

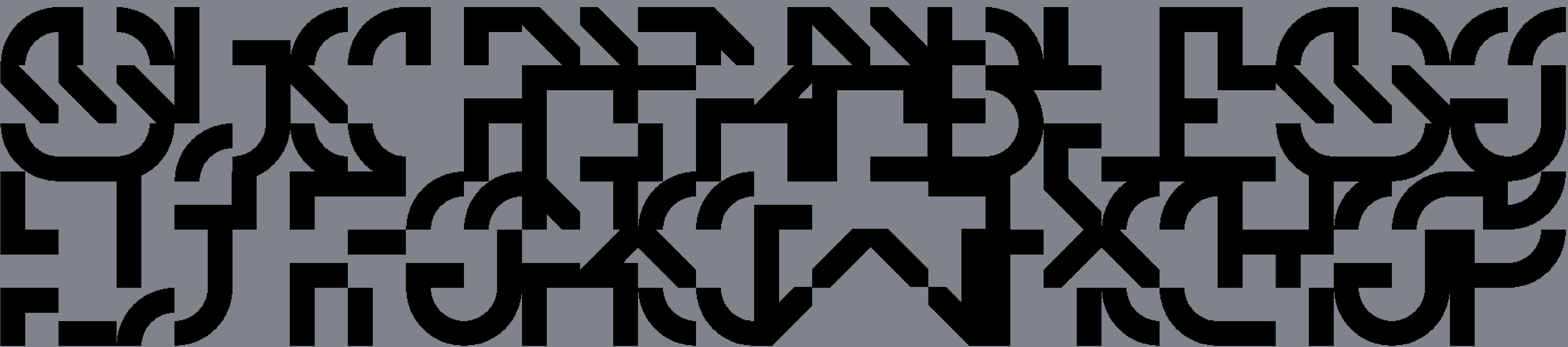
INSTITUTE
OF DESIGN

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**Reimagining the In-flight Meal Experience
for Sustainable Cities**

**SUSTAINABLE SOLUTIONS
WORKSHOP**

Report 2024



***“Civic infrastructures can appear oppressive, discriminatory,
and unsustainable, despite our best intentions.”***

Carlos Teixeira

ID Charles L. Owen

Professor in Design

Sustainable Solutions Workshop

Contemporary problems and their solutions can be defined as complex adaptive systems because they emerge from the daily behavior of seven billion people looking for better standards of living when confronting the challenges and opportunities shaped by the unprecedented interconnectivity of the world economy, the global society, and the natural environment.

This project explores applying design methods and strategic thinking through open innovation practices for leveraging the interconnectivity of markets, technology, finance, and social networks in order to envision sustainable solutions with an impact on the local lives and wellbeing of communities.

CONTENTS

- o1 Project Opener
- o2 Evolution of In-flight Dining
- o4 Goal Setting
- o5 Why In-flight Meals?
- o6 Sustainability in this Context
- o7 Introduction of Opportunity Spaces
- o8 Opportunity Space 1: Strategic Sourcing
- 13 Opportunity Space 2: Customer Experience
- 18 Opportunity Space 3: Logistics & Distribution
- 23 Opportunity Space 4: Waste Management
- 28 Data as an Asset
- 29 Anatomy of Infrastructure
- 30 Project Partner
- 31 Collaborators
- 32 Project Team

TODAY, THE IN-FLIGHT MEAL EXPERIENCE IS AT A CROSSROADS

Since 1919, in-flight meal service has evolved significantly. What began as a simple cold lunch box has grown into a \$15 billion industry. However, despite its growth, the current state of in-flight catering presents significant challenges.

Today, in-flight meals are pre-prepared, packaged, and often lack customization options. This system, while attempting to cater to diverse needs, is constrained by logistical and budgetary limitations, resulting in inefficiencies in resource allocation and waste management.

But we're determined to change that.

Through our project we're taking a bold step towards addressing these challenges. Teaming up with The Invert Chicago, we're pioneering a groundbreaking approach to in-flight dining. By harnessing Controlled Environment Agriculture (CEA) technologies such as vertical farming and hydroponics, we're redefining how in-flight meals are sourced, prepared, and delivered.

Our goal is ambitious: to set a new standard in the airline industry by combining culinary innovation with sustainability and community involvement. Not only will this revolutionize the in-flight dining experience, but it will also significantly reduce the environmental impact associated with traditional food production and transportation methods.

Project Team

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EVOLUTION OF IN-FLIGHT DINING

1919

First In-flight Meal

- Pre-prepared, cold lunch box served on an international flight between Paris and London

Problem

- Limited variety, freshness, and customization options

1920's

On-board Kitchens and Luxurious Dining

- Airplanes equipped with on-board kitchens, galleys, and dedicated dining spaces
- Meal service became an extravagant and luxurious affair for all passengers

Problem

- High cost and weight constraints; only feasible for luxury flights

1930's

Introduction of 'Flying Boats'

- Flying boats (winged sea-planes with a hull) rose in popularity
- Sea-planes could land on water, allowing service to cities without extended runways

Problem

- Limited accessibility; service dependent on availability of sheltered harbors



1940's

Adjustments with Faster Planes

- With faster planes and less need for entertainment, meal service became shorter

Problem

- Reduced meal service duration; limited time for meal enjoyment

1950's

Introduction of Frozen Food Trend

- Frozen food trend allowed greater amounts of food to be stored on the plane without extensive preparation
- Meal service became more differentiated, with economy services becoming possible

Problem

- Sacrifice in taste and quality; limited variety and nutritional value

Today

Outsourced Catering and Standardized Preparation

- Meal preparation and packaging outsourced to external catering companies like LSG SkyChefs or Gate Gourmet
- Meals cooked, frozen, and packed into trays before being loaded onto flights
- On-board meal preparation no longer practiced; meals simply heated up prior to service

Problem

- Limited customization options; excessive waste and environmental impact



REIMAGINING THE IN-FLIGHT MEAL EXPERIENCE

The overarching goal is to set a new standard in the airline industry, combining culinary innovation with sustainability and community involvement, thereby transforming the in-flight dining experience into a responsible, enjoyable, and forward-thinking service.

Resulting in a system that is more resilient to climate change, reducing the carbon footprint of food production, and ensuring equitable access to nutritious food for all.



WHY IN-FLIGHT MEALS?

In flight meals as a product experience has the highest potential of impact for making a city more sustainable through airports and real estate companies

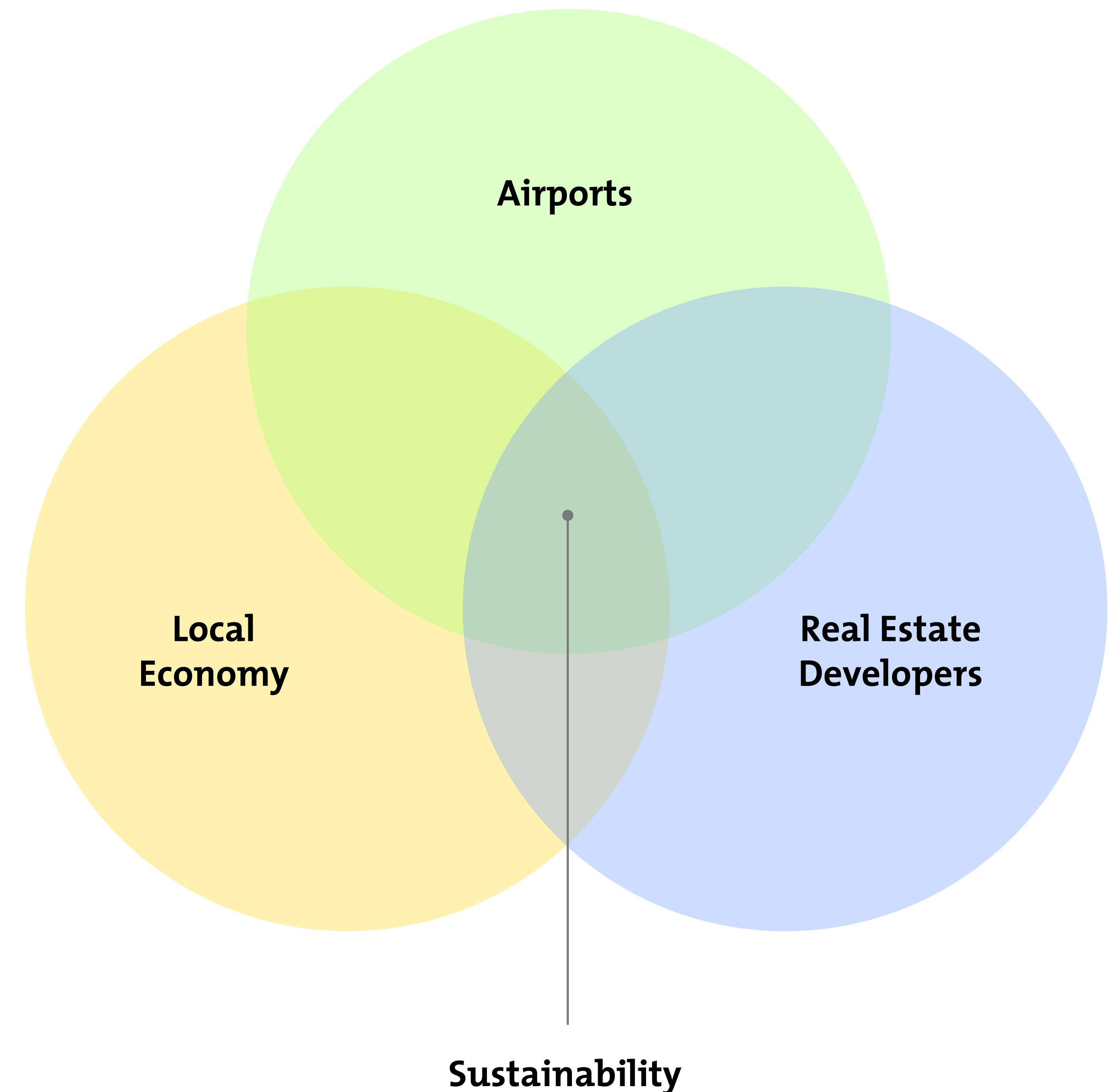
In-flight meals offer a unique opportunity for airports, real estate developers, and local economies to come together and address sustainability challenges head-on. By reimagining in-flight dining, we can implement sustainable sourcing practices, reduce waste, and support local communities simultaneously.

Airports, as key transportation hubs, play a crucial role in promoting sustainable practices to reduce their environmental footprint.

Real estate developers can contribute by integrating sustainable food systems into airport infrastructure, fostering community engagement, and supporting local businesses.

Also, real estate developers provide investible infrastructure for specialized retail spaces, where real estate spaces are dedicated for highly specialized use for sustainable and equitable food systems.

Investing in sustainable in-flight dining isn't just about protecting the environment; it's about enhancing the overall passenger experience and building a better future for everyone.



INNOVATIVE APPROACHES TO ELEVATING THE IN-FLIGHT ECOSYSTEM

At the heart of our approach lies a commitment to redefining the in-flight dining experience, not just as a meal but as a catalyst for positive change. Our solutions encompass a holistic approach, addressing key sustainability challenges while enhancing passenger satisfaction.

Through strategic partnerships with local suppliers, we prioritize sustainable sourcing practices, ensuring fresher, higher-quality ingredients while supporting local economies. By leveraging data-driven insights, we optimize meal planning and reduce waste, minimizing our environmental footprint.

Furthermore, our solutions extend beyond the confines of the aircraft, integrating sustainable practices into airport infrastructure and fostering community engagement. From farm-to-tray, we're committed to promoting social responsibility, environmental stewardship, and culinary excellence at every step of the journey.



