

HYPOT 

Hygiène Pour Tous



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Executive Summary

HYPOT - Hygiène Pour Tous. Our project focuses on improving hygiene in the city of Paris by offering education about this topic and implementing sanitary measures in the Paris Métro trains and stations. Much like hormones that reach all parts of the body through blood vessels, knowledge about personal hygiene is spread throughout the city in order to combat the troubles brought by poor health and sanitation in public spaces. Such action can help lower the economic loss due to sick days and excessive health care cost. We propose a two-pronged plan to tackle this issue. First, we will implement a poster contest in the Métro where young artists

may participate online to design posters in line with the theme of our project and that touch on important components, specifically to implement antibacterial silver-coated air ducts on the trains. Combining these efforts with support from key partners such as RATP, the Paris government, and private companies like Google and Baccide, will help us reach our goal of fully implementing this project in the coming years. With a comprehensive and ongoing assessment plan to evaluate our success and carry out necessary changes, this project can make a substantial impact on Paris' public health and sanitation education.



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“Public health service should be as fully organized and as universally incorporated...as is public education. The returns are a thousand fold in economic benefits, and infinitely more in reduction of suffering and promotion of human happiness.”

~ Herbert Hoover

The Cost of Health



In France, the average person misses 8.3 days of work each year due to illness (Health Statistics, OECD, 2016). Based on income and population data from Gallup, that means a national loss of 15.3 billion euros worth of work annually. Additionally, based on national public spending on healthcare, the average citizen contributes 3,648 euros per year for the sake of public health (WHO, 2013). While these statistics are not the whole story, they show the pricetag that comes with illness. An effort to lower these costs might begin with lowering the spread of widespread, communicable diseases such as the flu and staphylococcal infection. And a good place to start might be the country's hub of commerce, capital, and most populous city: Paris.

The Connection: Health and The Métro

More than four million people use the Paris Métro each day, totalling more than five billion users each year (STIF, 2016). Since a wide array of diseases are most transmissible in tight quarters with dense human groupings, it is no surprise that diseases can be easily transmitted amongst Métro commuters in the city. In fact, some dangerous pathogens like tuberculosis can survive on surfaces for months if proper cleaning measures are not in place (Kramer et al., 2006). For the most part though, disease-causing germs are transmitted via the air and via human-to-human contact, and so poor sanitation in terms of air quality and human behavior in the metro could pose a significant

Health hazard. That is not to say that the Métro is currently unsafe, but rather that because of how expansive and populated this setting is within the city, extra attention should be paid to health and sanitation.



“I hate touching the handrail in the Metro. It looks really disgusting”.

~ Anais, Sorbonne University student and daily line 13 commuter

Learning From New York City

The microbiome of the Paris Métro is yet to be extensively studied and so at this time it is difficult to understand the exact nature of disease spread in this setting. However, comprehensive studies conducted in other countries can provide insight. In New York City, scientists collected 4,200 samples from the subway and found samples of many infectious organisms. Perhaps more interesting, almost half of all isolated samples could not be identified, meaning the NYC subway is full of microorganisms that we have not yet characterized (PathoMap Project). While many of these unknown species are likely harmless, some are very likely not.



Explore by station | Explore by bacteria type

Share this view:  

FIND A STATION:
Times Square-42nd St, Theater District (A, C, E, ...)

Times Square-42nd St

Theater District

A C E N D R S 1 2 3 7

Researchers identified 114 unique bacteria at this location including species associated with:

- Food poisoning
- Radiation resistance
- Toxic cleanup
- Respiratory ailments
- Urinary-tract infections
- Medical-device infections
- Antibiotic resistance
- Oil cleanup
- Sunscreen
- Sepsis
- Italian cheese
- Staph infections
- Meningitis

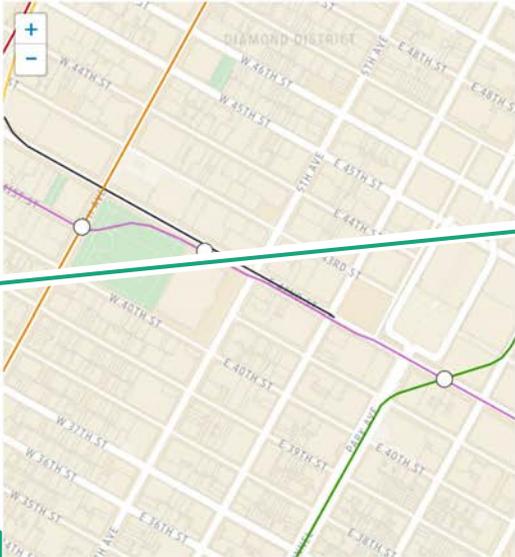
Select a bacteria association for more detail.

Nine samples taken from this location.

Surfaces swabbed: Turnstile, Garbage Can (2), Stairway Rail (3), Bench, Metrocard Vending Machine (2)

Identified DNA at this location:

48.73% Bacteria	3.45% Nonbacteria
47.82%	



Researchers identified 114 unique bacteria at this location including species associated with:

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- Urinary-tract infections
- Medical-device infections
- Antibiotic resistance
- Oil cleanup
- Sunscreen
- Sepsis
- Italian cheese
- Staph infections
- Meningitis

Select a bacteria association for more detail.

