DairyTale

Gamification as a means to raise awareness of sustainability

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Abstract

A lack of sustainability is cause for major concern in developing societies. This study explores gamification as a means to raise awareness of sustainability within the context of India. The final outcome of this study is a role-playing card game called DairyTale. DairyTale is based on the identification of industrial agriculture as one of the major unsustainable practises behind environmental degradation and organic agriculture as a sustainable alternative. The game uses organic dairy agriculture as a case study towards communicating sustainable values through gamification of sustainable practises.

Epochal analysis as understood from Raymond Williams' theory of cultural formation helps towards understanding the socio-political and economic contexts associated with dairy within Indian culture. A human-centered design research approach enabled an iterative design process. Utilizing non-linear play-based methods informed by play theory and cultural contexts, a broad range of ideas were explored to understand what play experiences could communicate sustainable values.

Through design-led research, the study arrives at the design research outcome of DairyTale. DairyTale gamifies organic dairy practise to represent sustainability in its form, and attempts to communicate sustainable values through its function of play.

This document focuses on the design and development of DairyTale

Acknowledgements

I would like to thank my family for being a source of never ending support. This project would not have been possible without you. Thank you Julieanna, Antony and Anna for being open minded and patient with me. I am fortunate to have you as my supervisors. I would also like to thank my classmates for always being there whenever I needed them. You have been a source of immense reflection, understanding and learning for me. Thank you Cami, Shari, Pip, Jorge, Matty, Tom, for always supporting me and inspiring me to do my best. Thank you to all my friends from Massey anime club and finally, thank you New Zealand!

Contents

1. Introduction

Research aim

Born and brought up in Calcutta, the former British Capital of India, I had the luxury of living in a house beside an abandoned factory. Here, nature had taken back the factory grounds, and sprung a patch of forest in its place. During my adolescence, I never really had to measure the importance of nature, considering I was always surrounded by it. This changed when I moved to Gurgaon, a small desert town on the outskirts of New Delhi, in 2001. Here, I witnessed first-hand India's economic boom create a new city of Gurgaon in less than five years. As I and many others were propelled by this economic development, I began to notice a growing trend towards the neglect of nature in favour of economic progress. As stories of India's booming economy and infrastructure filled the news, I grew increasingly disturbed by the rampant unsustainable development. When I moved to New Zealand for further studies in 2013, I couldn't help but notice a cultural trend towards sustainability in the people around me. It inspired and made me curious if I could use my skills as a communication designer to design something that could communicate sustainable values to raise awareness of sustainability within young adult emergent middle class Indians like myself – to introduce them to sustainable thinking and an understanding of why they are important (Figure 1). This MDes project is my exploration into that curiosity. My attempt to make a difference.

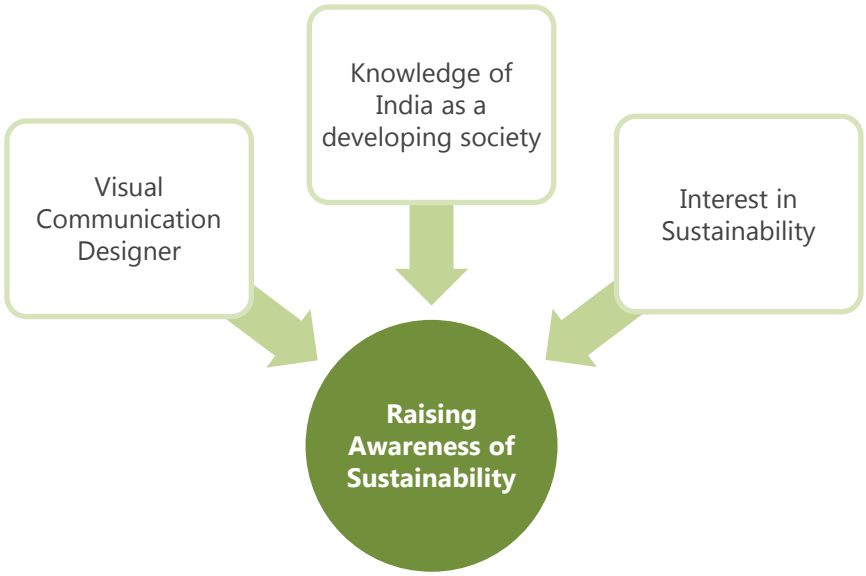


Figure 1: My role

Why raise awareness of sustainability

According to the Online Etymology Dictionary, 'sustainability' originates from the Latin sustinere to "Hold up, support, endure" (2013).

The United Nations Educational, Scientific and Cultural Organization or UNESCO, classifies sustainability as upholding biodiversity, factoring in climate change, managing disaster risk, embracing cultural diversity, reducing poverty, embracing gender equality, promoting better health, encouraging sustainable lifestyles, peace and human security, safe water and sustainable urbanisation (2013).

Unsustainable development is a major concern in India. According to report by the Government of India nearly half the land surface of the sub-continent is degraded in some way. Air pollution is increasing. Some unique species and ecosystems are threatened by development. Waste from uncontrolled urbanisation is emerging as a health issue. The Himalayan glaciers that provide water for the country are disappearing, leading to reduced crop yields and salinating aquifers around the coast, ultimately increasing the need for energy. These ongoing trends present an imperative necessity for greater sustainability in India.

According to the United Nations General Assembly (2002), education of sustainable development is essential in achieving greater sustainability. UNESCO (2013) also sees education about sustainability as a means for people to acquire the knowledge, skills, attitudes and values, necessary to shape a sustainable future.

Currently the only initiative by the Government of India towards education of sustainability has been the introduction of environmental education as part of the educational curriculum (Singh, 2013). However, sustainability is more than environmental consideration as indicated by UNESCO's view. Therefore there is a necessity for a more holistic alternative.

Organic agriculture

Habitable environments are necessary for facilitating life. The underlying driver of unsustainable environmental development is human consumption (Michaelis, 2004). One such basic consumption is food. Most food is procured through agriculture. According to the World Wide Fund for Nature, or WWF (2012), in the last 50 years, agricultural intensification through industrial means such as synthetic fertilisers, pesticides, and deforestation, have led to global disaster for the environment.

According to Encyclopaedia Britannica (2014) industrial agriculture is a form of agriculture that uses large amounts of labour and capital relative to land area. It relies on synthetic fertilisers, insecticides, fungicides, and herbicides to achieve higher agricultural output. In situations where animals are involved, battery farming is a regular practise. Animals are crowded into small areas leading to unwelcome side effects. For example, the staggering amounts of waste produced from battery farming are placed in waste lagoons. When manure is repeatedly over-applied, it runs off the land and accumulates as nutrient pollution in waterways. The result of this can be observed in Reuter's report as cited in The Huffington Post (2013), that more than 60 percent of New Zealand's rivers are polluted from fertiliser and effluent runoff caused by industrial dairying. Industrial agriculture can therefore be understood as a truly unsustainable form of agriculture.

To achieve sustainability in this field, some alternative forms of agriculture are:

Permaculture: A form of ecological design that focuses on developing a sustainable habitat, or closed eco-system that meets all the needs of its inhabitants (Mollison, Holmgren, & Barnhart, 1981). An example is the harnessing of solar energy as heat energy within greenhouses to create eco-systems independent from other technology. Incorporating practises such as crop rotation and encouragement of plant-life that can perform symbiotic functions within that closed eco-system. Sustainability in permaculture therefore focuses on minimizing wastage, human labour, and energy input.

Sustainable Agriculture: A system of plant and animal production practises with site-specific applications and long term production in mind (Gold & Gates, 2007). For example, growing crops in rotations to more efficiently utilise nitrogen in the soil and maintain a steady production. Sustainability in sustainable agriculture therefore focuses on sustaining productivity.

Organic Agriculture: The Food and Agriculture Organization of the United Nations, or FAO (2013) classifies organic agriculture as a system that emphasises the use of management practises, as opposed to synthetic materials or off-site inputs, to fulfil specific agricultural functions. For example, encouraging the proliferation of natural predators, fumigation and controlled flooding as methods of pest control. Maintaining soil integrity without synthetic fertilisers through manures, composts, crop rotation, and the preservation of natural environments. Water table integrity through water pump management. Weeding and mowing as opposed to using weedicides, herbicides and fungicides. These rules are normally enforced by a regulating body that oversees organic agriculture. In India the National Programme for Organic Production or NPOP performs this role (Apeda, 2013). Sustainability in organic agriculture therefore emphasises maintaining biodiversity, soil integrity, water table integrity, preservation of natural environments, and natural production methods as opposed to synthetic.

Summary

Permaculture, sustainable agriculture and organic agriculture each represent different concepts of sustainability. The endorsed holistic ideals of organic agriculture set it apart from closed eco-systems and sustained output practises.

What truly sets organic agriculture apart is its ability to encapsulate necessary features from permanent and sustainable agriculture within itself. For example, sustainable crop rotation can be performed in an organic manner. Closed symbiotic eco-systems like greenhouses can easily be used for organic agriculture. Furthermore, organic agriculture can incorporate other sustainable aspects within its practise. For example, use of sustainable energy sources like wind, solar and bio-gas in tandem with other sustainable practises allowing organic agriculture to extend into the sustainable aspect of climate change.

These examples demonstrate organic agriculture's ability to create subsets of sustainability within itself (Figure 2), This makes it a highly potent case study of sustainability. Such a broad scope of sustainable practises within organic agriculture make it possible to hypothesise that raising awareness of an organic agriculture, given its sustainable status could potentially help to raise awareness of sustainability.

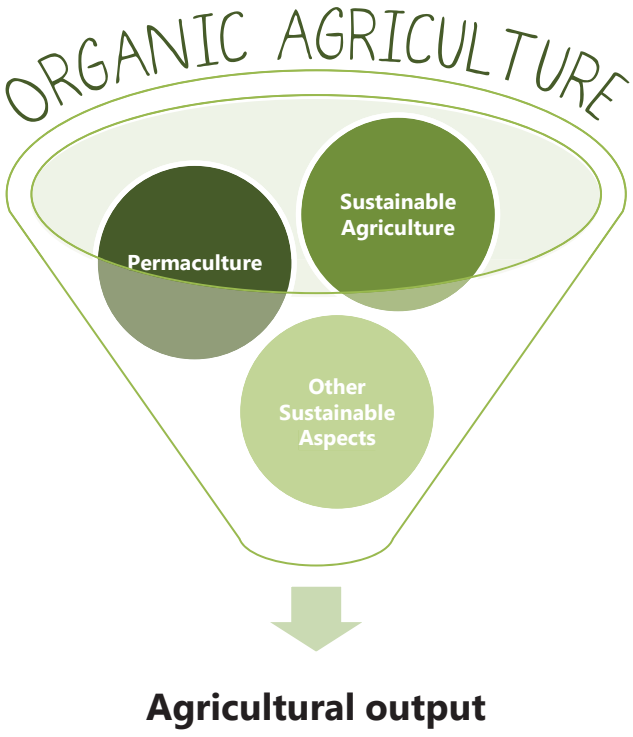


Figure 2: Subsets of sustainability

Organic dairy as a case study

Organic dairy agriculture follows the same fundamental principles as organic agriculture. However, unlike other forms of milk related organic agriculture, dairy comes from animals. This is distinctively different from organic soy or almond milk agriculture as they come from plant-life.

According to the Organic Dairy and Pastoral Group Inc. (2011), the key fundamental of organic dairying is prevention of livestock disease through maximum hygiene, maintaining animal health and keeping stress levels low for cows at all times. Pasture management is critical for a cow's health if it is to be managed without employing industrial means. This is achieved through soil and water management practises such as crop rotation and planting more than one type of grass or flower to provide a more wholesome diet to the cow (biodiversity). Unlike industrial dairying, where cows are fodder-fed indoors, cows are free to roam the pastures. Weeds are handled by weeding them out or mowing, instead of synthetic chemicals like weedicide. Organic remedies, such as apple cider vinegar or homeopathics are used in place of synthetic antibiotics. Animal manures in the form of effluent or composted manure are used as a form of natural fertiliser to renew pastures instead of synthetic fertilisers. Genetic modification and synthetic dyes in feed are banned. These regulations are enforced in India by the NPOP (2013). All effort is generally towards ensuring the safety and well-being of the livestock.

No synthetic chemicals are present in organic dairy products since none are used. For affluent, health conscious consumers, organic dairy products offer a more natural alternative.

There is considerable debate on the health benefits in relation to organic methods. However, the clear and quantifiable sustainable benefits of organic dairy agriculture over industrial dairy agriculture cannot be denied. It is a strong case study of sustainable practise.

Gamification

Gamification is a term first coined by British computer programmer Nick Pelling. Pelling coined the word while wondering whether game user-interfaces could be used to aid transactions and activities on commercial electronic devices such as in-flight video, ATM machines, vending machines, and mobile phones (Pelling, 2006). He referred to this as "applying game-like accelerated user interface design to make electronic transactions both enjoyable and fast". Michael Wu (2012), principle scientist of analytics at Lithium, defines gamification as "The use of game attributes to drive game-like player behaviour in a non-game context."

It offers a means to raise awareness of sustainability by gamification of a sustainable practise such as organic dairy agriculture.

Pelling's coining of the term may be a recent event, however in 1866 Milton Bradley, the inventor of *The Checkered Game of Life*, as cited in Chang (2012, p. 180) defined it as a 'social game'; that "The game, as here arranged, is called the 'checkered game of life,' and, in addition to the amusement and excitement of the game, it is intended to forcibly impress upon the minds of youth the great moral principles of virtue and vice." This indicates the use of gamification long before the advent of any digital technology. Salen & Zimmerman (2004, p. 16), authors of *Rules of play,* state that "The underlying properties of games and the core challenges of game design hold true regardless of the medium in which a game manifests." Thus gamification is possible without any digital media.

Game-play is a poignant way of communicating to mainstream and emergent cultures in India. For example, the gaming market in India is currently booming. According to a market report by Deloitte (2011), the Indian gaming market was poised to grow by 53% in 2012. This type of growth is only possible with the support of other emerging trends such as uptake of smartphones, tablets, consoles, computers and broadband internet. Mobile phones in particular, e.g. the uptake of smartphone ownership grew by 200% in 2012 (Anwer, 2013).

In India smart phones are considered a luxury item due to their higher pricing compared to regular mobile phones.

As previously stated, organic agriculture emphasises management practises. In other words, it is more labour intensive. This leads to higher prices for organic products compared to their conventional counterparts. Based on research from agricultural research firm Technopak (2011), consumers who are able to afford organic products in India belong to the socio-economic classification group of SEC-A. The socio-economic classification, from now to be referred to as SEC, is a measure of segmentation designed by the Market Research Society of India (MSRI). It is based on consumption of goods and services and not income (MSRI, 2011). SEC-A represents the highest consumption group. It originally consisted of only one group – A1. However in 2006 MSRI redesigned it to include a rapidly growing consumer mass as A2. In 2011 the category of A3 was further added. This signifies a rising number of high consumption groups within the economy. According to auditing firm KPMG (2012), the rise of high consumption groups in India can be attributed to India's economic development and continues to be seen with their increasing numbers in the face of global financial crisis. Economists Andrew & Peng of KPMG (2012, p. 3) state that "The people belonging to these groups are not wealthy enough to spend as much as they would like to but they are extremely conscious and sensitive about their status between the wealthy and poor". Based on this information, they can be referred to as the emergent middle class of India or EMC. They reside in English speaking metropolitan urban cities such as New Delhi, Mumbai and Gurgaon (Rathore, 2013). They demonstrate sharp contrast to the traditional middle class through their spending habits, as opposed to saving (Jodhka & Prakash, 2011). Research

from the McKinsey Global Institute (2007) indicates that spending within this emergent middle class is marked by consumption on luxury goods and services poised to improve quality of life, e.g. the leisure activities, travel, health care, mobile phones, personal care products.

It can therefore be understood that the EMC is a rapidly growing consumer of luxury goods in the Indian economy.

Due to its higher price point, organic products like organic dairy can be considered a luxury product, within the EMC's scope of consumption. The growing uptake of smartphones can also be attributed to the rise of the EMC.

This indicates that the EMC is a major force within the Indian economy and that they are also equipped with smartphones.

Smartphones are powerful mobile devices capable of supporting many forms of games and social media. According to Rajat Ojha, president of *Version 2 games* "Mobile gaming has brought gaming culture into India (Handrahan, 2012). The country did not have a gaming culture at all before it". He continues, "The popularity of mobile gaming has stirred up national interest in all forms of gaming." Clearly, mobile phones and games are a popular emerging trend in India.

By combining Pelling (2006) and Wu's (2012) definition of gamification with the popularity of smartphones and games within the EMC, and their fundamental principles holding true regardless of their medium, this study is presented with the scope of using the uptake of smartphone acquisition as leverage towards raising awareness of sustainability by gamifying organic dairying into something popular with the target audience – a game (Figure 3). It offers a compact, dynamic, interactive model to explore a broad range of possibilities into what could communicate sustainable values by using the added benefit of games as a design research approach, as opposed to gamification through traditional media like print, cinema, radio, and TV or as a badge and leader board system associated with a third party. As these simply cannot offer the benefits games can as a strategy to engage the EMC. For example, Warhammer is an action role-playing game originally started as a table top game but now exists as a performative role-playing game as well as a digital online game - Warhammer Online. Warhammer's marketing strategy deeply incorporates social media providing an immediate, informative, and interactive platform for player discussion and debate accessible by any digital media, e.g. smartphones (Cavatore, 2006). This demonstrates the medium independent, networkable, permeable, interactive intention of games as a strategy for gamification.

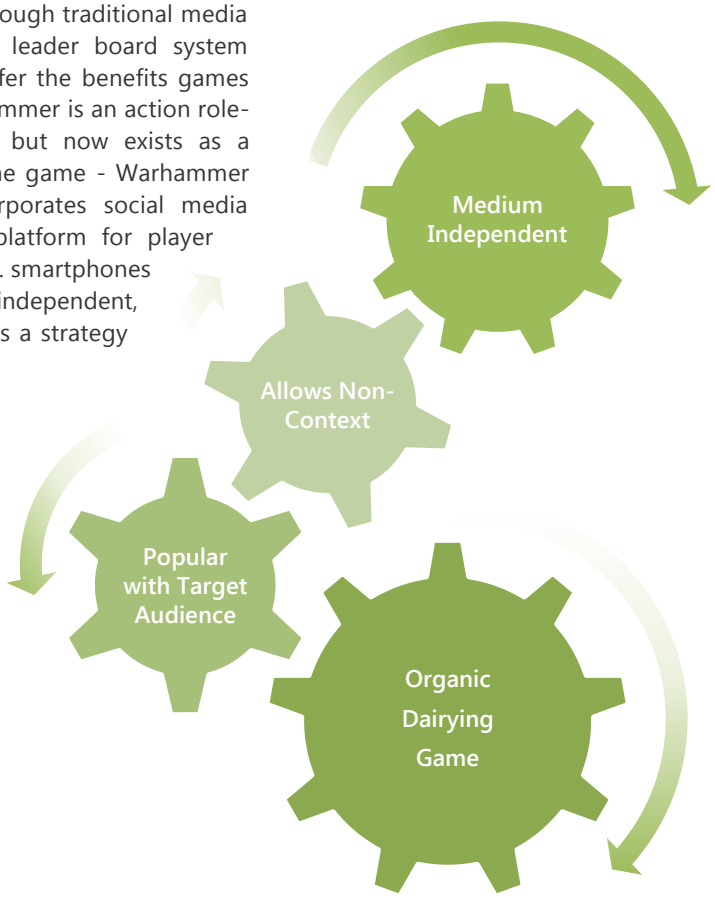


Figure 3: Gamification of organic dairy agriculture

Gamification case studies

Mole Bridge

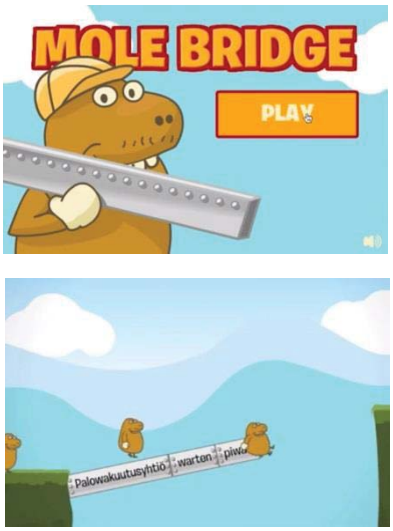


Figure 4: Mole Bridge

Mole Bridge was a joint project between the National Library of Finland and the Finnish developer Microtask (Benetti, 2011). The project aimed to digitise the Finnish National Archives

In the digital game *Mole Bridge* (Figure 4), a mole walks towards a cliff. Players must retype a word shown on the display to build a bridge extension. Unknown to the player, the words are unidentifiable by the computer and must be fixed by human intervention. If a word is not typed fast enough the mole falls off the cliff. Every word typed by the player builds an extension of a bridge. If the word is verified by the server, the bridge extension solidifies and allows a mole to cross over. If the typed-in word fails verification, the bridge explodes and the mole dies. With every level the length of the bridge increases.

Mole Bridge informed this study that by gamifying a problem within a social framework, it could allow crowdsourcing the ideation and solving of complex problems through play.

The Big Urban Game

Figure 5: The Big Urban Game

Another gamification precedent is *The Big Urban Game* or *B.U.G.* It was part of a design celebration held by the Design Institute of the University of Minnesota in 2003. It was developed by Katie Salen and Nick Fortugno towards engaging the community in a conversation about the design of the urban environment (Cameron, 2003).

In *B.U.G* (Figure 5), three teams pushed 25-foot tall inflatable game pieces through a series of five checkpoints over the course of five days. The team that first reached the final checkpoint first was be declared the winner. The pieces were carried by players through city streets and alleyways making players negotiate the pros and cons of each route by taking into account variables such as traffic jams, bridges etc. (Zurkow, 2004).

By converting an urban environment into a game board and having people race game pieces through the city, it facilitates player engagement with their environment through play, putting into motion any static views they had about their environment.

B.U.G informed this project that gamification not only has the power to solve problems (as seen in Mole Bridge), but also the potential to shift mindsets through play.

Get Water

The most directly relevant gamification precedent that helped to inform this project was *Get Water* by Decode Global (2013)**.** *Get Water* was aimed at raising awareness of water scarcity in India.

In *Get Water* (Figure 6) players assume the persona of Maya, a young girl in India who is trying to go to school but is persistently pulled out of class to go and fetch water. In the process of fetching water she must navigate slums, dodge flying turtles, deflect wayward footballs from village boys and battle angry peacocks. She must overcome all these obstacles and fetch water before the timer ends.

Get Water's premise brings up questions such as; Why does a little girl have to constantly fetch water? Moreover why does she have to do this while the boys are playing outside?

These questions not only made me think about water scarcity, but also the ethical and moral implications of a girl not attending school and Maya's unequal treatment because of her being a girl. These issues relating to water scarcity, access to education and, gender discrimination are common issues associated with developing nations such as India. *Get Water's* nature as gamification allows these issues to be discussed in a creative interactive way.

Get Water gamifies poignant social issues, allowing the player to become more aware of them through play. It is also an effective example of how Indian culture can help to inform the context of a game. This is extremely relevant and important for this study because not only am I attempting to do something similar with sustainability, but it shows gamification can cover multiple aspects of sustainability using the case study of organic dairying. Thus overcoming the drawback faced by the current method of raising awareness of sustainability being attempted by the Government of India as discussed on page 2.

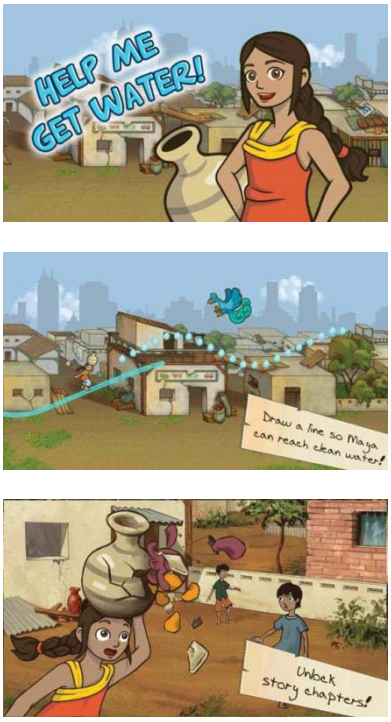


Figure 6: Get Water

Summary

There is a need for raising awareness of sustainability in the context of India. The scope of gamifying organic agricultural practise as a game using organic dairy as its case study presents a useful strategy or alternative approach to current methods being attempted in India to raise awareness of sustainability.

I aim to create an game which can inform players about sustainability through the context of organic dairy agriculture.

The following chapters reflect upon the exploration of contextual analogies that helped towards informing the design of the final product, key play theories which were necessary for making the game, the design methodologies which helped to develop it, and finally the conclusion.

2. Contextual Theory

To gamify organic dairying, understanding the relationship of dairy within Indian culture was imperative. Considering India's history extends back many thousands of years, Raymond Williams' theory of cultural formation provided this study with a conceptual lens as its starting point.

Raymond Williams was an influential cultural theorist and Marxist critic. In his book *Marxism and Literature* he outlined a method of analysis by segmenting culture into archaic, residual, dominant, and emergent cultures, with hegemony as a driving force for cultural change (Williams, 1977). He referred to this as 'epochal' analysis (Figure 8). It provided a framework towards understanding the dynamic complexity of dairy within Indian culture.

