# FriendFreight Copenhagen

SUSTAINABLE GOODS DELIVERY THROUGH A COMMUNITY-BASED BICYCLE SERVICE

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Submitted to the Department of Architecture
in partial fulfillment of the requirements for the Degree of
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## /ABSTRACT

Each day, in any given urban area, hundreds of thousands of small goods are distributed from their points-of-sale to their final destinations. The 'travel demand that is generated from this activity has a significant impact on congestion, pollution and the maintenance of infrastructure in cities. As such, and as the number of items distributed through urban areas continues to rise, city governments are showing increasing interest in strategies that can reduce these negative effects.

Most of these strategies treat inner-city goods transportation as optimization issues, whereby an existing delivery system is made to operate more efficiently and effectively - oftentimes through utilizing advances in distributed digital technologies. What is proposed in this thesis, however, is an alternative approach — a new type of service called FriendFreight, that exploits the untapped *freight capacity* of personal mobility vehicles, and the real-time location information of people and goods, to enable citizens to deliver items for others while moving through the city themselves. The success of such a service relies not only on the ability to transport goods in an optimal manner but also on an understanding of how and why people might deliver goods for each other. Thus, trust and reciprocity play an important role in the service design.

In this thesis, the feasibility of FriendFreight is explored within the specific context of Copenhagen where I propose that the 175,000 bicycles that move through the city each day can be harnessed to deliver small items that people need regularly. The mechanisms for building trust and reciprocity are determined through examining the theories of gift and market exchange. Special attention is also paid to our current sociological condition - what Manuel Castells calls the *Network Society* - whereby a rapid rise in digital electronic technologies has powered a transformation in social and operational exchange networks. Lastly, in collaboration with a colleague, Francesco Calabrese of the Senseable City Lab at MIT, a Matlab computer model has been developed as a framework for understanding a best-case scenario of the FriendFreight service and its potential effect on the efficient delivery of items given a particular scenario.

This work shows that digital information can be harnessed in a bottom-up way to address urban issues in cities. Additionally it uncovers how and why exchange occurs between people, which results in a single framework for the FreindFreight service that maximizes reciprocity, trust and continued growth. Finally, it is found that a significant reduction in travel demand is achievable through using FriendFreight for certain types of goods in the context of Copenhagen.

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## /ACKNOWLEDGMENTS

I am grateful to all the faculty and friends at MIT, who have generously contributed to the development of this thesis. In particular I would like to thank my committee: William J. Mitchell who inspired me to work on this topic and who shaped my understanding of the impact technology has on the city. I would also like to thank Carlo Ratti whose inspirational and visionary approach to these issues drove the work forward.

Many people have contributed in small, yet influential ways to this research. None of this would have been possible without the rationality and support of Francesco Calabrese of the SENSEable City Lab - without whom the last chapter of this thesis would not exist. I would also like to thank the City of Copenhagen, in particular Nikolaj Løfquist for generously donating the GIS data used in the modeling process. Lastly, to Dennis Frenchman, for his continued enthusiasm throughout my time at MIT.

Finally, I am indebted to the following people whose time, energy and belief in this research made it all possible.

To my mother, for her patience and the countless hours editing this text and to Amir whose love and support were critical to finishing this thesis. To my friends at MIT, in particular, Sabrina: laughter cures all; Daniel: for the social solidarity; Claire: for the fast-paced intellectual discussions; Andrew: for his incredible generosity; and the rest of the SMArchS Urbanism students for the insightful conversations. Thank you to all of the researchers at the SENSEable City Lab: you inspire me.

This thesis is for my parents and my family.

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***Figure 1.***
*Common pictures of dormant freight capacity*

# /INTRODUCTION

## URBAN GOODS DELIVERY: THE FRIENDFREIGHT PROPOSAL

### Freight Capacity, an untapped resource

Freight capacity, or the ability to carry goods to a specific destination, exists in all personal mobility vehicles. Our own bodies are the simplest example of a vehicle with 'freight capacity' and we use them for carrying the items that facilitate our daily lives. Similarly, bicycles, cars and other movement facilitators have an inherent ability to transport items. However, most of us, most of the time, move around carrying nothing but *pockets of air* and the *potential* to carry things should the need arise.

Part of the reason for this is that our vehicles are designed to meet peak load expectations, even if these situations rarely occur. For example, trains are designed to cope with the surge of people who use them at peak periods but remain underutilized at other times of the day. Similarly, the trunks of cars often sit empty until we suddenly need to move some furniture or go on that yearly camping trip.

While during our daily routines we are moving large amounts of empty space back and forth,

***Figure 2.***
*Cellphones, the Internet, Global Positioning Systems and RFID tags are examples of sensors that can be distributed to provide real-time locationing* **>>>>**

delivery companies are moving huge quantities of freight within our cities. Given the sheer scale of intra-city logistics, it is likely that some small freight items such as groceries, books, documents, and dry-cleaning will be headed to the same general location and in the same direction as we are.

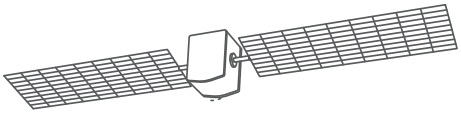
Until recently, there was no way to utilize the available freight capacity of private vehicles to facilitate the movement of small goods in a city. Knowledge about goods delivery was restricted to those who form part of the delivery chain, and to those at the origin and destination of a package. For instance, Ali, on his way home from work, would have no way of knowing that the truck sitting next to him at the traffic lights contained a small package for his next door neighbor, Claire.

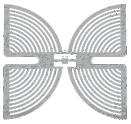
However, with the rise of distributed sensor networks able to provide real-time location and movement information about goods and people (should they wish to disclose it) an opportunity arises to coordinate the journeys of people and their personal mobility vehicles with the delivery trajectories of goods.

The research presented in this thesis deals specifically with this 'last-mile' delivery of small goods in urban centers, proposing a new community-based delivery service – FriendFreight – that harnesses real-time location information of people and goods in order to create a more sustainable and efficient way of moving items from businesses to final consumers. Reducing the number of stand-alone 'unnecessary' trips that people make to obtain some everyday items, by capitalizing on the unused freight capacity inherent in other people's vehicles, reduces what is defined in Chapter 3 as "travel demand". This in turn has a positive effect on the amount of energy expended by the transportation sector, as well as reducing congestion and $CO_2$ emissions – a key goal of the FriendFreight service.

### The Need for City Logistics solutions

The goal of alleviating the negative impacts of transportation through optimizing the delivery of





small goods in cities situates this thesis within the field of City Logistics (also referred to as Urban Logistics). However, unlike most work in City Logistics—which concentrates on optimizing *existing* delivery mechanisms through efficient routing or faster modal transitions (a top-down approach)—the proposed FriendFreight system is a new service that involves members of the community in delivering goods for others—a bottom-up approach.

Focusing on a new type of service to deliver goods is in line with the evolution of the field of City Logistics. Whereas City Logistics is most commonly defined as "the process for totally optimizing the logistics and transport activities by transport companies in urban areas while considering the traffic environment, the traffic congestion and energy consumption within the framework of the market economy" (Taniguchi, Thompson, & Yamada, 2001) in recent years, broader definitions have emerged that shift away from 'transport activities by transport companies' to: "Any service provision contributing to an optimized management of goods in cities" (Dablanc, 2007, p. 284). The work of this thesis sits firmly within this latter definition.

The growing importance of City Logistics is a reflection of a number of political, spatial, market and behavioral changes that are taking place in cities. City planners and local governments now recognize the impact of goods transportation in urban areas on the environment, congestion and energy use. Thus there is an increasing desire to manage these effects in order to achieve more sustainable cities. In Europe, the push for cleaner, more efficient delivery systems for distribution of goods in urban centers, is reflected in the creation of European Commission backed initiatives such as CIVITAS which, through political commitment from cities across the European Union, aims to promote, implement and evaluate approaches to sustainable urban mobility. Elsewhere, Japan, Australia and the USA have been leaders in conducting research and implementing these optimization systems (Quack, Van Duin, & Visser, 2006).

< ***Figure 3.***
*175,000 bikes pass through the boundaries of the City of Copenhagen each day.*

Evolving spatial configurations and land use patterns in urban areas also drive City Logistics solutions. Dablanc (2007) notes that as modern cities see the disappearance of spaces that were previously dedicated to delivering goods – warehouses, ports and freight railway terminals – there is a need to find new methods for coordinating modal changes at package delivery hubs.

Lastly, private companies are also seeing the benefit of optimizing their delivery systems. Changes in consumption patterns with the rise of e-commerce (involving home delivery of goods that are purchased online) has seen a rise in the number of small goods being shipped, and delivery companies are being pushed to provide a more efficient service at minimal cost. This has led to the development of ever-more intelligent real-time routing and scheduling algorithms.

### Existing bottom-up approaches

Most work in City Logistics uses a top-down approach, often harnessing distributed digital technologies (see Chapter 2) to make existing delivery services more efficient within the framework of the market economy.

Bottom-up solutions to goods distribution in cities —such as the proposed FriendFreight service— are harder to find. A notable exception is Fusco, Tatarelli and Valentini's (2003) research on setting up community drop-points that coincide with daily activities of customers—breakfast bars, newspaper stands, etc. However, while it is clear that the service could be convenient, the real impact on alleviating travel demand is difficult to evaluate. In contrast, the main goal of the FriendFreight service is to directly contribute to a reduction in the number of 'last mile' deliveries required in the city, by leveraging people's daily mobility patterns and thus demonstrably reducing some of the negative effects of inner city transportation.

While there has been little research on bottom-up services within the field of City Logistics, we can look towards some real-world examples to find

***Figure 4.*** *Urban traffic congestion in urban centers is recognized as a growing problem* >

working community-oriented services, where people do things for others in order to reach a common goal. Three of these are discussed in Chapters 1 and 2: the *Casual Car Pool* service in San Francisco—an unregulated yet highly efficient and successful service where members of the community utilize the untapped freight capacity of their own cars to give rides to strangers who are traveling downtown; and the *Couch Surfing* and *Global Freeloading* services which match up travelers in need of a place to stay with a global network of hosts who have a spare couch or bed. These successfully demonstrate that services can be built where communities are willing to share their time or resources with each other, for individual gain and collective benefit.

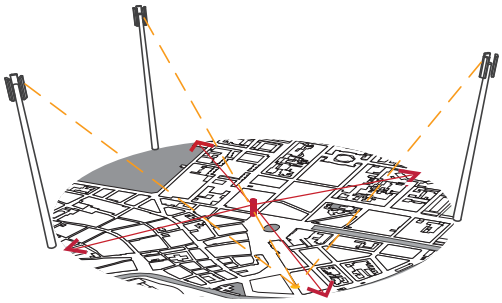
As yet, no one has tackled the potential for community members to deliver small goods. It is, of course, difficult to know what might motivate members of the community to carry something for someone else—should they be paid for their time and effort? Or could the service work for free? Additionally, who should be targeted as carriers, and can some goods be more effectively delivered than others? These questions, amongst others, form the basis for the research presented in the following chapters.

## FriendFreight: Framework and Research Scope

In order to explain the basis for the research presented in this thesis, I offer an example of the proposed Friend Freight service, using one type of mobility that has excess freight capacity and within a specific context: bicycles in the city of Copenhagen. I then explain how the service might operate within this framework, before outlining which aspects of the proposed service are addressed in this thesis and which are not.

Given that bicycles are ideal carriers for many small goods and with more than 175,000 cyclists travelling within the city limits each day, the City of Copenhagen makes an excellent test case for exploring how the FriendFreight service may operate. Bikes have a carrying capacity that matches many of the items that need to be delivered in cities yet, unlike

1 *The requester logs onto the FriendFreight service and specifies the item they need, where they need it from and within how much time.*



2 *The FriendFreight System sends out a localized SMS to only those cyclists who are enrolled in the service and are within a certain distance of the shop where the item is.*

5 *The carrier delivers the item.*

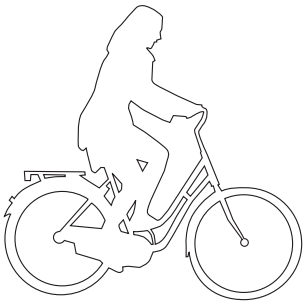
cars, they can be easily parked and are virtually non-polluting. In addition, it was found from a survey conducted for this thesis that 68% of the bikes that are moving through the city have unutilized freight capacity. (*Figure XX*). These observations provide a basis to explore the FriendFreight service—where members of the community deliver items for others.

Many of the trips we take in order to pick up small every day items are part of our daily movement patterns, such as going to work or school. The trips that the FriendFreight service targets, however, are those that are stand-alone trips.

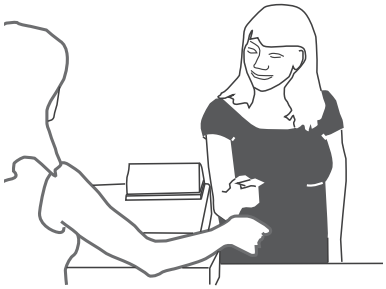
The starting point for the service is a person who needs to collect something but cannot do so as part of their usual routine. Perhaps they are going to be in meetings all afternoon and can't leave the office to get the dry cleaning, or maybe they have simply forgotten a vital item for dinner when they were at the supermarket. Whatever the reason, FriendFreight provides a delivery method that does not rely on commercial delivery companies, which are expensive, have large time-delivery windows and often restrict themselves to bulk deliveries or office related items. The system architecture for FriendFreight is shown in *Figure 5*.

The person in need—the requester—starts by logging onto the FriendFreight Service website and registering the item they want, the destination they want it delivered to, and the timeframe within which they need it. The system is then able to send a text message to all those who are enrolled in the service as carriers and are within a certain distance of where this item is located, requesting that somebody delivers the item. Once the carrier accepts the request, they collect the item and deliver it within the specified timeframe. On the assumption that only those who are heading in the direction of the delivery will accept the request, the FriendFreight service generates a reduction in travel demand.

The explanation above represents the bare bones of the FriendFreight service. However, in order make this conceptual idea operational, a number of



3 *One of the carrier's enrolled in the Friend-Freight service who is going in the direction of the package agrees to deliver the item to the requester.*



4 *The carrier picks up the item from the shop.*

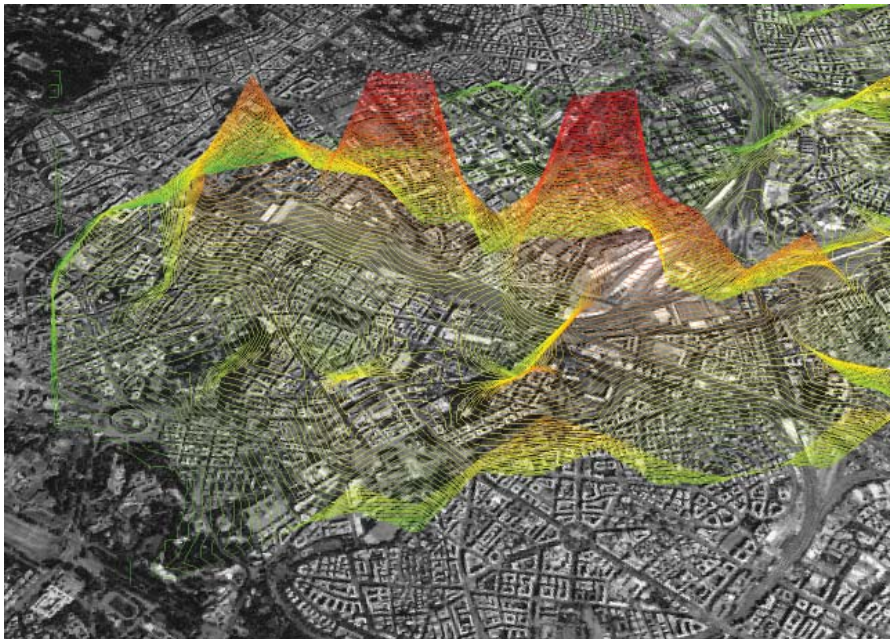
***Figure 5.***
*FriendFreight: Basic System Architecture*

aspects need to be addressed. The fleshing out of some of these issues forms the basis for the research presented in this thesis and results in a more concrete FriendFreight scenario and the testing of the service's viability through a *MatLab* computer model within the spatial context of Copenhagen.

Chapters 1 and 2 are concerned with establishing *how* and *why* people in cities might deliver goods for others. Chapter 1 discusses two forms of exchange: gift giving and market exchange, whereby, in the framework of the FriendFreight service, the former would involve the 'donation' of the time and effort it takes to deliver goods without an immediate expected return, while the latter would use money as the primary incentive to get people to do things for others. Uncovering how these two structures are formed, operate and are, in fact, related is achieved through examining the anthropological, and to a lesser extent economic, psychological and sociological literature of *exchange theory.* Given the complexity of this body of work, a 'causal loop' diagramming technique is used to make evident the relationships between gift and market exchanges and to tease out variables that have had a marked effect on the life of exchange systems and should thus be incorporated into the structure of the FriendFreight service.

Chapter 2 examines these gift and market structures within the context of our current condition, what the sociologist, Manuel Castells, calls *the Network Society*. The effect of digital information—a key component of the network society (and of the FriendFreight service)—on systems of distribution and exchange is examined by analysing long-standing delivery systems such as those studied in the field of City Logistics, as well as new exchange systems such as *eBay*, *Couch Surfing*, *Global Freeloading* and *LinkedIn*, which only became possible after the rise of the Internet. The relationships between the concepts in Chapters 1 and 2 are then drawn out and the chapter closes with three possible scenarios for the FriendFreight service, one of which is identified as the most likely to succeed.

The final chapter of this thesis tests the viability of the FriendFreight service using the specific



context and mode of transport that were identified at the beginning of this introduction: Copenhagen and bicycles. Viability is determined by building a computer simulation of the system in *MatLab* that can establish a best-case scenario, where the term *best-case* is defined as the maximum achievable reduction in travel demand for stand-alone trips (given that the service was already up and running). The modeling also takes into account the number of people required to achieve this target, and the effect of the spatial layout of Copenhagen on the success of the FriendFreight service.

There are, of course, other aspects that must be addressed if the service were to be deployed. These, which do not form part of this thesis, are briefly outlined below:

Firstly, as this is a 'location based service' (LBS) it has to be possible to localize the messages sent out about goods that need to be delivered so that only the potential carriers who are within a certain distance from the good will be messaged with the request. This is necessary because it is perceived that unwanted messages will greatly reduce the effectiveness and use of the service. Nowadays, however, the technical constraints for doing this are rapidly disappearing. Stringent regulations on location requirements for emergency calls on the 3G network, such as those required by North America's FCC has meant that as of 2003 in 67% of cases mobiles must be able to be located to the nearest 50 meters (using handset-based positioning) and to the nearest 100 meters (for network-based positioning) (Adams, Ashwell, & Baxter, 2003; Calabrese & Ratti, 2006). These types of regulations have had the additional benefit of creating a stable platform for all sorts of location based consumer services and it is seen that FriendFreight could become another.

If the service was to be deployed, protocols for collecting, using and potentially storing location information about people, particularly if there is a desire to use this information to help optimize the system at a later date must be established. However,

< ***Figure 6.***
*The Real Time Rome project by the Senseable City Lab at MIT harnesses the ability to locate people to within 100 meters accuracy.*

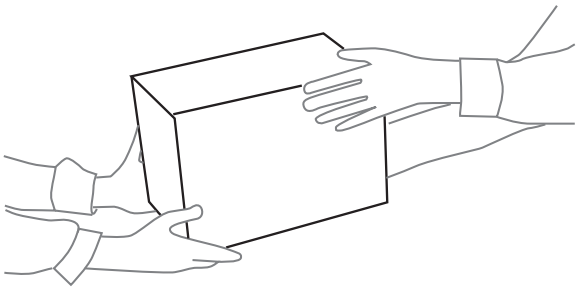
while this is certainly an important point to address should the service be implemented, it should be noted that the literature that has sprung up around this topic in recent years suggests that this issue can be overcome especially if users perceive a value to having their location known. In particular, in his book, *Civilizing Cyberspace: Policy, Power and the Information Superhighway,* Steven E. Miller (1995) notes that people routinely trade personal information if they see a benefit to it for themselves. When these benefits are common goals that can be shared across a community—such as the desire to have goods delivered more effectively—the sharing of location information may not be seen as a threat. Adding to this, the option of opting-out from location information being collected over time and transparent statements about the way the data is used by the system could provide an additional buffer of perceived trust in this regard.

Thirdly, while it is alluded to in the service scenarios that are presented at the end of Chapter 2, this thesis does not deal directly with the legal framework that would be necessary to ensure that goods are not dangerous or that if something is damaged it can be replaced.

Additionally, although the community of people that uses bottom-up services ultimately controls them, the initial start-up phase would require coordination and management until a critical mass of people is established. As such, if the FriendFreight service were to move towards deployment, it is predicted that it would require a two-step approach – the first phase using supplementary cyclists to carry goods in the case of a lack of community carriers and a second phase where the service is fully operational.

Finally, if FriendFreight were to be implemented, the ongoing coordination of the system to ensure adequate levels of service would need to be addressed. This is a concept that is touched on in Chapter 2 in the service scenarios, and in Chapter 3 through the detailing of how the spatial layout of Copenhagen, the availability of carriers and the type of goods

delivered would affect the success of the service. However, there are other aspects to this problem that are not discussed in this thesis including the building of the databases to manage the location and movement information, the monitoring of cyclists' movements so that request messages can be targeted towards likely carriers and the use of the system to predict goods demand in cities. While these are worthwhile avenues to explore, it is felt that the only way to really understand the dynamics of the system on this level will be through deployment and post-implementation analysis and optimization.



# /CHAPTER 1

## HOW AND WHY PEOPLE MIGHT DELIVER GOODS FOR OTHERS: EXCHANGE THEORY

Vital to the successful operation of the FriendFreight service is the relationship between the person who will carry goods for others (the carrier) and the person who needs an item brought to them (the requester): the former must be willing to take the goods, and the latter needs to be able to trust the carrier to do so. The relationships established between the carrier and the requester of the item in turn effect the structure of the service – which need not be limited to the conventional capital-driven incentive-based model whereby carriers receive money for goods delivered and requesters can trust that monetary incentives are a good enough reward for the carrier to do the job satisfactorily. In order to uncover the form that these relationships may take, this chapter examines two types of exchanges that take place between people – gift and market exchange – and, through the use of a technique named ‘causal loop diagraming’, outlines the mechanisms that make them work.

First the types of exchange commonly addressed by exchange theory scholars will be discussed. Next

the differences between gift and market exchange will be illustrated and potential links between the two models identified. Finally, a real-world example of a service that has some similarities to FriendFreight will be examined – *The Casual Car Pool* in San Francisco. This example highlights some interesting crossovers between gift and market exchanges - usually seen by anthropologists as separate exchange systems.

### Exchange Theory and Categories of Exchange

Exchange theory is the study of social relations among actors (individuals, groups and corporate entities), where relationships involve the exchange of items of value. These are often material objects, but can also be symbolic or informational items (Cook & Whitmeyer, 1992). In anthropology – the main body of knowledge used in this chapter – exchange is most often categorized into the following types: gift, barter and market exchanges. Of the three types, only two gift and market - are examined in this chapter. Barter, which is denoted as "the direct exchange of goods or services for each other without the medium of money." (Heady, 2005, p. 262) will not be discussed, as it involves something that does not work well with the structure of the FriendFreight service: a (sometimes lengthy) period of time where the terms of the exchange must be negotiated between the two exchange parties. Particularly if the people who use the FriendFreight service are strangers, it is unreasonable to think that they will haggle in order to come to a mutually beneficial exchange agreement. Thus, in the next section, although it is recognized that other forms of exchange exist, only gift and market exchanges are pursued.

It was initially hoped that the research on gift and market exchanges could revolve around exchange theory literature and case studies gathered from the Denmark context - in order to uncover some of the social aspects of life in Copenhagen and use these findings to additionally influence the development of the FriendFreight service. Unfortunately, due to a lack of resources on these topics within this context,

it was not possible to do so. Instead, the case studies and examples used are either based in an American context, or are 'international' services of exchange, that transcend localized boundaries. Having said this, it is felt that gaining a broad understanding of exchange systems in general is a good starting point, particularly should the service be implemented in another city other than Copenhagen.

### Gift Exchange vs. Market Exchange?

*The give-and-take of gifts in everyday life creates, maintains and strengthens various social bonds – be they cooperative, competitive or antagonistic – which in turn define the identities of persons.* (Yan, 2005, p. 246) …

*When exchange is mediated by money, involves a price set by supply and demand, and willing buyers and sellers who may well be in no other social relationship, we call it market exchange.* (Hunt, 2005, p. 290)

These statements illustrate some fundamental distinctions that are often made between gift and market driven exchanges: that pure gift exchanges can only exist between those we are closely tied to; and that the involvement of money can preclude the need for social interaction (a driving force of reciprocity) to have exchange work effectively.

However, although the separation of these two types of exchange is common in anthropological literature – with distinct bodies of work on each topic - the boundaries between them are not as clear if we look to other academic disciplines. This is particularly true of economics where, as John Davis (1992) points out, scholars have attempted, since the beginning of the twentieth century, to explain all exchanges, whether involving gifts or money, through a market framework. This concept supports the view that even in gift *giving* we are *getting* - regardless of whether the benefit is material or psychological. Thus, for the economist even "altruists and the alms-givers are profit-making purchasers of satisfaction". (Davis, 1992, p. 18)

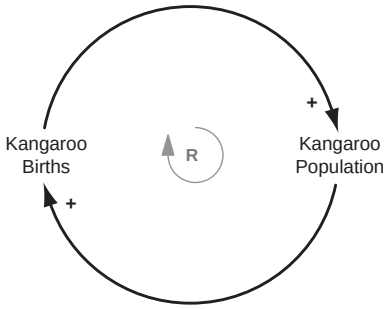



***Figure 7.*** *Reinforcing Loop*

As such, I am presented with an interesting choice: either to either separate the two types of exchange, as most scholars do; or to try and identify how they might be connected and intertwined within an anthropological (rather than an economic) framework. It is the latter that I have taken on as a as I consider that such an approach will enrich the understanding of both methods of exchange and ultimately the design of the FriendFreight service.

### Understanding Gift and Market Exchanges through System Dynamic Concepts

In this thesis, the discussion about the formation and continuum of gift and market exchanges as well as the links between them is drawn out through a technique called *causal loop diagramming* that is found in *System Dynamics*. Developed by Jay Forrester, this methodology was created to understand complex problems or the occurrence of particular events given the dynamic relationships between variables in a system.

System Dynamics has been used in many fields, including corporate planning and policy, biological and medical modeling, dynamic decision-making and public management and policy. It has also been used to develop theories in the natural and social sciences. My work sits firmly in this last category.

Although system dynamics models are often complex, particularly if the relationships between the variables in the system are to be represented mathematically, my use of the methodology remains on a more conceptual level. In other words, I intend to show how relationships between variables such as trust, social ties, gift giving and self interest contribute to the development of gift and market exchanges but I am not using this model to try and predict the future state of the system at any given time nor to understand any specific, real-world scenario. In chapters two and three I show these conceptual relationships through the creation of *causal loop* diagrams, a key component of system dynamics models. For the reader to understand these models it

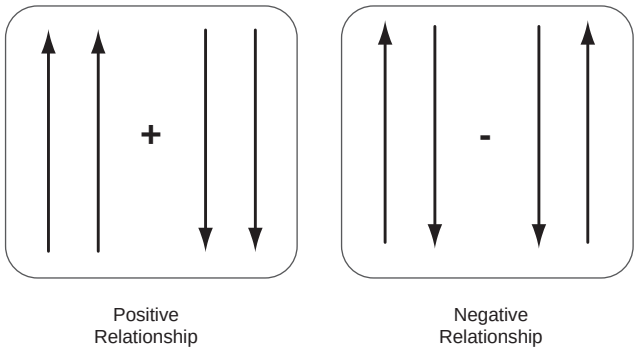



***Figure 8.*** *Positive and Negative Relationships between variables*

is necessary to explain some of the basic principles of system dynamics including the use of causal loop diagrams, positive and negative relationships between variables, reinforcing versus balancing loops and time delays. These are detailed below.

### *Causal Loops*

Causal loops are used in system dynamics to describe feedback processes in a system. Causal loop diagrams are thus a map of cause and effect relationships between individual variables, that when closed form a loop (US Department of Energy, n.d). A simple example will help to demonstrate this clearly.

Let's consider the following variables, *Kangaroo population* and *Kangaroo births*. These variables are not related to the topic of this thesis, but are a good example of how causal loop diagramming can be used to illustrate relationships between variables in a clear and efficient manner. A such, and by leaving aside other factors that might influence the population of kangaroos, we can relate these two variables in the following way: as there is an increase in the kangaroo population, there is an increase in kangaroo births and as kangaroo births increase, the kangaroo population increases. At the same time, the following also holds true: as kangaroo births decrease, the kangaroo population decreases and in turn the kangaroo births decrease etc. This is shown as a causal loop in *Figure 7*

### *Positive and Negative Links between Variables*

In *Figure 7* a '+' symbol is used to denote that there is a positive correlation between the two variables. That is, if there is an increase in one variable, the next variable also increases. Similarly if there is a decrease in the first variable, there is also a decrease in the second. This is a positive relationship. If however, the relationship is in opposition, where an increase in one variable causes a decrease in the other, or vice versa, then the relationship is negative. This is illustrated in *Figure 8.*

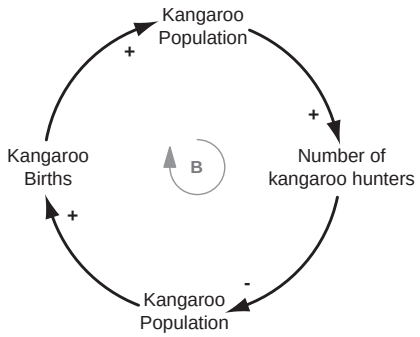



***Figure 9.*** *Balancing Loop*

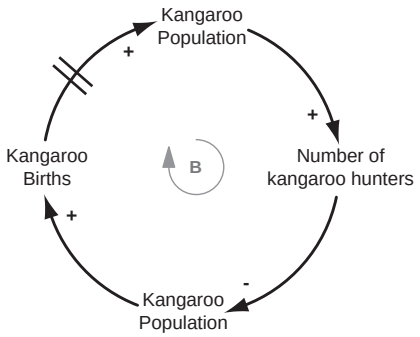



***Figure 10.*** *Time Delays*

*Reinforcing and Balancing Feedback Loops*

In system dynamics, causal (feedback) loops can be either reinforcing or balancing: reinforcing loops are self-reinforcing processes where an action that creates a result in turn generates more of the first action and also more of the result. The causal loop shown in *Figure 7* is an example of a reinforcing feedback loop, denoted by the letter R. These vicious or virtuous cycles cause exponential growth or exponential decline if there is no other variable present to affect the system.

On the other hand, balancing feedback loops, denoted with a B, can be described as goal-seeking processes that keep or move a system towards a balanced state. Balancing loops tend to stabilize systems. By adding another variable to our model on kangaroos, we can see how this works.

Here, as kangaroo births go up, the kangaroo population goes up (a positive relationship), however, as the kangaroo population goes up, the number of people hunting kangaroos also goes up (another positive relationship). This causes the kangaroo population to go down (a negative relationship) which in turn causes the kangaroo births to go down (a positive relationship). In the balancing loop, the outcomes of going around the loop the first time are in opposition to outcomes for the second time and so on. This is shown in *Figure 9*.

*Time Delays*

Not all actions by one variable cause an immediate effect in the next variable. Often there is a significant time delay, which can influence the power and speed of the reinforcing or balancing loop. In our kangaroo model, a time delay would exist between ‘kangaroo population’ and ‘kangaroo births’ due to a gestation period. Time delays are denoted in systems dynamics models by two parallel lines.

*Causal Loops: A cautionary Tale*

This thesis uses a technique known as ‘causal loop diagramming’ to illustrate relationships between certain variables that have influenced the formation

## /1.1
## GIFT EXCHANGE
## THE STRENGTHENING OF SOCIAL TIES

and continuation of gift and market exchanges. It has also been a useful tool in synthesizing the disparate writings of exchange theory scholars. There is, however, a danger in this type of modeling, particularly if the links between variables and the positive and negative signs accompanying them are taken as an indication that 'this is how the world works' or as the only relationships that would affect the subject being modeled. In reality, as with any technique that aims to model phenomena, not all possible variables are accounted for. At various stages throughout the following text I have attempted to make this clear through suggesting other influencing variables, even if they are ultimately left out of the model's structure for the sake of clarity.

Let us suppose that the service proposed in this thesis is based purely on the act of gift giving— that is, the gift of time and effort given by the person who delivers the item. In this scenario, when a potential carrier receives a message from somebody asking them to deliver an item, they would comply with this request and willingly donate their time without desire for compensation. Similarly, the requester of the service would feel no pressure to return the favor or give anything to the carrier.

However, we know from real-life experience and the work of sociologists and anthropologists that 'gifts' are voluntary only in theory (Mauss, 1954) and in reality contain (at the very least) an expectation of return - whether this is immediate or delayed, material or nonmaterial (Derrida, 1992, p. 13; Baron, 1989, p. 195). Thus gift giving is not a purely altruistic act but is also a method of exchange.

If this is the case, and if we assume for a moment that gift exchange could be a driving force in the running of the FriendFreight service, then

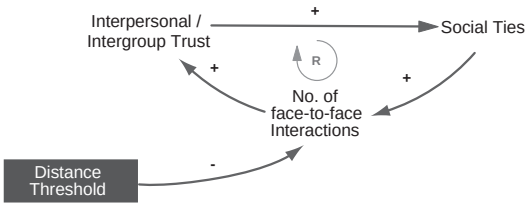



***Figure 11.***
*Reinforcing spatial ties through a low distance threshold*

understanding how and why people do things for others becomes important. The aim of this section is to uncover relationships that encourage social ties between givers and receivers of gifts - which in turn engenders reciprocal giving. In order to paint a clear picture of the formation of reciprocal relationships in gift exchange I have built a series of causal loop diagrams. My understanding of the relationships between different variables in these diagrams is drawn from an extensive reading of the ethnographic observations, case studies and quantitative studies that form the literature of exchange theory. This material comes predominantly from anthropologists, but also includes the work of sociologists, psychologists and to a lesser extent economic theory.

### Reinforcing Social Ties through Spatial Proximity

Let us begin with a statement that most exchange theorists from the anthropological background agree upon: that social ties are an integral factor in reciprocal gift exchanges. Thus, the causal loop (*Figure 11*) illustrates the development of these social bonds – as understood through primitive societies. Here, distance threshold, which I define as the ability to overcome distance in an efficient manner, is a catalyst for the causal loop that can be understood as follows: as distance threshold decreases, the number of personal interactions between people increases, as does interpersonal trust. Interpersonal trust is instrumental in establishing and increasing the number of social bonds in a society. In turn, the greater the social bond, the more interpersonal interactions that occur. This, as *Figure 11* shows creates a loop that continually reinforces these relationships.

