1 The story of K2

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K2 – The Swedish Knowledge Centre for Public Transport was established in 2013 following studies and discussions between government agencies, regions and the academic community. It was and remains a unique endeavour, with no clear equivalent in other countries. Why was such a centre created, and what circumstances have influenced the direction it is taking?

A formative stage for public transport

In the early 2000s, Swedish public transport experienced positive momentum. A new sustainability agenda was emerging, focusing on the adverse environmental impact of cars. Somewhat pointedly, it could be said that public transport made the switch from a low-status marker to a solution for the future. Studies were then launched both nationally and regionally with a view to increasing travel by public transport [1] [2]. This led to ambitious plans, new collaboration models between the State and the regions, and eventually to a new Swedish Public Transport Act, which emphasised the strategic role of public transport in a sustainable transition. Many perceived opportunities in this new spirit of the age. Commercial transport operators and public authorities joined forces in a joint initiative with a visionary goal – to double the number of trips made by public transport [3]. However, the State took on a more proactive role which included general sectoral responsibilities. Out of this mire emerged an insight into the need for more research and development in the field of public transport.

The sustainability agenda was also gaining ground in the world of research in the early 2000s. One of the many stakeholders pushing for this was VREF, the Volvo Research and Educational Foundations. But when they wanted to invest in a Swedish career programme for young researchers working with public transport, they found there was no environment that was good enough to invest in. Public transport research being conducted at universities of technology was regarded as

being too fragmented and insufficiently linked to practice. Instead, a letter was sent to three government agencies, Vinnova-Sweden's Innovation Agency, the Swedish Rail Administration and the Swedish Road Administration, asking them to review research into public transport. It gained traction. Before long, an inquiry was up and running to consider the formation of a centre of excellence for public transport.[1] The investigator's analysis was clear:

> ***Public transport is a long way behind other sectors. The tradition of engaging with research is essentially absent, to the detriment of both the research that does take place and the industry itself. Therefore, an initiative must aim to simultaneously elevate both research and the level of knowledge in the industry [4].***

The new Swedish Public Transport Act came into force in 2012. New Regional Public Transport Authorities were set up all over Sweden, with a changed, more strategic mandate. The pioneering spirit that prevailed resulted in the definition of the outlines of a centre of excellence that later went on to be K2. The government agencies were prepared to invest, but only if the regional public transport authorities were on board. The question was asked of the three metropolitan regions, because it was in these metropolitan areas that the challenges and potential for public transport were deemed to be greatest. The three regions jumped on board. Together, they came up with themes that they wanted the new centre to focus on. When the Region Västra Götaland had made a decision, they issued a press release on the new initiative:

> ***Regional expansion, increased accessibility and attractiveness, greater focus on passengers, structural changes in the organisation of public transport and a new Public Transport Act from 1 January 2012 place new and complex demands on the various stakeholders in the public transport system. The Public Transport Centre, the location of which has yet to be decided, will provide a hub for Swedish public transport research and projects going forward. […] The centre will start off with five knowledge fields/areas based on the knowledge perceived to be needed by of public transport partners. This includes focusing on the role of policy in***

1 The assignment was allocated to Måns Lönnroth, chairman of VREF at that time.

> ***increasing travel and market share, public transport in urban planning, the customer perspective and the ambition to increase market share, the roles for collaboration between operator and authority and the development of technology and services [5].***

Two issues remained unresolved. Who would run the centre, and where would it be based? A competition in which academies in metropolitan regions were invited to participate presented the solution. Three proposals were received, one centred on each metropolitan region. K2, the winning concept, was submitted by Lund University, Malmö University and the Swedish National Road and Transport Research Institute (VTI) with the support of the consultancy company Trivector as a driving force. According to people involved in the decision-making process, the winning proposal was not the one offering the greatest academic excellence. What was crucial, however, was having the best idea about how research could be conducted in collaboration between the academic community and practice. K2 began operating in January 2013 with a physical base in Lund.

A research agenda emerges

There was thus an explicit aim that the research should support the industry's ambitions for an increased market share for public transport, but issues relating to collaboration, urban planning and new technology were also identified as themes. When around 70 people gathered for a workshop, close to the Öresund Bridge in Malmö, their job was to identify clearer priorities for the future focus of K2. This resulted in five focus areas that later formed a basis for K2's first field of research.[2]

Governance of a market

One area was based on the changes to public services that had characterised Sweden (and many other countries) since the late 1980s, which had involved making the public sector more like the private sector. Result-oriented management, deregulation and privatisation were all part of the toolbox. It was in this spirit that competitive procurement of public transport services began, and a new market of commercial transport operators emerged. The design of contracts,

2 Decision made in 2016.

reimbursement models and requirements specifications became key elements of political governance, and hence important issues on which it was necessary to develop new knowledge.