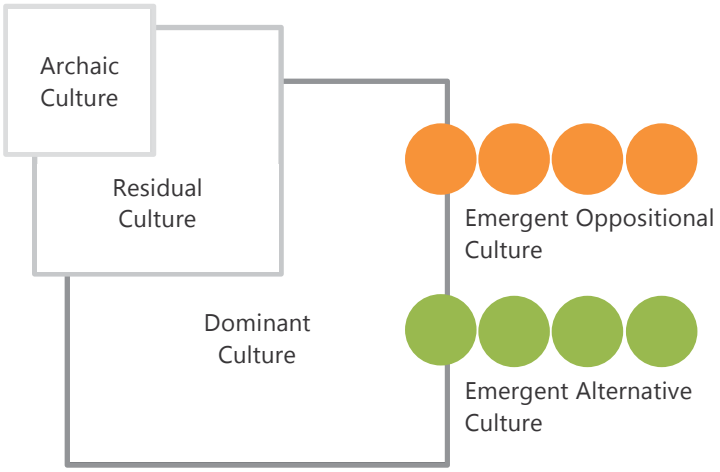


Figure 7: Raymond Williams' Theory

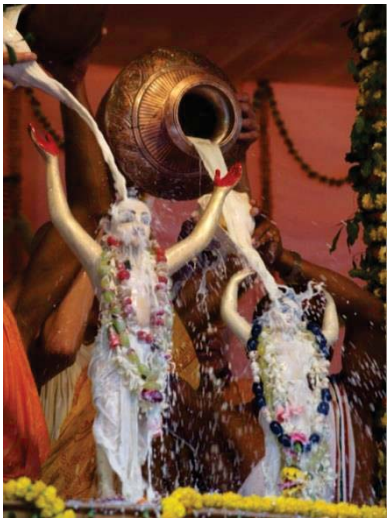


Figure 8: Dairy in Hindu rituals

Dairy in ancient India

India is a country of more than a billion individuals. According to the Census of India (2001) the majority of Indians are also Hindus making Hinduism the major religion of India. Dairy in India is closely associated with the Hindu religion. For example, Hindu rituals are performed using dairy products (Figure 7) such as milk, curd, clarified butter and cow dung (Mandokhot, 1987). Gopastami (Figure 9) is celebrated during fall when bovines are worshipped by dressing them up elaborately (Das, 2013). Raymond Williams' theory links the emergence of such cultural practise to a concept called 'cultural hegemony'. A term first used by Italian sociologist Antonio Gramsci (as cited in Anderson, 1976), cultural hegemony is a cultural phenomenon observed when prevailing cultural norms of a dominant ruling class are imposed upon the lower class and the lower class adopts these norms as their own even if it may not be in their best interests. In the case of ancient India, organised religion influencing the practise of using dairy in Hindu rituals within ancient Indian rural communities, can be understood as a dominant ruling class value adopted by the lower class – the rural community. Based on Williams' theory, this type of adoption leads to cultural change where the practise of such values solidifies as a new culture. This new culture is either oppositional or sees the values as an alternative and becomes part of dominant culture over time. In the case of ancient India, it can be assumed that regardless of whether or not it was an oppositional or alternative culture, dairy in India continues to be closely associated with the Hindu religion. A certain value associated with dairy still exists within Indian culture. As this

Figure 9: An adorned cow

Figure 10: An industrial dairy product advertisement from Colonial India

Figure 12: Fodder feeding

association is with the religious majority of the nation and as religious institutions extend into socio-political and economic realms, dairy and dairy animals such as cows, do as well. For example, in September 2013, a dead cow was found on a Muslim landlord's property. This enraged a Hindu group leading to 20 Muslim-owned houses and 10 shops in a village of the Harda district being set on fire. A gun-fire riot followed until the police enforced a two-night curfew. As a result, political figure, Ajay Singh from the Congress Party, claimed that the events were engineered by the opposing political party BJP, to stir up commotion for staying in power (Christopher, 2013). These socio-political events indicate cultural hegemony brought about by the use of dairy in Hindu rituals. It informs this project of Hinduism as an archaic culture because of its complete existence in the past. The practise of using dairy for religious events as a residual culture, given it is a practise from an archaic culture that continues to freely existing in dominant India, and certain values associated with dairy and dairy animals in India (Figure 11).

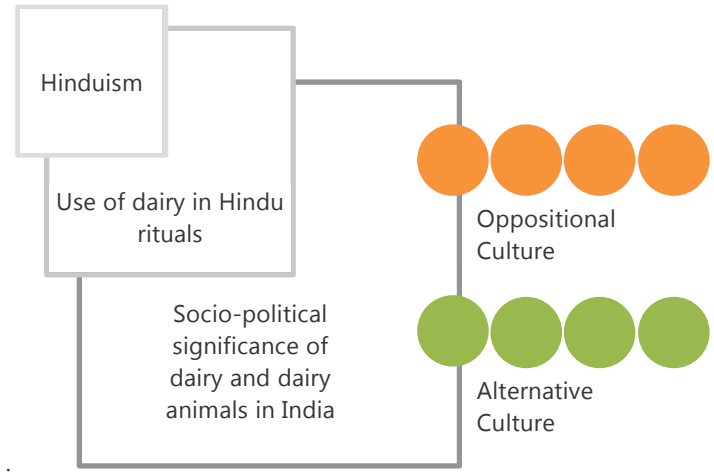


Figure 11: Dairy in ancient India

Dairy in contemporary India

Contemporary India offers certain socio-political drivers as well. According to the United Nations, India is the highest global consumer and producer of dairy products where currently dairy is neither exported nor imported (2009). This is only possible through industrial dairy agriculture. However industrial dairy agriculture is not native to India. The origins of industrial dairy agriculture in India can be traced to colonial rule in 1913, with the introduction of artificial insemination to develop better yielding bovine breeds (Banerjee, 1994). Industrial dairy agriculture, much like the practise of using dairy in Hindu rituals, can be seen as a norm indirectly brought on by the colonial ruling of the time. Industrialised dairy products such as table butter, processed milk, ice-cream were introduced for the first time (Figure 10). Since there is no recorded history of any opposition to the introduction of such industrial dairy products or industrial dairying, and as the uptake of these continue to be observed well into the present, it informs this project that its emergence can be seen as a form of alternative culture that took place in the past. The cultural embracing of practises such as synthetic chemicals, artificial insemination, growth hormones, fodder feeding (Figure 11) and the associated environmental degradation caused by industrial agriculture can be traced back to cultural hegemony brought about by colonial rule. Without this rule, these norms and practises would not have arrived in India. An epochal analysis suggests colonial rule as the political entity completely of the past (archaic culture) that introduced industrial dairying in India and was seen as an alternative culture without opposition which continues to be a prevalent dairy agricultural system (residual culture) of present day India (Figure 13).

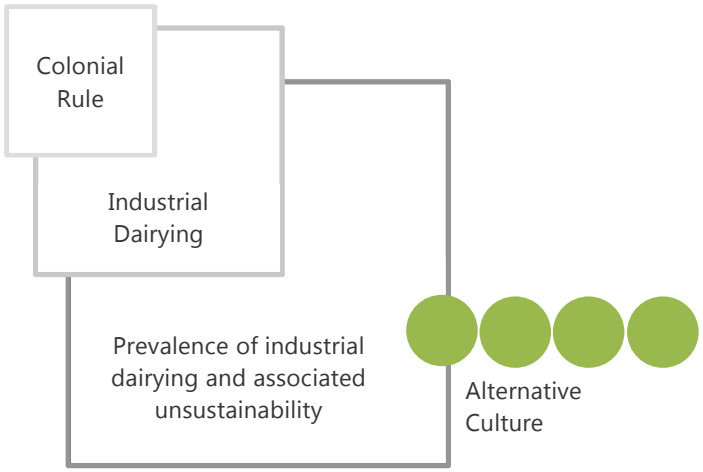


Figure 13: Dairy in contemporary India

Dairy in present day India

The profile of a high consumption group such as the EMC from top tier cities can be understood as a form of ruling economic power over producers (Figure 14). The EMC's desire for premium luxury goods and services, as indicated previously, does not match the quality of mass produced industrial dairy. For example, according to a report by the Government of India as cited in The Press Trust Of India, 68% of India's milk is adulterated, some even with paint, detergent and glucose (2012). This is not luxury or premium, it is not even safe.

In recognition of the EMC's values towards better quality of life and desire for luxury premium goods and services, the emergence of a new class of dairy producers can be observed with the Government of India establishing the National Programme on Organic Production in 2003. As previously mentioned in chapter one, the NPOP acts as the regulating body for organic agriculture in India. This process is currently in progress because the appearance of organic food in India is only a recent occurrence (post 2003). Based on the theory of hegemony, in the future, the values brought about by the EMC would classify the EMC as an archaic culture. The adoption of their values currently in progress can then be classified as a residual culture.

As this process is currently taking place, organic dairying can be seen as an emergent culture that is attempting to interface with the dominant dairy culture of India (Figure 15). This epochal analysis suggests that a new type of dairy producer who adhere to organic dairy values in order to market to the EMC.

Figure 14: Gurgaon

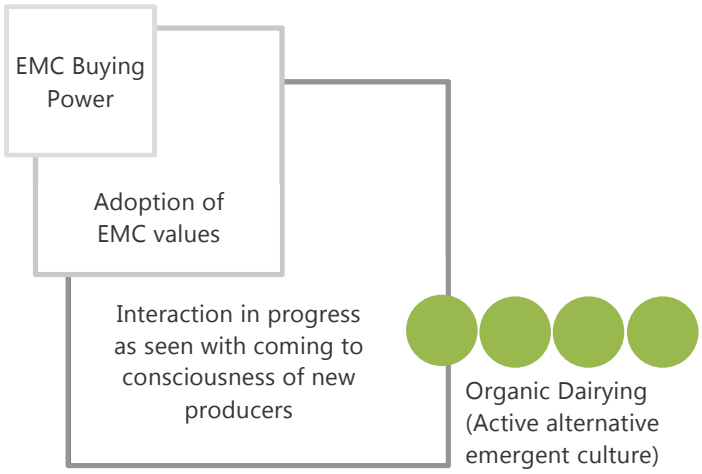


Figure 15: Dairy in present day India

Visual summary

The socio-political and economic contexts of dairy culture in ancient, contemporary and present day India can thus be represented as the following visual compendium of contextual analogies which helped towards informing this study (Figure 16).

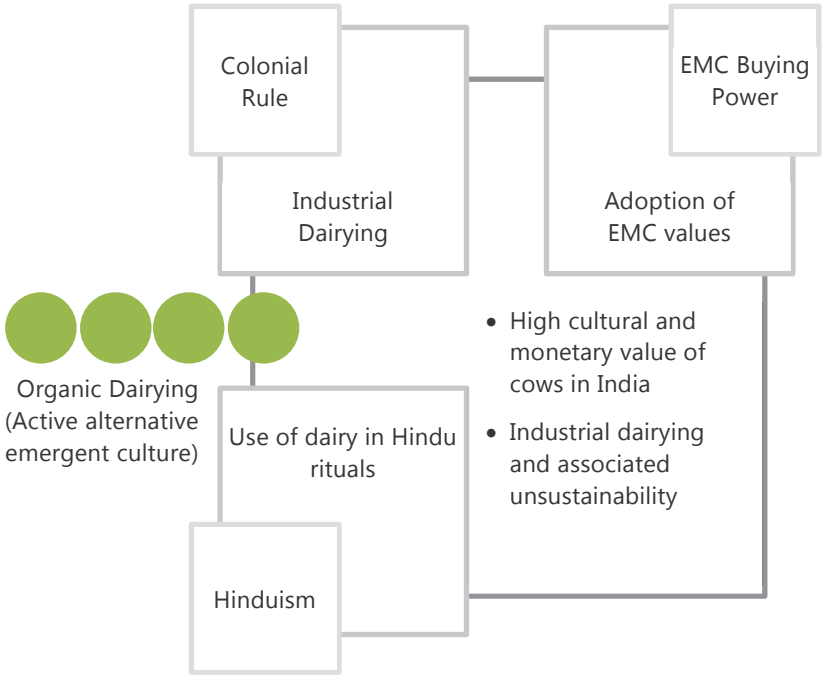


Figure 16: Visual summary

3. Play Theory

Magic Circle

The "Magic Circle" is a term first coined by Dutch historian Johan Huizinga in his book Homo Ludens (Huizinga, 1938) and it was later adopted by Salen & Zimmerman for contemporary games as "*the space within which a game takes place* (Salen & Zimmerman, 2004, p. 32)". Within this magic circle, the game's rules create a special set of meanings for the players of the game. This can be related to the flow of a game. The "Magic Circle" as a concept was necessary to be upheld by this project as it represented a state of mind necessary for players to play a game.

Meaningful Play

Playing games means making choices and taking actions. An action a player takes in a game can result in the creation of new meanings within it. For example, in games like cricket or baseball, a player catching a ball gives rise to a set of new meanings, for all other players - created by the players. All play is not meaningful. For example two individuals tossing a ball back and forth between each other has little or no discernable or integrated meaning within a larger context. Hence the reason meaningful play is defined as "The relationship between player action and system outcome; it is the process by which a player takes action within the designed system of a game and the system responds to the action" (Salen & Zimmerman, 2004, p. 33). Meaningful play thus occurs when the relationships between actions and outcomes in a game are discernable and integrated towards the larger context of the game. It signifies why players take the actions they do and what meaning that action has over the entire course of the game. Such a framework offers something important – a means to invoke critical choice making, and reflection. This kind of critical thinking is something I believe is essential for not just communicating but understanding sustainable values as well (Figure 17). This is because sustainable thinking means balancing consumption through our choices, to live within the finite resources of our planet. It offers a means to empowering an audience with this understanding through a voluntary, fun way as opposed to an education curriculum like that being attempted by the Government of India – making it an invaluable concept for and towards the research aim of this project. It was necessary that DairyTale be designed specifically to facilitate meaningful play.

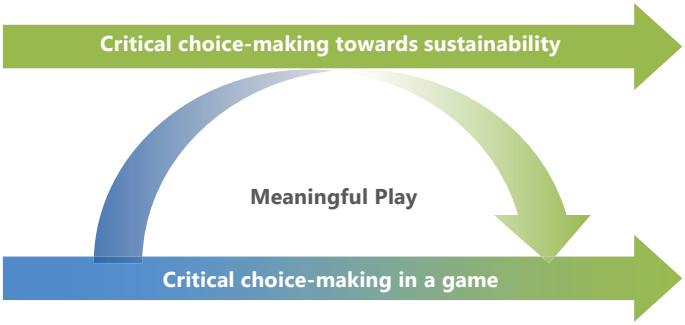


Figure 17: What meaningful play offers this project

Schemas

A game design schema is a way of understanding games, a conceptual lens that we can apply to the analysis or creation of a game (Salen & Zimmerman, 2004, p. 102). DairyTale was designed using the following schemas:

Rules

Rules constitute the formal structure of a game, e.g. the game-board of chess consists of 64 squares arranged in an 8x8 grid. It does not describe the experience of playing a game nor does it describe the history and culture of the game (Salen & Zimmerman, 2004, p. 120). Rules are also seen as as analytical tools which mathematically dissect a game. This schema is a defined structure that results in quantifiable outcomes and was thus necessary to build the formal structure of DairyTale's game design.

Play

Meaningful play in a game emerges through play. French Sociologist Roger Caillois suggests that play is difficult to define as it is a "free activity" outside "ordinary" life and "not serious" (Caillois, 1961). Catherine Garvey broadly classifies it as a '"range of voluntary, intrinsically motivated activities associated with recreational pleasure and enjoyment, or human experience of a game" (Garvey, 1990). Salen & Zimmerman (2004, p. 104) suggest that games as experiential systems means looking at them "as participation, as observation, as a mental state, as bodily sensation, as emotion, as something lived and that these experiences might be a social experience or narrative experience or an experience of pleasure". Play is thus an activity closely associated with human experience of a game.

However, the experiential nature of play appears to be in conflict with the concept of gamification as it attempts to direct user decision making towards choices that are desirable to a non-game context. This conflict can be attributed to how rhetoric is used as a form of discourse (Smith, 1997). For example, *The Landlord's Game* and *Monopoly* both share the concept of tax for profit. However according to Salen & Zimmerman (2004, p. 520) the creator of the former – Elizabeth Magie, stated that "The object of this game is not only to afford amusement to players, but to illustrate to them how, under the present or prevailing system to land tenure, the landlord has an advantage over other enterprisers, and also how the single tax would discourage speculation." While the latter, was stated to be a game about buying and selling to become the wealthiest player running a monopoly. The use of rhetoric in games thereby expresses completely different ideologies even though games may share similar rules and context. Rhetoric can be found within the language of the written rules, naming conventions and goals of the game. The result of the conflict can be seen with how *Monopoly* continues to be popular while *The Landlord's Game* faded into obscurity. To prevent this conflict in DairyTale, it was necessary that the nature of this project as gamification stay hidden behind rhetoric.

Culture

While taking into account both the formal and experiential aspects of a game, the culture or context schema focuses on the relationship between a game and the cultural contexts in which it sits (Salen & Zimmerman, 2004, p. 104). For example in the game *Oregon Trail* by Don Rawitsch (Figure 18), players assume the role of a wagon party leader in 1848 who must lead a wagon across the American West. It simulates the continental migration which took place in American history during that period. To successfully make the journey players must choose supplies, cross rivers, trade with Native Americans, hunt for animals, survive raiders, diseases and storms. They must make wagon repairs and overcome a host of other scenarios that are historically accurate to the real journey (Fenton, 2013). Oregon Trail blurs the boundaries between reality and the game using the context of American history as the environment for the game. The success of this approach can be seen by Oregon Trail being the most widely distributed educational game of all time (Lussenhop, 2011).

The scope of using Indian culture presented using the scope of using contextual analogies understood from Chapter two as a means to build the environment of DairyTale.

Figure 18: Oregon Trail

4. Methodology

According to Cal Swann (2002) "Design research is tied to a domain that derives its creative energy from the ambiguities of an intuitive understanding of phenomena." Meaningful play in a game emerges through play. Play can be considered a phenomenon, and as understood from the schema of play, it is an experiential aspect. Therefore to design play, design research encompassing human experience was fundamentally necessary. This is supported by Reiner Knizia's statement (as cited in Salen & Zimmerman, 2004, p. 22) that "The fun and excitement of playing cannot be calculated in an abstract fashion: it must be experienced."

Based on this view it was imperative that the project develop through the experience of actually playing the game. Iterative design makes this possible, as within the context of game design, it is a play-based design methodology, as well as a form of design research through the reinvention of play. Design decisions are made based on the experience of playing a game while it is in development through prototyping and play-testing (Salen & Zimmerman, 2004).

In this project prototyping refers to a set of methods to model gameplay while play-testing refers to the process of playing a game to test it. Rough paper prototypes of the game were created, and then played with in order to play-test them. I failed to obtain a low risk ethics evaluation within the given time-frame and could not play-test prototypes with individuals other than myself. As a result, the project developed through insight gained from autoethnographic self-reflective practise, over the course of successive iterations.

According to Donald Alan Schön (1983) reflective practise is "the capacity to reflect on action so as to engage in a process of continuous learning". While according to Garance Maréchal (2010) autoethnography "Is a form or method of research that involves self-observation and reflexive investigation in the context of ethnographic fieldwork and writing."

These are relevant to this project as not only do they provide a means to gain insight into what experience could communicate sustainability, but they also provide a means to overcome a major short-coming of attempting to design a game as one person - trying to predict the different experiential aspects of play. Brian Sutton-Smith (1971, p. 438) states that "Each person defines play in his own way". A reflective practise based approach allowed me to overcome this short-coming through the understanding that reflection-in-action, relies on knowledge gained from past and present experiences, for future improvement, there is not one right approach (Rawling & Fien, 1996). Furthermore, autoethnography as a research method based on self-reflection, allowed me to connect my own personal experiences of play-testing prototypes towards the context of how to communicate sustainable values through gamification. Essentially a method to critically examine my thoughts, move towards changes, and implement them – using insight gained from both reflectivity and reflexivity.

I created prototypes of DairyTale, played with them, evaluated their experiential effectiveness at communicating sustainable values, adjusted their designs, and played with them again - allowing the game design to emerge through insight gained from self-reflection and reflexivity.

Figure 19: Iterative design cycle

Author of *Lateral thinking* Edward de Bono suggests that an indirect and creative approach can allow us to obtain ideas that are not obtainable by using traditional step-by-step logic and reasoning, as the broader the range of ideas explored, the more likely the discovery of breakthrough concepts. For this purpose I utilised non-linear tools such as:

Rapid iterative paper prototyping: Rapid iterative prototyping using paper, pens, scissors, and other stationary to make game elements such as tokens or cards without waiting for the next iteration of the game allowed for easy and instant identification and bridging of gaps in the design (Figure 20). It made for a quick and effective means to explore ideas as they emerged during play. Paper prototyping is cost efficient and could incorporate digital graphics in tandem with hand drawn material.

Mind-maps: A concept by Tony Buzan, mind mapping utilises a range of cortical skills like words, images, numbers, logic, rhythm, colour and spatial awareness. It does so in a simple manner to allow the freedom of traversing multiple ideas in a non-linear fashion. This helped to see connections between them not otherwise visible (Figure 21).

Wire-Framing: A wire-frame is a low-fidelity visual representation of a layout design (Figure 22). It allows for quick refinement of layouts by providing a means to see content in a skeleton frame to evaluate the overall effectiveness of a layout.

Suspended disbelief: A term originally coined by poet Samuel Taylor Coleridge, it refers to the willingness of the audience to overlook the limitations of a medium such that it does not interfere with the acceptance of those premises. This made it possible to play with paper prototypes, as it provided a means to imagine events taking place in a game without them actually taking place but still perceive and accept the circumstances.

Play-Testing

According to Eric Dishman (as cited in Laurel, 2003, p. 47), "it is vital to anticipate how future groups of people discover, learn, buy, use and dispose of a product or creation we believe we invented for them. May that be through 'exploratory' questions to understand people, getting user input on prototypes, or even testing/trialling nearly finished products" Apart from helping to inform me of human-centered design methods, I found the inclusion of the word "dispose" in Dishman's statement appealing. I as an individual actively keep a small ecological footprint and doing so is important to me. It is the manifestation of my hope that if everybody kept a small ecological footprint, the world would be one step closer to sustainability. This idealism may not take place immediately but Dishman's statement indicates that human-centered research methodology could accommodate sustainability within its ideology. It kept the possibility open for the design outcome to be sustainable in function as well as form.

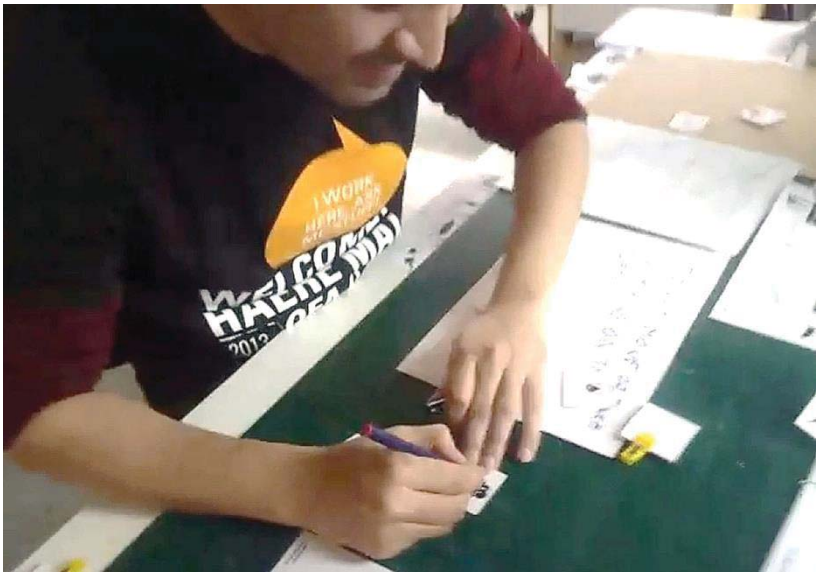


Figure 20: Rapid iterative paper prototyping

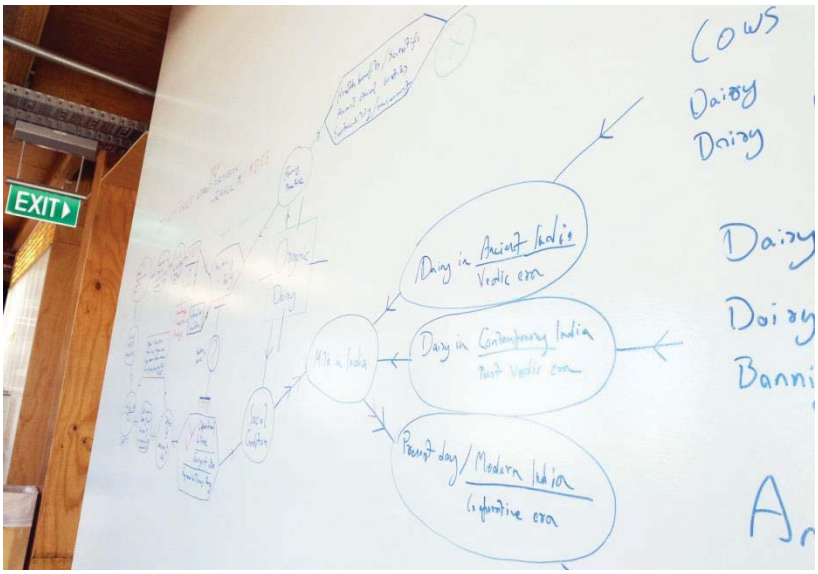


Figure 21: Mind-mapping

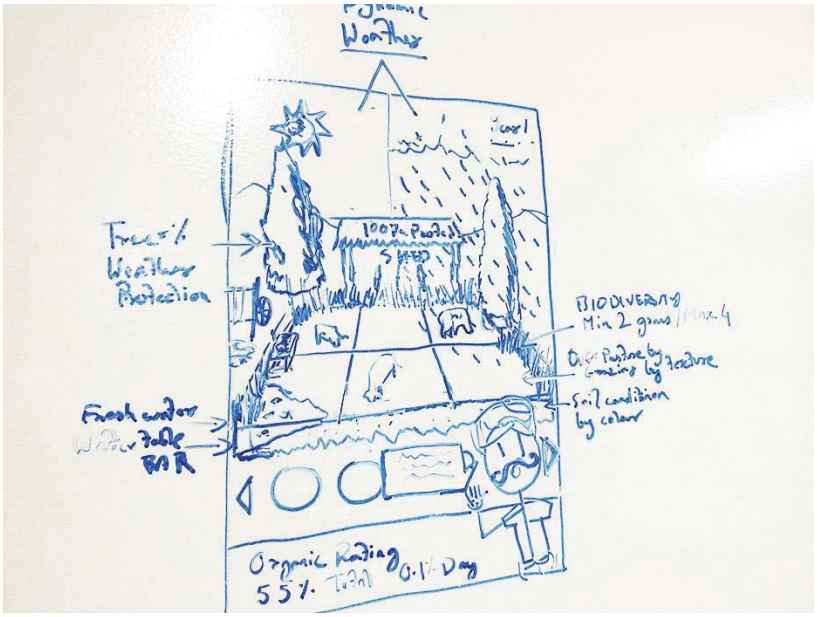


Figure 22: Wireframing

5. Design Development

Experiment One: Smartphone App

As someone who's played mostly video games, having an opportunity to make a game was exciting to me. It was something I had never done before. Some of my favourite digital games are *SimCity*, *Age of Empires*, *Transport Tycoon* – simulation games. I found simulation effective in creating or representing dynamic situations through play. A simulation can be defined as an "operating representation of central features of reality." As understood on page 5 of this document, organic dairying practise consists of central features oriented around hygiene of animals like preservation of biodiversity. Mind-mapping (Figure. 24) led to the ideation of some mechanics to gamify these features. These included

- Using a water pump to control soil and water management.
- Protecting the herd from harsh sun and weather by planting trees.
- Scoring organic points by performing management tasks organically.
- Measuring a cow's happiness using numerical values.

To articulate these I wanted the game to be available as an app on smartphones for which I made a wire-frame (Figure 23) and flowchart (Figure 25).