Identified DNA at this location:

48.73% Bacteria	3.45% Nonbacteria
47.82% Unidentified	

PathoMap Project—Interactive Subway Station

Learning From Hong Kong

Scientists have also studied Hong Kong's subway system, the MTR. There, they've found that bills collected from station automatic teller machines (ATMs) contain similar levels of antibiotic-resistant microorganisms as bills found in hospitals (Lazarus, 2017). Even without a full understanding of why this might be, it is clear that subway systems across the world contain a diverse and potentially dangerous world of microscopic creatures. The current understanding is that subway systems are not particularly dangerous, but that nevertheless they are hubs for diverse microbial growth, much of which is currently uncharacterized. Recognition of this idea can be applied to better plan health and sanitation measures in Paris, especially as it pertains to the Paris Métro.



Sanitation: The Ever-Present Defense

We propose the application of a silver-based antimicrobial air duct coating to all Métro cars in order to lower the transmission of aerosolized pathogens. The process of implementing this silver-coated heating/ventilation/air-conditioning (HVAC) ductwork can be seen below.

Additionally, we propose the application of a copper-based antimicrobial handrail coating that could be applied to the handrails inside all Métro cars in order to lower the transmission of surface-dwelling pathogens.



Silver coating added to HVAC ductwork.

SDG 3: Good Health and Well-Being



SDG 3: Good Health and Well-Being

“Strengthen the capacity for early warning, risk reduction and management of national and global health risks.”

~OECD

Quoting the United Nations, this project seeks to ensure health by educating the public through a wide network of transportation to make well-informed choices regarding health and well-being. This project can also serve as a model for other rapidly urbanizing settings. Given that the vast majority of the global population will be living in cities in the near future, these kinds of initiatives take on an added importance.

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The RATP and Cleaning Efforts

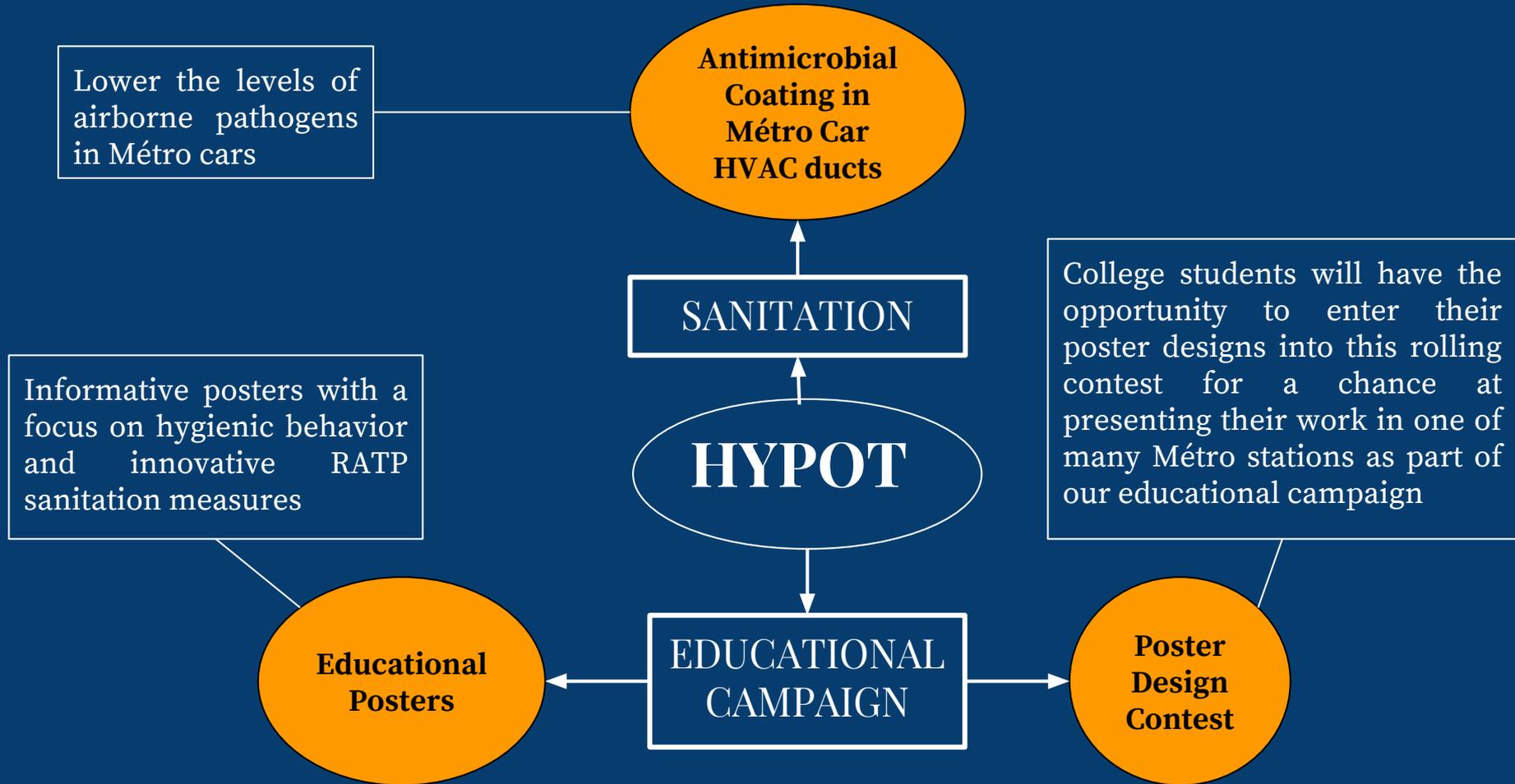
The RATP is a state-owned company that manages the Paris Métro system and, just as other any firm in Paris, is required to meet municipal and state health regulations. Yet, one might argue that the nature of the space in which the RATP operates (the underground subway system) and the constantly high rate of customers (commuters) is unique and warrants more intense scrutiny in the way of health and sanitation than do most entities. Currently, the RATP carries out daily cleaning of the Métro cars that mainly involves the removal of garbage. They also carry out a monthly cleaning during which each car is serviced by nine workers who clean the windows, doors, ceiling, and floor with soap, as well as vacuum and remove graffiti and gum (Le blog du RER B, 2016). To do this, the RATP spends roughly 65 million euros each year.



