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Workshop WASEDA University x h_da

May 26, 2025











WORKSHOP | SCHEDULE

TOP 1 Opening Remarks

- short round of introductions of the individual parties

TOP 2 Presentations

- Professor Marcin Orawiec, Ina-Marie Orawiec (h_da / OX2architekten)
- Professor Kang (Seoul National University)
- Professor Kamiya (Waseda University)
- Professor Carla Susana Assuad (Norwegian University of Science and Technology)

TOP 3 Lunch

TOP 4 Students Presentations

- students from h_da / OX2architekten rethink*rotor // blade*stage // power*stage // Departure to Rotopia // Energy on the Water
- students from Waseda University

TOP 5 Closing Remarks

TOP 6 Campus Tour













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TOP 4 Student Presentations

学生発表







rcchini rocor





Student Concepts rethink*rotor

past and current integration into academic studies





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CreativeLAB rethink*rotor @ h_da | Integration into Teaching

- Used in various teaching formats
 - Design, construction & electives
 - Real-life research for students
 - Interdisciplinary & focused on reuse





rcthink rotor

HOCHSCHULE DARMSTAD

UNIVERSITY OF APPLIED SCIENCES

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CreativeLAB rethink*rotor @ h_da | Formats & Examples

- Bachelor & Master Design Studios
- Construction courses on blade systems
- Elective: Wind Energy & Rotor Blades
- Students from different semesters















CreativeLAB rethink*rotor @ h_da | Output & Next Steps

- Results feed into research and exhibitions
- Each project adds to our knowledge
- Students shape the future direction

And we are very proud that some of the students will now share their ideas!













rethink*rotor blade*stage

Draft project at h_da











blade*stage | Historical Context



- Start of coal mining in the Ruhr area in Germany in the early 1820s
- Since then coal burning is extremely harmful to the climate
- Powerful companies use lobbyism and financial loopholes





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blade*stage | Environmental Impact



- Destruction of entire villages and displacement of residents
- Irreparable holes left in the landscape
- Permanent use of pumping stations to keep the area dry















blade*stage | Political Shift

- Recognition of the dangers of climate change
- Shift from coal-facilitating laws to greener solutions
- Demonstrations to save villages from being destroyed







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blade*stage | Political Shift









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What does this have to do with rotor blades?





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TCCNINK FOCOL



blade*stage | Kimiko Festival Aachen

- Collaboration with rethink*rotor for a new stage design
- Spontaneous decision and initial renderings for the festival









rcthink rotor



blade*stage | Kimiko Festival Aachen

















blade*stage Concepts





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TCCNINK FOCOL



blade*stage | blade stadium 12 60















blade*stage | blade stadium 12 60







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rcthink rotor



rethink*rotor 日本



blade*stage | blade stadium 12 60



Die Rotorblätter werden mit je einer Halterung aus einem Kunststoff-Metall Verbundgewebe ummantelt. Halterung 1 besteht aus zwei formstabilen Hälften, die an den Enden miteinander verschraubt sind und gelenkige Zugseilanschlüsse besitzen. Halterung 2 hingegen ist einteilig und wird nur an der Oberseite verschraubt und mit Anschlüssen versehen. Die Innenseiten sind mit einem elastischen Kunststoff gefüttert.





Die "Wurzel" des Rotorblattes wird genau wie bei einem Windrad an einem Gegenstück mit Bolzen befestigt und verschraubt. Bei diesem Anschluss sind Mängel leicht zu erkennen und gut zu erreichen. Das Gegenstück, ein Ring aus legiertem Vergütungsstahl, ist mit der Armierung des Betonfundamentes verbunden und garantiert so eine feste Verankerung.









rcchink rocor





blade*stage | blade wave













rethink*rotor 日本

blade*stage | blade wave









rcthink rotor





blade*stage | blade wave

















current integration of research into academic studies





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power*stage | Project Goal & Approach

- Innovative reuse of decommissioned rotor blades and batteries in a circular economy to create a multifunctional open-air stage.
- Combines ecological engineering with cultural and social value to promote sustainability, climate action, and regional transformation.
- Recognized as a model project with the "Cultural and Creative Pilots Germany 2024" award





