This is best illustrated by looking at the so-called primitive societies, exhaustively studied by sociologists and anthropologists in the realm of exchange theory. As these societies were often spatially bounded when studied (on islands or in isolated areas) they had few outside influences that might change the way relationships operated between people. Thus they are particularly useful in demonstrating that spatial proximity has a positive

***Figure 12.***
*Mailu Islanders - Papua New Guinea*

relationship with the construction of social ties. Bronislaw Malinkowki gives us a succinct example of the affect of distance thresholds on spatial ties from the island of Mailu in Papua (now Papua New Guinea) during the second decade of the twentieth century:

> Brothers living together, or a paternal uncle and his nephews living in the same house were, as far as my observation goes, on much closer terms with each other than relatives of similar degrees living apart. This was evident whenever there was a question of borrowing things, of getting help, of accepting and obligation, or of assuming responsibilities for each other. (Malinkowski, 1915, p. 532)

In his book, *Stone Age Economics* Marshall Sahlins - the American anthropologist born in 1930 – draws on this concept from Malinowski but extends it by working distance threshold into a theory of reciprocity: the easier it is to overcome the distance threshold and the more personal contact you have with other people, the stronger your ties with them, the more gifts you will give and the more you will reciprocate any act of gift giving. Gifts in this sense may take a material form, but can also be as Malinkowski describes – acts of lending, helping or taking responsibility.

Sahlins' theory of the way distance threshold affects spatial ties (what he calls kinship) and in turn reciprocity, is demonstrated in his diagram *Reciprocity and Kinship Residential Sectors.* (*Figure 14*) Based around tribal cultures, this quasi-plan can be viewed as a series of residential sectors, from the household in the center where reciprocity is strongest to the local lineage, to the village, the tribe and then a larger spatial area that may include many tribes and where reciprocity between groups is weak. Given this spatial arrangement, Sahlins creates a continuum of reciprocity where "reciprocity is inclined towards the generalized pole by close kinship, (and) toward the negative extreme in proportion to kinship distance" (Sahlins, 1972, p. 196). Here, the term, 'kinship

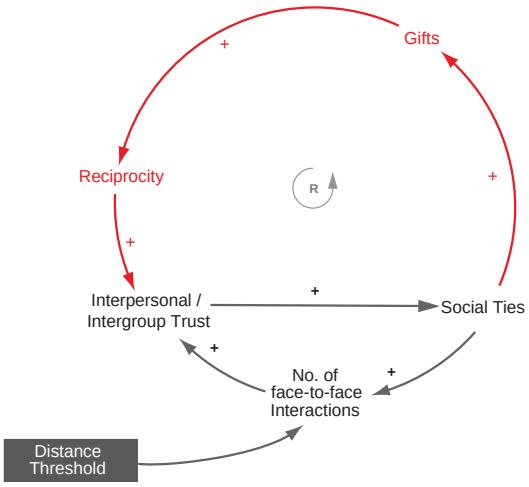



***Figure 13.***
*The reinforcing reciprocity loop*

distance' refers to the span of social distance between those who exchange and thus can be regarded as what I have termed 'social ties' in *Figure 11*.

Sahlins' judgment - that there can be positive as well as negative forms of reciprocity - has since been challenged by many exchange theorists. However, his work does support the idea that distance threshold is a catalyst in the formation of close social relationships, that increase gift giving, and in turn reciprocity and the strengthening of social ties.

*Figure XX* builds from the first system dynamics diagram to include the theories of Sahlins. Before we move on it is necessary to explain why the variable of 'distance threshold' is placed outside the reinforcing loops of a) the creation of social ties and b) building reciprocity through gift giving. This is because, although close distance threshold may have been a catalyst (particularly in tribal societies) in the formation of strong social ties, once those relationships are established, distance threshold can increase and the social ties may still remain. This is especially true as communication technologies – which allow connections to be maintained over a distance - become more widespread. Ability to maintain contact over distance is a point I will return to when discussing market exchange and again in Chapter 3 when discussing the network society. Lastly and in addition to this point, once the reciprocal loop of giving is established and this mode of operating becomes a social norm, the catalyst for building, maintaining, strengthening or weakening of social ties changes slightly, becoming embodied in the act of giving and is no longer solely predicated on a low distance threshold.

### Constructive and Destructive Gifts

The model presented in *Figure 13* shows a generalized concept of reciprocity. However, other variables - that are demonstrated through the work of subsequent exchange theorists - have a significant effect on understanding how this reciprocal mechanism can work effectively in a given context. These include: ceremonial and non-ceremonial gift exchange, gifts

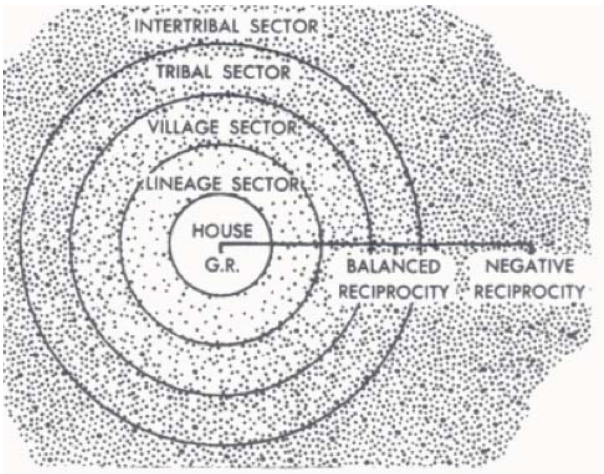



***Figure 14.***
*Marshall Sahlins' Reciprocity and Kinship Residential Sectors*

that are given versus gifts that are asked for, and motives for gift exchange. To illustrate the effects of these variables the giving of gifts will now be considered in two categories: constructive gifts (that create a positive feedback loop) and destructive gifts (that create a balancing loop) as can be seen in *Figures 15-16*.

Constructive gifts, those that are given out of compassion, caring or interest in another have a positive effect on reciprocal giving and in turn work to build or strengthen social relationships. In other words, the higher the number of constructive gifts  the more reciprocity increases – this creates a positive feedback loop. Destructive gifts are those that decrease the act of reciprocation. Destructive gifts can be designed to harm the receiver in some way, could indicate ill intent from the giver, or could simply be useless or thoughtless - showing a lack of interest in the social relationship on the side of the giver. Destructive gifts decrease the chance of social reciprocity and in turn weaken positive social ties. The feedback loop created through the giving of destructive gifts is thus a balancing loop. A typical example of a destructive gift is the giving of deodorant to a friend as a birthday present. It may be seen by the giver as a gentle hint, or even something funny but could be read as thoughtless or even embarrassing by the receiver, thus weakening social ties and diminishing the chance of a constructive gift being given in return.

### Ceremonial and Non-ceremonial Gifts

In his writings on the gift and the gift economy, Yan (2005) makes a distinction about gift giving: that there is a difference between ceremonial and non-ceremonial gifts where ceremonial gifts are those that are included in rites of passage and holidays – such as Christmas, while non-ceremonial gifts are occasional items that are given without the need for a formal ceremony (Yan, 2005). If we look at our system dynamics model as it stands so far, we can imagine that where gift giving occurs at specific times or occasions it contributes to the continual

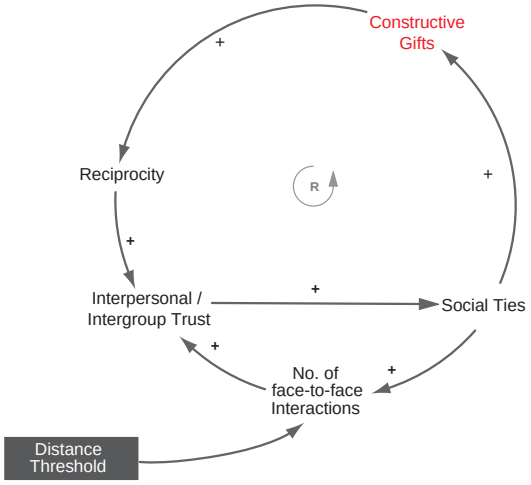



***Figure 15.***
*The reinforcing constructive gift loop*

reinforcement of the constructive gift loop and is therefore vital in retaining and strengthening social ties. Even if gifts are given out of obligation in these scenarios and not out of some other psychological motivation, the fact that some ceremonies are so ingrained into our cultures (Christmas, Chinese New Year, Hari Raya) ensures that there will still be reciprocity. On the other hand, non-ceremonial gifts can contribute either to the constructive gift loop or the destructive gift loop – sometimes strengthening and other times weakening social relationships. If the concepts of gift giving were used as a framework for the service, the FriendFreight service would certainly fall in this latter category.

### Gifts that are asked for...

Not all gifts are voluntary. As is the case of ceremonial giving, some gifts can become expected and, if not received, cause offense. Meanwhile, some gifts are asked for. This would be the case if the FriendFreight service proposed in this thesis were to rely on gift and not monetary exchange to motivate the carrier (the receiver is essentially *asking* the giver for their time and effort without an indication of immediate payment or return). As such, careful attention should be paid to the way this particular form of gift giving affects reciprocity. To demonstrate how people in different cultures deal with requested gifts let us first take an example from the well-studied Mt Hagen society of Papua New Guinea and contrast it with an example of gift requesting typical of Western societies.

Located in the Waghi Valley in central mainland Papua New Guinea, Mt Hagen has been studied by anthropologists since the early 1930's when three Australians – Dan Leahy, Mick Leahy and Jim Taylor - discovered the area and its tribes after a survey of the area by air. Two anthropologists that have observed the people at Mt Hagen more recently, however, are Andrew Strathern and Pamela Stewart. As they point out, the practice of asking people for gifts in Mt Hagen is well established even in contemporary society with people asking each other for money, food, tobacco or credit on a loose reciprocal basis (Strathern & Stewart, 2005). However, what is

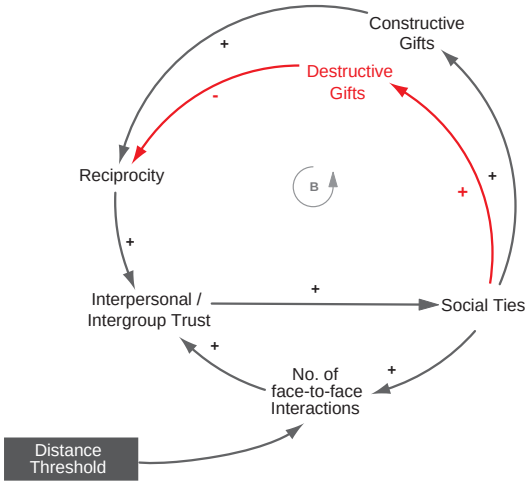



***Figure 16.***
*The balancing destructive gift loop*

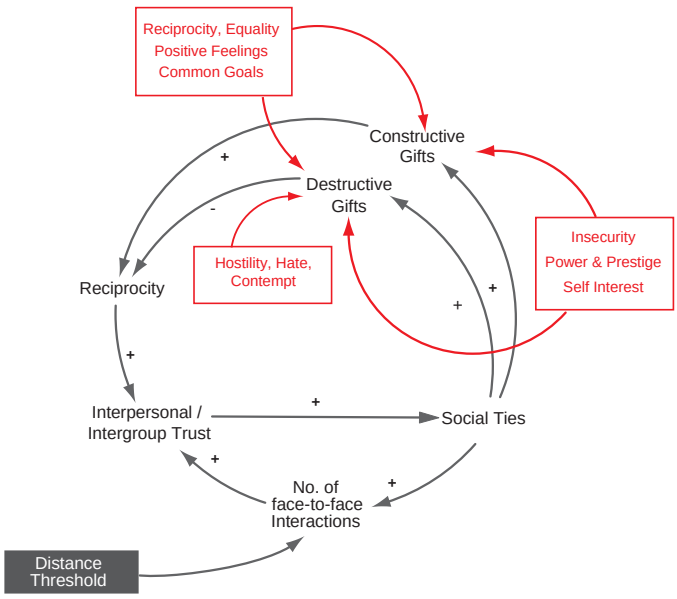
interesting about this example is that not all requests are met, as Strathern and Stewart explain:

> "Not all demands, however, are acceded to; in other words, there is no absolute obligation to give, and people have well-developed strategies for denying requests. The appropriate excuse is to say that one does not have the thing requested or, if one has it that it is promised to someone else." (Strathern & Stewart, 2005, p. 238)

Having a strategy to refuse a requested gift stands in contrast with examples of gift requests that can be found in many Western cultures. For example, if a friend asks us to sponsor them for a community marathon, there is no established strategy for refusal and we are likely to give, either because we are ashamed to say that we don't want to or that we don't have enough money. This is particularly true if we have a strong social tie with this person. Additionally, whether there will be reciprocity from this act of giving is unclear, particularly because giving money to a 'cause' is often painted as a one-off act of altruism. Thus, where there is no mechanism for refusal a requested gift can cause offence or awkwardness, as well as a feeling that there will be no reciprocity from the requester. These feelings could turn this exchange from a constructive gift to a destructive gift. If a gift giving mechanism were to be used to drive the FriendFreight service, this is something we need to keep in mind.

### Motivations: Constructive and Destructive Gift Giving

There are of course many reasons why gifts are given. Some of these motivations feed the constructive gift giving loop and others feed the destructive loop. However, as motives are largely unconscious things, it can be difficult to classify them. In his book, *Social Solidarity and the Gift*, Aafke Komter (2005, pp. 46-49) makes an attempt to do so. Drawing mostly from the field of care giving, Komter outlines six different psychological motives that are useful catch-all concepts: positive feelings, insecurity, power and prestige, reciprocity and equality, self-interest and hostility, hate and contempt.




In addition to Komter's list, which I have summarized below, I would like to consider one more form of motivation – the common good. This is an aspect of gift exchange whereby gifts are not given between autonomous individuals but where the collective interests of many motivate the giving. Additionally, as a motivation, it has great potential for the FriendFreight service.

In *Figure 17* I have added these psychological motivations as inputs to our system dynamics model.

### *Positive Feelings*

We often give gifts because we wish to express positive feelings to those that we care for around us— specifically, to show friendship, love, gratitude, respect, loyalty or solidarity. Positive feelings result in constructive gifts.

### *Insecurity*

Insecurity relates to the status of the relationship. We may be motivated to give because we are insecure about the grounds of the relationship and wish to ascertain or fortify the bond. These feelings could ultimately contribute to the constructive gift giving loop but could be destructive depending on the nature of the gift giving.

### *Power and Prestige*

A desire for power and prestige (related to reputation and fame) creates vertical gift exchange - we want the receiver to feel indebted to us by putting ourselves in a morally superior position. In this situation, although reciprocation might occur as a result of acquiescence, it can still be considered a constructive gift until the point that respect for the power structure ceases to be shown.

### *Reciprocity, Equality*

Psychological expectations of reciprocity and equality also encourage us to give. Although this is often also driven by a sense of moral obligation, it ultimately contributes to the constructive gift loop.

***Figure 17.***
*Motivations for constructive and destructive gift giving*

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*Self-Interest*

Some gift giving is motivated purely by what we can expect to gain for ourselves, whether this is implicit or explicit. Gifts in this category could be designed to flatter, to bribe or to corrupt. Personal costs and gains are the main motives here. These gifts can contribute to both the constructive or destructive loops.

*Hostility, Hate, Contempt*

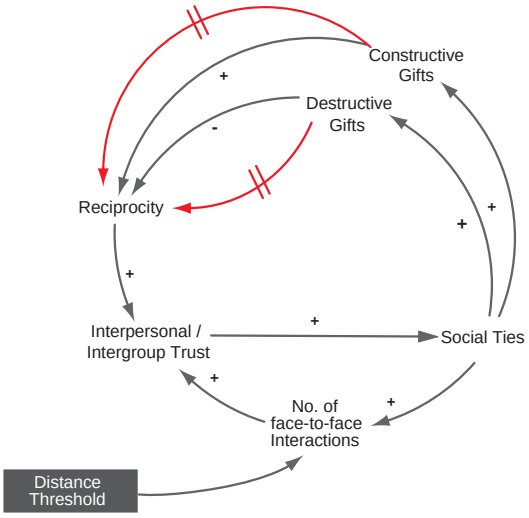
Hostility, hate and contempt form the basis for many destructive gifts. These can take the form of an unfunny practical joke or gifts that are designed to humiliate or are motivated by aggression. These gifts contribute only to the destructive gift loop.

*Contributing to the Common Good*

Gift giving does not always occur between autonomous individuals. Instead, givers are sometimes motivated because the gift contributes to (or detracts from) the common goals of a larger social group - such as a family or a community. Because of this common goal, even though the giver may have a weaker social tie with the person they are giving to, this person (the receiver) has the same goals or values as a person with whom the giver may have a stronger social tie. In turn, reciprocity is not restricted to individuals but can be distributed amongst the group in order to enhance the common goal. This motivation promotes a horizontal model of gift exchange that stands in contrast to the vertical gift exchange that is driven by power and prestige. Examples of this can be seen in cooperative farming models or in volunteering to give blood. Lastly, this motivation contributes to the constructive gift loop. It is also why the variable in our model is named interpersonal/intergroup trust.

### The Role of Time in the Building of Trust and Reciprocity

In the case of gift giving, there is often no time limit placed on the exchange process. For instance, when we donate blood or an organ, we do not think of immediate return, but through giving, reasonably expect that if at some future time we need these




things ourselves, there will be someone there to give them. Thus reciprocity is delayed although the expectation that it will exist in the future remains. When social ties are already established, this delay in reciprocity is what some scholars believe marks both trust and obligation on both sides and leads to the ongoing strengthening of relationships between giver and receiver (Strathern & Stewart, 2005, p. 230). As such if the system dynamics model we are building were to take account of this (given that we could get quantitative data!), we would have to add two more lines —linking destructive and constructive gifts to reciprocity. The additional connections would contain 'delay' marks (two parallel lines) indicating that there is a time lapse between the action of giving the gift and reciprocity. This is shown in *Figure 18* but, in the interests of simplicity, they will be left out of subsequent diagrams.

### Quantitative Findings about Gift Exchange

This section on gift exchange concludes with some quantitative findings about gift giving. These findings relate to contemporary Western gift giving and are drawn mostly from studies in the Netherlands. While they are not included in the system dynamics model in this thesis, it is possible that they could become inputs to a future model of gift giving in a particular society if supported by an understanding of its demographics.

#### *Gender Affects Giving*

In contemporary Western society women give and receive more gifts than men. This is shown through the work of Theodore Caplow (Caplow, 1982b; Caplow, 1982a) who studied the giving of gifts at Christmas between adults in Middletown, America. David Cheal (1988) found similar results in his study of giving gifts at Christmas and at weddings in Winnipeg. Lastly, Komter and Schuyt's research conducted in the Netherlands in 1993 concludes that regardless of socioeconomic differences, women give more than men across each of the following categories: presents, money, food, stay and care/help.(Komter, 2005, p. 81)

***Figure 18.***
*Time delays in reciprocal gift giving strengthens social ties*

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### *Education*

According to Komter (Komter, 2005, p. 43) those with a higher level of education give and receive more gifts. This does not necessarily equate to the access to financial resources experienced by those with a higher level of education, but also relates to the extended social networks that these people have (Douglas & Isherwood, 1979)

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What has been learnt thus far from the anthropological literature on gift exchange is that social ties, which are initially formed through a low distance threshold and the number of face-to-face interactions that take place between people, are the backbone of gift giving. These gifts, can be destructive or constructive, the latter of which is vital if reciprocity is to take place. It was also found that social ties could be less intense when there is a common goal that a group can align with. This promotes a horizontal and distributed form of gift exchange. In Chapter 2, the need for face-to-face interactions to happen at all, in order for social ties and gift giving to occur, is disputed. However, before this can be discussed, the formation of market based exchanges must be examined.

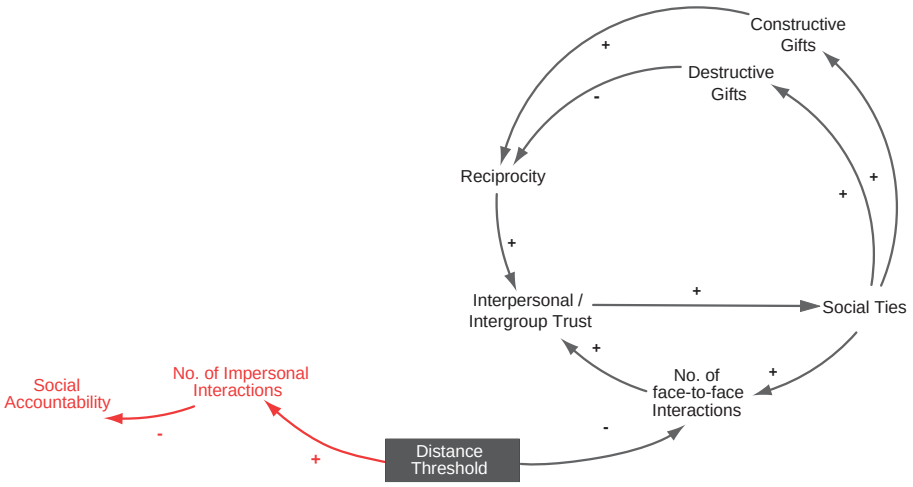
***Figure 19.***
*A high distance threshold leads to an increase in impersonal interactions and a decrease in social accountability* >

## /1.2
## MARKET EXCHANGE
## CURRENCY AND MAXIMIZATION

As with the section on *gift exchange*, let us begin by imagining that the service proposed in this thesis is based solely on the concept of the market economy—where the exchange of goods or services is governed by demand and supply, and mediated through currency exchange. In this section I am not interested in the part of the service that involves a payment to the owner of the goods, but in the type of incentive that would convince a potential carrier to take the goods to a requester. Under a market-based approach, when potential carriers receive a message from a requester, they are made aware that there is an incentive for providing the service, which comes in the form of a monetary payment. If potential carriers deem this monetary payment to be sufficient, they are motivated not only to take the goods, but also to ensure their safe delivery.

I will now examine in more detail how market exchanges operate and what causal relationships need to exist in order to sustain them. This will help us in understanding whether the FriendFreight service is feasible or whether additional aspects based on market exchanges should be incorporated.

Using causal loop diagrams, I will outline three aspects of market exchanges. The first deals with the development of market exchange in environments with high distance thresholds and a lack of what is termed ‘a coincidence of wants’ between the parties to the exchange. Also included is an explanation of the reinforcing ‘maximization’ loop in market exchange that is driven by the mechanism for calculating wealth: currency. Additionally, it is shown how industrial technologies—in particular, the rise of transport networks and communication technologies in the late 1800s and early 1900s—has affected and strengthened the market framework while also contributing to gift exchange. Then, it is demonstrated how those with a vested interest in the continuation of market exchanges have—since the middle of the twentieth century—been appropriating the concepts of gift exchange in order to increase the profit potential of market exchanges. This is what




I term "the manufacturing of socially motivated reciprocity through the giving of quasi-gifts".

### The Reinforcing Market Loop – Distance Thresholds and the Coincidence of Wants

As with the section on gift exchanges, which began by discussing how a low distance threshold is a catalyst in the formation of social ties, this section will examine how distance thresholds and another variable—the coincidence of wants—affect the formation of market based exchanges. Of course, it is necessary to say that these are not the only variables determining the formation of a market-based system, but they provide a good place to start illustrating the idea conceptually.

When talking about gift exchange I used examples proposed by Malinkowski and Sahlins to demonstrate how closed so-called primitive societies (those with little outside influence and that exist within a bounded spatial area) strengthen social ties through gift giving. What happens however, when societies are not closed within themselves but conduct exchanges with other groups where the distance threshold is much greater?

Imagine a situation where two 'primitive' societies live in isolation from each other and whose cultures and customs differ. Let's say society A lives on one island and society B lives on another, and the distance between the islands is considerable. Let's also imagine that one of these islands has an abundance of trees that produce summer fruits while the other has bushes that produce berries in winter.

Because the societies are not spatially collocated, there is not (yet) a build up of social ties between each group, nor is there a build up of interpersonal trust that comes with personal interactions. As such, we can say that if members of society B were to land on society A's island with the intent to exchange their winter berries, then the distance threshold between the two groups would mean that this exchange (at least initially) would take place as an impersonal interaction. Additionally, because there are no social ties established between the groups, the amount of

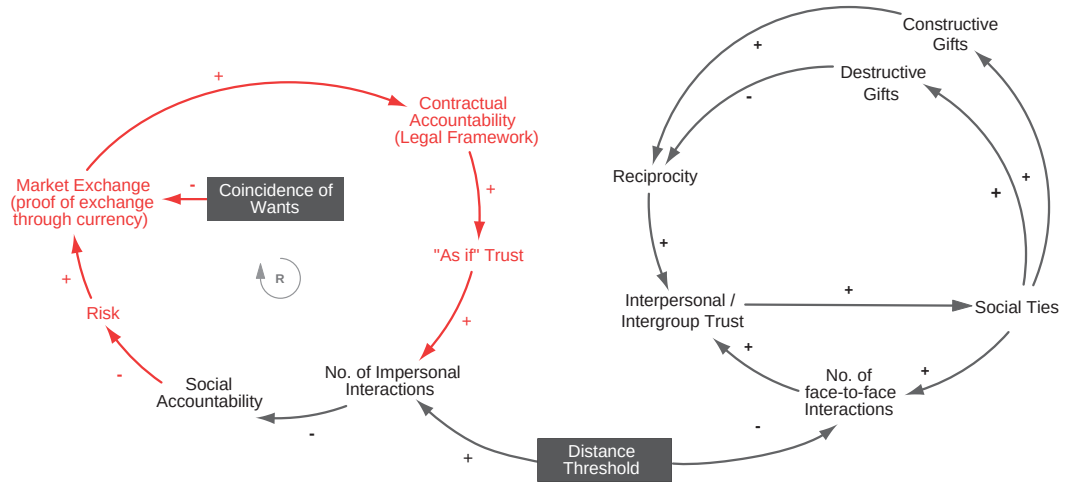



***Figure 20.***
*The reinforcing market loop based on a high distance threshold*

social accountability in relation to the transaction also decreases. This is sketched out as the beginning of a causal loop in *Figure 19* where as the distance threshold increases, the number of impersonal interactions increase and the amount of social accountability decreases.

If there is no social accountability in the transaction then the amount of risk involved in the exchange increases. Of course, if the exchange between both parties can happen in the one interaction then this risk can be mitigated (bartering is an example of this). If, however the people from society B wish to trade their winter berries for summer fruits, (which are not yet in season), then this poses a problem. Economists describe this problem as a *lack of coincidence of wants*.

One way to overcome the lack of a coincidence of wants could be for the people from society B to offer the berries as a gift with the hope that society A will reciprocate with summer fruits when the time comes. Without any established trust between the two groups however, and considering the distance, time and effort it takes to travel between islands this exchange is risky. Another measure of accountability could be to establish a value for the items and define a contract for trading. In other words, the two groups might decide that 3 bags of berries are worth 5 bags of fruit and that society A will deliver the fruit in 6 months time. However, this solution is still not risk free and may not suit all parties as time proceeds. If, for instance, the harvest fails then there might not be enough fruit and society A could default on the agreement. Similarly, society B may decide that they do not want to have that much fruit when the time comes for receiving it.

The way to solve these problems—the lack of social accountability and the lack of a coincidence of wants—is, of course, through a form of currency that is accepted by both groups. This currency can then be used freely to purchase items when they are desired or needed. It also acts as a proof of exchange. This proof in turn increases accountability—not a social

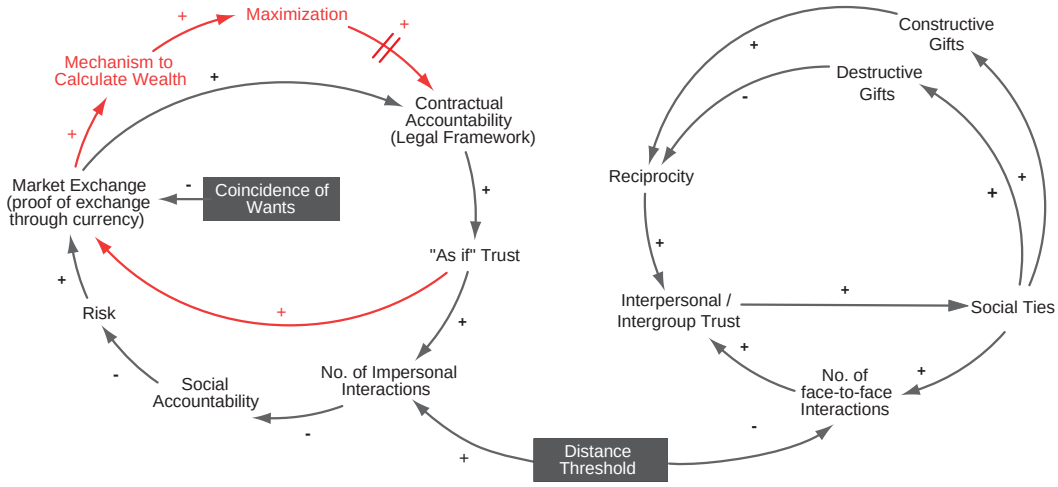



***Figure 21.***
*The reinforcing maximization loop: the backbone of everyday market exchanges**Figure***

accountability as we would see in gift exchanges but a contractual accountability that further down the track develops into a legal framework. This, as Patrick Heady observes, is the essential point: "money provides advantages in situations where it is not easy to bring together partners who may want to make corresponding exchanges of actual goods" (Heady, 2005, p. 265).

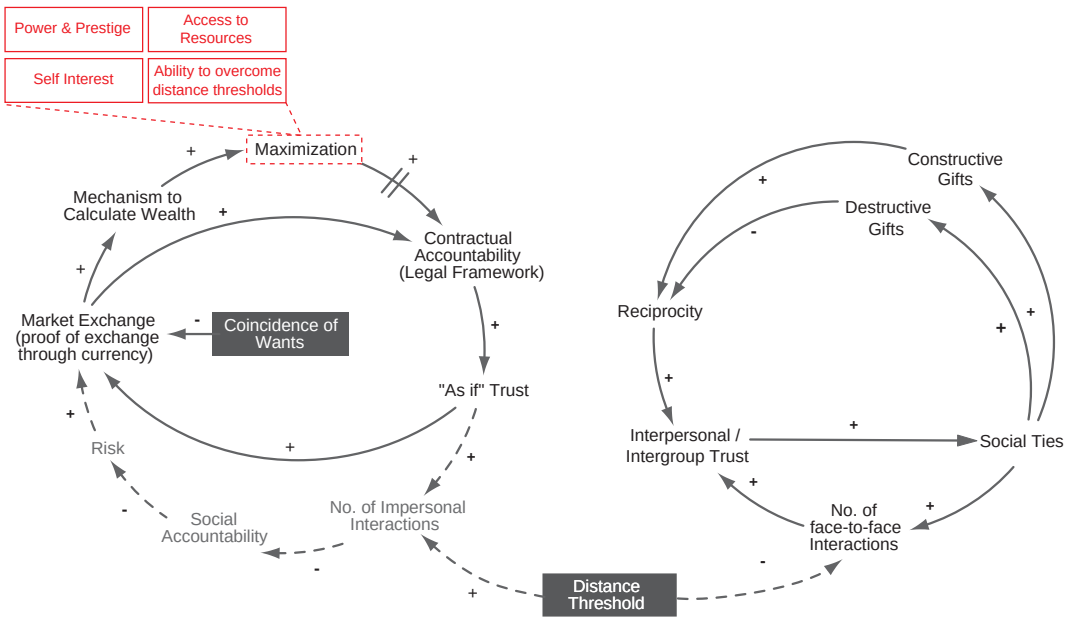
The contractual accountability that stems from market exchanges creates what economic scholars call "as if" trust. That is to say, when people or groups enter into an exchange within a market framework, the accountability that comes through the use of money allows them to engage "as if" the other were to be trusted even though the two parties may have no social ties. James Buchanan sums this up in relation to Western economies that are now heavily based on market exchanges. (Buchanan, 1994, p. vii)

> In developed Western economies (eg., the United States, Canada), individuals, firms, and associations engage, one with another, in sometimes highly sophisticated and complex contractual exchanges without concerning themselves directly about the ultimate trustworthiness of those with whom they engage. That is to say, participants proceed, "as if" their exchange partners may be trusted to abide by the explicit and implicit rules of the economic the economic game. They are enabled to do this, however, only because there exists a well functioning legal order that ensures that violators of the rules or norms will be located and punished.

"As if" trust therefore allows distance interactions to occur. As such, we can now close a causal loop of market exchange: This is shown in *Figure 20*.

### The Reinforcing Maximization Loop

We can now add to our system dynamics model, a second very powerful reinforcing loop, which can be seen in red in *Figure 21*. I have called it the Maximization loop and it can be understood as follows. A proof of exchange in the form of money can be used as a mechanism to account for and compare wealth between societies or individuals. In turn, a




mechanism for comparing wealth increases the ability to maximize the exchange of goods and services. To ensure that the practice of maximization is not abused and that the exchange system operates efficiently, an increase in contractual (legal) accountability and "as if" trust occurs. Lastly, although "as if" trust was originally connected to distance transactions alone, it can be seen that "as if" trust also causes an increase in the market exchanges that occur in the absence of a coincidence of wants. This is a very powerful loop where maximization is driven by market exchanges that lead to a mechanism to calculate wealth, as shown in *Figure 21*. I believe this loop has become the backbone of most of the transactions that take place in our day-to-day lives.

Of course, this is not the only factor that can drive maximization. If this were a more detailed system dynamics model, we would have to include numerous other variables that may result in the reinforcement or balancing of the Maximization loop. These include but are not restricted to: access to resources, personal motivations such as a desire to maintain power structures or self-interest, and the ability for an individual or a group to overcome *distance thresholds*. These variables can be seen in *Figure 22* but for the sake of simplicity, will be omitted from future diagrams.

### Industrial Technologies and beyond: Transport and Communication Networks

The rapid development of transport technologies during the Industrial Revolution and the subsequent development of communication technologies had a significant effect on market exchanges (and thus the distribution of goods). I am talking in particular about the rise of transportation and telecommunication technologies and their associated infrastructures, which not only markedly changed our ability to overcome distance and communication thresholds but, in turn, also increased the intensity and speed of market exchanges.

