



WALKING AS A MODE OF TRANSPORT

A Road Map for Implementation 2023 – 2029

June 2022

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Introduction

In 2001 the Volvo Research and Educational Foundations (VREF) launched its program *Future Urban Transport – How to deal with the complexity of urban transport (FUT)*. Since then the program has functioned as an overarching framework for VREF initiatives such as Centers of Excellence (CoE), research programs and projects, events, publications and networking and other activities.

The vision of VREF is “Equitable access and sustainable transport in urban areas”, with the general mission to:

- Support the development of new knowledge relating to ideas and solutions that can contribute to equitable access and sustainable urban transport;
- Support the development of educational and outreach programs in the area of equitable access and sustainable urban transport;
- Contribute to the dissemination and implementation of research findings among university researchers, practitioners, decision-makers and other relevant stakeholders;
- Support demonstrative examples and change processes.

Through the FUT Program, VREF has initiated 10+ CoEs and larger programs, including the current program *Mobility and Access in African Cities* (MAC). VREF has also hosted and co-organized numerous international events, including CoE workshops, research conferences and the Mobilize Summit conference.

During 2019, VREF initiated preparations for new research programs under the FUT Program, including a possible program in the area of Non-motorized transport/active transport. The first phase of preparatory work for this program included a broad consultation process with seminars, workshops and interviews with key individuals in VREF’s network of researchers, international organizations, and other actors within the FUT area. Based on this consultation VREF assigned Heather Allen, independent consultant, to prepare a background report on the current state of research and knowledge on Non-motorized transport/active transport. Based on this background report and discussions during the preparatory work, the VREF Board decided in December 2020 to initiate a VREF program for supporting research and education in the area of *Walking as a mode of transport*. The program started with an initial phase in 2021-2022 that consisted of both internal and external activities to strengthen the motivation and direction for the program, formulate concrete goals for the program, and develop the program’s “architecture.”

During the preparatory work and the initial phase, VREF has commissioned four preparatory studies carried out by leading scholars and experts in the field, as well as organized and lead several workshops with researchers and other experts. In parallel, VREF has had frequent internal discussions which in a cumulative way have contributed to this Road Map.

The following preparatory studies were carried out:

- **Background report on walking and cycling**
Walking and cycling gaps in transport research – an international overview by Heather Allen
- **Literature review**
Walking as a mode of transport: Review for VREF by Miles Tight, University of Birmingham
- **Bibliometric study**
Walking, the invisible transport mode? Research on Walking and Walkability today by Lake Sagaris et al., Pontificia Universidad Católica de Chile
- **Review of Walk21 Conference publications**
Walk21 Library Analysis Report by Bronwen Thornton, Walk21

The background report was published in 2021, and the other three studies in 2022.

Workshops and other events:

- Launch of the research program at Walk21 conference, Seoul 2021 (May 2021)
- Workshop with all authors of preparatory studies (February 2022)

VREF's preparatory work in surveying the status of current knowledge, identifying knowledge gaps, and mapping existing research capacity (e.g. research and research environments) with regard to "Walking as a mode of transport" has indicated that the current research landscape lacks vital knowledge and is relatively fragmented in terms of both thematic directions, disciplinary orientations, and research capacity. While walking more generally (including e.g. walkability and health benefits of walking) has been a research topic for many years, work on walking as a mode of transport has not yet developed into a cogent research direction, subject or "field" in itself.

Experiences and observations during the preparatory work for the *Walking as a mode of transport* program confirm the high relevance and urgency of a research initiative on walking as a mode of transport, as well as that there is a role for VREF to play in this area. While walking is by far the dominant mode of transport for much of the developing world, it is typically given little research or policy attention and the evidence base concerning both policy experiences and research results is poor. Further, while there is a growing number of institutions and universities studying the topic, neither the background report nor other preparatory work for the program has so far identified any established international research network that is focused on walking as a mode of transport.

This Road Map sets out the broad framework and approach of the Walking as a mode of transport Program. The Road Map has been written by David Lindelöw (VREF Program Coordinator for Walking), Jane Summerton (VREF Scientific Advisor) and Henrik Nolmark (VREF Director). The VREF Scientific Council has commented on draft versions, which has also contributed to this finalized version. The Road Map was adopted by the VREF Board in June 2022.

Background and context

The state and status of walking in policy and research

In an urban context, walking constitutes a vital part of the transport system and everyday life. Walking is also a prerequisite for the functioning and use of other modes of travel, foremost among them public transport. People of almost all ages and in almost any context and environment walk in their daily lives. Further, walking takes many shapes and roles: in addition to walking to carry out errands and reach destinations, walking could be a short stroll, a hike, a means of moving through office corridors, or participating in a religious procession or public demonstration. Some trips include several of these aspects at once or take place in the same environment.

The content and direction of this Road Map has followed the underlying concept that is embedded in the program title *Walking as a mode of transport*. Thus, the focus is on *walking as a means of gaining access to urban amenities and activities for all socio-economic groups in urban areas*. This focus does not, however, imply the exclusion of other purposes, aspects or motives attached to walking.

Pedestrians have naturally always been a part of urban environments in cities around the world, but perhaps this first became acknowledged during the 18th and 19th centuries when other transport options developed (e.g. horse-drawn vehicles, street cars). For some societal groups, walking became an elective activity, made by choice rather than out of necessity. It was presumably first with the rapid growth of motorization in the middle of the 20th century that the research community came to acknowledge walking as an everyday practice and a mode of transport. Even today, walking remains, however, the "odd cousin" of sorts in many contexts: it is often deemed "not-enough" a transport mode, and "not-enough" a kind of exercise. Further, because walking is (in theory) an option available for almost everyone, it risks being no one's responsibility or issue, thereby not gaining enough attention or interest from for example political organizations, societal groups or NGOs. Finally, there is no obvious industry or other significant entity that actively provides financial backing for this kind of travel and mobility (at least not in the case of urban, everyday walking).

Nevertheless, walking is arguably one of the most common means of movement in urban areas worldwide, especially in cities of the Global South. Further, many current societal goals and challenges relate to the issue of being a pedestrian, to pedestrian planning and policy, and to the many advantages of increasing the volume and modal share of walking. In many policy arenas and contexts, these dimensions are, however, seldomly articulated. Compared to other transport modes, walking remains markedly absent from discourses concerning congestion reduction, climate change mitigation and urban access/accessibility. Further, the advent of so-called micro-mobility vehicles and other mobility-related services in recent years has perhaps contributed even more to the situating of walking in a borderland both policy- and design-wise. These developments have also further increased the tension and competition regarding the use and distribution of street space between different modes and in relation to other activities. For example, parked electric scooters, delivery trucks, and charge points for electric vehicles often impact on an already (often) limited space for pedestrian movement.

To summarize, walking in urban areas has to a great extent been taken for granted, ignored or rendered invisible in both research, planning, design and policy. In recent years a heightened interest in sustainable travel and urban design has to some extent helped to overcome this deficit. Yet although an increased interest in walking can be observed in certain research fields such as public health, urban design and transport geography, walking remains overlooked from other perspectives such as transport appraisals and forecasting. Further, walking or the pedestrian often remains hidden in many transport contexts, typically left out or bundled together with cycling, public transport or so-called micro mobility¹. While sometimes strategically advisable, this mixing or packaging makes it difficult to decipher the specific needs and characteristics of pedestrians and their trips, to target interventions and measures specifically for walking, or to evaluate them. Overall, walking has not been treated as a mode of transport in its own right.