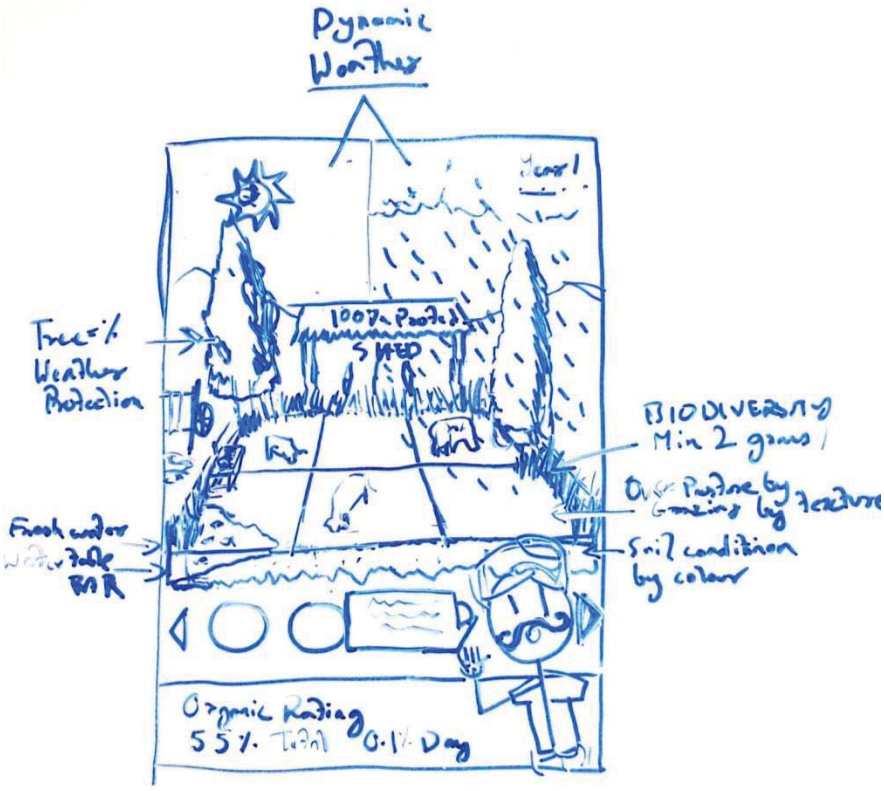


Figure 23: Simulation wire-frame

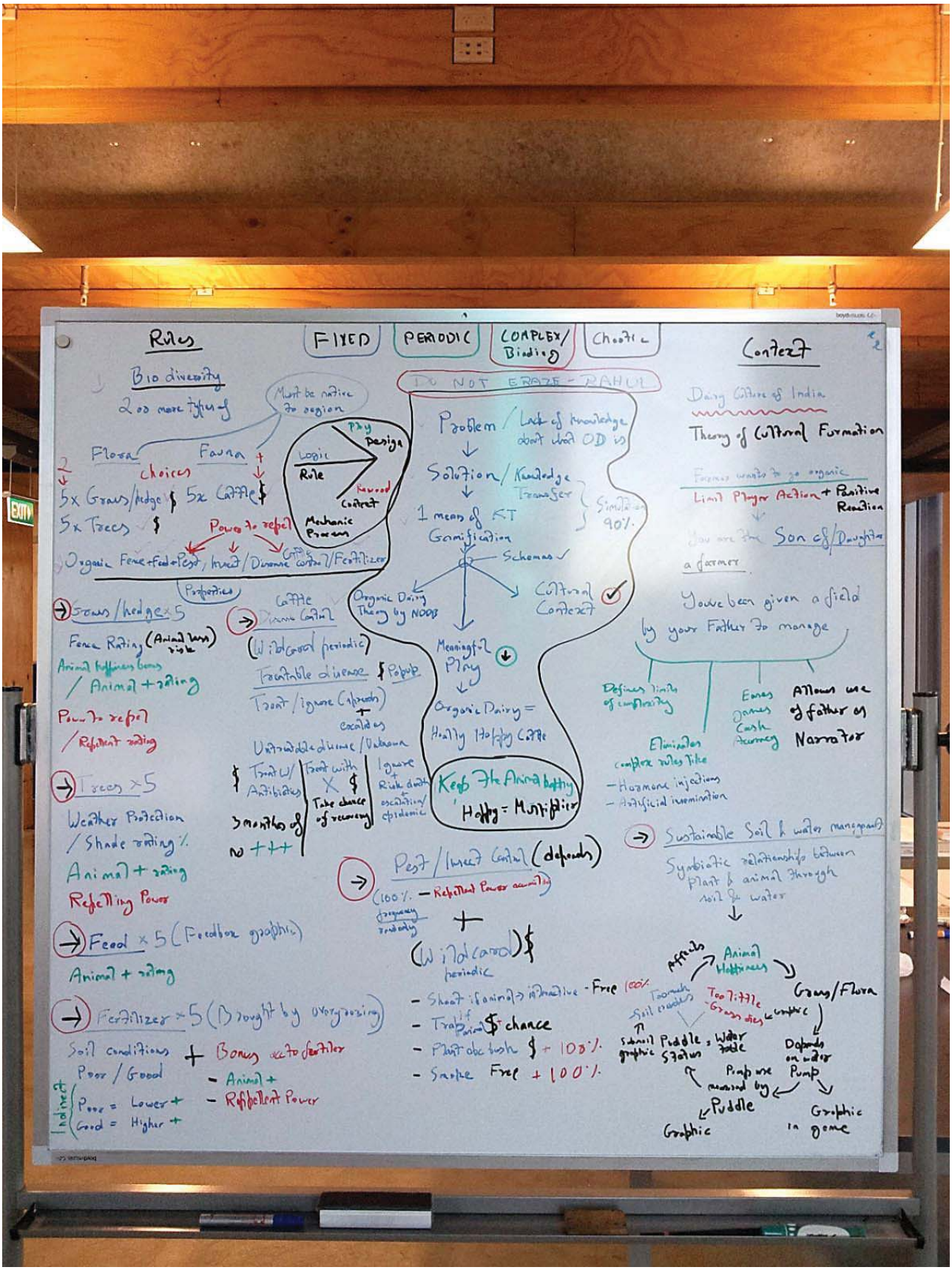


Figure 24: Mindmapping simulation of organic dairy

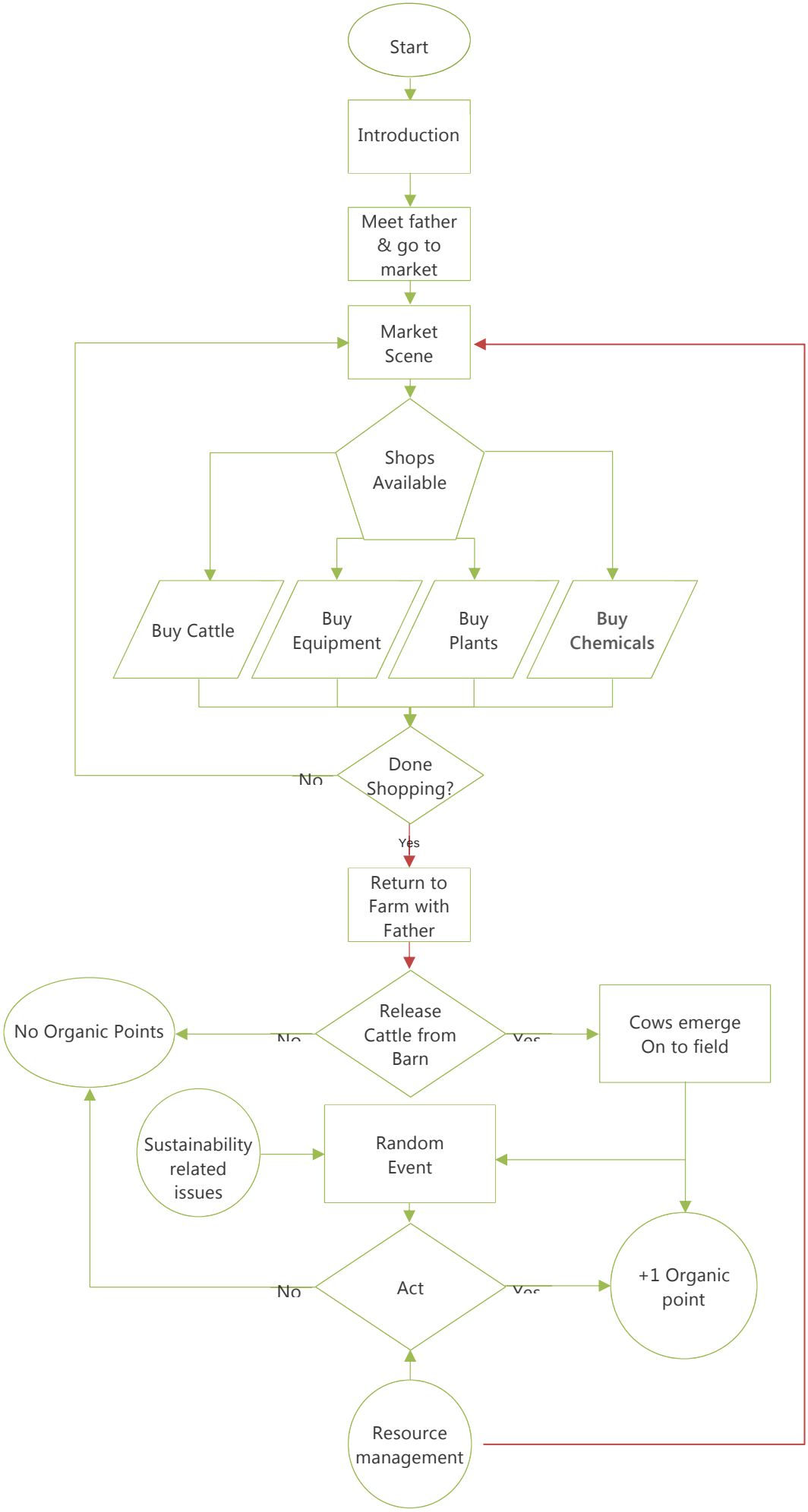


Figure 25: Flowchart for app concept

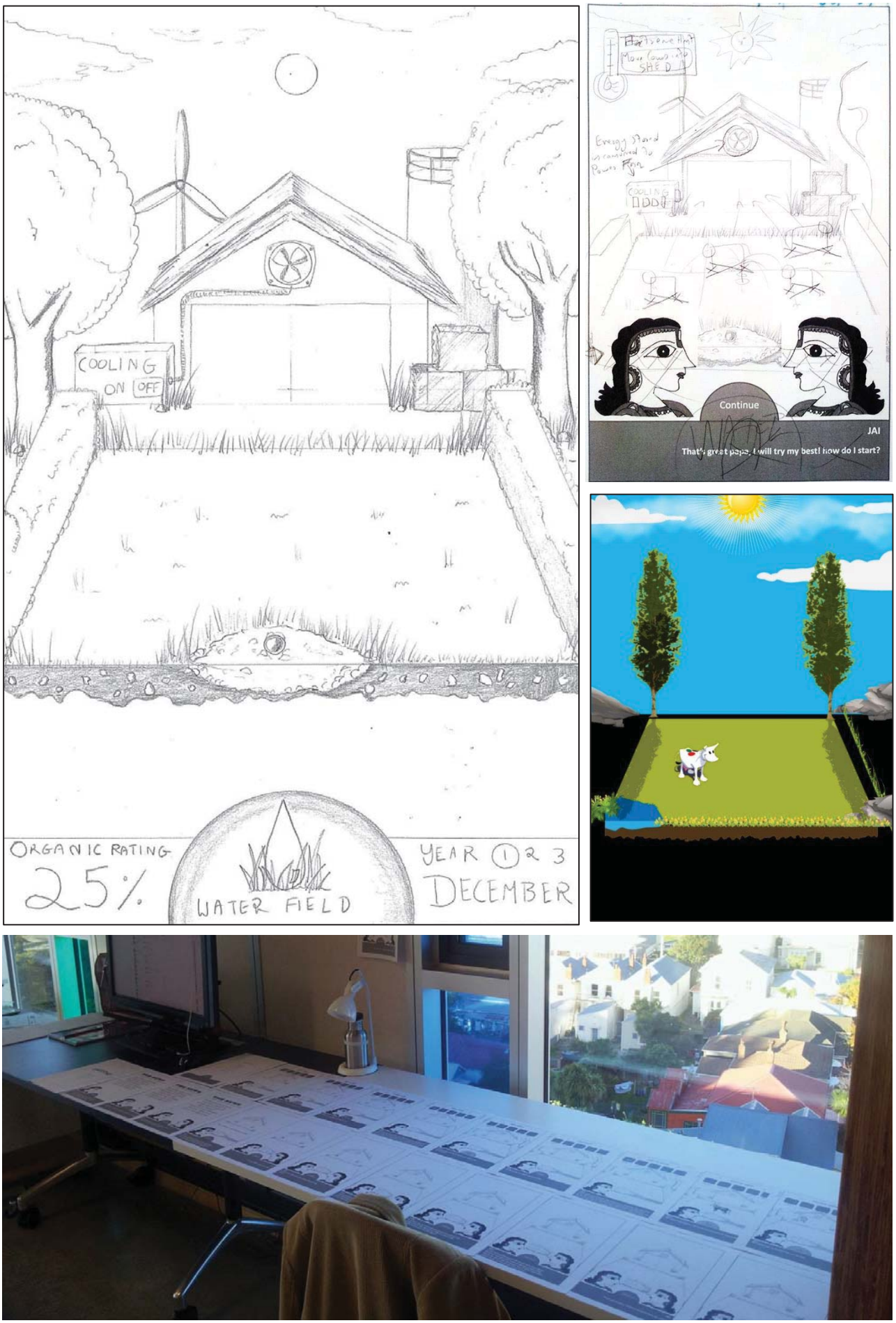


Figure 26: Various Key frames

After designing several key frames (Figure 26), a problem emerged. The size and layout of the wire-frame was getting in the way of exploring ideas (Figure 27). This was not acceptable as exploration of ideas was critical. The app layout was abandoned and a graphically projected layout was explored.

Popular digital simulation games like *SimCity* (Figure 28), *Farmville* (Figure 29) are graphically projected games. It makes for a familiar game environment as compared to 'reinventing' the wheel which I attempted with the previous app layout. Graphical projection allows the creation of an expandable world guided by a grid. This grid allows the integration of mathematical values of mechanics and their visual components simple.

The assets from the app concept were re-visualised in a graphically projected game map (Figure 30). In order to test the design without the delay and resources necessary for programming a full game, a paper prototype was created.

The paper prototype achieved this by letting me interact with the mechanics as physical models on a printout of the game map (Figure 31-32).

The assigned goal of the game was to score points by keeping cows happy. The measurement of a cow's happiness was

divided into different tasks according to a mind-map. To score points it was necessary to maintain soil and water table integrity using a well, protect cows from harsh weather, fertilise the field using organic fertiliser such as cow manure and ensure the cow stayed happy.

I performed the tasks a computer would and changed the game according to the choices made. For example, if the grass was I would water the grass by physically pressing the water well on the game map (Figure 30). If too much or too little water was used – measured by how long the well was pressed for. I create another set of variables. For example, using too much water erodes the soil. Too little dries it out. This in turn would affect the cow's happiness.