Collaboration between levels

The changes in the organisation of society also resulted in increased specialisation, both vertically between national, regional and local levels, and horizontally between public and private sectors. Rail services are a clear example. The Swedish State Railways was gradually divided into a large number of private and public organisations, each with its own specific responsibilities. There were increased demands for collaboration in this more fragmented organisational environment. Collaboration was a key issue for public transport, which was reliant on both national infrastructure planning, regional public transport planning and municipal urban planning. That was why it became a key area in K2's emerging field of research.

Passengers and customers

The late 20th and early 21st centuries saw the development of new ideas about the relationship between public authorities and citizens. Passengers became customers and consumers. The final report in 2003 of a parliamentary committee on public transport stressed that 'All public transport measures should be based on a consumer perspective and should be evaluated on the basis of aspects such as the consumer benefits they entail'. Increased knowledge of passengers was key to the ambitions of getting people out of their cars and onto public transport. From the outset, passengers' attitudes and behaviour were an obvious theme within K2 as well.

The digital revolution

Digitalisation was another trend that had a profound impact on society in the first decades of the 21st century. This was expressed in many tangible ways when it came to public transport. Printed timetables were replaced by digital journey planners[3], while paper tickets were replaced by travel cards. JoJo, ToGo and Access became well-known brands in Sweden. Digital signage and social media brought new opportunities for communication with passengers. K2 took on a slightly different role from other, more technically focused research environments.

3 The first organisation to do this was Östgötatrafiken in 2012, while printed timetables continued to be offered in Stockholm until 2020 and by Västtrafik until 2022.

Instead of focusing on developing the technology, K2's role was to monitor and understand how digital technology was used, and its consequences.

The benefits of public transport

While the organisation of society and technology evolved, other things remained unchanged, such as the methods used for planning infrastructure. There was criticism in the industry of established forecasting models and socio-economic calculations that were thought to favour the continued expansion of car use. A common metaphor deployed was known as the iceberg. Only the top of the benefits created by public transport for society were regarded as being included in the models. Hence, there was a desire to develop new ways of highlighting benefits in planning processes at local, regional and national levels. Research was initiated within K2 to explore the benefits of public transport from a broader perspective.

In retrospect, it is possible to give rational explanations as to why certain issues ended up on K2's research agenda. However, we know that the direction decided upon can also be the result of chance and coincidence. Personal perspectives and interests, and the positions of power of various stakeholders, all have their part to play. The direction that characterised the emerging K2 in 2013–2014, and which influenced its direction for the next decade, was far from obvious. For instance, K2 did not focus on areas that dominated public transport research at the time, such as vehicle development, road safety or optimisation models for public transport planning. There was a clear demand for a different approach. Compared to other, often technically orientated research environments, K2 took a broader, more social science-based approach, although other perspectives were also present.

The importance of education and communication

Education has been an important part of K2's activities over the years. It was emphasised already in the application that education and dissemination of knowledge would form part of the centre. The two Ks in K2 stood for *Kompetens* (competence) and *Kunskap* (knowledge); and the organisation focused on not only producing knowledge but also disseminating it. In 2015, following a two-year start-up phase, K2 embarked upon a new phase with the development of a communication strategy. It was established at that time that K2 would be the national knowledge centre for public transport. Again, it was emphasised that it

would be not a research centre, but a knowledge centre. This has become part of K2's DNA over the years.

In the decade in which K2 has been fully operational, around twenty courses have been organised for professionals, involving some 350 participants. These courses have covered general knowledge in the field of public transport, innovation in public transport, high-capacity bus rapid transit (BRT), more general courses on how to plan for sustainable transport, and on Special Transport Service and other publicly funded journeys. Participants themselves have emphasised the fact that the courses have given them time to reflect and discuss, create new networks and, of course, gain useful new knowledge. For these reasons, K2 has opted primarily to organise face-to-face courses on site, usually in Lund.

