

Poverty-stricken children's obesity

The Poorer, The Sicker

Group member:

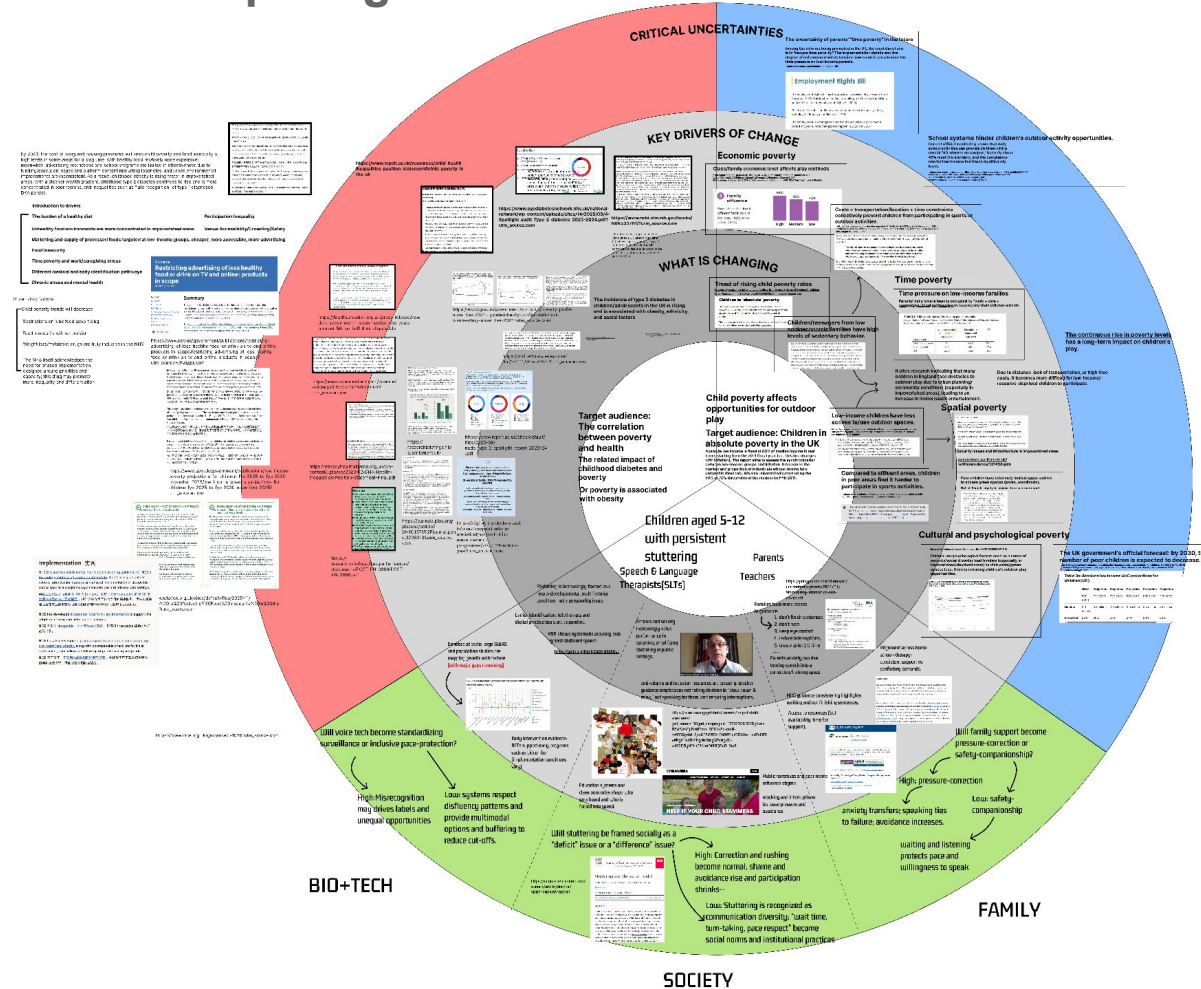
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research & concept co-creation; interaction & animation; 3D modeling; written summary
Research & concept co-creation; project video production & editing; final presentation
Research & concept co-creation; prototype production lead; 3D printing
Research & concept co-creation; Arduino development; prototype fabrication

Causal Loop Diagram

THEME 7: CHILD POVERTY



Direction 1

Poverty-stricken children's obesity

Direction 2

Child poverty affects opportunities for outdoor play

Direction 3

Children with persistent stuttering

Topic selection

The Poorer, The Sicker (Active Divide + Health Divide)

What does this world look like?

There is a shortage of activity venues, poor maintenance and insecurity;

The public budget is shrinking;

Paid sports/clubs are becoming more expensive; transportation and equipment costs have become barriers.

The NHS services are more fragmented, and digital barriers have kept some families out.

The food environment is "cheaper but less healthy", and advertising and platform recommendations exacerbate poor diets.

A Child's Day

After school, the child spends a lot of time sitting at home or in the neighborhood. The outdoor space is unsafe.

There is no money for activity fees at home, and there is no time to pick up and drop off the child.

Parents have no economic or time costs to provide healthy and stable meals for the child.

When health risks occur, the family is required to "self-manage", but there is a lack of resources and continuous support.

Result

The gap in childhood obesity has further widened; type 2 diabetes in teenagers is occurring earlier and more frequently.

The risk of chronic diseases enters adulthood earlier, and poverty is closely linked to health.

Early signals

The environment is not conducive to healthy eating and physical activity, the gap in digital health usage has widened, and T2D diagnoses are more concentrated in poverty-stricken areas.