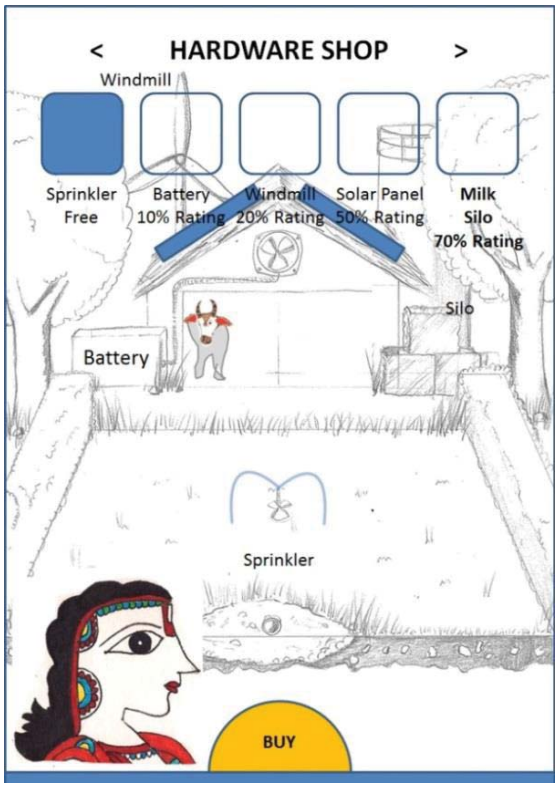


Figure 27: Lack of space to explore ideas

Figure 29: SimCity

Figure 28: Farmville

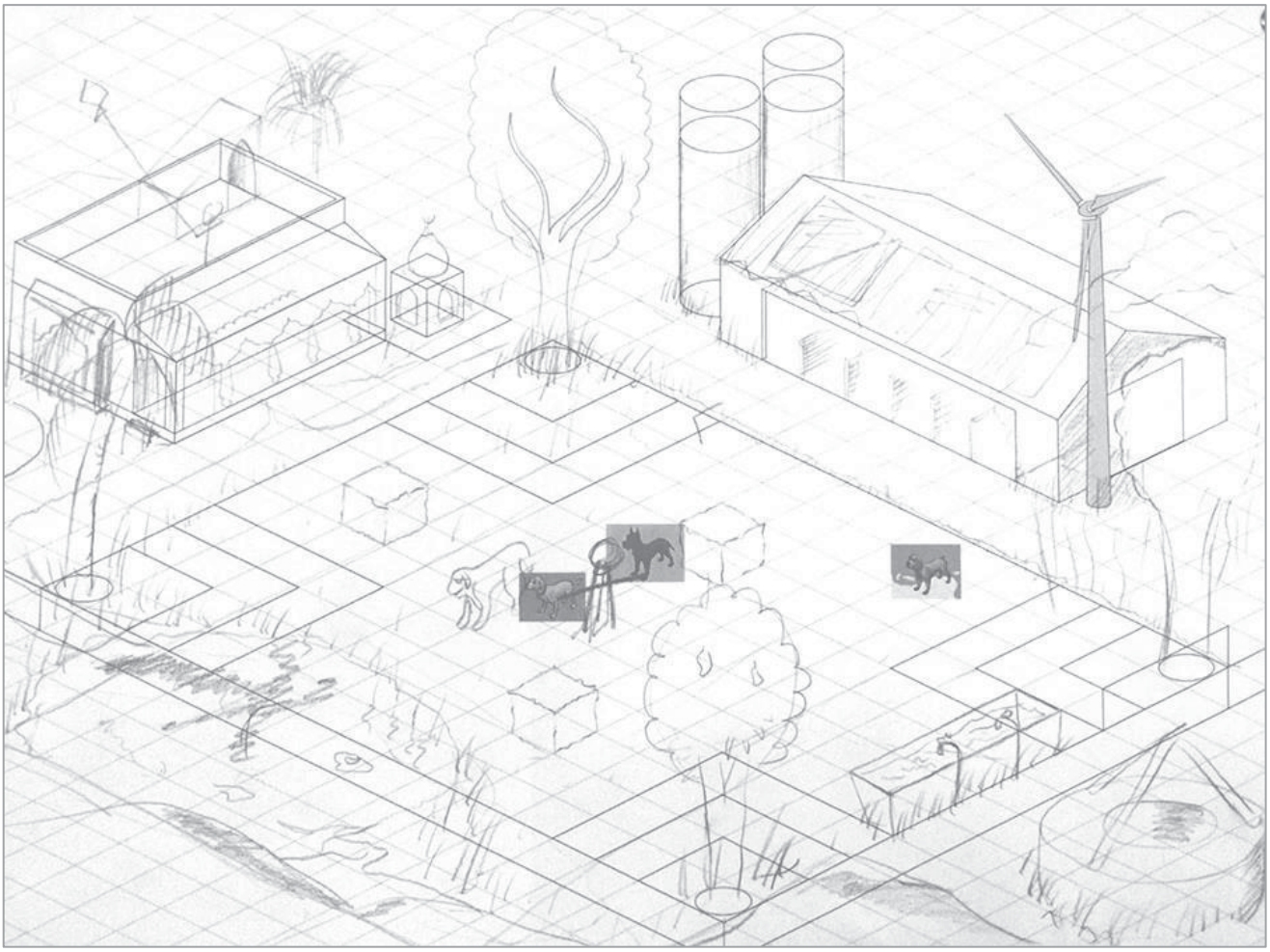


Figure 30: Game map with graphically projected grid

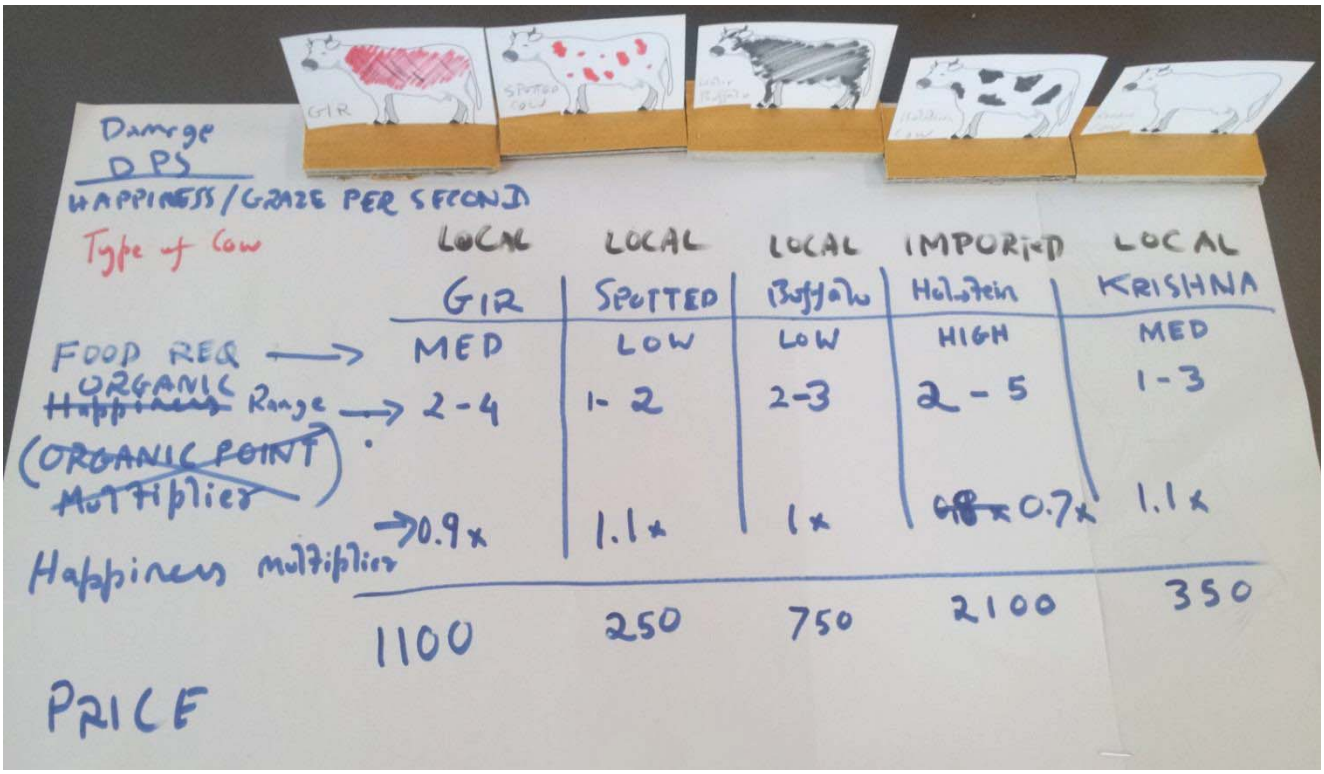


Figure 31: Cow models

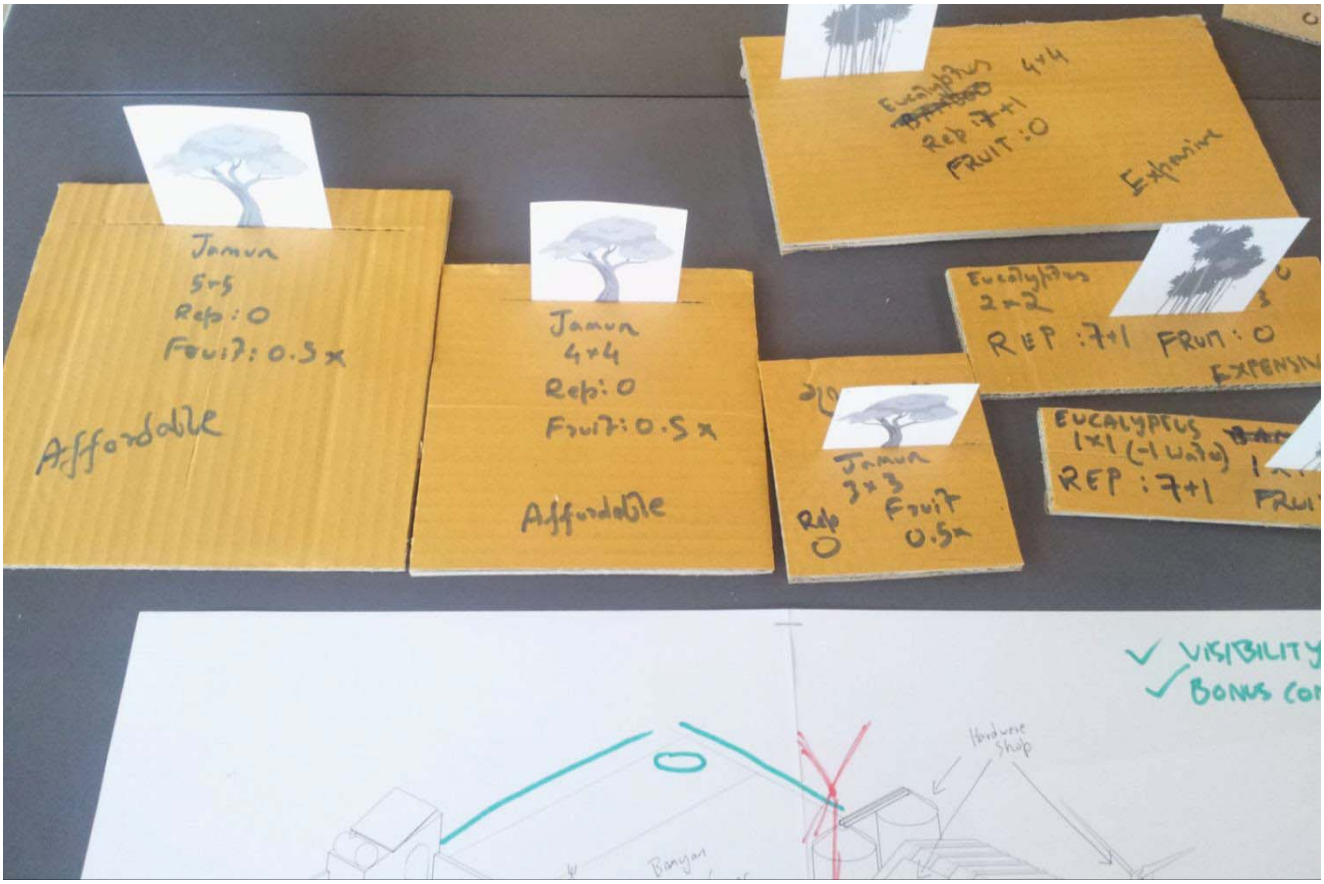


Figure 32: Tree models

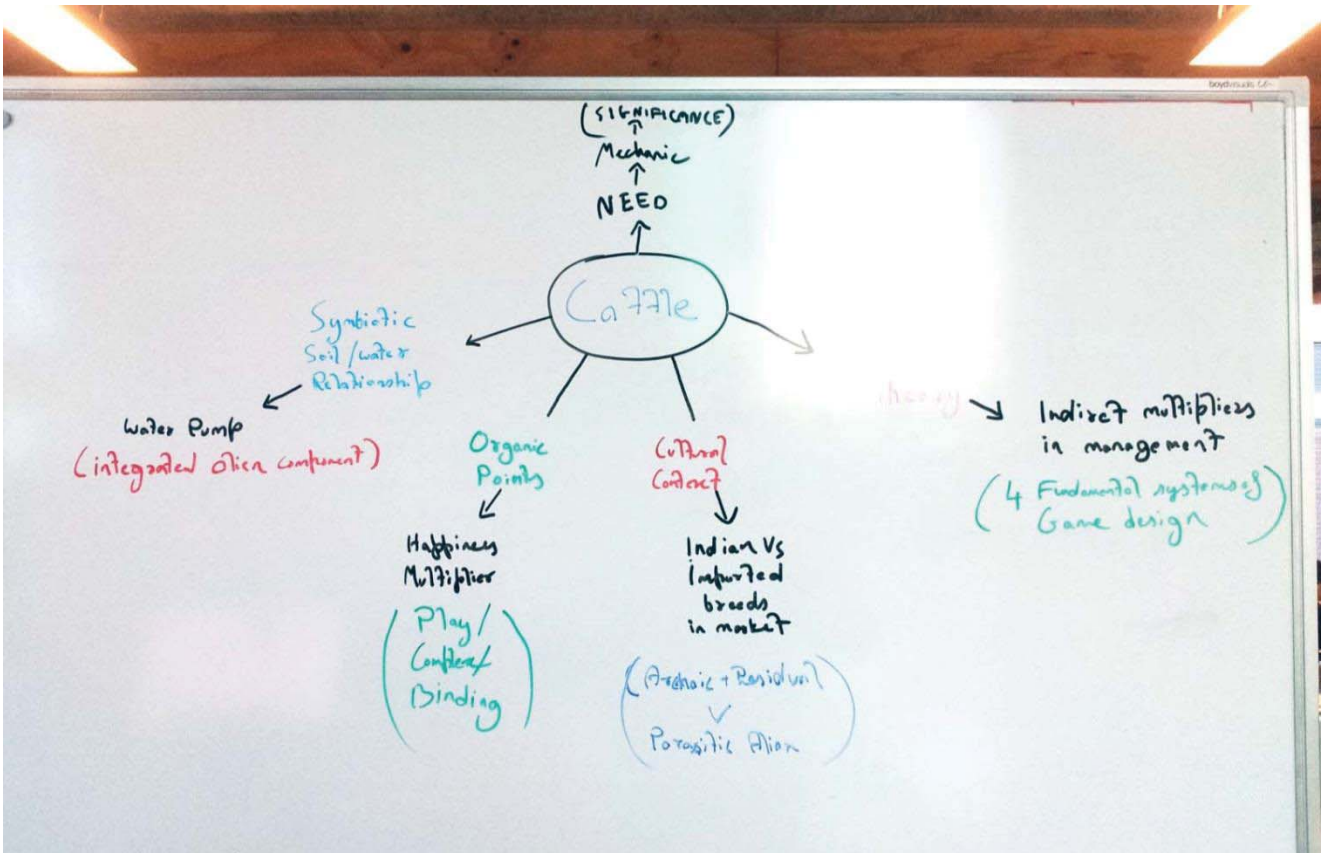


Figure 33: Breaking happiness down into values

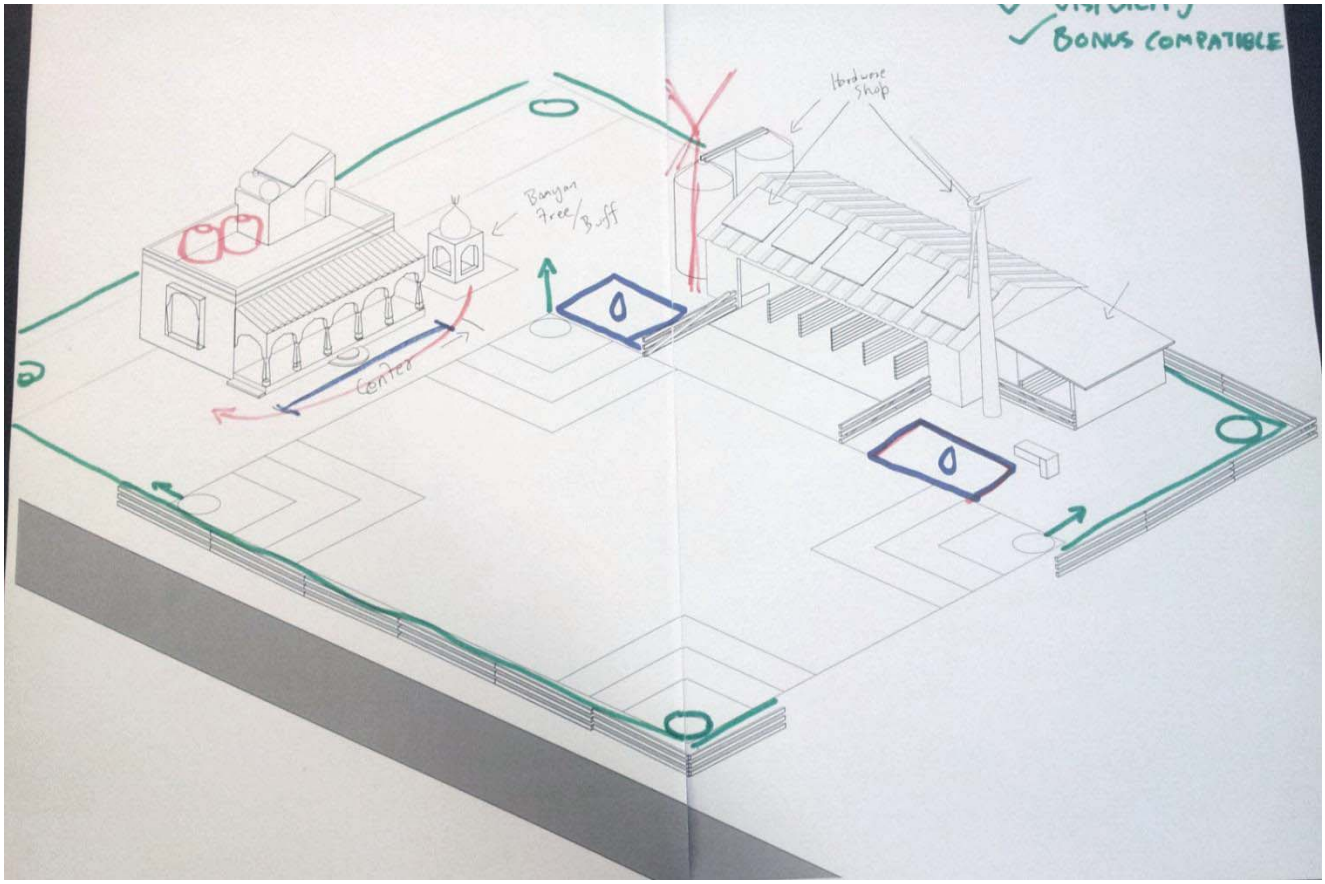


Figure 35: Documenting changes

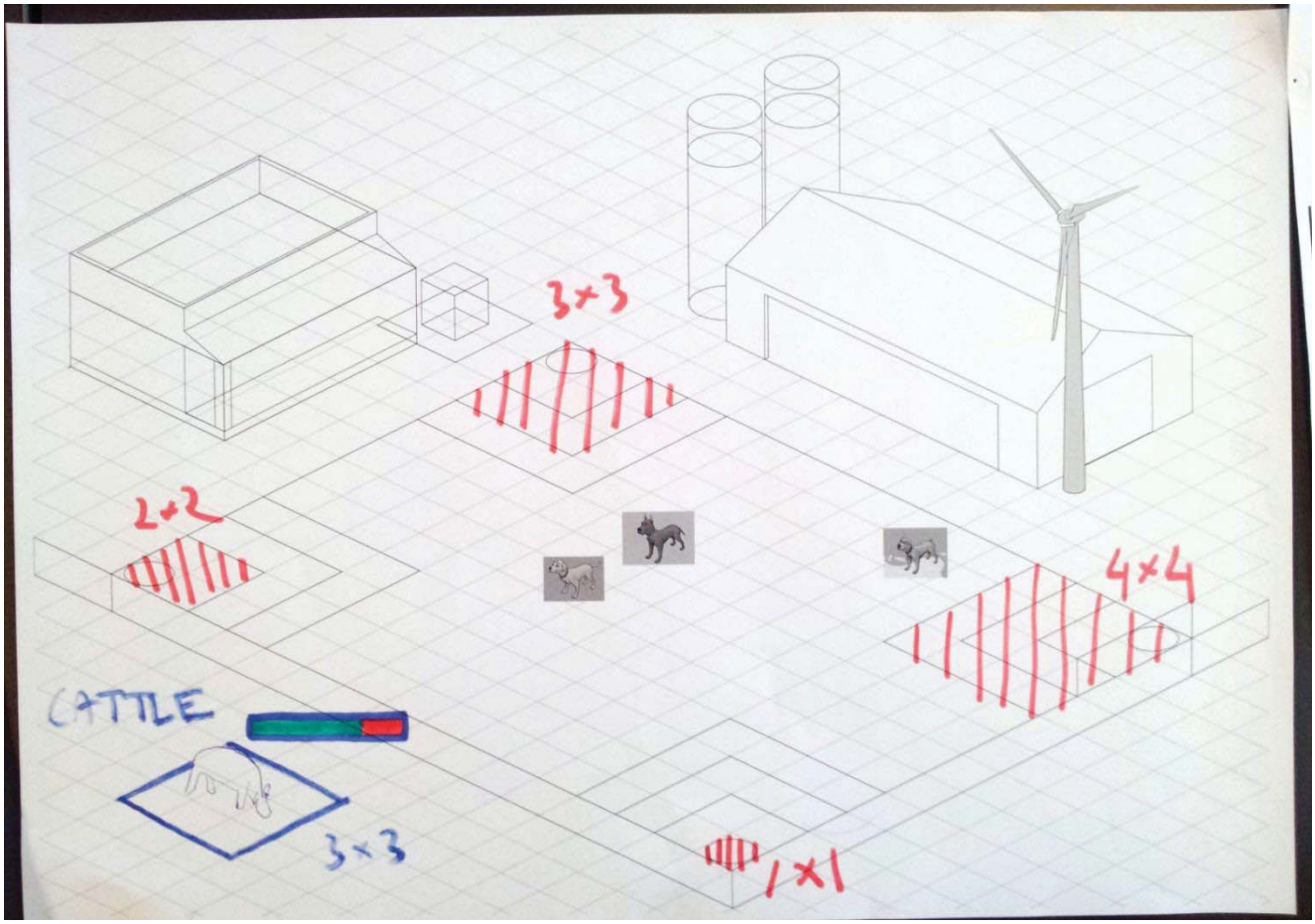


Figure 34: Documenting changes

Playing the game, I found the architecture of the house and shrine on the game map to create a sense of culture (Figure 36).

I also found I was unable to understand the objective of the gameplay. The purpose of farming tasks such as managing water and keeping the herd happy made no sense. It gave the impression of managing an organic dairy farm but nothing about sustainability. It felt like a farming trainer and a desire emerged to indulge in non-organic farming and to cause "mayhem"

It was clear that the paper prototype was not creating the desired connection with sustainable practises but it was seen as a farming exercise instead. This suggested the game was not engaging towards the research aim.

It took some time to analyze and understand this, as my own bias firmly held onto the notion that a simple simulation of organic dairy agriculture would automatically communicate sustainable values.

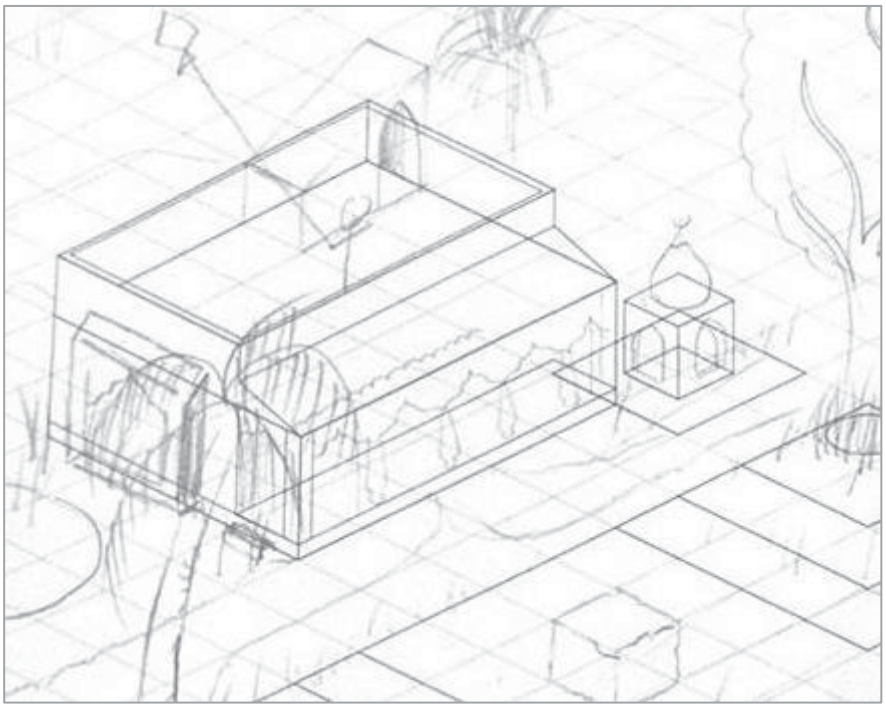


Figure 36: Recognition of architecture as signs of culture

Experiment Two: Online Game

Reflecting upon Experiment One, I saw the need to bring society into the game. As a starting point this was taken literally and society was attempted to be visually represented in the game (Figure 40).

By drawing what could be beyond the fences of the farm I found that it was possible to have an entire region to play on. This presented the scope of exploring realistic competitive gameplay and the social engagement associated with competition as drivers for reducing the focus on simulation, and as a means to have more than one player. A new game map (Figure 37) was created consisting of assets loosely resembling landmarks from various cities in India. For example the major bridge in figure 39 was made to resemble the Vidyasagar Setu in Calcutta (Figure 39), the circular structure on the game map, to resemble the parliament house in New Delhi (Figure 38). It was hoped that by making assets resemble the the location of the game, it would make the environment more easily relatable for the EMC.

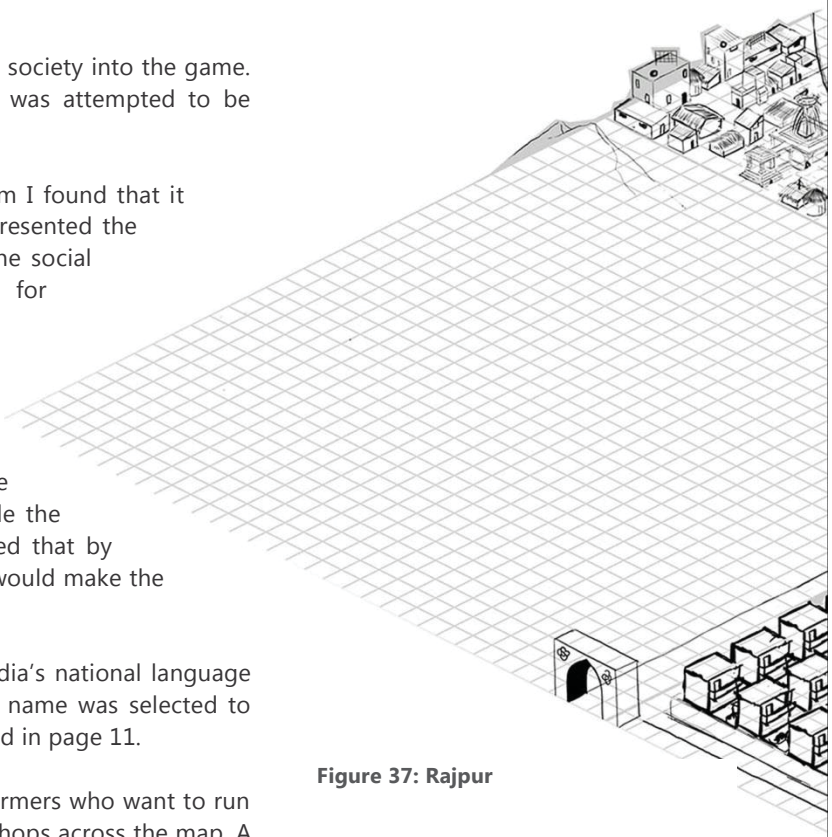


Figure 37: Rajpur

The region of this game map was named "Rajpur." In India's national language Hindi, Raj means leading, while "pur" means place. This name was selected to represent the progressive values of the EMC as understood in page 11.

In Rajpur, the players (myself) assume the role of dairy farmers who want to run a dairy monopoly. This is through the unlocking of milk shops across the map. A monopoly in this regard was seen as an exploration of the contextual analogies understood from dairy culture in contemporary and present day India where the two are presently interacting. The hope was to develop this as a digital game.

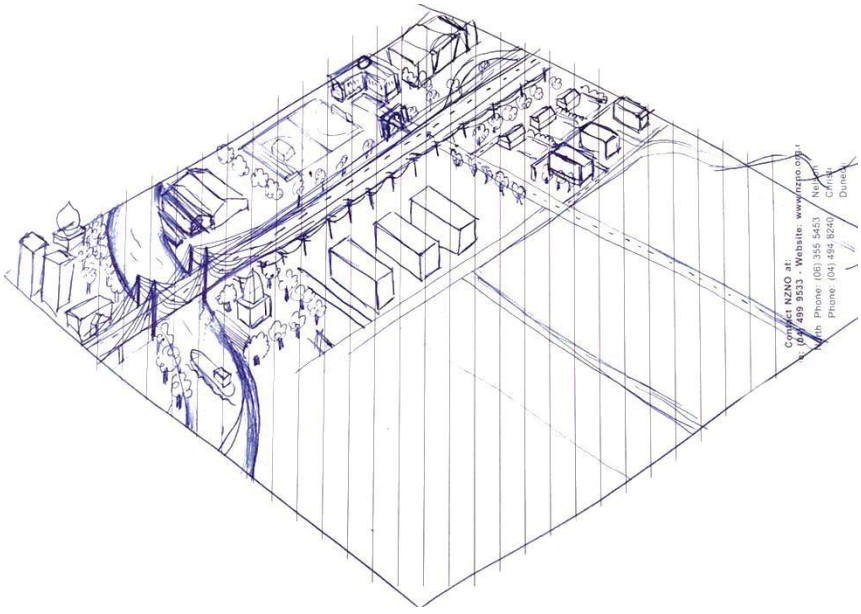


Figure 40: Expanded map

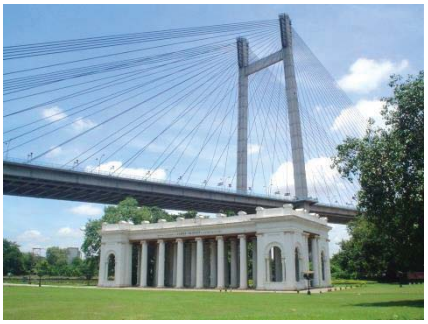
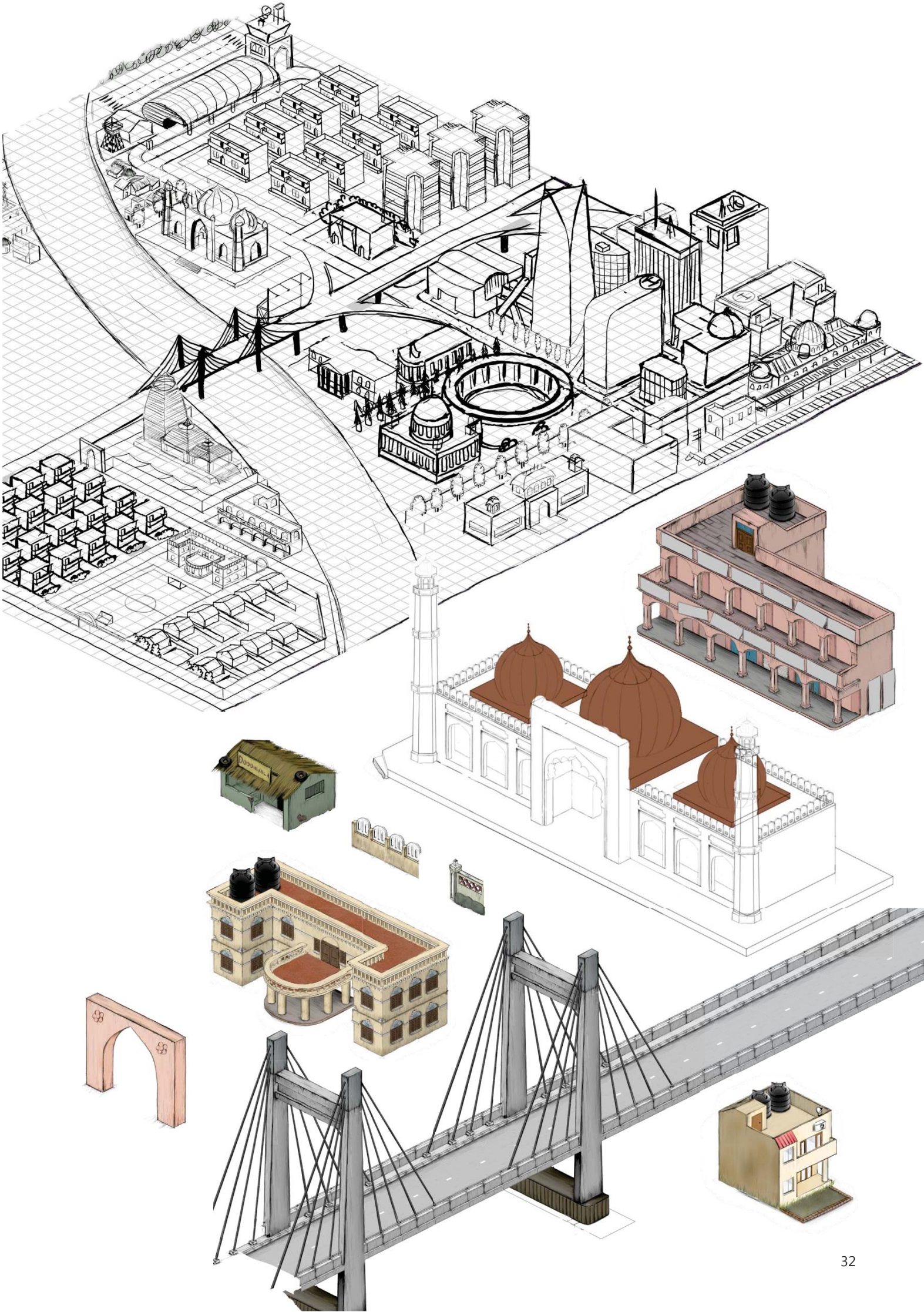


Figure 39: Vidyasagar Setu in Calcutta

Figure 38: Parliament House in Delhi



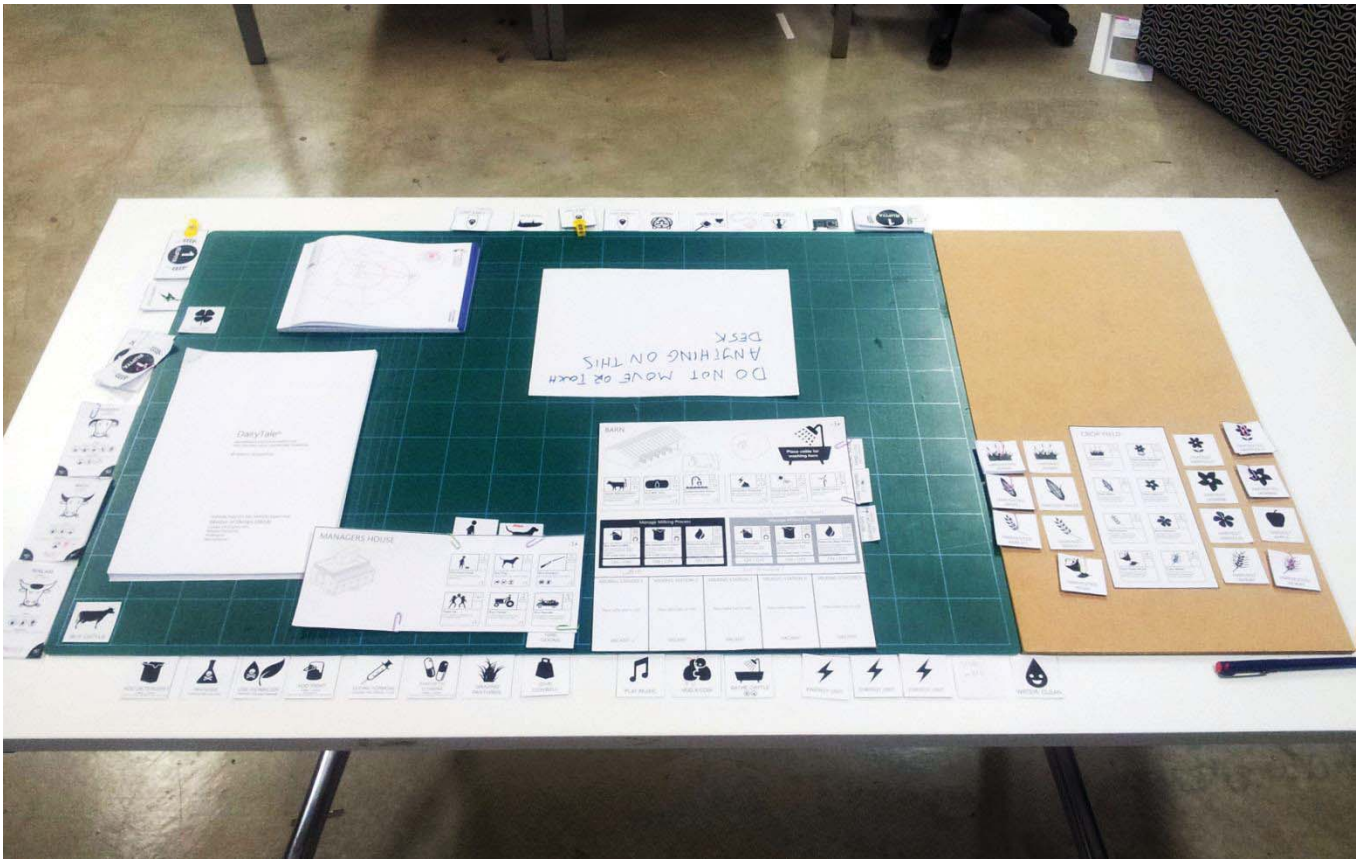


Figure 42: New paper prototype

A new paper prototype was created in the form of a board game with figure cards (Figure 42). The assigned objective of the game was to farm and produce dairy milk (Figure 41) and win over to all milk shops on the map to establish a monopoly. This included wire-frames (Figure 47).

Figure 41: A dairy milk unit

The concept was expanded from experiment one to incorporate industrial dairying (Figure 43). Representational models were took too much time to replicate by hand therefore they were dropped and replaced with digital printouts of using graphics as tokens and interfaces. Players could interact with the game using them. Industrial dairying options were available. But to progress in the game, it was necessary to unlock milk shops. This was possible with organic points scored from keeping cows happy according to information on cow cards. Milk shops in the game were metaphors segmenting society according to how people are willing to pay for better milk – like the EMC. To produce milk it was not necessary to keep their cows happy. This was represented by having a suspended disbelief timer where every X amount of time a cow would produce a unit of milk (Figure 44). This unit of milk would carry with it qualities influenced by the state of the cow's health or happiness. For example, using bovine hormones on cows to cut the milk timer in half, leading to double the profit (As understood from industrial agriculture focusing on achieving higher capital and output on page 3). However in doing so the milk would acquire the action token "bovine hormones". This token would negatively affect the milk sales.

