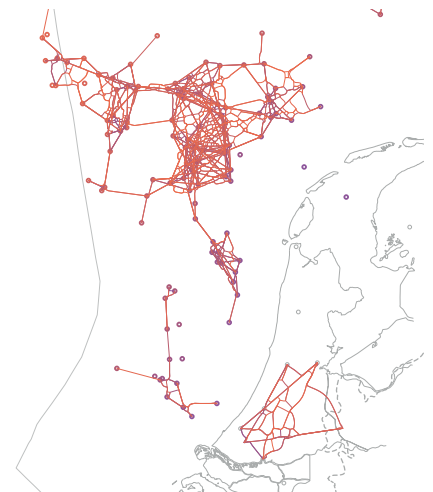
Robotic Building (formerly *hyperbody*) examines the intersection between the physically built robotically augmented environments and robotically supported building processes. Reconfigurable, robotic environments can incorporate sensor-actuator mechanisms that enable buildings to interact with their users and surroundings in real-time. Design to production-, assembly-, and operation-chains are



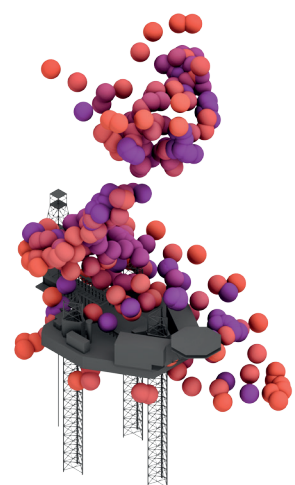
// fig. 02 // Map Platform Positions



// fig. 03 // Research Site: Platform Q13a-A



// fig. 04 // Map Networks North Sea



// fig. 05 // Swarm Simulation

¹ Perl, Yeshe. "Romeo and Juliet." By Perl Cooley. Rec. 31 Oct. 2006. *Mickey Avalon*. Mickey Avalon. Cisco Adler, 2006. CD.

supported by robotic means. Computational design, utilizing the cutting edge tools available today, allows a scholar to step beyond the limitations of traditional drafting. More often than not, curricula for those apprenticing as architects are based primarily on additive design processes, which have the benefit of being universally accepted, but are limited however in their intricacy as well as in their techniques to execute a vision.

ROOGOTFL encapsulates the aforementioned aspects. The design and development processes were, on the one hand, supported various computational strategies and, on the other hand, informed by the shift from traditional, standardized architecture towards individualized, informed architecture. The design strategy employs a solution based approach to address current complex problems, such as climate change, the oil and gas industry, and paradigm shifts in society and culture. The project integrates a high level of diversity in computational embedding, i.e. robotic fabrication (hybrid procedure: additive vs. subtractive manufacturing, soft vs. solid materials) and local responsive, intelligent behavior (cellular strategy). This allows for a locally informed structure that can treat and adapt to all different functions.

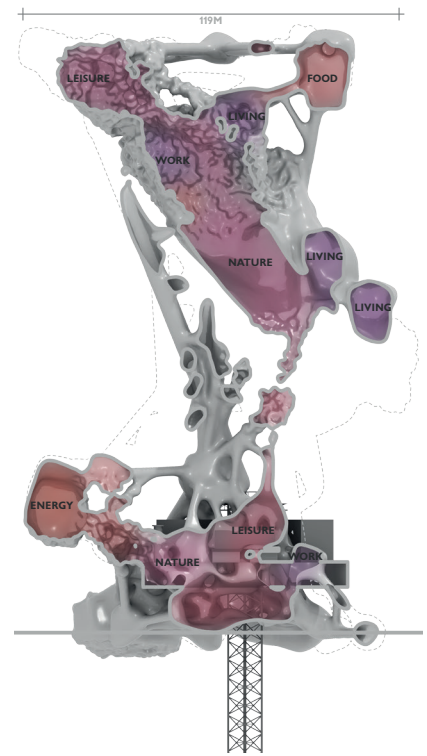
ASPECT 4 - 5

Two novel outcomes were achieved during the process. First, on a design level, the project benefited from an exploration of an unconventional combination of CGI (Computer Generated Imagery, mostly used in animations and visual effects) and computational architectural design. This approach was influenced by the work of Neri Oxman, even though her work focuses more on design scale (furniture) than on architecture. This combination of mathematical algorithms and parametric coding resulted in a growing geometry used to create architecture. Second, on a prototyping and material level, an additive procedure to 6D print silicone was developed. Therefore, a specialized end effector for the robot was built. The outcome showcases the possibilities of additive manufacturing, a soft material and hybridity with a rigid base material. Both research results not only influenced the design project, but are also promising to build upon and develop further.