Education: The Strongest Defense

Research in settings similar to the Métro has shown us that there is likely much we still do not know about microorganisms and disease spread in this space. This means that sanitation measures ought to be taken seriously in order to prevent unpredictable and negative outcomes in the way of public health. One powerful way to do this is to encourage awareness of personal hygiene and sanitation in the Métro. We propose a catchy and informative health awareness campaign that targets Métro commuters.

Posters will be placed in the Métro cars and around the stations with eye-catching designs and messages that encourage proper hygienic behaviors on the Métro, as well as point out innovative sanitation measures that are already taken by the RATP. Later into the implementation we also plan to phase in student-designed posters that will further garner interest in sanitation knowledge, all done with the goal of limiting disease spread in the Métro.

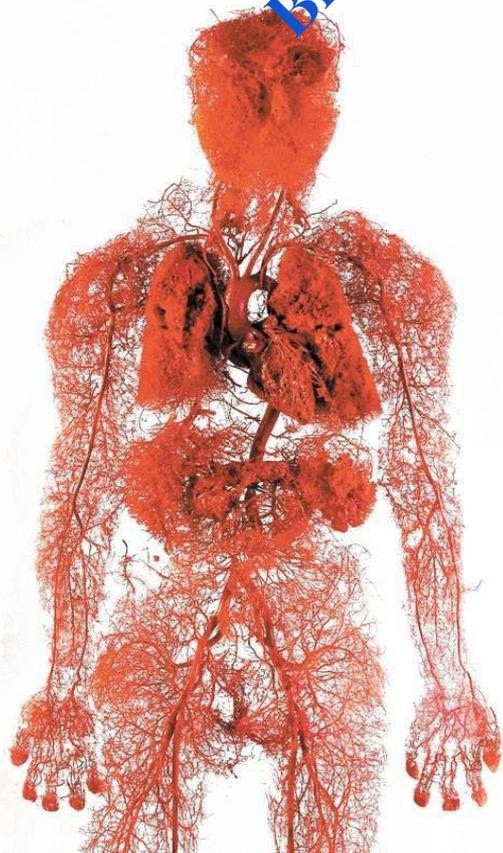


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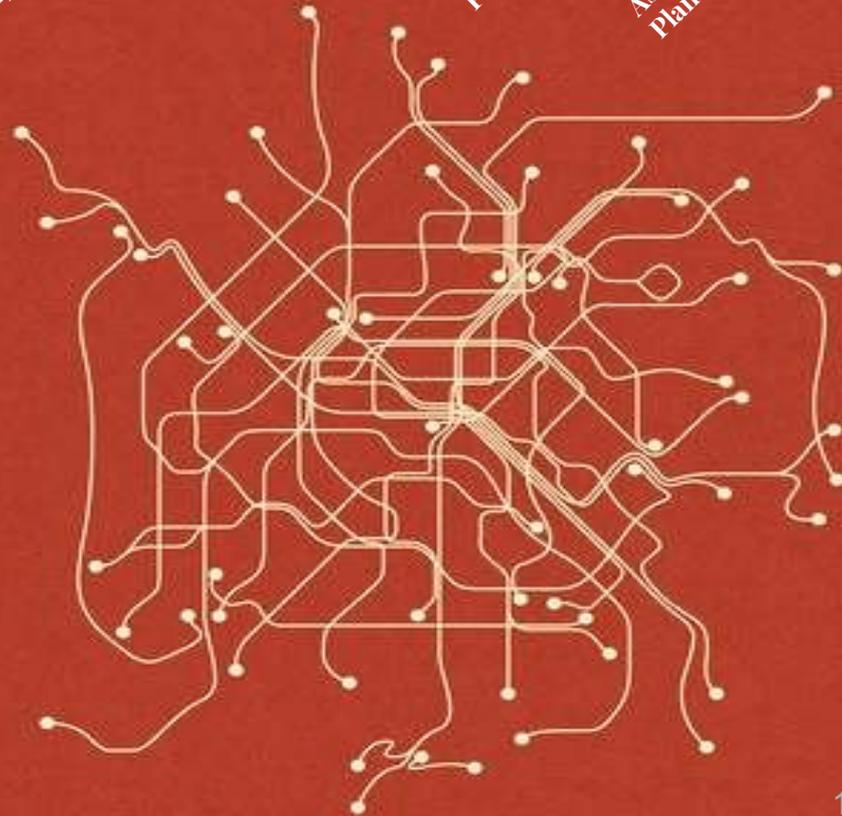


