The Creativity of Everyday Products: A Systemic Design Approach

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ABSTRACT

Purpose – This paper presents a design approach based on holistic diagnosis and the formulation of alternative scenarios. The refrigerator serves as a case study to address some critical points and potentialities highlighted by the preliminary analysis.

Design/methodology/approach – It combines various ethnographic methods (fridge studies, fridge stories, shop-along, at-home visits and interviews, food mapping and diaries studies) to the Systemic Design approach and Alternative Nows for investigating alternative scenarios.

Originality/value – How can creativity in redesigning consolidated objects such as refrigerators be increased? How can we change our perspective and approach to allow us to see things in different ways? The paper shows in detail the design process that leads to four speculative scenarios, namely the distributed refrigerator, the inside/outside refrigerator, the social refrigerator, and the locked refrigerator, dealing with how the initial critical issues were addressed.

Keywords: Systemic Design, Alternative Nows, Scenario, Refrigerator, Creativity

1 Introduction

The refrigerator represents an object that remained almost unchanged over time, in which creativity has stopped, as it were. Therefore, the refrigerator – of which everyone has her/his own mental projection – in this paper is considered as one of the solutions given long ago to the need to preserve food from spoilage. Since its final design was released, there have been no significant changes except in size and technologies since the concept has remained unchanged.

Creativity in the future could be natural and digital at the same time. We cannot deny years of technological advances and must not negate the need to reconnect to the natural world. Hence the potential for creativity on edge. It is already happening with the growing interest in the concept of the digital circular economy (Okorie *et al.*, 2018; Bressanelli *et al.*, 2022), which symbolises the dualism and paradox of 'sustainable and digital', 'natural and digital', no longer in conflict with each other. We could define it as a technology at the sustainability service and a new way of seeing and directing technological evolution. Hence the idea that these two natures can coexist within actual products in which the need to optimise the impacts of resource consumption is a relevant topic.

This paper takes the refrigerator as a case study, as a trivial and energy-intensive object we live with, and considers its strong relationship with the problem of food waste (Salonen, 2022; Waitt & Phillips, 2016) and social/environmental dynamics related to its use in a holistic perspective.

1.1 The refrigerator in the current scenario:

From early civilisations to the present time, the need for preserving space with a lower temperature than the environment in relation to the handling and preservation of food has been and will continue to be a fundamental part of life (Belman-Flores *et al.*, 2019), fitting within a web of habits, conditions, and behaviours. However, this was not always the case. Less than a hundred years ago, in 1949, only 10% of German households owned a refrigerator (Liebherr, 2022), and nowadays, some people voluntarily do not

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own a fridge. Technology was once considered superfluous in China until contemporary capitalism made it a necessity. In a small Chinese rural town called Jiaxiang, food processing and packaging implicitly accommodated the general lack of refrigeration in the community (Strickland, 2016).

The invention of the well-known home appliance resulted from a series of innovations by chemists, engineers, and inventors over the 18th and 19th centuries, most of whom were Americans. Over 200 years ago, iceboxes already had the same general shape and function as modern-day refrigerators (Tatum, 2022). However, the refrigerator as we know it (both form and technology) was invented around 150 years. In 1876, Carl von Linden discovered how to store chemical refrigerant efficiently, with an improved method of liquefying gas, paving the way for the widespread sale of refrigerators and their use in the 20th century (Tatum, 2022). Since then, the concept has remained relatively unchanged. Vapour compression is the most popular refrigeration in our homes, used in home refrigerators, home air conditioners and heat pumps. Other technologies can replace Vapour-compression, but they have not yet had the same diffusion either for a lower efficiency, for the costs, or because they can be considered experimental technologies with less reliability. We can list vapour absorption refrigeration, thermoelectric refrigeration, absorption refrigeration, adsorption refrigeration, magnetic refrigeration, Malone cycle refrigeration, Stirling/Pulse tube refrigeration, thermo-acoustic refrigeration, thermo-tunnelling refrigeration (Bansal, Vineyard & Abdelaziz, 2011).