Research landscape

This section presents the current research landscape in the area of walking as a mode of transport through a presentation and discussion of the main findings of all the preparatory studies mentioned earlier.

Walking is not a research field or subject in itself, nor can it be situated within a specific discipline. Research on walking transcends many subjects, theories and research fields – arguably more than other forms of travel. The recent bibliometric study carried out for VREF (Sagaris et al., 2022) confirms this perspective. The identified research publications were situated within several disciplines or areas², within e.g. social science, medicine, environmental science, humanities and urban design, while work within engineering was not as dominant as one perhaps would presume.

VREF Background report on walking and cycling

Allen, Heather (2020), Walking and cycling gaps in transport research – an international overview

Allen's study examined the current research landscape within the areas of both walking and cycling. The report carried out a literature review of academic and "grey" literature, which was supplemented with an internet survey, seven semi-structured interviews with selected experts, and a peer-review process with a reference group of key actors and experts active in the area of active transport. The result indicated that the most researched topic concerned active transport and road safety (usually exploring the negative impacts), followed by health (with the positive physical benefits being more studied than mental aspects). Overall, walking was found to be given much less attention in transport research compared to cycling. Walking was, however, well covered in health and other journals (e.g. as a lifestyle choice or part of road safety investigations).

The review and survey results also indicated several themes in need of further research. While the survey results showed little difference between the focused regions (i.e. High Income

1 E.g. non-motorised transport, vulnerable road user, active commuting, sustainable transport

2 The term discipline was used in the bibliometric report.

Countries/HIC, Middle Income Countries/MIC, Low Income Countries/LIC) with regard to perceived research gaps, there were some variations in the ranking.³ As shown in the table below, the most important research gaps and needs were equity, recognizing walking as a (transport) mode, tools and data collection, followed by economic benefits of walking and cycling.

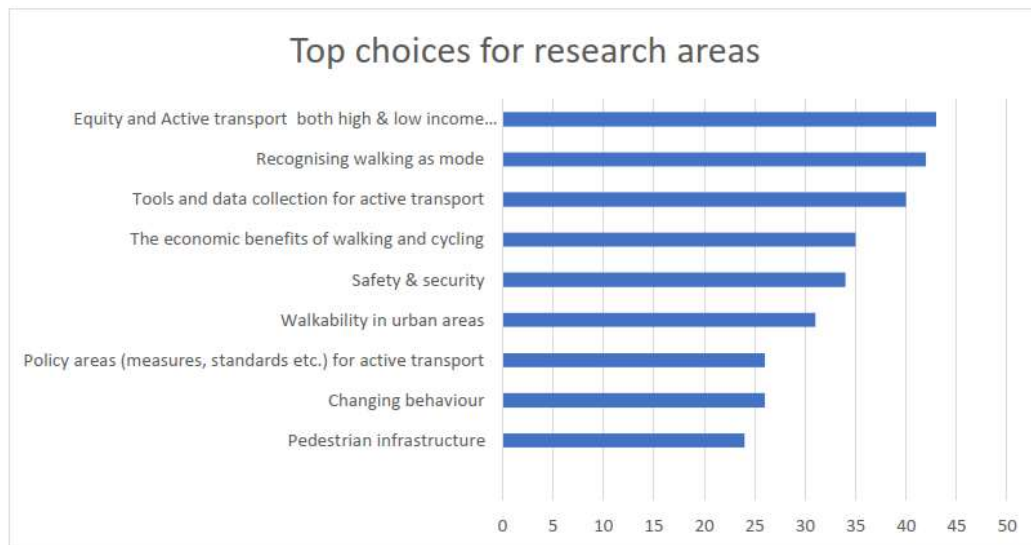


Figure 1 Perceived research gaps according to the surveyed researchers

When the literature, survey responses, and interviews were triangulated, the following top priority areas for future research were identified:

1. Data collection generally and specifically e.g. concerning trip purpose, pedestrian gender, etc.
2. Governance (including institutional and societal dimensions)
3. Evaluation tools to show and measure impacts
4. Policy development (including changes due to COVID-19)
5. Planning aspects

In addition, other key points and conclusions from Allen's study are:

- Research funding for walking is substantially smaller than that for cycling (and most other modes).
- Although many respondents claimed that there was not much research on the topic of walking, the literature review revealed that there indeed is a rather extensive volume of publications, which could indicate a lack of visibility of such research.
- Well-known research programs for walking were not identified; there seems to be no international program or funder of walking research.
- Research gaps and relative lack of interest within the research community were corroborated in education about transport planning and engineering, where a focus on walking (and cycling) appears to be considered a less viable career path.
- Overall, the importance and role of walking as a means of transport currently seem largely underestimated.

Literature review

Tight, Miles (2022), *Walking as a mode of transport: Review for VREF*.

University of Birmingham

³ In her report, Heather Allen used the concepts HIC, MIC and LIC to describe country groups. However, this Road Map employs the concepts Global North and South.

Tight's literature review (2022) focused on peer-reviewed, academic journal articles in the area of walking. The search used the keywords 'walking' and 'pedestrian', combined with 'urban' and 'transport'. Although the initial intention was to cover literature over the last 10 years, a recent review (Winters et. al., 2017) provided good coverage of the period up to and including 2016. The findings of Winters et. al. then served as a starting point in discussing articles from 2017 and onwards.⁴

The review showed a dominance of papers within the field of walkability (40 papers). However, other themes such as health (7), rights and justice (2), history (3), economic aspects (3) and covid-19-related papers (6) were also identified and discussed. Walkability includes a wide array of studies on supportive built environments for walking. Tight identified four strands within this field that show the variety of methods and variables employed in the work: methods, models, influencing factors, attractiveness/emotional response. Research on walkability has to a considerable extent focused on practical questions around "what needs to be done to make cities more walkable", which was reflected in the dominance of walkability studies centered around certain physical features in the built environment. This corroborates with the point made in Handy's extensive research overview (2005) of the relationships between transportation, land use and physical activity:

[M]ost studies are driven by questions that emerge from current trends and policy proposals, with most focusing on the new urbanism movement and calls for more traditional design in suburban areas.

This is not to say that only theories should drive research, but rather to acknowledge that policies based on research findings should account for the "risk" that these findings might originate from specific a priori planning policies and ideals, i.e. that research is undertaken merely to justify such policies. Further, it has been pointed out that the methodological approaches of such studies almost imply a certain outcome in themselves (Lindelöw 2016).

Tight concludes his review by raising general issues and needs for future research:

- Better data collection and evaluation techniques are needed, where specific examples are longitudinal research studies and studies over larger geographic scales. One of the problems of walkability research is the often limited scale/geographic scope that is considered and the lack of more inclusive urban-wide applications.
- More work is required on the equity distribution of interventions, with special need for studies focusing on sub-groups of the population, e.g. those who are least likely to engage in physical activity.
- When comparing walking to other areas of transport research, it could be argued that walking is perhaps over-represented in studies using qualitative, social research-oriented approaches. While there is some focus on mathematical and econometric modelling approaches in walking research, these appear less dominant than in other areas of transport.
- Much of the walkability literature focuses on measures that can be carried out in a specific geographic area in order to make it more walkable. However, few of these studies explicitly cite (car) traffic as a key factor which reduces walkability, nor do studies suggest measures to significantly reduce traffic flow and/or change traffic behaviors.

