Case Study

HITACHI
Inspire the Next

Next-Generation Airport Service Planning and Designing

Creating a passenger centric “airport of the future”

Society's Infrastructure

No. 01

How to break through preconceived ideas and create a “Solution for a Next-Generation Airport”?

Hitachi Consulting Co., Ltd.

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Creating a thoroughly passenger-focused "airport of the future"

How to break through preconceived ideas and create a "Solution for a Next-Generation Airport"?

An airport in Europe (referred to here as "Airport A") is in the process of formulating a redevelopment plan that aims to double both the number of passengers and flights ten years from now. Hitachi Consulting worked in collaboration with a British engineering firm and technology venture company to create a proposal for a truly innovative airport. So how did we go about creating ideas that would break the mold of conventional stereotypes and devise a solution for a next-generation airport utilizing ICT?

The airport microcosm

The region where Airport A is located is home to multiple international airports, including large-scale international airports that serve long-haul routes, with each airport competing fiercely for customer share. Airport A is one of these competing airports and it is popular with business travelers (who account for 70 percent of total users) given its advantageous location just 20 minutes by public transport to the city center. However, this proximity to the city also means that the airport faces spatial limitations that have restricted the length of the runway. The major routes the airport serves are therefore inter-EU destinations, using small to medium-sized passenger aircraft. The airport is also faced with the challenge of responding to recent increases in users, with congestion in arrival and departure halls at peak times becoming an increasingly serious problem.

It is against this background that Airport A is planning redevelopment over the course of the next ten years. During this period the airport authorities plan to build new car parking and terminal facilities, achieve environmental key performance indicators (KPI) set by the government for noise levels, CO2 emissions and traffic volume, and review airport services utilizing ICT, with an ultimate view to achieving a doubling in the annual number of airport users and flights. Airport A sought collaborating partners for the formulation of an ICT strategy that would interlock with the overall redevelopment plan.

It was 2013 when Swiss venture company Living PlanIT (LP) brought in Hitachi Consulting to the project. LP is a technology venture that provides urban information infrastructure. The company has concluded a strategic partnership with Hitachi Consulting and we have worked together on a variety of projects to date.

Kensaku Mori, Senior Manager of the Social Innovation &

Incubation Division at Hitachi Consulting explains, “An airport is really a city in microcosm, with various facilities all located on one site, starting with aircraft parking aprons and aircraft taxiways, but also including food and beverage outlets, retail stores, hotels, energy centers, car parks, railway stations and bus terminals. We realized that if this project were to be successful, it had real potential to become a model case for the Smart City initiative that the Hitachi Group is currently focusing its effort on, and so we responded that we would certainly be open to the challenge of taking on this project.”

The project was launched in April 2013 and at the same time the New Organizational Strategy Incubation Division was formed.* The aim in creating an entirely new division was to develop new services and mechanisms that would go beyond the boundaries of conventional consulting frameworks to achieve “social innovation” as espoused by the Hitachi Group. (*Note: In April 2014 the division was renamed the Social Innovation & Incubation Division.)

Looking back at that time, Mori recollects that, “What realizing social innovation really means is to solve societal challenges. In order to realize such a goal we believed that it would be necessary to aim to devise new business models and create new markets, thinking out of the box and beyond conventional consulting models. In that sense this project represented a truly new challenge as part of efforts to realize social innovation.”