TCCNINK TOCOL



power*stage inspired by rethink*rotor

Urban Planning – Sociology - Sustainability

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Fields of Study: Urban analysis, typoligization and localization, analizing socio- cultural impacts, defining sutainability criteria

Members:

- Ina-Marie Orawiec
- Vincent Orawiec
- Rick Opgenoorth
- Till Görgen
- Lina Achilles













Analyzing urban tasks







rcthink rotor



power*stage | analyzing urban tasks

- Rescource-friendly, resilient urban structures
- Promotion of denser, mixed-used regions
- Acieving long term sustainability goals
- liveable, economically efficient and socially just urban structures
- Integrative urban planning
- finding cultural hotspots













location finding and description







rcchini rocor



power*stage | location finding and description

Defining the **study area**:

the Rhineland region













power*stage | location finding and description

diadbach Rhein Kreis Neuss Kreis Rhein Erft Städteregion Apchen Cultural events – Open air Kreis Euskirchen



finding Attractions





opencast mining

wind turbines

rctnink rocor







power*stage | defining typologies



rural

Military succession landscapes, cultural loss landscapes, open-cast mining













defining sustainability criteria











power*stage | defining sustainability criteria



ressource conservation, accessibility, waste management, energy efficiency, environmental impact, water consumption

long-term use, local economic development, cost benefit ratio, subsidies and sponsoring

education and sensitization, inclusion and accessibility, community development, health and safety

innovation and design, flexibility, image and marketing, certification and standards













analyzing socio-cultural impacts










power*stage | analyzing socio-cultural impacts



Creating a **system** rather than an event











power*stage | analyzing socio-cultural impacts







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power*stage

Tangible Focus Points

Structural Innovation

load-bearing capacity fire protection compliance

Reuse of Materials

rotor blades as components lithium-ion batteries as anchors

Cultural Venue

physical stage infrastructure

Economic

jobs created cost-efficient material reuse

Intangible Focus Points

Sustainability

promoting the circular economy reducing waste

Cultural Enhancement

boosting the creative and cultural scene

Festival Success

social connection audience engagement

Regional Development

strengthening the identity and innovation of the Rhineland



















rctnink rotor



power*stage inspired by rethink*rotor

Architecture – Construction – Structural Design – Sustainability – Energy Fields of Study: Mechanical Engineering, Civil Engineering, Architecture, Environmental Engineering

Members:

- Lina Achilles
- Prof. Dr. Andreas Büter
- Savino Daragone
- Michael Freudel
- Niklas Haderlein
- Friedolin Herter
- Jamil Khoder
- Rick Opgenoorth
- Dr. Matthias Oppe
- Sercan Tozan











rethink*rotor 日本



Construction | Analysis











power*stage | Analysis - Student Drafts as fundamental models

1 - "Fan"



2 - "Water Lily"



3 - "Seashell"



4 - "Mine"





rethink*rotor 日本

6 - "Kite"













power*stage | Subject-specific analysis of stage concepts

rethink*rotor 日本



Membrane "linearly supported" Rotor blades then as "bending beams"

Department of Civil Engineering





Vorteile:

Nachteil









power*stage | Evaluation matrix

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- Evaluation matrix developed as part of a research project
- Supports selection and optimization of stage design models
- Based on ecological and economic sustainability criteria
- Applicable in architecture, urban planning, and engineering contexts





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power*stage | Advanced evaluation matrix

- Advanced evaluation matrix based on the first qualitative matrix
- Systematic assessment and selection of stage models
- Uses a quantitative approach with weighted scores
- Allows for more objective comparison between different designs

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Construction | Structural Concept













Rotor Blade Clamp -System for Transportation

















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Merle Steiner











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power*stage | Mechanical Engineering - Calculations













power*stage | Facade principle

Tensioning with Tie Straps (Membrane Connection)

- High flexibility / adaptability
- "One size fits all" solution
- Simple / flexible installation
- Cost-effective solution that can be adapted to various rotor blade sizes







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power*stage Tools of research

Integrating AI into the power*stage Project





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power*stage | From Analog Design to Al-Augmented Research

- Traditional tools: Sketching, modeling, prototyping
- Complexity of reused rotor blades challenges conventional methods
- Need for support in structuring, visualizing, and iterating ideas







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power*stage | Challenges That Prompted AI Integration



- Rotor blades have irregular shapes
- Hard to calculate loadbearing behavior
- Al doesn't understand reuse ideas yet
- Al-generated designs are often not realistic





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power*stage | Why Al?