SUSTAINABILITY IN IN-FLIGHT MEALS

In the realm of in-flight meals, sustainability isn't just a buzzword - it's a commitment to a greener, more responsible future

Sustainability means more than just reducing waste; it's about minimizing our environmental footprint, maximizing resource efficiency, and ensuring social responsibility at every step of the journey, from sourcing ingredients to waste disposal.

QUALITIES OF SUSTAINABLE IN THIS CONTEXT

Reducing Environmental Impact

Implementing waste reduction strategies, such as minimizing single-use plastics and food waste, to decrease the environmental footprint of in-flight dining.

Resource Efficiency

Optimal use of resources through efficient waste collection, recycling, and composting, reducing the need for virgin materials and minimizing energy consumption.

Promoting Social Responsibility

Supporting local economies through sustainable sourcing practices, engaging with local communities, and ensuring equitable access to nutritious food for all passengers.



Innovation and Continuous Improvement

Embracing innovative solutions and technologies to continually improve waste management practices and minimize environmental impact.

Collaborative Approach

Engaging with stakeholders across the aviation industry, including airports, airlines, catering companies, and passengers, to collectively address sustainability challenges and drive positive change.

By integrating these qualities of sustainability into in-flight meals, we can create a more environmentally responsible and socially conscious in-flight meal system

STRATEGIC SOURCING

How does this approach revolutionize the in-flight meals system, contributing to a greener, more enjoyable, and community-driven journey?

Food systems as we know it are fast changing. the current model is very linear; where farmers grow crops, sell to large distributors like Gordon Foods in Chicago and then procured by institutions like hospitals and catering facilities for consumption. It is a model that has operated for a very long time but it is a very flawed way of sourcing that does not take into account the external environment in which it operates. In fact for every dollar spent on food, \$2 extra goes into societal costs related to consumption and production (1).

Sustainable food systems of tomorrow are more circular and distributed (Image 1). They have the same goals as linear food systems, i.e to feed as many as possibly can, but exhibit very different characteristics and features.

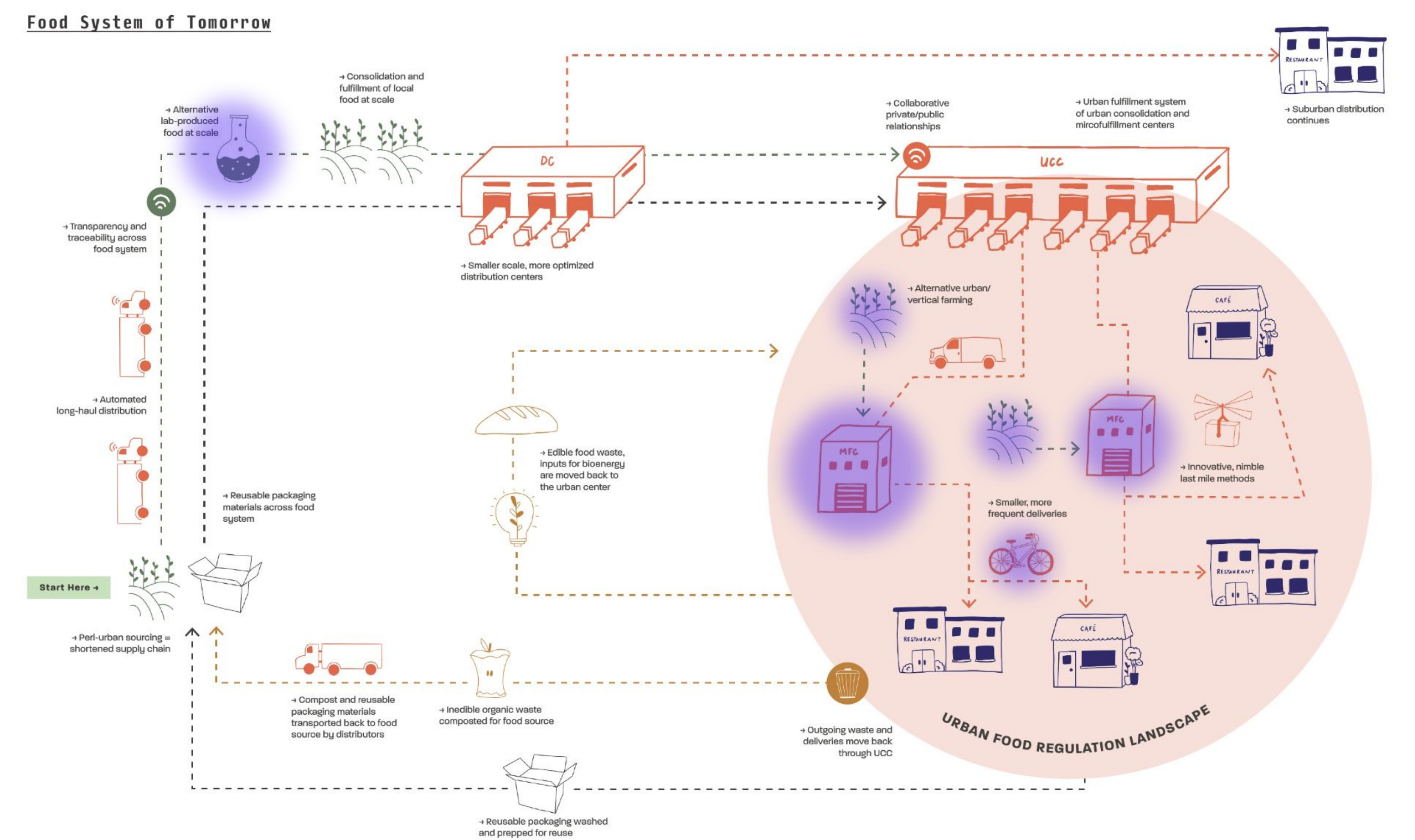


Image 1: Food Systems of the Future

Opportunities for Real Estate in the Food Systems of the Future

Sources:

(1) [Ellen MacArthur Foundation](#)

KEY FEATURES | Strategic Sourcing

More than half the world's population lives in cities and this number is expected to grow by 68% by 2050 at which stage 80% of the worlds food would be eaten within cities



Agricultural Technologies

Future food sourcing methods will include lab-grown sourcing, controlled environmental agriculture, cellular agriculture, and regenerative agriculture, among other forms of agricultural biotechnology.



Optimized Food Production

Ghost kitchens optimize food production by centralizing kitchen facilities and resources, enhancing strategically source ingredients in bulk, minimizing costs and reducing food waste through better inventory management.

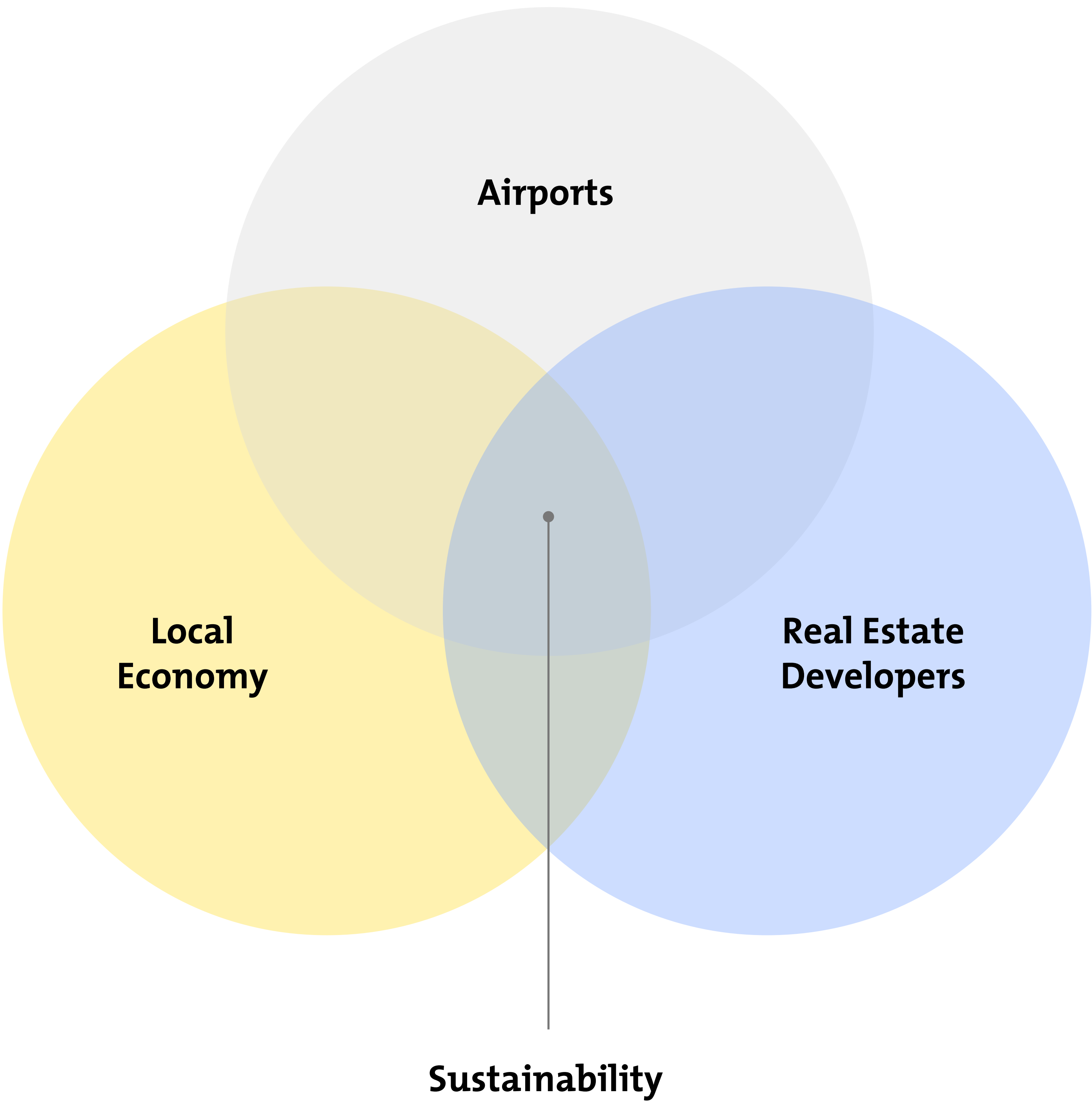


Unlocking the potential of circular economies and distributed food systems through real estate developers

There are multiple signals moving in the direction of circular and distributed food systems, but not the right drivers to facilitate and close the loop.

Real estate stakeholders have the right resources and incentives to push for circular, distributed food systems in partnership with local economies & stakeholders to meet earth’s growing demand for better quality of food in a sustainable and equitable manner.

The opportunities for real estate lies in not only providing avenues and spaces for lab-produced food but also venture into micro-fulfillment centers as an analogous business model within this entire ecosystem. They can also invest in how these centers and labs move goods between centers (will be explored more in Opportunity Space 3: Logistics and Distribution)



Key Features



Excelling in the future of food by uniquely positioning real estate developers to drive transformative change

Key Features



Agricultural Technologies



Optimized Food Production



Develop dedicated spaces for food production and distribution. Repurpose existing buildings or design new ones to accommodate urban farms, vertical farming facilities, food processing centers, and micro-fulfillment centers. These spaces should be optimized for energy efficiency, water management, and waste reduction.	Foster local partnerships and ecosystems. Collaborate with local farmers, food producers, distributors, and retailers to create a seamless circular food supply chain within the community. Leverage the real estate portfolio as a hub for these local ecosystems, facilitating the efficient movement of goods and services	Invest in urban agriculture technologies. Allocate resources for research and development in controlled environment agriculture (CEA), vertical farming, and other urban agriculture technologies. Collaborate with agricultural tech start-ups and academic institutions to stay ahead of the curve and integrate cutting-edge solutions into their real estate portfolio.
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Addressing asymmetries of power and unintended consequences to ensure equity in the future of food

It would not be an equitable system without doing a diagnostic of potential unintended consequences and asymmetries of power.