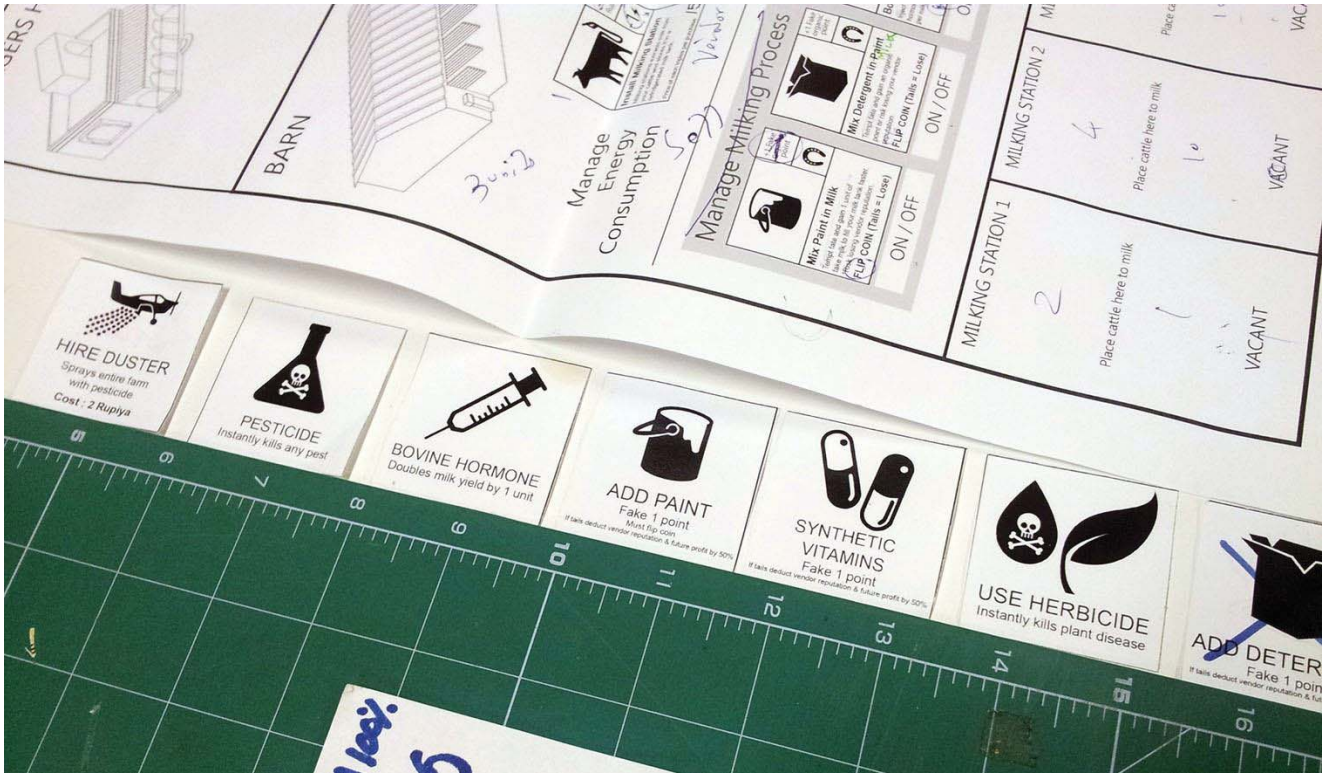


Figure 43: Industrial dairying options

Figure 44: Cow card and timer for points

With money a player (myself) could buy better cows or better farm assets. This in turn would allow one to produce better milk thus unlock better shops and better rewards (Figure 46). The sustainable scope of the game was expanded within this cycle in three regards.

- Sustainable energy sources could be purchased with money allowing players to interact with assets related to climate change (Figure 49).

- In the cow shop (Figure 48), cheap local cows had lower requirements to keep happy but with average happiness range – a metaphor for average milk yields, while imported cows like Holstein had higher a happiness range but with higher requirements to keep happy. This attempted to represent the unsustainability associated with importing cows which are unsuitable for an Indian climate and require air-conditioning – power. While also making it more difficult to balance the cows not becoming unhappy staying indoors.

- One could grow crops and plants for providing a better diet for their cows. This was represented by a fodder field with multiple crops and flower plants players could plant (Figure 47). In an attempt to introduce sustainable thinking to crops, a mechanic called "wildcard" opened the scope of introducing weed and disease management towards ensuring the herd's happiness. For example, if a weed was growing by the crops, there was the option to ignore, weed out the plant or use weedicide.

Figure 45: Currency Note

Figure 47: Crop Field

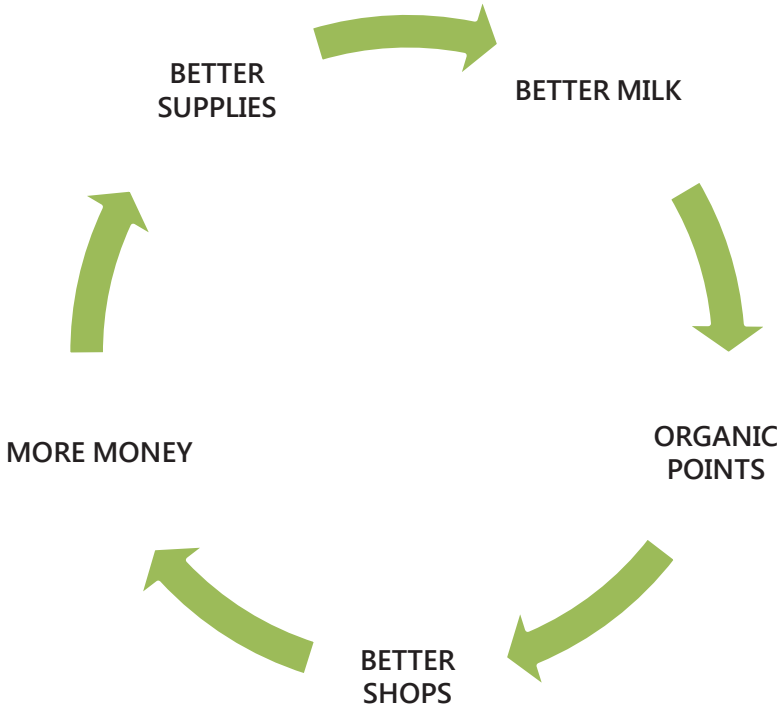


Figure 46: Dairy cycle

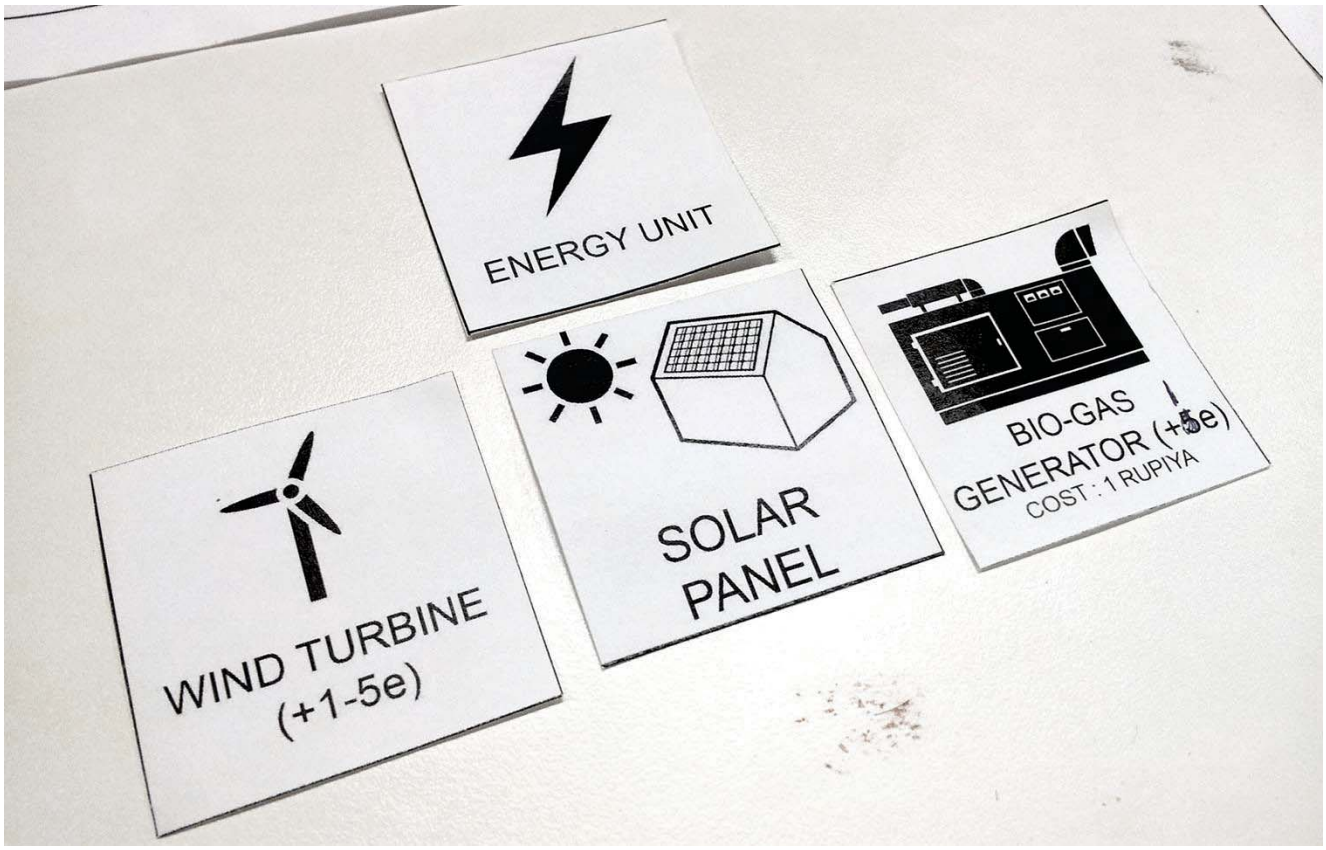


Figure 49: Sustainable energy sources

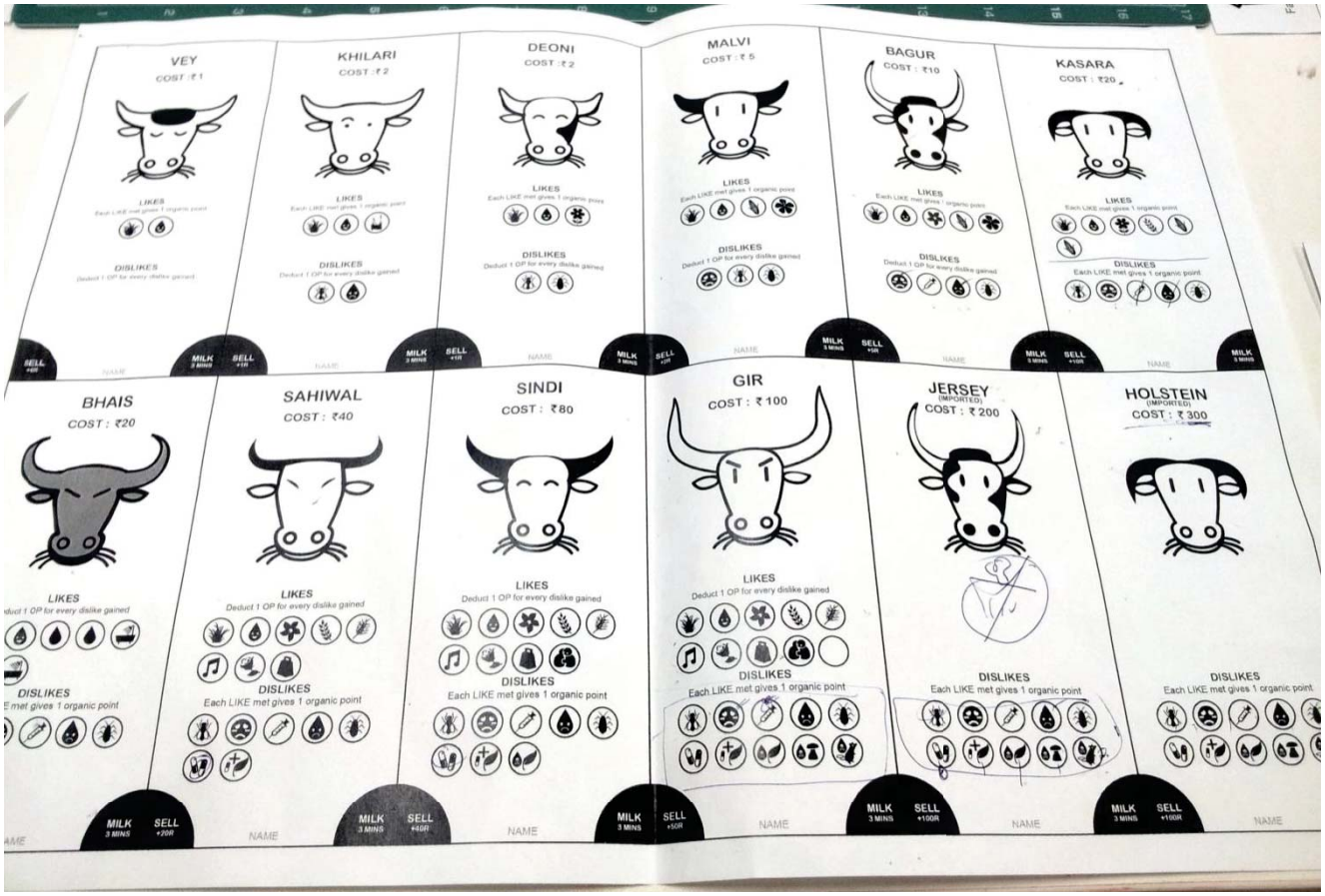


Figure 48: Cow shop

Wildcards could be seen as a problem solving mechanic. This opened the scope of using it to introduce other scenarios – sustainability related scenarios. For example, a scenario created was "A tiger was on the prowl" (see Figure 50). One would require to solve the problem in order to progress in the game.

- Ignore and risk losing cows or the tiger just leaving.
- Attempt tranquilizing the tiger by flipping a coin and be rewarded.
- Kill the tiger and instantly solve the issue without rewards.

According to WWF tigers are an endangered animal. They play a pivotal role in the health and diversity of an ecosystem. For thousands of years humans and tigers have co-existed in India. Human population was much lower and forest areas were in abundance. However, the population explosion in India has led to large scale deforestation - forcing wild animals such as tigers to into villages looking for food. In the process, humans, particularly children and women get killed. Villagers retaliate by killing tigers. India has lost 95% of its tiger population since the turn of the 20th century to such events and poachers. From a population of 100,000 it is estimated less than 1400 tigers remain. What is alarming is that India holds over half the world's tiger population. This is a critical sustainability related issue which desperately requires the attention of high consumption groups like the EMC. This is because as mentioned in Chapter One, human consumption is one of major the underlying drivers behind unsustainable environmental development. Wildcards present a means to articulate such sustainable issues within the game and explore them.

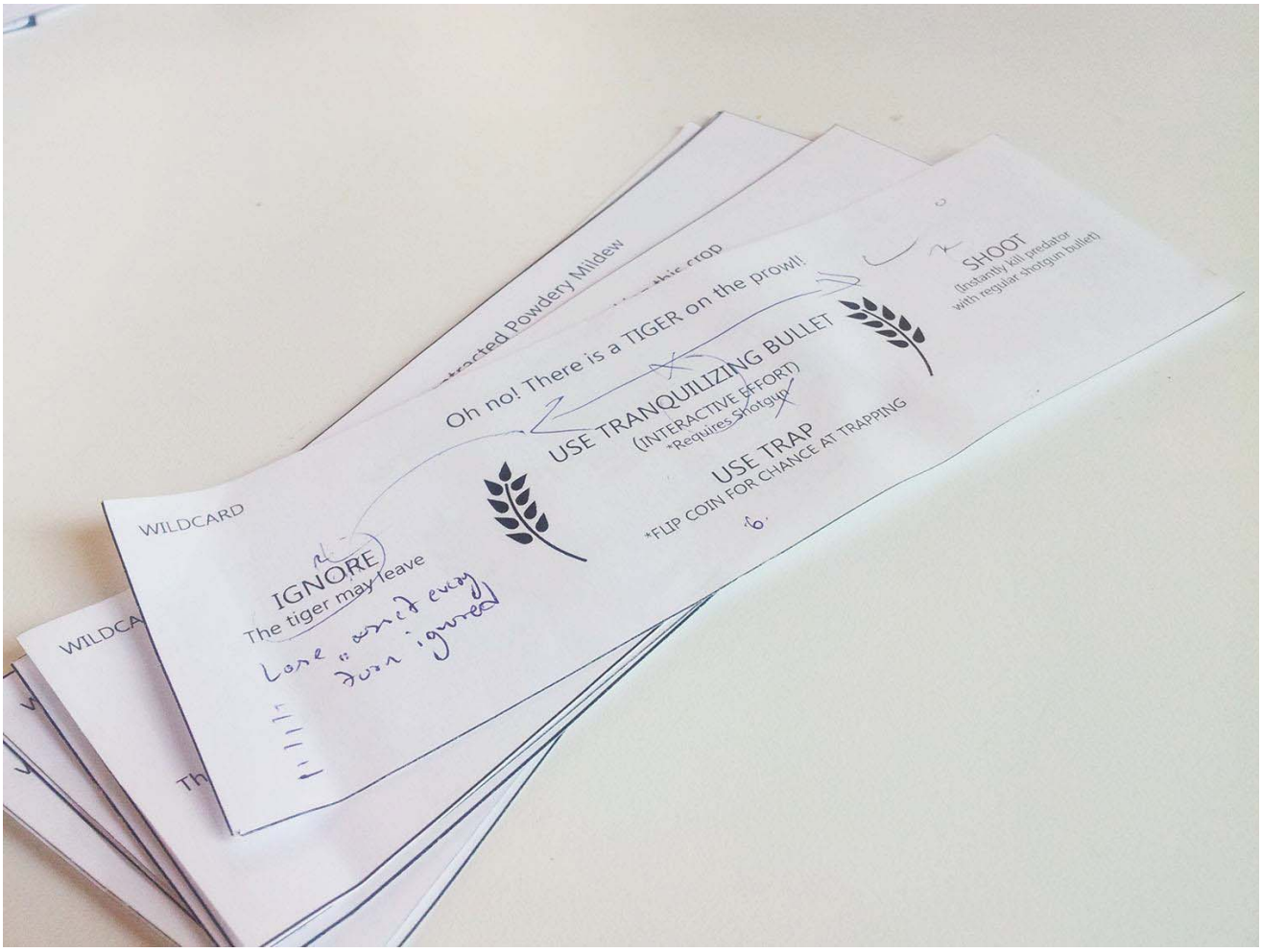


Figure 50: Sustainable wildcard scenario

MANAGERS HOUSE
BARN
MILK BAR
Organic Quality
Pasteurised
HARVESTED MAIZE
HARVESTED ROSE
HARVEST HIBISCUS
HARVEST HIBISCUS
HARVESTED WHEAT
HARVEST MARIGOLD
HARVESTED JOHAR
HARVEST JASMINE
HARVESTED BARLEY
HARVEST APPLE
GRAZING PASTURES
Farm Hand
1 RUPIYA
2
COBRA
LEOPARD
TIGER
PREDATOR
WILD PIG
FLIES ON COW
WILD BOAR
WILD BOAR CAT
FARM DOG
Farm Hand
BATHE CATTLE
HUG A COW
GIVE COWBELL
PLAY MUSIC
GUN
CLEAR SHED
VEY
COST: ₹1
KHILARI
COST: ₹2
DEONI
COST: ₹2
MALVI
COST: ₹5
BAGUR
COST: ₹10
KASARA
COST: ₹20
BHAIS
COST: ₹20
SAHIWAL
COST: ₹40
SINDI
COST: ₹80
GIR
COST: ₹100
LIKES
DISLIKES

Playing with board game, as compared to experiment one where I performed suspended disbelief, found that the updated design with industrial dairying and selling of milk to milk shops was creating some form of sustainable awareness but it was not apparent. Excessive game equipment was making the game tedious. For example counting currency notes repeatedly was annoying. Some of the key findings were:

Card based gameplay: Cards like cow cards presented both visual and textual information. This seemed to be more informative than tokens.

Wildcards: Wildcards created a strong sense of awareness regarding choices and their outcomes. Scenarios like the tiger issue made one negotiate the value of each choice. This activity was engaging and informative. Some aspect of meaningful play was thus taking place within the context of sustainability through wildcards.

Cultural elements: Certain bonuses in the game like celebration of cows and theft of cows by gangs were well understood. The avoidance of religious values in the rhetoric yet being able to experience cultural events was necessary.

Game map: A sense of culture from the architecture was found from on the map.

Evil Milk: I found myself drawing wings and horns on one of the milk tokens when I was unable to sell the milk to one of the shops I wanted and called it "evil milk." After this I stopped using industrial processes and attempted to actively avoid it. This indicated that the segmentation of society through milk shops was functioning and it allowed industrial and organic agricultural practises to be differentiated but the reasons for doing so had little to do with an acquired understanding of sustainable practises.

Figure 51: Thieves

Figure 52: Evil Milk

Experiment Three: Digital to Analogue

I found the gameplay very tedious and unenjoyable due to excessive game equipment. I realised the main cause behind this was my bias towards digital games.

The project's predisposition to the digital platform was inhibiting its ability to find out what could engage an audience. Given the autonomy of games and gamification understood in Chapter One, and the need to explore a broad range of ideas, it was necessary that the project stop clinging to exploration for a digital platform and explore all possible avenues towards communication of sustainable values through meaningful play. This is supported by Emma Westecott's view that "Contemporary digital games do not even begin to scratch the surface of how the game form might influence every aspect of human culture and behaviour." I therefore put aside rendering the game map any further focus on developing the gameplay.

A method explored for reducing clutter was combining multiple mechanics to represent a sum of their meaning (Figure 54). For example, rather than multiple fodder crop tokens, a single card was used to represent their integrating meaning in the game. In combining multiple assets in a similar manner I found that game had transformed into a card game (Figure 55).

The first set of prototypes consisted of random sized cards with handwritten instructions. They were redesigned as poker sized 2.5'' x 3.5'' cards with instructions and vector art (Figure 57). Multiple copies were easily replicated.

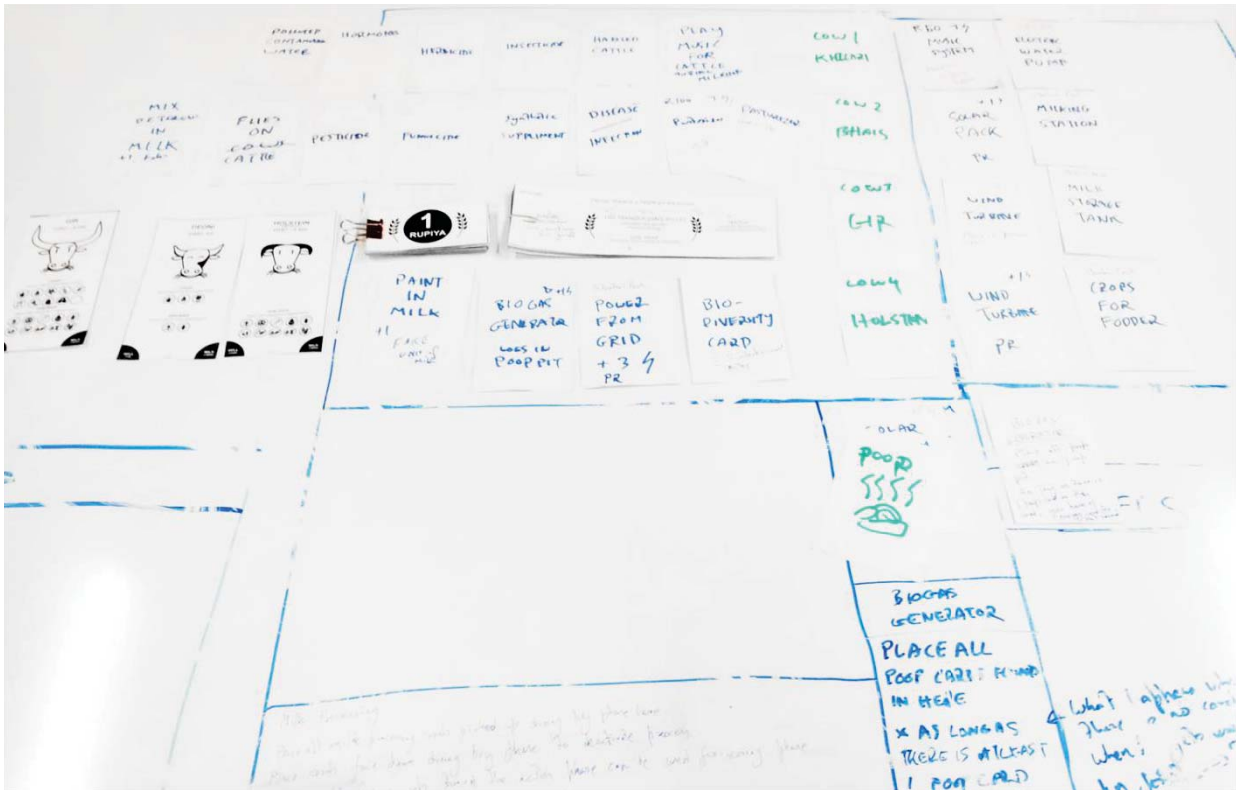


Figure 54: Reducing clutter

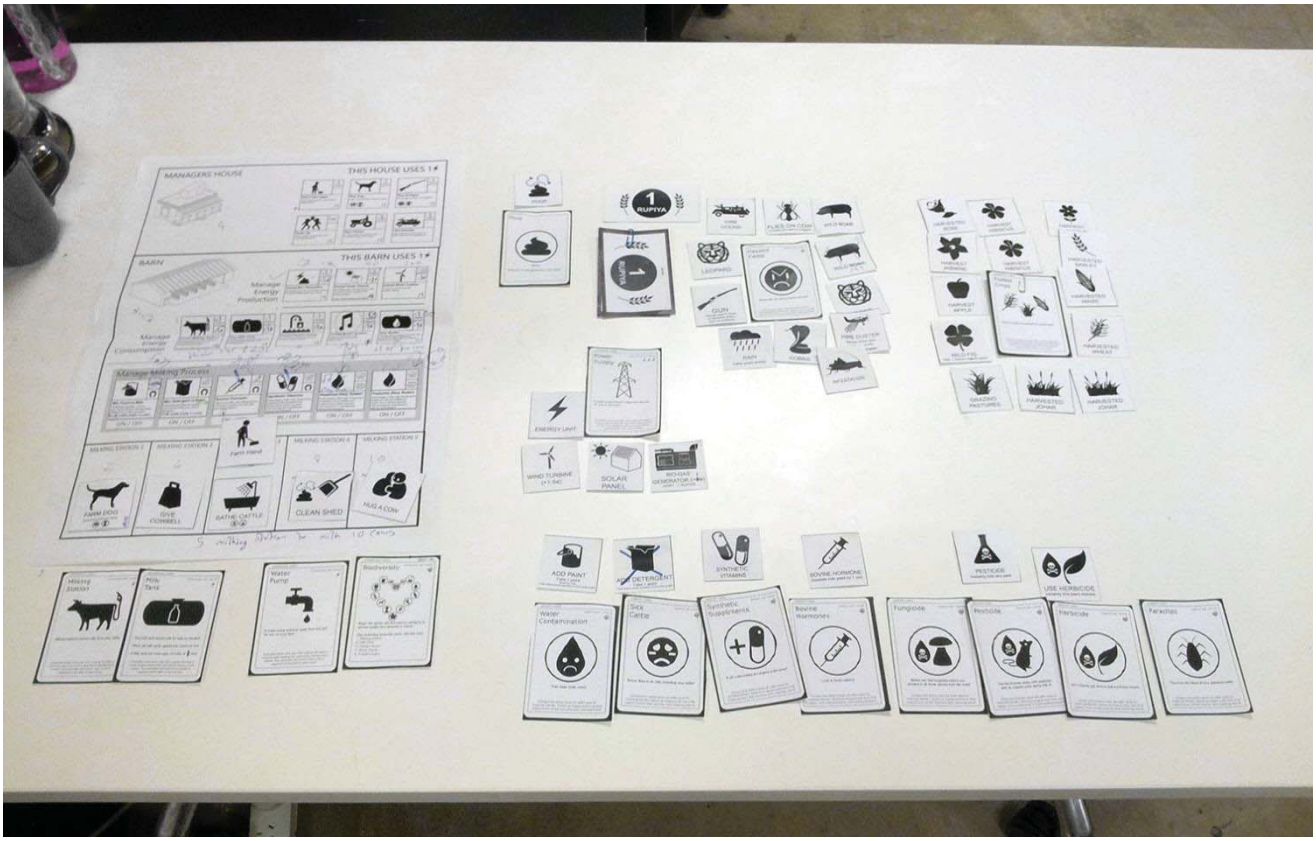


Figure 55: Transformation

Figure 56: Line borders

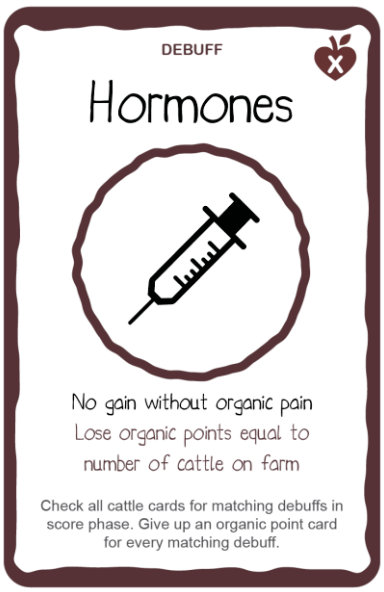


Figure 58: Organic borders

Figure 57

Without the game map the visual connection with the cultural environment of the game was lost. To find a solution I replaced the line borders (Figure 56) with organic lines (Figure 58). This proved to be unsuccessful as it appeared dull, boring and without any meaning to the game. The game was still somewhat confusing. This was linked to excessive cards and a lack of clear ideology in the rules (Figure 57). A rule sheet was created with game setup instructions (Figure 59). Immediately following, I found the game easier to understand as reflected by a critical issue coming to light. The idea of competing and/or eliminating someone who was trying to be sustainable was not acceptable as elimination of someone attempting to be sustainable is far more unsustainable than the sum of the game's ideological outcome. This raised the question of whether monopoly and competition were viable approaches for communicating sustainable values. As a result I found myself looking for a new game ideology.