Methodology Directory

Understanding & boundary setting

stakeholder map + Timeline

Pestle + Timeline

causal loop diagram

Problem statement, research questions, boundary

System modelling

system map

logic chine mapping

Futures framing & scenarios

four archetypes of the futures + pestle

Future cone

Scenario Matrix

Intervention & prototyping

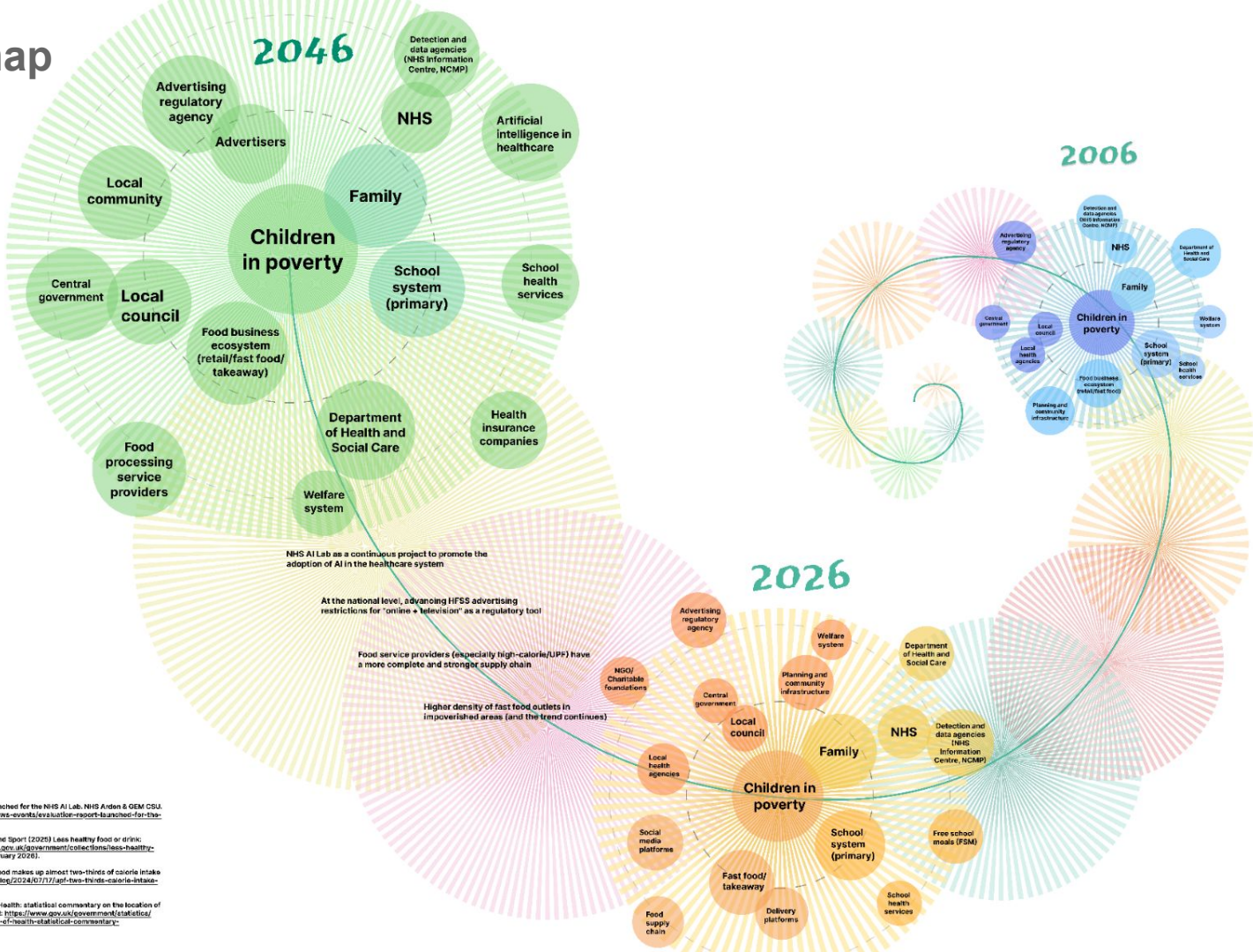
intervention opportunities

Prototyping

Prototype usage process

Service blueprint

Stakeholder map



Logic chain mapping

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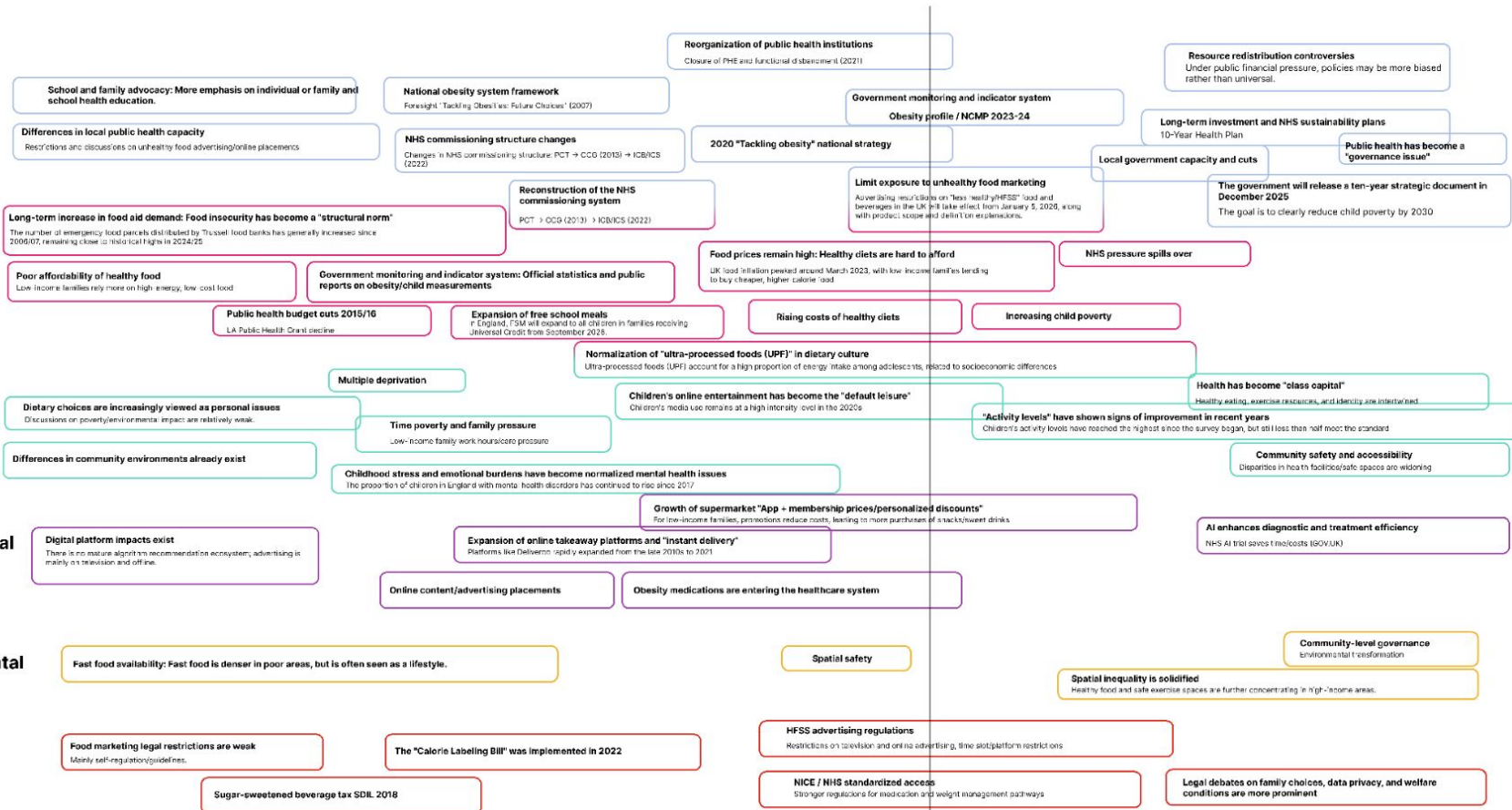
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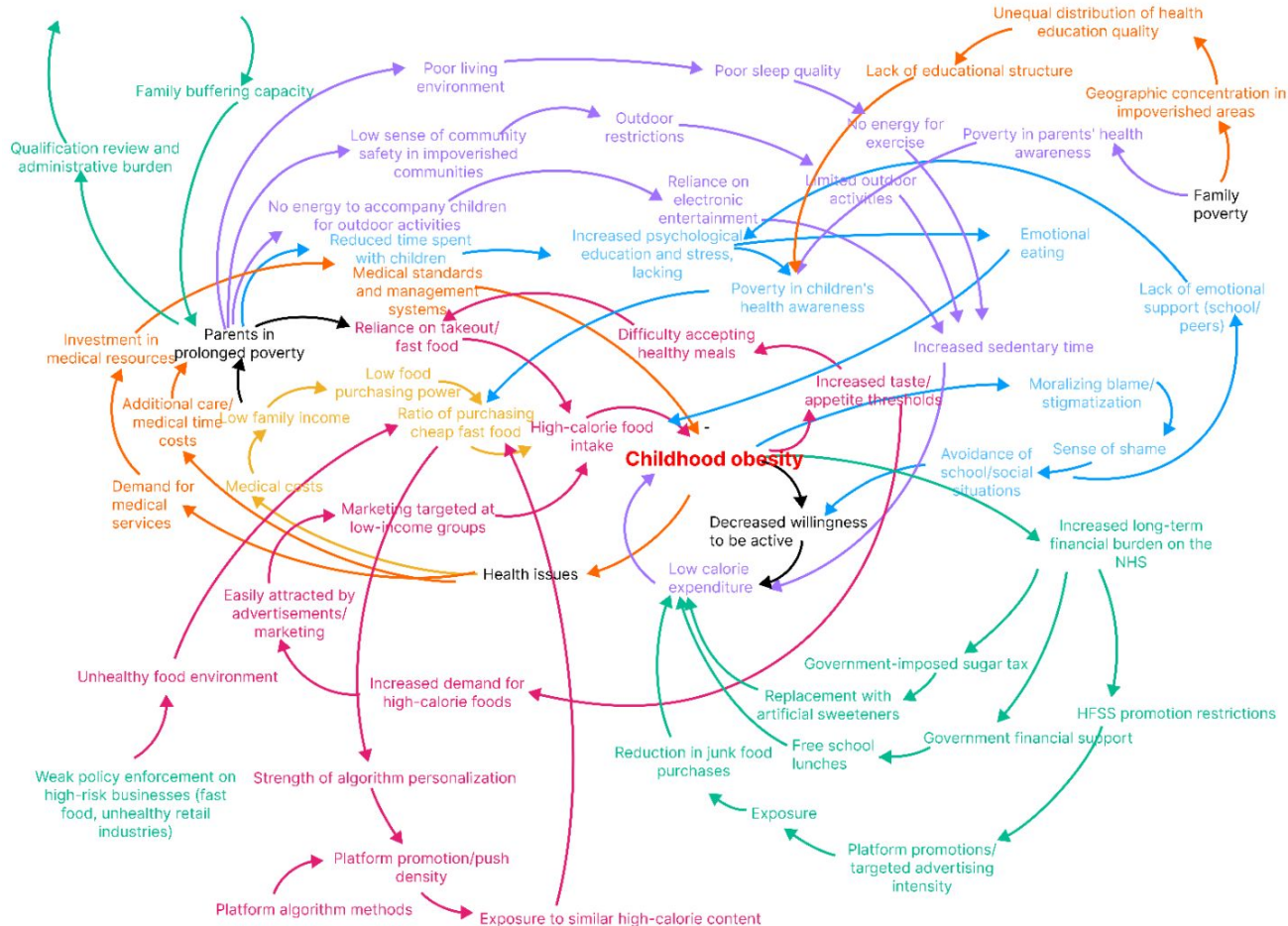
2006

2026

2046

Causal Loop Diagram

Support for actual uptake rates (FSM/programs/subsidies)



A. Economy and Resources

Household economic poverty
Cost of living pressure
Medical costs
Low purchasing power/insufficient food budget
High cost of healthy diet

B. Food Environment and Dietary Behavior

Unhealthy food environment
Advertising/promotional exposure
Reliance on takeout/fast food
Platform algorithm reinforcement
Unsafe/poor living conditions
Lack of outdoor activities
Sedentary time/screen time
Family environment

D. Psychological and Social

Child psychological stress
Moral responsibilities/stigmatization
Breakdown of emotional support chains

E. Medical and Public Services

Health issues
Medical resources and management
School education

F. Policies and Interventions

Regional financial burden
Community/school subsidy programs
Tax management of related enterprises
HFSS advertising/promotion restriction enforcement intensity

Problem statement

We aimed to explore the preferable future for obesity in poor children aged 6 to 12 in low-income neighbourhoods in England in 2046. Childhood obesity in the UK is largely a structural consequence of poverty: economic pressures and time poverty in low-income families make healthy eating more costly and unsustainable, and cheap, easily accessible takeaways and fast food become the default choice, further entrenching unhealthy eating environments. Existing interventions are mostly policy interventions. Existing interventions are often limited to policy interventions, which fail to change default environments and structural constraints, resulting in poor children being placed on an earlier trajectory of chronic obesity and exacerbating health inequalities.

Research questions

How can we interrupt the intake of high-calorie foods among impoverished children in the UK—obesity—family poverty—unable to afford healthy options—without adding time or economic burden?^x

How dependent is children's healthy diet on the dietary environment, and how should this prototype be adjusted to correct children's perception of healthy eating without increasing the burden?