One of the courses offered by K2 dates further back. Strategic Public Transport Planning, as the course is known, was established in the late 1990s at Lund University. The Strategic Public Transport Planning course has been run every year since K2 took it over. This course illustrates how the level of education in the sector has changed over the years. In the beginning almost 30 years ago, the majority of participants rarely had a university education. While today, most participants do have a university degree, although perhaps not always in subjects related closely to public transport. Another clear difference can be seen in the proportion of women taking the course. When the course began, it was almost exclusively attended by men. Women have been in the majority in recent years.

Local and regional politicians make up an important, but sometimes forgotten, group of people in great need of knowledge. Political committees make key decisions on the development of public transport. To help politicians better understand and deal with complex issues, K2 has conducted its one-day course on two occasions in cooperation with the Swedish Public Transport Association and the Swedish Association of Local Authorities and Regions (SALAR). Around 100 politicians from public transport committees or equivalent in 16 regions have attended courses on public transport.

There were courses on and about public transport even before K2, and even now courses are run by other stakeholders, but it appears that K2 is the organisation of choice for professionals when it comes to longer and broader training programmes. Regarding the two-week Strategic Public Transport Planning course, it is sometimes said in the industry that 'this is the course that anybody new to the industry should take'. People who have been working with public transport for a number of years also attend the course, and it is precisely this mix of participants with different experience and from different organisations that is its strength. The

importance of raising the educational level within the industry was also emphasised when the doubling goal was being developed.

There has been an ongoing discussion in society over the years about lifelong learning, which aligns perfectly with K2's ambition for education. Many aspects have worked well with K2's educational activities, but it has also become clear that determining the right content for new courses to make them appealing and encourage professionals to attend them presents a challenge. One important principle has been that K2 should provide courses that are aligned with the research conducted at K2. When a survey was conducted to identify a suitable course format, it was revealed that courses should ideally be short and preferably digital. Despite this, however, K2's two-week face-to-face course held in Lund every autumn is always booked up.

K2 realised early on just how important and necessary it was to communicate with the surrounding community. And here is another K, for *Kommunikation* – communication. A full-time communications officer was hired early on. K2's knowledge lunches are one example of how its communication activities have developed. Initially, a few researchers in-house met up for a sandwich and a presentation about a research project. These events came to be known as knowledge lunches and were pleasant and convivial. When the communications officer at the time grew tired of ordering baguettes and the pandemic struck, an entirely different type of knowledge lunch was developed – digital ones involving 40–50 participants, including both researchers and industry professionals. Having a full-time communications officer not only meant that information could be disseminated and knowledge could be transferred, but also that researchers could learn how to communicate with the surrounding community. Many of the researchers associated with K2 find that having opportunities to get their research results out to society and harmonise their research with the surrounding community are key elements of K2.

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A new approach to research and practice

Experience-based knowledge has always had a place in public transport. Individuals within public transport authorities, transport operators and consultancies who have been involved for a long time have learned lessons and documented their conclusions in memoranda and reports. Experience-based knowledge is extremely important, but it needs to be complemented by knowledge based on science. At the time (the year 2015), K2 was the single largest investment in public transport research in Sweden.[4] Just like any other form of production, the production of academic knowledge requires organisation, resources, equipment and, above all, people with the right expertise. Views on the role of research and how research should be organised have altered over time. K2 emerged at a time and in a context where the traditional view of research had been challenged for some time [6].

The traditional view was based on the notion of research as a matter of public interest that should be disengaged from the business community and other societal institutions. Research organisations were supposed to judge for themselves the relevance of what they were doing with a view to publishing independent knowledge. This knowledge was then expected to be picked up by the business community and society in ways that helped to bring about positive development. Public transport research, working on the basis of this notion, had primarily developed within the departments of transport planning at universities of technology, but also as a subdiscipline within economics.

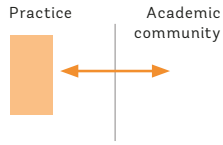
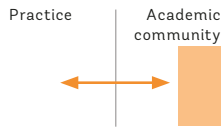
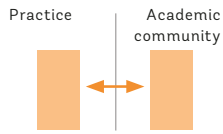
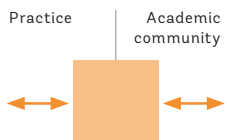
An alternative approach to the role of research in society emerged from the 1980s onwards. In the context of globalisation, greater emphasis on national competitiveness and a fear of falling behind, it was questioned whether university research automatically contributed to development. New approaches took hold that emphasised the importance of research involving collaboration between the academic community and practice where collective environments for joint learning became central. This approach has formed a basis for initiatives in network-oriented innovation environments of various kinds. In Sweden, Vinnova (Sweden's Innovation Agency) has played a driving role. The model for centres of excellence that was developed by the agency in the early 2000s set the tone for K2 as well.

