

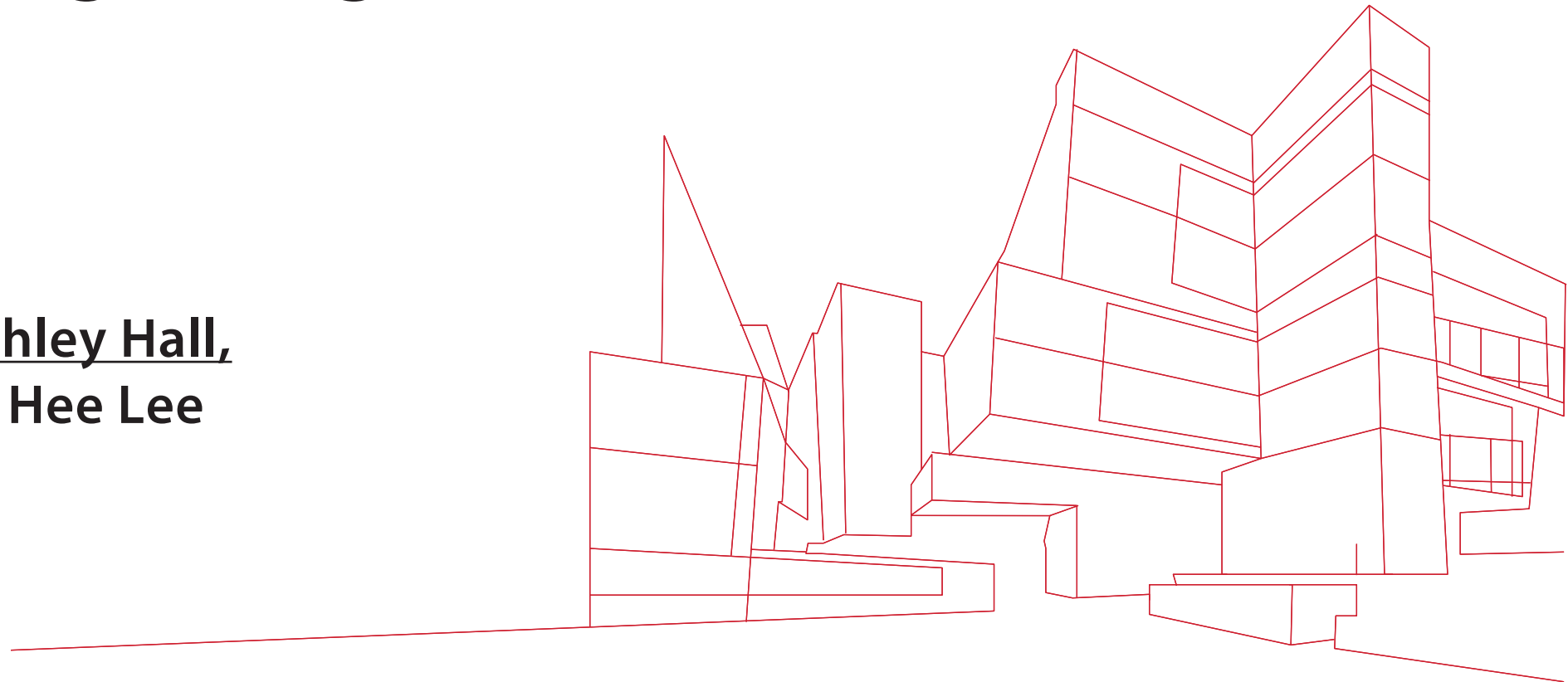
London, UK

Collaborating Design Risk

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Mike Kann, Change Hee Lee



Royal College of Art
Postgraduate Art and Design



Collaborating design risk:

- Collaboration between the Royal College of Art and the Lloyd's Register Foundation
- Common intent to foster a new attitude and culture to reduce risk to lives at sea
- Innovate into the maritime culture based on "Grandfathering"
- Explore new methods for tackling design risk

Design research group: 6 Researchers and 32 postgraduate students in 8 project teams from 10 disciplines (Innovation Design Engineering, Information Experience Design, Global Innovation Design, Visual Communication, Design Products, Service Design, Vehicle Design, Design History, Architecture and Sculpture)

Duration: 8 months



Grand challenge strategy:

Two challenges selected to explore diverse application of design for safety:

1. Safe Ship Boarding (ship's pilot transfers)

How design thinking can tackle practical focused safety challenges and develop solutions for implementing today.