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Dissemination



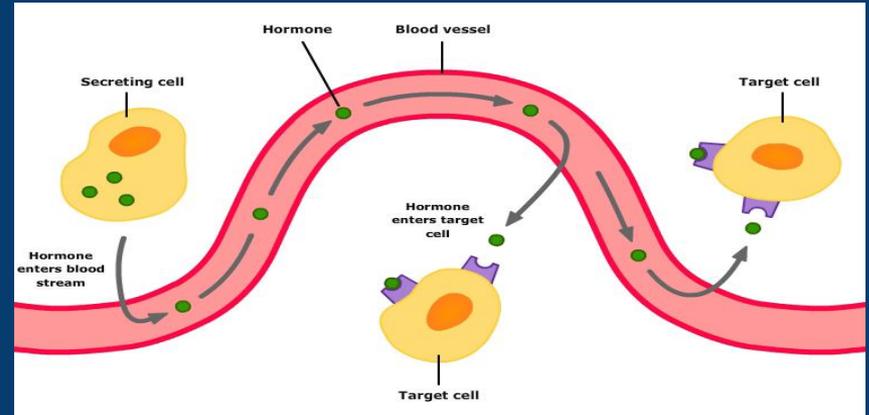
Traveling by the Métro is an integrative part of the Parisian experience, and so by relaying the important principles of our project via this central system we can greatly improve public health in the city. This impact and its method of delivery draws direct inspiration from biology.

If the city of Paris is a living body of activities, resources, and communities, then the Métro is undoubtedly one of the circulatory systems by which everything moves and interacts in the city. With this understanding, the Métro can then be used as a powerful mode of communication. In the same way that our bodies use blood vessels to spread hormone signals from a single releasing organ to many target locations in the body, the Métro can take an idea and disseminate it throughout the city. In our case, posters, technological components, and sanitation interventions implemented through the Métro can quickly draw the attention of commuters and encourage them to learn about aspects of health and sanitation surrounding them. They can then take this knowledge with them wherever they may travel in Paris.

Directed Change on Target

The end goal of hormone signaling is a directed action carried out by the target. The same can be said of our project, through which we hope to direct Parisians to change their behavior for the better by interacting with our various project components. Our teaching tools are analogous to hormones, and commuters the target. If the Metro is able to properly circulate our campaign, then our tools will motivate positive behavioral changes in our audience. This idea comes to fruition when commuters interact with the elements of our campaign. The online portion of our project provides an opportunity for individuals to offer their personal poster designs for display in different Métro stations. Then, these posters, as well as those designed by us, will provide commuters with advice on

how to behave in public spaces so as to lower illness rates and improve general health. Lastly, the air duct coating we introduce will be a first step in keeping the Métro clean as well as a sign to commuters that sanitation measures can do good. Each part of our project has been designed to capture the interest of Métro users and encourage directed behavioral changes.



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ARTS ET MÉTIERS

 Ne pas descendre sur la voie
Danger de mort

Context



Paris has proven itself the perfect candidate for our project. Its leaders strive to build a smart city on the forefront of development, and so this innovative environment is ideal for HYPOT to be implemented and assessed. Paris has one of the most extensive subway networks in the world, and an educational campaign would achieve the largest audience in this setting. With a large population of students and tourists, the educational component of our project can also be useful in spreading knowledge to different generations and to cities around the globe.

Audience

Our target audience is Métro commuters: Parisians and tourists, daily riders and first-timers, workers and party-seekers. We want to arm these people with knowledge that will keep them healthy and let them know that the RATP is trying to do the same. Our project, designed with the commuter's viewpoint in mind, looks to link an educational component with a sanitation component in order to quickly capture their attention and change their behavior for the better.



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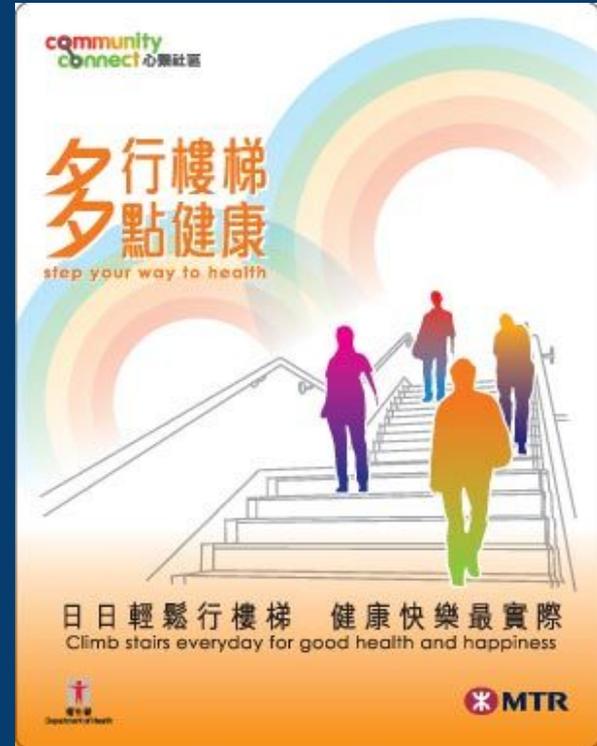
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Antimicrobial
Copper

