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Accelerating Innovation

An action research approach for PhD research

Gomez Beldarrain, G.; Toet, A.S.; Nieuwborg, A.B.D.

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Accelerating Innovation
An action research approach for PhD research within the Royal Schiphol Group

Gomez-Beldarrain, Garoa; Toet, Aniek; Nieuwborg, Alexander B. D.
Delft University of Technology, The Netherlands
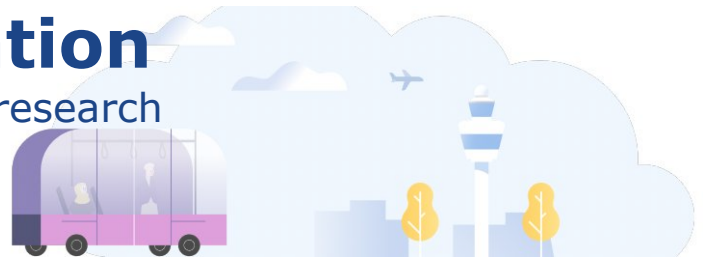
Context

This poster presents the "Accelerating Innovation" programme, a set up for three PhD research projects that was created within the collaboration between the Royal Schiphol Group (RSG) and the Industrial Design Engineering faculty of the TU Delft. Following the ambition of creating the world's most sustainable, high-quality airports, the RSG aimed at exploring processes, technologies, applications, and travel modalities that help create seamless travel experiences in a sustainable, resilient, and multimodal transport hub, challenge in which researchers from the IDE faculty were engaged.

With this collaboration, the focus was set on three challenges that do not only serve the interests of these two institutions, but are of great importance to current and future mobility challenges within society. Namely, a PhD research project (detailed below) was assigned to each of the following topics: (1) designing towards pandemic antifragility in Multimodal Transport Hubs (MTHs); (2) transforming Airport Hubs into passenger-oriented MTHs, and (3) investigating the adoption of autonomous processes in the context of organizations. Researchers at the IDE faculty are capable of dealing with such topics by adopting methods from design research and research through design, by embracing the inherent complexity within the challenges, and by developing practical solutions. An action research methodology is followed in the projects, meaning that the PhD researchers are embedded in the organization and will actively participate in daily practice and projects.

PhD projects

PhD Research on Designing towards Pandemic Antifragility in Multimodal Transport Hubs
[PhD candidate: Alexander Nieuwborg, started in December 2020]

The COVID-19 pandemic exposed existential fragilities of the civil aviation industry and their MTHs. To prevent future Black Swans, high impact and surprising events which are only predictable in hindsight, interest emerged in becoming "resilient". But what does resilience mean? As multiple interpretations exist, the first study aimed to create concept clarity by conducting a scoping review. This resulted in a categorization of resilience into four reoccurring aspects: fragility, robustness, adaptation, and transformation. When overlaying the aspects of resilience over the civil aviation industry and the COVID-19 pandemic, a transformative (or antifragile) approach seems significantly underdeveloped but of existential value for overcoming future disruptions. This lead to following research question: "*How to design towards pandemic antifragility in MTHs?*" The second study delved deeper into the lessons learned from an Dutch airport system during COVID-19. Some key takeaways emphasize the need for a more systemic approach across stakeholders, increased sensemaking and informal relation-building. A current, ongoing study aims to operationalize learnings from the first and second studies using serious gaming. The underlying goal is to explore how a systemic approach, increased sensemaking, and the use of the categorization of resilience can improve complex organizations in dealing with looming Black Swans.

STUDIES

1) Scoping review: what does resilience mean?

A Categorization of Resilience — Fragility, Robustness, Adaption, Transformation
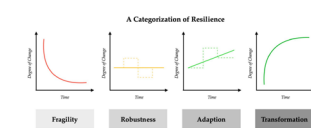
2) Lessons learned during Covid-19

3) Dealing with Black Swans through serious gaming

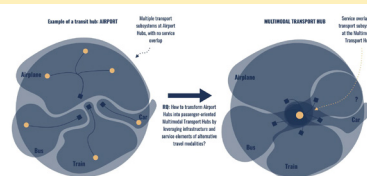Supervising master graduation: antifragility in emergency care

PhD Research on transforming Airport Hubs into passenger-oriented Multimodal Transport Hubs
[PhD candidate: Aniek Toet, started in August 2021]

This PhD approaches the transformation of Airport Hubs into MTHs. This originates from previous research that indicates that future mobility systems most likely will incorporate more multimodal journeys. These multimodal journeys integrate multiple modes of transport, and their higher future prevalence highlights the importance of paying attention to the modality transfers within journeys. To carefully facilitate these transfers, the PhD advocates the creation of passenger-oriented MTHs, which integrate both infrastructure and services of multiple travel modalities to ensure high-quality transfers between the different modes of transport. Airport Hubs unite the infrastructure of multiple travel modalities and already provide high-end integration for air travel. However, integrated services for high-quality transfers between different travel modalities at Airport Hub are very limited in practice. The focus of the research is captured in the following research question: "*How to transform Airport Hubs into passenger-oriented MTHs by leveraging infrastructure and service elements of alternative travel modalities?*" Interesting insights so far point to themes that stimulate or thwart the transition of an Airport Hub into an MTH.

