



More Accessible Paris





Augusta Uwamanzu-Nna, Harvard College

Jonathan Gunasti, Pomona College

Louis Marty, Sciences Po - HEC

Xander Hampel, Centre de Recherche Interdisciplinaire (CRI)

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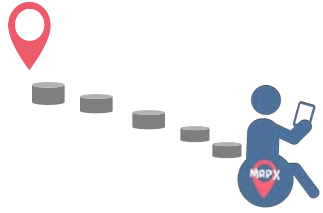
Executive Summary



We aim to create a More Accessible Paris by identifying and “swelling” the intersection between urbanism and physical disability (MAPX) through the lens of sidewalk travel. Inspired by the inflammatory immune response, MAPX is a mobile service-learning game that uses GPS data to document the accessibility of Parisian sidewalks.

Paris, as a world renowned tourist destination and cultural center, has one of the busiest yet least accessible metro systems. Walking is highly valued in Paris, and in a historic urban environment where wheelchair users cannot access the metro, it is especially important for sidewalk conditions to be documented. Paris, as a future Olympic and Paralympic host city, needs innovative and practical solutions to make its environment more accessible.

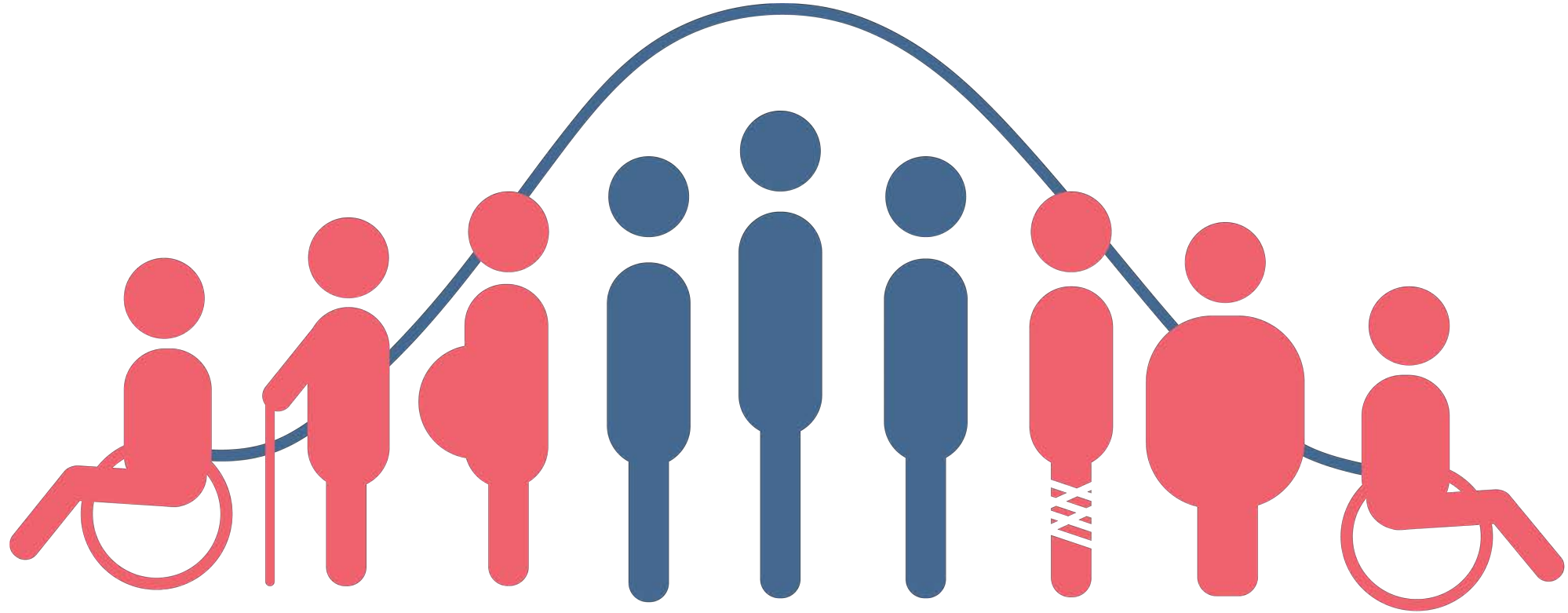
MAPX would rely on strategic partnerships with volunteers groups, who play the game and collect the data, and with mapping services, who use this data to provide wheelchair-friendly navigation services. Our ultimate goal is to make sidewalk travel easier for people with all degrees of mobility, and in this process we hope to both promote dialogue about physical ability and aid the City of Paris in its commitment to be a more accessible city.



BACKGROUND

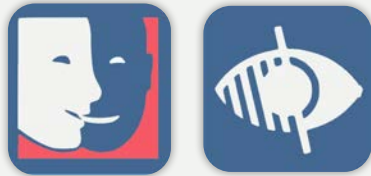


“The built environment is basically designed for the average human being...