What situations are most likely to trigger high-calorie intake in impoverished children? In these high-risk situations, what kind of interventions can most effectively change children's behavior patterns?

Boundary

Populations: UK poor children aged 6 to 12, their households and caregivers

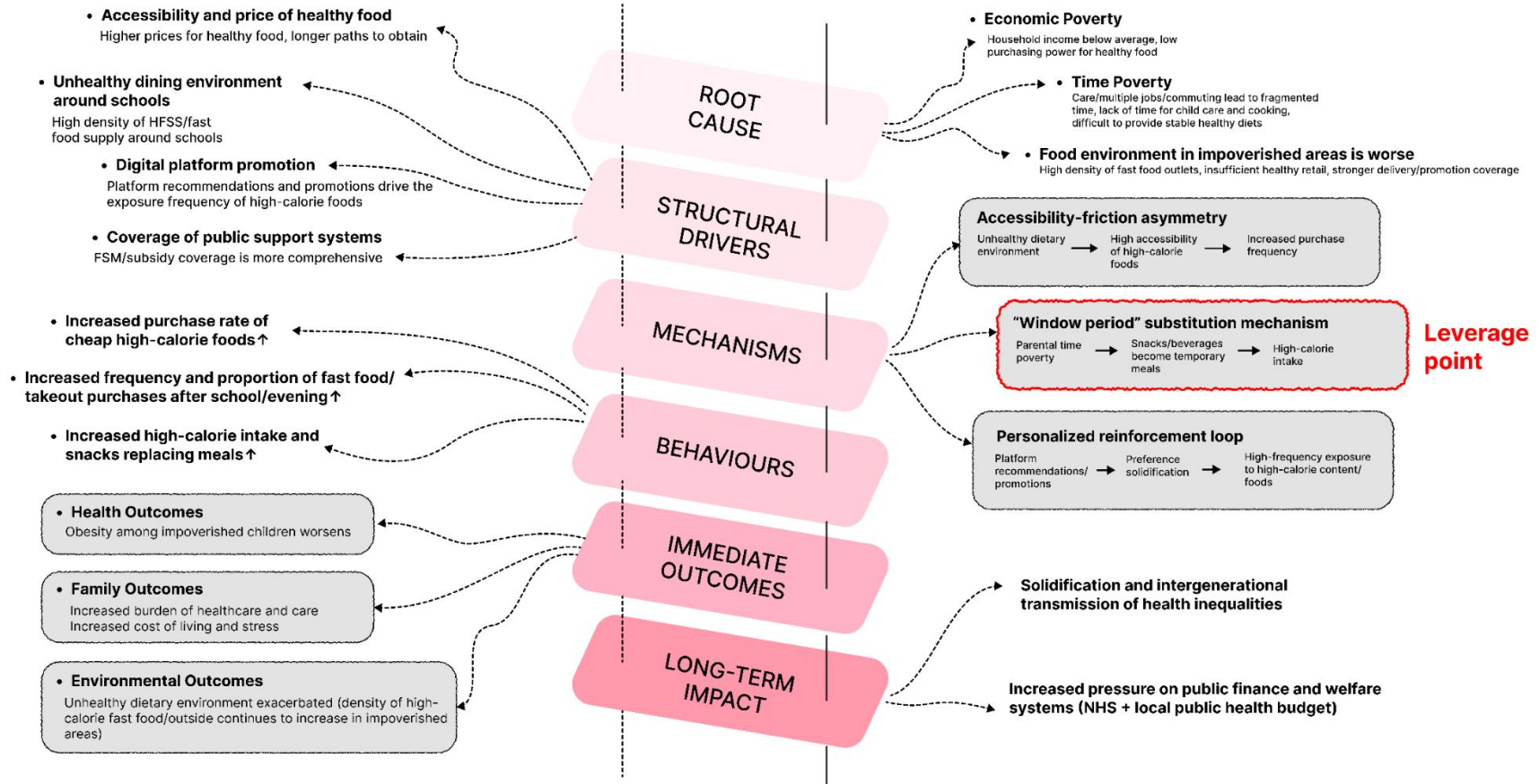
Geographic boundary: UK neighbourhood scale, with focusing on low-income communities

Summarize the key loops and entry points, and place these key variables back into the system to create a system structure and determine the core direction of focus.



Logic chain mapping

Carry out more in-depth research and exploration in the determined direction, and identify the leverage point.



four archetypes of the futures

Analyze the variable factors in the preliminary research to be used for constructing the future scenarios that follow.

	P olitical	E conomic	S ocial	T echnological	E nvironmental	L egal
 GROWTH	Disparities in local public health capacity continue to widen NHS commissioned structure progresses slowly Government monitoring and indicator systems Reorganization of public health institutions Policies and trials continue to emerge	Healthy eating is hard to afford Cost of living pressure is greater for low-income families Healthy eating costs are higher Child poverty situation becomes more severe	Time poverty and caregiving pressure in low-income families become normalized Children in low-income families face greater childhood life pressures Online entertainment for children becomes the "default leisure" Health becomes "class capital" UPF/snacking diets and takeout become daily habits	Expansion of online takeout platforms and "instant delivery" Online content/ad placement The future trend is not "everyone loves takeout more," but the system makes takeout a stronger default option.	Fast food availability and store density remain high in impoverished areas, solidifying spatial inequality Limited improvement in the safety and accessibility of activity spaces	HFSS, labeling, sugar tax, and other tools promote development
 COLLAPSE	Decline in public health and local governance capacity, fragmented policy execution	Public health budget cuts Market tendency towards cheap fast food/high-calorie foods	Family instability increases Children's stress, anxiety, and sleep issues lead to rising emotional eating problems	Platform algorithms promote higher-calorie default choices more strongly Platforms rely more on promotions and personalized conversions	Food environments worsen in impoverished areas (high density of fast food, weak health retail) Activity spaces and safety further restricted	Lag in platform governance and execution
 DISCIPLINE	Advocacy led by schools and families: more emphasis on individual or family and school health education. National obesity system framework Long-term investment and NHS sustainability plans	NHS pressure spills over—system reconstruction Economic accessibility of healthy food choices improves, but relies on continuous regulatory oversight	Normalization of "ultra-processed foods (UPF)" in dietary culture Institutionalization of health education Stronger health norms in schools/communities	AI enhances diagnostic and treatment efficiency The default dietary environment for low-income families leads AI to make the system "better at handling consequences," but does not necessarily reduce causes. Structural issues in the NHS lead to potential stratification of beneficiaries. Platform advertising/push notifications are required to be transparent and auditable	Community-level governance Food environments become more "managable," but the speed of improvement depends on enforcement strength	HFSS advertising restrictions, promotion restrictions, and labeling rules are stricter and enforced more strongly, covering online Children's data protection/minimization becomes clearer
 TRANSFORMATION	Controversies over resource redistribution Prevention becomes a long-term national project, stabilizing cross-departmental collaboration	Free school meal coverage is more widespread Welfare delivery becomes more automated	Emotional burden becomes a normalized mental health issue "Activity levels" show signs of improvement in recent years De-stigmatization and supportive health culture strengthen	Data systems and service systems become more integrated, accompanied by stronger data governance requirements	Spatial inequality solidifies	Children's data protection becomes a hard constraint, with mature audit/accountability mechanisms