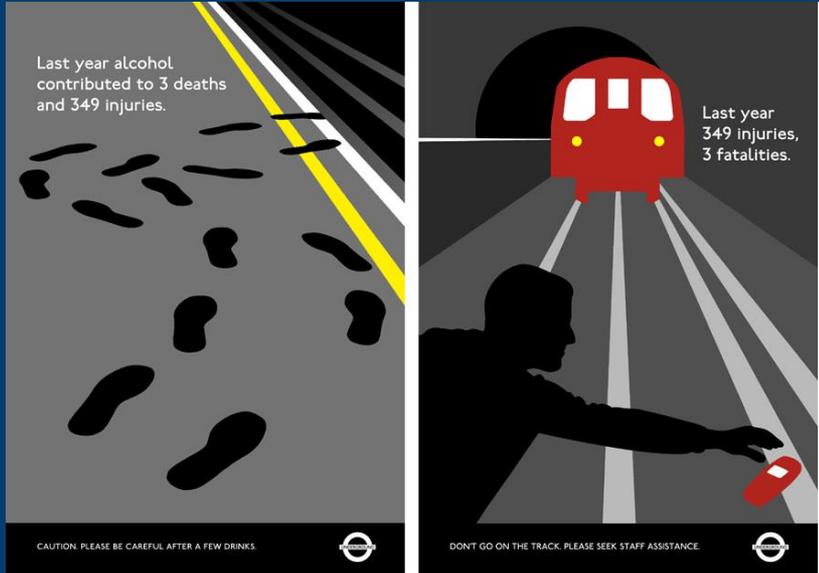
Cu⁺

Public Service Announcements in Hong Kong

In Hong Kong, podcasts regularly play on the subway cars and advise commuters to be aware of personal hygiene for the public good, such as washing their hands regularly, not sneezing on other people, and taking the stairs instead of the escalator. Moreover, MTR stations in Hong Kong have a variety of educational posters, including ones that warn of thievery, ones that show the dangers of pushing a baby stroller on an escalator, and ones urging citizens to take the stairs rather than the escalators (shown to the right). A widespread educational campaign such as the one present in the Hong Kong subways might offer insight as to how our project can be successful.