- Helps with geometry and idea development
- Speeds up iterations and variations
- Supports teamwork and cross-discipline exchange
- Improves communication and documentation







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power*stage | Our Main Goal

pow • Dra	er*stage Al bot 🐥
\sim General	information
Name *	
power*	*stage Al bot
Descript Describe w the agent's	tion what the AI agent does for the user. This is for the user's information only and will NOT be included in Auto fill v system instruction.
l know you wa	everything about rotor blades and I know what you want to do with it before you know what ant to do with it
Categor Help you o Design	rganize your Al agents. You can assign an Al agent to multiple categories.
power'	*stage inspired by rethink*rotor
	Profile Picture Enter the AI agent's profile picture URL https://www.typingmind.com/assets/ai-characters/oakley.webp

- Understand blade shape and structure
- Create new design ideas
- Turn text into clear image prompts
- Help improve small details in designs













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power*stage | Integration into Teaching

- Elective course: "A New Life for Rotor Blades power*stage tries AI"
- Interdisciplinary student involvement from architecture and interior design
- Al becomes part of academic experimentation and reflection
- The course trains a reusable AI agent for future project phases
- Ongoing feedback from students contributes directly to the research











power*stage | Week 1–4: Understanding Tools & Rotor Geometry

- Introduction to Typingmind and prompt workflows
- Deep analysis of rotor blade shape and structure
- Joint testing: AI → student iterations
- Exploration of language, tone, and detail depth in prompting

Im besten fall sollte an der ursprungsgeometrie der Rotorblätter nicht verändert werden. Wie du bereits sagtest ist die verarbeitung schwierig und schränkt die statischen eigenschaften sehr ein.

Wenn die ursprüngliche Geometrie der Rotorblätter unverändert bleiben soll, eröffnet das interessante Möglichkeiten und Herausforderungen für deren Anwendung in der Architektur unter der Berücksichtigung ihrer bestehenden strukturellen und ästhetischen Merkmale. Hier sind einige Überlegungen und Ideen, wie solche Blätter verwendet werden könnten:

Konzeptionelle und Praktische Anwendungen

- Freitragende Überdachungen: Die aerodynamische Form und Festigkeit der Blätter können genutzt werden, um freitragende Überdachungen zu schaffen. Diese könnten zum Beispiel für Open-Air-Strukturen wie Bushaltestellen, Marktplätze oder Fahrradunterstände verwendet werden.
- 2. **Pavillons oder Lauben**: Mehrere Rotorblätter könnten so angeordnet werden, dass sie einen Pavillon oder eine Laube bilden. Dabei nutzen sie die gebogene Form der Blätter zur Schaffung eines geschützten Bereichs.
- Fassadenverkleidung: Die Blätter könnten vertikal oder diagonal an Fassaden installiert werden, um einen modernen, nachhaltigen Look zu erzeugen, möglicherweise mit zusätzlicher Funktion als Sonnenschutz.
- Brücken- oder Laufstegstrukturen: Die Länge und Festigkeit der Blätter erlauben ihren Einsatz als tragende Balken oder Deckstrukturen in schmaleren Brücken oder Gehwegen.





