

# PhD in Transport and Mobility Systems

## Summary

The Institute for Sustainable Futures are pleased to announce that we are seeking applications for one PhD student to join our Joint PhD program with the Technische Universität Berlin (TUB): 'Transport service towards 2050: shaping an innovative mobility paradigm'.

A joint PhD program is one where candidates undertake a jointly supervised program between two universities. Candidates are enrolled in a primary institution, in this case UTS, and complete their first year requirements ahead of going to the secondary institution TUB for a minimum of one year. The candidate completes one thesis in English and undergoes a single examination process agreed by both institutions. At completion of the doctoral assessment process, candidates receive one testamur from their home institution.

This PhD opportunity is only available to domestic students (i.e. students who do not require a visa). The successful candidate will not have to pay course fees and will receive a living stipend of \$27,082 pa for full-time study (indexed annually). The PhD will be supervised by Dr Michelle Zeibots (primary supervisor), Dr Claudine Moutou (secondary supervisor) from ISF and Dr Massimo Moraglio as joint supervisor from TUB. Please submit your application for consideration to [claudine.moutou@uts.edu.au](mailto:claudine.moutou@uts.edu.au)

## Who we are looking for

We are seeking a PhD student with an interest in articulating the features of a newly emerging user focussed mobility paradigm – or practitioner mind-set – that we call 'Service Engineering'. The focus of this PhD is to investigate approaches to integrating sensitivity to a spectrum of passenger needs and experiences in the operational tools used to manage congested public transport environments. The successful candidate will be comfortable using a mix of methods that are appropriate to incorporating user perspectives. You will have an interest in improving mobility experience for all passengers in congested public transport systems. We welcome applicants from any discipline but especially welcome those with a person-centred focus to complex urban systems, such as sociology, human factors, health, design, education and urban planning.

This opportunity will suit candidates that have:

- A masters or strong undergraduate degree in a relevant discipline or equivalent.
- Demonstrated ability to undertake research at higher degree level i.e. demonstrated research experience or honours degree or master's degree with meaningful research component.
- Demonstrated high level critical thinking skills.
- Experience in working with/across different disciplines.
- Knowledge and experience in applying qualitative and mixed-methods research.
- A strong interest in public transport systems and improving mobility experiences.

## Selection Criteria

Applicants need to respond to the following selection criteria in a formal application to ISF.

1. Professional Experience - strength & relevance relative to the candidate's opportunities (impact)
2. Research Output (quality and impact)
3. Research Proposal (quality) – As the topic of the PhD has already been set please focus your proposal on **a research angle you would be particularly interested in pursuing**. Your proposal must include:
  - a review of the literature about user's engagement in transport systems for a specific vulnerable passenger group
  - possible research questions and contribution
  - preliminary research design
4. Academic Merit (quality)

## About ISF and the HDR Program

The Institute for Sustainable Futures (ISF) has been creating change towards sustainable futures by conducting independent project based research for Australian and international clients since 1997. Our research and professional staff come from varied backgrounds, including engineering, architecture, management, economics, science, the social sciences, international studies and political studies.

ISF offers an award-winning postgraduate program for Masters and Doctoral research students. Our postgraduate students work at the leading edge of complex societal problems and sustainability challenges, across diverse sustainability topics. Our postgraduate research delivers real-world impact on sustainability challenges, contributes to the flow of knowledge, and provides transformative learning experiences for participants.

We're tackling some of the most complex sustainability challenges facing our world, and this calls for innovative approaches. We take a holistic view that looks not just to technological solutions, but also the political, socio-cultural, organisational and individual factors that contribute to real change.

ISF's unique postgraduate program is an integral part of our path to a better future. We nurture and develop the brightest, most curious minds, giving them the skills to navigate this complex multidisciplinary environment. Our vibrant community of scholars brings fresh insight, inspiring new ways of seeing – and solving – wicked problems.

## Further Information

Background information about this joint PhD opportunity is available in the Appendix.

## Application Process

Interested applicants must submit their written responses to the four selection criteria and resume to [claudine.moutou@uts.edu.au](mailto:claudine.moutou@uts.edu.au). Please note that the successful candidate will be assessed first at interview and then assessed and ranked by the Faculty Board of ISF on their suitability for undertaking a PhD.