Other Poster Examples



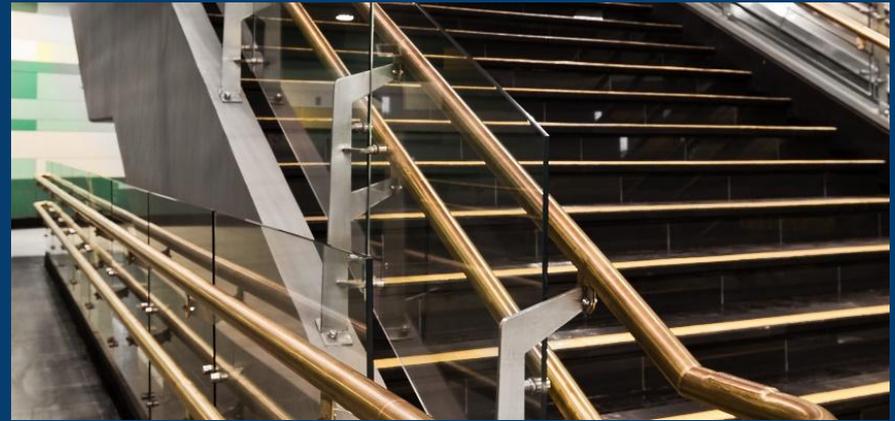
LONDON TUBE

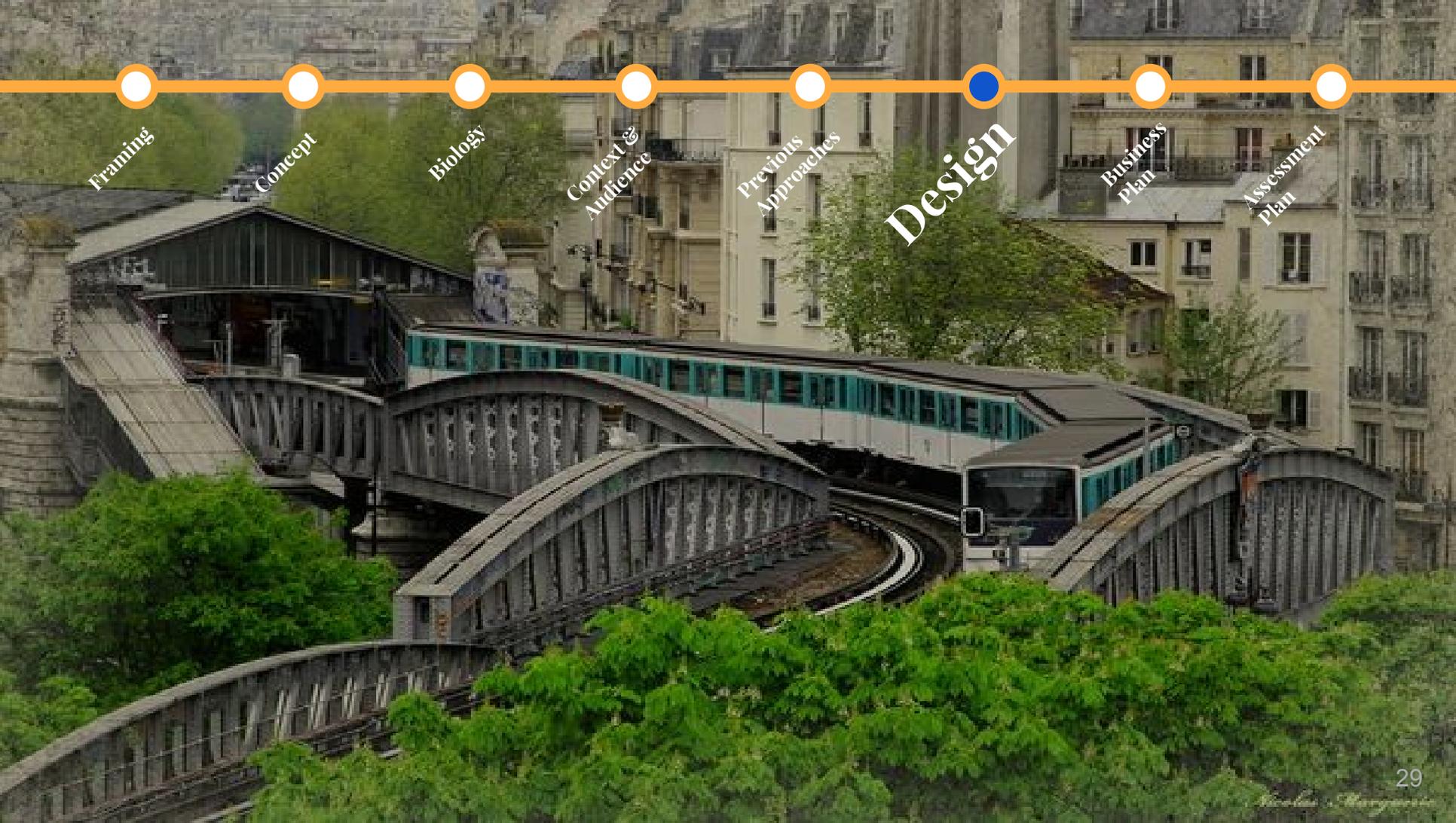


MELBOURNE METRO

Copper in Chile

In Santiago, Chile, the railings in the newly built Bueras station are coated with antimicrobial copper. The government saw this as a worthwhile investment to protect subway users in its capital city, and we share that sentiment in the case of Paris. Seeing the completion of this innovative sanitation technology on such a large scale gives us hope that many in Paris will see the benefits of our proposal and help bring it to realization. While we plan to implement an antimicrobial surface in a different setting (air ducts), there are a number of lessons we can take from this endeavour when it comes to project execution.





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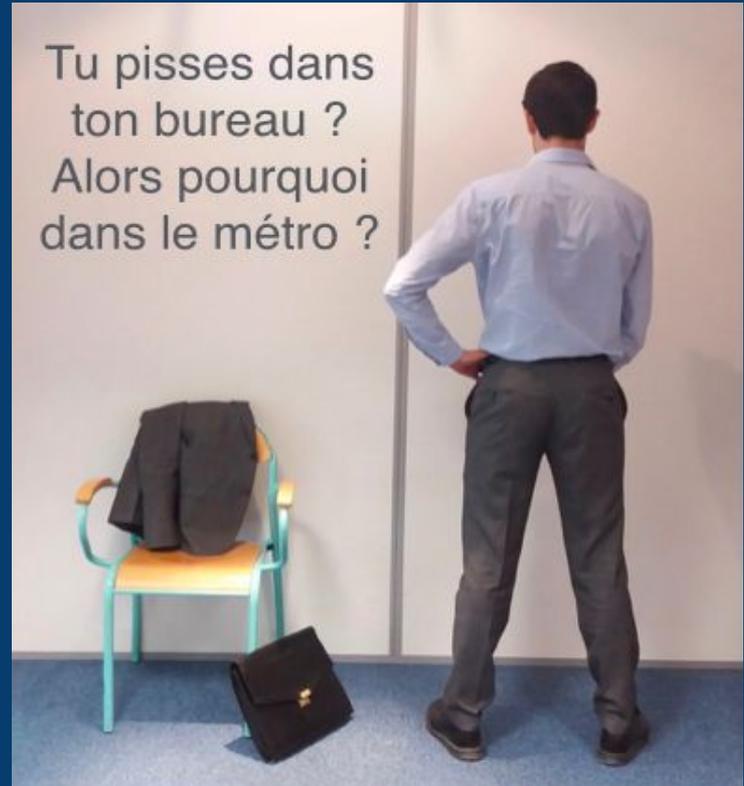
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Poster Campaign

The basis of our project's educational component will be a poster campaign. With the help of the RATP and funding partners we hope to bring into our operation, punchy yet informational posters will be placed in various Métro cars. They will contain easy-to-follow guidelines on how to help stop the spread of germs and how to lower one's own chance of becoming sick while moving through a dense, dynamic space like the Métro. Some posters will have a different tone, and will instead encourage behavioral change in commuters by drawing their attention to facets of sanitation (or lack thereof) that they may not have been aware of. The goal is to educate commuters about their surroundings and create a more knowledgeable and responsible Parisian population.



Model Posters



Avec les nouvelles
ventilations Hypot,
Plus besoin d'être
en apnée
tu peux maintenant
respirer

Ne laisse pas
trainer tes
microbes
partout !
Lave toi les
mains



Online Design Contest

While the poster campaign begins with our designs, in order to be truly effective, it must evolve to include the influences of the community we hope to reach. As we see it, that means offering individuals in Paris the opportunity to display their own educational poster designs in the Métro stations. A rolling contest will be implemented and targeted to university students, based on the understanding that this demographic will be most likely to successfully participate. In other words, university students tend to have an interest in educating themselves and others,

usually have more free time than the average worker, and often can tap into the burgeoning artistic taste of different communities. There are further plans to expand this competition to other demographics and age groups, targeting graphic designers, students in other age groups, and perhaps students in the public health sector in hopes of further spreading information and education. With a new winner every month, we hope to fill a number of stations with community-designed posters that will further supplement our own posters in the Métro cars.