Since the refrigerator is generally considered essential and instrumental in keeping food fresh and edible, it is the standard appliance in almost every home in industrialised countries (Wilson, 2016). Nowadays, Western society finds fridges to be convenient. However, we should consider that this appliance works properly only where there is a reliable energy network (in most of the World, this is not the case). Relying on it, temporary power outages decrease the reliability of a standard refrigerated system.

The refrigerator is related to several topics and issues, such as food waste, household energy consumption, social implication, and the diffusion of supermarkets (h24) which in turn modify eating habits, social implication, and work dynamics. There is a significant quantity of materials used and an environmental risk deriving from them (over a long useful life of about 14 years). Furthermore, a strong technological push wants this device to become smart, adding the scenario with the problems deriving from technology (obsolescence, to name one), connection and data. These interconnections make the refrigerator a trivial appliance in a complex context of non-trivial relationships and dynamics. Indeed, the usage phase of an appliance which works continuously and represents around 17% of the whole energy consumption in the domestic sector is a factor to be taken into consideration. Refrigerators are tested by keeping them closed in a lab environment, not even simulating the actual consumption deriving from interactions with the user in the real-use environment. Keeping this information in the design process requires systemic tools and approaches to help designers manage complexity.

2 Tools and Methods

Many ethnographic methods help designers and researchers gain a deeper awareness of user dynamics related to the refrigerator, such as fridge studies, fridge stories, shop-along, at-home visits and interviews, food mapping and diaries studies (Joosse & Marshall, 2020; Heidenstrøm & Hebrok, 2021). A Systemic Design approach eventually allows design researchers to manage this information and understand its potential and related issues by bringing it together in a complete project to modify the assumptions and propose a paradigm change. Systemic Design (DS) provides a holistic approach that could help designers keep stakeholders in the system while evaluating whether a solution could have severe consequences for someone. DS helps to manage the scale of detail, from micro to macro, always keeping in mind all the relevant aspects and the network of relationships between the stakeholders.

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2.1 Holistic Diagnosis

The first tool that systemic design makes available to us is the so-called holistic diagnosis, which allows design researchers to make value from all the insights obtained with the other methods listed, acquiring a greater awareness about the current scenario.

It allows the "analysis and visualisation of all the components that define the current scenario, considering both the surrounding context and the flow of energy and matter" to provide a holistic picture of the state-of-the-art and the advantages for change (Battistoni & Giraldo Nohra, 2017).

Based on desk and field research, this analysis identifies all the components that define the current scenario, that is, the linear model that considers the involved input and output resource flows (i.e., raw materials, finished products, consumables, waste, and by-products), and the surrounding context (e.g., local traditions and know-how) (Castiglione & Fiore, 2022).

Figure 1 shows the complexity of the scenario that revolves around the current refrigerator. It should be noted that the system boundaries have been set to include only food suppliers from which the purchase takes place and does not further investigate the food supply chain or food items. From the output perspective, boundaries include the recycling plants without further investigation. This scheme is neither comprehensive nor exhaustive, but it visualises some layers of the system, which is functional in the discussion of this paper.