Future cone

Based on the summarized variables,
develop future scenarios

• wild cards

Possible

Plausible

Probable

Preferable

AI healthcare enters large-scale deployment at the grassroots level

Local government financial crises/
restructuring lead to a sharp decline in
public health capacity

Breakthroughs in ultra-low-cost food
processing/preservation technology

Takeout platform algorithms are
mandated to undergo public audits

Local planning suddenly shifts: commercial
space around schools is redrawn

HFSS promotions/pricing rules upgraded
to hard standards

The normalization of cost of living
pressure: food prices/living costs
remain high for a long time, family
purchasing power declines, cheap
high-calorie options become the
default choice, affordability of
healthy diets continues to worsen

The "affordable healthy
choices" for impoverished
families cannot improve in
sync with the regulation of
the digital environment

Regulatory provisions are rapidly
intensified, enforcement and audit
frequency increase
But due to budget constraints, there is no
significant improvement in family
purchasing power and service supply

Platform targeted advertising,
push recommendations
establish hard constraints on
children's exposure

Public sector is more
proactive, but local
execution/resources
are still uneven

UPF/fast food supply structure,
takeout/promotions and other
commercial drivers remain strong,
leading to slow improvement in
the food environment

Obesity/inequality becomes a
political crisis, a large number of
policies and pilot programs are
launched in the short term.

Food prices
remain high
Cost of healthy
diets rises

The gap in fast food density/
availability of healthy food in
impoverished areas remains
unchanged

Governance capacity
weakens, public health
investment is unstable

Childhood obesity is becoming
younger, compounded by
psychological stress, lack of sleep,
and lack of exercise, health
inequality significantly expands

Platforms and commercial
promotions are stronger, the
availability of fast food/UPF
and the "convenience"
advantage further expand

Online content/ad placement
is strengthened (default
choices are being pushed)

Government governance capacity
strengthens, HFSS marketing restrictions
become more effective and systematic

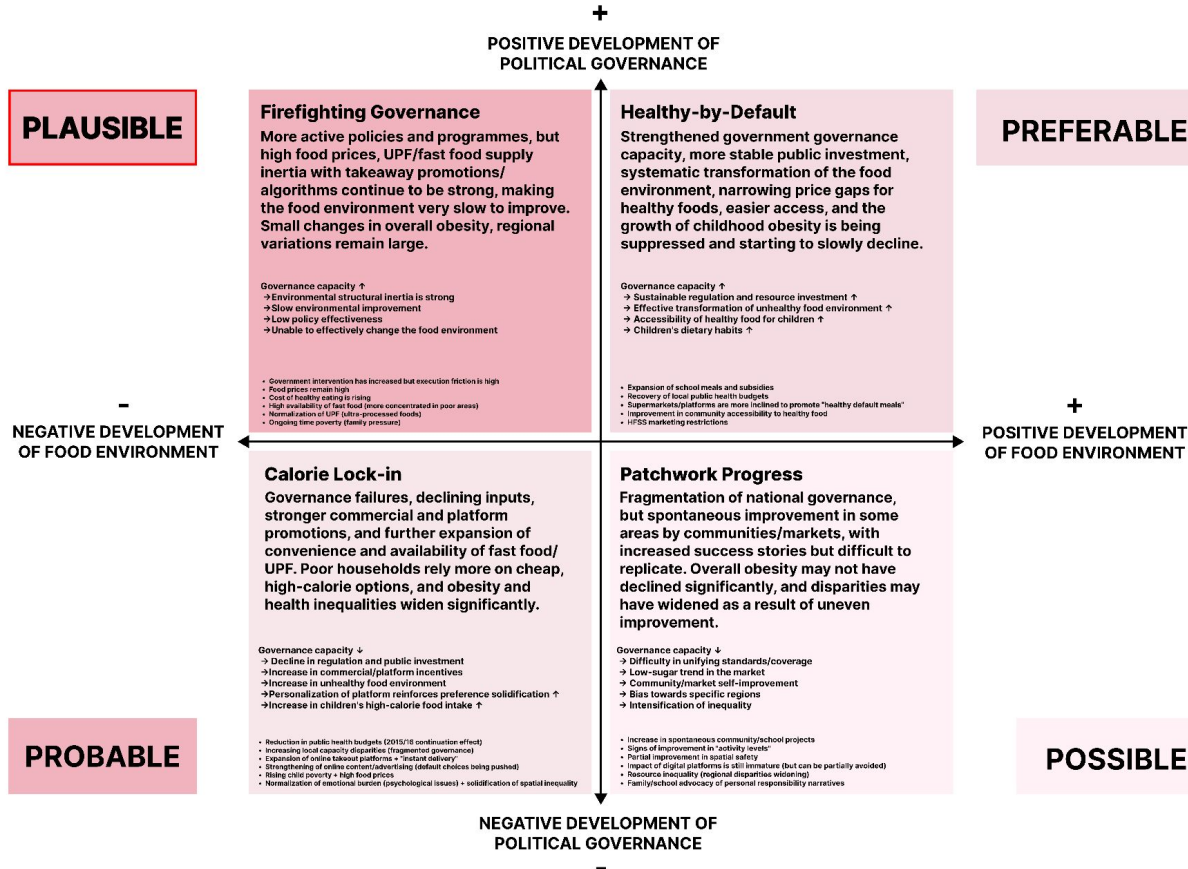
Public investment is more stable: local
public health budget rebounds, health
supply and support at the community
level are more stable

School meals and subsidy expansion; can
more effectively cover a larger range of
impoverished children

Local public health
budget rebounds

Scenario matrix

In "Four Archetypes of Futures", the key variables identified two axes and converged future scenarios from the future cone. Determine the design scenario to be a plausible future.