The feasibility study that led to the creation of K2 recognised that the industry would participate in the development of research questions, the implementation of

4 In the early 2000s, the government research programme ‘Framtidens personresor’ [The future of passenger travel] took place and Karlstad University had its Samot Research Centre.

the research and the dissemination of the results. Co-production became the concept that summed up K2's ambitions. In the early years, there was a strong ambition to involve practitioners as much as possible. This was expressed in several ways. People from municipalities, regions and enterprises formed part of the project teams that were set up. A living lab involving stakeholders was implemented around the development of public transport around a specific location. Activities were implemented where researchers and practitioners met to discuss the state of knowledge in various fields.

There are of course many different ways to organise collaboration within the framework of a research centre. The table below highlights four main variants [7] [8]. They differ in terms of who directs the focus and who constitutes the primary target audience for the results.

Collaboration typ	Process and output	Illustration
Focused on assign-ment	Practice sets the agenda and controls what research is to be carried out, either by formulating specific assignments or by making decisions on allocation of project funding. The industry's own perceptions of challenges and problems are in focus. The results are published in the form of reports.	
Research-led	The logic of the research dominates. Major empha-sis on academic publishing. Practice plays the role of passive funding body which monitors the work without actively controlling it, with expectations that the research will gradually benefit the industry.	
Long-distance relationship	The academic community and practice share responsibility for the direction of the research. However, daily work takes place along different paths, and researchers and practicians meet sporadically. Separate publication strategies for the academic community and practic	
Symbiosis	The academic community and practice co-produce in respect of both knowledge development and application on a common path. Researchers and practicians form part of the same project team and work closely together. The results are published in collective academic articles	

K2 was founded with the notion of a symbiotic relationship between research and practice, but in reality it has usually resembled a long-distance relationship. However, although the long-distance relationship is the dominant image, there are many examples of instances in which researchers and practitioners worked closely together. One such example involves the development of BRT (Bus Rapid Transit)

in Sweden, where researchers at K2 and industry stakeholders jointly developed guidelines and planning tools for a new generation of bus solutions. Another is the on-demand public transport policy lab, where K2, together with regions and transport operators, is creating shared learning from ongoing pilots. A third is 'Rådslaget', a K2 initiative for the renewal of public transport and a change towards collective mobility. This work was ongoing for over a year and involved 80 or so leading experts in public transport, other shared mobility services, urban planning and research. This resulted in an innovation agenda for the Future of Collective Mobility, which also helped to bring about a new strategic innovation programme for the built environment and mobility. These examples illustrate the role that K2 has come to play in the field of innovation. Rather than being a stakeholder that develops and manages its own products or services, K2 has brought together stakeholders for joint learning, reflection and development of ideas.

In retrospect – what have we learned

K2 emerged out of challenges and ideas that were prominent in society, research and public transport at the beginning of the last decade. These remain fundamentally relevant, but changes have also taken place over the last 10 to 15 years. New technologies have emerged, meaning that we now have electric bicycles, cars and buses; sharing services that were mostly just futuristic ideas a decade ago are now common features in our cities; new apps, social media and payment systems are increasingly shaping our daily lives. New ideas about how best to organise and govern society have emerged as a reaction to the focus in the late 20th and early 21st centuries on privatisation, deregulation and specialisation. Old but renewed issues relating to social exclusion, urban and rural issues and participation of citizens have gained greater prominence on the agenda. We have experienced a pandemic that has altered travel habits and increased remote working. K2 has kept pace with these changes and contributed with research to increase the understanding of what is happening.