Please refer to the ISF guidance on 'Postgraduate Applications Assessment Criteria and Process' on how to structure your application, which is available here:

[https://www.uts.edu.au/sites/default/files/ISF\\_PG\\_Application\\_Criteria.pdf](https://www.uts.edu.au/sites/default/files/ISF_PG_Application_Criteria.pdf)

For more information about ISF and the ISF HDR program please review the ISF website:

<https://www.uts.edu.au/research-and-teaching/our-research/institute-sustainable-futures/our-postgraduate-program/overview>

For more details on the eligibility requirements for PhD applications please read the following

<https://www.uts.edu.au/sites/default/files/2017-11/2018%20RTPS%20CfA.pdf>

## Contact

If you have any question about the position being advertised please contact Dr Claudine Moutou

[claudine.moutou@uts.edu.au](mailto:claudine.moutou@uts.edu.au)

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## Appendix

# Transport service towards 2050: shaping an innovative mobility paradigm

## Background information for candidates applying for joint PhD program

19 March 2018

The Institute for Sustainable Futures (ISF) is calling for PhD scholarship applications to our joint PhD program 'Transport service towards 2050: shaping an innovative mobility paradigm' with the Technische Universität Berlin (TUB).

A joint PhD program is one where candidates undertake a jointly supervised program between two universities. Candidates are enrolled in a primary institution, in this case UTS, and complete their first year requirements ahead of going to the secondary institution TUB for a minimum of one year. The candidate completes one thesis in English and undergoes a single examination process agreed by both institutions. At completion of the doctoral assessment process, candidates receive one testamur from their home institution.

This document provides background information for candidates wishing to apply for this unique opportunity. This document is organised in two parts.

1. Rationale for a Joint PhD program to investigate alternative mobility paradigms for future transport services
2. Information about the UTS based PhD topic, 'Embedding a spectrum of passenger experiences in a Responsive Passenger Information (RPI) Systems: a user centered approach for a transport services engineering mindset'.

## Rationale for the Joint PhD program UTS TUB

The primary objective of this joint PhD program is to develop an analysis of mobility paradigms with a particular focus on articulating the features of a newly emerging user focussed paradigm — or practitioner mind-set — that we call ‘Service Engineering’. We believe the potential outcomes from this way of looking at mobility will potentially benefit communities and transport users. If the academic research and teaching community can hasten the uptake of this view through teaching and learning for undergraduates and practitioners, then potential benefits will be realised more quickly. This is also a special point of focus for universities of technology with practice based foci like TUB and UTS.

The program is being carried out by a cluster of academic researchers<sup>1</sup> at UTS and TUB focussed on articulating the Service Engineering paradigm and how it plays out through a range of practitioner activities, including:

- Empathising with user perspectives and approaches to user engagement
- Design and problem framing for system development based on user needs
- Role of practitioner mind-sets in identifying and framing user needs
- Methods used to incorporate user needs into system design
- Deployment of new technologies that provide opportunities for serving and communicating with users in ways that were not previously possible with old technologies.

At the outset, it must be recognised that the defining features of underlying paradigms or mind-sets are subtle and often difficult to grasp. The role they play and how they affect decisions is multi-faceted and affects the myriad decisions that transport professionals and service providers have to make. However, they are also ubiquitous and powerful. If left unattended or unspoken, unintended results become more prevalent and success less likely.

There are two PhDs that will contribute to the TUB-UTS research cluster through specific projects — one focussed on the development and implementation of new railway signalling technologies (ETCS) in Denmark and Sydney, the other on approaches used to incorporate the service needs of public transport users who could experience disadvantage with the rush to develop new classes of digital passenger information systems (for example older people, people with hearing, visual and mobility impairments, and migrants from linguistically diverse backgrounds). This document focuses on the latter PhD topic which will be based at ISF (UTS) with one-year exchange at TUB.