Bibliometric study

Sagaris, Lake et. al., (2022). *Walking, the invisible transport mode? Research on Walking and Walkability today*

Pontificia Universidad Católica de Chile

⁴ Some papers were, however, excluded. Such papers included e.g. papers with a strong safety focus (e.g. accident analysis), papers that examined microscale features of the built environment, and papers with limited transferability to other geographical contexts.

The study carried out by Sagaris et. al. encompassed an informed discussion of possible subject definition, scope and delineation; a bibliometric study; two workshops; and an international mapping of university and research teams working on walking as a mode of transport. To discuss and synthesize these dimensions and understand how they reflect existing research and potential gaps, the authors applied a dual perspective based in both the Global North (where the main research publications are located) and in the Global South (where most people in most places rely on walking for their daily transport).

Sagaris et. al. triangulated their quantitative results from the bibliometrics search with results from specific desk searches and two participatory workshops, one of which was conducted in Spanish and one in English as a means of gaining perspectives beyond the English-speaking world. In addition, the authors included two co-researchers, one based in South Africa and one native-French speaker based in Europe and with experience in Latin America. This scope allowed the research team to consider research that is not included in major journals listed in Web of Science and Scopus. The work also included two workshops with participants from global networks, including researchers and networks from various parts of Africa, Europe, North America and Latin America.

The final bibliometric search generated 2,089 articles distributed between several disciplines and areas as shown in the table below. Social sciences, followed closely by engineering, are the main areas publishing research about walking for transport, with medicine, health professions and other areas following with smaller percentages. This partly reflects the fact that public health is spread across several fields, including the social sciences themselves. Further, social science comprises many subjects related to transport, e.g. geography, political science and sociology.

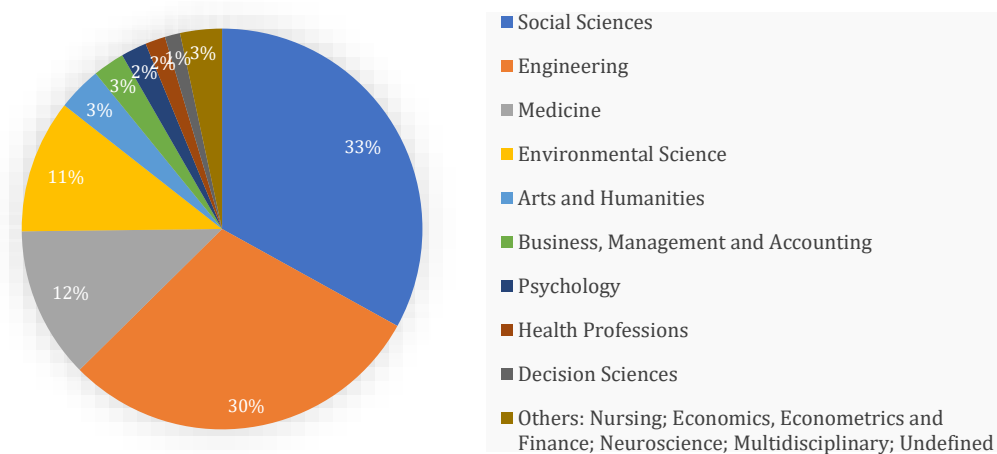


Figure 2 Article distribution by academic discipline, Final bibliometrics search (2000-2021)

The figures below display the geographical distribution of research output on walking and the collaborations between researchers and institutions in different countries and continents. The most connections are occurring between the English-speaking countries of Canada, the United States and Australia, as well as between these countries and south-east and southern Asia.

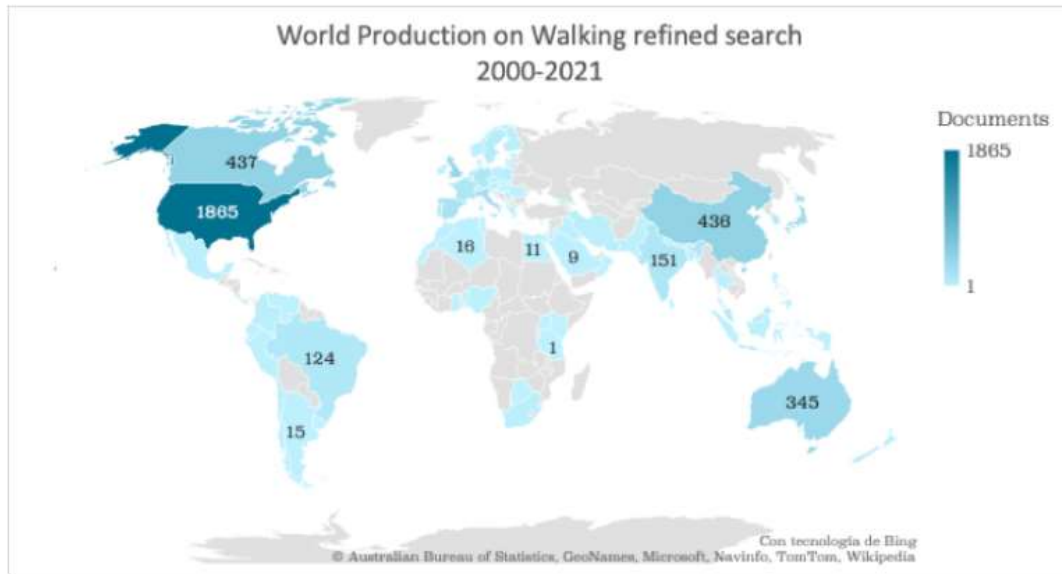


Figure 3 Map of production of research on walking generated by the bibliometric analysis

Country Collaboration Map



Figure 4 Map of collaborations involving research on walking, generated by the bibliometric analysis

An additional round of bibliometric analysis involved revisiting the initial list of potential terms and generating clusters to get a sense of their relevance. The table below summarizes which terms and combination of terms that were most common. Noteworthy is the end of the table where subjects such as governance, transport policy and planning, transport justice and equity, and community severance were seldom mentioned (see “total occurrences”) – corresponding to even fewer actual publications.

Table 1 Terms and combinations of terms that were most common in the bibliometric analysis

	Walking and...	Additional term	5-6 most frequent terms	Mentions, most frequent term	Variety (No. of different terms)	Total occurrences
1	Neighborhood	(Transport)	Walking, female, male, human, adult, humans, aged	1,363	3,609	31,734
2	Children	Non-motorized transport	Walking, pedestrian, mobility, pedestrians, walkability, sustainability	492	7,340	22,363
3	Policy	(transport)	Walking, female, human, male, humans	789	3,432	19,128
4	Public transport	Mobility	Mobility, walking, pedestrian, sustainability, accessibility, walkability	277	5,656	15,856
5	Advocacy	(transport)	Human, walking, humans, article, female, male, child	80	1,157	3,065
6	Transport	Behavior change	Walking, female, male, adult, human	97	738	2,170
7	Genders	Women	Female, male, walking, adult, middle aged	65	584	1,696
8	Participation	(Transport)	Physical activity, walking, built environment, exercise, active transport, cycling	61	699	1,202
9	Gender	Equity	Walking, pedestrian, human, male, female	129	20	1,073
10	Children	Public transport	Walking, children, physical activity, barriers, walkability (active transport)	65	311	970
11	Economic benefits	(transport)	Walking, female, adult, male, human	25	248	510
12	Governance	(transport)	Governance approach, sustainable development, transportation planning, urban transport, walking	10	280	444
13	Transport policy	Planning	Sustainable development, transportation planning, urbanization, climate change, governance approach	7	148	216
14	Transport justice	Equity	Public transport, transportation planning, urban transport, Canada, mobility, Ontario (Canada)	4	62	78
15	Community severance	(Transport)	Pedestrian, walking, mobility, public health, risk assessment	3	66	77

Source: Own elaboration based on bibliometric iterations, January 2022. © Laboratorio de Cambio Social.