Before the Industrial Revolution and the invention of motorized forms of transport, movement between places for the purposes of trade was reliant on animal power for transportation by land, and wind power

***Figure 22.***
*Additional variables that might drive maximization.*

*NB: once the maximization loop is established as an everyday exchange mechanism, a high distance threshold is no longer needed for this type of exchange to take place. This part of the diagram is therefore represented as dashed lines.*

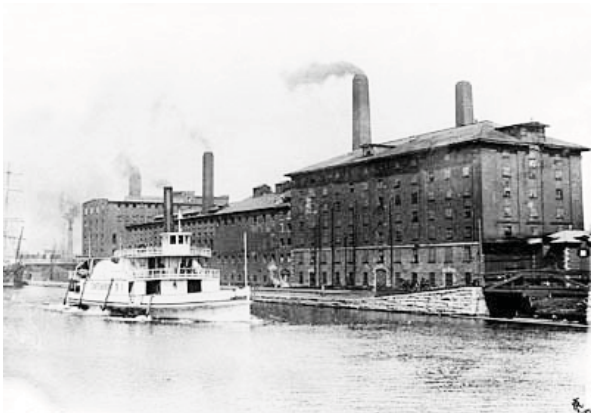
<

for transportation by sea. Although trade between societies existed at this time, the transportation modes were restricted to low speeds, with the average for horse-travel at 8 kilometers per hour and for wind-powered ships at 15! Thus trade in general was decidedly more local in scope (notable exceptions being the silk route and the roman empire's trade routes). (Rodrigue, 2006) As Jean Paul Rodrigue points out (Rodrigue, 2006, p. 14):

> From the perspective of regional economic organization, the provision of cities in perishable agricultural commodities was limited to a radius of about 50 kilometers, at most. The size of cities also remained constant in time. Since people can walk about 5 km per hour and that they are not willing to spend more than one hour per day walking, the daily space of interaction would be constrained by a 2.5 km radius, or about 20 square kilometers. Thus, most rural areas centered around a village and cities rarely exceeded a 5 km diameter.

Market exchanges within urban areas were already well established in the pre-industrial era. What Rodrigue's text demonstrates, however, is when it came to trade between urban areas, market exchanges were greatly restricted due to a high distance threshold. The technologies of the industrial revolution would change this—in particular the development of canal systems (especially in Britain, the US and Canada), railroads, steam ships, telecommunications and their associated infrastructures.

There is no need, at this point, to explain why these technologies developed. It will simply suffice to look at how, once in existence, and given a coincidence of wants, they affected the number and speed of market exchanges. Firstly, however, *Figure 24* shows these technologies—captured under the labels of *Transport Technologies and Infrastructure,* and *Communication Technologies and Infrastructure*—added to the system dynamics model. Although the labeling represents a vast reduction in the complexity of these terms, they will suffice to illustrate the main points of this section, which will be drawn out in the following text.

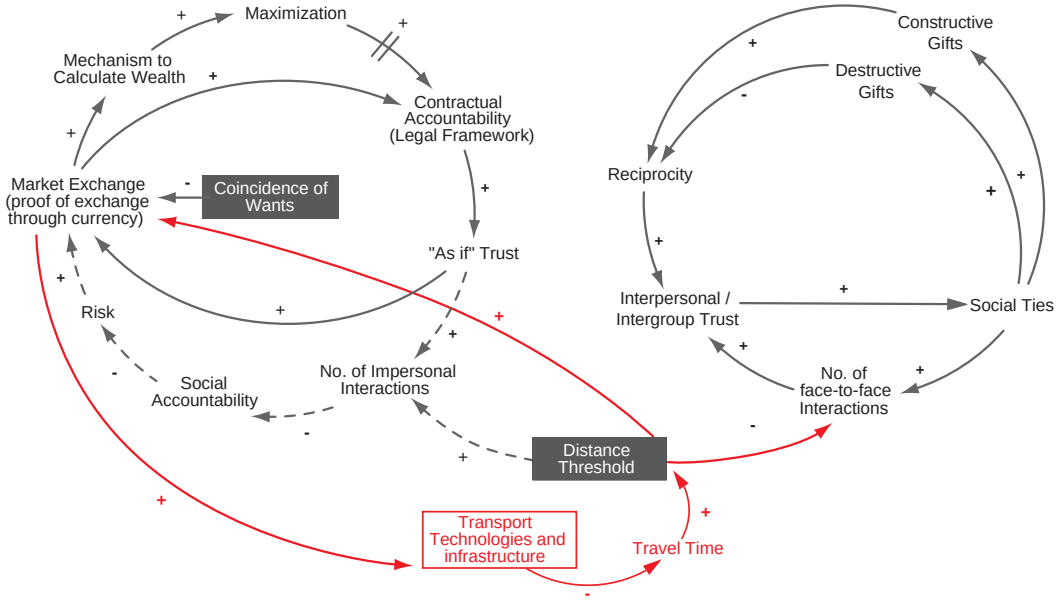


< ***Figure 23.***
*The Lachine Canal, Canada increased the intensity of market exchanges in the area.*

***Figure 24.***
*Transport technologies increase the speed and intensity of market and gift exchanges.* >

According to Rodrigue (2006) the reconfiguration of transport systems through the pressures of the industrial revolution began in earnest through the building of freight shipping canals in the early industrial countries such as England and the United States Canals allowed inland distribution systems to develop (albeit rudimentary and constrained). An early example is the Bridgewater Canal in England, which connected the coalmines of Worsley to Manchester along a 16-kilometer stretch. The completion of the Bridgewater Canal drastically reduced the time it took to transport coal from one place to another, in turn reducing the cost of coal by half (Rodrigue, 2009). This allowed many more market transactions to take place, which in turn spurred the extension of this canal and the application of the technology to other areas of the country. Thus, by the latter half of the eighteenth century, a significant network of canals existed and trade was booming.

This example can now be applied to our model. As canal infrastructure increased (captured by the variable *Transport Technologies and Infrastructure*), the amount of time required to transport goods was reduced. This additionally reduced the distance threshold between traders. If we continue with this logic through the links we have already placed in the model, then, as the distance threshold decreases the number of distance transactions also decreases. In turn, social accountability increases, trust increases and market exchanges decrease. At first glance, this appears to be a problem because we know the opposite to be true—trading between cities did not experience a decline in the industrial revolution, but experienced unprecedented growth. However, what might be forgotten is that the market mechanism was established as the norm for commodity trades in Britain at this time and that even if distance interactions decreased, the legal and monetary framework for market exchange ensured that in most cases this type of exchange would be adhered to and there would thus be no reverting to gift or some other form of exchange. This is not to say that the decrease in distance threshold did not engender an increase in




personal interactions, social ties and the gift giving associated with this - the railway technologies of the second phase of the Industrial Revolution were particularly instrumental in doing this - but simply that during the first phase of the Industrial Revolution, the market loop dominated commodity trade.

As such, with the market framework in place, the reduction in the time it took to exchange not only reduced the distance threshold but also, as we have seen in the example with coal traveling down the canals of Britain, reduced cost, which in turn increased the number of market exchanges. This additional connection is shown in *Figure 24*.

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The canal systems mentioned above are an early example of transportation technologies that changed the speed and number of market transactions in the first phase of the Industrial Revolution. During the second phase of the Industrial Revolution, (during the nineteenth century), railway technologies developed to do this with even greater intensity. It was around this time that communication technologies, including the early telegraph systems developed. I will now briefly look at how these influenced market exchanges (predominantly) and will also touch on their delayed influence on social exchanges (in America at least) that might encourage gift giving. This is done through examining the writing of Richard B. Du Broff, a Professor of Economics, who has written on these issues in relation to the development of businesses in the United States in the nineteenth century.

The impact of communication technologies on market exchanges is much less documented than the affect of the railroads during the mid nineteenth century. However, the early telegraph had significant influence on these types of exchange. Du Broff (1980) states that unlike rail technologies that were conceived of as a local and regional facility, the telegraph was from the beginning geographically dispersed and interregional from the beginning: “the greater the distance, the greater the savings for

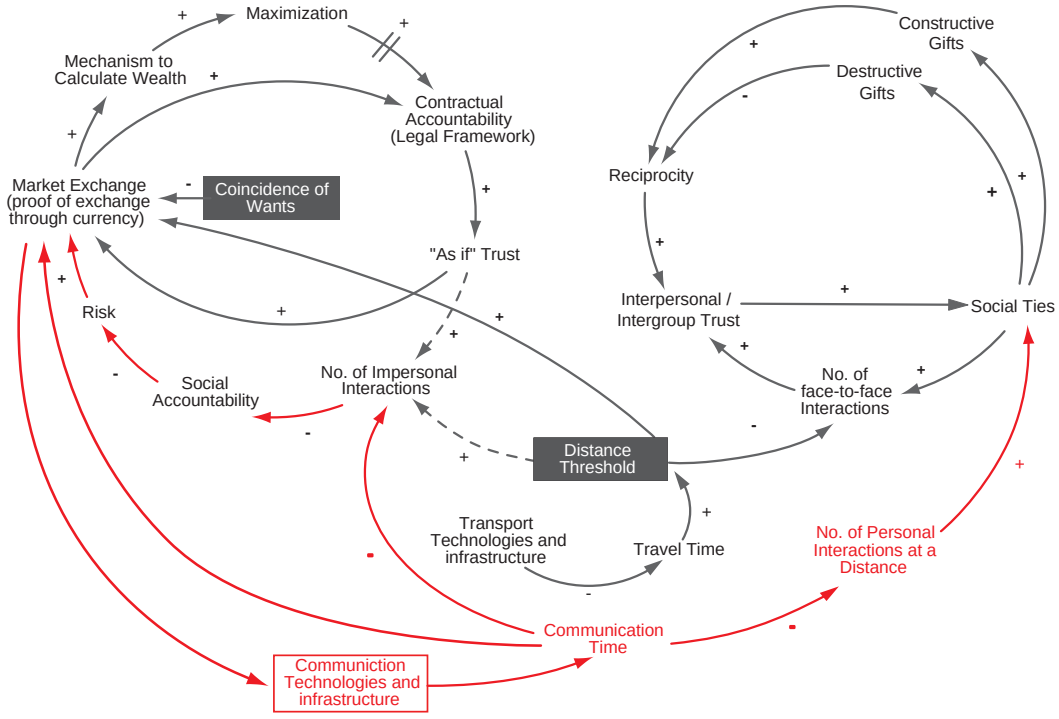
< ***Figure 25.***
*By 1910, telegraph poles had become a common site across the American Landscape*

***Figure 26.***
*Communication technologies increase the speed and intensity of market and gift exchanges* >

the individual in time and the overall economy in resources" (Du Broff, 1980, p.461).

In a decentralized country such as America, the commercial advantages of the telegraph were clear from the beginning. A desire by companies to increase profits, pushed them to search for new markets, which, given the geography of the US, were often located at great distances from where the business was run on a day-to-day basis. The telegraph supported this and in turn, after an initial few years of skepticism from some capitalists, the business potential of this new technology was recognized and demand for it increased. (Du Broff, 1980) This had the effect of driving the development of the technology faster. In *Figure 26* this can be seen: as communication technologies and deployment goes up, communication time goes down, market exchanges go up, but at the same time the number of market exchanges made possible pushes the further development of the technologies. This is a reinforcing loop that is a strong driver in continual market exchanges during this period.

Du Broff notes, that the use of the telegraph by private parties for "social messages", did not occur in the United States until the market use for the telegraph was well established. This contrasted the use of these technologies in Europe. This is corroborated by Frank Parsons, a Boston University law professor who asserted as late as 1899: "In Europe two-thirds of the telegrams are on social matters; in this country only 8 per cent are social. Ours is a business and railroad system" (Du Broff, 1980, p.465). However, the trend in Europe of using the telegraph for social matters was slowly seen in the US, particularly as the Post Office Department incorporated it into their services offered after the creation of the Western Union Monopoly. Thus, in the causal loop diagram, the reduction in communication time through the telegraph resulted in an increase in the number of 'personal interactions at a distance', which increased social ties (it can be assumed) gift giving.




On examining the causal loops drawn, it would be tempting to assume that I am proposing the following: if the transport technologies exist, then the intensity and speed of market exchanges will automatically increase. This of course is not the case and demonstrates that this model is really only for explanatory purposes and should not be considered a reflection of the history of the world! For example, although we know that the travel time between England and Australia sharply decreased during the industrial revolution as transport technologies improved, (Rodrigue, 2009) this does not mean that trade increased proportionally (even though an export such as wool was highly desired by British mills at the time). This is because other events, such as periods of drought and a reduction in available capital due to spending on the Napoleonic wars, had an additional influence on trade. A caveat can then be made about this model: In situations where facilitating social conditions and a coincidence of demand and supply exist, and additionally when there is no other consummate and spatially closer alternative place of supply, then the introduction of technologies that reduce travel time and thus the distance threshold between two places will increase the speed and intensity of market exchange. In other words, even though exchange between individual places may have risen and fallen due to other factors during this time, the overall global trend was a rise in the number of exchanges and the speed at which this could be done.

### Quasi-gifts and the Supermarket

Moving on from changes that occurred during the Industrial Revolution, this section outlines a key trend in market exchanges, which first appeared in the mid twentieth century: the use of gift-like exchanges to engender a feeling of loyalty in customers involved in market exchanges, with the aim of increasing profit for the company offering the “gift”. As the aim of this strategy is to increase the number of market exchanges that take place it may well be useful in establishing and maintaining the service proposed for Copenhagen. It is discussed below in relation to


< ***Figure 27.***
*The use of loyalty cards is common in many modern market exchanges.*

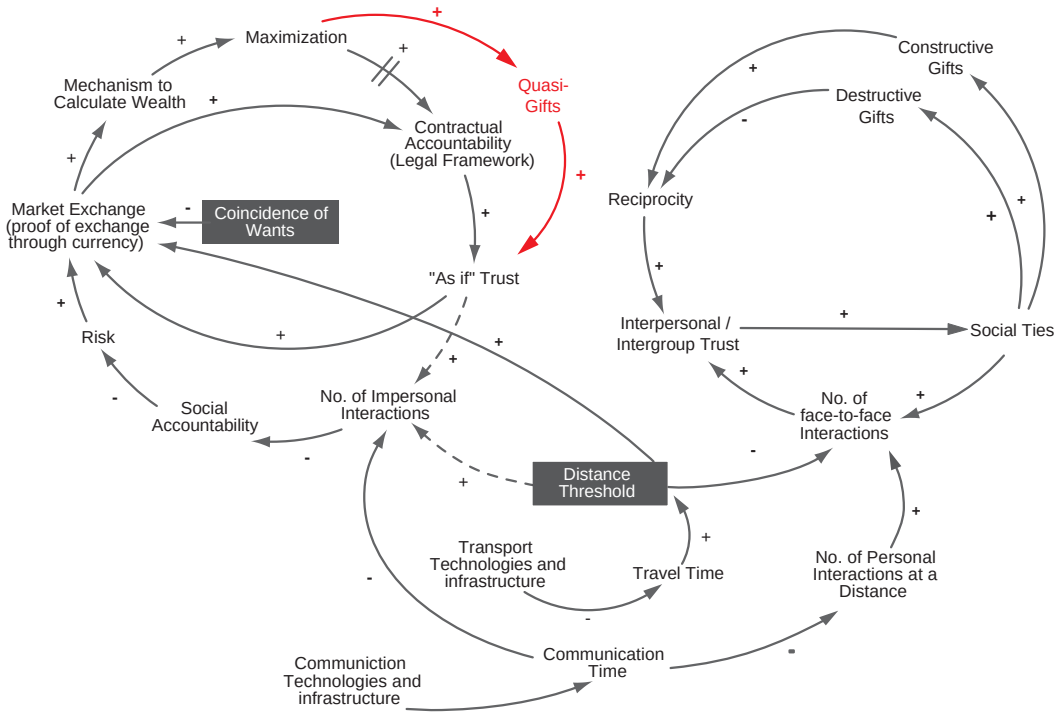
***Figure 28.***
*Quasi-gifts aim to manufacture socially motivated reciprocity by creating a relationship between people and brands.* >

supermarket exchanges—perhaps the most common of all market exchanges in contemporary Western societies.

Whereas the Agora of Greece or the bazaar at the base of Ali Ghapoo's Palace in Esfahan, were once places where social and political exchange were valued equally amongst the buying and selling of goods, the contemporary supermarket—a boxed in, formalized and more permanent version of traditional markets or bazaars—has now been reduced to a place of market utility. With the removal of social exchanges, supermarkets could be described as natural emanations of profit-motivated rationality and have all the functions of a neo-classical super!market—prices rise and fall with supply and demand, the company works to maximize profits and individuals work to maximize utility.

However, because competition influences the profitability of market exchange, supermarkets have been involved, since the mid twentieth century, in what I would describe as "manufacturing socially motivated reciprocity" in order to increase the number of market exchanges that take place within their walls. This concept is not new. As Parvartiyar and Sheth (2000, p. 137) have noted, the early twentieth century market-economy was characterized by the production of impersonal and anonymous commodities, whereas the contemporary market increasingly seeks to engage the individual when presenting and selling items. The following text outlines an example for how this is done.

Loyalty programs, which are particularly prevalent in United States supermarkets, are a prime example of how the *concept* of gift giving, (which as has been discussed can be associated with building social ties) is used in market exchange. When you shop at a supermarket for the first time, the cashier will ask you if you want to sign up to the store's loyalty program. This entitles you to a card that gives you immediate reduction on items advertised as discounted in the store. If you do not have the card, you do not see the discount. In return, however,




you are giving the store access to your personal details—your name, where you live and your phone number. This helps the store keep track of how much you spend and what items you buy—useful for their inventory management—but also, in the words of marketing executives, it helps to build a relationship with you, the customer. In the words of Philip Kotler, one of the leading authorities on marketing: "The marketer's goal is to build a mutually profitable long-term relationship with its customers, not just sell a product" (Kotler, 2003, p. xiii).

Economists might explain this away as a rational exchange: the supermarket gives Mary a discount card and she in return gives them her personal details and shopping habits. But this is not the market exchange of earlier formulations of (Western) neo-classical markets where exchange was devoid of all social-personal considerations. Nor is it a pure gift exchange predicated on close social bonds. Instead, as Andrej Rus posits, these types of market exchange are simply using the strategies and simulated intimacy of gift exchange—including creating (quasi) moral and social relations and embedding the gift-giving spirit into every day items—to evoke the feeling of a personal relationship (trust and loyalty) in customers and thus facilitate further exchange. (Rus, 2008, pp. 81-102)

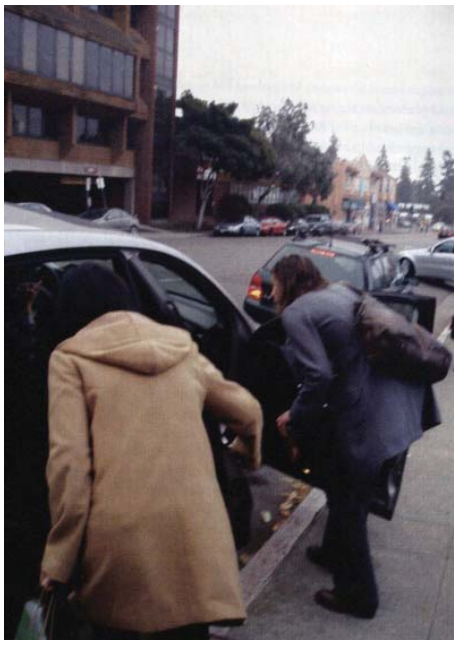
Strategies like loyalty programs and branding aim to create relationships with social meaning and obligations within the framework of market exchange. However, these are not akin to the gift exchanges that were discussed in the start of this chapter. Firstly, although the feeling of a relationship might exist between a buyer and a company or brand, this is not a social tie: we might be on a hello-goodbye relationship with the cashier at our local supermarket—the person who actually sells us the goods—but the relationship in general does not extend beyond this point. Thus I have added a new loop to the model: the quasi-gift loop that increases with maximization and in turn increases "as-if" trust. This is seen in *Figure 28*.

/1.3
GIFT AND MARKET EXCHANGES IN PRACTICE

What has been learnt from the examination of market exchanges is that when two people are strangers and do not have a coincidence of wants, money emerges as a form of accountability and allows the transaction to take place without the trust engendered through social ties. Money can also be used as a mechanism to calculate wealth – something that many market exchanges are driven by. However, what is interesting in the development of market exchanges is the use of *concepts* of gift exchange to further market transactions. This is a recognition of the power of social ties and the building of loyalty in reciprocal exchange systems. It should also be recognized as a potentially vital aspect of the proposed FriendFreight service.

Although anthropologists separate the categories of gift and market exchanges, they do acknowledge that, in both primitive as well as contemporary societies, the two types of exchange can occur **(reference?).** The challenge taken in this chapter is to understand the basis and the relationships (both actual and potential) between gift exchange and market exchange rather than treating them as two separate entities that could simply be applied individually to the FriendFreight service proposed in Copenhagen. So far, it has been shown that market exchanges use some of the concepts of gift exchange to increase the number of market exchanges taking place. What has not been examined is the way gift giving might work in a post-industrial society where market exchanges are already integral to everyday life.

To close this chapter, an example of a working gift exchange ‘service’ in the city of San Francisco will be described. This service is in many ways similar to the FriendFreight service proposed in this thesis (although it involves the movement of people



<< ***Figure 29.***
*The Casual Car Pool in San Francisco allows a more efficient journey to downtown.*

< ***Figure 30.***
*Female riders often use the ìsafety of threeî rule when using the Casual Car Pool service.*

not goods). By looking at this service through the lens of the causal loop diagram as it stands at present, it will be shown that, although at first glance this service appears to be based on gift exchange, it also operates within a framework of market exchange, even though no currency transfer takes place. More importantly this example establishes that in the successful running of a service that includes the movement of people and/or goods, be it through market or gift exchange, two variables rise to the top as being of importance (although other variables in the model should certainly not be discounted). The first has already been discussed in this chapter—it is the "coincidence of wants". The second—the spatial configuration of the city—has not yet been addressed. This second point is something that is not relevant to all gift or market exchanges but is influential in this particular example and is something that is examined in Chapter 3 of this thesis in relation to the FriendFreight service.

## The Casual Carpool

*The single largest transport resource, not just in the Bay Area but in the entire country, are the empty seats in everyone's car.* Randy Rentschler, director of legislation and public Affairs at the Metropolitan Transportation Commission for the Bay Area (Starr, 2009).

There is a (not so) new grassroots movement in San Francisco's Bay Area—the casual carpool. Each weekday between 6.00 am and 9.30 am a line of pedestrians forms in various parts of the city while a stream of cars comes past to pick them up and drive them to one destination: the corner of Freemont and Mission Streets in downtown San Francisco. Cars don't leave the pick-up point until they have three people—the minimum number to access carpool lanes, at which point they head towards the Bay Bridge. Once in the city, the riders walk to work or take city buses. What is amazing about this service is that the passengers are driven for free yet nobody knows each other (at least not at first). Additionally,

PETER MERHOLZ
**driver/rider**
President,
Adaptive Path

Merholz heard about the phenomenon when he was still in college at the University of California at Berkeley and has been using it for the last month. "What I love best about casual carpool is that, even with pretty much no rules, it simply just works. I totally feel safe. The type of Lefty professional that casual carpooling attracts is never threatening."

BEN METCALF
**rider/driver**
Project Manager,
BRIDGE Housing

Having carpooled for two years, Metcalf feels "completely safe" and sees "a clear mutual advantage which isn't there for hitchhiking. ... There's no power dynamic. It also helps that there are three strangers." He doesn't "think people talk enough. I think we'd all do better as a community and enjoy ourselves a bit more if we opened up."

***Figure 31.***
*Four interviews with Car Pool drivers and riders help to identify motivations as to why people use the service.*

the service, which has been running for over 30 years, is completely unregulated with no government or market oversight, yet every day it efficiently transports complete strangers in cars to a common destination. (Starr, 2009)

So, if there are no existing social ties, what is it that causes such gift giving to occur? The answer lies in a variable in the causal loop diagram that is currently related to the market exchange loop: the Coincidence of Wants. The coincidence of wants is a problem generally discussed in economic theory, and involves the difficulty in bringing together - both spatially and temporally - person A, who wants something from person B. As has been discussed, the use of a standardized currency that is accepted by both parties can overcome this. However, as market exchanges have become so prevalent in a post-industrial economy, oftentimes even if there is a coincidence of wants, money is still used to mediate the transaction.

This is not the case in our example from San Francisco. Here the coincidence of wants exists because the rider wants to get to the city in an efficient manner as cheaply as possible. They are also freed from the restrictive schedule of public transport as the cars flow steadily into the designated pick-up points. This is because the driver also has a want, to take more people in their car so that they can use the fast lanes across the Bay Bridge and avoid the $4 toll as well as minimizing congestion, thus increasing the efficiency of their journey. Of course, it would be reasonable in this situation, given the cost of car maintenance and ownership, for the driver to ask for a small donation for the drive, but they don't and thus no capital accumulation occurs. You could say here that money is involved in this transaction—due to the fact that drivers avoid the bridge toll. However, this is different to a market exchange where money is used as a mediator and is a direct transfer. It is instead the saving of money that is seen as an incentive to provide something for others.

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According to Adam Starr (2009) there exists an unspoken code of ethics that has developed in an ad-hoc fashion over the life of this service. Passengers do not use mobile phones, change the window positions or play with the air-conditioning. Additionally food and drink must be cleared with the driver before bringing it into the car. Drivers usually play National Public Radio or classical or jazz stations and if talking begins, its continuation is at their discretion. They are also expected to drive conservatively and maintain a clean car. In terms of safety, riders who feel uncomfortable entering a car with only two seats are commonly seen entering a vehicle which is waiting for two or more passengers to take advantage of the "safety of three". When testing the service out, Starr had two types of experience: in some these rules were strictly adhered to and he was admonished for casually speaking. The majority however, involved a general sense of conviviality with "one recent ride spent discussing the Pearl Jam vocalist Eddie Vedder's solo tour after the driver went off the reservation and played the *Into the Wild* soundtrack". (Starr, p. 79)

Bringing the structure of the service back to exchange theory, we see that it certainly does not fit into the contemporary writing of theorists such as Maurice Bloch and Jonathon Parry whose view according to Yan is that there are "two related but separate transactional orders in most societies, on the one hand transactions concerned with the with the reproduction of the long-term social or cosmic order; on the other, a "sphere" of short term transactions concerned with the arena of individual competition" (Yan, 2005, p. 255). In the service in San Francisco, there appears to be no individual competition nor is there a pre-meditated concern with the reproduction of a social order.

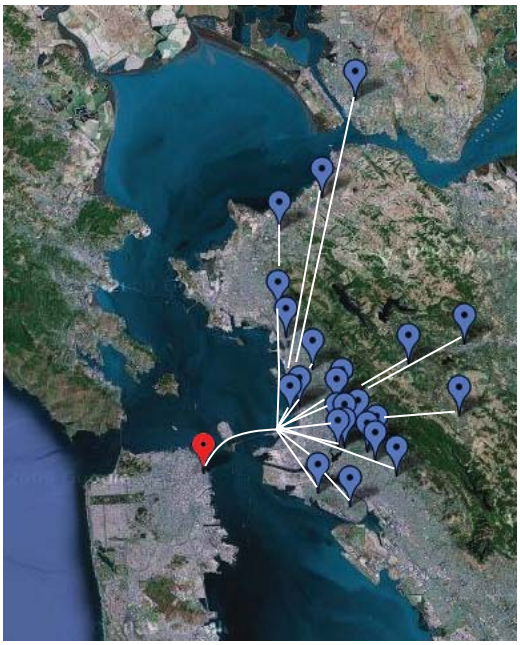
There are other exchange theorists, however, who might explain this exchange through a different set of theories and then call the service the building of a commodity-debt relationship. Christopher Gregory does not rely on the term market exchanges (which imply that money is involved) to distinguish types of exchange. Instead, he constructs the argument that there are both gift-debt relations, (which

***Figure 32.***
*The spatial layout of San Francisco limits driver choice and results in congestion on the Bay Bridge.* >

involve the transfer of inalienable items between mutually dependent persons), and commodity-debt relations (where alienable items are passed between independent parties) (Gregory, 1982). At first glance, this may appear to be a plausible classification for the casual car pooling taking place in San Francisco. After all, the ride to the city could be considered an alienable commodity and the people in the cars are most often strangers. However, Gregory (Gregory, 1982, p. 41) also maintains that commodity relations establish objective and quantitative relationships. This may be true for some of the car pool rides – particularly those that strictly adhere to the unwritten rules of the car pool, but as the experiences of Adam Starr show, most car pool experiences involve a social aspect and as car poolers often select the same car, given the right set of people, social ties could form.

There also appears to be a certain demographic that uses the service and thus there is a feeling of community even though people do not know each other. As Rentschler points out in Adam Starr's article on the service: "you are going to ride to work with somebody that you can relate to." Getting into a car and listening to NPR is a "comforting sensation" because drivers and riders have an indication that they have shared values and interests despite the fact that they do not know each other (Starr, 2009). These sentiments further rule out the likelihood that this service is strictly a commodity exchange.

The other major variable that facilitates the service in San Francisco is something that thus far has not been discussed in this thesis and interestingly, is rarely discussed by anthropologists in the literature on gift or market exchange that has been surveyed for this thesis. This variable is the spatial and built form of the area in which the exchange takes place. This is different to a distance threshold, which is simply the ability to overcome distance in an efficient manner. Instead it is the arrangement of infrastructure and architecture in relation to the existing land conditions of a given urban area that can facilitate or hinder certain types of movement and therefore exchange. The factors that encourage or discourage the San



Francisco service in this light can be considered in two parts: transport flows and spatial nodes. Transport flows relate to the infrastructure and route choice available in a city that, depending on availability and configuration can either keep the flow of traffic at a desired rate, or generate congestion and delays. Spatial nodes relate to the pick-up and drop off points where riders and drivers converge and which must be amenable to the casual carpool transport flows that are directed towards these locations.

San Francisco is a big city occupying a small peninsular. As such, people who work in the downtown area, but do not live in the center of the city are funneled towards a limited number of routes if they wish to drive their car for their daily commute. (*Figure 32*) This coming together of many people causes extreme congestion and thus delays – an efficiency issue both for drivers, but also a concern for city governments who have a desire to minimize the negative effects of transportation. To combat this problem, in 1975, the transport authority instigated a carpool lane on the Bay Bridge where if you drive a car with 3 or more passengers you can more effectively avoid the congestion that occurs due to these points of convergence. Here we see then, that the unique spatial configuration of San Francisco and the fact that the central business district developed in a spatially bounded area, limits the route choices available for those outside the city, which in turn increases congestion and thus forces a policy solution to enhance traffic flow (a policy solution being cheaper than building a new bridge!). This set of spatial conditions and policy reactions, sets up the necessary framework to encourage casual car pooling.

At the same time, the spatial nodes in the city which act as the pick up and drop off points in the service must be amenable to the traffic flow that converges toward these points. If these spatial nodes are hard to find, hard to get to, are not approved of by authorities or residents or do not have adequate facilities for both car and passenger queuing, then this

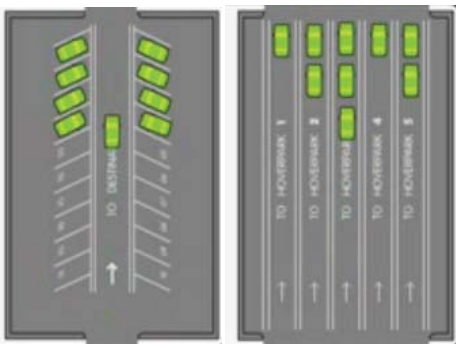

discourages the use of the service. In the destination node, this is especially important, as this is the point that experiences heightened traffic flow. In the case of San Francisco, the destination node is located at the corner of Freemont and Market streets (*Figure 34*). This location is a short walk to many businesses in the downtown area, but is also a place where there is existing infrastructure for other modes of transport that in turn can support this casual service.

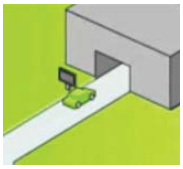
The origin nodes see lighter traffic flows and can thus be smaller. A quick survey through Google Maps™ shows that many are collocated with businesses that have parking facilities, roads that have street parking or pullover lanes and existing (or sometimes former) transit stops. In suburban areas, it appears that these nodes are even less formal, often occurring on a strip of road where a red curb indicates that it is illegal to stop, but which in terms of casual car pool makes for a better place than the side of the road that has street parking.

Being an unregulated service that is tolerated by the city, *Casual Car Pool* has a degree of flexibility that is not found in more formalized business transactions. Should a street become unsuitable because of complaints or ticketing (although it appears that this rarely happens), the relocation of a pick-up node is easy and a small sign on the street and the communication of this through the community network allows for fast re-organization. Although the service has been operating for over thirty years, the Internet has also become a valuable way of disseminating the knowledge about the changes made to and the potential safety hazards of the service. The use of the Internet to facilitate the exchange is a point I will return to this in Chapter 2.

The potential of the casual car pool to make money and be converted into more of a market exchange where an accumulation of capital can occur is already being explored by the company *flexiblecarpooling.org*. Here, a payment system is formalized—they use the concept of 'ride credits' that

***Figure 35.***
*Pick-up and drop off infrastructure proposed by the Flexible Car Pool company.* >





<< ***Figure 33.***
*Pick-up points are often colocated with existing parking lots or transit nodes.*

< ***Figure 34.***
*The final destination on Fremont street coincides with an existing transit hub.*

can be purchased with money by riders online, either as individual purchases or from other members of the system. Drivers accumulate credits by providing the service and can then sell these online to other members. Although it is not mentioned, it is likely that a proportion of each credit goes to the flexible carpooling company that deals with the maintenance of the service.

In addition, the flexible carpooling group proposes that pick-up and drop-off points are formalized spatially at specific points in the city. The configurations for these nodes are seen in *Figure 35* for pick-up points and for drop-off points (Flexible Car Pooling, 2009). As an isolated system where the aim is to manage queuing effectively these work well, however, the downfall of this infrastructure is firstly its inflexibility—something that is easily overcome in the unregulated system in San Francisco. Secondly the cost to implement the infrastructure—land-purchasing etc—is high compared to the amount of time in the day that the service is actually in use. Lastly, from an urban design perspective, these underutilized big boxes and pieces of asphalt—all too common in American cities already—do not (in the humble opinion of this author) contribute to a cohesive urban realm that is enjoyable to live and work in.

Having said this, a positive aspect of formalizing the casual car pool into some sort of market exchange is that it may be more readily implementable in cities where the spatial arrangement of the city has not led to a coincidence of wants - where people already have a desire to car pool because of a restriction of route choice, resulting congestion and lack of efficient mobility that results from this. Here, money can be used as an additional incentive.