It is important within this domain to prioritize community engagement. Engage with local communities to understand their needs and preferences, and tailor the food systems accordingly. Promote education and awareness programs to encourage sustainable food choices and support local economies

As real estate stakeholders and large corporations invest heavily in these new food systems, there is a risk of market consolidation and monopolization. This could limit competition, stifle innovation, and potentially lead to higher prices for consumers. This is where regulation and policy making becomes paramount to the the success of sustainability of the system for all.

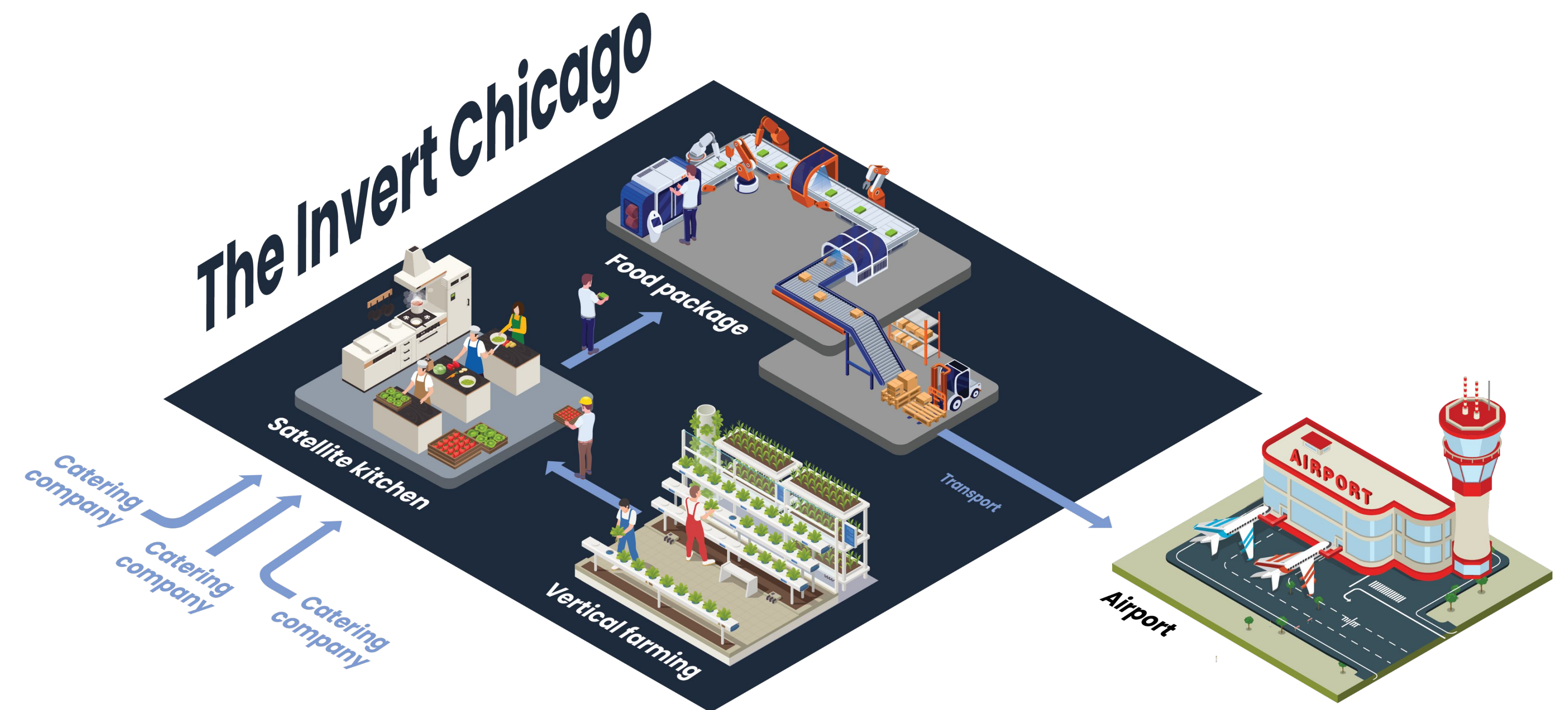


Image 2: Archetype diagram for sourcing

CUSTOMER EXPERIENCE

How can we reimagine the entire in-flight meal experience to prioritize sustainability and equity, while still ensuring passenger satisfaction and relevance?

Reimagining the in-flight meal experience goes beyond just changing what's on the menu; it requires a complete overhaul of how passengers experience the service. Sustainability, encompassing people, profit, and planet, lies at the heart of this transformation.

Currently, the focus is primarily on environmental impact, with little consideration for equity and inclusivity. Traditional in-flight meal services often overlook diverse dietary preferences and cultural considerations, leading to a one-size-fits-all approach that may exclude certain passengers.

The aim for this is to create an experience that is not only environmentally friendly but also fair and inclusive for all passengers. By leveraging data and innovative solutions, we can tailor the in-flight dining experience to individual preferences, ensuring that every passenger feels valued and catered to.



Empowering the future of in-flight dining by giving passengers the agency to take ownership of their meal



Modular Meal Selection

This reimagined solution solves more ‘planet’ sustainability. 20-30% of food served inflight is wasted; even when untouched (2). By giving passengers the option to decide which components of their meals they are not interested in, we give them choice but more importantly personal agency over what does not get unduly discarded.

A typical example could be unchecking boxed salads or bread off ones tray before its served. That way not only is waste minimized or hopefully zeroed out, but airlines have a very ripe opportunity to determine patterns through data and insights after multiple cycles.



Top-up Points System

This second reimagined system is a lot more ambitious but has the biggest potential to support local ecologies and remain sustainable in reducing waste while also giving passenger the biggest experience upgrade in comparison to their current inflight meal experience.

Imagine a world where passengers could get to choose exactly what they would like to eat on board; reducing the waste that eventually ends up in landfills. Freedom of choice not only has long term implication on reducing overall waste, but is the only way for airlines to deliver highly personalized, highly customizable meal inflight meals to fliers. Just like the first reimagined system, airlines get to leverage the data generated to this time around drive customer insights and hopefully engagement.

Sources:
(2) [IATA](#)

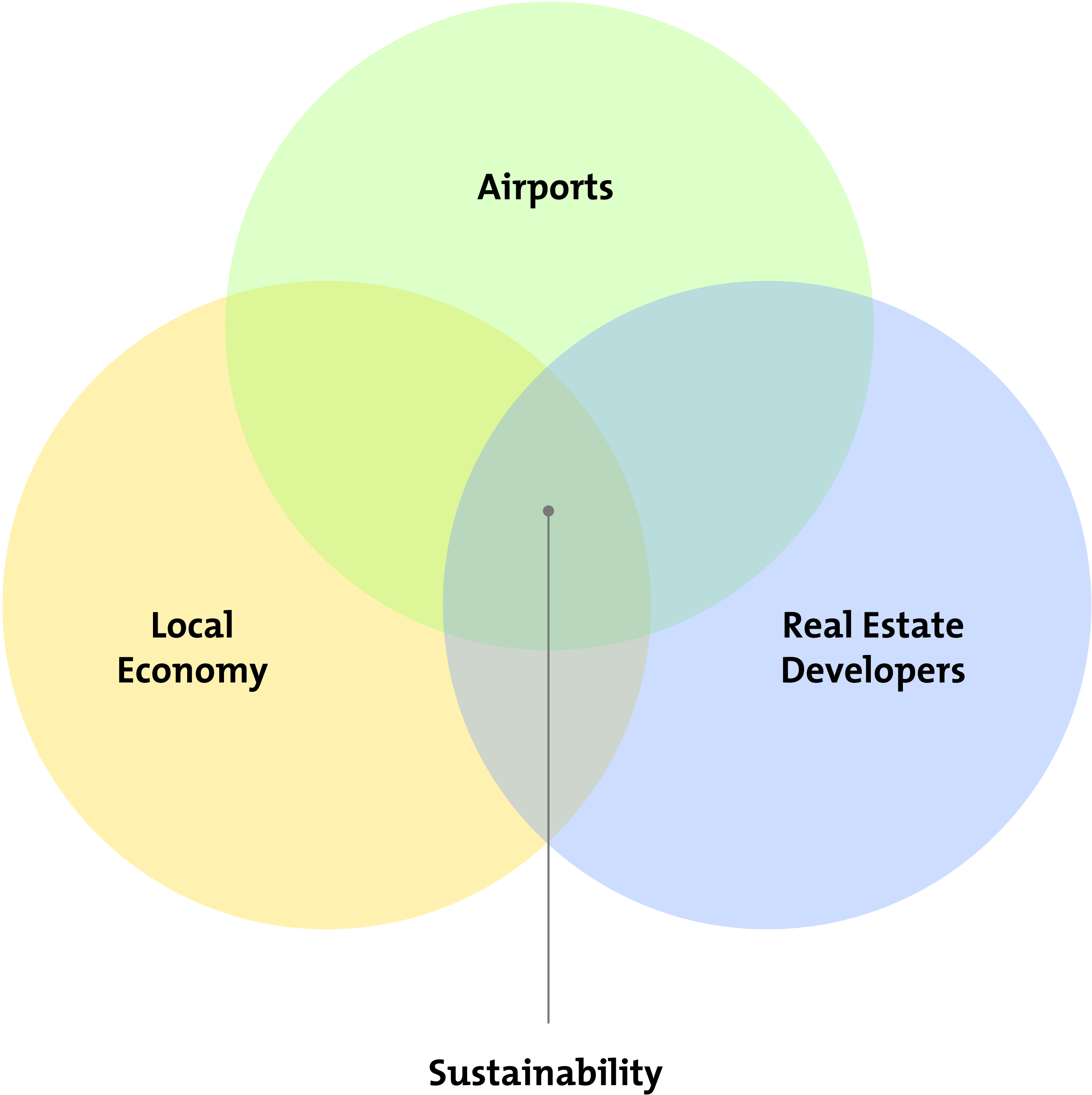
Elevating the in-flight experience with a threefold solution for the airport, real estate developers, and the local economy

By introducing these innovative solutions, we're not just redefining the dining experience; we're transforming the entire ecosystem.

For airports, these solutions mean a significant reduction in food waste, leading to a more sustainable operation and reduced environmental impact.

Real estate developers like The Invert have a golden opportunity to create dedicated spaces for dark kitchens and local food providers, supporting small businesses and fostering community engagement.

And for local economies, these solutions offer a chance to thrive. By partnering with local food providers and restaurants, we're not just reducing waste; we're supporting local businesses and stimulating economic growth.



Key Features



A chance for stakeholders to provide opportunities for small players to engage and break through a big and closed off ecosystem

Key Features



Modular Meal Selection



Top-up Points System



Short

Invest in establishing a network of dark kitchens and strategically located near major airports and airline hubs. These facilities should be designed to efficiently produce highly personalized, customized meals for airline passengers while minimizing waste and environmental impact.

Mid

Foster partnerships with local food providers and restaurants. Collaborate with local food providers, including restaurants, catering services, and specialty food producers, to create a diverse and locally sourced menu offering. This not only supports local economies but also ensures a unique and authentic dining experience for passengers.