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power*stage | Week 5–8: Design Generation and Feedback Loops

- Concept development using Al support
- Generative image production (e.g., Midjourney, LeonardoAI)
- Al-supported design refinements
- Development of a visual vocabulary and design language

Februar 2024

Midjourney Bot 🛩 BOT heute um 10:49 Uhr

Photorealistic image of a music festival stage at night, showcasing an innovative design where the roof structure is creatively constructed from repurposed white wind turbine blades. These blades arch over the stage, covered by a vibrant orange membrane that glows under the night sky. The scene captures a massive crowd in the foreground, with many attendees recording the moment on their smartphones, adding a dynamic, contemporary feel to the atmosphere. Onstage, a band performs energetically, illuminated by an array of bright spotlights that not only highlight the performers but also cast dramatic beams into the night sky above. In the backdrop, silhouettes of wind turbines blend seamlessly into the landscape, echoing the sustainable theme of the stage's design. The entire setup is bathed in a mix of artificial light from the stage and a subtle moonlight, enhancing the contrast and colors of the festival scene. ---v 6.0 ---style raw - @pitches_team3.61120 (fast)







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power*stage | Week 9–12: Workflow Building & Documentation

- Development of a full design-AI workflow
- Critical review: what worked, what didn't?
- Documenting the training process
- Preparing a reusable Al assistant for future use















power*stage | AI Tools (in Use) in Research

- ChatGPT & Perplexity: text support and idea writing
- **Typingmind:** control center for AI prompts
- MidJourney & LeonardoAI: image generation
- Kaedim & Sloyd.Al: 3D modeling tools
- BricsCAD & ArkoAI: structural simulations
- ClickUp & awork: project organization













power*stage | Design Workflow & Methodology

- Ping-Pong method: we talk with the AI, it answers, we react
- Prompts are part of the creative process
- We track mistakes and improvements
- Learning is more important than perfect results







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rethink*rotor Departure to Rotopia

Master draft project at h_da











Departure to Rotopia | Master project

















Tuvalu

- Archipelago, consisting of 9 islands
- "fourth smallest country in the world"











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Tuvalu

- approx. 3700km from Australia
- approx. 26km2 total area
- approx. 10,000 inhabitants with a density of 431 inhabitants/km2
- Parliamentary monarchy represented by King Charles 3.







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- The highest elevation is less than 5 meters. Due to rising sea levels, this state is also in danger of sinking.
- Due to the circumstances, the government tried to apply for asylum for the inhabitants of Tuvalu in Australia and New Zealand.
- Around 300 people were to be resettled each year. However, the application was rejected.







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Can we design an adequate replacement for the residents?







TCChini Totor


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Resident Design | Rotopia

by Sara Sürmeli Priscilla, Hussaini Fatma, Kübra Gülseven











Rotopia | Concept Visualisation















Rotopia | Modularity













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Rotopia | Urban planning



Applied strategies:

- appropriate culturally urban planning
- structured zoning
- accessible to all
- lively city edges
- integration of the airport
- representative mountain





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Resident Design | Concept Arche Tuvalu

by Felizitas Dochantschi, Giulia Migliorini, Lesley Saszawa











Arche Tuvalu | Concept Visualisation















Arche Tuvalu | Concept Visualisation













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Arche Tuvalu | Masterplan







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Arche Tuvalu | Island Construction





Plates

Grid

Lawn

Grid

Grid















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A new life for rotor*blades Energy on the water

Elective subject at h_da





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Energy on the water | WASEDA University x h_da















Energy on the water Analysing the energy supply in Japan







TCCNINK TOCOL



Energy on the water | Energy supply in Japan

- heavily dependent on energy imports (has hardly any natural raw materials of its own
- covers its energy needs with a combination of different energy sources
- vulnerable to price fluctuations and geopolitical risks
- makes the country susceptible to global market changes















Energy on the water | Investment in Renewable Energies

- Plans to make renewable energies as its main source by 2040
- Investing heavily in green hydrogen to partially replace crude oil
- Focus on recycling, circular economy, recovery of metals, further development of raw material extraction in the deep sea areas
- huge potential for geothermal energy due to its volcanic activity
- Basic Energy Plan (2021)
 - Reduction of fossil fuels: share of coal and gas to fall to 41% by 2030
 - Increase in renewable energies: Target: 36-38 % by 2030
 - Nuclear energy revitalisation: In the long term, it should once again account for 20-22 % of the energy mix
- Japan is committed to becoming climate neutral by 2050