Cross-industry, multi-disciplinary innovation

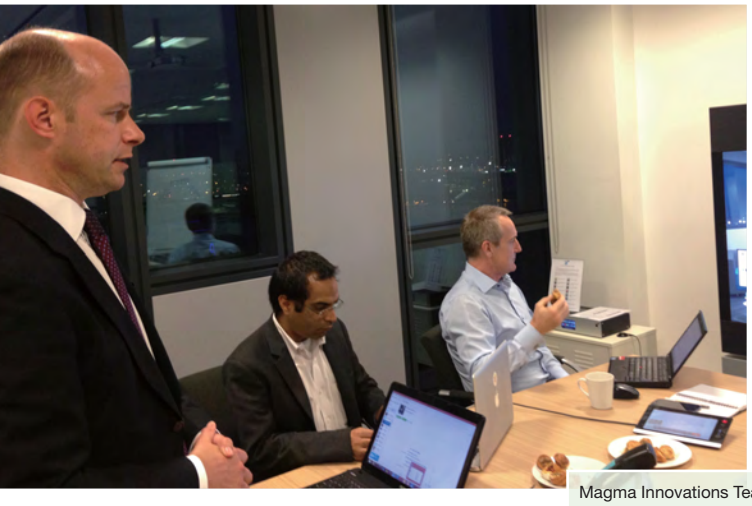
The end client’s wishes also had a big influence on the work of such a challenging project. From the outset the entire project was based on the client’s strong desire to realize a next-generation airport that would provide totally new user experience value through the creation of innovative services utilizing the very-latest ICT. When he first heard the client’s intentions, Mori’s first concern was that merely applying the latest environmental technologies would not lead to Airport A being able to differentiate itself from competitors. To realize an unprecedentedly groundbreaking airport would not be simply a case of fulfilling the required specifications—it would be essential to consider the airport from the perspective of its users. Mori was convinced that this was the only way forward and so he committed himself and his team to devising a management strategy by placing more attention on early-stage planning than is convention for projects of this nature. This meant that he and his team kicked off the project by first examining user experience value.

The team structure also resembled the unconventional nature of the project itself.
Mori further explains, “I realized that as an airport needs to provide diverse functions and services, it would be necessary to create a project team with cross-industry expertise. Aiming to achieve collaborative open innovation we decided to work together with BuroHappold Engineering, a leading urban engineering firm in the UK, LP, which owns and markets its Urban Operating System™ (UOS), and Magma Innovations, which provides specialist consulting services in the transport sector.”

Project leader Kensaku Mori. “Although initially I was slightly concerned about advancing a collaborative project among multiple global companies, in the end we were able to bring the project to an extremely satisfying conclusion.”

In actual fact, the various members of Hitachi Consulting who were involved in the project each have their own areas of experience. Mori, who coordinated the project overall comes from a marketing and business development background; Hisanari Kunimoto (Consultant, Social Innovation & Incubation Division), who worked on the creation of new mobility-related services specializes in information networks; Kentaro Hayashi (Senior Consultant, Social Innovation & Incubation Division), who examined the effective utilization of utility resources at Airport A (electricity, gas, water and waste) is an expert in environmental consulting; and Ryo Ishii (Senior Consultant, Social Innovation & Incubation Division), who devised the spatial layout and new services for the airport comes from an engineering and design background. It was also decided to bring together in the project team a broad range of other specialists, whose specialist skills would be vital to the creation of the city-in-microcosm functions of an airport, including a mobility expert from a major automobile manufacturer.

“Another feature of our project team was that we involved an IT consultant from the stage when nothing had been decided concerning



Magma Innovations Team

the actual content of operations and services. Including an IT specialist from the early stages of planning made it possible to create a comprehensive and effective proposal. For example, if there is a centrally managed warehouse within the airport grounds, similar in its functions to an Amazon distribution center, there is no need for individual stock spaces. You could say that it was concepts like this one that could only come from the IT angle that led to decisions on layout and services that made our proposal truly groundbreaking.", says Mori,

The airport at your seat

Let us take a look at the specific measures that were undertaken on this project.

Firstly, the following points were agreed with the client that: (i) the goal was to create innovative services and new businesses, and (ii) in order to achieve this goal the detailed scope would not be defined in the initial stages, and finally (iii) in addition to the above, the overall scope would be positioned at a high level, aiming to create new customer experience value and effectively utilize airport utility resources (electricity, gas, water and waste).

The project was subdivided into three phases: (i) present data analysis and formulation of initial hypothesis (2 months), (ii) formulation of overview of new businesses and services (3 months), and (iii) detailed design of new businesses and services (3 months). In the first phase the initial hypothesis was formulated based on the following three perspectives:

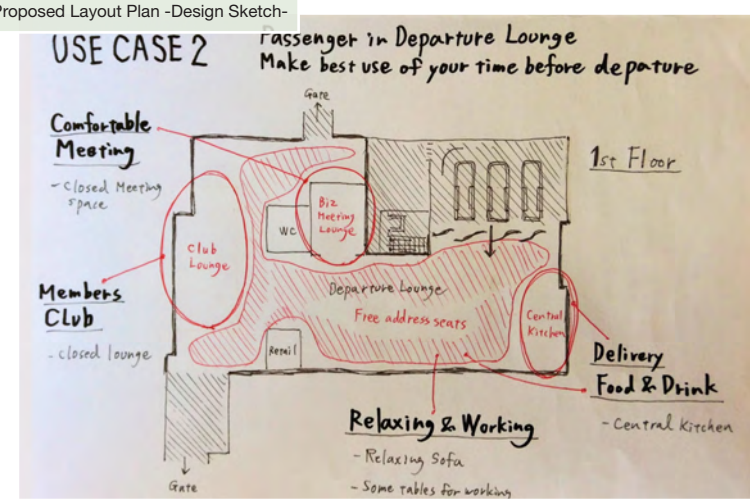
(1) Go beyond improvements that are simply an extension of current circumstances.
(2) Create new and untapped innovation.
(3) Essential need for cross-industry fertilization and collaboration.

Ishii, who was responsible for designing spatial layout and new services talks about the specific processes involved in the project.

"We did away with the conventional plan formulation process, where specialists are brought in one-by-one to contribute separately to the project. Instead, what we did first was to bring together a team of about 10 people, each with their own different specialist skills and experience, and hold a creative workshop towards the formulation of a proposal for new businesses and services. By doing this we were embarking on an entirely new process, where initial designs for spatial layouts, services and technology were devised simultaneously. Ideas that at first glance may have seemed overly ambitious were eventually brushed up into a feasible plan through the experts sharing their knowledge with each other. This demonstrates precisely the strength of collaborative work."

For example, Ishii himself proposed to remove all the booths inside the airport, including all retail, food and beverage outlets and to reconstruct the space from a zero base, making the entire departure lounge a comfortable and relaxing seating area for users. He suggested introducing a delivery service along the lines of the

Proposed Layout Plan -Design Sketch-



From our partners

Andrew Comer, Partner and Director for Environment & Infrastructure, BuroHappold Engineering

"BuroHappold Engineering and Hitachi Consulting have combined their common technology and engineering expertise to create an innovative solution for airports to improve the overall passenger experience, increase revenue generation and achieve efficient and resilient infrastructure networks. This unique approach integrates technology, engineering and social innovation for our clients."

Rosemary Lokhorst, VP Corporate Development, Living PlanIT SA

"Strategic partners Living PlanIT and Hitachi Consulting have combined their expertise to create unique solution frameworks for airports to improve traveler journey experience, optimize operations and improve resource efficiency. Our integrated platform approach is helping airports evolve to meet customer needs and stay competitive in the age of digital technologies."

Robin Daniels, Chief Executive Officer, Magma Innovations Ltd

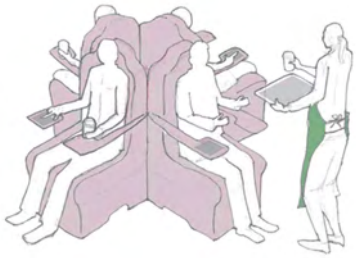
"We had the objective of developing an innovative, market validated, end-to-end passenger journey experience for the airport. This was underpinned with a robust technology strategy and a simple, scalable value case and partner ecosystem design. Hitachi Consulting demonstrated world class strategic insight throughout, along with intense professional rigour and a focus on delighting the customer that is second to none."

abovementioned Amazon method, where passengers would place their order online via a touch-panel monitor at their seats, which would then be quickly brought over to them. In other words, if a passenger ordered a coffee from his or her seat, a delivery staff member would bring it out to the passenger's seat from the central kitchen. This proposed service model has never been seen before and was the result of conceptual thinking that aimed to take into account the spatial limitations of Airport A and relieve peak time congestion, while also maximizing both passenger comfort and management efficiency.

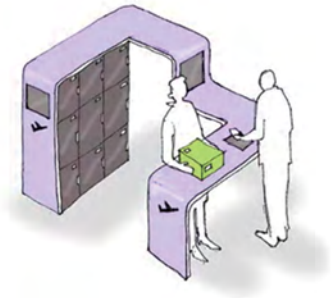
"Nonetheless, with a proposal that is so far removed from any model or format to date, conveying your ideas in words and on paper is simply not persuasive enough. We were putting on the table what could at first glance be perceived to be a crazy proposal, beyond the bounds of feasibility. So in order to promote the formation of consensus we decided to help the client visualize it in its entirety. We resolved to create an image for a prototype terminal that would be used for service provision, and utilizing the simulation technology owned by one of our collaborative partners to also demonstrate the flows of people and service operation in the departure lounge once the new services had been introduced (See diagram). Having seen the results of this visualized proposal

Ryo Ishii, who was involved in the design of the spatial layout and services in the airport lounge. "If our proposal is adopted it will be the first time anywhere in the world something like this has been tried. I am looking forward to the project being realized."