2. Thames Safest River 2030

- How design thinking can tackle broad strategic future design safety challenges for future river safety conditions.

1. Safe ship boarding: Pilot ladder incident



Ship transfer issues:

- Grandfathering culture
- Under reporting of incidents
- Lack of trust in equipment
- Safety critical activity
- 30,000 pilot transfers per year in London alone
- Without pilots guiding ships into port London only has 3 days of petrol and 4 days of food

1 in 100,000 ship to ship transfers result in a serious incident in one UK area alone

Lloyds Register 15-20 serious incidents a year across its activities

2. Thames safest river 2030:



The busiest lifeboat station in the UK is on the river Thames

RNLI Business plan aims to:

Reduce drowning's in UK and Ireland by 50% by 2024

Findings extracted from the RNLI Thames Strategic Report:

Frequent low casualty incidents

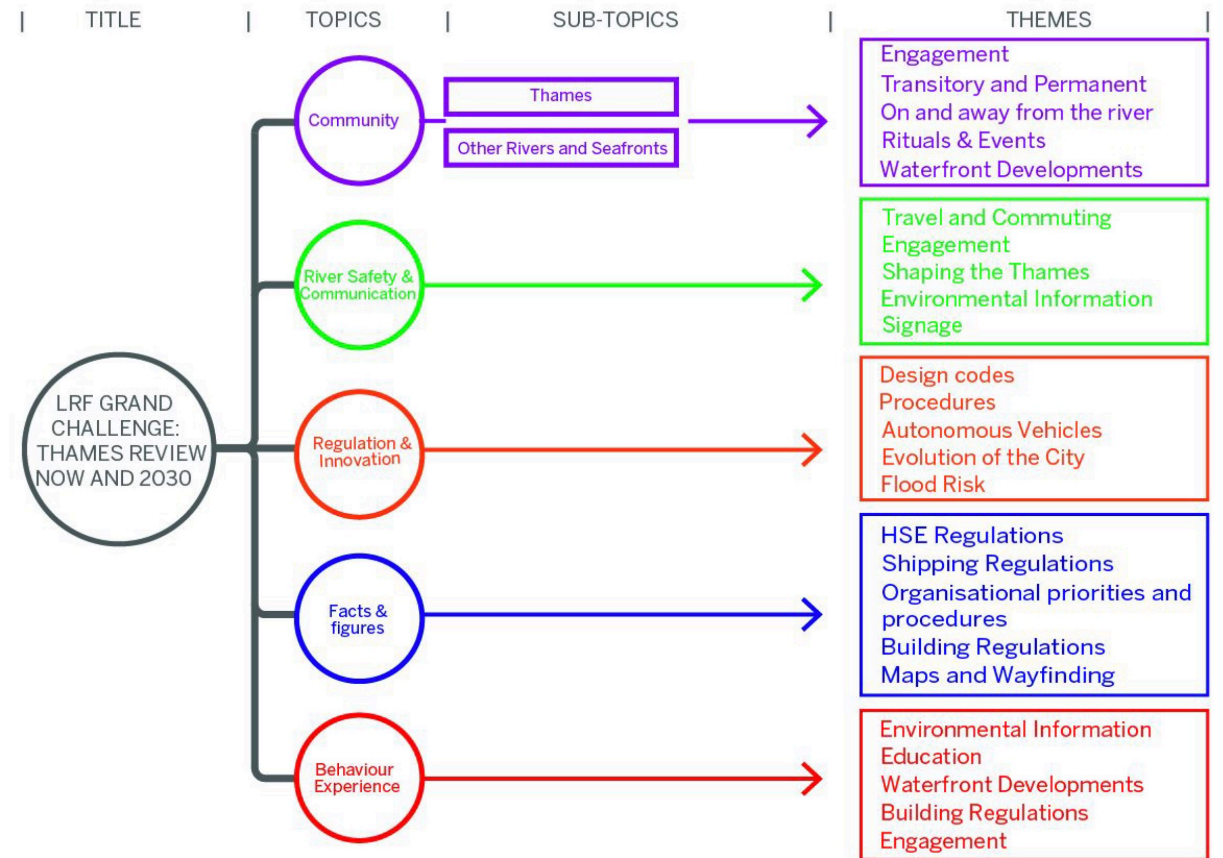
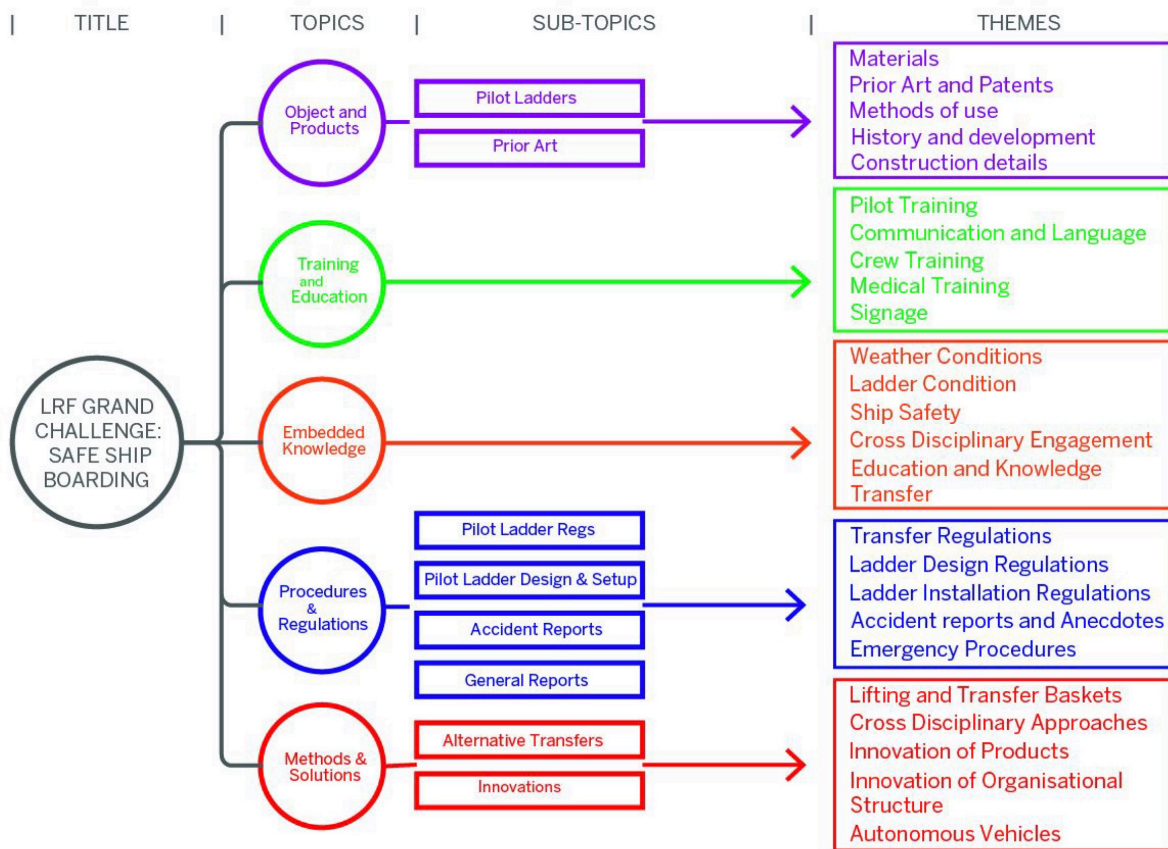
- Drunken and accidental falls
- Suicides

Infrequent high casualty scenarios

- Mass transit accident/terrorism
- Climate related flooding events

River Thames: 245 people rescued in 2015 (fill three double decker buses). 300 suicide attempts, 20 successful. Population increase the size of Birmingham between Tower and Gravesend by 2030. River journeys up from 8.5m-12m by 2020.