Long

Develop a seamless ordering platform that integrates with airlines' passenger management systems, allowing passengers to customize their meal preferences before their flight. Optimize logistics and supply chain operations to ensure timely delivery of fresh, personalized meals to aircraft.

Ensuring equity in the dining experience by taking action towards dietary diversity and considerations

While offering highly personalized meal options is a step forward in enhancing the in-flight dining experience, we must be mindful of inadvertently overlooking or underrepresenting certain cultural or dietary preferences and restrictions.

Failure to consider diverse dietary needs could lead to passenger dissatisfaction or feelings of exclusion, ultimately undermining the goal of providing an elevated dining experience for all.

The whole goal committed to ensuring equity in in-flight dining. By embracing cultural diversity and catering to a wide range of dietary preferences and restrictions, we aim to create an inclusive dining experience that leaves every passenger feeling valued and satisfied.

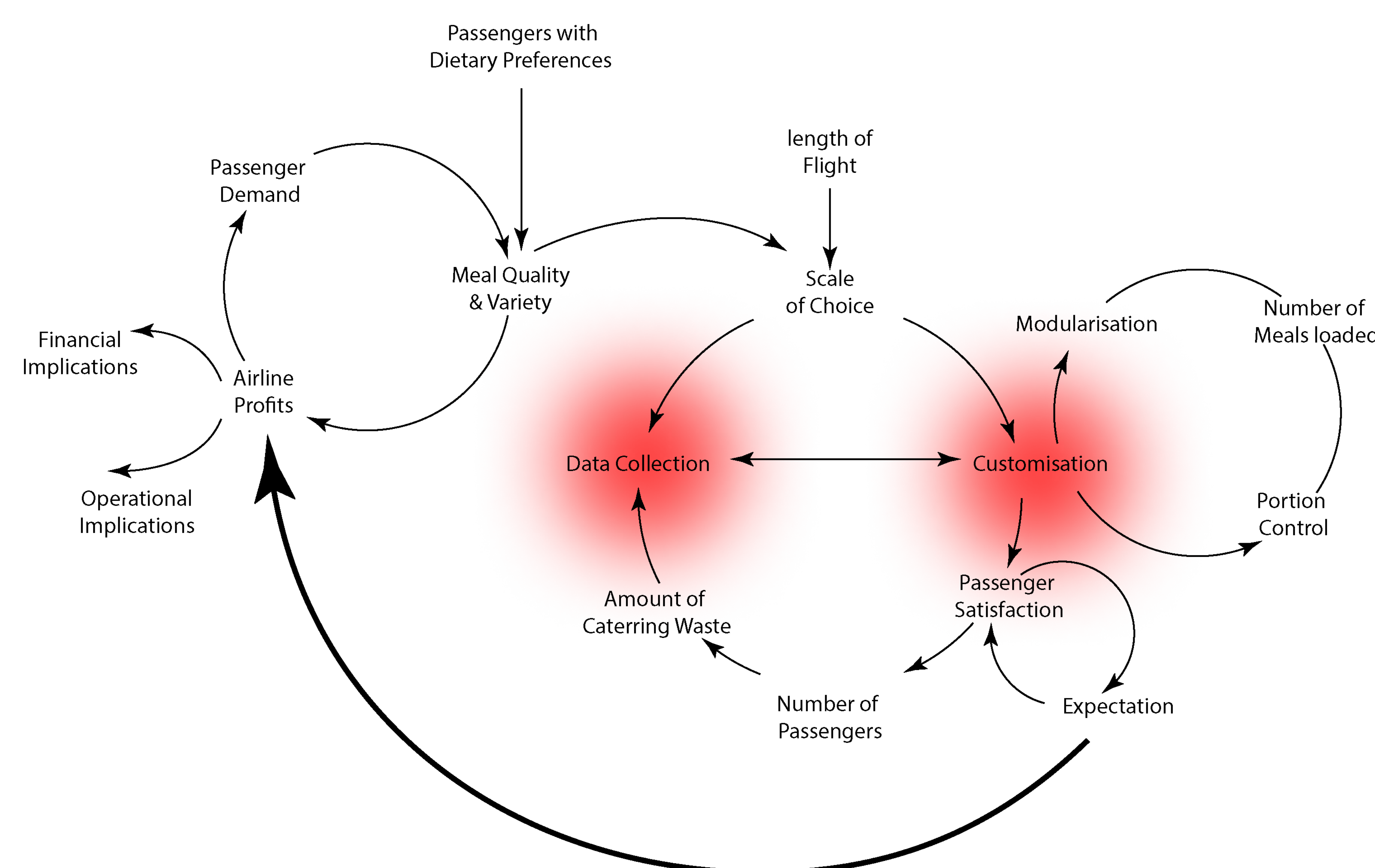


Image 3: Causal loop diagram for Meal Selection

Hotspots

ISSUES OF EQUITY

Ensuring equity in the dining experience by taking action towards dietary diversity and considerations

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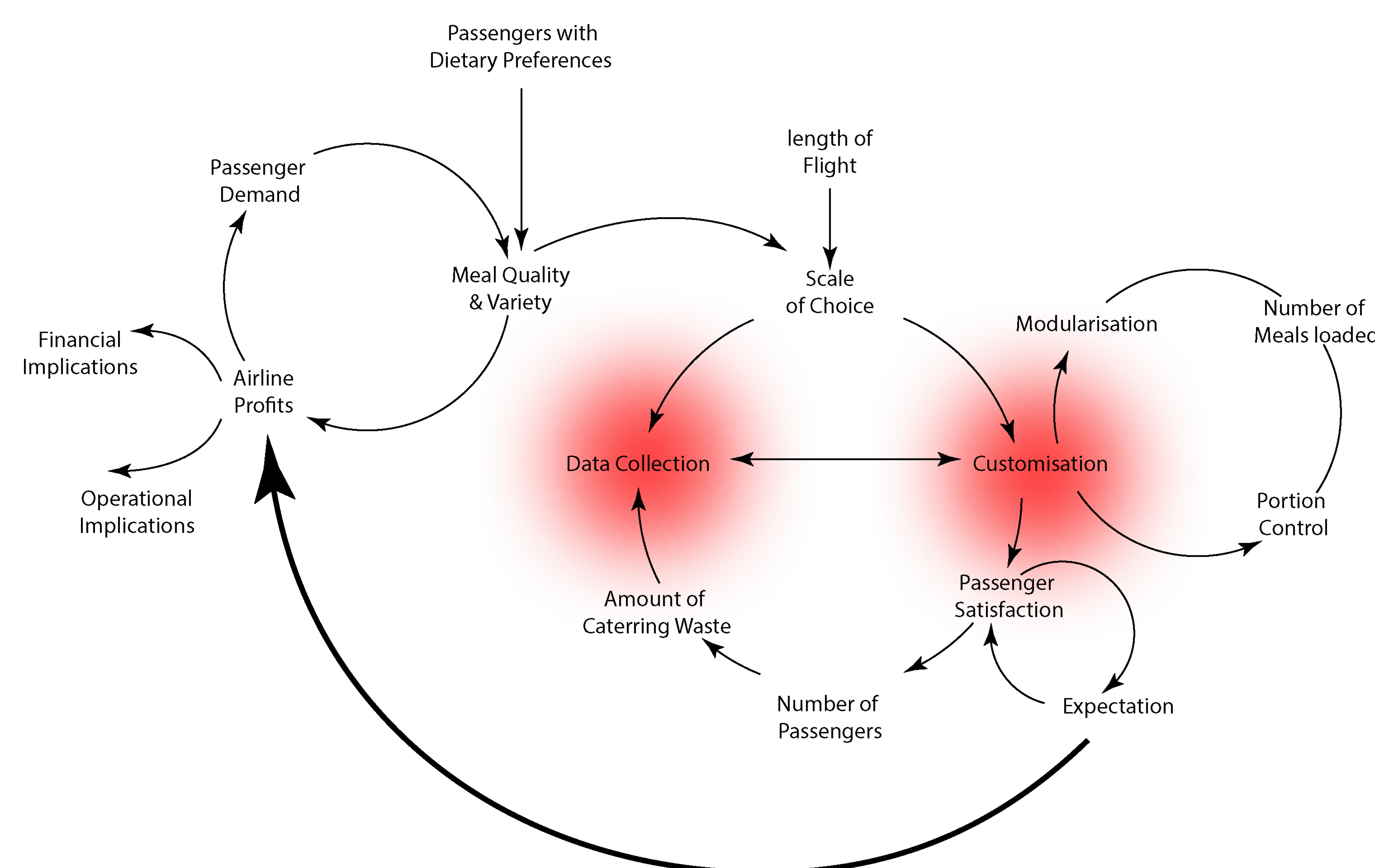


Image 3: Causal loop diagram for Meal Selection

Hotspots

LOGISTIC & DISTRIBUTION

How can logistics and distribution be optimized to ensure the seamless delivery of fresh, personalized, and locally-sourced in-flight meals?

The proposed concept emphasizes a shift from traditional, centralized meal production to a decentralized, efficient logistics system. This system incorporates Just-In-Time delivery to maintain the freshness of ingredients and minimize waste. It leverages autonomous, eco-friendly electric carts designed for efficient airport logistics, integrated with a digital platform that connects with airlines' passenger management systems for real-time meal customization.

The transformation within the logistics and distribution of in-flight meals moves from a traditional logistics model, which relies on bulk, centralized production and is characterized by significant food waste due to over-preparation and limited meal customization options. It evolves to a streamlined, responsive logistics model that utilizes smart, sustainable technologies. This new model supports personalized, just-in-time meal delivery, significantly reducing waste and enhancing the overall meal experience for passengers. This shift not only improves efficiency but also aligns with modern sustainability goals by minimizing environmental impact.