Sagaris ends by raising overall issues concerning the literature review as a whole, as well as needs for future research.

- Walking is so ubiquitous that its appearances in our research can be extremely vague and between-the-lines. This occurs in pollution studies that examine conditions on walking routes without mentioning this transport mode, or the many, many studies of public

transport, which ignore walking completely, despite the fact it is the main ingress and egress mode for trains and bus systems around the world.

- Key gaps included walking in rural areas, advocacy, and governance, linked to the socio-political exclusion of low-income and diverse populations, including a large proportion of women.
- A detailed examination of modal distribution for each country was not done. Nevertheless, the general rule that emerges from the list is that the more people walk in the country, the less walking is studied.
- Participants in both workshops recommended seeking ways to level the gap between research teams in the Global South and North. Encouraging North-South-South partnerships, as is a tradition within VREF, seems like a particularly promising strategy for generating equity within research communities themselves. This also appears like a good strategy for addressing more of the governance, social equity, advocacy and health issues required to put walking high on both research and sustainable transport planning agendas.

Review of Walk21 Conference publications

Thornton, B. & Ó Briain, E. (2022). *Walk21 Library Analysis Report*.
Walk 21 and TU Dublin

The Walk21 Library of 1,671 items contains a variety of documents including research papers, case studies, posters and presentations from academics, practitioners and policymakers, covering a range of countries and territories. The documents contained in the database are the collected proceedings from the International Walk21 Conference series, which has been held annually since 2000, each time in a different country, hosted by a different city or organization. Over time, the format of these papers has evolved from full written documents with presentations to mostly presentations and posters. The papers and posters presented at the annual conferences have been selected through peer review by the conference program committees.

This report provides a summary of the material contained in the Walk21 Library, including summary statistics and charts outlining, where available, the source (e.g. organization type), geographic focus and method of each item. Further, a form of rapid review technique has been adopted to inform the thematic analysis.

Academic items, i.e. conference presentations by researchers based at universities or research institutes, represent 24% of the totality of documents in the library. The geographical origin of contributions is shown below.

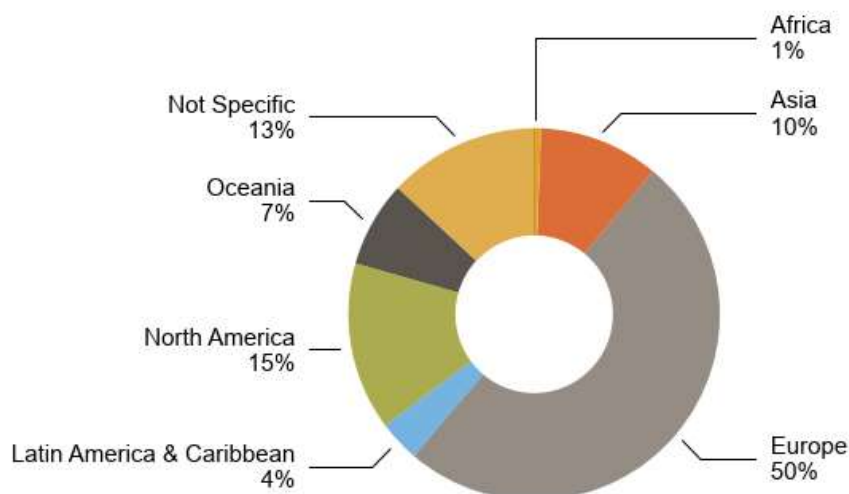


Figure 5 Academic items in the Walk21 Library by geographic focus

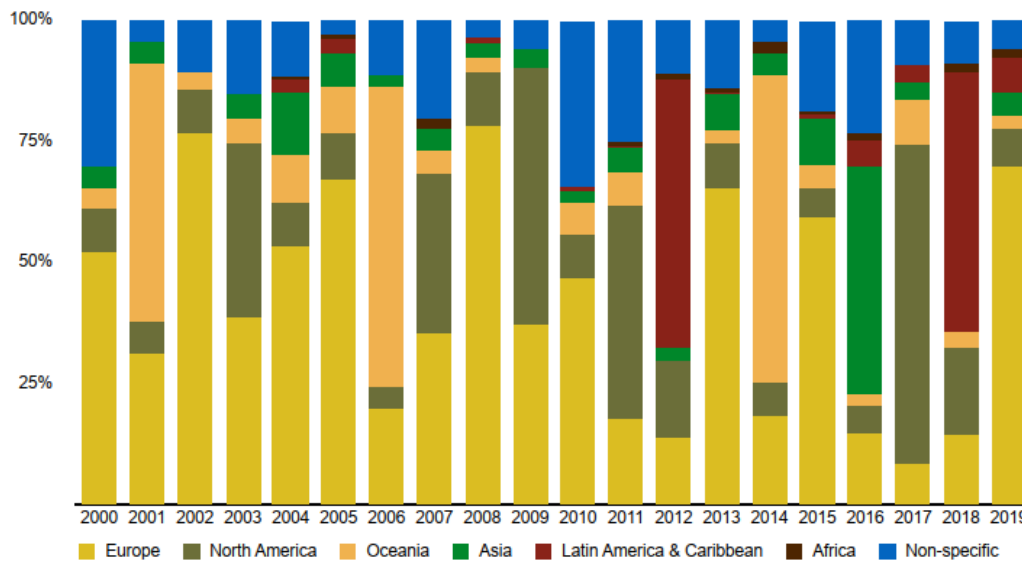


Figure 6 Items in the Walk21 Library by geographic focus and year

The uneven distribution illustrated above highlights the current imbalance in presentations that take as their focus territories other than Europe, particularly the lack of attention to the Global South. In this respect, the Walk21 library reflects broader trends in transport research in which the experiences of those living in low-income countries, particularly in the Global South, is under-researched. Walking was under-represented in research in the Global North in the early days of the conference as well.

In order to discern overarching themes, keywords were assigned to particular themes, based on the strength of their connections to other keywords within that theme. The most frequently occurring keywords, such as urban design and urban planning, which have connections to other keywords across all other themes, were assigned to the theme or keyword cluster to which they were most strongly connected. The following themes emerged, in order of prominence:

1. *Planning for Walking as a Mode of Transport* (keywords: urban design, urban planning, public space);
2. *Promoting Walking as a Mode of Transport* (keywords: promotion, health, community);
3. *Measuring Walking as a Mode of Transport* (keywords: data, evaluation, measurement);
4. *Enabling Walking as a Mode of Transport* (keywords: design, technology, wayfinding);
5. *Developing Policies for Walking as a Mode of Transport* (keywords: government policy, development plans, pedestrian culture);
6. *Making Walking Accessible and Safe as a Mode of Transport* (keywords: safety, mobility, security, development).