Online Design Contest Page



Le Concours

HYPOT



Campagne éducative | Qui sommes nous ?

Une campagne éducative sur le thème de la santé va être mise en place dans le métro ! Vous êtes créatifs ? vous avez envie d'aider la ville de Paris ? Alors participez au concours HIPOT !

Proposez nous la plus merveilleuse des oeuvres d'arts à mettre en place dans une des 302 stations de métro ! Une oeuvre sera retenue pour chaque station. Alors aidez nous à transformer le Métro en une véritable galerie d'art ! Photos, peintures, musiques, installations... ne limitez pas votre créativité et utilisez tous vos sens ! Mais n'oubliez pas, ces oeuvres doivent rentrer dans le thème de notre campagne éducative.

Inscrivez-vous dès maintenant



Inscription au concours Hypot

CONCORDE

Nom

E-mail

Envoyer

Créer un site WIX

Digital Screens

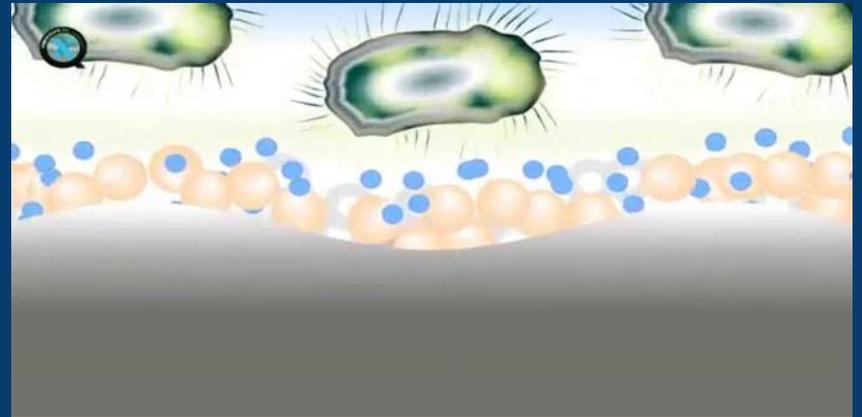
Digital screens will be installed in a number of stations in order to better acclimate commuters with the components and goals of our educational campaign. A speaking HYPOT will encourage commuters waiting in the station to choose one of a few prompts to hear more about the project's interventions, what it hopes to accomplish, and why these goals are important. Community engagement is crucial for the success of this campaign, and so these screens can act as powerful connections between us, the project designers, and our audience in the Métro.



Sanitation: HVAC Antimicrobial Coating

For us, education is not just about telling, but also doing. By working with the RATP to install a silver-based antimicrobial coating in the air ducts of the newer climatization-equipped Métro cars, we are showing the direct results of knowledge about health in the Métro. The SilverGuard® coating offered by McGill lowers the amount of bacteria, mold, and fungus in the air of contained spaces (such as Métro cars), and can be easily applied to an air duct system. While McGill does not offer cost estimates until direct consultation, similar technologies estimate a 25% material cost increase over traditional air ducts (Larry Sunshine, VP of Marketing, Lindab)— a cost which

can soon be negated by lowered cleaning expenditure. For the many individuals who may spend upwards of two hours on the Métro each day, this could lead to significant improvements in health over the long-term.



Silver-based coating prevents surface microbe settlement

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Proximal Goal



Still image from the HYPOT trailer film, 2017.

Within the first year of the roll-out of our project we hope to have gained popularity throughout the city. Our immediate goal is to garner interest in our project via commuter recognition of our antimicrobial coating, posters, and digital screens in order to encourage members of the Paris community to start asking themselves how to be healthier in various Métro spaces. The first step of our project is really to change the way people are thinking about sanitation and health. Ideally, we can then have enough traction and name recognition to successfully carry out our design contest. Once direct community involvement has begun we expect our project to grow exponentially.

Long-Term Goal



Paris is currently competing for the 2024 Olympic bid, but will still receive the 2028 bid in the case of a loss. In the long run, we hope to use the approaching Olympic Games within at least the next eleven years as a prime motivator for the government and other partners to implement our coating in all Métro cars across Paris, as well as adopt our educational campaign into the layout of every station in the city. Moreso, with the construction of Grand Paris Express, the new resulting trains can be equipped with silver-coated air ducts, reducing potential cleaning costs over the long-term for a comparatively lower upfront cost. With Paris quickly approaching the world stage, we hope that lawmakers and citizens alike will view enhanced sanitation and health education in the Métro as one of the many ways the city can show its prowess as a world leader.

What's the Value?

For Métro commuters, our proposal will offer a cleaner and more comfortable environment, and has the strong potential to reduce the spread of communicable diseases. These individuals will also be familiarized with proper hygienic behavior that will likely not only lower their odds of contracting or spreading an illness in the Métro, but also lower their odds in every stage of life as they carry their knowledge above ground.

Over time, the RATP can also expect to see economic benefits as a result of decreased manual sanitization efforts. The HVAC coating has significant upfront costs, but due to the decreased manual cleaning requirement they afford, these costs will eventually be negated.

College students with an interest in art or design will have the opportunity to publicly showcase their work in a Métro station thanks to our poster design contest. Winning our contest could be a quick path to popularity and paid contracts in the art community.



What Do We Need to Do Directly?