STUDIES

1) Scoping review: transforming Airport Hubs into MTHs

2) Themes for an Airport Hub in the transition towards an MTH

Supervising master graduations: selecting new travel modalities; future vision on MTHs; enhancing bimodal transfers

PhD Research on Investigating The Adoption of Autonomous Processes in the Context of Organizations
[PhD Candidate: Garoa Gomez-Beldarrain, started in September 2022]

The technological enablers for process automation have experienced a fast-paced development in the past decades. In organizations, the adoption of autonomous technologies could bring many benefits, as they offer the potential to increase the efficiency and precision of operations, to compensate human workers' limitations in uncomfortable physical tasks, or to reduce labor-related costs. Nevertheless, new challenges emerge when implementing autonomous technologies in organizational processes (e.g., human element issues, new weaknesses within the system, or emerging regulatory, liability, and security concerns), which make adoption hard to achieve.

The RSG is working towards the implementation of autonomous operations in the airside of Amsterdam Airport Schiphol. Schiphol's airside (i.e., the side of an airport terminal dedicated to supporting airplanes and their inherent baggage, passenger, and resource flows) is a multi-stakeholder ecosystem, characterized by high degrees of instability, uncertainty, and unpredictability, which makes it a specially complex and worth studying context for automation. As a first study, the PhD will be inquiring about the organizational tensions and implications that currently hinder the adoption of autonomous processes. Once those tensions mapped, intervention studies will be proposed with the aim to design and validate strategies that leverage them and facilitate a sustainable implementation of the technology.

STUDIES

1) Framing organizational imaginaries around automation

Supervising student project: automating the odd-size baggage process

Supervising master graduation: framing task delegation for human-robot collaboration (image: Jeongha Joo)
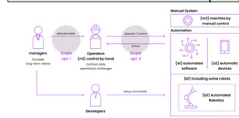
2) Intervention study: co-creating a strategy to implement autonomous processes

Considerations

ACTION RESEARCH
Action research is considered a suitable method for gaining insider knowledge of an organization, since it stimulates researchers to become part of the object of study:

- Trying to change their environment is the best way for researchers to understand it (Greenwood & Levin, 2007)
- Data will be gathered "through active involvement in the day-to-day organisational processes relating to the project" (Coughlan, 2002, p.231).
- The action research approach is about "research in action, rather than research about action" (Coughlan, 2002, p.222),
- The PhD researchers will inquire about their research questions by proposing interventions

TRANSDISCIPLINARY PRACTICES
The context and topics of research require the PhD researchers to collaborate with agents from different disciplines, institutions, and positions within the organizations.

- Multi-stakeholder ecosystem
- Multidisciplinary knowledge fields required to collaborate; PhD supervision teams were created accordingly
- The PhD topics represent wicked, multidimensional, and systemic problems

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Author(s): Gomez-Beldarrain, Garoa; Toet, Aniek; Nieuwborg, Alexander B. D.

WHAT GOT US HERE WON'T GET US THERE

BILBAO
The Discipline of Design – transdisciplinary practices

What Got Us Here, Won't Get Us There

Accelerating Innovation: An action research approach for PhD research within the Royal Schiphol Group.

Garoa Gomez-Beldarrain [a*], Aniek Sara Toet [a], Alexander Bruno Delphine Nieuwborg [a]

[a] Technische Universiteit Delft, The Netherlands
*Corresponding author e-mail: g.gomezbeldarrain@tudelft.nl

Abstract: This poster presents the "Accelerating Innovation" programme, a set up for three PhD research projects that was created within the collaboration between the Royal Schiphol Group and the Industrial Design Engineering faculty of the TU Delft. With this collaboration, researchers from the IDE faculty were engaged in three challenges: (1) designing towards pandemic antifragility in Multimodal Transport Hubs (MTHs); (2) transforming Airport Hubs into passenger-oriented MTHs, and (3) investigating the adoption of autonomous processes in the context of organizations. An action research methodology is followed in the projects, meaning that the researchers are embedded in the organization, and actively participate in daily practice. This poster presents the scope of the three projects, as well as the studies and academic supervision tasks that the researchers have undertaken until now; we hope to contribute with an example of action-research oriented PhD projects, which could serve to ilustrate transdisciplinary research perspectives.

Keywords: Action research, airport hub, design research

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