Further take-aways and conclusions are:

- In terms of contributions to the database, the emphasis has shifted from an initial focus on developing an agenda for the role of walking in transport policy, and a focus on advocacy and policy for walking as discrete from or separate to other modes, towards closer engagement to the broader transport agenda through the development of standardized data collection procedures and measurement protocols for walking.
- Above all, the Walk21 Conferences reveal a distinct combination of perspectives that might be missed through focusing solely on traditional academic literature or practitioners' perspectives, a combination that is generated by an international movement of practitioners, policymakers and researchers dedicated to the study of walking, and who

share a commitment to contribute their specific skills to bring about systematic change and improve walking.

- While European and North American audiences are increasingly concerned with modal shifts to walking and other forms of active travel, those in areas of the Global South where walking is the dominant means of transport are working in a policy environment where mode retention is the more appropriate consideration.
- Achieving geographical equity necessarily involves capacity building in underrepresented areas. As such, it is recommended that support mechanisms, in the form of additional training or financial aid, be developed that might allow those working in under-represented geographic areas, particularly the Global South.

Researchers, actors and networks

While there is a growing number of institutions and universities studying the topic, neither the Background Report nor other preparatory work for the program has so far identified a substantial number of established international researchers/research networks that focus on walking as a mode of transport. The research that is currently being carried out can be situated within specific disciplines (e.g. traffic safety, public health, urban sociology) or within work carried out jointly by researchers and cycling advocates. For example, Walk21 is an international organization which has affiliated researchers but does not fund or undertake research.

Other international and non-profit organizations working with issues related to walking identified so far are Africa Network for Walking and Cycling, ANWAC (organized and run by UNEP, the United Nations Development Program), and the International Federation of Pedestrians.

There are a few international scientific conferences that include issues related to walking—e.g. Walk21, Transportation Research Board and International Conference on Transport and Health

As Allen (2021) noted, efforts to identify established research programs in the area of active transport were inconclusive, with many respondents in that study claiming that there was “not much research” on walking even though the review revealed that there is an extensive volume of publications in the area (see also below) and the bibliometric report by Sagaris et. al. (2022) revealed a few university institutions working on research projects on walking. This implies that much published research is either not visible or considered not relevant.

Geographical considerations: differences in walking patterns and opportunities for South-North and South-South research collaboration

In discussing the role of walking as a socio-cultural phenomenon, as well as research priorities for understanding walking as a mode of transport, it is important to recognize that there are significant differences in Global North and Global South experiences and perspectives. While in many urban areas in the Global North, walking accounts for a smaller modal share (primarily due to the dominance of the car), in the Global South walking is the primary transport mode for most trips.

Related to this, many of those groups who walk in the Global North often do this by choice (i.e. as “elective pedestrians”), in contrast to those groups in the Global South who often are forced to walk due to the absence – or prohibitive cost – of other transport alternatives (i.e. as “captive pedestrians”). Further, as Sagaris et. al. (2022) points out, many societies in the Global South are less economically, socially and politically equal than those in the Global North, which raises issues of equity, unequal distribution of investments in walking, and transport justice in urban areas in the Global South. More specifically, poor or unsafe conditions for walking can lead to exclusion from livelihoods, education and other opportunities, which can be particularly evident from a gender perspective. Finally, differences between patterns of walking in the Global North and the Global South also underscore the crucial importance of avoiding “blueprint planning” based on approaches and standards developed in the Global North which may not be appropriate in light of social structures, activity patterns and needs in the Global South.

In terms of research commonalities from a North-South perspectives, the results of the bibliometric study indicate that there are enough *similarities* between research/researchers in the Global North and Global South to make fruitful scientific exchanges possible, while there are also enough *differences* for these contrasts to illuminate new ways of looking at issues and challenges (Sagaris et.al., 2022). At the same time, there are large gaps between the relative access to funding and other resources for research in the two global areas. Both the background report (Allen, 2020) and the bibliometric study (Sagaris et. al., 2022) point to the importance of nurturing fruitful collaborations both between North-South and South-South researcher teams as a particularly promising strategy, which also is in line with VREF traditions.

Summary of important conclusions from the background reports

- There is a need for research programs focusing on walking that have a larger scope than presently characterizes the field. Also, the current research landscape on walking as a mode of transport is quite dispersed in terms of both actors and topics that are covered;
- It is important to take into account differences in walking patterns and perspectives in the Global North and Global South, as well as to recognize fruitful opportunities for research collaboration South-North and South-South;
- There is a need to further conceptualize and appraise the perspective of walking as a mode of transport – e.g. its theoretical, methodological and planning-wise connotations;
- In terms of concrete research needs, the following preliminary conclusions have been made:
 - Dimensions related to the built environment for walking are relatively well covered on the neighborhood scale – studies dealing with walking from an urban and regional scale perspective remain;
 - Equity aspects in relation to walking, as well as distributional effects of (e.g. built environment) interventions, are not well researched;
 - Pedestrian planning in the procedural sense were identified as a research gap; i.e. aspects related to governance, strategies, planning processes and implementation for walking;
 - Better data collection and evaluation techniques are needed, where specific examples are studies over larger geographic scales and longer time periods;
 - The ever-evolving market of new mobility services and solutions has somewhat placed walking in the backwater – both in terms of acting as a relevant modal choice and being included in development and research projects related to mobility services;
 - Some general research fields and approaches are implicitly prescribed for motorized travel, while walking is often not considered.

VREF objectives for the program

Based on the overall vision and mission of the FUT Program described in chapter 1, as well as the challenges, opportunities and knowledge and capacity needs described in chapter 2 and 4, two primary objectives for the program can be formulated:

- *Objective 1:* To strengthen international research and research capacity on walking as a mode of transport in ways that can contribute to achieving more equitable access and sustainable mobility in urban transport.
- *Objective 2:* To build a broad, international and interdisciplinary community of learning which encompasses both researchers and other stakeholders in the area of walking as a mode of transport, as well as to support and contribute to new knowledge among next generation scholars.

The Program also aims to strengthen the research capacity on walking as a mode of transport in the Global South.

By creating a new international research program, substantial resources will be provided to create opportunities for creating new knowledge, particularly focusing on comparative work and international research collaboration. New collaborations will be encouraged by providing a range of opportunities for researchers to meet and exchange their findings and create new ideas.

Finally, the VREF objectives include scaling up funding for research on walking as a mode of transport. The VREF secretariat will work closely with its research partners and other international actors to identify further funding opportunities. At the same time, it is foreseen that through strengthening the profile of the program, more (co-)funding opportunities will arise to further scale up the impact of the Program.