The *Casual Car Pool* service relies on personal interaction to build interpersonal/intergroup trust. However, it is not through established social ties that the service evolves, but on two other things: a coincidence of wants—something that is usually only referred to in the economics of market exchange—

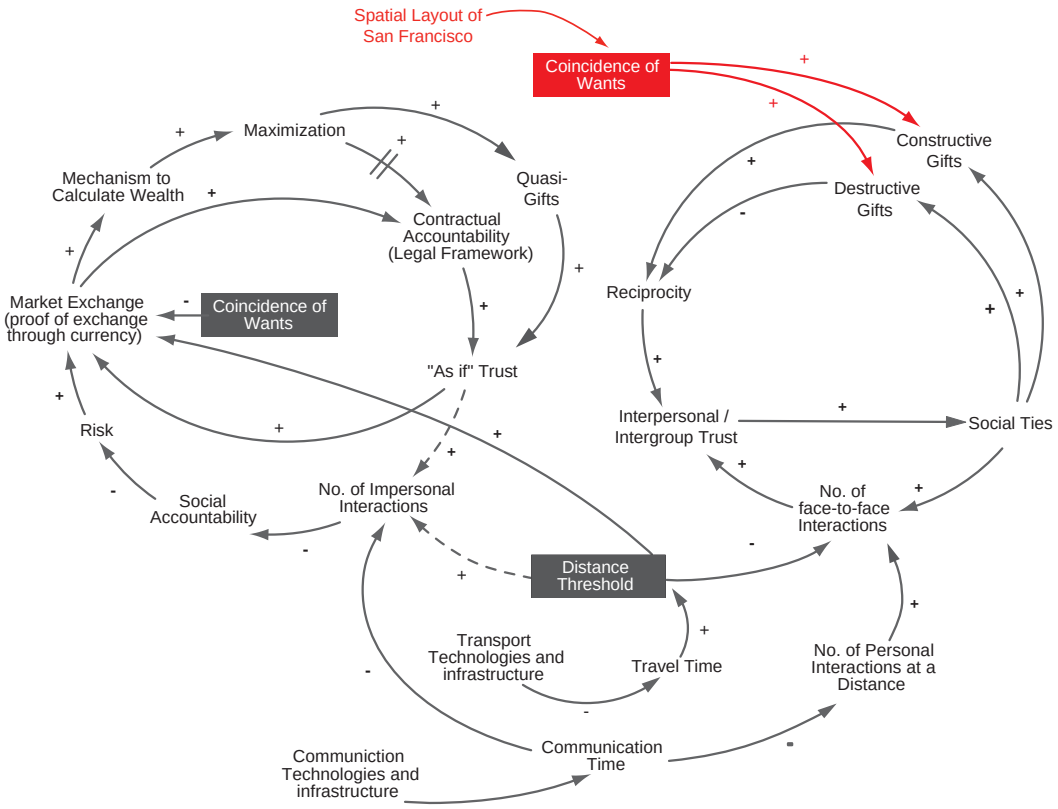
***Figure 36.***
*A coincidence of wants that is driven by the spatial layout of San Francisco encourages the Casual Car Pool gift exchange.* >

and unique spatial conditions that have led to certain traffic policies being implemented and nodes in the city where people can easily start and end their journey. Although there are some incidences where passengers have felt unsafe with their drivers, the gifts given and received are generally constructive for both parties and thus encourage reciprocity not between autonomous individuals, but between individuals and the *Casual Car Pool* community who share common goals, motivations and inclinations (which are indicated through adherence to the unwritten rules of the service). Casual car pooling also contains a mechanism for refusing the gift (ride) from drivers; it is an accepted practice to move to the next car waiting in line if the rider feels at all unsafe.

The *Casual Car Pool* example is interesting because it is essentially doing what I am hoping to show in this thesis: that it is possible to use the untapped resource of freight capacity to transport goods (in the case of the car pool, people) to a specific destination. In particular, it has highlighted the fact that, when considering the formation of a service like this, we cannot simply label it a gift exchange or market exchange but must see it as a hybrid—containing variables that exist in both dimensions. *Figure 36* shows how the coincidence of wants, as fed by the spatial layout of San Francisco contributes to gift exchanges.

### Gift and Market Exchange Conclusions

This chapter has looked predominantly at the anthropological literature of exchange theory to unearth some of the reasons why people make exchanges with others. Through using the technique of causal loop diagramming, found in the methodology of system dynamics, I have found that *distance threshold* was initially important for the formation of both gift and market exchanges. Additionally, both types of exchange involve trust. In gift exchange trust is formed through close personal relationships and face-to-face encounters. Meanwhile, "as if" trust, that is more commonly found in market exchanges stems



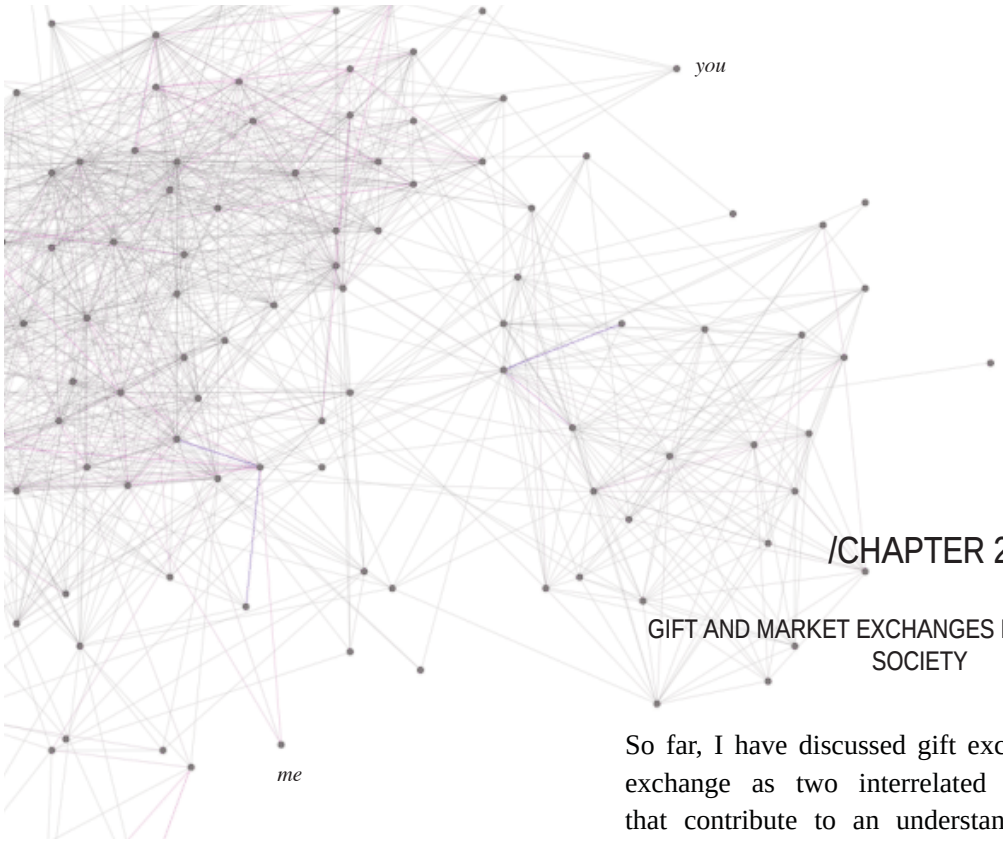

from the fact that exchange becomes accountable when there is money involved and thus a record of the transaction. Both of these are integral to the continued life of exchanges – in gift giving, this is called building reciprocity. It was also found that other factors, such as psychological motivations—self interest, power and prestige and contributing to the common good, hostility and equality—are influential in encouraging continued exchanged (through constructive motivations) or reducing or stopping exchange (through destructive motivations). Destructive motivations are sometimes prevented in market exchange because of the accountability that money brings and the legal framework that has developed around this—although the recent bubble bursting in the housing market because motivations of self-interest were not managed is an example of the failure of this 'safety mechanism' to protect the ability to have continued exchange! Regardless, these motivations affect all exchanges although in the case of market exchanges self-interest and profit-making motives are often stronger than the others.

Further to this and once both systems were established and were considered a 'normal' way of operating in societies, I posited that the technological changes that occurred during the industrial revolution—most notably transport and communication technologies and their associated infrastructures—affected the speed and number of exchanges in both a market and a gift framework. This statement is a reflection on a global trend in this direction and it was made clear that this was not a statement of technological determinism and that when looking at individual transactions between places there is certainly a rise and fall of exchange intensity based on other external factors.

Lastly, once a feasible model was established to explain the relationships that occur through these types of exchanges, a real-world example was discussed to dispel the idea that you can separate types of exchange into neat categories (although it is recognized that it is much easier to write about them in this way!). The example used was the *Casual Car*

*Pool* service that has been running in San Francisco for over thirty years. Two variables of influence emerged from examining this service: firstly, a coincidence of wants drives the gift exchange, even though this is usually considered a market mechanism and secondly, the spatial configuration and built form of the city is integral to the emergence of the service. Thus, these issues will need to be addressed when designing the FriendFreight service for the City of Copenhagen. Finally, a formalization of the *Casual Car Pool* system into a market exchange service was also discussed. Here money is used to facilitate the exchange and act as an incentive. It was supposed that this could be appropriate if used in a city where the spatial arrangements were not influential in building a coincidence of wants. The disadvantages of formalizing drop-off and pick-up points were also mentioned.

Before we can fully design the scenarios for the FriendFreight service, however, there is another 'input' that through the last thirty years, but particularly in the last five, has had a significant impact on exchange in our cities. This is the increased use of distributed digital information—as communicated through cell phones, the Internet, GPS devices etc—to organize and live our daily lives. Chapter 2 looks both at the effect these technologies have had on existing delivery services of goods in cities, as well as some new types of services that have been made possible through this socio-technological revolution. It will also show that this revolution has further blurred the boundaries of traditional distinctions between gift and market exchanges.




# /CHAPTER 2

## GIFT AND MARKET EXCHANGES IN THE NETWORK SOCIETY

So far, I have discussed gift exchange and market exchange as two interrelated fields of inquiry that contribute to an understanding of *why* and *how* relationships are developed between people, companies or brands and how these facilitate reciprocal systems of exchange. The case studies, examples and theories that I have used are in general ones that are commonly cited in the anthropological literature of exchange theory. However, the majority of these examples are rooted in a time before the rise of distributed digital technologies such as the internet, mobile phones and computers; that are able to store, quickly process and recombine vast amounts of information. The service I am proposing in Copenhagen is reliant on real-time information that can be digitally distributed at a rapid pace to those at a distance from the requester of an item, thereby negating the need for personal contact in order for delivery to be arranged. As such, it is now time to discuss the effects of our current condition—what the urban sociologist, Manuel Castells calls *The Network Society*—on exchanges that occur between people.

***Figure 37.***
*The New York Talk Exchange project by the Senseable City Lab at MIT, shows how IP traffic flows between cities - nodes - in a network of data exchange.* >

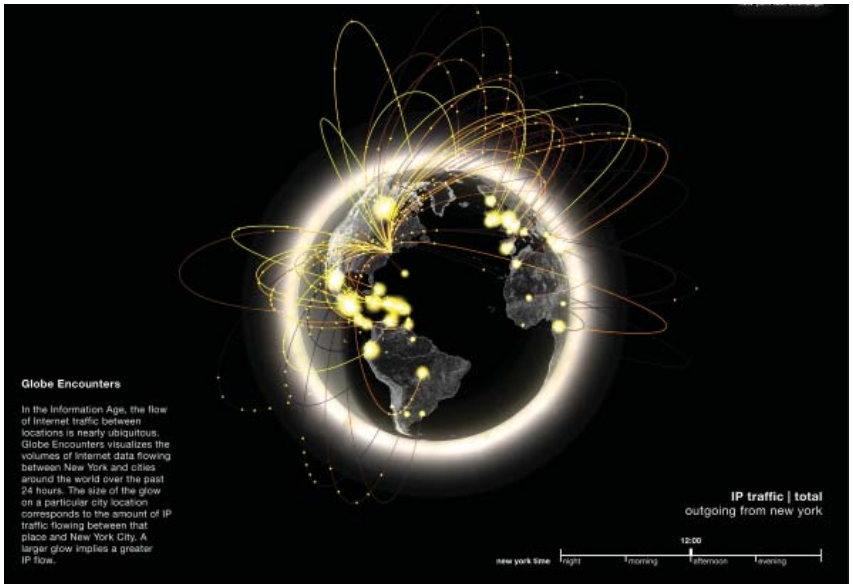
*The network is a pattern that is common to all life. Wherever we see life, we see networks"* Fritjof Capra, 2002, p. 9

## The Analysis of Networks

To understand what the Network Society is and how it might affect gift and market exchanges in cities, it is first useful to talk about the concept of networks in general. Networks are sets of things and/or people (described as nodes in the network structure) that are interconnected to form a system. These connections can be physical, as in the roads that form a network between places, or non-physical as in the patterns of communication that connect people in networks of communication exchange.

Network analysis is the observation and study of the patterns of interaction/connection between these nodes: things, people, groups, businesses or cities. Network theory is used to explain or predict complex sociological phenomena, patterns or events. For example, the American sociologist Saskia Sassen (2001) has used network theory to argue that cities that remain at the centre of global finance do so because of a larger concentration of high-level services that connect more frequently to each other and the world. Likewise, archaeologists and historians of antiquity have used this lens to re-examine ancient trade routes. They have proposed that it is not only power relationships that influence the rise of some urban centers over others but also the relationship between traders and specific geographies as well as the suppliers of raw materials. (Sindbæk, 2007; Ray, 2006). As Manuel Castells observes, these views about networks are in contrast with earlier theories of how relationships between people work, which were often based in ethnocentrism and vertical hierarchies of resources and subjects where the power of a few controlled the distribution of information in a downward manner as supported by mythology and religion (Castells 2004, p.4).

How the links (patterns of communication) between nodes in a network are constructed, strengthened or broken are of utmost importance in network theory.



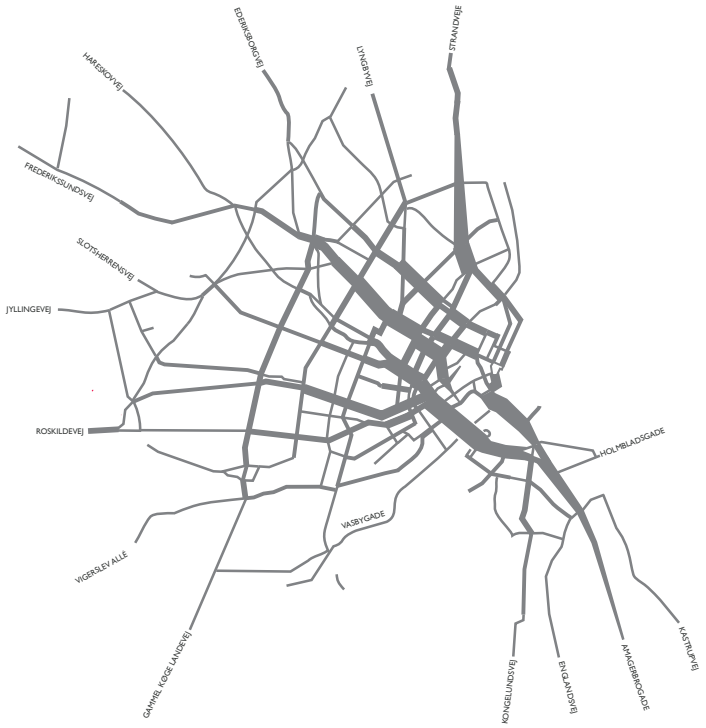

In many ways these are similar concerns to exchange theory, which also conceptualizes social structure as a configuration of social relations and positions, each of which can be strengthened or undermined through both material and nonmaterial exchanges (Cook and Whitmeyer, 1992). However, whereas exchange theory stresses the exchange aspect of all ties, network analysis appears to conceptualize nature of the links more broadly (Cook and Whitmeyer, 1992). Despite this, the two fields appear to be rapidly coalescing.

### What is the Network Society?

What historians and archaeologists now believe, and what is demonstrated in the example of ancient trade routes above, is that 'networks' have always existed. What, then is the current sociological condition that Manuel Castells calls the 'Network Society' and how is it different from previous societies that can also be explained through the construction of networks? Castells provides the following definition:

> "A Network Society is a society whose social structure is made of networks powered by micro-electronics based information and communication technologies. By social structure, I understand the organizational arrangements of humans in relations of production, consumption, reproduction, experience and power, expressed in meaningful communication coded by culture" Castells, 2004, p. 3

Thus, for Castells, the difference between the Network Society and previous societies is the addition of digital information, (distributed through an infrastructure of interfaces – cellphones, the Internet etc - that mediate our interactions between physical space and digital information space) and the way this digital information affects the connections we make and maintain with other people/businesses etc. This in turn affects our patterns of communication within a given social structure. He posits this against previous technological revolutions in communication and information distribution such as printing, the




< ***Figure 38.***
*The road network of Copenhagen representing the intensity of traffic flows through line weight.*

telegraph and non-digital telephones by asserting three major features of this society that did not exist previously. These are summarized below: (Castells, 2004, 9-13)

1. Technologically, the processing and communicating capacity of microelectronics has increased in terms of volume, complexity and speed. Qualitatively this means that there is a greater amount of continuous 'feedback' in the network that in turn drives the development of networks and their associated technologies at an even more rapid pace.

2. Recurrent communication and digitization allows digital networks to recombine quickly and easily. Hypertext, the text on a web page that takes you (almost) instantly to another location on the web is an example of the recombining power of this new society. This generates new outputs and new levels of innovation.

3. Distribution of information through digitized networks is flexible. Aided by wireless communications and computing power that is embedded not only in our personal devices (computers, mobile phones etc) but also increasingly embedded in more public objects (bus stops, café tables etc) interaction with digital information is no longer refined to specific spatial locations but is becoming mobile – an ever present network of information that we can tap into at any time.

This last point, the creation of a *continuous field of [digital] presence*, that extends through buildings, the outdoors, and public and private spaces as described by William Mitchell (2003), or the networked *space of flows* which interacts with the more traditional network of the space of places, as discussed by Castells (2004) is changing not only existing patterns of human communication and activities, but is creating new patterns that are only possible because of these burgeoning features.

***Figure 39.***
*A social network showing connections between members of the ëRyze Blog Tribeí.* >

In the following pages I will demonstrate how these features have become part of exchange and distribution systems in contemporary cities. First I will look at current delivery networks in urban areas—initially at the work done in the field of City Logistics on goods delivery, and then at the changes that have taken place in the *Casual Car Pool* service in San Francisco since the rise of the Internet. Two key points will be made from this: that the harnessing of digital technologies can vastly improve coordination and optimization of exchange services; and that digital technology can foster and strengthen a sense of community even when social ties do not already exist between people. Next I will look at three examples that would have been impossible to imagine if it weren't for the features of the Network Society. The first example is demonstrated through the websites *Couch Surfing* and *Global Freeloaders* and is conceptually closer to gift exchange. The next—*eBay*—is framed as a market exchange. The final example—*LinkedIn*—is a gift exchange with a market twist. The examples used will be related to the variables that have already been used in the causal loop model including: trust, reciprocity, structural organization, maximization and the creation and strengthening of social ties. Features that are not explicit in the causal loop diagram but that will also be discussed include: the language these websites use to communicate their goals and how reputation is built in the Network Society as it is felt that these features are also vital to understanding a potential implementation of FriendFreight.

Combining he findings from the case studies above and the key lessons learnt through Chapter 1, the final section of this chapter will develop three scenarios for the FriendFreight service based on three different frameworks of exchange. From here, a table can be built that summarizes all of the variables in each scenario and how they have been treated. This table serves as a basic check-list of elements required depending on the desired framework of the service. Lastly, one scenario is chosen as 'the most likely to succeed' based on its ability to maximize reciprocity and the number of people involved in FriendFreight (thereby minimizing travel demand).

/2.1
THE NETWORK SOCIETY AND EXISTING DELIVERY SYSTEMS

***Figure 40.***
*Digital Technologies increase the ability to coordinate and regulate information allows existing systems to be optimized.* >

## City Logistics

As mentioned in Chapter 1, the delivery of small goods in city centers is on the rise and as such, has given shape to a new field: City Logistics. This increase in goods traffic is seen as a problem by various stakeholders: governments want to ensure the successful running of services while reducing negative effects of transportation; private delivery companies wish to maximize their profits by effectively capitalizing on the rising demand for goods; and environmental groups are concerned about the effects of goods delivery on pollution and other environmental factors.

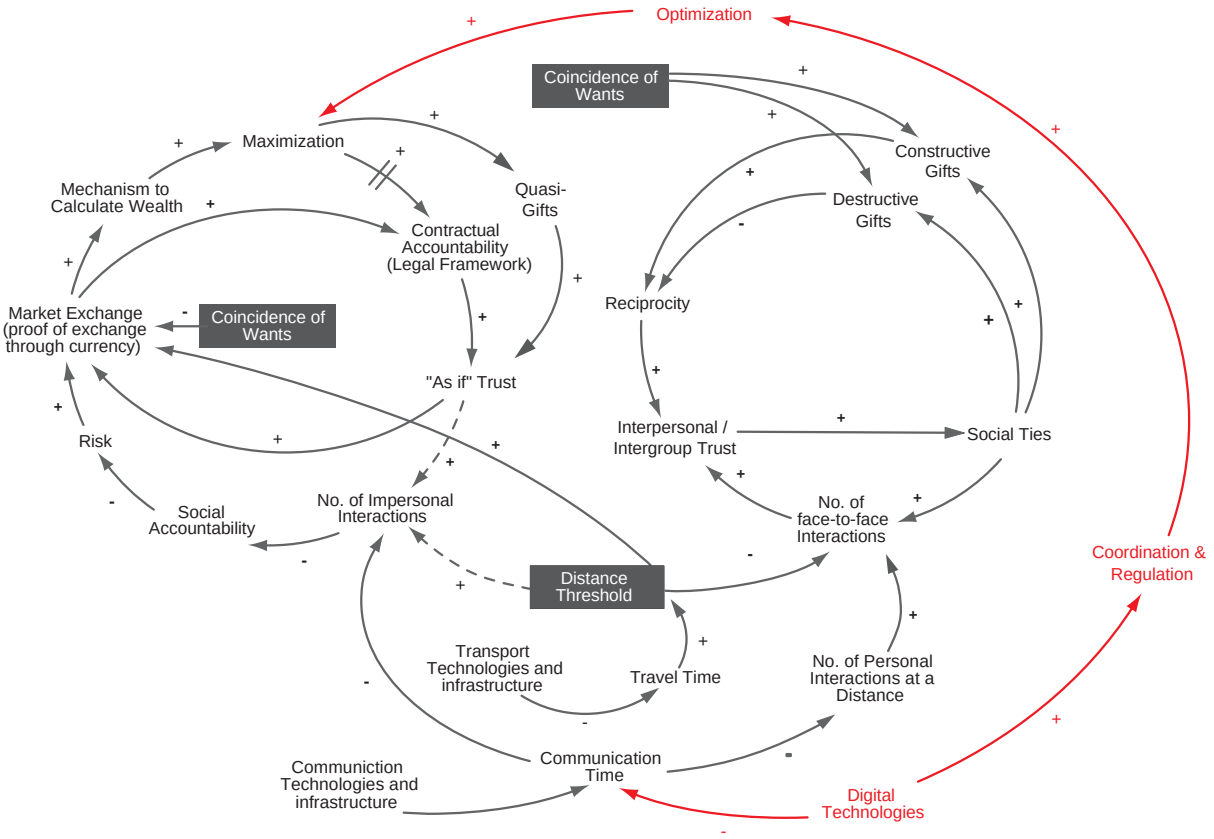
What is interesting for this thesis however, is the use of new digital technologies to combat some of these issues. A survey of the literature of City Logistics shows that digital technologies have been harnessed in three main areas.

### *Real-Time Routing and Scheduling*

If, at the beginning of any given day a delivery company was to know all of the deliveries and pick-ups they had to make, then an algorithm could be developed to work out the best route to do so. However, an increasing demand for fast delivery services has meant that those who need goods delivered want to be able to schedule a pick-up or delivery at any time of day. Real-time information about where these desired pick-up and drop-off points appear as the day progresses, has in recent years led to the development of algorithms that can readjust the route and scheduling path on the fly. This use of digital information solves what companies and logistics experts call *The Traveling Salesman Problem* and it markedly increases the speed and efficiency at which delivery companies can operate. (See Kunze, 2004; Thompson, 2004; Yamada et al., 2004)

### *Coordinating Modal Changes at Consolidation Hubs*

The World Bank estimates that over the last decade, the number of intermodal containers passing through ports worldwide has doubled, with a similar trend occurring in intermodal air, rail and truck traffic.




(Nemoto et. Al, 15) At the same time, there is a disappearance of dedicated spaces for housing goods in the cities - ports, railway terminals and warehouses (Dablanc, 2007) Increasing interest has therefore been shown in using digital information to coordinate modal changeovers at consolidation hubs - also known as urban freight platforms or freight villages. Here digital information can be used to create a real-time inventory of available freight space at any given time of day at these points. This allows a greater coordination between the flow of goods from outside of the city and the bundling of delivery within a city. (See also Koehler, 2004; Lozano, et al., 2005; Nemoto et al., 2005)

### *Improving Logistics Models*

A rise in devices that can efficiently sense and collect real-time information about the city – congestion and pollution levels, road conditions, parking availabilities for delivery trucks etc – has resulted in increasingly large data sets that can be harnessed to improve the planning, execution and re-planning of City Logistics schemes. However, it must also be noted that while digital technologies allow the rapid collection of this information, it is sometimes hard to coordinate the data between parties (private companies, public agenicies etc) in order to implement large-scale citywide schemes. As such, the rise in digital technologies has also seen the emergence of a body of literature that surrounds these issues (see Ito, et al., 2004; Munuzuri, et al., 2004).

What can be seen through the current literature on City Logistics is that digital technologies are effective in addressing the coordination and optimization issues of urban goods distribution even though citywide coordination can sometimes be difficult if stakeholders are unwilling to share their data. Optimization that is internal to a stakeholder, however, does have the effect of increasing the ability for private companies to make a profit while reducing some of the negative effects of transportation. These new variables – coordination, regulation and optimization - have been added to the system dynamics model as shown in *Figure 40*.

***Figure 41.***
*A community internet site allows members of Casual Car Pool to communicate pertinent information about the service from a distance.* >

## Casual Car Pool in the Network Society

Let's return now to the example of gift giving amongst strangers that was explored at the end of Chapter 1: *Casual Car Pooling* in San Francisco. This service has been running effectively for over 30 years. What influence then have digital technologies had upon it? This can be examined in terms of the criteria outlined by Manuel Castells in his writings on the Network Society, and can be fitted into the causal loop diagram.

Castells, (among others), asserts that digital technologies have allowed communication to occur at an even greater speed and with more intensity than ever before. In addition, that the platforms supporting digital technologies, (in particular, the Internet), allow for a greater amount of feedback in a network, which in turn strengthens a network's goals and drives its operation. (Castells, 2004) In the case of *Casual Car Pool*, the instigation of a community portal on the Internet enables members to quickly share information with each other, which in turn contributes to the overall successful running of the service. This information includes: informing one another if there are drivers or passengers who are deemed unsafe, general rules on etiquette for new users, requests for information and details about the service – location of pick-up points, etc. Before the rise of digital technologies, this had to be done face-to-face – a slow process that only worked effectively if *everybody* in the network was continuously involved in personal interactions with people in the service. For instance, if you were away for a few weeks and did not have any face-to-face interactions with other *Casual Car Pool* users, then your physical absence would result in an exclusion from information. However, with a centralized platform that exists in 'virtual space' members of the community do not have to be physically present to process and transmit information. This is a particularly important feature in the *Casual Car Pool* service, where, because the emergence of the service relied on a coincidence of wants and not on existing social ties, members of the community are usually strangers and do not have each other's personal contact details.

**April 27, 2009. Car break-in - Fruitvale & Montana**

YL wrote:

I just want to inform people that there have been a few car burglaries at the Fruitvale & Montana parking lot. Last Thursday my car was broken into and my stereo was stolen along w/ my gym bag. I heard that another car was broken into right before mine. Is there a way to petition for security cameras? I have been parking there for at least 5 years, and now I don't feel safe parking my car there.

**March 2, 2009. North Berkeley Civic Center line**

GF wrote:

There's a lot of confusion about the Civic Center pickup spot at N. Berkeley BART. Cars actually line up in front of the newspaper racks for Civic Center (and by "in front of, I mean, they drive PAST the Downtown line, past the newspaper racks, and the FIRST CAR IN LINE is BACKED UP TO THE NEWSPAPER RACKS. Cars that arrive thereafter PASS THE FIRST CAR, pull over to the curb and back up to the first car. Logistically this is the only way for it to work. Why? Because a fire lane begins about 3-4 car lengths after the newsracks.

The use of the Internet platform thus strengthens the community through providing timely and relevant information to those in the network (of course, only those that contribute to it, or check the site regularly). It also, however, provides information to those outside of the network and thus acts as an accessible form of advertising which has the long-term effect of increasing the use of the service as well as the number of interactions that take place both offline and online.

Reconfiguring the service is also made easier through the use of the Internet and mobile communication devices such as mobile phones. In the past, the standard way to communicate that a pick-up point had become unusable, due to ticketing of vehicles or complaints from businesses, was to post a sign at the old pick-up point telling users where the car pool has moved. Now, this information is additionally posted to the online community notice board, making it easier for all members of the community to get relevant information from a distance. Although the feature is not on the website yet, it is possible to imagine that relevant updates about the service could be pushed to your mobile phone – providing even more timely and efficient processing of information. In turn, mobile phone ownership allows for the updating of the community portal on the fly – either through SMS or increasingly, the Internet.

In the causal loop diagram, these aspects of digital technologies can be added. Firstly digital technologies decrease the amount of time it takes to communicate with others. This has the same effect - yet more pronounced - as the effect of communication technologies in the industrial era: it can lead to an increase in face-to-face interactions. This is in contrast with some early naysayers of digital technology who thought that as the number of community groups online rose, people would do away with the more personal face-to-face exchanges – what was perceived as a loss in society. As a recent study of interactions on the social networking site,

Facebook, has shown, the opposite is in fact true (Castells: seminar). The exchanges that occur through online community and social networks in fact result in a greater number of face-to-face interactions in the future.

However, even if these 'virtual' interactions do not result in face-to-face meetings (in some cases the distance threshold may still be too great), they still contribute to an increase in interpersonal or intergroup trust. This is true when participants have existing social ties, but as can be seen with the case of *Casual Car Pool*, also stands for community groups that do not know each other on a personal basis. Thus, it can be seen that a community platform provided on the Internet allows users to communicate to all members, messages about the trustworthiness of certain individuals. This then contributes to the building of trust in the group and the ongoing viability of a service where communication and coordination happens at a distance.

## /2.2
## EXCHANGE SYSTEMS MADE POSSIBLE BY THE NETWORK SOCIETY

Just as the Network Society has had an affect on existing delivery and exchange services, it has also provided the conditions that have given rise to new exchange systems and services that would not have been possible previously. This section discusses three types of exchanges that have emerged. The first type is discussed by looking at two services that have the same goal, but slightly different frameworks: *Global Freeloaders* and *Couch Surfing*. These are examples of gift exchange (no money is involved) yet are interesting because the exchange happens between strangers and not those that are socially tied. Additionally, their frameworks include variables that usually belong exclusively to market based exchanges. The second type is *eBay*. This is a typical market exchange system that capitalizes on the properties of digital information particularly the rapid transfer of information at a distance, to maximize market exchanges and profit. The attempt by *eBay* to use some aspects of gift exchange to increase profits further will also be discussed. The final exchange service is *LinkedIn: Relationships*

***Figure 42.***
*Global Freeloading and Couch Surfing match up unutilized couches with travelers in need of a place to stay*

*Matter*, a gift exchange that occurs between social/professional ties and potentially strangers. Here, it is the structure of the service and the way it capitalizes on the networking aspect of the Network Society that is of most interest. The examination of these types of new exchange services within the current causal loop diagram will prove instrumental in the forming of potential frameworks for the FriendFreight service at the end of this chapter.

## Global Freeloaders and Couch Surfing

*GlobalFreeloaders.com* and *Couchsurfing.com* are just two of a number of websites that have appeared in the last 6 or 7 years that are designed to match up those in need of a place to stay with those who have a spare couch, bed or piece of floor. Although the term *freeloader* implies getting something for nothing, or can be interpreted as taking advantage of a person's generosity, charity or hospitality, the service is designed to promote a reciprocal arrangement of giving and receiving. In other words, members are encouraged to use the service to find a free place to stay when they are traveling but in return are also expected to host other *Global Freeloaders* when they are in a position to do so.

To use either service, you must become a member through the Internet; upload a profile of yourself with the type of accommodation you have available and your schedule of availability. Those who need a place to stay are able to browse profiles and can get in contact with hosts initially through the website. Should both host and guest connect then an arrangement is made for the *freeloader* to come and stay.

The *Global Freeloaders* and *Couch Surfing* communities developed *after* Internet use became widespread and yet they have some of the same features as the post-digital *Casual Car Pool* service, including the use of the Internet as a platform to coordinate and disseminate information and build trust between members. However, unlike the *Casual Car Pool* service, these exchanges are not based on

| CouchSurfer Ages | (surfers) | |
|---|---|---|
| Average Age | 27 | |
| Ages 18 to 24 | 501,327 | 44.2% |
| Ages 25 to 29 | 330,012 | 29.1% |
| Ages 30 to 34 | 137,808 | 12.2% |
| Ages 35 to 39 | 67,331 | 5.9% |
| Ages 40 to 49 | 52,915 | 4.7% |
| Ages 50 to 59 | 24,380 | 2.2% |
| Ages 60 to 69 | 7,660 | 0.7% |
| Ages 70 to 79 | 951 | 0.1% |
| Ages 80 to 89 | 251 | 0.0% |

***Figure 43.***
*Average ages of Couch Surfers*

a coincidence of wants. In addition, mechanisms for maintaining reciprocity and the building of trust in *Global Freeloaders* and *Couch Surfing* are more formalized than the car pool service. It is my belief that the high spatial threshold that exists between members of these communities drives the need for such formalization. In other words, although the members of the *Casual Car Pool* service in San Francisco are strangers, they are ultimately making a decision to ride with or drive people through a face-to-face encounter. *Global Freeloaders*, on the other hand, must commit to an interaction with a person from a distance. Commitment to an exchange, potentially with a stranger and without face-to-face interaction is an important component of the FriendFreight service proposed in this thesis. As such this section examines the formalization of these mechanisms to uncover how they are structured and how they might be built into the FriendFreight service.