Educational Component:

Initial Poster Design

Poster Design Contest Management

Management of relationships with key partners
like the RATP and Paris City Hall

Management of relationships with distributors
like bracelet company

Sanitation Component:

Management of Relationships with key partners
like RATP

Management of relationships with distributors
like the two antimicrobial coating companies

Raising Awareness

To implement our project, a close partnership with RATP is needed. An official from the company can be reached via email or phone. For the Métro users, the posters and the digital components reachable via the links on the posters will be main channels of communication. Links to our social media platforms may also be distributed through these posters and the website, so we may be able to communicate to our audience through these online channels as well. For the artists, the City Hall's awareness campaigns, our original posters, and our social media platforms are all good ways to raise their awareness of the contest. Finally, for private companies that may potentially sponsor our efforts (such as Google, which has its French headquarters near line 12 and may be willing to

implement the sanitation efforts for that line for the benefit of its employees), we want to reach them via emails and phone calls detailing some of the differences they can make in the community by providing the much needed funding for our project.



Key Partners

A good relationship with the RATP will be crucial, as most of our educational campaign and posters, as well as our sanitation efforts, are based in their stations and Métro cars.



Working with the Parisian Government will also be important, since we will need to raise awareness of our campaign through multiple channels such as public service announcements and awareness campaign platforms. McGill will be a critical supplier and necessary for providing the materials for the air duct coating. Establishing a good relationship would grant our project easier access to cheaper materials. Other sanitation-related companies may also be valuable partners (i.e. Baccide, a well-known French company that produces hand sanitizers). Finally, partnerships with private companies that are motivated to help fund this project are invaluable. Companies such as Google, which places community service as one of its core values, may be able to provide much of the initial funding.

Cost structure

Educational Component:

We expect most costs to come from the purchasing of poster material, digital screens, as well as advertising space in the Métro. Despite the manner in which we hope to serve the customers of the RATP, we do not expect that they will offer us free poster space, either on Métro cars or in the stations.

Sanitation Component:

The bulk of our costs will be upfront and the result of purchasing the coating. This is where the support of a large funding partner would be crucial. We hope to convince the RATP to handle the installation and associated costs, based on the benefit to their company.

Revenue stream

We hope to acquire enough revenue to maintain our educational campaign in the Métro until the Paris Olympics, at the very least. Realistically, the funds needed to do this will be significant over the long-run, and so one possible source of funding is the city's participatory budget. If we can gain enough traction to encourage Parisians to direct the money to our idea, then we would likely be financially viable until the Paris Olympics arrive in either seven or eleven years. Regardless, it is not unreasonable to believe that Paris City Hall itself may decide to commit money to this project sometime in the future, especially given the recently announced innovation contest leading up to the Olympics.

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Evaluation Criteria

Evaluation Methods

Results and Communication

We intend to assess the situation before, during and after intervention. Assessments will focus on different criteria :

Quantitative & Qualitative

Number of users of the subway

Air quality / test air for mold/fungus/bacterial load over time

Level of bacteria on sample surfaces in train carts

Traffic on our website

Level of awareness on good practices

Level of satisfaction of travellers

Level of participation in the contest

Different evaluation tools will be used in order to measure the evolution of public behavior and the outcomes of our project.



Sampling some representative bacterial species on Métro car air duct surfaces before, 6 months, and 2 years after intervention to assess the efficiency of the antimicrobial coating



Sampling Métro car air quality before, 6 months, and 2 years after intervention to assess the efficiency of the antimicrobial coating



Using digital tools to quantify the traffic generated by our website



Issuing a required satisfaction survey before renewing Navigo card

Evaluation Criteria

Evaluation Methods

Results and Communication

Our assessment results will be used to evaluate the implemented measure outcomes in order continually improve our project and to enhance the sanitation of the subway environment.

Our assessment results will also be shared with our main partners, the RATP and any other major funding source, to better understand how the subway environment may be improved. Specifically, it is critical to focus our improvements on the areas that show the poorest performance in our assessments. To do this we will likely need to work with one or more of our key partners.

Assessment results may also be communicated to Métro commuters in some cases in order to involve them as much as possible and maintain a strong relationship. In the end, the goal is to make the Métro a healthier and more comfortable place for commuters, and we cannot truly do this well with their support and involvement.



HYPOT as the New Face of Hygiene

Our project, HYPOT, can become the embodiment of good hygienic behavior in the Métro and, just as importantly, of healthy behavior above ground. We hope that HYPOT can influence different spheres of life, encouraging the public to practice better hygiene in public spaces.

Over time, this campaign's teachings can extend to places like workplaces, schools, parks, different forms of transit, and more. In a supportive and aware environment, this campaign can make a substantial impact in the community of Paris and beyond.



Still image from the HYPOT trailer film, 2017.

Credits

Laan (Rainbow) Yeung

Harvard

Lotfi Aoulad

Sciences Po

Amandine Maire

Centre de Recherches
Interdisciplinaires

Hagen Puller

Harvard

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Image References

Slide 2: <http://www.victorianweb.org/decadence/architecture/16.jpg>

Slide 4: Photo taken by Rainbow Yeung, July 17, 2017

Slide 6: <http://www.freepngimg.com/world/eiffel-tower>

Slide 7: <http://nana-chroniques.blogspot.fr/2011/05/vendredi-13.html>

Slide 9:
http://kvedomosti.com/uploads/posts/2014-07/v-nyu-yorke-arestovana-zhenschi-na-brosivshaya-v-metro-kolyasku-s-10-mesyachnoy-docheryu_651.jpeg

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Slide 11:
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