Besides that, the design concept transfers to the real world. The chosen site, an oil platform in the North Sea, is only one possibility. Due to the flexibility of the computational model, many different locations can be foreseen. The parasitic approach of using an existing framework helps to conceptualize using this as a model to implement similar structures on other existing frameworks or extreme situations (abandoned industries, desert, dense urban spaces, etc.). Through a combination of universal data received from local analysis, a variation of scripts dealing with different scales and CGI algorithms can provide a unique and locally optimized structure.

The most frequently asked question concerning the project *ROOGOTFL* is, who wants actually to live there? Is not it too far fetched to assume that more than a few people would consider to live on an offshore platform? First, we need to get prepared for radical changes in the future. It is absolutely conceivable, that soon, most people will no longer be able to choose where they want to live because land is no longer abundant. Second, even if we are able to choose, there are many individuals who seek to break out of the status quo and live a life to their own expectations. These people will have the manner and the ambitions to start a better, an ideal life, and to build up an improved society.

The complete project needs to be considered as design research that considers a futuristic scenario. However, the research revealed useful outcomes for contemporary design and research approaches. In my opinion, it demonstrates future applications of cutting edge tools and contributes to the growing body of knowledge in the field of generative architecture.



// fig. 06 // Section ROOGOTFL



// fig. 07 // Differential Growth

BIBLIOGRAPHY

- Bradbury, Ray. *Fahrenheit 451: Fahrenheit 451 – the Temperature of Which Book Paper Catches Fire and Burns*. Cornelsen, 2014.
- Claeys, Gregory. *Searching for Utopia: the History of an Idea*. Thames & Hudson Ltd., 2011.
- Crompton, Dennis. *A Guide to Archigram 1961-74: = Jian Zhu Dian Xun Zhi Nan 1961-74: Liu Shi Nian Dai Jian Zhu Ci Tuan Ti*. Garden City Pub., 2003.
- “Dutch Oilfield Services Analysis 2015.” *Ernst & Young*, 2016, [www.ey.com/Publication/vwLUAssets/EY-dutch-oilfield-services-analysis-2015/\\$FILE/EY-dutch-oilfield-services-analysis-2015.pdf](http://www.ey.com/Publication/vwLUAssets/EY-dutch-oilfield-services-analysis-2015/$FILE/EY-dutch-oilfield-services-analysis-2015.pdf). p. 31.
- Hansen, James. “Why I Must Speak out about Climate Change.” TED2012. TED Talks, Feb. 2012, Long Beach, California.
- Hovestadt, Ludger, and Manuel Kretzer. *ALIVE: Advancements in Adaptive Architecture*. Birkhäuser, 2014.
- IJsseling, Herman, and Paul Schaap. *The Dutch Offshore: Still Going Strong*. Flying Focus Bv, 2015.
- Kemper, Benjamin N. “Running Out Of Gas On The Fast Lane.” *Atlantis – Magazine For Urbanism & Landscape Architecture*, Oct. 2017, pp. 41–46.
- Ministerie van Economische Zaken, “Delfstoffen En Aardwarmte in Nederland - Jaarverslag 2015.”, July 2015. www.nlog.nl/jaarverslagen. p. 135-139.
- Oosterhuis, Kas, and Henriette Bier. *IA#5: Robotics in Architecture*. Jap Sam Books, 2013.
- Oosterhuis, Kas, and Lukas Feireiss. *The Architecture Co-Laboratory: GameSetand-Match II: on Computer Games, Advanced Geometries, and Digital Technologies*. Episode Publishers, 2006.
- Oosterhuis, Kas, et al. *Jian Zhu Jiao Xue Shi Jian: Bei Jing 751 Di Kuai San Wei Cheng Shi Jie Gou She Ji*. Zhong Guo Jian Zhu Gong Ye Chu Ban She, 2009.
- Oosterhuis, Kas. *HyperBody: First Decade of Interactive Architecture*. JAP SAM Books, 2012.
- Oosterhuis, Kas. *Towards a New Kind of Building. ; A Designers Guide for Non-Standard Architecture*. NAI Uitgevers / Publishers Stichting, 2011.
- Robinson, Andrew. “Forgotten Utopia.” *New Scientist*, vol. 231, no. 3091, 17 Sept. 2016, p. 31.
- Sennett, Richard. *The Craftsman*. Penguin, 2009.
- Vehlken, Sebastian. “Die Unmöglichkeit Einer Insel Atomic Energy Islands Und Der Hydrogen Vector.” GfM Jahrestagung 2015. GfM Jahrestagung 2015, Oct. 2015, Bayreuth, University of Bayreuth.
- Vollers, Karel Jan. *Twist&Build: Creating Non-Orthogonal Architecture*. 010 Publishers, 2001.
- Wagenknecht, Antje. *Kiyonori Kikutake Als Wegbereiter: Visionen Und Realisationen Des Bauens Mit Dem Element Wasser*. Athena, 2012.
- Woods, Lebbeus. *War and Architecture = Rat i Arhitektura*. Princeton Architectural Press, 2002.