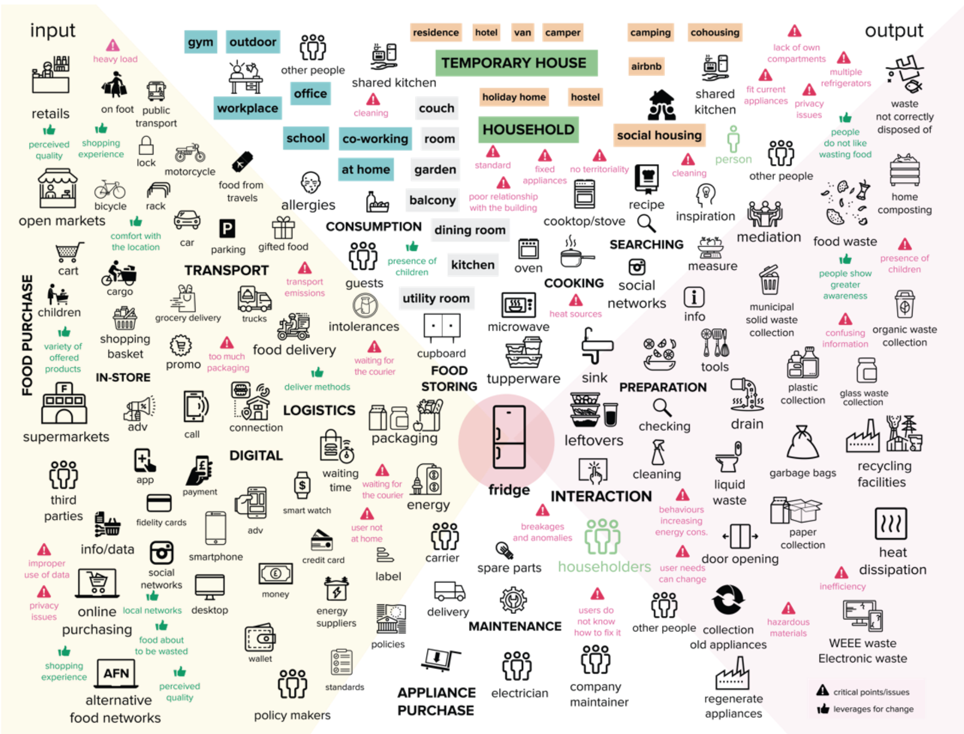

Figure 1: *Holistic diagnosis of a current fridge.*

3 Investigating upcoming futures or alternative scenarios

Since the 'refrigerator' is considered the 'solution', the commodity that Western society takes for granted for preserving food items, in this section, we record both the progress of the industrial sector, as well as case studies about alternative and low-tech solutions provided for 'conservation' in general. This approach helps to broaden the scenario on more disruptive and experimental solutions, different from those we experience daily (Fuad-Luke *et al.*, 2015).

3.1 Case Studies

Manufacturers try to bring technical innovations, and many active experiments are seeking to implement the following features in new products: adaptability of operation, temperature control, automated maintenance, flexibility in space management, customization, visibility of items, and IoT data for product design. They are often premium features in expensive premium products.

On the other hand, a series of case studies of alternative ways to carry out the general function of food preservation were studied, which led to the following considerations on three different main areas summarised as follows:

Food-related features

1. Separate food items according to their features by keeping different types of food at optimal temperatures.
2. Investigate food properties and specific needs (e.g., keep 'living food' fresh)
3. Investigate other ways of preserving food that do not need to cool (growing, drying, processing)

User-related features

4. Make food visible;
5. Change food purchase habits;

Product-related features:

6. Consider modularity and upgradeability;
7. Use natural and low-impact materials to perform some functions (e.g. use naturally insular materials);
8. Consider built-in solutions;
9. Establish a symbiotic relationship with other objects, components, and systems inside the kitchen, utilising energy, waste, water and other natural resources;
10. Using cold air instead of refrigerants. Consider alternative technologies or low-tech solutions to decrease the temperature;
11. Exploit side effects such as heat dissipation from evaporative cooling.

4 Alternative Nows

There are various methods for starting a critical reflection on the functions and future of projects: value scenarios, speculative futures (Sanders & Stappers, 2014), alternative nows, design noir, alternative scenarios, future scenarios or alternative futures (Angheloiu, 2017; Voros, 2003). We decided to adopt the Alternative Nows approach proposed by Dunne and Raby (2007), according to which: "We're not interested in futures, as in technical futures or scientific futures or technological futures, but more in alternative nows: how things could be right now if we had different values". The same approach can also be found in Amber Hickey's work 'A Guide for Alternative Nows' (2012) as a search for "ways for devising more socially, economically and ecologically just version of now."

In shaping these scenarios, I am also referring to John Maeda's Laws of Simplicity (Dunne & Raby, 2007), specifically:

- "A complex system of many functions can be simplified by carefully grouping related functions."
- "A material's failure to comply with a specific application provides indication that its more natural usage lies elsewhere."
- "The more care, attention, and effort applied to that which is less, the more it shall be perceived as more than it really is."
- "The more you know about something beforehand, the simpler it will ultimately be perceived."