Intervention opportunities

In the foreseeable future, where ‘policy is more active but structural inertia is strong, and commercial and platform dynamics are still strong’, it is difficult to change the UPF/fast food/takeaway supply structure quickly through education or piecemeal policy alone. A more promising intervention would be to rewrite the ‘defaults’ under conditions of poverty and time scarcity:

Short-term: reduce friction of healthy choices in critical contexts, increase stable availability, and reduce automation of high-calorie choices;

Longer term: improve identification and public discussion of commercial/algorithmic mechanisms of induction, so that children's perceptions of healthy eating are more correct.

Opportunity A | Making “healthy eating” a viable option in poverty and time poverty (Short-term)

Mechanisms for change: Reduce the cost of action for healthy eating → Make “saving money and effort” no longer point to fast food/takeaways but to healthy and filling options. Æ to make “saving money and effort” no longer only point to fast food/takeaways, but to healthy and filling options.

Opportunity B: Immediate substitution and contextual support at “school/after school” (Short-term)

Mechanism of change: intervene in the “window of substitution” of children's hunger/stress/impulse buying → reduce the frequency of snacks/beverages as a substitute for meals. Reduce the frequency and intensity of snack/beverage substitution for meals

Opportunity C | Weaken the reinforcing circuits of platform promotions/algorithms that solidify preferences (Short-term + Long-term)

Mechanisms of change: make platform promotions and personalised recommendations offsettable/more controllable → Reduce exposure to high-calorie and impulse purchases, and interrupt platform algorithms' exposure to high-calorie items for poor families.

Opportunity D | Health Awareness Education for Children in Poverty to Transform Dietary Choices (Long-term)

Mechanism of change: Transform “health” from an abstract lecture to an understandable healthy eating education for children Æ Re-establish children's awareness of healthy eating through positive feedback and reduce the impact of shame/moralisation on children's psychology. Æ Rebuilding children's perceptions of healthy eating through positive feedback and reducing the psychological impact of shame/moralisation

Prototype sketch

Direction 1: Traditional Prototype



Prototype 1: Deal-to-Meal Newspaper

(Opportunity A + D)

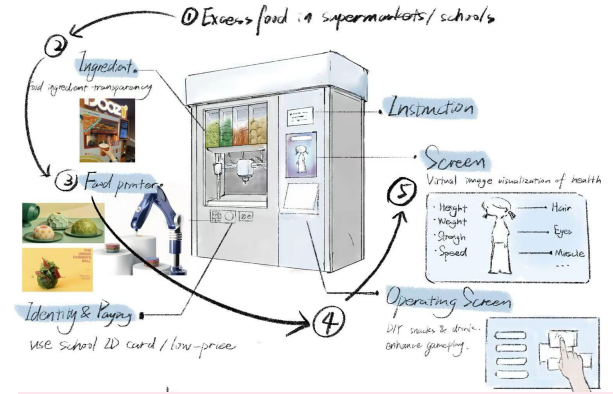
Using nano-sensors to track children's blood sugar and stress in real time, the system identifies “hunger vulnerability periods” and automatically raises a Marketing Resistance Index (MRI). During these moments, fast-food ads pushed by delivery algorithms are blocked and rewritten, repurposing the same persuasive tactics to promote government-subsidized healthy options instead—turning unhealthy marketing noise into proactive, healthy guidance through algorithmic counteraction.



Prototype 2: Dopamine Mirror

(Opportunity C + B + D)

Using nano-sensors to track children's blood sugar and stress in real time, the system identifies “hunger vulnerability periods” and automatically raises a Marketing Resistance Index (MRI). During these moments, fast-food ads pushed by delivery algorithms are blocked and rewritten, repurposing the same persuasive tactics to promote government-subsidized healthy options instead—turning unhealthy marketing noise into proactive, healthy guidance through algorithmic counteraction.



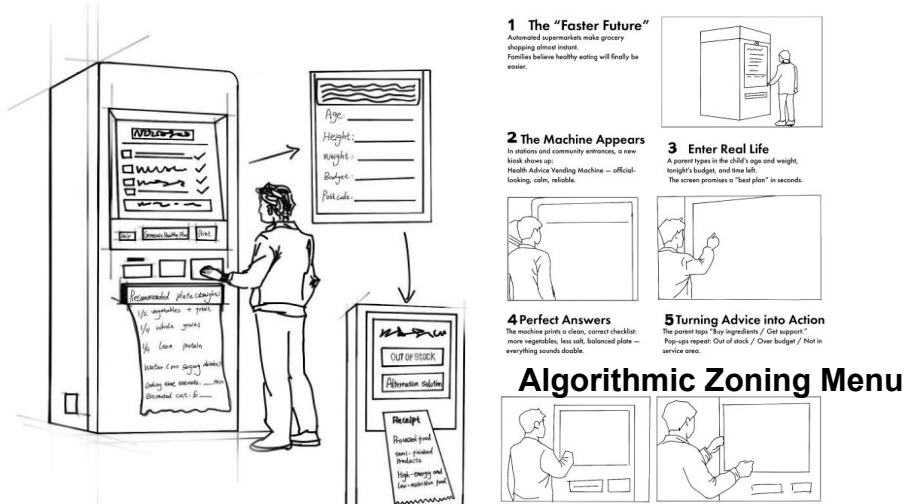
Prototype 3: Food printing vending machine

(Opportunity A + B + D)

In low-income areas where children often overconsume cheap snacks after school or late at night, we deploy a personalized food-printing device in or near schools to produce fun, filling, nutritious meals from low-cost ingredients and surplus food. Linked to each child's school ID, a virtual avatar grows with every meal received, offering positive feedback and encouraging continued participation, while a unified, privacy-friendly system delivers seamless, stigma-free subsidies and support.