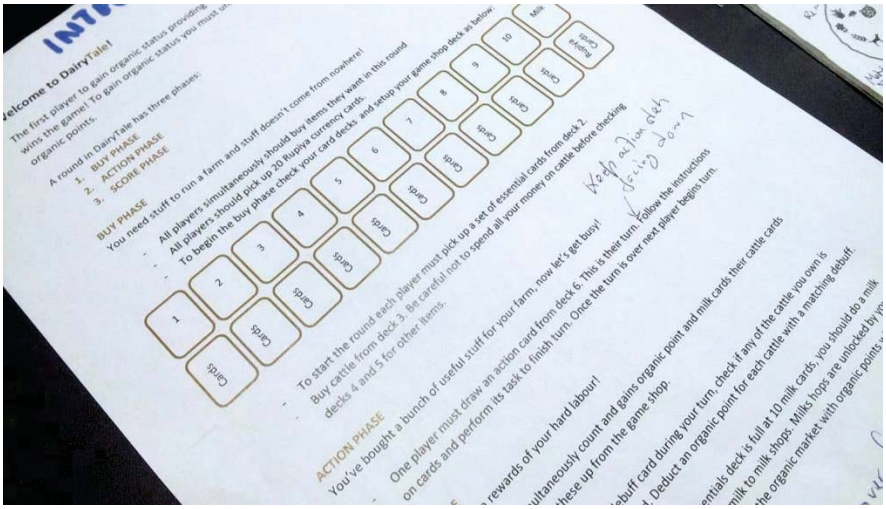


Figure 59

Experiment Four: Analogue Card Game

The idea of evil milk in experiment two, and how the key finding of competition in experiment three emerged, reminded me of how in stories, a villain poses as a protagonist and reveals themselves after subverting the scenario to their advantage. For example in the *Star Wars* franchise, the villain Darth Sidious poses as a protagonist, and transforms the scenario to his advantage only to reveal his identity once the damage is done. A similar subversion can be seen in chapter Two, between contemporary and present day dairy culture in India. Industrial dairy was once accepted by society without dissent however it turned into the very problem that plagues India today. This inspired the development of a new narrative for the game. One based on subversion where a corporation called Megamilk once meant to provide safe industrial dairy to the masses has turned corrupt from monopoly and brought a curse upon the land of Rajpur and a new generation of farmers emerge to take up the cause of bringing an alternative to the people. Prior to exploring how to implement this new story as the game's narrative, the problem of being unable to derive a sense of culture from the cards was looked into. A solution explored was increasing the dimensions of the cards to fit in architectural assets from the Rajpur's game map from Experiment Two (Figure 61).

Figure 61: Trying out other sizes

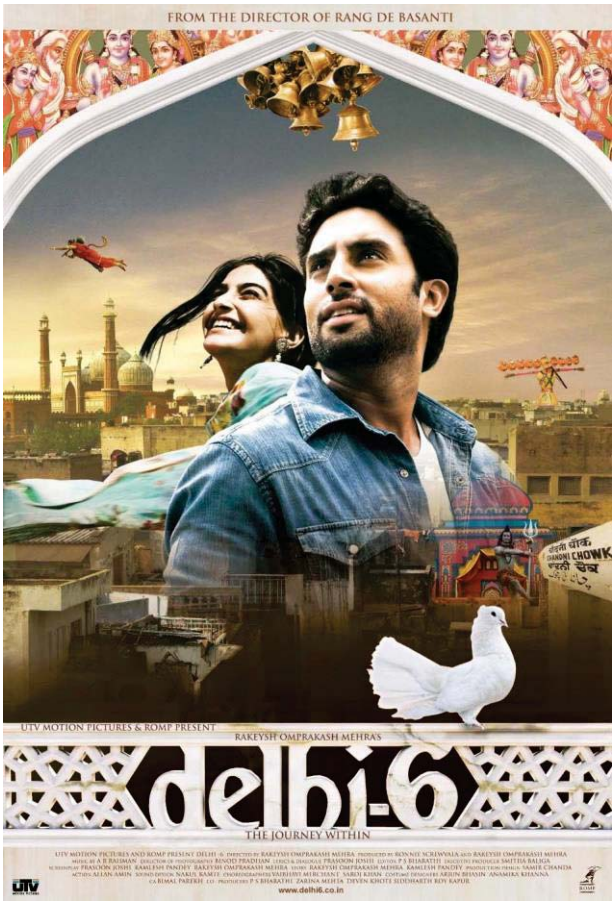


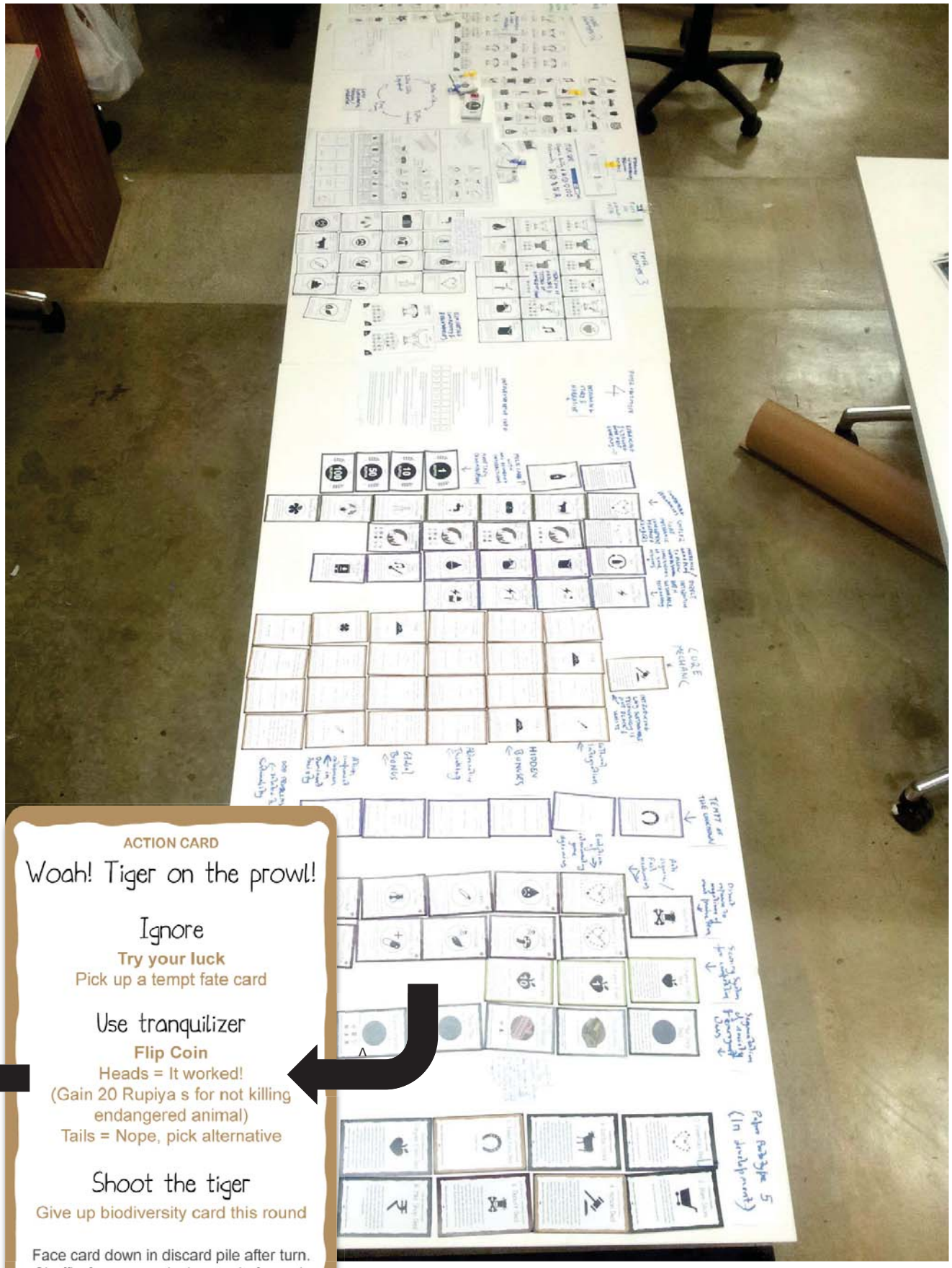
Figure 60: A Bollywood poster with an arch

This approach failed. The shrunken artwork of the architectural assets were too small to derive any culture from. Furthermore simply placing buildings on a card might work for certain cards but not all.

Attempts to find an architectural design element which could efficiently utilise the space on poker size cards led to exploring the use of arches as the visual frame on the cards. Arches as method of framing and contextualizing visual and textual content have been used throughout Indian history and continue to be used today as found in Bollywood movie posters (Figure 60). By applying an arch graphic to the card, an unused space emerged. To utilise the unused space inside the arch, a pattern to represent each card type was applied (Figure 62).

In Experiment Two, wildcards had proven themselves to be the most effective mechanic towards communicating sustainable values (Figure 63). In an experiment to see what would happen if every single idea and/or idea from all experiments were converted into wildcard scenarios (Figure 64), I found that not only had the game compressed itself into a single deck of cards, but as wildcards were a problem solving mechanic, a new, problem

Figure 62: New Action card



ACTION CARD

Woah! Tiger on the prowl!

Ignore

Try your luck

Pick up a tempt fate card

Use tranquilizer

Flip Coin

Heads = It worked!
(Gain 20 Rupiya s for not killing endangered animal)
Tails = Nope, pick alternative

Shoot the tiger

Give up biodiversity card this round

Face card down in discard pile after turn.
Shuffle & return to deck at end of round.

Figure 64: Old Wildcard

Figure 63: All experiments

solving game ideology had emerged. It represented everything previous experiments failed at communicating, in a framework demonstrating strong characteristics of meaningful play towards sustainability. Due to this, wildcards could no longer be seen as "wild" in nature and were renamed to action cards. As meaningful play for this project understood on page 15 occurs in tandem with realisation of ones action over the entire course of the game, it was necessary to build a system around action cards. To do this, three new types of cards were created. Action cards were first designed in a green colour scheme to signify eco-action. A heart symbol previously used for organic points was used to signify eco-action as something precious.

Character Cards

Character cards allowed the exploration of "lusory attitude". A term originally coined by Bernard Suits in *The Grasshopper: Games, Life and Utopia*, a lusory attitude depicts the "voluntary attempt to overcome unnecessary obstacles." It was later adapted to contemporary games by Salen & Zimmerman as "The psychological attitude required of a player entering into the play of a game." Character cards attempted this by letting one assume a persona to enter the game (Figure 66). These personas included a landlord, a trader, a mechanic and a holy priest, roles evident in most societies for easy relatability. This allowed easy assignment of role bonuses. For example, machine repair related bonuses for mechanics, trade related bonuses for traders.

Character cards allowed the scope of exploring another aspect of sustainability – gender equality. This was attempted by assigning a female persona to a leading character role – the landlord.

As vector graphics had repeatedly failed to create any culture in previous experiments, an alternative was tried out within character cards by creating illustrations of the personas in a traditional Indian miniature style. According to Jain & Daljeet (2004) "The miniature art was by and large a commissioned thing requiring the artist to paint the 'desired', something that delighted his patron or served any of his needs, the spiritual, aesthetic or sensuous." And that "it could be used to delete or minimize, or sophisticate, the crudeness or to add to the 'real', when the 'real' itself was crude or ugly, some degree of aesthetic refinement, as his patron would not have liked to see his 'reality' bearing a crude face" (Figure 65). It offered three things to this project:

1. A style that could utilise the small space on cards without losing detail.
2. A culturally relevant art style.
3. A style that is recognised towards delighting an audience as opposed to other forms of stylization that invoke emotions other than delight.

A pattern of stars was used to indicate the player as the star of the game and a yellow colour scheme was used to test if it invoked a sense of warmth as the first point of entry into the game.

Figure 65: A miniature painting

Figure 66: Character cards

Farm Cards

Farm cards represented the combined presence of all assets on a farm, including cows. Russet orange was used to test if it could represent the colour of earth. A pattern and main visual was created out of farm asset icons from previous experiments (Figure 67).

Figure 67

Megamilk cards

Megamilk cards represented Megamilk, the story's corrupt corporation. It was the combined presence of multiple unsustainable concepts in a simple narrative as a form of taxonomy. For example, the use of unsustainable synthetic chemicals such as pesticides, herbicides, weedicides, fungicides, hormones, paint, detergent, as one "synthecide" card. Other unsustainable cards included evil bugs, hassled cattle, disgusting water and captain unplanet. They were designed in a red colour scheme to test if it created a sense of caution. A pattern of negative point symbols was created to test if it communicated their negative nature. Each MegaMilk card contained one vector illustration to symbolise - the meaning is articulated in the accompanying captions.

Figure 68

A mind-map helped create a set of rules for turn-based play for up to 4 players (Figure 69). The rules were presented as a double-sided A4 printout (Figure 70).

One could setup the game by drawing a character card and 4 farm cards. These represented a player's hand. Losing them meant losing the game.

A round starts when the player draws an action card from the action card deck. That player must make a decision and depending on their decision, they either kept the action card, or discarded it. Each action card gained is a point scored towards the goal of the game – making "magic milk". This was a metaphor for organic dairy. Scoring action cards were made a challenge where making poor choices would lead them to acquire Megamilk cards. Each Megamilk card acquired signified the player falling towards corruption and a player could gain up to a limit of 5 Megamilk cards

Whoever acquired the most action cards by the end of the game had learnt the secret to making magic milk and saved the people from Megamilk's industrial milk, making them the winner.

The story of the game from the A4 printout seemed understandable however the presentation of it on the paper seemed boring.

The scenarios brought on by the action cards very engaging and informative. The game did not feel cluttered. This indicated the new ideology and narrative was functioning smoothly.

The game did not consume more than 20-30 minutes. This was a stark contrast compared to experiment two where the game could never be finished due to clutter.

Figure 69: Mind-Map

Figure 70: New game iteration with new rules

The concept of Megamilk as a corporation seemed to be unappealing and boring. The challenge of avoiding getting corrupted by gaining too many Megamilk cards was engaging. The cards could be even more malefic as one could abuse the system by acquiring up to 5 Megamilk cards and then they could simply stop picking up Megamilk card afterwards. Overall the representation of unsustainable values as a Megamilk cards was functioning.

The total visual absence of cows in the game was observed. Representing living dairy cows along with inanimate assets in a single card was therefore not the best route.

Using multiple symbols to create the farm card pattern appeared to be inconsistent with other cards and confusing.

The use of hearts as the pattern on action cards also seemed confusing. Hearts could be related to health points, making them relevant to cards that comprise of a player's hand. A players hand comprised of character and farm cards. These were cards a player needed to hold on to in order to survive in the game – much like health points.

The star pattern on character cards seemed to look more like a spark than a star. This spark pattern was more relatable to the emergence of an event.

The use of russet as a colour for representing farm cards also failed as no sense of meaning could be drawn from it. Rapid prototyping of farm cards in multiple colours (Figure 71) revealed that the use of two colours – yellow for character cards and another colour for farm cards to be confusing. It implied there were alternative uses to the cards which there was not.

An immediate cultural connection could be drawn to the arch and use of miniature art style for character card portraits - but not with the vector graphics of farm and Megamilk cards. The shape of the arch and the art style made the game feel as if it was set in India or the Middle East. The back of the cards were also blank at this point. This indicated the use of an arch and miniature art-style was creating an environment for the game while vector graphics were not and the back of the cards had been ignored.

Figure 71: Trying out other colours for farm cards

While playing the game I found that dice and coins sometimes flew off the table. A solution explored was if a paper box (Figure 72) made to the specifications required to fit the contents of the game (3.8" x 2.5") could be used to roll dice and coins. This brought to my attention that the dice being used was a plastic dice. Plastic is a synthetic material. A bio-degradable cork dice was made for testing (Figure 73). Playing with the dice revealed that the cork dice failed to roll within the box (Figure 74), while the plastic dice successfully rolled but only in one direction. However the cork dice began to deteriorate from successive rolling by hand and the plastic dice rolling only on one axis in the box was found to be annoying. Testing of the box to roll coins found the dimensions of the box insufficient to turn any coin on any axis. The scope of assigning a dual purpose to the packaging of the game held little or no merit unless the contents of the game increased in which case the increase in dimensions of the box would allow it to serve a dual purpose. Bio-degradable dice presented a scope of exploration.

Figure 72: Box

Figure 73: Cork Dice

Figure 74: Attempting to roll dice in box

Final Design

Figure 75: Adjustment of flow

Update Story & Pamphlet

The flow of the game was adjusted to prevent the abuse of the MegaMilk cards by adding a rule to deduct points for every Megamilk card a player held at the end of the game (Figure 75). From this, one would know acquiring Megamilk cards means a reduction in points but they wouldn't know how many points another player has till the end of the game.

The story of the game was adjusted with further fantasification. Megamilk Corporation was converted to a magical robot figurehead. Magic milk was replaced by pure milk. A prophecy was introduced stating whoever controlled pure milk controlled the people – a metaphor of the deep roots of dairy within Indian culture.

In the narrative Megamilk was created to mass produce pure milk however when people began to take it for granted the secret to making pure milk was forgotten and Megamilk emerged as the sole entity left with its knowledge. Falling to corruption brought on the power of this knowledge a curse fell on the land – a metaphor to represent the emergence of Industrial dairy in contemporary India and the issues it now plagues present day India with. The curse allowed the introduction of pop-culture elements such as the zombies, vampires and evil minions to make the game more appealing to the non-Hindu audiences.

To break the curse of Megamilk a handful of farmers as the players have set out to relearn the secret to making pure milk such that Megamilk is no longer the only entity with its knowledge – a metaphor to represent the emergence of new dairy farmers in present day India. However Megamilk's curse stands in the way of players attempting to farm and rediscover pure milk by means of misfortune, supernatural events and evil minions. Whoever overcomes the odds without falling to Megamilk's curse or being defeated by losing all their farm and cows would break the curse and deliver the people of Rajpur from the curse of the land.

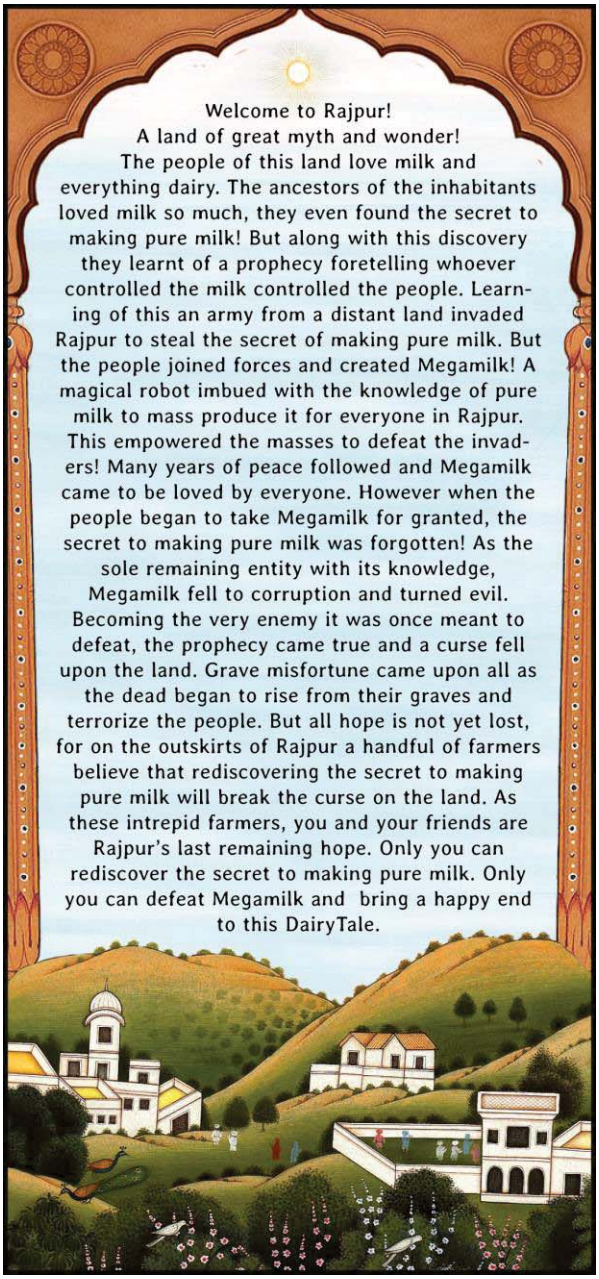
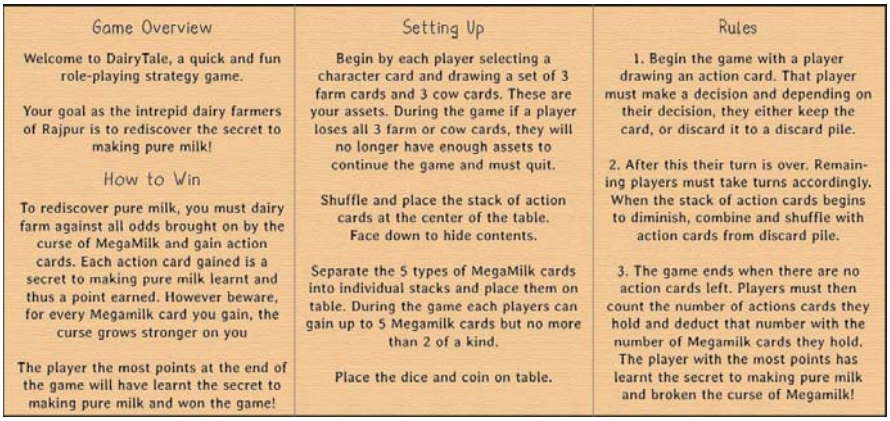


Figure 76: New story



Game Overview

Welcome to DairyTale, a quick and fun role-playing strategy game.

Your goal as the intrepid dairy farmers of Rajpur is to rediscover the secret to making pure milk!

How to Win

To rediscover pure milk, you must dairy farm against all odds brought on by the curse of MegaMilk and gain action cards. Each action card gained is a secret to making pure milk learnt and thus a point earned. However beware, for every Megamilk card you gain, the curse grows stronger on you

The player the most points at the end of the game will have learnt the secret to making pure milk and won the game!

Setting Up

Begin by each player selecting a character card and drawing a set of 3 farm cards and 3 cow cards. These are your assets. During the game if a player loses all 3 farm or cow cards, they will no longer have enough assets to continue the game and must quit.

Shuffle and place the stack of action cards at the center of the table. Face down to hide contents.

Separate the 5 types of MegaMilk cards into individual stacks and place them on table. During the game each players can gain up to 5 Megamilk cards but no more than 2 of a kind.

Place the dice and coin on table.

Rules

1. Begin the game with a player drawing an action card. That player must make a decision and depending on their decision, they either keep the card, or discard it to a discard pile.

2. After this their turn is over. Remaining players must take turns accordingly. When the stack of action cards begins to diminish, combine and shuffle with action cards from discard pile.

3. The game ends when there are no action cards left. Players must then count the number of actions cards they hold and deduct that number with the number of Megamilk cards they hold. The player with the most points has learnt the secret to making pure milk and broken the curse of Megamilk!

Figure 77: Pamphlet turned over

The updated story was represented through a new instruction pamphlet (Figure 76) and by alterations to the rhetoric of the cards. The new double sided instruction pamphlet folds to 2.5" x 3.5" to match the cards and fit inside a box. The pamphlet was designed with a miniature style illustration of Rajpur along with the updated story. Turning over the pamphlet revealed the game overview, instructions for setting up and rules for play (Figure 77).

New Box

Figure 78: New Box

A new box was created with an illustration of Rajpur and a logo unit (Figure 78). This illustration was used on the back of the cards as well.