...from the perspective of a bell-shaped curve, persons with many types of disabilities that place them in the tails of the distribution are effectively isolated by their environments”

- Herbert Hahn



12 MILLION PEOPLE

in France have some sort of disability



3.5 MILLION PEOPLE

have a motor disability

650,000 PEOPLE in France use a wheelchair



3/4 OF WHEELCHAIR USERS

require some human assistance



The historic architecture that characterizes Paris's urban environment distinguishes it from many cities, making it a particularly notable tourist destination. While Paris is alluring to many, its physical design complicates daily life for those who face a disability. Paris, as the capital and largest city in France, is responsible for leading the country in terms of innovation, equality, and development. Although France publishes census data on disability, the city of Paris has a lack of statistical data about its disabled population (J. Pacaud, personal communication, July 7, 2017). Consistent with this observation, Paris hosted a United Nations Expert Group Meeting on Disability Data and Statistics in 2015 to inform the creation of the Sustainable Development Goals and encourage documentation of disability in census data.

Background: Métro de Paris

The Métro de Paris is extremely busy with approximately 1.5 billion riders per year (STIF). However, this system remains largely inaccessible to those who cannot use stairs. Only Line 14, which opened in 1998, is wheelchair accessible at every station (Perry and Cathcart-Keays, 2015). The Réseau Express Régional (RER), while accessible to those in wheelchairs, requires advance notice of at least one day, and even then, author and accessibility activist Charlotte de Vilmorin notes that she must “travel like a suitcase” in the train’s luggage compartment (Wheelcome, 2014). Although Paris’s tram and bus systems are “accessible” and are a realistic alternative for those with ambulatory disabilities, Sciences Po student and wheelchair user Clotilde Aubet believes that they are “not wheelchair-friendly enough” (C. Aubet, personal communication, June 27, 2017).





Legislation

The French Parliament passed Law No. 2005-102 on “Equal Rights and Opportunities, Participation, and Citizenship of Persons with Disabilities” on (February 11th, 2005). This law evolves from related legislature from 1975, which recognized the needs of disabled workers, and focuses on the idea of universal accessibility. The 2005 law now aims to ensure equal access to goods and services, regardless of physical ability. Establishments like restaurants, movie theaters, hair salons, and doctors’ offices were required to become accessible

to those with hearing, visual, motor, and intellectual disabilities (Barlow, 2013). The original deadline to comply was 2015, but the government estimates that only 15 to 40 percent of businesses did. Some disregarded the law entirely, preferring to just pay the nearly \$50,000 non-compliance fine (Gee, 2015). Others did not have the financial capacity to retrofit their businesses. Although Parliament has granted multi-year extensions to many businesses, including the RATP metro system, retrofitting challenges still persist.

Why sidewalks?

While it is very important to address the challenges of the public transportation system, even simpler activities, like travelling via sidewalk, still lack accessible solutions. Regardless of the accessibility of the metro, wheelchair users must be able to navigate on sidewalks to live in the city. In a city that particularly values walkability, physical barriers like narrow and/or cobbled sidewalks, broken surfaces, and stairs interfere with mobility aids. It is important to identify novel ways to make sidewalk use possible for persons with motor disabilities.



MAPX is a mobile service-learning game that uses GPS data to document the accessibility of Parisian sidewalks. By integrating a virtual experience with the physical infrastructure of Paris, MAPX collects information **on sidewalk conditions in terms of width, surface, presence/absence of curb ramps and other obstacles that make**

movement difficult. This data, which has traditionally been hard to collect, is necessary for mapping services and city officials to identify, manage, and fix accessibility concerns. With this information, mapping services can provide wayfinding services for wheelchair users as an immediate alternative to retrofitting sidewalks. Our innovation lies in the data

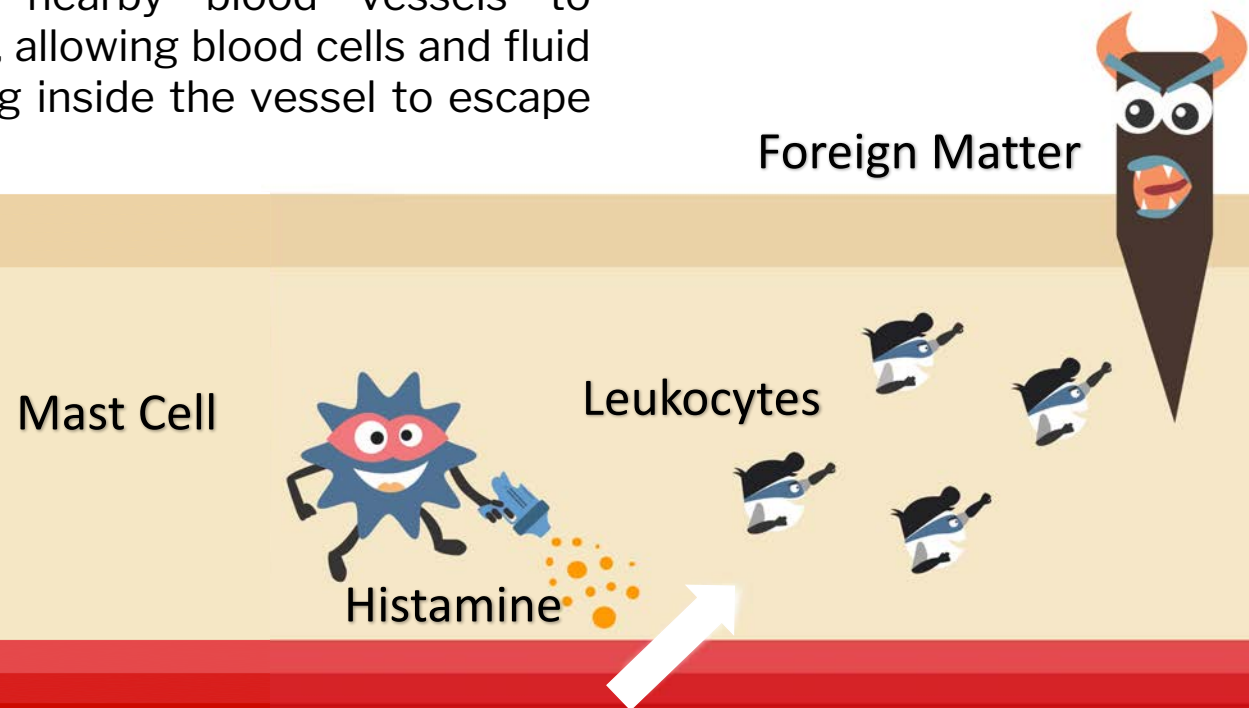
collection process; rather than relying on citizens to enter information onto a database out of goodwill, we incentivize participation through strategic partnerships with service organizations and an informative, gamified interface. Our data would provide insight to city offices and allow mapping organizations to efficiently operate in Paris.