Expected Program outcomes

The following expected program outcomes, which build on the above objectives, will be used to assess the impact and success of the program:

1. Contribute to creating new state-of-the-art, interdisciplinary knowledge on walking as a mode of transport in multiple geographies
2. Contribute to new research results on key research themes that will contribute to strengthening the role of walking in shaping more sustainable and equitable urban transport
3. Increase research capacity for work in this area, including capacity and skills among Next Generation Scholars
4. Build global research networks and communities that form internationally recognized "hubs" for knowledge exchange and dialogues among broad groups of stakeholders
5. Increase capacity and resources for research, education and outreach with a particular focus on walking as a mode of transport. Capacity in this context is related to more university staff and teams dedicated to research on walking as a mode of transport. As the international research program is expected to grow beyond the VREF funding, further resource allocation to support research in the field is envisioned.
6. Increase capacity for comparative, cross-country research and international collaboration which includes young researchers through VREF's Next Generation Scholars initiatives.

Thematic framework and priorities for research

Core Theme 1	Conceptualizing and critically appraising walking as a mode of transport
Core Theme 2	Walking as transport in everyday urban life; equity issues
Core Theme 3	Governance, policy and urban planning for walking as a mode of transport
Core Theme 4	Services, tools and business models to facilitate walking as a mode of transport

This section presents four themes that will be the proposed point of departure for the scientific profile of the Walking program. These themes have been identified through analyzing and discussing the results of the scientific reports and consultations during the preparatory phase, particularly in the form of focused workshops (both with the authors of the reports and internally). The conclusions and recommendations of both the reports and the workshops have then been “triangulated” to identify broad themes that reflect research gaps, needs and potential topics. The themes will be further explored and developed (e.g. through position papers and other commissioned work) in subsequent phases of the program.

Theme 1: Conceptualizing and critically appraising walking as a mode of transport

In the most fundamental sense, walking is a way of moving around and reaching destinations – both indoors and outdoors – for most people regardless of age. From this point of view, it might seem superfluous to discuss the definition of the term “transport mode” when it comes to walking. However, the term can be said to have theoretical, methodological and planning-wise connotations and implications (cf. Lindelöw, 2016).

Acknowledging the role of walking as a transport mode is not a new perspective. Various discussions of this subject have previously emerged in research and planning, often using typologies such as destination walking, utility walking, purposive walking, and transport walking. These typologies have sometimes been contrasted with “strolling walking” or discursive walking, where the journey “itself” is deemed more important than reaching a particular spatial destination. However, while these categorizations and typologies appear as almost mutually exclusive, in many cases they instead describe different aspects of the same walking trip (e.g. a walk to a daycare facility through a park) or simply reflect different fields of research (e.g. transport studies, mobilities, anthropology).

At the same time, it is clear that one kind of walk or trip might be described using several typologies, such as destination and “strolling walking”, where destination walking is not essentially different from “strolling walking”. Moreover, it can be argued that these categorizations are too blunt and simplistic to allow for more nuanced conceptualization of what walking for transport infers or entails. Thus walking as mode of transport does not denote a particular kind of trip or walking behavior, rather it constitutes a conceptual approach to walking overall.

Recent work in this area (Kärrholm et al. 2017; Martínez, 2021; Middleton 2009, 2010, 2011) are examples of conceptualization attempts that are relevant to kind of the research that could be carried on in this thematic area. Such research implies a step away from research driven by current trends and policy proposals or by specific needs and wants on the part of specific groups. Work in this area instead implies more holistic research approaches that treat pedestrians as subjects in themselves rather than as “means to an end”. Examples of issues that could be addressed in this thematic area are:

- How can walking as a mode of transport be conceptualized and operationalized, and what would be the implications of such conceptualizations for research and planning?

- What subjects, theories and perspectives can provide valuable contributions to understanding, developing and critically appraising the concept? Related to this, how can conceptualizations of the role of walking in “non-transport” studies inform and develop research more generally?
- How might perspectives from planning and design contribute to utilizing and implementing new (theoretical) approaches to walking as a mode of transport – beyond e.g. walkability, streetscape design and space syntax?

Theme 2: Walking as transport in everyday urban life; equity issues

While traditional research approaches have admittedly acknowledged the role of walking in linking destinations and activities, most research has not fully addressed what treating walking as a mode of transport implies from a more holistic perspective. As Monnet suggests in Sagaris et. al. (2022), walking is a “total social phenomenon”, by which is meant that walking is a ubiquitous part of everyday social life. Such a perspective seeks to understand and examine both the role of walking in urban everyday life, as well as various users’ behaviors, choices and preferences regarding how to reach destinations, activities and opportunities. Overall, there is currently a lack of in-depth studies of actual walking/mobility practices and the problems and needs among heterogeneous groups: their everyday patterns of getting about on foot, their needs and preferences, their experiences and challenges in gaining access to various modes of travel, and the implications of such barriers for their daily lives.

There is also a need to examine the role of walking in everyday urban life from a systems perspective, i.e. examining the role of walking for a functioning urban economy, effective public transport, or urban social life. Research and policy efforts are currently largely directed at promoting and understanding modal shifts (e.g. Brand et. al., 2021) – often to walking, cycling or public transport – as well as barriers for making such shifts. However, from a perspective of this theme, there is also a need for empirical investigations and assessments of walking trips already taking place, as well as how such behavior can be maintained and fostered. This type of work includes assessing the benefits (e.g. regarding congestion reduction and climate mitigation) both for walking trips already taking place *and* for increases in the number of walking trips.

Lest not forget, in many urban areas, walking is already an established way of mobility and travel – be it by choice or not: many walking trips (particularly in the Global South) are made by so called “captive pedestrians” who lack alternatives or financial means to travel differently. In order to support or influence current walking behavior, we need to better understand and decipher the fine-grained web of movements, interactions and choices that constitutes the walking patterns of diverse groups in various urban contexts today. Linked to this, we also need to contextualize patterns of walking in various urban areas so as to better understand the importance of different urban conditions and circumstances in which walking takes place. Also, since walking often consists of a series of intermediate trips (or parts of trips) in complex travel chains or activity patterns, it would be useful to develop new methods and data sources – beyond travel surveys and trip-based data – that could capture such nuances. In this context, intra-urban comparisons of walking behavior, practices and patterns could be fruitfully carried out through South-North or South-South comparative work.

Finally, understanding walking as an everyday mode of travel also entails dealing with issues related to equity, accessibility and safety for vulnerable groups of pedestrians in particular. Here it is important to analyze the intertwining socio-demographics, activity patterns and urban constraints that may restrict access to viable and safe walking infrastructure. Particularly in the Global South, unsafe, polluted and crowded streets – combined with various institutional constraints on authority – often restrict access to destinations such as workplaces, schools, and healthcare facilities. In this context, methods that focus on assessing equity among and within various groups could be fruitful.

Examples of issues that could be examined within this theme include:

- What role does walking play in everyday life for different user groups in various urban areas? In other words, how do different user groups and citizens walk to “get about” in their everyday activities, and how do they perceive walking in relation to their everyday life and mobility?
- How can we better understand the needs, preferences, problems and access to mobility options of different groups, particularly vulnerable pedestrians such as (some) women, children, the elderly, and groups with weak socioeconomic resources?
- What is the importance of different urban conditions and circumstances (e.g. related to the configuration of transport systems, the functioning of cities and their economic and social life) in shaping or restricting walking in everyday life? How would the quality of cities and their transport systems devolve if conditions for walking were to worsen? How would they benefit if conditions improved?