Prototype sketch

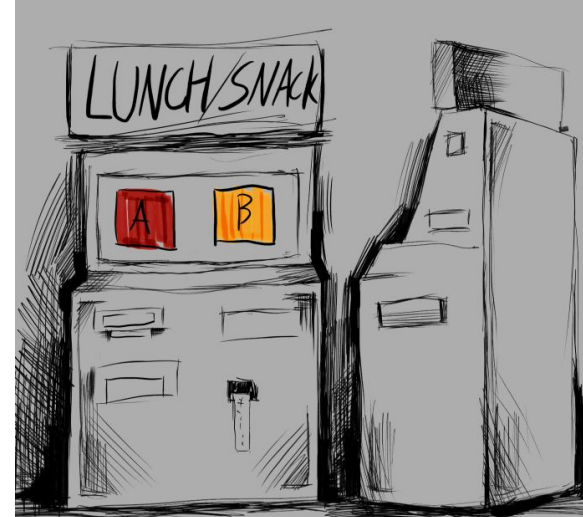
Direction 2: Speculative Prototype



Prototype 4: Health Advice Vending Machine

(Opportunity A + D)

This prototype doesn't blame children or families; it reveals how unhealthy defaults are systemically produced. By letting visitors explore contrasting postcode scenarios with different "kids' default menus" and incentives, it makes the extra friction of choosing healthier options tangible and shows why energy-dense choices can become the most rational under constraints of price, time, and visibility. Through elements like a "future receipt" and collective results wall, the installation reframes childhood obesity as a structural outcome of poverty, market forces, and information environments—not individual failure.



Prototype 5: Algorithmic Zoning Menu

(Opportunity C + D)

This prototype doesn't blame children or families; it reveals how unhealthy defaults are systemically produced. By letting visitors explore contrasting postcode scenarios with different "kids' default menus" and incentives, it makes the extra friction of choosing healthier options tangible and shows why energy-dense choices can become the most rational under constraints of price, time, and visibility. Through elements like a "future receipt" and collective results wall, the installation reframes childhood obesity as a structural outcome of poverty, market forces, and information environments—not individual failure.

Prototype concept

In poverty-stricken areas, excessive calorie intake among children often occurs after school/late at night: In an unhealthy diet environment, children resort to cheap snacks instead of regular meals due to hunger or emotional eating.

We have deployed a personalized food printing/forming device in/near the school. Using low-cost filling bases and healthy ingredients, we create "fun yet highly filling" alternative meals. We also incorporate leftover food from TGTG into the recycling supply to reduce costs and alleviate welfare pressure. Each child is assigned a virtual avatar through their school ID: every time they receive something, the avatar grows, providing immediate positive feedback and enhancing continuous participation. At the same time, through a unified interface and backend support, it achieves seamless subsidies, privacy-friendly, and stigma-free public services.



Prototype concept

why it is probable in future cone

- Circular supply chains will normalize surplus food as a standard input
- Healthy choices will be designed as the cheaper, easier default
- Welfare delivery will trend toward less stigma and more automation
- Targeting the after-school risk window aligns with public-service logic
- Low-maintenance, replicable, cost-controlled formats scale best

key stakeholders

- Poor children, schools, supermarkets/retailers
- Government/education bureau/public health department
- Community partners/NGOs/food banks

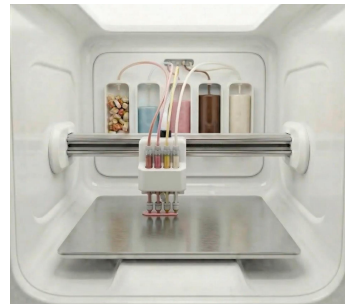
The strengthened loop formed by this prototype

- (+) Convenience of obtaining healthy food ↑ / Transaction costs ↓
- (+) Children's intake of healthy and stable food ↑
- (-) Intake of high-calorie foods ↓
- (-) Childhood obesity ↓
- (-) Health problems ↓
- (-) Living costs ↓
- (+) Family disposable resources ↑
- (+) Food purchasing power ↑
- (+) Children's intake of healthy and stable food ↑

Prototype components

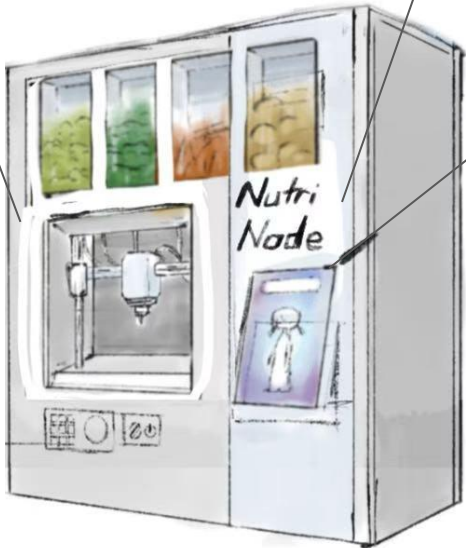
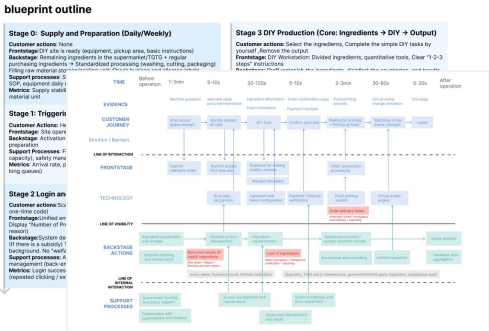
3D food printer

Print DIY food using healthy ingredients

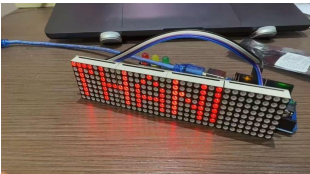


Service Blueprint

The process of using and managing machines



viewing screen (Arduino)



Interactive screen

Making healthy food by oneself and receiving positive feedback leads to the formation of a healthy mindset.



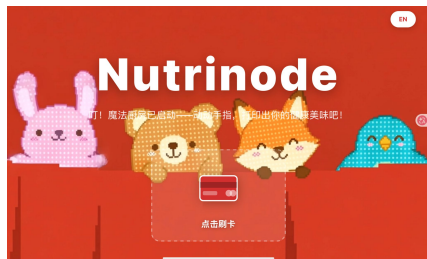
Prototype shell

The shape and basic functions of the machine

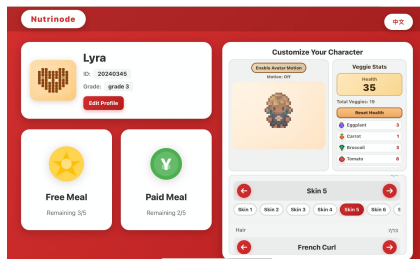


Prototype Usage process

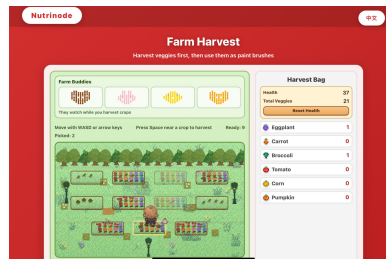
Step 1: Log in using the student card



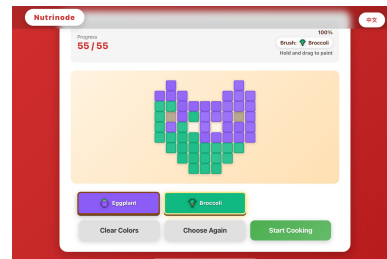
Step 2: Display personal information and animated images