The Inflammatory Response

Obstacles on sidewalks are similar to antigens, or foreign substances that induce an immune response in the human body. These obstacles further impede the mobility of those who use wheelchairs and threaten the health and wellbeing of the entire “body,” or the city and its residents. MAPX, our proposed game, draws inspiration from the inflammatory immune response, the mechanism the human

body uses to respond to foreign matter that threatens its health. When damage to skin tissue allows for dirt or bacteria to enter the bloodstream, a cascading series of signals prompt mast cells, a type of white blood cell, to release histamine, a signaling molecule. This histamine causes nearby blood vessels to expand, allowing blood cells and fluid traveling inside the vessel to escape

and occupy the damaged area. Through this process, the damaged area swells and becomes red, and leukocytes, another kind of white blood cells, arrive to digest foreign particles.



When skin cells detect damage, the first step in the inflammatory response is for the mast cells to release histamine and signal a foreign presence. In a biological sense, influxes of signals like histamine cause swelling. Swelling not only helps people identify and treat health concerns on a macroscopic scale, but also represents the conversion of signals into constructive action. Our application enables users to similarly **signal problems** for wheelchair users on Parisian sidewalks. These signals, released by gamers, metaphorically “swell” the locations that are difficult to access by wheelchair. Once “swollen” and visible to the city and mapping services, these organizations can internalize the information and increase the functionality and effectiveness of their operations in Paris.





Sustainable Development Goals

11 SUSTAINABLE CITIES AND COMMUNITIES



10 REDUCED INEQUALITIES



In 2015, the United Nations established seventeen Sustainable Development Goals to address the foremost challenges affecting society today. MAPX strives to address the challenges of urban accessibility in Paris under the framework provided by the United Nations. Specifically, we focus on the goals of good health and well-being, reduced inequalities, and sustainable cities and communities. We believe that encouraging sidewalk use both promotes healthy lifestyles and transportation equity. Specifically, we focus on target 11.2, which stipulates that member countries should “by 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety... with

special attention to the needs to those in vulnerable situations, women, children, persons with disabilities, and older persons.” The ultimate goal of MAPX is to lower the barriers to accessible routing services for those with reduced mobility, making sidewalks, a crucial and often overlooked element of city navigation, more inclusive and accessible.



PREVIOUS APPROACHES



City Efforts



The RATP has renovated station staircases with additional handrails and pioneered digital projects to provide real-time accessibility information, for example, about escalator service. Additionally, the RATP and city of Paris have supplemented physical changes with benefits for those who are disabled. For example, elderly or disabled residents who have lived in Paris for at least three years can qualify for free or reduced transit fares.



The Syndicat des Transports d'Île-de-France developed Infomobi, a website and mobile application that compiles accessibility information like the availability of elevators at metro stations. This service enables wheelchair users to create their own accessible itineraries. However, these efforts focus on Paris' public transportation system and do not account for other means of travel like sidewalks.



Pam75 is a car transport service for Parisians with disabilities and/or reduced mobility. Users must have support from a doctor and a disability card issued by the Departmental House of Persons in order to use the service. It is not for spontaneous travel; users must book a car in advance and pay a distance-dependent fee. While Pam75 is effective and convenient for planned transportation like a daily commute to work, it does not focus on flexible and spontaneous outings.

Mapping Services



Route4U

Route4U, a company based in Budapest, aims to document and map sidewalk and building accessibility. Route4U runs an application for people with ambulatory disabilities to identify accessible routes. Users input data about buildings, but information about sidewalks is limited to “automatic” collection through phone sensors. Those who enter data into the system earn points, and later get congratulatory trinkets from corporate sponsors.