The airport at your seat -Service Image-



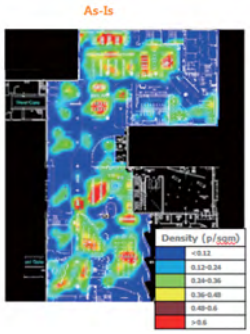
Order food, drinks and even duty-free goods from your seat



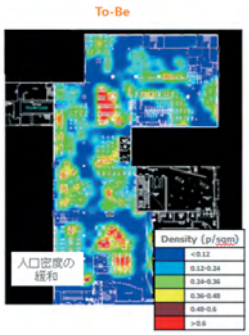
Pick up your duty-free goods at your gate

Crowd Simulations

Current layout



Proposed layout plan



Says project leader Mori, "In simulations the trick is what parameters to set above the algorithms. This is the kind of knowledge we have accumulated within the Hitachi Group and it is one of our greatest strengths."

the client was eventually persuaded.", elaborates Ishii.

This highly innovative proposal is being considered for introduction on a trial basis in the terminal facilities where redevelopment work will initially start. If it can be realized there is no mistaking that it will create a sensation.

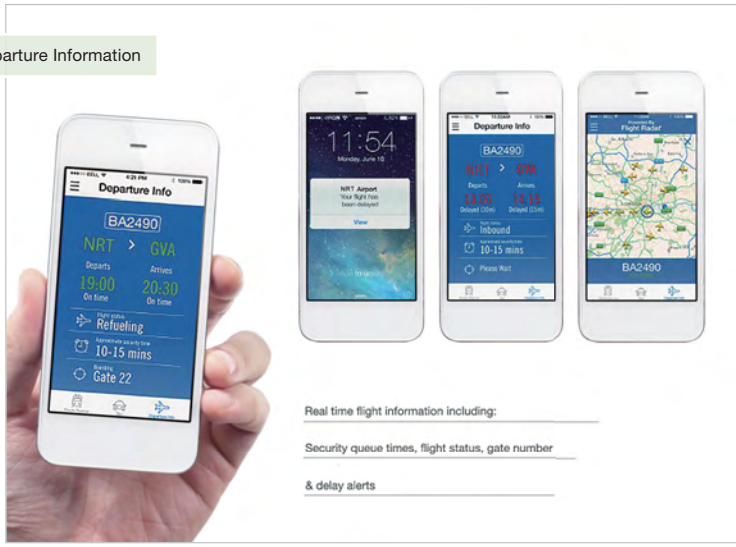
Innovative mobility and utility service design

Another proposal was for mobility information services that would comprehensively support each mobility scenarios, including access to and from the airport. Kunimoto, who conceived this service proposal, provides this explanation.

"Based on amount of information gathered from group interviews and behavioral observation studies, we engaged in comprehensive analysis of the needs and behavior of passengers during thier journey from their home to destination. Throughout passenger journey analysis, we realized that passengers are eager to have various kinds of information which reassure their on-going and planned journey as under control; transport delays and highway status, the degree of congestion within the airport, status of departures and arrivals, and weather information at their destination. What is more, passengers are frustrated at not being able to access such information from one unified source. This issue is not one that can be solved by current airport application which only provides airport information. In response to this challenge we proposed a mechanism that would gather relevant transport data-set which covers any customer journey from airport A: local transportation, overseas transportation, domestic and overseas airports, airline flight information and local taxi company directories, etc., and couple it with open data such as geographical and climatological information. Each data could then be concentrated and enriched in a single data platform that could be reprocessed under application and provide unique itinerary pattern which dynamically assures passenger's trip from information perspective."

If such a service was available for use, it would help people to understand and forecast their entire journey in near real- time, from hotel or office to the airport, then by airplane to the destination airport, and on to their arrival at their final destination, such as a business partner's office, etc. This kind of service could be expected to significantly relieve the stress and worry from uncertainty and provide better that travelcustomers experience when traveling. There are, however, challenges to be overcome.