In both cases, industry partners (public transport service providers) will be heavily engaged throughout the research process. Both UTS and TUB have a practice-based focus for research, teaching and learning. Heavy industry engagement is always preferable but for this research it is also a necessity as it is ultimately practitioner based mind-sets and perspectives of users that will affect the quality and delivery of public transport services. This industry engagement dimension to the research makes it richer and has implications for the timeline of the student’s research. The timing of the student’s period of exchange at TUB or UTS will be planned for optimal engagement with industry partner and the research process.

### *Background on transport mind-sets*

The old “command and control” mentality that has prevailed in public transport service provision and the “predict and provide” approach that has dominated road and private transport development is not able to adequately service customer needs; on top of that, available budgets for infrastructures are reduced, and the inner contradictions of the post-WW2 mass motorisation model have resulted in heavily congested systems.

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<sup>1</sup> Dr Massimo Moraglio (TUB), Prof Dr Hans-Liudger Dienel (TUB), Dr Michelle Zeibots (UTS), Prof Stuart White (UTS), Dr Claudine Moutou (UTS), Adj Prof Felix Laube (UTS and Emch+Berger), Adj Prof Nathan Kirchner (UTS), A/Prof Roger Hadgraft (UTS), Rodger Watson (UTS).

Additionally, the transport industry has been product-driven, especially in the service sector, with little attention devoted to the end-user's expectations, requests and needs. Considering the shift towards the post-ownership economy and other societal trends, such an approach is becoming less and less appealing to individual consumers, or sustainable from a whole-of-system perspective, both economically and environmentally. This requires an expansion of the field of such studies. Despite the above questions and critiques emerging from the very core of transport research, today the approach to everyday mobility too often still follows 1950s paradigms.

Considering the inertia of transport systems, any shift toward new mobility regimes and paradigms is difficult, even more so considering the reduced authority of experts and policy-makers in legitimating their proposals. The weakening of the classical 20th century political landscape, the cultural shift in the perception of technology and the emergence of a "liquid society" have reduced the space of maneuver for experts. At the same time, we have witnessed a greater need of user participation, which is widely accepted in other economic and industrial areas, but regrettably public transport (and urban transport more generally) often undervalues or lacks this involvement in a meaningful way. This attitude creates a lack of communication, an imprecise consideration of passenger needs, a low level of customer satisfaction and a misunderstanding of social needs. According to the European Transport Policy, "users therefore need to be put back at the heart of transport policy" (EC 2001:64), especially as participating actors in all the stages of public transport policy-making. To promote this participation does not only produce, in the long run, a socially shaped transport system, but also better resource allocation and even better economic performance for transport companies.

For this reason, transport structures "cannot be understood solely in terms of their technological components but as complex systems" (Moss 2000:65). Among the "system builders" of such a system, the users are truly involved: "Within the possibilities and constraints set by system building processes and intrinsic system properties, users may use large technical systems in multiple, sometimes surprising ways. Users, too, are agents of Large Technical System-related societal changes" (Van der Vleuten 2006:294). To that end, a better definition of users should be community not limited by citizenship and one that can encompass users and non-users to recognize their contribution to system building (Baumann and White 2015).

Additionally, and very crucially, the innovative and every day more stringent connection between transport and telecommunication systems asks for a better appraisal. We know that ICT is triggering innovative approaches to transport system development, to the point that some mega ICT companies, like Google, are taking advantage of this and developing economies of scope, as in the case of Google maps, exploited for driver-less vehicles. ICT is also central in enhancing better use of existing infrastructure. However, an enthusiastic and a-critical appraisal of the ICT impacts on transport systems can be misleading: communications and transport do set each other in motion, and we need a better appraisal of this combined new socio-technical system, also considering how it can easily it can result in a Jevons' "efficiency paradox".

Luckily, there is greater agreement to better take into account the "soft" and social side of the construction of mobility: some sectors of the transport industry, as the automotive one, are indeed re-framing their mind-set and their business models, thinking at the mobility peak and post-ownership society, moving from selling product to offer services, so crumbling the classical distinction among industrial sectors. Those moves aim to keep the industry economically vibrant and to be in tune with the societal shifts. But, at the very moment in which an investigation is requested, we still witness weak networking opportunities (both in academia and in the realm of policy-making) to discuss the above in a trans-disciplinary way.