Project Sidewalk

Project Sidewalk uses a mobile application and an online interface to allow users to document and describe sidewalk accessibility in Washington, DC. The organization depends on individual assessments of sidewalk severity to develop an algorithm that automatically maps sidewalk accessibility. The project currently does not have an interactive accessibility map, but however the map’s code is open source and readily accessible.



Google Maps

Google Maps will now display whether a location, such as a building or a restaurant, is accessible by wheelchair. The update pinpoints accessible locations instead of accessible routes. When launching this update, Google announced that they aim to crowdsource accessibility information based on the free contributions of Google Maps users, indicating a corporate interest in gathering this information.

Data Recipients



Mapping Services

Our direct beneficiaries are mapping services with the digital infrastructure to provide turn-by-turn navigation to wheelchair users. These services require a large amount of data and face challenges sourcing enough to provide their services. Route4U, one of these mapping services, has expressed interest in the data that we plan to collect and has confirmed that it would be valuable to their service. While traditional methods of data collection rely on paid surveyors or individual volunteers (crowdsourcing), we aim to innovate on this process. In return for the data we provide at no cost, companies like Route4U provide MAPX with the strategic partnerships and visibility that we need to continue our own operations.

Government

The city government is interested in information on its sidewalks, as their current digital system only focuses on incline as the primary measure of accessibility. By having more comprehensive data about street conditions that are troublesome to wheelchair users, the city would better understand the specific problems people in wheelchairs face and their relation to city services. Regarding our biological inspiration, “swelling” individual and systematic problems galvanizes city, regional, and national governments to take action. In the context of the Grand Paris, data on accessibility would help policymakers design and implement more effective programs regarding mobility and inclusivity. In addition to the city government itself, the Office of Tourism may also be interested in improving the appeal of Paris as an accessible tourist destination.



By providing our data at no cost, we “swell” the problems that wheelchair users experience and provide the visibility and information necessary for governments and NGOs to take action.



MAPX strives to help **wheelchair users** manage the unique challenges of a pedestrian-oriented city. Presently, wheelchair users resort to a trial-and-error method of navigation: trying different routes until one works adequately, and then using this route whenever they wish to travel (Aubert, Interview). Although services presently exist to assist residents, there is a need for more simplicity and spontaneity in sidewalk travel. Wheelchair users should be able to use sidewalks without comprehensive earlier planning. Paris, as a leader in innovation and as a future host of the Olympics and Paralympics, has a responsibility to support safe and practical transit for all.

Anticipating the influx of tourists leading up to the Olympic Games, the city needs immediate, novel solutions. While municipal programs and support services exist to aid residents, these services do not include **tourists with limited mobility conditions**. This puts tourists in a unique position during their stay, as the municipal programs represent the current solution for the lack of accessibility in Paris's transit system. We eventually hope to target all people with any kind of difficulty navigating the city, whether it be from permanent or from temporary conditions (pregnant women, people with crutches, tourists overwhelmed with luggage, etc.).

Our Approach



Crowdsource Data



Send to Mapping Services



Use Accessible Routes



Through our gamified approach, MAPX becomes a key player for mapping services that would value data that documents the accessibility of sidewalks. Our potential collaboration with organizations like Project Sidewalk, Route4U and/or Google can help establish wayfinding functionality in Paris.



MAPX: THE GAME



Gamers: Volunteers

Organizations that rely on crowdsourced data face a unique limitation: establishing consistent participation. We hope to overcome this problem by allying with community and service-based organizations. We intend to partner with Scouts and Guides de France, whose members would earn a symbolic reward, like an “Accessibility” badge, for playing our game. Since there are many Scouts in Paris, we believe that a partnership would provide us with the feedback and participation that we need to refine our initial prototype. Partnerships with such organizations will assure us of participation and promote education. Once we launch our finalized game, we hope to broaden our user base to include independent gamers.





Players open the application for the first time to a short, introductory video. The game is based on a new understanding of particle physics and quantum entanglement that has allowed Marie X, a Parisian scientist, to create new technology that can instantaneously transport people and goods across the world. However, when political leaders suggested that this technology be used to assert authority over less powerful nations, Marie hid her work through a secure computer system requiring a series of the complex geometric passwords. Marie X has gone missing, and world leaders have demonstrated that their scientists are close to developing their own version of Marie's work.

Mr. X, her son, recognizes that the only way to prevent the abuse of his mother's technology is to recover her work and make it accessible to everyone. Since he, like his mother, uses a wheelchair, he has discovered that her passwords are geometric and correspond to the shapes of accessible sidewalk routes in Paris.