Theme 3: Governance, policy and urban planning for walking as a mode of transport

Despite increasing recognition of the importance of walking for achieving societal goals such as sustainable urban transport, walking remains largely invisible in planning, policy and investment plans both nationally and locally in many areas. There are several factors that contribute to this situation. Among else, dominant planning paradigms based on e.g. “predict and provide”, “travel-time reduction” or “transit-oriented development” tend to overlook walking (Sagaris et. al., 2022), and in many areas planners lack evidence-based tools that are needed to support policy initiatives for walking (Tight, 2022). Little knowledge exists about the effectiveness of various measures, which is compounded by problems of transferability and the need for policies that are suitable to the specific circumstances of a place and time (Tight, 2022). Finally, there is also a strong need for research on new approaches based on broad, inclusive collaborative planning processes that meet the needs of broad groups, reflect equitable distribution of interventions (ibid.) and prioritize walking as an important social and cultural phenomenon.

Further, as discussed earlier, walking risks being “no one’s responsibility” – it is (in theory) an option available for almost everyone and it has no particular industry or financial interest backing it. This situation risks resulting in walking receiving too little attention or interest from political organizations, societal groups, or NGOs. However, the landscape of relevant stakeholders for walking, including their interests and motivations (or lack thereof), is a topic deserving further attention and scrutiny.

It has also been pointed out (Allen, 2020) that even when walking is explicitly mentioned as “important” in planning documents, there remain significant barriers to *actual implementation* of measures and strategies (such as dedicated plans and tools for walking) that could contribute to developing adequate pedestrian infrastructure in urban areas, particularly in the Global South. Plans and strategies for “sustainable” or “active” mobility might often prioritize cycling or public transport before walking. Further, policies and strategies on a national level might be poorly fit for dealing with aspects relevant to walking, while local plans and strategies might not mirror or resonate with strategies, goals or metrics on the (inter-)national level. Here it is important to identify and understand the interdependencies and interactions (or lack thereof) between priorities, planning processes and policies on different levels of governance, sometimes referred to as multi-level governance. Existing institutional structures may limit actors’ ability to allocate resources for walking; it is also clear that governance is embedded in power relations that can influence planning and decision-making processes. At the same time, there is currently little research on dynamics, paradigms and processes that shape transport planning and politics for walking specifically. Findings and “lessons learned” from other transport modes cannot automatically be translated to walking.

Examples of issues that could be examined within this theme include:

- What dimensions, stakeholders or barriers have significance for the institutional capacity of urban planners to develop and implement policy measures to explicitly promote walking in urban spaces? What groups of stakeholders (e.g. public, private, NGOs) are influential in shaping decisions and outcomes regarding policies for walking? What are their respective goals and interests?
- What is the status of walking in urban planning and decision-making processes in specific urban areas, e.g. to what extent are guidelines and methods for walking planning actually applied and why/not why in specific contexts? To what extent is planning for walking integrated and coordinated with other policy areas, e.g. planning for public transport or public health? How are policies and strategies at different scales coordinated (or not)? What are the potential prospects and pitfalls of coordinated multi-level governance when it comes to improving conditions for walking as a mode of transport?
- How might new approaches, standards, and tools for urban planning and governance of walking be further developed in ways that are based on both broad, collaborative planning and equity considerations?

Theme 4: Services, tools and business models to facilitate walking as a mode of transport

The current revolution in “big data” holds many promises and opportunities, not least for the mobility and transportation industry. The evolution and use of autonomous vehicles, automated mobility options (“travel on demand”), shared bicycles and electric scooters are all dependent on collecting and using trip data. However, in these developments, walking has so far been largely neglected or merely been given a passive role. For example, the concept of mobility as a service (Maas) seemingly assumes a “vehicles-only” approach in which walking is regarded merely as a feeder mode to delivery modes and shared mobility options. Overall, walking remains somewhat deemed to be viewed as a natural, manual and non-technological means of travel.

There are significant reasons, however, to question this view and its apparent divide between on the one hand, new mobility services and on the other hand, walking as a mode of travel that links such services. In urban areas today, residents use their mobile phones or gadgets extensively while getting about on foot – which not only influences their use of, and views on, travel time and the possibility of performing simultaneous activities and reschedule future ones, but also provides support for wayfinding and discovering nearby amenities and activities. From a research and policy perspective, this combination of technology and the “mobile individual” can be seen from two perspectives: the array of possibilities for what the activity of walking could entail expands, and pedestrians themselves become producers of data for tech companies to collect, analyze and make use of in their business and service operations.

In this context, the concept of “walking as a service” (Lyons, 2020) suggests a way forward and is well worth exploring further. From an individual perspective, a pedestrian with a mobile phone can be seen as a mobility-technology assemblage (Holton, 2019), almost constituting a mode of travel in its own right. The combination and abundance of big data, and the use of technological gadgets and attire, could be fruitfully applied to facilitate walking as a part of integrated approaches to urban mobility. While support to technological development per se will not be included in the current VREF program, there are a number of related research issues that could fruitfully be explored in this theme:

- How can (mobile) technology help increase pedestrians’ wayfinding capability and knowledge and perception of their walking environment? How can such technology develop and expand our understanding of walkability and pedestrian-friendly planning?
- How can active and passive data and its sources be further utilized to develop services, tools and business models that support and foster walking as a mode of transport?
- What are the risks of such initiatives from a pedestrian’s planning perspective, as related to e.g. vulnerability, risks of relying on/trusting automated planning tools, and high demands on user knowledge of various systems?

Forms of implementation: program phases, components, instruments

VREF's preparatory work in surveying the status of current knowledge, identifying knowledge gaps, and mapping existing research capacity (e.g. research and research environments) with regard to "Walking as a mode of transport" has indicated that the current research landscape lacks vital knowledge and is relatively fragmented in terms of both thematic directions, disciplinary orientations, and research capacity. While walking more generally (including e.g. walkability; health benefits of walking) has been a research topic for many years, work on walking as a mode of transport has not yet developed into a cogent research direction, subject or "field" in itself. As noted earlier, despite its ubiquitous presence in everyday life (particularly in the Global South), as well as indications of significant interest in walking as an instrument for achieving sustainable urban environments, the area of walking as a mode of transport has not received extensive research or policy attention.

On the one hand this situation offers a potential for VREF to make significant long-term contributions toward strengthening knowledge building and establishing international communities of learning; on the other hand, it indicates that the area is not sufficiently identified, delineated or researched in ways that could form a firm basis for immediate large-scale program implementation. Instead, similarly to the status of VREF's "Mobility and Access in African Cities" (MAC) initiative at the time it was launched, the Walking as a mode of transport program should be built up successively, with gradual implementation of program initiatives based on accumulated results and findings of previous activities.

The envisaged time frame for the Walking program is 2021 – 2029. The program will be planned and successively implemented in the form of four phases:

- Initial (preparatory) phase: mapping and framing (2021-2022)
- Program phase 1: Bridge-building (2023-2024)
- Program phase 2: Stable instruments and implementation (2025-2026)
- Program phase 3: Continued implementation and synthesis (2027-2029)

Initial phase: mapping and framing (January 2021-May 2022) – activities and outcomes

The overall objective of the initial phase was to 1) strengthen the foundation for a long-term VREF program through identifying and mapping state-of-the-art knowledge and research in the area, 2) contribute to the international research conversation, and 3) frame the long-term VREF program. This phase has consisted of numerous activities which have provided a firm basis for defining the direction and scope of subsequent phases of the program (see "Background and Context") and which have resulted in this Road Map which formulates a tentative long-term program strategy, including objectives, research priorities and program design.