- The laws of simplicity in navigating complex systems provide an interesting contrast leading us to face that the system's complexity does not go hand in hand with a complicated design.

4.1 Proposed Scenarios

Starting from these characteristics in Fig. 1, together with the participants of a workshop held in Brighton during the RSD11 pre-conference workshops in 2022, we underlined some aspects to improve (red triangles) and some positive things (thumb up) to emphasise. By grouping these points in four scenarios (Figure 2), we covered four areas of both critical and positive aspects, decentralised from the refrigerator object.

4.1.1 Distributed Refrigerator

It is scattered throughout the housing unit in modules capable of performing different functions in a diversified way. This scenario contrasts with the concept of a refrigerator cabinet, a big box in that we could aggressively throw our products. On the contrary, it aims to provide better visibility, handling, and differentiation of food items based on their characteristics (organoleptic, biological, physical and chemical) and the real needs of the users. The scenario assumes that a lower standardisation and rigidity of the existing architecture of the building could be possible. At present, indeed, the kitchen environment is rather fixed, made up of 60x60cm modules and non-existent configuration flexibility. It also starts from the assumption that products with the exact same characteristics should not be delivered to all parts of the Globe. It assumes that territoriality could be valued again and the culture and tradition of the places rediscovered when no longer handed down. These local material values could be part of the domestic environment in some way without standardising us as citizens of the World. The second prerequisite is a change of mentality, not to do the same things differently but to change habits in favour of more sustainable ones. Users may purchase their food on local alternative food networks (AFNs) and open markets rather than relying on large-scale distribution for the quantity, variety and quality of foodstuffs and frequency of provisioning. A smaller but more frequent purchase is preferred compared to the big weekly shopping. A gradual decrease in the overall quantity of items needing storage space at lower temperatures is also recommended. We can count many initiatives that collect edible food that is about to become waste if it is not given to someone. Usually, they sell products or processed products at a lower price but without infinite choice and on a strict daily supply. It consists of a configuration of units at different temperatures/humidity/light that should guarantee a rapid change of configuration and dimensions according to the real users' needs, whether the change is in the household structure or the food choices. If a household consumes more fruit and vegetables, the configuration chosen will have larger units for that purpose. The configuration will have suitable characteristics at a lower temperature for those who consume meat and dairy products. Furthermore, if the user changes his/her diet, she/he should also be able to change configurations.

4.1.2 Inside-Outside Refrigerator

Inside-outside refrigerator is part of the architecture of the building. It includes an outer side that works by evaporation with the sun and cooling in the winter. It is a model that foresees radical changes in the architecture of current households. Since the refrigerator is exposed to heat sources that interfere with its operation in most homes (Belman-Flores *et al.*, 2019), we can suggest that something is wrong with placing it randomly inside the kitchen just because it fits that space. A priori location of it in the building might work. Furthermore, the appliance could be disconnected from the energy network or at least reduce operation for a certain period of the year, taking cold air from the outside. On the other hand, the evaporative principle could also be general by exploiting the sun's high temperatures and direct rays, naturally exposing a container to the sun with a wet material and causing evaporation. This scenario must be identified in advance and made possible by implementing profound changes of paradigm and mentality that lead to re-imagine even the simplest tasks that we usually do in a certain way.