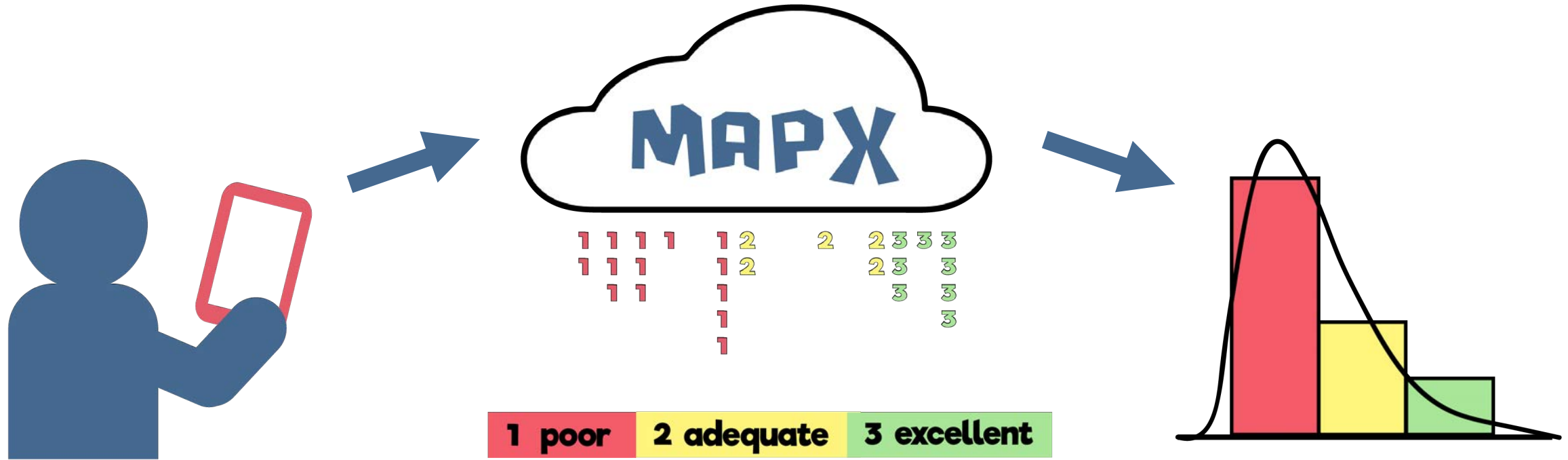
Players must assess sidewalks in terms of width, curb ramps, and surface texture, and report back to Mr. X so he can build a map of accessible sidewalks in Paris. With this information, Mr. X and his society, MAPX, will recover his mother's technology and end transportation inequity for good.



The main interface of the application consists of many “story segments” consisting of five missions. Each mission is defined by one of the three sidewalk parameters—width, surface, or curbs—a unique story, and a defined route. Players must complete the missions, which are of varying lengths, in order, and do so when

they have reached the destination of the defined route. Throughout each mission, players face “checkpoints” at which the information the player has gathered is uploaded to MAPX servers. Players will characterize sidewalk conditions based on their geo localized position. The way data is input by the gamer will depend on the mission and therefore the type of

sidewalk parameter. For curbs and surfaces, gamers will characterize sidewalk accessibility based on in-app visuals. For width, gamers will use their phone camera to take a picture of the sidewalk. Computer programs will then be used to quantitatively analyze the width of the sidewalk and rate the condition accordingly.



Users will document sidewalk conditions through a “traffic light” color rating system, where each color input will correspond with a numeric output. This will enable statistical analysis to create an accessibility metric for the given parameter. MAPX will also store the raw datasets for more comprehensive analyses by individual mapping services.



Throughout the game, the player will hear from Mr. X, who is working to “decode” the geometric shapes hidden in the streets. There is a chance that players will receive a plot development message at any time that they reach a checkpoint, introducing an unpredictable and exciting element to gameplay. At the end of the mission, the player will always receive a message from MAPX and a quantity of points corresponding to mission length, data collected, and random chance. Additionally, depending on where the players complete the mission, they may receive a message indicating that the information from that location is linked to other locations (which MAPX can define in order to encourage users to go

to these less documented areas). Players are awarded “levels” according to the quantity of points accrued as they complete story missions, special missions, and free documentation. Higher level players have the opportunity to document more complex sidewalk features that will reflect the additional needs of mapping services. The game also rewards the most active players with badges—for example, a badge for the first player to document a particular street. We also hope to involve corporate sponsors who may provide discounts or other rewards for high-level players.