Both the *Global Freeloaders* and the *Couch Surfing* services work because of two common goals that are shared by the freeloading community: a desire for cheap accommodation and a desire for an authentic traveling experience. While these are not explicitly stated goals, they are captured in the ethos of the writing that appears on both websites. As Adam Staines (Staines, n.d) the founder of the *Global Freeloaders* writes:

> It occurred to me one day, why not harness this communal travelling spirit and create a website that pools together the collective resources of travellers from all over the world, and create a community inside the travelling community… Think about it, on average approximately one third of a budget traveller's costs are spent on accommodation. Imagine if you could dramatically lower, if not completely eliminate, that cost by being able to stay for free in people's homes all over the world. That means more money in your pocket to spend on having a great time on your travels. Not only do you get free accommodation but you also get the inside knowledge, experience and culture that comes with staying with a local that you'd never be exposed to staying in a hotel or hostel.

| Top 10 CouchSurfing Countries | (surfers) | |
|---|---|---|
| United States | 267,505 | 23.6% |
| Germany | 103,908 | 9.2% |
| France | 95,326 | 8.4% |
| Canada | 59,965 | 5.3% |
| United Kingdom | 55,531 | 4.9% |
| Italy | 33,889 | 3.0% |
| Australia | 33,734 | 3.0% |
| Brazil | 29,402 | 2.6% |
| Spain | 28,552 | 2.5% |
| Netherlands | 23,254 | 2.1% |

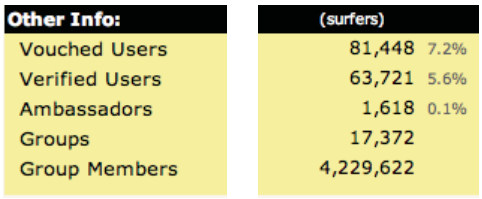
***Figure 44.***
*Top countries with Couch Surfing members*

This statement already sets up a profile for the type of community that is reflected in the demographics of its users: 44% of 'couch surfers' are aged between 18-24 (those who have little money and often travel for long periods) with the next largest group being the 25-29 year olds at 29% (Couch Surfing, 2009). The statement also suggests that these exchanges are not motivated by a coincidence of wants—where exchange parties have a desire to trade at the same time and place and where exchange is in general devoid of social considerations—but are motivated by the spirit of traveling, the desire to meet other people and additionally the saving of money. As such, they could be categorized as a pure gift exchange even though members of the community do not know each other personally.

### *Trustworthiness and Reputation*

As was demonstrated in Chapter 2, a high spatial threshold often results in a market exchange where currency can be used as a form of accountability in situations where social relations do not exist. However, in *Global Freeloaders* and *Couch Surfing* exchanges, a high spatial threshold between members has not been overcome through money but through distance interactions and mechanisms to promote trustworthiness. This trustworthiness is generated through a combination of "as if" trust—a legal framework that promotes accountability and something traditionally found in market transactions - as well as mechanisms that attempt to replicate interpersonal or intergroup trust (traditionally generated through face-to-face interactions but now occurring at a distance through distributed digital technologies). A combination of online information—the building of member profiles and recommendation systems—and physical verifications are used to do this (Molz, 2007).

Both the *Global Freeloader* and the *Couch Surfing* websites are closed member systems. To become a member, a profile must be set up with the user's name, nationality, phone number, year of birth, gender, couch availability and some personal information. Users are also encouraged to upload a



| Other Info: | (surfers) | |
|---|---|---|
| Vouched Users | 81,448 | 7.2% |
| Verified Users | 63,721 | 5.6% |
| Ambassadors | 1,618 | 0.1% |
| Groups | 17,372 | |
| Group Members | 4,229,622 | |

***Figure 45.***
*Vouched and verified members of Couch Surfing*

photo. It is common practice for hosts to check the passports of their guests so it is in the best interest for members to provide accurate information. In many ways, this technique replicates information you would gather naturally from a face-to-face interaction and is the first step in replicating interpersonal trust. In addition, on both websites, those signing up need to accept the terms and conditions of the service and in the case of *Couch Surfing* confirm they will not use the site to spam others or as a dating site. This is an example of the use of "as if" trust which builds an expectation of accountability for members through the semblance of a legal framework.

However, the most extensive method used to promote trustworthiness on these sites occurs through reputation systems. Reputation systems originally developed for market transactions (*eBay* was the first) so that strangers could discern who was trustworthy to interact with based on that person's past behavior. Now, however they are commonly used for any exchange where transactors do not (initially) know each other or where it is important for the experiences of one member of an online community to be communicated to others. Resnick et. al. (2000) explains how these online reputation systems work:

> A reputation system collects, distributes and aggregates feedback about participants' past behaviour... [they] help people decide whom to trust, encourage trustworthy behaviour, and deter participation by those who are unskilled or dishonest.

In the case of the *Global Freeloaders* and *Couch Surfing* sites, recommendations are made after a face-to-face encounter through leaving messages on people's profiles and giving ratings. This is a form of physical verification that complements the virtual profile that members have on display. In line with the goals of the community, references and recommendations predominantly revolve around how safe a host or guest feels, rather than containing

petty complaints such as whether or not the person left a mess in the kitchen.

Lastly, to promote trust even further, the *Couch Surfing* website (in particular), allows members to become 'friends', to be 'vouched' for and also (for a $25 fee) to be verified. Any two members can make friend links. However, vouching only occurs when one member who is already vouched for, vouchers for another member. As Molz (2007) determines, these interrelated forms of reputation building act "as gatekeepers to the core, and presumably 'safe', group of members… they bind the community even closer together as a 'safe' community in which the community is responsible for keeping itself safe". On the other hand, the paid-for verification is an identity check that substantiates the information that an individual provides when they set up their initial profile. According to the statistics available on the *Couch Surfing* website, however, only 7.2% of members are vouched for and only 5.6% of members are verified. This points to the fact that simple recommendations and references are still effective in promoting trust and allowing exchanges to occur. (Couch Surfing, 2009)

### *Reciprocity*

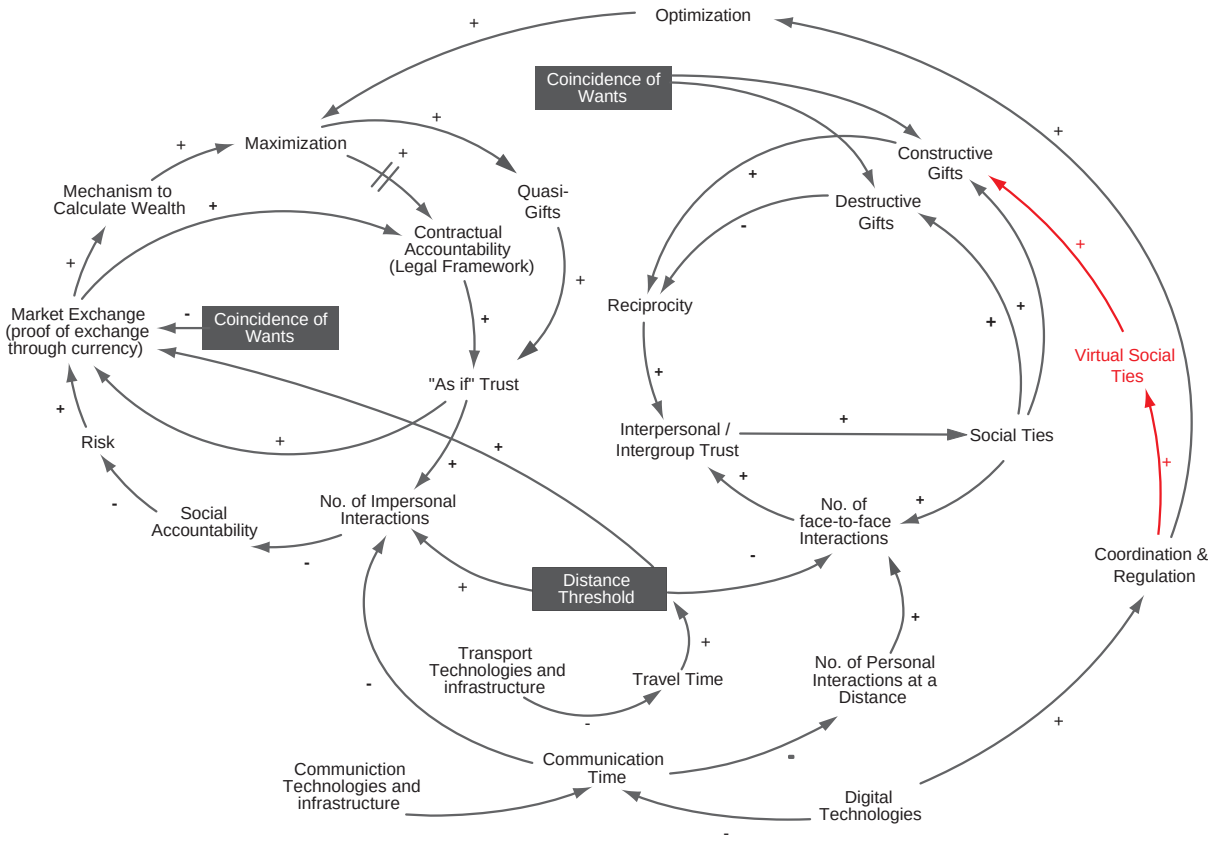
In the pure gift exchanges that were discussed in Chapter 2, reciprocity is not formalized. It may be expected that somebody gives something in return, but the lapse in time between giving and receiving is, as Strathern and Stewart contend, a mark of the strength of a social relationship (Strathern and Stewart, 2005). *Global Freeloaders* and *Couch Surfing*, however, is initially conducted between strangers and thus, (without money as a mediator) the motivation for reciprocal giving is reduced. In addition, as the service is a horizontal and distributed form of gift giving whereby a participant may give to one member of the community only to receive from another, reciprocity becomes hard to account for. This is where the power of the *Network Society*, in particular the ability to coordinate and disseminate information can be harnessed. As with the communication about

***Figure 46.***
*Virtual social ties as aided through digital technologies contribute to the giving of gifts.* >

trustworthiness to community members, what results is a more formal system of reciprocity that works to overcome the issues associated with distance interactions in gift giving scenarios.

Community websites give people who do not know each other a place to interact. They also, however, provide a platform for solidifying expectations of giving and receiving between the strangers that form the virtual community. Both *Global Freeloaders* and *Couch Surfing* do this through the description of the service on their websites. The words they use have the effect of blurring the distinctions between host and traveler, whereby, a traveler is simply a host who is currently moving and hosts were formerly travelers and will be travelers again in the future. In addition, the sites encourage reciprocity through highlighting the rewards of both roles – the host is not simply hosting but in a certain sense is traveling vicariously through their visitor. At the same time, the visitor is getting an authentic experience with a local and also a free place to stay.

Making a conscious statement of this dual role enhances reciprocity and is a way of binding the community together. It also works to exclude those who are unwilling or unable to reciprocate. Once the expectation of equal "give and take" is expressed, the mechanisms by which this happens can be further formalized. In the case of *Global Freeloaders*, members are asked to write their expected availabilities into a calendar and are automatically taken off the membership list if they have had no activity in 12 months. This serves to exclude those who are not reciprocating or are inactive. The communal calendar also makes it easy for a search engine to provide appropriate results to those looking for a host. Providing only the information that is relevant to travelers lowers the threshold between getting in contact with a potential host and being invited to stay (an act of gift giving) which in turn promotes reciprocity. This is an example of the power of the digital age to collect, recombine and distribute information to more effectively work towards a common goal.




The high spatial threshold between members of these types of websites results in a clear statement of objectives that in turn attracts a like-minded community. The acceptance of these objectives is a key tenet of becoming a member of the community where acceptance takes place both through the act of signing up but also through mechanisms that promote "as if" trust including the acceptance of standardized terms and conditions. The objectives are then further regulated by both online and physical verifications – the building of personal profiles, the use of recommendations, friend-links, the vouching for others and the formal verification of one's credentials (for a fee).

*Global Freeloaders* and *Couch Surfing* demonstrate that it is possible in the Network Society for gift giving to occur between strangers even when there is a large distance threshold involved. Some might argue that this situation is no different to donating blood. However, whereas blood donors will never know whom they are helping, freeloading and surfing work to create (virtual) social ties through the coordination and regulation of digital information that is communicated through the service websites. This then allows constructive gifts to be given (a place to sleep and a travel tale shared) which in turn increases reciprocal giving and may contribute to 'real' social ties forming. *Virtual Social Ties* as a variable have been added to the causal loop model in *Figure 46*.

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## eBay: The Community Market

*The very first item sold on eBay was a broken laser pointer for $14.83. Astonished, Omidyar [eBay's founder] contacted the winning bidder to ask if he understood that the laser pointer was broken. In his responding email, the buyer explained: "I'm a collector of broken laser pointers."* (Wikipedia, 2009)

Most readers will be familiar with *eBay*—the online service where buyers and sellers from around the

world can connect to purchase or distribute goods for money—but how does its structure compare with the other services we have examined? This section outlines how an internet market framework—where exchange occurs from a distance between strangers using money as a regulator—operates in the Network Society and how this differs from the gift-giving between strangers that occurs through *Casual Car Pool*, *Global Freeloaders* or *Couch Surfing*. These differences will be demonstrated through examining the following themes: the projection of the site to the public; the communication of trustworthiness and reputation; and the building of the *eBay community*.

### *The Projection of the Site to the Public*

In the section on *Global Freeloaders* and *Couch Surfing* it was shown that the objectives of these services, as displayed through their websites, were important in establishing the terms of participation and expectations of users and, through this, a generalized reciprocity. Revolving primarily around gift giving, the statements of these websites were highly personal in nature and emphasized the building of a community of like-minded people who enjoy sharing their travel experiences (and who incidentally like to get free accommodation). Visiting the 'about *eBay*' page—accessed via a tiny link at the bottom of their homepage—tells a different story. The pages here are devoid of any *soft* social language with terms and phrases kept to a third-person business-like parlance. This is true not only for the description of the business, but extends to *eBay's* pages on *philanthropy*, *social ventures* and *eBay communities* each of which makes a claim for the positive effects that *eBay* (2009) has on communities but do so with economic, not social language that is focused on the distribution of profit as a contribution towards social good:

> Philanthropy has been an important part of eBay since its very beginning, and is carried out principally through eBay Foundation.

eBay Foundation was established in 1998 and, reflecting eBay innovation, was the first corporate foundation to be endowed with pre-IPO stock. This pioneering decision has inspired over 400 corporations to follow eBay's example and set aside equity to endow philanthropic program. eBay Foundation's mission is to contribute to the economic and social well-being of local communities. In carrying out this mission, the Foundation engages eBay Inc.'s employees and customers and supports their pursuit of charitable giving and volunteerism. Each year eBay Foundation provides grants of more than US$2 million to improve the lives of those who most need help, with many of the recipient organizations selected from customer and employee recommendations. Consistently recognized as one of the San Francisco Bay Area's top corporate foundations, eBay Foundation has made over US$18 million in grants since its creation.

The lengthy quote above sums up the focus of the company as based purely around market exchange and the accumulation (and distribution) of wealth. This focus is additionally carried over into the structure and language of the service itself, where, when a 'buyer' wants an item from a 'seller' on *eBay*, they are able to 'bid' for it as part of an 'open auction'. Here, the open auction works as follows: the seller posts a starting price for the item which potential buyers are able to bid for within the allotted auction timeframe decided by the seller. These auctions, which can result in bidding wars—that in turn maximize the profit for the seller and for *eBay*—are made possible because of the decrease in time it takes to communicate over the Internet. Near instantaneous communication makes it possible to have a continuous feedback of information that increases the speed and frequency of exchange—a key feature of Castell's Network Society.

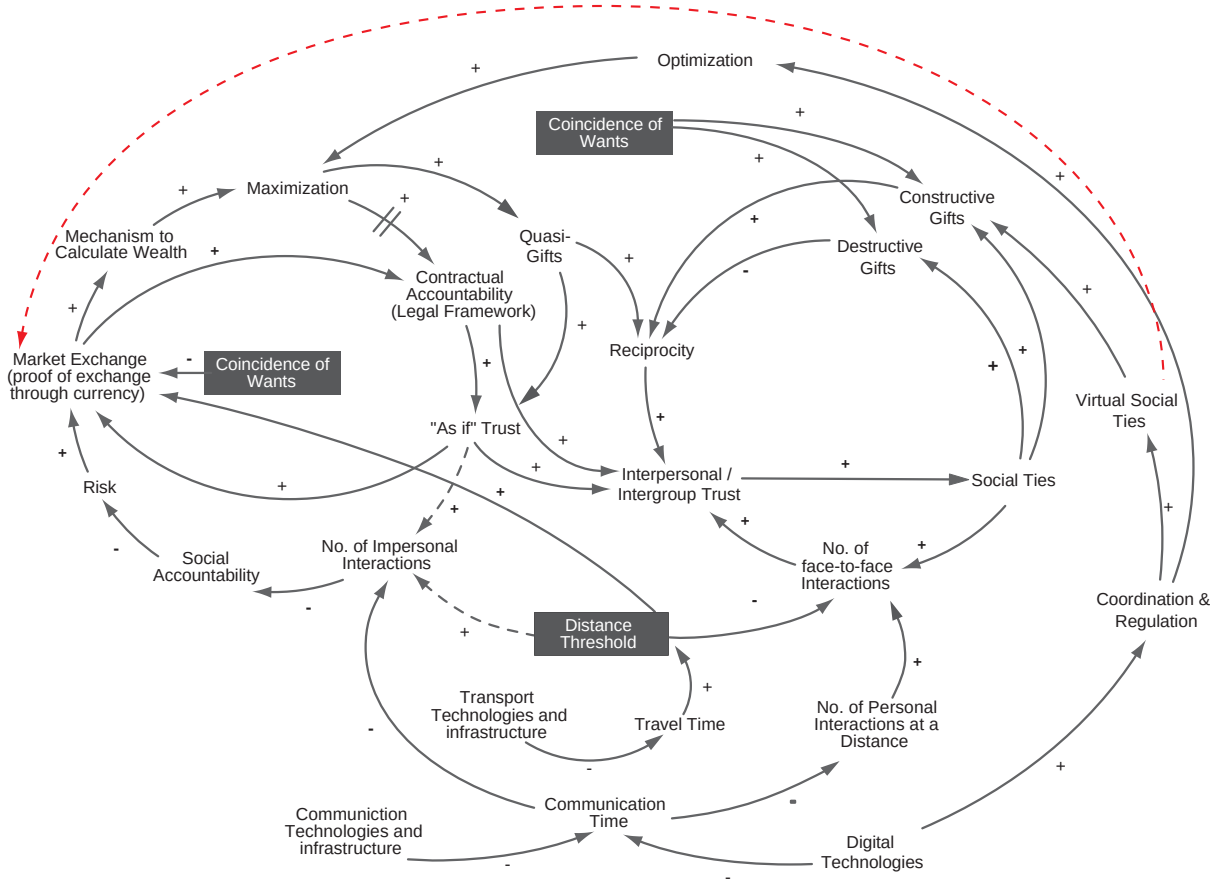
***Figure 47.***
*The building of virtual Social ties through eBay neighborhoods is intended to increase market exchanges on the site.* >

*Trustworthiness and Reputation*

Market exchanges are traditionally devoid of social interaction. As was discussed in Chapter 1, the use of money to generate accountability between two people reduces the need for social ties. Additionally, as market exchanges have become the norm in our everyday lives, we do not in general (beyond daily pleasantries) interact with people when the exchange of money is involved. As such, it is logical that the profiles of *eBay* members are without personal details. These personas are simply providers or buyers of goods – not a person with whom we are or want to be socially connected. This stands in contrast to the *Global Freeloader* and *Couch Surfing* communities where profiles are used to build and communicate trustworthiness between members.

With *eBay*, communicating trustworthiness between buyers and sellers is not supported through personal profiles. The focus of the site is on the objects themselves, not the people. As such the profiles of sellers become supplementary information aimed at facilitating the sale. In *eBay*, people become 'merchants' with aliases that often resemble shop names instead of real names, items are numbered, and the general location of the object, not the person is disclosed (although one could assume that, for the casual seller, these are one and the same thing). The only personal aspects about the seller are found in *eBay's* sole mechanism for communicating trustworthiness between members: the reputation system. As was previously discussed, these systems communicate information about a member's past performance as documented by buyers and sellers that have previously had dealings with this person. This documentation of previous actions creates what political scientist Robert Axelrod claims is a "shadow of the future" which either adds to or detracts from a seller's trustworthiness. (Axelrod, 1984)

Resnick, et al., (2006) demonstrated the success of reputation systems used in *eBay* through a controlled experiment whereby an established seller with a high reputation and seven new sellers with no reputation all sold identical items during the same




period of time. Unsurprisingly the established seller fared better - receiving up to 8.1% more for items than other sellers. However, even though reputation systems are a tool whose power has been greatly enhanced by the digital age (in that information can be easily stored, processed and distributed), they still encounter significant challenges. For instance, should a profile be erased then the reputation of that person is also gone. In addition, as profiles that are displayed on the site do not contain any personal details, a dishonest person can simply start afresh once their bad reputation becomes known.

Besides the communication of trustworthiness between buyers and sellers, trust must also be established between members of *eBay* and the company itself. Much has been written on this subject, though none of it is in direct relation to *eBay*. In general, however, the building of this type of trust between these parties can be summarized in the following: the building of "as if" trust through the communication of contractual accountability including privacy statements, terms of agreements, payment intermediaries, website certifications as well as user identification certificates; the design and layout of the website's interface; and the ability for disputes or issues to be dealt with through real people and not a computer. (Patton and Josang, 2004)

### *The Building of the eBay 'Community'*

Launched in 1998, *eBay* is one of the earliest websites to use the power of the Internet to combine interests and information at a distance. As such it experienced enormous early growth. However, by 2007, the company faced two downward trends: stagnant growth in active members and a decline in the number of items listed for sale (Fortune Magazine Online, 2007). Meanwhile, as access to the Internet expanded in the early 2000s and online communities which were not related to market transactions grew, studies emerged that found a correlation between the use of social aspects and repeat visitors of sites. In particular, a report by McKinsey & Company in 2001, found that while online community sites had


***Figure 48.***
*Examples of eBay neighborhoods*

a 60% success rate at converting unique visits into members, transaction based sites only had a 2% success rate (Agrawal et al, 2001).

It should come as no surprise then, that in October 2007, in an attempt to increase profit margins and site traffic, *eBay* launched a new component for its website: *eBay neighborhoods.* Here members can create more personal profiles, post photos, write reviews and discuss what is on their mind. This move into a more social networking space (though the language of the site still remains business oriented) is a bid, as Brian Bolan, an analyst with Jackson Securities explains, "to get shopping to become much more of a social experience… Users aren't spending the majority of their time on *eBay* anymore. You have to be in the space where people are, which is why you'll see more tools that will wrap around social networks". (Fortune Magazine Online, 2007)

*eBay neighborhoods* has been running for almost two years now with the biggest 'neighborhood' being *coffee lovers* with a little over 1 million people. However, despite the number of people signed up to *neighborhoods,* there is little evidence that this is creating more sales. An online article from Fortune magazine in April 2008, points to a survey conducted by Nielsen which states that the growth rate of *eBay* users was just 1% compared to 10% in the same quarter in 2007. (Fortune Magazine Online, 2008). However, despite the declining growth rate—which as numerous bloggers have pointed out could also stem from an increase in seller's fees and the amount per transaction that *eBay* takes —there is something to be learnt here about the evolution of exchanges between people who are communicating at a distance through distributed digital technologies. In other words, in the case of *eBay*, the move to create more 'communal' elements within the enterprise makes it apparent that distance market transactions alone are seen as insufficient to sustain the ongoing growth of a business. Instead, as is also demonstrated through the survey by McKinsey & Company, it is social ties, that when strengthened and forged on the Internet, emerge as the winner in the driving of sustainable

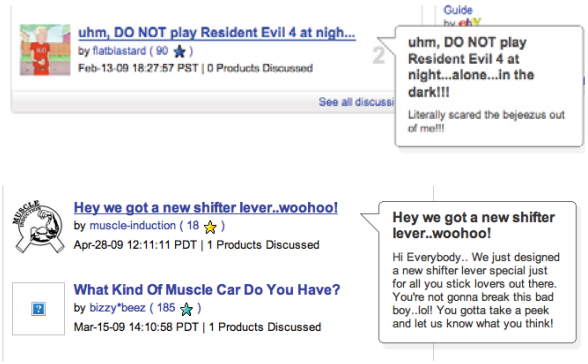



***Figure 49.***
*Examples of comments left on eBay neightborhood pages*

exchange relations. Lastly, while it is not necessarily a success, the attempt to use social ties in *eBay* to enhance market transactions results in an additional blurring of the distinctions made by scholars between gift and market exchanges.

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## LinkedIn: Relationships Matter

*"The number one way you find a job is through referral and LinkedIn is the biggest referral network out there,"* Charlene Li, founder of the research outfit Altimeter Group. (Fortune Magazine Online, 2009)

*LinkedIn* is a website that allows people to create connections with their existing social and business ties in order to further their professional goals. However, the power of this website is that it not only allows the maintaining of existing relationships, but facilitates the establishment of new relationships. In the words from the *LinkedIn* (2008) website:

> LinkedIn is an interconnected network of experienced professionals from around the world, representing 170 industries and 200 countries. You can find, be introduced to, and collaborate with qualified professionals that you need to work with to accomplish your goals.

*LinkedIn* can be classified as a gift exchange as it does not involve the use of currency to mediate exchanges. However, because the goal of the site is to further professional aspirations (which for the majority of us centers around the making of money) it additionally, yet indirectly, contributes to market exchange. The gifts that are given between members of *LinkedIn* networks, center around recommendations, referrals and introductions.

### *The Structure and Growth of LinkedIn Networks*

Just as with *Global Freeloaders* and *Couch Surfing*, joining *LinkedIn* requires the creation of a public profile that uses real names and information. Here, however, information is predominantly

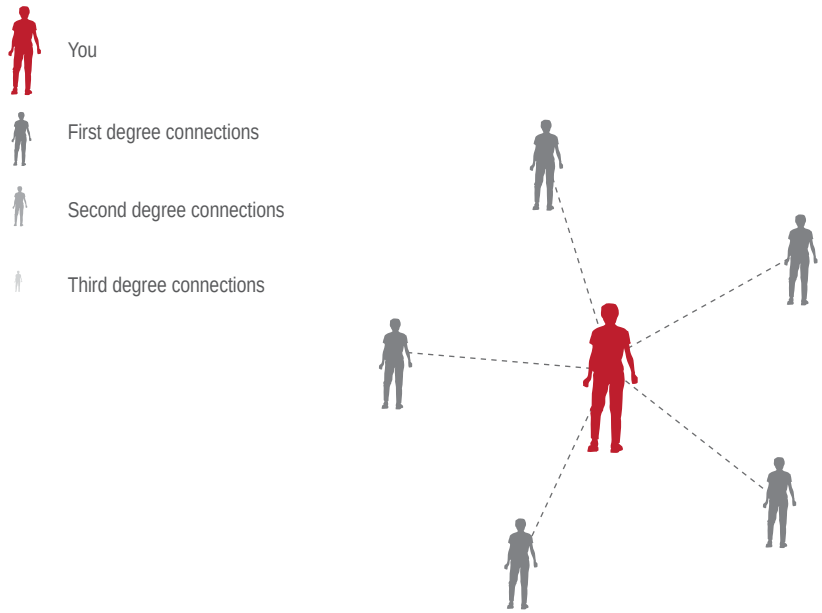



***Figure 50.***
*The first step in creating a LinkedIn network is to invite people to be connected to you.*

professional with those who sign up being asked to summarize present and past professional experience as well as expertise and accomplishments. It is then possible to invite people - those who are considered trusted contacts - to join your professional network and in turn view the profile's of others and see if they are connected to anyone you know. *Figures 50 – 51* help to explain the structure of the service more clearly. Connections that are indirect (second or third degree connections) can be solidified into direct connections through introductions. Alternatively, both indirect connections and those people who are members of *LinkedIn*, but are not in your immediate network (ie: strangers), can also be contacted through the website. Thus, the website acts as a powerful virtual space where the profiles of over 40 million professional connections are displayed, managed and can be capitalized on towards the goal of fulfilling professional aspirations.

The ability to quickly search, share and recombine the information found in people's profiles, is a fundamental aspect of the Network Society and would not have been possible before its rise. It also shows that with a strong common goal, this type of network structure has enormous growth potential - a growth that is evident in the site's membership rate that has increased by 200% in the last year (LinkedIn Blog, 2009).

### *The Projection of the Site to the Public*

The projection of the *LinkedIn* site to the public represents an interesting crossover between the examples of *eBay* and *Couch Surfing / Global Freeloaders.* With its goal of facilitating professional connections, the language used is business-like yet also personal. This is exemplified through the use of the second-person narrative in the service's mission statement:

> Your professional network of trusted contacts gives you an advantage in your career, and is one of your most valuable assets. LinkedIn exists to help you make better use of your professional network and help the people you trust in return.

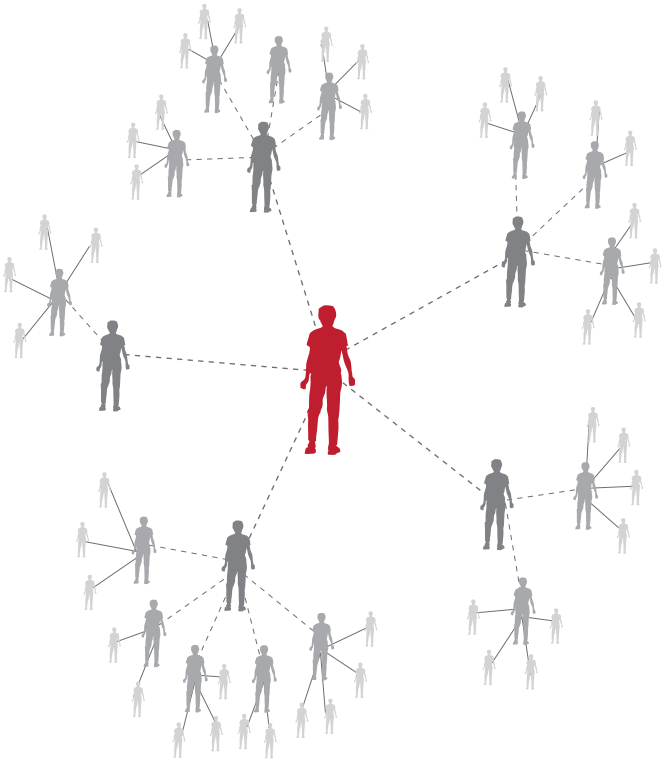


***Figure 51.***
*First, second and third degree connections form networks of trust.*

> Our mission is to connect the world's professionals to accelerate their success. We believe that in a global connected economy, your success as a professional and your competitiveness as a company depends upon faster access to insight and resources you can trust.

*Social Ties/Business Ties*

In the mission statement, emphasis is placed on the trust that comes from personal relationships yet the word used to communicate these relationships – 'contacts' – is not personal. Although the service relies on gift giving between members to facilitate the goal of the network, these are not the usual 'social ties' that are discussed in gift exchange theory. They are, instead, business/social ties which often exist within a bounded aspect of our lives – work. As mentioned previously these business ties also have the ability to contribute to market exchanges – further differentiating them from the more traditional category of social ties.

*Trustworthiness, Reciprocity and Reputation*

*LinkedIn*'s mission statement additionally highlights how trust, reciprocity and reputation are viewed and how the service uses these concepts to encourage ongoing use. Firstly, it is stated that you are only helping "people you trust". As there is an assumption that in trusting your first-degree contacts, you can also trust your second and third degree contacts, this creates a reciprocal exchange relationships that is built *along trust lines* that are structured by the network, even though people may not know each other directly. This results in a much larger pool of trusted people in the service and encourages reciprocal exchange. Reciprocity is also nurtured through the giving of recommendations to those that are trusted. Recommendations not only build reputation, but the structure of the service is such that if you get a recommendation you are encouraged to give one back. Therefore, and unlike *eBay* where reputation is built solely around prior performance, with *LinkedIn*, reputation is also a form of 'mutual back-scratching' that benefits both parties.

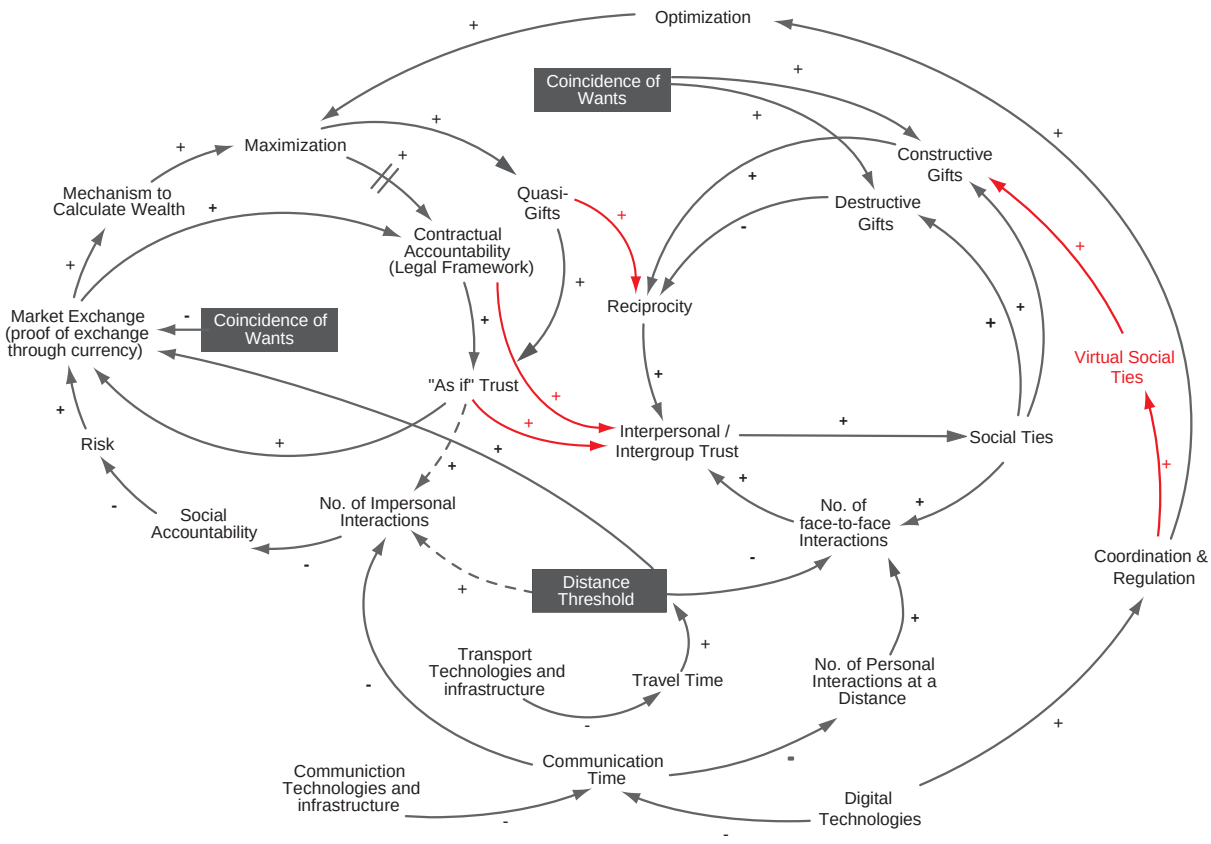
***Figure 52.***
*In the Network Society, mechanisms that were traditionally considered to be part of one exchange mechanism over another get used in both types of exchange.* >

Besides the concepts above, *LinkedIn* also uses what have become standard "as if" trust mechanisms (privacy statements and terms and conditions of use) that have been discussed in the examples of *eBay*, *Couch Surfing* and *Global Freeloaders*. These work to promote trustworthiness between the *LinkedIn* company and the service users by defining accountability.