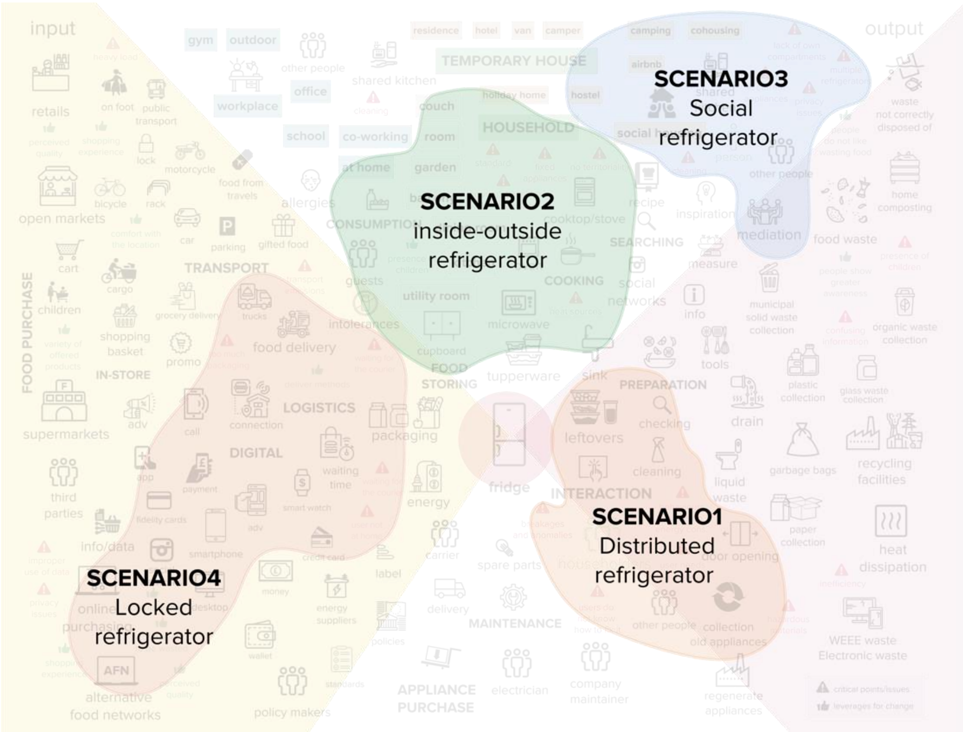

Figure 2: *Possible scenarios that cover critical issues and levers for change.*

4.1.3 Social Refrigerator

It works in those houses of roommates, social houses, and hostels. This shared refrigerator responds to a growing need for shared households, as the cost of living and the units made up of single people are increasing. People are grouped in hybrid homes made of strangers, for which the refrigerator was not designed. This recent transformation, as happens for non-resident students or people who do not want to waste money on an entire apartment or do not want to live alone – may only be for a period or a long time –brings unexpected dynamics. We want to stress that the current appliance in these circumstances is being just used randomly and creatively but not in designed ways. Since people always find their way to get the benefit they hoped for, in the best of the current scenarios, users agree on a division of the fridge by stacking all the food items on the shelf gained, carving out their own space in a standard refrigerator. At worst, each dweller equipped his/her room with his/her refrigerator with dizzying consumption. This scenario is the one that presents a more critical linear counterpart, as the shared refrigerator is challenging to manage at present. Moreover, stacking all the products on a shelf does not allow users to have their organization of groceries. Another aspect concerns cleaning tasks and the correct operation of the refrigerator because when the fridge is always fully loaded, it does not allow proper air circulation, increases consumption and does not guarantee suitable refrigeration. When more than three users share the house, often the tendency is to equip their room with a personal fridge, perhaps smaller and maybe still have a shared fridge, near the kitchen. To remedy this series of real malpractices, we can state that there is room for redesigning a device capable of providing its own organized space separate from the others. It can be structured by providing a

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shared refrigerating system and several housings/units that can be activated and deactivated to avoid unnecessary energy waste.

4.1.4 Locked Refrigerator

It is a refrigerator detached from the household where food can be safely delivered and retrieved by the user. In close correlation with the first scenario, with which it shares the differentiation of supply, this scenario presents a refrigerator detached from the house where, with the principle of the different lockers scattered around the cities, food can be deposited by AFNs and picked up by the user when needed. This way, the delivery will take place at the local point, and codes will be enough to allow deposit and withdrawal, optimising transport, logistics and waiting. The user will not feel obliged to stay home while waiting for the courier; this type of AFNs would take hold more easily if certain conditions are guaranteed. This scenario is inspired by the community fridge network Freedge, whose number increased progressively from a few units to hundreds in the United States during the pandemic (Oung, 2017), albeit with a more logistical intent.

5 Conclusions

This paper presents the refrigerator as a large-distributed appliance with correlated current implications fostering the creative reflection on possible scenarios detached from the fridge-as-a-totem. Some viable design paths are presented and discussed through a combination of systemic design and alternative nows.

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