Although the primary purpose of MAPX is to collect data through a

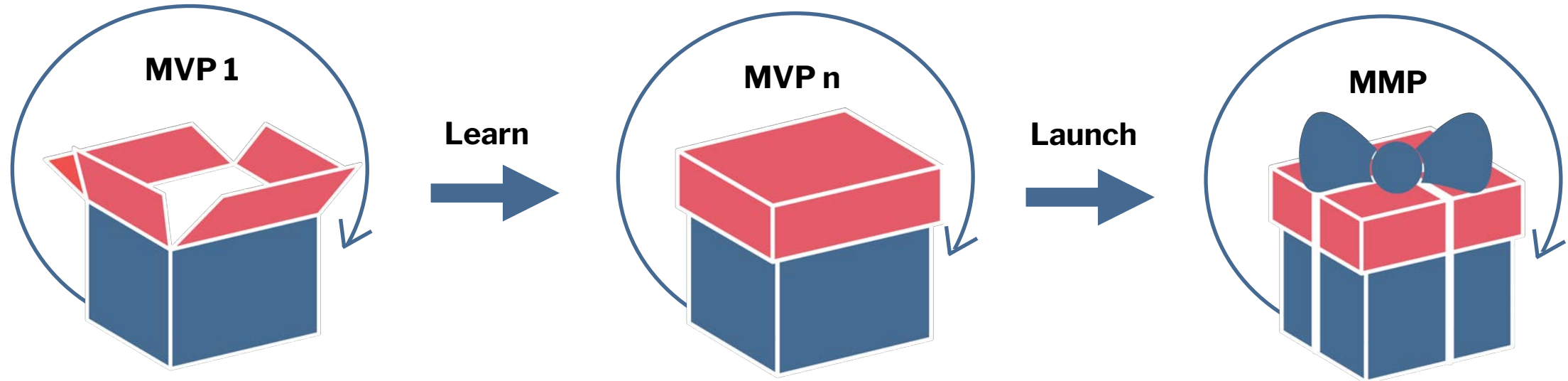
fun interface, we also recognize the need for education on universal design, or design that prioritizes accessibility for all people in the built environment, regardless of age or physical ability, as a metric of sustainability. We hope, as a secondary goal, to educate players about design elements that define a space’s accessibility. By encouraging players to consider the design of the built environment in which they live, we by extension hope to help mend the social stigma regarding physical disability.





EXECUTION PLAN





We will begin the development of our mobile game by introducing a minimum viable product (MVP) that is limited in scope and function. We plan on implementing our basic form of our game as our MVP in the 16th arrondissement, an area that is both touristic and residential, and is also an active area for the Scouts de Guides. The missions we include in

this area will focus on documenting one parameter: curb ramps. By focusing on one geographical area, we can verify the accuracy of our in-game data collection methods by comparing data generated by the game and manually. Additionally, we will receive qualitative feedback regarding the gameplay experience from the Scouts. As we gain more

information about the data collection process through the MVP, we will evolve this basic application into a minimum marketable product (MMP). The MMP has more features than the MVP and incorporates user feedback. Eventually, MAPX will become a fully-functional game that can be launched in application stores to reach a broader audience.