In this vein, the main objective of this Joint PhD program between UTS and TUB is to develop a long-term analysis of mobility paradigms in order to support development of a newly emerging paradigm we call 'Service Engineering'. Such a development is significant in that it provides a new platform from which to debate and create new understandings of mobility. The Joint PhD program between UTS and TUB is a wonderful opportunity to further improve the current debate and a leverage to reach a larger scale of achievements, including publications and other funding schemes.

#### References

- Baumann, Christiane. and Stuart White (2015). "Collaborative Stakeholder Dialogue: A Catalyst for Better Transport Policy Choices." *International Journal of Sustainable Transportation* 9(1): 30-38.

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## UTS Based-candidate (with 1-year exchange at TUB)

Title of Thesis (DRAFT)

### **Embedding a spectrum of passenger experiences in a Responsive Passenger Information (RPI) Systems: a user centered approach for a transport services engineering mindset**

The candidate taking up this scholarship will have Dr Michelle Zeibots as primary supervisor and Dr Claudine Moutou as secondary supervisor at UTS and Dr Massimo Moraglio as the joint supervisor from TUB.

The PhD will investigate approaches to integrating sensitivity to a spectrum of passenger needs and experiences in the context of a congested public transport system that is implementing new technology innovations to support operational challenges. The PhD will help to inform an understanding of the learnings and transitions necessary for the public transport sector to shift into a transport services engineering mindset focused on the customer-experience. This PhD research will join a technology and innovation research project developed by UTS researchers as part of the Responsive Passenger Information (RPI) systems project in collaboration with Sydney Trains and other industry partners.

#### *Background*

In 2016, UTS researchers commenced work scoping a new class of passenger information systems, known as Responsive Passenger Information (RPI) Systems, that harnesses technological innovations to address crowding and guide passenger movements in a congested train network (Zeibots et al 2017). In 2017, work on the RPI System involved eight technological innovation teams from UTS working closely with Sydney Trains. The research was supported by the Australian Government's Cooperative Research Centres (CRC) Program through the Rail Manufacturing CRC. Work continues on the RPI Systems and preparations are underway for the next stages of research in 2018-2019 – Pilot Prototype research and Operational Evaluation. In the Pilot Prototype phase of research projects the RPI System elements will be tested for an extended time period on site, with different refinements so as to develop parameters for different operating conditions. The Operational Evaluation adopts an action learning cycle methodology which focuses on operational staff and their interaction with the technology to address congestion and movement of passengers within the spaces they manage. The Pilot Prototype and Operational Evaluation research will provide a context for this specific PhD research.

The PhD will contribute to an applied understanding of how to embed a spectrum of passenger experiences in the RPI Systems technologies. Technological solutions applied in a public transport context are intended to make public transport better, for all, however too often a mass stream of people can be assumed to travel at the same pace, confidence, ability, and needs when moving through a congested transport node. Passengers of transport systems are not homogeneous, but the experience of using transport infrastructure for those sitting outside a normative view of the passenger can be alienating. For example, the mobility independence of users to navigate a congested transport environment can be related to age, physical ability, language skills and sensory abilities. Difficult experiences can deter future use and exacerbate transport disadvantage, a suboptimal outcome for an inclusive public transport system.

This PhD will assess how a RPI System can incorporate a spectrum of different user experiences that form the actual (and potential) customer base of Sydney Trains. This research will adopt a complex systems recognition that users are also system-builders whose participation and experience within a transport system can be both as producers and consumer. Engagement of users in the development of technology is an opportunity for helping transport operators shift away from the "command and control" model and embed alternative processes that align with what we term a 'service engineering' mindset. The PhD research will focus particularly on the community vulnerable to exclusion as a result of the requirements brought about by the digitization of transport systems and /or new expectations about customer behaviour, competencies or resources to fully benefit from the RPI system. Communities of focus in Sydney will include for example, older people, those on low-incomes, those with physical, sensory or communication difficulties which could include non-English speakers or children.



Pilot Prototype testing of sensing, perception and actuation technologies that form the RPI System (see for example Virgona et al 2015) and the Operational Evaluation conducted with Sydney Trains staff will be a source of knowledge for this research. Observation and engagement in these concurrent research projects are an opportunity to assess and also influence how a range of passenger experiences in the RPI System will be integrated into the final product and operational processes.