Energy on the water | Comparison

- Philippines
 - o Geothermal energy and hydropower approx. 82% of electricity generation
 - Solar and wind energy still underdeveloped
- Indonesia
 - o fossil resources (coal)
 - o only utilises geothermal potential to a limited extent
- Taiwan
 - o High Import dependency (~98%)
 - o Planned phase-out of Nuclear energy by 2025
 - o growing share of renewable energies (lack of space)
- South Korea
 - similar Import dependency to Japan (~90 %)
 - Nuclear energy and fossil fuels
 - o growing investment in renewable energies











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Energy on the water | Geographical Framework conditions



- Interface of several tectonic plates, causes high level of seismic activity
- High risk of earthquakes, tsunamis, flooding of coastal areas, land-/rockslides











Energy on the water | In connection with wind power

- Steep, by mountains characterised Landscape and Natural Disasters makes construction of onshore wind turbines difficult
- Ideal conditions for offshore wind power in coastal regions

• Theoretical potential of over 9,000 terawatt hours per year from offshore wind energy











Energy on the water | Political Framework conditions

- Heavy criticism of Nuclear power after disaster in Fukushima (2011)
 - o shut down of many Nuclear power pants
 - Increasing dependence on fossil fuels, energy imports
 - recommissioning of nuclear power plants, to stabilise the energy supply
- Plan is to, shut down nuclear power plants completely and expand renewable energies

- Increased focus on diversifying energy sources in order to minimise geopolitical risks
- Possible solution: Offshore wind power, expansion of hydrogen technology











Energy on the water | Technological Framework conditions





- electricity grid was not originally designed for a high feed-in of renewable energies
- Network infrastructure requires modernisation
 - energy storage, smart grids, load management





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Energy on the water | In connection with (Offshore) wind power

- Increased Investment in offshore wind power, as the technology becomes more mature
- Floating wind turbines, can be installed in deep waters where fixed foundations are not possible
- Could play a central role in Japan's energy supply







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Energy on the water | Evaluation of existing floating platforms





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Iniversity

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Energy on the water | Floating Platforms: Key Types

- Semi-Submersible
 Platforms
- Spar Buoy Platforms
- Barge Platforms
- Tension-leg Platform















Energy on the water | Required wind turbines to fully power Japan

- Annual consumption Japan approx. 950 TWh
- around 31,667 offshore wind turbines, each with a capacity of 8 MW

(calculations depend on Weather conditions, wind speed, efficiency)













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Energy on the water | Existing wind Farms in Japan

- Setana Wind Farm (Hokkaido), since 2004
- Sakata Offshore Wind Farm (Yamagata), since 2005
- Wind Power Kamisu (Ibaraki), since 2008
- Fukushima Floating Wind Turbine (Fukushima), since 2013
- Noshiro Port and Akita Port (Akita), since 2022
- Ishikari Bay (Hokkaido), since 2023

















Energy on the water Student Concepts







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Energy on the water | Windfarms



- Offshore wind farm off Japan's west coast, with lower tsunami risk
- Floating foundations made from decommissioned rotor blades and recycled rubble
- Dual function as buoyant structure and reuse of wind turbine components
- Triangular shape for stability and efficiency
- Integrated circular rescue station for safety and frequency optimization





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Energy on the water | Student Concepts







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Energy on the water | Student Concepts







- OFFSHORE SOLAR/WINDPARK





perspective







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Student Concepts | Tripod Design











Energy on the water | Offshore Concept: Tripod Design





The supporting substructure of the turbines is based on a tripod design to achieve high stability and low material consumption







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Energy on the water | Offshore Concept: Tripod Design





Energy on the water | Offshore Concept: Triangular Design



- Typhoon-resistant design
- Reduced surface for wind/wave impact
- Tsunami and earthquake resilience
- Tsunami and earthquake resilience
- Reduced surface for wind/wave impact







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Student Concepts | Hexagon Design










Energy on the water | Offshore Concept: Hexagon Design





Energy on the water | Offshore Concept: Polygonal Design





Marius Noé











Energy on the water | Offshore Concept: Polygonal Design







Student Concepts | Hydrogen - Hexagon







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Hexagonal modules can be flexibly expanded and combined as needed.







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Melanie Maria Mayer

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regulation.



The main components include

Rotor blades, - Floating bodies











A modular floating platform was specifically designed for disaster relief and emergency response.







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