Key Stakeholders



Government
City of Paris,
Office of Tourism



Service Organizations
Scouts and Guides
de France



Value Chain



Sponsors
RATP, AXA,
Orange, Vinci



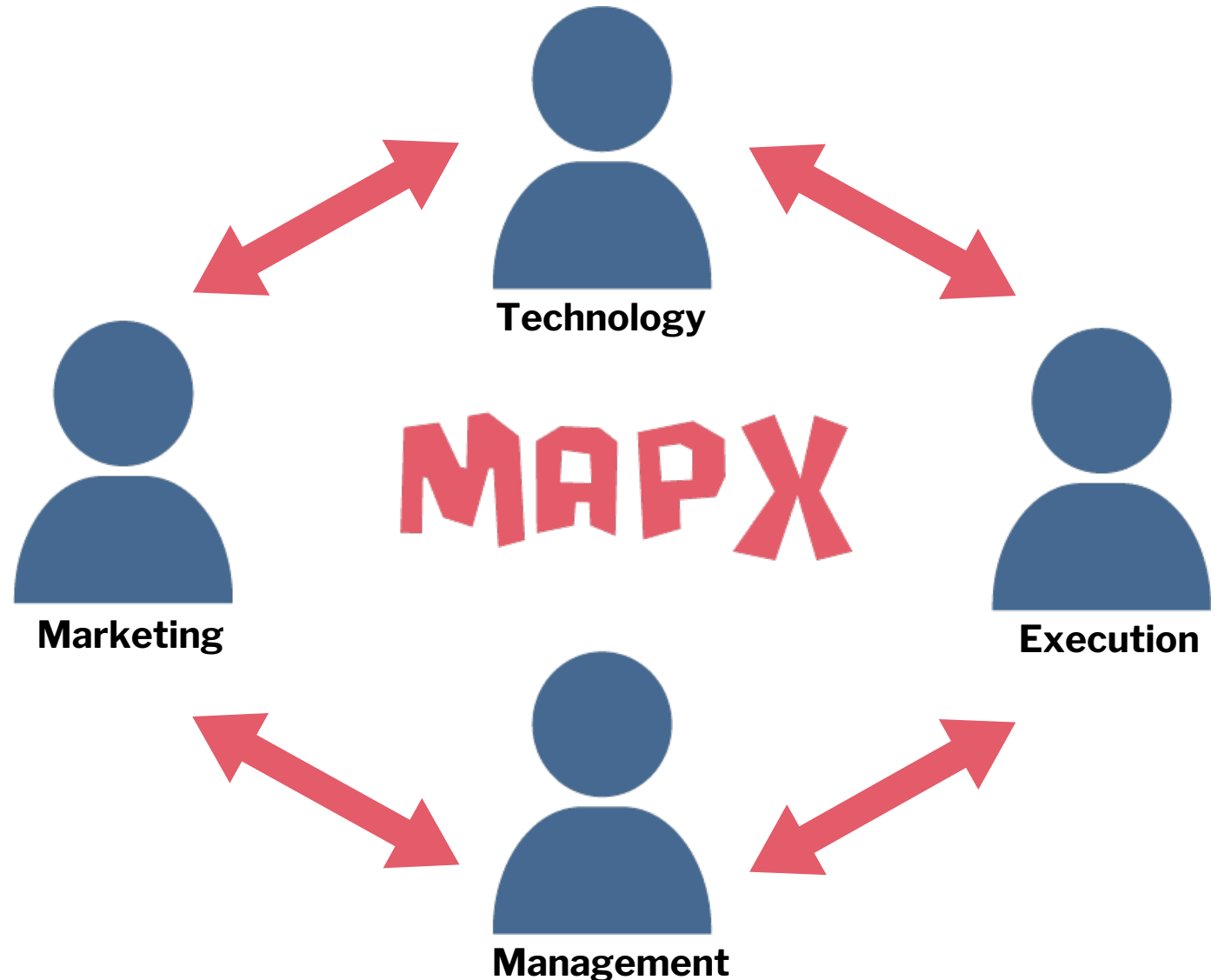
Companies
Amazon, FedEx,
La Poste



Organizational Structure

Due to the immediate need to address accessibility concerns (and the social implications of doing so), non-profit corporate status is the best way to advocate for change. We believe that formally recognizing this status will facilitate conversations with governmental organizations.

MAPX will be a decentralized collaborative organization (DCO), to promote a “startup” culture that not only values, but relies on the perspectives of all team members. We will utilize “design-thinking” methodologies and have a team consisting of four full-time employees. Additionally, we will work with two firms: one that will design our service’s artwork and create our brand and another that will write the code of our game.





Phase 1
8 weeks

€8500

Develop MVP and establish partnerships

Phase 2
6 weeks

€11,500

Develop MMP based on MVP user feedback

Phase 3
4 weeks

€16,000

Deploy finished game to application stores



The development of MAPX will incur a number of entry and recurring costs. Because our service relies on storing data, data hosting will likely be our most expensive cost. Notably, the code for Project Sidewalk is open source, so we may reduce development fees by using their existing architecture. OpenStreetMap is also available for use by services like MAPX, so we will not need to pay a fee to integrate their city maps. Following the launch of our full service, we will also need to consider the rent for a physical office location. At this point, as we hope scale our project to address accessibility issues in other cities, we will host our own data, which means we will need to purchase a

server. We expect to source the initial investment that we require to develop our application through corporate grants, governmental grants, and individual donors. In the future, we will gain revenue through in-game advertisements and corporate sponsorships.

Additionally, we recognize that information about sidewalks is becoming increasingly relevant as corporations consider innovative ground delivery techniques. As future delivery methods may involve delivery robots that travel along sidewalks, corporations need to compile comprehensive data about where and how these vehicles can travel. Our game will eventually encompass many more

sidewalk parameters, and we believe that in order to fund our expenditures, we could collect and sell information that is of value to these corporations.

Entry Costs

Software and Hardware	€4,300
Advertising	€1,700
Development	€21,000
Design	€4,300
Legal Fees	€4,300

Recurring Costs

Yearly Data Hosting	€10,000
Salary (four employees)	€170,000
TOTAL	€215,600



ASSESSMENT PLAN



Key Performance Indicators



To understand our effectiveness and success as an organization, we will rely on a series of Key Performance Indicators (KPIs): values that characterize how we achieve our key goals as an organization. We will assess our impact by comparing our ideal performance with our actual performance every quarter. MAPX must produce tangible effects relating to both the inputs and outputs of the systems involved in our project: service organizations, gamers, and data consumers. Focusing on individual aspects of performance will help MAPX address the needs of users and partner organizations. MAPX will set time-dependent goals with regards to the KPIs at each quarter. Should the KPIs not meet a goal in time, the management team will discuss why there is a discrepancy and focus on change that will address the particular issue.



Quantitative

- Gamer acquisition
- Gamer retention
- Number of volunteers
- Number of documented sidewalks

Qualitative

- Happiness of mapping services with data
- Happiness of city with data
- Gamer enjoyment

Key Performance Indicators

Our core objective is to collect data about the sidewalks in Paris, and while creating an educational experience for gamers is another main value, our KPIs will need to focus on the data collection process. Understanding this, our indicators will relationships with other organizations, the numerical data that gamers collect, and the gamer experience. In this process, it is important to recognize the the difference in corporate status (non-profit versus for-profit) between our potential partners because this difference will inform our ideal KPI values.

Initially, the primary KPI we will examine is the **strength of partnerships**. Because MAPX uses a two-sided business model, our effectiveness relies on strong relationships with both volunteer groups and mapping services.

Additionally, we will need to assess the **effectiveness of partnerships**, which we define more tangibly as whether allied organizations provide volunteers.

We will also need to assess the **efficiency of partnerships**, which entails quantifying the number of volunteers from particular service organizations and how much service each volunteer from a specific organization offers.

Because our game will shift toward involving individual gamers after its complete development, we will also need to examine our **user-base composition**: whether our gamers come from a service organization or join independently. Likewise, we will need to examine **new gamer acquisition** and **gamer retention**.