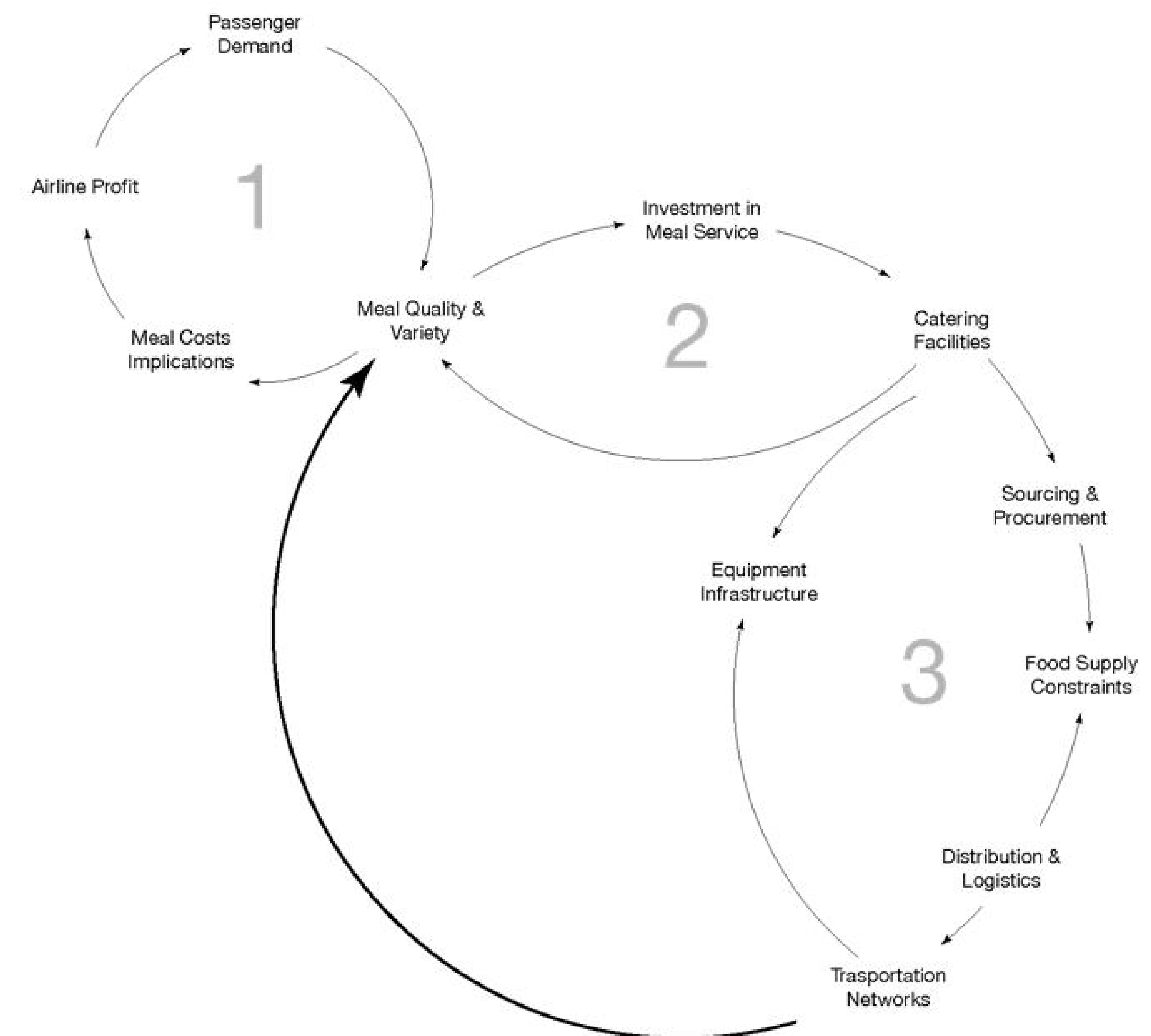


Image 4: Causal loop diagram for logistics and distribution

KEY FEATURES | Logistics & Distribution

Transforming In-Flight Dining with Advanced Logistics and Sustainable Practices to Minimize Waste and Maximize Freshness



Optimized Supply Chain & Just-In-Time (JIT) Delivery

Streamlining the supply chain with Just-In-Time delivery ensures fresh, locally-sourced meals and reduces waste.



Automated Delivery & Digital Integration

Autonomous electric carts provide efficient airport logistics, supported by digital platforms that integrate with airline systems for personalized meal services.

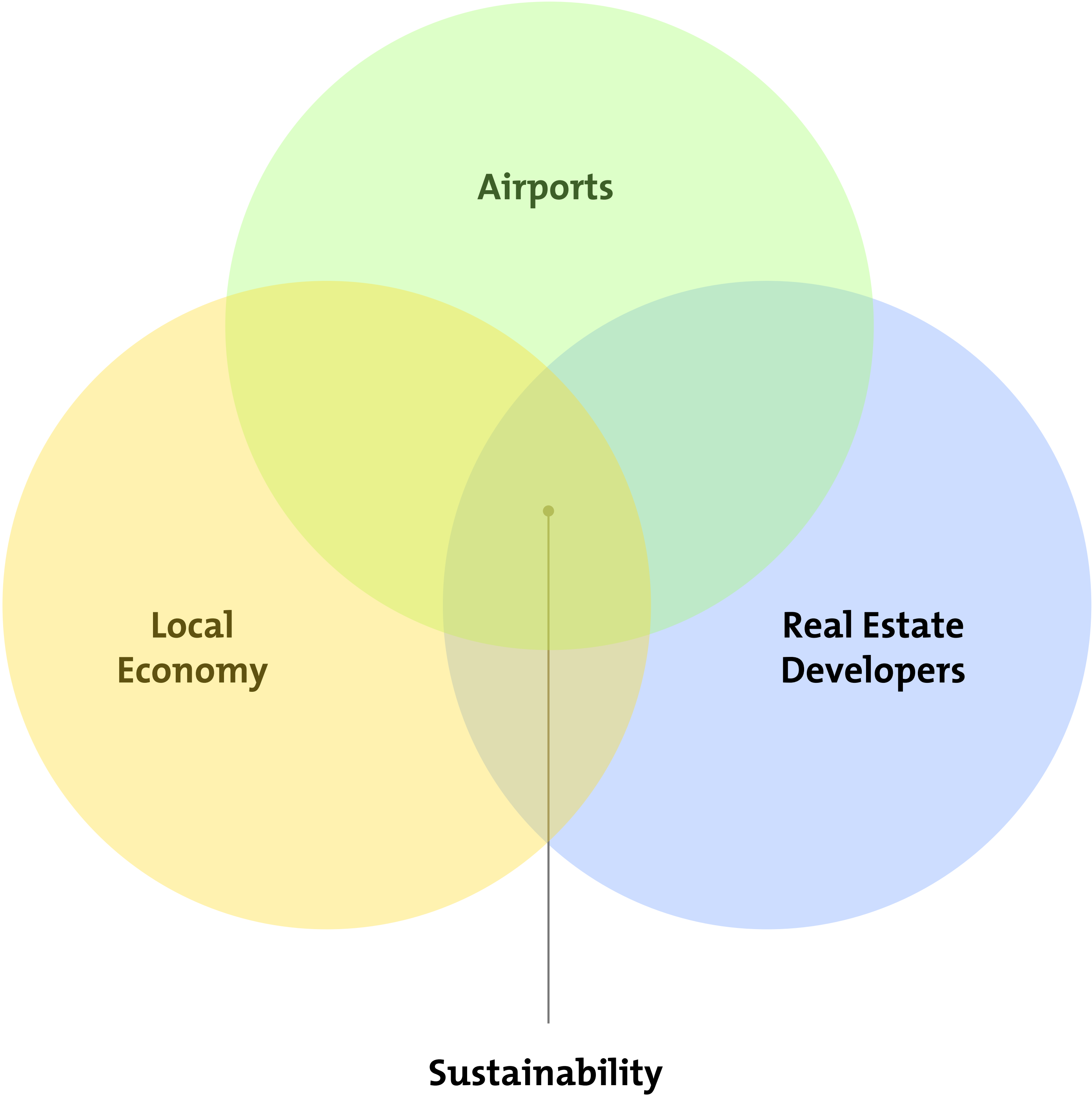


Real estate developers and airports unite to integrate urban farm produce into airport logistics, aiming for a circular economy

In the quest for sustainable in-flight dining, real estate developers, airports, and airlines converge to build an eco-friendly ecosystem.

Real estate developers are instrumental in establishing urban farms and vertical farming facilities that form a resilient local supply chain. Airports serve as pivotal points of integration, adapting their infrastructure to accommodate these sustainable practices, including the potential future use of autonomous delivery systems.

Together, these stakeholders can cultivate a circular economy that significantly reduces food waste and carbon emissions while providing passengers with fresh, personalized meal options. This collaborative effort not only responds to environmental concerns but also positions the stakeholders as leaders in innovation and customer-centric service within the aviation industry.



Key Features



Optimized Supply Chain & Just-In-Time (JIT) Delivery



Automated Delivery & Digital Integration

Sustainable in-flight meal logistics success relies on targeting tech-ready urban airports and enhancing consumer sustainability awareness.

Key Features



Optimized Supply Chain & Just-In-Time (JIT) Delivery



Automated Delivery & Digital Integration



Short

Mid

Long

In the initial phase, the focus should be on integrating sustainable in-flight meal logistics at technologically advanced urban airports, which are well-equipped to adopt new systems. Establishing partnerships with local food producers and suppliers is crucial during this period to ensure a steady flow of fresh ingredients, which are essential for the system's success.

As the system matures, the emphasis should shift towards enhancing operational integration and optimization. This involves refining the logistics processes to ensure they are fully integrated with airline operations, thereby improving efficiency and reducing environmental impacts. Additionally, it's important to engage passengers by increasing their awareness of the sustainability efforts and benefits provided by the new meal logistics system, which can help to build consumer support and preference.

Focus on continuing to advance the technology used in the logistics system, such as improving autonomous delivery mechanisms and digital integration platforms. This will help to maintain a competitive edge by enhancing meal customization and delivery efficiency. Furthermore, the goal should be to expand this sustainable logistics model to more airports and regions, leveraging the success and learnings from the initial implementations to scale the system globally and maximize its impact.

Urban farming and automation risk centralizing power and displacing jobs, needing careful oversight.

As airports and real estate developers adopt urban farming and automated delivery systems, there's a risk of centralizing power among fewer entities, potentially marginalizing traditional farmers and logistics workers.

This shift might lead to job displacement in conventional roles, creating a workforce imbalance as tech skills become more valuable than agricultural or culinary expertise.

Additionally, while aiming for sustainability, stakeholders must ensure they do not compromise on food safety or diversity, avoiding unintended consequences that could undermine the system's benefits. Efforts must be balanced to maintain equity and manage any socioeconomic disruptions this new model might introduce.