Program phase 1: Bridge-building (2023-2024) – activities and outcomes

Starting with this program phase, the components and activities of the Walking program will follow the general VREF program structure (see figure 7 below) combining a thematic profile with three pillars of action – *Knowledge Building*, *Community of Learning* and *Next Generation Scholars* – and supported by continuous program coordination. The three pillars of action will complement each other to meet the objectives of the program.

Structure of the Walking program

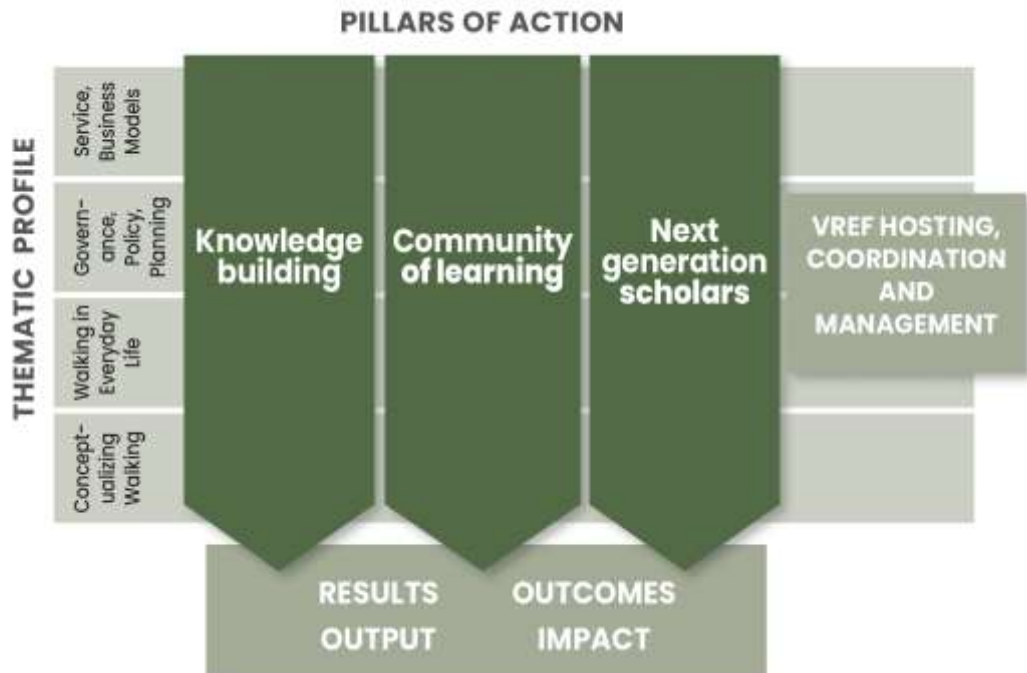


Figure 7 Generic structure of VREF program

The core aim of program phase 1 is to develop linkages between different research topics and fields; between researchers, other actors and regions; and between the initial phase and program phase 1, thereby “building bridges” as the conceptual basis for this program phase, including activities under the three pillars of action as well as continued development of the program. This phase of the program will focus on the following activities:

Knowledge Building

The Knowledge Building pillar will focus on research and further knowledge creation through research projects, special studies, research papers, think pieces, knowledge synthesis etc. Scientific publication will be embedded in the activities under this pillar.

Communities of Learning

The Community of Learning (CoL) pillar will focus on communication, exchange and learning activities among a network of researchers and other experts, framed around the research findings. This pillar will also strengthen the outreach and communication of research findings beyond academic channels and establish a community of interested individuals, networks and organizations.

Next Generation Scholars

The overall aim of the Next Generation Scholars pillar is to support and enhance the growth and renewal of academic capacity in the field through capacity building and career development for young scholars, as well as improved education on bachelor, master and PhD levels.

VREF continued program development

During this phase, VREF should work to establish a solid base for the long-term program implementation with the aim of building an academic base and strengthening the scientific quality and visibility of the research area, while also establishing VREF in a convening role for research on Walking as a mode of transport.

Besides overall program management and administration, VREF's active program coordination will strive to strengthen the Walking program through initiating, enabling, catalyzing and facilitating activities under the three pillars, as well as linking the Walking program to other VREF programs (e.g. Informal and Shared Mobility in Low- and Middle-income Countries, ISM and Mobility and access in African cities, MAC) and the FUT program at a general level.

Program phase 2: Stable instruments and implementation (2025-2026) – activities and outcomes

The mapping and framing work in the initial phase of the program has indicated multiple kinds of instruments and mechanisms that might be considered as forms of implementation for a full-scale program on Walking as a mode of transport. Among these various forms of implementation are the following alternative configurations:

- (i) Establishing an *International Research Program (IRP)*, where an international team of researchers/environments is given responsibility for carrying out a coherent research program on Walking as a mode of transport, as well as responsibility for other program-related activities (e.g. building communities of learning and supporting next generation scholars in areas directly related to the research area).
- (ii) Establishing a *decentralized program* in which knowledge production is primarily carried out in the form of multiple comparative research projects that are selected through a series of international Calls and carried out by a diversity of researchers/environments who are loosely connected through their participation in the program.
- (iii) Establishing a program in which VREF does not initiate significant new knowledge production but instead focuses on what could be coined a *"network or hub" role* which could imply establishing e.g. an "observatory" for collecting and providing data and other information on Walking as a means of transport. This approach could also entail operating a continuous platform for networking, knowledge exchange and discussion among researcher and other stakeholders (e.g. building a community of learning).

Program phase 3: Continued implementation and synthesis (2027-2029) – activities and outcomes

This program phase implies continued implementation of the Walking program in the three pillars of action, as well as synthesis of program results and outreach activities for stimulating dialogues/exchanges/further initiatives in relation to these results. The content, direction and scope of the phase is contingent upon a decision by VREF's Board.

Opportunities for cooperation

Collaborations with non-academic actors are an important part of VREF objectives and strategies with regard to stimulating broad dialogues between researchers and multiple stakeholders, as well as applying research results to ongoing efforts to achieve equitable access and sustainable mobility.

Furthermore, international collaborations with non-academic institutions can provide opportunities for researchers to engage directly with various contexts and events through activities such as workshops, webinars or other forums. Such cooperation can strengthen the dissemination and uptake of research results, while helping to inform researchers and the research community so as to better understand the needs of the decision-makers. In some cases, events or shared initiatives can be designed in ways that can contribute to capacity building among broad groups of shareholders through e.g. online training, short courses and small policy-oriented workshops.

Identifying relevant actors and organizations for short-term or long-term cooperation, as well as developing fruitful collaborations with these organizations, is an important part of work in all phases of the program.

Implementation process 2022 – 2023

The first year of implementation, July 2022 – June 2023, will focus on activities that support establishing an international network around the program, as well as to start forming a scientific profile of the theme. This period will have two parallel and partly intertwined processes:

- A call for proposals for relatively short exploratory research projects. Based on an open call, VREF will award grants to a limited number of projects to be implemented in 2023.
- Additional activities with the aim to connect people, scientific disciplines and geographical contexts, such as commissioned research papers, online and physical events, website and pilot activities to support early career scholars and PhD students.

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