New Wooden Dice

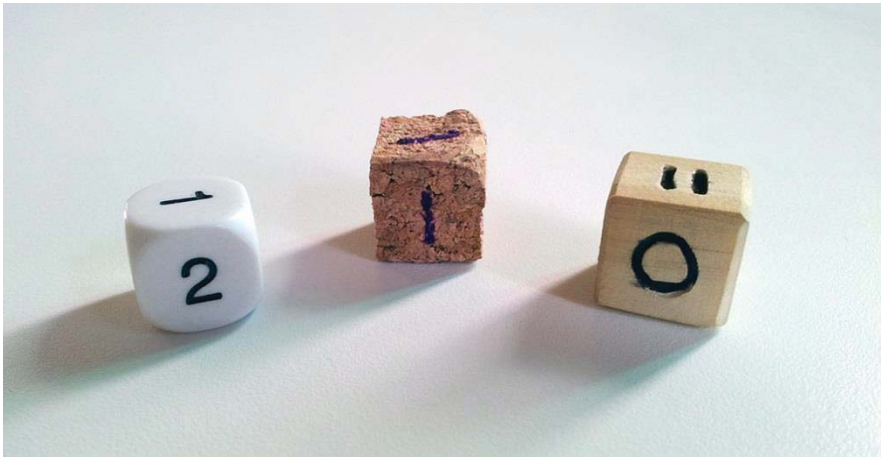


Figure 79: The evolution of dice

A new wooden dice was created from a waste block of wood keeping in mind earlier findings. The new wooden dice is silent, does not fly off the table surface as easily and is not as fragile as the cork dice.

The Player's Hand

Cow cards were integrated into the game by altering action card scenarios. Action card scenarios where cows were involved were redirected to affect cow cards instead of farm cards.

A player's hand now comprised of cow cards, farm cards and character cards. As the use of multiple colours for the player's hand confusing, the yellow colour scheme from character cards was replicated on all cards for player hands. Character cards were updated with a new narrative by altering each persona background story. The spark pattern on character cards and the heart pattern on the action cards were swapped with each other.

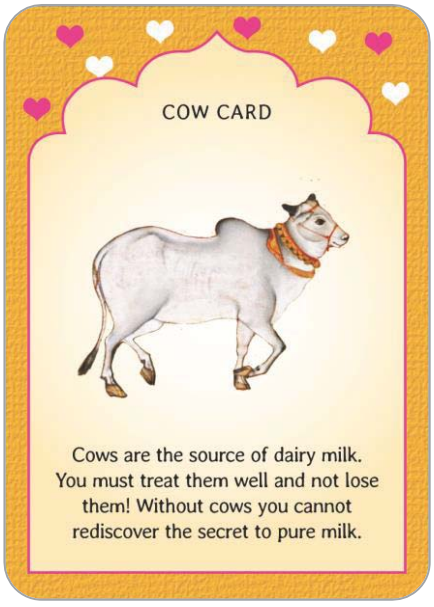


Figure 80: Updated cow cards

Figure 81: Updated farm cards

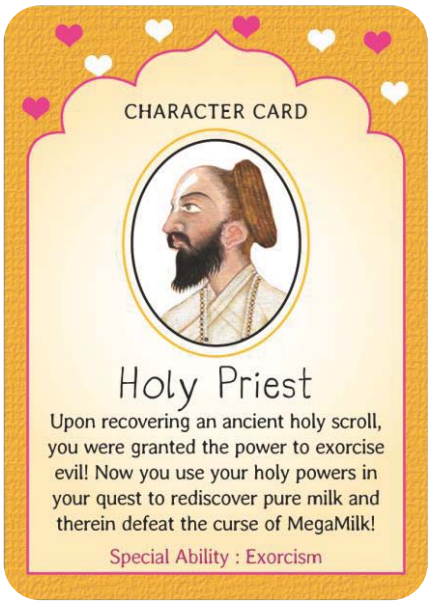


Figure 82: Updated character cards

New Action Cards

New sustainability related scenarios were made into action cards and integrated into the game (Figure 83). A total of 30 action cards were created. The narrative of each card was adjusted for the updated story.

Updated Megamilk Cards

Megamilk cards were updated with a skull pattern to make the negative nature of the cards more apparent. The vector visuals were replaced with new miniature styled illustrations based on their respective themes.

The narrative of the cards was updated to match the new story.

Figure 83: New action cards

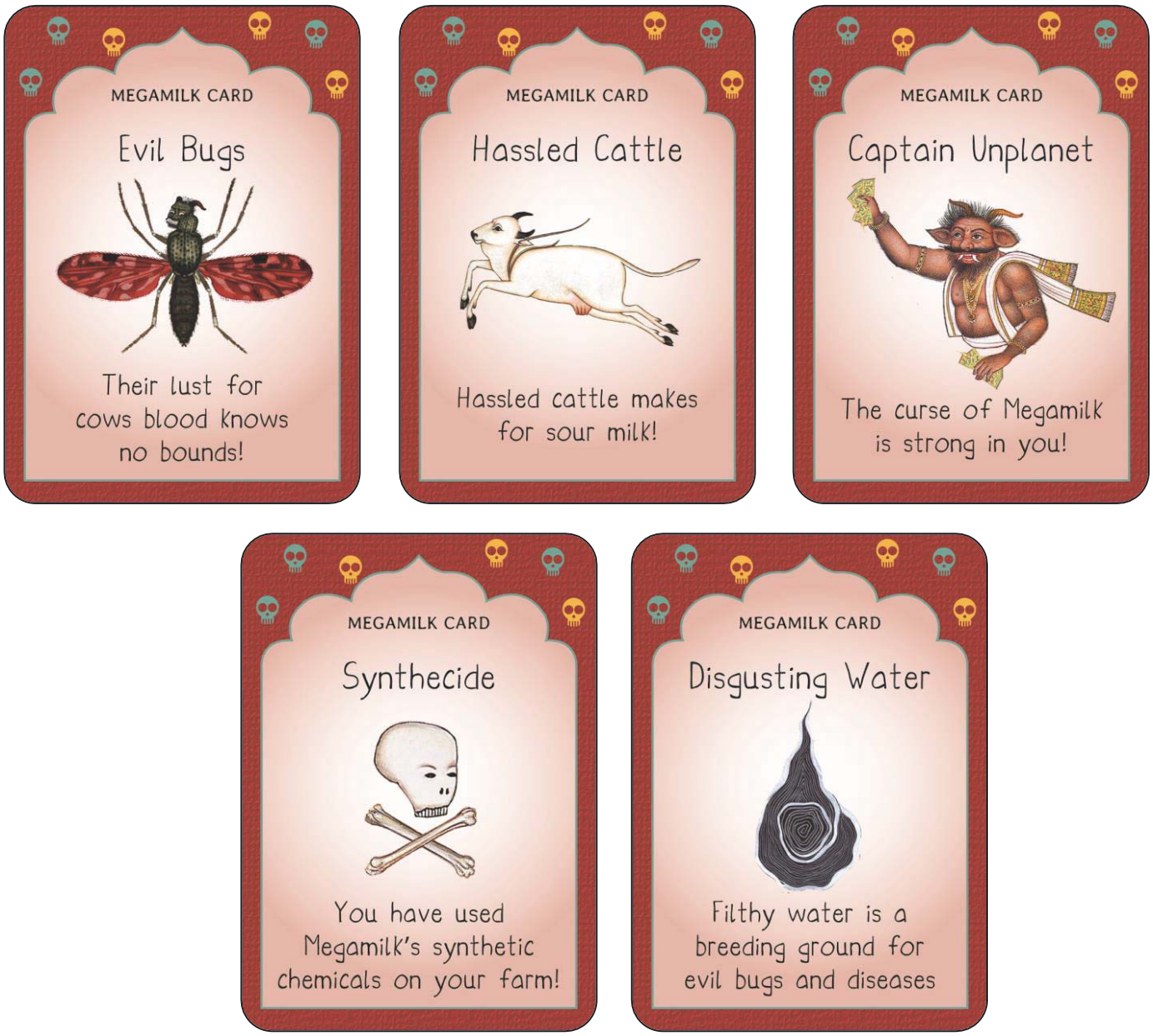


Figure 84: Updated Megamilk cards

The final iteration of the project consists of 88 3.5" x 2.5" cards created from 5 A3 sheets. This includes:

- 4 Character cards
- 12 Farm cards. 3 for each character
- 12 Cow cards. 3 for each character
- 30 Megamilk cards as 6 copies of 5 types of Megamilk cards
- 30 Action cards each representing a unique scenario

The game fits into a minimal footprint box of 4.2" x 2.5" x 0.8" and comes with one wooden three-sided dice.

Figure 85

Figure 87

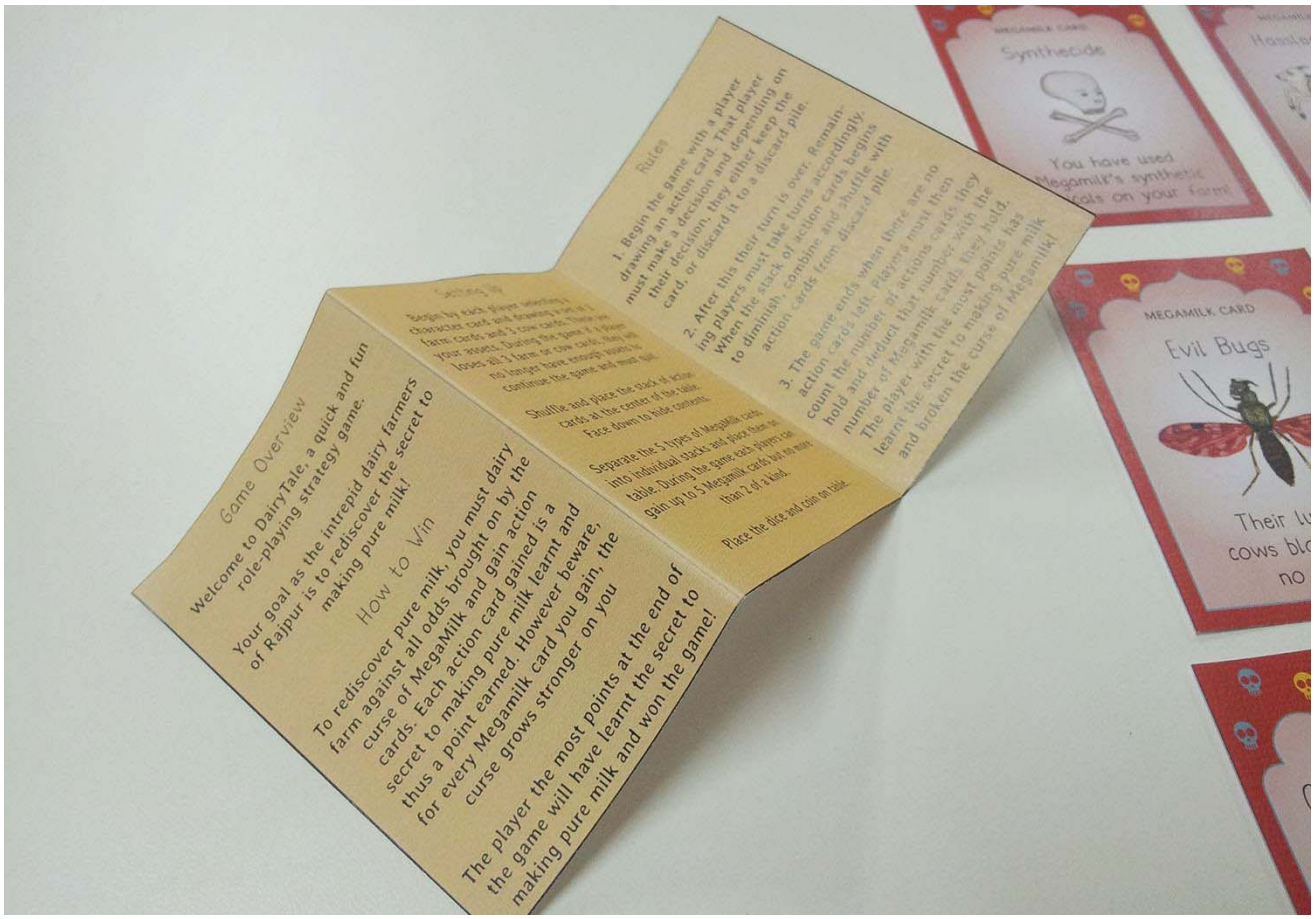


Figure 86

6. Conclusion

This MDes project began with the research aim of developing a means to raise awareness of sustainability within young adults of India's emergent middle class.

Comparing different forms of agriculture led to finding organic agriculture to be a strong example of sustainable agricultural practise.

By identifying gamification as a method of using game-like elements to make a non-game context more enjoyable, and a game's principles being independent from its medium, it was understood that by combining these two functions with digital media and games as popular emergent trends within the emergent middle class, gamification could be as a used as strategy to explore raising awareness of sustainability by gamifying a sustainable practise such as organic dairy agriculture into a digital game.

The concept of meaningful play was identified to be a mechanism which could allow players to acquire sustainable thinking through sustainability related decision-making.

Epochal analysis provided the means to interpreting the significance of dairy within Indian culture by helping to recognise associated socio-political and economic contexts. This helped towards enabling the use of Indian culture to contextualise the design, independent from its target audience and allowing the design research to take place with young adults in New Zealand.

A conflict between the experience of play and gamification attempting to direct user decision-making towards a non-game context was resolved through the use of rhetoric to suppress the nature of DairyTale as a gamification of sustainability related contexts. This was to ensure a smooth transmission of sustainable values.

A play based iterative design process emphasising play-testing and prototyping using a self-reflective autoethnographic approach allowed me to design DairyTale using insight from play-tests towards communicating sustainable values through gamification. Though challenging, this approach also helped to keep me aware of my relationship with the research and prevent the design from being solely how I define play to be. In the process, I was able to explore variety of ideas and solutions I otherwise would not have. This was necessary to allow individuals other than myself to experience, enjoy and learn about sustainability playing the game.

Non-linear creative methods such as mindmaps, paper prototyping, wireframing and suspended disbelief, proved to be essential towards uncovering ideas not easily obtainable using traditional linear methods like empirical surveys, step by step logic and scientific methods – allowing the research to explore a broad range of ideas towards communicating sustainable values through gamification.

Design development beginning as a smartphone app failed to accommodate the design research due to a physical lack of space to design in. A graphically projected alternative that focused on simply simulating organic dairy farming was found to be unsuccessful towards communicating sustainable values. Exploring a competitive monopoly based gameplay through an expanded online game concept revealed that competing for sustainability to be unsustainable and the amount of game equipment necessary for economic simulation excessive, making the game tedious and unenjoyable. It was recognised that meaningful play was not occurring smoothly in all digital exploration attempts up to this point. My predisposition of the project to digital media was understood to be inhibiting the research. As the core principles of a game was

understood to be independent from its medium and my role was towards game design and not its implementation or development as a digital game, the project switched to exploring analogue mediums for its design research leading to the game transforming into a card game from synthesis. Following this, a fantasy based-narrative, utilizing emphasising sustainability related problem solving within the context of organic dairy agriculture was found to be engaging

Gamification of a sustainable practise as a game could be seen as an effective strategy towards communication of sustainable values. However how it is gamified is key to its success.

The process of continuously making and breaking the game through multiple iterations was a method that was fundamental towards understanding the experience of play toward uncovering what aspects of gamified organic dairy farming could communicate sustainability.

DairyTale in its current form represents a culturally rich game environment with a story capable of engaging young adults from a variety of backgrounds.

The final iteration of DairyTale is not essentially its true final form. It is a point in design development that establishes a strong base for the concept to be further built upon. It is by no means the end. Rather it is a beginning.

When I started this project, I wanted to find a means to raise awareness of sustainability within an Indian context. What I found is something I believe has the potential to communicate sustainability not only to Indians, but also to a much wider audience.

The combining of pop-culture with sustainable aspects towards communicating sustainable values, is a potential scope of future exploration.

I plan on continuing to design DairyTale using what I've learnt, for eventually developing a family inclusive digital version.

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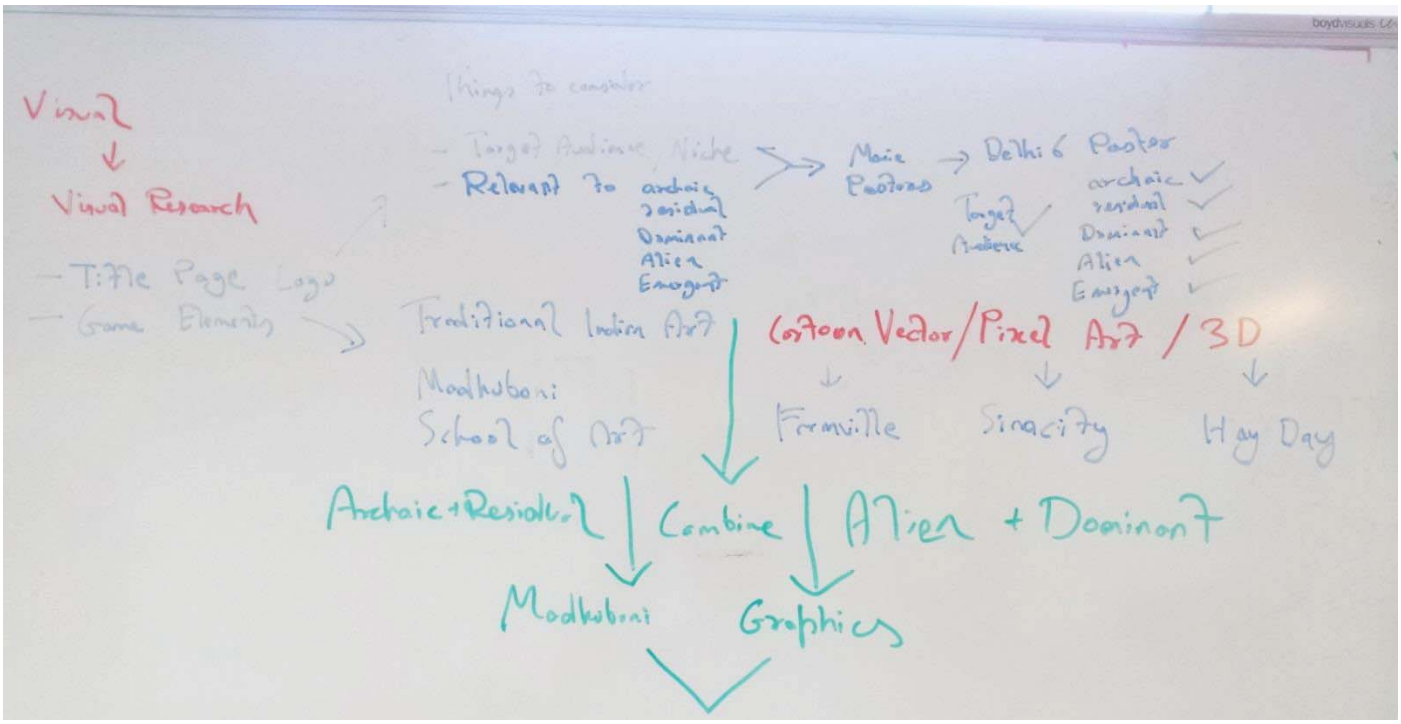
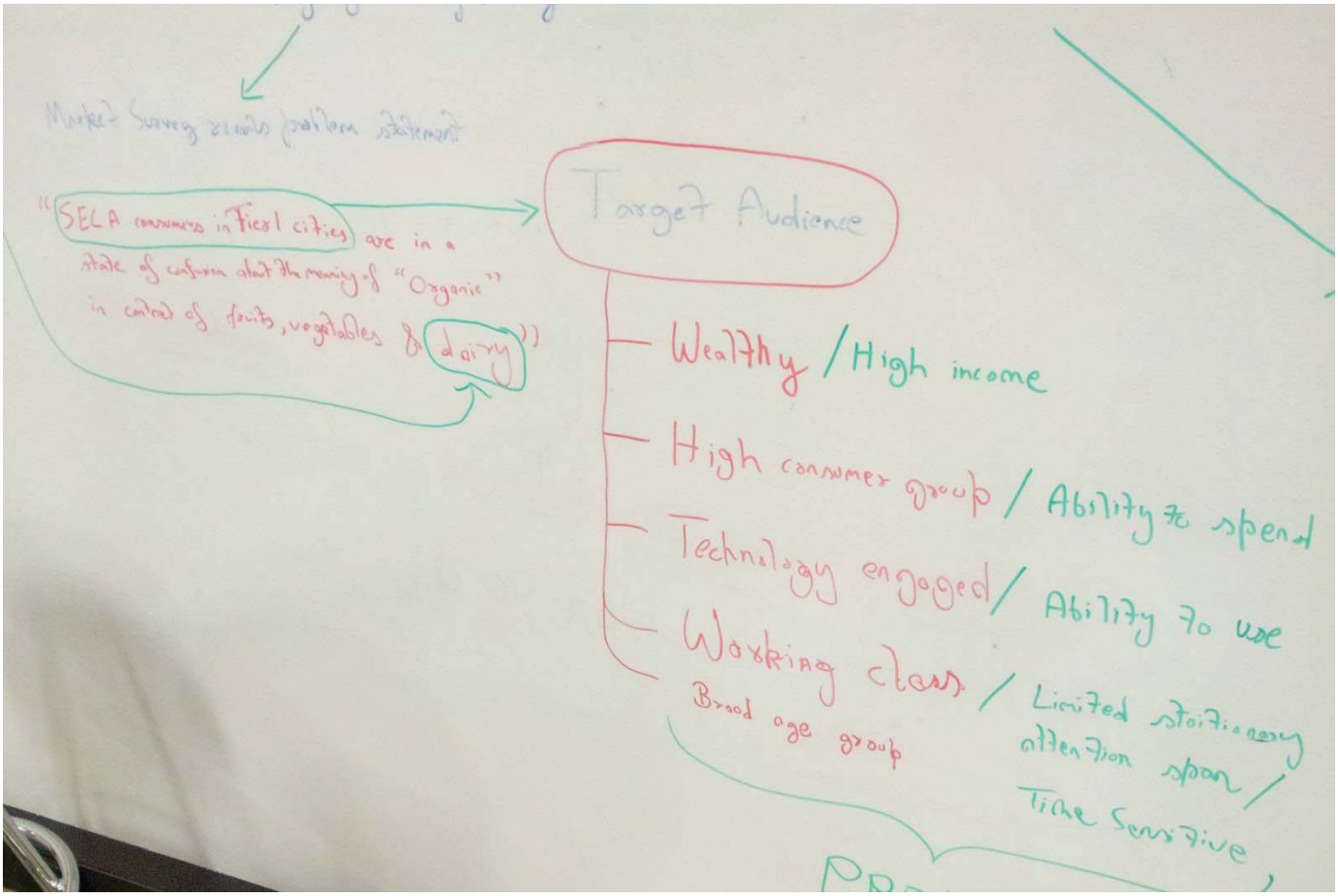
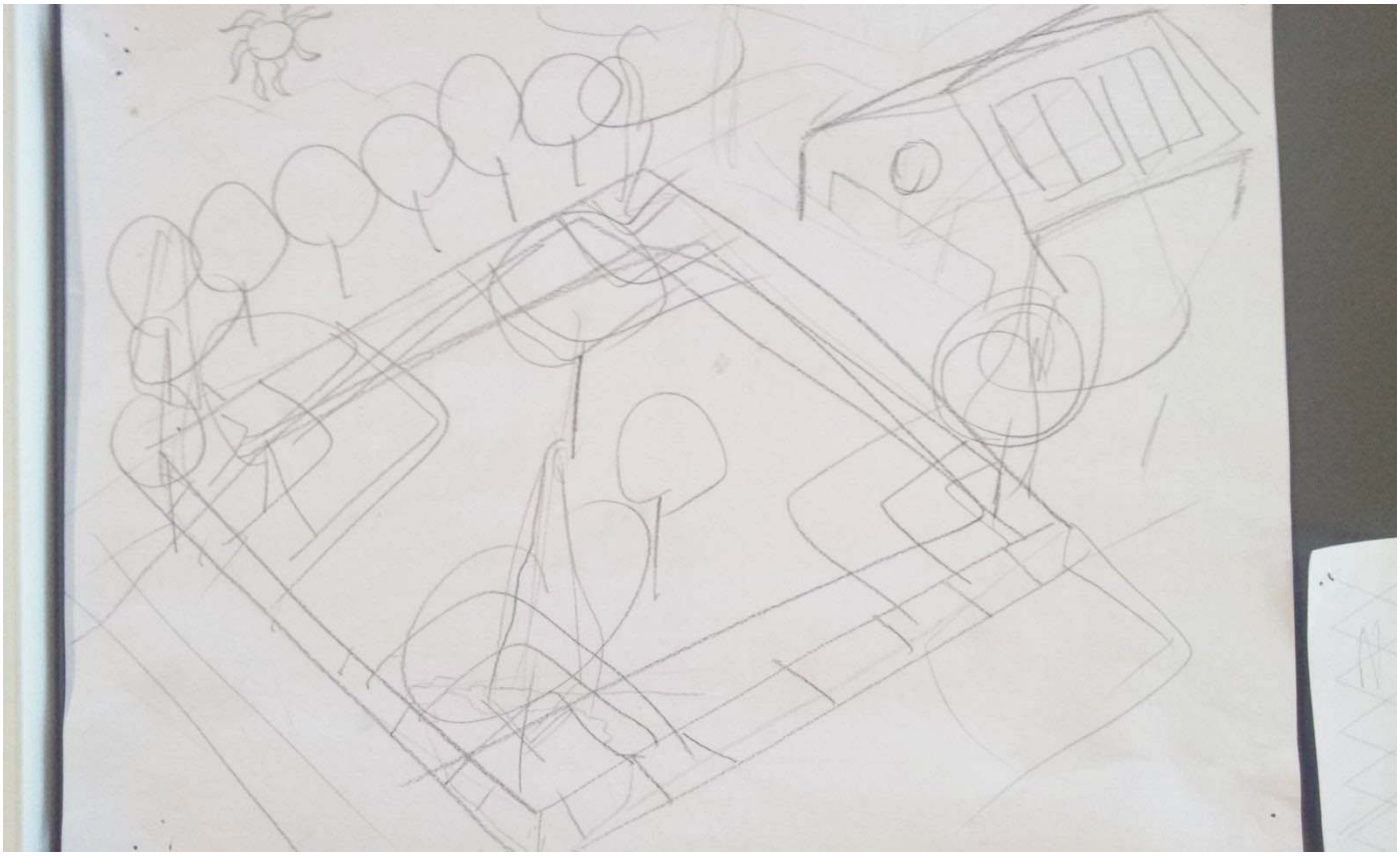
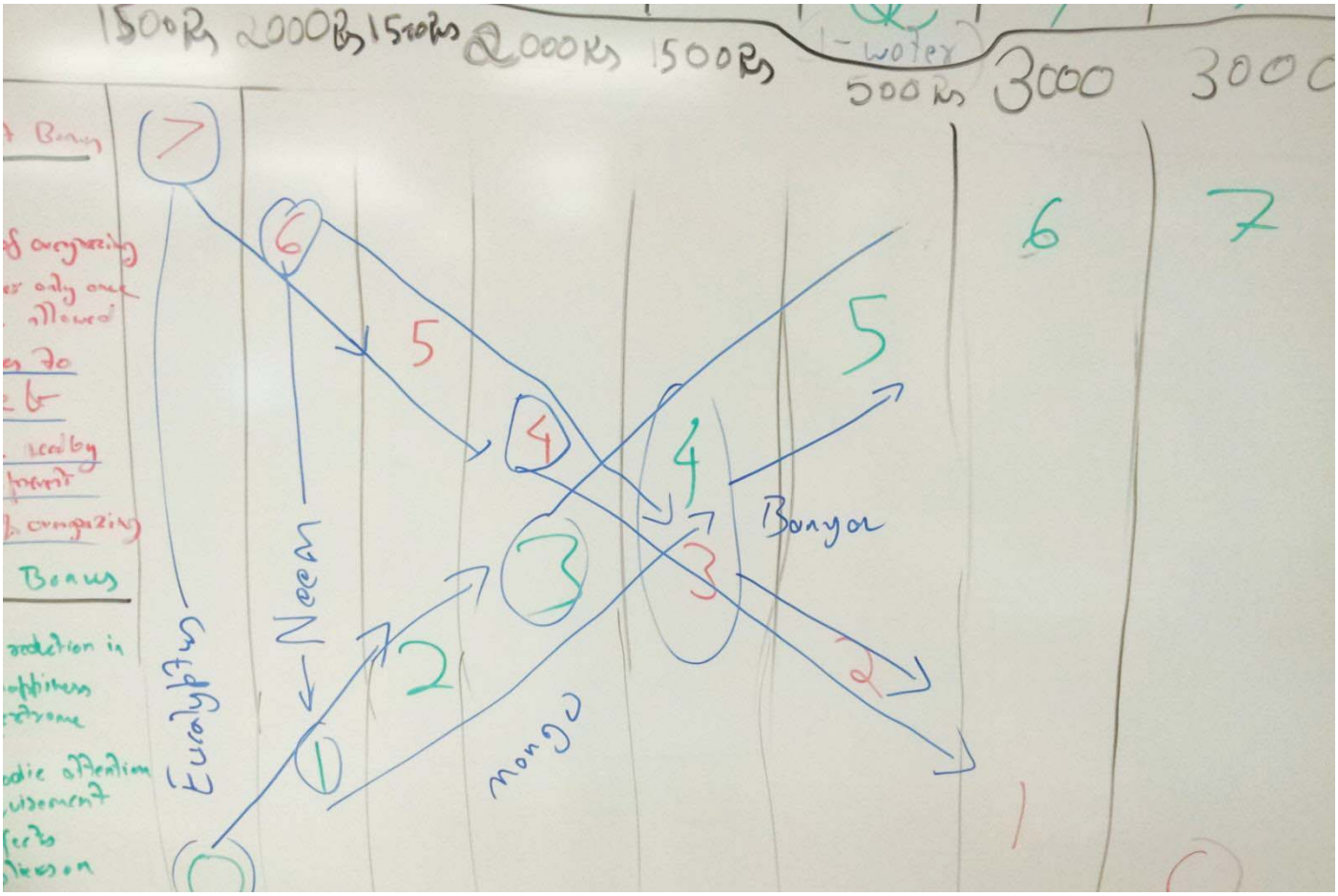
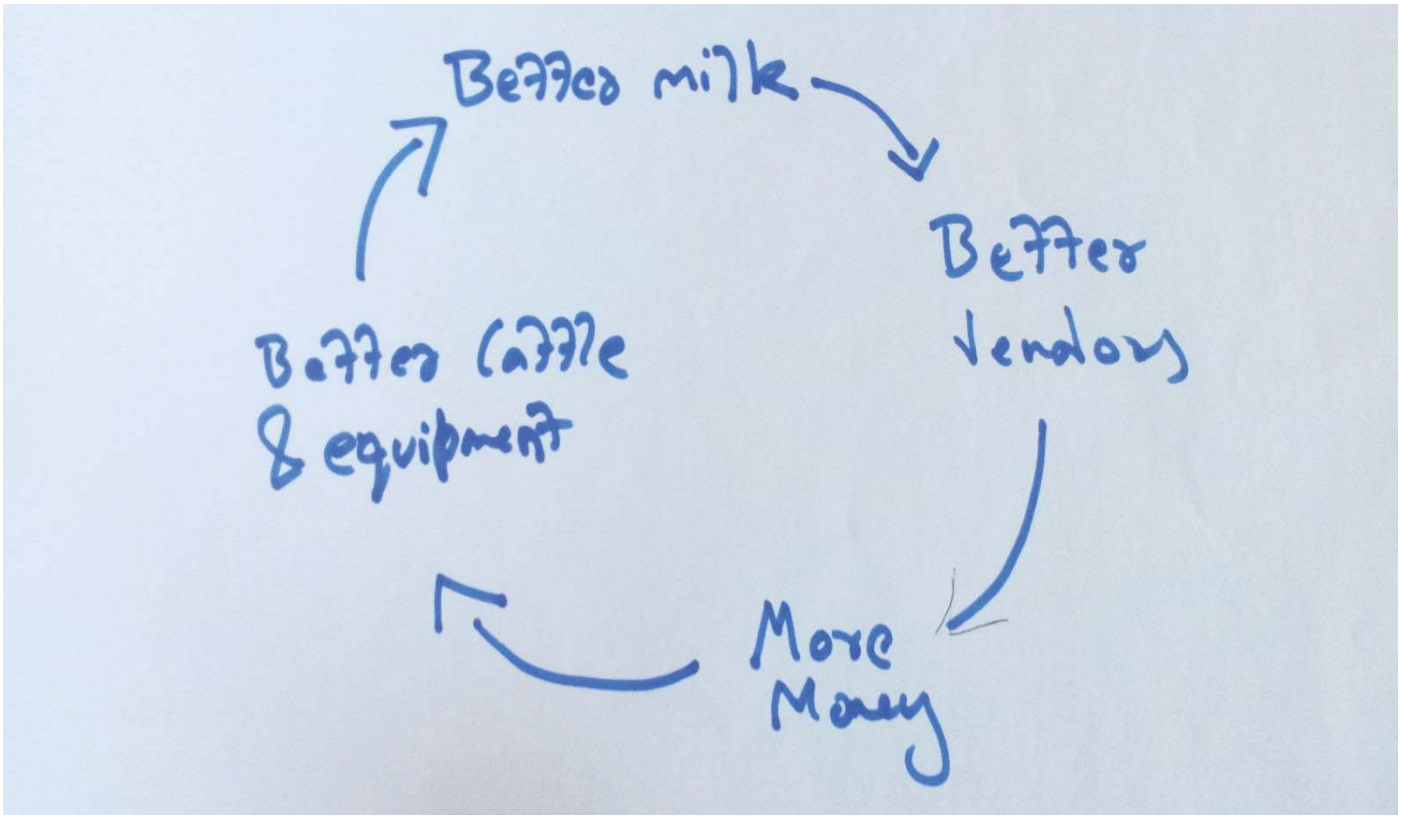
10. Appendix