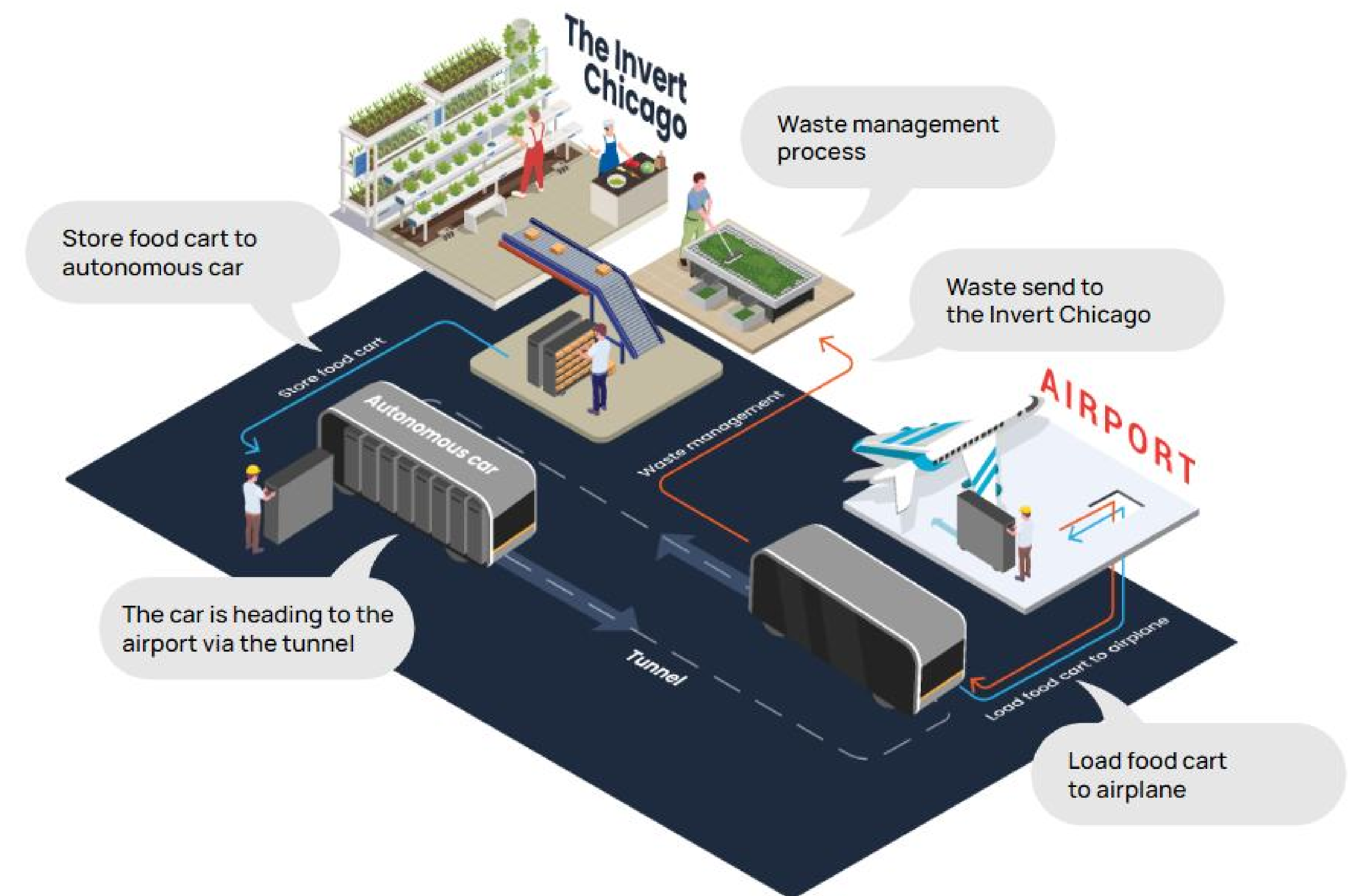


Image 5: Archetype diagram for logistics and distribution

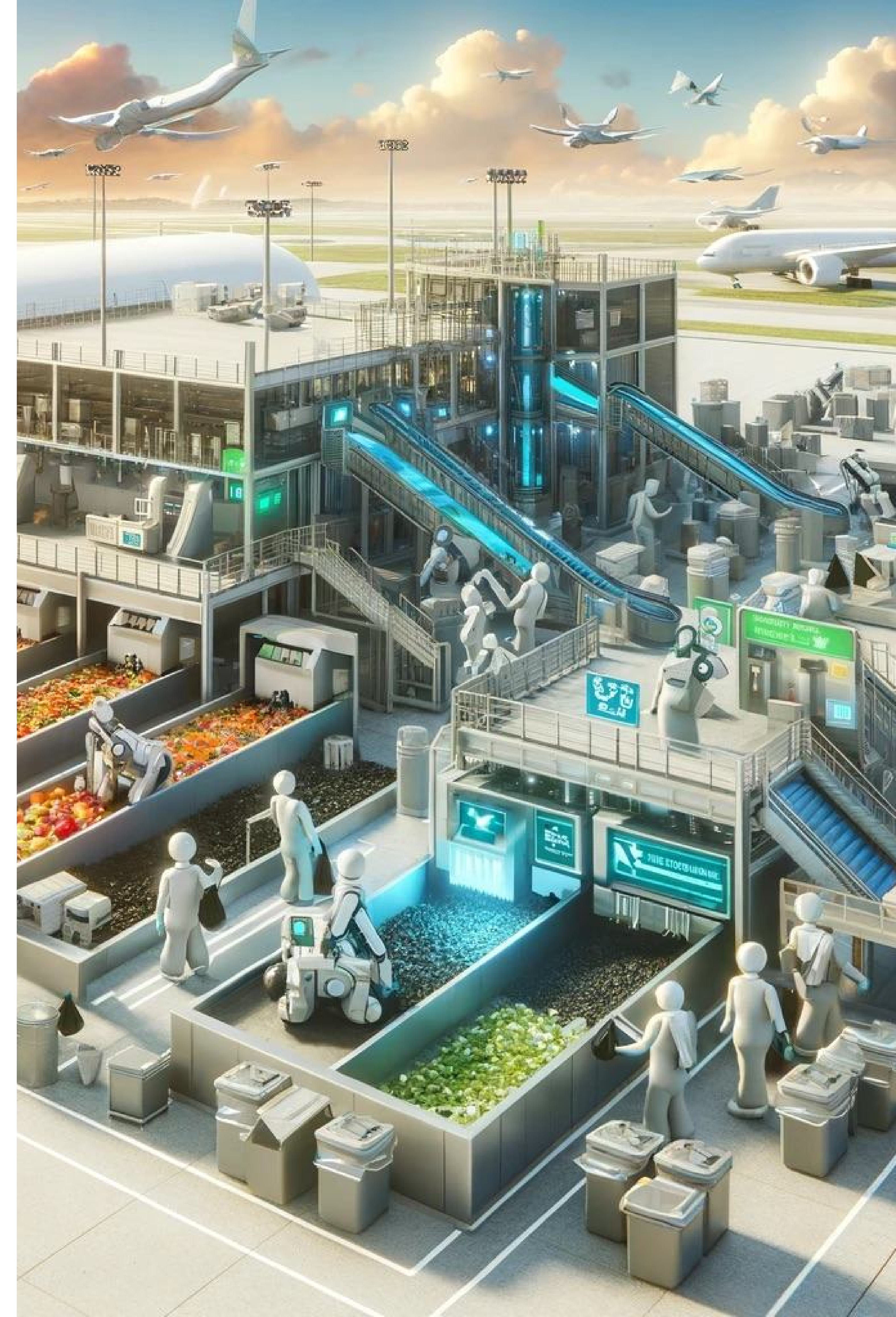
WASTE MANAGEMENT

How can we transform the in-flight dining experience to not only serve nutritious meals but also responsibly manage waste?

With the number of global travelers reaching 1.5 billion in 2019, all requiring meals during their journeys, the tourism industry significantly contributes to the 40% of annual global food production that goes to waste, often ending up in landfills. Recent data has shown that approximately 2.5 million tonnes of food waste are generated annually from in-flight meals, significantly impacting the aviation industry's environmental footprint. However, airlines are at the forefront of deploying solutions to prevent and manage waste efficiently. Currently, food waste collection and disposal of in-flight meals vary among airlines and airports.

In the future state, airlines are adopting innovative solutions to minimize in-flight meal waste production, impacting the entire system of air travel. Leveraging data-driven insights and comprehensive waste management programs, airlines are optimizing meal preparation, minimizing waste generation, and promoting a more sustainable approach to in-flight meal waste management. By closing the loop in the product lifecycle and optimizing resource utilization, airlines are expected to significantly reduce in-flight meal waste production, contributing to a more sustainable and environmentally friendly flight experience.

Sources:
(2) IATA
(3) Food Takes Travel



KEY FEATURES | Waste Management

Contributing to a more sustainable and environmentally friendly future through revolutionizing the waste management system



IOT-enable Carts

The collected leftovers and packages are placed in specially designed carts that weigh them. This innovative cart system automatically calculates the weight of the leftover food, capturing essential data on what and how much food is being wasted or left uneaten.



Modular Packaging

Modular packaging solutions, designed to minimize waste and maximize resource efficiency, can be extended to consumer goods and packaging within cities, fostering a circular economy where materials are reused, recycled, and repurposed.



Waste Management Initiatives

Implementation of programs to collect and recycle in-flight meal leftovers, collaborating with waste management companies for responsible disposal and recycling.

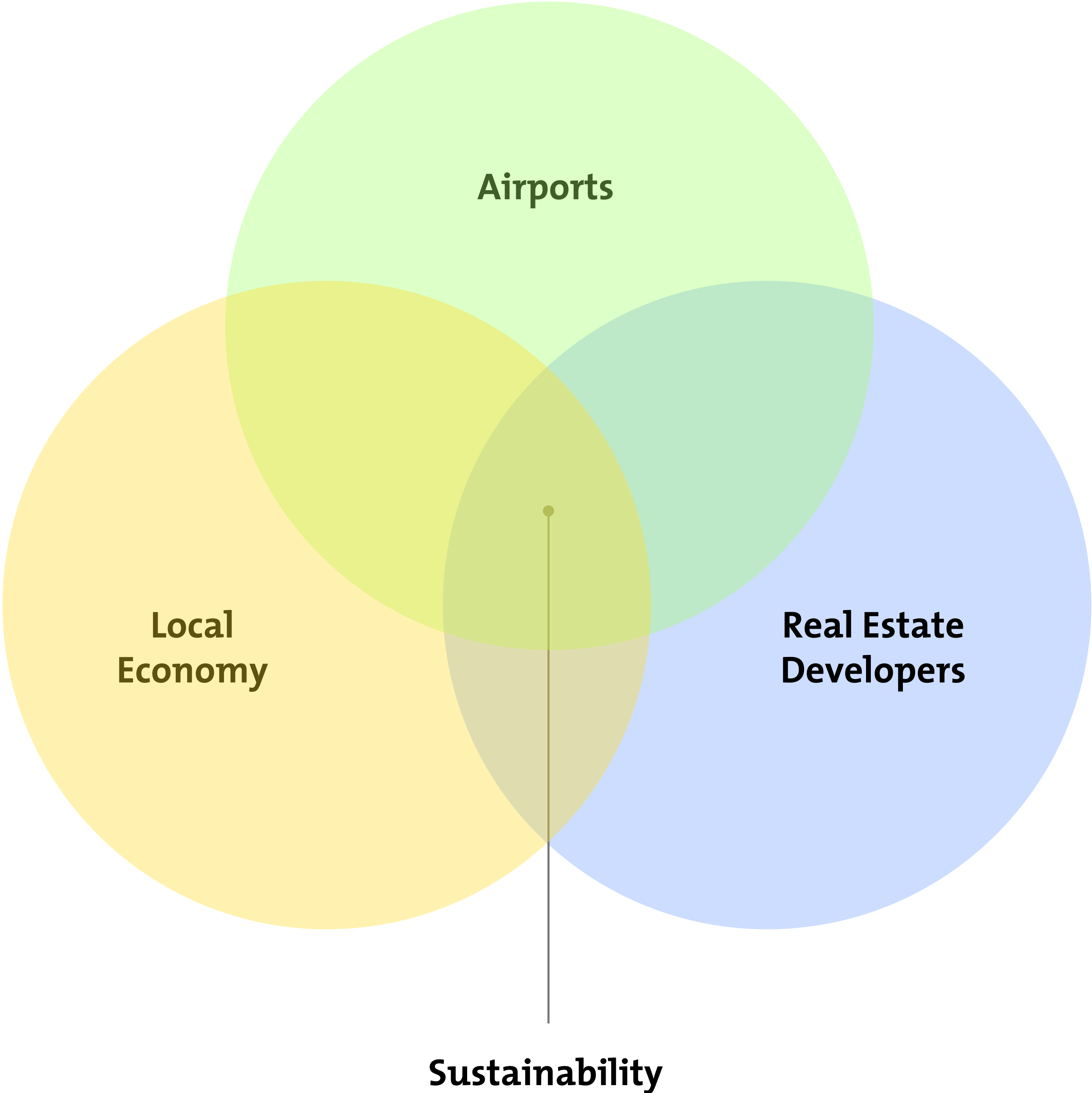


By prioritizing waste reduction and sustainable practices, airlines can lead the industry in environmental stewardship

Airports play a crucial role in implementing and supporting waste management initiatives within their facilities, providing infrastructure and resources for waste management, and collaborating with airlines and catering companies to streamline waste collection and disposal processes.

Waste reduction initiatives within airports contribute to the local economy by creating opportunities for waste management companies and recycling facilities, while enhancing the airport's reputation, attracting more passengers and businesses to the area.

Real estate developers may be involved in the design and construction of airport facilities, including waste management infrastructure, incorporating sustainable design principles into airport development projects.