### *LinkedIn Conclusions*

Although *LinkedIn* is interesting in that it includes a new type of exchange relationship – *business ties* that encourage gift-giving while also promoting market exchange – it is the structure of the service that is most relevant for the FriendFreight service proposal. The networked structure of *LinkedIn* - that harnesses the features of the Network Society - combined with a goal that people want to achieve and the branding and language of the website, sets up a system that maximizes the continued growth of the service.

In this section, we have seen how activities that existed prior to the rise of distributed digital technologies have been enhanced by the ability to coordinate and distribute information from a distance. In the case of City Logistics, this has resulted in an optimization of systems that, in some cases, is driven by a desire on the part of private companies to maximize profit, and in others, to alleviate the negative effects of transportation in inner cities. At the same time, the *Casual Car Pool Service* which emerged from a coincidence of wants and the spatial arrangement of San Francisco, has used the power of the Internet to more efficiently distribute information in order to contribute to the ongoing goals of the members of the community: to have a cheap, safe and reliable way of getting to downtown San Francisco. As the *Casual Car Pool* service involves no money exchange but happens between strangers, the Internet has also been used a mechanism to communicate trustworthiness. Here, the number of interactions that happen at a distance through the community platform increases the amount of interpersonal and intergroup trust.




This helps to forge these people together as a social community that looks out for each other which in turn encourages reciprocal giving.

When it comes to services that developed after the widespread use of digital technologies were established, we can reflect on the emergence of these services and 'virtual' communities to highlight factors that contribute to their continued use and growth. In the mid 1990s, the power of the Internet to collect, recombine and distribute information was quickly adopted by businesses who saw the profit potential of connecting people in seller-to-buyer market driven exchanges. Sites like *eBay* were a significant step away from the initial utopian promise of the Internet, which was to create a "global village of strangers meeting strangers, sharing cultures and opening doors, heart and minds" (Molz, 73). However, the ability of these sites to capitalize on supply and demand, established them as go-to points for many early Internet users. These differ from the rise in the last 6-7 years of websites such as *Global Freeloaders* and *Couch Surfing*, which aim to connect complete *strangers* to each other. *Global Freeloaders* and *Couch Surfing* do this through establishing and nurturing common social goals - maintaining the spirit of traveling through the sharing of travel experiences between hosts and guests and the ability to save money on accommodation. They have in place a range of more formalized mechanisms for building trust between members, including: personal profiling, friend links, vouching, verifications and reputation systems. Lastly, *LinkedIn*, which began 6 years ago, also uses a strong social goal to bring people together into an exchange relationship – the furthering of professional aspirations. Here, however, it is the networked structure of the service that is harnessed through lines of direct and indirect trust that facilitates ongoing exchange.

The importance of social connections, in fostering the ongoing growth of distance exchanges, was recognized by McKinsey and Company as early as 2001. The move by *eBay* (and others) to add a social

dimension to their purely market-based exchanges which, until recently, were devoid of personal details about users and relied purely on a reputation system, can be seen as a general acceptance of the findings in this report. Additionally, if we look towards a service like *LinkedIn*, we see how starting with ties that are already established (business/social ties in this case) fosters the continued growth of distance exchanges.

Looking to the future, then, it would seem that any framework proposed for the FriendFreight service must include the fostering of personal ties, regardless of whether the service involves the exchange of money, happens between strangers, or is restricted to those who are already connected socially or through business. Additionally, in a case where money is not used, it is evident that a strong common social goal must be in place. The following section of this chapter thus outlines three possibilities for the FriendFreight service based on the findings of Chapters 1 and 2.

## /2.3
## THREE SCENARIOS FOR THE FRIENDFREIGHT SERVICE

Before building possible scenarios for the FriendFreight it is important to recap some aspects of the service that were outlined in the introduction and can be elaborated on through the discoveries made in Chapters 1 and 2. These aspects are summarized as follows:

- Firstly, requesting an item and carrying an item is distributed. You request from one person in order to carry for another. Thus, either a coincidence of wants, or a common goal must be identified that members in the FriendFreight community can align themselves with and which promotes this type of giving.
- Secondly, initial interactions are at distance and are facilitated through digital technologies. Therefore the “as if” trust, that is usually associated with market exchanges must be incorporated into the service regardless of whether giving and receiving happens between strangers or those with social ties.

- Finally, although issues of trust and privacy surrounding the collection of location and movement based data must be dealt with if the service were to be implemented, they are not dealt with directly in the scenarios developed.

### A Coincidence of Wants?

Taking into consideration the things that are outlined above, the first thing to determine before building the FriendFreight scenarios is whether this service can be built on a coincidence of wants. As was seen in the *Casual Car Pool* in San Francisco, a coincidence of wants—which is the meeting of two exchange parties who both have a desire to trade at the same time and place—is a powerful motivator that can drive continued exchange. In the FriendFreight service, the coincidence of wants would need to occur between the movement patterns of people on bikes and the desired movement patterns of small goods that can be carried on bikes. Unfortunately, this is difficult to establish. Firstly, because only general information about the movement patterns of bikes in the city are available, and unlike San Francisco where car movements are predictable, Copenhagen's spatial layout means that bicycle movements are more dispersed. Secondly, there is currently little data available about the last-mile (from the point of sale to the consumer) movement patterns of goods in cities. Thus, even though information that could facilitate the harnessing of a coincidence of wants could be obtained once the service is up and running, an assumption that there is no coincidence of wants must be made to begin with.

Without a coincidence of wants, another mechanism – a common social goal - must be used to bring people together into a relationship of reciprocal exchange. This mechanism should be made apparent through the ethos of the service. The examples of *eBay*, *Couch Surfing* and *Global Freeloaders* (combined) and *LinkedIn*, highlight three different ways of doing this. The *eBay* service, which is a market-based exchange, uses the desire to

accumulate wealth in order to encourage transactions between strangers. This market relationship is reinforced through business-like parlance on the website. In *Couch Surfing* and *Global Freeloaders* a common social ideal of being an eternal traveler brings together strangers without the use of money into a relationship of reciprocal 'gift' giving. Here the language used on the websites is more idealistic and geared toward social benefits. With *LinkedIn*, a common social ideal is also used – furthering your professional career. Relationships in this context are not initially between strangers, but begin with existing *business/social* ties and the language used on the website is a cross between business-speak and personal pronouns. Given these goals and how they are communicated, these three approaches can be categorized as follows: A *Market Framework between Strangers,* a *Gift Framework between Strangers,* and *A Gift Framework between Friends and Acquaintances,* where it is recognized that the use of the words Gift and Market do not imply exclusive and contrasting structures, but are simply frameworks with different emphases (either wealth accumulation or the building of social ties) and that either may contain elements of what were traditionally considered to be representative of market exchanges *or* gift exchanges.

There is one category, however, that is not illustrated through the examples used above. This is the *Market Framework between Friends.* In this case, given *eBay's* (failed) attempt to produce such a framework, I have made a decision that this type of structure is not viable and it will therefore not be examined further.

The three frameworks identified can be used as a basis for fleshing out three scenarios for the FriendFreight service. This is done below and is followed by a table that summarizes how each of the 'lessons learnt' from Chapters 1 and 2 has been incorporated into the three different scenarios.

/Scenario 1

## A Market Framework Between Strangers

Sara is at university when she realizes that she has run out of the black cardboard she needs to finish her architectural model. Unfortunately, she has two meetings scheduled for the afternoon and by the time she is free, the art store will be closing. Additionally, even if she did leave, it would mean losing her parking spot and having to find another space on her return (notoriously difficult around the university). Recently, however, and motivated by this situation happening often in her university life, she became a member of a bottom-up delivery service that utilizes the real-time location of people to deliver goods around the city. Not only does can it get her things when she needs them, but she is pleased that it is also helping to reduce congestion and pollution in the city.

When she signed up, she created an account where she could choose her username – she chose 'sa_79'- and had to supply her credit card details, email address, and phone number. She also had to give details about the locations that she most often spends time in, periods of the day when she did not want to be contacted by the service and the frequency with which she might use the system – these details help to minimize unwanted messages as well as match her likely requests with people who are often in the same area. This in turn gets her items delivered more efficiently. Lastly, Sara had to accept the sites terms and conditions that detailed how payment would work (for instance, she must have a minimum positive balance of $50 on her service account to get items delivered), how disputes could be resolved and issues pertaining to privacy and accountability. Once signed up, a card was sent to Sara that could be used anytime she wants to pay for an item she is delivering to another person. Today however, she needs to use the service to request that an item be delivered to her.

To do this, she first logs onto the delivery service's website and enters the following information:

- The location of the cardboard that she needs;

- The destination of where she needs it delivered; and
- The time frame within which she needs the item.

It is at this point that the system can tell Sara the number (not names) of people who are enrolled in the service and are within the vicinity of the item she has requested. It can also tell her how trustworthy they are and the average amount of money they usually deliver goods for. This information is generated from the behavioral history of the carriers as captured through a *reputation system* and data collected by the service over time. It is at this point that Sara can:

- Specify the minimum and maximum amount she is willing to pay to have the item delivered. (In this case due to the stress of wanting to finish her model and given the information that the website is showing her, she is wiling to pay between $2 and $12 to get the cardboard);
- Specify if she only wants trusted carriers or is willing to have anyone deliver the item; and
- Call the art shop and ask them to hold what she wants by giving them her account number and user name and confirming that she has done this on the website.

Once these details are complete, the system sends out a request to *only* those who are enrolled in the service and that are *currently within a 5-minute* ride of the item (600m). This request contains information about the item location, destination and an initial price incentive of $2. Five minutes after the message goes out, 3 people have expressed interest in delivering the item by replying to the system with a text message. Nobody, however, has made a full commitment. Those who didn't reply to the first text message are now out of the running and will receive no further messages regarding this item.

A second message is then sent out to the three people who have already expressed interest in the

delivery and to any new people who are within the 600m zone. This time a $5 incentive is offered and Peter, who is close to the art store, and is on his way to university, accepts the task and has $5 credited to his account. He can use this credit later to pay for his own deliveries or cash-out at the end of each month (for a small fee). He then goes to the art store and shows the confirmation message to the cashier. The cashier charges the item to the card that was sent to Peter when he signed up for the service. Once the transaction has gone through (it is ultimately deducted from sa_79's account), Peter is able to take the item.

Peter delivers the cardboard to sa_79 within 30 minutes of the initial request. Sara is extremely thankful and pleased with the efficiency and cost of the delivery and the fact that it has helped streamline her workday. She leaves a positive rating for Peter on his profile which increases his trust rating on the website.

One month passes and Peter delivers many goods for others through the service. By doing this he not only capitalizes on journeys that he is doing anyway, but through receiving positive ratings for his deliveries becomes a "star-carrier". Star carriers, receive bonus credits on their account and are also advertised as citizens who are doing good work for their community, helping to make the city a more enjoyable place to be in through reducing congestion and pollution.

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/Scenario 2

## A Gift Framework between Strangers

Nina is one of many elderly people in the city of Copenhagen with limited mobility. Although family and friends are able to assist her with going out for a meal, visiting the doctor or shopping for groceries, there are often times when she doesn't wish to bother them. One Monday she realizes that she has forgotten to pick-up some vitamins from the pharmacy and knows that her son and daughter-in-law are too busy to help her. She has, however, recently joined a not-for-profit community-based service – FriendFreight – that collects and delivers small items by bicycle to those who do not have the time, or capacity to do so themselves.

Lars and Anna who run the program came and taught her how to sign-up to the system. They helped her build a profile with a picture of herself and some details about her needs and her interests. They also talked her through the finer points of the service: how it operates, what the terms and conditions are, what information it requires (her credit card details, phone number and address so that she can be a registered verified user as well as a minimum account balance of $20), and what happens if she is satisfied/unsatisfied with the delivery (she is able to give ratings through the reputation system but can also vouch for people or provide recommendations to other users). Lars and Anna also showed her how to use and search on the website where a variety of non-sensitive items are available from specific stores.

On this Monday, when Nina realizes that she needs the vitamins, she logs onto the service, chooses what she needs and specifies that she would like them within the next two hours. A message is then sent to the nearest store with a supply of these vitamins and the system waits for confirmation that the order is filled and has been charged to the FriendFreight service. Following confirmation, a text message is sent to the mobile phones of the membership base of delivery-capable cyclists within a five-minute ride of the pharmacy. The message reads as follows:

> 79 year-old Nina would appreciate if someone could spare some time to deliver vitamins within the next two hours from the chemist at Torvegade 47, Kobenhavn to her house at Borgbjergsvej 2/15, Kobenhavn. To help Nina, reply YES.

Tine has just finished lunch and is about to head back to work when she receives the text message asking if she is available to deliver Nina's vitamins. She has been a member of the FriendFreight service for over a year now and is a "gold-rated giver", having received many recommendations for delivering items to those who are unable to get things themselves. She has also had items delivered to her by other people in the FriendFreight community. Tine enjoys being part of a group that helps those in need as well as each other – without any costs attached. She also feels good when she receives information about how much her actions contribute to increasing social capital as well as to reducing congestion and pollution in her home town: Copenhagen.

On this day, Tine sees the message from Nina and remembers that she has delivered to her before and how appreciative Nina had been of the time and effort Tine had made the first time. As Nina's house is only a little bit out of the way from where she works and she is interested to see how Nina is doing, Tine confirms that she will be able to deliver the vitamins within the allotted time frame. She is then sent some further details and directions. The acceptance message is also relayed to the people in the pharmacy, and to Nina so that she knows to expect the delivery.

After showing the shop staff at the pharmacy a delivery confirmation message on her phone, Tine takes the vitamins, puts them in her basket and rides to Nina's address. Pleased with the fact that the vitamins arrive in perfect condition and well before the end of the delivery-time window Nina gives Tine another 5 star rating as a deliverer on the FriendFreight website.

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/Scenario 3

## A Gift Framework between Friends and Acquaintances

There were stickers and signs everywhere—on traffic lights, park benches, bus stops and shop windows, on the back of people's bikes and cars—and buttons on backpacks and handbags. Each read the same thing: *FriendFreight - Get Connected, Do Good*. Noticing all these signs on his way to work, made Ulrik think about how he got involved in the FriendFreight service.

It was after the 2009 United Nations Climate Summit that the municipality of Copenhagen decided that the traffic generated from urban goods deliveries needed to be minimized. Other cities in Denmark had already trialed solutions that aimed at, among other things, reducing the number of delivery vans in the city, but after the Summit, Copenhagen was implementing these City Logistics solutions with much more force. It was around this time that the stickers for the FriendFreight service began appearing. At the time, Ulrik had Googled the words to see what it was about. What he found was a bottom-up delivery service, supported by the municipality but run by the community, that offered a way to get small everyday items delivered efficiently and at no cost. However, it became apparent through reading the information on the website further that this service actually had three goals: to reduce the number of stand-alone trips taken in the city and thus reduce the negative effects of transportation (part of the reason why it was supported by the municipality); to provide an efficient service for getting goods to people when they did not have the time or capacity to get them for themselves; and lastly, to introduce members of the community to each other in ways that could facilitate social and business connections.

Intrigued by this idea, and often needing small items delivered to him because his life was so busy, Ulrik decided to become a member of the FriendFreight community. When he began the sign-up process, he was asked to provide his name, occupation and interests and to rank his reasons for signing up to the service. Here he chose getting items delivered as the number one priority, making friends and business connections as number two, and saving the environment as number three. He was then asked to sign two sets of terms and conditions. One was a document setting out the legal accountability of

becoming a member of the service, explaining that his data would not be shared and stating what the service should not be used for (dating etc). The other was a more light-hearted description of what it meant to be a member of the FriendFreight community including why giving the time and effort to deliver something could be just as rewarding as using the service to receive goods.

Through the website, Ulrik had understood that the way the service operated was for each member of the community to nominate a number of friends that they would deliver items for and that they felt could be asked to deliver items for them. As such, he had entered the names and email addresses of six of his friends that he felt comfortable doing this for and whom he felt would accept his invitation to join the FriendFreight community. As each friend that he nominated would also be asked to nominate their friends, this would begin a network of people who he was either directly or indirectly connected to and whom he knew, either through personal experience or by proxy, that he was able to trust to deliver goods. In turn, as profile information for each member of the FriendFreight community would be displayed, over time he would be able to see if there were people he wanted to build relationships with in the system and could use the service to make connections. (see *Figures 50-51*).

Having already been made aware that his personal information would not be disclosed, the next step for Ulrik was to record on a map his usual travel routines and at what time of day these occurred. This information would help to minimize unwanted messages about goods delivery. Additionally it was made clear that he would not receive any messages or show up as available unless it was determined that he was within a close range of his usual travel paths. This meant that if he was conducting any private business that he didn't want others to know about and which was off his usual travel routes, the system would not show him as being available.

He was also asked how often (number of times per week) he would be willing to deliver goods for his close friends, his first degree connections (friends of

friends), and his second degree connections (friends of friends of friends), and whether he would ever be willing to deliver to members of the FriendFreight community that he didn't know. He entered that he would be willing to deliver to his close friends a maximum of twice a week, for his second and third degree connections a maximum of once a week, and for other members of the service once a month.

Over the next couple of weeks, Ulrik had received emails from the FriendFreight community saying that five of his friends had also become members and were willing to deliver goods for him should he need it. It was approximately a week later when Ulrik needed a book delivered to his office from a bookshop in the center of the city, but did not have time to get it for himself. He logged onto the FriendFreight community website to see if someone was likely to be traveling in the direction of his office from the city anytime soon. The service told him that one of his close friends was in the area and given his usual routes, was likely to be headed in the direction of Ulrik's office in the next hour. Additionally six of his second-degree connections were available and 23 of his third-degree connections. Alternatively 76 strangers were also likely to go in the direction of Ulrik's office in the next few hours. On this occasion, seeing that his friend Nikolaj was in the area, Ulrik called him directly and asked if he wouldn't mind going into the bookstore to pick up the item that he had already paid for online. Nikolaj confirmed that he could do this and the two arranged to meet for a quick coffee in half an hour at the base of Ulrik's office to exchange the book.

The next time Ulrik needed something, it was because he had forgotten to pick up his sweater from the dry-cleaner on his way home. Wanting this item for the next day, he logged onto the service again. This time, none of his friends were available but seven of his second-degree friends and 14 of his third-degree friends and 24 strangers were located near the dry-cleaners and likely to be somewhere near his house in the next few hours. Ulrik could not see the paths these people usually take, but was presented with a list of their names and some details about them including which of his friends they are connected to, whether others have recommended them as good carriers and

how often they are willing to take goods for others. He was then able to either select all of these people to send a standardized message to, or could opt to send out personal messages to various members. He chose to send a more personalized message to those members who were first-degree friends with his friend Nikolaj (he had been at the bar with many of them the week before) and a standardized message to all the others. One of the personalized messages read:

> Hi, My name is Ulrik – I am a friend of Nikolaj (we met at the bar last week?) As a friendfreight friend I was hoping you could help pick up my sweater from Torvegade 47, Kobenhavn and bring it to Borgbjergsvej 2/15, Kobenhavn within the next hour or so? My number is 33 897 4646. Reply YES to confirm.

Meanwhile, the standardized message to second-degree friends (who had prioritized environmental concerns when signing up to the service) read:

> Make a connection! Ulrik Droel a friend of a friend needs you to help deliver his sweater from Torvegade 47, Kobenhavn to Borgbjergsvej 2/15, Kobenhavn in the next 2 hours. Accepting this trip will reduce travel demand for today to negative 95km. Reply YES to confirm

As it turns out, Andreas, a second-degree friend was willing to pick up Ulrik's sweater—having remembered his name in connection to an academic paper he had read that was related to his own work. The initial dropping off of the sweater was kept short but personal, as suggested by the FriendFreight community website. However, having established face-to-face contact Andreas was then able to connect to Ulrik, through the FriendFreight site and arrange a longer meeting. In this case, Ulrik was happy to meet with Andreas outside of the service; however, should he not have wanted to, an accepted method of refusal (that was outlined but not stipulated in the FriendFreight website) would have been to reply with a simple message saying that at this stage he simply did not have time to meet.

| | Scenario 1<br>A *Market* Framework between *Strangers* | Scenario 2<br>A *Gift* Framework between *Strangers* | Scenario 3<br>A *Gift* Framework between *Friends* and *Acquaintances* |
|---|---|---|---|
| Common Goal:<br>*A common goal is required for the scenarios as there is no coincidence of wants. (p. 89) Having more than one goal encourages use of the service by a wider range of people* | Market Goal: To efficiently and effectively deliver small goods to others by using money as an incentive for doing so. | Social Goal: To help a stranger who is in need and to be helped by others who also share the goal of helping those in need. | Social Goal: To help your friends and strengthen relationships.<br>To be introduced to acquaintances through friends so as to build your social and/or business network. |
| | Environmental/Social Goal: To be rewarded for contributing to a healthier more livable city | Environmental/Social Goal: To be rewarded for contributing to a healthier more livable city | Environmental/Social Goal: To be rewarded for contributing to a healthier more livable city |

***Table 1.***
*Goals and elements contained in the three FriendFreight scenarios*

The following table sums up all of the elements in each scenario and relates these back to sections in this thesis. Each column represents one of the frameworks and includes: primary and secondary goals that could feasibly drive the system as well as how elements related to: trust, reciprocity, social ties, incentives and motivations, structure of the service, and accountability can be integrated into the service given the different frameworks. This table provides a basic outline of the elements that need to appear in each potential framework for the FriendFreight service and as such can be seen as a checklist should the service be implemented.

NB: some items in the table do not explicitly appear in the service scenarios, but are included here as they would encourage reciprocity and growth of the service.

| | Scenario 1<br>A *Market* Framework between *Strangers* | Scenario 2<br>A *Gift* Framework between *Strangers* | Scenario 3<br>A *Gift* Framework between *Friends* and *Acquaintances* |
|---|---|---|---|
| Motivations<br>*Requesters and carriers of items who subscribe to the goal a framework will be driven by different motivations (pp.33-35), incentives and rewards (pp.47-49).* | Requester: Maximize convenience<br><br>Carrier: Capitalize on existing journey's being made, self-interest through desire to accumulate wealth | Requester: Maximize convenience, building of social ties.<br><br>Carrier: Positive feelings, insecurity, power and prestige, reciprocity/equality, self interest, contributing to the common good. | Requester: Receiver: Maximize convenience, introductions to people, surprise element, networking, self-interest.<br><br>Carrier: Giver: Introducing themselves to people, networking, positive feelings, insecurity, power and prestige, reciprocity/equality, self-interest, contributing to the common good. |
| Formalized Incentives and Rewards<br>*Incentives and rewards are used to generate loyalty and reciprocity (pp.47-49).* | Bonus credits on the account that can be used when needing a service.<br><br>"Star-Carrier's" are advertised and promoted as valuable citizens in the community.<br><br>Recognition for reducing congestion and pollution in the city through 'green-miles' travel reduction statements. | "Gold-rated givers" are advertised and promoted as valuable citizens in the community.<br><br>Recognition for reducing congestion and pollution in the city through 'green-miles' travel demand reduction statements. | "Gold-rated givers" are advertised and promoted as valuable citizens in the community.<br><br>Recognition for reducing congestion and pollution in the city through 'green-miles' travel demand reduction statements.<br><br>Social Capital Statements that detail the number of connections and meetings had. |
| Structure of the service -<br>*Ideally designed to maximize transactions and encourage membership growth* | Bidding is used to maximize the incentive for carriers to take goods. Over time this information can be used to target certain carriers and increase overal transactions. | This scenario is structured around communal giving and getting. | Giving occurs between those who are already directly or indirectly connected, thus encouraging exchanges. The networked structure of this scenario encourages growth. |

| | Scenario 1<br>A *Market* Framework between *Strangers* | Scenario 2<br>A *Gift* Framework between *Strangers* | Scenario 3<br>A *Gift* Framework between *Friends* and *Acquaintances* |
|---|---|---|---|
| **"As if" Trust**<br>*As interaction happens from a distance, "as if" trust is vital to all three scenarios. (pp.41, 73, 81, 86).* | Terms & Conditions of Use<br>Clear design of website<br>Privacy Statements | Terms & Conditions of Use<br>Clear design of website<br>Privacy Statements | Terms & Conditions of Use<br>Clear design of website<br>Privacy Statements |
| **Interpersonal/ Intergroup trust**<br>*particularly encouraged in scenarios 2 & 3* | **Reputation System** Based on ratings given for past performance (p.80)<br>**Mostly Anonymous profile** can be used on the website as market exchanges require less interpersonal/intergroup trust (accountability occurs predominantly through "as if" trust. | **Reputation System** Based on ratings given for past performance (p.80)<br>**Personal profile** is used to encourage exchange and reduce uncertainty in the transaction<br>**Face-to-face/personal interactions** are encouraged. This builds interpersonal/ intergroup trust and complements the virtual profile on the website<br>**Vouching**<br>**Friend Links**<br>**Verification System** As there are no initial social ties, this ensures that people are not taken advantage of. | **Reputation System** Based on ratings given for past performance (p.80)<br>**Complete Personal/ Professional profile** revealed to closest relationships, less information revealed to second and third degree (etc) connections<br>**Face-to-face/personal interactions** are encouraged. This builds interpersonal/ intergroup trust and complements the virtual profile on the website<br>**Vouching**<br>**Friend Links**<br>Existing *Trust Lines* (p. 85) encourage a greater number of trustworthy people available |

| | Scenario 1<br>A *Market* Framework between *Strangers* | Scenario 2<br>A *Gift* Framework between *Strangers* | Scenario 3<br>A *Gift* Framework between *Friends* and *Acquaintances* |
|---|---|---|---|
| Reciprocity<br>*Reciprocity promotes continued exchange. Mechanisms are needed if reciprocity does not occur - particularly in scenarios 2 & 3. (pp. 75, 85)* | As this is a market exchange, reciprocity in the social sense is not expected<br>Quasi Gifts are given (see formalized incentives and rewards) to encourage transactions. | Users are removed from the system if they do not reciprocate for a long period of time (p. 76)<br>Common Social Goal generates expectation of reciprocity (p. 89) | Users are removed from the network if they do not participate (p. 76)<br>Common Social Goal generates expectation of reciprocity (p. 89)<br>Existing social and business *trust lines* generate expectation of reciprocity<br>(p. 85) |
| Projection of the service to the public<br>*(pp.75, 79, 84)* | Language of the website communicates distinct boundaries between "requester" and "carrier" of an item. (p.79) | Language of the website communicates blurs distinction between "receiver" and "giver" of an item. (p. 75) | Language of the website communicates blurs the distinction between "receiver" and "giver" of an item. (p. 75) |
| Social Ties | The building of Social Ties is not actively encouraged | The building of Social Ties is actively encouraged. New social ties may form through participation in the service. | The building of Social and Professional Ties is actively encouraged. New ties can be formed through virtual and face-to-face introductions and recommendations. |

## /2.4
## SCENARIO CONCLUSIONS

The rise of the Network Society changes the nature and intensity of gift and market exchanges. At the same time, it further emphasizes the point made in chapter 1: that the classification of two separate forms of exchange - gift and market – by many anthropologists may need to be examined more closely. The Network Society has further allowed the two types of exchange to be recombined in interesting ways with variables that are traditionally considered as being from either gift *or* market exchanges being found used in the other.

The findings from Chapter 1 and 2 have been combined to develop three scenarios for the FriendFreight service.

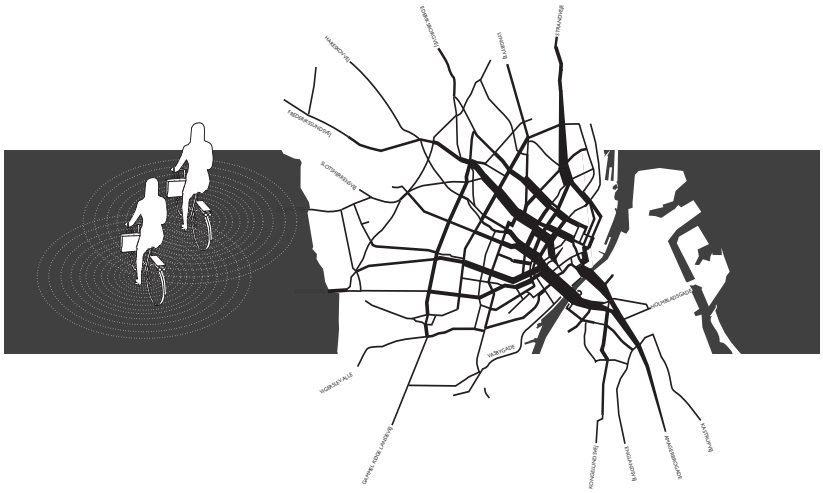
Scenario 1 – *A Market Scenario between Strangers* – which in many ways is similar to *eBay*, is viable as it uses a formal strategy we are all familiar with (money) in order to motivate people to take goods. The downsides to this scenario, however, are that it is exclusionary – without money you cannot participate. Having something delivered could also be seen as a luxury, which would be quickly eliminated in hard economic times. Lastly, similar to pizza delivery, where delivery is simply a service, it is unlikely that any lasting social ties would be made through this service.

Scenario 2 – *A Gift Scenario between Strangers* – appeals to the altruist in us. The main motivation for taking gifts to others is helping people for the common good and joining in the 'spirit of giving'. The structure of this service is designed to contribute to the building of social ties. Additionally, services such as *Meals on Wheels* show that there is a section of the community who would be motivated by this type of goal. However, the issue with this scenario is that the number of people who are motivated by this type of goal are usually a small subset of the community, and as such, the service does not have much room to grow. As Chapter 3 shows, there is a minimum number of people that need to be available at any given time during the day in order for the service to run. It is therefore unlikely that this type of scenario could provide these numbers.

Scenario 3 – *A Gift Scenario between Friends and Acquaintances* – capitalizes on direct and indirect lines of trust to promote mutual obligation and thus reciprocity. It captures the 'spirit' of the Network Society in that the structure of the service can be easily reconfigurable, expandable and adaptable. In order for this structure to be successful, the creation and marketing of a common goal or goal/s that is strong enough to encourage continued growth and use of the system must be carefully determined and executed. However, to counter this, I could also imagine that because the structure of the network is so flexible, it would be possible to have smaller networks that nurture their own common goals – thus making the service even more 'bottom-up'.

Through examining all three scenarios, through a lens of encouraging reciprocity and maximizing the numbers of people who might become members of the FriendFreight Community, Scenario 3 emerges as a clear winner. Here, existing trust lines and the assumption that we can trust those who are connected to people we already trust encourages reciprocal giving. Meanwhile, the structure of the service promotes continued growth. Having said this, the reciprocity and growth structure must be additionally supported by the elements drawn out in the table on page 104 which come from the findings in Chapters 1 and 2.

Thus as a final conclusion, if the FriendFreight service were to be implemented, I would do so based on scenario 3 - *A Gift Scenario between Friends and Acquaintances.*



# /CHAPTER 3

## MODELING THE FRIENDFREIGHT SERVICE: COPENHAGEN

The focus of Chapter 3 is to explore some aspects of the FriendFreight service in a more quantitative manner - done through building a computer model in *MatLab* that tests some of the variables of the service within the specific context of Copenhagen. The model that is presented in this chapter is the joint work of myself and Francesco Calabrese, a computer engineer and colleague at the Senseable City Lab, MIT, where I am currently leading the CopenCycle project that will be displayed at the next United Nations Climate Summit in December 2009.

At the end of Chapter 3, it was determined that scenario 3 – *a gift framework between friends and acquaintances* - was the most desirable structure for running this service as it allows the most flexibility, can become self-reorganizing, has a tangible incentive structure and uses the power of existing social ties (and the ability to make new friends and connections) to keep the service running. In short, this scenario takes advantage of the recombining capability of the Network Society and encourage reciprocity and grwoth to a greater degree than scenarios 1 or 2.

***Figure 53.***
*68% of bicycles in Copenhagen have unutilized Freight Capacity*

/3.1
THE MODELING APPROACH

However, although scenario 3 is desirable, it is, unfortunately, difficult to simulate and observe through computer modeling – the particular data required on direct and indirect social ties as well as the spatial locations and movement patterns of these specific people in the context of Copenhagen are simply not known.

As such and given the data that is obtainable for the Copenhagen area, a decision was made to build the model based around scenario 1, where anybody who is moving through the city can take a package for somebody else without the necessity for these people to be socially tied, either directly or indirectly. However, regardless of whether the people carrying the goods are strangers or friends, the framework built for this computer model could be adapted to any of the scenarios should more data about the relationships between people in Copenhagen become available.

It is impossible for any computer model to exactly replicate the complexity of interactions that take place in real life. This is not just a problem of computing power, but is also a recognition that models are, by their nature, abstractions of the real world, which only take into account a fraction of the variables that might impact the outcomes shown through their use. Even so, a carefully constructed computer model, and an awareness of the limitations inherent in modeling, can be useful in helping researchers understand higher-level thresholds that are critical to a proposed system – in our case the FriendFreight service in Copenahgen.

Given this, it is important to define the goals of the model clearly and then assess which methodology and modeling technique can be used to achieve them. In the case of this thesis, the aim of the modeling exercise is to produce a best-case scenario for the FriendFreight service given available data about the demand generated from residential properties for particular types of goods, and the movements and availability of cyclists to carry goods in the city of Copenhagen.

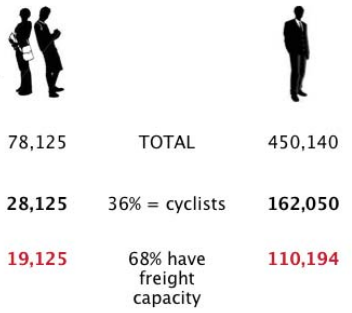



***Figure 54.***
*Number of students and workers in Copenhagen who cycle to work and have available freight capacity*

The best-case scenario can be assessed through the following questions:

1. **With regard to the maximum reduction in kilometers traveled to deliver goods:** What is the number of kilometers traveled when moving particular goods from their point of sale to their final destination and what is the maximum number of kilometers that could be reduced when the FriendFreight service is running?