This PhD research will need to make a contribution to knowledge that has applied value beyond Sydney. The UTS-TUB joint PhD program provides an opportunity for the PhD student to examine a European context of users as system-builders. Specifically, the different organisational and societal norms shifting towards a transport service engineering mindset and the different sensitivities to movement within transport spaces that exist within Berlin.

A mix of methods and user perspectives are expected to be important for this research:

- Sense-making methods that centre around user needs
- Semi-structured interviews and/or focus groups with users and advocates
- Fieldwork observation studies or similar

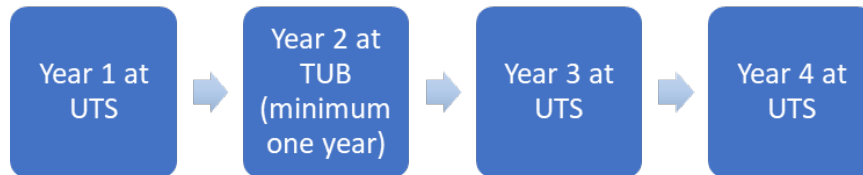
#### References

- Virgona, Alexander, Nathan Kirchner, and Alen Alempijevic. (2015) "Sensing and perception technology to enable real time monitoring of passenger movement behaviours through congested rail stations." In Australasian Transport Research Forum, 2015. <https://opus.lib.uts.edu.au/handle/10453/41850>
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## Timeline of the PhD program

The PhD candidate will have three-year time to complete her/his PhD course, with a possible extension to the fourth year.

Figure 1: Stages of the PhD candidature for the UTS student



1st Year Research Tasks	Building up competencies
<p><b>Objectives: The PhD candidate will engage with researchers working on the RPI System project for Sydney Trains.</b></p>	
<p><b>Description of work:</b></p> <ul style="list-style-type: none"> <li>• Fine-tuning of the research goals and in-depth definition of the work program.</li> <li>• Mapping and scrutiny of scientific and professional literature regarding the user’s engagement in transport.</li> <li>• Mapping customer experiences (indirect and direct) with the RPI System, with specific attention to the Town Hall and Parramatta train stations, in Sydney.</li> <li>• Developing familiarity with the RPI System, and Sydney Trains operational considerations</li> <li>• Semi-structured interviews or focus groups with organisations important in advocacy for relevant communities.</li> <li>• Preparation of the visit to TUB.</li> <li>• Drafting of the outcomes.</li> </ul>	
2nd Year Research Tasks	Visit to TUB – Fieldwork in Germany
<p><b>Objectives: The PhD candidate will develop the comparative part of the research with fieldwork in Berlin, as a guest of TUB.</b></p>	
<p><b>Description of work:</b></p> <ul style="list-style-type: none"> <li>• Continuing the scrutiny of scientific and professional literature regarding the user’s engagement in transport, specifically in relation to European initiatives related to mobility poverty.</li> <li>• Conduct the comparative component of the research, particularly in relation to the different cultural context of system-building and user perspectives.</li> <li>• Semi-structured interviews or focus groups.</li> <li>• Observation studies.</li> <li>• Drafting of the outcomes in a comparative way.</li> <li>• Preparation for the third year of research and return to Sydney.</li> </ul>	

<b>3rd Year Research Tasks</b>	<b>Comparative analysis and final writing</b>
<p><b>Objectives: The PhD candidate will complete the comparative part of the research with second round of interview, and s/he will finalize the writing of the thesis.</b></p>	
<p><b>Description of work:</b></p> <ul style="list-style-type: none"> <li>• Incorporation of the mixed methods data set from Berlin and Sydney</li> <li>• Engagement and review of RPI System in implementation phase.</li> <li>• Evaluation and assessment of user-needs and experiences</li> <li>• Finalizing the research.</li> <li>• Finalizing the thesis writing.</li> </ul>	
<b>Activity 4th Year</b>	<b>Comparative analysis and final writing</b>
<p><b>Objectives: if the three years are not sufficient to complete her/his activities, the PhD candidate will complete in the fourth year the research.</b></p>	