Key Features



IOT-enabled Carts



Modular Packaging



Waste Management Initiatives

Utilizing data-driven insights to reduce in-flight meal waste, while extending innovative solutions to tackle waste disposal challenges in sustainable cities

Key Features



IOT-enabled Carts



Modular Packaging



Waste Management Initiatives



Implement immediate actions to kickstart our waste reduction initiative. Roll out comprehensive waste management programs in collaboration with airlines, airports, and waste management companies.

This includes introducing eco-friendly, modular packaging made from recycled materials, designed for easy separation and sorting of recyclable and compostable materials. Additionally, we will integrate data-analytics-enabled carts to weigh leftover food and packaging, automatically calculating waste metrics to inform future waste reduction strategies.

Optimize resource utilization and establish closed-loop recycling systems. Utilize data-driven insights, we will optimize meal preparation and packaging to minimize waste generation. Tailoring meal offerings to passenger preferences and consumption patterns will help reduce overproduction.

Moreover, we will establish closed-loop recycling systems, recycling paper packaging to minimize waste sent to landfills and integrating recycled materials back into the production of new packaging. Collaborations with airports, local economies, and real estate developers will continue to strengthen, ensuring a more sustainable and attractive travel experience.

Contribute to a more sustainable and environmentally friendly flight experience. Through collective efforts, it will ultimately lower the environmental footprint of the aviation industry, positively impacting the entire aviation ecosystem.

By embracing waste reduction and sustainable practices, we will pave the way for a more sustainable future for air travel, ensuring a cleaner and greener planet for generations to come.

Implementing comprehensive waste management initiatives designed to be the forefront of addressing equity issues

The data collected from IoT-enabled carts not only allows airlines to optimize meal preparation and packaging but also informs future menu adjustments, ensuring that meals are tailored to passenger preferences and consumption patterns. This helps address asymmetries of power by ensuring that decisions are based on accurate information rather than assumptions, empowering both airlines and passengers.

Furthermore, the implementation of modular packaging solutions enhances this waste reduction strategy by minimizing packaging waste and maximizing resource efficiency. Designed to be reusable, recyclable, and easily separable, these modular packages contribute to a circular economy both in the air and on the ground, benefiting all stakeholders involved in the air travel ecosystem.

Coupled with comprehensive waste management initiatives, including programs to collect and recycle in-flight meal leftovers, airlines are leading the way in responsible waste disposal and recycling. By collaborating with waste management companies, airlines ensure that leftover food and packaging are disposed of responsibly, further minimizing their environmental impact and addressing issues of equity by promoting sustainable practices that benefit all.



Image 6: Causal loop diagram for waste management

Leverage points of the solution

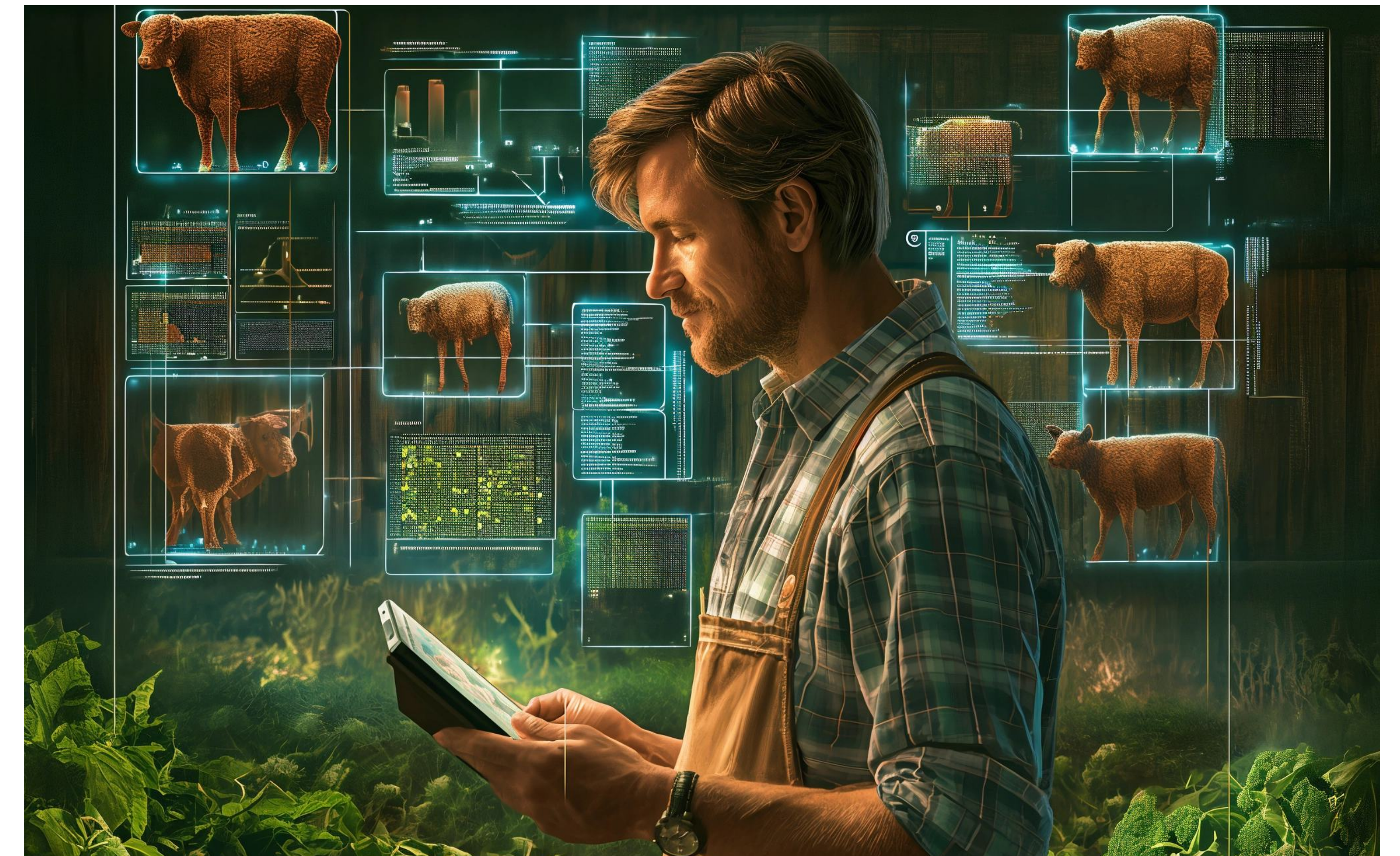
DATA AS AN ASSET

Exploring how the transformative power of data and computation in revolutionizing the way the in-flight meals ecosystem

Our entire solution for revolutionizing in-flight dining is backed and powered by the incredible capabilities of data and computation.

Imagine a passenger who prefers vegetarian meals, avoids gluten, and has a preference for spicy food. By leveraging data on past meal selections and dietary preferences, we can ensure that this passenger receives a personalized meal that perfectly aligns with their tastes and dietary restrictions. This level of personalization not only enhances the passenger experience but also minimizes food waste by serving meals that are more likely to be enjoyed and consumed.

One of the biggest challenges in in-flight dining is minimizing food waste. By analyzing data on passenger meal preferences and consumption patterns, we can optimize food inventory and meal preparation, ensuring that we only serve the right amount of food needed for each flight. For example, if data shows that a particular flight has a higher percentage of vegetarian passengers, we can adjust the meal options accordingly, reducing the likelihood of leftover food being wasted.



Data-driven insights also enable us to streamline our supply chains, ensuring that fresh and customized meals are delivered to aircraft efficiently and sustainably. By analyzing historical data on meal delivery times and flight schedules, we can optimize the timing of meal preparation and delivery, reducing the need for excess inventory and minimizing food spoilage.

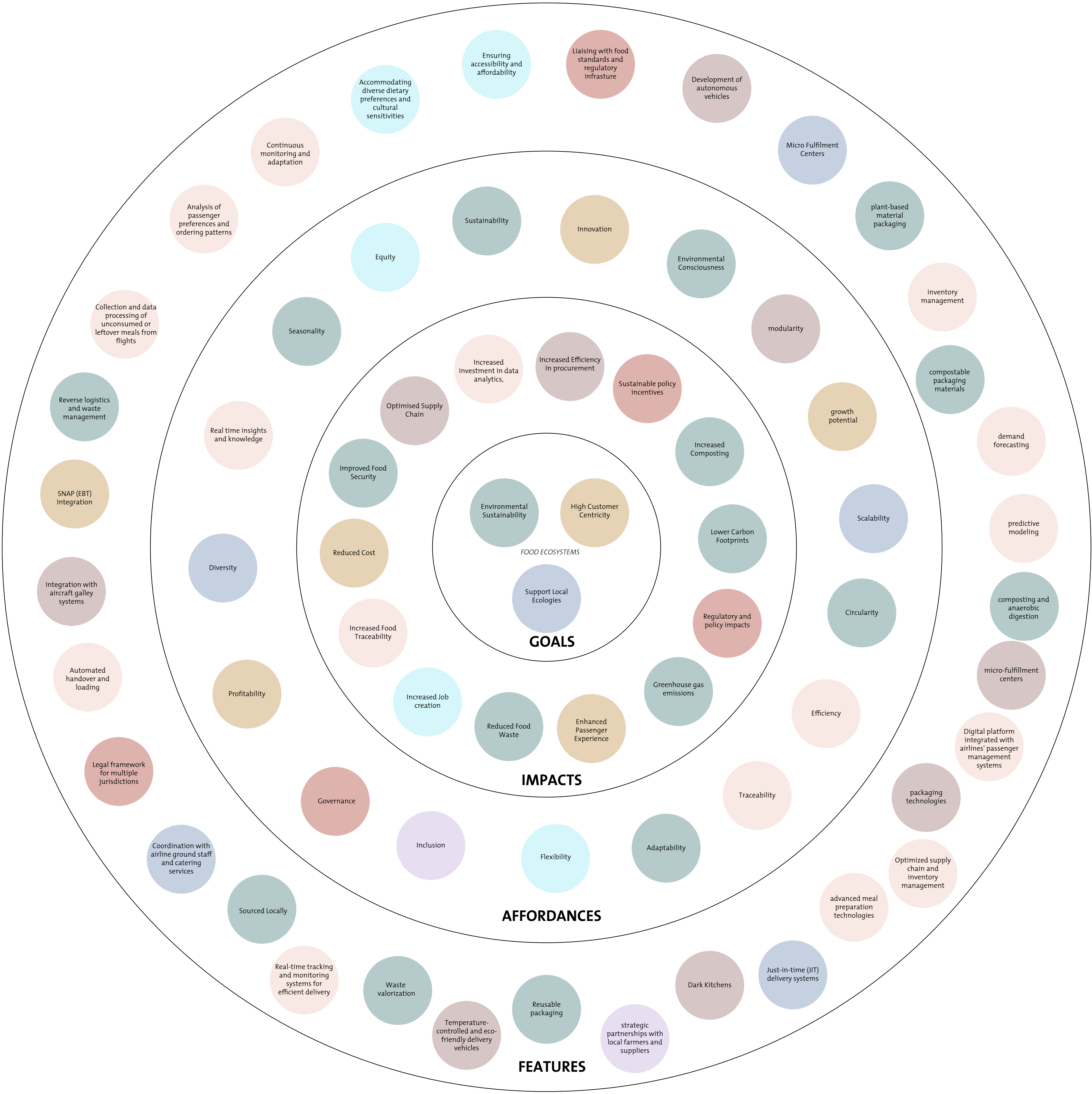
Data isn't just a part of our solution; it's the driving force behind our quest for a more sustainable, personalized, and enjoyable in-flight dining experience.