2. **With regard to the numbers of people enrolled in the service**: what is the minimum number and optimal mix of people (different groups of people have different movement patterns at different times of day) that would need to be enrolled in the service in order to maximize a reduction in the number of kilometers traveled when moving particular goods from their point of sale to their final destination?

3. **With regard to what types of goods could be delivered:** How does the layout of Copenhagen - the spatial distribution of particular shops (points of sale) and residences (final destinations) affect the successful delivery of one type of good over another?

There are several modeling approaches that could be used to answer these questions and thus establish a best-case scenario. These include cellular autonoma modeling and agent based modeling. However, it was decided that as an initial exercise, the model would be built with *MatLab.* MatLab is a technical computing language and interactive environment for algorithm development, data visualization, data analysis, and numeric computation. It can handle large data sets and has been used in the past to simulate urban systems including water flows (Ahlman & Svensson, 2002) and traffic. The limitations of MatLab and the possibility of using alternative modeling approaches for future experiments will be discussed at the end of this chapter.

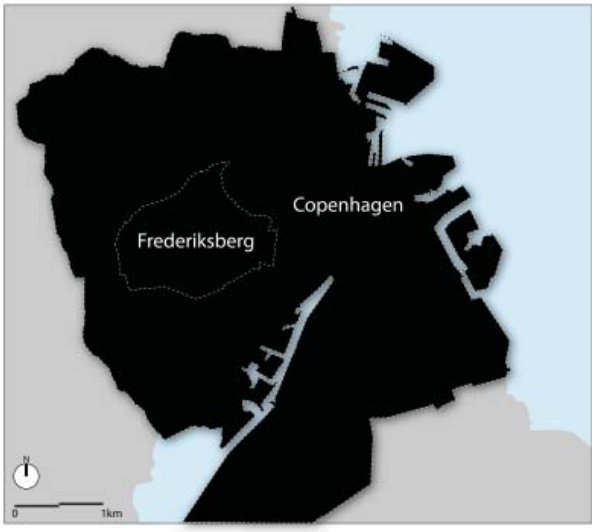



***Figure 55.***
*Area of research: Copenhagen and the municpality of Frederiksberg*

>

/3.2
RESEARCH CONTEXT AND DATA GATHERING

The MatLab model is not attempting to simulate the full scale running of the FriendFreight service and eliminates many variables including the trustworthiness of people, the technical challenges associated with the service and the willingness for people to carry goods for others. Instead, it is assumed that these factors are accounted for in the service scenario.

In order to set up the MatLab model a spatial area of study (the research context) must first be defined: Copenhagen. Second it must be established, that within this area there is enough available freight capacity within the chosen vehicles: bicycles. Once this is determined, data gathering can be divided into two categories: information about the demand, location and movement of *goods* and information about the availability and movement patterns of *cyclists*. This is expanded below:

*Goods*

- The types of goods that are in high demand and can be carried by bikes
- The average hourly demand for these types of goods by households
- The destinations that these goods may be traveling to (residences)
- The locations where these goods can be found (points of sale)
- The average distance between points of sale and final destinations

| | Basket | Rack | Buggy | Side Basket | Rack & Basket | Nothing | TOTAL |
|---|---|---|---|---|---|---|---|
| Number of Bikes | 144 | 276 | 18 | 6 | 258 | 123 | 795 |
| Number of Bikes with freight capacity | 54 | 228 | 9 | 0 | 252 | 0 | 543 |

***Table 2.***
*Types of available freight capacity on bicycles in Copenhagen*

*Cyclists*

- The different categories of cyclists who might carry goods, recognizing that we are assuming that these categories of people have similarities in movement patterns and temporal availability.
- The number of people in each category
- The availability of people based on their averaged daily movement patterns

## Copenhagen

The geographical area that the model will be tested in is shown in *Figure XX*: it is approximately 11 x 12 kilometers and includes the City of Copenhagen, as well as the municipality of Frederiksberg that lies within the boundaries of the city of Copenhagen. Although both areas are included in the model, it is referred to in this chapter as the Copenhagen area.

## The Establishment of Freight Capacity

The next step is to establish that there is adequate freight capacity on bicycles in Copenhagen. During January 2009, a 30-minute survey was conducted at three busy intersections (the total observation period being 90 minutes). During these times, a total of 795 bikes were counted and of these a significant proportion—68%—had what we can describe as available freight carrying capacity, that is, there was enough room for additional items to be carried. It was decided that this percentage is adequate for considering the running of this service in Copenhagen. The freight carrying capacity by type is summarized in the table above.

## Goods

*Types of goods in high demand that can be carried by bikes*

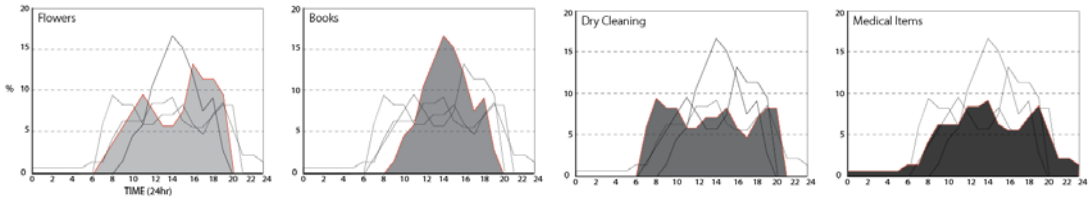
In order to reduce the complexity of the model, a limited number of goods are initially chosen. The criteria for choosing these goods is that they can be carried by bike and have a high daily demand—we want to target stand-alone trips for items (those trips

2728


5670

3109


6170




that are not combined with other daily activities) and we have assumed that the number of stand-alone trips is proportional to the demand for the item.

To find this information, the average household consumption (in kroner) of different types of goods in the Copenhagen area was examined. This is information that is publicly available through *Statistikbanken*, the Danish government's statistics website (Statistics Denmark, 2006/2007). Initially, all goods were eliminated that were considered sensitive in nature or could not be carried by bike because of excess volume or weight. The remaining goods were then ranked based on the average number of goods that are needed by households. This was done by dividing the total amount spent per year for each goods category by their average price—as found online—for each likely good type, giving an estimate of the number of goods required per type/per year/per total number of households. (see *Figure 56*) Although it is recognized that demand for goods has a temporal aspect (that is some goods might be bought more on a Sunday than a Monday or in a certain month), a lack of statistics forced us to simply divide the yearly figures by 365 to establish the daily averages on which the model is based.

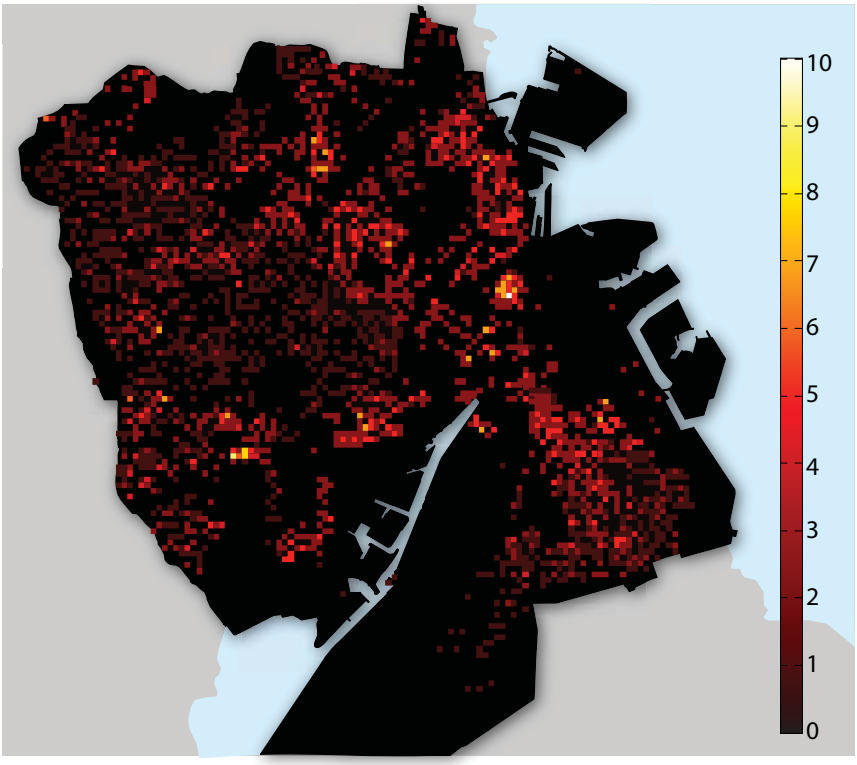
Four categories of goods emerged from this process: Flowers, Books, Dry Cleaning and Medical Items The average numbers of goods per category required each day across all households (277,624) in the Copenhagen area is found above.

However, although these numbers represent the daily demand for goods from all households in Copenhagen, it is recognized that many of these items will be attained through trips combined with doing other things – for instance we might drop into the pharmacy on the way home from work, or pick up some flowers on the way to school. As such, it is assumed in the computer model presented in this chapter that only 10% of items required by households will be delivered by the service and therefore, the numbers of items required per day for flowers, books, dry-cleaning and medical items are: 273, 567, 311 and 617.

***Figure 56.***
*Number of goods by type needed daily in Copenhagen per total number of households: 277,624.*

***Figure 57.***
*Density of residences per 100 x 100m pixels. This generates the demand for goods.*

***Figure 58.***
*Temporal demand for goods by type.*




*Average Hourly Demand for these Types of Goods*

To assess the success of matching up the availability of people with goods that need carrying, an hourly the demand for goods must be established. The average distribution of this demand on a typical weekday was found through an analysis of shop opening hours and the temporal travel habits of people in the city. Here it is assumed that when people are traveling, they are likely to be carrying goods with them. This assumption could be refined if the hourly purchasing patterns in shops was known. Although this data is not currently available, real time inventories are becoming commonplace and it is not unreasonable to imagine that we would know this information in the future. The results of the initial investigations provide the following graphs: (*Figure 58* )

*Locations where these Goods are Needed*

In a real world scenario, goods are delivered everywhere – to residences, businesses, schools and institutions. In this model only residences are considered, as households generate many more stand-alone trips than businesses or schools, which often place bulk orders for items. GIS land use data sets can determine the spatial distribution and density of households across the Copenhagen area. This then acts as a proxy for demand for goods as distributed spatially in the model. *Figure 57* shows how this information is translated into the MatLab model. Here, Copenhagen is divided into 100 x 100m pixels where each pixel is weighted depending on the number of residences in that particular area. For example, a white pixel contains 10 residences in the 100 x 100m, while a black pixel contains no residences.

*Locations where these Goods can be Found*

The next step in the data gathering was to determine the locations of stores that sell the four categories of goods in the Copenhagen area. These points of sale indicate where the goods need to come from. The addresses of these stores were found through

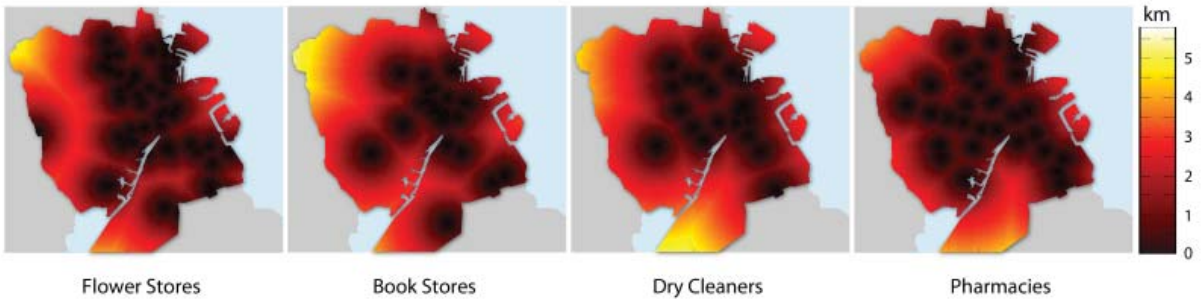



***Figure 59.***
*Average distances between points of sale and residences.*

Internet directories. A GPS visualizer was then used to convert the addresses into discrete latitudes and longitudes . These coordinates were then inserted into the Matlab model.

*Average Distances between Points-of-sale and Residences*

In the model, it is assumed that when someone requests a good it will be ordered from the closest shop that has that type of good for sale. The distance between these two points provides a measure of the number of kilometers that must be traveled to bring the item from the point of sale to its final destination, a place of residence. The distance between every residence and its closest shops can be calculated by combining the coordinates of shops with the centroid coordinates of each polygon that is designated as residential in the GIS database. It is recognized that this is an "as the crow flies" measure of distance but it will still be useful in establishing a benchmark for total kilometers traveled and the reduction of kilometers traveled when using the FriendFreight service. *Figure 59* shows this information combined in the MatLab model. Here, the color of each pixel relates to how far a residence is from the location of a shop that sells a given category of goods.

This method can also be used to calculate the average distance between residences and different types of shops. Here, the mean distances are 1.63km for flower shops, 2.2km for bookstores, 2.33km for dry cleaners, and 1.86km for pharmacies. Even taking into account that these are not distances based on road travel, they are still within normal range for bike riding. This confirms that bikes are a suitable mode of delivery for these services. Additionally as only shops within the City of Copenhagen boundary were considered, it is reasonable to assume that the actual mean distance would be lower.

## Cyclists

To assess whether adequate levels of service can be provided through this system, the number of cyclists that are potentially available to carry goods at different

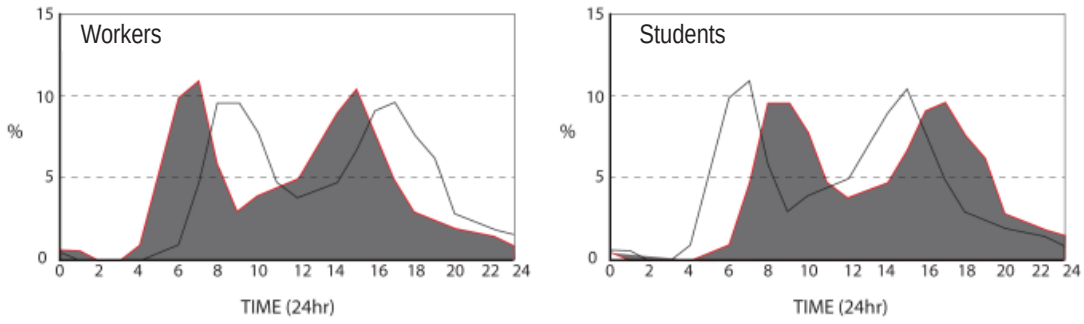



***Figure 60.***
*Temporal availability of workers and students.*

times of the day as well as the estimated trajectories of their journeys must be established. Since different types of people have different temporal and spatial movement patterns, it seems sensible to involve diverse groups of people, such as university students and workers with varying shift or work patterns.

According to Danish statistics (Statistics Denmark, 2007), the Copenhagen area has 78,125 university students that live and study within the municipality and 450,140 people who work in this area. Thirty-six percent of people commute to work by bike and 50% of the population use a bike on a daily basis. This figure is even higher in the inner city, but as a starting point it was assumed that 36% of each category of people would ride their bicycles daily. Aggregating the number of people in each category according to the percentage that move over the course of a day, gave a total number of potential carriers per hour. This total however, needs to be diminished as only two-thirds of cyclists have available freight capacity as established in the initial field surveys. Data on bicycle mobility trends from the City of Copenhagen allows an estimate of the variability in the number of potential carriers and how this changes through the day for the categories of students and workers to be made (see *Figure 60*).

### *Locations of Available Cyclists*

To match up cyclists with goods that are requested, the locations of cyclists with available freight capacity need to be determined. For both categories it is considered that cyclists are best able to deliver goods when traveling from their place of residence to their other significant location (work or university), and vice versa. Consequently, the location of universities and businesses are taken to be a suitable proxy for the spatial availability of possible carriers. *Figure XX* shows this spatial distribution. As many students live close by to the institution they attend, for universities, a circle with a radius of 800m is taken as the spatial distribution of students in the area.

Lastly, as data on the exact number of students for each university and the number of people in each business is unavailable, it was assumed that the number of students and workers is evenly distributed across the businesses and institutions that are marked in figures *61* and *62*. However, as buildings in Copenhagen are mostly of a uniform height (on average 5 storeys) this assumption, at least in the case of businesses, is fairly reasonable. In an alternative city that has a downtown area with many tall buildings, the distribution of people would have to be weighted more heavily in favor of taller buildings.

## /3.3
## BUILDING THE MODEL OF THE FRIENDFREIGHT SERVICE

With the data gathering complete, the structure of the model can be built so that the questions posed at the start of this chapter can be answered. The terminology for people who need and distribute goods as used in this section is as follows:

- *Requester*: The person that is in need of a particular type of good and puts in a request for this good to be delivered to their residential address (from the closest shop) through the FriendFreight service.
- *Carrier*: The cyclist who is available to carry a particular type of good for someone else, given that they are already headed in the same direction as the delivery destination.

In addition to evaluate a best-case scenario there are two conditions that are considered:

### The 'Business as Usual' Condition

The business as usual (BAU) condition is the current condition where the service is not yet in place. The travel required to get goods under these conditions

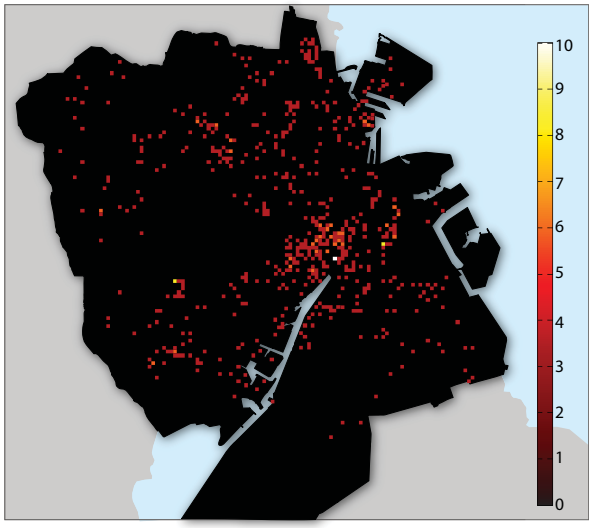



***Figure 61.***
*Density of businesses per 100 x 100m pixels*

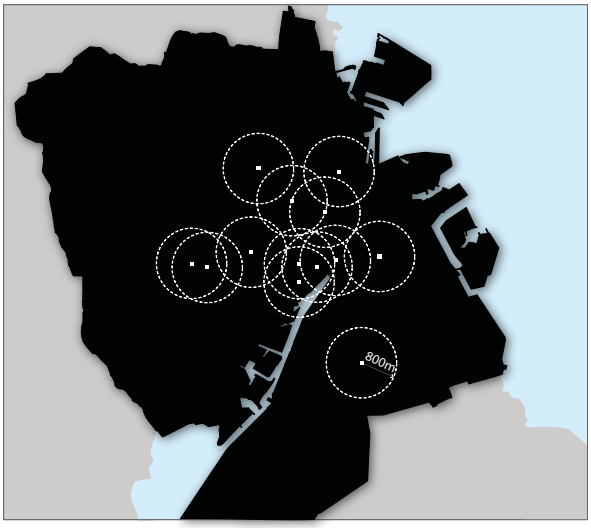



***Figure 62.***
*Location of universities as a proxy for location of students*

generates a particular *travel demand.* This will be referred to as BAU travel demand. The concept of travel demand under the BAU condition is shown in *Figure XX*.

### The FriendFreight Condition

In the FriendFreight (FF) service condition, members of the public who have available freight capacity are utilized to deliver goods when they are already traveling in the same general direction as the trajectory of the good. This has the effect of reducing the travel required to obtain goods and thus the travel demand as is explained in *Figures 63-64*. The travel demand that is generated when the Friend Freight Service is running is referred to as FF travel demand.

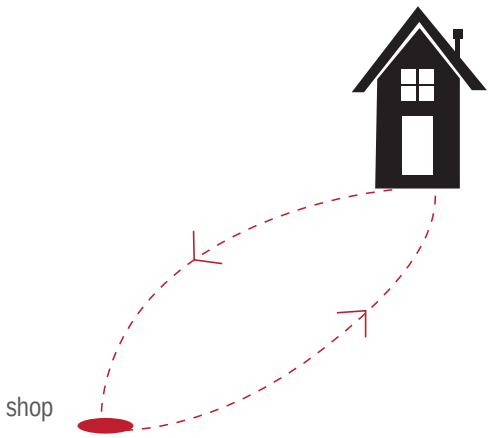
### Assumptions

In order to model the FriendFreight service effectively, a number of assumptions must be made. These are summarized as follows:

1. A 'package' is equivalent to one item from any of the four goods categories
4. Each person carries the same number ***p*** (1) of packages
5. All goods in the model are the ones available through the service
6. All the carriers in the model are the ones enrolled in the service
7. People request goods from the shop that is closest to them
8. Carriers who are defined as available (based on their daily mobility patterns) will always accept a request to deliver goods

### Defining the Variables

As mentioned above, to model the service effectively, the Copenhagen area was divided into a discrete number of pixels, each of which represents a number (density) of residential properties. A generic pixel is denoted as **d.** Time is indicated with **t,** categories of goods with **G,** and groups of people with **P**.




$$TravelDemand(G,t) = \alpha \sum_{i=1}^{nD} Demand(G,d_i,t)\,Distance(G,d_i) \quad \text{where } \alpha \text{ is 1.5}$$

***Figure 63.***
*Business as usual travel demand*

The model of the logistics system uses the following information, gathered through the data collection process described in the previous section.

1. **Demand (G,d,t)**: Number of goods of type G requested by the location d, at time t - as generated through the weighted distribution explained above.

2. **Distance (G,d)**: Distance of good of type G from the location d – based on the closest shop that sells this good type.

3. **Availability (t):** Number of available people of category P, at time t The availability is the sum of the availabilities of different categories of people at the same time

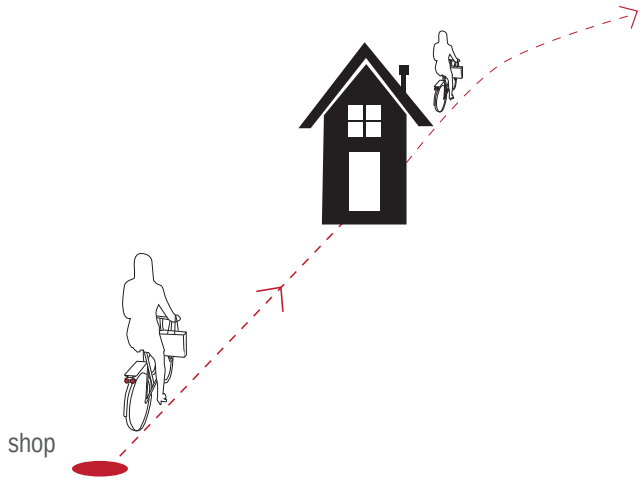
$$Availability(t) = Availability(P_1,t) + K + Availability(P_{nP},t)$$

4. **Mobility (G,d,t):** Number of people that travel at time t from the location of a shop of good **G** to the location **d**. The mobility is the sum of the mobilities of different categories of people

$$Mobility(G,d,t) = Mobility(P_1,G,d,t) + K + Mobility(P_{nP},G,d,t)$$

### Defining the Distribution of Demand

To understand the distribution of demand for items, the Copenhagen area was divided up into a discrete number of pixels, each of which represents a number of residential households (as taken from the land use information in the GIS database) as was explained in *Figure 57*. In the model, the request for goods is randomly generated from one of these pixels, where requests are weighted towards those pixels that contain a higher number of households. This is what is called a weighted distribution.




$$ServiceTravelDemand(G,t) = \beta\ p\sum_{i=1}^{nD} n_{d_i}(t)\,Distance(G,d_i) + $$
$$+\alpha\sum_{i=1}^{nD}\left(Demand(G,d_i,t) - p\,n_{d_i}(t)\right)Distance(G,d_i) \qquad \text{where } \beta \text{ is 0.2}$$

***Figure 64.***
*FreindFreight travel demand*

### Defining the Functions for Travel Demand

Travel demand needs to be defined for Business as Usual (BAU Travel Demand) as well as FriendFreight Travel Demand (FF Travel Demand). This will help to establish the best possible reduction in kilometers traveled to get goods when the service is running.

BAU travel demand is defined as follows:

$$TravelDemand(G,t) = \alpha\sum_{i=1}^{nD} Demand(G,d_i,t)\,Distance(G,d_i)$$

Here it can be seen how the travel demand for carrying a certain package under the business as usual condition is modeled as a function of the distance between the residential pixels and the shops, where $\alpha$ is the weight given to the distance. For instance $\alpha = 2$ means that it is considered that the requesters have to travel from home to the shop and go back (2 times the distance), and that this trip does not overlap with other movements they already do, e.g. for work. It is, however, recognized that people almost always coordinate their trips to get goods in the city and thus a typical value for $\alpha$ of 1.5 can be assumed. The BAU travel demand represents the benchmark from which to assess the effectiveness of the FriendFreight service. *Figure XX* explains this concept of the weight given to the distance in more detail.

To evaluate the best-case scenario when the FriendFreight service is running FriendFreight travel demand must also be calculated.

The FF travel demand is the sum of two components: the demand that is the result of the travel that the carriers who are enrolled in the service undertake and a remaining demand that is needed to deliver goods that can not be distributed through the service. The latter demand assumes the same form as in the BAU condition while the former is defined as follows:

While the service is in operation, each trip of length **Distance (G,d)** generates a travel demand that is proportional to the distance traveled. It should be noted that the theoretical travel demand for carrying a certain package by using the FriendFreight service

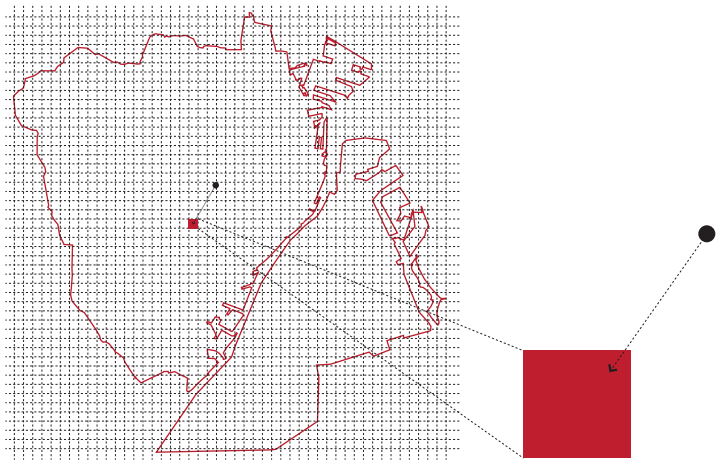


***Figure 65.***
*1. A residential pixel generates a demand for an item which is requested from the closest shop*

should be equal to zero because it is assumed that the carrier of the goods is already heading to the location where the package needs to be delivered. However, it is recognized that it is unlikely that the carrier will be going to the exact final destination of the good. Therefore a small travel demand is associated with every trip that is a function of the distance traveled. This average weight placed on the trip is represented by $\beta$ where in general $\beta < \alpha$**.** An assumed typical value for $\beta$ is 0.2. *Figure XX* explains the concept of the weight given to FriendFreight travel.

The number of carriers traveling to location $\boldsymbol{d_i}$**,** $\boldsymbol{= 1,\ldots,nD}$ at time t to carry goods of category G, can be represented as follows: $\boldsymbol{n_d(G,t)}$**.** Each carrier will carry a total of $\boldsymbol{p}$ packages.[i] As such, it results that, when the service is in operation, the FF travel demand can be measured as:

$$ServiceTravelDemand(G,t) = \beta \; p\sum_{i=1}^{nD} n_{d_i}(t)\,Distance(G,d_i) +$$

$$+\alpha \sum_{i=1}^{nD}\left(Demand(G,d_i,t) - p\,n_{d_i}(t)\right)Distance(G,d_i)$$

## Assigning Carriers to Goods

In order to evaluate the theoretical maximum reduction in travel demand through using the FriendFreight service, the model needs to determine how goods are assigned to carriers. For instance, if we have 100 available cyclists in the service and have 150 requests for flowers, how does the model decide which flowers to assign to which carriers? Let us consider a simple example that explains how this is done in the MatLab model. This can be seen in *Figures 65-66*. Here, a request (let us assume that it is for a book) is generated from a pixel that represents a certain residential density. As per the assumptions made earlier, we know that the item will be requested from the closest bookshop. We also know the number of potential carriers that are traveling in the direction of the bookstore/residence at this time. In the MatLab model, the task is assigned to the carrier who is furthest away from the item as this reduces travel demand by the greatest amount and thus creates a

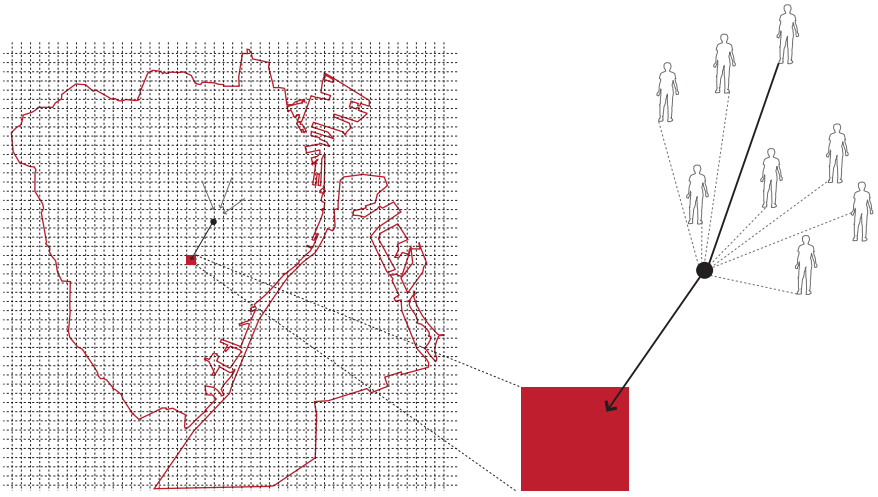


***Figure 66.***
*2. The carrier who is going in this direction and is furthest away is assigned the task in the model. This generates the maximum reduction in travel demand and generates a best-case scenario*

'best-case scenario' that can help to evaluate whether the service is worth implementing.

The *Figures 65 – 66* describe how the goods can be optimally assigned to carriers in order to minimize the amount of travel that is required to carry goods from shops to their final destination and maximize the reduction in travel demand during the running of the FriendFreight service. The linear discrete optimization problem above defines this concept over time:

**Problem 1:** Find the vector-valued function

$S(t) = \{ n_{d_i}(G,t) \}_i$

that maximizes:

$$\sum_{i=1}^{nD} n_{d_i}(G,t)\,Distance(G,d_i)$$

This problem operates under the following constraints:

*1. The number of people assigned to goods must be less than or equal to the number of people available*

$$\sum_{i=1}^{nD} n_{d_i}(G,t) \le Availability(t) \quad \forall t$$

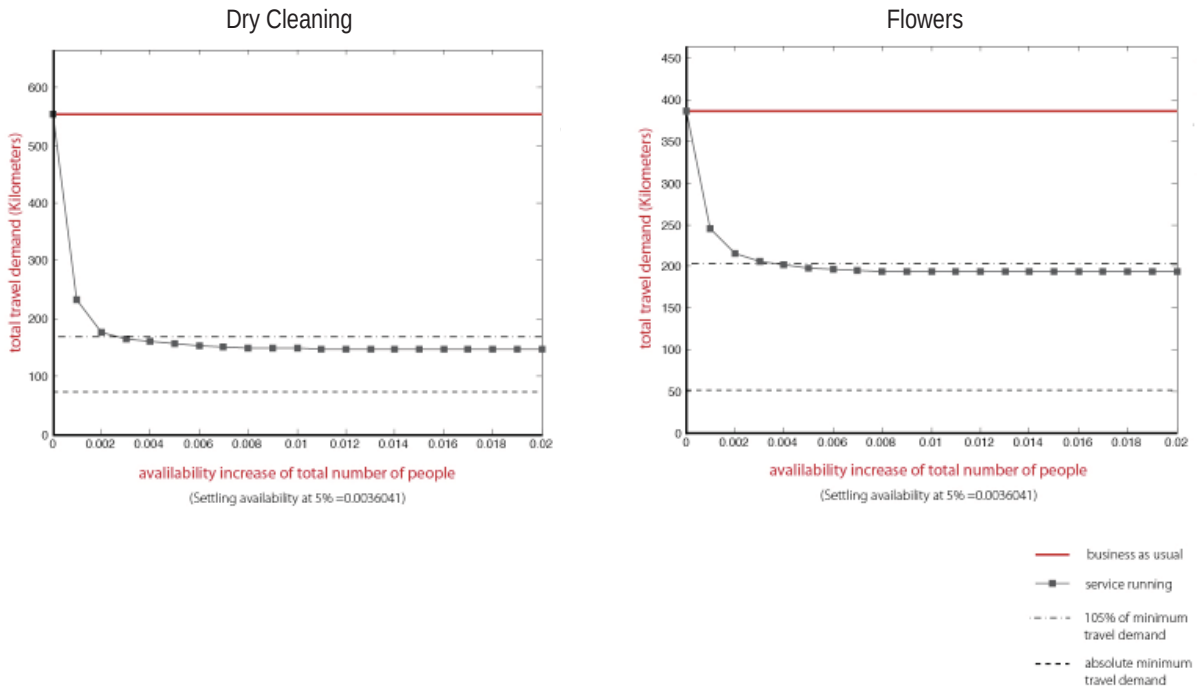
*2. The number of carriers that are a) heading in the right direction and b) are assigned to carry goods must be less than or equal to the number of people heading in the right direction and less than the total demand for goods.*

$$0 \le n_{d_i}(G,t) \le \min\{Mobility(G,d_i,t),\ Demand(G,d_i,t)/p\} \quad \forall i = 1,K,nD \quad \forall t$$

*3. A carrier can only be defined as a whole number.*

$$n_{d_i}(G,t) \in \aleph \quad \forall i = 1,K,nD \quad \forall t$$

The solution to the optimization problem provides, for every time step ***t*** a vector $\boldsymbol{n_d(G,t)}$, which indicates how to optimally assign to the carriers the packages that need to be delivered, in order to minimize the FF travel demand.