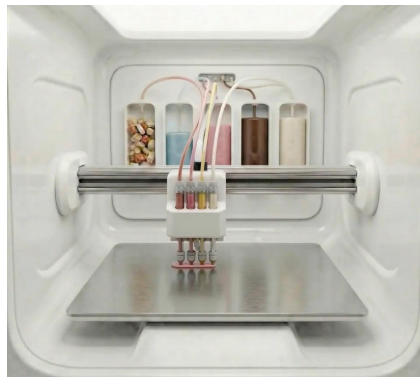
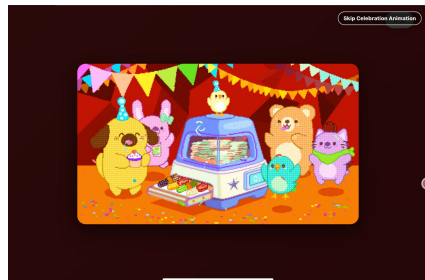
Step 3: Choose healthy ingredients by "collecting vegetables"



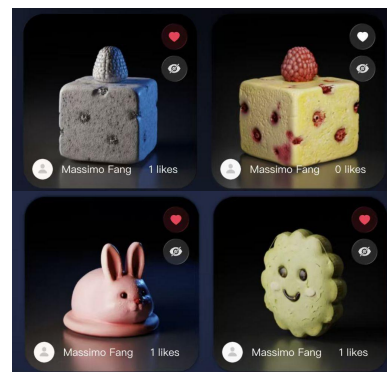
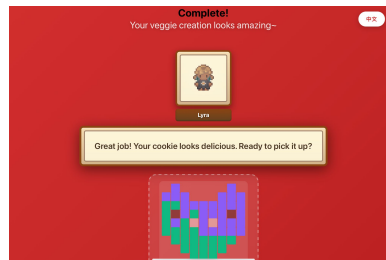
Step 4: DIY personalized healthy food



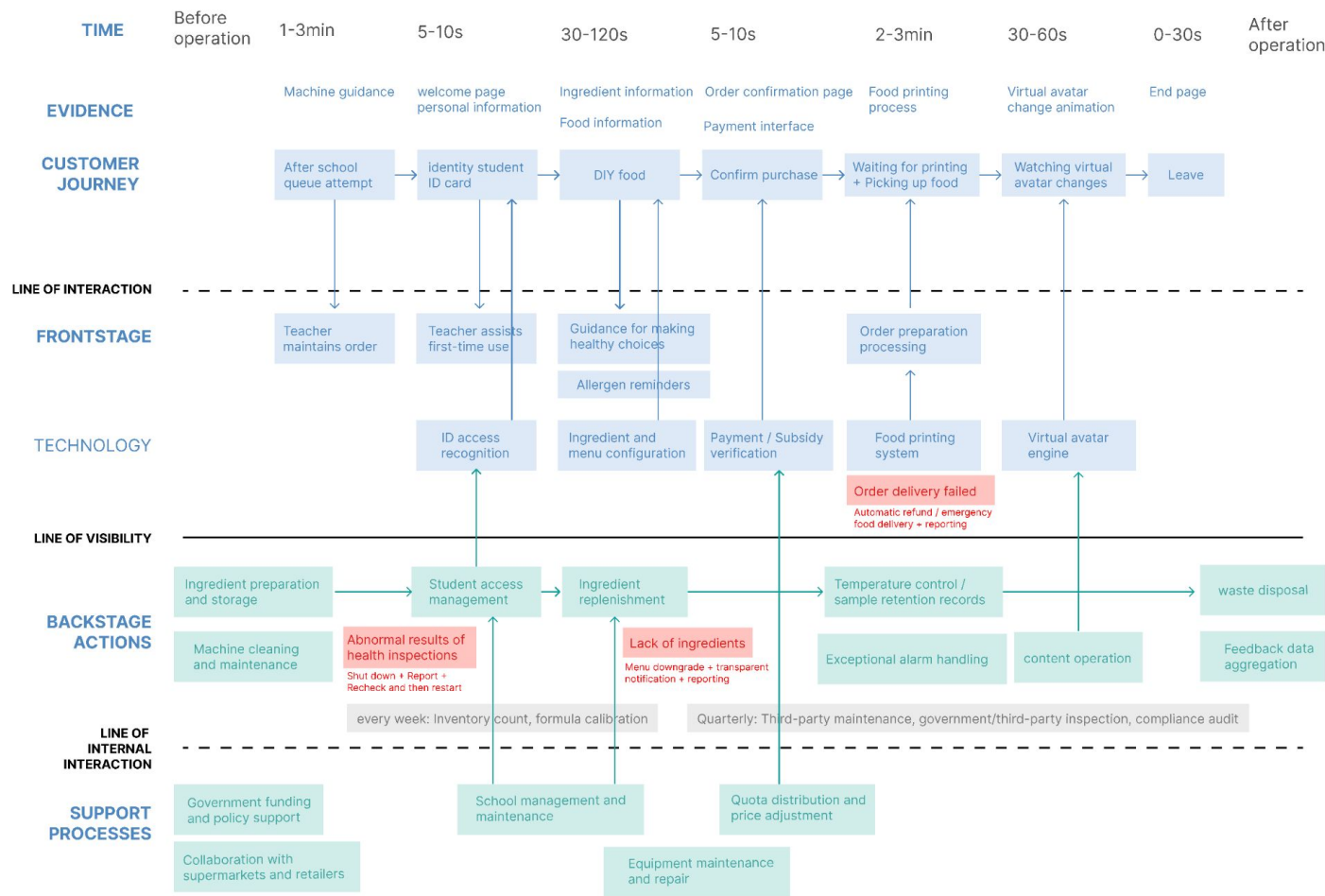
Step 5: Waiting for 3D Printing of Food



Step 6: Printing completed. Collect the food.



Service blueprint



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