Mapping literature:



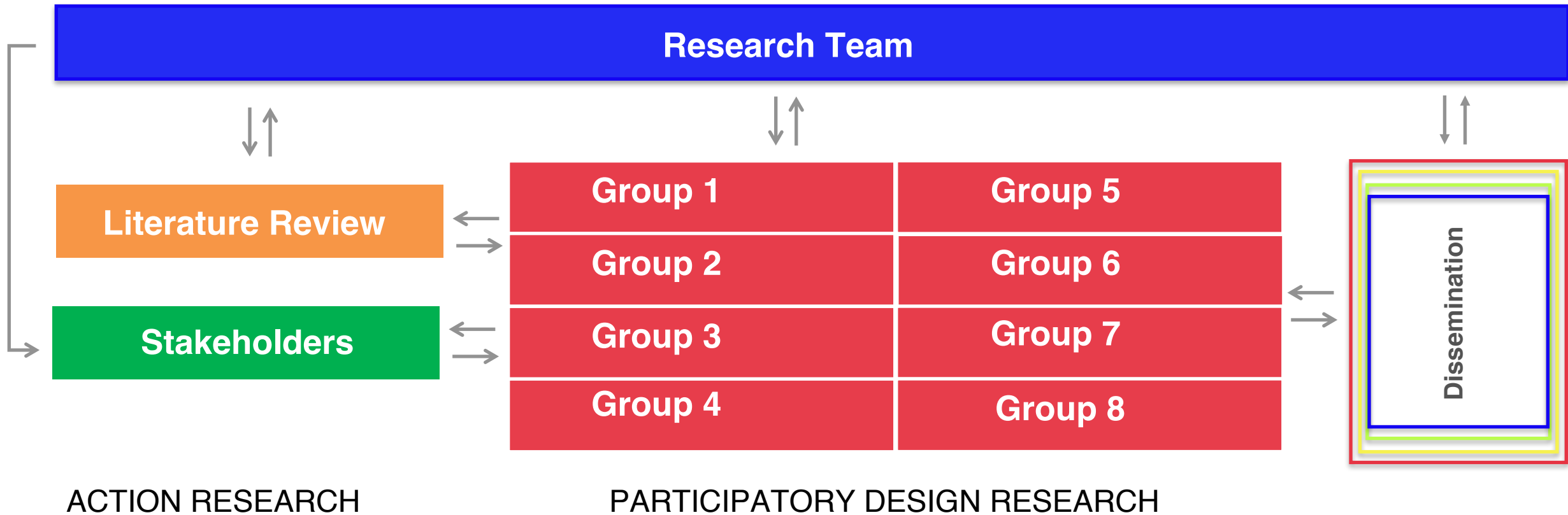
Literature mapped for design led innovation supporting project context and challenge topics structure influenced by Arup & Rockefeller model

Key literature:

- **Arup & Rockefeller Foundation:** City resilience index, with interdisciplinary communities engaged to tackle complex problems.
- **Ovink:** Rebuild by Design, Designing mixed communities to co-design for climate change producing an inclusive culture of safety combining infrastructure and society.
- **Thames Tideway:** Building a sense of community, ownership and membership.
- **Niedderer:** Ambition of shifting a culture of procedures to proactive behaviour that supports responsibility via participation, perception of H&S from a human perspective.
- **Hofstede:** Cultural dynamics in safety environments, A high power distance Index crew member is less inclined to question a senior authority figure even when they feel there is a safety issue taking place.

Require new methods to generate mixed stakeholder communities to design for safety?

Methods:



Hybrid Method: To deal with the complexity of the project - different expertise levels, cultures and approaches to the topic - used a hybrid method that interfaced Participatory Design and Action research

Project: Cross Lock System (CLS)



Collaborating Design Risk: Ferrarello, L, Hall, A., Kann, M, Hee-Lee, C.



Design Team: Andrea Carrera, Madelaine Jane Dowd, Mikhal Wertheim Aymes, and Sarah Cronin Rodger

Project: Cross Lock System (CLS)

Key points the students analysed and transferred to the project as design strategies:

Observation:

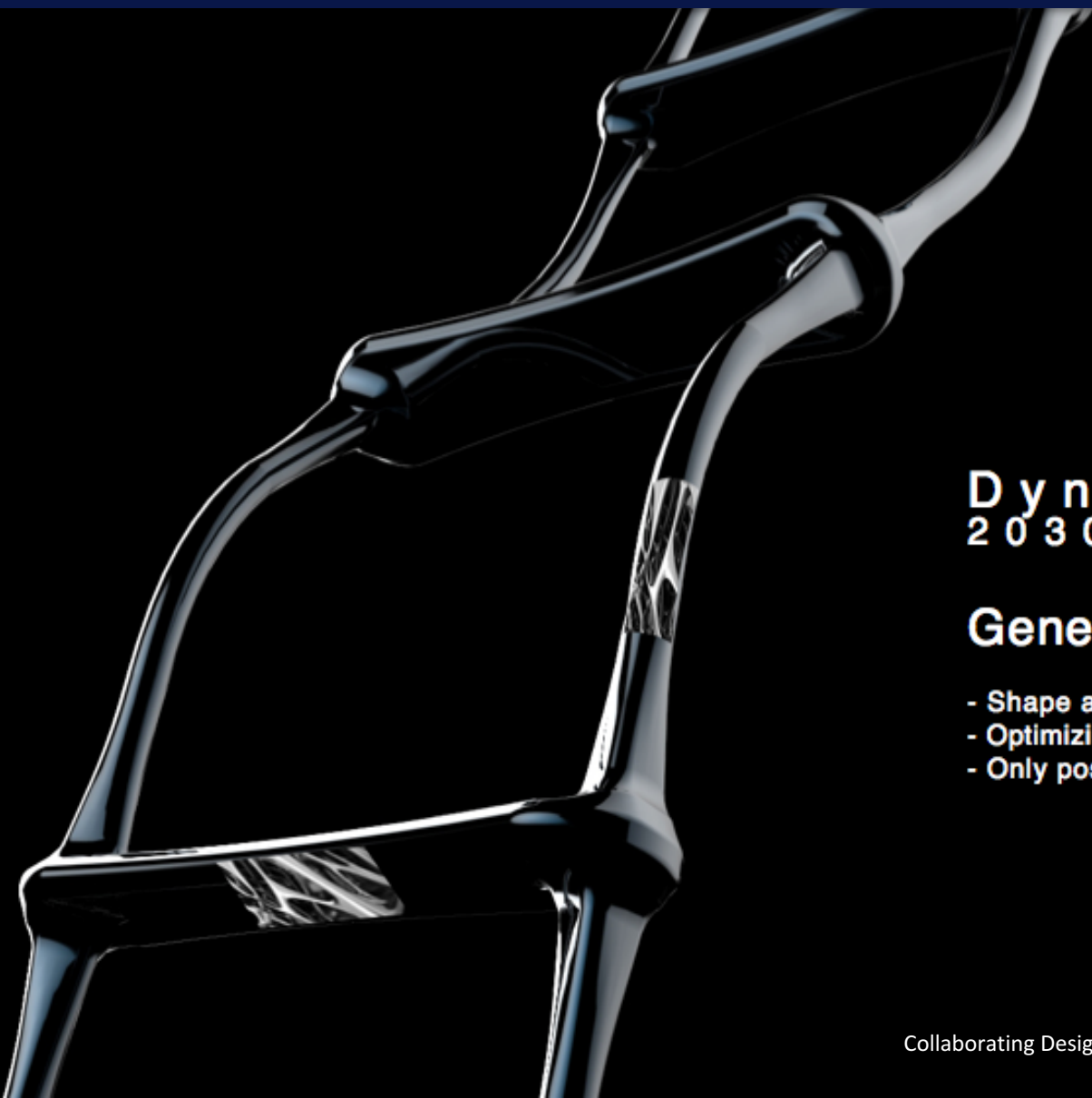
By researching articles, social networks and interviews to experts students decided to focus on rigging ladders. This being one of the most common problems found through CHIRP research and students understood a new rigging mechanism could be the best easiest and fastest way to increase safety.

Visual Communication for increase confidence:

Global diversity of maritime languages, culture and knowledge requires new visual communication media capable of crossing language barriers to enhance confidence in equipment.

Project: Dynaweb

Design Team: Irene Chiu, Chia Cheng Huang,
Chih Hsing Huang, Nick Hooton



D y n a w e b
2 0 3 0

Generative design

- Shape and structure optimization
- Optimizing for strength, weight, flexibility
- Only possible with additive manufacturing

Project: Dynaweb

Key points the students analysed and transferred to the project as design strategies:

Observation: Students have been exposed to the ship transfer problem via field trips at the RNLI and PLA facilities between London, Poole and Gravesend. This helped sharpen the sense practical observations.