Kunimoto says, "Although high-level methodologies and strategies have been constructed to address questions such as how to comprehensively gather the information efficiently from transport operators from the number of countries and cities, then how to provide it to passengers effectively, and how opt-in stakeholders could get benefit, the reality is that project is still necessary to conduct hard work to design negotiation scenarios with all the players involved before concreate progress can be made. Nonetheless this proposal has provided us with an opportunity to reassess conventional



Hisanari Kunimoto, who devised the mobility information platform. "I want to realize truly 'usable' services that support the entire holiday experience, not just in the enclosed space of an airport, but from when people depart their homes right through until they return."

services. After receiving our proposal, the client decided to reconsider changing their functional requirement of new airport application."

On the other hand, in a certain sense the most difficult challenge to resolve was the effective utilization of utilities. As noted above, merely introducing the latest environmental technologies alone will not lead to Airport A being able to differentiate itself from competitors. Hayashi explains the entirely new idea that the team arrived at after examining this issue—"external linkage."

"In conventional types of environmental consulting it is the accepted norm to segmentalize energy, water and waste, etc., as separate areas, which meant that until now proposals were also limited to the confines of their specific areas. However, in this project we were able to use the expertise of our collaborative partners to devise a comprehensive and optimal proposal. It was from the formulation of this proposal that we formed a new idea to incorporate external factors into our considerations."
The foremost basic assumption that informed our decisions when creating the proposal was that airport revenue is easily impacted by economic fluctuations. A further issue was the high costs related to waste disposal within an airport. As a measure to supplement revenue flows we therefore proposed utilizing the waste created within the airport as the raw material to produce bio-gas/fuel, which could then be burned to create heat, electricity and water, etc., for use in the airport. As excess electricity or heat could be sold to external buyers, this would lead to revenue generation. However, given that waste from the airport alone would not provide sufficient raw materials for bio-gas production, we drew up a scenario in which the waste from supermarkets and a sugar plant in the vicinity would be collected."

In view of the spatial limitations at the airport, in order to determine whether it would be possible to construct an onsite bio-gas production plant it was necessary to accurately calculate the area and plot it on a basic design diagram. Once the economic and technical underpinnings of the proposal had been presented, we were successfully able to gain positive feedback from the client. However, it was subsequently discovered that the permission of the municipal government would be required in order to collect external waste resources, so further consideration will be required for going forward.

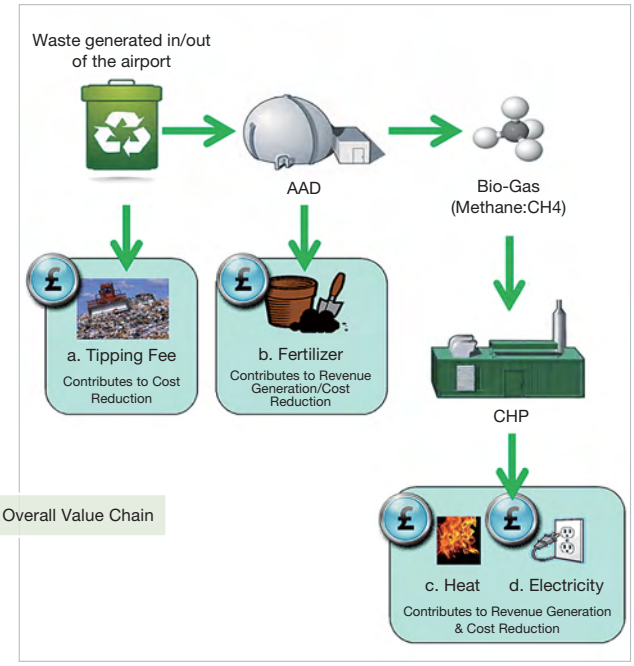
There is no doubt that the client was very surprised to be presented with such a highly innovative proposal. Project leader Mori also feels the potential for a great response.

"Based on this project we are already starting to develop similar ideas with other clients. We have received an extremely positive response and inquiries are also coming in. I hope that you will keep an eye out for further developments."

Let us hope for further great results from the young experts at Hitachi Consulting.

(Interviewer & writer: Madoka Tainaka; Photographer: Yuki Akiyama)

Kentaro Hayashi, who was involved in environmental consulting. "I made frequent visits to Europe during the project. I became great friends with a Portuguese member of our collaborating partners and one of my good memories of the project is going surfing with him in Portugal on one of my days off."



Overall Value Chain

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