ANATOMY OF INFRASTRUCTURE

A Reimagined Sustainable In-flight Meal System

The main goals of the reimagined system is to reintroduce Environmental Sustainability into the current food systems, whiles elevating Customer Centricity and also being mindful of supporting Local Ecologies

HUMAN		NETWORKS		CULTURAL		GOVERNANCE	
Knowledge	Wellbeing	Professional	Personal	Local	Global	Regulations	Norms
What are the institutional structures for knowledge creation and dissemination?	What are the institutions maintaining the capacity of individuals to perform?	What is the portfolio of organizations? What are the values being exchanged?	What are the structures promoting community engagement?	What are the traditions and cultural heritage? What are values and beliefs sustaining them?	What are global elements and practices that have been incorporated in the situation?	What are the policies influencing decisions?	What is the power structure?
How and where are the engagements within these structures happening?	How and where is the capacity of individuals to perform?	How and where are partnerships and collaborations being formed?	How and where are the events and activities supporting for social gathering happening?	How and where are the (ordinary) practices and manifestations of the values and beliefs?	How and where are individuals and organizations being exposed to new global practices?	How and where are they being enforced?	How and where are decisions being made?
FINANCIAL		BUILT		DIGITAL		ECOLOGICAL	
Services	Money	Infrastructure	Products and Services	Infrastructure	Data	Fauna and Flora	Life support systems
What are the structures allowing for credits and loans?	What is the institutional structure defining value?	What is the infrastructure available and its condition?	What are the portfolio of offerings supporting activities?	What are digital infrastructures available?	What are the mechanisms for data collection?	What is the composition of species?	What is the composition and functions of energy, blue and green infrastructures?
How and where are financial services being provided?	How and where money in flowing considering the incomes and expenditures?	How and where are infrastructures being used?	How and where products and services are being produced and consumed?	How and where are infrastructures being used?	How and where data is stored?	How are species growth rates affected by various activities?	How and where are nutrients and components being extracted and regenerated?

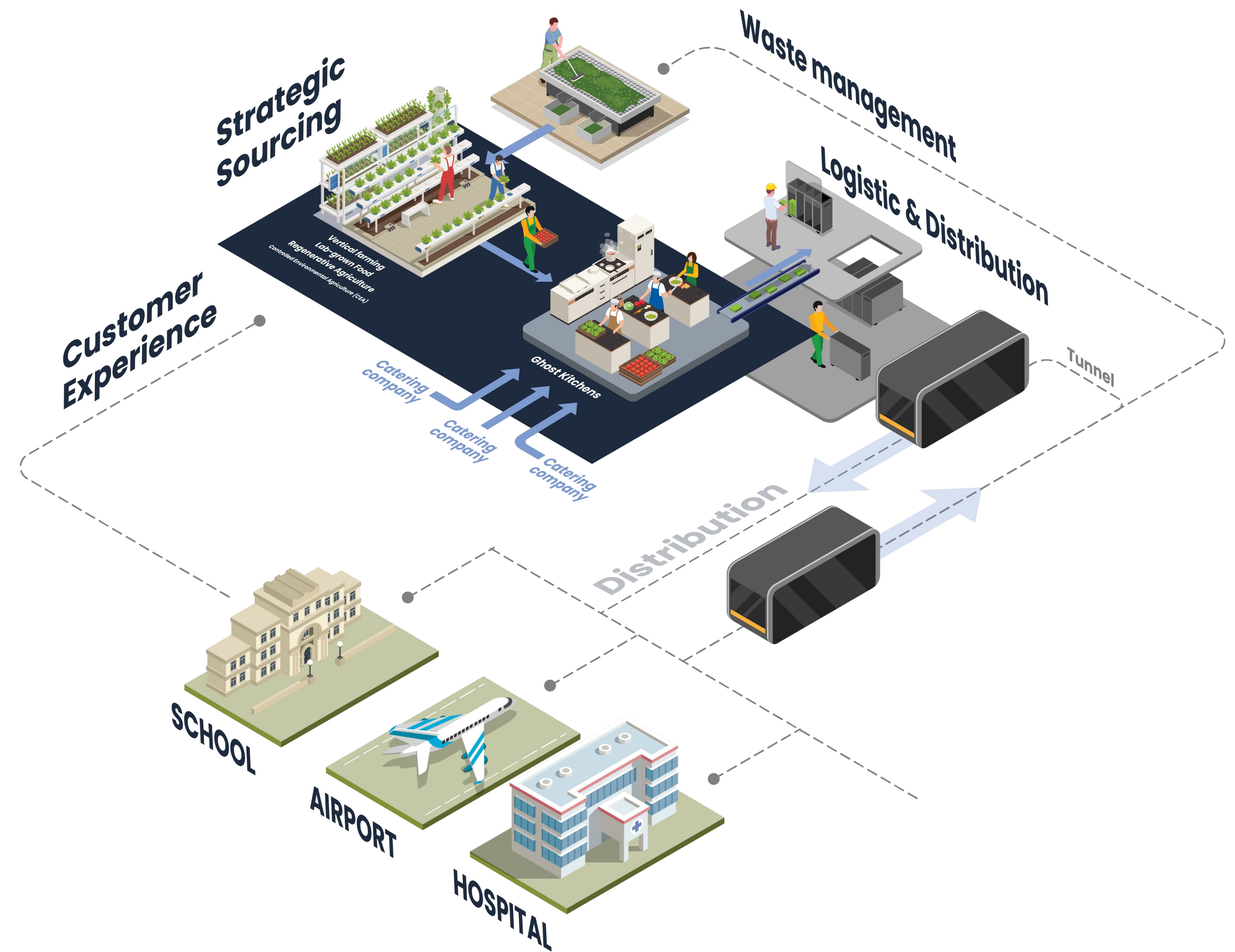


SUMMARY

Re-Imagining the inflight meal experience solves for one industry interfacing with the entire food system; But it has potential to solve for several industries as well

How we have designed this system is predominantly based on the in-flight meal experience. However, a system such as this can be modular in so many ways. It is possible to reimagine this entire system and model it for hospitals, schools and other larger institutional agents.

This system takes into account sustainable practices in food sourcing and waste disposal (among others), while centring the experiences of users and empowering local ecologies in the process



PROJECT PARTNER

The Invert

Returning the core values that drives the Southeast Side of Chicago - a community of strength, resilience, and determination

The Invert Chicago project is a pioneering real estate development aiming to create a 6 million square feet underground industrial complex on a 140-acre site on Chicago's southeast side. This site, previously contaminated by the steel industry, will feature two subsurface levels for various uses including vertical farming, cloud computing, and green manufacturing. The project is designed for energy efficiency, with an estimated 75% reduction in energy use compared to traditional surface facilities. It also plans to utilize solar energy for net zero energy use, and the surface will be covered with vegetation.

This innovative development is not just an industrial project but also a community-centric initiative. It involves substantial community engagement, with over 3,000 stakeholders and 100 organizations consulted. The Invert Chicago is expected to generate over 650 annual trade construction jobs and more than 3,000 permanent jobs in the region, contributing significantly to the local economy. Its environmental sustainability and community-focused approach make it a noteworthy development in urban industrial projects.



COLLABORATORS

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Ric Edinburg
US President, The Evolved Group

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Capital Designer and Partner, Fuse Strategy

Karl Mendonca
Design Research & Strategy, Google

Matt Shapiro
Professor of Political Science, Illinois Institute of Technology

Panelists

Nick Paredes
Executive Director User Experience, JP Morgan Chase & Co.

Sharlene King
Innovation Executive, Salesforce

Isaac Yun
VP of Design, The Invert Chicago

TEAM

TEAM



Benedicta Gokah
Master of Design + MBA 2024

Benedicta has a background in Design Research prior to graduate school at the Institute of Design - working at the nexus of multiple systems in multiple industries including agriculture, insurance and EV Technology. With a masters degree in design & an MBA, Benedicta is looking to work more in industry, helping develop sustainable investable infrastructure

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After earning a BS in Interior Design, she worked for two years in the field before joining her family's software development business. There, she found her passion for UI/UX design, blending creativity with user-centric principles. She's currently pursuing a graduate degree to deepen my expertise in human-centered design and HCI, and how these extend into business applications.

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Jiwon Shin
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Jiwon is a Design Strategist currently pursuing an M.Des at the IIT Institute of Design, brings 7 years of professional experience specializing in human-centered research and strategy development. Jiwon firmly believes that integrating customer, user, technology, and business insights is crucial for successful innovation.

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Nafisa Shams
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Nafisa earned a BFA in Visual Communication and worked as a graphic designer before joining the Institute of Design for her M.Des degree. This created a deep multi-faceted and versatile skillset, allowing her to continue working to be a strong systems-minded thinker and pursuer of continuously learning all things design.

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GUIDANCE

GUIDANCE



Carlos Teixeira

Charles L. Owen Professor of Systems Design, PhD Program Director

Carlos Teixeira is the leading instructor of Organizational Models for Innovation at the Institute of Design (ID), where he focuses on Systems Design and teaches graduate courses on the strategic use of design capabilities in complex spaces of innovation. Carlos advises global leaders on how to build the know-how to innovate through design capabilities and strategies, and has received multiple awards worldwide for his work and contribution to innovations and the design field as a whole, in both academia and industry.

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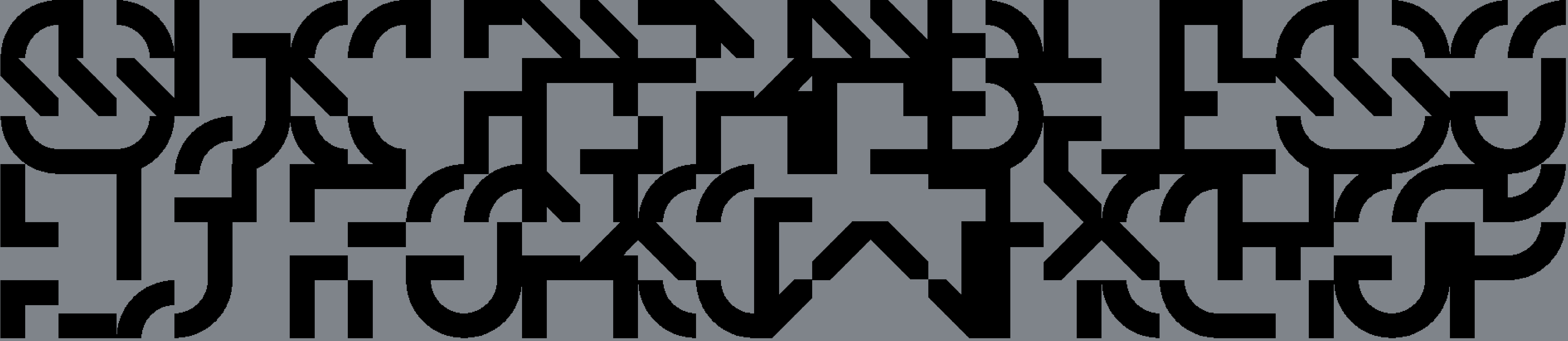


Deaa Bataineh

PhD Researcher at IIT Institute of Design

A design expert, blends academia with practical design consultancy. He co-founded the design program of Jordan University. His expertise spans strategic choice-making in energy, mobility, health, and food sectors. Engaging as an advisor contributed to design consultations and tech startups in MENA. His work focuses on the transformation of public infrastructures into private platforms and vice versa, focusing on sustainable, equitable, and intelligent design outcomes like EV charging and cashless payments.

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**Reimagining the In-flight Meal Experience
for Sustainable Cities**

**SUSTAINABLE SOLUTIONS
WORKSHOP**

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Report 2024

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OF DESIGN**