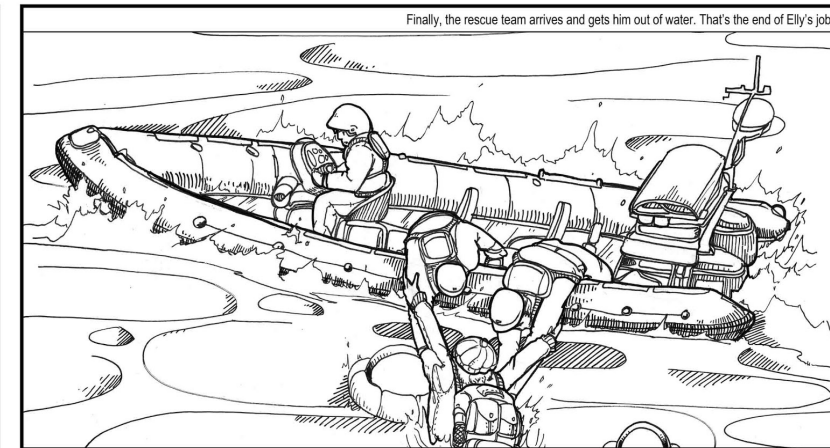
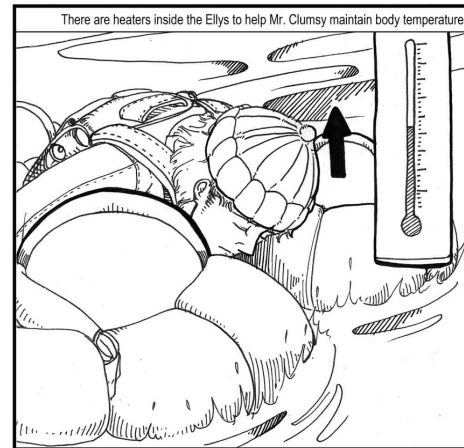
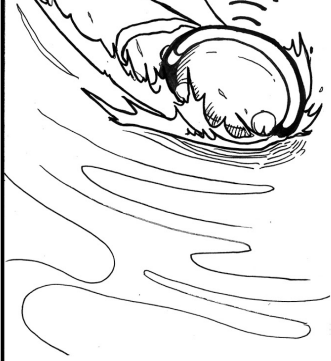
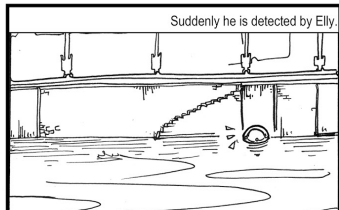
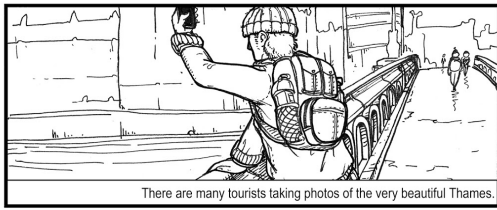
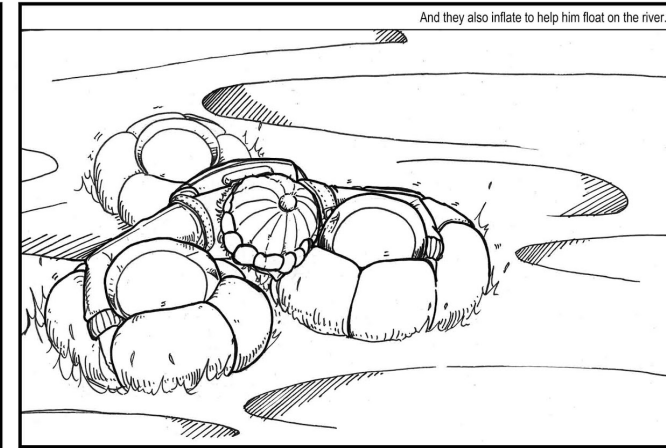
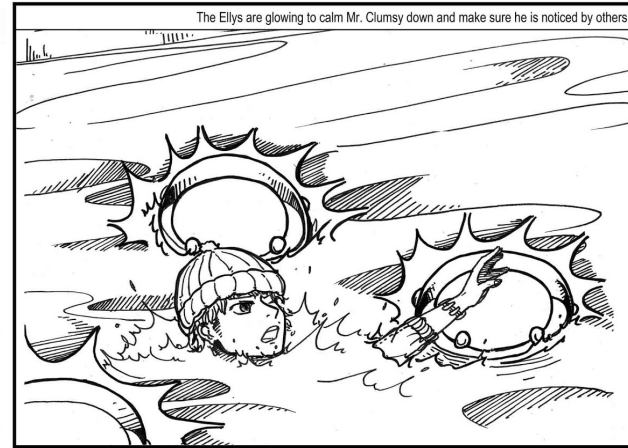
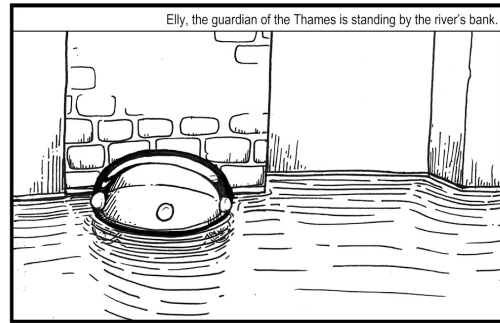
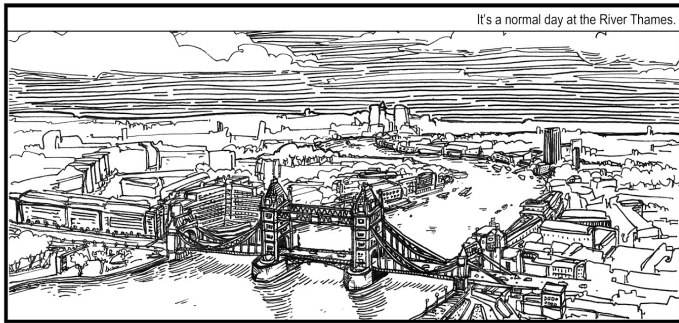
Participation: To develop and execute the prototypes students worked in collaboration with pilots from the IMPA with prototype production supported by Autodesk