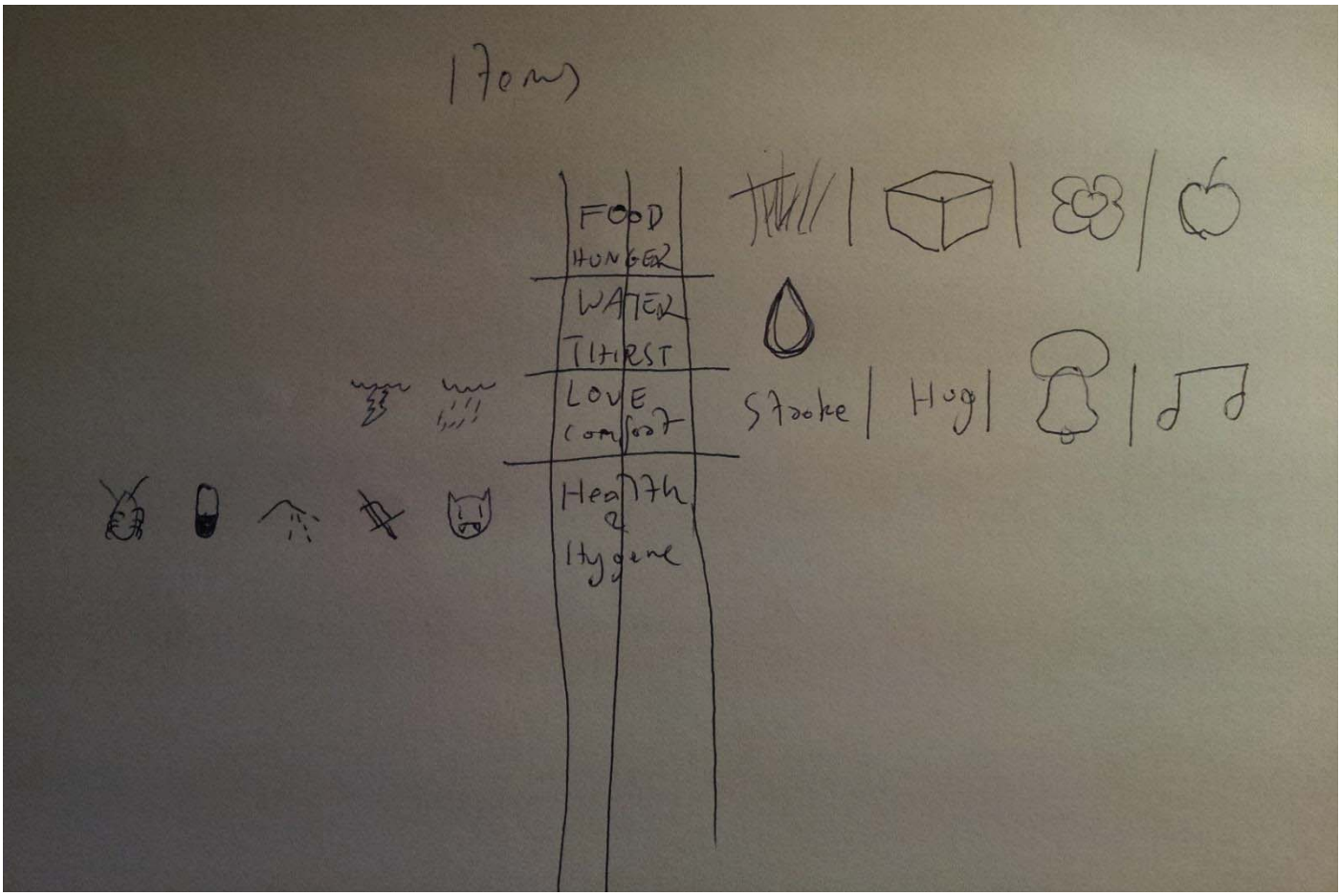

Visual
Visual Research
Title Page Logo
Game Elements
Things to consider
Target Audience, Niche
Relevant to archaic residual Dominant Alien Emergent
Main Festivals
Delhi 6 Poster
Target Audience
archaic
residual
Dominant
Alien
Emergent
Traditional Indian Art
Madhubani School of Art
Cartoon Vector/Pixel Art / 3D
Farmville
Sinacity
Hay Day
Archaic+Residual
Combine
Alien + Dominant
Madhubani
Graphics

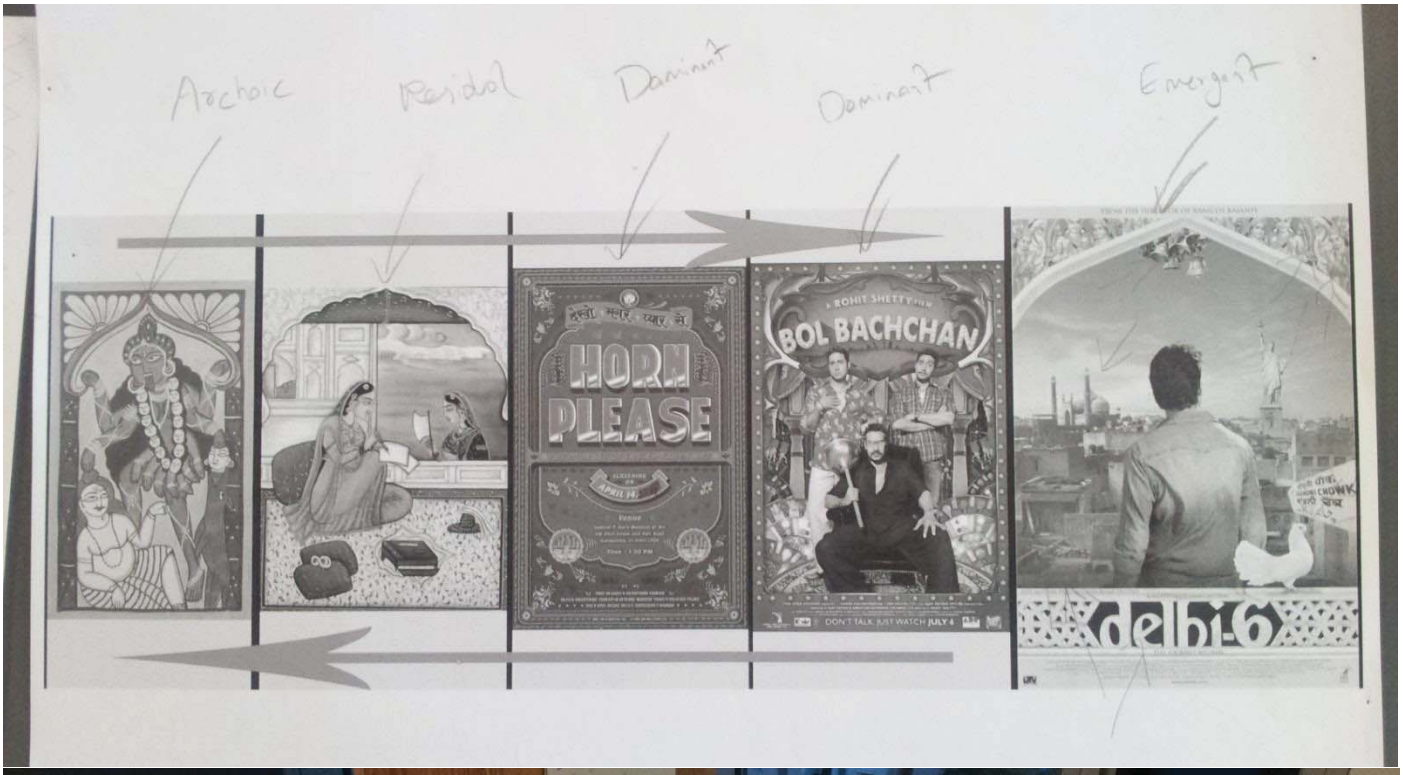

Market Survey reveals pattern statement
"SELA consumers in Tier1 cities are in a state of confusion about the meaning of "Organic" in context of fruits, vegetables & dairy"
Target Audience
Wealthy / High income
High consumer group / Ability to spend
Technology engaged / Ability to use
Working class / Limited stationary attention span / Time sensitive
Broad age group



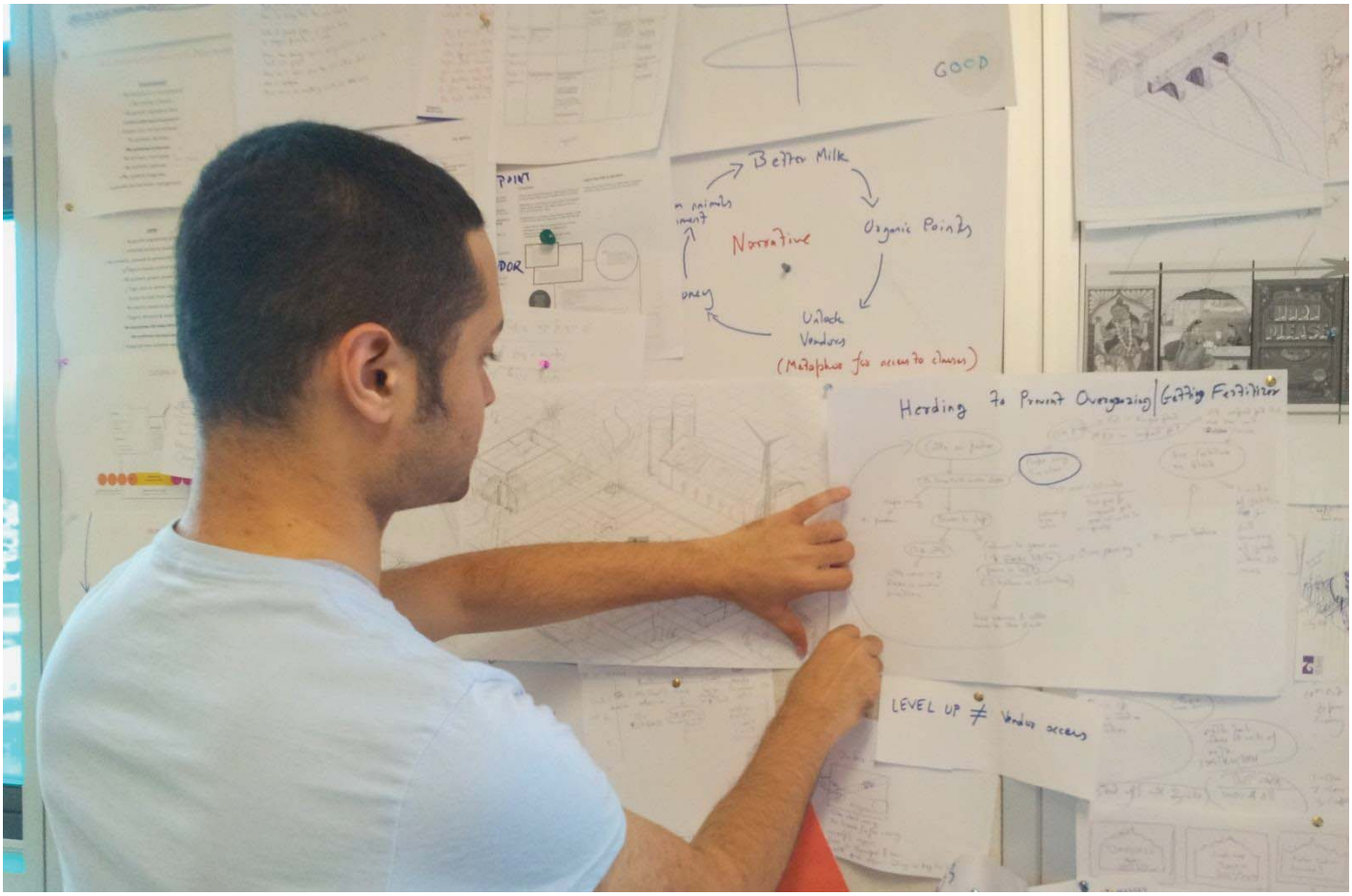

1500Rs 2000Rs 1500Rs 2000Rs 1500Rs
500Rs 3000 3000
Eucalyptus
Neem
mango
Banyan
Beams

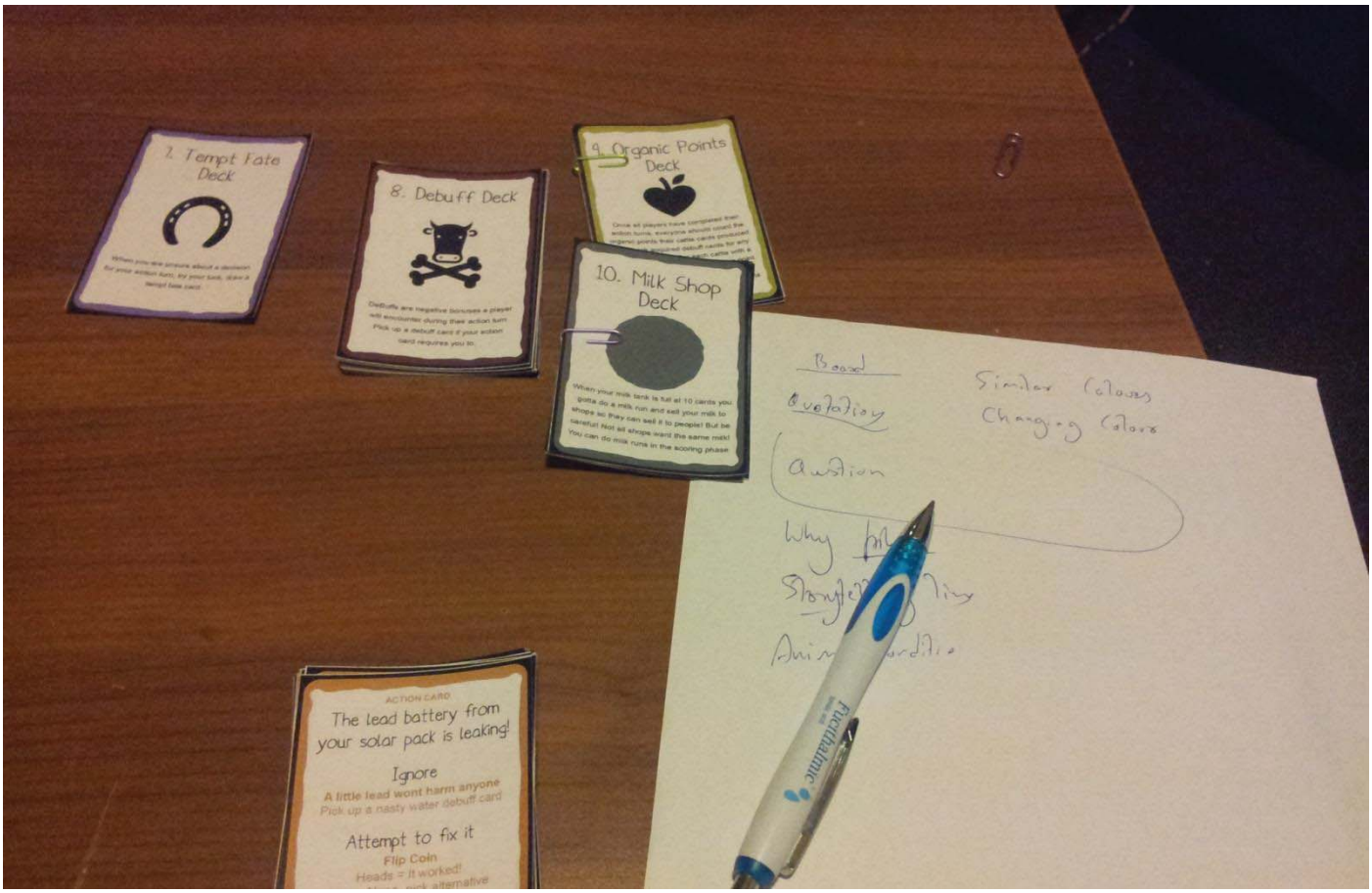

Better milk
Better vendors
More Money
Better cattle & equipment


Items
FOOD
HUNGER
WATER
THIRST
LOVE
comfort
Health & Hygene
Stroke
Hug

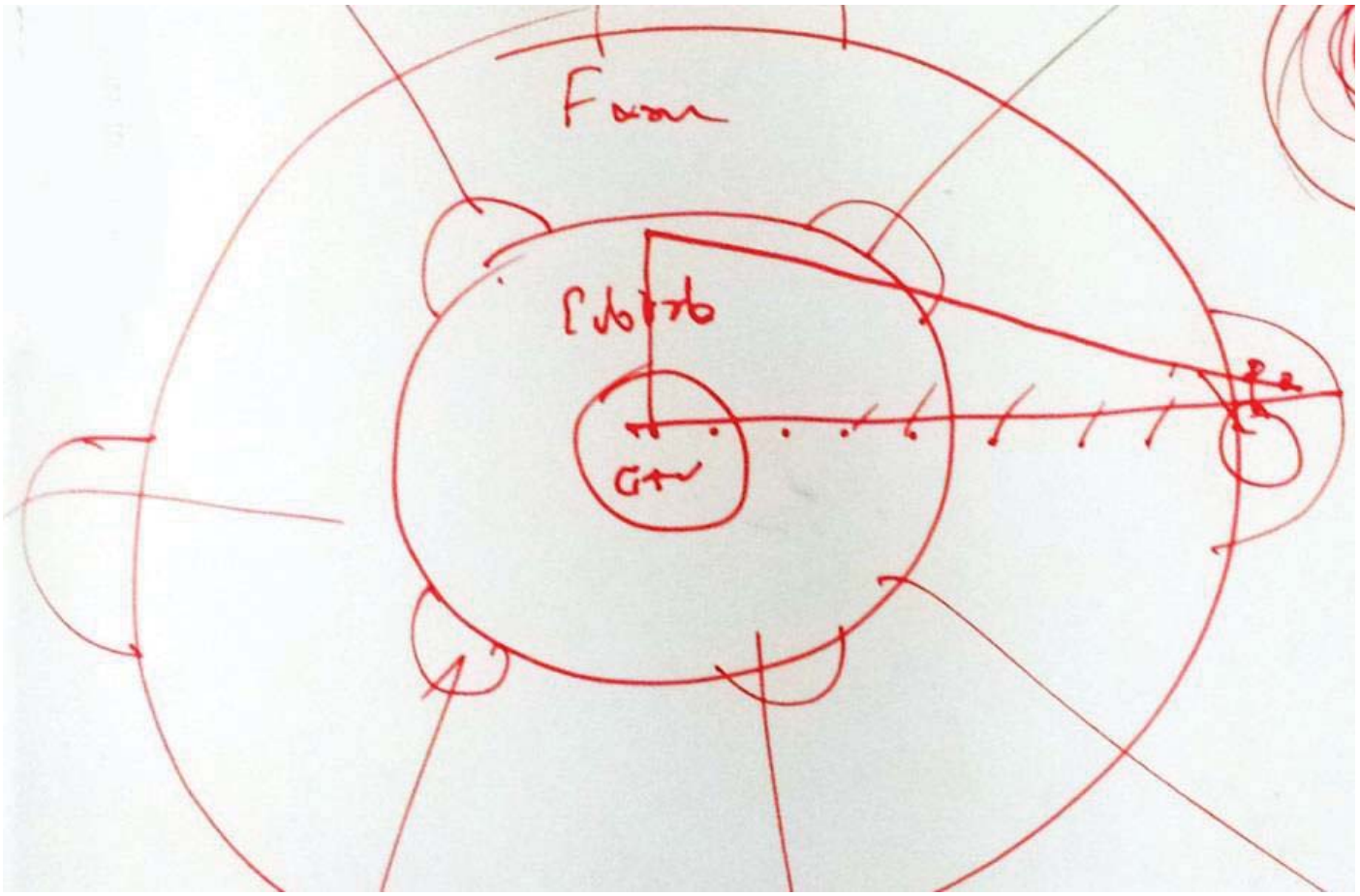

Archaic
Residual
Dominant
Dominant
Emergent
HORN PLEASE
BOL BACHCHAN
DON'T TALK JUST WATCH JULY 6
delhi-6


PLACE ALL
MILK
MILKING STATION
MILK STORAGE TANK
CROPS FOR FODDER
WIND TURBINE
SOLAR PACK


GOOD
Better Milk
Organic Points
Narrative
Unlock Vendors
Herding to Prevent Overgrazing | Getting Fertilizer
LEVEL UP ≠ Vendor access


1. Tempt Fate Deck
8. Debuff Deck
9. Organic Points Deck
10. Milk Shop Deck
Board
Similar Colours
Changing Colours
ACTION CARD
The lead battery from your solar pack is leaking!
Ignore
A little lead wont harm anyone
Pick up a nasty water debuff card
Attempt to fix it
Flip Coin
Heads = It worked!


Welcome To Dairyble


Foam