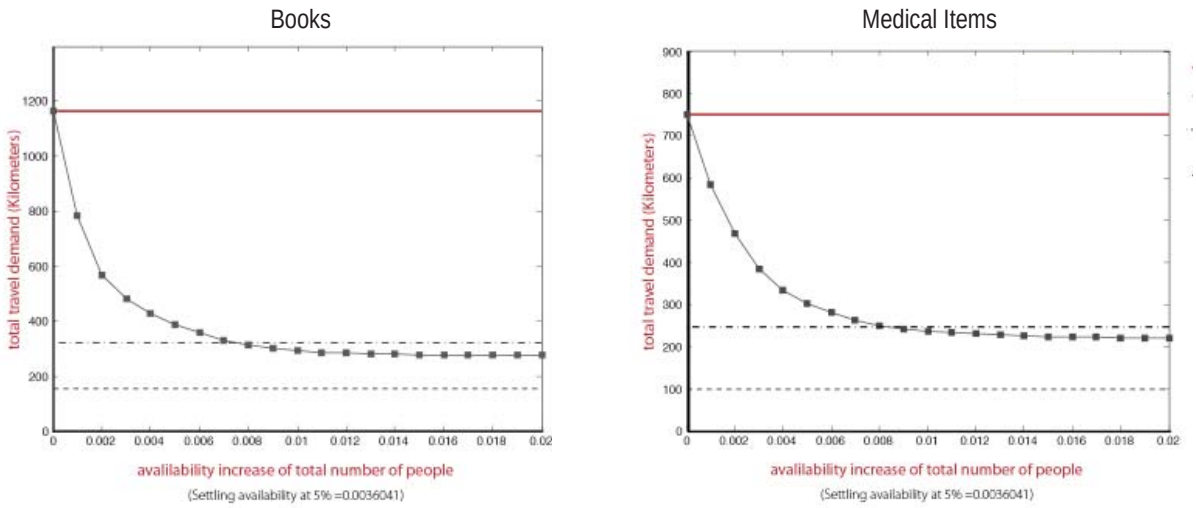

/3.4
TESTS AND FINDINGS

### Test 1: Minimizing Travel Demand with an Optimal Number of Carriers

Having set up the parameters of the model with the information collected and described in the previous section, the best-case scenario for the FriendFreight service can be evaluated through a series of tests. The first tests will establish how much travel demand is reduced for each category of goods when the FriendFreight service is in operation and the minimum number of carriers (available cyclists) that are required to maximize the effective delivery of goods. Here, two things should be noted: each category of goods is tested separately and there is only one time-step in the model – a single day.

*Figure 67a* shows the resulting graph for dry cleaning where a sharp decrease in travel demand can be seen as the number of people enrolled in the service increases. Here, the BAU travel demand that is represented with a blue line indicates the number of kilometers that are traveled in one day in order to distribute goods when the service is not running.

In this initial test, it is intriguing to see that the FF travel demand reaches saturation when the number of available carriers increases to a certain point. This essentially means that there is no perceivable benefit to increasing the total number of carriers available past a certain threshold. To define the optimal number of carriers needed, the availability point when the service travel demand reaches the settling point, with a tolerance of five percent is considered. In other words the minimum level of available cyclists is considered so that the travel demand reaches 105% of its optimal value (see dot-dashed line in Figure 9). In particular, for the case of dry-cleaning items, shown in figures *67a* the available people (number of carriers) at the settling point corresponds to 0.27% of the total combined number of workers and students. That is, when the service is running, a reduction in total travel demand of around 70% can be seen. The optimal number of carriers for flowers, books and pharmacy items is respectively 0.36%, 0.76% and 0.85% of the total combined number of workers and students. Lastly, the BAU line in the graphs represents




***Figures 67.***
*Reductions in travel demand (no. of km) when the FriendFreight service is in operation and as the available number of people increases.*

the minimum travel demand that is required to move these goods if all of them were able to be moved by the carriers in the service. Although it would be nice to think that this could be zero, we know from how we have defined travel demand above, that trips are weighted. In the case of BAU travel demand, this weight ($\alpha$) is defined in the model as 1.5. In the case of the FF travel demand, this weight ($\beta$) is defined in the model as 0.2. Thus the travel demand cannot be reduced further than the threshold indicated.

What this test demonstrates is that in a situation where all likely travel paths can be assumed (something that can never be fully achieved, but can be predicted with a fair degree of accuracy once the service has been established for a fair amount of time) and where everybody in the service is willing to carry goods for others, then there is a significant reduction in the number of kilometers traveled to deliver goods in the city. Obviously this is a best-case scenario, but it provides two useful conclusions:

2. Given the spatial layout of shops in the city of Copenhagen and the spatial availability of carriers, some types of goods can be more effectively delivered than others.

3. The number of carriers required to effectively deliver goods also changes from good type to good type.

Both of these points should be taken into account if this service were to become a commercial venture.

### Test 2: Testing how Spatial Distribution of Shops and Carriers affects Successful Delivery

Once the optimum number of carriers required to minimize the travel demand has been defined, the effectiveness of the service in distributing these goods spatially can be examined. In other words, are there areas where this service will not work because of the distinct distribution of shops? Additionally, how many goods out of the total can be delivered?

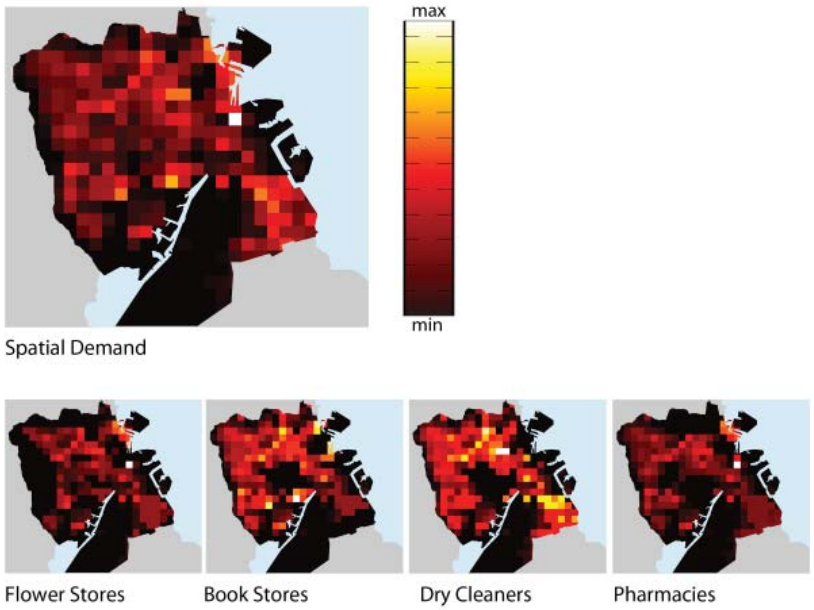



***Figure 68.***
*Overall demand and met demand for each good type. Note how the boundaries for met demand change for each good type.*

***Figure 69.***
*Reduction in travel demand (km) with both a combination of students and workers over 24 hours.*

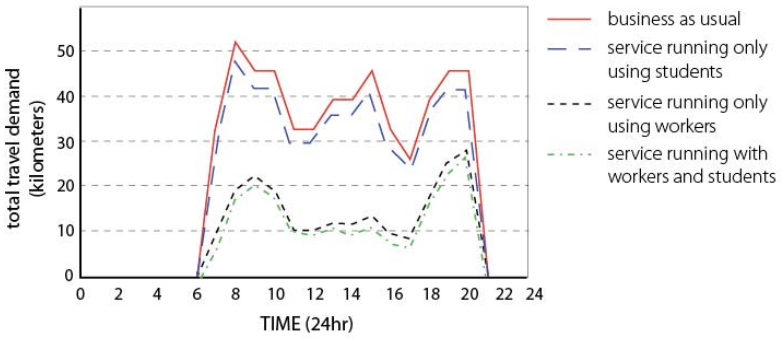
For flowers, books, dry-cleaning and medical items, given the weighted distribution of requests that come from residences, the following percentages of requests are met: 62%, 75%, 70% and 71% respectively. *Figure 68a*, demonstrates the spatial demand as generated by the spatial distribution and density of households in Copenhagen. *Figures 68b – 68e.* demonstrates show, for each good type, the areas of the city where demand for goods can be met for most of the time using this service. It is interesting to see that different levels of performance and ideal spatial coverage are seen for different goods categories. Where demand is not met, this is an indication that with the current spatial distribution of shops, the service would not work in these areas and delivery should be restricted to those areas where coverage is total.

### Test 3: Establish how the Demand and Availability of Carriers over Time influences the Performance of the Service.

The tests that have been performed so far have only used 1 time-step – a whole day. It is worthwhile to see how the availability of carriers over a day affects the ability to deliver goods. As a result of the first test, it was found that dry-cleaning items require a lower percentage of carriers than other items, but at the same time the spatial demand is met quite well with a spatial match of approximately 88%. This good type is therefore used in the final test.

Using information about the demand per hour for dry-cleaning as well as the percentage of available people per hour as calculated in the previous section, the model was rerun to find the results shown in *Figure 69.*

At different hours of the day, the performance of the service varies. However, since different categories of people have different temporal movement patterns and therefore availabilities, the hours in which dry-cleaning demand can be met is generally extended using a combination of different categories of people. In conclusion, it is found that it is best to have a mix of categories of carriers enrolled in the service in order to increase the effectiveness of the service for a wider time range.




## /3.5
## CONCLUSIONS AND NEXT STEPS

The objective of this Chapter was to use *MatLab* to build a computer model to establish the viability of the FriendFreight service in Copenhagen - where goods are delivered through utilizing the untapped freight capacity of bicycles and the existing movement patterns of cyclists.

It was initially recognized that although the ideal FriendFreight service scenario is one that operates between friends, and friends of friends, that a lack of data on the social/spatial connections between people in Copenhagen means that the model is structured around strangers taking goods for others. We could imagine that this is closer to the *market scenario between strangers* outlined in Chapter 2.

Once it was established that the majority of bicycles in Copenhagen have enough freight capacity to carry goods, data collection was used to determine four likely categories of goods that could be delivered and their spatial and temporal demand. Two categories of potential carriers - university students and workers – were also selected and data about their mobility patterns and availability over time was collected. The model was then built to:

- Evaluate the theoretical effectiveness of the FriendFreight service in terms of reduction of kilometers traveled (travel demand).
- Establish the minimum number of people required to deliver a certain percentage of goods.
- Establish which category of goods can be delivered most effectively given its temporal need and the spatial distribution of shops that provide these goods.
- Establish how many people from each category will best satisfy demand given their temporal availabilities and the spatial mobility differences between each group.
- Establish for which spatial area of Copenhagen this service would be most effective.

Several tests were performed with the model

using different conditions for the percentage of people involved in the service and the percentage of goods that need to be delivered. Of these tests, the three that are the most useful (should the service be implemented) are presented in this chapter

What was found was that some items could be more effectively delivered than others – something that is dependant on the unique spatial distribution of shops and residences in Copenhagen as well as the availability of cyclists to carry goods. This seems to suggest that the service might be restricted to one set of goods rather than another and that the viability of the service and the type of goods that can be delivered through it are likely to vary from city to city.

The results also show that some areas of the city are better than others when it comes to having goods successfully delivered to residences, the majority of the time. In addition the spatial pattern of this met demand varies from good type to good type. This is interesting because delivery zones are often based on neighborhood boundaries and yet these become completely arbitrary in the successful running of the FriendFreight service.

Concerning carriers, it was found that it is best to have a mix of students and workers enrolled in the service as this allows an increase in the number of goods that can be delivered across the course of a day.

Lastly, when delivering 10% of goods through the service, it was also found that travel demand could be significantly reduced. In the case of dry cleaning the theoretical reduction was up to 70%.

There are, of course, some obvious limitations with the MatLab model. The way the model has been defined gives a base-case scenario in which it is known where all people are going and their availability. It is also assumed that if we define a carrier as available (based on their daily mobility patterns) that they will always accept a request to deliver goods. It is recognized that this type of global optimization only gives us a theoretical approximation of the real system when the service is in operation.

However, as an initial test case, it can still provide some key recommendations and with additional data on the exact movement patterns of people and their willingness to be involved in the service, it is felt that the model could be further developed.

One way to overcome the issues with global optimization that have occurred in the MatLab model is to use a different computer-modeling tool. A likely modeling environment for future experiments would be Agent Based Modeling - often used for traffic simulations and testing emergency evacuation situations. In these computer models, ‘agents’ (that represent individual people) are programmed with specific characteristics and rules of interaction. When the model is run, the modeler can observe how these agents react, both to external stimuli and each other. Through changing the parameters of the model and the rules of interaction the modeler can then make assumptions about the real world. This type of modeling would be useful in differentiating the reactions and needs of different requesters and carriers (a problem with the current MatLab model). One downside of this modeling tool, however, is that it is often used to model scenarios that are restricted to a small spatial area. Should agent-based modeling be used, the feasibility of modeling an area the size of Copenhagen with potentially tens of thousands of ‘agents’ needs to be investigated further.

# /CONCLUSION

There is an obvious problem in cities: an increasing need to distribute small goods in inner urban areas is resulting in more ‘travel demand’ which in turn leads to greater levels of congestion, pollution, the requirement for additional maintenance of infrastructures and increasingly difficult routing and scheduling problems for deliveries. City governments, private delivery companies and transport officials, have recognized these issues and through this, the field of City Logistics.

The FriendFreight service that forms the basis for this thesis offers a solution for reducing some of the travel demand required to deliver small items in the city. It proposes that we can harness the unutilized ‘freight capacity’ of our personal mobility vehicles to deliver goods for others when we are already traveling through the city ourselves. Although this new service fulfills the same goals as the work found in City Logistics, unlike the majority of examples in the literature - which try to solve the issues of urban goods transportation by optimizing existing delivery systems (a top-down approach) - FriendFreight can be considered a bottom-up solution.

The matching up of members of the community with goods that need to be delivered is enabled through the utilization of digitally distributed information. This is collected, accessed and redistributed through cellphones and the Internet, tools that allow information to be rapidly transferred at a distance. Without these digital devices, the coordination of such a service would not be possible – a point that this thesis recognizes and is actively capitalizing upon.

However, in order to make a service such as FriendFreight operational, a number of other factors must additionally be considered. This thesis identified two of these to examine in more detail. The first was understanding *how* and *why* people in the city might deliver goods for others, particularly in an age where the use of digital information is so prevalent. The second was determining what a best-case scenario would be for reducing travel demand if the FriendFreight service was up and running within a specific context and using a specific mode of transport. Here, the latter establishes the viability of the service if it were to move towards implementation.

In Chapter 1, *How* and *why* people might deliver goods for others was firstly uncovered through examining the predominantly anthropological literature of exchange theory and in particular two types of exchange: gift exchanges and market exchanges. Here, in the case of the FriendFreight service, gift exchange would involve community members giving the time and effort it takes to deliver an item for another, without an immediate reward and a market exchange would require money as a form of payment for the delivery - with money becoming the main motivation for people to deliver items needed.

By using a causal loop diagramming technique I was able to construct an understanding of the development of each type of exchange and the elements that are influential – trust, accountability, social ties etc – in promoting continued exchanges between people using either mechanism. This included how a ‘distance threshold’ (the ability to overcome spatial distance) can affect the formation of types of exchange; how early transport technologies

in the industrial revolution and furthermore communication technologies in the early twentieth century influenced the speed and intensity of both gift and market exchanges; and how the development of techniques such as the giving of 'quasi-gifts' by companies in the mid twentieth century helped to manufacture socially motivated reciprocity in market exchanges.

What was found through this section of the research can be summarized in three key points:

1. Gift exchanges predominantly occur between people with strong social ties. However, when there is a common goal amongst a community, gift giving can occur in a distributed manner among strangers.

2. Market exchanges use money as a form of accountability when exchanges happen between strangers (who do not have the levels of trust that exist between people with existing social ties). However, recognizing that social ties are a strong motivator in giving and getting, market exchanges have begun to incorporate elements of gift exchange into their frameworks in a bid to increase profit.

3. Anthropologists tend to separate gift and market exchanges as distinct mechanisms, yet this research shows that these distinctions are in fact more blurred than was perhaps previously considered. I feel that this finding could be a valuable contribution to the literature of exchange theory.

Chapter 2 looked at gift and market exchanges in the context of our current sociological condition – *The Network Society* – where a rise in the use of digitally distributed information has changed the nature of exchanges between people. Here, through the examination of case studies, it was found that there are further crossovers between gift and market exchanges, with elements that anthropologists have traditionally categorized as belonging to one

exchange mechanism, over another, being used in both. This further supports my findings that a simple separation of gift and market exchanges may need to be examined further within the context of exchange theory.

Having drawn out key elements of exchange in the age of the Network Society and combining these with the findings of Chapter 1, I then proposed three scenarios for the FriendFreight service where the goal was to maximize the amount of people involved in the service so as to potentially minimize the travel demand required to deliver small items through cities. These three scenarios were: *A market exchange between strangers, A gift exchange between strangers* and *A gift exchange between friends and acquaintances.* Of these, the final scenario was nominated as being the most likely to promote reciprocal giving: it's 'networked' structure, encourages growth of the service and thus maximizes the potential number of people who would become involved. At the same time, it uses existing trust lines to nurture exchanges.

The final Chapter of this thesis used a computer model built in MatLab with the help of Francesco Calabrese of the Senseable City Lab at MIT, to demonstrate the best-case scenario for reducing travel demand if the FriendFreight service was running within a specific context using a specific mode of transport: Copenhagen and the 175,000 bicycles that enter the city each day.

It was found that given the spatial layout of Copenhagen - the distribution of shops and residences and the location and availability of potential cyclists that can carry items - that some goods can be delivered with a higher success rate than others. The model also allowed us to calculate the number of cyclists it takes to maximize a reduction in travel demand. In the case of dry-cleaning, the delivery success rate was high, the reduction in travel demand was significant – around 70% – and the number of cyclists required was relatively low – around 2000. What this section of the thesis made clear is that the service can feasibly be used to reduce travel

demand by a reasonable amount, but that different cities will be able to deliver different types of goods with greater and lesser success. It also showed that deliveries can be made more successfully in some areas of the city but not in others and that the edges for these successful delivery zones are not based on neighborhood boundaries. Should the service be implemented, this is an interesting point to consider from a logistics point of view. However, it is also interesting with regard to how we understand neighborhood boundaries in a planning/urban design context.

There are still many aspects to be explored if this service were to be deployed. Issues that were not covered in this thesis include: the technical requirements for using the digital information, issues of privacy and trust that surround the use of location based data and an in depth look into the legal framework that would be required to make the service operational. Additionally, the data used in the MatLab model could be improved – particularly when it comes to determining the likely paths of carriers. However, it is felt that all of the limitations mentioned above can be overcome with more research and access to better data sources.

The attaining of better data sources in order to verify the findings of the MatLab model is something that is actively being pursued. In addition, there are aspects to the work that, as an urban designer and architect I am interested in and will also form part of the next phase of research. In particular, I would like to explore using a range of mobilities that have excess freight capacity: pedestrians, cyclists, cars and potentially public transit and undertake a study of the spatial implications that might relate to these different modes.

In conclusion, the FriendFreight service presents a novel way to combine the freight capacity that is inherent in the personal mobility vehicles of the general public with the movements of small goods in cities through harnessing the power of digital information that can be distributed at a distance. This thesis has uncovered a likely structure for

the FriendFreight service that promotes reciprocal giving and continued growth of the service in terms of membership numbers. It has also proved the feasibility of the service within the context of Copenhagen using a limited set of goods.

The first contribution that this work makes is to show that digital information can be harnessed in a bottom-up way to address urban issues in cities. This is in contrast with using digital information to optimize existing systems and services. Secondly, it is felt that the observations made in relation to exchange theory are a worthy contribution to the field in general. Thirdly, while it could be improved, the *MatLab* modeling technique adds to the body of work that surrounds transportation modeling. Finally, the relevance of this work to a wider audience and academic research in general is shown through the recent acceptance of this research as a chapter in the forthcoming book: *Movement-Aware Applications for Sustainable Mobility: Technologies and Approaches* to be published by IGI press at the end of 2009.

# /BIBLIOGRAPHY

## INTRODUCTION


Adams, P., Ashwell, G., & Baxter, R. (2003). Location Based Services – an overview of the standards. *BT Technology Journal , 21* (1), 31-42.

Calabrese, F., & Ratti, C. (2006). Real Time Rome. Networks and Communication Studies. *Official Journal of the IGU's Geography of Information Society Commission* , 247-258.

Dablanc, L. (2007). Goods Transport in large European Cities: Difficult to Organize, Difficult to Modernize. *Transportation Research Part A , 41*, 280-285.

Fusco, G., Tatarelli, L., & Valentini, M. (2003). Last-Mile, A procedure to set-up an Optimized Delivery Scheme. *Proceedings of the 3rd International Conference on City Logistics* (pp. 147-161). Madeira, Portugal: Elsevier.

Miller, S. E. (1995). *Civilizing Cyberspace: Policy, Power and the Information Superhighway.* Reading, Massachusetts: Addison-Wesley.

Quack, H., Van Duin, R., & Visser, J. (2006). City Logistics over the Years. Lessons learnt, Research Directions and Interests. *5th International Conference on City Logistics.* Crete.

Taniguchi, E., Thompson, R., & Yamada, T. (2001). Recent advances in modeling city logistics. In E. Taniguchi, & R. G. Thompson (Ed.), *City Logistics II* (pp. 3-34). Tokyo: Institute of Systems Science Research.


## CHAPTER 1


Baron, J. (1989). Gifts, bargains and form. *Indiana Law Jounal , 64* , 155-203.

Buchanan, J. M. (1994). Foreword. In J. Tai Landa, *Trust, Ethnicity, and Identity* (p. vii). Michigan: University of Michigan.

Caplow, T. (1982b). Christmas gifts and kin networks. *American Sociological Review , 47*, 383-392.

Caplow, T. (1982a). *Middletown Families.* Minneapolis: Univeristy of Minnesota Press.

Cheal, D. (1988). *The Gift Economy.* New York: Routledge.

Cook, K. S., & Whitmeyer, J. M. (1992). Two Approaches to Social Structure. *Annual Reviews Sociology , 18*, 109-27.

Davis, J. (1992). *Exchange.* Minneapolis: University of Minnesota Press.

Derrida, J. (1992). *Given Time: I. Counterfeit Money.* (P. Kamuf, Trans.) Chicago: University of Chicago Press.

Douglas, M., & Isherwood, B. (1979). *The World of Goods.* New York: Basic.

Du Broff, R. (1980). Business Demand and the Development of the Telegraph in the United States, 1844-1860. *The Business History Review*, *Vol. 54, No. 4, Business History and the History of Technology*, Winter, 1980, pp. 459 - 479

*Flexible Car Pooling*. (2009). Retrieved April 25, 2009, from flexiblecarpooling.org

Gregory, C. (1982). *Gifs and Commodities.* London: Academic Press.

Heady, P. (2005). Barter. In J. Carrier (Ed.), *A Handbook of Economic Anthropology* (pp. 264-74). Northampton, MA: Edward Elgar Publishing, Inc.

Hunt, R. C. (2005). One-way economic transfers. In J. Carrier (Ed.), *A Handbook of Economic Anthropology.* Northampton, MA: Edward Elgar Publishing, Inc.

Komter, A. (2005). *Social Solidarity and the Gift.* Cambridge, UK: Cambridge University Press .

Kotler, P. (2003). *Marketing Insights from A to Z.* Hoboken, New Jersey: John Wiley & Sons.

Malinkowski, B. (1915). The Natives of Mailu. *Transactions of the Royal Society of South Australia , 39*, 494-706.

Mauss, M. (1954). *The Gift.* London: Routledge.

Parvatiyar, A., & Jagdish, S. (2000). The evolution of relationship marketing. In J. Sheth, & A. Parvatiyar (Eds.), *Handbook of relationship marketing* (pp. 119–148). London: Sage Publications.

Rodrigue, J.-P. (2009, April 9). *Historical Geography of Transportation - Part 1*. Retrieved May 2, 2009, from The Geography of Transport Systems: http://people.hofstra.edu/geotrans/eng/ch1en/conc1en/bridgewatercanal.html

Rodrigue, J.-P. (2006). *The Geography of Transport Systems.* New York: Routledge.

Rus, A. (2008). 'Gift vs. commodity' debate revisited. *Anthropological notebooks , 14* (1), 81-102.

Sahlins, M. (1972). *Stone Age Economics.* Chicago: Aldine Atherton, Inc.

Starr, A. (2009). Everybody in the Pool. *Good , Spring* (15), 72-77.

Strathern, A., & Stewart, P. (2005). Ceremonial Exchange. In J. Carrier (Ed.), *A handbook of Economic Anthropology* (pp. 231-45). Northampton: Edward Elgar Publishing, Inc.

US Department of Energy. (n.d). *Introduction to System Dynamics*. Retrieved April 19, 2009, from US Department of Energy's Introduction to System Dynamics: http://www.systemdynamics.org/DL-IntroSysDyn/start.htm

Yan, Y. (2005). The gift and gift economy. In J. Carrier (Ed.), *A Handbook of Economic Anthropology* (pp. 246-61). Northamption, MA: Edward Elgar Publishing, Inc.

/CHAPTER 2

Agrawal V, Lemmens L. e-Performance: the path to rational exuberance. *McKinsey Q2001,* 1, 30 – 44.

Axelrod, R. (1984). *The Evolution of Cooperation.* New York: Basic Books.

Capra, F. (1996). *The Web of Life.* New York: Random House.

Castells, M. (2004). *The Network Society, A Cross-cultural Perspective*. Northampton: Edward Elgar Publishing, Inc.

Cook, K. and Whitmeyer, J. (1992). Two Approaches to Social Structure: Exchange Theory and Network Analysis. *Annu. Rev. of Sociol. 18:* 109 – 127

Couch Surfing. (2009, May 10). *Statistics*. Retrieved May 10, 2009, from Couch Surfing: http://www.couchsurfing.org/statistics.html.

Dablanc, L. (2007). Goods Transport in large European Cities: Difficult to Organize, Difficult to Modernize. *Transportation Research Part A , 41*, 280-285.

eBay. (2009, n.d). *eBay Inc. Globaly Citizenship: Philanthropic Programs.* Retrieved May 5, 2009, from eBay: http://pages.ebay.com/aboutebay/philanthropicprograms.html

Fortune Magazine Online (2007, October 12). *eBays new friendly neighborhood.* Retrieved May 5, 2009, from Money.cnn: http://money.cnn.com/2007/10/11/technology/ebay_neighborhoods.fortune/index.htm

Fortune Magazine Online (2008, April 16). *eBay Sales up 24%, but user growth is weak.* Retrieved May 5, 2009, from Money.cnn: http://techland.blogs.fortune.cnn.com/2008/04/16/ebay-sales-up-24/

Fortune Magazine Online (2009, March 24), *Recession Lifts Social Networking Site LinkedIn.* Retrieved May 15, 2009, from Money.cnn: http://money.cnn.com/2009/03/24/technology/hempel_linkedin.fortune/index.htm

Ito, T., Hayano, M., Naito, T., Asakura, Y., Hato, E., Wada, T. (2004). Empirical Analysis on hazardous material transportation using road traffic sensors and accident data. *Proceedings of the 3rd International Conference on City Logistics,* (pp. 235-250). Madeira, Portugal: Elsevier.

Koehler, U. (2004). New ideas for the City Logistics Project in Kassel. In *Proceedings of the 3rd International Conference on City Logistics.* (pp. 321-332). Madeira, Portugal: Elsevier.

Kunze, O. (2004). A new interactive Approach on Route Planning with Tight Delivery Time Windows. In *Proceedings of the 3rd International Conference on City Logistics,* (pp. 83-96). Madeira, Portugal: Elsevier.

LinkedIn (2008). *About Us.* Retrieved May 14, 2009, from LinkedIn: http://press.linkedin.com/about

LinkedIn Blog. (2009, May 5). *Happy Birthday: Seis años de LinkedIn.* Retrieved May 14, 2009, from LinkedIn Blog: http://blog.linkedin.com/2009/05/05/happy-birthday-seis-anos-de-linkedin/

Lozano, A., Antun, J.P., Santos, C., Alarcon, R., Granados, F., Hernandez, R. (2005). Basis for a policy for the development of Logistics Platforms in the Metropolitan Zone of Mexico City. *Proceedings of the 4rd International Conference on City Logistics.* (pp. 147-161). Langkawi, Malaysia: Elsevier.

Mitchell, W, J. (2003). *Me++: The Cyborg Self and the Networked City.* Cambridge, MA: MIT Press.

Molz, J. (2007). Cosmopolitans on the Couch: Mobile Hospitality and the Internet. In Molz, J. and Gibson, S. (eds) *Mobilizing Hospitality, the ethics of social relations in a mobile world* (pp. 65 - 80). Burlington, VT: Ashgate Publishing Ltd.

Munuzuri, J., Larraneta, J., Onieva, L., Cortes, P. (2004). Estimation of an origin destination matrix for urban freight transportation. Application to the city of Seville, *Proceedings of the 3rd International Conference on City Logistics,* (pp. 67-82). Madeira, Portugal: Elsevier.

Nemoto, T. Browne, M. Visser, J. and Castro, J. (2005). Intermodal transport and City Logistics policies. In *Proceedings of the 4rd International Conference on City Logistics.* (pp. 15-29). Langkawi, Malaysia: Elsevier.

Paton, MA. Josang, A. (2004). Technologies for Trust in Electronic Commerce. *Electronic Commerce Research, 4,* 9 – 21.

Ray, P. (2004). Connectivity: Transjordan in the Persian Period. In La Bianca,O. Scham, S. (eds) *Connectivity in Antiquity: Globalization as a Long-Term Historical Process* (pp. 75-91). London: Equinox Publishing.

Resnick,P., Zeckhauser, R., Swanson, J., Lockwood, K., (2006). The value of reputation on eBay: A controlled experiment. *Exp Econ,* 9: 79-101.

Sassen, S. (2001). *The Global City: New York, London, Tokyo.* Princeton: Princeton University Press.

Sindbæk, S. (2007). Networks and nodal points: the emergence of towns in early Viking Age Scandinavia. *Antiquity, 81,* 119 – 132

Staines, A. (n.d). *New User Information*. Retrieved May 5, 2009, from Global Freeloaders: http://www.globalfreeloaders.com/newuser.php?lang=EN

Strathern, A., & Stewart, P. (2005). Ceremonial Exchange. In J. Carrier (Ed.), *A handbook of Economic Anthropology* (pp. 231-45). Northampton: Edward Elgar Publishing, Inc.

Thompson, R.G. (2004). Intelligent Vehicle Routing and Scheduling. In *Proceedings of the 3rd International Conference on City Logistics.* (pp. 97-110). Madeira, Portugal: Elsevier.

Wikipedia. (2009, May 10). *eBay.* Retrieved May 10, 2009, from Wikipedia: http://en.wikipedia.org/wiki/EBay

Yamada, T., Yoshimura, Y., Mori, K. (2004). Road Network Reliability Analysis using Vehicle Routing and Scheduling Procedures. In *Proceedings of the 3rd International Conference on City Logistics.* (pp. 111- 122). Madeira, Portugal: Elsevier

CHAPTER 3

Ahlman, S., & Svensson, G. (2002). Modeling Substance Flows in Urban Sewer Systems Using MATLAB/Simulink. In E. Strecker, & W. Huber (Ed.), *Global Solutions for Urban Drainage.* Portland.

Statistics Denmark. (2007). *Education and Culture, Labour Force*. Retrieved January 15, 2009, from Statistics Denmark: http://www.statistikbanken.dk/statbank5a/default.asp?w=1440

Statistics Denmark. (2006/2007, January 15). *Income Consumption and Prices*. Retrieved January 15, 2009, from Statistics Denmark: http://www.statistikbanken.dk/statbank5a/default.asp?w=1440

## /FIGURE REFERENCES

All Figures not mentioned were created by the author.


Figure 3. Wired Magazine Online. (2008, November 21). *Facebook App keeps Danish cyclists green and In Touch,* Retrieved December 2, 2008. from Autopia, Road to the Future: http://www.wired.com/autopia/2008/11/facebook-app-ke/

Figure 6. Senseable City Lab. (2008). *Real Time Rome,* Retrieved January 19, 2009. from Senseable City Lab: http://senseable.mit.edu/realtimerome/

Figure 14. *Reciprocity and Kinship Residential Sectors* in Sahlins, M. (1972). *Stone Age Economics.* Chicago: Aldine Atherton, Inc.

Figure 23. The Journal for the Society of Industrial Archaeology. (2003). *The Lachine Canal.* Retrieved May 5, 2009.from A Precipitous Decline, Steam as Motive Power in Montreal: A Case Study of the Lachine Canal Industries: http://www.historycooperative.org/journals/sia/29.1/gelly.html

Figure 25. Sasktel. (2009). *Men on Telephone Pole, 1910.* Retrieved May 5, 2009. From Centennial Photos: http://www.sasktel.com/about-us/news/centennial-photos/index.html

Figure 27. Informe. (2008). *Loyalty Card.* Retrieved May 10, 2009. From Customer Loyalty Cards: http://accountant.informe.com/blog/2008/09/02/customer-loyalty-cards/

Figure 29. Starr, A. (2009). Everybody in the Pool. *Good , Spring* (15), 72-77.

Figure 30. Starr, A. (2009). Everybody in the Pool. *Good , Spring* (15), 72-77.

Figure 31. Starr, A. (2009). Everybody in the Pool. *Good , Spring* (15), 72-77.

Figure 32. GoogleMaps. (2009). Retrieved May 14, 2009. From Google Maps: http://maps.google.com/

Figure 33. GoogleMaps. (2009). Retrieved May 14, 2009. From Google Maps: http://maps.google.com/

Figure 34. GoogleMaps. (2009). Retrieved May 14, 2009. From Google Maps: http://maps.google.com/

Figure 35. Hoverport.org. (2006-2007). Retrieved May 14, 2009. From Welcome to Hoverport.org: http://www.hoverport.org/index.php

Figure 37. Senseable City Lab. (2008). *New York Talk Exchange,* Retrieved January 19, 2009. from Senseable City Lab: http://senseable.mit.edu/nyte/

Figure 39. http://radio.weblogs.com/0114726/images/RyzeBlogTribe-Friends.gif

Figure 41. Casual Car Pool. (2009). *Message Board,* Retrieved May 19, 2009. From Casual Car Pool Information exchange: http://www.ridenow.org/carpool/

Figure 43. Couch Surfing. (2009, May 10). *Statistics*. Retrieved May 10, 2009, from Couch Surfing: http://www.couchsurfing.org/statistics.html.

Figure 44. Couch Surfing. (2009, May 10). *Statistics*. Retrieved May 10, 2009, from Couch Surfing: http://www.couchsurfing.org/statistics.html.

Figure 45. Couch Surfing. (2009, May 10). *Statistics*. Retrieved May 10, 2009, from Couch Surfing: http://www.couchsurfing.org/statistics.html.

Figure 48. eBay Neighborhoods. (2009). Retrieved May 15, 2009, *Muscle Cars* and *MinnesotaVikings,* from Ebay Neighborhoods: http://neighborhoods.ebay.com/

Figure 49. eBay Neighborhoods. (2009). Retrieved May 15, 2009, *Muscle Cars* and *Resident Evil,* from Ebay Neighborhoods: http://neighborhoods.ebay.com/