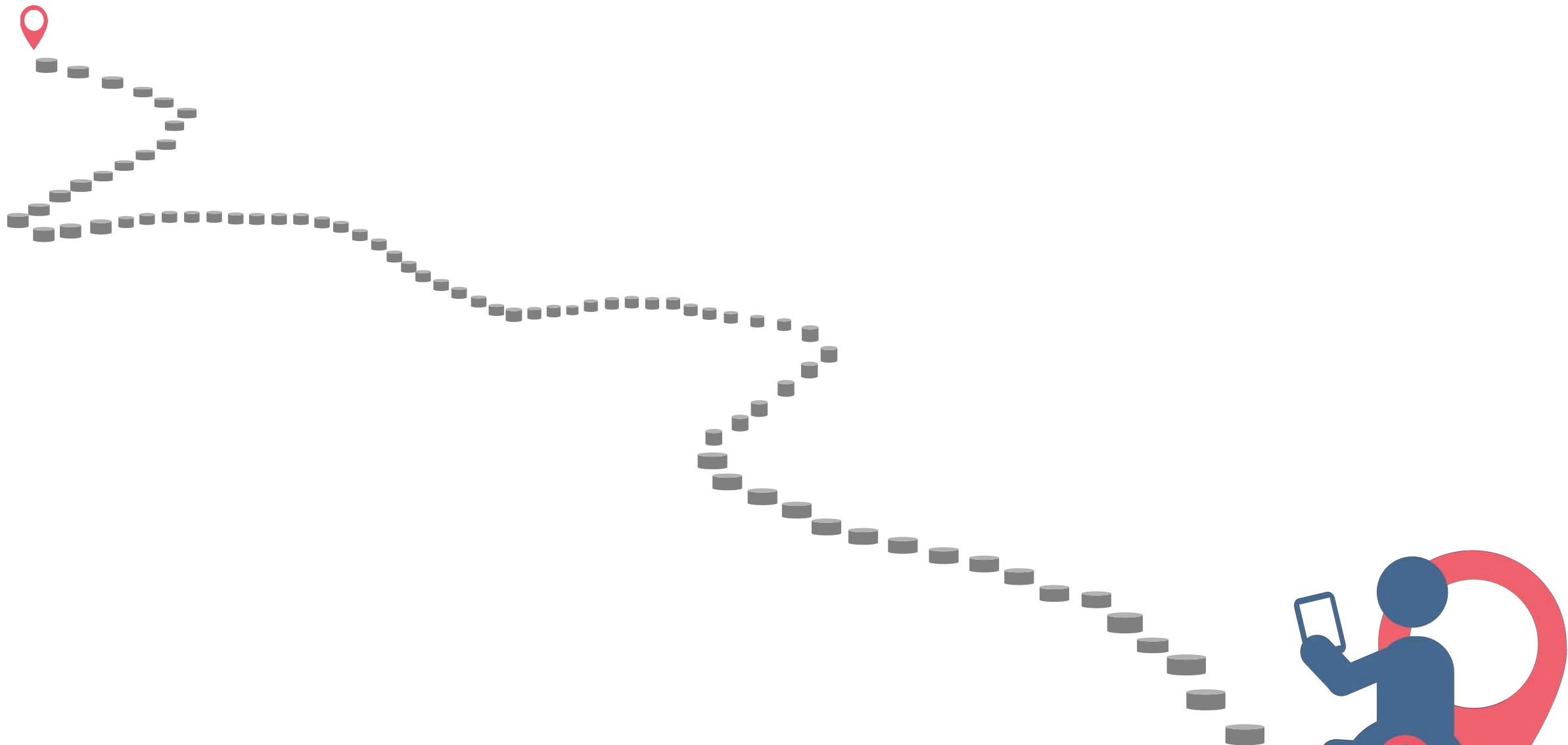


Social Impact



We believe in the potential of games to catalyze and support positive change. At the end of the day, we hope to generate a beneficial and systemic social impact. Ultimately, we wish to help all people with a reduced mobility navigate more freely in Paris. Although it is not part of the project's business model, our long-term objective is to promote the development of new navigation services which would take people's mobility profiles into account. Acknowledging that the relevant technology already exists, crowdsourcing data on street accessibility would lower the final barriers preventing mapping services from fully offering such a service. Paris's 2024 Olympic motto, "Made for Sharing," illustrates that, although the city faces challenges, it

strives to share its rich cultural history, built environment and resources with all. Documenting and improving sidewalks for wheelchair users, and eventually people with different types of mobility conditions, would put Paris on the forefront of urban design, innovation, and social progress. In a city that cares deeply about its residents, crowdsourced urban data collection represents effective, realistic, and immediate action.



ROUTE CALCULATED!



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<http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

Other Resources

City of Paris Office of Tourism: <https://reservation.parisinfo.com/>
Paris 2024 Olympic & Paralympic Games website <http://www.paris2024.org/en>
Route4U <https://route4u.org/>
Project Sidewalk <https://sidewalk.umiacs.umd.edu/>
Google Maps <https://www.google.fr/maps?source=tldso>
Scouts et Guides de France <https://www.sgdf.fr/>



Pictures

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Vectors

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