New Ladder Materials: Dynaweb rethinks marine construction through a generatively designed composite flexible-rigid behavior that allows the ladder to flex and be stored easily. In addition the flexible-rigid ladder is much lighter than the current design.

Perception: As the group understood the importance of the pilot's perception of solidity, they also designed the ladder visual interpretation through shape and coloration.

Project: Elly, water robots that save lives

Design Team: Dongyuan Li, Xiaoyi Hu, Yang Gao, Yikun Wang



Project: Elly, water robots that save lives



Project: Elly, water robots that save lives

Key points the students analysed and transferred to the project as design strategies:

Prevention over intervention:

Understanding the value of monitoring the behaviour of the river, from the community that regularly is engaged with it to the one that occasionally visits the river.

River ecology:

The students researched the daily changing states of the river and how this increases difficulty in search and rescue procedures.

Team Work:

Elly adds new team members in risk prevention and intervention by using robots to make to collaborate rescues.

Conclusions

Key Findings:

- Design as medium that collaborates and engages diverse expertise, skills and interests to tackle complex problems.
- Complexity proved to be a strength rather than a barrier for the capability of bounding the system of elements that supported the project.
- Project became an ecosystem where knowledge was exchanged across fields.
- Allowed methods to emerge through design research practice and development of stakeholder engagement.
- Participants co-designed safety strategies that understand the technology-behavioural context and the people acting within it.
- Through participation, engagement and experience the project stakeholders co-designed a framework based on mutual responsibility.

Development:



Collaborating Design Risk: Ferrarello, L, Hall, A., Kann, M, Hee-Lee, C.

LR Global ships marine pilots reviewed findings.

Projects exhibited at LRF Foundation London; IMPA conference HMS Wellington Thames, London; LR Global Technology Centre Southampton; RNLI Headquarters Poole, Dorset.

Dynaweb and CLS awarded Best Business Award with seed funding to develop design and technologies for IP and commercial partnerships.

Dynaweb shortlisted for 2017 Seatrade award.

QUESTIONS

Download full digital report from RCA repository:

<http://researchonline.rca.ac.uk/2854/8/LRF%20Report%2020170613.pdf>

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