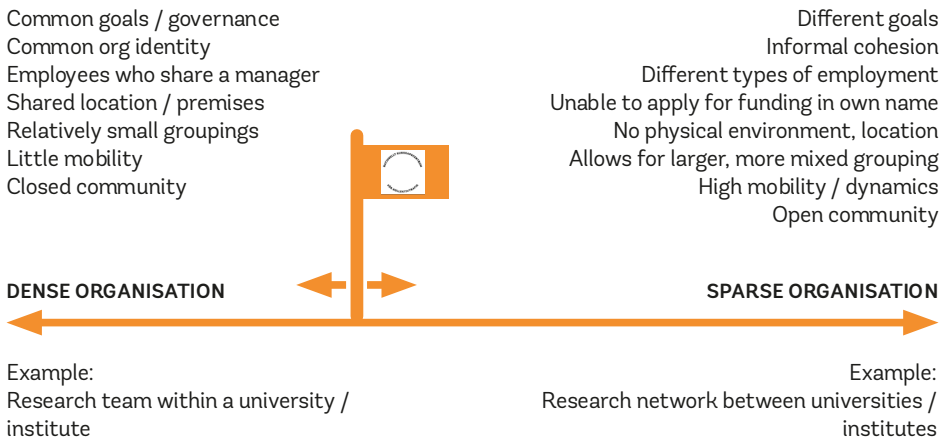
If an organisation like K2 is to make a difference, an idea is needed that has both potential and support; but that is not enough. It also requires work to ensure that this potential is realised. That work has been shaped on the basis of the added value that we have seen K2 is capable of contributing with; values that do not naturally emerge within existing universities, research institutes or the industry's own organisations. In the case of K2, this involves three things.

Firstly, it has involved creating a platform for collaboration between researchers from different organisations and disciplines. Researchers who are active within K2 often refer to this as a success factor. It may seem obvious but encounters across organisational and disciplinary boundaries are conspicuous by their absence in modern research; at least at a more systematic level. Establishing connections and building relationships between researchers and people working with public transport issues in practice is even more difficult. Differences in temporal perspectives, experiences and frames of reference mean that such collaboration is easier to discuss in theory than to achieve in practice. It requires resources and commitment from both 'sides', and it requires an organisation that is determined to make it happen. K2 has facilitated such collaboration.

The second added value has involved tackling issues of strategic importance. Both researchers and practitioners need to help shape that direction in some way. At K2, this has been achieved through the field of research described earlier in this chapter, which has undergone continuous development over the years. However, having a field of research is not enough: it is also necessary to have the resources to translate it into new knowledge. In short, funding is essential. Without funding, K2 would have been unable to take on researchers with the time to familiarise themselves with new questions, conduct interviews, gather data, perform analyses, write, discuss, workshop and carry out all the other activities that form part of a research project. Having the funding to conduct research is an essential part of the appeal that makes a research environment an attractive place to work. However, it has been important for K2 to present itself not as a research funding body, but rather as a research environment in which researchers can collaborate and contribute. K2 has not distributed funding for research like a funding agency but has invited researchers to collaborate and contribute to the research agenda and received funding for that work.

The third added value has involved contributing to skills development. And as indicated in this chapter, skills development can take a number of forms, from traditional academic education to courses for professionals and more continuous knowledge updates by means of initiatives such as knowledge lunches. Working with one format will not suffice: several are needed. It is not enough for a knowledge centre just to produce new knowledge: that is only half the job. It is every bit as important to ensure that the knowledge is applied in ways that might lead to new approaches, working methods, solutions. For this to happen, there needs to be continuous dialogue between the people leading and working within a research environment and the people who represent target audiences for that

knowledge. It is necessary to keep an ear to the ground in order to understand and respond to current knowledge needs.



Besides focusing on added value, a knowledge centre needs to be organised in ways that allow that potential added value to be realised. Research and education can be organised in many different ways, as illustrated in the figure above [9]. These range from loosely connected network organisations (sparse organisation) based on voluntary and often informal structures, to organisational forms based on formal structures and a common legal entity (dense organisation). K2 has positioned itself between these extremes right from the start. This position can be flexible and allows for openness and flexibility, but it requires a constant supply of energy in the form of activities that bring people together and make them communicate.

The physical location has been a key element in K2's organisation. The office – which was initially located at the outskirts of Lund and later (2018) moved to an area very close to the central station– has served as a place for both spontaneous and scheduled meetings. In a way, the physical location embodies the organisation. K2 has never been a separate legal entity, and the office has helped the organisation to establish its own independent identity with its own brand. K2 has provided a home for researchers alongside and as a complement to their home department or institute. K2 with its office has provided opportunities for meetings between researchers and between research and practice, and discussions that are multidisciplinary in nature. The fact that partners and funding bodies are willing to carry on into a new phase from 2025 onwards is the best testament to the value created by K2.

Swedish public transport has undergone positive development in recent decades, but it needs to play more of a role if Sweden and the rest of the world are to make a successful transition to a climate-neutral and sustainable transport system. Public transport needs academically-based knowledge development to help it navigate a complex world with new perspectives on what public transport is and can be, and to further understand how it can pave the way for people's access to work, education, leisure, commerce and social contacts in the sustainable society of the future.